

Appendices

Of the Environmental Impact Statement for the construction and operation of a 2,112 cow dairy freestall barn on 'Yarrimbah' 2901 Cobb Hwy, Mathoura

November 2020



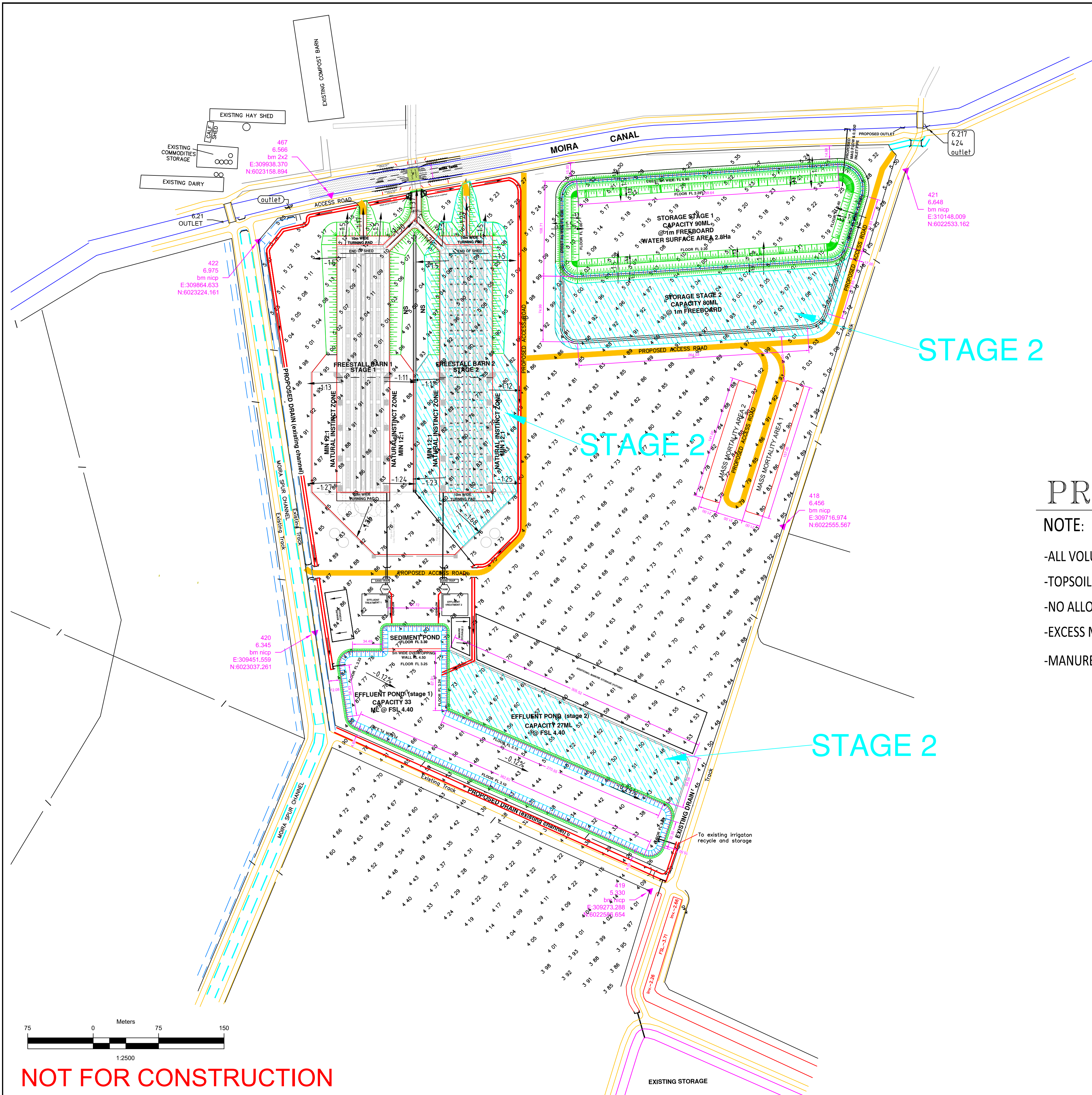
Progressive Rural Solutions

www.prs ltd.com.au

Appendix 1

Project and site plans

Plan Number	Date	Author	Name	Comment
J128-Landscape-V1R3	17/11/2020	Progressive Rural Solutions Pty Ltd	Landscape Plan	Plan showing project dimensions and offset distances as required for Development Applications
J000410	17/11/2020	Rich River Irrigation Developments	Project Overview Plan	Overview of project area and works including earthwork volumes by stage
J000410	17/11/2020	Rich River Irrigation Developments	Existing Site Conditions	Plan showing existing elevations
NA	20/08/2020	Entegra Signature Structures	Layout Plan	Overview of shed plans (Sheets 1 to 3)
20150 Sheets 1to10	29-10-2020	Entegra Signature Structures	Structural Drawings of barns	Structural drawings of proposed barns (Sheets 1 to 10)



LOCATION MAP.

YARRIMBAH PROPOSED FREESTALL BARN

NOTE:

- ALL VOLUMES CALCULATED @ 1:1.15 COMPACTION RATIO
- TOPSOIL TO BE STRIPPED PRIOR TO CONSTRUCTION AT 0.10m DEPTH
- NO ALLOWANCE HAS BEEN MADE FOR SURROUNDING ACCESS ROADS MANURE STORAGE AREAS
- EXCESS MATERIAL FROM STAGE 1 TO BE PLACED ON SURROUNDING ROADS
- MANURE AND EFFLUENT STORAGE AREAS ARE TO HAVE A MAX. PERMEABILITY EQUAL TO OR LESS THAN $1 \times 10^{-9} \text{m/sec}$

Yarrimbah Freestall Barn Earthworks Summary				
Description	Area (m2)	Cut (m3)	Fill (m3)	Short/Excess (m3)
Feedpad 1/Ramp x2	44000		73600	-73600
Feedpad 2/Ramp x1	38821		72240	-72240
TOTALS	82821	0	145840	-145840
Storage - STAGE 1	42850	69800	18460	51340
Storage - STAGE 2	26760	50000	2940	47060
TOTALS	69610	119800	21400	98400
Sediment Pond	2526	1300	251	1049
Effluent Pond - stage 1	32048	33900	2020	31880
Effluent Pond - stage 2	17870	26000	1000	25000
TOTALS	52444	61200	3271	57929
STAGE 1 Short/Excess (m3)	-73600			
FEEDPAD	51340			
STORAGE	32929			
EFFLUENT/SEDIMENT	10669			
TOTAL	-72240			
STAGE 2 Short/Excess (m3)	-72240			
FEEDPAD	47060			
STORAGE	25000			
EFFLUENT/SEDIMENT	-180			
TOTAL				
TOTALS				
Feedpad 1	-73600			
Feedpad 2	-72240			
Storage	98400			
Effluent Sediment PondS	57929			
EXCESS	10489			

NOT FOR CONSTRUCTION

REF. DATE DESCRIPTION.

22/09/20 PLAN AMENDED TO SHOWED STAGED PRODUCTION

NO RESPONSIBILITY TAKEN FOR TITLE DEFINITION.

Finished Level Pegs To Be Placed at Clients Instruction Prior to Landforming. Any Internal Channels, Fences etc. Not Required Are To Be Removed Before Landforming. Where Subsoil is Exposed during Landforming, Resoling is Suggested. Breaching is to be Placed Downstream of All Structures. Proposed Channels Are To Be Constructed Out Of Suitable Soils. Where Channels and Drains Stop, Erosion Control is Suggested.

SOIL TESTS MUST BE UNDERTAKEN TO DETERMINE THE SUITABILITY OF ANY PROPOSED RECYCLE DRAIN, SUMP OR STORAGE AREA.

This Plan May Be Subject To Change.

LEGEND

Fence on Boundary

Fence - Internal

Gate

Laneway/Access Tracks

Tree

Timber Belt

Swamp

Gilgai or Crab Hole

Powerline

Channel To Be Removed

Drain To Be Removed

Main Supply Channel

Proposed Farm Supply

Existing Farm Supply

Main Drainage

Farm Drainage

Terrace Line

Fence on Terrace Line

Channel Pad Height

Channel Base Width

Drainage Bed

Drainage Width

Design Bay Elevation

Change of Grade

Flow Direction & Slope

Cut & Fill (in cm.)

Permanent Mark

Bench Mark

Finished Level Peg

House or Shed

Inv. - 8.83

W. - 3.60

F.L. - 9.171

F.L. - 9.102

F.L. - 9.102

GRADE

+12

or

-12

S

H

Grid Peg

Road Crossing Bridge

Farm Crossing Culvert

Drop Structure

Check or Regulator

Farm Crossing & Drop

Farm Crossing & Check

Detheridge Outlet

Dumpy Peg Level

Design Full Supply Level

AREA SURVEYED - Approx 47 Hectares, 110 Acres.

DATUM - SS 4827, RL - 107.927

NOTE - ADD RL - 100.00 TO ALL LEVELS FOR AHD71 DATUM.

Rich River Irrigation Developments.

BAUER

One Step Ahead

FOR A GREENER WORLD

Centerstar - Centre pivot

Linestar - Linear move

Centerliner - Pivoting Linear, Ditch or Hose feed

RICH RIVER IRRIGATION DEVELOPMENTS

PTY LTD A.C.N.106 901 777

DATE. -17/11/20

SCALE. -1: 2500

Rich River Irrigation Developments. P/L.

26 McCulloch Drive, Moama, N.S.W. 2731.

Ph. 03 5482 2564, Fax. 03 5482 1918, Mob. 0427 691 042, Email. web. www.rird.com.au

Client. -Raymond Smith

"Yarrimbah"

Proposed Freestall Barn

SURVEY

JARROD

BASE PLAN

CHRIS

SHEET

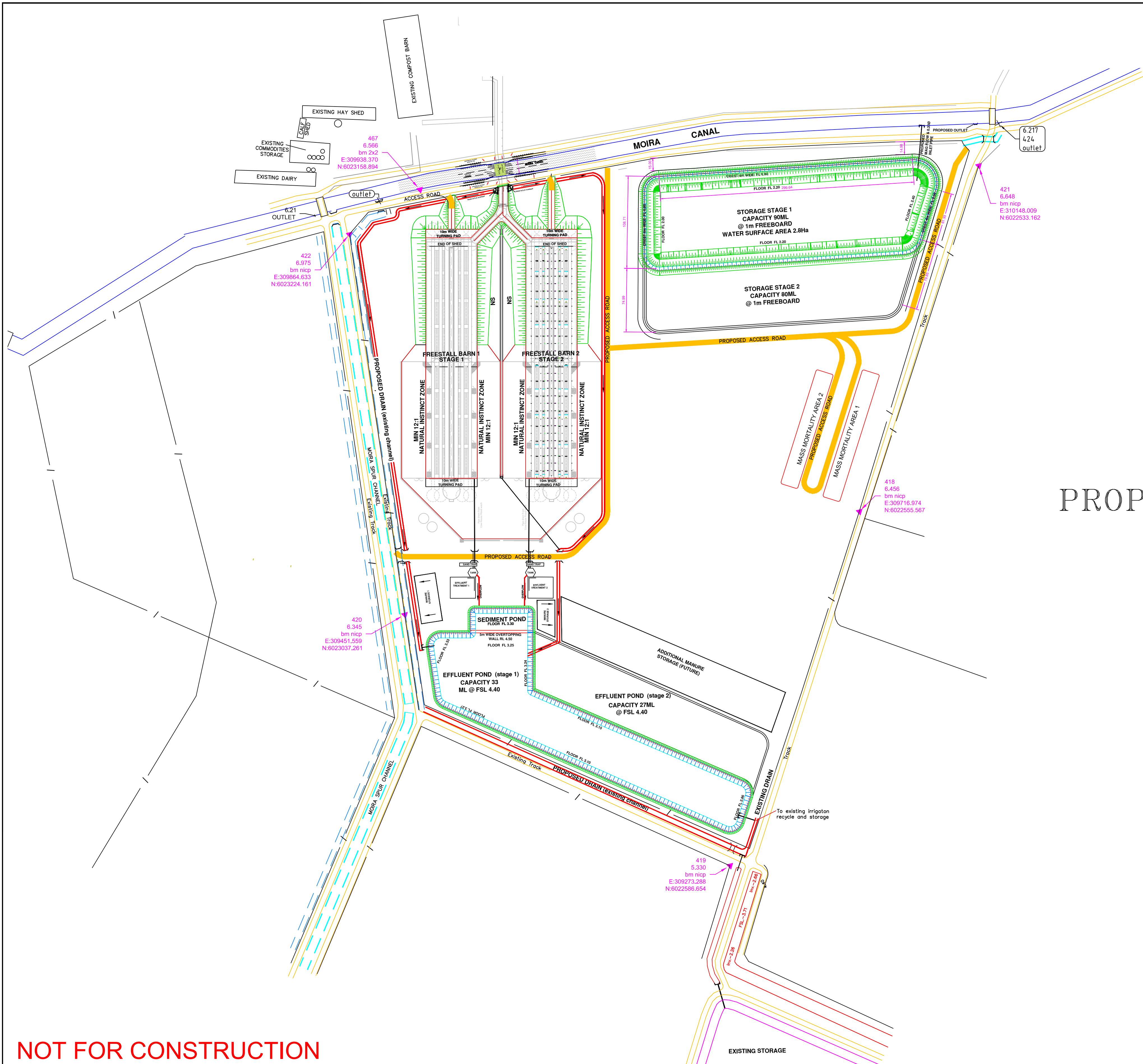
JARROD

SIZE

A1

DRAWING NO.

J000410



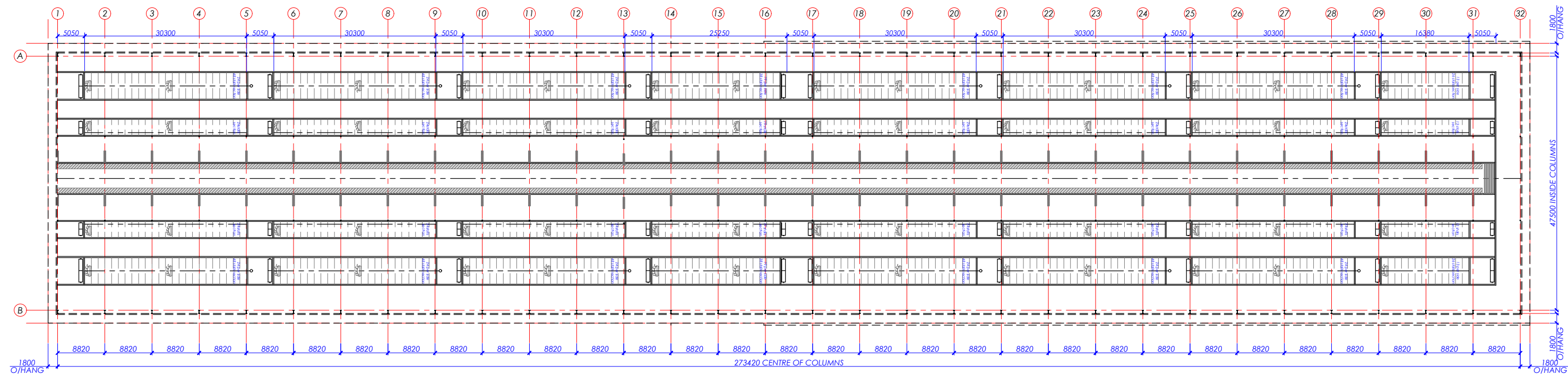
LOCATION MAP.

YARRIMBAH PROPOSED FREESTALL BARN

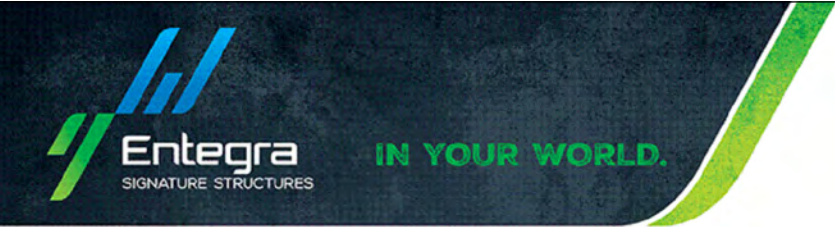
NOT FOR CONSTRUCTION

REF.	DATE	DESCRIPTION.
	22/09/20	PLAN AMENDED TO SHOWED STAGED PRODUCTION
NOTES GENERAL: NO RESPONSIBILITY TAKEN FOR TITLE DEFINITION. Finished Level Pegs To Be Placed at Client's Instruction Prior to Landforming. Any Internal Channels, Fences etc. Not Required Are To Be Removed Before Landforming. Where Subsoil is Exposed during Landforming, Resoling is Suggested. Breaching is to be Placed Downstream of All Structures. Proposed Channels Are To Be Constructed Out Of Suitable Soils. Where Channels and Drains Stop, Erosion Control is Suggested. SOIL TESTS MUST BE UNDERTAKEN TO DETERMINE THE SUITABILITY OF ANY PROPOSED RECYCLE DRAIN, SUMP OR STORAGE AREA. This Plan May Be Subject To Change.		
LEGEND Fence on Boundary Fence - Internal Gate Laneway/Access Tracks Tree Timber Belt Swamp Gilgai or Crab Hole Powerline Channel To Be Removed		
Drain To Be Removed Main Supply Channel Proposed Farm Supply Existing Farm Supply Main Drainage Farm Drainage Terrace Line Fence on Terrace Line Channel Pad Height Channel Base Width		
Drainage Bed Drainage Width Design Bay Elevation Change of Grade Flow Direction & Slope Cut & Fill (in cm.) Permanent Mark Bench Mark Finished Level Peg House or Shed		
Inv. - 8.83 W. - 3.60 F.L. - 9.171 F.L. - 9.102 F.L. - 9.102 GRADE +12 or -12 S H		
Grid Peg Road Crossing Bridge Farm Crossing Culvert Drop Structure Check or Regulator Farm Crossing & Drop Farm Crossing & Check Detheridge Outlet Dumpy Peg Level Design Full Supply Level		
AREA SURVEYED - Approx 47 Hectares, 116 Acres. DATUM - SS 4827, RL - 107.927 NOTE - ADD RL - 100.00 TO ALL LEVELS FOR AHD71 DATUM. Dy. - 9.32 S 8.80		
Rich River Irrigation Developments. BAUER One Step Ahead Centerstar - Centre pivot Linestar - Linear move Centerliner - Pivoting Linear, Ditch or Hose feed		
RICH RIVER IRRIGATION DEVELOPMENTS PTY LTD A.C.N.106 901 777		
DATE. -17/11/20 SCALE. -1: 2500 Rich River Irrigation Developments. P/L. 26 McCulloch Drive, Moama, N.S.W. 2731. Ph. 03 5482 2564, Fax. 03 5482 1918, Mob. 0427 691 042, Email. admin@rird.com.au Client. - Raymond Smith "Yarrimbah" Proposed Freestall Barn		A.B.N. 48 106 901 777 web. www.rird.com.au SHEET SIZE A1 DRAWING NO. J000410

PROPOSED DAIRY FREESTALL BARN FOR RAY SMITH - 2901 COBB HIGHWAY, MATHOURA, NSW 2710



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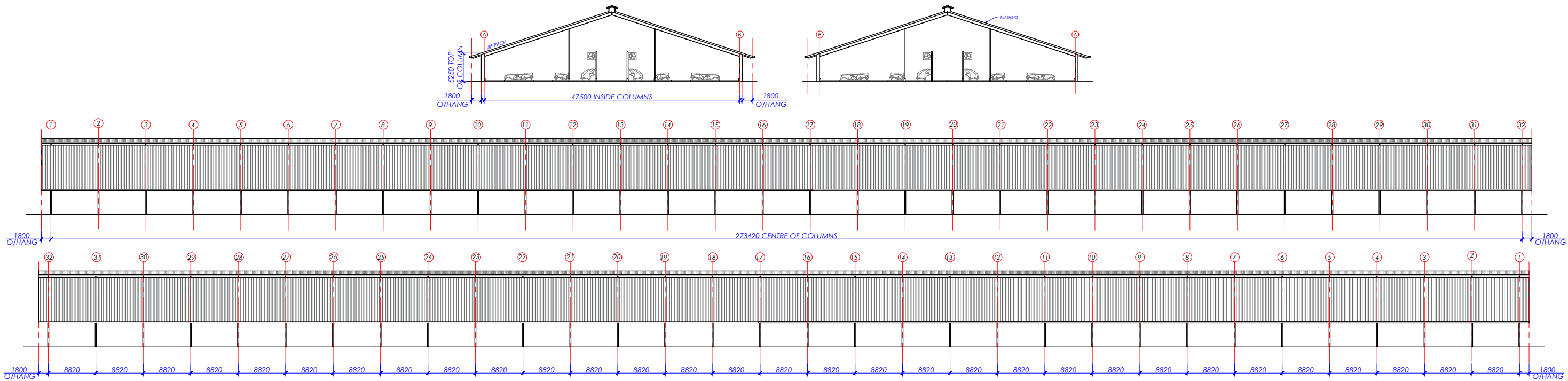


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C			ISSUED.		PAGE: 1 OF 3	SCALE: 1:750	DATE: 20/08/2020
D							

PROPOSED DAIRY FREESTALL BARN FOR RAY SMITH - 2901 COBB HIGHWAY, MATHOURA, NSW 2710

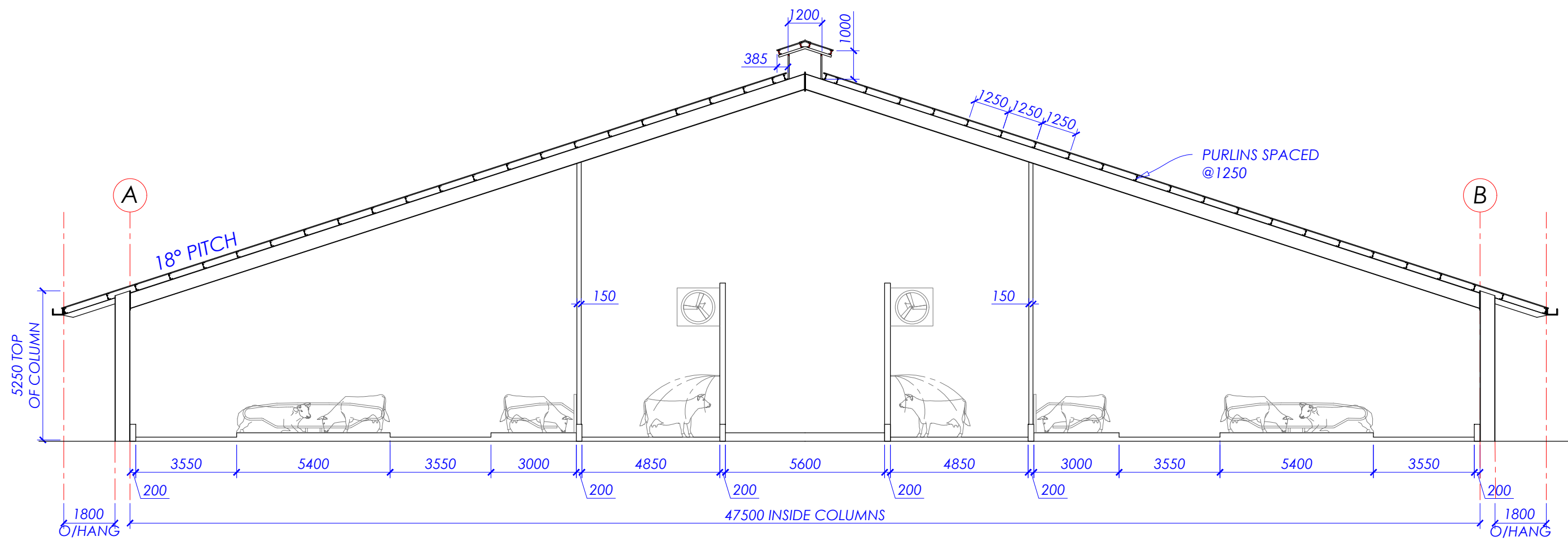


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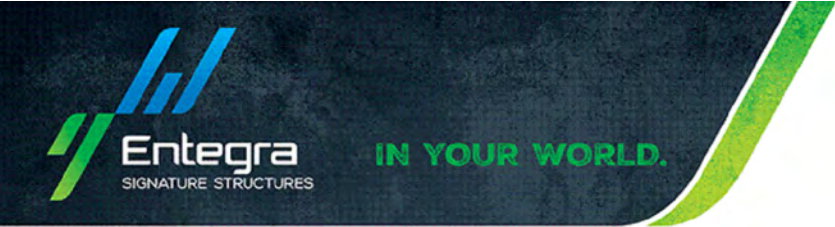


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PROPOSED DAIRY FREESTALL BARN FOR RAY SMITH - 2901 COBB HIGHWAY, MATHOURA, NSW 2710



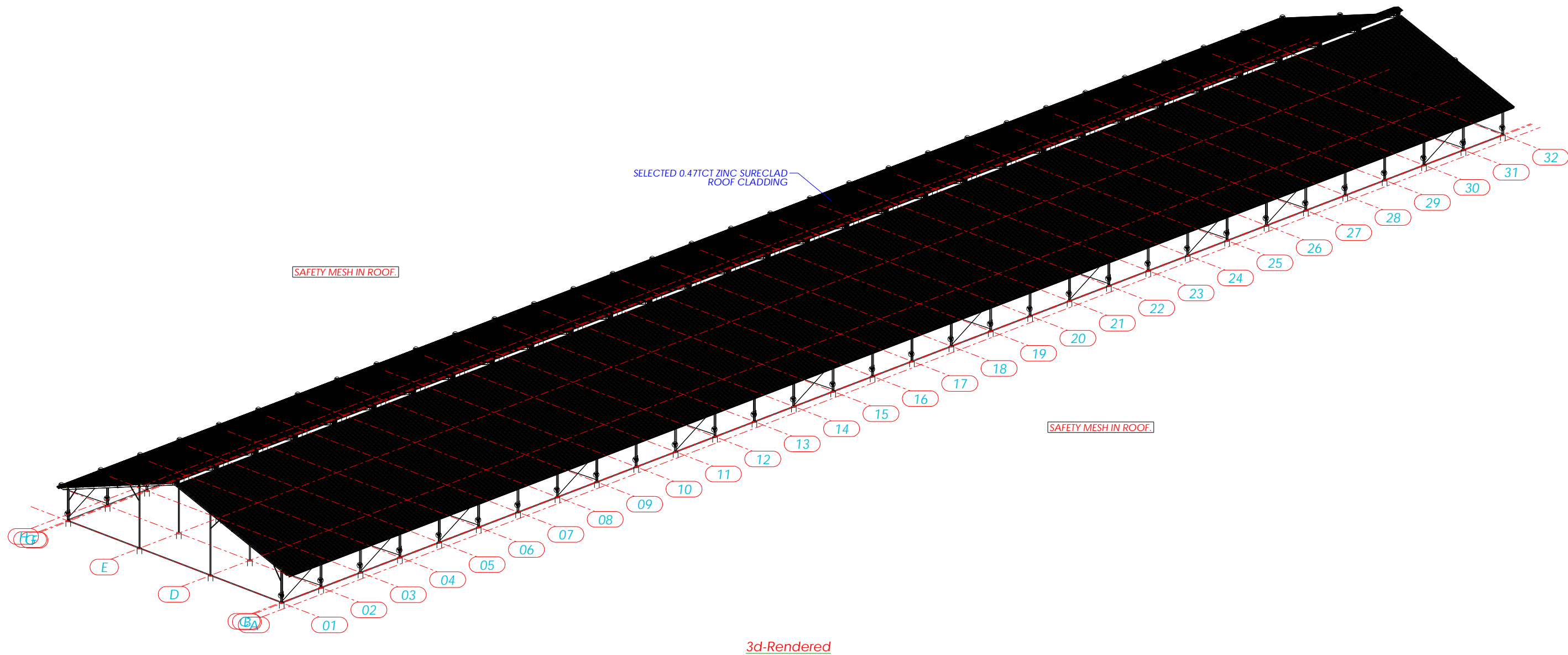
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Chris Artym MIEAust 1151775

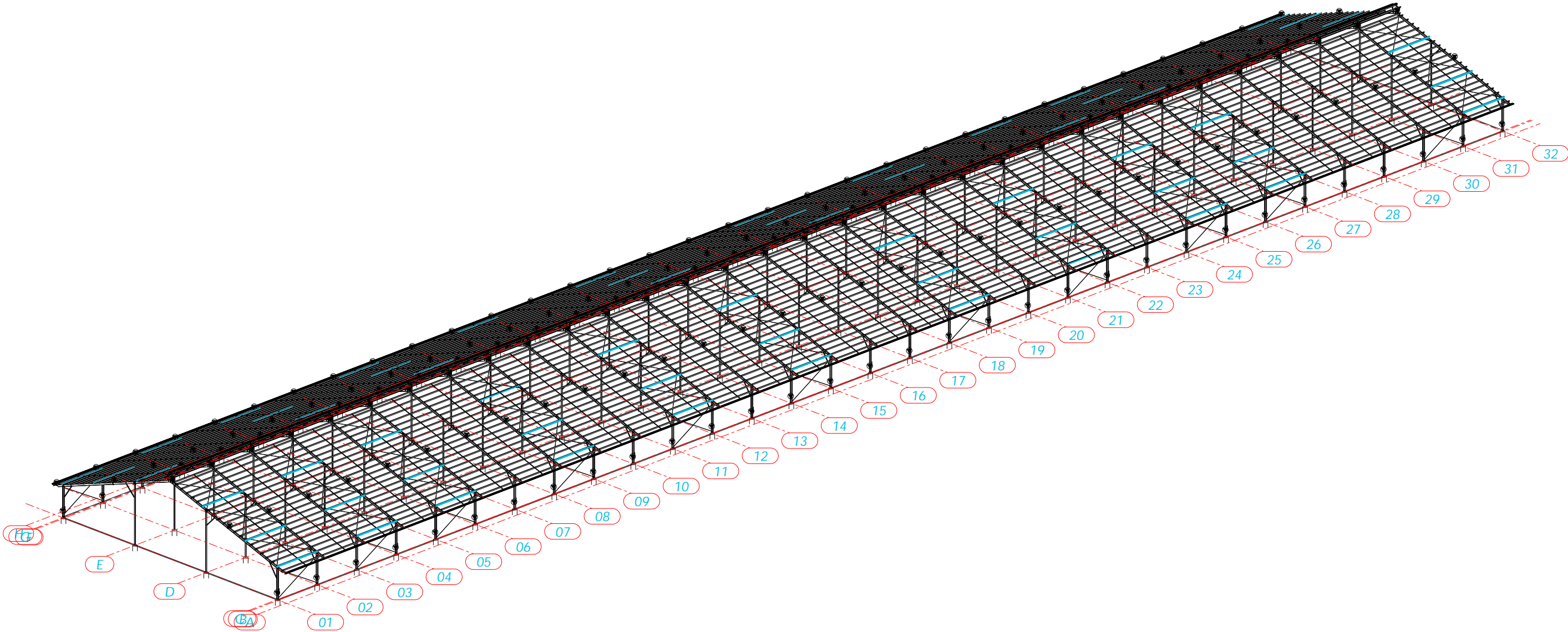
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D	Engineer's Review	29/10/20	APPROVED.	PAGE: G01 OF [10]	SCALE: 1:450	DATE: 17.11.2020	
E	Building Permit Issue	29/10/20	ISSUED.				
F	Site Address Number Revised	17/11/20					



3d-Rendered

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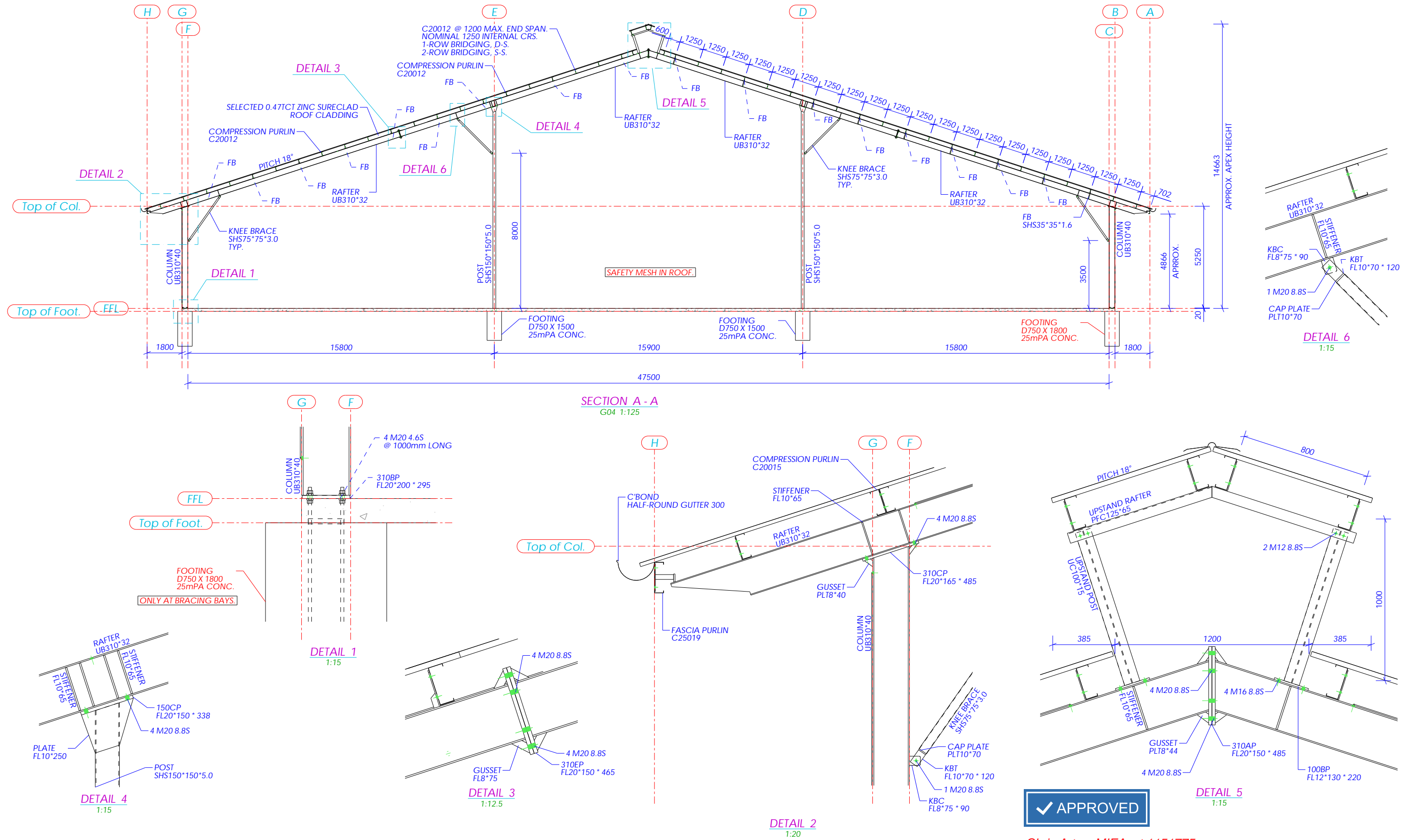


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E	Building Permit Issue	29/10/20					
F	Site Address Number Revised	17/11/20	ISSUED.				

PROPOSED 273.42 x 51.71 x 5.25m Shed for Ray Smith. 2901 Cobb Highway, Mathoura, NSW. 2710



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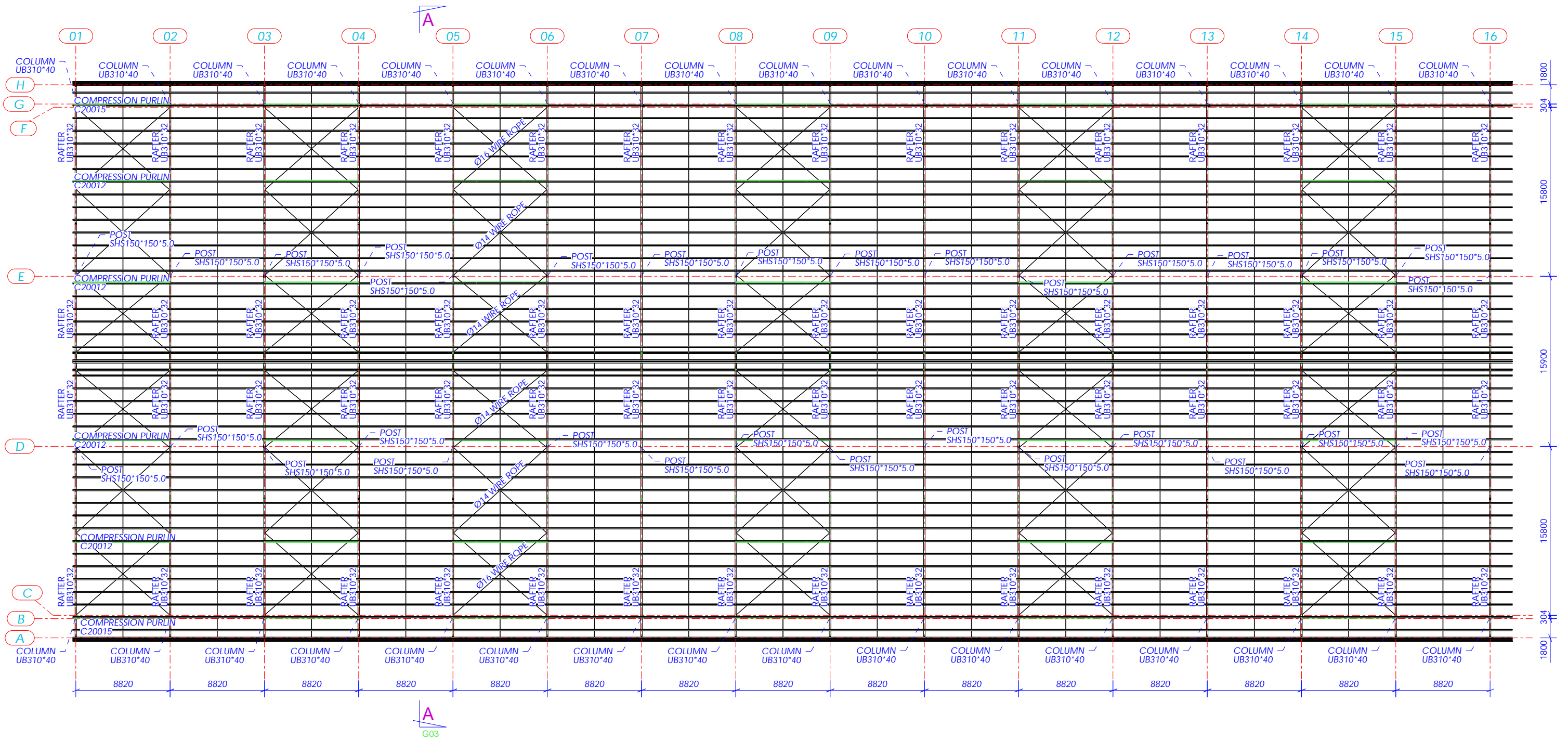
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D	Engineer's Review	29/10/20	ISSUED:		REV:	F
E	Building Permit Issue	29/10/20			SIZE:	A2
F	Site Address Number Revised	17/11/20			PAGE:	G03 OF [10]
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					DATE:	17.11.2020



Roof Layout (Grid 01-16)
1:250

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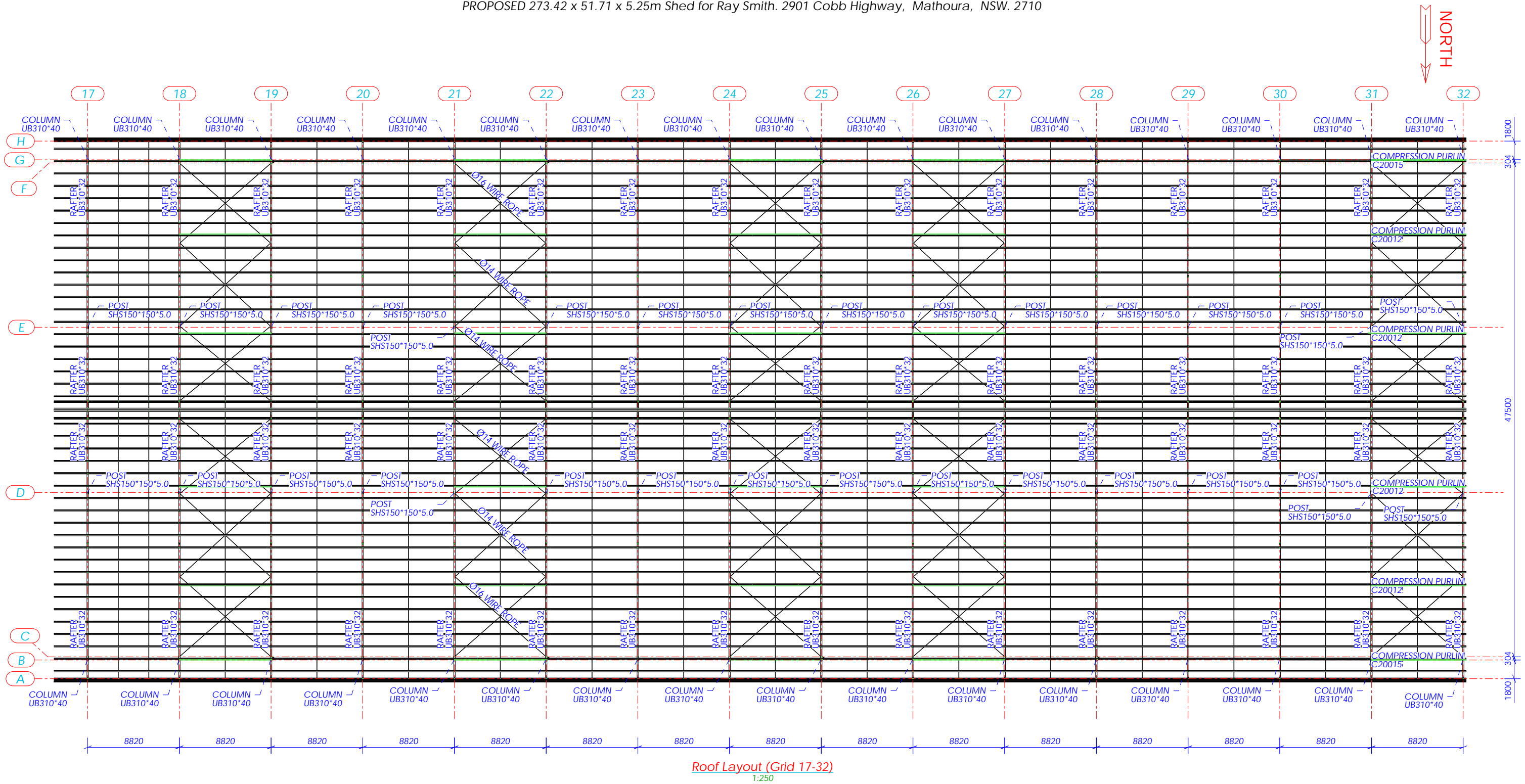
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C	Client Review	05/10/20					
D	Engineer's Review	29/10/20	APPROVED.	20150	G04	F	A2
E	Building Permit Issue	29/10/20					
F	Site Address Number Revised	17/11/20	ISSUED.	PAGE: G04 OF [10]	SCALE: 1:250	DATE: 17.11.2020	



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NOTES:

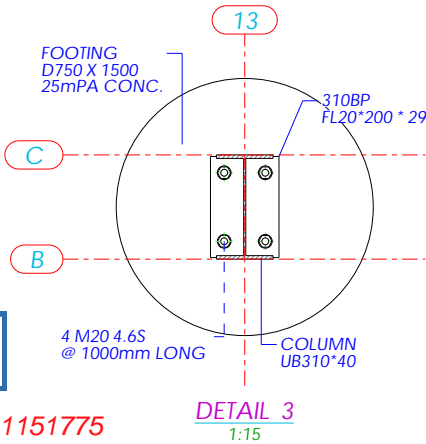
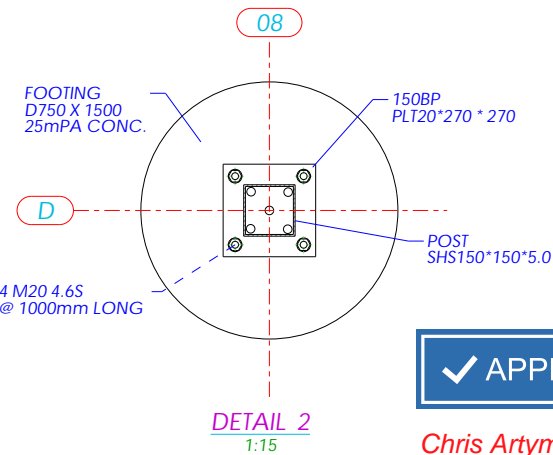
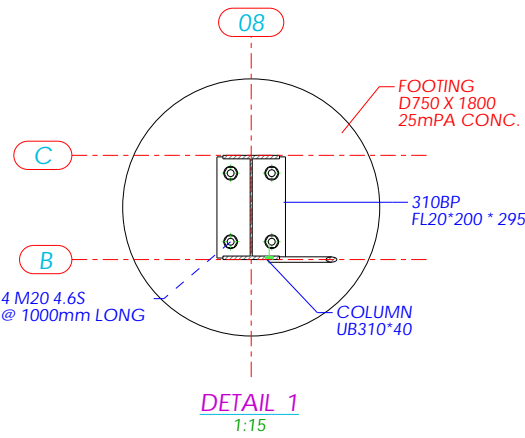
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C	Client Review	05/10/20				
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E	Building Permit Issue	29/10/20	APPROVED:			SIZE: A2
F	Site Address Number Revised	17/11/20	ISSUED:	PAGE: G05 OF [10]	SCALE: 1:250	DATE: 17.11.2020

PROPOSED 273.42 x 51.71 x 5.25m Shed for Ray Smith. 2901 Cobb Highway, Mathoura, NSW. 2710



Plan Top of Foot.
1:250



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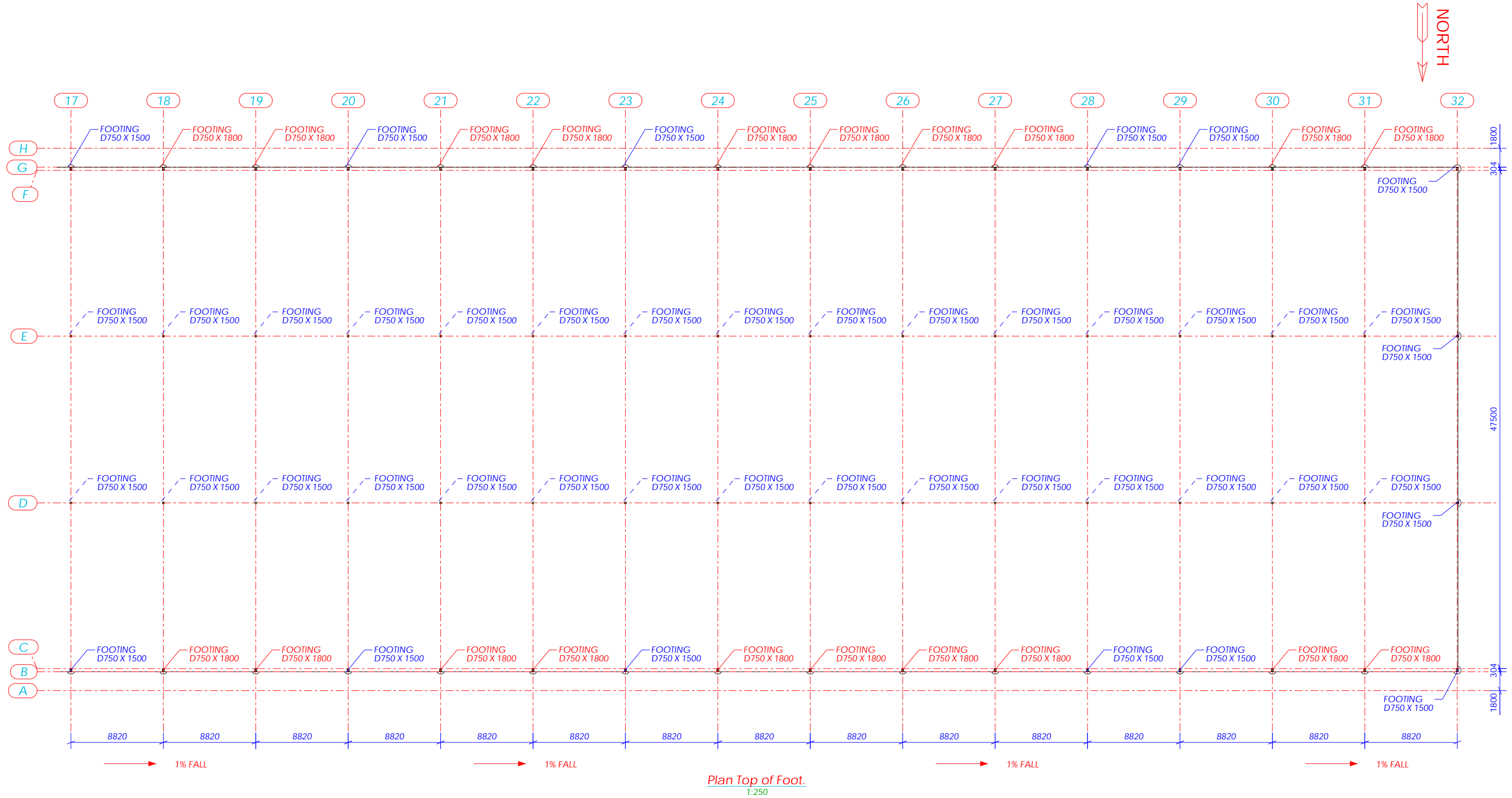
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D	Engineer's Review	29/10/20	APPROVED.	PAGE: G06 OF [10]	SCALE: AS NOTED	DATE: 17.11.2020	
E	Building Permit Issue	29/10/20	ISSUED.				
F	Site Address Number Revised	17/11/20					



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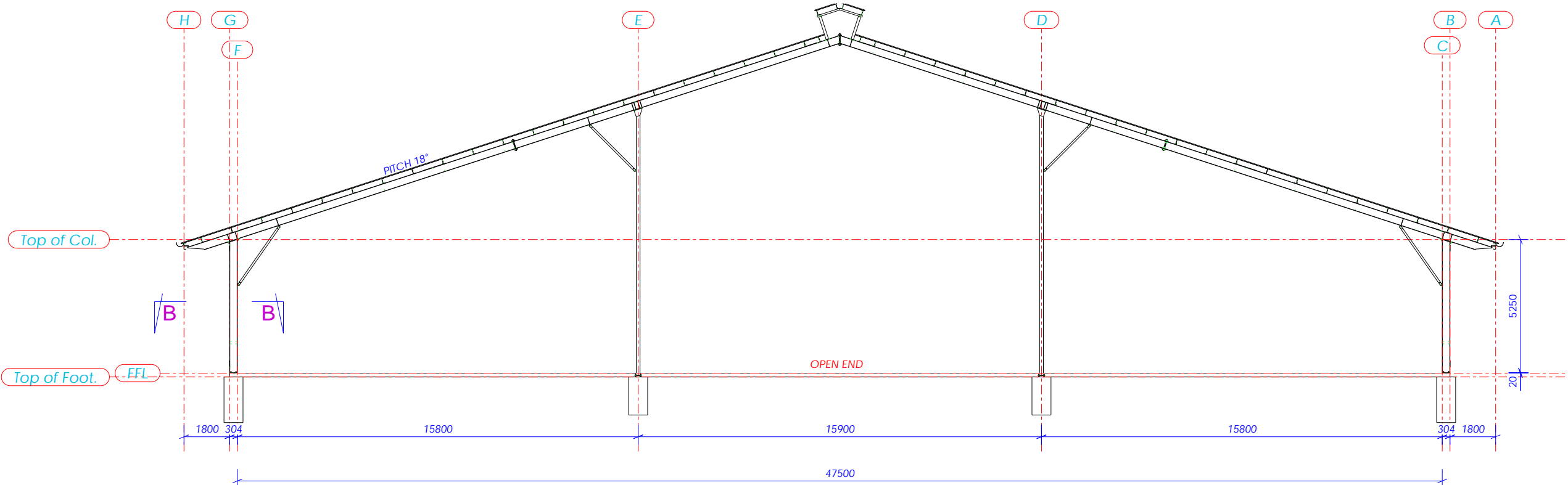
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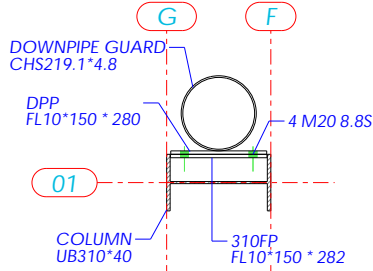
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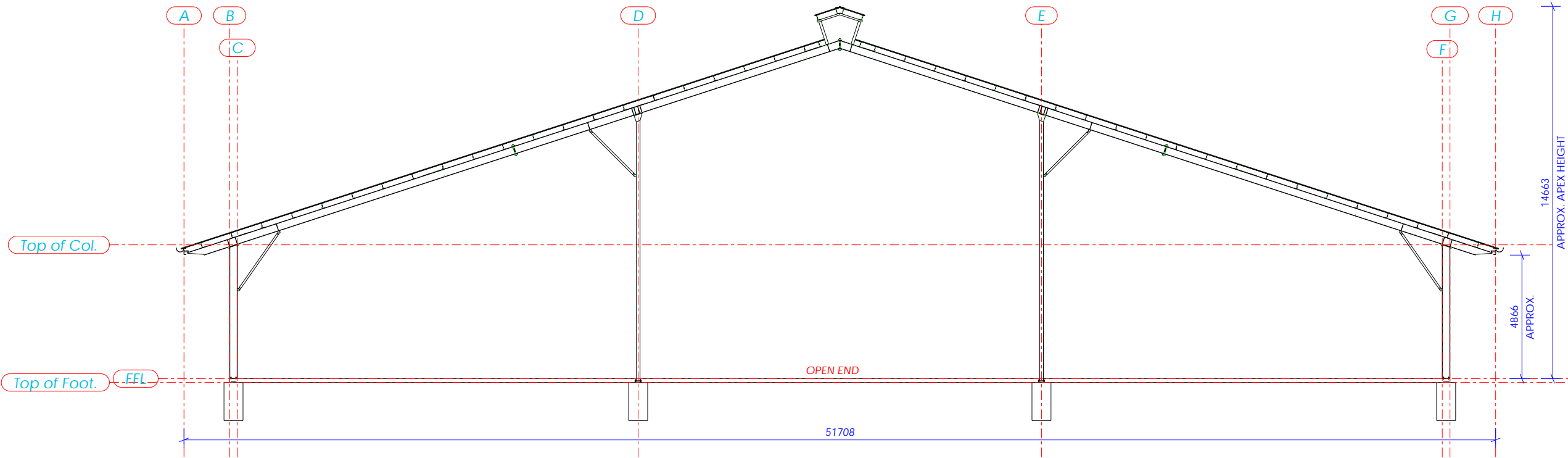
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C	Client Review	05/10/20				
D	Engineer's Review	29/10/20	CHECKED.			
E	Building Permit Issue	29/10/20	APPROVED.			
F	Site Address Number Revised	17/11/20	ISSUED.			
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			PAGE: G07 OF [10]	SCALE: AS NOTED	DATE: 17.11.2020	



Grid 01 View
1:125



SECTION B - B
1:15



Grid 32 View
1:125

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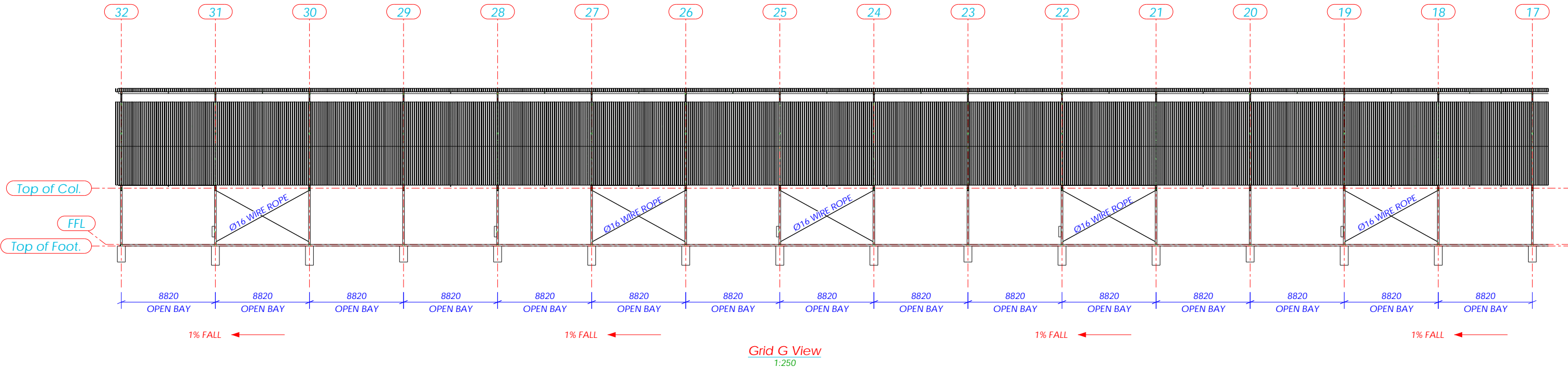
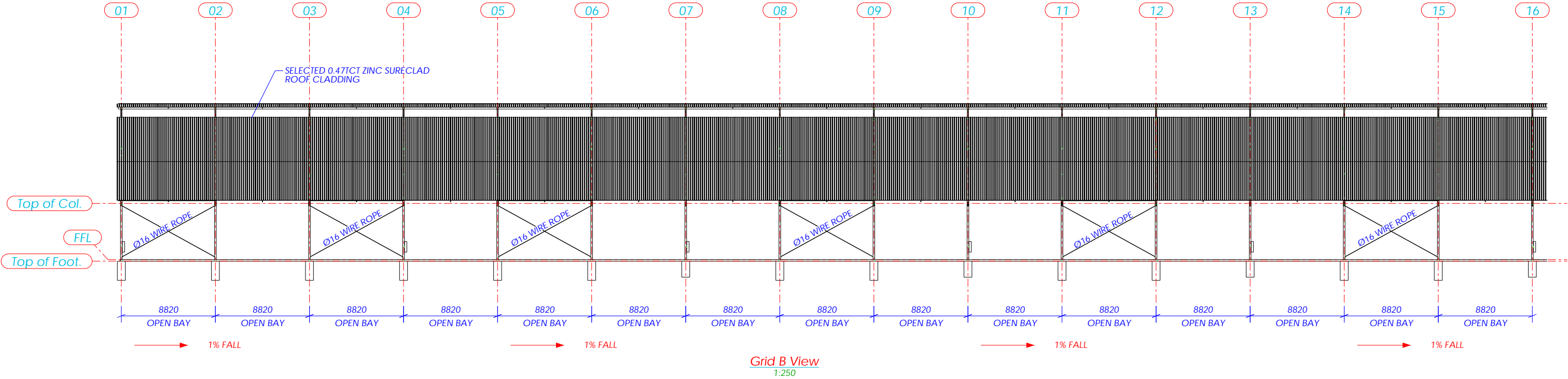
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C	Client Review	05/10/20			20150	G08	F	A2
D	Engineer's Review	29/10/20	APPROVED.		PAGE: G08 OF [10]	SCALE: 1:15	DATE: 17.11.2020	
E	Building Permit Issue	29/10/20						
F	Site Address Number Revised	17/11/20	ISSUED.					



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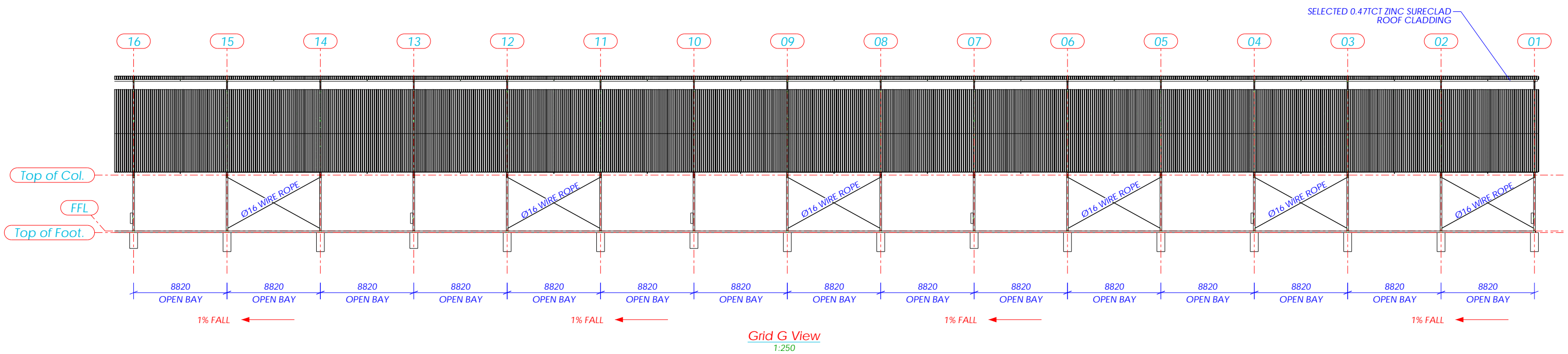
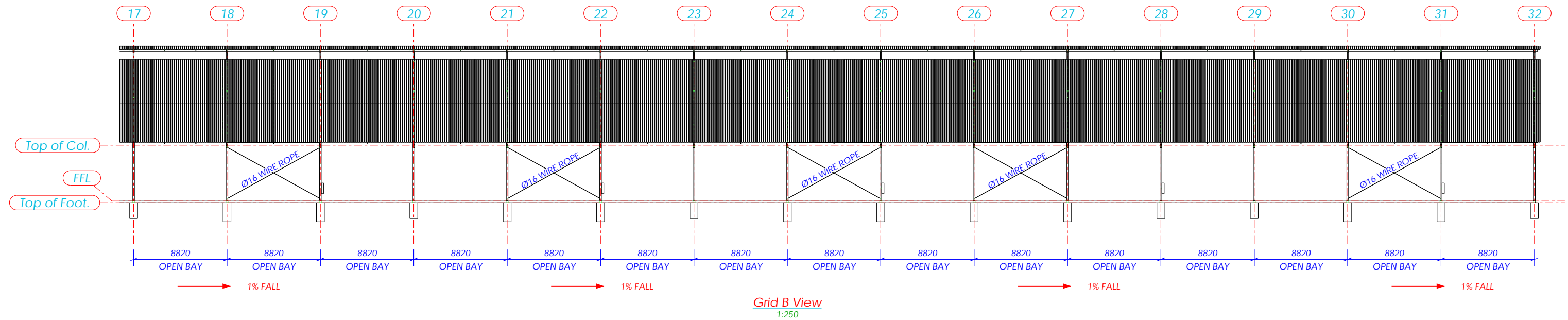
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C	Client Review	05/10/20	CHECKED.				
D	Engineer's Review	29/10/20	APPROVED.				
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D	Engineer's Review	29/10/20	APPROVED.	PAGE: G10 OF [10]	SCALE: 1:250	DATE: 17.11.2020	
E	Building Permit Issue	29/10/20					
F	Site Address Number Revised	17/11/20	ISSUED.				

Appendix 2

Secretaries Environmental Assessment Requirements



29 July 2020

Ms Clare Fitzpatrick
Principal
Progressive Rural Solutions Pty Ltd
PO Box 74
DENILIQUIN NSW 2710

SEAR 1476

Dear Ms Fitzpatrick,

**Intensive Livestock Agriculture – Dairy Farm
'Yarimbah' 2901 Bobb Highway, Mathoura (Lot 2 DP 1077844, Lot 117 DP455183, Lot 13 and 14
DP751153)**

Planning Secretary's Environmental Assessment Requirements (SEAR) 1476

Thank you for your request for the Planning Secretary's Environmental Assessment Requirements (SEARs) for the preparation of an Environmental Impact Statement (EIS) for the above development proposal. I have attached a copy of these requirements.

In support of your application, you indicated that your proposal is both designated and integrated development under Part 4 of the *Environmental Planning and Assessment Act 1979* and requires an approval under the *Protection of the Environment Operations Act 1997* and *Water Management Act 2000*. In preparing the SEARs, the Department of Planning, Industry and Environment (the Department) has consulted with the Environment Protection Authority and Natural Resources Access Regulator. A copy of their requirements is attached.

The Department has also consulted with the Transport for NSW (TfNSW) as required by Schedule 3 of State Environmental Planning Policy (Infrastructure) 2007. Unfortunately, TfNSW was unable to respond in time. You must undertake direct consultation with them and address their requirements in the EIS.

The Department has also consulted with Water NSW, Department of Primary Industries – Agriculture and Biodiversity and Conservation Division of the Department. A copy of their additional requirements for the EIS are attached.

If other integrated approvals are identified before the Development Application (DA) is lodged, you must undertake direct consultation with the relevant agencies, and address their requirements in the EIS.

If your proposal contains any actions that could have a significant impact on matters of National Environmental Significance, then it will require an additional approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This approval is in addition to any approvals required under NSW legislation. If you have any questions about the application of the EPBC Act to your proposal, you should contact the Commonwealth Department of Agriculture, Water and the Environment on (02) 6274 1111.

Should you have any further enquiries, please contact Mary Ellen Trimble, Planning and Assessment, at the Department on (02) 9274 6213 or via maryellen.trimble@planning.nsw.gov.au.

Yours sincerely

Chris Ritchie
Director
Industry Assessments
as delegate of the Planning Secretary

Planning Secretary's Environmental Assessment Requirements

Section 4.12(8) of the *Environmental Planning and Assessment Act 1979*.
Schedule 3 of the *Environmental Planning and Assessment Regulation 2000*.

Designated Development

SEAR Number	1476
Proposal	Construction and operation of dairy farm that will accommodate up to 2112 head of cattle.
Location	'Yarimbah' 2901 Bobb Highway, Mathoura (Lot 2 DP 1077844, Lot 117 DP455183, Lot 13 and 14 DP751153) in the Murray River local government area.
Applicant	Progressive Rural Solutions Pty Ltd
Date of Issue	29 July 2020
General Requirements	The Environmental Impact Statement (EIS) must meet the minimum form and content requirements in clauses 6 and 7 of Schedule 2 of the Environmental Planning and Assessment Regulation 2000.
Key Issues	<p>The EIS must include an assessment of all potential impacts of the proposed development on the existing environment (including cumulative impacts if necessary) and develop appropriate measures to avoid, minimise, mitigate and/or manage these potential impacts. As part of the EIS assessment, the following matters must also be addressed:</p> <ul style="list-style-type: none"> • strategic and statutory context – including: <ul style="list-style-type: none"> – a detailed justification for the proposal and suitability of the site for the development – a Land Use Conflict Risk Assessment prepared in accordance with relevant Department of Primary Industries guidelines – a demonstration that the proposal is consistent with all relevant planning strategies, environmental planning instruments, development control plans (DCPs), or justification for any inconsistencies – a list of any approvals that must be obtained under any other Act or law before the development may lawfully be carried out. • animal welfare, bio-security and disease management – including: <ul style="list-style-type: none"> – details of how the proposed development would comply with relevant codes of practice and guidelines – a heat load assessment in accordance with Department of Primary Industries guidelines – details of all pest, weed and disease control measures – a detailed description of the contingency measures that would be implemented for the mass disposal of livestock in the event of disease outbreak. • air quality and odour – including: <ul style="list-style-type: none"> – a quantitative assessment of the potential air quality, dust and odour impacts of the development in accordance with relevant Environment Protection Authority guidelines – a description and appraisal of air quality and odour impact mitigation and monitoring measures, in line with International Best Practice. • soil and water – including: <ul style="list-style-type: none"> – a description of local soils, topography, drainage and landscapes – details of water usage for the proposal including existing and proposed

	<p>water licencing requirements in accordance with the <i>Water Act 1912</i> and/or the <i>Water Management Act 2000</i></p> <ul style="list-style-type: none"> - an assessment of potential impacts on floodplain and stormwater management and any impact to flooding in the catchment - details of sediment and erosion controls - a detailed site water balance - an assessment of potential impacts on the quality and quantity of surface and groundwater resources - details of the proposed surface water and wastewater management systems, water monitoring program and other measures to mitigate surface and groundwater impacts - a description and appraisal of impact mitigation and monitoring measures. <ul style="list-style-type: none"> • waste management – including: <ul style="list-style-type: none"> - details of waste handling including, transport, identification, receipt, stockpiling and quality control including off-site reuse and disposal - detail of waste management including manure and disposal of dead cattle for the proposal - details and proposed management of any effluent irrigation to land - the measures that would be implemented to ensure that the proposed development is consistent with the aims, objectives and guidelines in the <i>NSW Waste Avoidance and Resource Recovery Strategy 2014-21</i>. • biodiversity – including: <ul style="list-style-type: none"> - accurate predictions of any vegetation clearing on site or for any road upgrades - details of weed management during construction and operation in accordance with existing State, regional or local weed management plans or strategies - a detailed description of the measures to avoid, minimise, mitigate and/or offset biodiversity impacts. • heritage – including: <ul style="list-style-type: none"> - an archaeological assessment that details the potential impact on Aboriginal heritage in accordance with relevant NSW Heritage guidelines - an assessment of non-aboriginal cultural heritage. • hazards and risk – including: <ul style="list-style-type: none"> - a preliminary risk screening completed in accordance with State Environmental Planning Policy No. 33 – Hazardous and Offensive Development and Applying SEPP 33 (DoP, 2011), with a clear indication of class, quantity and location of all dangerous goods and hazardous materials associated with the development. Should preliminary screening indicate that the project is "potentially hazardous" a Preliminary Hazard Analysis (PHA) must be prepared in accordance with Hazardous Industry Planning Advisory Paper No. 6 - Guidelines for Hazard Analysis (DoP, 2011) and Multi-Level Risk Assessment (DoP, 2011). - an assessment of the risk of bushfire, including addressing the requirements of <i>Planning for Bush Fire Protection 2019</i> (RFS). Any proposed Asset Protection Zones must not adversely affect environmental objectives (e.g. buffers) - any geotechnical limitations that may occur on the site and if necessary, appropriate design considerations to address this • noise and vibration – including: <ul style="list-style-type: none"> - a description of all potential noise and vibration sources during construction and operation, including road traffic noise - a noise and vibration assessment in accordance with the relevant Environment Protection Authority guidelines - a description and appraisal of noise and vibration mitigation and monitoring measures. • traffic and transport – including: <ul style="list-style-type: none"> - details of road transport routes and access to the site - road traffic predictions for the development during construction and
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	<p>operation</p> <ul style="list-style-type: none"> – an assessment of impacts to the safety and function of the road network and the details of any road upgrades required for the development. • food safety – including details of how the proposed development would meet the relevant Australia Standards and NSW Food Authority Standards in relation to food handling and processing. • visual – including an impact assessment at private receptors and public vantage points.
Environmental Planning Instruments and other policies	<p>The EIS must assess the proposal against the relevant environmental planning instruments, including but not limited to:</p> <ul style="list-style-type: none"> • State Environmental Planning Policy (Infrastructure) 2007 • State Environmental Planning Policy (Aboriginal Land) 2019 • State Environmental Planning Policy (Koala Habitat Protection) 2019 • State Environmental Planning Policy (Primary Production and Rural Development) 2019 • State Environmental Planning Policy No. 33 – Hazardous and Offensive Development • Murray Regional Environmental Plan No. 2 – Riverine Land • Murray Local Environmental Plan 2011 • relevant development control plans and section 7.11 plans.
Guidelines	<p>During the preparation of the EIS you should consult the Department's Register of Development Assessment Guidelines which is available on the Department's website at https://www.planning.nsw.gov.au/Assess-and-Regulate/Development-Assessment/Industries. Whilst not exhaustive, this Register contains some of the guidelines, policies, and plans that must be taken into account in the environmental assessment of the proposed development.</p>
Consultation	<p>During the preparation of the EIS, you must consult the relevant local, State and Commonwealth government authorities, service providers and community groups, and address any issues they may raise in the EIS. In particular, you should consult with the:</p> <ul style="list-style-type: none"> • Department of Planning, Industry and Environment, specifically the: <ul style="list-style-type: none"> ○ Biodiversity and Conservation Division ○ Natural Resources Access Regulator ○ Environment Protection Authority • Department of Regional NSW, specifically: <ul style="list-style-type: none"> ○ Department of Primary Industries – Agriculture • Transport for NSW • NSW Rural Fire Service • WaterNSW • Heritage NSW • Moira Private Irrigation District • Moama Local Aboriginal Land Council • Murray River Council • the surrounding landowners and occupiers that are likely to be impacted by the proposal. <p>Details of the consultation carried out and issues raised must be included in the EIS.</p>
Further consultation after 2 years	<p>If you do not lodge an application under Section 4.12(8) of the <i>Environmental Planning and Assessment Act 1979</i> within 2 years of the issue date of these SEARs, you must consult with the Planning Secretary in relation to any further requirements for lodgement.</p>



Our ref: DOC20/487209

Senders ref: SEAR 1476 (Yarrimbah Dairy, Murray River Council)

Mary Ellen Trimble
Industry Assessments
Department of Planning, Industry & Environment
PARRAMATTA NSW 2124

Via email: maryellen.trimble@planning.nsw.gov.au

6 July 2020

Dear Ms Trimble

Subject: Request for Secretary's Environmental Assessment Requirements – 'Yarrimbah' dairy farm – 2901 Cobb Highway, Mathoura (SEAR 1476)

Thank you for your email dated 19 June 2020 about the above designated development application, seeking input from the Biodiversity and Conservation Division (BCD) into the Department of Planning, Industry and Environment (the Department) Secretary's Environmental Assessment Requirements (SEARs) for the preparation of an Environmental Impact Statement (EIS).

BCD has reviewed the documentation and provides SEARs for the proposed development in **Attachment A**. Guidance material is listed in **Attachment B**.

BCD recommends that the EIS appropriately address the following:

1. Biodiversity
2. Aboriginal cultural heritage

The EIS should fully describe the proposal, the existing environment, including threatened species habitat not associated with vegetation communities such as paddock trees, and impacts of the development including the location and extent of all proposed works that may impact on ACH and biodiversity. The scale and intensity of the proposed development should dictate the level of investigation. It is important that all conclusions are supported by adequate data. The assessment must include all ancillary infrastructure associated with the project such as roads, water and power supplies, and Rural Fire Service requirements for asset protection.

Biodiversity

The background document (PRS 2020) suggests that the site has no native vegetation. However, the NSW vegetation mapping shows areas of Plant Community Type 237 *Riverine Western Grey Box grassy woodland of the semi-arid (warm) climate zone* on the project site. The EIS will need to provide sufficient evidence to support the claim that the mapping is incorrect, including photographs to show vegetation condition.

If the vegetation mapping is incorrect, the EIS should be accompanied by a Biodiversity Offset Scheme Entry Thresholds (BOSET) report as a demonstration that no clearing is required. If there is any threatened species habitat affected by the development a Test of Significance under Part 7 of the *Biodiversity Conservation Act 2016* should be included.

Aboriginal cultural heritage

Despite some prior modification/disturbance at the subject site there is potential for the occurrence of Aboriginal cultural heritage (ACH) which may be at risk of harm from the proposed activities. We also note that three known Aboriginal sites registered with AHIMS are located within close proximity

(approximately 650m) to intended ground disturbance activities with the nearest occurring approximately 340m south of the proposed works.

We recommend that the proposed activity area be subject to a detailed Aboriginal cultural heritage assessment in accordance with the *Guide to Investigation, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011) and *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010). This is a standard requirement for designated development proposals and should be prepared by a qualified archaeologist with specialist skills in identifying and reporting on ACH. It is important that the EIS confirms all statements and conclusions in relation to ACH with appropriate supporting material. Further details on assessment requirements for ACH are provided in **Attachment A**.

If you have any questions about this advice, please contact Simon Stirrat, Senior Conservation Planning Officer via rog.southwest@environment.nsw.gov.au or 03 5021 8930.

Yours sincerely



Marcus Wright
A/Senior Team Leader Planning
South West Branch
Biodiversity and Conservation Division
Department of Planning, Industry and Environment

ATTACHMENT A – Recommended Environmental Assessment Requirements for ‘Yarrimbah’ dairy farm (SEAR 1476)
ATTACHMENT B – Guidance material

Attachment A Recommended Environmental Assessment Requirements for 'Yarrimbah' dairy farm (SEAR 1476)

Sources of guidance material for terms in [blue](#) are in Attachment B.

The Proposal

The objectives of the proposal should be clearly stated and identify:

- the size, scale and type of the proposed activity / development;
- all anticipated environmental impacts including: direct and indirect; construction and operational; and extent of vegetation / habitat clearing or disturbance;
- threatened species, populations, ecological communities or habitats impacted upon;
- the staging and timing of the proposal; and
- the proposal's relationship to any other proposals and developments.

1. Environmental Impacts of the Proposal

The proponent must consider, assess, quantify and report on the likely environmental impacts of the proposal if applicable, particularly:

- Aboriginal cultural heritage
- Biodiversity

The Secretary's Environmental Assessment Requirements should address the specific requirements outlined under each heading below and assess impacts in accordance with the relevant guidelines mentioned. A full list of guidelines and reference material is presented in **Attachment B**. Appropriate justification should be provided in instances where the below matters are not addressed.

2. Aboriginal Cultural Heritage

- The Environmental Impact Statement (EIS) must identify and describe the Aboriginal cultural heritage values that exist across the whole area that will be affected by the proposal. This may include the need for surface survey and test excavation. The identification of cultural heritage values must be conducted in accordance with the [Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW](#) (DECCW 2010), and should be guided by the [Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW](#) (OEH 2011) and consultation with BCD regional branch officers. **The Due Diligence process is not appropriate to use as an assessment for this proposal.**
- Where Aboriginal cultural heritage values are identified, consultation with Aboriginal people must be undertaken and documented in accordance with the [Aboriginal cultural heritage consultation requirements for proponents 2010](#) (DECCW). The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented in the EIS.
- Impacts on Aboriginal cultural heritage values are to be assessed and documented in the EIS. The EIS must demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes. Where impacts are unavoidable, the EIS must outline measures proposed to mitigate impacts. Any objects recorded as part of the assessment must be documented and notified to the Department.
- The assessment of cultural heritage values must include a surface survey undertaken by a qualified archaeologist in areas with potential for subsurface Aboriginal deposits. The result of the surface survey is to inform the need for targeted test excavation to better assess the integrity, extent, distribution, nature and overall significance of the archaeological record. The results of surface surveys and test excavations are to be documented in the EIS.

- Where harm to an Aboriginal object or declared Aboriginal place cannot be avoided, an [Aboriginal Heritage Impact Permit \(AHIP\)](#) will be required from the Department under the *National Parks and Wildlife Act 1974*. You must apply to the Department for an AHIP prior to commencing works that will directly or indirectly harm an Aboriginal object or a declared Aboriginal place.
- The EIS must outline procedures to be followed in the event Aboriginal burials or skeletal material is uncovered during construction to formulate appropriate measures to manage the impacts to this material.
- The EIS must outline procedures to be followed if Aboriginal objects are found at any stage of the life of the development to formulate appropriate measures to manage unforeseen impacts.

3. Biodiversity

Impacts on native vegetation should be avoided where possible. The applicant should apply the [Biodiversity Offset Scheme Entry Threshold tool \(BOSET\)](#) and append the report to the EIS. The BOSET tool will determine whether project activities (vegetation clearing and impacts on threatened species) will trigger entry into the Biodiversity Offset Scheme (BOS). All clearing must be assessed at this stage, including clearing for ancillary activities such as roads and associated infrastructure.

If the vegetation clearing area is below the BOS threshold and is not in an area mapped on the Biodiversity Values Map, the applicant should provide evidence that any impacts of the project, including ancillary activities, are not likely to significantly affect threatened species, threatened ecological communities or their habitats within the meaning of Section 7.2 of the *Biodiversity Conservation Act 2016* (BC Act). At a minimum that evidence should take the form of a [Test of Significance \(ToS\)](#) according to the Minister's Guidelines. The ToS should be appended to the EIS with the BOSET report. If the project may affect threatened species habitat, a Species Impact Statement may be required.

Links to biodiversity assessment-related guidance and tools are in **Attachment B**. The [threatened species profile website](#) and [BioNet Atlas of NSW Wildlife](#) can be used to generate a list of threatened species, populations and ecological communities predicted or known to occur in the area. Vegetation map datasets can be accessed via [SEED](#). Habitat preferences can then be used to determine the likelihood of these species occurring in the study area.

Where project impacts cannot be avoided and vegetation clearing is above the BOS threshold, the EIS must be accompanied by a Biodiversity Development Assessment Report (BDAR). The following requirements apply:

- Biodiversity impacts related to the proposal are to be assessed in accordance with the [Biodiversity Assessment Method](#) and documented in a BDAR. The BDAR must include information in the form detailed in the BC Act (s6.12), *Biodiversity Conservation Regulation 2017* (s6.8) and Biodiversity Assessment Method.
- The BDAR must document the application of the avoid, minimise and offset hierarchy including assessing all direct, indirect and prescribed impacts in accordance with the Biodiversity Assessment Method.
- The BDAR must include details of the measures proposed to address the offset obligation as follows:
 - The total number and classes of biodiversity credits required to be retired for the proposal.
 - The number and classes of like-for-like biodiversity credits proposed to be retired.
 - The number and classes of biodiversity credits proposed to be retired in accordance with the [variation rules](#).
 - Any proposal to fund a [biodiversity conservation action](#).
 - Any proposal to make a payment to the Biodiversity Conservation Fund.

If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been taken to obtain requisite like-for-like biodiversity credits.

The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s6.10 of the BC Act.

Appropriate measures to avoid, minimise and mitigate any impacts on vegetation and threatened species habitat should be set out in the EIS.

Please note that because the 'Yarrimbah' dairy farm (SEAR 1476) is a matter which requires consent under the *Environmental Planning and Assessment Act 1979*, the clearing provisions of the *Local Land Services Act 2013* and the *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017* do not permit clearing associated with or ancillary to the activity regardless of zone.

Matters of National Environmental Significance

Regarding the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, the EIS should identify any relevant Matters of National Environmental Significance, and whether the proposal has been referred to the Australian Government or whether it is already determined to be a controlled action.

Attachment B – Guidance material

Title	Web address
<u>Relevant Legislation</u>	
<i>Biodiversity Conservation Act 2016</i>	www.legislation.nsw.gov.au/#/view/act/2016/63/full
<i>Commonwealth Environment Protection and Biodiversity Conservation Act 1999</i>	www.austlii.edu.au/au/legis/cth/consol_act/epabca1999588/
<i>National Parks and Wildlife Act 1974</i>	www.legislation.nsw.gov.au/maintop/view/inforce/act+80+1974+cd+0+N
<i>Environmental Planning and Assessment Act 1979</i>	www.legislation.nsw.gov.au/maintop/view/inforce/act+203+1979+cd+0+N
<u>Biodiversity</u>	
Biodiversity Offset Scheme	www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/biodiversity-offsets-scheme
Biodiversity Offsets Scheme Entry Threshold Tool	www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap
Test of Significance Guidelines	www.environment.nsw.gov.au/research-and-publications/publications-search/threatened-species-test-of-significance-guidelines
Biodiversity Assessment Method (OEH 2017)	www.environment.nsw.gov.au/research-and-publications/publications-search/biodiversity-assessment-method
BAM Assessor Resources (including links to Survey Guidelines, Registers and Databases)	www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/accruited-assessors/assessor-resources
BAM Assessor FAQ	www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/accruited-assessors/assessor-questions-and-answers
Biodiversity Values Map	www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap
Guidance and Criteria to assist a decision maker to determine a serious and irreversible impact (OEH 2017)	www.environment.nsw.gov.au/research-and-publications/publications-search/guidance-to-assist-a-decision-maker-to-determine-a-serious-and-irreversible-impact
Ancillary rules: biodiversity conservation actions	www.environment.nsw.gov.au/research-and-publications/publications-search/ancillary-rules-biodiversity-conservation-actions
Ancillary rules: reasonable steps to seek like-for-like biodiversity credits for the purpose of applying the variation rules	www.environment.nsw.gov.au/research-and-publications/publications-search/ancillary-rules-reasonable-steps-to-seek-like-for-like-biodiversity-credits
DPIE Threatened Species Profiles	www.environment.nsw.gov.au/threatenedspeciesapp/
BioNet Atlas of NSW Wildlife	www.environment.nsw.gov.au/wildlifeatlas/about.htm
BioNet Vegetation Classification – see NSW Plant Community Type (PCT)	www.environment.nsw.gov.au/research/Visclassification.htm

Title	Web address
classification link for PCT database login page.	
NSW SEED Data Portal (access to online spatial data)	www.seed.nsw.gov.au/
Fisheries NSW policies and guidelines	www.dpi.nsw.gov.au/fishing/habitat/publications/pubs/fish-habitat-conservation
<u>Aboriginal Cultural Heritage</u>	
Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW 2010)	www.environment.nsw.gov.au/research-and-publications/publications-search/code-of-practice-for-archaeological-investigation-of-aboriginal-objects-in-nsw
Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW (OEH 2011)	www.environment.nsw.gov.au/research-and-publications/publications-search/guide-to-investigating-assessing-and-reporting-on-aboriginal-cultural-heritage-in-nsw
Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010)	www.environment.nsw.gov.au/resources/cultureheritage/commco/nsultation/09781ACHconsultreq.pdf
Aboriginal Site Recording Form	www.environment.nsw.gov.au/topics/aboriginal-cultural-heritage/protect-and-manage/aboriginal-heritage-information-management-system/record-aboriginal-sites
Aboriginal Site Impact Recording Form	www.environment.nsw.gov.au/resources/cultureheritage/aboriginal-site-impact-recording-form-120558.pdf
Aboriginal Heritage Information Management System (AHIMS) Registrar	www.environment.nsw.gov.au/contact/AHIMSRegistrar.htm
Care Agreement Application form	www.environment.nsw.gov.au/resources/cultureheritage/20110914TransferObject.pdf
<u>Water</u>	
Flooding	
Floodplain development manual	www.environment.nsw.gov.au/floodplains/manual.htm
NSW Climate Impact Profile	climatechange.environment.nsw.gov.au/
Climate Change Impacts and Risk Management	www.environment.gov.au/climate-change/adaptation/publications/climate-change-impact-risk-management



OUT20/8135

6 July 2020

Mary Ellen Trimble
Para Planner
Industry Assessments
Department of Planning

Maryellen.trimble@planning.nsw.gov.au

Dear Mary Ellen

SEAR's Request –SEAR 1476 – Dairy Farm 2901 Cobb Highway Mathoura

Thank you for the opportunity to provide Secretary Environmental Assessment Requirements (SEAR) for the above proposal as per correspondence dated 19 June 2020.

The NSW Department of Primary Industries (NSW DPI) Agriculture is committed to ensure that dairy developments are designed and operated to meet industry standards, and associated codes of practice. The Department is also committed to the protection and growth of agricultural industries, and the land and resources upon which these industries depend.

NSW DPI Agriculture provides SEARs (Attachment 1) and a range of publications to assist consent authorities, community and proponents in addressing the recommended SEARs (Attachment 2).

For further information please contact Lilian Parker on 02 69381906 or lilian.parker@dpi.nsw.gov.au .

Yours sincerely

A handwritten signature in black ink that reads 'L Parker' in a cursive script.

Lilian Parker
Agricultural Land Use Planning

Attachment 1: SEARs Recommendations

Issue and desired outcome	Detail / Requirement
Site Suitable for development	<ul style="list-style-type: none"> Determine if site is permissible in accordance with the Council Land and Environment Plan (LEP) and land zone. Determine whether the size of the site is adequate for the yards, sheds and feed silos, any amenity buildings, storage sheds, internal roads, composting and stockpile areas, dead animal management, and mitigation measures for odour, dust and noise impacts and general amenity. Issues such as topography and drainage can impact on the ability of a site to accommodate the dairy development and should be considered. Complete a Landuse Conflict Risk Assessment (LUCRA) to identify potential landuse conflict, in particular relating to separation distances and management practices to minimise odour, dust and noise from sensitive receptors. A LUCRA is described in the DPI Land Use Conflict Risk Assessment Guide.
Consideration for impacts to agricultural resources and land	<ul style="list-style-type: none"> Describe the current and potential Important Agriculture Land, including water use, on the proposed development site and surrounding locality. Demonstrate that all significant impacts on current and potential agricultural developments and resources can be reasonably avoided or adequately mitigated. Consider possible cumulative effects to agricultural enterprises and landholders.
Appropriate and secure power supply	<ul style="list-style-type: none"> Power supply is to be reliable, adequate and sufficient for farm requirements. This includes access to 3 phase power, back up arrangements in the event of power failure and sufficient power for future farm expansion.
Suitable and secure water supply	<ul style="list-style-type: none"> Water supply is to be adequate, suitable and reliable for drinking, cooling, effluent cleaning, bush fire management and other facilities such as rest rooms, landscaping requirements etc. Water must meet standards detailed in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) and the National Guidelines for Beef Cattle Feedlots in Australia, 3rd Edition. The source of water and any sanitisation methods should also be detailed in the application.
Surface & Groundwater protected	<ul style="list-style-type: none"> Proposed development design, operation and by-product management should be undertaken to avoid nutrient and sediment build up and minimise erosion, off site surface water movement and groundwater accession. The proposal should detail how design and operation will be undertaken in accordance with best practice to prevent excess build-up of nutrients and salts in the soil profile and increase the risk of leaching. A monitoring program should be developed.
Biosecurity Standards met	<ul style="list-style-type: none"> Include a biosecurity (pests, weeds and disease) risk assessment outlining the likely plant, animal and community risks. Develop a biosecurity response plan to deal with identified risks as well as contingency plans for any failures. Details of dead animal management and disposal must be fully detailed. If onsite disposal is proposed the management facility and operations must be fully documented.
Effluent and spent litter disposal handled appropriately	<ul style="list-style-type: none"> Effluent and solids must be effectively stored, handled and recycled or disposed of in a lawful manner that protects environmental values and biosecurity.

	<ul style="list-style-type: none"> Any reuse areas should be appropriately designed on the basis of a nutrient budget that considers proposed annual volumes and nutrient loads, soil types, current soil nutrient levels and pasture use rates via a reuse management plan.
Animal welfare compliance met	<ul style="list-style-type: none"> Demonstrated compliance with the Animal Welfare Standards: Land transport, Cattle and Loading All weather access or provisions on site to provide adequate food for the livestock for the duration of a flood event if applicable Development of sick livestock and disease management plan including adequate provision for implementation.
Suitable traffic movements	<ul style="list-style-type: none"> Proposed access to the site, transport routes and resultant impacts (eg noise, dust, volume of traffic) on existing road users. This should include consideration of Travelling Stock Reserves and the movement of livestock or farm vehicles along / across the affected roads. Identify how farm access will be retained if road closures or realignments are required.
Visual amenity achieved	<ul style="list-style-type: none"> Amenity impacts are assessed and any necessary response to mitigate visual impacts is described and illustrated.
Adequate consultation with community	<ul style="list-style-type: none"> Consult with relevant agencies such as on the design, construction and operation of the proposed infrastructure. Consult with the owners / managers of affected and adjoining agricultural operations in a timely and appropriate manner about; the proposal, the likely impacts and suitable mitigation measures or compensation. Establish a complaints register and response protocol.
Contingency and Environmental Management Plan developed	<ul style="list-style-type: none"> Contingency plans should be developed to enable the operation to deal with emergency situations. Commitment to the preparation of an Emergency Management plan that outlines procedures and responsibilities for responding to impacts to agriculture during emergency situations such as flooding, fire, disease outbreaks and other possible catastrophic events.

Appendix 2: Guidelines for assessment

Title	Location
Land Use Conflict Risk Assessment Guide	https://www.dpi.nsw.gov.au/agriculture/lup/development-assessment2/lucra
Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)	https://www.environment.gov.au
Australian Animal Welfare Standards and Guidelines	http://animalwelfarestandards.net.au/
Environmental management guidelines for the dairy industry	https://www.dpi.nsw.gov.au/_data/assets/pdf_file/0003/249033/Environmental-management-guidelines-for-the-dairy-industry.pdf
Dairy Australia food safety regulatory framework	https://www.dairyaustralia.com.au/industry/food-safety-and-regulation/regulatory-framework/regulatory-overview http://www.dairysat.com.au/



DOC20/490617-1

The Para Planner
Industry Assessments
Department of Planning, Industry and Environment

By email: Maryellen.trimble@planning.nsw.gov.au

Dear Ms Trimble

Re SEAR 1476

I refer to your electronic mail on 19 June 2020 to the Environment Protection Authority (EPA) requesting our requirements for the preparation of an Environmental Impact Statement for the proposed Intensive Livestock Agriculture – Dairy Farm, located at Yarrimbah, 2901 Cobb Highway, Mathoura.

We have considered the details of the proposal and have identified the information required for the environmental impact assessment as outlined in Attachment A. The EPA's key information requirements for the project includes the following.

- Details on the potential environmental impacts such as odour, noise, dust, waste and contamination, including cumulative impacts and detail monitoring and mitigation measures that is proposed to be implemented to prevent or minimise these impacts;
- Details of an odour impact assessment completed in accordance with the *Approved Methods for Modelling and Assessment of Air Pollutants in NSW* (2016) and *Assessment and Management of Odour from Stationary Sources in NSW* (2006);
- Details on the proposed construction and management of the wastewater collection and treatment system, including a demonstration that surface water, ground water and soils will be protected from adverse impacts; and
- Details of the management of the waste that is to be produced by the proposal.

In carrying out the environmental impact assessment the guidelines in Attachment B should be referred to.

As there has been no planning focus meeting in relation to the proposed development, we recommended that during the preparation of the EIS the proponent consult with us to ensure that the specific issues identified in the attachments are adequately addressed.

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Phone 131 555
(from outside NSW)

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130-140 Banna Ave
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www.epa.nsw.gov.au
riverina.farwest@epa.nsw.gov.au

If you have any further enquiries about this matter please contact Briohny Seaman by telephoning 02 6969 0700 or by electronic mail at riverina.farwest@epa.nsw.gov.au.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'J. Creed', with a stylized, cursive script.

JESSICA CREED
Unit Head – Regulatory Operations
Environment Protection Authority

30 June 2020

ATTACHMENT A

The EPA's assessment of the proposal has identified the following areas that require further information.

Environmental impacts of the proposal

The Environmental Impact Statement (EIS) must address the requirements of Section 45 of the *Protection of the Environment Operations Act 1997* (POEO Act) by determining the extent of each impact and provide sufficient information to enable the EPA to determine appropriate conditions, limits and monitoring requirements for an Environment Protection Licence (EPL).

The following potential environmental impacts of the project need to be assessed, quantified and reported on.

- Air
- Noise
- Water
- Land
- Waste and chemicals.

The EIS should address how the required environmental goals will be met for each potential impact.

The EIS should describe mitigation and management options that will be used to prevent, control, abate or mitigate identified potential environmental impacts associated with the project and to reduce risks to human health and prevent the degradation of the environment.

This should include an assessment of the effectiveness and reliability of the measures and any residual impacts after these measures are implemented.

Air Quality impacts

The goal of the proposal in relation to air quality should be to ensure sensitive receptors are protected from any adverse impacts from odour and dust.

Details need to be provided on the proposed measures to manage odour from all sources and in particular pens, manure stockpiles and associated wastewater collection, treatment and storage ponds. Measures to prevent or control the emission of odour from these facilities must be detailed.

For a proposal of this scope we would expect an assessment of odour to be undertaken in accordance with the *Approved Methods and Guidance for the Modelling and Assessment of Air Pollution in New South Wales* (DECC, 2016) and the *Technical Framework: Assessment and Management of Odour from Stationary Sources in NSW* (EPA, 2006).

The EIS needs to identify any other existing impacts on air quality within the area, and if necessary provide an assessment and commentary on the predicted cumulative impacts that may arise.

Emissions from any plant must meet the design criteria detailed in the Protection of the Environment Operations (Clean Air) Regulation 2010.

Surface and Groundwater impacts

The EIS must demonstrate how the proposed development will meet the requirements of section 120 of the POEO Act.

The goals of the project should include the following.

- No pollution of waters (including surface and groundwater), except to the extent authorised by the EPA (ie in accordance with an Environment Protection Licence);
- Polluted water (including effluent, process waters, wash down waters, polluted stormwater or sewage) captured on the site and collected, treated and beneficially reused, where this is safe and practicable to do so; and
- It is acceptable in terms of the achievement or protection of the River Flow Objectives and Water Quality Objectives.

The EIS should document the measures that will achieve the above goals.

The EIS should provide details of any water management systems for the site to ensure surface and ground waters are protected from contaminants. This should include an assessment of the following.

- Effluent storage and treatment measures, including the design storage capacity and overflow frequency of each wastewater storage pond;
- Effluent and sludge disposal measures, including sufficient detail to demonstrate sustainable irrigation and sludge disposal practices consistent with the *Environmental Guidelines: Use of Effluent by Irrigation* (DEC, 2004);
- Measures to monitor effluent irrigation sustainability consistent with the *Environmental Guidelines: Use of Effluent by Irrigation* (DEC, 2004), including an assessment of any effluent irrigation areas to determine soil capacity to accommodate hydraulic and nutrient loads;
- Details of management practices the proponent will implement on effluent areas, (eg effluent application rates, cropping regimes) to maintain sustainable hydraulic and nutrient loads; and
- Surface and groundwater conditions that may potentially be impacted by operations on site and any proposed environmental monitoring measures that the proponent will implement to monitor the receiving environment.

Land impacts

The goals of the project should include the following.

- No pollution of land, except to the extent authorised by the EPA (ie in accordance with an Environment Protection Licence);
- The potential impact of land erosion from the development is mitigated; and
- The land impacted by solid and liquid waste application are appropriately monitored and managed in accordance with relevant EPA guidelines.

The EIS should document the measures that will achieve the above goals.

Details on the proposed disposal or re-use applications of wastewater and manure associated with the intensification must be provided including a demonstration of how any soils impacted will be monitored and protected.

Noise and vibration impacts

The EIS should include design, construction, operation and maintenance of the premises in accordance with relevant EPA policy, guidelines and criteria, and in order to minimise potential impacts from noise.

The EPA expects that potential noise sources are assessed in accordance with the *Noise Policy for Industry* (EPA 2017), and where required mitigation measures are proposed (eg appropriate equipment chose to minimise noise levels). All residential or noise sensitive premises likely to be impacted by the development must be identified and included in the assessment.

The proposed development may result in an increase in traffic movements associated with the proposal. The number of traffic movements associated with the proposal should be quantified and the potential noise impacts associated with these traffic movements need to be assessed in accordance with the *NSW Road Noise Policy* (DECCW, 2011).

Waste and chemical impacts

The EIS must assess all aspects of waste generation, management and disposal associated with the proposed development. The EIS should include the following.

- It is in accordance with the principles of the waste hierarchy and cleaner production;
- Where potential impacts associated with the handling, processing and storage of all waste materials generated at the premises are identified, these be satisfactorily mitigated;
- The beneficial reuse of all waste generated at the premises are maximised where it is safe and practical to do so;
- No waste disposal occurs on site except in accordance with an Environment Protection Licence; and
- Ensure that the environmental risks from hazardous chemicals and chemical waste are minimised.

The goal of the project should be to ensure that environmental risks from intensive livestock agriculture activities are minimised. The EIS needs to identify the proposed type, quantity and location of wastes to be stored and/or processed at the site.

Spill management measures, including items such as bunding, and emergency procedures should be clearly outlined.

Monitoring

The EIS must outline the proposed monitoring regime to be implemented in relation to the following potential impacts, where relevant.

- Surface runoff and ground water quality monitoring; and
- Effluent and soil quality monitoring.

ATTACHMENT B

<u>Title</u>	<u>Web address</u>
Relevant Legislation	
<i>Environmental Planning and Assessment Act 1979</i>	https://www.legislation.nsw.gov.au/#/view/act/1979/203
<i>Protection of the Environment Operations Act 1997</i>	https://www.legislation.nsw.gov.au/#/view/act/1997/156/full
Licensing	
Guide to Licensing	http://www.epa.nsw.gov.au/licensing/licenceguide.htm
Air Issues	
POEO (Clean Air) Regulation 2010	https://www.legislation.nsw.gov.au/#/view/regulation/2010/428/historical2016-11-01/full
Approved methods for modelling and assessment of air pollutants in NSW (2016)	http://www.environment.nsw.gov.au/resources/air/ammodelling05361.pdf
Assessment and management of odour from stationary sources in NSW (DEC, 2006)	Technical framework: https://www.environment.nsw.gov.au/resources/air/20060440framework.pdf Technical notes: https://www.environment.nsw.gov.au/resources/air/20060441notes.pdf
Noise and Vibration	
Interim Construction Noise Guidelines (EPA, 2017)	https://www.epa.nsw.gov.au/your-environment/noise/industrial-noise/interim-construction-noise-guideline
Noise Policy for Industry (EPA, 2017)	https://www.epa.nsw.gov.au/your-environment/noise/industrial-noise/noise-policy-for-industry-(2017)
NSW Road Noise Policy (EPA, 2011)	https://www.epa.nsw.gov.au/publications/noise/2011236-nsw-road-noise-policy
Assessing Vibration: a technical guideline (DEC 2006)	https://www.epa.nsw.gov.au/noise/vibrationguide.htm
Australian and New Zealand Environment Council: Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration (ANZECC 1990)	https://www.epa.nsw.gov.au/resources/noise/ANZECBlasting.pdf

Soils	
Managing Urban Stormwater: Soils and Construction (Landcom, 2004)	https://www.environment.nsw.gov.au/stormwater/publications.htm
Waste	
Waste Classification Guidelines (EPA, 2014)	https://www.epa.nsw.gov.au/your-environment/waste/classifying-waste/waste-classification-guidelines
Protection of the Environment Operations (Waste) Regulation 2014	https://www.legislation.nsw.gov.au/regulations/2014-666.pdf
Environmental Guidelines: Solid Waste Landfills, Second edition (EPA, 2016)	https://www.epa.nsw.gov.au/~/_media/EPA/Corporate%20Site/resources/waste/solid-waste-landfill-guidelines-160259.ashx
Water	
Water Quality Objectives	http://www.environment.nsw.gov.au/ieo/index.htm
National Water Quality Management Strategy: Australia and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ, 2000)	http://www.waterquality.gov.au/anz-guidelines/Documents/ANZECC-ARMCANZ-2000-guidelines-vol2.pdf
National Water Quality Management Strategy: Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ, 2000)	http://www.waterquality.gov.au/anz-guidelines/Documents/ANZECC-ARMCANZ-monitoring-reporting.pdf
Using the ANZECC Guidelines and Water Quality Objectives in NSW (EPA, 2006)	https://www.epa.nsw.gov.au/~/_media/epa/corporate-site/resources/water/anzeccandwqos06290.pdf
Environmental Guidelines: Storage and Handling of Liquids (EPA, 2007)	https://www.epa.nsw.gov.au/licensing-and-regulation/licensing/environment-protection-licences/compliance-audit-program/chemical-storage-handling-and-spill-management/storing-and-handling-liquids-trainers-manual
The NSW State Groundwater Policy Framework Document (DLWC, 1997)	http://www.water.nsw.gov.au/__data/assets/pdf_file/0008/547550/avail_ground_nsw_state_groundwater_policy_framework_document.pdf
The NSW State Groundwater Quality Protection Policy (DLWC, 1998)	http://www.water.nsw.gov.au/__data/assets/pdf_file/0006/548286/nsw_state_groundwater_quality_policy.pdf
National Water Quality Management Strategy Guidelines for Groundwater	https://www.water.wa.gov.au/__data/assets/pdf_file/0020/4925/8728.pdf

Protection in Australia (ARMCANZ/ANZECC, 1995)	
---	--

3 July 2020

Contact: Simone Tonkin
Phone: 03 5880 1736
Email :simone.tonkin@watarnsw.com.au
Our ref: F2020/838

Executive Director
Planning Services
Department of Planning and Environment
PO Box 39
Sydney NSW 2000

Attn: Mary Ellen Trimble,

Dear Ms Mary Ellen Trimble,

**Re: SEARs ID No.1476– Proposed Intensive Live Stock Agriculture (Dairy Farm),–
“Yarrimbah” 2901 Cobb Highway, Mathoura.**

WaterNSW has reviewed the supporting documentation accompanying the request for Secretary’s Environmental Assessment Requirements (SEARs) and provides the following comments below, and further detail in **Attachment A**.

It is recommended that the EIS be required to include:

Access to surface and groundwater resources

- Annual volumes of surface water and groundwater proposed to be taken by the activity (including through inflow and seepage) from each surface and groundwater source as defined by the relevant water sharing plan.
- Assessment of any volumetric water licensing requirements (including those for ongoing water take following completion of the project).
- Assessment of the impact and approvals (Works and Use Approvals under the WMA 2000) required for the taking or storage of water.
- The identification of an adequate and secure water supply for the life of the project. Confirmation that water can be sourced from an appropriately authorised and reliable supply. This is to include an assessment of the current market depth where water entitlement is required to be purchased.
- A detailed and consolidated site water balance.

Impact on surface and groundwater resources

- Assessment of impacts on surface and ground water sources (both quality and quantity), related infrastructure, adjacent licensed water users, basic landholder rights, watercourses, riparian land, and groundwater dependent ecosystems, and measures proposed to reduce and mitigate these impacts.
 - Full technical details and data of all surface and groundwater modelling.
 - Proposed surface and groundwater monitoring activities and methodologies.
 - Proposed management and disposal of produced or incidental water.
-

Flooding

WaterNSW is responsible for the management and licensing of flood work approvals.

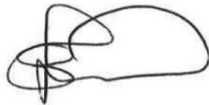
If the proposal is for an earthwork, embankment or levee, wherever situated or proposed to be constructed that is reasonably likely to affect the flow of water to or from a river or lake then the assessment is required to address potential impacts detailed further in attachment A.

Impact on waterfront land and water resource dependents

- Clear identification of "waterfront land" (as defined in the WMA 2000) and an assessment of impacts of works and activities on waterfront land. (Works on waterfront land may be subject to Controlled Activity Approval (CAA) under the *Water Management Act 2000*.)
- Details of the final landform of the site, including final void management (where relevant) and rehabilitation measures.
- Assessment of any potential cumulative impacts on water resources, and any proposed options to manage the cumulative impacts.
- Consideration of relevant policies and guidelines.
- A statement of where each element of the SEARs is addressed in the EIS (i.e. in the form of a table).

Please direct any questions or correspondence to **Simone Tonkin** at simone.tonkin@waterNSW.com.au.

Yours sincerely



Simone Tonkin
Water Regulation Officer
Assessments and Approvals
Customer and Community
WaterNSW

WaterNSW General Assessment Requirements

The following detailed assessment requirements are provided to assist in adequately addressing the assessment requirements for this proposal.

For further information visit the website, www.water.nsw.gov.au

Key Relevant Legislative Instruments

This section provides a basic summary to aid proponents in the development of an Environmental Impact Statement (EIS), and should not be considered a complete list or comprehensive summary of relevant legislative instruments that may apply to the regulation of water resources for a project.

The EIS should take into account the objects and regulatory requirements of the *Water Management Act 2000* (WMA 2000), and associated regulations and instruments, as applicable.

Water Management Act 2000 (WMA 2000)

Key points:

- Volumetric licensing in areas covered by water sharing plans
- Works within 40m of waterfront land
- SSD & SSI projects are exempt from requiring water supply work approvals and controlled activity approvals as a result of the *Environmental Planning & Assessment Act 1979 (EP&A Act)*.
- No exemptions for volumetric licensing apply as a result of the *EP&A Act*.
- Basic landholder rights, including harvestable rights dams
- Aquifer interference activity approval and flood management work approval provisions have not yet commenced and are regulated by the *Water Act 1912*
- Maximum penalties of \$2.2 million plus \$264,000 for each day an offence continues apply under the *WMA 2000*

Water Management (General) Regulation 2011

Key points:

- Provides various exemptions for volumetric licensing and activity approvals
- Provides further detail on requirements for dealings and applications.

Water Sharing Plans – these are considered regulations under the *WMA 2000*

Access Licence Dealing Principles Order 2004

Harvestable Rights Orders

Water Sharing Plans

It is important that the proponent understands and describes the ground and surface water sharing plans, water sources, and management zones that apply to the project. The relevant water sharing plans can be determined spatially at www.ourwater.nsw.gov.au. Multiple water sharing plans may apply and these must all be described.

The EIS is required to:

- Demonstrate how the proposal is consistent with the relevant rules of the Water Sharing Plan including rules for access licences, distance restrictions for water supply works and rules for the management of local impacts in respect of surface water and groundwater sources, ecosystem protection (including groundwater dependent ecosystems), water quality and surface-groundwater connectivity.
-

- Provide a description of any site water use (amount of water to be taken from each water source) and management including all sediment dams, clear water diversion structures with detail on the location, design specifications and storage capacities for all the existing and proposed water management structures.
- Provide an analysis of the proposed water supply arrangements against the rules for access licences and other applicable requirements of any relevant WSP, including:
 - Sufficient market depth to acquire the necessary entitlements for each water source.
 - Ability to carry out a “dealing” to transfer the water to relevant location under the rules of the WSP.
 - Daily and long-term access rules.
 - Account management and carryover provisions.
- Provide a detailed and consolidated site water balance.
- Further detail on licensing requirements is provided below.

Relevant Policies and Guidelines

The EIS should take into account the following policies (as applicable):

- NSW Guidelines for Controlled Activities on Waterfront Land (NOW, 2012)
- NSW Aquifer Interference Policy (NOW, 2012)
- Risk Assessment Guidelines for Groundwater Dependent Ecosystems (NOW, 2012)
- Australian Groundwater Modelling Guidelines (NWC, 2012)
- NSW State Rivers and Estuary Policy (1993)
- NSW Wetlands Policy (2010)
- NSW State Groundwater Policy Framework Document (1997)
- NSW State Groundwater Quality Protection Policy (1998)
- NSW State Groundwater Dependent Ecosystems Policy (2002)
- NSW Water Extraction Monitoring Policy (2007)

Policies can be accessed at the following links:

<http://www.water.nsw.gov.au/Water-management/Law-and-policy/Key-policies/default.aspx>
<http://www.water.nsw.gov.au/Water-licensing/Approvals/Controlled-activities/default.aspx>

An assessment framework for the NSW Aquifer Interference Policy can be found online at:

<http://www.water.nsw.gov.au/Water-management/Law-and-policy/Key-policies/Aquifer-interference>.

Licensing Considerations

The EIS is required to provide:

- Identification of water requirements for the life of the project in terms of both volume and timing (including predictions of potential ongoing groundwater take following the cessation of operations at the site – such as evaporative loss from open voids or inflows).
 - Details of the water supply source(s) for the proposal including any proposed surface water and groundwater extraction from each water source as defined in the relevant Water Sharing Plan/s and all water supply works to take water.
 - Explanation of how the required water entitlements will be obtained (i.e. through a new or existing licence/s, trading on the water market, controlled allocations etc.).
-

- Information on the purpose, location, construction and expected annual extraction volumes including details on all existing and proposed water supply works which take surface water, (pumps, dams, diversions, etc).
- Details on all bores and excavations for the purpose of investigation, extraction, dewatering, testing and monitoring. All predicted groundwater take must be accounted for through adequate licensing.
- Details on existing dams/storages (including the date of construction, location, purpose, size and capacity) and any proposal to change the purpose of existing dams/storages
- Details on the location, purpose, size and capacity of any new proposed dams/storages.
- Applicability of any exemptions under the *Water Management (General) Regulation 2011* to the project.

Water allocation account management rules, total daily extraction limits and rules governing environmental protection and access licence dealings also need to be considered.

The Harvestable Right gives landholders the right to capture and use for any purpose 10 % of the average annual runoff from their property. The Harvestable Right has been defined in terms of an equivalent dam capacity called the Maximum Harvestable Right Dam Capacity (MHRDC). The MHRDC is determined by the area of the property (in hectares) and a site-specific run-off factor. The MHRDC includes the capacity of all existing dams on the property that do not have a current water licence. Storages capturing up to the harvestable right capacity are not required to be licensed but any capacity of the total of all storages/dams on the property greater than the MHRDC may require a licence.

For more information on Harvestable Right dams, including a calculator, visit:

<http://www.water.nsw.gov.au/Water-licensing/Basic-water-rights/Harvesting-runoff/Harvesting-runoff>

Dam Safety

Where new or modified dams are proposed, or where new development will occur below an existing dam, the NSW Dams Safety Committee should be consulted in relation to any safety issues that may arise. Conditions of approval may be recommended to ensure safety in relation to any new or existing dams.

See www.damsafety.nsw.gov.au for further information.

Surface Water Assessment

The predictive assessment of the impact of the proposed project on surface water sources should include the following:

- Identification of all surface water features including watercourses, wetlands and floodplains transected by or adjacent to the proposed project.
- Identification of all surface water sources as described by the relevant water sharing plan.
- Detailed description of dependent ecosystems and existing surface water users within the area, including basic landholder rights to water and adjacent/downstream licensed water users.
- Description of all works and surface infrastructure that will intercept, store, convey, or otherwise interact with surface water resources.
- Assessment of predicted impacts on the following:
 - flow of surface water, sediment movement, channel stability, and hydraulic regime,

- water quality,
- flood regime,
- dependent ecosystems,
- existing surface water users, and
- planned environmental water and water sharing arrangements prescribed in the relevant water sharing plans.

Flooding

If the proposal is for an earthwork, embankment or levee, wherever situated or proposed to be constructed that is reasonably likely to affect the flow of water to or from a river or lake then the assessment is required to address potential impacts detailed below;

- the contents of any relevant floodplain management plan or any other relevant Government policy,
- the need to maintain the natural flood regimes in wetlands and related ecosystems and the preservation of any habitat, animals (including fish) or plants that benefit from periodic flooding,
- the effect or likely effect on water flows in downstream river sections,
- any geographical features, or other matters, of Aboriginal interest that may be affected by a controlled work,
- the effect or likely effect of a controlled work on the passage, flow and distribution of any flood waters,
- the effect or likely effect of a controlled work on existing dominant flood ways or exits from flood ways, rates of flow, flood water levels and the duration of inundation, the protection of the environment

Groundwater Assessment

To ensure the sustainable and integrated management of groundwater sources, the EIS needs to include adequate details to assess the impact of the project on all groundwater sources including:

- Works likely to intercept, connect with or infiltrate the groundwater sources.
 - Any proposed groundwater extraction, including purpose, location and construction details of all proposed bores and expected annual extraction volumes.
 - Bore construction information is to be supplied to DPI Water by submitting a “Form A” template. DPI Water will supply “GW” registration numbers (and licence/approval numbers if required) which must be used as consistent and unique bore identifiers for all future reporting.
 - A description of the water table and groundwater pressure configuration, flow directions and rates and physical and chemical characteristics of the groundwater source (including connectivity with other groundwater and surface water sources).
 - Sufficient baseline monitoring for groundwater quantity and quality for all aquifers and GDEs to establish a baseline incorporating typical temporal and spatial variations.
 - The predicted impacts of any final landform on the groundwater regime.
 - The existing groundwater users within the area (including the environment), any potential impacts on these users and safeguard measures to mitigate impacts.
 - An assessment of groundwater quality, its beneficial use classification and prediction of any impacts on groundwater quality.
-

- An assessment of the potential for groundwater contamination (considering both the impacts of the proposal on groundwater contamination and the impacts of contamination on the proposal).
- Measures proposed to protect groundwater quality, both in the short and long term.
- Measures for preventing groundwater pollution so that remediation is not required.
- Protective measures for any groundwater dependent ecosystems (GDEs).
- Proposed methods of the disposal of waste water and approval from the relevant authority.
- The results of any models or predictive tools used.

Where potential impact/s are identified the assessment will need to identify limits to the level of impact and contingency measures that would remediate, reduce or manage potential impacts to the existing groundwater resource and any dependent groundwater environment or water users, including information on:

- Any proposed monitoring programs, including water levels and quality data.
- Reporting procedures for any monitoring program including mechanism for transfer of information.
- An assessment of any groundwater source/aquifer that may be sterilised from future use as a water supply as a consequence of the proposal.
- Identification of any nominal thresholds as to the level of impact beyond which remedial measures or contingency plans would be initiated (this may entail water level triggers or a beneficial use category).
- Description of the remedial measures or contingency plans proposed.
- Any funding assurances covering the anticipated post development maintenance cost, for example on-going groundwater monitoring for the nominated period.

Groundwater Dependent Ecosystems

The EIS must consider the potential impacts on any Groundwater Dependent Ecosystems (GDEs) at the site and in the vicinity of the site and:

- Identify any potential impacts on GDEs as a result of the proposal including:
 - the effect of the proposal on the recharge to groundwater systems;
 - the potential to adversely affect the water quality of the underlying groundwater system and adjoining groundwater systems in hydraulic connections; and
 - the effect on the function of GDEs (habitat, groundwater levels, connectivity).
- Provide safeguard measures for any GDEs.

Watercourses, Wetlands and Riparian Land

The EIS should address the potential impacts of the project on all watercourses likely to be affected by the project, existing riparian vegetation and the rehabilitation of riparian land. It is recommended the EIS provides details on all watercourses potentially affected by the proposal, including:

- Scaled plans showing the location of:
 - wetlands/swamps, watercourses and top of bank;
 - riparian corridor widths to be established along the creeks;
 - existing riparian vegetation surrounding the watercourses (identify any areas to be protected and any riparian vegetation proposed to be removed);
-

- the site boundary, the footprint of the proposal in relation to the watercourses and riparian areas; and
- proposed location of any asset protection zones.
- Photographs of the watercourses/wetlands and a map showing the point from which the photos were taken.
- A detailed description of all potential impacts on the watercourses/riparian land.
- A detailed description of all potential impacts on the wetlands, including potential impacts to the wetlands hydrologic regime; groundwater recharge; habitat and any species that depend on the wetlands.
- A description of the design features and measures to be incorporated to mitigate potential impacts.
- Geomorphic and hydrological assessment of water courses including details of stream order (Strahler System), river style and energy regimes both in channel and on adjacent floodplains.
- Works on waterfront land may be subject to Controlled Activity Approval (CAA) under the *Water Management Act 2000*. This is managed by DPI Water. Further information can be obtained from the DPI Water's website:
www.water.nsw.gov.au [Water licensing](#) » [Approvals](#) » Controlled activities

Drill Pad, Well and Access Road Construction

- Any construction activity within 40m of a watercourse, should be designed by a suitably qualified person, consistent with the *NSW Guidelines for Controlled Activities on Waterfront Land* (July 2012).
- Construction of all wells must be undertaken in accordance with the *Minimum Construction Requirements for Water Bores in Australia* (3rd edition 2012) by a driller holding a bore drillers' licence valid in New South Wales.
- The length of time that a core hole is maintained as an open hole should be minimised.

Landform rehabilitation (including final void management)

Where significant modification to landform is proposed, the EIS must include:

- Justification of the proposed final landform with regard to its impact on local and regional surface and groundwater systems;
 - A detailed description of how the site would be progressively rehabilitated and integrated into the surrounding landscape;
 - Outline of proposed construction and restoration of topography and surface drainage features if affected by the project;
 - Detailed modelling of potential groundwater volume, flow and quality impacts of the presence of an inundated final void (where relevant) on identified receptors specifically considering those environmental systems that are likely to be groundwater dependent;
 - An outline of the measures to be put in place to ensure that sufficient resources are available to implement the proposed rehabilitation; and
 - The measures that would be established for the long-term protection of local and regional aquifer systems and for the ongoing management of the site following the cessation of the project.
-

Consultation and general enquiries

General licensing enquiries can be made to Advisory Services:

water.enquiries@waternsw.com.au, 1800 353 104.

Assessment or state significant development enquiries, or requests for review or consultation should be directed to the Strategic Stakeholder Liaison Unit, water.referrals@dpi.nsw.gov.au.

A consultation guideline and further information is available online at:

www.water.nsw.gov.au/water-management/law-and-policy/planning-and-assessment

End Attachment A



Natural Resources Access Regulator

Contact: Shavaun Tasker
Phone: (03) 5881 9944
Email : shavaun.tasker@nrar.nsw.gov.au

Our ref: V15/2812-4#66
Your Ref: SEAR 1476

Mary Ellen Trimble
Department of Planning Industry and Environment
Locked Bag 5022
PARRAMATTA NSW 2124

17 July 2020

email: maryellen.trimble@planning.nsw.gov.au

Dear Mary Ellen,

Re: Intensive Livestock Agriculture (Dairy Farm)– Environmental Assessment Requirements ID No. 1476 - Designated Development

Thank you for your email of 22 June 2020 seeking input to Secretary Environmental Assessment Requirements (SEARs) for the above development. The Natural Resources Access Regulator (NRAR) has reviewed the supporting documentation accompanying the request for SEARs and recommends the EIS be required to include the following.

- Annual volumes of surface water and groundwater proposed to be taken by the activity (including through inflow and seepage) from each surface and groundwater source as defined by the relevant water sharing plan.
- Existing and proposed water licensing requirements in accordance with the *Water Act 1912/Water Management Act 2000* (whichever is relevant). This is to demonstrate that existing licences and/or approvals and licensed uses are appropriate, and to identify where additional licences and/or approvals are required.
- The identification of an adequate and secure water supply for the life of the project. Confirmation that water can be sourced from an appropriately authorised and reliable supply. This is to include an assessment of the current market depth where water entitlement is required to be purchased.
- A detailed and consolidated site water balance.
- Assessment of impacts on surface and groundwater sources (both quality and quantity), related infrastructure, adjacent licensed water users, basic landholder rights, watercourses, riparian land, and groundwater dependent ecosystems, and measures proposed to reduce and mitigate these impacts.
- Proposed surface and groundwater monitoring activities and methodologies.
- Assessment of any potential cumulative impacts on water resources, and any proposed options to manage the cumulative impacts.
- Consideration of relevant policies and guidelines eg. "*Guideline for Controlled Activities on Waterfront Land*".
- A statement of where each element of the SEARs is addressed in the EIS in the form of a table.

- Full technical details and data of all surface and groundwater modelling.

For further information please contact Shavaun Tasker, Water Regulation Officer at NRAR (Deniliquin) on t: (03) 5881 9944; e: shavaun.tasker@nrar.nsw.gov.au

Yours sincerely

A handwritten signature in blue ink, appearing to read 'T. Baker', with a stylized flourish at the end.

Tim Baker
Senior Water Regulation Officer
Natural Resources Access Regulator
Department of Planning, Industry and Environment

6 July 2020

The Manager
Department of Planning Industry & Environment
Locked Bag 5022
PARRAMATTA NSW 2124

Attention: Mary Ellen Trimble

**SEAR 1476 - REQUEST FOR INPUT TO ENVIRONMENTAL ASSESSMENT REQUIREMENTS
- INTENSIVE LIVESTOCK AGRICULTURE (DAIRY FARM) - "YARRIMBAH", 2901 COBB
HIGHWAY, MATHOURA.**

I refer to correspondence forwarded to Transport for NSW (TfNSW) requesting the provision of key issues and assessment requirements to be included in the Secretary's Environmental Assessment Requirements.

From review of the information provided it is understood that the proposal is for the establishment of a dairy development plus ancillary infrastructure on the subject site. The subject site is located with frontage to the Cobb Highway, south of Mathoura Road. Access to the site is proposed to be via a driveway to the Cobb Highway within a 100 km/h speed zone. The Cobb Highway is an approved road train route.

From the information available it is considered that the establishment and operational phases of the development have the potential to impact on the transport infrastructure required to service the development. TfNSW advises that in relation to traffic related issues the development should be considered and addressed in 2 distinct stages as follows;

- Establishment phase – the transport of materials and equipment/components for the establishment of the facility and ancillary infrastructure, the movement and parking of construction related vehicles, including personal vehicles, during the construction period.
- Operational phase – the ongoing traffic generation due to the operation, maintenance and servicing of the various elements of the project.

TfNSW is interested in the characteristics of the traffic generated by the development and in the potential impact of the development on the safety and efficiency of the road network and particularly the interaction of the development with the Classified Road Network. Given the scale of the development a Traffic Impact Assessment (TIA) is required to address and mitigate traffic related issues generated by the development. The documentation submitted should address the potential impacts on the road network, particularly intersections, associated with the development during the lifetime of the project, the works required to the existing road infrastructure, the measures to be implemented to maintain the standard and safety of the road network, and the procedures to monitor and ensure compliance. A transport management plan may also be required to outline measures to manage traffic related issues generated by the development.

The submitted documentation will need to address the traffic generation of the proposed development plus also consider the cumulative traffic to the Cobb Highway resultant from other operations on the subject site. It is understood that access to the development will be via an existing driveway to the Cobb Highway therefore an assessment of the current driveway and the required standard to accommodate the cumulative traffic generation from the subject land holding is required.

For guidance in the preparation of the TIA the applicant is referred to section 2 of the "Guide to Traffic Generating Developments" prepared by the RTA and the Austroads publications, particularly the Austroads Guide to Traffic Management Part 12: Traffic Impacts of Development and Part 3: Traffic Studies and Analysis. The TIA is to address the existing and anticipated additional traffic generation, including peak volumes, vehicle types and numbers, travel routes for vehicles accessing the development and provide recommendations for any measures, such as intersection upgrades, necessary to address traffic related impacts.

As a minimum the TIA is to address the existing and anticipated additional traffic generation, including peak volumes, vehicle types and numbers, travel routes for vehicles accessing the development and provide recommendations for any measures, such as intersection upgrades, necessary to address traffic related impacts. For a site with multiple land uses the TIA shall address the cumulative impacts of the total development on the subject site.

TfNSW emphasises the need to appropriately consider and minimise the impacts of the development on the existing road infrastructure and maintain the safety, efficiency and standard of maintenance along the existing road network through the design, construction and operation of the development.

Any enquiries regarding this correspondence may be referred to the Manager, Land Use - TfNSW (South West Region), Maurice Morgan, phone (02) 6923 6611.

Yours faithfully



Per:
Lindsay Tanner
Director South West

Appendix 3

Property Planning Report

Titles list

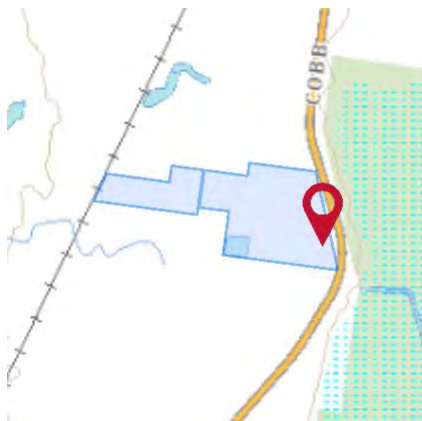
The table below identifies the property titles owned by the applicant. Title searches have been provided for the those identified relating to the project infrastructure and construction activities.

Property Name	Lot	DP	Project Infrastructure	Associated
Yarrimbah	2	1077844	Yes	Yes
	31	751153		Yes
	124	751153		Yes
	12	751153		Yes
	14	751153	Yes	Yes
	13	751143	Yes	Yes
	117	455183	Yes	Yes
Moirā	1	111271		Yes
	2	1179468		Yes
	118	751153		Yes
	1	1081831		Yes
	162	751153		Yes
	60	751153		Yes
	1	550495		Yes
	125	751153		Yes
	126	751153		Yes
	127	751153		Yes
	128	751153		Yes
	129	751153		Yes
	140	751153		Yes
	164	751153		Yes
	141	751153		Yes
	121	751153		Yes
	21	751153		Yes
	1	169121		Yes
	2	169121		Yes
	23	751153		Yes
	22	751153		Yes
	1	126929		Yes
	2	126929		Yes
	17	751153		Yes
	15	751153		Yes
	18	751153		Yes
	2	781409		Yes
	1	781409		Yes
	30	751153		Yes
	174	751153		Yes
	24	751153		Yes
	25	751153		Yes



Property Report

2813 COBB HIGHWAY MATHOURA 2710



Property Details

Address: 2813 COBB HIGHWAY MATHOURA 2710
 Lot/Section 117/-/DP455183 13/-/DP751153 14/-/DP751153
 /Plan No: 2/-/DP1077844 9/-/DP111270
 Council: MURRAY RIVER COUNCIL

Summary of planning controls

Planning controls held within the Planning Database are summarised below. The property may be affected by additional planning controls not outlined in this report. Please contact your council for more information.

Local Environmental Plans	Murray Local Environmental Plan 2011 (pub. 16-12-2011)
Land Zoning	RU1 - Primary Production: (pub. 16-12-2011) SP2 - Infrastructure: (pub. 16-12-2011)
Height Of Building	NA
Floor Space Ratio	NA
Minimum Lot Size	120 ha
Heritage	NA
Land Reservation Acquisition	NA
Foreshore Building Line	NA
Terrestrial Biodiversity	Terrestrial Biodiversity

Detailed planning information

State Environmental Planning Policies which apply to this property

State Environmental Planning Policies can specify planning controls for certain areas and/or types of development. They can also identify the development assessment system that applies and the type of environmental assessment that is required.

- State Environmental Planning Policy (Affordable Rental Housing) 2009: Land Application (pub. 31-7-2009)
- State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004: Land Application (pub. 25-6-2004)

This report provides general information only and does not replace a Section 10.7 Certificate (formerly Section 149)



Property Report

2813 COBB HIGHWAY MATHOURA 2710

- State Environmental Planning Policy (Concurrences) 2018: Land Application (pub. 21-12-2018)
- State Environmental Planning Policy (Educational Establishments and Child Care Facilities) 2017: Land Application (pub. 1-9-2017)
- State Environmental Planning Policy (Exempt and Complying Development Codes) 2008: Land Application (pub. 12-12-2008)
- State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004: Land Application (pub. 31-3-2004)
- State Environmental Planning Policy (Infrastructure) 2007: Land Application (pub. 21-12-2007)
- State Environmental Planning Policy (Koala Habitat Protection) 2019: Land Application (pub. 20-12-2019)
- State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007: Land Application (pub. 16-2-2007)
- State Environmental Planning Policy (Miscellaneous Consent Provisions) 2007: Land Application (pub. 28-9-2007)
- State Environmental Planning Policy (Primary Production and Rural Development) 2019: Land Application (pub. 28-2-2019)
- State Environmental Planning Policy (Primary Production and Rural Development) 2019: Subject Land (pub. 28-2-2019)
- State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017: Subject Land (pub. 25-8-2017)
- State Environmental Planning Policy No 1—Development Standards: Land Application (pub. 17-10-1980)
- State Environmental Planning Policy No 21—Caravan Parks: Land Application (pub. 24-4-1992)
- State Environmental Planning Policy No 33—Hazardous and Offensive Development: Land Application (pub. 13-3-1992)
- State Environmental Planning Policy No 36—Manufactured Home Estates: Land Application (pub. 16-7-1993)
- State Environmental Planning Policy No 44—Koala Habitat Protection: Land Application (pub. 6-1-1995)
- State Environmental Planning Policy No 50—Canal Estate Development: Land Application (pub. 10-11-1997)
- State Environmental Planning Policy No 55—Remediation of Land: Land Application (pub. 28-8-1998)
- State Environmental Planning Policy No 64—Advertising and Signage: Land Application (pub. 16-3-2001)
- State Environmental Planning Policy No 65—Design Quality of Residential Apartment Development: Land Application (pub. 26-7-2002)

This report provides general information only and does not replace a Section 10.7 Certificate (formerly Section 149)



Property Report

2813 COBB HIGHWAY MATHOURA 2710

Other matters affecting the property

Information held in the Planning Database about other matters affecting the property appears below. The property may also be affected by additional planning controls not outlined in this report. Please speak to your council for more information

1.5 m Buffer around Classified Roads	Classified Road Adjacent
Bushfire Prone Land	Vegetation Buffer
	Vegetation Category
Crown Land	Crown Land
Land near Electrical Infrastructure	This property may be located near electrical infrastructure and could be subject to requirements listed under ISEPP Clause 45. Please contact Essential Energy for more information.
Local Aboriginal Land Council	MOAMA

This report provides general information only and does not replace a Section 10.7 Certificate (formerly Section 149)



Order number: 65018845
Your Reference: J128 - Smith
06/11/20 15:16



NSW LRS - Title Search

NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: 2/1077844

SEARCH DATE	TIME	EDITION NO	DATE
6/11/2020	3:16 PM	4	22/9/2018

NO CERTIFICATE OF TITLE HAS ISSUED FOR THE CURRENT EDITION OF THIS FOLIO.
CONTROL OF THE RIGHT TO DEAL IS HELD BY RABOBANK AUSTRALIA LIMITED.

LAND

LOT 2 IN DEPOSITED PLAN 1077844
AT MATHOURA
LOCAL GOVERNMENT AREA MURRAY RIVER
PARISH OF MOIRA COUNTY OF CADELL
TITLE DIAGRAM DP1077844

FIRST SCHEDULE

RAYMOND ANTHONY SMITH
LEANNE JOY SMITH
AS TENANTS IN COMMON IN EQUAL SHARES (T AB800598)

SECOND SCHEDULE (3 NOTIFICATIONS)

- 1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
- 2 AB800599 MORTGAGE TO RABOBANK AUSTRALIA LIMITED
- 3 AC780610 MORTGAGE TO RABOBANK AUSTRALIA LIMITED

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

PRINTED ON 6/11/2020

CERTIFICATE ORDER SUMMARY

Transaction Details

Date: 06/11/2020 15:27

Order No. 65019340

Certificate No: 99453686

Your Reference: J128 - Smith

Certificate Ordered: NSW LRS - Copy of Plan - Deposited Plan 1077844

Available: Y

Size (KB): 95

Number of Pages: 1

Scan Date and Time: 28/06/2005 10:32

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Order number: 65018845
Your Reference: J128 - Smith
06/11/20 15:16



NSW LRS - Title Search

NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: AUTO CONSOL 10037-103

SEARCH DATE	TIME	EDITION NO	DATE
6/11/2020	3:16 PM	4	22/9/2018

NO CERTIFICATE OF TITLE HAS ISSUED FOR THE CURRENT EDITION OF THIS FOLIO.
CONTROL OF THE RIGHT TO DEAL IS HELD BY RABOBANK AUSTRALIA LIMITED.

LAND

LAND DESCRIBED IN SCHEDULE OF PARCELS
LOCAL GOVERNMENT AREA MURRAY RIVER
PARISH OF MOIRA COUNTY OF CADELL
TITLE DIAGRAM SEE SCHEDULE OF PARCELS

FIRST SCHEDULE

RAYMOND ANTHONY SMITH
LEANNE JOY SMITH
AS TENANTS IN COMMON IN EQUAL SHARES (T AB800598)

SECOND SCHEDULE (4 NOTIFICATIONS)

- 1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
- 2 LAND EXCLUDES MINERALS OF PORTIONS 14 AND 117 BY THE CROWN GRANTS
- 3 AB800599 MORTGAGE TO RABOBANK AUSTRALIA LIMITED
- 4 AC780610 MORTGAGE TO RABOBANK AUSTRALIA LIMITED

NOTATIONS

NOTE: DISPOSAL OF ANY LOTS IN DP455183 MAY REQUIRE REGISTRATION OF A
DEPOSITED PLAN OF SURVEY PURSUANT TO SECTION 114 OF THE REAL
PROPERTY ACT, 1900

UNREGISTERED DEALINGS: NIL

SCHEDULE OF PARCELS

LOT 117 IN DP455183
LOT 13 IN DP751153
LOT 14 IN DP751153

TITLE DIAGRAM

DP455183
CROWN PLAN 793.1817
CROWN PLAN 921.1817.

*** END OF SEARCH ***

PRINTED ON 6/11/2020

C793 - 1817

CERTIFICATE ORDER SUMMARY

Transaction Details

Date: 06/11/2020 15:27

Order No. 65019340

Certificate No: 99453688

Your Reference: J128 - Smith

Certificate Ordered: NSW LRS - Copy of Plan or Plan Documents - Crown Plan 793-1817

Available: Y

Size (KB): 458

Number of Pages: 1

Scan Date and Time: 26/11/2012 19:20

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Order number: 65018845
Your Reference: J128 - Smith
06/11/20 15:16



NSW LRS - Title Search

NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: AUTO CONSOL 10037-103

SEARCH DATE	TIME	EDITION NO	DATE
6/11/2020	3:16 PM	4	22/9/2018

NO CERTIFICATE OF TITLE HAS ISSUED FOR THE CURRENT EDITION OF THIS FOLIO.
CONTROL OF THE RIGHT TO DEAL IS HELD BY RABOBANK AUSTRALIA LIMITED.

LAND

LAND DESCRIBED IN SCHEDULE OF PARCELS
LOCAL GOVERNMENT AREA MURRAY RIVER
PARISH OF MOIRA COUNTY OF CADELL
TITLE DIAGRAM SEE SCHEDULE OF PARCELS

FIRST SCHEDULE

RAYMOND ANTHONY SMITH
LEANNE JOY SMITH
AS TENANTS IN COMMON IN EQUAL SHARES (T AB800598)

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DEPOSITED PLAN OF SURVEY PURSUANT TO SECTION 114 OF THE REAL
PROPERTY ACT, 1900

UNREGISTERED DEALINGS: NIL

SCHEDULE OF PARCELS

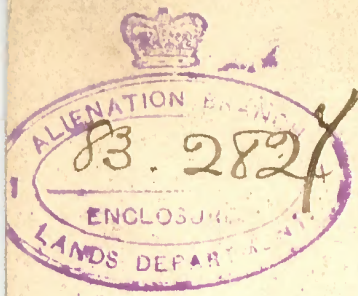
LOT 117 IN DP455183
LOT 13 IN DP751153
LOT 14 IN DP751153

TITLE DIAGRAM

DP455183
CROWN PLAN 793.1817
CROWN PLAN 921.1817.

*** END OF SEARCH ***

PRINTED ON 6/11/2020



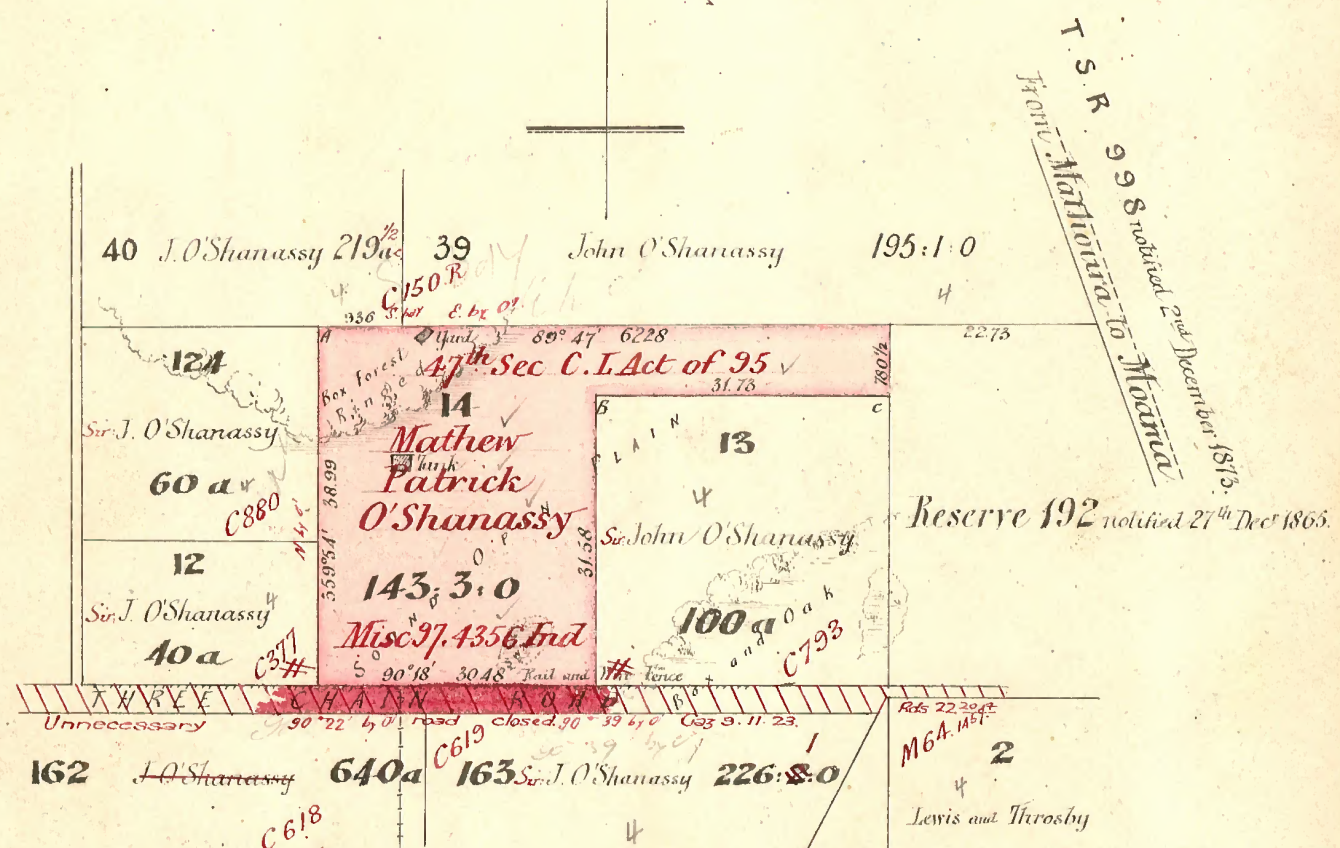
PLAN
of portion N^o 14
Parish of Moira, County of Cadell
Being part of Reserve N^o 192 notified 27th December 1865.

Cate. Book No. 524
Page 17 of 20

Measured for Sale

That part of R.N^o 192 included in Portion 14 to be retained pending Legislation. Vide Ms. 83-25494 Revoked 19th September 1896.

Port. 14 applied for under Sec. 46, C.L.A. of '89, Oct. 94. 4/35.



T.S.R. 998 notified 2nd December 1873.
From Moira to Moira

Unnecy Roads Pt 443r 38p granted to Moira Pastoral Company Proprietary
Limited under 12th Sec. PRA Act 1902 vide Roads Compn 26.473 See also
#C 94, 377, 618, 619, 793, 999, & 1000 1897
Exmd. for Descn. 25.11.26
Reference to
Corners

Plan accepted
10th October 1883

Corner	Bearing	From	Links	Marked
A	22° 24'	Box	79	124-14
Numbered, tests at all other corners.				

Scale
Close
Area & Corners.
Examined & Charted
M. W. Lewis
5th October 1883.

Value of Improvements: Tank £137.15.0, Yards £8.0.0, Ringing and clearing 15 acres £3.0.0
Rail and wire fencing £25.15.4 Total £175.8.4. Situated in the Moira Ruin.
The survey was made on the 16th May 1883 in accordance with the Circular dated 18th December. N^o 89/81
the line B.C. being the initial azimuth of the survey.

William C. ...

Scale 20 Chains to an Inch

Transmitted to the Surveyor General with my letter N^o 48 of the 12th June 1883.

PLAN MICROFILMED

NO ADDITIONS OR AMENDMENTS TO BE MADE

Exmd. for Descn. 13.98
Deed Issued

921-1817

C921. 1817

CERTIFICATE ORDER SUMMARY

Transaction Details

Date: 06/11/2020 15:27

Order No. 65019340

Certificate No: 99453689

Your Reference: J128 - Smith

Certificate Ordered: NSW LRS - Copy of Plan or Plan Documents - Crown Plan 921-1817

Available: Y

Size (KB): 311

Number of Pages: 1

Scan Date and Time: 26/11/2012 19:23

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Order number: 65018845
Your Reference: J128 - Smith
06/11/20 15:16



NSW LRS - Title Search

NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: AUTO CONSOL 10037-103

SEARCH DATE	TIME	EDITION NO	DATE
6/11/2020	3:14 PM	4	22/9/2018

NO CERTIFICATE OF TITLE HAS ISSUED FOR THE CURRENT EDITION OF THIS FOLIO.
CONTROL OF THE RIGHT TO DEAL IS HELD BY RABOBANK AUSTRALIA LIMITED.

LAND

LAND DESCRIBED IN SCHEDULE OF PARCELS
LOCAL GOVERNMENT AREA MURRAY RIVER
PARISH OF MOIRA COUNTY OF CADELL
TITLE DIAGRAM SEE SCHEDULE OF PARCELS

FIRST SCHEDULE

RAYMOND ANTHONY SMITH
LEANNE JOY SMITH
AS TENANTS IN COMMON IN EQUAL SHARES (T AB800598)

SECOND SCHEDULE (4 NOTIFICATIONS)

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- 4 AC780610 MORTGAGE TO RABOBANK AUSTRALIA LIMITED

NOTATIONS

NOTE: DISPOSAL OF ANY LOTS IN DP455183 MAY REQUIRE REGISTRATION OF A
DEPOSITED PLAN OF SURVEY PURSUANT TO SECTION 114 OF THE REAL
PROPERTY ACT, 1900

UNREGISTERED DEALINGS: NIL

SCHEDULE OF PARCELS

LOT 117 IN DP455183
LOT 13 IN DP751153
LOT 14 IN DP751153

TITLE DIAGRAM

DP455183
CROWN PLAN 793.1817
CROWN PLAN 921.1817.

*** END OF SEARCH ***

PRINTED ON 6/11/2020

DP455183

Registered :  6-5-1997

Title System : TORRENS

Purpose : DEPARTMENTAL

Ref. Map : PH #

Last Plan :

THIS PLAN HAS BEEN CREATED TO
PROVIDE UNIQUE IDENTIFIER(S) TO
ENABLE THE ISSUE OF AN AUTO-CONSOL
TITLE FOR THE LAND COMPRISED IN
FOLIO OF THE REGISTER
VOLUME 10037 FOLIO 103

Lengths are in metres

Reduction Ratio : NOT TO SCALE

L. G. A. : MURRAY

LOCALITY :

PARISH : MOIRA

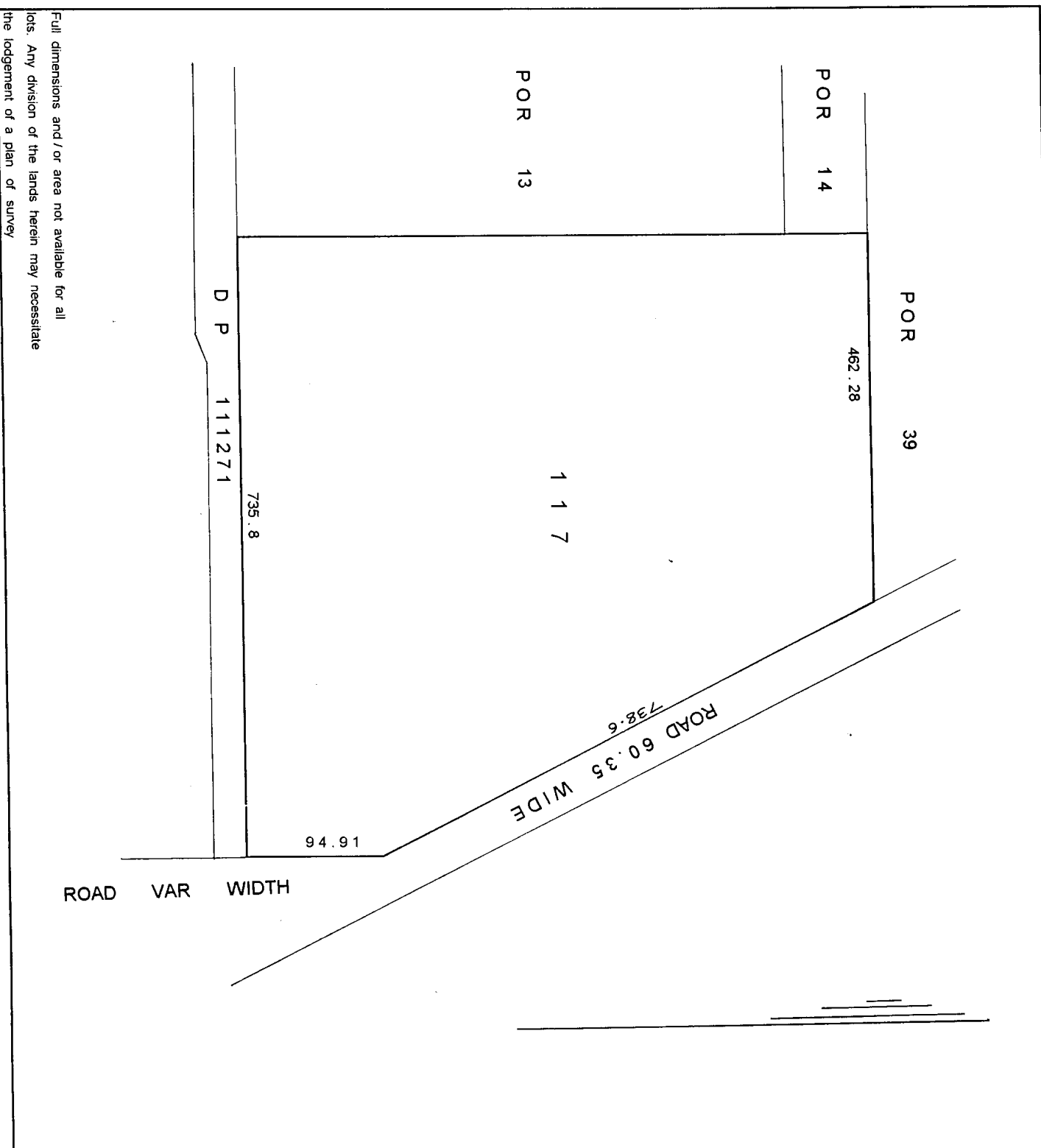
COUNTY : CADELL (55)

LOTS PRIOR IDENTITY

117 PART OF PORTION 117

B
I
D
1
O
O
N

D. C. D. B.



CERTIFICATE ORDER SUMMARY

Transaction Details

Date: 06/11/2020 15:17

Order No. 65018845

Certificate No: 99453083

Your Reference: J128 - Smith

Certificate Ordered: NSW LRS - Copy of Plan - Deposited Plan 455183

Available: Y

Size (KB): 24

Number of Pages: 1

Scan Date and Time: 13/05/1997 16:23

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Appendix 4

Heat Load Assessment

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

Results

Results calculated on 2020-08-10 08:30:13 AM

HLI threshold: 95

AHLU Risk Level: 95

Years analysed: 22

Event duration	Frequency of High	Frequency of Extreme
2 days	Less than 1 event in 22 years	Less than 1 event in 22 years
3 days	Less than 1 event in 22 years	Less than 1 event in 22 years
4 days	Less than 1 event in 22 years	Less than 1 event in 22 years
5 days	Less than 1 event in 22 years	Less than 1 event in 22 years
6 days	Less than 1 event in 22 years	Less than 1 event in 22 years
7 or more days	Less than 1 event in 22 years	Less than 1 event in 22 years

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

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

Parameters

Parameter	Value
Site	Deniliquin
Period analysed	Long Term
Cattle type	Bos taurus
Coat colour	Black
Health status	Healthy
Number of days on feed	More than 130
Amount of shade	3.0 - 5.0
Trough water temperature	15 - 20 degrees
Pen class	Class 1
Extra water troughs installed	Yes
Heat load ration fed	Yes
Wet manure removal	Yes
User Notes	Note: Analysis undertaken on milking cows (black & white) to be housed in dairy freestall barn.

Appendix 5

Dam Safety Response

Clare Fitzpatrick
Progressive Rural Solutions
PO Box 74
Deniliquin, NSW 2710
clare@prsltd.com.au

7/08/2020

Our ref: Yarrimbah

Dear Clare,

Re: Proposed Yarrimbah Dam

The Dams Safety NSW (DSNSW) thanks Progressive Rural Solutions for its email on the 7th of August and the attached supporting documentation for development of the proposed Yarrimbah Dam.

The documentation has been viewed and the basin will not be declared due to its Low Consequence Category under both Sunny Day and Flood Conditions.

As such DSNSW has no further requirements for this basin, unless there is future development downstream of the basin which would upgrade the Consequence Category. Please advise the DSNSW of any such future development.

Your continuing cooperation is appreciated. If there are any queries with regards to the above please do not hesitate to contact the undersigned.

Yours faithfully,



for

Chris Salkovic
Chief Executive Officer – Dams Safety NSW

Appendix 6

Maximum Harvestable Rights Calculation

Maximum Harvestable Right Dam Capacity

Information provided by the user

1. The location of the proposed dam is:
 - Latitude: **-35.92401**
 - Longitude: **144.882239**
2. Total property area to use for calculating the size of the dam is **584 Hectares**

Result

The maximum Harvestable right dam capacity for your property is **29.2** ML (Megalitres)

Date

06/10/2020

Name

Progressive Rural Solutions

Limitations of the calculator

a) Where to site a dam

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

b) First and Second order streams

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

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

c) Size of property and dam

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

d) Protected wetlands

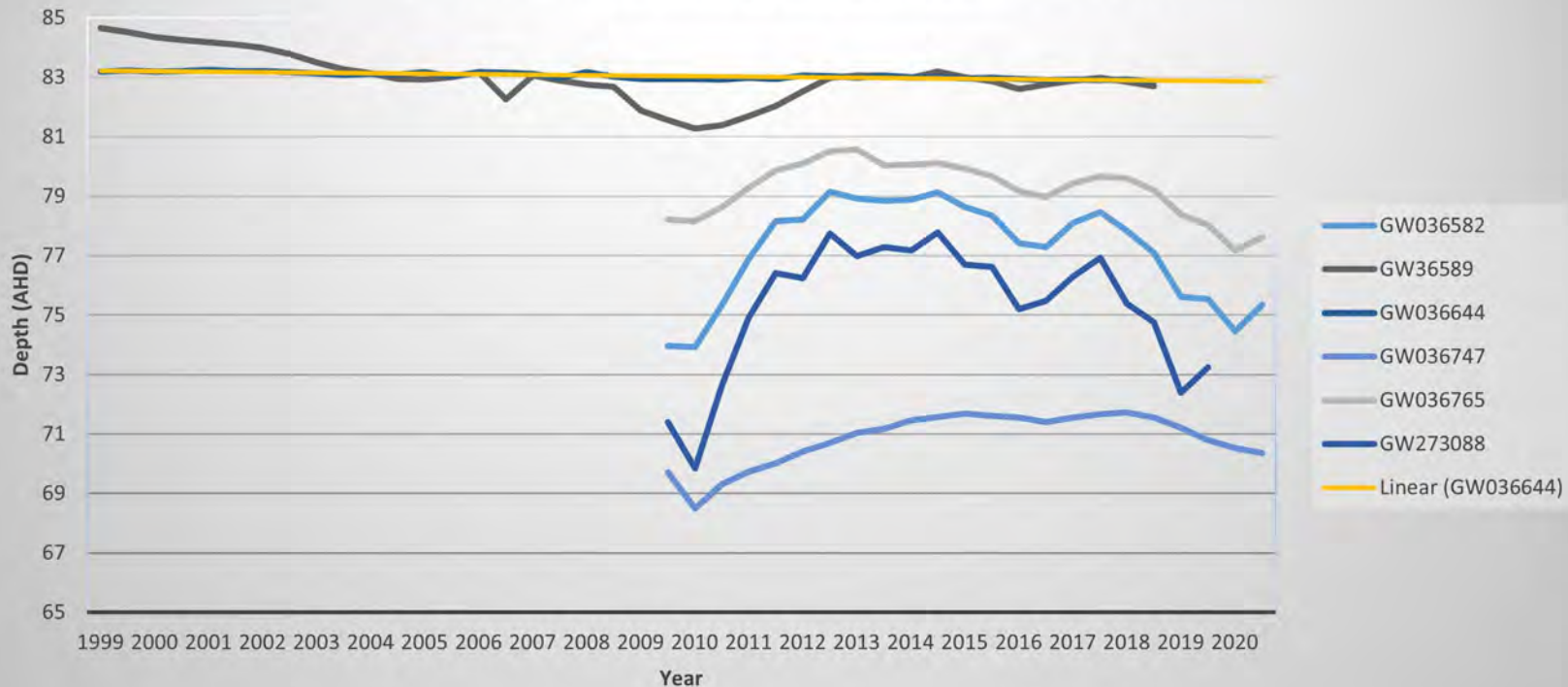
The Harvestable Rights Orders specify that you are not allowed to build a dam on or within 3 km of a RAMSAR wetland site. There are 12 RAMSAR wetlands in NSW. Further information on the location of those [12 RAMSAR sites in NSW](#) can be found on the NSW Environment and Heritage government website.

Appendix 7

Groundwater Data

Year	Season	Bore ID					
		GW036582	GW36589	GW036644	GW036747	GW036765	GW273088
		AHD	AHD	AHD	AHD	AHD	AHD
Name	Amberdell				Pindaree		
Easting	304029		315525	300806	287252	285269	308700
Northing	6034760		6032904	6010452	6049764	6022928	6047045
Monitoring Timeframe	2009-2020		1987-2018	1988-2018	2009-2020	2009-2020	2009-2020
Depth	183		206	180	291	263	202
Elevation	101.8		96.59	98.8	87.3	87.5	102.59
Yield	NA		NA	NA	NA	NA	32.2
1999	Summer		84.66	83.19			
	Winter		84.51	83.23			
2000	Summer		84.34	83.19			
	Winter		84.25	83.21			
2001	Summer		84.18	83.24			
	Winter		84.1	83.21			
2002	Summer		83.98	83.21			
	Winter		83.77	83.17			
2003	Summer		83.49	83.13			
	Winter		83.27	83.07			
2004	Summer		83.14	83.11			
	Winter		82.95	83.1			
2005	Summer		82.92	83.18			
	Winter		83.01	83.03			
2006	Summer		83.17	83.18			
	Winter		82.26	83.16			
2007	Summer		83.05	83.11			
	Winter		82.89	82.99			
2008	Summer		82.75	83.18			
	Winter		82.67	83.02			
2009	Summer		81.88	82.94			
	Winter	73.96	81.56	82.95	69.71	78.21	71.4
2010	Summer	73.92	81.27	82.94	68.5	78.16	69.85
	Winter	75.34	81.39	82.93	69.31	78.64	72.65
2011	Summer	76.89	81.7	82.99	69.72	79.28	74.91
	Winter	78.15	82.04	82.94	70.01	79.87	76.41
2012	Summer	78.21	82.53	83.05	70.41	80.09	76.24
	Winter	79.14	82.98	83.03	70.7	80.51	77.75
2013	Summer	78.91	83.06	82.98	71.04	80.57	76.99
	Winter	78.85	83.06	83.05	71.17	80.04	77.28
2014	Summer	78.88	82.99	83	71.45	80.06	77.18
	Winter	79.12	83.19	83	71.57	80.12	77.78
2015	Summer	78.63	83.01	82.96	71.68	79.93	76.7
	Winter	78.34	82.87	82.99	71.6	79.68	76.62
2016	Summer	77.41	82.61	82.95	71.56	79.17	75.2
	Winter	77.29	82.76	82.91	71.4	78.97	75.49
2017	Summer	78.11	82.88	82.92	71.56	79.43	76.29
	Winter	78.47	82.98	82.91	71.66	79.66	76.93
2018	Summer	77.83	82.84	82.92	71.73	79.61	75.39
	Winter	77.09	82.69	82.84	71.56	79.21	74.76
2019	Summer	75.61			71.21	78.39	72.38
	Winter	75.54			70.8	78.03	73.25
2020	Summer	74.45			70.53	77.18	
	Winter	75.35			70.35	77.62	
	Summer						
Total		1.39	-1.97	-0.35	0.64	-0.59	1.85
Current Depth below NS at site		29.42	22.08	21.93	34.42	27.15	31.52
Current depth below storage		26.65	19.31	19.16	31.65	24.38	28.75
Current depth below pond floor		27.5	20.16	20.01	32.5	25.23	29.6
Max		79.14	84.66	83.24	71.73	80.57	77.78
Min		73.92	81.27	82.84	68.5	77.18	69.85
Highest level		84.66	20.11				
Lowest Level		68.5	36.27				

'Yarrimbah' Existing Groundwater Levels



Appendix 8

Geotechnical Report

Geotechnical Investigation

Proposed Cowhouse Development

13739/P/777



Prepared for
G&K Kennaugh Earthmoving Contractors

27 April 2020

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1 Introduction

As requested by Gavan Kennaugh of G&K Kennaugh Earthmoving Contractors, a geotechnical investigation was carried out by Construction Sciences Pty Ltd (Construction Sciences) to provide an assessment of the geotechnical conditions for the proposed Cowhouse development at 2901 Cobb Highway, Mathoura, NSW.

As per the Scope of Works, the project overview was to perform a detailed geotechnical investigation, including material suitability for the proposed fresh water supply and effluent pond. Also provide evaluation and recommendation in relation to the ground bearing characteristics for the proposed Cowhouse area and classify the site in accordance with AS2870.

This report has been issued to present the findings based on the geotechnical investigation undertaken by Construction Sciences in accordance with the agreed scope of work as proposed by Construction Sciences and approved by Gavan Kennaugh.

The scope of works of the geotechnical investigation as per the Construction Sciences' proposal brief included:

- > Conducting required inspection and testing onsite;
- > Sampling required material;
- > Laboratory Testing;
- > Comprehensive Geotechnical Report;

This report must be read in conjunction with our attached '*Important Information about this Geotechnical Report*' included at the end of this report.

2 Site Description

The locations of the proposed ground investigation were nominated by Gavan Kennaugh and comprised of nine (9) boreholes within the proposed development area.

The project location is outlined in Figure 2-1 below.



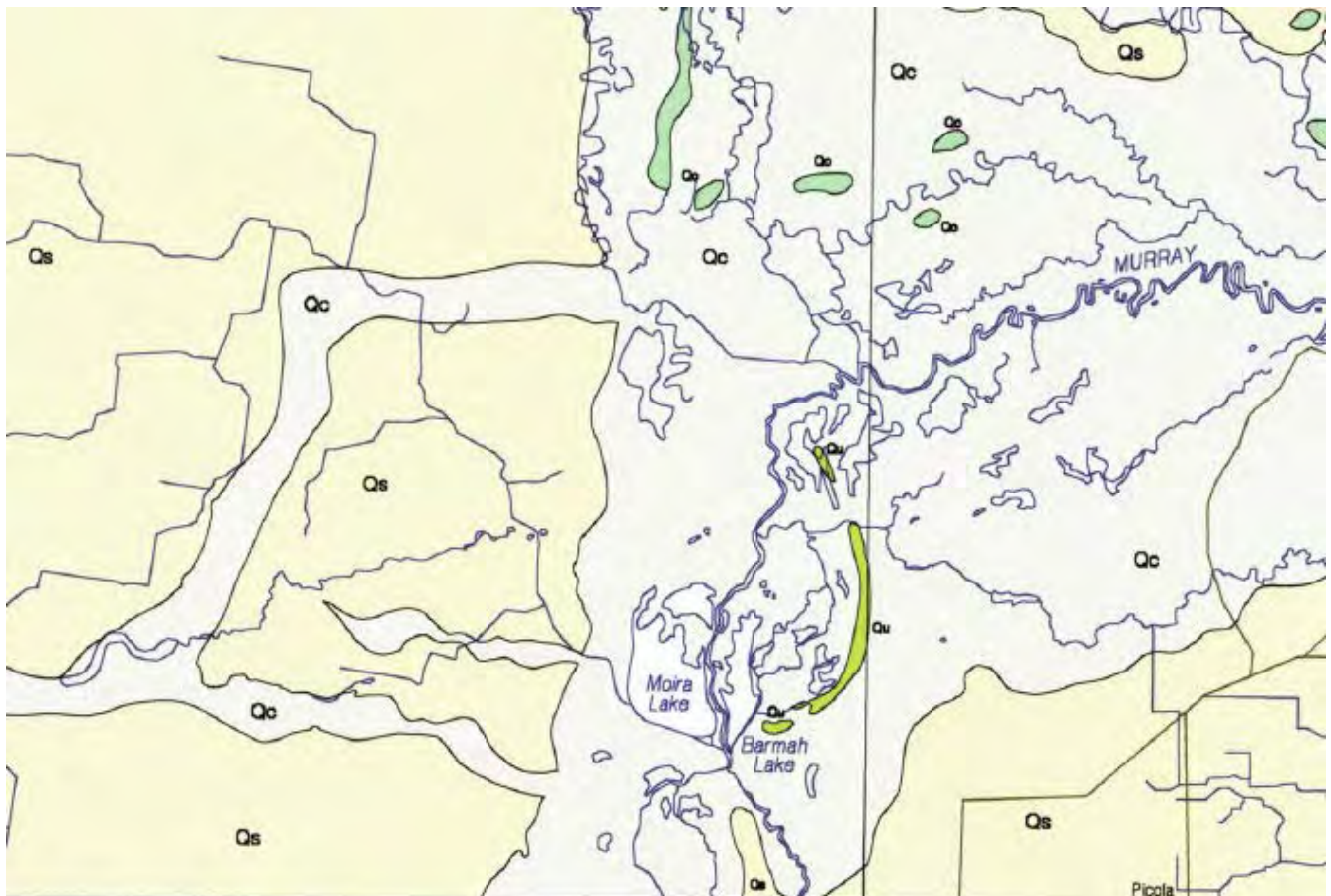
Figure 2-1 Project Location

2.2 Regional Geology

The Geological Survey of Victoria, 1:50,000 series, Geological Map Part of 7724-2, Zone 55 Titled “Deniliquin” (2001), indicates that the site is underlain by Qc: Quaternary, mostly Holocene: Fluvial, lacustrine: clay, sand, sandy clay.

An extract of the geological map is shown in Figure 2-2 below.

Figure 2-2 Site Geology – Geological Survey of Victoria 1:50,000 series



2.3 Site Condition

At the time of investigation, the subject site area consisted mostly of lightly grassed agricultural paddocks. The site was relatively flat across all investigation areas.

The encountered site conditions are depicted in the following site photo.



Figure 2-3 Site Condition – 26/03/20

3 Investigation Work

3.1 Fieldwork

The fieldwork was carried out on the 26th of March 2020, and included a site walk over to identify the proposed investigation locations, with due consideration to the physical access, presence of utilities and environmental constraints. The investigation program was performed in three stages – investigation for the fresh water supply dam, investigation for the proposed Cowhouse and investigation for the proposed effluent dam. A total of nine (9) boreholes using conventional auger drilling techniques under full-time supervision of an experienced geotechnical technician were performed. The boreholes were logged and samples recovered for testing by Construction Sciences NATA endorsed soil laboratories. An investigation location plan is included in Appendix A.

Fieldwork was carried out in general accordance with Australian Standard, AS1726-2017 '*Geotechnical Site Investigations*'.

3.2 Laboratory Testing

Samples of representative strata were recovered and returned to Construction Sciences NATA accredited soils laboratory for testing in accordance with the project brief. Lab testing has been carried out to verify the field logging of soil description, classification, composition, condition, material suitability and structure of the encountered materials. The following tests were carried out on selected samples;

Laboratory testing was carried out using Australian Standard, *AS1289 'Methods for testing soils for engineering purposes'*.

- Particle Size Distribution
- Atterberg Limits
- Linear Shrinkage
- Permeability
- Emerson Class Number
- Exchangeable Sodium Percentage

4 Subsurface Conditions

4.1 Subsurface Strata

The geotechnical investigation identified a relatively consistent subsurface profile, consisting of a fine grained silt, topsoil material, which overlaid a high plasticity clay to borehole termination depth. The general profile increased in consistency/density with depth.

Table 4-1 below includes a summary of the material encountered, borehole logs attached in Appendix B should be referred to for a detailed description of the subsurface profile.

Table 4-1 Summary of Subsurface Strata

BH No.	FILL/ TOPSOIL	NATURAL		TD
		Clay (CH)	Clay (CH)	
		Stiff to Very Stiff	Very Stiff or Better	
BH01	0.00 – 0.20	0.2 – 1.4	1.4 – 4.0	4.0
BH02	0.00 – 0.02	-	0.2 – 4.0	4.0
BH03	0.00 – 0.02	0.2 - 1.2	1.2 – 4.0	4.0
BH04	0.00 – 0.02	0.2 - 1.3	1.3 – 4.0	4.0
BH05	0.00 – 0.02	0.2 – 1.1	1.1 – 4.0	4.0
BH06	0.00 – 0.02	0.2 – 1.2	1.2 – 4.0	4.0
BH07	0.00 – 0.02	-	0.2 – 3.0	3.0
BH08	0.00 – 0.02	-	0.2 – 3.0	3.0
BH09	0.00 – 0.02	0.2 – 3.0	-	3.0

Notes:

TD = Termination at Target Depth

4.2 Laboratory Test Results

A summary of laboratory test results is provided in Tables 4-2 below. The lab testing was undertaken following review of the borehole logs and investigation requirements.

Geotechnical Lab Results

Table 4-2 Atterberg Limit and Particle Size Distribution Laboratory Test Results

Borehole	Depth (m)	LL (%)	PI (%)	LS (%)	% < 75µm
BH01	1.4 – 4.0	55	39	13.0	79
BH03	1.3 – 4.0	51	35	14.0	83
BH05	1.1 – 4.0	56	39	14.5	88
BH07	0.2 – 3.0	57	40	16.5	78

Notes:

LL (%) = Liquid Limit

PI (%) = Plasticity Index

LS (%) = Linear Shrinkage

% < 75µm = Material passing the 75 micro sieve

Table 4-3 Coefficient of Permeability Test Results

Borehole	Depth (m)	Coefficient of Permeability (m/s)	Maximum Dry Density (t/m³)	Optimum Moisture Content (%)
BH01	1.4 – 4.0	6E-010	1.683	20.5
BH03	1.3 – 4.0	9E-010	1.692	18.9

Table 4-4 Emerson Class Number Test Results

Borehole	Depth (m)	Emerson Class Number (ECN)
BH01	1.4 – 4.0	4
BH03	1.3 – 4.0	4
BH07	0.2 – 3.0	3

5 Geotechnical Assessment

5.1 Existing Ground Conditions

The ground conditions encountered across the proposed development area have been summarised in Section 4-1 of this report. The insitu profile comprised predominantly of a high plasticity clay. The consistency of the residual material generally increased with depth from stiff to very stiff or better to termination depth.

5.2 Bearing Capacity

Information provided indicates a large Cowhouse structure is to be constructed. No preliminary design plans or foundation requirements have been forwarded, so a broad assessment of the existing sub-surface bearing capacity has been established. The existing Clay within the proposed Cowhouse building envelope will provide an allowable bearing capacity of least 150KPa at a depth of 0.5m below the existing surface level.

5.3 Site Classification

To provide an indication of the surface ground movement due to seasonal moisture variation, an assessment was undertaken of the soil profile in accordance with AS2870-2011 '*Residential Slabs and Footings*' on the basis of shrink/swell potential.

Based on the investigation and Atterberg Limit test results, the estimated surface movement of the prominent soil profile, as discussed in Section 5-1, due to seasonal variations in moisture content is in the order of 80mm to 100mm. This indicates that the site may be classified Class E – Extremely Reactive.

6 Limitations of the Report

We appreciate the opportunity to work collaboratively with you on this project. Our team looks forward to bringing our high level of expertise to deliver successful outcomes in your future projects.

Your attention is drawn to the appended document titled "Important Information about this Geotechnical Report". This document is intended to clarify to the reader what the realistic expectations of this report should be, and what is the correct use of the document. Misinterpretation of geotechnical information presents significant risk to projects: The document includes a discussion on general limitations of geotechnical services, which by nature, are based extensively on opinion and judgement.

The statements included in this document are not intended to be exculpatory clauses or to reduce the general responsibility accepted by Construction Sciences, but rather to identify where Construction Sciences and our Client's responsibilities lie. The statements ensure that all parties that may rely on the report are aware of their respective responsibilities.

For further enquiries, please do not hesitate to contact Construction Sciences on the information supplied.

7 Safety in Design

The design should be developed to provide a safe operational environment, as well as taking into consideration the safety of personnel and the general public during construction and maintenance of the project works.

Safety in Design and Risk & Opportunity workshops should also be held during the detailed design stage. The intention of the workshops is to identify hazards and construction issues at an early stage and measures to eliminate or control the risks can be implemented. These risks will be captured in a Safety in Design register which will be regularly reviewed and updated.

GENERAL NOTES



Construction Sciences

March 2017

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GENERAL

This report comprises the results of an investigation carried out for a specific purpose and client as defined in the introduction section(s) of the document. The report should not be used by other parties or for other purposes as it may not contain adequate or appropriate information.

TEST HOLE LOGGING

The information on the Test Hole Logs (Boreholes, Backhoe Pits, Exposures etc.) has been based on a visual and tactile assessment except at the discrete locations where test information is available (field and/or laboratory results).

Reference should be made to our standard sheets for the definition of our logging procedures (Soil and Rock Descriptions).

GROUNDWATER

Unless otherwise indicated the water levels given on the test hole logs are the levels of free water or seepage in the test hole recorded at the given time of measuring. The actual groundwater level may differ from this recorded level depending on material permeabilities. Further variations of this level could occur with time due to such effects as seasonal and tidal fluctuations or construction activities. Final confirmation of levels can only be made by appropriate instrumentation techniques and programmes.

INTERPRETATION OF RESULTS

The discussion and recommendations contained within this report are normally based on a site evaluation from discrete test hole data. Generalised or idealised subsurface conditions (including any cross-sections contained in the report) have been assumed or prepared by interpolation/extrapolation of these data. As such these conditions are an interpretation and must be considered as a guide only.

CHANGE IN CONDITIONS

Local variations or anomalies in the generalised ground conditions used for this report can occur, particularly between discrete test hole locations. Furthermore, certain design or construction procedures may have been assumed in assessing the soil structure interaction behaviour of the site.

Any change in design, in construction methods, or in ground conditions as noted during construction, from those assumed in this report should be referred to this firm for appropriate assessment and comment.

FOUNDATION DEPTH

Where referred to in the report, the recommended depth of any foundation (piles, caissons, footings, etc.) is an engineering estimate of the depth to which they should be constructed. The estimate is influenced and perhaps limited by the fieldwork method and testing carried out in connection with the site investigation, and other pertinent information as has been made available. The depth remains, however, an estimate and therefore liable to variation. Footing drawings, designs and specifications based upon this report should provide for variations in the final depth depending upon the ground conditions at each point of support.

REPRODUCTION OF REPORTS

Where it is desired to reproduce the information contained in this report for the inclusion in the contract documents or engineering specification of the subject development, such reproduction should include at least all the relevant test hole and test data, together with the appropriate standard description sheets and remarks made in the written report of a factual or descriptive nature.

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Important Information about this Geotechnical Report

Scope of Work

The purpose of this report and any associated documentation is expressly stated in the document. This document does not form a complete assessment of the site, and no implicit determinations about Construction Sciences scope can be taken if not specifically referenced. Whilst this report is intended to reduce geotechnical risk, no level of detail or scope of work can entirely eliminate risk.

The nature of geotechnical data typically precludes auxiliary environmental assessment without undertaking specific methods in the investigation. Therefore, unless it is explicitly stated in the scope of work, this report does not provide any contamination or environmental assessment of the site or adjacent sites, nor can it be inferred or implied from any component of the document.

The scope of work, geotechnical information, and assessments made by Construction Sciences may be summarised in the report; however, all aspects of the document, including associated data and limitations should be reviewed in its entirety.

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Construction Sciences have undertaken investigations, performed consulting services, and prepared this report based on the Client's specific requirements, data that was available or was collected, and previous experience.

Construction Sciences findings and assessment represent its reasonable judgment, diligence, skill, with sound professional standards, within the time and budget constraints of its commission. No warranty, expressed or implied, is made as to the professional advice included in this report.

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Variability in conditions and limitations of data

Subsurface conditions are complex and can be highly variable; they cannot be accurately defined by discrete investigations. Geotechnical data is based on investigation locations which are explicitly representative of the specific sample or test points. Interpretation of conditions between such points cannot be assumed to represent actual subsurface information and there are unknowns or variations in ground conditions between test locations that cannot be inferred or predicted.

The precision and reliability of interpretive assessment between discrete points is dependent on the uniformity of the subsurface strata, as well as the frequency, detail, and method of sampling or testing.

Subsurface conditions are formed by various natural and anthropogenic processes and therefore are subject to change over time. This is particularly relevant with changes to the site ownership or usage, site boundary or layout, and design or planning modifications. Aspects of the site may also not be able to be determined due to physical or project related constraints and any information provided by Construction Sciences cannot apply following modification to the site, regulations, standards, or the development itself.

It is important to appreciate that no level of detail in investigation, or diligence in assessment, can eliminate uncertainty related to subsurface conditions and thus, geotechnical risk. Construction Sciences cannot and does not provide unqualified warranties nor does it assume any liability for site conditions not observed or accessible during the investigations.

Verification of opinions and recommendations

Geotechnical information, by nature, represents an opinion and is based extensively on judgment of both data and interpretive assessments or observation. This report and its associated documentation are provided explicitly based on Construction Sciences opinion of the site at the time of inspection, and cannot be extended beyond this.

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APPENDIX

A

LOCATION PLAN



**Construction
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2901 Cobb Highway, Mathoura
BOREHOLE LOCATION DIAGRAM



APPENDIX

B

BOREHOLE LOGS



**Construction
Sciences**



Client: G&K Kennaugh Earthmoving Contractors	Drilling Commenced: 26/03/2020	Relative Level: -	Borehole Number: BH 1
Project: Geotechnical Investigation - Proposed Cowhouse De	Drilling Completed: 26/03/2020	Groundwater: -	Location: BH 1
	Rig Type: Power Auger	Casing Diameter: -	
Project No: 13739/P/777	Driller: A. Gleeson	Angle From Horiz: -	Supply Dam
Lab Ref: 13739/S/31104	Logged By: Adam Gleeson	Date Logged: 26/04/2020	

Depth (m)	RL	DCP	"V" Bit "TC" Bit Washbore Casing	Ground -water	Sample or Field Test	Graphic Log	USCS Symbol	DESCRIPTION (SOIL NAME, plasticity/particle characteristics, colour, minor components, moisture, consistency, structure, ORIGIN)
0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8 4.0 4.2 4.4 4.6 4.8 5.0 5.2 5.4 5.6 5.8 6.0 6.2 6.4 6.6 6.8 7.0 7.2 7.4 7.6 7.8 8.0 8.2 8.4 8.6 8.8 9.0 9.2 9.4 9.6 9.8 10.0 10.2 10.4 10.6 10.8 11.0 11.2 11.4 11.6 11.8 12.0 12.2 12.4 12.6 12.8 13.0 13.2 13.4 13.6 13.8 14.0 14.2 14.4 14.6 14.8 15.0 15.2 15.4 15.6 15.8 16.0 16.2 16.4 16.6 16.8 17.0 17.2 17.4 17.6 17.8 18.0 18.2 18.4 18.6 18.8 19.0 19.2 19.4 19.6 19.8 20.0 20.2 20.4 20.6 20.8 21.0 21.2 21.4 21.6 21.8 22.0 22.2 22.4 22.6 22.8 23.0 23.2 23.4 23.6 23.8 24.0 24.2 24.4 24.6 24.8 25.0 25.2 25.4 25.6 25.8 26.0 26.2 26.4 26.6 26.8 27.0 27.2 27.4 27.6 27.8 28.0 28.2 28.4 28.6 28.8 29.0 29.2 29.4 29.6 29.8 30.0 30.2 30.4 30.6 30.8 31.0 31.2 31.4 31.6 31.8 32.0 32.2 32.4 32.6 32.8 33.0 33.2 33.4 33.6 33.8 34.0 34.2 34.4 34.6 34.8 35.0 35.2 35.4 35.6 35.8 36.0 36.2 36.4 36.6 36.8 37.0 37.2 37.4 37.6 37.8 38.0 38.2 38.4 38.6 38.8 39.0 39.2 39.4 39.6 39.8 40.0 40.2 40.4 40.6 40.8 41.0 41.2 41.4 41.6 41.8 42.0 42.2 42.4 42.6 42.8 43.0 43.2 43.4 43.6 43.8 44.0 44.2 44.4 44.6 44.8 45.0 45.2 45.4 45.6 45.8 46.0 46.2 46.4 46.6 46.8 47.0 47.2 47.4 47.6 47.8 48.0 48.2 48.4 48.6 48.8 49.0 49.2 49.4 49.6 49.8 50.0 50.2 50.4 50.6 50.8 51.0 51.2 51.4 51.6 51.8 52.0 52.2 52.4 52.6 52.8 53.0 53.2 53.4 53.6 53.8 54.0 54.2 54.4 54.6 54.8 55.0 55.2 55.4 55.6 55.8 56.0 56.2 56.4 56.6 56.8 57.0 57.2 57.4 57.6 57.8 58.0 58.2 58.4 58.6 58.8 59.0 59.2 59.4 59.6 59.8 60.0 60.2 60.4 60.6 60.8 61.0 61.2 61.4 61.6 61.8 62.0 62.2 62.4 62.6 62.8 63.0 63.2 63.4 63.6 63.8 64.0 64.2 64.4 64.6 64.8 65.0 65.2 65.4 65.6 65.8 66.0 66.2 66.4 66.6 66.8 67.0 67.2 67.4 67.6 67.8 68.0 68.2 68.4 68.6 68.8 69.0 69.2 69.4 69.6 69.8 70.0 70.2 70.4 70.6 70.8 71.0 71.2 71.4 71.6 71.8 72.0 72.2 72.4 72.6 72.8 73.0 73.2 73.4 73.6 73.8 74.0 74.2 74.4 74.6 74.8 75.0 75.2 75.4 75.6 75.8 76.0 76.2 76.4 76.6 76.8 77.0 77.2 77.4 77.6 77.8 78.0 78.2 78.4 78.6 78.8 79.0 79.2 79.4 79.6 79.8 80.0 80.2 80.4 80.6 80.8 81.0 81.2 81.4 81.6 81.8 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Client: G&K Kennaugh Earthmoving Contractors	Drilling Commenced: 26/03/2020	Relative Level: -	Borehole Number: BH 3
Project: Geotechnical Investigation - Proposed Cowhouse De	Drilling Completed: 26/03/2020	Groundwater: -	Location: BH 3
Project No: 13739/P/777	Rig Type: Power Auger	Casing Diameter: -	
Lab Ref: 13739/S/31106	Driller: A. Gleeson	Angle From Horiz: -	Supply Dam
	Logged By: Adam Gleeson	Date Logged: 26/04/2020	

Depth (m)	RL	DCP	V Bit "TC" Bit Washbore Casing	Ground -water	Sample or Field Test	Graphic Log	USCS Symbol	DESCRIPTION (SOIL NAME, plasticity/particle characteristics, colour, minor components, moisture, consistency, structure, ORIGIN)
0.00							ML	ML, SILT, fine grained, brown, trace fine grained sand, moist, medium dense, TOPSOIL
0.50							CH	CH, CLAY, high plasticity, brown, moist, stiff to very stiff, NATURAL
1.00							CH	CH, CLAY, high plasticity, pale-brown, trace fine grained, moist, very stiff, NATURAL
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Client: G&K Kennaugh Earthmoving Contractors	Drilling Commenced: 26/03/2020	Relative Level: -	Borehole Number: BH 4
Project: Geotechnical Investigation - Proposed Cowhouse De	Drilling Completed: 26/03/2020	Groundwater: -	Location: BH 4
Project No: 13739/P/777	Rig Type: Power Auger	Casing Diameter: -	
Lab Ref: 13739/S/31107	Driller: A. Gleeson	Angle From Horiz: -	Supply Dam
	Logged By: Adam Gleeson	Date Logged: 26/04/2020	

Depth (m)	RL	DCP	V Bit "TC" Bit Washbore Casing	Ground -water	Sample or Field Test	Graphic Log	USCS Symbol	DESCRIPTION (SOIL NAME, plasticity/particle characteristics, colour, minor components, moisture, consistency, structure, ORIGIN)
0.00							ML	ML, SILT, fine grained, brown, trace fine grained sand, moist, medium dense, TOPSOIL
0.50							CH	CH, CLAY, high plasticity, brown, moist, stiff to very stiff, NATURAL
1.00							CH	CH, CLAY, high plasticity, pale-brown, trace fine grained, moist, very stiff, NATURAL
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Client:	G&K Kennaugh Earthmoving Contractors	Drilling Commenced: 26/03/2020	Relative Level: -	Borehole Number: BH 5
Project:	Geotechnical Investigation - Proposed Cowhouse De	Drilling Completed: 26/03/2020	Groundwater: -	Location: BH 5
		Rig Type: Power Auger	Casing Diameter: -	
Project No:	13739/P/777	Driller: A.Gleeson	Angle From Horiz: -	Cowhouse
Lab Ref:	13739/S/31108	Logged By: Adam Gleeson	Date Logged: 26/04/2020	

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Ararat Vic 3377

Fax:

03 5444 4812

BOREHOLE LOG SHEET

Page 1 of 1

Date Logged: 26/04/2020

Depth (m)	RL	DCP	"V" Bit "TC" Bit	Washbore Casing	Ground -water	Sample or Field Test	Graphic Log	USCS Symbol	DESCRIPTION (SOIL NAME, plasticity/particle characteristics, colour, minor components, moisture, consistency, structure, ORIGIN)					
<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>		4					<div><div></div><div></div><div></div></div>	ML	ML, SILT, fine grained, brown, trace fine grained sand, moist, medium dense, TOPSOIL					
		5												
		5										<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	CH	CH, CLAY, high plasticity, brown, dry, stiff to very stiff, NATURAL
		6												
		6												
		7												
		6												
		8												
		8												
		7												
		9												
		8												
		14												
		15												
		15												






Client: G&K Kennaugh Earthmoving Contractors	Drilling Commenced: 26/03/2020	Relative Level: -	Borehole Number: BH 7
Project: Geotechnical Investigation - Proposed Cowhouse De	Drilling Completed: 26/03/2020	Groundwater: -	Location: BH 7
	Rig Type: Power Auger	Casing Diameter: -	
Project No: 13739/P/777	Driller: A. Gleeson	Angle From Horiz: -	Effluent Dam
Lab Ref: 13739/S/31110	Logged By: Adam Gleeson	Date Logged: 26/04/2020	

Depth (m)	RL	DCP	V Bit "TC" Bit Washbore Casing	Ground -water	Sample or Field Test	Graphic Log	USCS Symbol	DESCRIPTION (SOIL NAME, plasticity/particle characteristics, colour, minor components, moisture, consistency, structure, ORIGIN)
							ML	ML, SILT, fine grained, brown, trace fine grained sand, moist, medium dense, TOPSOIL
0.5							CH	CH, CLAY, high plasticity, pale-brown, trace fine grained, moist, very stiff, NATURAL
1.0								
1.5								
2.0								
2.5								
3.0								End of Bore
3.5								
4.0								







Client: G&K Kennaugh Earthmoving Contractors	Drilling Commenced: 26/03/2020	Relative Level: -	Borehole Number: BH 8
Project: Geotechnical Investigation - Proposed Cowhouse De	Drilling Completed: 26/03/2020	Groundwater: -	Location: BH 8
	Rig Type: Power Auger	Casing Diameter: -	
Project No: 13739/P/777	Driller: A. Gleeson	Angle From Horiz: -	Effluent Dam
Lab Ref: 13739/S/31111	Logged By: Adam Gleeson	Date Logged: 26/04/2020	

Depth (m)	RL	DCP	V Bit	TC Bit	Washbore	Casing	Ground-water	Sample or Field Test	Graphic Log	USCS Symbol	DESCRIPTION (SOIL NAME, plasticity/particle characteristics, colour, minor components, moisture, consistency, structure, ORIGIN)
										ML	ML, SILT, fine grained, brown, trace fine grained sand, moist, medium dense, TOPSOIL
0.5										CH	CH, CLAY, high plasticity, brown, trace fine grained, moist-wet, very stiff, NATURAL
1.0										CH	CH, CLAY, high plasticity, red-brown, trace fine grained, moist-wet, very stiff, NATURAL
1.5											
2.0											
2.5											
3.0											End of Bore
3.5											
4.0											



Client: G&K Kennaugh Earthmoving Contractors	Drilling Commenced: 26/03/2020	Relative Level: -	Borehole Number: BH 9
Project: Geotechnical Investigation - Proposed Cowhouse De	Drilling Completed: 26/03/2020	Groundwater: -	Location: BH 9
	Rig Type: Power Auger	Casing Diameter: -	
Project No: 13739/P/777	Driller: A. Gleeson	Angle From Horiz: -	Effluent Dam
Lab Ref: 13739/S/31112	Logged By: Adam Gleeson	Date Logged: 26/04/2020	

Depth (m)	RL	DCP	V Bit "TC" Bit Washbore Casing	Ground -water	Sample or Field Test	Graphic Log	USCS Symbol	DESCRIPTION (SOIL NAME, plasticity/particle characteristics, colour, minor components, moisture, consistency, structure, ORIGIN)
							ML	ML, SILT, fine grained, brown, trace fine grained sand, moist, medium dense, TOPSOIL
0.5							CH	CH, CLAY, high plasticity, pale-brown, trace fine grained, moist to wet, stiff, NATURAL
1.0							CH	CH, CLAY, high plasticity, red-brown, trace fine grained, moist-wet, stiff, NATURAL
1.5								
2.0								
2.5								
3.0								End of Bore
3.5								
4.0								

APPENDIX

C

LABORATORY TEST RESULTS



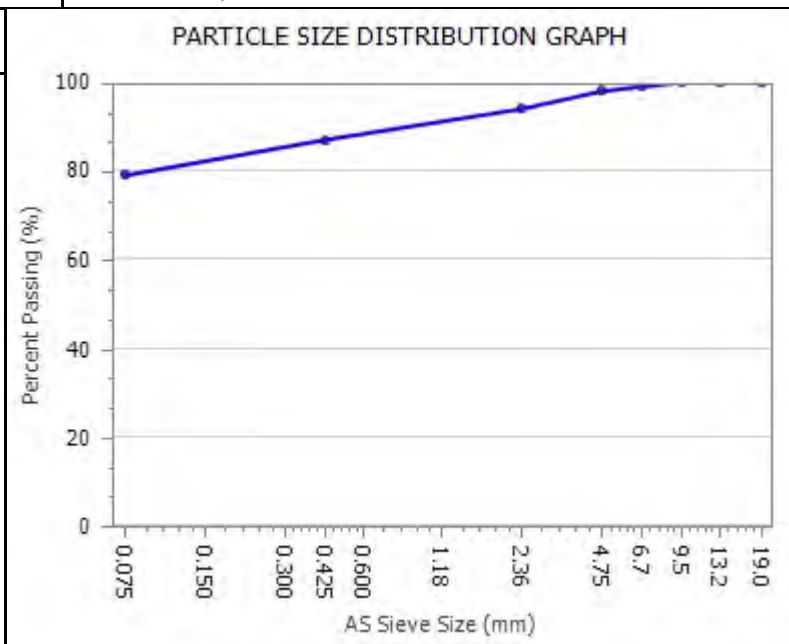
**Construction
Sciences**

QUALITY OF MATERIALS REPORT

Client:	G&K Kennaugh Earthmoving Contractors	Report Number:	13739/R/13058-1
Client Address:	16 Cornelia Creek Rd, ECHUCA	Project Number:	13739/P/777
Project:	Geotechnical Investigation - Proposed Cowhouse Developme	Lot Number:	
Location:	2901 Cobb Hwy, Mathoura	Internal Test Request:	13739/T/7326
Supplied To:	n/a	Client Reference/s:	Ray Smith Property
Area Description:	2901 Cobb Hwy, Mathoura	Report Date / Page:	26/04/2020 Page 1 of 4


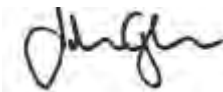
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Sample Number	13739/S/31104	Borehole No:	BH 1
Sampling Method	AS1289.1.2.1 CI 6.5.3	Depth:	(m) 1.4 - 4.0m
Date Sampled	26/03/2020	Location:	Supply Dam
Sampled By	Adam Gleeson	Offset:	
Date Tested	14/04/2020	Material Source	Insitu Material
Att. Drying Method	-	Material Type	Insitu Material
Atterberg Preparation	Dry Sieved	Material Description	CH, CLAY

AS Sieve (mm)	Specification Minimum (%)	Percent Passing (%)	Specification Maximum (%)
19.0		100	
13.2		100	
9.5		100	
6.7		99	
4.75		98	
2.36		94	
0.425		87	
0.075		79	



Test Result	Specification Minimum (%)	Result	Specification Maximum (%)	Test Result	Specification Minimum (%)	Result (%)	Specification Maximum (%)
Liquid Limit (%)		55		0.075/0.425 Fines Ratio		0.91	
Plastic Limit (%)		16		PI x 0.425 Ratio (%)		3385.2	
Plastic Index (%)		39		LS x 0.425 Ratio (%)		1128.4	
Linear Shrinkage (%)		13.0		Particle Size Dist. Moisture Content (%)		16.0	
Linear Shrinkage Defects	Curling						

Remarks

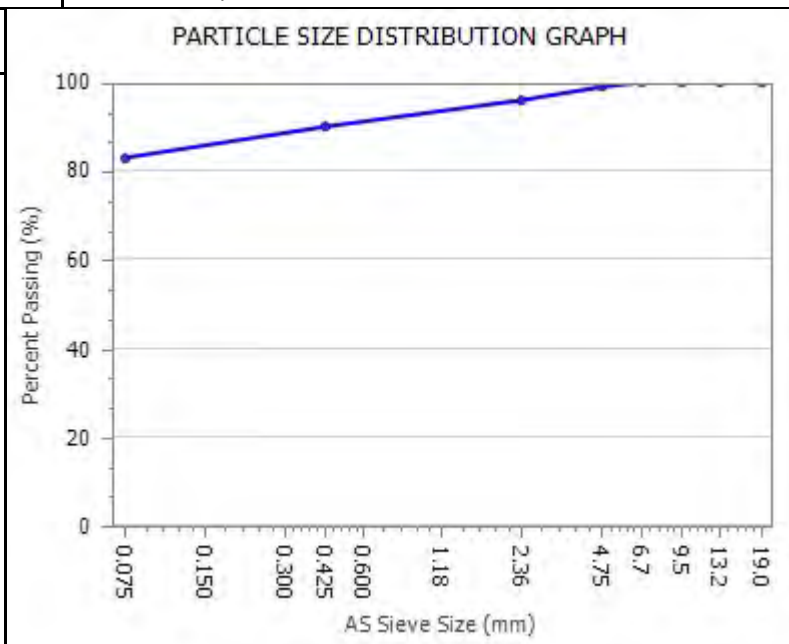
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	Accreditation Number:	1986	
	Corporate Site Number:	13739	
	Approved Signatory:	Adam Gleeson	
	Form ID:	W85MCRep Rev 2	

QUALITY OF MATERIALS REPORT

Client:	G&K Kennaugh Earthmoving Contractors	Report Number:	13739/R/13058-1
Client Address:	16 Cornelia Creek Rd, ECHUCA	Project Number:	13739/P/777
Project:	Geotechnical Investigation - Proposed Cowhouse Developme	Lot Number:	
Location:	2901 Cobb Hwy, Mathoura	Internal Test Request:	13739/T/7326
Supplied To:	n/a	Client Reference/s:	Ray Smith Property
Area Description:	2901 Cobb Hwy, Mathoura	Report Date / Page:	26/04/2020 Page 2 of 4


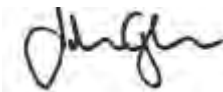
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Sample Number	13739/S/31106	Borehole No:	BH 3
Sampling Method	AS1289.1.2.1 CI 6.5.3	Depth:	(m) 1.3 - 4.0m
Date Sampled	26/03/2020	Location:	Supply Dam
Sampled By	Adam Gleeson	Offset:	
Date Tested	14/04/2020	Material Source	Insitu Material
Att. Drying Method	Oven Dried	Material Type	Insitu Material
Atterberg Preparation	Dry Sieved	Material Description	CH, CLAY

AS Sieve (mm)	Specification Minimum (%)	Percent Passing (%)	Specification Maximum (%)
19.0		100	
13.2		100	
9.5		100	
6.7		100	
4.75		99	
2.36		96	
0.425		90	
0.075		83	



Test Result	Specification Minimum (%)	Result	Specification Maximum (%)	Test Result	Specification Minimum (%)	Result (%)	Specification Maximum (%)
Liquid Limit (%)		51		0.075/0.425 Fines Ratio		0.92	
Plastic Limit (%)		16		PI x 0.425 Ratio (%)		3157.0	
Plastic Index (%)		35		LS x 0.425 Ratio (%)		1262.8	
Linear Shrinkage (%)		14.0		Particle Size Dist. Moisture Content (%)		11.1	
Linear Shrinkage Defects	Curling						

Remarks

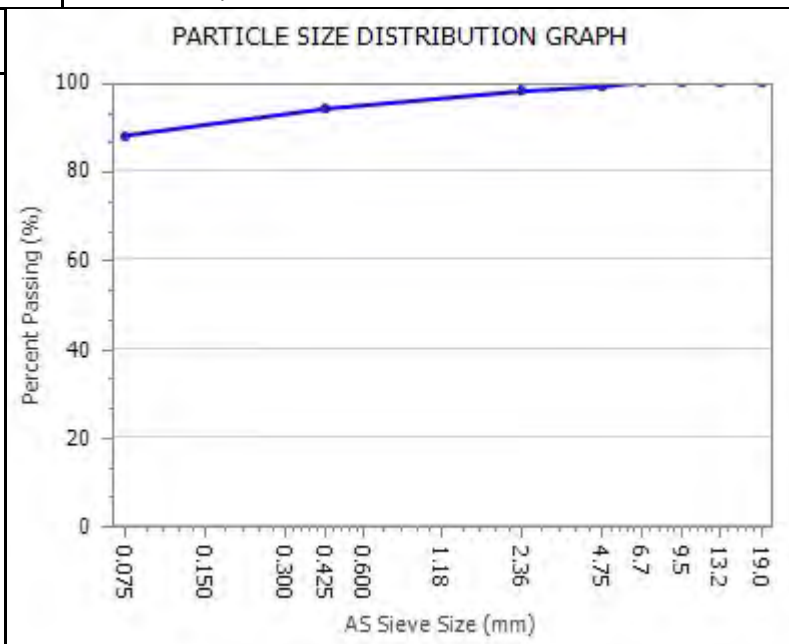
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	Accreditation Number:	1986	
	Corporate Site Number:	13739	
	Approved Signatory: Adam Gleeson		
	Form ID: W85MCRep Rev 2		

QUALITY OF MATERIALS REPORT

Client:	G&K Kennaugh Earthmoving Contractors	Report Number:	13739/R/13058-1
Client Address:	16 Cornelia Creek Rd, ECHUCA	Project Number:	13739/P/777
Project:	Geotechnical Investigation - Proposed Cowhouse Developme	Lot Number:	
Location:	2901 Cobb Hwy, Mathoura	Internal Test Request:	13739/T/7326
Supplied To:	n/a	Client Reference/s:	Ray Smith Property
Area Description:	2901 Cobb Hwy, Mathoura	Report Date / Page:	26/04/2020 Page 3 of 4


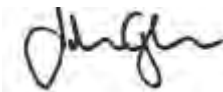
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Sample Number	13739/S/31108	Borehole No:	BH 5
Sampling Method	AS1289.1.2.1 CI 6.5.3	Depth:	(m) 1.1 - 4.0m
Date Sampled	26/03/2020	Location:	Cowhouse
Sampled By	Adam Gleeson	Offset:	
Date Tested	14/04/2020	Material Source	Insitu Material
Att. Drying Method	Oven Dried	Material Type	Insitu Material
Atterberg Preparation	Dry Sieved	Material Description	-

AS Sieve (mm)	Specification Minimum (%)	Percent Passing (%)	Specification Maximum (%)
19.0		100	
13.2		100	
9.5		100	
6.7		100	
4.75		99	
2.36		98	
0.425		94	
0.075		88	



Test Result	Specification Minimum (%)	Result	Specification Maximum (%)	Test Result	Specification Minimum (%)	Result (%)	Specification Maximum (%)
Liquid Limit (%)		56		0.075/0.425 Fines Ratio		0.94	
Plastic Limit (%)		17		PI x 0.425 Ratio (%)		3662.1	
Plastic Index (%)		39		LS x 0.425 Ratio (%)		1361.6	
Linear Shrinkage (%)		14.5		Particle Size Dist. Moisture Content (%)		19.7	
Linear Shrinkage Defects	Curling						

Remarks

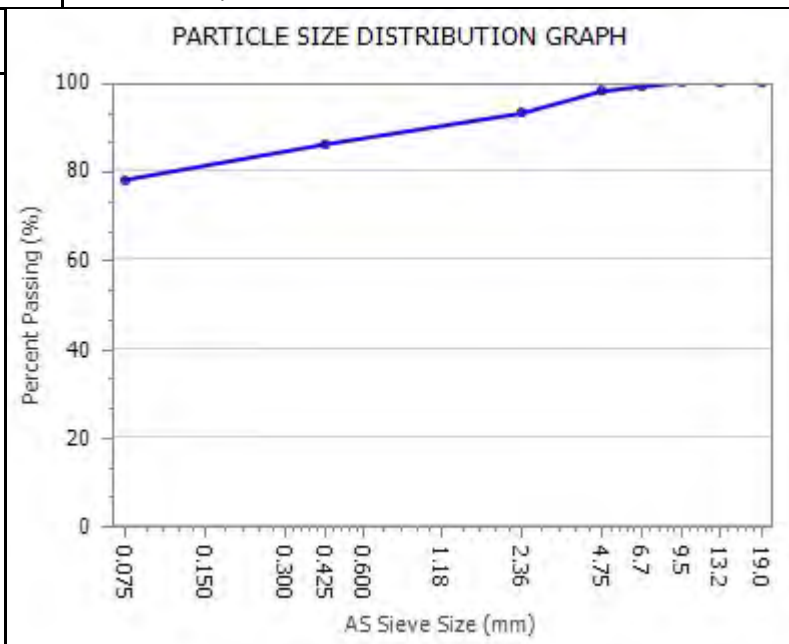
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	Accreditation Number:	1986	
	Corporate Site Number:	13739	
	Approved Signatory: Adam Gleeson		Form ID: W85MCRep Rev 2

QUALITY OF MATERIALS REPORT

Client:	G&K Kennaugh Earthmoving Contractors	Report Number:	13739/R/13058-1
Client Address:	16 Cornelia Creek Rd, ECHUCA	Project Number:	13739/P/777
Project:	Geotechnical Investigation - Proposed Cowhouse Developme	Lot Number:	
Location:	2901 Cobb Hwy, Mathoura	Internal Test Request:	13739/T/7326
Supplied To:	n/a	Client Reference/s:	Ray Smith Property
Area Description:	2901 Cobb Hwy, Mathoura	Report Date / Page:	26/04/2020 Page 4 of 4


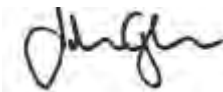
Test Procedures	AS1289.3.6.1, AS1289.3.1.2, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1, AS 1289.3.3.1		
Sample Number	13739/S/31110	Borehole No:	BH 7
Sampling Method	AS1289.1.2.1 CI 6.5.3	Depth:	(m) 0.2 - 3.0m
Date Sampled	26/03/2020	Location:	Effluent Dam
Sampled By	Adam Gleeson	Offset:	
Date Tested	14/04/2020	Material Source	Insitu Material
Att. Drying Method	Oven Dried	Material Type	Insitu Material
Atterberg Preparation	Dry Sieved	Material Description	CH, CLAY

AS Sieve (mm)	Specification Minimum (%)	Percent Passing (%)	Specification Maximum (%)
19.0		100	
13.2		100	
9.5		100	
6.7		99	
4.75		98	
2.36		93	
0.425		86	
0.075		78	



Test Result	Specification Minimum (%)	Result	Specification Maximum (%)	Test Result	Specification Minimum (%)	Result (%)	Specification Maximum (%)
Liquid Limit (%)		57		0.075/0.425 Fines Ratio		0.91	
Plastic Limit (%)		17		PI x 0.425 Ratio (%)		3436.0	
Plastic Index (%)		40		LS x 0.425 Ratio (%)		1417.4	
Linear Shrinkage (%)		16.5		Particle Size Dist. Moisture Content (%)		17.4	
Linear Shrinkage Defects	Curling						

Remarks

	The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards. Accredited for compliance with ISO/IEC 17025 - Testing		
	Accreditation Number:	1986	
	Corporate Site Number:	13739	
	Approved Signatory: Adam Gleeson		
	Form ID: W85MCRep Rev 2		

PERMEABILITY OF A SOIL

Client:	G&K Kennaugh Earthmoving Contractors	Report Number:	13739/R/13059-1
Client Address:	16 Cornelia Creek Rd, ECHUCA	Project Number:	13739/P/777
Project:	Geotechnical Investigation - Proposed Cowhouse Developme	Lot Number:	
Location:	2901 Cobb Hwy, Mathoura	Internal Test Request:	13739/T/7326
Supplied To:	n/a	Client Reference/s:	Ray Smith Property
Area Description:	2901 Cobb Hwy, Mathoura	Report Date / Page:	26/04/2020 Page 1 of 2

Test Procedures:	AS1289.6.7.2		
Sample Number	13739/S/31104	Sample Location	
Sampling Method	AS1289.1.2.1 CI 6.5.3	Borehole No:	BH 1
Date Sampled	26/03/2020	Depth:	(m) 1.4 - 4.0m
Sampled By	Adam Gleeson	Location:	Supply Dam
Date Tested	14/04/2020	Offset:	
Material Source	Insitu Material	Material Type	Insitu Material

Soil Description: CH, CLAY			
Retained on 19.0 mm Sieve (%)	-	Compaction Method:	Standard

Maximum Dry Density (t/m³)	1.68300	Optimum Moisture Content (%)	20.5
Dry Density of Sample (t/m³)	1.654	Moisture at Compaction (%)	20.4
Achieved Dry Density Ratio (%)	98.3	Achieved Moisture Ratio (%)	99.5

Surcharge Mass (kg)	5.500	Surcharge Pressure (kPa)	3.1
Moisture % After Permeability (%)	23.1	Hydraulic Gradient	

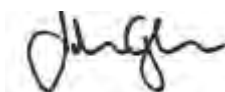
Coefficient of Permeability (Falling Head)	6E-010 m/s (6E-008 cm/s)
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Remarks



The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
Accredited for compliance with ISO/IEC 17025 - Testing

Accreditation Number: 1986
Corporate Site Number: 13739



Approved Signatory: Adam Gleeson
Form ID: W49Rep Rev1

PERMEABILITY OF A SOIL

Client:	G&K Kennaugh Earthmoving Contractors	Report Number:	13739/R/13059-1
Client Address:	16 Cornelia Creek Rd, ECHUCA	Project Number:	13739/P/777
Project:	Geotechnical Investigation - Proposed Cowhouse Developme	Lot Number:	
Location:	2901 Cobb Hwy, Mathoura	Internal Test Request:	13739/T/7326
Supplied To:	n/a	Client Reference/s:	Ray Smith Property
Area Description:	2901 Cobb Hwy, Mathoura	Report Date / Page:	26/04/2020 Page 2 of 2

Test Procedures:	AS1289.6.7.2		
Sample Number	13739/S/31106	Sample Location	
Sampling Method	AS1289.1.2.1 CI 6.5.3	Borehole No:	BH 3
Date Sampled	26/03/2020	Depth:	(m) 1.3 - 4.0m
Sampled By	Adam Gleeson	Location:	Supply Dam
Date Tested	14/04/2020	Offset:	
Material Source	Insitu Material	Material Type	Insitu Material

Soil Description: CH, CLAY			
Retained on 19.0 mm Sieve (%)	-	Compaction Method:	Standard

Maximum Dry Density (t/m³)	1.69200	Optimum Moisture Content (%)	18.9
Dry Density of Sample (t/m³)	1.658	Moisture at Compaction (%)	19.1
Achieved Dry Density Ratio (%)	98.0	Achieved Moisture Ratio (%)	101.1

Surcharge Mass (kg)	5.500	Surcharge Pressure (kPa)	3.1
Moisture % After Permeability (%)	22.7	Hydraulic Gradient	

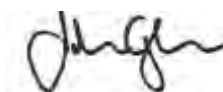
Coefficient of Permeability (Falling Head)	9E-010 m/s (9E-008 cm/s)
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Remarks



The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
Accredited for compliance with ISO/IEC 17025 - Testing

Accreditation Number: 1986
Corporate Site Number: 13739



Approved Signatory: Adam Gleeson
Form ID: W49Rep Rev1

EMERSON CLASS NUMBER REPORT

Client:	G&K Kennaugh Earthmoving Contractors	Report Number:	13739/R/13060-1
Client Address:	16 Cornelia Creek Rd, ECHUCA	Project Number:	13739/P/777
Project:	Geotechnical Investigation - Proposed Cowhouse Developme	Lot Number:	
Location:	2901 Cobb Hwy, Mathoura	Internal Test Request:	13739/T/7326
Supplied To:	n/a	Client Reference/s:	Ray Smith Property
Area Description:	2901 Cobb Hwy, Mathoura	Report Date / Page:	26/04/2020 Page 1 of 1

Test Procedures:	AS1289.3.8.1
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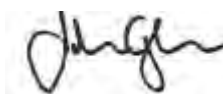
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ID / Client ID	-	-	-	
Lot Number	-	-	-	
Date / Time Sampled	26/03/2020	26/03/2020	26/03/2020	
Date Tested	14/04/2020	14/04/2020	14/04/2020	
Material Source	Insitu Material	Insitu Material	Insitu Material	
Material Type	Insitu Material	Insitu Material	Insitu Material	
Sampling Method	AS1289.1.2.1 CI 6.5.3	AS1289.1.2.1 CI 6.5.3	AS1289.1.2.1 CI 6.5.3	
Water Type	Distilled	Distilled	Distilled	
Water Temperature (C°)	21	21	22	
Borehole No:	BH 1	BH 3	BH 7	
Depth:	1.4 - 4.0m	1.3 - 4.0m	0.2 - 3.0m	
Location:	Supply Dam	Supply Dam	Effluent Dam	
Offset:				
Soil Description	CH, CLAY	CH, CLAY	CH, CLAY	
Emerson Class Number	4	4	3	

Remarks



The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
Accredited for compliance with ISO/IEC 17025 - Testing

Accreditation Number: 1986
Corporate Site Number: 13739



Approved Signatory: Adam Gleeson
Form ID: W34Rep Rev 2

**SWEP**
PTY. LTD.**ANALYTICAL
LABORATORIES**

ABN 26 005 031 569

Tel: (03) 9701 6007

Fax: (03) 9701 5712

REPORT ON SAMPLE OF SOIL**FILE NO :** 2005151796**DATE ISSUED :**

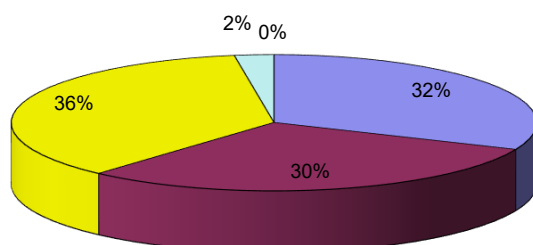
21/05/2020

CONSTRUCTION SCIENCES PTY LTD
ATT: DANIEL BOYD
PO BOX 253
ACACIA RIDGE, QLD 4110**CLIENT ID :** CON075
PHONE : 07 3320 8500
07 3320 8599**E-mail:** daniel.boyd@constructionsciences.net**REFERENCE :**
REFERENCE PHONE :
DATE RECEIVED : 14/05/2020
ANALYSIS REQUIRED : Gypsum+Lime Req**SAMPLE ID :** G & K KENNAUGH - 13739/S/31105 [BH 2]**DEPTH OF SAMPLE (cm):** STOCKPILE**LAND USE :** PASTURE

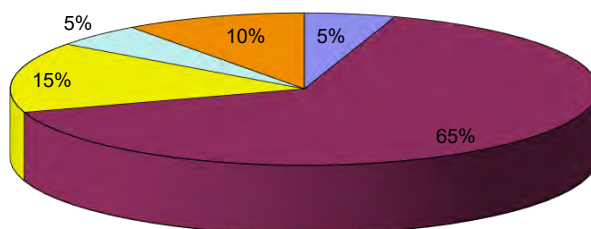
ITEMS			RESULTS	DESIRABLE LEVEL
pH(1:5 Water)			8.7	5.5-7.5
pH(1:5 0.01M CaCl ₂)			8.29	
Electrical Conductivity	EC	µS/cm	963	< 300
TOTAL SOLUBLE SALT	TSS	ppm	3177.9	< 990
EXCHANGEABLE CALCIUM	Ca	meq/100 of soil	5.6	12.08
EXCHANGEABLE MAGNESIUM	Mg	meq/100 of soil	6.69	2.79
EXCHANGEABLE SODIUM	Na	meq/100 of soil	5.85	< 0.93
EXCHANGEABLE POTASSIUM	K	meq/100 of soil	0.45	0.93
EXCHANGEABLE HYDROGEN	H	meq/100 of soil	0.01	< 2.79
ADJ. EXCHANG. HYDROGEN	H	meq/100 of soil	0	
AVAILABLE SULPHUR	S	ppm	266	
TOTAL ORGANIC MATTER	OM	%	0.45	
CATION EXCHANGE CAPACITY	CEC	meq/100g of soil	18.6	
ADJUSTED CEC	ACEC	meq/100g of soil	18.59	
EXCH. SODIUM PERCENTAGE	ESP		31.45	< 5
CALCIUM / MAGNESIUM RATIO	Ca/Mg		0.84	2 - 4

RECOMMENDATION

GYPSUM REQUIREMENT	14.12 kg/m ³	
LIME REQUIREMENT	0 kg/m ³	
DOLOMITE REQUIREMENT	0 kg/m ³	
MAGNESIUM SULPHATE	0 g/m ³	0

Actual Exchangeable Cation Percentage

- Exchangeable Sodium
- Exchangeable Calcium
- Exchangeable Magnesium
- Exchangeable Potassium
- Exchangeable Hydrogen

Desirable Exchangeable Cation Percentage

- Exchangeable Sodium
- Exchangeable Calcium
- Exchangeable Magnesium
- Exchangeable Potassium
- Exchangeable Hydrogen

- Desirable levels for Exchangeable Cations (Ca, Mg, Na, K and H) is directly related to the constant desirable level percentages (see pie graph page 2) and the soil's Adjusted CEC. The other elements vary in relation to the soil's CEC, landuse, leaching requirement and yield.

ANALYTICAL METHODS

Items	Methods
pH (1:5 Water)	4A1
pH (1:5 CaCl ₂)	4B1
Electrical conductivity (1:5 Water)	3A1
Total Soluble Salts	Calculation from Electrical conductivity
Exchangeable Calcium	15D3 or 15A1
Exchangeable Magnesium	15D3 or 15A1
Exchangeable Sodium	15D3 or 15A1
Exchangeable Potassium	15D3 or 15A1
Exchangeable Hydrogen	Barium Chloride-Triethanolamine method*
Available Sulphur	KCl 40, 10D1
Total Organic Matter	modified Walkley & Black, 6A1
Chloride	5A1

NB. For available Iron and Manganese, SWEP uses the method developed by E.H. Mikhail (1980) due to the tendency for the standard EDTA method to produce erroneously high results.

For numbered test methods:

Rayment, G.E. & Lyons, D.J. (2011). Soil Chemical Methods - Australasia. CSIRO Publishing, 150 Oxford Street, Collingwood Vic 3066, Australia.

*Peech, M., Cowan, R.L. & Baker, J.H. (1962). Soil Science Society American Procedures, A critical study of the Barium chloride-Triethanolamine and ammonium acetate methods for determining exchangeable Hydrogen of soils.

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Fax: (03) 9701 5712

REPORT ON SAMPLE OF SOIL**FILE NO :** 2005151797**DATE ISSUED :**

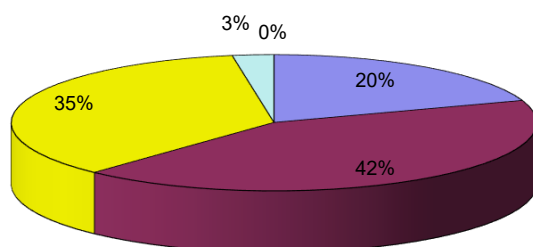
21/05/2020

CONSTRUCTION SCIENCES PTY LTD
ATT: DANIEL BOYD
PO BOX 253
ACACIA RIDGE, QLD 4110**CLIENT ID :** CON075
PHONE : 07 3320 8500
07 3320 8599**E-mail:** daniel.boyd@constructionsciences.net**REFERENCE :**
REFERENCE PHONE :
DATE RECEIVED : 14/05/2020
ANALYSIS REQUIRED : Gypsum+Lime Req**SAMPLE ID :** G & K KENNAUGH - 13739/S/31110 [BH 7]**DEPTH OF SAMPLE (cm):** STOCKPILE**LAND USE :** PASTURE

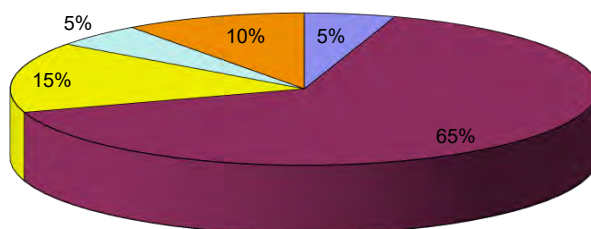
ITEMS			RESULTS	DESIRABLE LEVEL
pH(1:5 Water)			8.5	5.5-7.5
pH(1:5 0.01M CaCl ₂)			8.1	
Electrical Conductivity	EC	µS/cm	740	< 300
TOTAL SOLUBLE SALT	TSS	ppm	2442	< 990
EXCHANGEABLE CALCIUM	Ca	meq/100 of soil	8.27	12.74
EXCHANGEABLE MAGNESIUM	Mg	meq/100 of soil	6.96	2.94
EXCHANGEABLE SODIUM	Na	meq/100 of soil	3.87	< 0.98
EXCHANGEABLE POTASSIUM	K	meq/100 of soil	0.5	0.98
EXCHANGEABLE HYDROGEN	H	meq/100 of soil	0.01	< 2.94
ADJ. EXCHANG. HYDROGEN	H	meq/100 of soil	0	
AVAILABLE SULPHUR	S	ppm	223	
TOTAL ORGANIC MATTER	OM	%	0.15	
CATION EXCHANGE CAPACITY	CEC	meq/100g of soil	19.61	
ADJUSTED CEC	ACEC	meq/100g of soil	19.6	
EXCH. SODIUM PERCENTAGE	ESP		19.73	< 5
CALCIUM / MAGNESIUM RATIO	Ca/Mg		1.19	2 - 4

RECOMMENDATION

GYPSUM REQUIREMENT	11.04 kg/m ³	
LIME REQUIREMENT	0 kg/m ³	
DOLOMITE REQUIREMENT	0 kg/m ³	
MAGNESIUM SULPHATE	0 g/m ³	0

Actual Exchangeable Cation Percentage

■ Exchangeable Sodium
■ Exchangeable Calcium
■ Exchangeable Magnesium
■ Exchangeable Potassium
■ Exchangeable Hydrogen

Desirable Exchangeable Cation Percentage

■ Exchangeable Sodium
■ Exchangeable Calcium
■ Exchangeable Magnesium
■ Exchangeable Potassium
■ Exchangeable Hydrogen

- Desirable levels for Exchangeable Cations (Ca, Mg, Na, K and H) is directly related to the constant desirable level percentages (see pie graph page 2) and the soil's Adjusted CEC. The other elements vary in relation to the soil's CEC, landuse, leaching requirement and yield.

ANALYTICAL METHODS

Items	Methods
pH (1:5 Water)	4A1
pH (1:5 CaCl ₂)	4B1
Electrical conductivity (1:5 Water)	3A1
Total Soluble Salts	Calculation from Electrical conductivity
Exchangeable Calcium	15D3 or 15A1
Exchangeable Magnesium	15D3 or 15A1
Exchangeable Sodium	15D3 or 15A1
Exchangeable Potassium	15D3 or 15A1
Exchangeable Hydrogen	Barium Chloride-Triethanolamine method*
Available Sulphur	KCl 40, 10D1
Total Organic Matter	modified Walkley & Black, 6A1
Chloride	5A1

NB. For available Iron and Manganese, SWEP uses the method developed by E.H. Mikhail (1980) due to the tendency for the standard EDTA method to produce erroneously high results.

For numbered test methods:

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*Peech, M., Cowan, R.L. & Baker, J.H. (1962). Soil Science Society American Procedures, A critical study of the Barium chloride-Triethanolamine and ammonium acetate methods for determining exchangeable Hydrogen of soils.

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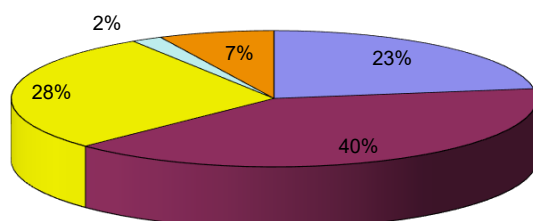
21/05/2020

CONSTRUCTION SCIENCES PTY LTD
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PO BOX 253
ACACIA RIDGE, QLD 4110**CLIENT ID :** CON075
PHONE : 07 3320 8500
07 3320 8599**E-mail:** daniel.boyd@constructionsciences.net**REFERENCE :**
REFERENCE PHONE :
DATE RECEIVED : 14/05/2020
ANALYSIS REQUIRED : Gypsum+Lime Req**SAMPLE ID :** G & K KENNAUGH - 13739/S/31112 [BH 9]**DEPTH OF SAMPLE (cm):** STOCKPILE**LAND USE :** PASTURE

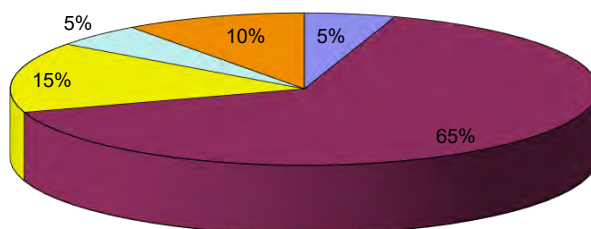
ITEMS			RESULTS	DESIRABLE LEVEL
pH(1:5 Water)			7.9	5.5-7.5
pH(1:5 0.01M CaCl ₂)			7.41	
Electrical Conductivity	EC	µS/cm	2360	< 300
TOTAL SOLUBLE SALT	TSS	ppm	7788	< 990
EXCHANGEABLE CALCIUM	Ca	meq/100 of soil	6.96	11.31
EXCHANGEABLE MAGNESIUM	Mg	meq/100 of soil	4.92	2.61
EXCHANGEABLE SODIUM	Na	meq/100 of soil	3.95	< 0.87
EXCHANGEABLE POTASSIUM	K	meq/100 of soil	0.33	0.87
EXCHANGEABLE HYDROGEN	H	meq/100 of soil	1.28	< 2.61
ADJ. EXCHANG. HYDROGEN	H	meq/100 of soil	1.24	
AVAILABLE SULPHUR	S	ppm	875	
TOTAL ORGANIC MATTER	OM	%	0.075	
CATION EXCHANGE CAPACITY	CEC	meq/100g of soil	17.44	
ADJUSTED CEC	ACEC	meq/100g of soil	17.4	
EXCH. SODIUM PERCENTAGE	ESP		22.65	< 5
CALCIUM / MAGNESIUM RATIO	Ca/Mg		1.41	2 - 4

RECOMMENDATION

GYPSUM REQUIREMENT	8.62 kg/m ³	
LIME REQUIREMENT	0 kg/m ³	
DOLOMITE REQUIREMENT	0 kg/m ³	
MAGNESIUM SULPHATE	0 g/m ³	0

Actual Exchangeable Cation Percentage

- Exchangeable Sodium
- Exchangeable Calcium
- Exchangeable Magnesium
- Exchangeable Potassium
- Exchangeable Hydrogen

Desirable Exchangeable Cation Percentage

- Exchangeable Sodium
- Exchangeable Calcium
- Exchangeable Magnesium
- Exchangeable Potassium
- Exchangeable Hydrogen

- Desirable levels for Exchangeable Cations (Ca, Mg, Na, K and H) is directly related to the constant desirable level percentages (see pie graph page 2) and the soil's Adjusted CEC. The other elements vary in relation to the soil's CEC, landuse, leaching requirement and yield.

ANALYTICAL METHODS

Items	Methods
pH (1:5 Water)	4A1
pH (1:5 CaCl ₂)	4B1
Electrical conductivity (1:5 Water)	3A1
Total Soluble Salts	Calculation from Electrical conductivity
Exchangeable Calcium	15D3 or 15A1
Exchangeable Magnesium	15D3 or 15A1
Exchangeable Sodium	15D3 or 15A1
Exchangeable Potassium	15D3 or 15A1
Exchangeable Hydrogen	Barium Chloride-Triethanolamine method*
Available Sulphur	KCl 40, 10D1
Total Organic Matter	modified Walkley & Black, 6A1
Chloride	5A1

NB. For available Iron and Manganese, SWEP uses the method developed by E.H. Mikhail (1980) due to the tendency for the standard EDTA method to produce erroneously high results.

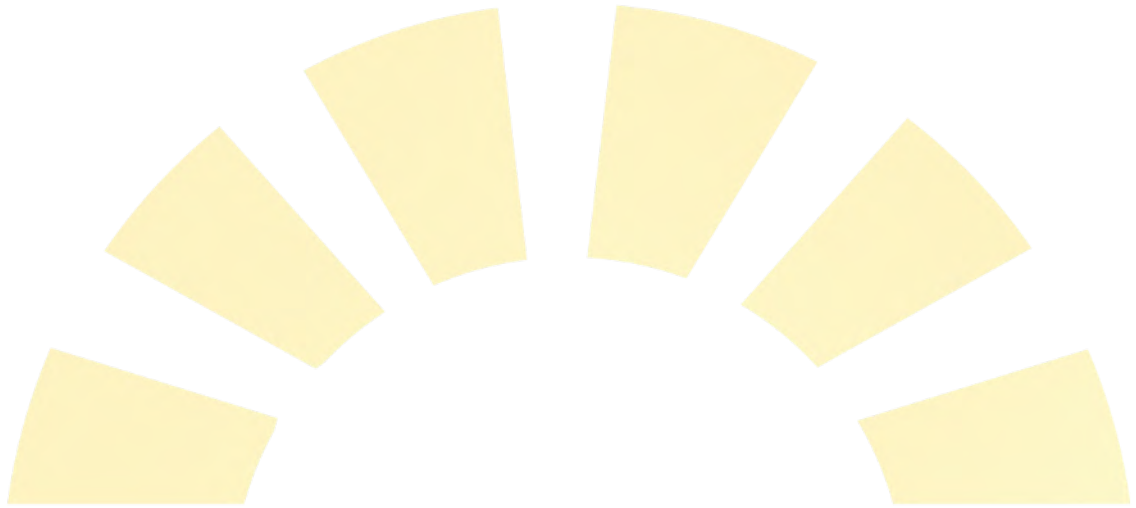
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*Peech, M., Cowan, R.L. & Baker, J.H. (1962). Soil Science Society American Procedures, A critical study of the Barium chloride-Triethanolamine and ammonium acetate methods for determining exchangeable Hydrogen of soils.

Appendix 9

Biodiversity Test of Significance



Biodiversity Test of Significance

For the construction and operation of a 2,112 cow dairy freestall barn
on 'Yarrimbah' 2901 Cobb Hwy, Mathoura

November 2020



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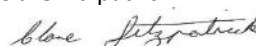
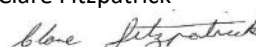


Document Information Record

Project Details

Client name:	RA & LJ Smith
Project:	Construction and operation of a new 2,112 cow dairy freestall barn system on 'Yarrimbah', Mathoura NSW
Project No:	128-0

Document Control

Document Title	Biodiversity Test of Significance to accompany a development application for the construction and operation of a new 2,112 cow dairy freestall barn system on 'Yarrimbah', Mathoura, NSW				
File Name:	J128 – BTS – V1R4				
Revision:	V1R4				
Author	Clare Fitzpatrick	Position:	Director		
Signature:		Date:	16/11/2020		
Reviewed by:	Clare Fitzpatrick	Position:	Director		
Signature:		Date:	16/11/2020		
Approved by:	Ray Smith	Position:	Owner		
Signature:		Date:	11/11/2020		

Revision history

Version	Issue date	Reason for issue	Author	Reviewed by	Approved by
V1R1	16/06/2020	Initial Document	Clare Fitzpatrick	NA	NA
V1R2	06/11/2020	Draft	Clare Fitzpatrick	M Fitzpatrick	Clare Fitzpatrick
V1R3	11/11/2020	Draft for client review	Clare Fitzpatrick	Client	Clare Fitzpatrick
V1R4	17/11/2020	FINAL	Clare Fitzpatrick	Clare Fitzpatrick	Owner

Distribution

Version	Recipient	Lodgement	Copies
V1R3	Client for review	Electronic	1
V1R4	Murray River Council	Electronic	1
V1R4	Client/Contractor	Electronic & Hard	1

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Related Documents

Type	Author	Name	Date
Environmental Impact Statement	Progressive Rural Solutions	J128-EIS-V1R4	17/11/2020
Design Plans	Rich River Irrigation Developments	J000410 – staged plan	17/11/2020
Layout Plans	Entegra	Layout Plans 1-3	20/08/2020
Certified Plans	Entegra	Certified Plans 1-10	06/11/2020
Aboriginal Cultural Heritage Management Plan	McCardle Cultural Heritage	Yarrimbah	22/09/2020

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1. INTRODUCTION

1.1. PURPOSE

This assessment forms part of an Environmental Impact Statement (EIS) and is to accompany the required applications for the increase in milking cow number and construction of a dairy freestall barn system on the property known as 'Yarrimbah' near Mathoura. Activities that have the potential to disturb or modify the flora, fauna, threatened and endangered ecological communities, groundwater dependant ecosystems and biosecurity include the following components:

- Removal of single row plantation trees,
- Excavation work for water and effluent storage dam construction,
- Construction of embankments for shed placement and storage dam walls,
- Construction of compacted manure storage areas,
- Future requirements in the event of a mass mortality event,
- Water management infrastructure (pumps & pipelines), and
- General construction works on site.

The purpose of this report is to determine the relevant assessment methodology and to assess any impacts that may occur to threatened species, populations and communities as part of completing project works described below. This report has been carried out in accordance with the following standards, guidelines, and policies where relevant:

- *Environmental Protection and Biodiversity Conservation Act 1999,*
- *NSW Environmental Planning and Assessment Act 1979.*
- *NSW Biodiversity Conservation Act, 2016,*
- *NSW Biodiversity Conservation Regulation, 2017,*
- *NSW Fisheries Management Act 1994,*
- *NSW Biosecurity Act 2015,*
- *Local Land Services Amendment Act, 2016,*
- *State Environmental Planning Policy 44 – Koala Habitat,*
- Biodiversity Offsets Scheme threshold, and
- Threatened species 'test of significance'.

This document also aims to provide further clarity surrounding biodiversity within the project site with relation to the project works and potential impacts.

1.2. REPORT FORMAT

This report is set out in the following format:

Table 1 - Report format

Section	Address
1	Objectives, documentation and background.
2	Statutory and planning context.
3	Site description and analysis.
4	Project assessment methodology.
5	Findings.
6	Assessment of impacts.
7	Identification of mitigation measures.
8	Conclusion.
Appendices	Plans and supporting reports.

1.3. BACKGROUND

The Smith Family is proposing to extend their existing dairy operation from a 790 head compost barn to a 2,112-cow dairy freestall barn system. The freestall barn system will be constructed within an existing irrigation area, separated from the existing barn, milking shed, feed storage and mixing area. The proposed barn system will replace the existing compost barn and be independently managed in relation to water storage, effluent management and controlled drainage. The operation will continue to utilise the existing milking shed and commodities areas. No further consideration of the existing milking shed effluent system will be made within this assessment as the existing effluent system will not interact with the proposal. The existing compost barn will no longer be in operation which will reduce the existing effluent system by a higher capacity than the additional cow numbers processed through the dairy.

The freestall barns are each proposed to house 1,056 cows with each cow housed within the barns provided with access to its own stall. The open sided barns will have a central feed alley and each side a row of single and double stalls creating six lanes within the barns that will be cleaned utilising a flood wash system. The barns will be constructed on a 1% slope allowing sufficient fall for manure removal by floodwash. Adjoining the lower half of each site of the barns is an earthen 'natural instinct' area where cows will be provided access during suitable days.

The images below provide an overview of the site, a cross section and a plan view of the barn areas.



Figure 1 - Overview of area proposed for barn system

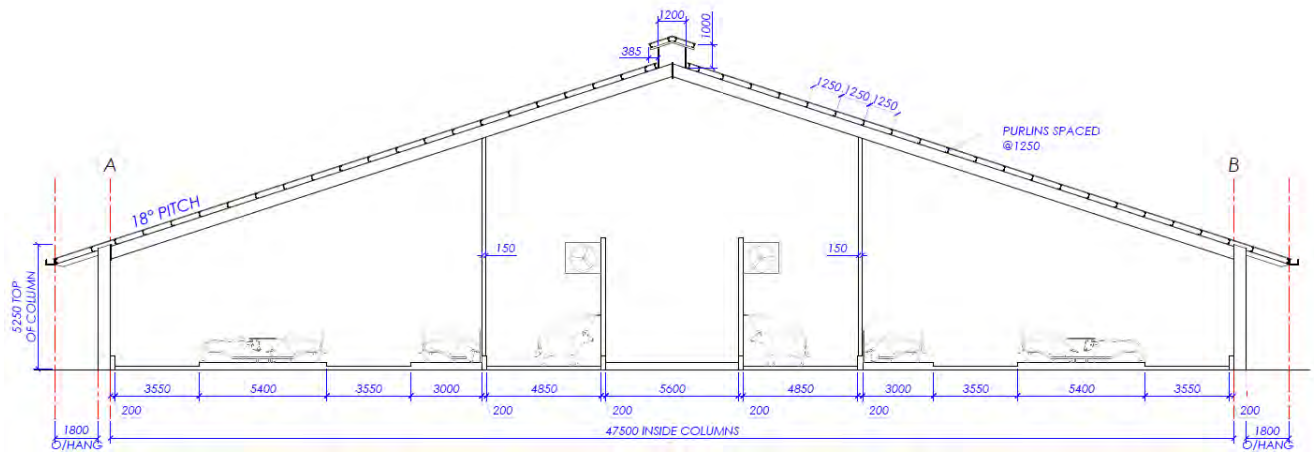


Figure 2 - Cross sectional plan of barn

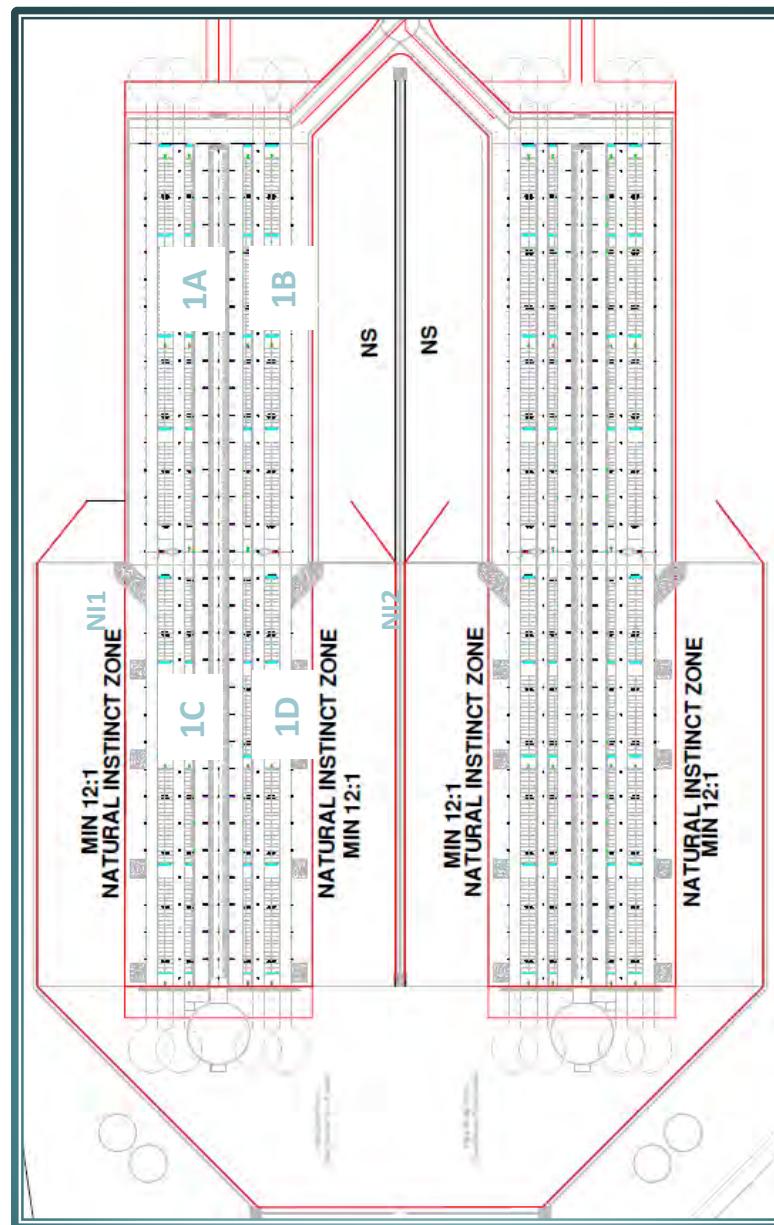


Figure 3 - Plan view of barn



Figure 4 - Image showing overview the site (Photo taken August 2020 looking northeast over site)

The project site has been selected based on its potential for low environmental impact. The project area was completely upgraded in approx. 2005 and following land forming activities, single row plantation trees were established. Some of these species have survived and remain on site in varying stages of health. The ground cover at the site consists of regularly established introduced crop and pasture species. The area proposed for the construction works which includes a new internal construction access track, are all located within the intensive irrigation area shown in the above photo.

1.1. ENGAGEMENT

No consultation has occurred relating to biodiversity as part of the preparation of this report however the report has been prepared following advice provided by the Biodiversity Conservation Division of the Department of Planning, Industry and Environment which indicated in the SEARs response that the *'EIS will need to provide sufficient evidence to support the claim that the mapping is incorrect, including photographs to show vegetation condition'*. The advice also identified that *'if the mapping was incorrect, the EIS should be accompanied by a BOSET report as a demonstration that no clearing is required. If there are any threatened species identified, a Test of Significance under Part 7 of the Biodiversity Conservation Act 2016 should be included'*.

Additional details were provided in this response which have been addressed as part of this report.

2. SITE DESCRIPTION AND WORKS

2.1. LOCATION

The project is located in the New South Wales Riverina region and the Murray River Council Local Government Area. The project site is located on the property known as 'Yarrimbah' which adjoins the Cobb Hwy between Moama and Mathoura.

The project site which includes the proposed freestall barns and infrastructure is located within the existing irrigation area of the property. The site also adjoins the Moira Private Irrigation District's main supply and a spur channel on two sides. The project infrastructure and works are proposed on Lot 2 DP1077844, Lot 117 DP455183, Lot 13 DP751153 and Lot 14 DP 751153 with the remaining portions of the property incorporated for effluent and manure application which will be utilised to grow feed as part of the project operation.

The location of the project site is shown in the figures and tables below.



Figure 5 - Location of project site in relation to the region

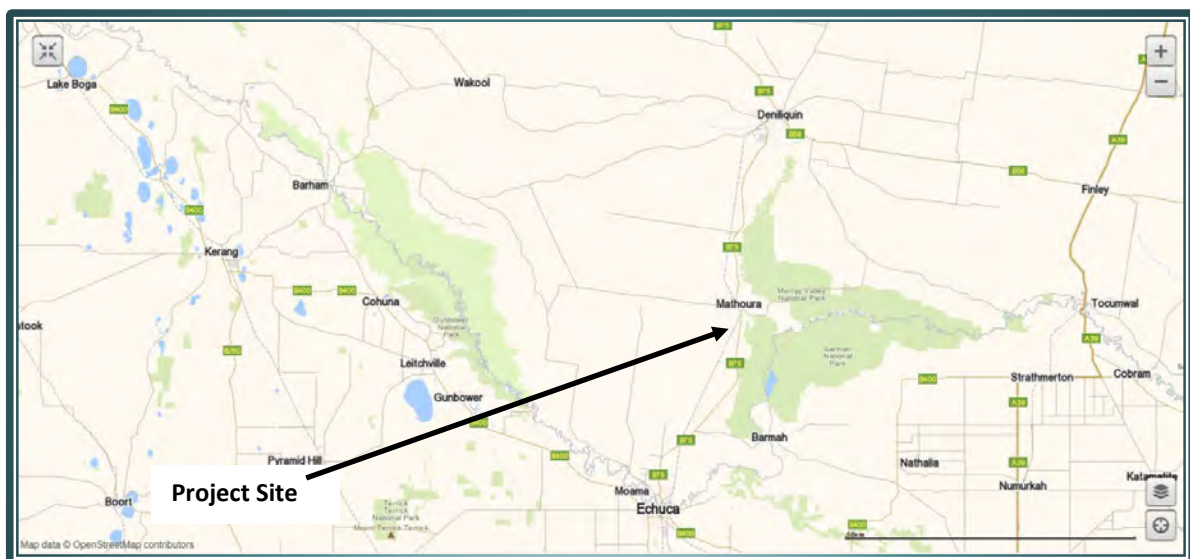


Figure 6 - Location of project site in relation to the local area

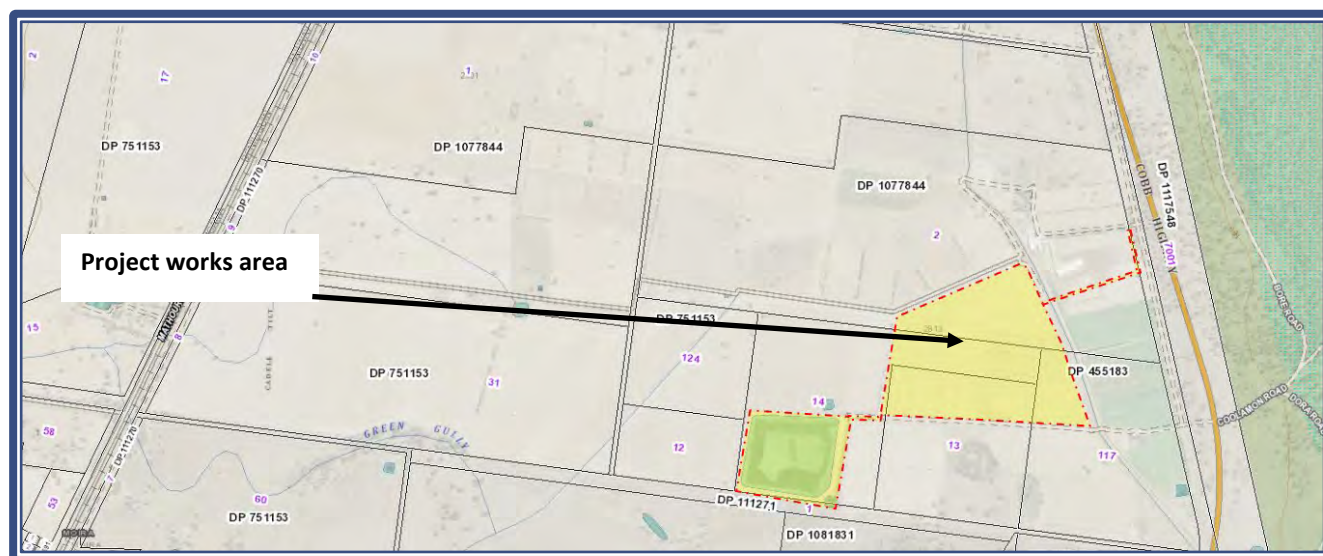


Figure 7 - Location of project in relation to the property

The land details of the project are summarised as follows:

Table 2 - Land details of the project

Details	Specific related to project site			
Lot number	2	117	13	14
Deposited Plan	1077844	455183	751153	
Parish	Moirā			
County	Cadell			
Local Shire	Murray River Council			
LEP Zone	Zone RU1 – Primary Production			
Catchment Area	Murray			
IBRA Sub-region	Riverina – Murray Fans			
Mitchell Landscapes	Murray Scalded Plains			
Local Aboriginal Land Council	Moama Local Aboriginal Land Council			
Floodplain Management Plan	Nil			
Land Stature	Freehold			
Area of project works	Approx. 42ha			
Area of this property	Approx. 573ha			
GPS Reference	MGA Zone 55 E:309685 N:6022812			

2.2. SITE DESCRIPTION

The project site where infrastructure is proposed including the access track, has been utilised for irrigated pasture and cropping since the Moira Private Irrigation District's (PID) inception more than 50 years ago. The irrigation system on the site is surrounded by an access track, existing drains and channels. There irrigation fields within the area are supplied from the Moira PID channel on the eastern side. Each field is connected to the existing on-farm irrigation drainage which exits the project area in the south west corner delivering drainage water to the property recycle point and connected storage dam for re-use on the property.

Following a complete irrigation renovation of the area in around 2005, single row plantation trees were established throughout the area. The species consisting mainly of Swamp mallet (*Eucalyptus spathulata*), interspersed with Ghost gum (*Corymbia aparrerinja*) and willows (*Salix spp*) being selected for their shade properties and ability to survive regular inundation. Over time, and through varying climatic conditions, many of these trees have died or are in a declining state of health. The groundcover species at the site consist of established annual pasture and cereal varieties which are established in line with a mechanical and limited chemical management regime.

The total project is identified below in yellow with the existing vegetation identified in green (alive) and red (dead).



Figure 8 - Project site showing existing vegetation

2.3. SITE SURROUNDS

The site being located within a rural area is surrounded by other farming properties. The Moira Private Irrigation District maintains its pump infrastructure and workshop located approx. 1km to the south east of the site. The Cobb Hwy is located to the east being divided from the property boundary by Travelling Stock Reserve. The entrance to the Moira National Park is on the opposite side of the Cobb Hwy located over 650m to the east at its closest point to the site. The nearest known camping and frequent public use area is over 5.5kms from the property.

The site and surrounds are generally flat with a very low relief within the broader area. There is less than a 10m elevation change in the surrounding area – including considering the Cadell Tilt formation. The broader area is described as the Riverine plain and contains isolated stands of vegetation with some scattered paddock trees.





Figure 9 - Photos showing remnant vegetation in the adjoining Travelling Stock Reserve

2.4. PROJECT WORKS

The project is made up of the following components:

Table 3 - Project design details

Detail	Type	Number	Size	Stages
Freestall barn (open sided)	Proposed	2	277m x 51m	1 & 2
Natural instinct area adjoining barns	Proposed	4	4,000m ²	1 & 2 (2 each)
Freshwater storage	Proposed	1	170ML	1 & 2
Sediment pond	Proposed	1	1ML	1
Effluent treatment system	Proposed	2	60ML	1 & 2
Manure storage area	Proposed	1	2ha	1 & 2
Internal access to site	Proposed	1	600m	1
Rotary dairy	Existing	1	50 cows	NA
Feed processing and storage	Existing	1		NA
Irrigation storage dam	Existing	1	300ML	NA
Irrigation area on property	Existing	2	42ha 352ha	NA

2.5. PROJECT METHODOLOGY

The proposed development would comprise of the following main elements:

- Ground preparation and earthworks,
- Shed construction, and
- Shed fit out and completion.

1.3.1. GROUND PREPARATION & EARTHWORKS

Project estimated earthwork volumes as described above have been provided by stage in **Table 11** and **Table 12**.

Table 4 - Stage 1 earthwork volumes

Work Area	Area (m ²)	Cut (m ³)	Fill (m ³)*	Short/Excess
Shed pad	44,000		73,600	-73,600
Water Storage	42,850	69,800	18,460	+51,340
Sediment Pond	2,526	1,300	251	+ 1,049
Effluent Pond	32,048	33,900	2,020	+31,880
Manure Pad	20,000	-	10,669	-10,669

Work Area	Area (m ²)	Cut (m ³)	Fill (m ³)*	Short/Excess
Access Track	2,400			
Total	143,824	105,000	105,000	0

Table 5 - Stage 2 earthwork volumes

Work Area	Area (m ²)	Cut (m ³)	Fill (m ³)*	Short/Excess
Shed pad	38,821		72,240	-72,240
Water Storage	26,760	50,000	2,940	+47,060
Effluent Pond	17,870	26,000	1,000	+25,000
Total	83,451	76,000	76,180	-180

* **Note:** Earthwork volumes are calculated at a 1:1.15 volume compaction ratio

Works for each stage are proposed to be undertaken in the following works order:

1. Review of existing site drainage prior to works. Installation of erosion and sediment control where appropriate.
2. Peg out and site calibration for GPS control,
3. Construction parking and machinery storage area (future manure storage area) constructed,
4. Site office delivered,
5. Access track within property to site constructed (stage 1 only),
6. Site area drains constructed (stage 1 only),
7. Topsoil progressively removed from construction area and stockpiled,
8. Effluent pond system constructed by stage with earth used for shed pad,
9. Storage dam constructed by stage with export to shed pad undertaken first,
10. Shed pad embankments re-topsoiled and shed area drains checked for level following construction,
11. Storage completed and embankments re-topsoiled.

The earthworks are expected to be undertaken over a 16-week period per stage.

It must be noted that the mortality area is identified for use in a mass mortality event and no construction activities are proposed within this area.

1.3.2. SHED CONSTRUCTION

Shed construction activities relate to the construction of the shed structure will be undertaken in the following works order:

1. Footing mark out survey,
2. Footing excavation and inspection,
3. Concrete pouring and footing bolt placement for all footings,
4. Commencing at end, erect structural steel framework,
5. At completion of framework, roof to be clad,
6. Install flashings and downpipes.

The shed construction for each stage is expected to be undertaken over a 13 week period per stage.

1.3.3. SHED FIT OUT AND COMPLETION

This stage relates to the installation of and connection to all parts of the freestall barn system. These works include electrical work, concreting of flooring and laneways, water supply systems for drinking, temperature management and washing, stall and bedding installation, effluent management systems and fencing.

It is estimated that these works will be undertaken over a 26-week period and will form the longest part of each construction stage.

1.4. CONSTRUCTION ELEMENTS

1.4.1. TIMEFRAME

The project works for stage one is proposed to commence upon receipt of all approvals. As identified above, the estimated timeframes (pending weather) are:

Table 6 - Proposed construction timeframes

Stage	Works	Timeframe
1	Earthworks	16 weeks
	Shed Construction	13 weeks
	Shed fit out	26 weeks
2	Earthworks	12 weeks
	Shed Construction	13 weeks
	Shed fit out	20 weeks

Allowing for lodgement and permits, a preferred timeframe for stage 1 to commence pending suitable weather and contractor scheduling would be for construction to commence in mid-December.

Stage 2 is not proposed for construction for up to 5 years pending organisation scale and cow numbers.

3. STATUTORY CONTEXT

3.1. COMMONWEALTH

3.1.1. ENVIRONMENTAL PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) protects nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the EPBC Act as Matters of National Environmental Significance (MNES). An action will require approval from the Minister if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance.

The Act identifies seven matters of national environmental significance:

- World heritage properties,
- National heritage places,
- Wetlands of international importance (Ramsar wetlands),
- Threatened species and ecological communities,
- Migratory species,
- Commonwealth marine areas,
- The Great Barrier Reef Marine Park,
- Nuclear actions (including uranium mining), and
- A water resource, in relation to coal seam gas development and large coal mining development.

The EPBC Act Policy Statement 1.1 Significant Impact Guidelines (DEH 2006) outline an assessment process, including detailed criteria, to assist in deciding whether or not referral to the Minister is required. Significance of impacts is determined in accordance with the Significance Impact Guidelines 1.1 – Matters of National Environmental Significance (Department of the Environment, 2013). Where a project is likely to have a significant impact on a MNES, the project is referred to the Federal Environment Minister.

3.2. NSW STATE LEGISLATION

3.2.1. NSW ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) provides the framework for the assessment of the project. This project is being assessed under the following regimes:

Division 4.1, previously Part 4, applies to projects that require development consent from a consent authority. A statement of environmental effects or environmental impact statement (for designated development) is to be prepared to assess environmental impacts.

Section 1.7 of the EP&A Act requires that Part 7 of the *Biodiversity Conservation Act 2016* and Part 7A of the *Fisheries Management Act 1994* relate in connection with the terrestrial and aquatic environment. As such a significance of the impact of the project on terrestrial and aquatic threatened species, populations and Endangered Ecological Communities (EEC) is required.

Schedule 1 of the EP&A Regulation, 2000 item 1 identifies that:

A development application must contain the following information:

- (e) an indication as to whether the development is likely to significantly affect threatened species, populations or ecological communities, or their habitats, unless the development is taken to be development that is not likely to have such an effect because it is biodiversity compliant development,*
- (ea) for biodiversity compliant development, an indication of the reason why the development is biodiversity compliant development,*

3.2.2. NSW BIODIVERSITY CONSERVATION ACT 2016

The *Biodiversity Conservation Act 2016* (BC Act) replaced the *Threatened Species Conservation Act 1995* as of 25 August 2017. The purpose of the BC Act is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development (described in section 6 (2) of the *Protection of the Environment Administration Act 1991*), and in particular:

- a) To conserve biodiversity at bioregional and State scales,*

- b) To maintain the diversity and quality of ecosystems and enhance their capacity to adapt to change and provide for the needs of future generations,
- c) To improve, share and use knowledge, including local and traditional Aboriginal ecological knowledge, about biodiversity conservation,
- d) To support biodiversity conservation in the context of a changing climate,
- e) To support collating and sharing data, and monitoring and reporting on the status of biodiversity and the effectiveness of conservation actions,
- f) To assess the extinction risk of species and ecological communities, and identify key threatening processes, through an independent and rigorous scientific process,
- g) To regulate human interactions with wildlife by applying a risk-based approach,
- h) To support conservation and threat abatement action to slow the rate of biodiversity loss and conserve threatened species and ecological communities in nature,
- i) To support and guide prioritised and strategic investment in biodiversity conservation,
- j) To encourage and enable landholders to enter into voluntary agreements over land for the conservation of biodiversity,
- k) To establish a framework to avoid, minimise and offset the impacts of proposed development and land use change on biodiversity,
- l) To establish a scientific method for assessing the likely impacts on biodiversity values of proposed development and land use change, for calculating measures to offset those impacts and for assessing improvements in biodiversity values,
- m) To establish market-based conservation mechanisms through which the biodiversity impacts of development and land use change can be offset at landscape and site scales,
- n) To support public consultation and participation in biodiversity conservation and decision making about biodiversity conservation, and
- o) To make expert advice and knowledge available to assist the Minister in the administration of this Act.

3.2.3. NSW FISHERIES MANAGEMENT ACT 1994

The *Fisheries Management Act 1994* (FM Act) identifies threatened aquatic species, populations and ecological communities and also requires an assessment of significance of impacts on threatened biota.

If the following activities form part of a project, a permit from the Department of Primary Industries (DPI) under the FM Act may be required (pending other approvals):

- Aquaculture,
- Harm marine vegetation such as mangrove, seagrass or seaweed,
- Dredging or reclamation of waterways, including removal of snags or aquatic vegetation (sections 198 and 199),
- Temporary or permanent blockage of fish passage (section 219).

3.2.4. BIOSECURITY ACT 2015

The *Biosecurity Act 2015* and its subordinate legislation commenced on the 1st July 2017. The Biosecurity Strategy 2013-2021 and *Biosecurity Act 2015* (which repeals the *Noxious Weeds Act 1993*) provide a streamlined, clear framework for safeguarding primary industries, natural environments and communities from a range of pests, diseases and weeds. The broad objectives of this Act and for biosecurity in NSW are to manage biosecurity risks from animal and plant pests and diseases, weeds and contaminants by:

- Preventing their entry into NSW,
- Quickly finding, containing and eradicating any new entries,
- Effectively minimising the impacts of those pests, diseases, weeds and contaminants that cannot be eradicated through robust management arrangements.

The *Biosecurity Act* provides a flexible and responsive statutory framework to help achieve these objectives for the benefit of the NSW economy, environment and community. Priority weeds identified within the study area and associated impacts are assessed in Section 5.2.2.

3.2.5. STATE ENVIRONMENTAL PLANNING POLICY (KOALA HABITAT PROTECTION), 2019

The project is located within the Murray River Council Local Government Area, which is listed on Schedule 1 of Koala SEPP. The Murray River Council is within the Far West Koala Management Area which identifies the following species as Koala use tree species.

Table 7 - Koala use tree species within the Farm West KMA

Scientific name	Common name(s)
<i>Angophora floribunda</i>	Rough-barked Apple
<i>Callitris glaucophylla</i>	White Cypress Pine
<i>Casuarina cristata</i>	Belah
<i>Eucalyptus albens</i>	White Box
<i>Eucalyptus blakelyi</i>	Blakely's Red Gum
<i>Eucalyptus camaldulensis</i>	River Red Gum
<i>Eucalyptus chloroclada</i>	Dirty Gum
<i>Eucalyptus coolabah</i>	Coolibah
<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark
<i>Eucalyptus dealbata</i>	Tumbledown Red Gum
<i>Eucalyptus intertexta</i>	Gum Coolibah
<i>Eucalyptus largiflorens</i>	Black Box
<i>Eucalyptus melanophloia</i>	Silver-leaved Ironbark
<i>Eucalyptus melliodora</i>	Yellow Box
<i>Eucalyptus microcarpa</i>	Western Grey Box
<i>Eucalyptus moluccana</i>	Grey Box
<i>Eucalyptus pilligaensis</i>	Narrow-leaved Grey Box
<i>Eucalyptus populnea</i>	Bimble Box
<i>Eucalyptus sideroxylon</i>	Mugga Ironbark
<i>Geijera parviflora</i>	Wilga

A review of the tree species within the project area identifies that none of the species identified as Koala use tree species are present on the site. As a result, the Koala SEPP does not apply to this project.

4. METHODOLOGY

4.1. BACKGROUND REVIEW

4.1.1. BIODIVERSITY OFFSET SCHEME AND BIODIVERSITY ASSESSMENT METHOD

The Biodiversity Offsets Scheme Threshold is a test used to determine when it is necessary to engage an accredited assessor to apply the Biodiversity Assessment Method (BAM) to assess the impacts of a project. It is used for local developments and clearing that does not require development consent in urban areas and areas zoned for environmental conservation (under the *NSW State Environmental Planning Policy - Vegetation in Non-Rural Areas* 2017).

The *NSW Biodiversity Conservation Regulation 2017* sets out threshold levels for when the Biodiversity Offsets Scheme will be triggered. The threshold has two elements:

- whether the amount of native vegetation being cleared exceeds a threshold area set out below, and
- whether the impacts occur on an area mapped on the Biodiversity Values map published by the Minister for the Environment.

If clearing and other impacts exceeds either trigger, the Biodiversity Offset Scheme applies to the proposed development including biodiversity impacts prescribed by clause 6.1 of the *Biodiversity Regulation 2017*.

A Biodiversity Values Map and Threshold Tool is utilised to provide a 'Biodiversity Offset Scheme Entry Threshold (BOSET) Map in relation to the above requirements. This report will identify if a Biodiversity Development Assessment Report (BDAR) is required.

In some cases, the area of impact may be proposed on land with no vegetation mapping available and the tool is unable to determine if the area of native vegetation exceeds the area threshold. In this case, the BOSET guide is referred to and identifies the following in relation to assessing the 'clearing area'.

Native vegetation is defined under s. 60B of the Local Land Services Amendment Act 2016 as follows:

1. *For the purposes of this Part, native vegetation means any of the following types of plants native to New South Wales:*
 - a. *trees (including any sapling or shrub or any scrub),*
 - b. *understorey plants,*
 - c. *groundcover (being any type of herbaceous vegetation)*
 - d. *plants occurring in a wetland.*
2. *A plant is native to New South Wales if it was established in New South Wales before European settlement. The regulations may authorise conclusive presumptions to be made of the species of plants native to New South Wales by adopting any relevant classification in an official database of plants that is publicly accessible.*
3. *For the purposes of this Part, native vegetation extends to a plant that is dead or that is not native to New South Wales if:*
 - a. *the plant is situated on land that is shown on the native vegetation regulatory map as category 2 – vulnerable regulated land*
 - b. *it would be native vegetation for the purposes of this Part if it were native to New South Wales.*

Applicants are also required to undertake a 'test of significance' to ensure that the project will not have significant impact on biodiversity – specifically threatened species. The form of this assessment is through the utilisation of the 'Five-part test'.

An assessment of the existing vegetation on site has been undertaken in relation to the above test. In addition to and in accordance with the assessment requirements, a likelihood of occurrence ranking has been attributed to threatened biota and migratory species based on the framework outlined in **Table 4** below.

Table 8 - Ranking for Assessment

Presence of habitat	Definition
Present	Potential of known habitat is within the project site.
Marginal	Habitat present in project site is not typical but may be suitable.
Absent	No potential or known habitat is present within the project site.
Unlikely	Species not previously recorded within a 10km radius and suitable habitat not recorded within the project site.

Likelihood of occurrence	Definition
Known	Species recorded within the project site either from previous records or field survey results
Likely	Species previously recorded within a 10km radius and suitable habitat occurs within the project site.
Possible	Species recorded within 10km radius but no suitable habitat recorded, or species not previously recorded within a 10km radius, but the project site is located within species known distribution and suitable habitat occurs within the project site.
Unlikely	Species not previously recorded within a 10km radius and suitable habitat not recorded within the project site.

Possible to be impacted	Definition
No	The project would not result in an impact to this species. No Assessment of Significance (AoS) is necessary for this species.
Low	The project is unlikely to result in an impact to the species. No Assessment of Significance (AoS) is necessary for this species.
Moderate	The project could impact on this species of its habitats. This species is considered further in the Assessment. The risk to this species is considered manageable and an AoS is not considered necessary.
High	The project is likely to impact on this species or its habitats. An AoS has been applied to these entities.

4.1.2. DATABASE SEARCHES

Database searches were undertaken following the initial site inspection and during preparation of the SEARs background document to identify threatened species or communities known to, or potentially occurring in the locality (within 10kms of the project area). These searches utilised the following resources.

Table 9 - Summary of database searches

Resource	Target	Search Date	Search Area	Results Location
Biodiversity Offsets Search Entry Tool	Assessment Level	17/02/2020 02/11/2020	Project site	Section 11.2
OEI Wildlife Atlas Data (BioNet)	Threatened flora and fauna species, populations and ecological communities listed under the BC Act.	11/05/2020 02/11/2020	Study area (10km radius)	Section 5.2
EPBC Act Protected Matters Search	Threatened flora and fauna, endangered populations and ecological communities and migratory species.	11/05/2020 23/10/2020	Study area (10km radius)	Section 11.3
NSW Weed Wise database	Priority weeds declared in the relevant region	23/10/2020	Murray Region	Section 11.4
NSW Primary Industries threatened and protected fish database	Key fish habitat, species, populations or communities listed under schedules 4	Nil	Nil	NA

Resource	Target	Search Date	Search Area	Results Location
	and 5 and their relation to the project site.			
Bureau of Meteorology National Atlas of Groundwater Dependant Ecosystems	Vegetation communities that are likely to rely on groundwater.	03/11/2020	Study area (10km radius)	Section 5.2.3 and 11.5
SEED data portal	Regional and local mapping, Aquatic Fauna.	03/11/2020	Study area and surrounds.	Section 11.6

4.1.3. DESKTOP ASSESSMENT

The species identified by database searches were evaluated for their potential to occur in the project site and surrounding area (10km) based on habitat requirements, species sightings and records. This approach assumes that if suitable habitat is present on site, and local records of species occur, the project site may have the potential to harbour those species. The habitat evaluation approach increases the integrity of the site inspection to determine presence or absence of threatened species. This detailed assessment is included in Section **11.5**.

4.2. SITE INSPECTION

An initial site inspection was undertaken on the 24th February 2020 to identify the site area in relation to concept plans and broadly reviewing the site in relation to species type and habitat value. An additional site inspection was undertaken on the 17th August 2020 with a focus on species identification and recording and habitat features associated with threatened species identified in the desktop assessment. This includes the following considerations:

- Vegetation requiring removal from the site for site works,
- Presence of mature trees with hollows, fissures and/or other suitable roosting/nesting places,
- Presence of hollow logs/debris and areas of dense leaf litter,
- The presence of preferred feed tree species,
- Condition, flow and water quality of drainage lines and bodies of water,
- Presence of fruiting flora species and blossoming flora species, particularly winter flowering species,
- Vegetation connectivity and proximity to neighbouring areas of vegetation,
- Presence of caves, hollow trees and/or man-made structures suitable as bat roost sites,
- Native flora species and vegetation communities present,
- Opportunistic fauna sightings, and
- Weed species present and their abundance.

4.3. COMBINED ASSESSMENT

Following the site inspections, this report reviews the findings of both the desktop assessment, site inspection and records the results in relation to the 'Five-part test' and EPBC referral assessment. Any mitigation measures required will be recommended and a conclusion will be provided at the end of the report.

5. RESULTS

5.1. BIODIVERSITY OFFSET SCHEME ENTRY TEST REPORT

The Biodiversity Offset Scheme Entry Threshold Tool (BOSET) was accessed prior to the site inspections and again on the 2nd November 2020 during the report writing. The map and report produced as part of this review demonstrates that the:

- Project site is located on land excluded from the LLS Act.
- Project site is not located on an area mapped as 'Biodiversity Values'.
- Threshold report identifies that a Biodiversity Development Assessment Report (BDAR) may be required based on the Area clearing trigger.

The BOSET mapping is replicated below in **Figure 10** and identifies the project site in relation to the Biodiversity Values mapping. The full BMAT report is located in **Appendix 1**.

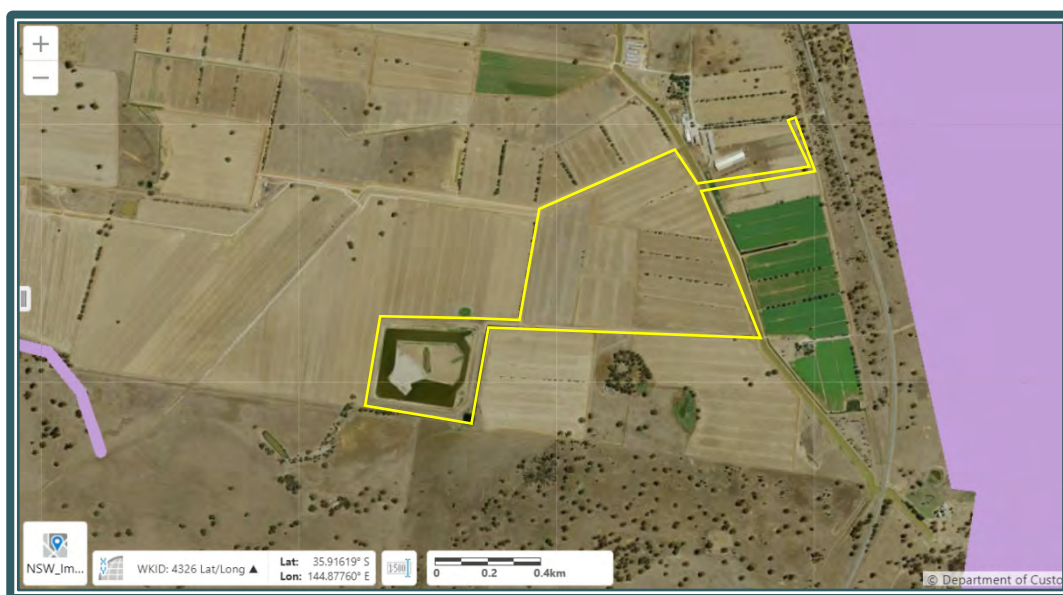


Figure 10 – Biodiversity Value mapping (BC Act) (image from 02-04-2020)

The site inspection assessed and recorded all 69 trees on site recording species, nests, hollows, status and general health. Each tree has then been reviewed in terms of the project activities with the following identified:

Table 10 - Site species and outcome summary

Species	No. on site	No. Alive	No. for removal	No. alive for removal
Swamp Mallet	55	45	39	30
Willow	7	0	7	0
Red Ironbark*	4	4	1	1
Ghost Gum	2	2	2	2
River She-oak*	1	1	1	1
Total	69	52	50	34

* - Denotes species that are considered to be native under the BOSET and LLS Amendment Act 2016 being established in New South Wales before European settlement.

As identified above, the site contains a total of 69 trees of which 52 are alive. 50 trees require removal of which 34 of these are alive. Of the species identified on site, 2 species can be defined as native vegetation under the BOSET and these include Red or Mugga Ironbark (*E. tricarpa*) and River She-oak (*Casuarina cunninghamiana*). Of the species that are defined as native, there are 2 that require removal as part of the project construction activities. The removal of these trees is below the vegetation threshold of 1ha and as such, the Biodiversity Development Assessment Report is not required.



Figure 11 - Native species for removal (left ID-22 & right ID-31)

The project does not exceed the trigger for a BDAR however this does not remove the requirement to consider project works in relation to threatened species. A Test of Significance or 'Five-part test' has been undertaken by utilising a collation of database records, species and community profiles with a 'likelihood of occurrence' assessment prepared with reference to the existing site conditions.

5.2. DATABASE SEARCHES

The following results have been determined as part of the mapping and database searches:

Table 11 - Site in relation to regions

Detail	Specific related to Project Site	
Bioregion	Riverina	
Sub-region	Murray Fans	
Soil Type	Predominantly red-brown earth (Bunnaloo soils)	
Mitchell Landscape	Murray Scalded Plains	
Vegetation Formation	Not Native	Grassy Woodland
Vegetation Class	Not Native	Floodplain Transitional Woodlands
Vegetation Type	Not Native	Riverine Western Grey Box grassy woodland of the semi-arid climate zone.
Plant Community Type ID	0	237
Surface Water Sharing Plan (WSP)	WSP for the Murray Unregulated and Alluvial Water Sources 2011	
Surface Water Source	Murray Below Mulwala Water Source	
Ground Water Sharing Plan	Lower Murray Shallow Groundwater Source 2012	
Ground Water Management Area	Lower Murray Alluvium (DS of Corowa)	

5.2.1. FLORA

PLANT COMMUNITY TYPES – ECOLOGICAL VEGETATION CLASSES

The NSW State Vegetation Type Map: Riverina Region Version V1.2 – VIS_ID4469 (OEH, 2016) has been utilised to identify the mapped Plant Community Type (PCT) of the project site. This mapping identified the PCT of non-native

(ID-0) and small isolated areas Riverine Western Grey Box grassy woodland (ID-237) being located over the above described single row plantation trees. The site is consistent with the non-native mapping however is inconsistent with the Grey-box grassy woodland. The PCT mapping is shown below.



Figure 12 - Plant Community Type mapping of the site

As identified above, there are no recorded Grey Box (*Eucalyptus macrocarpa*) species remaining on the site and no remaining native mid or understorey plants. The groundcover species consists of planted introduced annual cereal crops, grasses and clovers.

There are remnant Grey Box recorded in the surrounding area particularly on the adjoining Travelling Stock Reserve identified to the east of the site in yellow above. A review of the classification of a Grey Box Grassy Woodland as provided in the document 'A guide to the identification, assessment and management of a nationally threatened ecological community Environment Protection and Biodiversity Conservation Act 1999' has been undertaken. This document provides two flow charts to identify if a site is a Grey Box community or if the area is of sufficient quality to meet the listing.

Table 12 - Flowchart 1 - Could a nationally threatened grassland or grassy woodland community be present?

Test	Response	Justification
Is the property within or near the area shown on the Grey Box Grassy Woodland distribution map?	Yes	Property located within the distribution area
Is at least 50% of the plant cover in the ground layer made up on perennial native species? OR Is at least 10% of plant cover in the ground layer made up of perennial native grass species?	No	No native ground layer remains. The site has been dramatically modified and forms part of an intensive irrigation area on a dairy operation. There is no native shrub species and no native grass species remaining on site.
Not a listed threatened ecological community.		

Table 13 - Flowchart 2: Is the patch of potential Grey Box Grassy Woodlands of sufficient quality for national listing?

Test	Response	Justification
Is (or was previously) the most common tree species Grey Box?	Possible – Yes selected	Site located within an area where this species would have been common. Site has been mapped as Grey Box.
Is the patch at least 0.5ha in size?	Unknown – Yes selected	Project site encompasses an area larger than 0.5ha although no species remain.

Test	Response	Justification
Do non-grass weeds make up more than 30% of the plant cover in the ground layer?	No	The ground cover at the site does not include any native species however all species on the site are introduced grasses. This test does not specifically identify the requirement of grasses to be native.
Is there evidence that Grey Box trees were once common in the patch?	Yes	Selected based on adjoining travelling stock reserve vegetation and mapping.
Are there at least 12 perennial native species in the mid and ground layers?	No	There are no native species evident in the mid and ground layers remaining on the site.
The site is not a listed ecological community		

It can be seen that in both tests that the site does not fulfill the criteria of a Grey Box community or the potential quality for a listed patch. Photos of the site vegetation are provided below with species recorded and additional photos in **Appendix 5**.

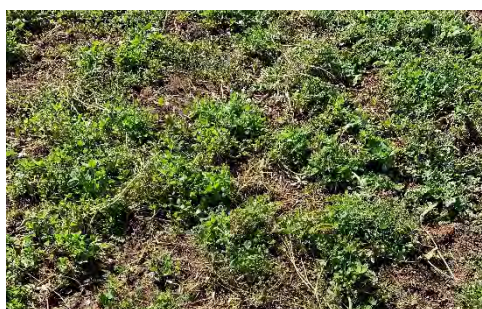


Figure 13 - Photos showing the vegetation within the site looking from north to south

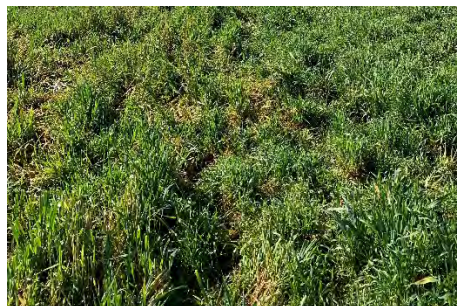


Figure 14 - Photos showing the vegetation within the site looking from east to west



Figure 15 - Photos showing the vegetation within the proposed construction access to site

THREATENED ECOLOGICAL COMMUNITIES

Database searches undertaken on the 2nd April 2020 and the 3rd November 2020 revealed the following listed Ecological Communities with the potential to occur within the surrounding area (within 10 km). These are identified below in **Table 10**.

Table 14 - Listed Threatened Ecological Communities

Threatened Ecological Communities	Database ID
<i>Acacia melvillei</i> (Yarran) Shrubland in the Riverina and Murray-Darling Depression bioregions	Bionet
<i>Allocasuarina luehmannii</i> (Bulloak) Woodland in the Riverina and Murray-Darling Depression bioregions	Bionet/PMST
<i>Eucalyptus microcarpa</i> (Inland Grey Box) Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South bioregions	Bionet/PMST
<i>Acacia pendula</i> (Weeping Myall/Boree) Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	Bionet/PMST
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions	Bionet
White Box-Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland bioregions	Bionet/PMST
Natural Grasslands of the Murray Valley Plain bioregions	PMST

The site assessment undertaken did not indicate any evidence of the above ecological communities. It is noted above that the site has a mapped ecological community of *E. macrocarpa* woodland in the Riverina however there is no evidence of the community remaining on the site. No aquatic ecological community is located within the project site.

THREATENED FLORA

The BioNet database search for threatened flora species listed under the BC Act revealed two threatened species with records within the study area (10kms of site). The PMST suggests six threatened flora species with the potential to occur within the study area. Of these species, none are considered as having a medium or high potential for impact with a very limited likelihood of occurring within the site. See section 11.5. The species identified in the searches are:

Table 15 - Threatened Flora identified within the study area

Scientific Name	Common Name	NSW	C'Vealth	Recorded at site	EPBC	Bionet	Potential for impact
<i>Austrostipa wakoolica</i>	A spear-grass	E	E	No	Yes		No
<i>Brachyscome muelleroides</i>	Claypan Daisy	V	V	No	Yes		No
<i>Sclerolaena napiformis</i>	Turnip Copperburr	E	E	No	Yes	Yes	No
<i>Swainsona murrayana</i>	Slender Darling Pea	V	V	No	Yes		No
<i>Amphibromus fluitans</i>	Floating Swamp Wallaby-grass	V	V	No	Yes	Yes	No
<i>Pimelea spinescens</i>	Plains Rice-flower	NL	CE	No	Yes		No

NL – Not Listed, V – Vulnerable, E – Endangered, CE – Critically Endangered, PE – Presumed extinct

5.2.2. PRIORITY WEEDS

The *Biosecurity Act* 2016 dictates that all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any land managers or authorities who deal with any plant has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

Within the Murray region there are 88 listed priority weeds, one of which was recorded during the site visits (Willow). All Willow plants within the site have been treated and are dead and will be removed during project construction activities. It should be noted that due to season of the survey, the presence of priority weeds cannot be discounted entirely. Other weed species that were identified within the study area are common within the region and are often encountered along riparian and disturbed areas.

Section 7 details mitigation measures that will aid in alleviating any potential biodiversity risks associated with the assisted spread of exotic flora.

5.2.3. GROUNDWATER DEPENDANT ECOSYSTEMS

Groundwater Dependent Ecosystems (GDE) are those ecosystems that rely on groundwater as a source for its water requirements. In Australia there are six types of GDEs that have been identified (Geoscience Australia, 2020):

- Terrestrial vegetation that relies on the availability of shallow groundwater,
- Wetlands such as paperbark swamp forests and mound springs,
- River base flow systems where groundwater discharge provides a significant baseflow component to the river,
- Aquifer and cave ecosystems where life exists independent of sunlight,
- Terrestrial fauna, both native and introduced species, that rely on groundwater as a source of drinking water,
- Estuarine and near-shore marine systems, such as coastal mangroves, salt marshes and sea-grass beds, which rely on the submarine discharge of groundwater.

In the Murray Alluvium Water Resource Plan area there are several high value, high probability GDEs of ecological value which include wetlands, vegetation and base flow ecosystems. The high value of the ecosystems within the area are due to the internationally significant RAMSAR and other wetlands which support a large number of threatened species. Generally, the GDE with high ecological values have large vegetation patches, are highly connected (eg riparian corridors) and have a high number of threatened species present.

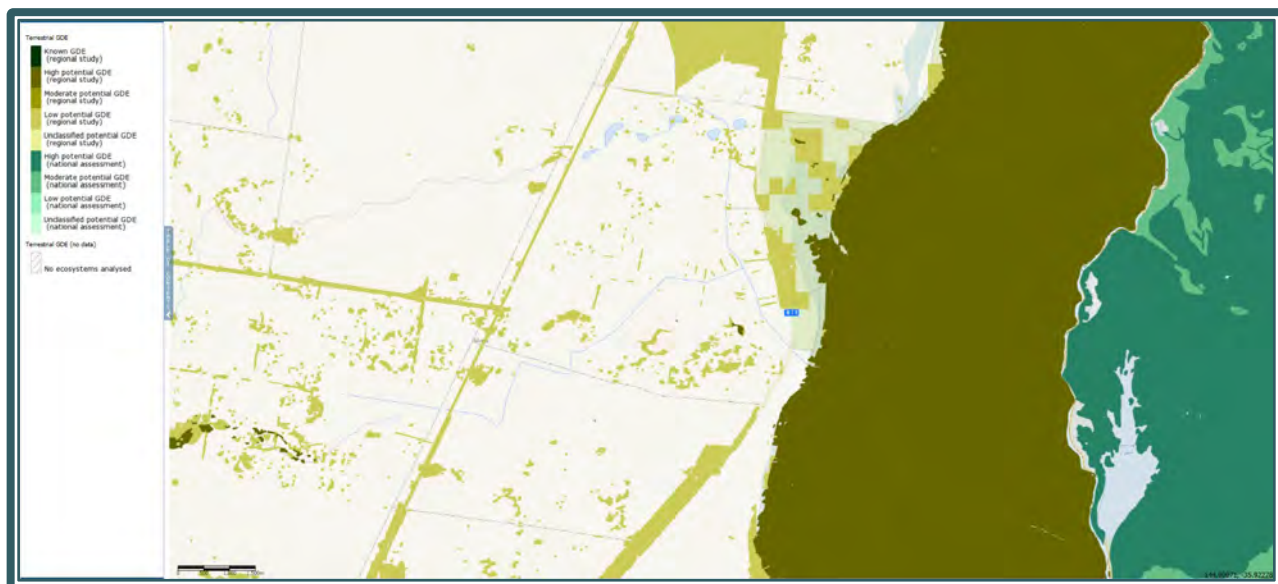


Figure 16 - Map identifying the Groundwater Dependant Ecosystems within the region (Source: BoM: GDE Atlas)

It can be identified from the above that the site is adjoining an area of known GDE being the River Red Gum Forests of the Moira National Park. There is a small area of the site which has been identified by a regional study as being a Grey-box grassy woodland with a low potential GDE. As described above, the site does not contain any evidence of a Grey Box community and as such, the project area and proposed works are unlikely to impact any GDE.

Project works at this location are not proposed to exceed 1m in depth and do not relate to the extraction of groundwater at any depth. No vegetation is proposed for removal. As a result, impacts to any GDE are unlikely.

5.3. FAUNA

5.3.1. THREATENED FAUNA

A total of forty NSW listed species have been identified through the above desktop searches. Of these identified species, there are two amphibians, one reptile, twenty-eight birds, five aquatic, one mammal and three bats. A summary showing these species and their potential for impact is shown below in **Table 12**.

Table 16 - Threatened Fauna identified within the study area

Species	Scientific Name	Common Name	NSW	C'wealth	Recorded at site	EPBC	Bionet/SEED/	Potential for impact
Amphibian	<i>Crinia sloanei</i>	Sloane's Froglet	V	NL	No	Yes		Low
Amphibian	<i>Litoria raniformis</i>	Southern Bell Frog	E	V	No	Yes		No
Reptile	<i>Delma impar</i>	Stiped Legless Lizard	V	V	No	Yes		Low
Aves	<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V	NL	No		Yes	Low
Aves	<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	E	No	Yes	Yes	No
Aves	<i>Calidris ferruginea</i>	Curlew Sandpiper	E	CE	No	Yes	Yes	No
Aves	<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V	NL	No		Yes	Low
Aves	<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	NL	No		Yes	Low
Aves	<i>Falco hypoleucos</i>	Grey Falcon	E	V	No	Yes		No
Aves	<i>Falco subniger</i>	Black Falcon	E	NL	No		Yes	No
Aves	<i>Grantiella picta</i>	Painted Honeyeater	V	V	No	Yes	Yes	Low
Aves	<i>Grus rubicunda</i>	Brolga	V	NL	No		Yes	Low
Aves	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V	Listed	No	Yes	Yes	No
Aves	<i>Hieraaetus morphnoides</i>	Little eagle	V	NL	No		Yes	No
Aves	<i>Lathamus discolor</i>	Swift Parrot	E	CE	No	Yes	Yes	Low
Aves	<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)	V	NL	No		Yes	Low
Aves	<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)	V	NL	No		Yes	No
Aves	<i>Ninox connivens</i>	Barking Owl	V	NL	No		Yes	Low
Aves	<i>Oxyura australis</i>	Blue-billed Duck	V	NL	No		Yes	No
Aves	<i>Pachycephala inornata</i>	Gilbert's Whistler	V	NL	No		Yes	No
Aves	<i>Pedionomus torquatus</i>	Plains-wanderer	E	CE	No	Yes		No
Aves	<i>Petroica boodang</i>	Scarlet Robin	V	NL	No		Yes	Low
Aves	<i>Petroica phoenicea</i>	Flame Robin	V	NL	No	Yes	Yes	Low
Aves	<i>Polytelis swainsonii</i>	Superb Parrot	V	V	No	Yes	Yes	No
Aves	<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	V	NL	No		Yes	Low
Aves	<i>Rostratula australis</i>	Australian Painted Snipe	E	E	No	Yes		No
Aves	<i>Stagonopleura guttata</i>	Diamond Firetail	V	NL	No		Yes	Low
Aves	<i>Stictonetta naevosa</i>	Freckled Duck	V	NL	No		Yes	No

Species	Scientific Name	Common Name	NSW	C'wealth	Recorded at site	EPBC	Bionet/SEED/	Potential for impact
Aves	<i>Pezoporus occidentalis</i>	Night Parrot	PE	E	No	Yes		No
Aves	<i>Numenius madagascariensis</i>	Eastern Curlew	NL	CE	No	Yes		No
Aves	<i>Pandion Haliaetus</i>	Osprey	V	NL	No	Yes		No
Fish	<i>Galaxias rostratus</i>	Flathead Galaxias	CE	CE	NA	Yes		No
Fish	<i>Maccullochella peelii</i>	Murray Cod	NL	V	NA	Yes		No
Fish	<i>Macquaria australasica</i>	Macquarie Perch	E	E	NA	Yes		No
Fish	<i>Bidyanus bidyanus</i>	Silver Perch	V	CE	NA	Yes		No
Fish	<i>Craterocephalus fluvialilis</i>	Murray Hardyhead	CE	E	NA	Yes		No
Mammals	<i>Phascogale cinereus</i>	Koala	V	V	No	Yes	Yes	No
Bats	<i>Myotis macropus</i>	Southern Myotis	V	NL	No		Yes	No
Bats	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V	NL	No		Yes	Low
Bats	<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat	V	V	No	Yes		Low

NL – Not Listed, V – Vulnerable, E – Endangered, CE – Critically Endangered, PE – Presumed extinct

No threatened fauna species were recorded during the site inspection.

Based on the habitat values present within the study area, seventeen fauna species have been identified as a low potential for impact and the remaining species with no potential impact. No species have been identified with a medium to high potential for impact. These are further discussed in Section 6.2.

5.3.2. THREATENED FAUNA HABITAT

The area proposed for disturbance as part of the construction and infrastructure work has been selected due to the minimal disturbance of undisturbed remnant vegetation within the area. As previously identified, the site consists mainly of single row plantation species with no mid to low storey, no identified native forbs or grasses and limited fallen timber (being 3 dead trees). The site is limited in terms of habitat value and is likely to only be utilised by species in an opportunist form for hunting. No nests, dens or other significant roosting features were observed within the vegetation on the proposed works site.

The areas adjoining the project site contain potential foraging and nesting/roosting habitat for woodland birds, parrots and arboreal mammals in the form of flowering eucalypts and hollow-bearing trees. These areas are located to the south of the site in isolated remnant patches and east of the area within the Travelling Stock Reserve and National Forest. No works are proposed within or are predicted to impact these areas.

There are no known Koala feed tree species located within the site and no records of species within or adjoining the project area. No further assessment in relation to Koalas or their habitat has been undertaken.

The site is unlikely to contain suitable habitat for species which prefer complex habitat features and a variation of structure.

5.3.3. THREATENED, PROTECTED AND MIGRATORY FAUNA SPECIES

The PMST revealed one migratory marine species, two terrestrial migratory species and eight migratory wetland species with the potential to occur within the study area (10kms of the site). Four Ramsar wetlands are identified as being located more than 200km from the study area, one within 20kms and the remaining two (Barmah Forest and NSW Central Murray State Forest) located within 10kms of the project site. No wetland will be impacted either directly or indirectly by the project, through the installation or operation of the project. Results of PMST is provided in Section **11.3**.

Table 17 - MNES Wetlands of International Importance

MNES - Wetlands of International Importance	Proximity
Banrock Station wetland complex	400-500kms
Barmah Forest	Within 10kms
Gunbower Forest	20-30kms
Hattah-Kulkyne Lakes	200-300kms
NSW Central Murray State Forest	Within 10kms
Riverland	400-500kms
The Coorong and Lakes Alexandrina and Albert Wetland	400-500kms

5.4. EPBC MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

There are no MNES with the potential to occur within the project site and the site does not contain an EPBC listed ecological community.

6. ASSESSMENT OF IMPACTS

6.1. FLORA IMPACTS

6.1.1. LOSS OF VEGETATION

The proposed works will result in the loss of 34 living trees from the site being trees that are located within single row plantations. Of these trees, two are considered as native trees under the definition of '*vegetation that was native to NSW at the time of European settlement*' although both are located out of their native distribution or habitat zones. The project ground disturbance works will be undertaken in areas that have been previously disturbed and contain no native identified groundcover species. The site does not contain any low or mid storey shrubs or forbs.

6.1.2. THREATENED ECOLOGICAL COMMUNITIES

The project site has been described as predominantly Non-native (ID-0) and Riverine Western Grey Box grassy woodland (ID-237). As discussed, and identified above, the site does not meet the description of the Grey Box PCT and as such the entire site is considered a non-native PCT.

As there are no remaining plant community types remaining on site, the project will not reduce the extent of any threatened or endangered ecological community.

6.1.3. THREATENED FLORA

No threatened flora was identified during the site inspection nor is any known to occur within the project site. The PMST identified six species with potential to occur within the study area however the site has been modified and there is no evidence of these species within the footprint. The assessments contained within Section 11.5, concluded that the project would not have a significant impact to any of these species listed under the BC Act and/or EPBC Act.

6.2. FAUNA IMPACTS

6.2.1. HABITAT LOSS

There is no identified significant habitat proposed for removal for the construction or operation of this project. As identified above, the site is unlikely to be utilised by species as an important or significant habitat area.

6.2.2. LOSS OF HOLLOW-BEARING TREES AND LOGS

There are no trees with hollows identified within the project area. The vegetation remaining on site has been established single row plantation trees that are less than 20 years in age. Over time, these trees have died and been removed with three of the fallen plantation trees remaining within the site. No tree, dead, alive or fallen contains hollows and, as a result, the vegetation on site will be of little value to species requiring this as a habitat requirement.

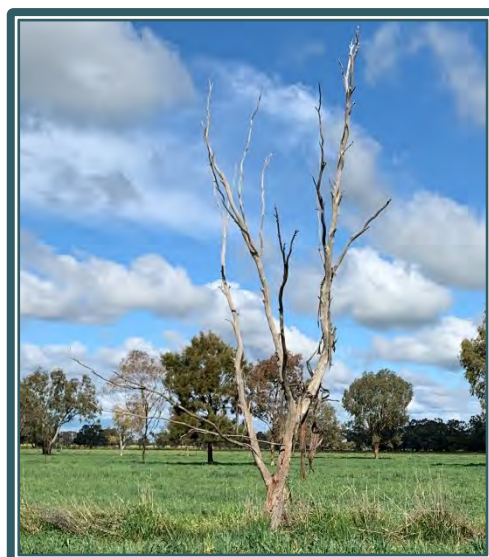


Figure 17 - Photo showing typical dead tree within the site

6.2.3. THREATENED AND MIGRATORY FAUNA

The impact assessment as described above and attached in Section 11.5, has not identified any species with a moderate to high potential for impact and no Assessment of Significance has been identified as required.

6.3. IMPACT OF RELEVANT KEY THREATENING PROCESSES

The following Key Threatening Processes have been identified as being relevant to the project and the potential impacts as a result of the project works have been addressed below.

Table 18 - Key threatening processes under the BC and FM Acts

Key Threatening Processes		
BC Act	EPBC Act	Relevance
Clearing of Native Vegetation	Land Clearance	As identified above, there are 2 species that are defined as Native Vegetation that require removal within the site. The remaining vegetation consists of introduced or species not native to the area. Weed control and management within the project site will continue to prevent the spread of weeds and associated decline in biodiversity values.
Loss of Hollow-bearing Trees	N/A	No hollows identified in vegetation (dead or alive) or fallen trees are proposed for removal.
Removal of dead wood and dead trees	N/A	As identified above, the species proposed for removal consist of introduced species that are of an age of less than 20 years. There are no hollows, and the fallen timber is unlikely to provide an important habitat resource.
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands	N/A	The project will not alter the course of the river or the floodplain. Project works do not relate to the harvesting of flood or surface water from within the site.
Invasion of native plant communities by exotic perennial grasses	N/A	Exotic grasses and weeds form the majority of the groundcover layer within the project site due to its current land use. The project works and operation are unlikely to create an invasion of exotic grasses.

6.4. FIVE PART TEST

An assessment of all recorded threatened species within the project site and study area has been undertaken with the results recorded in Section 11.7.

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

The project area has not been identified as a utilisation area for any threatened species. The vegetation proposed for removal is predominantly introduced and forms limited habitat value. There are no impacts proposed with relation to surrounding hollow bearing trees, feed trees or fallen timber, therefore, it is unlikely that the project works or operation will have an adverse effect on the life cycle of any species or place any species or population at the risk of extinction.

(b) in the case of an Endangered Ecological Community (EEC) or critically endangered ecological community, whether the proposed development or activity:

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

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

There are five endangered ecological communities that have been identified in the Protected Matters Report and six in the BioNET search - a total of seven. Plant Community Type mapping has identified that the site consists of two plant community types being Non-native and Grey Box. A review of the site vegetation in relation to the mapping has been undertaken with the EPBC test applied which concluded that the site does not meet the requirements of the Grey Box community, this being due to the complete absence of Grey Box, native mid, low and grassy understorey.

No activities proposed will have an adverse effect on the extent or composition of an EEC and the construction and operation will not place an EEC at the risk of extinction either locally or otherwise. The project will not modify the composition of any EEC.

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

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

A review of the site in relation to its potential habitat values for threatened species or an ecological community has determined that the site is unlikely to contain suitable resources or value for the species with potential to occur within the area.

The removal of the plantation trees from the site is unlikely to fragment existing vegetation within the area and the removal of vegetation and modification of the site will not impact an identified threatened species or community within the site or broader area. It should be noted that in this region, irrigation dams such as that proposed for freshwater storage, can support native species and migratory birds forming an important resource in dry periods.

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

The project site does not lie within and will not affect a declared area of outstanding biodiversity value.

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

Key Threatening Processes from the EPBC and BC Act have been considered as part of this assessment. There are five processes that have been reviewed in line with project works with the KTP - removal of native vegetation and dead trees identified as a low potential process. There are two native species and several dead non-native trees proposed for removal as part of the construction activities. The removal of the two native species in conjunction with the non-native species is unlikely to increase the broadscale impact of land clearing and is under the biodiversity values threshold. The dead trees would normally be removed as part of the normal farming operation and any impact from their removal will not be increased by this proposal.

7. MITIGATION MEASURES

7.1. AVOID AND MINIMISE

The proposed works have been designed to eliminate vegetation clearing where possible and minimise potential impacts to specific threatened species that may be present within and surrounding the project site.

7.2. MANAGEMENT AND MITIGATION

The following mitigation and monitoring measures relating to the project construction and operation will be implemented to minimise potential impacts biodiversity. These are shown in the table below.

Table 19 - Mitigation Measures

Potential Impact	Timing	Safeguard
Vegetation Clearing	Pre-construction and Construction	Only identified vegetation within the site is to be removed – all compounds, excavations and access tracks are to be located within identified project area or areas of introduced vegetation where possible.
		Construction areas are to be stabilised as soon as practicable (progressively where possible).
		All 'No-Go' zones are to be clearly identified and communicated to contractors.
Hollow-bearing tree removal	Pre-construction	No native vegetation with hollows-are to be removed as part of the project works.
Weed and pathogen management	Pre-construction and construction	Machinery must be inspected and cleaned prior to entering and leaving the site to ensure that weed seeds and propagules are not imported or spread to unaffected areas.
Water quality risks	Pre-construction and construction	Erosion and Sediment Control Plans must be prepared, and controls put in place prior to any soil disturbance occurring to minimise potential water quality impacts during construction.
		Measures to prevent and contain spillage of potential contaminants must be implemented.
		In the event of a spill or contamination at the site, all works must cease, and the spill management procedure implemented immediately.
		Any pollution of the waterway or site must be reported to the EPA in accordance with the notification requirements of the <i>Protection of the Environment Operations Act 1997</i> (POEO Act).

8. CONCLUSION

A preliminary desktop assessment has been undertaken on the project area reviewing database searches for threatened species, populations and communities with the potential to occur within the project site and surrounding area (10kms). A review of these results to identify their potential requirements was undertaken with site inspections undertaken on the 24th February and 17th August 2020.

The project construction and operation activities are proposed within a disturbed area which is mapped as plant community types Non-native and Riverine Western Grey Box grassy woodland. A review of these mapped plant community types identified that the site is not considered a Grey Box community due to the absence of Grey Box and the related native mid storey and ground layers.

The existing vegetation on site has been identified as five separate species with two of these being defined as native to New South Wales at the time of European settlement. Of the 69 trees on site, these native trees represent 7 of the total number with 2 proposed for removal. 80% of the species consist of Swamp mallot with these forming the majority of trees for removal. Willows, all of which are dead, are also recorded on site and are a listed weeds species. These will be removed as part of the project activities.

Assessments to determine the scale of impact of the project to the listed communities concluded that a significant impact was not likely and therefore an Assessment of Significance or *Environment Protection and Biodiversity Conservation Act* (EPBC) referral is not required. Similarly, the applicant is not required to voluntarily enter the Biodiversity Offset Scheme.

No threatened flora or fauna species are known to be directly impacted by the project construction or operation. Threatened species considered likely to inhabit or utilise the project site were assessed in accordance with the NSW *Biodiversity Conservation Act*, *Fisheries Management Act* and Commonwealth *EPBC Act* as applicable.

Mitigation and management measures are aimed at ensuring that the project works do not impact biodiversity through the spread of weeds and pathogens, and other indirect impacts. With the effective implementation of management and mitigation measures identified in this Biodiversity Test of Significance and Assessment, risk of impacts to biodiversity is considered negligible.

9. GLOSSARY

Abbreviation	Term
ACT	Australian Capital Territory
BC Act	<i>Biodiversity Conservation Act 2016</i>
BOM	Bureau of Meteorology
DA	Determining Authority
DPI	Department of Primary Industries
DECCW	Former NSW Department of Environment, Climate Change and Water (Now BCD)
DP	Deposited Plan
EEC	Endangered Ecological Community
EPBC	<i>Environmental Protection and Biodiversity Conservation Act 1999</i>
FM	<i>Fisheries Management Act 1994</i>
GDE	Groundwater Dependant Ecosystem
MNES	Matters of National Environment Significance
NSW	New South Wales
OEH	Office of Environment and Heritage
PCT	Plant Community Type
PMST	Protected Matters Search Tool
Project Site	The area directly affected by the proposal.
SEED	Sharing and Enabling Environmental Data
Study Area	The project site and additional areas likely to be affected by the proposal, either directly or indirectly.
TEC	Threatened Ecological Community

10. REFERENCES

Cunningham, G., Mulham, W., Milthorpe, P. and Leigh, J., 1981. *Plants of Western New South Wales*. 1st ed. Australia: N.S.W Government Printing Office.

Martin, D. and Porteners, M., 2002. *The Use of Locally-Native Trees & Shrubs in the Southern Riverina*. 1st ed. Deniliquin: Reliance Press Pty Ltd.

NRAR, 2018, *Guide to the application form for a new or amended controlled activity approval*, NSW Government, Natural Resources Access Regulator.

NSW Office of Water, 2012, *Guidelines for riparian corridors on waterfront land*, NSW Government Dept of Trade and Investment, Regional Infrastructure and Services.

NSW Office of Water, 2012, *Guidelines for vegetation management plans on waterfront land*, NSW Government Dept of Trade and Investment, Regional Infrastructure and Services.

NSW Office of Water, 2012, *Guidelines for instream works on waterfront land*, NSW Government Dept of Trade and Investment, Regional Infrastructure and Services.

NSW Office of Water, 2012, *Guidelines for outlet structures on waterfront land*, NSW Government Dept of Trade and Investment, Regional Infrastructure and Services.



11. APPENDICES

11.1. BIODIVERSITY OFFSET SCHEME ENTRY THRESHOLD MAP AND REPORT

Biodiversity Offset Scheme (BOS) Entry Threshold Map



983.7 0 491.83 983.7 Metres

WGS_1984_Web_Mercator_Auxiliary_Sphere

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Legend

- Biodiversity Values that have been mapped for more than 90 days
- Biodiversity Values added within last 90 days

Notes

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NSW Environment & Heritage

Biodiversity Values Map and Threshold Report

Results Summary

Date of Calculation	02/11/2020 5:38 PM	BDAR Required*
Total Digitised Area	41.26 ha	
Minimum Lot Size Method	LEP	
Minimum Lot Size	120 ha	
Area Clearing Threshold	1 ha	
Area clearing trigger Area of native vegetation cleared	Unknown [#]	Unknown [#]
Biodiversity values map trigger Impact on biodiversity values map(not including values added within the last 90 days)?	no	no
Date of the 90 day Expiry	N/A	

*If BDAR required has:

- at least one 'Yes': you have exceeded the BOS threshold. You are now required to submit a Biodiversity Development Assessment Report with your development application. Go to <https://customer.lmbc.nsw.gov.au/assessment/AccreditedAssessor> to access a list of assessors who are accredited to apply the Biodiversity Assessment Method and write a Biodiversity Development Assessment Report
- 'No': you have not exceeded the BOS threshold. You may still require a permit from local council. Review the development control plan and consult with council. You may still be required to assess whether the development is "likely to significantly affect threatened species" as determined under the test in s. 7.3 of the Biodiversity Conservation Act 2016. You may still be required to review the area where no vegetation mapping is available.

Where the area of impact occurs on land with no vegetation mapping available, the tool cannot determine the area of native vegetation cleared and if this exceeds the Area Threshold. You will need to work out the area of native vegetation cleared - refer to the BOSET user guide for how to do this.

On and after the 90 day expiry date a BDAR will be required.

Disclaimer

This results summary and map can be used as guidance material only. This results summary and map is not guaranteed to be free from error or omission. The State of NSW and Office of Environment and Heritage and its employees disclaim liability for any act done on the information in the results summary or map and any consequences of such acts or omissions. It remains the responsibility of the proponent to ensure that their development application complies with all aspects of the *Biodiversity Conservation Act 2016*.

The mapping provided in this tool has been done with the best available mapping and knowledge of species habitat requirements. This map is valid for a period of 30 days from the date of calculation (above).

Acknowledgement

I as the applicant for this development, submit that I have correctly depicted the area that will be impacted or likely to be impacted as a result of the proposed development.

Signature _____ Date: 02/11/2020 05:38 PM



11.2. PROTECTED MATTERS SEARCH



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: 23/10/20 19:09:07

[Summary](#)

[Details](#)

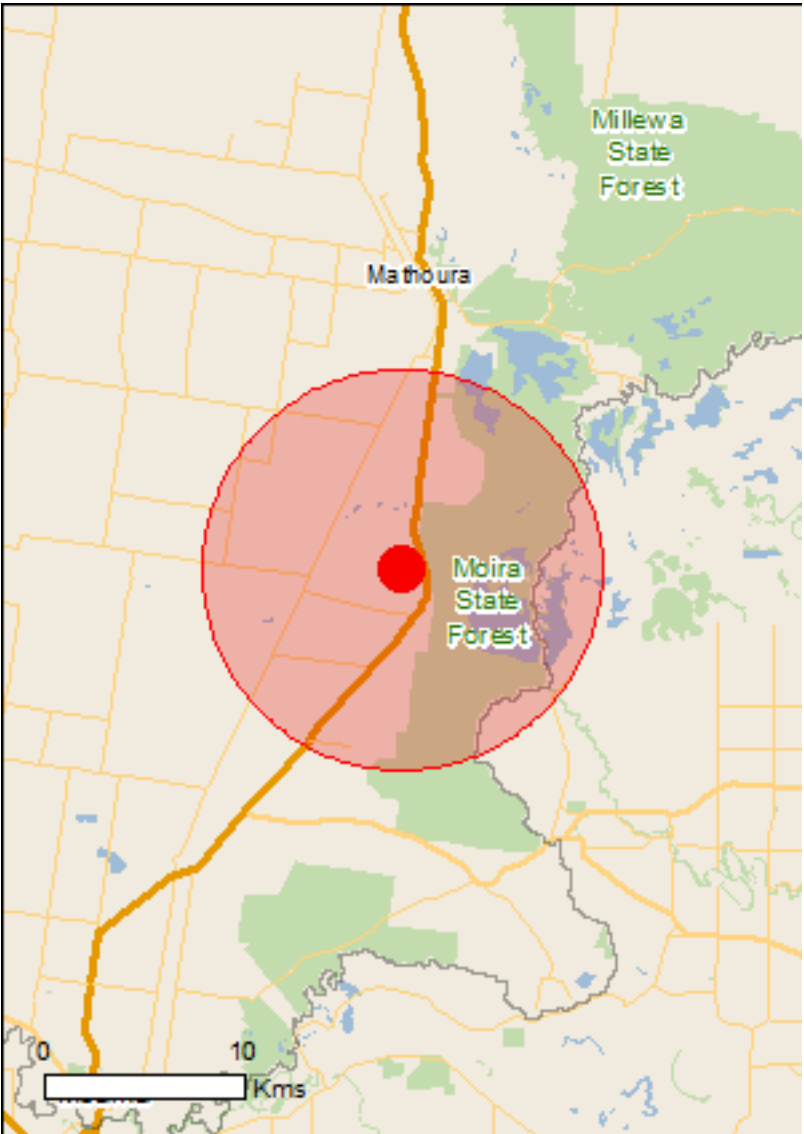
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

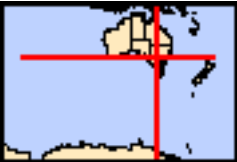
[Acknowledgements](#)



This map may contain data which are
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[Coordinates](#)

[Buffer: 10.0Km](#)



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:	7
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	5
Listed Threatened Species:	27
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:	3
Regional Forest Agreements:	None
Invasive Species:	29
Nationally Important Wetlands:	3
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)		[Resource Information]
Name		Proximity
Banrock station wetland complex		400 - 500km upstream
Barmah forest		Within Ramsar site
Gunbower forest		20 - 30km upstream
Hattah-kulkyne lakes		200 - 300km upstream
Nsw central murray state forests		Within Ramsar site
Riverland		400 - 500km upstream
The coorong, and lakes alexandrina and albert wetland		400 - 500km upstream

Listed Threatened Ecological Communities	[Resource Information]
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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
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered	Community may occur within area
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community likely to occur within area
Natural Grasslands of the Murray Valley Plains	Critically Endangered	Community likely to occur within area
Weeping Myall Woodlands	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		
Botaurus poiciloptilus		
Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Falco hypoleucos		
Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta		
Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor		
Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat likely to occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Extinct within area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Breeding known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Fish		
Bidyanus bidyanus Silver Perch, Bidyan [76155]	Critically Endangered	Species or species habitat known to occur within area
Craterocephalus fluviatilis Murray Hardyhead [56791]	Endangered	Species or species habitat may occur within area
Galaxias rostratus Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow [84745]	Critically Endangered	Species or species habitat likely to occur within area
Maccullochella macquariensis Trout Cod [26171]	Endangered	Species or species habitat known to occur within area
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat known to occur within area
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Frogs		
Crinia sloanei Sloane's Froglet [59151]	Endangered	Species or species habitat may occur within area
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog, Golden Bell Frog [1828]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Nyctophilus corbeni Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may 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
Plants		
Amphibromus fluitans River Swamp Wallaby-grass, Floating Swamp Wallaby-grass [19215]	Vulnerable	Species or species habitat known to occur within area
Austrostipa wakoolica [66623]	Endangered	Species or species habitat may occur within area
Brachyscome muelleroides Mueller Daisy [15572]	Vulnerable	Species or species habitat known to occur within area
Pimelea spinescens subsp. spinescens Plains Rice-flower, Spiny Rice-flower, Prickly Pimelea [21980]	Critically Endangered	Species or species habitat may occur within

Name	Status	Type of Presence
area		
Sclerolaena napiformis Turnip Copperburr [11742]	Endangered	Species or species habitat known to occur within area
Swainsona murrayana Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Delma impar Striped Legless Lizard, Striped Snake-lizard [1649]	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		
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may 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 known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within 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
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		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]		Breeding known 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 known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to 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 known 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]		Breeding known 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
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Barmah	VIC
Murray Valley	NSW
River Murray Reserve	VIC

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 Resouces Audit, 2001.	

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
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
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
<div>Sturnus vulgaris</div> <div>Common Starling [389]</div>		Species or species habitat likely to occur within area
<div>Turdus merula</div> <div>Common Blackbird, Eurasian Blackbird [596]</div>		Species or species habitat likely to occur within area
Mammals		
<div>Canis lupus familiaris</div> <div>Domestic Dog [82654]</div>		Species or species habitat likely to occur within area
<div>Capra hircus</div> <div>Goat [2]</div>		Species or species habitat likely to occur within area
<div>Equus caballus</div> <div>Horse [5]</div>		Species or species habitat likely to occur within area
<div>Felis catus</div> <div>Cat, House Cat, Domestic Cat [19]</div>		Species or species habitat likely to occur within area
<div>Lepus capensis</div> <div>Brown Hare [127]</div>		Species or species habitat likely to occur within area
<div>Mus musculus</div> <div>House Mouse [120]</div>		Species or species habitat likely to occur within area
<div>Oryctolagus cuniculus</div> <div>Rabbit, European Rabbit [128]</div>		Species or species habitat likely to occur within area
<div>Rattus rattus</div> <div>Black Rat, Ship Rat [84]</div>		Species or species habitat likely to occur within area
<div>Sus scrofa</div> <div>Pig [6]</div>		Species or species habitat likely to occur within area
<div>Vulpes vulpes</div> <div>Red Fox, Fox [18]</div>		Species or species habitat likely to occur within area
Plants		
<div>Asparagus asparagoides</div> <div>Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]</div>		Species or species habitat likely to occur within area
<div>Genista monspessulana</div> <div>Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]</div>		Species or species habitat likely to occur within area
<div>Lycium ferocissimum</div> <div>African Boxthorn, Boxthorn [19235]</div>		Species or species habitat likely to occur within area
<div>Nassella neesiana</div> <div>Chilean Needle grass [67699]</div>		Species or species habitat likely to occur within area
<div>Rubus fruticosus aggregate</div> <div>Blackberry, European Blackberry [68406]</div>		Species or species habitat likely to occur within area
<div>Sagittaria platyphylla</div> <div>Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]</div>		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii		
Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Ulex europaeus		
Gorse, Furze [7693]		Species or species habitat likely to occur within area

Nationally Important Wetlands		[Resource Information]
Name		State
Barmah-Millewa Forest		VIC
Broken Creek		VIC
Millewa Forest		NSW

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

-35.91979 144.89099

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](#)
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- [-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.

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11.3. NSW WEED WISE SEARCH

Scientific Name	Common Name	Duty	Comments
All plants	NA	General Biosecurity Duty	
<i>Lycium ferocissimum</i>	African Boxthorn	Prohibition on dealings	
<i>Alternanthera philoxeroides</i>	Alligator Weed	Prohibition on dealings	
		Biosecurity Zone	
		Regional Recommended Measure	
<i>Eichhornia azurea</i>	Anchored water hyacinth	Prohibited Matter	
<i>Tamarix aphylla</i>	Athel pine	Prohibition on dealings	
<i>Jatropha gossypifolia</i>	Bellyache bush	Prohibition on dealings	
<i>Chrysanthemoides monilifera subsp. rotundata</i>	Bitou bush	Prohibition on dealings	
		Biosecurity Zone	The Bitou Bush Biosecurity Zone is established for all land within the State except land within 10 kilometres of the mean high water mark of the Pacific Ocean between Cape Byron in the north and Point Perpendicular in the south.
		Regional Recommended Measure	
<i>Centaurea x moncktonii</i>	Black knapweed	Prohibited Matter	
<i>Salix nigra</i>	Black Willow	Prohibition on dealings	
		Regional Recommended Measure	
<i>Rubus fruticosus species aggregate</i>	Blackberry	Prohibition on dealings	All species in the <i>Rubus fruticosus</i> species aggregate have this requirement, except for the varieties Black Satin, Chehalem, Chester Thornless, Dirksen Thornless, Loch Ness, Murrindindi, Silvan, Smooth Stem, and Thornfree
<i>Chrysanthemoides monilifera subsp. monilifera</i>	Boneseed	Prohibition on dealings	
		Control Order	Boneseed Control Zone: Whole of NSW
<i>Cylindropuntia fulgida var. mamillata</i>	Boxing glove cactus	Prohibition on dealings	
<i>Asparagus asparagoides</i>	Bridal creeper	Prohibition on dealings	*this requirement also applies to the Western Cape form of bridal creeper
<i>Asparagus declinatus</i>	Bridal veil creeper	Prohibited Matter	
<i>Orobancha species</i>	Broomrapes	Prohibited Matter	All species of <i>Orobancha</i> are Prohibited Matter in NSW, except the natives <i>Orobancha cernua</i> var. <i>australiana</i> and <i>Orobancha minor</i>
<i>Cabomba caroliniana</i>	Cabomba	Prohibition on dealings	
<i>Austrocylindropuntia cylindrica</i>	Cane cactus	Prohibition on dealings	All species in the <i>Austrocylindropuntia</i> genus have this requirement
<i>Genista monspessulana</i>	Cape Broom	Prohibition on dealings	
		Regional Recommended Measure	
<i>Dolichandra unguis-cati</i>	Cat's claw creeper	Prohibition on dealings	

Scientific Name	Common Name	Duty	Comments
<i>Nassella neesiana</i>	Chilean needle grass	Prohibition on dealings	
		Regional Recommended Measure	
<i>Asystasia gangetica subsp. micrantha</i>	Chinese violet	Control Order	
<i>Asparagus africanus</i>	Climbing asparagus	Prohibition on dealings	
<i>Asparagus plumosus</i>	Climbing asparagus fern	Prohibition on dealings	
<i>Opuntia stricta</i>	Common pear	Prohibition on dealings	
<i>Hyparrhenia hirta</i>	Coolatai grass	Regional Recommended Measure	
<i>Rhaponticum repens</i>	Creeping knapweed	Regional Recommended Measure	
<i>Myriophyllum spicatum</i>	Eurasian water milfoil	Prohibited Matter	
<i>Austrocylindropuntia subulate</i>	Eve's needle cactus	Prohibition on dealings	
<i>Senecio madagascariensis</i>	Fireweed	Prohibition on dealings	
		Regional Recommended Measure	
<i>Genista linifolia</i>	Flax-leaf broom	Prohibition on dealings	
		Regional Recommended Measure	
<i>Asparagus densiflorus</i>	Foxtail fern	Prohibition on dealings	
<i>Limnobium laevigatum</i>	Frogbit	Prohibited Matter	
<i>Andropogon gayanus</i>	Gamba grass	Prohibited Matter	
<i>Ulex europaeus</i>	Gorse	Prohibition on dealings	
		Regional Recommended Measure	
<i>Cestrum parqui</i>	Green cestrum	Regional Recommended Measure	
<i>Salix cinerea</i>	Grey willow	Prohibition on dealings	
		Regional Recommended Measure	
<i>Asparagus aethiopicus</i>	Ground asparagus	Prohibition on dealings	
<i>Hieracium species</i>	Hawkweeds	Prohibited Matter	All species in the genus Hieracium are Prohibited Matter
<i>Equisetum species</i>	Horsetails	Regional Recommended Measure	
<i>Cylindropuntia pallida</i>	Hudson pear	Prohibition on dealings	
<i>Hydrocotyle ranunculoides</i>	Hydrocotyl	Prohibited Matter	
<i>Hymenachne amplexicaulis and hybrids</i>	Hymenachne	Prohibition on dealings	
<i>Vachellia karroo</i>	Karoo thorn	Prohibited Matter	
<i>Heteranthera reniformis</i>	Kidney-leaf mud plantain	Regional Recommended Measure	

Scientific Name	Common Name	Duty	Comments
<i>Bassia scoparia</i>	Kochia	Prohibited Matter	
<i>Clidemia hirta</i>	Koster's curse	Prohibited Matter	
<i>Lagarosiphon major</i>	Lagarosiphon	Prohibited Matter	
<i>Lantana camara</i>	Lantana	Prohibition on dealings	
<i>Anredera cordifolia</i>	Madeira vine	Prohibition on dealings	
<i>Prosopis species</i>	Mesquite	Prohibition on dealings	
		Regional Recommended Measure	
<i>Nassella tenuissima</i>	Mexican feather grass	Prohibited Matter	
<i>Miconia species</i>	Miconia	Prohibited Matter	All species of Miconia are Prohibited Matter in NSW
<i>Mikania micrantha</i>	Mikania vine	Prohibited Matter	*all species in the genus Mikania are Prohibited Matter in NSW
<i>Mimosa pigra</i>	Mimosa	Prohibited Matter	
<i>Leucanthemum vulgare</i>	Ox-eye daisy	Regional Recommended Measure	
<i>Parkinsonia aculeata</i>	Parkinsonia	Prohibition on dealings	
		Control Order	Parkinsonia Control Zone: Whole of NSW
<i>Parthenium hysterophorus</i>	Parthenium weed	Prohibited Matter	
		Prohibition on dealings	The following equipment must not be imported into NSW from Queensland: grain harvesters (including the comb or front), comb trailers (including the comb or front), bins used for holding grain during harvest operations, augers or similar for moving grain, vehicles used to transport grain harvesters, support vehicles driven in paddocks during harvest operations, mineral exploration drilling rigs and vehicles used to transport those rigs, unless set out as an exception in Division 5, Part 2 of the Biosecurity Order (Permitted Activities) 2017
<i>Physalis longifolia</i>	Perennial ground cherry	Regional Recommended Measure	
<i>Annona glabra</i>	Pond apple	Prohibited Matter	
<i>Physalis hederifolia</i>	Prairie ground cherry	Regional Recommended Measure	
<i>Vachellia nilotica</i>	Prickly acacia	Prohibited Matter	
<i>Austrocyllindropuntia species</i>	Prickly pears - Austrocyllindropuntias	Prohibition on dealings	All species in the Austrocyllindropuntia genus have this requirement
<i>Cylindropuntia species</i>	Prickly pears - Cylindropuntias	Prohibition on dealings	All species in the Cylindropuntia genus have this requirement
<i>Opuntia species</i>	Prickly pears - Opuntias	Prohibition on dealings	Except for <i>Opuntia ficus-indica</i> (Indian fig)
<i>Cylindropuntia imbricata</i>	Rope pear	Prohibition on dealings	All species in the Cylindropuntia genus have this requirement
<i>Cryptostegia grandiflora</i>	Rubber vine	Prohibited Matter	
<i>Sagittaria platyphylla</i>	Sagittaria	Prohibition on dealings	

Scientific Name	Common Name	Duty	Comments
		Regional Recommended Measure	
<i>Salvinia molesta</i>	Salvinia	Prohibition on dealings	
		Regional Recommended Measure	
<i>Cytisus scoparius</i> <i>subsp. scoparius</i>	Scotch broom	Prohibition on dealings	
		Regional Recommended Measure	Snowy Valleys Council
		Regional Recommended Measure	Whole region excluding Snowy Valleys Council
<i>Gymnocoronis spilanthoides</i>	Senegal tea plant	Regional Recommended Measure	
<i>Nassella trichotoma</i>	Serrated tussock	Prohibition on dealings	
		Regional Recommended Measure	
<i>Chromolaena odorata</i>	Siam weed	Prohibited Matter	
<i>Solanum elaeagnifolium</i>	Silverleaf nightshade	Prohibition on dealings	
<i>Opuntia monacantha</i>	Smooth tree pear	Prohibition on dealings	
<i>Asparagus scandens</i>	Snakefeather	Prohibition on dealings	
<i>Limnobia spongia</i>	Spongeplant	Prohibited Matter	
<i>Centaurea stoebe</i> <i>subsp. micranthos</i>	Spotted knapweed	Prohibited Matter	
<i>Opuntia aurantiaca</i>	Tiger pear	Prohibition on dealings	
<i>Solanum viarum</i>	Tropical soda apple	Control Order	Tropical Soda Apple Control Zone: Whole of NSW
<i>Opuntia tomentosa</i>	Velvety tree pear	Prohibition on dealings	
<i>Trapa species</i>	Water caltrop	Prohibited Matter	All species in the <i>Trapa</i> genus are Prohibited Matter in NSW
<i>Eichhornia crassipes</i>	Water hyacinth	Prohibition on dealings	
		Biosecurity Zone	The Water Hyacinth Biosecurity Zone applies to all land within the State, except for the following regions: Greater Sydney or North Coast, North West (but only the local government area of Moree Plains), Hunter (but only in the local government areas of City of Cessnock, City of Lake Macquarie, MidCoast, City of Maitland, City of Newcastle or Port Stephens), South East (but only in the local government areas of Eurobodalla, Kiama, City of Shellharbour, City of Shoalhaven or City of Wollongong).
		Regional Recommended Measure	
<i>Pistia stratiotes</i>	Water lettuce	Regional Recommended Measure	
<i>Nymphaea species</i>	Water lilies	Regional Recommended Measure	
<i>Hydrocleys nymphoides</i>	Water poppy	Regional Recommended Measure	
<i>Stratiotes aloides</i>	Water soldier	Prohibited Matter	

Scientific Name	Common Name	Duty	Comments
<i>Salix species</i>	Willows	Prohibition on dealings	All species in the <i>Salix</i> genus have this requirement, except <i>Salix babylonica</i> (weeping willows), <i>Salix x calodendron</i> (pussy willow) and <i>Salix x reichardtii</i> (sterile pussy willow)
<i>Striga species</i>	Witchweeds	Prohibited Matter	All species in the <i>Striga</i> genus are Prohibited Matter in NSW, except the native <i>Striga parviflora</i>
<i>Limnocharis flava</i>	Yellow burrhead	Prohibited Matter	

General Biosecurity Duty - All plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

Prohibition on dealings - Must not be imported into the State or sold.

Prohibited Matter - A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries.

Biosecurity Zone - The Biosecurity Zone is established for all land within the state except land in the following regions: Greater Sydney; Hunter (but only in the local government areas of City of Lake Macquarie, City of Maitland, City of Newcastle or Port Stephens). Within the Biosecurity Zone this weed must be eradicated where practicable, or as much of the weed destroyed as practicable, and any remaining weed suppressed. The local control authority must be notified of any new infestations of this weed within the Biosecurity Zone.

Regional Recommended Measure - Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Control Order - Owners and occupiers of land on which there is boneseed must notify the local control authority of new infestations; immediately destroy the plants; ensure subsequent generations are destroyed; and ensure the land is kept free of the plant. A person who deals with a carrier of boneseed must ensure the plant (and any seed and propagules) is not moved from the land; and immediately notify the local control authority of the presence of the plant.

11.4. SPECIES ASSESSMENT

Scientific Name	Common Name	Description	Level of Threat NSW Status	C'with Status	Presence of habitat	Likelihood of occurrence	Potential for impact
Amphibian							
<i>Crinia sloanei</i>	Sloane's Froglet	<p>Region: Murray-Darling Basin with majority or records in the Darling Riverine Plains, NSW South Western Slopes and Riverina Bioregions.</p> <p>Habitat: Ground-dwelling frog associated with periodically inundated areas in grassland, woodland and disturbed areas.</p> <p>Preferred Food: No information available.</p> <p>Breeding: Breeds in ephemeral wetlands or periodically inundated areas of permanent wetlands, in grasslands, woodlands and disturbed environments.</p>	V	NL	Marginal	Possible	Low
<i>Litoria raniformis</i>	Southern Bell Frog	<p>Region: In NSW the species was once distributed along the Murray and Murrumbidgee Rivers and their tributaries, the southern slopes of the Monaro district and the central southern tablelands as far north as Tarana, near Bathurst. Currently, the species is known to exist only in isolated populations in the Coleambally Irrigation Area, the Lowbidgee floodplain and around Lake Victoria.</p> <p>Habitat: Found mostly amongst emergent vegetation, including Typha sp. (bullrush), Phragmites sp. (reeds) and Eleocharis sp.(sedges), in or at the edges of still or slow-flowing water bodies such as lagoons, swamps, lakes, ponds and farm dams. Can be found floating in warmer waters in temperatures between 18–25°C. Additionally, this species occurs in: clays or well-watered sandy soils; open grassland, open forest, and ephemeral and permanent non-saline marshes and swamps; montane eucalypt forest, dry schlerophyll forest in coastal Victoria; steep-banked water edges (like ditches and drains) and gently graded edges containing fringing plants; and formerly, areas of high altitudes.</p> <p>Food sources: Invertebrates as well as other small frogs.</p> <p>Breeding: Breeding occurs during the warmer months and is triggered by flooding or a significant rise in water levels. The species has been known to breed anytime from early spring through to late summer/early autumn (Sept to April) following a rise in water levels.</p>	E	V	Absent	Unlikely	No

Scientific Name	Common Name	Description	Level of Threat		Presence of habitat	Likelihood of occurrence	Potential for impact
			NSW Status	C'wlth Status			
Insect							
Reptile							
<i>Delma impar</i>	Stiped Legless Lizard	Region: Occurs in the Southern Tablelands, South West Slopes, the Upper Hunter and possible the Riverina. Also occurs in the ACT, Victoria and South Australia. Habitat: Natural Temperate Grassland however also captured in grasslands with a high exotic content. Also found in secondary grassland near Natural Temperate Grassland and occasionally in open Box-Gum Woodland. Found where grassland is dominated by perennial, tussock-forming grasses such as Kangaroo Grass (<i>Themeda australis</i>), spear-grasses (<i>Austrostipa spp</i>). and poa tussocks (<i>Poa spp.</i>), and occasionally wallaby grasses (<i>Austrodanthonia spp.</i>). Sometimes found in grasslands with significant amounts of surface rocks, which are used for shelter. Goes below ground or under rocks or logs over winter. Preferred Food: Actively hunts for spiders, crickets, moth larvae and cockroaches. Breeding: Two papery eggs are laid in early summer.	V	V	Marginal	Unlikely	Low
Aves							
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	Region: Widespread in eastern, southern and southwestern Australia. In New South Wales it is widespread from coast to inland, including the western slopes of the Great Dividing Range. Habitat: Predominantly woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. The Dusky Wood swallow is considered a woodland dependent bird. Preferred Food: Primarily eats invertebrates, mainly insects. Occasionally feeds on nectar, fruit and seeds. Breeding: Late September to late February, with eggs present between September and January, although most eggs are present between October and early December. Clutch size is 1–4 and pairs may nest twice in a season. Nest: The nest is an open shallow untidy cup, frequently in an open hollow, crevice or stump.	V	NL	Marginal	Possible	Low

Appendices

Scientific Name	Common Name	Description	Level of Threat NSW Status	C'wlth Status	Presence of habitat	Likelihood of occurrence	Potential for impact
<i>Botaurus poiciloptilus</i>	Australasian Bittern	<p>Region: Widespread but uncommon over south-eastern Australia. Found throughout most of NSW except for the north-west.</p> <p>Habitat: Favors permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes and spikerushes.</p> <p>Food source: Frogs, rush, yabbies, spiders, insects, snails.</p> <p>Breeding: Occurs in summer from October to January. Usually six eggs to a clutch.</p> <p>Nests: Built in secluded places in densely-vegetated wetlands on a platform of reeds.</p>	E	E	Absent	Possible	No
<i>Calidris ferruginea</i>	Curlew Sandpiper	<p>Region: Distributed around most of the Australian coastline (including Tasmania). It occurs along the entire coast of NSW, particularly in the Hunter Estuary, and sometimes in freshwater wetlands in the Murray-Darling Basin. Inland records are probably mainly of birds pausing for a few days during migration. The Curlew Sandpiper breeds in Siberia and migrates to Australia (as well as Africa and Asia) for the non-breeding period, arriving in Australia between August and November, and departing between March and mid-April.</p> <p>Habitat: It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland. Roosts on shingle, shell or sand beaches; spits or islets on the coast or in wetlands; or sometimes in salt marsh, among beach-cast seaweed, or on rocky shores.</p> <p>Food source: Worms, molluscs, crustaceans, insects and some seeds.</p>	E	CE Listed	Absent	Possible	No

Scientific Name	Common Name	Description	Level of Threat NSW Status	C'wlth Status	Presence of habitat	Likelihood of occurrence	Potential for impact
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	<p>Region: Eastern Australia from SA to Cape York, Qld. Western boundary of the species' range runs approximately through Corowa, Wagga Wagga, Temora, Forbes, Dubbo, Inverell.</p> <p>Habitat: Mainly inhabits woodlands dominated by rough-barked eucalypts, usually with open grassy understory, sometimes with one or more shrub species. Fallen timber is an important habitat feature.</p> <p>Food source: Feeding predominantly on ants and other invertebrates and sometimes on nectar, sap, lizards and food scraps.</p> <p>Breeding: Usually produce 2-3 speckled and streaked pinkish eggs.</p> <p>Nest: Grass-lined hollow.</p>	V	NL	Marginal	Possible	Low
<i>Daphoenositta chrysoptera</i>	Varied Sittella	<p>Region: Distribution in NSW nearly continuously from the coast to the far west.</p> <p>Habitat: Eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.</p> <p>Food source: Arthropods.</p> <p>Breeding: Limited information available.</p> <p>Nest: Cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, often re-using the same fork or tree in successive years.</p>	V	NL	Marginal	Possible	Low
<i>Falco hypoleucos</i>	Grey Falcon	<p>Region: Sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin. The breeding range has contracted since the 1950's, with most breeding now confined to the arid parts of the range. Population trends are unclear, but it is believed to be extinct in areas with more than 500mm annual rainfall in NSW.</p> <p>Habitat: Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions. Occasionally found in open woodlands near the coast. Also occurs near wetlands where surface water attracts prey.</p> <p>Food source: Preys primarily on birds, especially parrots and pigeons.</p> <p>Breeding: Two to three eggs are laid in late winter and early spring.</p> <p>Nest: Uses old nests of other birds of prey and ravens, usually high in a living eucalypt near water or a watercourse.</p>	E	V	Absent	Unlikely	No

Scientific Name	Common Name	Description	Level of Threat NSW Status	C'wlth Status	Presence of habitat	Likelihood of occurrence	Potential for impact
<i>Falco subniger</i>	Black Falcon	<p>Region: Widely but sparsely distributed in NSW, mostly in inland regions. Assumed to be a single population in NSW that is continuous with a broader continental population, giving the falcons are highly mobile.</p> <p>Habitat: Found along tree-lined watercourses and in isolated woodlands, mainly in arid and semi-arid areas. Roosts in trees at night and often on power poles by day.</p> <p>Food source: Birds, small mammals, insects, reptiles, sometimes carrion. Sometimes steals prey from other falcons.</p> <p>Breeding: Limited information available, but likely to have poor breeding success.</p> <p>Nest: Nest along tree-lined creeks and rivers of inland drainage basins.</p>	E	NL	Absent	Possible	No
<i>Grantiella picta</i>	Painted Honeyeater	<p>Region: Nomadic species occurring at low densities throughout its range. Occurs throughout NSW, except in coastal areas and the south-western corner of the state. Greatest concentration and almost all breeding occurs on inland slopes of Great Dividing Range.</p> <p>Habitat: Boree/Weeping Myall, Brigalow and Box-Gum Woodlands and Box-Ironbark forests.</p> <p>Food source: Specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias.</p> <p>Breeding: Nest from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, Sheoak, paperbark or mistletoe branches.</p>	V	V	Marginal	Possible	Low
<i>Grus rubicunda</i>	Brolga	<p>Region: Formerly found across most of Australia, particularly towards the north. Still abundant in the north, but very sparse across the southern part of its range.</p> <p>Habitat: Dependent on wetlands, yet will also feed in dry grassland and ploughed paddocks.</p> <p>Food source: Sedge roots, tubers, insects, crustaceans, molluscs, frogs.</p> <p>Breeding: Two eggs laid from winter to autumn.</p> <p>Nest: A platform of grasses and sticks augmented with mud, on an island or in the water.</p>	V	NL	Marginal	Possible	Low

Scientific Name	Common Name	Description	Level of Threat NSW Status	C'wlth Status	Presence of habitat	Likelihood of occurrence	Potential for impact
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	<p>Region: The White-bellied Sea-Eagle is distributed along the coastline (including offshore islands) of mainland Australia and Tasmania. It also extends inland along some of the larger waterways, especially in eastern Australia. The inland limits of the species are most restricted in south-central and south-western Australia, where it is confined to a narrow band along the coast.</p> <p>Habitat: The White-bellied Sea-Eagle is found in coastal habitats (especially those close to the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. The habitats occupied by the sea-eagle are characterised by the presence of large areas of open water (larger rivers, swamps, lakes, the sea). Birds have been recorded in (or flying over) a variety of terrestrial habitats. Birds have been recorded at or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs, saltmarsh and sewage ponds.</p> <p>Food source: Fish, birds, reptiles, mammals, crustaceans, carrion and offal.</p> <p>Breeding: Breeding season from June to January.</p> <p>Nesting: The nest is a large structure composed of sticks and lined with leaves, grass or seaweed. Nests may be built in a variety of sites including tall trees (especially Eucalyptus species), bushes, mangroves, cliffs, rocky outcrops, caves, crevices, on the ground or even on artificial structures.</p>	V	Listed	Absent	Possible	No
<i>Hieraetus morphnoides</i>	Little Eagle	<p>Region: Occurs throughout the Australian mainland.</p> <p>Habitat: Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW also used.</p> <p>Food source: Birds, reptiles and mammals, large insects and carrion.</p> <p>Breeding: Lays two or three eggs in spring, young fledge in summer.</p> <p>Nest: Pairs build large stick nest in tall living trees within remnant patches in winter.</p>	V	NL	Absent	Possible	No

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Scientific Name	Common Name	Description	Level of Threat NSW Status	C'wlth Status	Presence of habitat	Likelihood of occurrence	Potential for impact
<i>Lathamus discolor</i>	Swift Parrot	<p>Region: Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes.</p> <p>Habitat: Found in dry sclerophyll forests and woodlands, suburban parks and gardens and flowering fruit trees. They roost communally, often in the same tree each night. They are almost always in trees, only coming to ground to drink. Migrates to the Australian south-east mainland between March and October. Following winter they return to Tasmania where they breed from September to January, nesting in old trees with hollows and feeding in forests dominated by Tasmanian Blue Gum Eucalyptus globulus.</p> <p>Food Source: Commonly used lerp infested trees include Inland Grey Box, Grey Box and Blackbutt. Favored feed trees include winter flowering species such as Swamp Mahogany, Spotted Gum, Red Bloodwood, Mugga Ironbark, and White Box.</p> <p>Breeding: Swift Parrots breed only in Tasmania and many pairs breed close together. Timing may vary with the flowering of the Tasmanian Blue Gum.</p> <p>Nest: The nest is in a hollow in the trunk, a branch or spout of a living or dead gum. Pairs may return to the same nest site each year.</p>	E	CE Listed	Marginal	Possible	Low
<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)	<p>Region: Widespread throughout Australia except for the driest deserts and wettest coastal areas. Rare throughout most of its range.</p> <p>Habitat: Lightly wooded country such as open eucalypt woodland, acacia scrub and mallee, often in or near clearings/open areas. Requires structurally diverse habitats including mature and young trees, shrubs and native grasses.</p> <p>Food source: Insects.</p> <p>Breeding: Breed between July and November, often raising several broods. Two to three eggs per clutch.</p> <p>Nest: Small cup of bark, grasses and webs in a tree fork or crevice, from less than 1m to over 5m above ground.</p>	V	NL	Marginal	Possible	Low

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Scientific Name	Common Name	Description	Level of Threat		Presence of habitat	Likelihood of occurrence	Potential for impact
			NSW Status	C'wlth Status			
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)	<p>Region: The Black-chinned Honeyeater has two subspecies, with only the nominate (<i>gularis</i>) occurring in NSW. The eastern subspecies extends south from central Queensland, through NSW, Victoria into south eastern South Australia, though it is very rare in the last state. In NSW it is widespread, with records from the tablelands and western slopes of the Great Dividing Range to the north-west and central-west plains and the Riverina. It is rarely recorded east of the Great Dividing Range, although regularly observed from the Richmond and Clarence River areas.</p> <p>Habitat: Found in the upper levels of open eucalypt forests and woodlands dominated by box and ironback eucalypts and often found along waterways, especially in arid and semi-arid areas and in northern Australia. It is occasionally seen in gardens and street trees.</p> <p>Food sources: Mainly nectar and insects, but will sometimes eat seeds. It usually forages in the upper canopy on the outermost flowers and foliage.</p> <p>Breeding: Often breed co-operatively, with up to four adults helping the females to feed the young. At the start of the breeding season the males become agitated and aggressive, attacking even larger birds of other species, and defend a breeding territory.</p> <p>Nest: Female builds the nest, with helpers sometimes bringing materials or accompanying the female bird while she builds. Nest is placed high in the crown of a tree, hidden by foliage and slung by the rim from the outer leaves of a branch and is a compact, cup-shaped formed from bark fibres, woven with hair, wool or fur and matted into a thick, hairy 'felt', and is lined with wool, hair or fur.</p>	V	NL	Absent	Possible	No

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Scientific Name	Common Name	Description	Level of Threat NSW Status	C'wlth Status	Presence of habitat	Likelihood of occurrence	Potential for impact
<i>Ninox connivens</i>	Barking Owl	<p>Region: Found throughout continental Australia except for in the central arid regions. Species has declined in southern Australia, occurs in a wide but sparse distribution in NSW. Core populations exist on the western slopes and plains (especially in the Pilliga) and in some northeast coastal and escarpment forests.</p> <p>Habitat: Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. Is flexible in its habitat use. Can hunt in closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats due to higher prey density on fertile soil.</p> <p>Food source: Small arboreal mammals such as squirrel gliders and ringtail possums, birds, invertebrates, terrestrial mammals such as rodents and rabbits.</p> <p>Breeding: Two or three eggs laid in hollows of large, old trees. Nesting occurs during mid-winter and spring but is variable between pairs and among years.</p>	V	NL	Marginal	Possible	Low
<i>Oxyura australis</i>	Blue-billed Duck	<p>Region: Endemic to south-eastern and south-western Australia. Widespread in NSW, most common in the southern Murray-Darling Basin area. Birds disperse during the breeding season to deep swamps 300km away. They are generally only seen in coastal areas during summer or in drier years.</p> <p>Habitat: Prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic.</p> <p>Food Sources: Feed on the bottom of swamps eating seeds, buds, stems, leaves, fruit and small aquatic insects.</p> <p>Breeding: Species is partly migratory, with short-distance movements between breeding swamps and overwintering lakes, with some long-distance dispersal to breed during spring and early summer.</p> <p>Nest: Nest over deep water in bull rush, or in trampled vegetation in Lignum, sedges or spike-rush.</p>	V	NL	Absent	Possible	No

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Scientific Name	Common Name	Description	Level of Threat NSW Status	C'wlth Status	Presence of habitat	Likelihood of occurrence	Potential for impact
<i>Pachycephala inornata</i>	Gilbert's Whistler	<p>Region: Distributed throughout most of central and western Australia. The range of the species has declined chiefly due to habitat clearance, such that the extent of communities is uncertain.</p> <p>Habitat: Occurs in a range of habitats, with a dense shrub layer seeming to be a key habitat feature. Forages on or near the ground in shrub thickets and in tops of small trees.</p> <p>Food source: Spiders, insects, and occasionally seeds and fruits.</p> <p>Breeding: Breeding occurs between August and November. Between two and four eggs per clutch. Nest either lined cup or sometimes birds use old nests of other species, particularly disused babblers' nests.</p>	V	NL	Absent	Possible	No
<i>Pedionomus torquatus</i>	Plains-wanderer	<p>Region: Western Riverina area bounded by Hay, Narrandera on the Murrumbidgee River in the north, the Cobb highway in the west, the Billabong creek in the south and Urana in the east. Also in North-central Victoria and central-western QLD.</p> <p>Habitat: Plains-wanderers live in semi-arid, lowland native grasslands that typically occur on hard red-brown soils. Habitat structure appears to play a more important role than plant species composition. Preferred habitat of the Plains-wanderer typically comprises 50% bare ground, 10% fallen litter, and 40% herbs, forbs and grasses.</p> <p>Food source: Insects.</p> <p>Breeding: Plains-wanderers are capable of breeding in their first year and they breed in solitary pairs. Clutch-size is usually four eggs, but can range from two to five.</p> <p>Nest: The nest is a hollow or 'scrape' that is scratched into the ground and lined with grass. The nests are placed amongst native grasses and herbs, or sometimes amongst crops.</p>	E	CE	Absent	Unlikely	No

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Scientific Name	Common Name	Description	Level of Threat NSW Status	C'wlth Status	Presence of habitat	Likelihood of occurrence	Potential for impact
<i>Petroica boodang</i>	Scarlet Robin	<p>Region: South east Queensland to south east South Australia, also in Tasmania and WA. In NSW, occurs from coast to inland slopes.</p> <p>Habitat: Dry eucalypt forests and woodlands. Understory open and grassy with few scattered shrubs. Species lives in both mature and regrowth vegetation. Also occasionally occurs in mallee or wet forest communities, in wetlands and tea-tree swamps. Breeds on ridges, hills and foothills of western slopes, Great Dividing Range and eastern coastal regions.</p> <p>Food Source: Insects and other invertebrates.</p> <p>Breeding: Breeding season between July and January, between two to three broods in each season. Eggs pale greenish-, bluish- or brownish-white, spotted with brown. Clutch size 1-4.</p> <p>Nest: Open cup made of plant fibres and cobwebs, usually more than 2m above ground. Nests usually on a dead branch in a live tree, or in a dead tree/shrub.</p>	V	NL	Marginal	Possible	Low
<i>Petroica phoenicea</i>	Flame Robin	<p>Region: Near Queensland border to south east South Australia, also in Tasmania. In NSW, breeds in upland areas, and moves to inland slopes and plains in winter. Likely there are two separate NSW populations, one in Northern Tablelands, another ranging from Central to Southern Tablelands.</p> <p>Habitat: Breeds in upland tall moist eucalypt forests and woodlands, open on ridges and slopes. Prefers clearings and/or open understoreys, with ground layer of native grasses. In winter, birds migrate to drier, more open habitats in the lowlands, including dry forests, open woodlands, and in pastures and native grasslands with or without scattered trees.</p> <p>Food source: Insects and other invertebrates.</p> <p>Breeding: Reproduce in spring to late summer. Clutch size three to four eggs.</p> <p>Nest: Open cup nest, often near ground in sheltered sites such as shallow tree cavities, stumps, banks. Eggs oval in shape, pale bluish- or greenish-white and marked with brownish blotches.</p>	V	NL	Marginal	Possible	Low

Appendices

Scientific Name	Common Name	Description	Level of Threat NSW Status	C'wlth Status	Presence of habitat	Likelihood of occurrence	Potential for impact
<i>Polytelis swainsonii</i>	Superb Parrot	<p>Region: Eastern inland NSW Breeding on the South-western slopes, migrating to the Namoi & Gwydir regions during winter.</p> <p>Habitat: Red river gums, black box, yellow box, river oak, mostly near rivers; mallee, stubbles, pastures, gardens.</p> <p>Food source: Mostly on grass seed and herbaceous plants but also fruits, berries, nectar, bud's, insects and flowers.</p> <p>Breeding: Sept-Jan to produce 4-6 round white eggs.</p> <p>Nest: Hollow of red river gum or yellow box near water.</p>	V	V	Marginal	Possible	Low
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	<p>Region: Eastern and northern Australia. Becoming rarer in settled areas.</p> <p>Habitat: A bird species common in Box-Gum, Box-Cypress & Open Box woodlands and scrubland. Birds are generally unable to cross large open areas.</p> <p>Food source: Feed on invertebrates by foraging on the trunks and branches of eucalypts and other woodland trees or on the ground, digging and probing amongst litter and tussock grasses.</p> <p>Breeding: Usually 2-3 eggs laid between July and February.</p> <p>Nest: Nest is a large, untidy dome of sticks lined with grass, bark, wool etc. 3-6m above ground.</p>	V	NL	Marginal	Possible	Low
<i>Rostratula australis</i>	Australian Painted Snipe	<p>Region: Most records from the south east, particularly the Murray Darling Basin. In NSW, most records associated with marshes, lakes and swamps in the Basin.</p> <p>Habitat: Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Forages on mud flats and in shallow water.</p> <p>Food source: Worms, molluscs, insects, some plant matter.</p> <p>Breeding: Often in response to local conditions, generally occurs from September to December.</p> <p>Nest: A scrape in the ground lined with grasses and leaves.</p>	E	E	Absent	Unlikely	No

Appendices

Scientific Name	Common Name	Description	Level of Threat NSW Status	C'wlth Status	Presence of habitat	Likelihood of occurrence	Potential for impact
<i>Stagonopleura guttata</i>	Diamond Firetail	<p>Region: Endemic to south-eastern Australia, from central Queensland to South Australia. Widely distributed in NSW. Uncommon along the coast and west of the Darling River.</p> <p>Habitat: Grassy eucalypt woodlands. Often found in riparian areas, sometimes in lightly wooded farmland.</p> <p>Food source: Grass and herb seeds, green leaves, insects.</p> <p>Breeding: Between August and January. Nests are globular structures either in shrubby understory or higher up (especially under hawk's or raven's nests).</p>	V	NL	Marginal	Possible	Low
<i>Stictonetta naevosa</i>	Freckled Duck	<p>Region: Found primarily in south-eastern and south-western Australia. Widespread throughout NSW.</p> <p>Habitat: Prefers permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times, they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds. Generally, rest in dense cover over deep water during the day.</p> <p>Food source: Algae, seeds and vegetative parts of aquatic grasses, small invertebrates.</p> <p>Breeding: Nesting usually occurs between October and December but can take place at other times in favorable conditions.</p> <p>Nests: Usually located in dense vegetation at or near water level.</p>	V	NL	Absent	Possible	No
<i>Pezoporus occidentalis</i>	Night Parrot	<p>Region: Distribution has not been well documented, but it is known to be restricted to arid and semi-arid Australia.</p> <p>Habitat: Known to occur within Spinifex grasslands in stony or sandy areas and samphire and chenopod associations on floodplains, salt lakes and clay pans. Suitable habitat is characterized by the presence of large and dense clumps of Spinifex, and it may prefer mature spinifex that is long and unburnt.</p> <p>Food Source: Said to feed on the seeds of grasses and herbs, particularly those of Spinifex.</p> <p>Breeding: Largely unknown. Breeding is said to take place after heavy rainfall. Actual breeding records are few, but young have been recorded in August, and there are unverified reports of breeding activity in April, July and August.</p>	PE	E	Absent	Unlikely	No

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Scientific Name	Common Name	Description	Level of Threat NSW Status	C'with Status	Presence of habitat	Likelihood of occurrence	Potential for impact
<i>Numenius madagascariensis</i>	Eastern Curlew	<p>Region: Region Within Australia, the Eastern Curlew has a primarily coastal distribution. The species is found in all states, particularly the north, east, and south-east regions including Tasmania. Eastern Curlews are rarely recorded inland. In NSW the species occurs across the entire coast but is mainly found in estuaries such as the Hunter River, Port Stephens, Clarence River, Richmond River and ICOLLs of the south coast.</p> <p>Habitat: It generally occupies coastal lakes, inlets, bays and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets.</p> <p>Food source: It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. It is carnivorous, mainly eating crustaceans (including crabs, shrimps and prawns), small molluscs, as well as some insects.</p> <p>Breeding: It may delay breeding until three to four years of age. Within Australia, immature birds, which do not migrate, move northward in winter. Breeds in Russia and north-eastern China but its distribution is poorly known. During the non-breeding season a few birds occur in southern Korea and China, but most spend the non-breeding season in north, east and south-east Australia.</p> <p>Nest: It roosts on sandy spits and islets, especially on dry beach sand near the high-water mark, and among coastal vegetation including low saltmarsh or mangroves. May also roost on wooden oyster leases or other similar structures</p>	NL	CE Listed	Absent	Unlikely	No
<i>Pandion Haliaeetus</i>	Osprey	<p>Region: Found right around the Australian coast line except Victoria and Tasmania. Few records from inland areas.</p> <p>Habitat: Favor coastal areas, especially the mouths of large rivers, lagoons and lakes.</p> <p>Food Sources: Feeds on fish over clear, open water.</p> <p>Breeding: Breed from July to September in NSW. Nests are high up dead trees or in dead crowns of live trees and within 1km of the sea.</p>	V	NL	Absent	Unlikely	No
Fish							

Appendices

Scientific Name	Common Name	Description	Level of Threat NSW Status	C'wlth Status	Presence of habitat	Likelihood of occurrence	Potential for impact
<i>Galaxias rostratus</i>	Flathead Galaxias	<p>Region: endemic to the southern tributaries of the Murray Darling River system; the Murray, Murrumbidgee and Lachlan Rivers and their tributaries and the upper Macquarie River catchment. Flathead Galaxias has experienced significant declines in distribution and abundance in all river systems in NSW. Extensive scientific sampling over the last two decades has recorded extremely few specimens. The last record in the Murrumbidgee River was in 1971, and it is thought that the species may be locally extinct from the lower Murray, Murrumbidgee, Macquarie and Lachlan Rivers.</p> <p>Habitat: freshwater fish generally found mid-water in still and gently moving waters of small streams, lakes, lagoons, billabongs and backwaters. Its habitat consists of coarse sand or mud substrate and aquatic vegetation.</p> <p>Preferred Food: Flathead Galaxias feeds predominately on aquatic insects and crustaceans.</p> <p>Breeding: Spawning occurs in spring, when water temperatures are above 10.5°C. The species produces 2000-7000 transparent, slightly adhesive demersal eggs, with fecundity increasing with length of fish. The eggs hatch after 9 days at temperatures between 9-14°C. Fry are 6-8 mm long after hatching. Individuals probably mature in their first year (approximately 80 mm long).</p>	CE	CE	Absent	Unlikely	No

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Scientific Name	Common Name	Description	Level of Threat		Presence of habitat	Likelihood of occurrence	Potential for impact
			NSW Status	C'wlth Status			
<i>Macculloche ulla peelii</i>	Murray Cod	<p>Region: are massively reduced in numbers. Wild stocks are now estimated to be less than ten percent of the population present at the time of European settlement. Have become locally extinct in many small tributaries in which they once abounded, particularly in upland reaches of the southern and central Murray Darling Basin, and the fish is rare in the majority of the rest of its original range.</p> <p>Habitat: varies greatly, from quite small clear, rocky, upland streams with riffle and pool structure on the upper western slopes of the Great Dividing Range to large, meandering, slow-flowing, often silty rivers in the alluvial lowland reaches of the Murray-Darling Basin.</p> <p>Preferred Food: have a varied diet of other fish, spiny freshwater crayfish, Yabbies, shrimp, freshwater mussels, frogs, water fowl, small mammals, tortoises and other reptiles.</p> <p>Breeding: reach sexual maturity at 4 to 6 years of age and 2 to 3 kg in weight. Has relatively low fertility compared to many other freshwater fish. Egg counts range from <10,000 eggs for a barely mature female to approximately 90,000 for females around the 22 kg mark. It is likely that large female Murray cod that are in the 15-25 kg range and "in their prime" are perhaps the most important breeders because they produce the most eggs. Both of these factors mean the spawning's of large female fish have far higher larval survival rates and make far greater reproductive contributions than the spawning's of small female fish.</p>	NL	V	Absent	Unlikely	No

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Scientific Name	Common Name	Description	Level of Threat		Presence of habitat	Likelihood of occurrence	Potential for impact
			NSW Status	C'wlth Status			
<i>Macquaria australasica</i>	Macquarie Perch	<p>Region: found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury/Nepean and Shoalhaven catchments. The conservation status of the different populations is not well known, but there have been long-term declines in their abundance.</p> <p>Habitat: prefers clear water and deep, rocky holes with lots of cover as well as aquatic vegetation, additional cover may comprise of large boulders, debris and overhanging banks. Spawning occurs just above shallow running water.</p> <p>Preferred Food: Adult fish feed on aquatic insects, crustaceans and molluscs.</p> <p>Breeding: Sexual maturity occurs at 15-20 cm or two years of age for males and 25 cm or three years for females however this varies between locations due to local conditions. Macquarie Perch spawn in spring or summer in flowing shallow upland streams and rivers. Females produce around 50,000-100,000 eggs which settle among stones and gravel of the stream or river bed. Hatching occurs after approximately 10 days and larvae are about 7 mm long.</p>	E	E	Absent	Unlikely	No
<i>Bidyanus bidyanus</i>	Silver Perch	<p>Region: Once widespread throughout entire Murray Darling. Now only one self sustaining population occurs in the central Murray downstream of Yarrawonga weir.</p> <p>Habitat: Generally found in fast flowing water including rapids and races and more open sections of the river.</p> <p>Food source: Omnivorous with diet containing aquatic plants, snails, shrimps and aquatic insect larvae.</p> <p>Breeding: Successful spawning seems dependent on high flows and overbank flooding.</p>	V	CE	Absent	Unlikely	No

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Scientific Name	Common Name	Description	Level of Threat NSW Status	C'wlth Status	Presence of habitat	Likelihood of occurrence	Potential for impact
<i>Craterocephalus fluviatilis</i>	Murray Hardyhead	<p>Region: Found only in lowland areas of the southern basin. In the Murray as far upstream as Yarrawonga and lower to mid Murrumbidgee (although possibly extinct in the Murrumbidgee).</p> <p>Habitat: Found on the margins of lakes, wetlands, backwaters and billabongs, preferring open water, shallow, slow moving or still habitats.</p> <p>Food source: Omnivorous eating primarily microcrustaceans but also some aquatic insects and algae.</p> <p>Breeding: Spawning occurs over an extended breeding season (Sept-Apr) but breeding usually occurs in late spring - early summer. Batch spawner with ovarian eggs at various stages of development. Likely to lay adhesive eggs amongst aquatic vegetation.</p>	CE	E	Absent	Unlikely	No
<i>Phascolarctos cinereus</i>	Koala	<p>Region: Fragment distribution throughout eastern Australia from north-east Queensland to South Australia. In NSW, mainly occurs on the central and north coasts, and some populations in the west of the Great Dividing Range.</p> <p>Habitat: Eucalypt woodlands and forests.</p> <p>Food source: Foliage of more than 70 eucalypt and 30 non-eucalypt species.</p> <p>Breeding: Females breed at two years of age and produce one young per year.</p>	V	V	Absent	Possible	No
Bats							
<i>Myotis macropus</i>	Southern Myotis	<p>Region: The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers.</p> <p>Habitat: Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage.</p> <p>Food source: Forage over streams and pools catching insects and small fish by raking their feet across the water surface.</p> <p>Breeding: In NSW females have one young each year usually in November or December.</p>	V	NL	Absent	Possible	No

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Scientific Name	Common Name	Description	Level of Threat NSW Status	C'wlth Status	Presence of habitat	Likelihood of occurrence	Potential for impact
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat	<p>Region: The Yellow-bellied Sheathtail-bat is a wide-ranging species found across northern and eastern Australia. There are scattered records of this species across the New England Tablelands and North West Slopes.</p> <p>Habitat: Forages in most habitats across its very wide Region, with and without trees; appears to defend an aerial territory. Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas, they are known to utilise mammal burrows.</p> <p>Food source: Insects</p> <p>Breeding: Breeding has been recorded from December to mid-March, when a single pup is born.</p>	V	NL	Marginal	Possible	Low
<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat	<p>Region: Coincides approximately with the Murray Darling Basin with the Pilliga Scrub region being the distinct stronghold for this species.</p> <p>Habitat: Inhabits a variety of vegetation types, including mallee, bullocke <i>Allocasuarina leuhmanni</i> and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland. Roosts in tree hollows, crevices, and under loose bark.</p> <p>Food source: Slow flying agile bat, utilising the understory to hunt non-flying prey - especially caterpillars and beetles - and will even hunt on the ground.</p> <p>Breeding: Mating takes place in autumn with one or two young born in late spring to early summer.</p>	V	V	Marginal	Possible	Low
Flora							

Scientific Name	Common Name	Description	Level of Threat		Presence of habitat	Likelihood of occurrence	Potential for impact
			NSW Status	C'wlth Status			
<i>Austrostipa wakoolica</i>	A spear-grass	<p>Region: Confined to the floodplains of the Murray River tributaries of central-western and south-western NSW, with localities including Manna State Forest, Matong, Lake Tooim, Merran Creek, Tulla, Cunninyeuk and Mairjimmy State Forest (now part of South West Woodland Nature Reserve).</p> <p>Habitat: Grows on floodplains of the Murray River tributaries, in open woodland on grey, silty clay or sandy loam soils; habitats include the edges of a lignum swamp with box and mallee; creek banks in grey, silty clay; mallee and lignum sandy-loam flat; open Cypress Pine forest on low sandy range; and a low, rocky rise. Associated species include <i>Callitris glaucophylla</i>, <i>Eucalyptus microcarpa</i>, <i>E. populnea</i>, <i>Austrostipa eremophila</i>, <i>A. drummondii</i>, <i>Austrodanthonia eriantha</i> and <i>Einadia nutans</i>.</p> <p>Flowering/Description: Flowers from October to December, mainly in response to rain.</p>	E	E	Absent	Unlikely	No
<i>Brachyscome muelleroides</i>	Claypan Daisy	<p>Region: The Claypan Daisy occurs in the Wagga Wagga, Narranderra, Tocumwal and Walbundrie areas. Also occurs in north-central Victoria (only along the Murray from Tocumwal to the Ovens River).</p> <p>Habitat: Grows in damp areas on the margins of claypans in moist grassland with <i>Pycnosorus globosus</i>, <i>Agrostis avenacea</i> and <i>Austrodanthonia duttoniana</i>. Also recorded from the margins of lagoons in mud or water, and in association with <i>Calotis anthemoides</i>. Victorian collections have generally come from open positions on the Murray River floodplain, swampy River Red Gum (<i>Eucalyptus camaldulensis</i>) Forest and damp depressions.</p> <p>Flowering/Description: September to November.</p>	V	V	Absent	Unlikely	No

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Scientific Name	Common Name	Description	Level of Threat		Presence of habitat	Likelihood of occurrence	Potential for impact
			NSW Status	C'wlth Status			
<i>Sclerolaena napiformis</i>	Turnip Copperbur	<p>Region: Known from only a few small populations in remnant grassland in the southern Riverina of NSW and north-central Victoria. NSW populations are confined to the area between Jerilderie and Moama on travelling stock routes and road reserves.</p> <p>Habitat: Confined to remnant grassland habitats on clay-loam soils. Grows on level plains in tussock grassland of <i>Austrostipa nodosa</i> and <i>Chloris truncata</i>, in grey cracking clay to red-brown loamy clay. Sites are roadside travelling stock routes and reserves subject to sheep grazing. Associated species include <i>Austrodanthonia duttoniana</i>, <i>Enteropogon acicularis</i>, <i>Austrostipa nodosa</i>, <i>Chloris truncata</i>, <i>Lolium rigidum</i>, <i>Swainsona murrayana</i>, <i>S. plagiotropis</i>, <i>S. procumbens</i>, <i>Rhodanthe corymbiflora</i>, <i>Calotis scabiosifolia</i>, <i>Microseris lanceolata</i>, <i>Acacia pendula</i> and various chenopods.</p> <p>Flowering/Description: Fruiting period is from November to May. Plants grow as low shrubs within an open to mid-dense tussock grassland with herbaceous ground layer.</p>	E	E	Absent	Possible	No
<i>Swainsona murrayana</i>	Slender Darling Pea	<p>Region: Found throughout NSW, it has been recorded in the Jerilderie and Deniliquin areas of the southern riverine plain, the Hay plain as far north as Willandra National Park, near Broken Hill and in various localities between Dubbo and Moree.</p> <p>Habitat: Collected from clay-based soils. Grows in a variety of vegetation types. Species may require some disturbance, and has been known to occur in paddocks that are moderately grazed or occasionally cultivated.</p> <p>Flowering/Description: Produce winter-spring growth, flower in spring to early summer, then die back after flowering. They re-shoot readily and often carpet the landscape after good cool-season rains.</p>	V	V	Absent	Unlikely	No

Appendices

Scientific Name	Common Name	Description	Level of Threat		Presence of habitat	Likelihood of occurrence	Potential for impact
			NSW Status	C'wlth Status			
<i>Amphibromus fluitans</i>	Floating Swamp Wallaby-grass	<p>Region: There are many historic collections in the City of Greater Albury. It has been recorded recently in lagoons beside the Murray River near Cooks Lagoon (Shire of Greater Hume), Mungabarina Reserve, East Albury, at Ettamogah, Thurgoona (Charles Sturt University Campus), near Narranderra, and also further west along the Murray River (near Mathoura) and in Victoria. There is a recent record of this species near Lagoon in Upper Lachlan Shire. It is also found in Victoria and in Tasmania.</p> <p>Habitat: Grows mostly in permanent swamps. The species needs wetlands which are at least moderately fertile and which have some bare ground, conditions which are produced by seasonally-fluctuating water levels. Habitats in south-western NSW include swamp margins in mud, dam and tank beds in hard clay and in semi-dry mud of lagoons with Potamogeton and Chamaeraphis species. Disturbance regimes are not known, although the species requires periodic flooding of its habitat to maintain wet conditions. Has been observed covering several hectares in area. The species is also recorded as occasional to common in populations.</p> <p>Flowering/Description: Flowering time is from spring to autumn or November to March. Amphibromus fluitans appears to fruit later than the other grasses with which it grows. The flower heads remain almost hidden by the leaf sheaths until the seeds are nearly mature, and even then elongation of the stems is barely sufficient to expose the heads completely.</p>	V	V	Absent	Possible	No
<i>Pimelea spinescens</i>	Plains Rice-flower	<p>Region: Endemic to Victoria occurring in grassland or open shrubland North and West of Melbourne.</p> <p>Habitat: Confined to and dependent on lowland grassland or open shrubland habitats. Occurs on basalt soils and in areas that received low levels of disturbance.</p> <p>Flowering/Description: Slow growing and may live as long as 100 years, Flowering occurs from April to August and plants are dioecious.</p>	NL	CE	Absent	Unlikely	No

11.5. SITE INSPECTION AND RECORD OF SITE SPECIES

11.5.1. OVERVIEW PLAN



11.5.2. SPECIES DETAIL

ID	Status	Common Name	Scientific Name	Action	Contains hollows?	Contains Nest?	Has Scar?	Native to NSW?	Project area	PCT Mapping
1	Dead	Willow	<i>Salix spp.</i>	Remove	No	No	No	No	Barn 1	Non-native
2	Dead	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Barn 1	Non-native
3	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Barn 1	Non-native
4	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Barn 1	Non-native
5	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Barn 1	Non-native
6	Dead	Willow	<i>Salix spp.</i>	Remove	No	No	No	No	Barn 1	Non-native
7	Dead	Willow	<i>Salix spp.</i>	Remove	No	No	No	No	Storage 1	Non-native
8	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 1	Non-native
9	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Leave	No	No	No	No		Grey Box
10	Dead	Willow	<i>Salix spp.</i>	Remove	No	No	No	No	Barn 2	Grey Box
11	Dead	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Barn 2	Grey Box
12	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Barn 2	Non-native
13	Dead	Willow	<i>Salix spp.</i>	Remove	No	No	No	No	Barn 2	Non-native
14	Alive	Swamp Mallet (2 regrowth)	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Barn 2	Non-native
15	Dead	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Barn 2	Non-native
16	Dead	Willow	<i>Salix spp.</i>	Remove	No	No	No	No	Barn 2	Non-native
17	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Barn 2	Non-native
18	Dead	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Barn 2	Non-native
19	Dead	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Barn 2	Non-native
20	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Effluent 1	Non-native
21	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Effluent 1	Non-native
22	Alive	Red Ironbark	<i>Eucalyptus tricarpa</i>	Remove	No	No	No	Yes	Adjoining Effluent	Non-native
23	Alive	Red Ironbark	<i>Eucalyptus tricarpa</i>	Leave	No	No	No	Yes		Non-native
24	Alive	Red Ironbark	<i>Eucalyptus tricarpa</i>	Leave	No	No	No	Yes		Non-native
25	Alive	Red Ironbark	<i>Eucalyptus tricarpa</i>	Leave	No	No	No	Yes		Non-native



Appendices

ID	Status	Common Name	Scientific Name	Action	Contains hollows?	Contains Nest?	Has Scar?	Native to NSW?	Project area	PCT Mapping
26	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Leave	No	No	No	No		Non-native
27	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 1	Non-native
28	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 1	Grey Box
29	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 1	Grey Box
30	Dead	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 1	Grey Box
31	Alive	River She-oak	<i>Casuarina cunninghamiana</i>	Remove	No	No	No	Yes	Storage 1	Grey Box
32	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 1	Grey Box
33	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 2	Grey Box
34	Dead	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 2	Grey Box
35	Dead	Willow	<i>Salix spp.</i>	Remove	No	No	No	No	Storage 2	Grey Box
36	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 2	Grey Box
37	Dead	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 2	Grey Box
38	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Leave	No	No	No	No		Non-native
39	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Leave	No	No	No	No		Non-native
40	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Leave	No	No	No	No		Non-native
41	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Leave	No	No	No	No		Non-native
42	Dead	Swamp Mallet	<i>Eucalyptus spathulata</i>	Leave	No	No	No	No		Non-native
43	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Leave	No	No	No	No		Non-native
44	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Leave	No	No	No	No		Non-native
45	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Leave	No	No	No	No		Non-native
46	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Leave	No	No	No	No		Non-native
47	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Leave	No	No	No	No		Non-native
48	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Leave	No	No	No	No		Non-native
49	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Leave	No	No	No	No		Non-native
50	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Leave	No	No	No	No		Non-native
51	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 2	Grey Box
52	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 2	Grey Box

ID	Status	Common Name	Scientific Name	Action	Contains hollows?	Contains Nest?	Has Scar?	Native to NSW?	Project area	PCT Mapping
53	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 2	Grey Box
54	Dead	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 2	Grey Box
55	Alive	Ghost Gum	<i>Corymbia aparrerinja</i>	Remove	No	No	No	No	Storage 2	Grey Box
56	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 1	Grey Box
57	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 1	Grey Box
58	Alive	Ghost Gum	<i>Corymbia aparrerinja</i>	Remove	No	No	No	No	Storage 1	Grey Box
59	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 1	Non-native
60	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 1	Non-native
61	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 1	Non-native
62	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 1	Non-native
63	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 1	Non-native
64	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 1	Non-native
65	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 1	Non-native
66	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 1	Non-native
67	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 1	Non-native
68	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Remove	No	No	No	No	Storage 1	Non-native
69	Alive	Swamp Mallet	<i>Eucalyptus spathulata</i>	Leave	No	No	No	No		Non-native

11.5.3. SITE PHOTOS



ID - 1



ID - 2



ID - 7



ID - 9



ID - 16



ID - 22

WGS84 55s 309954 6022809 Δ $\pm 3m$ 106 Δ ± 13 °,T NW340



17Aug20 14:14
Mathoura NSW 2710, Australia

ID - 28

WGS84 55s 309926 6022855 Δ $\pm 3m$ 107 Δ ± 13 °,T S177



17Aug20 12:22
Mathoura NSW 2710, Australia

L-R – ID 30, 31 & 32

WGS84 55s 309854 6022820 Δ $\pm 3m$ 107 Δ ± 13 °,T NW311



17Aug20 14:15
Mathoura NSW 2710, Australia

ID – 36

WGS84 55s 309755 6022835 Δ $\pm 3m$ 106 Δ ± 13 NW328



17Aug20 14:17
Mathoura NSW 2710, Australia

L-R – ID 43, 44 & 45

WGS84 55s 309817 6022785 Δ $\pm 3m$ 107 Δ ± 15 SE157



17Aug20 10:31
Mathoura NSW 2710, Australia

ID50

WGS84 55s 309928 6022769 Δ $\pm 3m$ 107 Δ ± 15 S178



17Aug20 10:33
Mathoura NSW 2710, Australia

ID – 55

WGS84 55s 309997 6022764 Δ $\pm 3m$ 106 ∇ ± 16 S172



17Aug20 10:35
Mathoura NSW 2710, Australia

ID - 59

WGS84 55s 310054 6022753 Δ $\pm 3m$ 107 ∇ ± 16 S168



17Aug20 10:36
Mathoura NSW 2710, Australia

ID - 64

WGS84 55s 309787 6022665 Δ $\pm 3m$ 107 ∇ ± 15 NW307



17Aug20 11:00
Mathoura NSW 2710, Australia

ID - 69



Appendix 10

Aboriginal Cultural Heritage Assessment

Progressive Rural Solutions

M

Yarrimbah

LGA: Murray River Shire

Aboriginal Cultural Heritage Assessment (ACHA)

22 September 2020

McCARDLE CULTURAL HERITAGE PTY LTD

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Report No: J20053 ACHA

Approved by: Penny McCardle

Position: Director

Signed: 

Date: 22 September 2020

This report has been prepared in accordance with the scope of services described in the contract or agreement between McCardle Cultural Heritage Pty Ltd (MCH), ACN: 104 590 141, ABN: 89 104 590 141, and Progressive Rural Solutions. The report relies upon data, surveys, measurements and specific times and conditions specified herein. Any findings, conclusions or recommendations only apply to the aforementioned circumstances and no greater reliance should be assumed or drawn by Progressive Rural Solutions. Furthermore, the report has been prepared solely for use by Progressive Rural Solutions and MCH accepts no responsibility for its use by other parties.

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EXECUTIVE SUMMARY

McCardle Cultural Heritage Pty Ltd (MCH) has been commissioned by Progressive Rural Solutions on behalf of RA & LJ Smith to prepare an Aboriginal Cultural Heritage Assessment (ACHA) for a proposal for two free stall dairy barns and associated infrastructure including effluent treatment systems, ponds, pipelines and a freshwater storage dam located on the Yarrimbah property located approximately 12 kilometres south of Mathoura and includes Lot 2 DP1077844, Lot 117 DP455183, Lot 13 DP751153 and Lot 14 DP751153.

The assessment has been undertaken to meet the Heritage NSW, Department of Premier & Cabinet, Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (DECCW 2010), the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011), the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW 2010b), the Secretary's Environmental Assessment Requirements (SEARs) and the brief.

The project area is located in the Riverina region of NSW. The Riverina covers the alluvial fans of the Lachlan, Murrumbidgee and Murray Rivers (subregions) west of the Great Dividing Range and extends down the Murray. The project area is located approximately 10 metres above the floodplain area and situated on the Cadell Tilt and over 600 metres west of a dune. Whilst the dune area would have been utilised by past Aboriginal people, the flood plain would have been unsuitable for camping but would have been utilised for transitory activities such as hunting and gathering. The geology of the region and project area consists of quaternary alluvial sediments of clay and sands with the Cadell Tilt, a north-south trending intra-plate geological fault. Materials most dominant in stone tool manufacture throughout the area are indurated mudstone/tuff and silcrete, both of which would have been transported into the area as there are no known local sources of such raw materials in the immediate area. The geomorphology of the Riverine Plain has developed from fluvial, lacustrine and aeolian activity all of which have resulted in the current level of soil formation on the plain. Soils of the Project Area include Red-Brown Earths, grey clays and deep sands.

Whilst it is likely that prior to agricultural activities, including man-made drains throughout the flood plain area, that natural drainage lines were present, however, as their locations are no longer evident, site prediction in terms of proximity to reliable fresh water is not possible beyond the local lakes and their tributaries local area including, but not limited to, Moira Lake (2 kilometres south east of the project area), and the Murray River (4.5 kilometres east of the project area at its closest point) as focal points. One 1st order was located approximately 1.1 kilometres to the west of the project area (Green Gully), however this has been significantly impacted through long term intensive cropping. The project area is located to the west of reliable fresh water sources and elevated landforms that would have also included subsistence and medicinal resources along their edges and in close proximity in this area. The project area, is in fact some distance from these resources and given the resource rich Murray River it is unlikely that the project area would have been used for more than transitory activities such as hunting and gathering and travel to these resource rich environments.

In terms of land uses and impacts to the landscape and cultural materials, the landscape has been subjected to a range of different modifactory activities including extensive logging and clearing, long-term intensive agricultural irrigation practices (cropping, ploughing) and pastoral grazing. The associated high degree of landscape disturbance has resulted in the alteration of large tracts of land and the cultural materials contained within these areas.

A search of the AHIMS register has shown that six known Aboriginal sites are currently recorded within five kilometres of the project area and include two scar trees, an earth mound, artefact site, burial and an ochre mine, none of which are in the project area. One Aboriginal place is recorded on

AHIMS is also outside the project area. After reviewing both regional and local assessments, past Aboriginal land use patterns are evident as follows:

- a wide variety of site types are represented in the project area with open campsites, isolated artefacts and scarred trees being the most common
- sites located in the vicinity of major tributaries (4th and 5th order streams/rivers) have the highest distribution and densities. These sites tend to be extensive and complex in landscapes with permanent and reliable water and contain evidence representative of concentrated activity
- sites located in the vicinity of the lower reaches of tributaries (3rd order creeks) have an increased distribution and density and contain evidence that may represent repeated occupation or concentration of activity
- sites located in the vicinity of the upper reaches of minor tributaries (2nd order streams) also have a relatively sparse distribution and density and may represent evidence of localised one-off behaviour
- sites in proximity to ephemeral water sources or located in the vicinity of headwaters of upper tributaries (1st order streams) have a sparse distribution and density and contain little more than a background scatter
- sites within the plain's areas consist of a background scatter representative of hunting and gathering activities and travel
- lithic artefacts are primarily manufactured from mudstone and silcrete with a variety of other raw materials also utilised but in smaller proportions
- scarred trees are mainly Black Box with other tree types used significantly less
- hearths are located in close proximity to reliable water sources
- burials and associated activities may be located in the dunes within the Riverina environment

Whilst the regional environment provided resources, including fauna, flora and water, that would have allowed for sustainable occupation of Moira Lake (2 kilometres south east of the project area) and the Murray River (4.5 kilometres east of the project area at its closest point), the project area is located within an environment that provided limited resources due to its distance from reliable water and associated resources that would have allowed for sustainable occupation of the area. Being a flood plain with no elevated land, it is possible that isolated finds and small density artefacts scatters maybe present and would be indicative of transitory activities such as hunting and gathering and travel rather than large numbers of people camping. Any sites present are also expected to have been significantly impacted, if not destroyed, on by the long-term intensive rotation dairy grazing, extensive agricultural activities and irrigation developments including channels, drains and dams.

The project area, consisting of very low-lying elevated flats within 10 metres of the flood plain, was surveyed as five survey units (SU) that was based on landform elements and separate project development areas.

SU1 - Access track: The access track is approximately 48,000 m² and had been previously cleared, and subject to long-term intensive ploughing and grazing, has been fenced in places and also includes water pipelines. Exposures were high and visibility was 100%.

SU2 - Above ground pads - dairy sheds: The irrigation paddock had also been subject to complete clearing and long-term agricultural activities (ploughing, grazing) and land-forming. This unit

contained channel, constructed track, fencing, water troughs and pipelines. A single row of trees planted in about 2000 was also present. Exposures were high and visibility was moderate at 30%.

SU3 - irrigation storage dam: Subject to complete clearing and long-term agricultural activities (ploughing, grazing) and land-forming, this unit, also an irrigation paddock, contains an irrigation channel, fencing, water troughs and pipelines. The site contains single row tree plantation lines. Exposures were high and visibility was moderate at 40%.

SU4 - Effluent ponds: Consisting of an irrigation paddock, this area has been previously cleared and subject to long term ploughing, cultivation and grazing activities. Containing a large drain, road and irrigation channels, it also has existing pipelines to supply stock water and fencing. Exposures were high and visibility was moderate to high at 50%.

SU5 - Drain (existing): This unit includes the existing drain maintenance works that will be contained within the existing drain. Being highly disturbed, exposures and visibility were high at 100%.

The overall effective coverage for project area was moderate at 40.29% with grass being the limiting visibility factor. The entire site has been disturbed through large scale clearing, long-term extensive agricultural activities which include ploughing, cropping and high impact rotational grazing. The site has also been developed for irrigation with activities such as deep ripping, land forming and the construction of channels, banks, drains and fencing throughout. All activities have significantly impacted upon the landscape and associated cultural materials through removal and displacement resulting in a highly disturbed landscape with no potential for in-situ deposits. No archaeological sites or Potential Archaeological Deposits (PADs) were identified during the survey and this is likely due to a number of factors including:

- Distance from reliable water and subsistence resources indicates the project area was unlikely to have been utilised for camping;
- The project area may have been used for travel and/or hunting and gathering which manifest in the archaeological record as very low-density artefact scatters and/or isolated finds; and
- Past and present land uses would have displaced and/or destroyed any evidence of past Aboriginal land use.

The survey results demonstrate the absence of Aboriginal objects within the project area. The results are consistent with those obtained from other studies in the regional area in similar environmental contexts. The results indicate a number of possible past Aboriginal land use within the project area;

- No or limited Aboriginal occupation
- Ground disturbances having disturbed or removed evidence

Considering general models of occupation for the locality, the results of this and other investigations, the locality may have been utilised by Aboriginal people. As the project area itself is located over two kilometres from the closest reliable fresh water source and associated resources, the project area is unlikely to have been utilised more than a low intensity usage such as transitory movement or hunting/gathering activities.

As no sites were identified during the survey, there are no impacts on the archaeological record and the following recommendations are provided:

- 1) The persons responsible for the management of onsite works will ensure that all staff, contractors and others involved in construction and maintenance related activities are made aware of the statutory legislation protecting sites and places of significance. Of particular

importance is the National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010, under the National Parks and Wildlife Act 1974; and

- 2) Should any Aboriginal objects be uncovered during works, all work will cease in that location immediately and the Unexpected Finds Protocol followed.

GLOSSARY

Aboriginal Cultural Heritage Values: traditional values of Aboriginal people, handed down in spiritual beliefs, stories and community practices and may include local plant and animal species, places that are important and ways of showing respect for other people.

Aboriginal Place: are locations that have been recognised by the Minister for Climate Change and the Environment (and gazetted under the *National Parks and Wildlife Act 1974*) as having special cultural significance to the Aboriginal community. An Aboriginal Place may or may not include archaeological materials.

Aboriginal Site: an Aboriginal site is the location of one or more Aboriginal archaeological objects, including flaked stone artefacts, midden shell, grinding grooves, archaeological deposits, scarred trees etc.

Artefact: any object that is physically modified by humans.

Assemblage: a collection of artefacts associated by a particular place or time, assumed generated by a single group of people, and can comprise different artefact types.

Axe: a stone-headed axe usually having two ground surfaces that meet at a bevel.

Backed artefact: a stone tool where the margin of a flake is retouched at a steep angle and that margin is opposite a sharp edge.

Background scatter: a term used to describe low density scatter of isolated finds that are distributed across the landscape without any obvious focal point.

Blade: a flake that is at least twice as long as it is wide.

Bondi point: a small asymmetrical backed artefact with a point at one end and backing retouch.

Core: a chunk of stone from which flakes are removed and will have one or more negative flake scars but no positive flake scars. The core itself can be shaped into a tool or used as a source of flakes to be formed into tools.

Debitage: small pieces of stone debris that break off during the manufacturing of stone tools. These are usually considered waste and are the by-product of production (also referred to as flake piece).

Flake: any piece of stone struck off a core and has a number of characteristics including ring cracks showing where the hammer hit the core and a bulb of percussion. May be used as a tool with no further working, may be retouched or serve as a platform for further reduction.

Flaked piece/waste flake: an unmodified and unused flake, usually the by-product of tool manufacture or core preparation (also referred to as debitage).

Formation processes: human caused (land uses etc) or natural processes (geological, animal, plant growth etc) by which an archaeological site is modified during or after occupation and abandonment. These processes have a large effect on the provenience of artefacts or features.

Grinding stone: an abrasive stone used to abrade another artefact or to process food.

Hammer stone: a stone that has been used to strike a core to remove a flake, often causing pitting or other wear on the stone's surface.

Harm: is defined as an act that may destroy, deface or damage an Aboriginal object or place. In relation to an object, this means the movement or removal of an object from the land in which it has been situated

Holocene: the post-glacial period, beginning about 10,000 B.P.

In situ: archaeological items are said to be "in situ" when they are found in the location where they were last deposited.

Pleistocene: the latest major geological epoch, colloquially known as the "Ice Age" due to the multiple expansion and retreat of glaciers. Ca. 3,000, 000-10,000 years B.P.

Retouched flake: a flake that has been flaked again in a manner that modified the edge for the purpose of resharpening that edge.

Stratified Archaeological Deposits: Aboriginal archaeological objects may be observed in soil deposits and within rock shelters or caves. Where layers can be detected within the soil or sediments, which are attributable to separate depositional events in the past, the deposit is said to be stratified. The integrity of sediments and soils are usually affected by 200 years of European settlement and activities such as land clearing, cultivation and construction of industrial, commercial and residential developments.

Taphonomy: the study of processes which have affected organic materials such as bone after death; it also involves the microscopic analysis of tooth-marks or cut marks to assess the effects of butchery or scavenging activities.

Traditional Aboriginal Owners: Aboriginal people who are listed in the Register of Aboriginal owners pursuant to Division 3 of the *Aboriginal Land Register Act (1983)*. The Registrar must give priority to registering Aboriginal people for lands listed in Schedule 14 of the *National Parks and Wildlife Act 1974* or land subject to a claim under 36A of the *Aboriginal Land Rights Act 1983*.

Traditional Knowledge: Information about the roles, responsibilities and practices set out in the cultural beliefs of the Aboriginal community. Only certain individuals have traditional knowledge and different aspects of traditional knowledge may be known by different people, e.g. information about men's initiation sites and practices, women's sites, special pathways, proper responsibilities of people fishing or gathering food for the community, ways of sharing and looking after others, etc.

Typology: the systematic organization of artefacts into types on the basis of shared attributes.

Use wear: the wear displayed on an artefact as a result of use.

ACRONYMS

ACHA	Aboriginal Cultural Heritage Assessment
ACHMP	Aboriginal Cultural Heritage Management Plan
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit

AHIMS SITE ACRONYMS

ACD	Aboriginal ceremonial and dreaming
AFT	Artefact (stone, bone, shell, glass, ceramic and metal)
ARG	Aboriginal resource and gathering
ART	Art (pigment or engraving)
BOM	Non-human bone and organic material
BUR	Burial
CFT	Conflict site
CMR	Ceremonial ring (stone or earth)
ETM	Earth mound
FSH	Fish trap
GDG	Grinding groove
HAB	Habitation structure
HTH	Hearth
OCQ	Ochre quarry
PAD	Potential archaeological Deposit
SHL	Shell
STA	Stone arrangement
STQ	Stone quarry
TRE	Modified tree (carved or scarred)
WTR	Water hole

1 INTRODUCTION

1.1 INTRODUCTION

McCardle Cultural Heritage Pty Ltd (MCH) has been commissioned by Progressive Rural Solutions on behalf of RA & LJ Smith to prepare an Aboriginal Cultural Heritage Assessment (ACHA) for the proposed for two free stall dairy barns and associated infrastructure including effluent treatment systems, ponds, pipelines and a freshwater storage dam located on the Yarrimbah property located approximately 12 kilometres south of Mathoura.

The assessment has been undertaken to meet the Heritage NSW, Department of Premier & Cabinet, Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (DECCW 2010), the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011), the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW 2010b), the Secretary's Environmental Assessment Requirements (SEARs) and the brief.

1.2 PROPONENT DETAILS

RA & LJ Smith

1.3 THE PROJECT AREA

The project area is defined by the proponent and is located approximately 12 kilometres south of Mathoura (NSW) and 28 kilometres north of Echuca (Victoria). Including Lot 2 DP1077844, Lot 117 DP455183, Lot 13 DP751153 and Lot 14 DP751153, the location and extent of the project area is illustrated in Figures 1.1 to 1.3.

Figure 1.1 Regional location of the project area

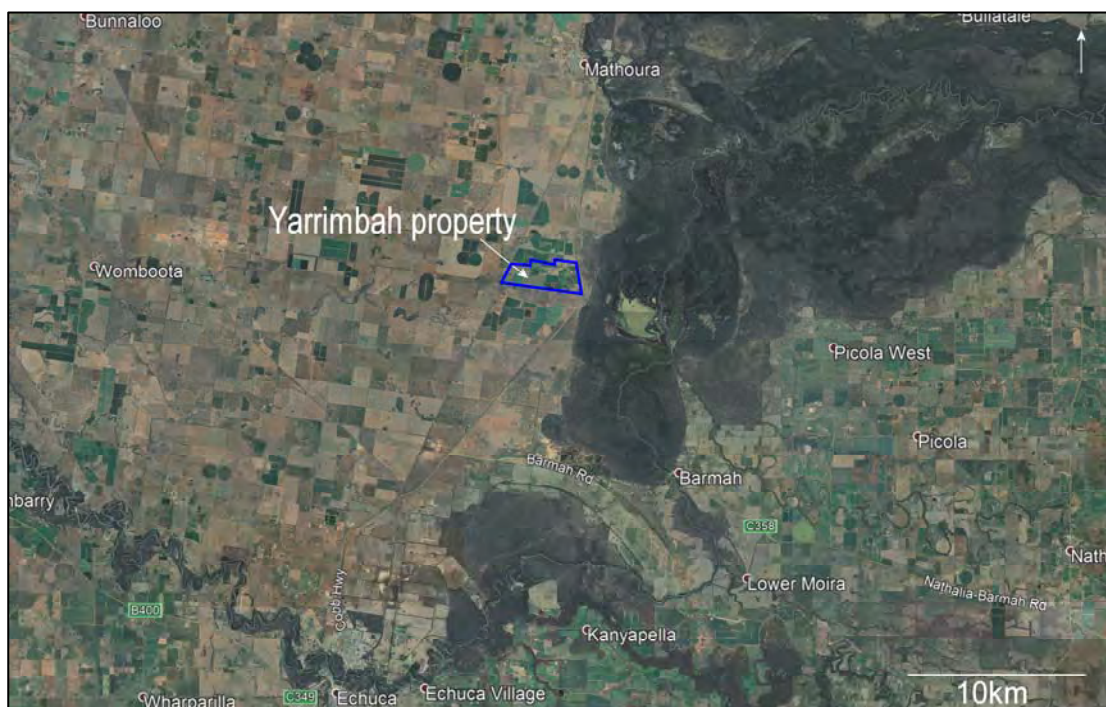


Figure 1.2 Local location of the project area

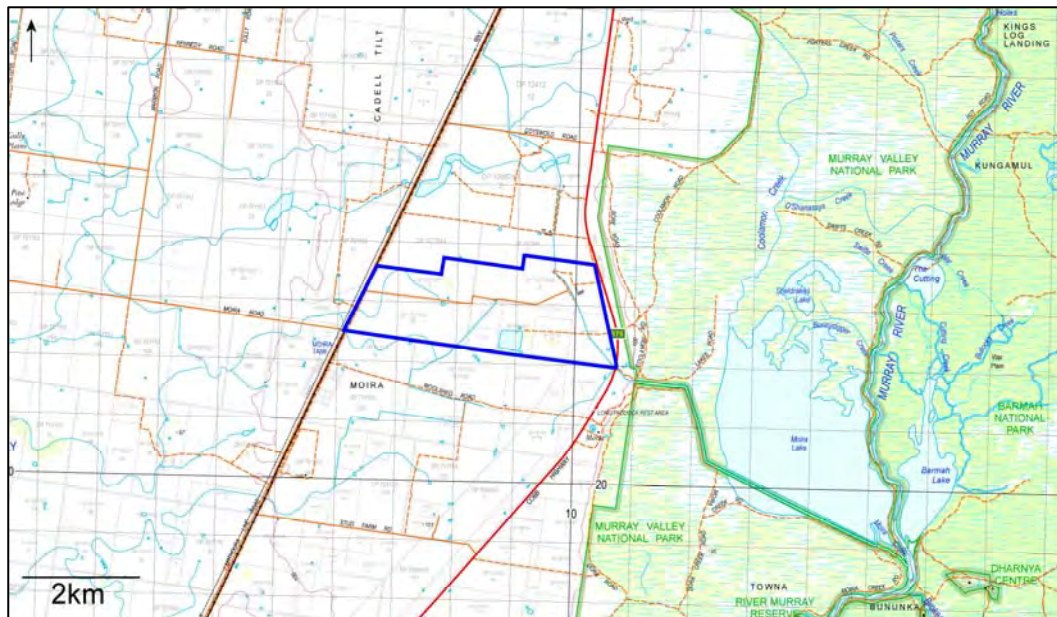


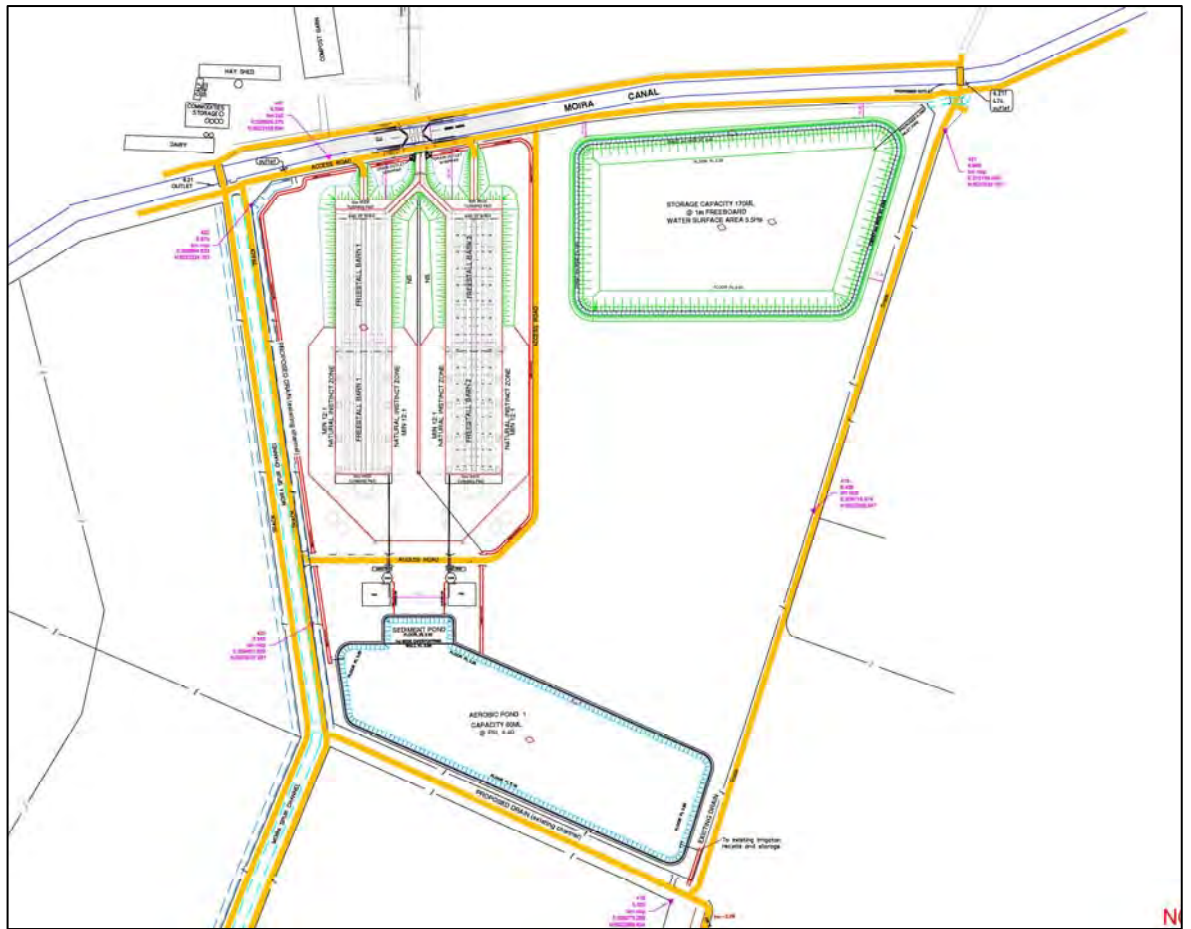
Figure 1.3 Detailed location of the project area with plan overlay



1.4 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The project proposal is for two free-stall dairy barns and associated infrastructure including an access road with temporary parking and storage areas, dairy shed pads, effluent treatment systems, ponds, pipelines and a freshwater irrigation storage dam. Other works within the project area boundary include an area set aside for emergency dead animal management (only excavated if required), access tracks and a pad area for manure storage. There are no revegetation works proposed on the site and existing infrastructure is to be removed from site. Plans are provided in Figure 1.4.

Figure 1.4 Proposed plan



1.5 PURPOSE OF THE ARCAHEOLOGICAL ASSESSMENT

The purpose of the assessment is to assess any archaeological constraints to support the proposal and to provide opportunities and options to ensure any cultural materials present are protected through appropriate mitigation and management.

1.6 OBJECTIVE OF THE ASSESSMENT

The objective of the assessment is to identify areas of indigenous cultural heritage value, to determine possible impacts on any indigenous cultural heritage identified (including potential subsurface evidence) and to develop management recommendations where appropriate. The assessment employs a regional approach, taking into consideration the landscape of the project area (landforms, water resources, soils, geology etc), the regional archaeological patterning identified by past studies, natural processes (e.g. erosion) as well as land uses and associated impacts across the landscape and any associated cultural that may be present.

1.7 PROJECT BRIEF/SCOPE OF WORK

The following tasks were carried out:

- a review of relevant statutory registers and inventories for indigenous cultural heritage including the Aboriginal Heritage Information Management System (AHIMS) for known archaeological sites, The National Heritage List, the Commonwealth Heritage List, the Australian Heritage Database, Australia's National Heritage List, The National Trust Heritage Register State Heritage Inventory the and the Murray River Shire Local Environmental Plan;
- a review of local environmental information (topographic, geological, soil, geomorphological, vegetation, erosion) to determine the likelihood of archaeological sites and specific site types that may be present, prior and existing land uses and associated impacts and site disturbance that may affect site integrity;
- a review of previous cultural heritage investigations to determine the extent of archaeological investigations in the area and identify any archaeological patterns;
- the development of a predictive archaeological statement based on the data searches and literature review;
- identification of human and natural impacts in relation to the known and any new archaeological sites and archaeological potential within the project area;
- consultation with the Aboriginal stakeholders as per the Aboriginal Cultural Heritage Consultation Requirements for Proponents (2010);
- undertake a site inspection with the participation of the registered Aboriginal stakeholders, and
- the development of mitigation and conservation measures in consultation with the registered Aboriginal stakeholders.

1.8 LEGISLATIVE CONTEXT

The following overview of the legislative framework, is provided solely for information purposes for the client, and should not be interpreted as legal advice. MCH will not be liable for any actions taken by any person, body or group as a result of this general overview and MCH recommends that specific legal advice be obtained from a qualified legal practitioner prior to any action being taken as a result of the general summary below.

Land managers are required to consider the effects of their activities or proposed development on the environment under several pieces of legislation. Although there are a number of Acts and regulations protecting Aboriginal heritage, including places, sites and objects, within NSW, the three main ones include:

- National Parks and Wildlife Act (1974, as amended)
- National Parks and Wildlife Regulation (2009)
- Environmental Planning and Assessment Act (1979)

1.8.1 NATIONAL PARKS AND WILDLIFE ACT (1974, AS AMENDED)

The National Parks and Wildlife Act (1974), Amended 2010, is the primary legislation for the protection of Aboriginal cultural heritage in New South Wales. The NPW Act protects Aboriginal heritage (places, sites and objects) within NSW and the Protection of Aboriginal heritage is outlined in s86 of the Act, as follows:

- “A person must not harm or desecrate an object that the person knows is an Aboriginal object” s86(1)
- “A person must not harm an Aboriginal object” s86(2)
- “A person must not harm or desecrate an Aboriginal place” s86(4)

Penalties apply for harming an Aboriginal object, site or place. The penalty for knowingly harming an Aboriginal object (s86[1]) and/or an Aboriginal place (s86[4]) is up to \$550,000 for an individual and/or imprisonment for 2 years; and in the case of a corporation the penalty is up to \$1.1 million. The penalty for a strict liability offence (s86[2]) is up to \$110,000 for an individual and \$220,000 for a corporation.

Harm under the National Parks and Wildlife Act (1974, as amended) is defined as any act that; destroys defaces or damages the object, moves the object from the land on which it has been situated, causes or permits the object to be harmed. However, it is a defence from prosecution if the proponent can demonstrate that;

- 1) harm was authorised under an Aboriginal Heritage Impact Permit (AHIP) (and the permit was properly followed), or
- 2) the proponent exercised due diligence in respect to Aboriginal heritage.

The ‘due diligence’ defence (s87[2]), states that if a person or company has applied due diligence to determine that no Aboriginal object, site or place was likely to be harmed as a result of the activities proposed for the Project Area, then liability from prosecution under the NPW Act 1974 will be removed or mitigated if it later transpires that an Aboriginal object, site or place was harmed. If any Aboriginal objects are identified during the activity, then works should cease in that area and OEH notified (DECCW 2010:13). The due diligence defence does not allow for continuing harm.

1.8.2 NATIONAL PARKS AND WILDLIFE REGULATION (2009)

The National Parks and Wildlife Regulation 2009 provides a framework for undertaking activities and exercising due diligence in respect to Aboriginal heritage. The Regulation (2009) recognises various due diligence codes of practice, including the Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW which is pertinent to this report, but it also outlines procedures for Aboriginal Heritage Impact Permit (AHIP) applications and Aboriginal Cultural Heritage Consultation Requirements (ACHCRs); amongst other regulatory processes.

1.8.3 ENVIRONMENTAL PLANNING & ASSESSMENT ACT 1979 (EP&A ACT)

EP&A Act establishes the statutory framework for planning and environmental assessment in NSW and the implementation of the EP&A Act is the responsibility of the Minister for Planning, statutory authorities and local councils. The EP&A Act contains three parts which impose requirements for planning approval:

- Part 3 of the EP&A Act relates to the preparation and making of Environmental Planning Instruments (EPIs), State Environmental Planning Policies (SEPPs) and Local Environmental Plans (LEPs).
- Part 4 of the EP&A Act establishes the framework for assessing development under an EPI. The consent authority for Part 4 development is generally the local council, however the consent authority may be the Minister, the Planning Assessment Commission or a joint regional planning panel depending upon the nature of the development.

- Part 4, Division 4.1 of the EP&A Act establishes the assessment pathway for State significant development (SSD) declared by the State Environmental Planning Policy (State and Regional Development) 2011 (NSW). Once a development is declared as SSD, the Secretary's Environmental Assessment Requirements (SEARs) will be issued outlining what issues must be considered in the EIS.
- Part 5 of the EP&A Act provides for the control of 'activities' that do not require development consent and are undertaken or approved by a determining authority. Development under Part 5 that are likely to significantly affect the environment is required to have an EIS prepared for the proposed activity.
- Part 5.1 of the EP&A Act establishes the assessment pathways for State significant infrastructure (SSI). Development applications made for SSI can only be approved by the Minister. Once a development is declared as SSI, the SEARs will be issued outlining what issues must be addressed in the EIS.

The applicable approval process is determined by reference to the relevant environmental planning instruments and other controls, LEPs and State Environmental Planning Policies (SEPPs). This project falls under Part 4 as a local designated development (not state). It is nominated as being designated under Schedule 3 Part 21 – Intensive Livestock Agriculture being a *dairy that accommodates more than 800 head of cattle for the purposes of milk production*.

1.9 QUALIFICATIONS OF THE INVESTIGATOR

Penny McCardle: Principal Archaeologist & Forensic Anthropologist has 10 years experience in Indigenous archaeological assessments, excavation, research, reporting, analysis and consultation. Six years in skeletal identification, biological profiling and skeletal trauma identification.

- BA (Archaeology and Palaeoanthropology, University of New England 1999
- Hons (Archaeology and Palaeoanthropology): Physical Anthropology), University of New England 2001
- Forensic Anthropology Course, University of New England 2003
- Armed Forces Institute of Pathology Forensic Anthropology Course, Ashburn, VA 2008
- Analysis of Bone trauma and Pseudo-Trauma in Suspected Violent Death Course, Erie College, Pennsylvania, 2009
- PhD, University of Newcastle, 2019

1.10 REPORT STRUCTURE

The report includes Section 1 which outlines the project, Section 2 provides the consultation, Section 3 presents the environmental context, Section 4 presents ethno historic context, Section 5 provides the archaeological background, Section 6 provides the results of the fieldwork, analysis and discussion; Section 7 presents the development impact assessment, Section 8 presents the mitigation strategies and Section 9 presents the management recommendations.

2 CONSULTATION

As per the Heritage NSW, Department of Premier & Cabinet Aboriginal Cultural Heritage Consultation Requirements for Proponents (April 2010), MCH followed the four stages of consultation as set out below. All correspondences for each stage are provided in Appendix A.

In relation to cultural significance, MCH recognises and supports the indigenous system of knowledge. That is, that knowledge is not 'open' in the sense that everyone has access and an equal right to it. Knowledge is not always definitive (in the sense that there is only one right answer) and knowledge is often restricted. As access to this knowledge is power, it must be controlled by people with the appropriate qualifications (usually based on age seniority, but may be based on other factors). Thus, it is important to obtain information from the correct people: those that hold the appropriate knowledge of those sites and/or areas relevant to the project. It is noted that only the Aboriginal community can identify and determine the accepted knowledge holder(s) may be not archaeologists or proponents. If knowledge is shared, that information must be used correctly and per the wishes of the knowledge holder.

Whilst an archaeologist may view this information as data, a custodian may view this information as highly sensitive, secret/sacred information and may place restrictions on its use. Thus, it is important for MCH to engage in affective and long-term consultation to ensure knowledge is shared and managed in a suitable manner that will allow for the appropriate management of that site/area. MCH also know that archaeologists do not have the capability nor the right to adjudicate on the spirituality of a particular location or site as this is the exclusive right of the traditional owners who have the cultural and hereditary association with the land of their own ancestors. For these reasons, consultation forms an integral component of all projects and this information is sought from the registered stakeholders to be included in the report in the appropriate manner that is stipulated by those with the information.

2.1 STAGE 1: NOTIFICATION & REGISTRATION OF INTEREST

The aim of this stage is to identify, notify and register Aboriginal people and/or groups who hold cultural knowledge that is relevant to the project area, and who can determine the cultural significance of any Aboriginal objects and/or places within the proposed project area. In order to do this, the sources identified by Heritage NSW, Department of Premier & Cabinet (OEH 2010:10) and listed in Table 2.1, to provide the names of people who may hold cultural knowledge that is relevant to determining the significance of Aboriginal objects and/or places were contacted by letter on 5th June 2020 and it was stipulated that if no response was received, the project and consultation will proceed. Information included in the correspondence to the sources listed in Table 2.1 included the name and contact details of the proponent, an overview of the proposed project including the location and a map showing the location.

Table 2.1 Sources contacted

Organisations contacted	Response
Heritage NSW (Formerly BCD)	7 groups
Moama LALC	no response
Murray River Council	Moama LALC
Registrar Aboriginal Land Rights Act 1983	no response
National Native Title Tribunal	no claims
Native Title Services Corporation Limited	no response
Murray Land Services	no response

Following this, MCH compiled a list of people/groups to contact (Refer to Appendix A). As per the Aboriginal cultural heritage consultation requirements for proponents (April 2010), archaeologists and proponents must write to all those groups provided asking if they would like to register their interest in the project. Unfortunately, some Government departments written to requesting a list of groups to consult with do not differentiate groups from different traditional boundaries and provide an exhaustive list of groups from across the region including those outside their traditional boundaries.

MCH wrote to all parties identified by the various departments and an advertisement was placed in the Pastoral Times on 19th June 2020. The correspondence and advertisement included the required information as per the Aboriginal Cultural Heritage Consultation Requirements for Proponents (April 2010) and requested to nominate the preferred option for the presentation of information about the proposed project: an information packet or a meeting and information packet (Refer to Stage 2). One Registered Aboriginal Party (RAP) registered an interest in the project being the Yorta Yorta Nation Aboriginal Corporation (YYNAC).

2.2 STAGE 2: PRESENTATION OF INFORMATION

The aim of this stage is to provide the RAPs with information regarding the scope of the proposed project and the cultural heritage assessment process.

As YYNAC did not provide their preferred method of receiving information, an information packet was sent to YYNAC and included the required information as per the Aboriginal Cultural Heritage Consultation Requirements for Proponents (April 2010). The pack included the required information as per the Aboriginal Cultural Heritage Consultation Requirements for Proponents (April 2010) and a written response to the proposed methods was due no later than 30th July 2020.

The information pack also stipulated that consultation was not employment, and requested that in order to assist the proponent in the engagement of field workers, that the groups provide information that will assist in the selection of field staff who may be paid on a contractual basis). This included, but was not limited to, experience in field work and in providing cultural heritage advice (asked to nominate at least two individuals who will be available and fit for work) and their relevant experience; and to provide a CV and insurance details.

The information pack also noted that failure to provide the required information by the date provided will result in a missed opportunity for YYNAC to contribute to their cultural heritage and the project will proceed.

2.3 STAGE 3: GATHERING INFORMATION ABOUT CULTURAL SIGNIFICANCE

The aim of this stage is to facilitate a process whereby the RAPs can contribute to culturally appropriate information gathering and the research methodology, provide information that will enable the cultural significance of any Aboriginal objects and or/places within the proposed project area to be determined and have input into the development of any cultural heritage management options and mitigation measures. In order to do this, included in the information pack sent for Stage 2, was information pertaining to the gathering of cultural knowledge. This included the following information;

- MCH noted that information provided by YYNAC may be sensitive and MCH and the proponent will not share that information with all RAPs or others without the express permission of the individual. MCH and the proponent extended an invitation to develop and implement appropriate protocols for sourcing and holding cultural information including any restrictions to place on information, as well as the preferred method of providing information;
- request for traditional/cultural knowledge or information associated with ceremonial, spiritual, mythological beliefs, traditions and known sites from the pre-contact period;
- request for traditional/cultural knowledge or information regarding sites or places with historical associations and/or cultural significance which date from the post-contact period and that are remembered by people today (e.g. plant and animal resource use areas, known camp sites); and
- request for traditional/cultural knowledge or information in relation to any sites or places of contemporary cultural significance (apart from the above) which has acquired significance recently.

During this process, YYNAC did not disclose any specific traditional/cultural knowledge or information of sites or places associated with spiritual, mythological, ceremonies or beliefs from the pre contact period within the project area or surrounding area. The stakeholders did not disclose any information pertaining to sites or places of cultural significance associated with the historic or contemporary periods within the project area or surrounding area. However, it must be noted that traditional/cultural knowledge and/or information regarding sites and/or places of cultural significance may exist that were not divulged to MCH by those consulted.

2.4 SURVEY

YYNAC were invited to participate in the survey on 17th August 2020. Unfortunately, YYNC did not attend the survey and the survey proceeded in accordance with the proposed methodology provided to YYNAC for review.

2.5 STAGE 4: REVIEW OF DRAFT CULTURAL HERITAGE ASSESSMENT

A copy of the DRAFT report was forwarded to YYNAC for their review and were asked to provide a written or verbal response no later than 22nd September 2020. MCH received no response and a final copy of the report was sent to YYNAC. All documentation regarding the consultation process is provided in Appendix A.

3 LANDSCAPE AND ENVIRONMENTAL CONTEXT

3.1 INTRODUCTION

Documenting and understanding the context of archaeological sites in relation to surrounding terrain features is essential to landscape archaeological studies worldwide (De Reu et al., 2013; De Reu et al., 2011; Turrero et al., 2013) and the nature and distribution of Aboriginal cultural materials in a landscape are strongly influenced by environmental factors such as topography, geology, landforms, climate, geomorphology, hydrology and the associated soils and vegetation (Hughes and Sullivan 1984). These factors influence the availability of plants, animals, water, raw materials, the location of suitable camping places, ceremonial grounds, burials, and suitable surfaces for the application of rock art. As site locations may differ between landforms due to differing environmental constraints that result in the physical manifestation of different spatial distributions and forms of archaeological evidence, these environmental factors are used in constructing predictive models of Aboriginal site locations.

Environmental factors also effect the degree to which cultural materials have survived in the face of both natural and human influences and affect the likelihood of sites being detected during ground surface survey. Site detection is dependent on a number of environmental factors including surface visibility (which is determined by the nature and extent of ground cover including grass and leaf litter etc) and the survival of the original land surface and associated cultural materials (by flood alluvium, erosion etc). It is also dependant on the exposure of the original landscape and associated cultural materials by human impacts (e.g. Aboriginal fire stick farming, clearing, logging, agricultural activities, construction works, mining etc), (Hughes and Sullivan 1984). Combined, these processes and activities are used in determining the likelihood of both surface and subsurface cultural materials surviving and being detected.

It is therefore necessary to understand the environmental factors, processes and activities, all of which affect site location, preservation and detection during surface survey and the likelihood of in situ subsurface cultural materials being present. The environmental factors, processes and disturbances of the surrounding environment and specific project area are discussed below.

3.2 RIVERINA

The project area is located in the Riverina region of NSW. The Riverina covers the alluvial fans of the Lachlan, Murrumbidgee and Murray Rivers (subregions) west of the Great Dividing Range and extends down the Murray. The project area is located in the Murray Channels and floodplains of the Riverina subregion.

3.3 GEOLOGY

The underlying regional geology plays a major role in the structure of the surrounding environment (landforms, topography, geomorphology, vegetation, climate etc), and also influences patterns of past occupation and their manifestation in the archaeological record. This is primarily relevant to past Aboriginal land use in regard to the location of stone resources or raw materials and their procurement for the manufacturing and modification of stone tools.

The geology of the region and project area consists of quaternary alluvial sediments of clay and sands (DPIE 2016). The project area is located along the edge of the Cadell Fault (approximately 10 metres from the flood plain), a north-south trending intra-plate geological unit in the Riverina that changed the course of the Murray, Edward, Wakool, Goulburn and Campaspe Rivers. Materials most

dominant in stone tool manufacture throughout the area are indurated mudstone/tuff and silcrete, both of which would have been transported into the area as there are no known local sources of such raw materials in the immediate area.

3.4 TOPOGRAPHY

The topographical context is important to identify potential factors relating to past Aboriginal land use patterns. The subregion is characterised by an alluvial fan with meandering channels, floodplains bordering dunes overflow lakes and swamps (DPI 2016). The specific project area is located on slightly elevated land approximately 10 metres from the edges of the flood plain and over 600 metres west of a dune. Whilst the dune area would have been utilised by past Aboriginal people, the low-lying flats would have been unsuitable for camping but would have been utilised for transitory activities such as hunting and gathering.

3.5 SOILS

The nature of the surrounding soil landscape also has implications for Aboriginal land use and site preservation, mainly relating to supporting vegetation and the preservation of organic materials and burials. The deposit of alluvial and aeolian sediments and colluvium movement of fine sediments (including artefacts) results in the movement and burying of archaeological materials. The increased movement in soils by this erosion is likely to impact upon cultural materials through the post-depositional movement of materials, specifically small portable materials such as stone tools, contained within the soil profiles.

The geomorphology of the Riverine Plain has developed from fluvial (action of streams), lacustrine (action of lakes and wetlands) and aeolian (action of wind) activity all of which have resulted in the current level of soil formation on the plain. Soils of the Project Area include Red-Brown Earths, grey clays and deep sands.

3.6 CLIMATE

Climatic conditions would also have played a part in past occupation of an area as well as impacted upon the soils and vegetation and associated cultural materials. January is typically the hottest month, with an average maximum temperature of 33.1°C. July is the coldest month with a mean minimum temperature of 3.5°C. The mean annual rainfall is 319mm, with rainfall evenly distributed throughout the year ranging between 30.7mm and 23.2mm falling on average each month.

3.7 WATERWAYS

One of the major environmental factors influencing human behaviour is water as it is essential for survival and as such people will not travel far from reliable water sources. In those situations where people did travel far from reliable water, this indicates a different behaviour such as travelling to obtain rare or prized resources and/or trade. Proximity to water not only influences the number of sites likely to be found but also artefact densities. The highest number of sites and the highest density are usually found in close proximity to water and usually on an elevated landform. This assertion is undisputedly supported by the regional archaeological investigations carried out in the region where by such patterns are typically within 50 metres of a reliable water source.

The main types of water sources include permanent (rivers and soaks), semi-permanent (large streams, swamps and billabongs), ephemeral (small stream and creeks) and underground (artesian). Stream order assessment is one way of determining the reliability of streams as a water source.

Stream order is determined by applying the Strahler method to 1:25 000 topographic maps. Based on the climatic analysis, the project area will typically experience comparatively reliable rainfalls under normal conditions and thus it is assumed that any streams above a third order classification will constitute a relatively permanent water source.

The Strahler method dictates that upper tributaries do not exhibit flow permanence and are defined as first order streams. When two first order streams meet, they form a second order stream. Where two-second order streams converge, a third order stream is formed and so on. When a stream of lower order joins a stream of higher order, the downstream section of the stream will retain the order of the higher order upstream section (Anon 2003; Wheeling Jesuit University 2002).

When assessing the relationship between sites and water sources it must be noted that the Australian continent has undergone significant environmental changes during the past 60,000 years that people have lived here and that Pleistocene sites (older than 10,000 years) would have been located in relation to Pleistocene water sources that may not exist today. Whilst it is likely that prior to agricultural activities, including man-made drains throughout the flood plain area, that natural drainage lines were present, however, as their locations are no longer evident, site prediction in terms of proximity to reliable fresh water is not possible beyond the local lakes and their tributaries local area including, but not limited to, Moira Lake (2 kilometres south east of the project area), and the Murray River (4.5 kilometres east of the project area at its closest point) as focal points. One 1st order was located approximately 1.1 kilometres to the west of the project area (Green Gully), however this has been significantly impacted through long term intensive cropping.

The project area is located to the west of reliable fresh water sources and elevated landforms within its upper reaches near the project area that would have also included subsistence and medicinal resources along their edges and in close proximity. The project area, is in fact some distance from these resources and given the resource rich Murray River it is unlikely that the project area would have been used for more than transitory activities such as hunting and gathering and travel to these resource rich environments.

3.8 FLORA AND FAUNA

The availability of flora and associated water sources affect fauna resources, all of which are primary factors influencing patterns of past Aboriginal land use and occupation. The assessment of flora has two factors that assist in an assessment including a guide to the range of plant resources used for food and medicine and to manufacture objects including nets, string bags, shields and canoes which would have been available to Indigenous people in the past. The second is what it may imply about current and past land uses and to affect survey conditions such as visibility, access and disturbances.

The pattern of soil deposition, stream location and flooding occurrence determines the vegetation pattern across the plain which includes River Red Gum and Cooba generally found close to water courses, Black Box, Lignum and Old man saltbush on the floodplains. Myall and Old man saltbush with other saltbush and grasses were previously widespread on the back plains and White cypress pine previously on dunes (DPIE 2016).

European settlers extensively cleared the original native vegetation in the project area and surrounds in the 1800's and the present vegetation within the investigation area is cropping. The drainage throughout the project area would have supported a limited range of faunal populations including kangaroo, wallaby, goanna, snakes and a variety of birds. A wider variety of resources would have been available in areas in close proximity to the Murray River 4.5 kilometres east of the project area.

3.9 LAND USES AND DISTURBANCES

Based upon archaeological evidence, the occupation of Australia extends back at least 40,000 years (Mulvaney and Kamminga 1999). Although the impact of past Aboriginal occupation on the natural landscape is thought to have been relatively minimal, it cannot simply be assumed that 20,000 years of land use have passed without affecting various environmental variables. The practice of ‘firestick farming’ whereby the cautious setting of fires served to drive game from cover, provide protection and alter vegetation communities significantly influenced seed germination, thus increasing diversity within the floral community.

Following European settlement of the area in the 1820s, the landscape has been subjected to a range of different modifactory activities including extensive logging and clearing, long-term intensive agricultural cultivation (ploughing) and pastoral grazing. The associated high degree of landscape disturbance has resulted in the alteration of large tracts of land and the cultural materials contained within these areas. The specific project area has been cleared and utilised for long-term intensive agricultural/irrigation activities (ploughing, cropping) and rotational grazing. The project area also underwent significant disturbance in the late 1990s where substantial land forming was undertaken. This included several passes of deep ripping (up to 60cms), relocation of earth to form irrigation bays suitable for dairy farming, channels, dams and drains.

Although pastoralism is a comparatively low impact activity, it does result in disturbances due to vegetation clearance and the trampling and compaction of grazed areas. These factors accelerate the natural processes of sheet and gully erosion, which in turn can cause the horizontal and lateral displacement of artefacts. Furthermore, grazing by hoofed animals can affect the archaeological record due to the displacement and breakage of artefacts resulting from trampling (Yorston et al 1990). Pastoral land uses are also closely linked to alterations in the landscape due to the construction of dams, fence lines and associated structures. As a sub-set of agricultural land use, ploughing typically disturbs the top 10-12 centimetres of topsoil (Koettig 1986) depending on the method and machinery used during the process. Ploughing increases the occurrence of erosion and can also result in the direct horizontal and vertical movement of artefacts, thus causing artificial changes in artefact densities and distributions. In fact, studies undertaken on artefact movement due to ploughing (e.g. Roper 1976; Odell and Cowan 1987) has shown that artefact move between one centimetre up to 18 metres laterally depending on the equipment used and horizontal movement. Of course, this increases with additional ploughing and would be significant after such long-term continued ploughing and cropping as has occurred in the project area. Ploughing also interferes with other features and disrupt soil stratigraphy (Lewarch and O’Brien 1981). Ploughing activities are typically evidenced through ‘ridges and furrows’ however a lengthy cessation in ploughing activities dictates that these features may no longer be apparent on the surface.

3.10 NATURAL DISTURBANCES

The disturbance of cultural materials can also be a result of natural processes. The patterns of deposition and erosion within a locality can influence the formation and/or destruction of archaeological sites. Within an environment where the rate of sediment accumulation is generally very high, artefacts deposited in such an environment will be buried shortly after being abandoned. Frequent and lengthy depositional events will also increase the likelihood of the presence of well-stratified cultural deposits (Waters 2000:538,540). In a stable landscape with few episodes of deposition and minimal to moderate erosion, soils will form and cultural materials will remain on the surface until they are buried. Repeated and extended periods of stability will result in the compression of the archaeological record with multiple occupational episodes being located on one surface prior to burial (Waters 2000:538-539). Within the duplex soils artefacts typically stay within the A horizon on the interface between the A and B horizons.

If erosion occurs after cultural material is deposited, it will disturb or destroy sections of archaeological sites even if they were initially in a good state of preservation. The more frequent and severe the episodes of erosional events the more likely it is that the archaeological record in that area will be disturbed or destroyed (Waters 2000:539; Waters and Kuehn 1996:484). Regional erosional events may entirely remove older sediments, soils and cultural deposits so that archaeological material or deposits of a certain time interval no longer exist within a region (Waters and Kuehn 1996:484-485).

The role of bioturbation is another significant factor in the formation of the archaeological record. Post-depositional processes can disturb and destroy artefacts and sites as well as preserve cultural materials. Redistribution and mixing of cultural deposits occur as a result of burrowing and mounding by earthworms, ants and other species of burrowing animals. Artefacts can move downwards through root holes as well as through sorting and settling due to gravity. Translocation can also occur as a result of tree falls (Balek 2002:41-42; Peacock and Fant 2002:92). Depth of artefact burial and movement as a result of bioturbation corresponds to the limit of major biologic activity (Balek 2002:43). Artefacts may also be moved as a result of an oscillating water table causing alternate drying and wetting of sediments, and by percolating rainwater (Villa 1982:279). Experiments to assess the degree that bioturbation can affect material have been undertaken. In abandoned cultivated fields in South Carolina, Michie (summarised in Balek 2002:42-43) found that over a 100-year period 35% of shell fragments that had been previously used to fertilise the fields were found between 15 and 60 centimetres below the surface, inferred to be as a result of bioturbation and gravity. Earthworms have been known to completely destroy stratification within 450 years (Balek 2002:48). At sites in Africa, conjoined artefacts have been found over a metre apart within the soil profile. The vertical distribution of artefacts from reconstructed cores did not follow the order in which they were struck off (Cahen and Moeyersons 1977:813). These kinds of variations in the depths of conjoined artefacts can occur without any other visible trace of disturbance (Villa 1982:287). However, bioturbation does not always destroy the stratigraphy of cultural deposits. In upland sites in America, temporally-distinct cultural horizons were found to move downwards through the soil as a layer within minimal mixing of artefacts (Balek 2002:48).

In terms of natural impacts to the project areas, bioturbation would have increased during intensive long-term agricultural activities as the soils would have been ploughed and cropped, providing an environment rich for worms and other earth moving insects.

3.11 DISCUSSION

Whilst the regional environment provided resources, including fauna, flora and water, that would have allowed for sustainable occupation of Moira Lake (2 kilometres south east of the project area) and the Murray River (4.5 kilometres east of the project area at its closest point), the project area is located within an environment that provided limited resources due to its distance from reliable water and associated resources that would have allowed for sustainable occupation of the area. The project area was like to have been utilised for hunting and gathering activities that manifest in the archaeological record as a background scatter of discarded artefacts.

In relation to modern alterations to the landscape, the use of the project area for long-term intensive agricultural and rotational grazing activities as well as channel and dam construction can be expected to have had very high impacts upon the archaeological record. Such activities are known to displace cultural materials and long term intensive agricultural activities would have completely displaced the expected background scatter of artefacts that may have been present within the project area.

4 ETHNO-HISTORIC BACKGROUND

Unfortunately, due to European settlement and associated destruction of past Aboriginal communities, their culture, social structure, activities and beliefs, little information with regards to the early traditional way of life of past Aboriginal societies remains.

4.1 USING ETHNO-HISTORIC DATA

Anthropologists and ethnographers have attempted to piece together a picture of past Aboriginal societies throughout the Riverina. Although providing a glimpse into the past, one must be aware that information obtained on cultural and social practices were commonly biased and generally obtained from informants including white settlers, bureaucrats, officials and explorers. Problems encountered with such sources are well documented (e.g. Barwick 1984; L'Oste-Brown et al 1998). There is little information about who collected information or their skills. There were language barrier and interpretation issues, and the degree of interest and attitudes towards Aboriginal people varied in light of the violent settlement history. Access to view certain ceremonies was limited. Cultural practices (such as initiation ceremonies and burial practices) were commonly only viewed once by an informant who would then interpret what he saw based on his own understanding and then generalise about those practices.

4.2 ETHNO-HISTORIC ACCOUNTS

In the Murray River area, when Aboriginal people were observed camping together, they were constantly reported being in large groups with some having up to 270 people being recorded (Stuart: 1833: 149). It is indicated by the ethnography that even larger groups were formed for specific purposes. Often these large groups seemed to gather to exploit the abundant food resources available whilst Curr (1833: 129 – 50) describes a meeting between two tribes to exchange women as marriage partners.

Throughout the year there was a variety of food available including fish, vegetables and game (which included both animals and birds alike). It was observed that fish were a major source of food (Sturt 1833: 144; Hawdon 1952: 41; Curr 1883: 24 and Beveridge 1883: 36) and that shellfish, especially freshwater mussel, were also eaten in large quantities. Shellfish were especially eaten in the summertime as they could be more easily obtained from streams and dug up from dry lake beds.

Among the land animals that were hunted possum was abundant throughout the area with other animals commonly eaten such as the Kangaroo Rat and the tortoise (Sturt 1883:114; Hawdon 1852: 41). Snakes were also reported to have been eaten (Curr 1883: 259) although Beveridge maintains that these, along with dogs and frogs, were only eaten when food was scarce. Water birds also played an important part of the diet with ducks being commonly exploited.

Vegetable foods were plentiful with the roots of various plants including yams and water lily tubers, being eaten in quantity (Hawdon 1952: 4; Curr 1883: 225, 259; Beveridge 1883: 36). Other vegetables which were eaten were the sow thistle, dandelions, and trefoil, manna gum and wild fruit. Nets made of fibre were widely used within the Murray area to trap fish, ducks, and larger game. Water was also carried in containers made from small animal skins and food in baskets made from woven reeds or rushes (Bickford 1966: 27). Net bags were used by women and skin bags by men to carry around small possessions.

Spears were carried around constantly by men who were on the move and different spears had their own specific purposes, most of these being the hunting and gathering of food. For larger game, long spears were made of mallee sapling and were either thrown by hand or a spear thrower was used.

Spears made specifically for fishing were shorter than the spears used to hunt game. These were made of wood and some were barbed (Mitchell 1839: 144) or un-barbed (Beveridge 1889: 63). Another implement that was also used to hunt fish was the canoe stick, often made of wood it was shaped into a paddle place on one end and an elongated spear on the other. It could be alternated and used as both a spear and a paddle.

Edge ground or polished stone axes were used for rough woodworking activities such as cutting toe-holds in the bark of trees or chopping open a tree to extract a possum (Mitchell 1839: 153; Hawdon 1952: 29). For woodwork that required a finer technique (such as spear making) was often done with smaller stone flakes. These were also used for skinning and butchering game and dressing skins. Bivalve shells, pieces of bone and tough pieces of reed stem were also used for this purpose. Bone awls were used for puncturing possum skins so that they could be bound together to make clothing and flat stone dishes and edge-ground stones were used as grinding mills for processing seeds are reported by Beveridge (1889: 139).

Objects akin to toys were also recorded including a ball made from tightly rolled possum skins used in throwing and catching games (Beveridge 1883: 52) and a watchwie (a solid oval shaped piece of wood) was attached to a long length of pliant reed or cane-grass and the game with this was a competition to see which toy could be throwing the furthest.

Canoes were an incredibly important part of past Aboriginal life, often used to transport people across large stretches of water, they were also used extensively for fishing. Often a small fire on a bed of clay was kept on the canoe for warmth and to cook food. Fire was made using one of two methods: drilling or sawing and the cooking method most often remarked upon however was the use of ovens. A major advantage of ovens is that they allowed large quantities of food to be cooked at once.

Shelters that were constructed enabled a temporary windbreaker during the summertime and were made of boughs or bush that were arranged around one side of the fire (Mitchell 1839: 123; Curr 1883: 277; Beveridge 1889: 103). Little clothing seems to have been worn however one item of clothing is frequently mentioned; cloaks made of animal skin worn over the shoulders with fur on the inside.

Little information is available on aboriginal ceremonial life since many ceremonies were not shown to early European observers however, the painting of bodies and faces with ochre and grease appears to be commonly associated with ceremonies (Sturt 1883: 103; Hawdon 1952: 155). The disposal of the dead was governed by specific rules. In the Murray area, the major disposal method which was used was primarily burial. Both adults and children were buried (Eyre 1840:347) with particular care and attention being given to males as observed by Curr (1887:238). Graves were typically four feet deep (Curr 1883: 281; Beveridge 1883: 28 – 29) and were usually located on sandhills (Hawdon 1952: 52; Curr 1883: 312) or in oven mounds (Beveridge 1883: 38-40) where it was easy to dig. The personal belongings of the individual were often placed in the grave (Beveridge 1883: 287).

5 ARCHAEOLOGICAL CONTEXT

A review of the archaeological literature of the region, and more specifically the local area and the results of an AHIMS search provide essential contextual information for the current assessment. Thus, it is possible to obtain a broader picture of the wider cultural landscape highlighting the range of site types throughout the region, frequency and distribution patterns and the presence of any sites within the project area. It is then possible to use the archaeological context in combination with the review of environmental conditions to establish an archaeological predictive model for the project area.

5.1 HERITAGE REGISTER LISTINGS

The National Heritage List, the Commonwealth Heritage List, the Australian Heritage Database, Australia's National Heritage List, The National Trust Heritage Register State Heritage Inventory the and the Murray Shire Local Environmental Plan have no Aboriginal objects, sites or places listed in the project area.

5.2 ABORIGINAL HERITAGE INFORMATION MANAGEMENT SYSTEM

MCH note that there are many limitations with an AHIMS search. Firstly, site coordinates are not always correct due to errors and changing of computer systems over the years that failed to correctly translate old coordinate systems to new systems. Secondly, AHIMS will only provide up to 110 sites per search, thus limiting the search area surrounding the project area and enabling a more comprehensive analysis and finally, few sites have been updated on the AHIMS register to notify if they have been subject to a s87 or s90 and as such what sites remain in the local area and what sites have been destroyed, to assist in determining the cumulative impacts, is unknown.

In addition to this, other limitations include the number of studies in the local area. Fewer studies suggest that sites have not been recorded, ground surface visibility also hinders site identification and the geomorphology of the majority of NSW soils and high levels of erosion have proven to disturb sites and site contents, and the extent of those disturbances is unknown (i.e. we do not know if a site identified at the base of an eroded slope derived from the upper crest, was washed along the bottom etc: thus altering our predictive modelling in an unknown way). Thus, the AHIMS search is limited and provides a basis only that aids in predictive modelling.

The new terminology for site names including (amongst many) an 'artefact' site encompasses stone, bone, shell, glass, ceramic and/or metal and combines both open camps and isolated finds into the one site name. Unfortunately, this greatly hinders in the predictive modelling as different sites types grouped under one name provided inaccurate data.

A search of the AHIMS register has shown that six known Aboriginal sites are currently recorded within five kilometres of the project area and include two scar trees, an earth mound, artefact site, burial and an ochre mine, none of which are in the project area. One Aboriginal place is also on AHIMS is also outside the project area. The AHIMS results are provided in Appendix B and the location of sites is shown in Figure 5.1.

Figure 5.1 Location of AHIMS sites



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5.3 ARCHAEOLOGICAL CONTEXT

Buchan (1973-1974) undertook a two-year survey of the Murray River for the NPWS. The aims of the survey were to locate and record as many sites as possible, to add data to the AHIMS register and to identify any sites that warranted protection under the NPWS Act 1974. The project area was defined as a 30-mile (48.2 kilometres) strip along the north bank of the Murray River extending from Albury to Mildura, and area of approximately 16,000 square miles (4,1440 square kilometres).

One hundred and eighty eight (198) sites were identified, most of which had been impacted by some extent from long-term European settlement and land uses. The survey also identified clear patterns of site location and site type in relation to landforms and proximity to reliable water. Site types included ovens (94), scar trees (75), surface campsite (12), shell middens (8), burials (6), ceremonial sites (2) and an archaeological deposit (?). Buchan notes that the site numbers include all individual sites present at any one location and hence the higher site numbers than in AHIMS.

Oven mounds constituted nearly half of the sites identified and their distribution was very clearly correlated with water sources. They were seldom found singly but rather a cluster together in groups ranging from 2-3 or 50-60. Oven sites shared a number of common characteristics including being raised mounds, the soil matrix of the oven was markedly darker than the surrounding soils, typical inclusion were pieces of baked clay, fragmented shell, stone artefacts, charcoal, animal and burnt human bone. Occasionally complete human burials were present. Examination of the profile of the ovens that had been truncated by tracks or irrigation channels showed no sign of stratigraphy but a relatively even distribution of clay and charcoal throughout the depth of the deposit. Ovens ranged in size from one metre in diameter and 10 centimetres high to 120 metres in diameter and two metres high.

Buchan importantly notes that some of the mounds are natural in origin and include those ones that are smaller and compact containing only baked clay and charcoal and points out that burnt trees,

that accumulates mounds of leaf litter and wind-blown soils around their base, when burnt, baked clay and charcoal accumulates from the heat. In time the mound consolidates into what resembles some of the oven mounds recorded previously.

The second largest category of site type were scar trees. No further information is provided on scar trees.

Of the sixteen burials identified, ten were associated with other cultural materials including artefacts, shell middens and ovens. Nine were on a sand dune, two on ovens, two on remnant clay dunes bordering a creek, two on clay pans and one in a creek bank, confirming early observations that burials were made in places where digging was easy. Buchan also noted that all the burials had been disturbed to some extent by natural weathering and, or human impacts. All burials were thought to be adult males, tooth evulsion was evident in many and excessive tooth wear was present on all. Most of the remains were noted to be in a fixed position on their side or were extended.

All seven middens exhibited stratified deposits and their composition variation was minor. In all cases the predominant shell was freshwater mussel with an occasional occurrence of small amounts of other species such as freshwater snail. The shell midden deposits were contained within a soil matrix with charcoal throughout the deposit. One midden had contained a burial that was removed prior to the site being recorded. Shell middens ranged in length from 15 centimetre to 650 metres and in width between 2 metres and 60 metres with an average thickness of 20-30 centimetres.

The archaeological stratified deposit was identified on a dune exposed by erosion. The exact nature of the deposit could not be determined due to the erosion pattern but change in composition and the distribution of cultural material was noted. The surface of the site contained large amounts of bone, baked clay, charcoal and stone artefacts.

Two possible ceremonial sites were identified. One consisted of two adjacent circular hollows about two metres in diameter joined by the remnants of a narrow shallow trench. The site was located on the edge of a stream bank of a dry creek on a hill top. The second site was no longer present having been bulldozed during clearing many years prior. Buchan reports that an examination of early aerial photographs clearly show two large rings (estimated to be 100 metres in diameter) located in between two creeks. Both sites were known to the local Aboriginal people and owners of the first site reported that his grandfather knew of the site being used by Aboriginal people in the early 1900's.

In relation to site distribution, Buchan identified the relationship between site types and topographic features. Of significance is the association of site with fresh water, which is not surprising as fresh water is essential for survival. No site was more than 160 metres from a water source. Ovens, scar trees and middens were located on the banks of rivers or creeks indicating that most camps were made close to water and food resources. Most of the burials were located in sand dunes with two in ovens and the remainder in clay deposits near creeks. Four sites were located along prior streams or channels and the stratified deposit was located on a dune. The two ceremonial sites were located on elevated land with one having a good view over the Murray flood plain and the second at the junction of two creeks.

Bonhomme (1987) undertook a large-scale assessment of Aboriginal burials and sand mining of the Riverina Plain. The study was in response to the location and disturbances of Aboriginal burials on the Riverina Plain. The report details the available information for the location of burials on the Plain, summarises the geomorphology and describes the types of sand deposits that occur on the Plain. An attempt was made in an interim report to interpret the data with a view to predicting the location of burials in the region and it was concluded that the data base was inadequate and that no predictive models could be formulated. Following this, a survey was undertaken and due to many

discrepancies in the AHIMS site cards, the survey involved revisiting known sites with a number of them being re-classified.

Three types of burials were identified as follows:

- Type 1: contain relatively few individuals usually between 1 to 5 and there is no evidence the deceased are associated with each other. They may be random burials that took place at different times. These burials appear to come from the dune crests and may be more recent in age. Some of the sites also have evidence of occupation but it is not known if this is in association with the burials or not.
- Type 2: contain tens of burials and possibly hundreds, some of which may be quite old. This type has a distinct boundary beyond which no burials are located. This type has different modes of burial including extended, contracted, flexed and bundle burials. Whilst other sites appear to have exclusively one kind of mode.
- Type 3 Cemeteries: contain a great many individuals within a clearly defined area. Bonhomme notes that some of Type 2 sites may be 'cemeteries' and no definition of a cemetery is in the report.

Bonhomme found that past Aboriginal land uses focussed on lakes and swamps which offered a variety of reliable resources. A great number of burials were found to be located in the levees of the associated outlet creeks which were usually some distance from the camping sites but close enough to be conveniently used for burials. It was also identified that burials were also found to be associated with carved trees located along the creeks and rivers and along prior stream channels. Interestingly, Bonhomme identified a lack of burials sites in dunes in the Eastern Riverine Plain.

Craib (1991) undertook an assessment of the Moira, Millewa and Gulpa Island State Forests of the Riverina that sit along the northern margin of the Murray River between Tocumwal and Moama. Background research into the environmental, historical and archaeological contexts indicated that the project area was a resource rich region containing a range of plants and animals. Historical documents of European accounts of the Aboriginal people suggest that the Aboriginal people of the region were at least semi-sedentary and lived within discrete territories. Past archaeological assessment indicated high density of sites in the area. One hundred and forty-six sites were identified during the survey and located in a range of environments and included predominantly scar trees, cultural deposits, artefact scatters, shell middens, cemeteries/ burials and traditional areas).

A cultural deposit, of which 68 were identified, is not clearly defined. Craib notes that the question that needs considering of cultural deposits is whether it comprises the whole site or is one component in a larger site complex and notes that mounds are usually discussed as if they were the entire site. Interestingly, Craib notes previous excavations of mounds providing useful information as excavation have typically been within the mound itself and suggests that the outer areas of the mounds may provide more information and cultural deposits. Craib notes that cultural deposits were found in both mounds and un-mounded areas, and as such what a cultural deposit is remains unknown. Seventy-seven scar trees were recorded with the majority being Red Gum (# 55), followed by grey and yellow box as well as pine. A burial area was identified and interestingly appears to be cemetery. Although it is difficult to quantify the number of burials required to define a cemetery, the burial area identified contained high numbers of individuals, discrete clustering and special use (exclusive). Cremations as well as burials were observed. The results have shown past Aboriginal land use patterns with residential base camps being rare, usually located in forested areas, uniformly spaced from each other with their placement suggestive of defined territory boundaries. Additionally, the presence and distance placement of Aboriginal burials/cemeteries supported the argument that specific territories were defined by the inhabitants. A range of recommendations was provided.

5.3.1 SUMMARY OF THE ARCHAEOLOGICAL PATTERNING

In summary, despite the recognised limitations of utilising previous studies as the basis for generalisations regarding archaeological patterning, the following broad predictions can be made for the region:

- a wide variety of site types are represented in the project area with open campsites, isolated artefacts and scarred trees are by far the most common
- sites located in the vicinity of major tributaries (4th and 5th order streams/rivers) have the highest distribution and densities. These sites tend to be extensive and complex in landscapes with permanent and reliable water and contain evidence representative of concentrated activity
- sites located in the vicinity of the lower reaches of tributaries (3rd order creeks) have an increased distribution and density and contain evidence that may represent repeated occupation or concentration of activity
- sites located in the vicinity of the upper reaches of minor tributaries (2nd order streams) also have a relatively sparse distribution and density and may represent evidence of localised one-off behaviour
- sites in proximity to ephemeral water sources or located in the vicinity of headwaters of upper tributaries (1st order streams) have a sparse distribution and density and contain little more than a background scatter
- sites within the plain's areas consist of a background scatter representative of hunting and gathering activities and travel
- lithic artefacts are primarily manufactured from mudstone and silcrete with a variety of other raw materials also utilised but in smaller proportions
- scarred trees are mainly Black Box with other tree types used significantly less
- hearths are located in close proximity to reliable water sources
- burials and associated activities may be located in the dunes within the Riverina environment

Within the region, a broad range of site types are represented including artefact scatters, isolated finds, scarred trees, hearths, shell middens and burials. Within the areas covered by the regional studies, the range of available landforms has been sampled. In regional terms, site distribution is closely linked to proximity to reliable fresh water sources and topography, with elevated landforms such as dunes and along reliable water sources, exhibiting the highest concentrations of sites and open plains areas utilised for hunting and gathering activities and travel as evidenced by significantly less number and densities of sites.

5.4 LOCAL & REGIONAL CHARACTER OF ABORIGINAL LAND USE & ITS MATERIAL TRACES

Based on the previous assessments and the AHIMS search, the following summary is provided:

- main site types are artefact scatters, isolated finds, scar trees and burials;
- the majority of sites, and sites of the highest density, are located in close proximity to reliable fresh water sources representing concentrated activity;
- burials may be found in the elevated dunes;

- site numbers and site densities decrease with increased distance from reliable fresh water sources;
- sites within the plain's areas consist of a background scatter representative of hunting and gathering activities and travel;
- lithic artefacts are primarily manufactured from mudstone and silcrete with a variety of other raw materials also utilised but in smaller proportions;
- flakes, broken flakes and flaked pieces are the most common artefact types recorded;
- scarred trees are mainly Black Box with other tree types used significantly less;
- hearths are located in close proximity to reliable water sources and may be miss identified throughout the plain's landforms (burnt termite clay mounds); and
- the vast majority of artefactual material in the region was observed on exposures with good to excellent ground surface visibility

Based on information gained from previous studies within a five-kilometre radius of our project area, it can be expected that:

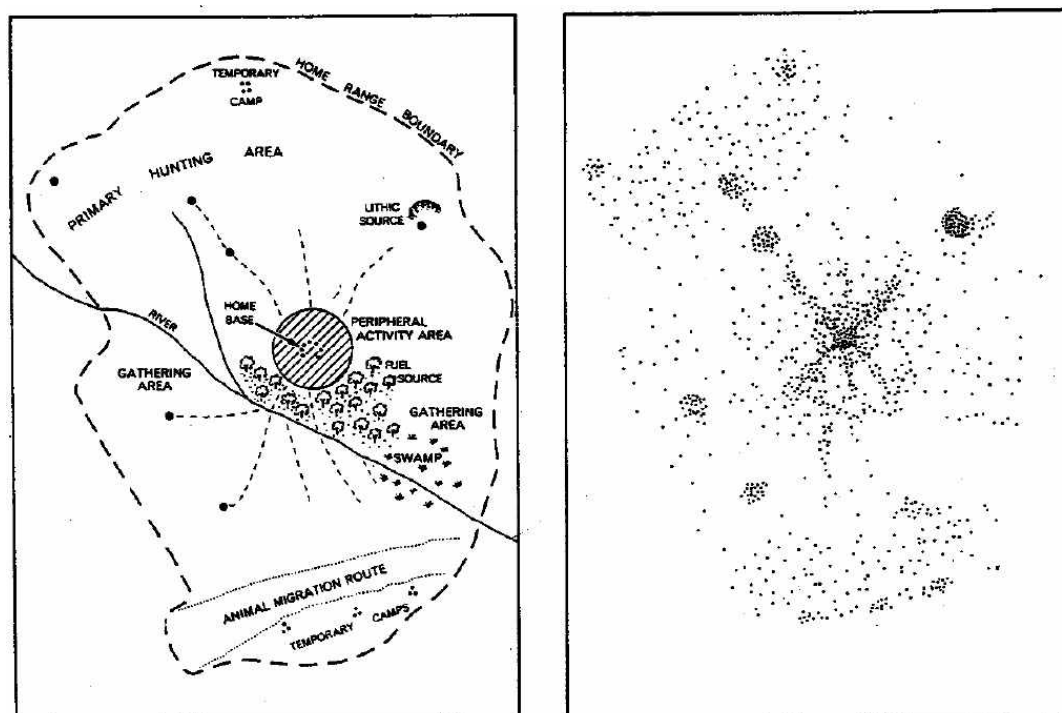
- the likelihood of locating sites increases with elevated landforms and proximity to water;
- the likelihood of finding large sites increases markedly with elevated landforms and proximity to water;
- burials may be found in the elevated dunes;
- a variety of raw materials will be represented though the majority of sites will be predominated by mudstone and silcrete;
- a variety of artefact types will be located though the majority will be flakes, flaked pieces and debitage;
- the likelihood of finding scarred trees is dependent on the level of clearing in an area, and
- the majority of sites will be subject to disturbances including human and natural.

5.5 MODELS OF PAST ABORIGINAL LAND USE

The main aim of the assessment is to attempt to define both the nature and extent of occupation across the area. As a result, the nature of the analysis will focus on both the landform units and sites. The purpose of this strategy is to highlight any variations between sites and associated assemblages, landforms and resources across the area treating assemblages as a continuous scatter of cultural material across the landscape. In doing this, it is possible to identify variation across the landscape, landforms and assemblages that correspond with variation in the general patterns of landscape use and occupation. Thus, the nature of activities and occupation can be identified through the analysis of stone artefact distributions across a landscape. A general model of forager settlement patterning in the archaeological record has been established by Foley (1981). This model distinguishes the residential 'home base' site with peripheral 'activity locations'. Basically, the home base is the focus of attention and many activities and the activity locations are situated away from the home base and are the focus of specific activities (such as tool manufacturing). This pattern is illustrated in Figure 5.6. Home base sites generally occur in areas with good access to a wide range of resources (reliable water, raw materials etc). The degree of environmental reliability, such as reliable water and subsistence resources, may influence the rate of return to sites and hence the complexity of evidence. Home base sites generally show a greater diversity of artefacts and raw material types (which represent a greater array of activities performed at the site and immediate area). Activity locations

occur within the foraging radius of a home base camp (approximately 10 km); (Renfrew and Bahn 1991). Based on the premise that these sites served as a focus of a specific activity, they will show a low diversity in artefacts and are not likely to contain features reflecting a base camp (such as hearths). However, it is also possible that the location of certain activities cannot be predicted or identified, adding to the increased dispersal of cultural material across the landscape. If people were opting to carry stone tools during hunting and gathering journeys throughout the area rather than manufacturing tools at task locations, an increased number of used tools should be recovered from low density and dispersed assemblages.

Figure 5.2 Foley's model (L) and its manifestation in the archaeological record (R), (Foley 1981).



5.5.1 GENERAL MODEL OF OCCUPATION

Work throughout NSW has aimed to understand the nature of Aboriginal occupation and determine the nature of land use. This theme often aims to identify and explain archaeological patterning in site type, content and distribution. General theories have been developed outlining the relationship between land use patterns and the resulting archaeological evidence. A number of models developed have been reviewed and the most commonly accepted model is summarised below.

Kuskie and Kamminga (2000) established a general model of occupation strategies based primarily upon ethnographic research. Used as a starting point, it makes a general set of predictions for the Hunter that is consistent with other studies (e.g. Nelson 1991) and can be utilised for Australia in general. The model distinguishes between short-term or extended long-term occupation and makes some predictions about the likely location of different foraging and settlement activities. Combining this information with a general review of assemblage contents from a sample of excavated sites, a baseline of settlement activities may be determined (Barton 2001). The model provides a number of archaeological expectations that may be tested. For example, the presence of features requiring a considerable labour investment such as stone-lined ovens or heat-treatment pits are likely to occur at places where occupation occurred for extended periods of time. The presence of grindstones is

also a reliable indicator of low mobility and extended occupation. Seed grinding requires a large investment of time and effort (Cane 1989). In most ethnographic examples, seed grinding is an activity that takes place over an entire day to provide adequate energetic returns (Cane 1989; Edwards and O'Connell 1995). Where group mobility was high and campsites frequently shifted throughout the landscape, artefact assemblages are not expected to contain elements such as grindstones, heat-treatment pits, ovens and the diversity of implements frequently discarded at places of extended residential occupation. It may also have been the case that the location of particular activities could not be predicted by tool users, adding to the increased low-density scattering of artefacts over the landscape. Also, if individuals were opting to carry a number of stone tools during hunting and gathering activities and maintaining these tools rather than manufacturing new tools at each task location, the ratio of used tools to unworn flakes in these assemblages should be high. Table 5.2 has been adapted from Kuskie and Kamminga (2000).

Table 5.1 Site descriptions.

Occupation pattern	Activity location	Proximity to water	Proximity to food	Archaeological expectations
Transitory movement	all landscape zones	not important	not important	<ul style="list-style-type: none"> assemblages of low density & diversity evidence of tool maintenance & repair evidence for stone knapping
Hunting/gathering without camping	all landscape zones	not important	near food resources	<ul style="list-style-type: none"> assemblages of low density & diversity evidence of tool maintenance & repair evidence for stone knapping high frequency of used tools
Camping by small groups	associated with permanent & temporary water	near (within 100m)	near food resources	<ul style="list-style-type: none"> assemblages of moderate density & diversity evidence of tool maintenance & repair evidence for stone knapping & hearths
Nuclear family base camp	level or gently undulating ground	near reliable source (within 50m)	near food resources	<ul style="list-style-type: none"> assemblages of high density & diversity evidence of tool maintenance & repair & casual knapping evidence for stone knapping heat treatment pits, clay lined ovens grindstones
Community base camp	level or gently undulating ground	near reliable source (within 50m)	near food resources	<ul style="list-style-type: none"> assemblages of high density & diversity evidence of tool maintenance & repair & casual knapping evidence for stone knapping heat treatment pits, clay lined ovens grindstones & ochre large area >100sqm with isolated camp sites

To identify the specific activity areas through analysis of the composition of patterning of lithic assemblages, is utilised. However, this is applied to excavated materials as they provide more realistic data due to the lesser degree of disturbances, removal and breakages.

5.6 PREDICTIVE MODEL FOR THE PROJECT AREA

Due to issues surrounding ground surface visibility and the fact that the distribution of surface archaeological material does not necessarily reflect that of sub-surface deposits, it is essential to establish a predictive model.

Previous archaeological studies undertaken throughout the region, the AHIMS register and the environmental context provide a good indication of site types and site patterning in the area. This research has shown that occupation sites (artefact scatters and isolated finds) are the most frequently recorded site type and are commonly located along or adjacent to watercourses, and on relatively flat to gently sloping topography in close proximity to reliable water. Sites with higher artefact densities are similarly concentrated within fifty metres of watercourses. Within the local area, previous assessments within a similar environmental context indicate that, within a well-watered context, there is high potential for archaeological material to be present on level, typically well-elevated landforms that provide ready access to low-lying waterlogged areas and the associated resources.

Whilst the regional environment provided resources, including fauna, flora and water, that would have allowed for sustainable occupation of Moira Lake (2 kilometres south east of the project area) and the Murray River (4.5 kilometres east of the project area at its closest point), the project area is located within an environment that provided limited resources due to its distance from reliable water and associated resources that would have allowed for sustainable occupation of the area. It is possible that isolated finds and small density artefacts scatters maybe present and would be indicative of transitory activities such as hunting and gathering and travel rather than large numbers of people camping. Any sites present are also expected to have been significantly impacted, if not destroyed, on by previous clearing, long-term intensive agricultural/irrigation activities (ploughing, cropping) and rotational grazing, substantial land forming (deep ripping up to 60cms), relocation of earth to form irrigation bays suitable for dairy farming, channels, dams and drains.

The refinement of this predictive model will be dependent upon an investigation of the range of landforms and the occurrence of modern disturbances within the project area.

5.7 ARCHAEOLOGICAL POTENTIAL IN THE PROJECT AREA

Based on archaeological sites registered in the region and the results of past archaeological studies, two sites types are likely to occur throughout the project area:

- **Artefact scatters**

Also described as open campsites, artefact scatters and open sites, these deposits have been defined at two or more stone artefacts within 50 metres of each other and will include archaeological remains such as stone artefacts and may be found in association with camping where other evidence may be present such as shell, hearths, stone lined fire places and/or heat treatment pits. These sites are usually identified as surface scatters of artefacts in areas where ground surface visibility is increased due to lack of vegetation. Erosion, agricultural activities (such as ploughing, grazing) and access ways can also expose surface campsites. Artefact scatters may represent evidence of;

- Large camp sites, where everyday activities such as habitation, maintenance of stone or wooden tools, manufacturing of such tools, management of raw materials, preparation and consumption of food and storage of tools has occurred;
- Medium/small camp sites, where activities such as minimal tool manufacturing occurred;
- Hunting and/or gathering events;
- Other events spatially separated from a camp site, or
- Transitory movement through the landscape.

Artefact scatters are a common site type in the locality and the broader region. There is potential for very low-density artefact scatters to occur within the project area and reflect past Aboriginal landuses such as hunting and gathering and travel. There is also the potential for such sites to be

influenced through past impacts including previous clearing, long-term intensive agricultural/irrigation activities (ploughing, cropping) and rotational grazing, substantial land forming (deep ripping up to 60cms), relocation of earth to form irrigation bays suitable for dairy farming, channels, dams and drains.

- **Isolated finds**

Isolated artefacts are usually identified in areas where ground surface visibility is increased due to lack of vegetation. Erosion, agricultural activities (such as ploughing) and access ways can also expose surface artefacts. Isolated finds may represent evidence of;

- Hunting and/or gathering events; or
- Transitory movement through the landscape.

Isolated finds are a common site type in the locality and the broader region. There is potential for isolated artefacts to occur across the project area and across all landforms. There is also the potential for such sites to be influenced through past impacts including previous clearing, long-term intensive agricultural/irrigation activities (ploughing, cropping) and rotational grazing, substantial land forming (deep ripping up to 60cms), relocation of earth to form irrigation bays suitable for dairy farming, channels, dams and drains.

6 RESULTS

6.1 METHODOLOGY

The survey areas were surveyed on foot in accordance with the proposed methodology provided to the stakeholders for review. The survey included transects at approximately 15-20 metres apart walked in an east/west direction across the project area and focused on areas of high ground surface visibility and exposures (erosional features, drains, tracks, cleared areas).

6.2 LANDFORMS

McDonald et al (1998) describes the categories of landform divisions. This is a two layered division involving treating the landscape as a series of 'mosaics'. The mosaics are described as two distinct sizes: the larger categories are referred to as landform patterns and the smaller being landform elements within these patterns. Landform patterns are large-scale landscape units, and landform elements are the individual features contained within these broader landscape patterns. There are forty landform pattern units and over seventy landform elements. However, of all the landform element units, ten are morphological types. For archaeological investigations they divide the landscape into standardised elements that can be used for comparative purposes and predictive modelling. As outlined in Section 3, the project area includes one landform: elevated land approximately 10 meters from the flood plain.

6.3 SURVEY UNITS

The project area, consisting of slightly elevated land within 10 metres of the flood plain, was surveyed as five survey units (SU) that were based on landform elements (following McDonald et al 1984) and separate project development areas.

SU1 - Access track: The access track is approximately 48,000 m² and had been previously cleared, and subject to long-term intensive ploughing and grazing, has been fenced in places and also includes water pipelines. Exposures were high and visibility was 100% and an example of this survey unit is provided in Figure 6.1.

Figure 6.1 Access track location facing west



SU2 - Above ground pads - dairy sheds: This irrigation paddock has also been subject to complete clearing and long-term agricultural activities (ploughing, grazing) and land-forming. This unit contained channel, constructed track, fencing, water troughs and pipelines. A single row of trees planted in about 2000 was also present. Exposures were high and visibility was moderate at 30%. An example of this survey unit is provided in Figure 6.2.

Figure 6.2 Location of the dairy sheds facing west (drone photograph)



SU3 - Irrigation storage dam: Subject to complete clearing and long-term agricultural activities (ploughing, grazing) and land-forming, this unit, an irrigation paddock, contained an irrigation channel, fencing, water troughs and pipelines and a single row tree plantation line. Exposures were high and visibility was moderate at 40% and an example of this survey unit are provided in Figure 6.3.

Figure 6.3 Location of the storage dam area facing north (drone photograph)



SU4 - Effluent ponds: Consisting of an irrigation paddock, this area has been previously cleared and subject to long term ploughing, cultivation and grazing activities. Containing a large drain, road and irrigation channels, it also has existing pipelines to supply stock water and fencing. Exposures were

high and visibility was moderate to high at 50%. An example of this survey unit is provided in Figure 6.4.

Figure 6.4 Location of the effluent pond area facing west (drone photograph)



SU5 - Drain (existing): This unit includes the existing drain maintenance works that will be contained within the existing drain. Being highly disturbed, exposures and visibility were high at 100% and an example of this survey unit is provided in Figure 6.5.

Figure 6.5 Example of the existing drain



6.4 EFFECTIVE COVERAGE

To determine the effectiveness of an archaeological survey, the visibility and exposure conditions for each survey unit is calculated to provide an effective coverage amount. Effective coverage is an estimate of the amount of ground observed considering local constraints on site discovery such as vegetation and leaf litter and erosion. There are two components to determining the effective coverage: visibility and exposure.

Visibility is the amount of bare ground on the exposures which may reveal artefacts or other cultural materials, or visibility refers to 'what conceals'. Visibility is hampered by vegetation, plant or leaf litter, loose sand, stony ground or introduced materials (such as rubbish) On its own, visibility is not

a reliable factor in determining the detectability of subsurface cultural materials (DECCW 2010/783:39).

The second component in establishing effective coverage is exposure. Exposure refers to 'what reveals'. It estimates the area with a likelihood of revealing subsurface cultural materials rather than just an observation of the amount of bare ground. Exposure is the percentage of land for which erosion and exposure is sufficient to reveal cultural materials on the surface (DECCW 2010/783:37). The effective coverage for the project area was determined for both visibility and exposure ratings and Table 6.1 details the visibility rating system used.

Table 6.1 Ground surface visibility rating

Description	GSV rating %
Very Poor – heavy vegetation, scrub foliage or debris cover, dense tree or scrub cover. Soil surface of the ground very difficult to see.	0-9%
Poor – moderate level of vegetation, scrub, and / or tree cover. Some small patches of soil surface visible in the form of animal tracks, erosion, scalds, blowouts etc, in isolated patches. Soil surface visible in random patches.	10-29%
Fair – moderate levels of vegetation, scrub and / or tree cover. Moderate sized patches of soil surface visible, possibly associated with animal, stock tracks, unsealed walking tracks, erosion, blow outs etc, soil surface visible as moderate to small patches, across a larger section of the project area.	30-49%
Good – moderate to low level of vegetation, tree or scrub cover. Greater amount of areas of soil surface visible in the form of erosion, scalds, blowouts, recent ploughing, grading or clearing.	50-59%
Very Good – low levels of vegetation / scrub cover. Higher incidence of soil surface visible due to recent or past land-use practices such as ploughing, mining etc.	60-79%
Excellent – very low to non-existent levels of vegetation/scrub cover. High incidence of soil surface visible due to past or recent land use practices, such as ploughing, grading, mining etc.	80-100%
Note: this process is purely subjective and can vary between field specialists, however, consistency is achieved by the same field specialist providing the assessment for the one project area/subject site.	

As indicated in Table 6.2, the effective coverage for project area is moderate at 46.15% with grass being the limiting visibility factor. The disturbances included large scale clearing throughout, long-term intensive agricultural activities including ploughing and cropping and grazing with associated channels and pipelines, all of which have significantly impacted upon the landscape and associated cultural materials through removal and displacement resulting a highly disturbed landscape with no potential for in situ deposits.

Table 6.2 Effective coverage for the investigation area

SU	Landform	Area (m2)	Vis. %	Exp. %	Exposure type	Previous disturbances	Present disturbances	Limiting visibility factors	Effective coverage (m2)
1	disturbed	48,000	100%	100%	clearing, grazing	clearing, long-term intensive ploughing and grazing, pipelines	ploughing and grazing, pipelines	NA	48,000
2	disturbed	122,000	30%	100%	clearing, grazing	clearing, long-term intensive ploughing and grazing, pipelines	ploughing and grazing, pipelines	grass	36,600
3	disturbed	145,000	40%	100%	clearing, grazing	clearing, long-term intensive ploughing and grazing, pipelines	ploughing and grazing, pipelines	grass	58,000
4	disturbed	72,000	50%	100%	clearing, grazing	clearing, long-term intensive ploughing and grazing, pipelines	ploughing and grazing, pipelines	grass	36,000
Totals		349,000							178,600
Effective coverage %									46.15%

The level and nature of the effective survey coverage is considered satisfactory to provide an effective assessment of the investigation area. The coverage was comprehensive for obtrusive site types (e.g. grinding grooves and scarred trees) but somewhat limited for the less obtrusive surface stone artefact sites by surface visibility constraints that included vegetation cover and minimal exposures.

In view of the predictive modelling (Section 5) and the results obtained from the effective coverage, it is concluded that the survey provides a valid basis for determining the probable impacts of the proposal and formulating recommendations for the management of the identified sites and potential Aboriginal sites.

6.5 ARCHAEOLOGICAL SITES AND PADS

No archaeological sites or Potential Archaeological Deposits (PADs) were identified during the survey and this is likely due to a number of factors including:

- Distance from reliable water and subsistence resources indicates the project area was unlikely to have been utilised for camping;
- The project area may have been used for travel and/or hunting and gathering which manifest in the archaeological record as very low-density artefact scatters and/or isolated finds; and

- Past and present land uses would have displaced and/or destroyed any evidence of past Aboriginal land use.

In view of the predictive modelling and the results obtained from the effective coverage, it is concluded that the survey provides a valid basis for determining the probable impacts of the proposal and formulating recommendations for the project. The survey results demonstrate the absence of Aboriginal objects within the project area. The results are consistent with those obtained from other studies in the regional area in similar environmental contexts. The results indicate a number of possible past Aboriginal land use within the project area;

- No or limited Aboriginal occupation
- Ground disturbances having disturbed or removed evidence

Considering general models of occupation for the locality, the results of this and other investigations, the locality may have been utilised by Aboriginal people. As the project area itself is located over two kilometres from the closest reliable fresh water source and associated resources, the project area is unlikely to have been utilised more than a low intensity usage such as transitory movement or hunting/gathering activities.

6.6 DISCUSSION

Considering the environmental, cultural and archaeological contexts of the regional and local area, the distribution of archaeological sites may be identified and thus effectively protected, manage lands, and conserve areas where required and appropriate. As no sites have been identified, the results of the investigation are discussed below in terms of overall site integrity, local and regional contexts, and predictive modeling.

6.6.1 INTEGRITY

The integrity of the project area can be assessed only for surface integrity through the consideration of past and present land uses and their impacts. Subsurface integrity can only be assessed through controlled excavation that allows for the examination of both the horizontal and vertical distribution of cultural materials (caused by natural and/or human impacts) and by conjoining artefacts. Land uses and their impacts (long term cultivation and grazing, fencing, channel and dam construction), as well as natural impacts (bioturbation, erosion), within the project area are considered to be significantly high throughout and due to such disturbances, the integrity of the project area is highly disturbed and any sites that may have been present would have been disturbed or destroyed.

6.7 INTERPRETATION & OCCUPATION MODEL

The inferences that can be made about the nature of occupation within the investigation area and the specific sites identified area are limited by the small sample size. However, consistent with the occupation model, it is inferred from the absence of evidence obtained during the survey that:

- Aboriginal people did not appear to occupy/camp in flood plain locations;
- if flood plain areas were utilised in the past during times of drought, the distance from reliable fresh water would have also rendered the project areas unsuitable for camping;
- if the project areas were used by past Aboriginal people, although the environment would have allowed for limited hunting and gathering potential, the area may have been utilised for travel with minimal hunting and gathering during travel to reliable fresh water sources, and

- any evidence that may have been present would have been significantly disturbed/destroyed through long-term agricultural activities.

The survey results are consistent with, or do not contradict the general model of occupation.

6.8 REGIONAL & LOCAL CONTEXT

Although no sites have been identified, the lack of sites in the project area being a great distance from reliable fresh water does indicate such environments were not utilised intensively by past Aboriginal people.

6.9 REASSESSMENT OF THE PREDICTIVE MODEL

In view of the survey results, the predictive model of site location can be reassessed for the investigation area as follows:

- The potential for bora/ceremonial, carved tree, scarred tree, rock engraving and stone arrangement sites to occur within the investigation remains assessed as very low or negligible.
- No evidence of past Aboriginal stone knapping was identified, however the potential for casual, opportunistic stone knapping may have been present in the project area but is now highly disturbed and not identified.
- No evidence of local raw materials was present.
- No evidence was encountered of burial sites, and although the potential for skeletal remains to occur within the investigation area is considered to be very low, it cannot be discounted.
- Sites of traditional cultural significance (such as mythological sites) were not identified by the Aboriginal stakeholders. The registered Aboriginal stakeholders also did not disclose any specific knowledge of other cultural values/places (for example, historically known places or resource use areas). However, the possibility cannot be excluded that traditional or historical Aboriginal values or associations may exist that were not divulged to MCH by the persons consulted, although this potential is assessed as low.
- Site location (absence of sites), in relation to landforms and proximity to reliable water is also supported by the evidence.

6.10 CONCLUSION

It is well established that proximity to water was an important factor in past occupation of the area, with sites reducing in number significantly away from water with most sites located within 50 metres of the tributaries. The project area is located approximately two kilometres north west of Moira Lake which is the closest fresh water source along with the associated subsistence and medicinal resources. The project area was unsuitable for sustained camping but may have been utilised for transitory movement or hunting/gathering activities only during times of drought. In relation to modern alterations to the landscape, the large scale clearing throughout, long-term intensive agricultural activities including ploughing and cropping and grazing with associated channels and pipelines, have significantly impacted upon the landscape and associated cultural materials through removal and displacement resulting a highly disturbed landscape with no potential for in situ deposits.

7 ASSESSMENT OF IMPACTS

The archaeological record is a non-renewable resource that is affected by many processes and activities. As outlined in Section 3 and 6, the various natural processes and human activities would have impacted on archaeological deposits through both site formation and taphonomic processes. Section 4 describes the impacts within the project area, showing how these processes and activities have disturbed the landscape and associated cultural materials in varying degrees.

7.1 IMPACTS

Detailed descriptions of the impacts are provided in Section 1.5 and the results of the survey in Section 6. The Heritage NSW, Department of Premier & Cabinet Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales (2010:21) describes impacts to be rated as follows:

- 1) Type of harm: is either direct, indirect or none
- 2) Degree of harm is defined as either total, partial or none
- 3) Consequence of harm is defined as either total loss, partial loss, or no loss of value

As no sites were identified during the survey, there are no impacts on the archaeological record.

8 MITIGATION AND MANAGEMENT STRATEGIES

Specific strategies, as outlined through the Heritage NSW, Department of Premier & Cabinet Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW 2010b), the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEHL 2011), and the Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (DECCW 2010c), are considered below for the management of the identified site within the project area.

One of the most important considerations in selecting the most suitable and appropriate strategy is the recognition that Aboriginal cultural heritage is very important to the local Aboriginal community. Decisions about the management of sites and potential archaeological deposits should be made in consultation with the appropriate local Aboriginal community.

8.1 CONSERVATION/PROTECTION

The Heritage NSW, Department of Premier & Cabinet is responsible for the conservation/protection of Indigenous sites and they therefore require good reason for any impact on an indigenous site. Conservation is the first avenue and is suitable for all sites, especially those considered high archaeological significance and/or cultural significance. Conservation includes the processes of looking after an indigenous site or place so as to retain its cultural significance and are managed in a way that is consistent with the nature of peoples' attachment to them.

As no sites have been identified and the project area is highly disturbed through previous large scale clearing throughout, long-term intensive agricultural activities including ploughing and cropping and grazing with associated channels and pipelines, conservation/protection is not required.

8.2 FURTHER INVESTIGATION

An Aboriginal Heritage Impact Permit (AHIP) is no longer required to undertake test excavations (providing the excavations are in accordance with the Code of Practice for Archaeological Investigations in NSW). Subsurface testing is appropriate when a Potential Archaeological Deposit (PAD) has been identified, and it can be demonstrated that sub-surface Aboriginal objects with potential conservation value have a high probability of being present, and that the area cannot be substantially avoided by the proposed activity. However, testing may only be undertaken as per the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DECCW 2011) and discussions/consultation with the local Aboriginal community.

As no sites have been identified and the project area is highly disturbed through previous large scale clearing throughout, long-term intensive agricultural activities including ploughing and cropping and grazing with associated channels and pipelines, further investigations are not justified.

8.3 AHIP

If harm will occur to an Aboriginal object or Place, then an AHIP is required from the Heritage NSW, Department of Premier & Cabinet. If a systematic excavation of the known site could provide benefits and information for the Aboriginal community and/or archaeological study of past Aboriginal occupation, a salvage program may be an appropriate strategy to enable the salvage of cultural objects. The AHIP may also include surface collection of artefacts.

As no sites have been identified in the project area, an AHIP is not required.

9 RECOMMENDATIONS

9.1 GENERAL

- 1) The persons responsible for the management of onsite works will ensure that all staff, contractors and others involved in construction and maintenance related activities are made aware of the statutory legislation protecting sites and places of significance. Of particular importance is the National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010, under the National Parks and Wildlife Act 1974; and
- 2) Should any Aboriginal objects be uncovered during works, all work will cease in that location immediately and the Unexpected Finds Protocol followed as provided in Appendix C.

REFERENCES

- Anonymous. 2003. Catchment SIM GIS. <http://www.uow.edu.au/~cjr03/index.htm?Overview/VNAnalysis/VNAnalysisFrame.htm~mainFrame>. Downloaded 24 February 2004.
- Arnour-Chelu, M. and Andrews, P. 1994. Some Effects of Bioturbation by Earthworms (Oligochaeta) on Archaeological Sites. *Journal of Archaeological Science* 21:433-443.
- Balek, C. 2002. Buried Artefacts in Stable Upland Sites and the Role of Bioturbation: A Review. *Geoarchaeology: An International Journal* 17(1):41-51.
- Barton, H. 2001. *Howick Coal Mine Archaeological Salvage Excavations, Hunter Valley, NSW*. AMBS Consulting. Report Prepared for Coal & Allied.
- Barwick, D. 1984. Mapping the Past: An atlas of Victorian Clans. *Aboriginal History*. Vol. 8 (2):100-131.
- Beveridge, P. 1883. Of the Aborigines Inhabiting the Great Lacustrine and Riverina Depression of the Lower Murray, Lower Murrumbidgee, Lower Lachlan and Lower Darling. *Journal and Proceedings of the Royal Society of New South Wales*. 17: 19-74.
- Bickford, R.A. 1966. The Traditional Economy of the Aborigines of the Murray Valley. Unpublished B.A. (Hons) Thesis, University of Sydney.
- Bonhomme, T. 1987. Aboriginal Burials and Sand Mining of the Riverina Plain, NSW. Report to the NPWS.
- Buchan, R. A. 1973-1974. Report on an Archaeological Survey in the Murray Valley, New South Wales. Report to NPWS.
- Cahen, D. and J. Moeyersons. 1977. Subsurface Movements of Stone Artefacts and Their Implications for the Prehistory of Central Africa. *Nature* 266:812-815.
- Cane, S. 1989. Australian Aboriginal Seed Grinding and its Archaeological Record: a case study from the Western Desert. In *Foraging and Farming*, D. R. Harris and G. C. Hillman (eds.), 99-119. London: Unwin Hyman.
- Curr. E.M. 1883. *Recollections of Squatters in Victoria*. George Robertson, Melbourne.
- De Reu J, Bourgeois J, Bats M, et al. 2013. Application of the topographic position index to heterogeneous landscapes. *Geomorphology*, 186: 39–49. DOI:10.1016/j.geomorph.2012.12.015.
- De Reu J, Bourgeois J, De Smedt P, et al. 2011. Measuring the relative topographic position of archaeological sites in the landscape, a case study on the Bronze Age barrows in northwest Belgium. *Journal of Archaeological Science*, 38(12): 3435–3446. DOI:10.1016/j.jas.2011.08.005.
- Department of Environment, Climate Change and Water (DECCW). 2010a. *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*. Department of Environment, Climate Change and Water NSW, Sydney.

Department of Environment, Climate Change and Water (DECCW). 2010b. *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. Department of Environment, Climate Change and Water NSW, Sydney.

Department of Environment, Climate Change and Water (DECCW). 2010c. *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW*. Department of Environment, Climate Change and Water NSW, Sydney.

Department of Planning, Industry and Environment (DPIE). 2016, Riverina; (accessed 5 June 2020). <https://www.environment.nsw.gov.au/bioregions/Riverina-Biodiversity.htm>

Edwards, D. and J. F. O'Connell 1995. Broad Spectrum Diets in Arid Australia. *Antiquity*, 69: 769-783.
ERM. 2001. Waterforde Estate Stage 2: Archaeological Test Excavations (partial). Report to Waterforde Pty Limited.

Eyre, E. J. 1840. *Journals of Expeditions of Discovery into Central Australia and Overland from Adelaide to King Gorges Sound, 1840-41*. T & W Boone, London.

Foley, R. 1981. A Model of Regional Archaeological Structure. *Proceedings of the Prehistoric Society*. 47: 1-17.

Hughes, P. J. and Sullivan, M. 1984. Environmental Approaches to the Assessment of Archaeological Significance. In S. Sullivan and S. Bowdler (eds) *Site Surveys and Significance Assessments in Australian Archaeology*. Pp: 34-47.

Koettig, M. 1986. Assessment of Archaeological Sites along the Proposed Singleton to Glennies Creek Water Pipeline Route and the Reservoir Site at Apex Lookout, Hunter Valley, New South Wales. Unpublished report for The Public Works Department.

Kuskie, P.J., and J. Kamminga. 2000. Salvage of Aboriginal archaeological sites in relation to the F3 Freeway near Lenaghans Drive, Black Hill, New South Wales. Report to Roads and traffic Authority New South Wales.

Lewarch, D. E. and O'Brien, M. J. 1981. The Expanding Role of Surface Assemblages in Archaeological research. In Schiffer, M. B. (ed) *Advances in Archaeological Method and Theory*, Volume 4. Academic Press, New York.

L'Oste-Brown, S., L. Godwin., and C. Porter., In Association with Bowen Basin Aboriginal steering Committee. 1998. Towards an Indigenous Social and Cultural Landscape of the Bowen Basin. Bowen Basin Aboriginal Cultural Heritage Project. Cultural Heritage Monograph Series Volume 2. Queensland Department of Environment and Heritage, Brisbane.

McDonald, R.C., Isbell, R.F., Speight, J.G., Walker, J. and Hopkins, M.S. 1998. *Australian Soil and Land Survey Field Handbook*, Second Edition. Inkata Press, Australia.

Mitchell, T.L. 1839. *Three Expeditions into the Interior of Eastern Australia with Descriptions of the Recently Explored Region of Australia Felix and the Present Colony of New South Wales*. Vol II. T & W Boone, London.

Mulvaney, J., and J. Kamminga. 1999. *Prehistory of Australia*. Allen and Unwin, Australia.

National Parks and Wildlife Service, Ed. 1997. Aboriginal Cultural Heritage Standards and Guidelines Kit. NPWS, Sydney.

Nelson, M. 1991. The study of technological organisation. In Schiffer, M. (ed.) *Archaeological Method and Theory*. Tuscon: University of Arizona Press. pp. 57-100.

Odell, G. and F. Cowan. 1987. Estimating Tillage Effects on Artifact Distributions. *American Antiquity* 52(3):456-484.

Office of Environment and Heritage (OEH), 2011. Guide to Investigating, Assessing and reporting on Aboriginal Cultural Heritage in NSW. Department of Environment, Climate Change and Water NSW, Sydney.

Peacock, E. and D. Fant. 2002. Biomantle Formation and Artefact Translocation in Upland Sandy Soils: An Example from the Holly Springs National Forest, North-Central Mississippi, U.S.A. In *Geoarchaeology* 17(1):91-114.

Renfrew, C., and Bahn, P. 1991. *Archaeology: Theories, Methods and Practice*. Thames & Hudson.

Roper, D. 1976. Lateral Displacement of Artifacts Due to Plowing. *American Antiquity* 41(3):372-375.

Spennemann, D. H. (2015). Nineteenth Century Indigenous Land Use of Albury (NSW), as reflected in the historic sources. In Institute for Land, Water and Society Report (Vol. 83). Charles Sturt University.

Sturt, C. 1833. *Two Expeditions into the Interior of Southern Australia During the Years 1828-1830*. Smith Elder, London.

Villa, P. 1982. Conjoinable Pieces and Site Formation Processes. *American Antiquity* 47(2):276-290.

Waters, M. 2000. Alluvial Stratigraphy and Geoarchaeology in the American Southwest. *Geoarchaeology: An International Journal* 15(6):537-557.

Waters, M. and D. Kuehn. 1996. The Geoarchaeology of Place: The Effect of Geological Processes on the Preservation and Interpretation of the Archaeological Record. *American Antiquity* 61(3):483-496.

Wheeling Jesuit University, 2002. *Exploring the Environment: Water Quality*. <http://www.cotf.edu/ete/modules/waterq/wqphysmethods.html> Downloaded 24 February 2004.

Yorston, R.M., Gaffney, V.L. and Reynolds, P.J. 1990. Simulation of Artefact Movement Due to Cultivation. *Journal of Archaeological Science* 17:67-83.

APPENDIX A

Aboriginal Stakeholder Consultation

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5 June 2020

Sir/Madam
NTSCORP Limited
information@ntscorp.com.au

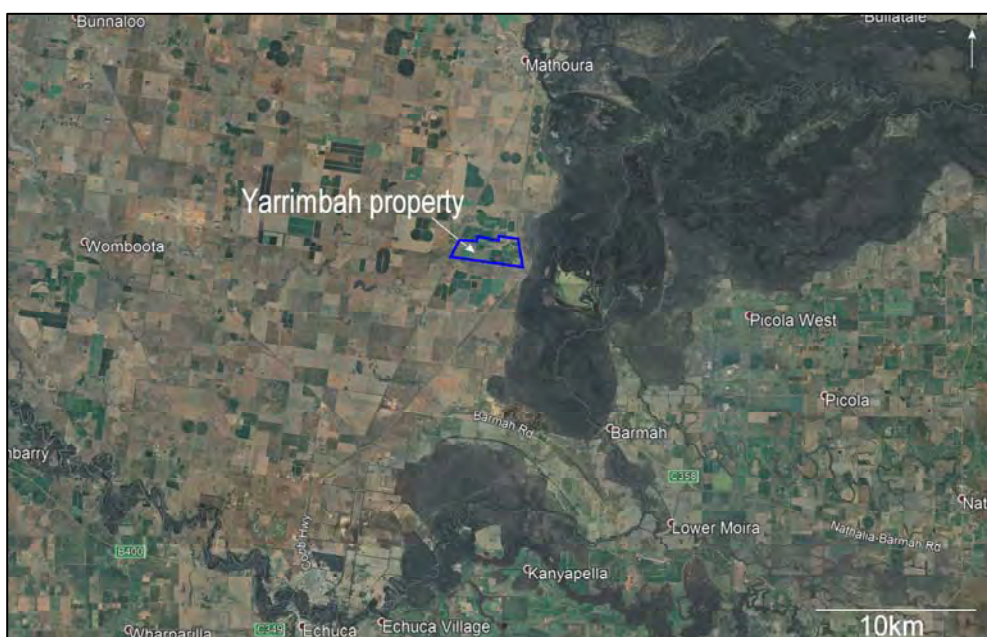
Dear Sir/Madam,

**RE: Written notification of project proposal and registration of interest as required under DPIE
Aboriginal Cultural Heritage Consultation requirements for proponents 2010 (Stage 1)–
Proposed developmnet at the Yarrimbah property located 12km south of Mathoura**

McCardle Cultural Heritage Pty Ltd (MCH) has been commissioned by Progressive Rural Solutions on behalf of RA & LJ Smith (PO Box 32 Mathoura NSW 2710) prepare an Aboriginal Cultural Heritage Assessment (ACHA) for the proposed for two free stall dairy barns and associated infrastructure including effluent treatment systems, ponds, pipelines and a freshwater storage dam located on the Yarrimbah property located approximately 12 kilometres south of Mathoura, , The Murray River Shire Local Government Area (LGA).

As per the Department of Planning, Industry and Environment (DPIE) Biodiversity and Conservation Division (BCD) formerly the Office of Environment and Heritage (OEH) policy - *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, (Stage 1, s4.1.1 to 4.1.2), MCH and the proponent are seeking community consultation with indigenous knowledge holders relevant to the project area who can determine the cultural significance of Aboriginal objects and/or places in the area of the proposed project.

Location of the project area



In order to comply with the BCD policy - *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, in particular Stage 1 (s4.1.2) - we are writing to advise you of the proposal and ask whether you could provide details of any Aboriginal groups or individuals that your organisation is aware of who may have an interest in the investigation area and hold knowledge relevant to determining the cultural significance of Aboriginal objects and/or places in the area of the proposed project.

Should you have this information, we request that you provide the names and contact details of these Aboriginal people/organisations, in writing, to the undersigned either via written correspondence or email (mcheritage@iprimus.com.au) within 14 working days of receipt of this letter.

Please note that in order to adhere to time constraints, and the minimal time requirements as stated in the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, the absence of a response by the prescribed timeline, will be taken by the proponent as your indication that your organisation is not aware of any such interested parties.

Should you wish to discuss this matter, please do not hesitate to contact me on 0412 702 396.

Yours sincerely,

for McCardle Cultural Heritage Pty Ltd



Dr. Penny McCardle
Principal Archaeologist
Forensic Anthropologist

5 June 2020

Andrew Fisher
Biodiversity and Conservation Division (Archaeology)
Andrew.Fisher@environment.nsw.gov.au

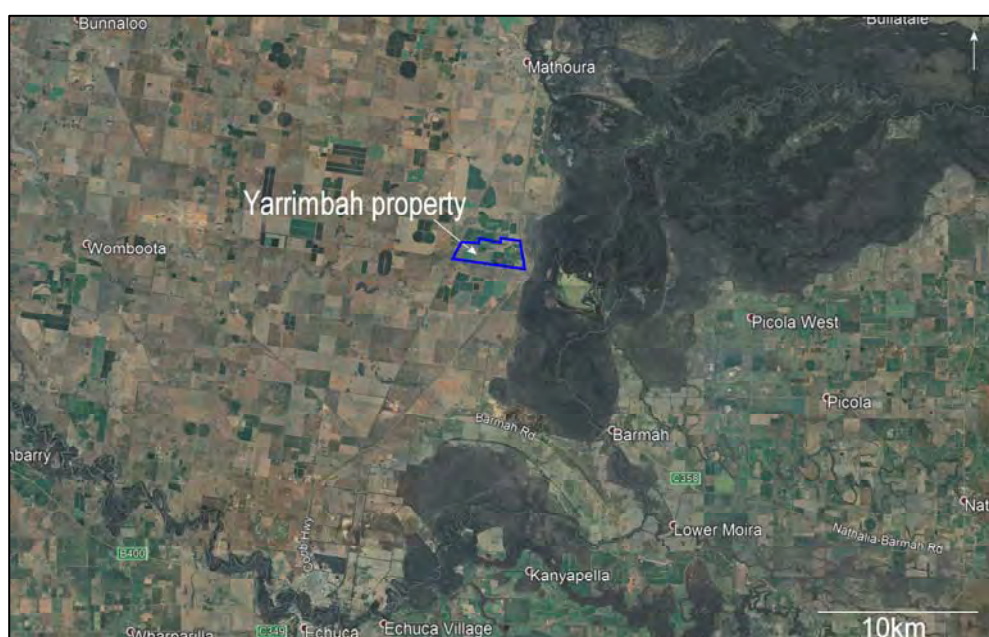
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Forensic Anthropologist

5 June 2020

Sir/Madam
Murray Local Land Services
admin.murray@lls.nsw.gov.au

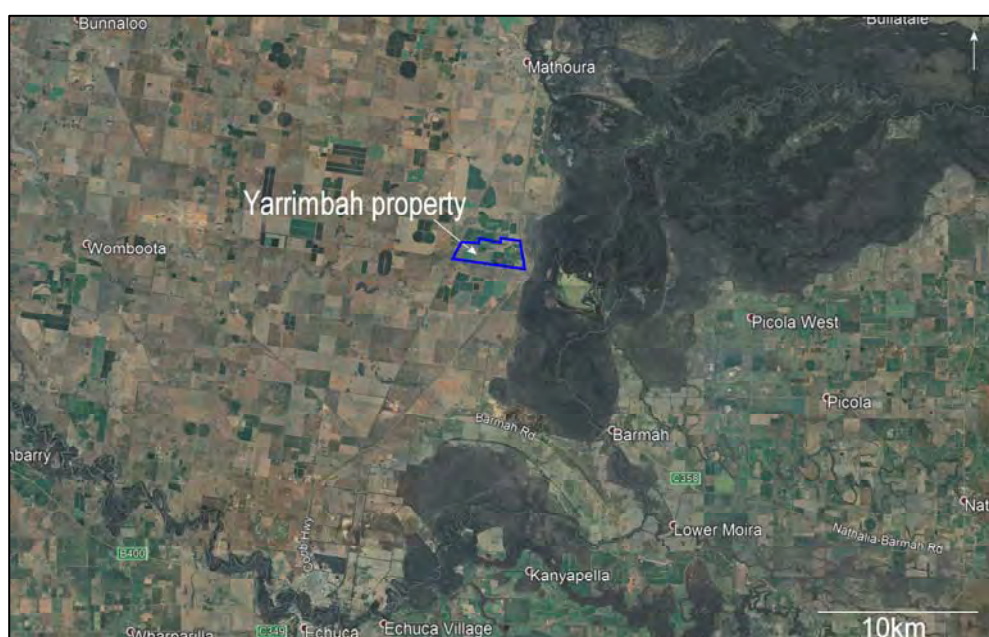
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Principal Archaeologist
Forensic Anthropologist

5 June 2020

Sir/Madam
National Native Title Tribunal
GeospatialSearch@NNTT.gov.au

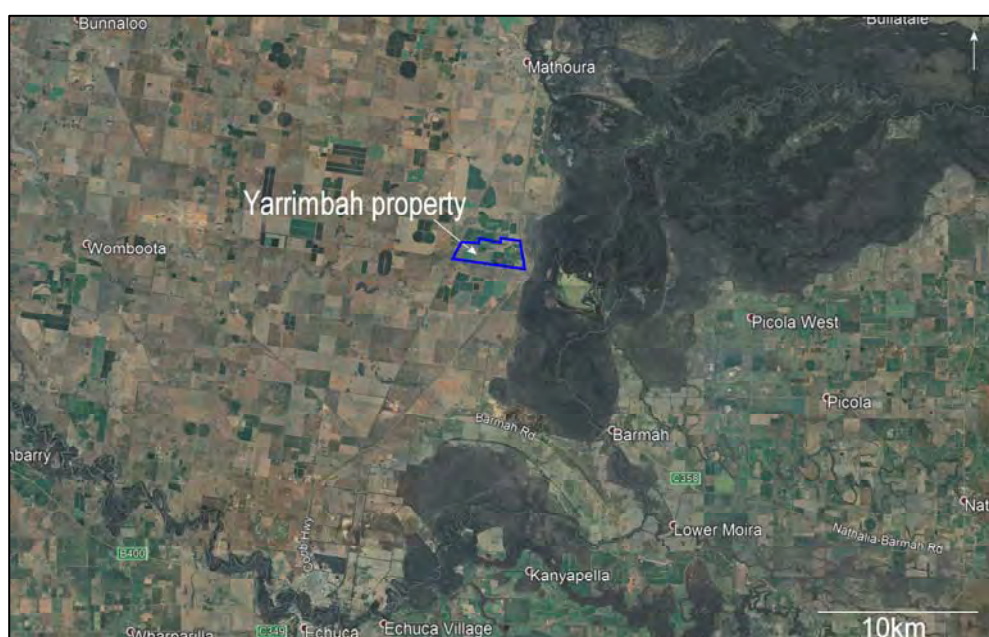
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As per the Department of Planning, Industry and Environment (DPIE) Biodiversity and Conservation Division (BCD) formerly the Office of Environment and Heritage (OEH) policy - *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, (Stage 1, s4.1.1 to 4.1.2), MCH and the proponent are seeking community consultation with indigenous knowledge holders relevant to the project area who can determine the cultural significance of Aboriginal objects and/or places in the area of the proposed project.

Location of the project area



In order to comply with the BCD policy - *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, in particular Stage 1 (s4.1.2) - we are writing to advise you of the proposal and ask whether you could provide details of any Aboriginal groups or individuals that your organisation is aware of who may have an interest in the investigation area and hold knowledge relevant to determining the cultural significance of Aboriginal objects and/or places in the area of the proposed project.

Should you have this information, we request that you provide the names and contact details of these Aboriginal people/organisations, in writing, to the undersigned either via written correspondence or email (mcheritage@iprimus.com.au) within 14 working days of receipt of this letter.

Please note that in order to adhere to time constraints, and the minimal time requirements as stated in the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, the absence of a response by the prescribed timeline, will be taken by the proponent as your indication that your organisation is not aware of any such interested parties.

Should you wish to discuss this matter, please do not hesitate to contact me on 0412 702 396.

Yours sincerely,

for McCardle Cultural Heritage Pty Ltd



Dr. Penny McCardle
Principal Archaeologist
Forensic Anthropologist

Request for Search of Tribunal Registers

Search for overlapping interests i.e.: Is there a native title claim, determination or land use agreement over this land?

Please note: the NNTT cannot search over freehold land.

For further information on freehold land: [Click Here](#) (NNTT website)

1. Your details

NAME:	Penny McCardle
POSITION:	Archaeologist
COMPANY/ORGANISATION:	McCardle Cultural Heritage Pty Ltd
POSTAL ADDRESS:	PO Box 166, Adamstown NSW 2289
TELEPHONE:	0412 702 396
EMAIL:	mcheritage@iprimus.com.au
YOUR REFERENCE:	Yarrimbah
DATE OF REQUEST:	5/6/2020

2. Reason for your request

Are you a party to a native title proceeding?

☐ Yes ☒ No

Please provide Federal Court/Tribunal file number/or application name:

OR

Do you need to identify existing native title interests to comply with the *Native Title Act 1993* (Cth) or other State/Territory legislation?

☒ Yes ☐ No

Please provide brief details of these obligations here:

_____ OEH requirements

3. Identify the area to be searched

If there is insufficient room below, please send more information on a Word or Excel document.

Mining tenure

State/Territory: NSW

Tenement ref/s: _____

OR

Crown land / non-freehold tenure

Tenure type: ☐ Lease ☐ Reserve or other Crown land

State/Territory: _____

Lot and plan details: _____

Pastoral Lease number or name: _____

Other details: (Town/County/Parish/

Section/Hundred/Portion): _____

Email completed form to: GeospatialSearch@nntt.gov.au

5 June 2020

Sir/Madam
Moama Local Aboriginal Land Council
mlalc@mcmmedia.com.au

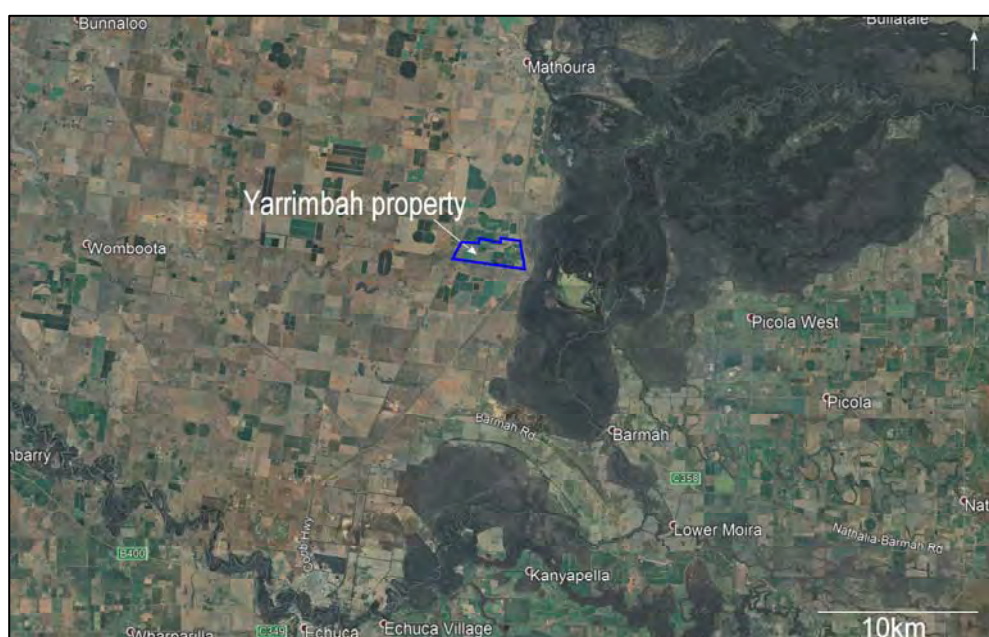
Dear Sir/Madam,

**RE: Written notification of project proposal and registration of interest as required under DPIE
Aboriginal Cultural Heritage Consultation requirements for proponents 2010 (Stage 1)–
Proposed development at the Yarrimbah property located 12km south of Mathoura**

McCardle Cultural Heritage Pty Ltd (MCH) has been commissioned by Progressive Rural Solutions on behalf of RA & LJ Smith (PO Box 32 Mathoura NSW 2710) prepare an Aboriginal Cultural Heritage Assessment (ACHA) for the proposed for two free stall dairy barns and associated infrastructure including effluent treatment systems, ponds, pipelines and a freshwater storage dam located on the Yarrimbah property located approximately 12 kilometres south of Mathoura, , The Murray River Shire Local Government Area (LGA).

As per the Department of Planning, Industry and Environment (DPIE) Biodiversity and Conservation Division (BCD) formerly the Office of Environment and Heritage (OEH) policy - *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, (Stage 1, s4.1.1 to 4.1.2), MCH and the proponent are seeking community consultation with indigenous knowledge holders relevant to the project area who can determine the cultural significance of Aboriginal objects and/or places in the area of the proposed project.

Location of the project area



In order to comply with the BCD policy - *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, in particular Stage 1 (s4.1.2) - we are writing to advise you of the proposal and ask whether you could provide details of any Aboriginal groups or individuals that your organisation is aware of who may have an interest in the investigation area and hold knowledge relevant to determining the cultural significance of Aboriginal objects and/or places in the area of the proposed project.

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Should you wish to discuss this matter, please do not hesitate to contact me on 0412 702 396.

Yours sincerely,

for McCardle Cultural Heritage Pty Ltd



Dr. Penny McCardle
Principal Archaeologist
Forensic Anthropologist

5 June 2020

Sir/Madam
Murray River Shire
admin@murrayriver.nsw.gov.au

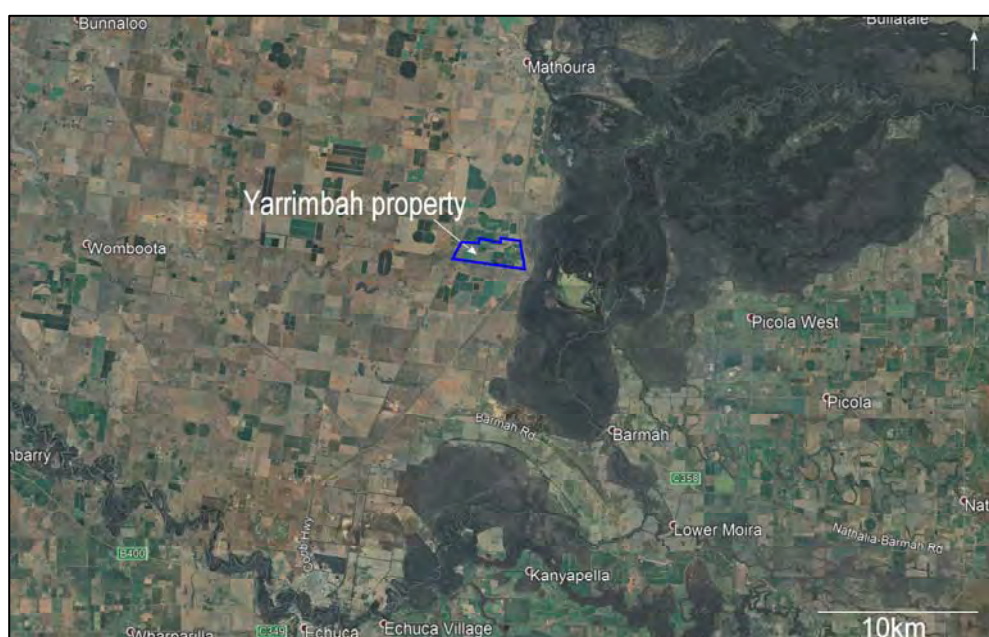
Dear Sir/Madam,

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Aboriginal Cultural Heritage Consultation requirements for proponents 2010 (Stage 1)–
Proposed developmnet at the Yarrimbah property located 12km south of Mathoura**

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As per the Department of Planning, Industry and Environment (DPIE) Biodiversity and Conservation Division (BCD) formerly the Office of Environment and Heritage (OEH) policy - *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, (Stage 1, s4.1.1 to 4.1.2), MCH and the proponent are seeking community consultation with indigenous knowledge holders relevant to the project area who can determine the cultural significance of Aboriginal objects and/or places in the area of the proposed project.

Location of the project area



In order to comply with the BCD policy - *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, in particular Stage 1 (s4.1.2) - we are writing to advise you of the proposal and ask whether you could provide details of any Aboriginal groups or individuals that your organisation is aware of who may have an interest in the investigation area and hold knowledge relevant to determining the cultural significance of Aboriginal objects and/or places in the area of the proposed project.

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Should you wish to discuss this matter, please do not hesitate to contact me on 0412 702 396.

Yours sincerely,

for McCardle Cultural Heritage Pty Ltd



Dr. Penny McCardle
Principal Archaeologist
Forensic Anthropologist

5 June 2020

Megan Mebberson
Office of the Registrar, Aboriginal Land Rights Act 1983
Megan.Mebberson@aboriginalaffairs.nsw.gov.au

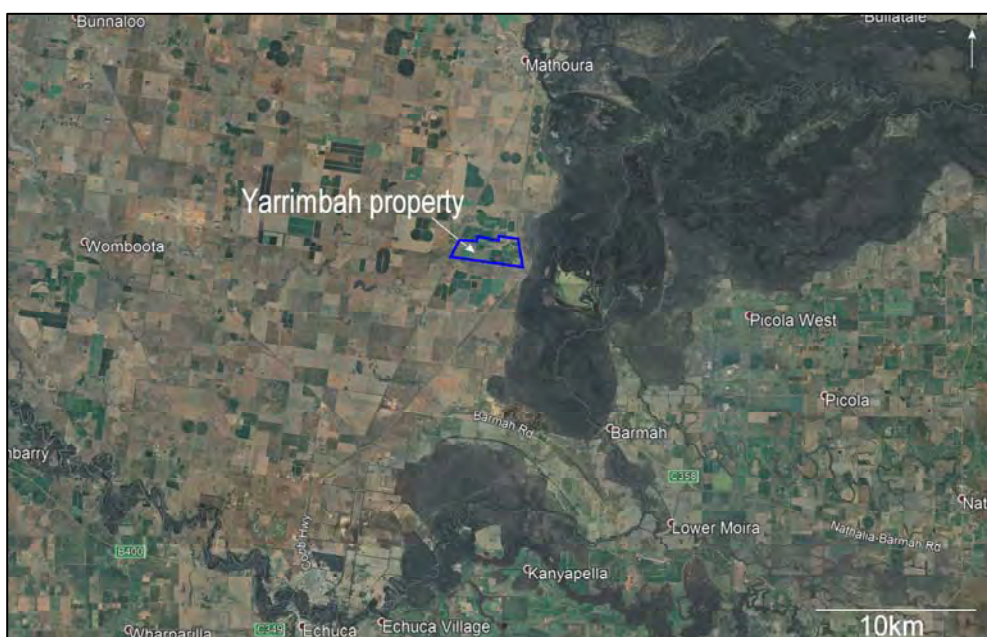
Dear Megan Mebberson,

**RE: Written notification of project proposal and registration of interest as required under DPIE
Aboriginal Cultural Heritage Consultation requirements for proponents 2010 (Stage 1)–
Proposed development at the Yarrimbah property located 12km south of Mathoura**

McCardle Cultural Heritage Pty Ltd (MCH) has been commissioned by Progressive Rural Solutions on behalf of RA & LJ Smith (PO Box 32 Mathoura NSW 2710) prepare an Aboriginal Cultural Heritage Assessment (ACHA) for the proposed for two free stall dairy barns and associated infrastructure including effluent treatment systems, ponds, pipelines and a freshwater storage dam located on the Yarrimbah property located approximately 12 kilometres south of Mathoura, , The Murray River Shire Local Government Area (LGA).

As per the Department of Planning, Industry and Environment (DPIE) Biodiversity and Conservation Division (BCD) formerly the Office of Environment and Heritage (OEH) policy - *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, (Stage 1, s4.1.1 to 4.1.2), MCH and the proponent are seeking community consultation with indigenous knowledge holders relevant to the project area who can determine the cultural significance of Aboriginal objects and/or places in the area of the proposed project.

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Should you wish to discuss this matter, please do not hesitate to contact me on 0412 702 396.

Yours sincerely,

for McCardle Cultural Heritage Pty Ltd



Dr. Penny McCardle
Principal Archaeologist
Forensic Anthropologist

Penny McCardle

From: Geospatial Search Requests <GeospatialSearch@NNTT.gov.au>
Sent: Monday, 8 June 2020 11:50 AM
To: 'Penny McCardle'
Subject: RE: SR20/520 - search request - SR20/520
Attachments: 20200608_SR20_520_NSW_Murray_River_Council.xlsx

UNCLASSIFIED

Native title search – NSW LGA – Murray River Council

Your ref: Yarrimbah - **Our ref:** SR20/520

Dear Penny McCardle,

Thank you for your search request received on 08 June 2020 in relation to the above area, please find your results attached.

Search Results

The results provided are based on the information you supplied and are derived from a search of the following Tribunal databases:

- Schedule of Native Title Determination Applications
- Register of Native Title Claims
- Native Title Determinations
- Register of Indigenous Land Use Agreements
- Notified Indigenous Land Use Agreements

For more information about the Tribunal's registers or to search the registers yourself and obtain copies of relevant register extracts, please visit our [website](#).

Please note: There may be a delay between a native title determination application being lodged in the Federal Court and its transfer to the Tribunal. As a result, some native title determination applications recently filed with the Federal Court may not appear on the Tribunal's databases.

The search results are based on analysis against external boundaries of applications only. Native title applications commonly contain exclusions clauses which remove areas from within the external boundary. To determine whether the areas described are in fact subject to claim, you need to refer to the "Area covered by claim" section of the relevant Register Extract or Schedule Extract and any maps attached.

Search results and the existence of native title

Please note that the enclosed information from the Register of Native Title Claims and/or the Schedule of Applications is **not** confirmation of the existence of native title in this area. This cannot be confirmed until the Federal Court makes a determination that native title does or does not exist in relation to the area. Such determinations are registered on the National Native Title Register.

The Tribunal accepts no liability for reliance placed on enclosed information

The enclosed information has been provided in good faith. Use of this information is at your sole risk. The National Native Title Tribunal makes no representation, either express or implied, as to the accuracy or suitability of the

information enclosed for any particular purpose and accepts no liability for use of the information or reliance placed on it.

If you have any further queries, please do not hesitate to contact us on the free call number 1800 640 501.

Regards,

Geospatial Searches

National Native Title Tribunal | Perth

Email: GeospatialSearch@nntt.gov.au | www.nntt.gov.au

Overlap Analysis

Disclaimer

This information product has been created to assist in understanding the spatial characteristics and relationships of this native title matter and is intended as a guide only. Spatial data used has been sourced from the relevant custodians in each jurisdiction, and/or the Tribunal, and is referenced to the GDA2020 datum.

While the National Native Title Tribunal (NNTT) and the Native Title Registrar (Registrar) have exercised due care in ensuring the accuracy of the information provided, it is provided for general information only and on the understanding that neither the NNTT, the Registrar nor the Commonwealth of Australia is providing professional advice. Appropriate professional advice relevant to your circumstances should be sought rather than relying on the information provided. In addition, you must exercise your own judgment and carefully evaluate the information provided for accuracy, currency, completeness and relevance for the purpose for which it is to be used.

The information provided is often supplied by, or based on, data and information from external sources, therefore the NNTT and Registrar cannot guarantee that the information is accurate or up-to-date.

The NNTT and Registrar expressly disclaim any liability arising from the use of this information.

This information should not be relied upon in relation to any matters associated with cultural heritage.

Please note:

- Calculated areas may not be the same as the legal area of a parcel.
- Where shown, NNTT Tenure Class for a non freehold parcel refers to a tenure grouping derived for the purposes of the Tribunal, and does not necessarily represent the jurisdictional tenure type.
- Overlap results are returned only for the currently active jurisdiction.
- Where shown, overlap results are returned for 'current' future act notices. These are notices within six months of the notification date, notices subject to a current future act application or state deed and those notices where the right to negotiate applies and are within five years of the notification date.
- Where shown, overlap results are returned for Future Act Objections that are currently active, or that have been subject to an NNTT determination.

Selected Feature from Local Government Area

Name	Murray River
Full Name	Murray River Council
Selection Area (sq km)	11,859.013

Selected Feature



Reporting overlapping features in New South Wales

Schedule of Native Title Determination Applications

No overlap found

Register of Native Title Claims

No overlap found

Native Title Determinations

Tribunal No	Name	Federal Court No	Determination Type	Related NTDA	Area (sq km)	Overlap Area (sq km)	% Region Overlapped
VCD1998/001	Yorta Yorta	VID6001/1995	In effect - Finalised	VC1994/001	1,833.8762	572.2988	4.83%

Native Title Determination Outcomes

Tribunal No	Name	Federal Court No	Determination Type	Outcome	Area (sq km)	Overlap Area (sq km)	% Region Overlapped
VCD1998/001	Yorta Yorta	VID6001/1995	In effect - Finalised	Native title does not exist	710.9643	570.1266	4.81%

* Note: Outcomes identified as "Native title extinguished" are generally outside the determination area. Refer to the determination document for more information.



Indigenous Land Use Agreements

No overlap found

RATSIB Areas

Name	Organisation	Area (sq km)	Overlap Area (sq km)	% Region Overlapped
New South Wales	NTSCORP Limited	1,719,931.7807	11,859.0129	100.00%

Local Government Areas

Name	Full Name	Area (sq km)	Overlap Area (sq km)	% Region
Murray River	Murray River Council	11,859.0129	11,859.0129	100.00%

Penny McCardle

To: Christopher O'Brien
Subject: RE: archaeological assessment

From: Christopher O'Brien <cobrien@murrayriver.nsw.gov.au>
Sent: Tuesday, 9 June 2020 3:17 PM
To: 'mcheritage@iprimus.com.au' <mcheritage@iprimus.com.au>
Subject: RE: archaeological assessment

Hi Penny

Thanks for your email.

The relevant Local Aboriginal Land Council (LALC) is the Moama LALC.

Contact details below:

LALC	Physical Address	Physical Town	Code	PO Box	PO Town	State	PO Code	Admin Email	Office Ph
Moama	52 Chanter Street	MOAMA	2731	PO Box 354	MOAMA	NSW	2731	JoeDay@njernda.com.au	03 5482 6

The ePlanning Spatial Viewer, available: <https://www.planningportal.nsw.gov.au/spatialviewer/#/find-a-property/address>, is also saying the Regional Council name is WIRADJURI, however Council doesn't have their details. The NSW LALC may be able to provide their details, website <http://alc.org.au/home.aspx>.

Regards

Chris



Christopher O'Brien | Senior Town Planner

Murray River Council | Moama Office | 52 Perricoota Rd Moama, NSW 2731
PO Box 906, Moama, NSW 2731

f 03 5884 3417 | m 0429 935 686

1300 087 004 | www.murrayriver.nsw.gov.au



Our ref: DOC20/437824

Penny McCardle

Principal Archaeologist & Forensic Anthropologist
McCardle Cultural Heritage Pty Ltd
PO Box 166
ADAMSTOWN NSW 2289

Via email: mcheritage@iprimus.com.au

12 June 2020

Dear Penny

Subject: Registration of Aboriginal Interests – Proposed Free Stall Dairy Barns (2) and Infrastructure ACHA, Yarrimbah – Murray River LGA

WRITTEN NOTIFICATION OF PROPOSAL AS REQUIRED UNDER DECCW ABORIGINAL CULTURAL HERITAGE CONSULTATION REQUIREMENTS FOR PROPONENTS 2010

Thank you for your correspondence dated 5 June 2020 about the above matter seeking comments from the Biodiversity and Conservation Division of the Department of Planning, Industry and Environment (The Department).

The Biodiversity and Conservation Division has statutory responsibilities relating to biodiversity (including threatened species, populations, ecological communities, or their habitats), Aboriginal cultural heritage and flooding.

Attached is a list of known Aboriginal parties for the Murray River local government area that the Department considers likely to have an interest in the development. Please note this list is not necessarily an exhaustive list of all interested Aboriginal parties. Receipt of this list does not remove the requirement of a proponent/ consultant to advertise in local print media and contact other bodies seeking interested Aboriginal parties, in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (April 2010).

Under Section 4.1.6. of the Consultation Requirements, you must also provide a copy of the names of each Aboriginal person who registered an interest to the relevant Department regional office and Local Aboriginal Land Council (LALC) within 28 days from the closing date for registering an interest.

Please note that the contact details in the list provided by the Department may be out of date as it relies on Aboriginal parties advising the Department when their details need changing. If individuals/companies undertaking consultation are aware that any groups contact details are out of date, or letters are returned unopened, please contact either the relevant stakeholder group (if you know their more current details) and/or the Department. AHIP applicants should make a note of any group they are unable to contact as part of their consultation record.

If you have any questions about this advice, please contact me via rog.southwest@environment.nsw.gov.au or 02 6022 0623.

Yours sincerely



Andrew Fisher

Senior Team Leader Planning

South West Branch

Biodiversity and Conservation Division

Department of Planning, Industry and Environment

ATTACHMENT A

Registered Aboriginal Interests – Murray River Local Government Area

ATTACHMENT A Registered Aboriginal Interests

Murray River Local Government Area

Organisation/ Individual Name	Address	Contact Details
Yorta Yorta Nation Aboriginal Corporation	Neville Atkinson (Chairperson) Shier St BARMAH VIC 3639	Phone: 03 5869 3353 Email: reception@yynac.com.au
Yarkuwa Indigenous Knowledge Centre	Jeanette Crew (Chairperson) 125 End St PO Box 276 DENILIKUIN NSW 2710	Phone: 03 5881 3312 Fax: 03 5881 5494 Email: admin@yarkuwa.com
Bangerang Aboriginal Corporation	PO Box 989 SHEPPARTON VIC 3630	Mobile: 0437 657 526 Email: vicki@bacch.org.au
Pappin Family Aboriginal Corporation	2 Alfred Close MILDURA VIC 3500	Mobile: 0400 634 994
Gary Pappin	PO Box 243 BALRANALD NSW 2715	Mobile: 0424 625 636
Wakool Indigenous Corporation	Cynthja Pappin PO Box 243 BALRANALD NSW 2715	Mobile: 0400 634 994 Email: info@wakool.com.au
John Jackson	PO Box 132 BALRANALD NSW 2715	Phone: 0427 927 675 Email: John.Jackson@health.nsw.gov.au



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1300 660 886

Email: advertise@localclassies.com.au

Fax: 1300 714 453

BIRTHDAYS

90

HAPPY 90th
BIRTHDAY

**Josie
Jackson**

Have a great day.
21.06.1930.

DEATHS

LEAN, Dr Bruce Andrew.
01.08.1947 ~ 08.06.2020.
Passed away peacefully
and unexpectedly at home
in Canberra on June 8,
2020.

—Sorely missed by Ann,
Alex, Geoff and Annabel,
Andrew, Jon and Bruce's
brother Roger.

We remember his many
happy days in General
Practice in Deniliquin.

CHURCH SERVICES

**ANGLICAN CHURCH OF
AUSTRALIA
ST PAUL'S CHURCH,
DENILIQUIN**
Cnr Harrison and
Wellington Sts.

Saturdays: 5 pm.
Sundays: 9 am.

CHURCH SERVICES

**UNITING CHURCH IN
AUSTRALIA**
Cnr Poitiers and
Edwards Streets,
Deniliquin.
SUNDAY SERVICES:
No Sunday Worship
Services until further
notice.
Enquiries: 0409 884 710.

LOST & FOUND

**FOUND
CAT**

Black with white nose and
chest, very friendly, found
Davidson St, North Denili-
quin. Please phone (03)
5881 1465.

FOUND: Glasses Prescrip-
tion Bifocals, Cressy Street,
Deniliquin. Call into Deni
Pastoral Times office or
phone (03) 5881 2322.

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FOR FOUND**

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notice free of charge
in today's classifieds.

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TRUCKS, UTES
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Also buying running regis-
tered cars. Phone Mark
0413 869 623.

WANTED TO BUY

WANTED

Holden PROJECT Car.
Interested in: Holden H, V
and early V Series (Pre
1997). V8 and 6cyl models.
More original the better.
Will consider any condition.
Phone 0458 289 221.

SERVICES

**SLASHING
SERVICE**

Tractor with 3m heavy duty
slasher with operator.
Hourly rate.
Phone 0409 500 459
for a quote.

**PLACE YOUR
VEHICLE AD
TODAY!**
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localclassies

PUBLIC NOTICES

**DENILQUIN MEALS ON
WHEELS.**
Contact: Co-ordinator on
5881 7310, 0408 219 168,
admin@denimealsonwheels.com.au
No roster until further
notice.

Call today to place your
CLASSIES AD
1300 660 886
localclassies



**Public
Notice**

Draft Amendment to Deniliquin Local Environmental Plan 2013

Council has prepared a planning
proposal to amend the Deniliquin Local
Environmental Plan

2013 (LEP 2013) to rezone Lot 2 DP1220715
Harfleur Street, Deniliquin from SP2
Infrastructure to B2 Local Centre to allow
for the development of this land for
seniors housing. The subject site is located
in the block bounded by Poitiers, Napier,
Harfleur and Hardinge Streets, Deniliquin.

In accordance with section 2.22 and
Part 3, Division 3.4 of the Environmental
Planning and

Assessment Act 1979 the planning
proposal will be on exhibition from
Monday, 22 June 2020 and all
documentation can be inspected at
www.edwardriver.nsw.gov.au or during
normal business hours at Council's
Customer Service Centre, 180 Cressy
Street, Deniliquin.

Submissions regarding the planning

PUBLIC NOTICES

Notification of project proposal and registration of interest under BCD Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (Stage 1) – Proposed development at the property 'Yarrimbah' located 12km south of Mathoura.

McCardle Cultural Heritage Pty Ltd (MCH) has been commissioned by Progressive
Rural Solutions Pty Ltd on behalf of RA & LJ Smith (PO Box 32 Mathoura NSW
2710) to prepare an Aboriginal Cultural Heritage Assessment (ACHA) and
Section 90 Aboriginal Heritage Impact Permit (AHIP) application, if required, for a
proposed development of two dairy free-stall barns and associated infrastructure
including effluent treatment systems, ponds, pipelines and a freshwater storage
dam at Lot 2 DP1077844, Lot 117 DP455183, Lot 13 DP751153 and Lot 14
DP751153.

The purpose of community consultation with Aboriginal people is to assist the
proposed applicant in the preparation of the AHIP application if required and to
assist the Chief Executive of BCD in his or her consideration and determination of
the application should an AHIP be required.

In compliance with the BCD policy - Aboriginal Cultural Heritage Consultation
Requirements for Proponents 2010, MCH would like to extend an invitation
to Aboriginal people who hold cultural knowledge relevant to the proposed
project area and who can determine the significance of Aboriginal object(s)
and/or place(s) in the area of the proposed project to register an interest in the
consultation process for this project.

**Written registrations must be forward to MCH (P.O. Box 166 Adamstown,
NSW, 2289; penny@mcheritage.com.au; fax 02 4950 5501) no later than
C.O.B. 3rd July, 2020.**

All registered parties will then be contacted to discuss the project in compliance
with the BCD policy. If you register your interest in this project, please also
nominate your preferred option to receive the initial information. You may wish
to attend a non-paid meeting and receive an information pack, or receive an
information packet through the mail, fax or e-mail.

Any parties to register are advised that, unless otherwise requested, their details
will be forward to BCD and the relevant LALC within 28 days of the closing date
of registration and in compliance with the BCD policy.

SITUATIONS VACANT

19 June 2020

Yorta Yorta Nation Aboriginal Corporation

Neville Atkinson

reception@yynac.com.au

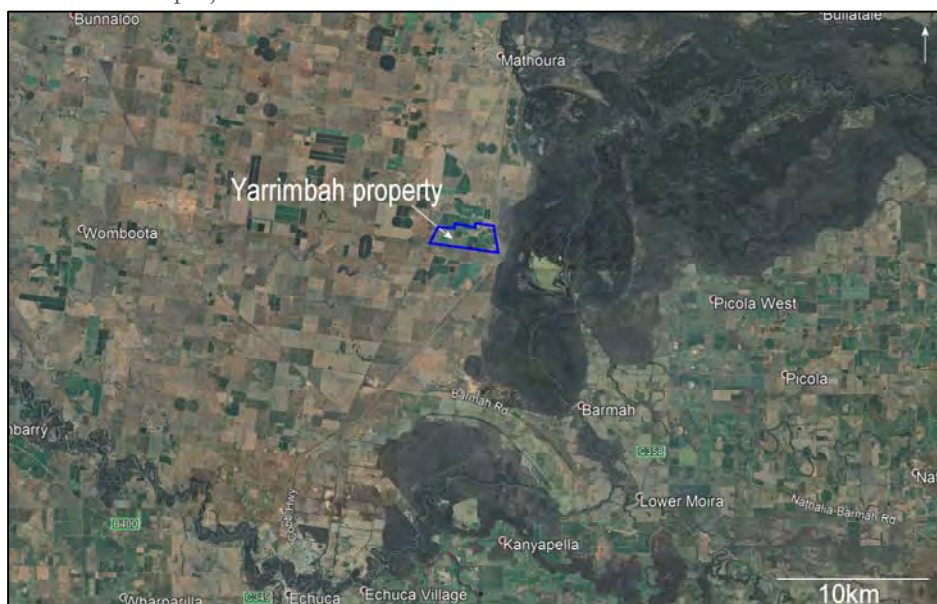
Dear Neville,

**RE: Written notification of project proposal and registration of interest as required under DPIE
Aboriginal Cultural heritage Consultation requirements fro proponents 2010 (Stage 1)–
Proposed developmnet at the Yarrimbah property located 12km south of Mathoura**

McCardle Cultural Heritage Pty Ltd (MCH) has been commissioned by Progressive Rural Solutions on behalf of RA & LJ Smith (PO Box 32 Mathoura NSW 2710) prepare an Aboriginal Cultural Heritage Assessment (ACHA) for the proposed for two free stall dairy barns and associated infrastructure including effluent treatment systems, ponds, pipelines and a freshwater storage dam located on the Yarrimbah property located approximately 12 kilometres south of Mathoura, , The Murray River Shire Local Government Area (LGA).

As per the As per the Department of Planning, Industry and Environment (DPIE)), Biodiversity and Conservation Division (BCD) formerly the Office of Environment and Heritage (OEH) policy - *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, Stage 1 (s1.3 to 4.1.8), MCH and the proponent are seeking community consultation with indigenous knowledge holders relevant to the project area who can determine the cultural significance of Aboriginal objects and/or places in the area of the proposed project.

Location of the project area



The purpose of community consultation with Aboriginal people is to assist the proposed applicant in the preparation of an application for an AHIP (if required) and to assist the Chief Executive of the BCD, in his or her consideration and determination of the application should an AHIP be required.

This is an invitation for Aboriginal people who hold cultural knowledge relevant to the proposed project area and who can determine the significance of Aboriginal object(s) and/or place(s) in the area of the proposed project to register an interest in a process of community consultation. As per the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (s 4.1.5, 4.1.7 and 4.1.8), you are advised of the following:

- unless otherwise specified, if you register your interest, your details will be provided to BCD and the LALC;
- the LALC's who hold cultural knowledge relevant to the proposed project area that is relevant to determining the significance of Aboriginal objects and/or places within the proposed project area who wish to register, must do so as an Aboriginal organisation not an individual;
- where an Aboriginal organisation representing Aboriginal people, who hold cultural knowledge relevant to the proposed project area and that is relevant to determining the significance of Aboriginal objects and/or places within the proposed project area who wish to register, must nominate a contact person **and** provide written confirmation and contact details of this person or persons.

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Dr. Penny McCardle
McCardle Cultural Heritage
PO Box 166
Adamstown, NSW, 2289

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Yours sincerely,

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Dr. Penny McCardle
Principal Archaeologist
Forensic Anthropologist

REGISTRATION OF INTEREST: Yarrimbah property Assessment

The project area lies within Yorta Yorta traditional lands.

Company Name): _____

Contact: _____

Postal address: _____

Mobile No: _____

E-Mail: _____

Date: _____

If you are a descendant of, or represent a descendant of the Yorta Yorta people, please answer the questions below (circle yes/no).

1) Are **you** part of a current Native Title Claim where the project area is located within? YES/NO

2) Are **you** a descendant of the Yorta Yorta people? YES/NO

3) Are **you** a knowledge holder? YES/NO

If yes please clarify further:

a) I am a traditional knowledge holder of specific, details knowledge pass directly by a traditional knowledge holder in a traditional manner YES/NO

b) I am a traditional knowledge holder of general knowledge pass directly by a traditional knowledge holder in a traditional manner YES/NO

c) I am a knowledge holder of recent information obtained through other means (such as, but not limited to, ethnographic sources, internet searches, assessment reports, personal experience etc).
YES NO

4) Do **you represent** a traditional knowledge holder? YES/NO

If yes, please provide details of whom you represent. You must provide written confirmation of those individual(s) whom you act on behalf of.

Name: _____ Phone: _____

Name: _____ Phone: _____

Name: _____ Phone: _____

5) Do **you represent** a traditional knowledge holder of general knowledge? YES/NO

If yes, please provide details of whom you represent. You must provide written confirmation of those individual(s) whom you act on behalf of.

Name: _____ Phone: _____

Name: _____ Phone: _____

Name: _____ Phone: _____

6) Do **you represent** a knowledge holder of recent information? YES/NO

If yes, please provide details of whom you represent. You must provide written confirmation of those individual(s) whom you act on behalf of.

Name: _____ Phone: _____

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Please nominate when you would like to provide any knowledge:

1) Before the survey YES/NO

2) During the survey YES/NO

3) After the survey (within a week after the survey due to time consideration for preparing the draft reports) YES/NO

If you are not a descendant of the Yorta Yorta people and would still like to register an interest in the project please answer the questions below.

1) Are you a knowledge holder (whereby you obtain your knowledge through written records such as ethnographic information, archaeological reports, field experience). YES/NO

2) Do you have a specific or general interest in the project? If so, please outline your interest. YES/NO

19 June 2020

Yarkuwa Indigenous Knowledge Centre

Jeanette Crew

admin@yarkuwa.com

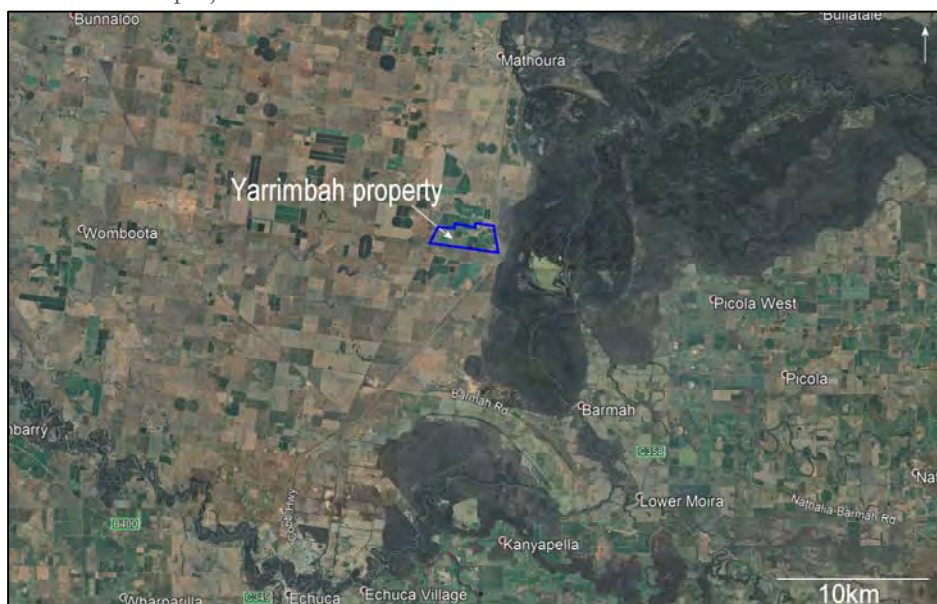
Dear Jeanette,

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Location of the project area



The purpose of community consultation with Aboriginal people is to assist the proposed applicant in the preparation of an application for an AHIP (if required) and to assist the Chief Executive of the BCD, in his or her consideration and determination of the application should an AHIP be required.

This is an invitation for Aboriginal people who hold cultural knowledge relevant to the proposed project area and who can determine the significance of Aboriginal object(s) and/or place(s) in the area of the proposed project to register an interest in a process of community consultation. As per the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (s 4.1.5, 4.1.7 and 4.1.8), you are advised of the following:

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REGISTRATION OF INTEREST: Yarrimbah property Assessment

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Company Name): _____

Contact: _____

Postal address: _____

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E-Mail: _____

Date: _____

If you are a descendant of, or represent a descendant of the Yorta Yorta people, please answer the questions below (circle yes/no).

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2) Do you have a specific or general interest in the project? If so, please outline your interest. YES/NO

19 June 2020

Bangerang Aboriginal Corporation

vicki@bacch.org.au

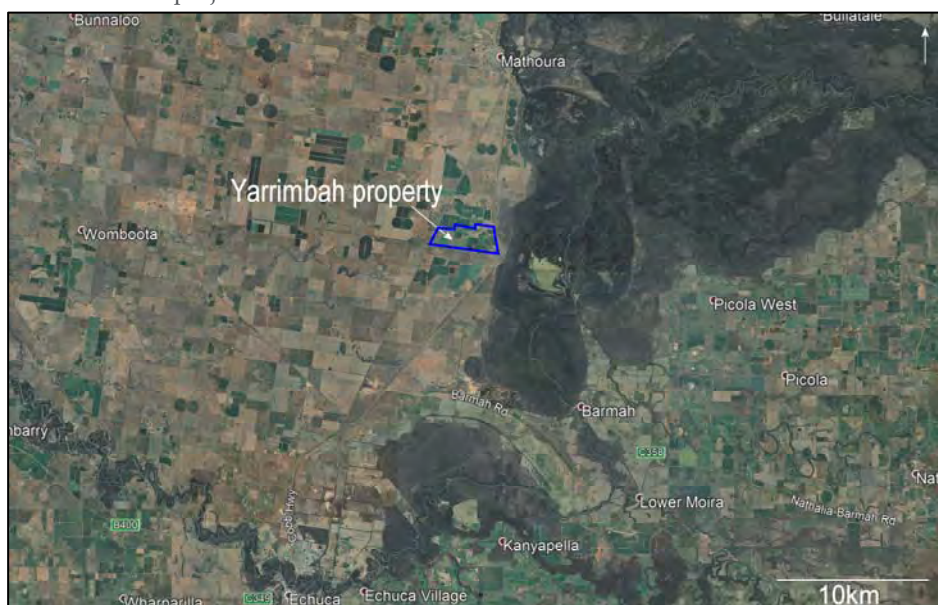
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Location of the project area



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REGISTRATION OF INTEREST: Yarrimbah property Assessment

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Company Name): _____

Contact: _____

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E-Mail: _____

Date: _____

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19 June 2020

Pappin Family Aboriginal Corporation
info@wakool.com.au

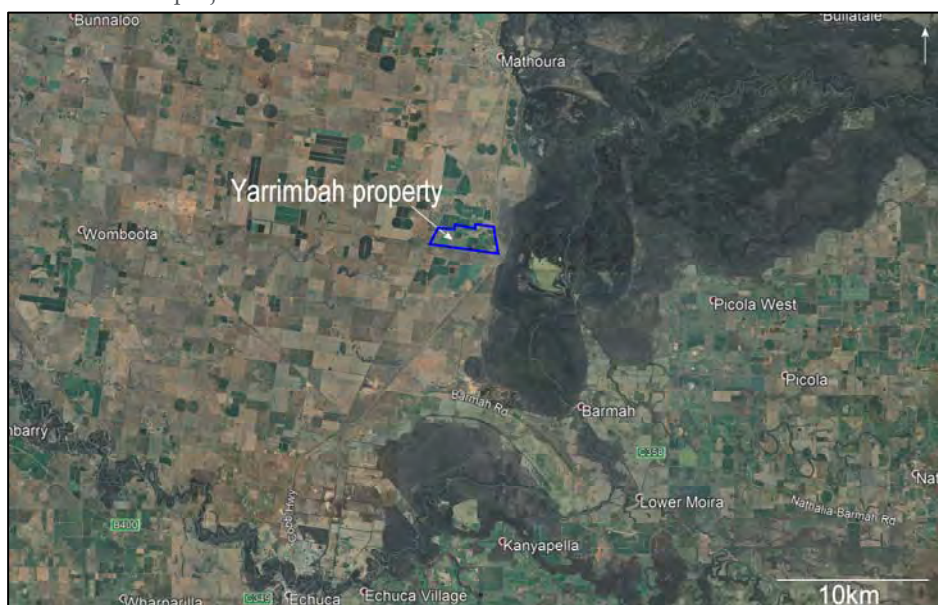
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Location of the project area



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REGISTRATION OF INTEREST: Yarrimbah property Assessment

The project area lies within Yorta Yorta traditional lands.

Company Name): _____

Contact: _____

Postal address: _____

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E-Mail: _____

Date: _____

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19 June 2020

Gary Pappin
info@wakool.com.au

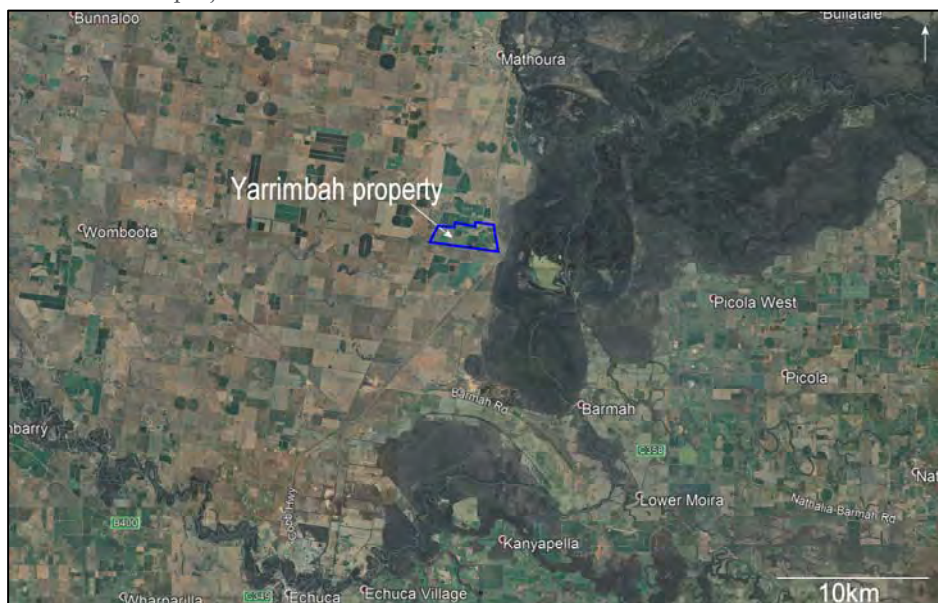
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Location of the project area



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2) Are **you** a descendant of the Yorta Yorta people? YES/NO

3) Are **you** a knowledge holder? YES/NO

If yes please clarify further:

a) I am a traditional knowledge holder of specific, details knowledge pass directly by a traditional knowledge holder in a traditional manner YES/NO

b) I am a traditional knowledge holder of general knowledge pass directly by a traditional knowledge holder in a traditional manner YES/NO

c) I am a knowledge holder of recent information obtained through other means (such as, but not limited to, ethnographic sources, internet searches, assessment reports, personal experience etc).
YES NO

4) Do **you represent** a traditional knowledge holder? YES/NO

If yes, please provide details of whom you represent. You must provide written confirmation of those individual(s) whom you act on behalf of.

Name: _____ Phone: _____

Name: _____ Phone: _____

Name: _____ Phone: _____

5) Do **you represent** a traditional knowledge holder of general knowledge? YES/NO

If yes, please provide details of whom you represent. You must provide written confirmation of those individual(s) whom you act on behalf of.

Name: _____ Phone: _____

Name: _____ Phone: _____

Name: _____ Phone: _____

6) Do **you represent** a knowledge holder of recent information? YES/NO

If yes, please provide details of whom you represent. You must provide written confirmation of those individual(s) whom you act on behalf of.

Name: _____ Phone: _____

Name: _____ Phone: _____

Name: _____ Phone: _____

Please nominate when you would like to provide any knowledge:

1) Before the survey YES/NO

2) During the survey YES/NO

3) After the survey (within a week after the survey due to time consideration for preparing the draft reports) YES/NO

If you are not a descendant of the Yorta Yorta people and would still like to register an interest in the project please answer the questions below.

1) Are you a knowledge holder (whereby you obtain your knowledge through written records such as ethnographic information, archaeological reports, field experience). YES/NO

2) Do you have a specific or general interest in the project? If so, please outline your interest. YES/NO

19 June 2020

Wakool Indigenous Corporation

Cynthja Pappin

info@wakool.com.au

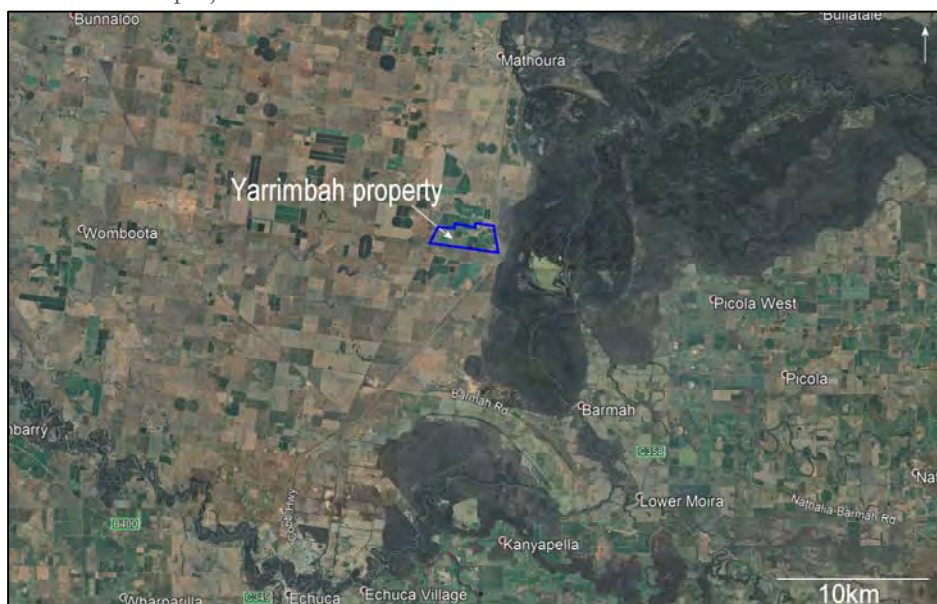
Dear Cynthja,

**RE: Written notification of project proposal and registration of interest as required under DPIE
Aboriginal Cultural heritage Consultation requirements fro proponents 2010 (Stage 1)–
Proposed developmnet at the Yarrimbah property located 12km south of Mathoura**

McCardle Cultural Heritage Pty Ltd (MCH) has been commissioned by Progressive Rural Solutions on behalf of RA & LJ Smith (PO Box 32 Mathoura NSW 2710) prepare an Aboriginal Cultural Heritage Assessment (ACHA) for the proposed for two free stall dairy barns and associated infrastructure including effluent treatment systems, ponds, pipelines and a freshwater storage dam located on the Yarrimbah property located approximately 12 kilometres south of Mathoura, , The Murray River Shire Local Government Area (LGA).

As per the As per the Department of Planning, Industry and Environment (DPIE)), Biodiversity and Conservation Division (BCD) formerly the Office of Environment and Heritage (OEH) policy - *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, Stage 1 (s1.3 to 4.1.8), MCH and the proponent are seeking community consultation with indigenous knowledge holders relevant to the project area who can determine the cultural significance of Aboriginal objects and/or places in the area of the proposed project.

Location of the project area



The purpose of community consultation with Aboriginal people is to assist the proposed applicant in the preparation of an application for an AHIP (if required) and to assist the Chief Executive of the BCD, in his or her consideration and determination of the application should an AHIP be required.

This is an invitation for Aboriginal people who hold cultural knowledge relevant to the proposed project area and who can determine the significance of Aboriginal object(s) and/or place(s) in the area of the proposed project to register an interest in a process of community consultation. As per the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (s 4.1.5, 4.1.7 and 4.1.8), you are advised of the following:

- unless otherwise specified, if you register your interest, your details will be provided to BCD and the LALC;
- the LALC's who hold cultural knowledge relevant to the proposed project area that is relevant to determining the significance of Aboriginal objects and/or places within the proposed project area who wish to register, must do so as an Aboriginal organisation not an individual;
- where an Aboriginal organisation representing Aboriginal people, who hold cultural knowledge relevant to the proposed project area and that is relevant to determining the significance of Aboriginal objects and/or places within the proposed project area who wish to register, must nominate a contact person **and** provide written confirmation and contact details of this person or persons.

MCH understands it is the Indigenous custom to elect knowledge holders and it is traditionally the Indigenous people who nominate who speak for country. Unfortunately, some RAPs and Government Departments have placed the onus of identifying traditional knowledge holders onto proponents and archaeologists. In order to do this, MCH are guided by the Aboriginal Cultural Heritage Consultation Requirements for Proponents (2010), the Burra Charter (2013) and Ask First (2002) which provide guidelines to identify traditional knowledge holders.

A number of questions are attached to assist MCH and the proponent in identifying traditional knowledge holders who are holders of specific detailed traditional knowledge, traditional knowledge holders who are holders of general traditional knowledge and knowledge holders who have knowledge based on other sources (such as but not limited to, ethnographic information, archaeological assessments, filed experience). MCH respectfully ask that you read the questions and provide your answers if you choose to register an interest in the project. MCH also sincerely apologise if you take offence to any questions or the manner in which we are guided to identify traditional knowledge holders; no offence is intended.

Should you wish to register your interest in this project, please register in writing no later than C.O.B. 2nd July 2020 to:

Dr. Penny McCardle
McCardle Cultural Heritage
PO Box 166
Adamstown, NSW, 2289

If you register your interest in this project, please also nominate your preferred option to receive the project

information. You may wish to have a non paid meeting and receive an information pack, or receive information packet through the mail, fax or e-mail. If a preferred method is not nominated, all information will be forward by mail, e-mail or fax.

Please note that in order to adhere to time constraints, the absence of a response by the prescribed timeline, will be taken by the proponent as your indication that your organisation does not wish to register for this project.

All information provided will be included in the consultation component of the assessment report unless otherwise stated it is confidential.

Yours sincerely,

for McCardle Cultural Heritage Pty Ltd

A handwritten signature in dark ink, appearing to read 'Penny McCardle', with a horizontal line extending to the right.

Dr. Penny McCardle
Principal Archaeologist
Forensic Anthropologist

REGISTRATION OF INTEREST: Yarrimbah property Assessment

The project area lies within Yorta Yorta traditional lands.

Company Name): _____

Contact: _____

Postal address: _____

Mobile No: _____

E-Mail: _____

Date: _____

If you are a descendant of, or represent a descendant of the Yorta Yorta people, please answer the questions below (circle yes/no).

1) Are **you** part of a current Native Title Claim where the project area is located within? YES/NO

2) Are **you** a descendant of the Yorta Yorta people? YES/NO

3) Are **you** a knowledge holder? YES/NO

If yes please clarify further:

a) I am a traditional knowledge holder of specific, details knowledge pass directly by a traditional knowledge holder in a traditional manner YES/NO

b) I am a traditional knowledge holder of general knowledge pass directly by a traditional knowledge holder in a traditional manner YES/NO

c) I am a knowledge holder of recent information obtained through other means (such as, but not limited to, ethnographic sources, internet searches, assessment reports, personal experience etc).
YES NO

4) Do **you represent** a traditional knowledge holder? YES/NO

If yes, please provide details of whom you represent. You must provide written confirmation of those individual(s) whom you act on behalf of.

Name: _____ Phone: _____

Name: _____ Phone: _____

Name: _____ Phone: _____

5) Do **you represent** a traditional knowledge holder of general knowledge? YES/NO

If yes, please provide details of whom you represent. You must provide written confirmation of those individual(s) whom you act on behalf of.

Name: _____ Phone: _____

Name: _____ Phone: _____

Name: _____ Phone: _____

6) Do **you represent** a knowledge holder of recent information? YES/NO

If yes, please provide details of whom you represent. You must provide written confirmation of those individual(s) whom you act on behalf of.

Name: _____ Phone: _____

Name: _____ Phone: _____

Name: _____ Phone: _____

Please nominate when you would like to provide any knowledge:

1) Before the survey YES/NO

2) During the survey YES/NO

3) After the survey (within a week after the survey due to time consideration for preparing the draft reports) YES/NO

If you are not a descendant of the Yorta Yorta people and would still like to register an interest in the project please answer the questions below.

1) Are you a knowledge holder (whereby you obtain your knowledge through written records such as ethnographic information, archaeological reports, field experience). YES/NO

2) Do you have a specific or general interest in the project? If so, please outline your interest. YES/NO

REGISTRATION OF INTEREST: Yarrimbah property Assessment

The project area lies within Yorta Yorta traditional lands.

Company Name: Yorta Yorta Nation Aboriginal Corporation

Contact: WADE MORGAN

Postal address: P.O Box 1363, Shepparton
Vic, 3632

Mobile No: 0437 666 435

E-Mail: wade.m@yynac.com.au

Date: _____

If you are a descendant of, or represent a descendant of the Yorta Yorta people, please answer the questions below (circle yes/no).

1) Are **you** part of a current Native Title Claim where the project area is located within? YES/NO

2) Are **you** a descendant of the Yorta Yorta people? YES/NO

3) Are **you** a knowledge holder? YES/NO

If yes please clarify further:

a) I am a traditional knowledge holder of specific, details knowledge pass directly by a traditional knowledge holder in a traditional manner YES/NO

b) I am a traditional knowledge holder of general knowledge pass directly by a traditional knowledge holder in a traditional manner YES/NO

c) I am a knowledge holder of recent information obtained through other means (such as, but not limited to, ethnographic sources, internet searches, assessment reports, personal experience etc). YES NO

4) Do **you represent** a traditional knowledge holder? YES/NO

If yes, please provide details of whom you represent. You must provide written confirmation of those individual(s) whom you act on behalf of.

Name: YXWAC Phone: 03 58320 222

Name: Colin Walker Phone: 03 58693220

Name: _____ Phone: _____

5) Do **you represent** a traditional knowledge holder of general knowledge? YES/NO

If yes, please provide details of whom you represent. You must provide written confirmation of those individual(s) whom you act on behalf of.

Name: _____ Phone: _____

Name: _____ Phone: _____

Name: _____ Phone: _____

6) Do **you represent** a knowledge holder of recent information? YES/NO

If yes, please provide details of whom you represent. You must provide written confirmation of those individual(s) whom you act on behalf of.

Name: _____ Phone: _____

Name: _____ Phone: _____

Name: _____ Phone: _____

Please nominate when you would like to provide any knowledge:

1) Before the survey ☒ YES/NO

2) During the survey ☒ YES/NO

3) After the survey (within a week after the survey due to time consideration for preparing the draft reports) ☒ YES/NO

If you are not a descendant of the Yorta Yorta people and would still like to register an interest in the project please answer the questions below.

1) Are you a knowledge holder (whereby you obtain your knowledge through written records such as ethnographic information, archaeological reports, field experience). YES/NO

2) Do you have a specific or general interest in the project? If so, please outline your interest. YES/NO



McCARDLE
CULTURAL HERITAGE

3 July 2020

PO Box 166
Adamstown 2289 NSW
penny@mcheritage.com.au
P: 0412 702 396

mcheritage.com.au

Wade Morgan
Yorta Yorta Nation Aboriginal Corporation
wade.m@yynac.com.au

Dear Wade,

RE: Heritage NSW Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (Stage 2 & 3) – Presentation of information about the proposed project and request for comment on the proposed methods of investigation - Proposed development at the Yarrimbah property located 12km south of Mathoura

McCardle Cultural Heritage (MCH) would like to thank you for registering your interest in this project. MCH sent a letter extending an invitation to register your interest and asking if you would prefer to have a meeting to discuss the project or have an information pack sent to you. As MCH did not receive your preferred option, we are posting the information packet.

In order for the proponent to fulfil its cultural heritage consultation requirements per the Heritage NSW, Department of Premier & Cabinet policy - *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (Stage 2; s 4.2.1 to 4.2.4; Stage 3, s 4.3.1 to 4.3.7) please find enclosed an Aboriginal Cultural Heritage Assessment Information Packet that the proposed project including, but not limited to, details of the proposed project including maps indicating the impact areas, an outline of the impact assessment process, summary of the cultural, environmental and archaeological contexts, a site specific predictive model, details of the proposed methodology, the roles and responsibilities of all parties, and provide an opportunity for you to identify and raise any cultural concerns, perspectives and assessment requirements you may have.

MCH would appreciate your input on;

- The proposed methodology
- Any Aboriginal objects and/or place(s) of cultural value within the investigation area and/or any issues of cultural significance you are aware of
- Any protocols and/or restrictions you may wish to implement in relation to any information you may like to provide, and
- Any other factors you consider relevant to the heritage assessment;

Please make your written submission to MCH by close of business 30th July 2020. The absence of a response by the requested timeline will be taken as your indication that your organisation has no comments regarding the above.

The proponent intends to engage a number of RAPs (relative to the scale and nature of the investigations) to participate in the field work. If you wish to be considered for paid participation in the field investigations please review and complete the Aboriginal stakeholder site officer application form attached to the information packet provided. Aboriginal representatives will be selected by the proponent based upon merits of the applications received with respect to the selection criteria. Late application will not be accepted by the proponent.

Please note that the number of people engaged and the duration of any engagement will be at the sole discretion of the proponent who will notify MCH of the successful applicants. MCH will notify the successful applicants and all RAPs will be invited to participate in the field investigations regardless of remuneration and subject to Occupational Health and Safety requirements and operational requirements.

Please note that regardless of participation in the field investigations, RAPs will be consulted in accordance with the Heritage NSW, Department of Premier & Cabinet policy - *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* for the remainder of the assessment.

As all communications, including phone calls, faxes, letters, and e-mails must be included in the consultation component of the report as per the Heritage NSW, Department of Premier & Cabinet requirements, please ensure that any items that you or your group deem confidential are either stated at the beginning of a conversation or stamped/written on each piece of paper communicate.

MCH looks forward to your response and working with you on this project. Please do not hesitate to contact myself on 0412 702 396 should you have any questions.

Yours sincerely,

for McCardle Cultural Heritage Pty Ltd



Dr. Penny McCardle
Principal Archaeologist
Forensic Anthropologist

Enclosures:

Aboriginal Cultural Heritage Assessment Information Packet



M

Yarrimbah

LGA: Murray River Shire

**Aboriginal Cultural Heritage Assessment
Information Packet**

3 July 2020

McCARDLE CULTURAL HERITAGE PTY LTD

ACN 104 590 141 • ABN 89 104 590 141

PO Box 166, Adamstown, NSW 2289

Mobile: 0412 702 396 • Email: penny@mcheritage.com.au



Report No: J20053 Info Pack

Approved by: Penny McCardle

Position: Director

Signed: 

Date: 3 July 2020

This report has been prepared in accordance with the scope of services described in the contract or agreement between McCardle Cultural Heritage Pty Ltd (MCH), ACN: 104 590 141, ABN: 89 104 590 141, and Progressive Rural Solutions. The report relies upon data, surveys, measurements and specific times and conditions specified herein. Any findings, conclusions or recommendations only apply to the aforementioned circumstances and no greater reliance should be assumed or drawn by Progressive Rural Solutions. Furthermore, the report has been prepared solely for use by Progressive Rural Solutions and MCH accepts no responsibility for its use by other parties.

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GLOSSARY

Aboriginal Cultural Heritage Values: traditional values of Aboriginal people, handed down in spiritual beliefs, stories and community practices and may include local plant and animal species, places that are important and ways of showing respect for other people.

Aboriginal Place: are locations that have been recognised by the Minister for Climate Change and the Environment (and gazetted under the *National Parks and Wildlife Act 1974*) as having special cultural significance to the Aboriginal community. An Aboriginal Place may or may not include archaeological materials.

Aboriginal Site: an Aboriginal site is the location of one or more Aboriginal archaeological objects, including flaked stone artefacts, midden shell, grinding grooves, archaeological deposits, scarred trees etc.

Harm: is defined as an act that may destroy, deface or damage an Aboriginal object or place. In relation to an object, this means the movement or removal of an object from the land in which it has been situated

Traditional Aboriginal Owners: Aboriginal people who are listed in the Register of Aboriginal owners pursuant to Division 3 of the *Aboriginal Land Register Act (1983)*. The Registrar must give priority to registering Aboriginal people for lands listed in Schedule 14 of the *National Parks and Wildlife Act 1974* or land subject to a claim under 36A of the *Aboriginal Land Rights Act 1983*.

Traditional Knowledge: Information about the roles, responsibilities and practices set out in the cultural beliefs of the Aboriginal community. Only certain individuals have traditional knowledge and different aspects of traditional knowledge may be known by different people, e.g. information about men's initiation sites and practices, women's sites, special pathways, proper responsibilities of people fishing or gathering food for the community, ways of sharing and looking after others, etc.

1 INTRODUCTION

McCardle Cultural Heritage Pty Ltd (MCH) has been commissioned by Progressive Rural Solutions on behalf of RA & LJ Smith to prepare an Aboriginal Cultural Heritage Assessment (ACHA) for the proposed for two free stall dairy barns and associated infrastructure including effluent treatment systems, ponds, pipelines and a freshwater storage dam located on the Yarrimbah property located approximately 12 kilometres south of Mathoura.

The assessment will determine the potential impacts upon the indigenous cultural heritage within the development area. It is intended that any areas of indigenous cultural heritage value will be identified and appropriate management recommendations will be established through consultation with the registered Aboriginal parties.

In compliance with the Heritage NSW, Department of Premier & Cabinet policy - *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (Stage 2, s4.21 to 4.2.4 and Stage 3 s4.3.1 to 4.3.7), this Aboriginal Cultural Heritage Information Packet provides information about the proposed project including, but not limited to, details of the proposed the project including maps indicating the impact areas , an outline of the impact assessment process, cultural context, summary of the environmental and archaeological contexts, a site specific predictive model, details of the proposed methodology the roles and responsibilities of all parties, and provide an opportunity for you to identify and raise any cultural concerns, perspectives and assessment requirements you may have.

The assessment has been undertaken to meet the Heritage NSW, Department of Premier & Cabinet *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010a*, the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW 2011*, the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales 2010b*, and the brief.

1.1 CONSULTATION

Consultation will be undertaken as per the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* and will be detailed in the Aboriginal Cultural Heritage Assessment report.

1.2 PROJECT AREA

The project area is defined by the proponent and is located approximately 12 kilometres south of Mathoura (NSW) and 28 kilometres north of Echuca (Victoria). Including Lot 2 DP1077844, Lot 117 DP455183, Lot 13 DP751153 and Lot 14 DP751153, the location and extent of the project area is illustrated in Figures 1.1 to 1.3.

Figure 1.1 Location of the project area

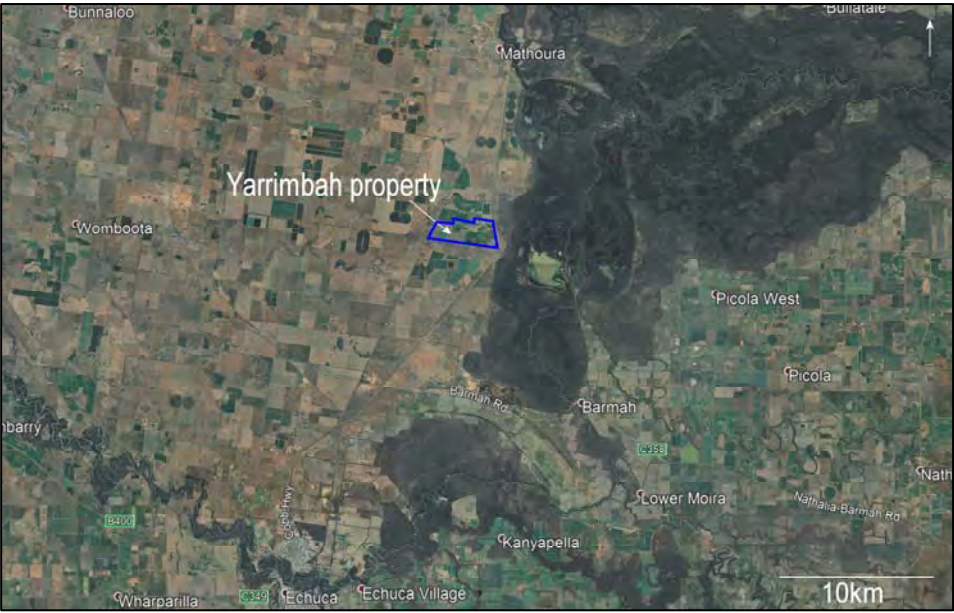


Figure 1.2 Local location of the project area

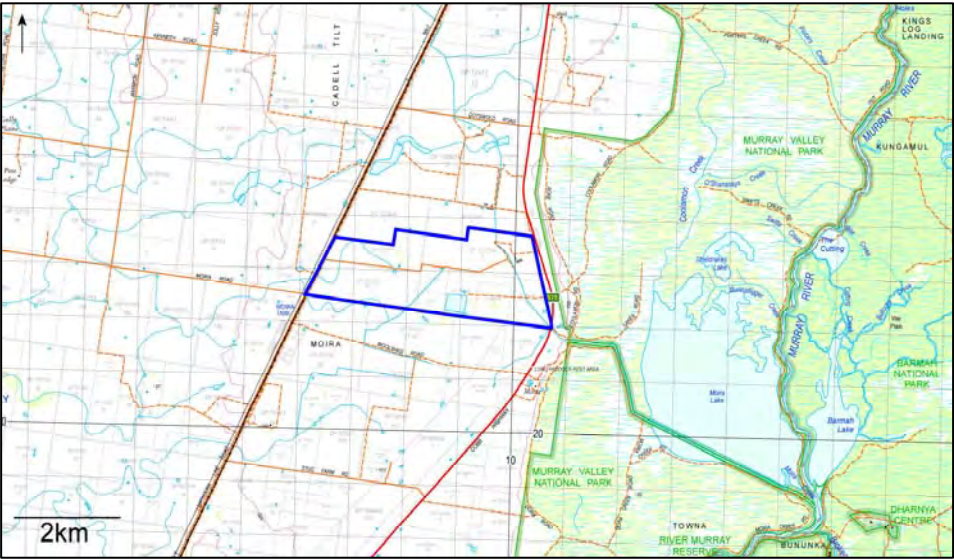


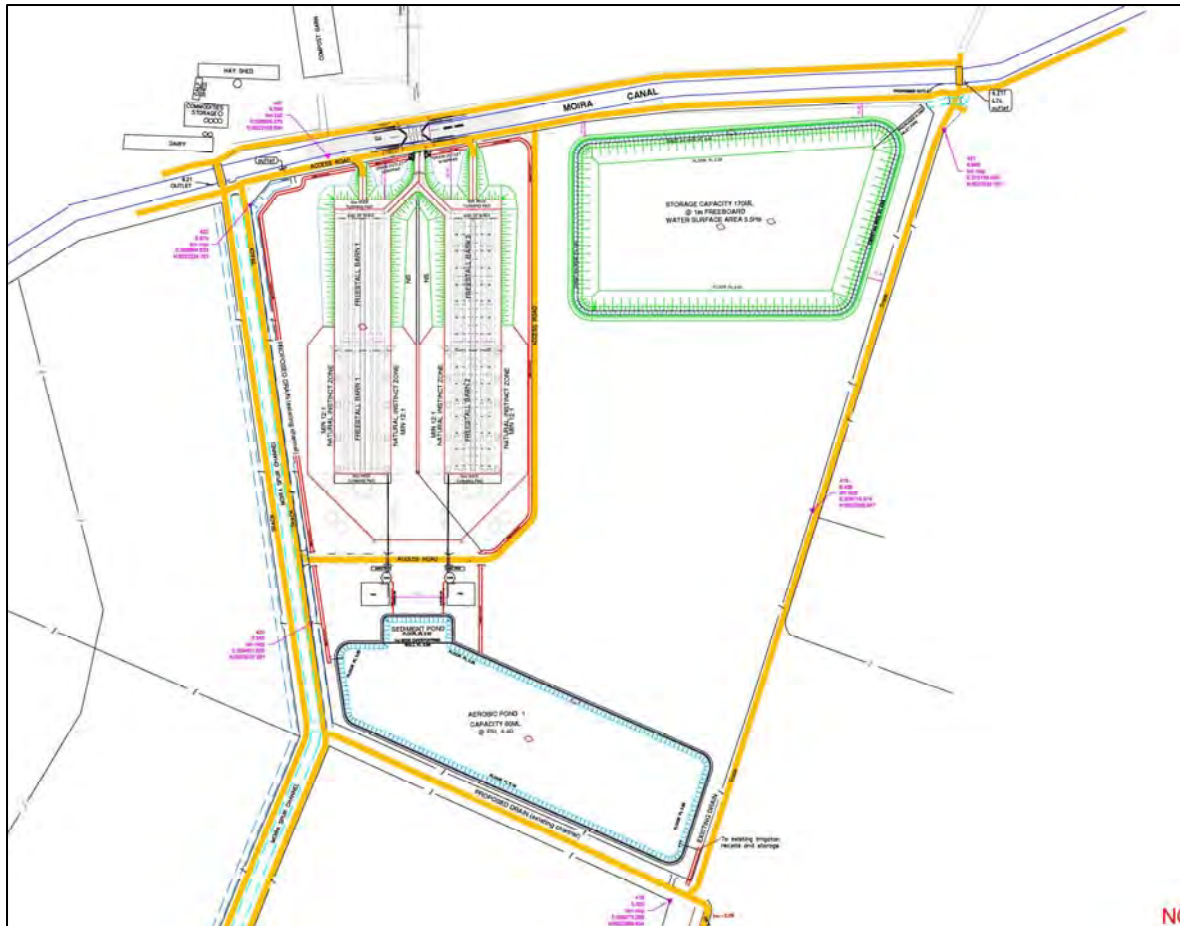
Figure 1.3 Detailed location of the project area with plan overlay



1.3 PROJECT OUTLINE AND IMPACTS

The project proposal is for two free-stall dairy barns and associated infrastructure including effluent treatment systems, ponds, pipelines and a freshwater storage dam. Plans are provided in Figure 1.4. Any future development of the project will have regard to the requirements and provision of the National Parks and Wildlife Act 1974 and any impacts will be managed in accordance with the requirements and provisions of the National Parks and Wildlife Act 1974 where required.

Figure 1.4 Proposed plan



1.4 CRITICAL DEVELOPMENT TIME LINES

The proponent wishes to commence works as soon as possible but also acknowledges the need to undertake indigenous cultural heritage investigations on the site. Ideally these would be undertaken prior to any works commencing on the site, however, it would be possible to stage the development to exclude areas identified for investigation until the investigations are complete.

1.5 CRITICAL ARCHAEOLOGICAL TIMELINE

The following Table indicates the timelines critical for the archaeological assessment. However, please note that consultation may be increased or decreased depending on response times and knowledge sharing.

1.1 Archaeological timeline

	Week														
Stages	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Stage 1: consultation	Gov. letters		RAP letters		Information pack				2 weeks' notice for survey & survey			Draft report review			
Stage 2: gathering of knowledge															
Stage 2: contextual research															
Stage 3: survey															
Stage 4: reporting															
Stage 5: finalisation															

2 ENVIRONMENTAL CONTEXT

The environmental context provides a background to the landforms and potential resources that may have been available in the past. The land uses also assists in an understanding of potential impacts they would have had on the landscape and associated cultural materials. This information is utilised with the archaeological context in order to ascertain a reliable predictive model of not only sit location and site type, but also the likelihood of survivability within that landscape.

The project area is located in the Riverina region of NSW. The Riverina covers the alluvial fans of the Lachlan, Murrumbidgee and Murray Rivers (subregions) west of the Great Dividing Range and extends down the Murray. The project area is located in the Murray Channels and floodplains of the Riverina subregion. The geology of the region and project area consists of quaternary alluvial sediments of clay and sands (DPIE 2016). The project area is located within the floodplain area over 600 metres west of a dune. Whilst the due are would have been utilised by past Aboriginal people, the flood plain would have been unsuitable for camping but would have been utilised for transitory activities such as hunting and gathering.

When assessing the relationship between sites and water sources it must be noted that the Australian continent has undergone significant environmental changes during the past 60,000 years that people have lived here and that Pleistocene sites (older than 10,000 years) would have been located in relation to Pleistocene water sources that may not exist today. Whilst it is likely that prior to agricultural activities, including man-made drains throughout the flood plain area, that natural drainage lines were present, however, as their locations are no longer evident, site prediction in terms of proximity to reliable fresh water is not possible beyond the local lakes and their tribalities local area including, but not limited to, Moira Lake (2 kilometres south east of the project area), and the Murray River (4.5 kilometres east of the project area at its closest point) as focal points. One 1st order was located approximately 1.1 kilometres to

the west of the project area (Green Gully), however this has been significantly impacted through long term intensive cropping.

The project area is located to the west of reliable fresh water sources and elevated landforms that would have also included subsistence and medicinal resources along their edges and in close proximity. The project area, is in fact some distance from these resources and given the resource rich Murray River it is unlikely that the project area would have been used for more than transitory activities such as hunting and gathering and travel to these resource rich environments.

Following European settlement of the area in the 1820s, the landscape has been subjected to a range of different modifactory activities including extensive logging and clearing, long-term intensive agricultural cultivation (ploughing) and pastoral grazing. The associated high degree of landscape disturbance has resulted in the alteration of large tracts of land and the cultural materials contained within these areas. The specific project area has been cleared and subject to long term intensive agricultural and grazing activities and impacts from the construction of the existing dam and channel.

Whilst the regional environment provided resources, including fauna, flora and water, that would have allowed for sustainable occupation of Moira Lake (2 kilometres south east of the project area) and the Murray River (4.5 kilometres east of the project area at its closest point), the project area is located within an environment that provided limited resources due to its distance from reliable water and associated resources that would have allowed for sustainable occupation of the area. Being a flood plain with no elevated landforms the project area was like to have been utilised for hunting and gathering activities that manifest in the archaeological record as a background scatter of discarded artefacts.

In relation to modern alterations to the landscape, the use of the project area for long-term agricultural and grazing activities as well as channel and dam construction can be expected to have had very high impacts upon the archaeological record. Such activities are known to displace cultural materials and long term intensive agricultural activities would have completely displaced the expected background scatter of artefacts that may have been present within the project area.

3 ARCHAEOLOGICAL CONTEXT

The archaeological background provides context to the project area and wider cultural landscape in which the project area is situated. It identifies known sites, their landform location and proximity to subsistence resources. It also provides the nature and extent of known sites as well as their distribution across the landscape, thereby enabling a site-specific predictive model to be developed.

A search of the AHIMS register has shown that six known Aboriginal sites are currently recorded within five kilometres of the project area and include two scar trees, an earth mound, artefact site, burial and an ochre mine, none of which are in the project area. One Aboriginal place is also on AHIMS is also outside the project area.

Researching the archaeological context, the following archaeological patterning is evident:

- main site types are artefact scatters, isolated finds, scar trees and burials;
- the majority of sites, and sites of the highest density, are located in close proximity to reliable fresh water sources representing concentrated activity;
- burials may be found in the elevated dues;
- site numbers and site densities decrease with increased distance from reliable fresh water sources;
- sites within the plain's areas consist of a background scatter representative of hunting and gathering activities and travel;

- lithic artefacts are primarily manufactured from mudstone and silcrete with a variety of other raw materials also utilised but in smaller proportions;
- flakes, broken flakes and flaked pieces are the most common artefact types recorded;
- scarred trees are mainly Black Box with other tree types used significantly less;
- hearths are located in close proximity to reliable water sources and may be miss identified throughout the plain's landforms (burnt termite clay mounds); and
- the vast majority of artefactual material in the region was observed on exposures with good to excellent ground surface visibility

3.1.1 PREDICTIVE MODEL

Just as the environmental context and the results of the regional and local archaeological contexts have assisted in formulating a predictive model, the predictive modeling has assisted in formulating the field investigation methodology (Section 4).

Whilst the regional environment provided resources, including fauna, flora and water, that would have allowed for sustainable occupation of Moira Lake (2 kilometres south east of the project area) and the Murray River (4.5 kilometres east of the project area at its closest point), the project area is located within an environment that provided limited resources due to its distance from reliable water and associated resources that would have allowed for sustainable occupation of the area. Being a flood plain with no elevated land, it is possible that isolated finds and small density artefacts scatters maybe present and would be indicative of transitory activities such as hunting and gathering and travel rather than large numbers of people camping. Any sites present are also expected to have been significantly impacted, if not destroyed, on by the intensive long-term agricultural activities and previous storage dam and channel construction works.

4 METHODS OF INVESTIGATION

There are two methods of investigation including the gathering of cultural significance knowledge and archaeological assessment. These are briefly outlined below.

4.1 GATHERING OF INFORMATION OF CULTURAL SIGNIFICANCE

MCH and the proponent understand that unlike the written word, Aboriginal cultural knowledge is not static, but responds to change through absorbing new information and adapting to its implications. Aboriginal cultural knowledge is handed down through oral tradition (song, story, art, language and dance) from generation to generation, and preserves the relationship to the land (DECCW 2010).

Specific details and parts of cultural knowledge are usually held and maintained by individuals or within particular family groups. Although the broader community may be aware of the general features of that knowledge, it is not a common practice within Aboriginal society for detailed cultural knowledge to be known in the broader community or within Aboriginal community organisations. However, at times these organisations may defer to particular individuals or family groups as being the knowledge-holders of particular sets of cultural knowledge about places or the environment (DECCW 2010).

Proposed methods of gathering information of cultural significance are provided in the Cultural Heritage information packet.

All responses to the cultural information packet will be considered in the final methods which will adapt accordingly. Any other changes to the methods may occur on site in order adapt to unforeseen field conditions.

4.2 ARCHAEOLOGICAL ASSESSMENT

This entails an archaeological assessment of the proposed project area. It includes the gathering of both environmental and archaeological information to gain an understanding of the environment, disturbances and provide a predictive model for the proposed project area.

Following the completion of the survey, a report that includes detailed environmental and archaeological background, results, discussion, the cultural significance as determined by the registered Aboriginal parties and mitigation measures will be provide to all registered parties for their review. This will also include opportunities for the registered Aboriginal parties to provide feedback on any management or mitigation recommendations. All registered parties will also be required to provide their own report/letter within a specified time and a copy of the final report will be provided to all parties. A summary of the regional and local archaeological contexts ism provided in order to assist in the development of a predictive model for the project area that will in turn assist in determining the survey methodology/strategy.

5 PROPOSED METHODS OF GATHERING INFORMATION ABOUT CULTURAL SIGNIFICANCE

There are two methods of investigation including the gathering of information about cultural significance and an archaeological assessment. The archaeological assessment was discussed in the Archaeological information packet provided to you. The gathering of information about cultural significance for the Cultural heritage Assessment is briefly outlined below.

5.1 GATHERING OF INFORMATION OF CULTURAL SIGNIFICANCE

The aim of the cultural heritage assessment is to facilitate a process whereby RAPs can;

- 1) Contribute culturally appropriate information
- 2) Contribute to the proposed methodology
- 3) Provide information that will enable the cultural significance of Aboriginal objects and/or places within the project area to be determined.

MCH and the proponent understand that unlike the written word, Aboriginal cultural knowledge is not static, but responds to change through absorbing new information and adapting to its implications. Aboriginal cultural knowledge is handed down through oral tradition (song, story, art, language and dance) from generation to generation, and preserves the relationship to the land (DECCW 2010).

Specific details and parts of cultural knowledge are usually held and maintained by individuals or within particular family groups. Although the broader community may be aware of the general features of that knowledge, it is not a common practice within Aboriginal society for detailed cultural knowledge to be known in the broader community or within Aboriginal community organisations. However, at times these organisations may defer to particular individuals or family groups as being the knowledge-holders of particular sets of cultural knowledge about places or the environment (DECCW 2010).

In some cases the information provided may be sensitive and MCH and the proponent will not share that information with all registered Aboriginal parties or others without the express permission of the individual. MCH and the proponent would like to develop and implement appropriate protocols for sourcing and holding cultural information.

5.2 IDENTIFYING KNOWLEDGE HOLDERS

The aim is to identify Traditional Owners/traditional knowledge holders who have knowledge that is relevant to the project area so that any potential effects of the project or activity on the Indigenous heritage values of objects and/or places can be identified.

It also aims to identify Indigenous people who may not necessarily be Traditional Owners/traditional knowledge holders but who do have interests in the area so that any effects of the project or activity on the Indigenous heritage values of objects and/or places, such as mission stations and historic buildings, will be identified.

MCH understands it is the Indigenous custom to elect knowledge holders and it is traditionally the Indigenous people who nominate who speak for country. Unfortunately, some RAPs and Government Departments have placed the onus of identifying traditional knowledge holders onto proponents and archaeologists. In order to do this, MCH are guided by the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010), the Burra Charter (2013) and Ask First (2002) which provide guidelines to identify traditional knowledge holders.

Knowledge holders are defined as follows:

- a) Traditional knowledge holder of specific, details knowledge pass directly by a traditional knowledge holder in a traditional manner YES/NO
- b) Traditional knowledge holder of general knowledge pass directly by a traditional knowledge holder in a traditional manner YES/NO
- c) Knowledge holder of recent information obtained through other means (such as, but not limited to, ethnographic sources, internet searches, assessment reports, personal experience etc). YES/NO

Knowledge holders have been initially identified through the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010), Stage 1 (S. 4.1.1 to 4.1.2) that seeks to identify, notify and register Aboriginal people who hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and/or places in the area of the proposed project.

Additionally, knowledge holders were sought to be identified through the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010), Stage 1 (S. 4.1.3 to 4.1.8) that sought to identify, notify and register Aboriginal people who identify as knowledge holders (using the above defined knowledge holder criteria) who hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and/or places in the area of the proposed project.

Native Title Claimant Groups/individuals are acknowledged as knowledge holders due to the requirements through the Native Title Registration process. Native Title Claimant groups/individuals are also asked to further define the knowledge holder using the above defined knowledge holder criteria.

This process ensures consistent consultation for all RAPs and adheres to the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010).

5.3 IDENTIFYING CULTURAL SIGNIFICANCE

Cultural significance is embodied in the place—in its fabric, setting, use, associations and meanings. It may exist in: objects at the place or associated with it; in other places that have some relationship to the place; and in the activities and traditional and customary practices that may occur at the place or that are dependent on the place. A place may be of cultural significance if it satisfies one or more of these criteria. Satisfying more criteria does not mean a place is necessarily more significant.

Only Aboriginal people who are descendants of the people from the traditional lands in which the project is situated can identify the cultural significance of their own cultural heritage.

The cultural significance of a place is assessed by analysing evidence gathered through the physical investigation of the place, research and consultation for this project in line with the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010), Code of Practice for Archaeological Investigations of Aboriginal Objects in New South Wales (DECCW 2010) and the ICOMS Burra Charter (2013).

Part of the process is to evaluate its qualities against a set of criteria that are established for this purpose. The criteria used include those set out by the Burra Charter (see below).

5.4 VALUES AND QUESTIONS TO CONSIDER

The following values and questions are derived from the Burra Charter (2013) to facilitate your consideration when providing information on the cultural significance of any Aboriginal objects(s) and/or place(s). The criteria discussed below are a means to assess cultural significance in order to meet the Government Departmental requirements. MCH understands that the method of assessing cultural

significance presented may not be culturally appropriate and considered offensive to some; it is not intended to be so.

There are five terms or values, which are listed alphabetically in the Burra Charter, and are often included in Australian heritage legislation. Criteria are also used to help define cultural and natural significance, and there is now a nationally agreed set of heritage assessment criteria and each of these criteria may have tangible and intangible aspects and it is essential that both are acknowledged.

The five criteria include Aesthetic value, Historic value, Scientific value, Social value and Spiritual value. These are discussed below along with some questions for consideration when you consider reporting on the cultural significance.

5.4.1 AESTHETIC SIGNIFICANCE

Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. It is how we respond to visual and non-visual aspects such as sounds, smells and other factors that can have a strong impact on your thoughts, feelings and attitudes. It may also include consideration of the form, scale, colour, texture and material and its beauty (Australia ICOMOS 2013).

When considering the aesthetic value and significance of a site and/or PAD, some questions to consider may include:

- Does the object or place have special compositional or uncommonly attractive qualities involving combinations of colour, textures, spaces, massing, detail, movement, unity, sounds, scents?
- Is the object or place distinctive within the setting or a prominent visual landmark?
- Does the object or place have qualities which are inspirational or which evoke strong feelings or special meanings?
- Is the object or place symbolic for its aesthetic qualities: for example, does it inspire artistic or cultural response, is it represented in art, photography, literature, folk art, folk lore, mythology or other imagery or cultural arts?
- Does the object or place display particular aesthetic characteristics of an identified style or fashion?
- Does the object or place show a high degree of creative or technical achievement?

5.4.2 HISTORIC SIGNIFICANCE

The historic value encompasses all aspects of history. For example, it may include the history of aesthetics, art, science, society and spirituality. A place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase or activity. It may also have historic value as the site of an important event. For any given place the significance will be greater where evidence of the association or event survives in situ, or where the settings are substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of subsequent treatment (Australia ICOMOS 2013).

When considering the historic value and significance of a site and/or PAD, some questions to consider may include:

- Is the object or place associated with an important event or theme in your history?
- Is the object or place important in showing patterns in the development of your history locally, in a region, or on a state-wide, or national or global basis?
- Does the object or place show a high degree of creative or technical achievement for a particular period?
- Is the object or place associated with a particular person or cultural group important in the history of the local area, state, nationally or globally?

5.4.3 SCIENTIFIC SIGNIFICANCE

The scientific value refers to the information content of a place and its ability to reveal more about an aspect of the past through examination or investigation of the place, including the use of archaeological techniques. The relative scientific value of a place is likely to depend on the importance of the information or data involved, on its rarity, quality or representativeness, and its potential to contribute further important information about the place itself or a type or class of place or to address important research questions (Australia ICOMOS 2013). Whilst the scientific value and significance will be discussed in detail in the Archaeological Heritage Impact Assessment report, it is important to consider this value when assessing the cultural values and significance of an object and/or place.

When considering the scientific value and significance of a site and/or PAD, you may consider:

- Would further investigation of the place have the potential to reveal substantial new information and new understandings about people, places, processes or practices which are not available from other sources?

5.4.4 SOCIAL VALUE

Social value refers to the associations a place has for a particular community or cultural group and the cultural or social meaning it has for that community or cultural group (Australia ICOMOS 2013).

When considering the social value and significance of a site and/or PAD, some questions to consider may include:

- Is the object or place important as a local marker or symbol?
- Is the object or place important as part of community identity or the identity of another particular cultural group?
- Is the object or place important to the people, community or other cultural group because of associations and meanings developed from long use and association?

5.4.5 SPIRITUAL VALUE

Spiritual value embraces the intangible values and meanings embodied in or evoked by a place which gives importance to the spiritual identity, or traditional knowledge, art and practices of a cultural group. Spiritual value may also be reflected in the intensity of aesthetic and emotional responses or community associations, and be expressed through cultural practices and related places (Australia ICOMOS 2013). The qualities of the place may inspire a strong and/or spontaneous emotional or metaphysical response in people, expanding their understanding of their place, purpose and obligations in the world, particularly in relation to the spiritual realm (Australia ICOMOS 2013).

When considering the spiritual value and significance of a site and/or PAD, some questions to consider may include:

- Does the object or place contribute to the spiritual identity or belief system of cultural group?
- Is the place a repository of knowledge, traditional art or lore related to spiritual practice of the people or another a cultural group?
- Is the object or place important in maintaining the spiritual health and wellbeing of culture or group?
- Do the physical attributes of the object or place play a role in recalling or awakening an understanding of an individual or a group's relationship with the spiritual realm?
- Do the spiritual values of the object or place find expression in Awabakal cultural practices or human-made structures, or inspire creative works?

5.5 PROVIDING YOUR KNOWLEDGE AND CULTURAL SIGNIFICANCE INFORMATION

It is difficult to provide options that will ensure every individual's needs are met. In light of this, the following proposed options are provided in no way the only options available. If you have alternative ways of providing your knowledge and cultural significance information please notify MCH to ensure we can facilitate your requirements where appropriate.

It is acknowledged and understood that the methods and options discussed are not traditional customs and some may take offence. MCH sincerely apologise for any offence taken as none is intended.

- 1) Discussion in the field during the survey
- 2) Written documentation (letter, e-mail, fax)
- 3) Meeting to discuss and/or provide written documentation
- 4) Formal interview with specific questions/answers and/or discussions
- 5) Phone conversation
- 6) Skype conversation
- 7) Using the attached form/questioner

5.6 PROPOSED CULTURAL HERITAGE ASSESSMENT REPORT

MCH will undertake the cultural heritage assessment as traditional knowledge holders/Traditional Owners and contemporary knowledge holders will be identified as set out above. The cultural heritage assessment will include, but not be limited to:

- Background ethnographic, historic and contemporary research of the Aboriginal people of the area, including but not limited to, past land uses, resources, customs and traditions where the information is available to examine connection to country throughout the past and into the future;
- Discussions with knowledge holders and those who identify themselves as having an interest in the project, taking into account that Indigenous people may have differing degrees of knowledge about heritage places and their importance;
- Discussion will also take place during the survey (as well as throughout the project) as requested by some knowledge holders;
- An additional focused field survey if required to identify, locate and record any Indigenous heritage values of objects and/or places in a manner that is appropriate;
- The writing of a cultural heritage assessment report with the knowledge holders and RAPs ensuring the content is appropriate and sensitive to the knowledge holders; and
- All detailed information provided will be confidential unless otherwise stipulated by the knowledge holders, however, in order to protect any Indigenous heritage values of objects and/or places, their location must be known (not necessarily documented in detail or mapped) in order to discuss the appropriate mitigation and management options and recommendations.

5.7 FORMS

You will find forms attached for your convenience. However, if you prefer to use your own please feel free to do so. Please ensure that these are either filled out in full or your own forms/letters answer the questions and return to MCH no later than 30th July 2020.

6 ARCHAEOLOGICAL INVESTIGATION METHODS

6.1.1 OBJECTIVES

The objective of the investigation is to determine whether subsurface cultural material exists in the areas identified as having archaeological potential. The detection of surface material will drive the management recommendations and mitigation measures to ensure that any significant cultural resources are identified and protected where possible or is subject to minimal impact by the proposed development.

The Archaeological investigation will be carried out in accordance with the Heritage NSW, Department of Premier & Cabinet policy - 2010, Section 2 and the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*.

6.1.2 ARCHAEOLOGICAL HERITAGE ASSESSMENT METHODOLOGY & REPORT

Overall, the assessment will include, but not limited to, the following;

The provision of an Archaeological Heritage Impact Assessment Report that will include:

- Project background, including project description, detailed maps, legislative context, qualifications of the investigator
- Consultation outlining the process as per the Heritage NSW Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010
- Landscape context including, landforms, soils, geology, geomorphology, water sources, fauna and flora, history of land use and impacts and, natural impacts
- Archaeological context including review of previous regional and local work in the area, AHIMS search, summary and discussion of the local and regional character of Aboriginal land use and its material traces, occupation model and site-specific predictive model
- Results that will include the survey results (see below for proposed survey methodology), detailed descriptions of landforms (survey units), vegetation cover, exposures, land uses and disturbances, site(s) and PAD(s). It will also include any analysis and discussion
- An assessment of scientific values and significance assessment
- An impact assessment
- Management and mitigation measures
- Recommendations
- References
- Appendices will include the AHIMS results and community consultation log and communications

6.1.3 PROPOSED SURVEY METHODOLOGY

The survey methodology is in accordance with the Heritage NSW, Department of Premier & Cabinet policy - *Code of Practice for Archaeological Investigations of Aboriginal Objects in New South Wales 2010*, Section 2.2. This proposed methodology is subject to variation due to unforeseen field conditions/constraints.

- Survey units identified based on landforms
- Transects will be via foot with the survey team spaced at 5-10 metres apart across the entire investigation area of impact
- Ground surface visibility recorded for each survey unit and given a % rating of vegetation cover
- Exposures recorded for each survey unit given a % rating of exposure and exposure type

- Using the effective coverage and exposure information, calculate the effective survey coverage for each survey unit and the entire investigation area
- Disturbances recorded for each survey unit
- Take representative photographs of survey units
- All sites and/or PADs recorded in each survey unit and accurately mapped

Sites and their boundaries will be defined as;

- The spatial extent of the visible objects or direct evidence of their location
- Obvious physical boundaries where present such as, but not limited to, mound sites, middens, ceremonial grounds, disturbances (i.e. road, building)
- Identification by the Aboriginal community on the basis of cultural information

All sites and PADs will include, but not limited to, the following:

- Site type and content
- Survey unit (landform)
- Distance from water sources
- Vegetation cover (if any)
- Exposure (if any)
- Disturbances (if any)
- GPS co-ordinates
- Identified site boundaries
- Potential for in situ deposits
- Photographs (with a metric scale)

6.1.4 RESEARCH QUESTIONS

The assessment is designed to address a number of research hypothesis. The research questions listed below derive from Kuskies (2005) detailed work in the region and are used here for consistency in analysis and discussions as well as local and regional comparative research.

- What past Aboriginal activities occurred within the project area?
- What types of past Aboriginal occupation occurred within the project area (e.g. transitory movement, hunting, gathering, camping etc)?
- Were the types of activity and nature of occupation related to environmental factors (e.g. landforms, proximity to reliable water)?
- Does spatial patterning of activity areas occur within the project area?
- Did single or multiple episodes of occupation occur within the project area?
- Did episodes of occupation occur at different times over the whole time-span of occupation in the region within the project area?
- Is there potential for older evidence of occupation (i.e. early Holocene)?
- How intensive was occupation of the sites, in both a local and regional context?

- Did microblade and microlith production occur on the sites?
- Were other tools manufactured on the sites?
- Was maintenance of tools conducted on site?
- Was knapping of flakes largely casual and opportunistic, meeting requirements on 'as needed' basis?
- What raw materials were favoured for use on site within the project area and why?
- Did thermal alteration of raw materials occur within the project area?
- How does the evidence and inferred human behaviour represented within the project area compare with evidence from other locations in the region?
- How does the evidence relate to the regional and local models of occupation?

7 ROLES, RESPONSIBILITIES AND FUNCTIONS OF PARTIES

The roles, responsibilities and functions of all parties are outlined below and is taken from DECCW (2010).

7.1 HERITAGE NSW, DEPARTMENT OF PREMIER & CABINET

The Chief Executive of Heritage NSW, Department of Premier & Cabinet is the decision-maker who decides to grant or refuse an Aboriginal Heritage Impact Permit (AHIP) application. If an AHIP is issued, conditions are usually attached and Heritage NSW, Department of Premier & Cabinet is responsible for ensuring the AHIP holder complies with those conditions. When considering an application under Part 6 of the NPW Act, the Chief Executive will review the information provided by proponents in line with its internal policies and procedures to assess potential or actual harm to Aboriginal objects or places (DECCW, 2009).

The Environment Protection and Regulation Group (EPRG) of Heritage NSW, Department of Premier & Cabinet is responsible for administering the regulatory functions under Part 6 of the NPW Act. Heritage NSW, Department of Premier & Cabinet expects that proponents and Aboriginal people should:

- be aware that Part 6 of the NPW Act establishes the Chief Executive or delegate of Heritage NSW, Department of Premier & Cabinet as the decision-maker; and
- recognise that the Chief Executive's (or delegates) decisions may not be consistent with the views of the Aboriginal community and/or the proponent. However, Heritage NSW, Department of Premier & Cabinet will consider all relevant information it receives as part of its decision-making process.

7.2 PROPONENT

All proponents operate within a commercial environment which includes:

- strict financial and management issues, priorities and deadlines;
- the need to gain community support in order to secure any necessary approval/consent/licence/permit to operate;
- the need for clearer processes and certainty of outcomes;
- the need for suitable access to land for the purpose of their development project;
- the need to work efficiently within the project's time, quality and cost planning and management parameters; and
- the need for culturally appropriate assessment findings relevant to their project.

Under these requirements, proponents should undertake the following:

- bring the registered Aboriginal parties or their nominated representatives together and be responsible for ensuring appropriate administration and management of the consultation process;
- consider the cultural perspectives, views, knowledge and advice of the registered Aboriginal parties involved in the consultation process in assessing cultural significance and developing any heritage management outcomes for Aboriginal object(s) and/or place(s);
- provide evidence to Heritage NSW, Department of Premier & Cabinet of consultation by including information relevant to the cultural perspectives, views, knowledge and advice provided by the registered Aboriginal parties; and
- accurately record and clearly articulate all consultation findings in the final cultural heritage assessment report.

7.3 REGISTERED ABORIGINAL STAKEHOLDERS

The interests and obligations of Aboriginal people relate to the protection of Aboriginal cultural heritage. It is only Aboriginal people who can determine who is accepted by their community as being authorised to speak for Country and its associated cultural heritage. Where there is a dispute about who speaks for Country, it is appropriate for Aboriginal people, not Heritage NSW, Department of Premier & Cabinet or the proponent, to resolve this dispute in a timely manner to enable effective consultation to proceed.

Aboriginal people who can provide information about cultural significance are, based on Aboriginal lore and customs, the traditional owners or custodians of the land that is the subject of the proposed project area. Traditional owners or custodians with appropriate cultural heritage knowledge necessary to make informed decisions who wish to register as an Aboriginal party are those people who:

- continue to maintain a deep respect for their ancestral belief system, traditional lore and customs;
- recognise their responsibilities of their community, knowledge and obligations to protect and conserve their culture and heritage and to care for their traditional lands or country; and
- have the trust of their community, knowledge and understanding of their culture and permission to speak about it.

The registered Aboriginal parties should undertake the following;

- ensure the appropriate cultural knowledge holder is providing the appropriate information;
- uphold and respect the traditional rights, obligations and responsibilities of Aboriginal people within their own boundaries and not to infringe in other areas or Aboriginal people outside their own boundaries;
- consider and provide the proponent the cultural perspectives, views, knowledge and advice during the consultation process, assessing cultural significance and developing any heritage management outcomes for Aboriginal object(s) and/or place(s); and
- need to work efficiently within the project's time and provide feedback in a timely manner.

7.4 LOCAL ABORIGINAL LAND COUNCILS

The NSW Aboriginal Land Council (NSWALC) and Local Aboriginal Land Councils (LALCs) have statutory functions relevant to the protection of Aboriginal culture and heritage under the NSW Aboriginal Land Rights Act 1983. These requirements do not extend the role of NSWALC and LALCs in the significance assessment process. That is, these requirements do not provide NSWALC and/or LALCs any additional or specific decision-making role in the assessment of significance of Aboriginal object(s) and/or place(s) that are subject to an AHIP application under Part 6 of the NPW Act.

LALCs may choose to register an interest to be involved in the consultation process, or may assist registered Aboriginal parties to participate in the consultation process established by these requirements. In order to ensure effective consultation and the subsequent informed heritage assessment, LALCs are encouraged to identify and make contact with Aboriginal people who hold cultural knowledge in their area.

7.5 EMPLOYMENT

The proponent may engage a number of Aboriginal representatives from the registered parties (based on the size and nature of the project) to participate and assist in the fieldwork component of this project. If you would like to be considered for paid field work please answer the selection criteria attached and ensure you attach certificates of currency for the relevant insurances, CV(s), any certificates and references. MCH will then pass this information onto the proponent for their consideration to make the selection for

fieldwork participants should they wish to do so. MCH will ensure all Aboriginal parties are invited to participate in fieldwork; however paid participation is determined by the proponent.

7.6 FORMS

You will find forms attached for your connivance. However, if you prefer to use your own please feel free to do so. Please ensure that these are either filled out in full or your own forms/letters answer the questions and return to MCH no later than 30th July 2020.

REFERENCES

Australian Heritage Commission. 2002. Ask First. A Guide to respecting Indigenous Heritage Places and Values.

Australian International Council on Monuments and Sites (ICOMOS). 2013a. The Burra Charter.

Australian ICOMOS. 2013b. The Practice Note – Understanding and assessing cultural significance

Australian ICOMOS. 2013c. The Practice Note – The Burra Charter and archaeological practice

Australian ICOMOS. 2013d. The Practice Note – The Burra Charter and Indigenous cultural heritage management

Department of Environment, Climate Change and Water (DECCW). 2010a. *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*. Department of Environment, Climate Change and Water NSW, Sydney.

Department of Environment, Climate Change and Water (DECCW). 2010b. *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. Department of Environment, Climate Change and Water NSW, Sydney.

Appendix A

MCH would like to clearly state that, should you wish to provide feedback in another form, you are encouraged to do so. You are under no obligation to complete the current form.

However, should you wish to use this form, please complete, sign and return to MCH using one of the following;

E-mail: penny@mcheritage.com.au

Postal address: MCH

PO Box 166

Adamstown, NSW 2289

ABORIGINAL STAKEHOLDER SITE OFFICER APPLICATION

Position description

A site officer must demonstrate that they have satisfactorily participated in previous archaeological fieldwork with an archaeologist. A trainee site officer does not need to demonstrate previous archaeological experience. Site officers must be able to:

- undertake direction from the project archaeologist
- work in a range of climates wearing protective clothing
- work in teams with a wide range of people
- identify a broad range of Aboriginal objects across the landscape

To qualify as a site officer, appropriate training in identifying Aboriginal objects must have been undertaken (such as the NPWS sites awareness training course, or other relevant secondary or tertiary studies) or equivalent knowledge or experience must be demonstrated.

The duties of the site officer under the direction of the project archaeologist may include, but not limited to:

- walking the project area
- meeting general and site-specific Occupational Health and Safety requirements

Selection criteria

The proponent will offer positions based on the following key selection criteria:

- an individual's ability to undertake the tasks specified above
- an individual's availability to undertake the activity (physically able to undertake field work)
- an individual's experience in undertaking similar activities. Applications may be subject to a reference check
- individuals with demonstrated cultural knowledge relevant to the local area
- individuals who can demonstrate they can communicate the results of the field work back to their managers and RAPs
- In addition to a consideration of the key selection criteria, the Proponent may give preference to applicants who live locally.

The proponent is under no obligation to offer site officer positions based on an individual's association with a cultural group or area. The proponent makes no guarantee that registered parties will be engaged to undertake archaeological field activities. The number of site officer positions available will be based on need as described in the archaeological methodology. However, MCH will ensure all registered stakeholders are invited to participate in the survey regardless of engagement arrangements between the stakeholder(s) and the proponent. Applicants will be notified whether they have been successful or unsuccessful in their application.

Engagement

The Proponent selects and has final approval on who will be engaged as a site officer. Successful applicants will be engaged to provide the services through a written contract that will be provided at a later date. The proponent will only engage Service Providers with NSW workers compensation insurance, public liability insurance, and comprehensive motor vehicle insurance or third-party property damage insurance.

Payment

The proponent will pay the Service Provider at a rate that will be based on the project budget. The quoted rate is the rate to be paid by the Proponent to the Service Provider - not to the individual site officer/trainee site officer. The site officer/trainee site officer will be paid by the Service Provider at a rate agreed to by the Service Provider and the site officer/trainee site officer. Payment will only be made for the provision of the services (actual hours worked), and not for the time spent travelling to and from site. Payment will be made upon the receipt of a cultural heritage report and receipt of your response to the draft report.

ABORIGINAL SITE OFFICER APPLICATION FORM

Yarrimbah

An Aboriginal site officer application form must be filled out for each individual seeking engagement as a site officer.	
Name of organisation (if relevant)	
Name	
Contact number	
Mailing address	
Email address	
Fax	
Position applied for	Site officer <input type="checkbox"/> Trainee Site Officer <input type="checkbox"/>
Please list any formal qualifications or relevant experience to the position applied for (attach documentation as required)	
Please list any previous archaeological, sites, survey, excavation or other relevant experience (attach additional sheets as required)	
Please provide the contact details of at least one archaeologist (other than the project archaeologist) who can be contacted as a referee	
INSURANCES	
Public Liability	Expiry date: (attach certificate of currency)
Worker Compensation	Expiry date: : (attach certificate of currency)
Comprehensive Motor Vehicle	Expiry date: : (attach certificate of currency)
Failure to provide up to date Certificate of Currencies will prevent you participating in any fieldwork. MCH may have received copies previously, however, they must be provided for each project.	
OCCUPATIONAL Health & SAFETY (OH&S)	
<p>All participants are required to comply with MCH and the proponents OH&S requirements.</p> <p>This includes high visibility clothing, hat, sunscreen and steel caped boots. You will be advised of any additional requirements.</p> <p>This also includes appropriate and acceptable behaviour at all times.</p> <p>Failure to comply will prevent you from participating in the field work.</p>	

COMMENTS ON PROPOSED METHODOLOGY

Yarrimbah

I, _____ (please insert your name) of _____ (please insert the name of your group), **agree to the methodology** outlined by MCH in relation to gathering information about cultural significance:

Signed: _____ Date: _____

Position within organisation: _____

I, _____ (please insert your name) of _____ (please insert the name of your group), **do not agree to the methodology** outlined by MCH in relation to gathering information about cultural significance for the following reasons (please explain your reasons for disagreeing):

I would like to suggest the following (please provide your reasoning): _____

Signed: _____ Date: _____

Position within organisation: _____

PROVIDING KNOWLEDGE ABOUT CULTURAL SIGNIFICANCE

Yarrimbah

Company Name):_____

Contact:_____

Postal address:_____

Mobile No:_____

E-Mail:_____

Date:_____

I would like to provide knowledge about cultural significance using the following method(s). Please tick your preferred method(s):

- 1) Discussion in the field during the survey
- 2) Written documentation (letter, e-mail, fax)
- 3) Meeting to discuss and/or provide written documentation
- 4) Formal interview with specific questions/answers and/or discussions
- 5) Phone conversation
- 6) Skype conversation
- 7) Using the attached form/questioner

Other: Please provide details:

3 August 2020

Wade Morgan
Yorta Yorta Nation Aboriginal Corporation
wade.m@yynac.com.au

Dear Wade,

RE: Heritage NSW Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (Stage 3) –Survey invitation - Proposed development at the Yarrimbah property located 12km south of Mathoura

The proponent and MCH would like to invite you to the survey for the above-named project (17th August 2020) on an unpaid basis. If you would like to attend the survey please contact Penny McCardle. Please note that if you intend to participate in the site survey then:

- Before commencement you must notify MCH for access arrangements and notification and provide MCH with a Certificate of Currency for Workers Compensation and Public Liability insurance. MCH will also provide you with our OH&S requirements for field staff and request that you ensure all field staff participating in the project have read and understood the document fully prior to going out on site; and
- All field participants must wear covered shoes, long pants and long shirt (hi-visibility) with appropriate sun protection including hat. It is recommended that participants bring adequate amounts of food and water for the day.

As all communications, including phone calls, faxes, letters, and e-mails must be included in the consultation component of the report as per the Heritage NSW, Department of Premier & Cabinet requirements, please ensure that any items that you or your group deem confidential are made apparent to your field representative prior to field work to ensure that information remains confidential if required. Failure to disclose that information is confidential may result in the information being included in the report.

Following the completion of the survey, a draft copy of the assessment will be made available to you for comment. Should you have any further questions, please do not hesitate to contact Penny McCardle on 0412 702 396.

Yours sincerely,
for McCardle Cultural Heritage Pty Ltd



Dr. Penny McCardle
Principal Archaeologist
Forensic Anthropologist



McCARDLE
CULTURAL HERITAGE

PO Box 166
Adamstown 2289 NSW
penny@mcheritage.com.au
P: 0412 702 396

mcheritage.com.au

26 August 2020

Wade Morgan
Yorta Yorta Nation Aboriginal Corporation
wade.m@yynac.com.au

Dear Wade,

RE: Heritage NSW Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (Stage 3 & 4 –Review of Draft Cultural Heritage Assessment - Proposed development at the Yarrimbah property located 12km south of Mathoura

Please find enclosed a copy of the draft Aboriginal Cultural Heritage Assessment (ACHA) for the above-named project for your review.

The cultural heritage Assessment includes information provided by the knowledge holders and is included with their permission. As required by the Heritage NSW, Department of Premier & Cabinet *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010), Stage 3 (S. 4.3.5; 4.3.6; 4.3.7) and Stage 4 (S. 4.4.1; 4.4.2; 4.4.3) and based on the information provided by knowledge holders throughout the project, the cultural significance will be included in the final report.


MCH would like to provide further opportunity to provide your further input and request your comments on the draft ACHA. Additionally, any concerns you may have are also important and we would like the opportunity to address any concerns you may have.

As outlined in the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010), Stage 4 (S. 4.4.3) MCH would appreciate your input and your comments on the draft reports no later than C.O.B. 22nd September 2020.

As all communications, including phone calls, faxes, letters, and e-mails must be included in the consultation component of the report as per the Heritage NSW, Department of Premier & Cabinet requirements, please ensure that if any response to the draft report is deemed confidential that this is either stated at the beginning of a conversation or stamped/written on each piece of paper communicate.

Please note that in order to adhere to time constraints, the absence of a response by the requested timeline, will be taken by the proponent as your indication that your organisation has no comments regarding the draft ACHA.

Yours sincerely,
for McCardle Cultural Heritage Pty Ltd


Dr. Penny McCardle
Principal Archaeologist
Forensic Anthropologist



McCARDLE
CULTURAL HERITAGE

22 September 2020

PO Box 166
Adamstown 2289 NSW
penny@mcheritage.com.au
P: 0412 702 396

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Wade Morgan
Yorta Yorta Nation Aboriginal Corporation
wade.m@yynac.com.au

Dear Wade,

**RE: Heritage NSW Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010
(Stage 4 –Final Cultural Heritage Assessment - Proposed development at the Yarrimbah property
located 12km south of Mathoura**

MCH and the Proponent would like to take this opportunity to thank you for your involvement in the above-named project. Your time and input has been instrumental throughout the project

As outlined in the Heritage NSW, Department of Premier & Cabinet *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010), Stage 4 (S. 4.4.5) please find enclosed copy of the final Aboriginal Cultural Heritage Assessment for your records.

We look forward to continue working with you in the future.

Yours sincerely,
for McCardle Cultural Heritage Pty Ltd

Dr. Penny McCardle
Principal Archaeologist
Forensic Anthropologist

APPENDIX B

AHIMS search results

Progressive Rural Solutions

PO Box 74

Deniliquin New South Wales 2710

Attention: Clare Fitzpatrick

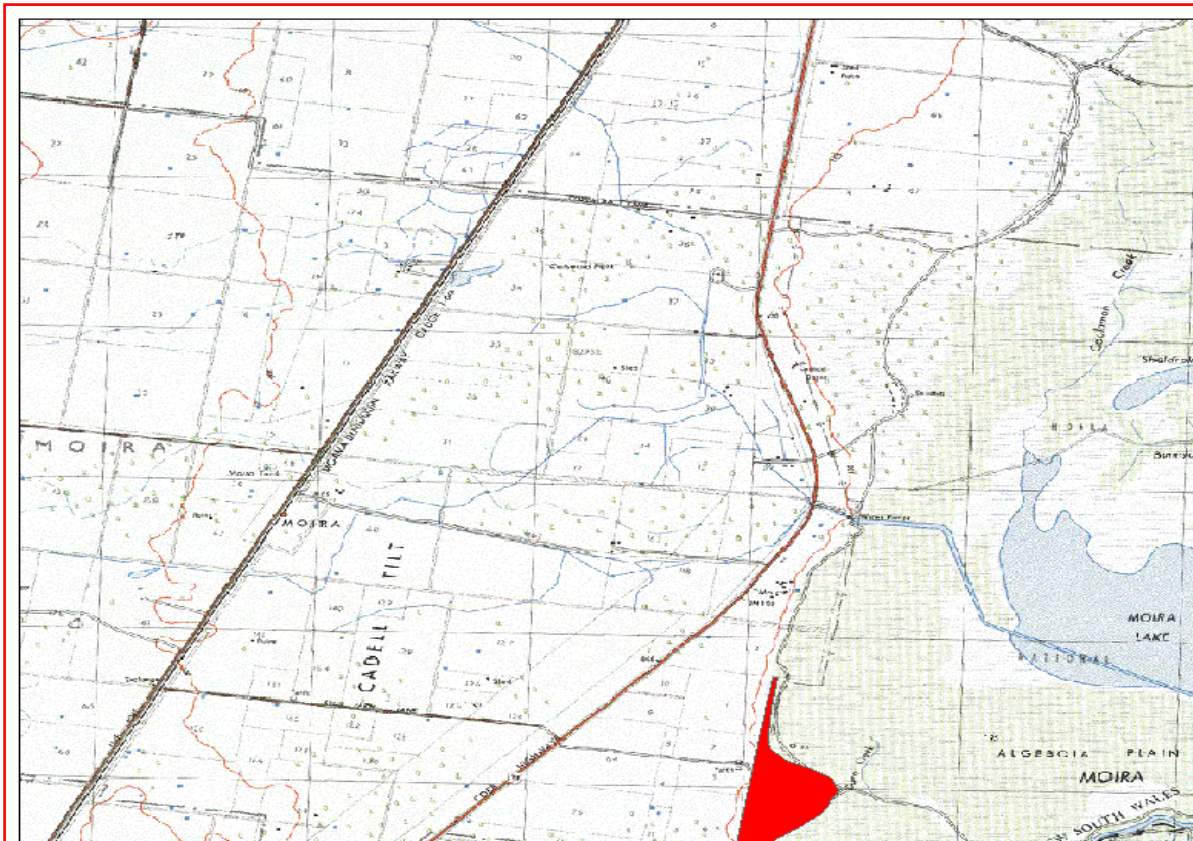
Email: clare@prsltd.com.au

Dear Sir or Madam:

Date: 17 February 2020

AHIMS Web Service search for the following area at Lat, Long From : -35.9574, 144.8209 - Lat, Long To : -35.8819, 144.9406 with a Buffer of 50 meters, conducted by Clare Fitzpatrick on 17 February 2020.

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



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

6 Aboriginal sites are recorded in or near the above location.

1 Aboriginal places have been declared in or near the above location. *

ID	Aboriginal Place Name
----	-----------------------

43	Algeboia
----	----------

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

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

Important information about your AHIMS search

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

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Smith

Client Service ID : 484334

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
54-4-0030	Ochre mine	AGD	55	310200	6019100	Open site	Valid	Ochre Quarry : -	Ochre Quarry	884
	<u>Contact</u>	<u>Recorders</u>	<u>Permits</u>							
54-5-0067	Site 13 Scarred Tree;	AGD	55	310300	6019000	Open site	Valid	Ochre Quarry : -, Modified Tree (Carved or Scarred) : -, Earth Mound : -, Hearth : -, Burial : -, Shell : -, Artefact : -	Burial/s,Midden,Mo und (Oven),Ochre Quarry,Scarred Tree	2205
	<u>Contact</u>	<u>Recorders</u>	<u>Permits</u>							
54-5-0054	Moirra;	AGD	55	310636	6019540	Open site	Valid	Burial : -	Burial/s	884,1216
	<u>Contact</u>	<u>Recorders</u>	<u>Permits</u>							
54-5-0194	MFSST1	AGD	55	309426	6021908	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	<u>Contact</u>	<u>Recorders</u>	<u>Permits</u>							
54-5-0195	MFHM1	AGD	55	309663	6021746	Open site	Valid	Earth Mound : 1		
	<u>Contact</u>	<u>Recorders</u>	<u>Permits</u>							
54-5-0196	MFGC1	AGD	55	309958	6021834	Open site	Valid	Artefact : 1		
	<u>Contact</u>	<u>Recorders</u>	<u>Permits</u>							

Report generated by AHIMS Web Service on 17/02/2020 for Clare Fitzpatrick for the following area at Lat, Long From : -35.9574, 144.8209 - Lat, Long To : -35.8819, 144.9406 with a Buffer of 50 meters. Additional Info : Background Planning. Number of Aboriginal sites and Aboriginal objects found is 6

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

APPENDIX C

Unexpected finds protocol

1 UNEXPECTED FINDS PROTOCOLS

Unexpected find protocols have been developed to provide procedures for unexpected finds including Aboriginal objects and the discovery of human remains. These protocols must be followed throughout all stages of the development.

1.1 UNEXPECTED ABORIGINAL OBJECTS

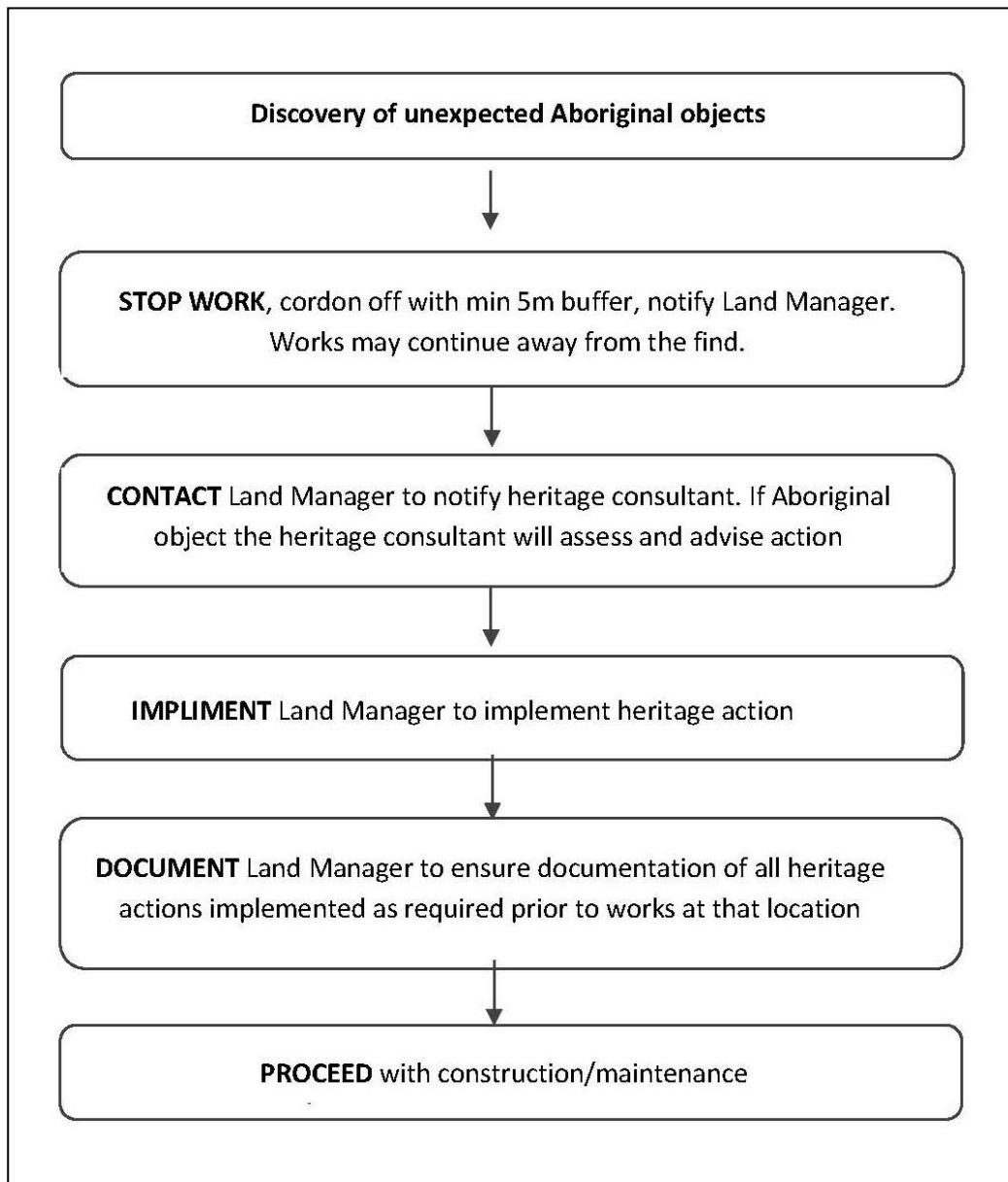
Should unexpected Aboriginal objects be uncovered during any stage of the development, Figure 1.1 illustrates the protocols. Unexpected Aboriginal objects may include, but not limited to, isolated artefacts, artefact scatters, scarred trees and hearths (descriptions of such objects are provided in Appendix A).

Work must stop immediately in that location, the objects cordoned off with at least a 50m perimeter surrounding the object(s) with high visibility fencing/barrier and the Land Manager notified immediately. The Land Manager will then contact the heritage consultant will assess the object(s) and recommend appropriate mitigation measures. The Land Manager is to implement all reasonable mitigation measures recommended by the heritage consultant and in accordance with Heritage NSW regulations and the NSW NPW Act.

If additional works are required, such as an Aboriginal Cultural Heritage Assessment (ACHA) with or without test excavations) or an Aboriginal Heritage Impact Permit (AHIP) (with collection or salvage excavations), the Land Manager is to arrange for the heritage consultant to undertake those works in accordance with all Heritage NSW requirements, procedures and Code of Practice. The methodology for undertaking additional works will be dependant on a number of factors including, but not limited to, site/object type and disturbances. Due to the unknown nature of unexpected objects, methodologies for further investigations (if required) of unexpected Aboriginal objects will be determined during consultation with the appropriate Registered Aboriginal Parties (RAP's).

Provided these heritage unexpected finds protocols have been followed, construction/maintenance works in that location may proceed.

Figure 1.1 Unexpected finds protocol flow chart



1.2 DISCOVERY OF HUMAN REMAINS

Human skeletal remains are of the highest significance and importance to Aboriginal people, and all care, respect and dignity will be extended by all parties should human remains be uncovered.

If human remains or unidentified bone are uncovered during any stage of the development and maintenance activities, the appropriate State legislation will be followed. All human remains fall under the *Coroners Act 2009* in the first instance. If they are identified as Aboriginal and older than 100 years old, they will fall under the *NSW NPWS Act 1974* (as amended). If they are identified as Aboriginal and 100 years or less, they will remain under Police derestriction under the *Coroners Act 2009*.

Figure 1.2 outlines the required protocols should human remains be uncovered.

Should any human remains or unidentifiable bone be found, work is to stop in that area immediately and an area of 30m cordoned off surrounding the remains/bone in high visibility fencing. The Land Manager is to be notified immediately.

The Land Manager will contact the heritage consultant and local NSW Police immediately, who will then contact the NSW Forensic Services who will determine if they are:

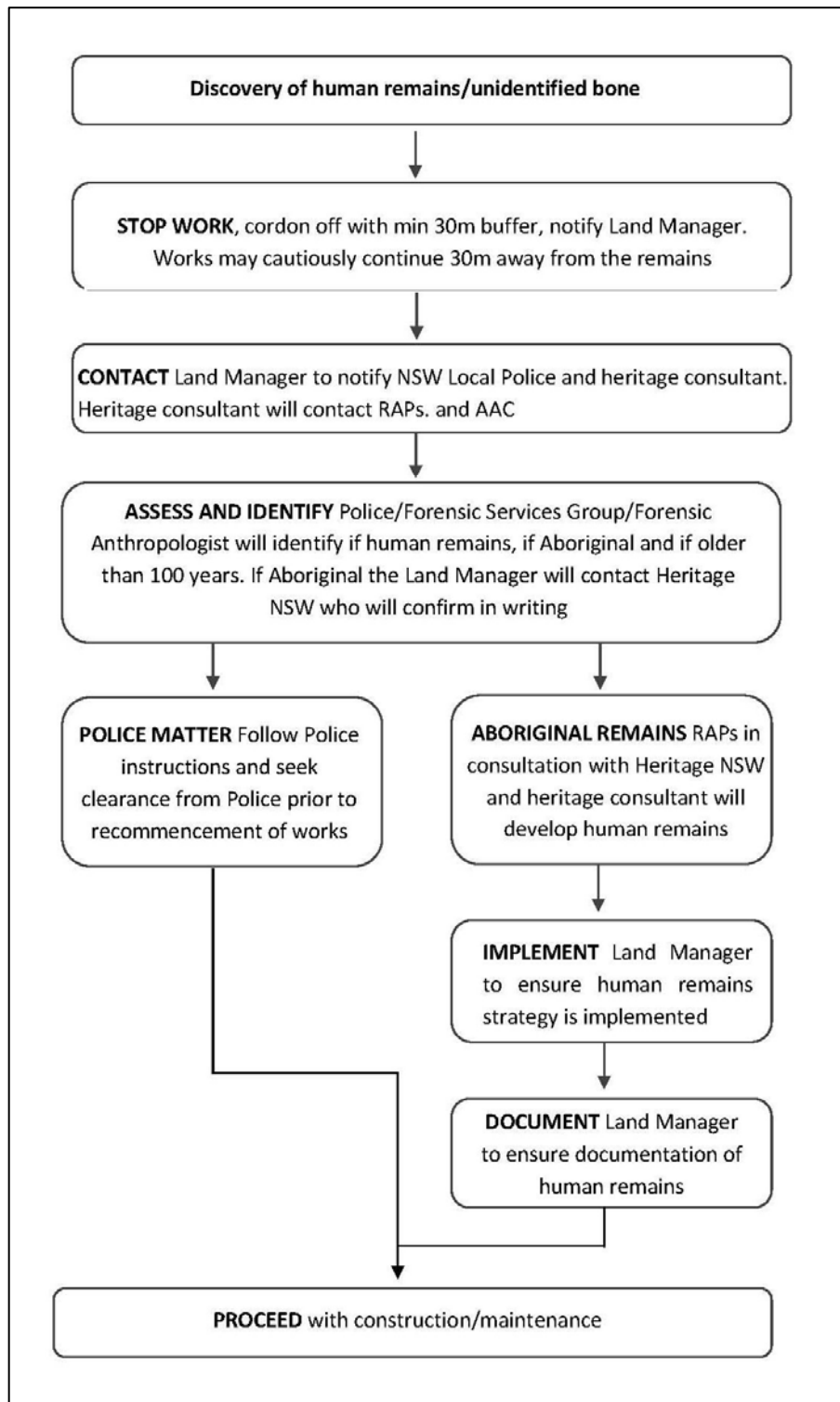
- 1) Human;
- 2) Aboriginal or non-Aboriginal;
- 3) If Aboriginal, determine antiquity (older or younger than 100 years)

If it is determined the remains are Aboriginal and older than 100 years old, the Police will notify the Land Manager who must contact Heritage NSW immediately and a Heritage NSW officer will confirm the identification in writing. Heritage NSW, in consultation with the RAPs and the heritage consultant will develop a human remains management strategy and the Land Manager is to ensure this strategy is implemented. The Land Manager must also document the human remains management strategy and the heritage consultant in consultation with Heritage NSW will provide a letter of clearance prior to any works recommencing at that location.

If the remains are determined to be a Police matter, Police instructions will be followed and clearance to recommence works should be sought from the Police.

Provided the human skeletal protocols have been followed and documented, and a clearance letter from the heritage consultant has been obtained, construction/maintenance works may proceed in that location.

Figure 1.2 Human remains protocol flow chart



Site Types

Verification of all Aboriginal objects (sites)

All potential Aboriginal sites will be verified by the heritage consultant or their representative in the first instance, and representatives from the RAPs if required.

The purpose of the verification process is to determine whether or not the objects in question are in fact Aboriginal objects to ensure appropriate management measures be implemented.

The verification process will include the following provisions:

1. A heritage consultant may assess the scientific status of the Aboriginal object (site) and provide evidence and justification for significance;
2. If it is an Aboriginal object and will be impacted on by the development, then one representative from each RAP may assess the Aboriginal object (site) for its cultural status and must provide evidence and justification for significance;
3. An AHIMS site card will be completed for each Aboriginal object (site); and
4. Management recommendations specific to each Aboriginal object (site), based on both traditional knowledge and scientific methodology, will be provided to the Land Manager. Should a potential site be either scientifically or culturally significant but no evidence or justification is provided, the matter will be put to the Biodiversity Conservation Division.

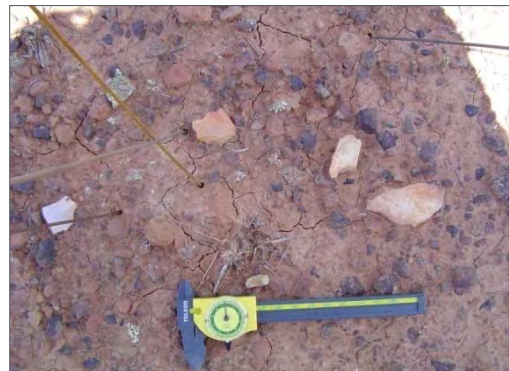
Surface Artefact scatters

Also described as open campsites, artefact scatters and open sites, these deposits have been defined at two or more stone artefacts within 50 or 200 metres of each other and may include archaeological remains such as stone artefacts, shell, and sometimes hearths, stone lined fire places and heat treatment pits. These sites are usually identified as surface scatters of artefacts in areas where ground surface visibility is increased due to lack of vegetation. Erosion, agricultural activities (such as ploughing) and access ways can also expose surface campsites. Artefact scatters may represent evidence of;

- Camp sites, where everyday activities such as habitation, maintenance of stone or wooden tools, manufacturing of such tools, management of raw materials, preparation and consumption of food and storage of tools has occurred;
- Hunting and/or gathering events;
- Other events spatially separated from a camp site, or
- Transitory movement through the landscape.

If a potential artefact scatter has been identified, the Unexpected Finds Protocol must be followed immediately.

Examples of artefact scatters (MCH)



Surface Isolated finds

Isolated artefacts are usually identified in areas where ground surface visibility is increased due to lack of vegetation. Erosion, agricultural activities (such as ploughing) and access ways can also expose surface artefacts. Isolated finds may represent evidence of;

- Hunting and/or gathering events; or
- Transitory movement through the landscape.

If a potential isolated find has been identified, the Unexpected Finds Protocol must be followed immediately.

Examples of isolated artefacts (MCH)



Hearth

A hearth may also be known as an oven, earth oven, campfire or fireplace. In general, a hearth is a relatively small (<2m diameter) roughly circular piles of ash-stained, heat fractured rock and/or lumps of burnt clay (known as hearth stones) and are often associated with an ash-stained substrate and charcoal fragments found on or in open ground. Hearths are typically associated with burnt flora, faunal remains (particularly bone and shell) and other cultural material, including stone artefacts. Hearths are assumed to have been used for food cooking and/or heating and/or heat-treating stone for stone tool manufacture,

These sites are usually identified as surface and/or subsurface sites in areas where ground surface visibility is increased due to lack of vegetation. Erosion, agricultural activities (such as ploughing) and access ways can also expose hearths, although this usually results in a disturbed hearth with hearth stones dispersed over a slightly larger area than their original location.

Hearths may represent evidence of;

- Camp sites, where everyday activities such as habitation, maintenance of stone or wooden tools, manufacturing of such tools, management of raw materials, preparation and consumption of food and storage of tools has occurred; and
- Hunting and/or gathering events.

If a potential hearth has been identified, the Unexpected Finds Protocol must be followed immediately.

Examples of hearths and a hearth stone (MCH; OEH)



Shell midden

Shell middens are places where debris from eating shell fish has accumulated. Middens preserve a range of past dietary remains which have the potential to inform about past dietary consumption and availability of food resources. Most shell middens analysed to date pertain to coastal environments with few pertaining to inland middens. In NSW, middens are located on headlands, beaches and dunes, around estuaries, swamps, the tidal stretches of creeks and rivers and along the banks of inland rivers, creeks and lakes. Shell middens may be found in the open or in rock shelters and often those in the open are disturbed through erosion and land use impacts and those in shelters are usually well preserved. The location of middens is influenced by a variety of factors including, but not limited to, the availability of shell fish, aspect, accessibility and the nature of the immediate area and are typically located within a reasonable distance from water on level, sheltered surfaces.

Ranging in size from small scatters to deep layered deposits that have built up over time, the size of the midden may relate to its location (e.g. riverbank middens tend to be smaller than estuarine and coastal middens). Small middens may represent short term occupation or the debris from a single meal. Major estuarine species include bivalves such as cockle, whelk, mud and rock oyster and both edible and hairy mussels. Rock platform species of gastropods include limpets, turban shell, periwinkles, nerits, tritons and cartrut shell fish and the most important beach species is the pipi.

Shell middens may also include fish, sea birds, sea mammals and land mammals. Stone artefact are also typically found within middens and indicate trade and/or transportation of raw materials. Bone and shell artefacts, such as fish hooks and barbs, evidence of cooking may be present in the form of charcoal, ash, fire stones, hearths, burnt clay and/or burnt earth. The midden usually occurs within a soil or sand layer that is darker than the surrounding sediment. Middens may also contain burials and if present are usually located under the midden.

Preservation varies with food stuffs such as berries and fruits leaving no archaeological traces, sea foods such as cartilageous fish, stingrays, octopus and fish eggs are likely to be equally invisible in the archaeological record. However, tissue such as shell and crustations and bone may be preserved. Preservation is also dependant on land use impacts and associated soil pH.

An important contribution to the study of coastal shell middens was made by Meehan (1975, 1977a, b) through ethnographic studies of coastal hunter and gatherers in northern Arnhem Land. Through a yearlong quantitative record of the total diet, Meehan provides unique insights into all aspects of shell fish gathering and the creation of shell middens with pertinent data to the interpretation of midden data. Shell middens may be distinguished from natural shell beds as follows (Attenbrow 1992; Bailey 1994; Gill 1951; Coutts 1966; Hughes and Sullivan 1974);

- 1) Middens contain charcoal, burnt wood, clay and/or earth, blackened shells, stone artefacts, hearth stones. These are absent from natural shell beds.
- 2) Middens are either unstratified or roughly stratified whereas natural shell deposits are well stratified and exhibit sedimentary features of water laid deposits.
- 3) Middens contain edible species and sizes whereas shell beds contain shells of varied species and sizes as well as both edible and non-edible species.
- 4) Middens do not contain worn shell resulting from transportation from the off shore or beach zone, whereas shell beds do.
- 5) Middens contain mammal bones used in food consumption, shell beds do not.
- 6) Middens do not contain certain forms of marine life not used by Aboriginal people (e.g. corals, tube worms) but shell beds do.

Interpretation of shell middens usually falls into three main categories;

- 1) Taphonomy: differential survival value of different species may be considered.
- 2) Environmental/ecological: changes in habitat may bring about changes in the availability of species (Coutts 1970).
- 3) Economic/behavioural: changes in gathering habits brought about by some purely cultural factor may be considered (Bowdler 1970, 1976).

The interpretation of shell middens is only as good as ones' analysis, which is only as good as ones' sample, all of which are typically limited during surface survey only.

- Large camp sites, where everyday activities such as habitation, maintenance of stone or wooden tools, manufacturing of such tools, management of raw materials, preparation and consumption of food and storage of tools has occurred;
- Medium/small camp sites, where activities such as a small meal was cooked and/or consumed;
- Hunting and/or gathering events;
- Other events spatially separated from a camp site, or
- Transitory movement through the landscape.

If a potential shell midden has been identified, the Unexpected Finds Protocol must be followed immediately.

Examples of shell middens (MCH)



Appendix 11

Heritage Searches

World Heritage List

Nil results

Commonwealth Heritage List

Nil results

National Heritage List

Item	Address	Suburb	LGA
Echuca Wharf	52 Murray Esp	Echuca	Murray

NSW State Heritage register

SECTION 1 – ABORIGINAL PLACES LISTED UNDER THE NATIONAL PARKS AND WILDLIFE ACT

ABORIGINAL PLACE NAME	LOCAL GOVERNMENT AREA	LOCAL ABORIGINAL LAND COUNCIL	LATITUDE	LONDTITUDE	GASETTAL DATE AND PAGE NUMBERS	COMMENTS
Algeboia	Murray	Moama	-35.96	144.8980	10/26/1990 p. 9558	Located within Murray Valley Park

SECTION 2 ITEMS LISTED UNDER THE NSW HERITAGE ACT

Item	Address	Suburb	LGA	SHR
Echuca Rail/Road Bridge	Echuca Rd	Moama	Murray	00600
Echuca Warf	Murray River	Moama	Murray	00600
Moama Historic Precinct	Hunt St	Moama	Murray	00600
Coonamit Bridge over Wakool River	Main Rd 386	Swan Hill	Wakool	01464
Barham Bridge over Murray River	Main Road 319	Barham	Wakool	01456
Murray Downs Homestead	Moulamein Highway	Wakool	Wakool	01438
Swan Hill-Murray River Road Bridge	Main Rd 67	Swan Hill (East)	Wakool	01481
Tooleybuc Bridge over Murray River	Main Road 222	Tooleybuc	Wakool	01482

SECTION 3 ITEMS LISTED BY LOCAL GOVERNMENT AND STATE AGENCIES

LOCALITY	ITEM NAME	ADDRESS	PROPERTY DESCRIPTION	SIGNIFICANCE	ITEM NO
Barmah	Bridge over Murray River	Main Road	Main Road 391	State	NA
Bullatale	McLaurin Cemetery	Millewa Road	Within Murray Valley National Park	Local	165

LOCALITY	ITEM NAME	ADDRESS	PROPERTY DESCRIPTION	SIGNIFICANCE	ITEM NO
Burraboi	Wera Station	Rangemore Road	Lot 1, DP 756342	Local	162
Cornalla	Cornalla Station	Dudleys Road	Lot 211, DP 848121	Local	159
Echuca	Echuca Wharf	Murray Esplanade	Murray River	State	19
Echuca/Moama	Echuca–Moama road and former rail bridge	Cobb Highway over Murray River	Public road	State	110
Mathoura	St Andrews Uniting Church	Corner Burnes and Morris Streets	Lot 1, Section 74, DP 758686	Local	130
Mathoura	Timber residence	13A Burnes Street	Lot 5, DP 114978	Local	142
Mathoura	Murray Shire Council (offices and hall)	21–25 Conargo Street	Lot 7, Section 65, DP 758686	Local	131
Mathoura	Timber residence	27 Conargo Street	Lot 3, Section 65, DP 758656	Local	143
Mathoura	Catholic Convent	Corner Livingstone and Frome Streets	Lot 10, Section 37, DP 758686	Local	132
Mathoura	Soldiers Memorial Gardens	Corner Livingstone and Lawrence Streets	Lot 10, Section 40, DP 758686	Local	134
Mathoura	Anglican Church	Corner Livingstone and Stephen Streets	Lot 51, DP 1072403	Local	141
Mathoura	Timber residence	6 Livingstone Street	Lot 9, Section 97, DP 758686	Local	145
Mathoura	Concrete shop and house	18 Livingstone Street	Lot 2, DP 312113	Local	139
Mathoura	Brick residence/bed and breakfast; (former Charleston's Hotel)	20 Livingstone Street	Lot 1, DP 312113	Local	140
Mathoura	Shops	25b Livingstone Street	Lot 2, DP 541436	Local	138
Mathoura	Pastoral Hotel	26 Livingstone Street	Lot 8, Section 40, DP 758686	Local	137
Mathoura	Brick shop and residence (butchery)	27a Livingstone Street	Lot 6, Section 39, DP 758686	Local	136
Mathoura	Supermarket (former bakery)	29b Livingstone Street	Lot 1, DP 1163845	Local	135
Mathoura	Timber residence	35b Livingstone Street	Lot 1, DP 1096894	Local	144
Mathoura	St Brigid's Catholic Church	38 Livingstone Street	Lot 9, Section 37, DP 758686	Local	133
Mathoura	Timber residence	51 Moama Street	Lot 5, Section 29, DP 758686	Local	147
Mathoura	Timber residence	53 Moama Street	Lot 4, Section 29, DP 758686	Local	146
Mathoura	Mathoura Station	Station Road	Lot 2, DP 756272	Local	163
Mathoura	D&M Railway Tower – water tank and railway precinct	Conargo St (btw Lawrence and Morris)	Railway	Local	NA
Mathoura	Gulpa Creek Cutting	Gulpa Creek	Gulpa Creek	State	NA
Mathoura	Post Office and Official residence	Mathoura St – Cnr of Lawrence St	NA	State	NA

LOCALITY	ITEM NAME	ADDRESS	PROPERTY DESCRIPTION	SIGNIFICANCE	ITEM NO
Moama	Fig trees	Berry Street	Lot 4, Section 56, DP 758686	Local	I27
Moama	Residence	2 Berry Street	Lot 3, Section 56, DP 758686	Local	I11
Moama	Timber residence	13 Berry Street	Lot 4, Section 50, DP 758686	Local	I26
Moama	Maiden's Punt	Chanter Street	Lot 7021, DP 1123285	Local	I29
Moama	Residence (former post office)	2–4 Chanter Street	Lot 1, DP 654519	Local	I1
Moama	Residence and outbuildings (former police station)	10–12 Chanter Street	Lot 4, Section 30, DP 758686	Local	I2
Moama	Former river captain's cottage	54 Chanter Street	Lot 4, Section 18, DP 758686	Local	I7
Moama	Former Moama Telegraph Station	60 Chanter Street	Lot 8, Section 18, DP 758686	Local	I14
Moama	Residence	72 Chanter Street	Lot 3, DP 577291	Local	I8
Moama	Portal entry (former Maiden's Inn Hotel)	100 Chanter Street	Lot 1, Section 1, DP 758686	Local	I13
Moama	Cranford House	Cobb Highway	Lot 1, DP 537724	Local	I25
Moama	Timber residence	11 Echuca Street	Lot 71, DP 623922	Local	I18
Moama	Timber residence	23 Echuca Street	Lot 21, DP 700038	Local	I17
Moama	Group of cottages	31–33 Echuca Street	Lot 1, DP 922312; Lot 2, DP 667846	Local	I16
Moama	Residence	38 Echuca Street	Lot 1, DP 712717	Local	I15
Moama	Timber residence	33 Francis Street	Lot 9, DP 330	Local	I19
Moama	Moama slipway and barges	Hunt Street	Lots 256 and 257, DP 726664	Local	I5
Moama	Courthouse group	Corner Maiden and Francis Streets	Lots 6–8, Section 65, DP 758686	Local	I3
Moama	Anglican Church	31–35 Maiden Street	Lot 1, DP 528484	Local	I20
Moama	Brick residence (former bank)	7 Meninya Street	Lot 1, DP 216216	Local	I21
Moama	Boiling down works	Perricoota Road	Lot 1, DP 1088592	Local	I64
Moama	Perricoota Wool Shed	Perricoota Road	Lot 1, DP 521201	Local	I66
Moama	Mile Tree 311	Perricoota Road (Dead Horse Point)	Lot 73, DP 751159	Local	I6
Moama	La Bella Sombre tree, horse trough and obelisk	Shaw Street	Lot 1, DP 1075441	Local	I28
Moama	Shop and residence (former bank)	9–11 Shaw Street	Lot 1, DP 716265	Local	I22
Moama	"Killarney", residence	8 Simms Street	Lot 1, DP 514180	Local	I4
Moama	Timber residence	12 Simms Street	Lot 3, Section 29, DP 758686	Local	I12
Moama	Timber residence	15 Simms Street	Lot 1, DP 504342	Local	I23
Moama	Courthouse Group	Maiden St	Maiden St	Local	NA

LOCALITY	ITEM NAME	ADDRESS	PROPERTY DESCRIPTION	SIGNIFICANCE	ITEM NO
Moama	Echuca-Moama Bridge	Cobb Hwy	Cobb Hwy	State	NA
Moama	Historic Precinct	Hunt St	NA	Local	NA
Moira	Moira Station	Cobb Highway	Lot 1, DP 1062036	Local	157
Moira	Moira Station woolshed	Cobb Highway	Lot 2, DP 1062036	Local	158
Moama	Police Station	27 Maiden St	NA	State	NA
Tantonan	Tantonan weighbridge	Bunaloo Street	Lot 87, DP 751161	Local	156
Thule	Thule Station	Lower Thule Road	Lot 75, DP 751156	Local	161
Thyra	"Fairfield", residence	Thyra Road	Lot 1, DP 133845	Local	150
Thyra	"Minerva", residence and outbuildings	Thyra Road	Lot 1, DP 23013	Local	149
Thyra	Uniting Church and cairn memorial	Thyra Road	Lot 1, DP 923053	Local	148
Womboota	Brick residence	Moira Street	Lot 2, Section 12, DP 759106	Local	155
Womboota	Catholic Church	Moira Street	Lot 10, Section 6, DP 759106	Local	152
Womboota	Uniting Church	Moira Street	Lot 1, Section 12, DP 759106	Local	154
Womboota	Womboota Public Hall	Moira Street	Lot 1, Section 22, DP 759106	Local	151
Womboota	Perricoota Station	Perricoota Road	Lot 3, DP 751155	Local	160
Womboota	Former Womboota School	Perricoota Rd	Lot 81, DP751150	Local	153
Barham	Barham Koondrook Bridge over Murray River	Main Road 319		State	12
Barham	Barham War Memorial Hall	15 Murray St	Part Lots 5 and 6, Section 4, DP 758053; Part Lot 157, DP 1049554	Local	11
Cunninyeuk	Gee Gee Bridge over Wakool River	Nacurrie Road North, Noorong State Forest	Adjacent to Lot 50, DP 756533	State	13
Koraleigh	Koraleigh Uniting Church	17 Eagles Lane	Lot 8, Section 1, DP 15133	Local	14
Moulamein	The Old Courthouse and footbridge	Via Jebb Street	Part Lot 109 and Lot 110, DP 39558	Local	15
Murrabit	Gonn Crossing Bridge over Murray River	Murrabit Road	Adjacent to Lot 1, DP 608956	Local	16
Murray Downs	Murray Downs Homestead	MR 467 Swan Hill-Kyalite Road	Lot 2, DP 1067731	State	17
Nyah	Nyah Bridge over Murray River	Speewa Road	Adjacent to Lot 1, DP 135141	Local	19
Speewa	Speewa Ferry, Murray River	Speewa Ferry Road	Adjacent to Lot 3, DP 317039	Local	110
Swan Hill	Coonamit Bridge over Wakool River	MR 386	Adjacent to Lot 1, DP 653213	State	112
Swan Hill	Swan Hill Bridge over Murray River	MR 467	Adjacent to Lot 65, DP 756603	State	111



Appendices

LOCALITY	ITEM NAME	ADDRESS	PROPERTY DESCRIPTION	SIGNIFICANCE	ITEM NO
Tooleybuc	Tooleybuc Bridge over Murray River		Adjacent to Lot 1, DP 585209	State	I13

PART 2 – HERITAGE CONSERVATION AREAS

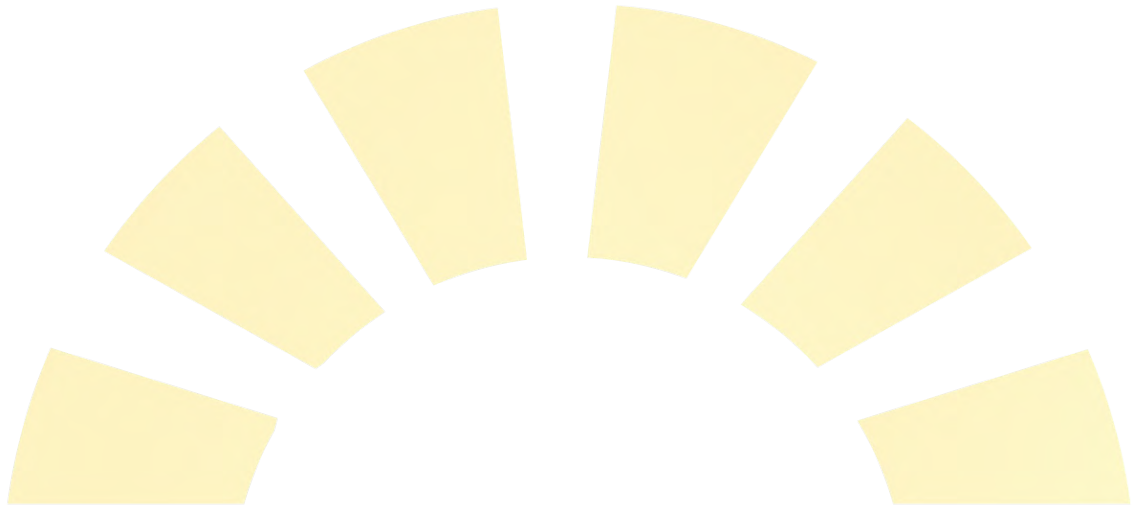
SUBURB	ITEM NAME	ADDRESS	PROPERTY DESCRIPTION	SIGNIFICANCE	ITEM NO
Mathoura	D&M Railway Tower, water tank and railway precinct (including former railway station site)	Conargo St between Lawrence and Morris Streets	Railway reserve	Local	C2
Moama	Moama historic precinct	Hunt St	Multiple	State	C1

PART 3 – ARCHAEOLOGICAL SITES

SUBURB	ITEM NAME	ADDRESS	PROPERTY DESCRIPTION	SIGNIFICANCE	ITEM NO

Appendix 12

Odour Assessment and Management Plan



Odour Assessment

Proposed 2,112 dairy cow freestall barn

'Yarrimbah' 2901 Cobb Hwy, Mathoura, NSW

November 2020



Progressive Rural Solutions

www.prsltd.com.au





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Version	Recipient	Lodgement	Copies
V1R3	Client for review	Electronic	1
V1R4	Murray River Council for lodgement	Electronic	1
V1R4	WaterNSW	Electronic	1
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V1R4	Client/Contractor	Electronic & Hard	1

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Related Documents

Type	Author	Name	Date
Environmental Impact Statement	Progressive Rural Solutions	J128-EIS-V1R4	17/11/2020
Design Plans	Rich River Irrigation Developments	J000410 – staged plan	17/11/2020
Layout Plans	Entegra	Layout Plans 1-3	20/08/2020
Certified Plans	Entegra	Certified Plans 1-10	06/11/2020

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1. INTRODUCTION

1.1. PURPOSE

The purpose of this assessment and management plan is to:

- Identify and describe the potential sources of odour within the proposed operation,
- Identify potential sensitive receivers in relation to the site,
- Identify other potential contributing sources of odour in the area including other dairy operations that are not considered intensive livestock operations,
- Determine appropriate buffer distances for the operation utilising the S factor methodology, and
- Describe the methods proposed to manage potential odour sources as reasonably practical.

2. BACKGROUND

The Smith Family is proposing to extend their existing dairy operation from a 790 head compost barn to a 2,112-cow dairy freestall barn system. The freestall barn system will be constructed within an existing irrigation area, separated from the existing barn, milking shed, feed storage and mixing area. The proposed barn system will replace the existing compost barn and be independently managed in relation to water storage, effluent management and controlled drainage. The operation will continue to utilise the existing milking shed and commodities areas. No further consideration of the existing milking shed effluent system will be made within this assessment as the existing effluent system will not interact with the proposal. The existing compost barn will no longer be in operation which will reduce the existing effluent system by a higher capacity than the additional cow numbers processed through the dairy.

The freestall barns are each proposed to house 1,056 cows with each cow housed within the barns provided with access to its own stall. The open sided barns will have a central feed alley and each side a row of single and double stalls creating six lanes within the barns that will be cleaned utilising a flood wash system. The barns will be constructed on a 1% slope allowing sufficient fall for manure removal by floodwash. Adjoining the lower half of each site of the barns is an earthen 'natural instinct' area where cows will be provided access during suitable days.

The images below provide an overview of the site, a cross section and a plan view of the barn areas.



Figure 1 - Overview of area proposed for barn system

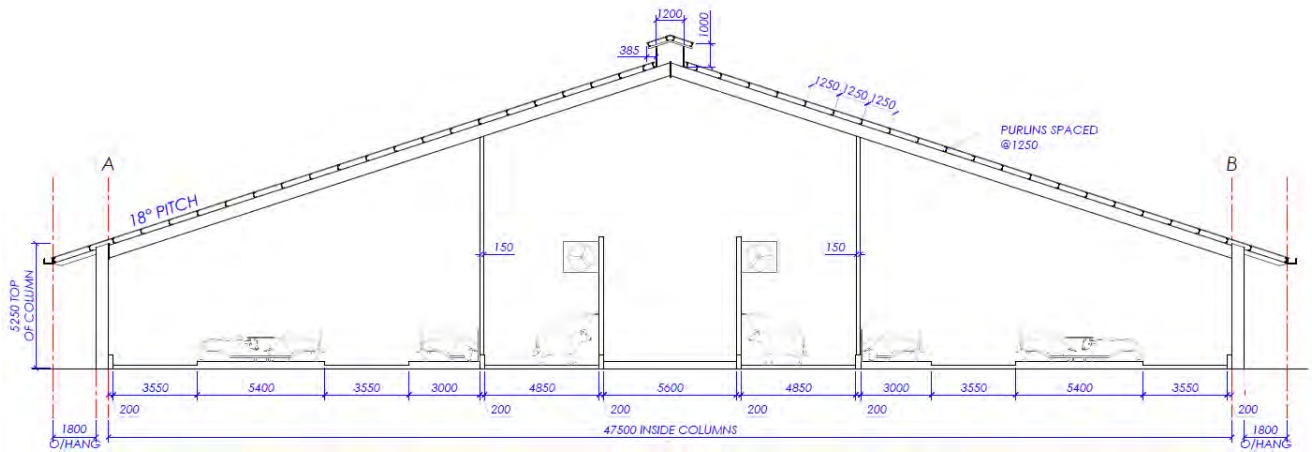


Figure 2 - Cross sectional plan of barn

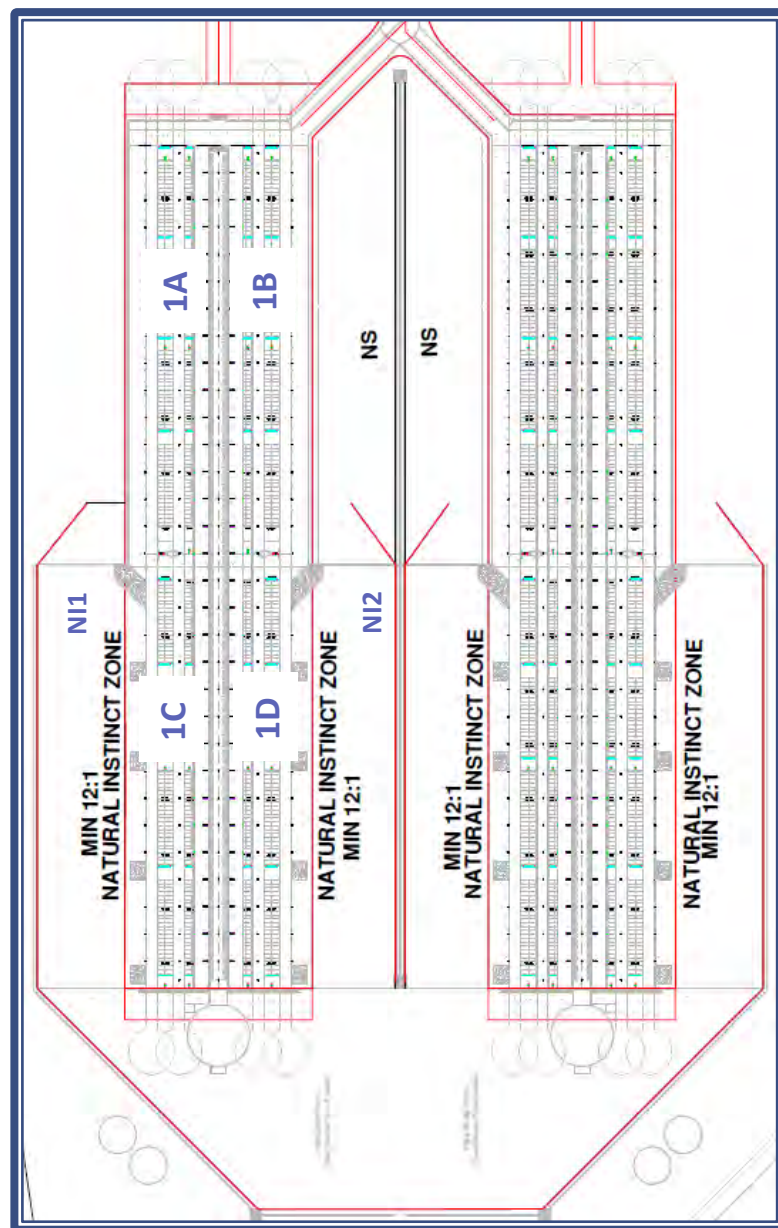


Figure 3 - Plan view of barn

2.1. LOCATION

The project is located in the New South Wales Riverina region and the Murray River Council Local Government Area. The project site is located on the property known as 'Yarrimbah' which adjoins the Cobb Hwy between Moama and Mathoura.

The project site, which includes the proposed freestall barns and infrastructure, is located within the existing irrigation area of the property. The site also adjoins the Moira Private Irrigation District's main supply and a spur channel on two sides. The project infrastructure and works are proposed on Lot 2 DP1077844, Lot 117 DP455183, Lot 13 DP751153 and Lot 14 DP 751153 with the remaining portions of the property incorporated for effluent and manure application which will be utilised to grow feed as part of the project operation.

The location of the project site is shown in the figures and tables below.



Figure 4 - Location of project site in relation to the region

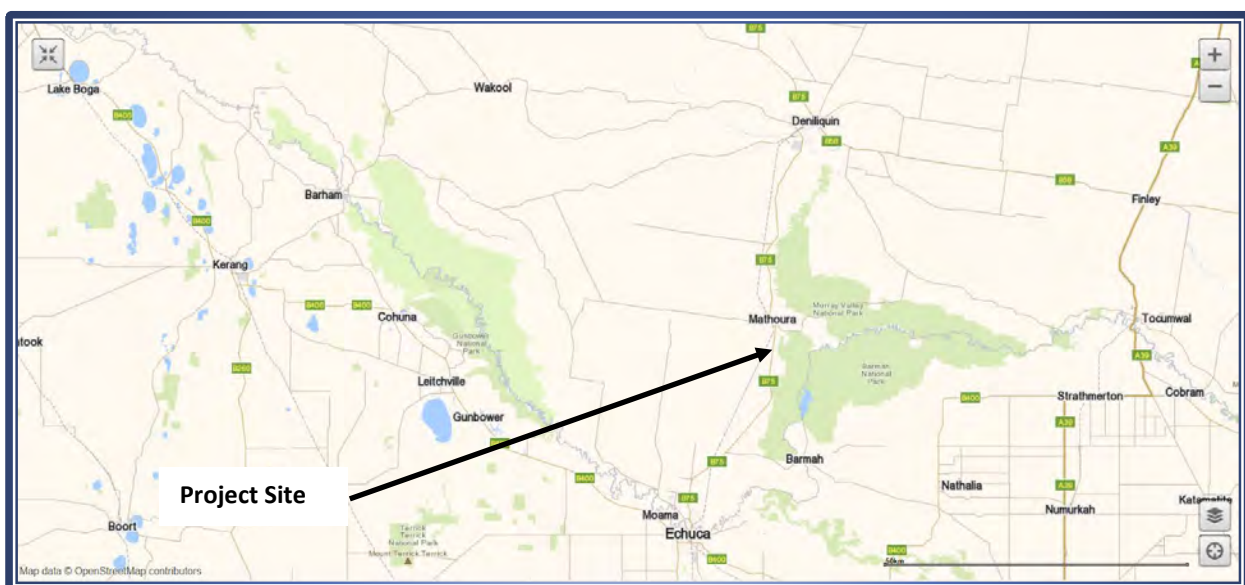


Figure 5 - Location of project site in relation to the local area

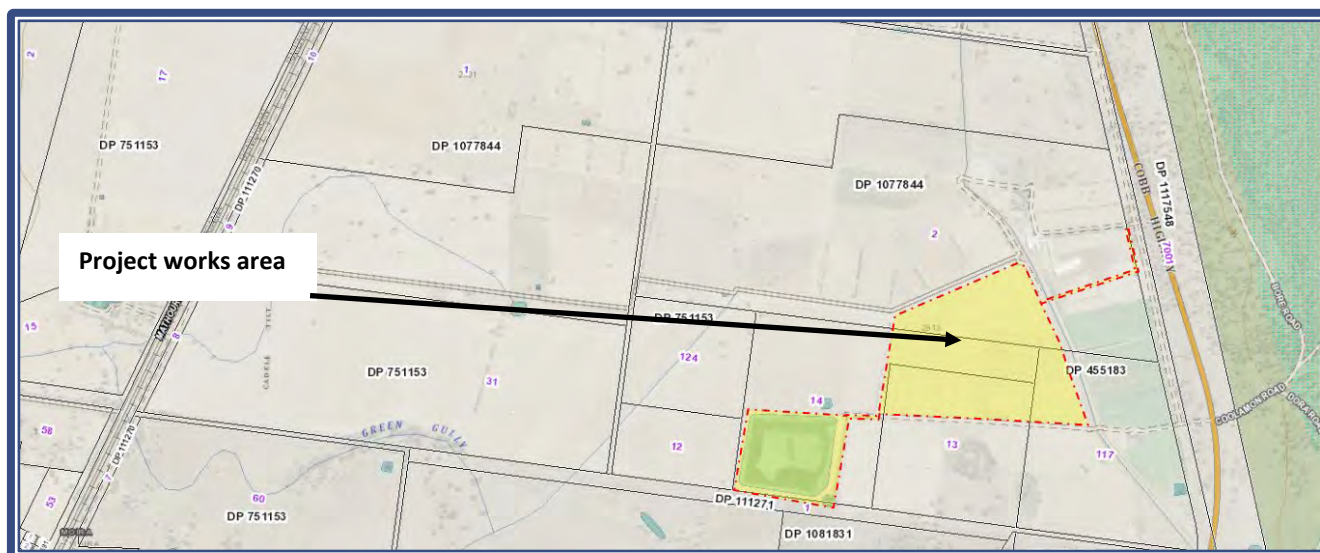


Figure 6 - Location of project site in relation to the property

The land details of the project are summarised as follows:

Table 1 - Land details of the project

Table 1 – Land details of the project				
Details	Specific related to project site			
Lot number	2	117	13	14
Deposited Plan	1077844	455183	751153	
Parish	Moirra			
County	Cadell			
Local Shire	Murray River Council			
LEP Zone	Zone RU1 – Primary Production			
Catchment Area	Murray			
IBRA Sub-region	Riverina – Murray Fans			
Mitchell Landscapes	Murray Scalded Plains			
Local Aboriginal Land Council	Moama Local Aboriginal Land Council			
Floodplain Management Plan	Nil			
Land Stature	Freehold			
Area of project works	Approx. 42ha			
Area of this property	Approx. 573ha			
GPS Reference	MGA Zone 55 E:309685 N:6022812			

Other property and connected Lot & DP numbers in relation to the project are:

Table 2 - Property identification details

Property Name	Lot	DP	Parish	County	Total Area (ha)	Irrigation Area (ha)
Yarrimbah	2	1077844	Moirra	Cadell	573	394
	31	751153				
	124	751153				
	12	751153				
	14	751153				
	13	751143				
	117	455183				

2.2. THE SITE

The project site where infrastructure is proposed has been utilised for irrigated pasture and cropping since the Moira Private Irrigation District's (PID) inception more than 50 years ago. The irrigation system on the site is surrounded by an access track, existing drains and channels. There are four fields within the main area which are supplied from the Moira PID channel on the eastern side. Each field is connected to the existing on-farm irrigation drainage which exits the project area in the south west corner delivering drainage water to the property recycle point and connected storage dam for re-use on the property.



Figure 7 - Image showing existing irrigation layout on the project site

The groundcover on the site consists entirely of introduced species such as grazing oats and pasture species. Standing vegetation on the site consists of single row plantation species that are predominantly non-native to the area and are in varying stages of survival.

There is no existing dairy infrastructure located on this site as this project relates to a new proposal. The existing dairy system will remain as an independent system that will continue to operate separately.

2.3. SITE SURROUNDS

The site being located within a rural area is surrounded by other farming properties. The Moira Private Irrigation District maintains its pump infrastructure and workshop located approx. 1km to the south east of the site. The Cobb Hwy is located to the east being divided from the property boundary by Travelling Stock Reserve. The entrance to the Moira National Park is on the opposite side of the Cobb Hwy located over 650m to the east at its closest point to the site. The nearest known camping and frequent public use area is over 5.5kms from the property.

The site and surrounds are generally flat with a very low relief within the broader area. There is less than a 10m elevation change in the surrounding area – including considering the Cadell Tilt formation. The broader area is described as the Riverine plain and contains isolated stands of vegetation with some scattered paddock trees.

2.4. CLIMATE

Meteorological conditions have the potential to influence a range of project-related activities. An overview of these conditions at the project site and surrounds, with a focus on their potential influencing factors to project related activities has been recorded below.

The climate records utilised in this assessment have been sourced from both the Deniliquin Airport (site 074258 since 1997) and the Silo data portal (records between 1900 and 2019). The grid point utilised for the Silo search is Lat: -35.95 and Long: 144.85 which is located 10 km to the south west of the site.

A previously decommissioned weather station in the vicinity of the site has been re-activated and upgraded for future use. Records available from this weather station have been provided in addition to the regional data however do not provide 12 months of data for consideration. For future assessment of the climate at the site, the site related weather station will be utilised. This weather station is a Weather Maestro station installed and serviced by Envirodata, which includes the following modular systems:

Table 3 - Weather station recording conditions

Sensor Type	Identification	Operating Range	Accuracy	Resolution
Wind Speed	WS52	0-75m/s	+/- 0.2 m/s	0.1 m/s
Wind Direction	WD50	0-359 degrees	+/- 1 degree	1 degree
Air Temperature	TA70	-20 to 80 deg C	+/- 0.2 deg C	0.025 Deg C
Relative Humidity	RH70	0 to 100%	+/-2% RH (10% - 90% RH) +/- 4% rh (<10% or <90% RH)	0.1% RH
Rain Gauge	RG50	0-700mm/hr	+/- 1% to 200mm/hr +/- 3% to 380mm/hr	0.2mm per tip

The wind speed and wind direction sensors are installed on a 10m high mast in an open environment. The weather station is located at E: 310113, N: 6020661 Zone 55.

CLIMATE RECORDS

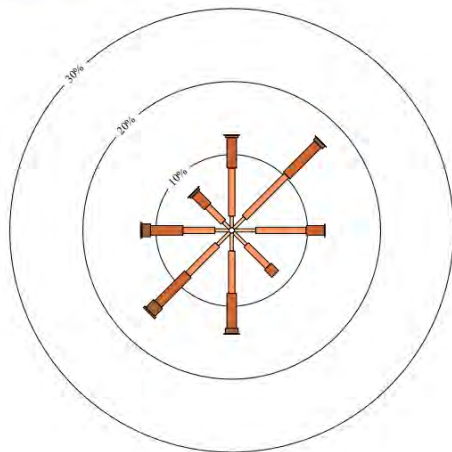
The Deniliquin to Moama area can be described as a semi-arid climate under the Koppen climate classification with warm to hot summers and cool winters. Temperature extremes are quite variable across the year and the highest temperature recorded at Deniliquin was 47.2 degrees on the 25th January 2019. The lowest temperature was -5.6 on the 1st July 2017. The average annual rainfall is 258mm with most rainfall falling in August to October.

Table 4 - Climate Data

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Highest High	47.2	46.6	41.2	39.0	27.0	24.4	23.3	27.6	36.7	37.6	44.0	46.5	47.2
Mean Max	33.4	32.1	28.6	23.6	18.6	15.0	14.4	16.2	19.9	23.9	28.0	30.7	23.7
Mean Min	16.7	16.2	13.5	9.6	6.2	4.0	3.5	4.0	5.9	8.5	12.0	14.4	9.5
Lowest Low	5.7	6.0	3.5	1.0	-2.0	-4.4	-5.6	-5.0	-2.1	-0.6	1.1	5.0	-5.6
Mean rainfall	27	24	29	29	39	39	41	40	37	38	30	29	402
Mean rainfall days	4.4	4.8	4.3	5.5	8.0	12.7	14.3	11.0	8.6	6.4	6.8	5.7	92.5
Mean 9am wind speed	19.5	19.3	17.9	16.4	13.8	14.0	13.7	15.9	17.9	19.2	19.6	17.2	13
Mean 3pm wind speed	20.5	19.2	18.4	17.4	17.7	17.9	18.6	20.3	21.3	21.3	20.3	21.1	19.5
Monthly Evaporation	266	216	174	99	54	35	37	58	91	142	194	245	1612

The annual wind records which are displayed as wind roses for both 9am and 3pm for the Deniliquin Airport have been provided below.

9 am
8073 Total Observations
Calm 2%



3 pm
8076 Total Observations
Calm *

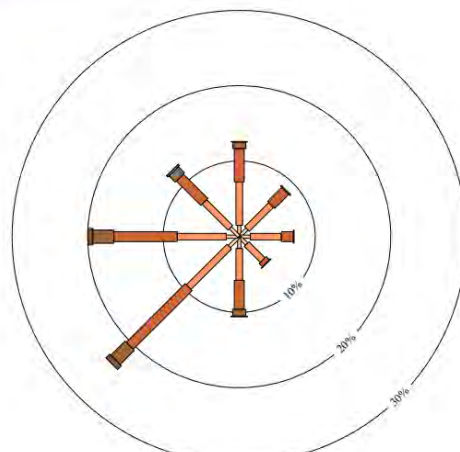


Figure 8 - Average annual wind data from 9am (left) and 3pm (right) showing direction wind blowing from

The site-specific records for period 8th July to 30th September 2020 (being the available timeframe for the station) are shown below.

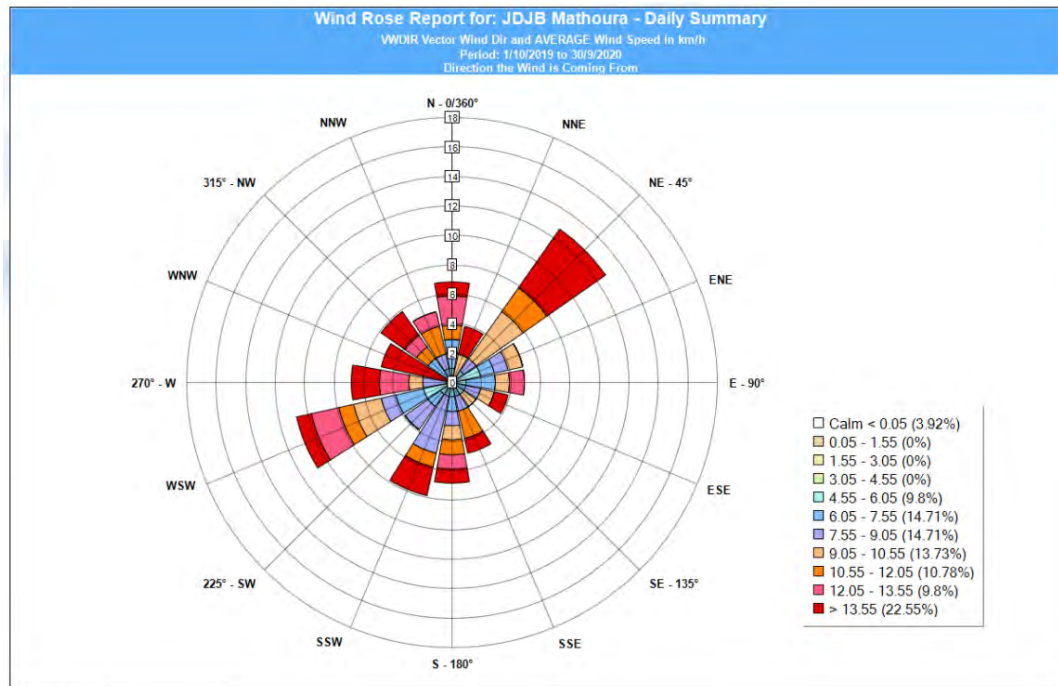


Figure 9 - Site specific wind rose showing the direction the wind is blowing from

It can be identified from the above that the site and surrounds are subject to 'normal wind conditions' with no low or high frequency winds blowing in any specific direction. The main wind direction at the site is from the north-east and the west south-west.

The average rainfall vs evaporation is shown below which identifies that in all months except June and July, evaporation exceeds rainfall.

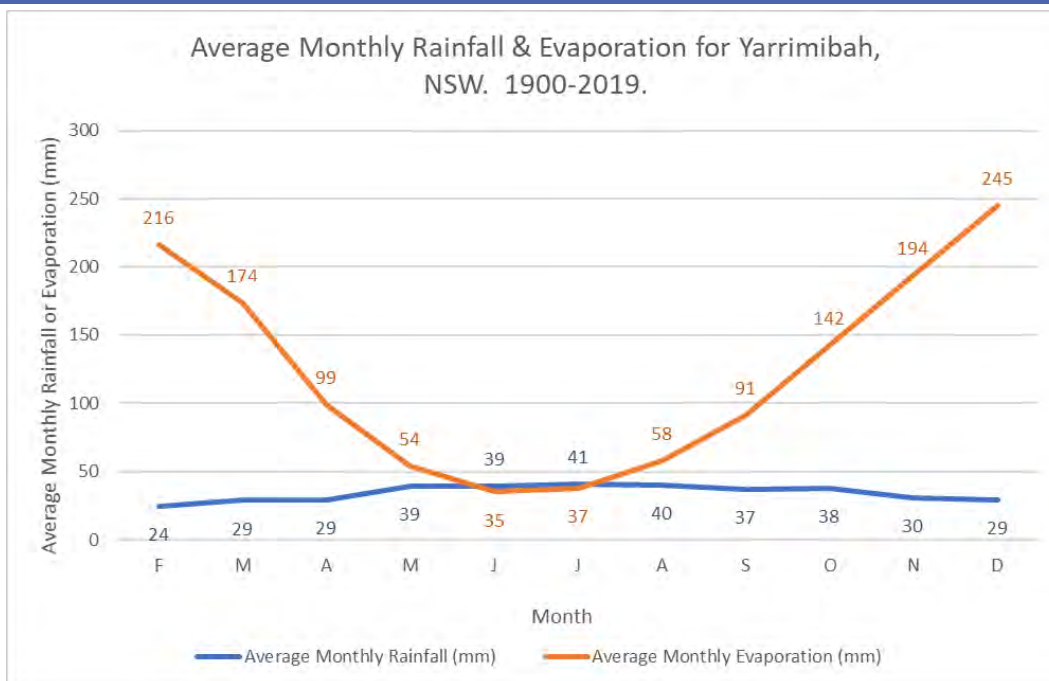
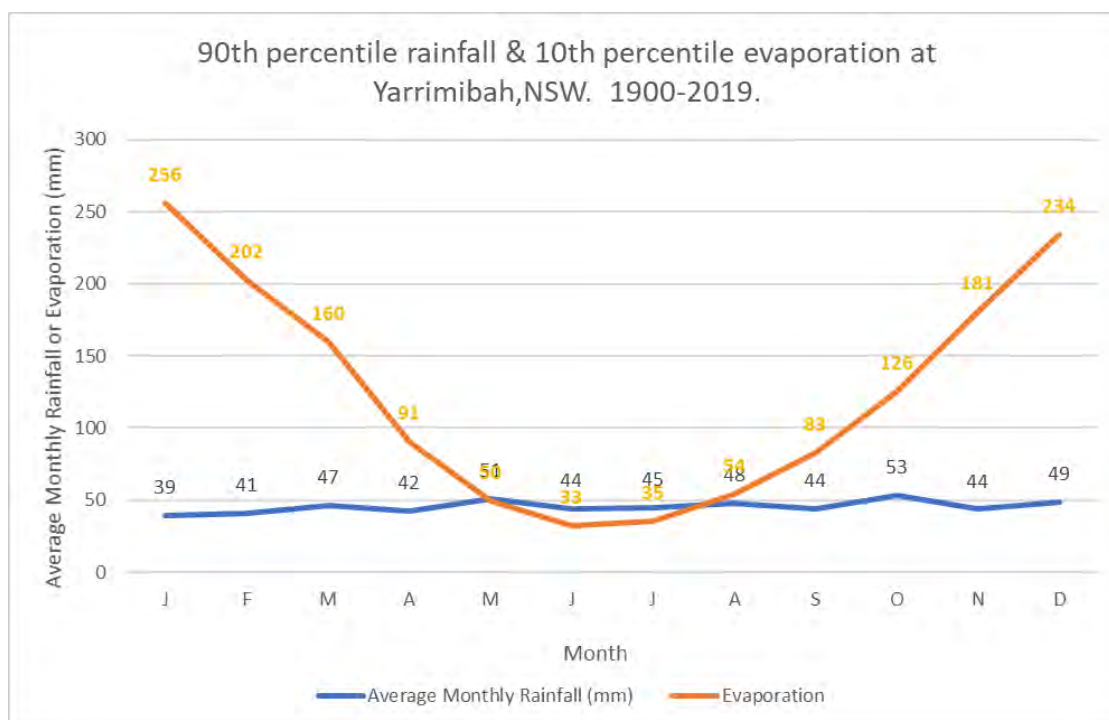


Figure 10 - Rainfall vs evaporation at site in average year

The 90th percentile rainfall vs 10th percentile evaporation is shown below which identifies that in the months of May and August evaporation and rainfall are equal. In the months of June and July rainfall exceeds evaporation. This shows that in a 90th percentile year, the storage periods for effluent should include a maximum of four months.


Figure 11 - Rainfall vs evaporation at site in 90th percentile year

3. OPERATION & ODOUR

3.1. ODOUR SOURCES

The potential sources of odour at the 'Yarrimbah' dairy and freestall barn site are predicted to be consistent with other dairy and freestall operations. It should be noted that there is limited background data available relating to dairy and freestall systems. Where possible, dairy specific odour considerations have been used, where this information is not available, feedlot data has been used. A simplified process chart of a dairy freestall barn operation is presented below in **Figure 11**.

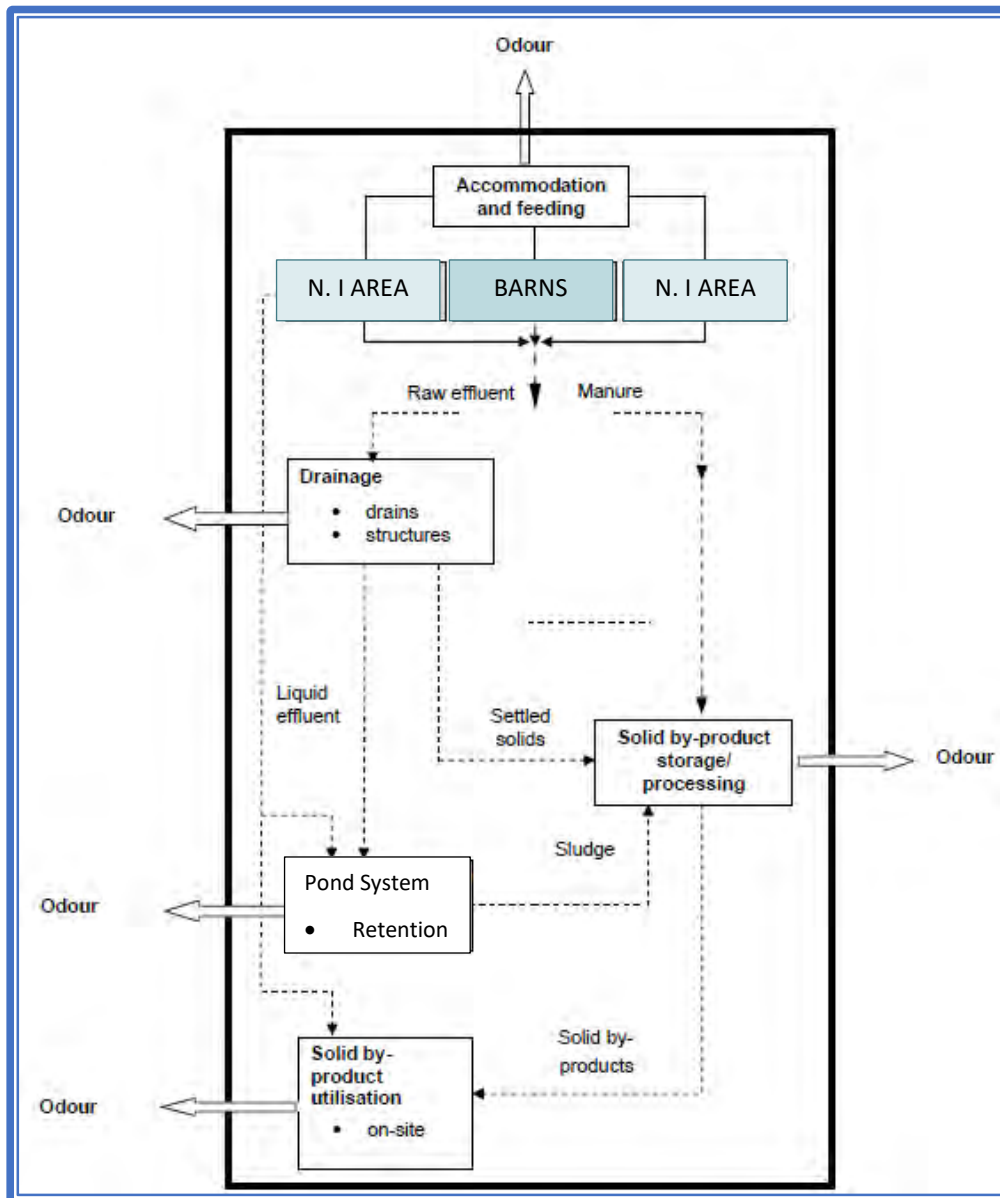


Figure 12 - Amended figure from Air Quality Guidance Note - Beef Cattle Feedlots

It can be seen that there are five potential sources of odour that relate to the operation. These are:

1. Accommodation and feeding,
2. Drainage and initial treatment,
3. Effluent pond system,
4. Manure storage, and
5. By-product utilisation.

Of these the primary sources are predicted to be the accommodation (concrete floored barn) and ponds. Manure storage is not considered to be a large contributor as solids are planned for removal and utilisation within the farming operation

as soon as practical. Manure will require storage during periods where it is not suitable or possible to be incorporated into farming operations.

The above identified odour sources are further described below with the proposed management measures to minimise the risk of adverse impacts detailed in **Table 17** located within the management section.

3.1.1. Accommodation and Feeding

Accommodation and feeding activities have the potential to create odour within the operation. These sources can be further divided into the following areas.

Barns

The barn system within the operation is a covered, unenclosed system. The barns are constructed on a 1% slope which meets the minimum recommended slope for freestall operations in Australia. A clean dry bedding area is important for animal health and odour management. Alleys must be cleaned regularly to ensure that excreta (urine and faeces) within the system is expelled from the sheds and treated.

Stocking density within barns should be maintained to meet animal welfare standards with adequate space for each cow to eat, drink and rest (I.e. one stall allowance per cow).

Natural Instinct Areas

The freestall barns will each have two individual earthen areas adjoining the lower area of the barn. This area provides an outside behavioural enrichment area which includes environmental stimuli that benefits cow health and happiness. This area being a compacted earthen surface has a 1:12 slope and will allow for adequate drainage away from the barns. These areas are not proposed for permanent utilisation.

An even, earthen pen surface, free of potholes and low areas, should be maintained to prevent opportunities for odour emissions. These areas are proposed to be used periodically and as such the cleaning interval will vary but will aim to meet the 50mm manure depth of a class 1 feedlot operation. It is proposed to retain the protective interface layer on these areas. Stocking density within this area will depend on the herd utilising the area however the size of this area matches that available within each herd section of the freestall barns i.e. between 10 and 14m² per cow.

Fences

The natural instinct area will consist of an earthen area. It is unlikely that these areas will be utilised during wet and muddy periods which can lead to pugging along fence lines.

Maintenance of any manure build up under fences within the natural instinct area should be managed to ensure that every area drains during rainfall events and does not contribute to unnecessary moisture and potential odour emissions.

Troughs and Water Supply Systems

Troughs that overflow create damp areas within earthen pens and have the potential to increase odour emissions. The natural instinct areas will contain water troughs located within the area and these will have the potential to overflow if not checked and maintained.

Leaking trough lines and any overflowing troughs within the natural instinct areas should be repaired immediately to prevent potential odour emissions.

Feed Storage and Processing

Feed processing may also contribute to odour where there are levels of undigested starch within the manure. Feed processing methods should be monitored to ensure feed grains are processed optimally. Feed storage particularly silage can contribute to odour emissions.

Silage pits should remain covered until in use at which time only the face of the pit will be open.

3.1.2. Drainage

Adequate drainage assists with the minimisation of odour emissions through allowing all areas to dry quickly. An even drain surface, free of potholes and low areas, should be maintained to prevent poor drainage and additional odour emissions. Vegetation in drains should be minimised to ensure that there is limited organic matter entering the pond system assisting with the reduction in odour from the ponds. Where sediment has accumulated within the drains, it should be allowed to dry prior to removal to the manure storage area or for utilisation.

Drainage of effluent from the barns occurs through an open drain across the low end encompassing the full width of each barn. This drainage system conveys captured effluent from the barns to the trafficable solids trap. This solids trap allows sand and gravel to settle from the effluent reducing volume and unnecessary wear and tear of manure processing machinery. In leaving the sediment trap, effluent then flows to either the solids separation system (when employed) or the sediment pond, where further settling occurs leaving the liquid portion in the upper layer. When the full supply level is reached, the liquid effluent is released to the irrigation recycle system where it will be integrated with irrigation water and utilised on farm.

All pipes and drains employed within this system will be maintained and cleaned at regular intervals to ensure there is no build-up of waste products. The solids trap should be cleaned at required intervals to ensure system operates as designed.

3.1.3. Effluent Treatment and Ponds

Effluent ponds are designed to allow the deposition of solids that have not previously been removed from the system. They allow for the storage of liquid effluent and sludge during a period when application to land is not possible (i.e. during winter or between irrigation applications). The pond will accumulate the remaining solids not removed during the effluent treatment process which will be in the form of sludge. When ponds are cleaned, sludge will either be removed and stored on the manure storage pad or removed and applied directly to paddocks (depending on application machinery).

Accumulated sludge and sediment must be removed to ensure all drainage structures continue to operate as designed and drainage systems are not impeded.

3.1.4. Manure Storage

Manure solids will be generated as part of the waste treatment system. This will be in the form of sands and gravel from the sediment solids trap, sludge from the pond system and processed manure separated during the treatment process. Where possible, all manure removed from the system will be transported to paddocks for use and incorporation into the soils/utilised by plants immediately following removal from the system. During periods that this is not possible (ie winter and or just prior, during and following rainfall) manure will be stored in windrows which will be typically formed in a long pile with a triangular cross section.

The shape of the windrows should be maintained so that there is an apex and sloping sides to promote water shedding and prevent the manure from becoming too wet during rainfall events. An appropriate height for rows is approx. 2m high which is optimal to manage internal heat and combustion which allows for pathogen deactivation, weed seed destruction and decomposition.

Wet manure from drains and sedimentation systems should be stored separately and allowed to dry prior to being added to windrows.

3.1.5. By-product Utilisation

Processed manure can be a valuable source of nutrients and organic matter for improving soil fertility, structure, water holding capacity and crop or pasture production. Manure utilisation areas should be carefully selected taking into account the following:

- Application method,
- Separation distances between sensitive receptors and watercourses,
- Prevailing winds,
- Area to be spread,
- Time of day (spreading not to occur before 7 am or after 4 pm),
- Existing nutrient levels and application history,
- Topography, flood inundation and weather for 48 hours pre and post spreading, and
- Grazing rotation.

Once the utilisation area is selected, the application timing should be considered. This includes:

- Crop or pasture needs (nutrient balance) and rotation stage,
- Manure maturity,
- Timing of other management events (cultivation etc),
- Soil moisture, and
- Wind conditions.

Further detail relating to the use of manure and effluent is contained in the Effluent Management Plan (J128-EfMP-V1R4 dated 17/11/2020)

3.2. SENSITIVE RECEPTORS

The property is located between the Cobb Highway on the east being approx. 620m at its closest point and the Moama to Deniliquin Railway line on the western side being 2.9km from the site. The northern adjoining boundary is owned by the applicant's family and the southern property is owned by the applicant. The Moira National Park is situated to the east of the property with the boundary being more than 500m from the site.

The site in relation to surrounding residences and external workplaces is identified below. The map and summary table identifies that there is one residence (green), one temporary stay (yellow) and one storage/workshop area (yellow) within 5kms of the site, not owned by the applicant or their family.

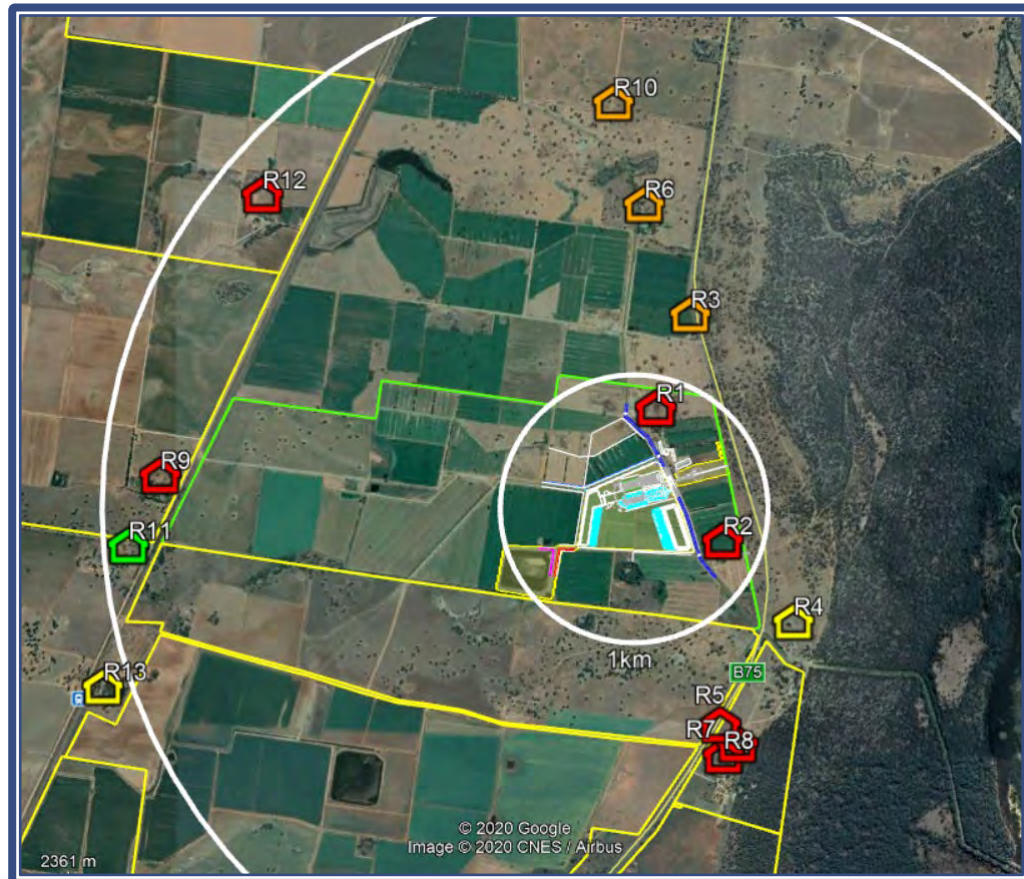


Figure 13 - Project site in relation to surrounding area. White circles 1km & 4km from centre of project area (Source Google Earth)

Table 5 - Table of receptors

ID	Type	From barn		From effluent system	
		Distance	Direction	Distance	Direction
R1	Yarrimbah House 1*	332m	N	614m	NE
R2	Yarrimbah House 2*	625m	SE	958m	E
R3	Rural Residence – 'Cotswold Park' Staff House unoccupied**	1057m	N to NE	1,370m	NW
R4	Moira PID Workshop	1,438m	SE	1,631m	S to SE
R5	Rural Residence @ 'Moira'*	1,661m	S to SE	1,693m	SE
R6	Rural Residence - 'Cotswold Park' **	1,832m	N to N-W	1,989mm	N
R7	'Moira' temporary stay buildings*	2,021m	S to SE	1,880m	SE
R8	'Moira' Homestead*	2,063m	S to SE	1,850m	SE
R9	'Moira Downs' House*	3,436m	W	2,618m	W
R10	'Cotswold Park' North house**	2,665m	N to NW	2,751m	N
R11	Rural Residence – Owned by staff member	3,735m	W to SW	2,785m	W

ID	Type	From barn		From effluent system	
		Distance	Direction	Distance	Direction
R12	'Moira Downs' House*	3,319m	NW	3,192m	NW
R13	Weekend Camping Hut – no power	4,178m	SW	3,100m	SW
	Moira State Forest	927m	SE	1,370m	E
	Cobb Hwy	620m	E	1,251m	E
	Property Boundary*	505m	E	941	E

* Denotes owned by applicant

** Denotes owned by family

3.3. BUFFER DISTANCES

As identified in the *Environmental management guidelines for the dairy industry*, (NSWDPI, 2008), there are no specific guidelines in NSW for the assessment of odour from dairy operations however consideration of the NSW *Technical notes: assessment and management of odour from stationary sources in NSW – cattle feedlots* have been used as a baseline for this background document. A review of the Victorian *Dairy cattle feedpad guidelines – Appendix H – Determining buffer distances* has also been used for detail around potential odour from feedpads and as a comparison.

The foundation or factor calculations for the required Level 1 odour assessment required buffer distances relating to this site have been provided below:

3.3.1. Design and Management Factor

Odour emissions at intensive livestock operations are related to management and design factors which includes the depth of manure on surfaces and the moisture content of that manure. These factors in turn relate to other factors such as climatic conditions, stocking density and cleaning frequency.

It is noted that the *NSW Environmental Management guidelines for the dairy industry* (NSW DPI, 2008) suggests that an odour impact assessment should utilise the Feedlot Class 4 S1 factor identified in the *Technical notes: Assessment and Management of Odour from Stationary Sources in NSW* (DEC NSW, 2006) for all dairies, 'since feedpads, loafing areas and holding yards remain wetter for longer periods than most cattle feedlots.' This recommendation is further reviewed below.

Victoria provides a similar operation and management factor which specifically relates to the management principles of a dairy feedpad style operation. As this assessment was written specifically for dairy feedpads and freestall barns, this assessment methodology has been included in this assessment of the project.

As described above, this operation relates to a concrete floored freestall barn system that utilises a mattress and dry bedding system for cow comfort. The sheds are cleaned by floodwash at least twice daily to ensure a clean and well-maintained area for cow welfare and comfort. The grade of the barns is a 1% slope allowing full drainage of the concrete surfaces within the operation. An additional area adjoining the barns is available to be utilised, when appropriate, for cows with the area in line with class 1 feedlot management. Considering the above design and operation and twice daily cleaned concrete surfaces, the operation better fits within the Class 1 feedlot operation description. This value is higher than the Victorian specific factor for this type of system

New South Wales

Table 6 - Replication of Table 7.2a Stocking Density Factor, S1, (less than 750mm rainfall)

NSW Stocking density (m ² /beast)			
Feedlot class	10	15	20
Class 1	65	52	40
Class 2	95	78	58
Class 3	128	103	78
Class 4	158	127	96

Victoria

Table 7 - Victorian Stocking Density Factor

Type of Cleaning System			Stocking Density		
			M2 per DCU		
			10	15	20
Roofed Pad	Scraped Only	Weekly	29	27	25
		Monthly	32	31	30
		Annually	35	34	33
	Flood washed	Daily	20	19	18
		Weekly	23	22	21

3.3.2. Receptor Type Factor

The receptor value allows for a variance in sensitivity to odour based on population. The greater the exposed population, the more likely it is that 'sensitive' individuals might be exposed to nuisance odour. (MLA, 2012)

Table 8 - Receptor Factor

Receptor type	NSW Value	Vic Value
Large towns, greater than 2,000 persons	1.6	5
Medium towns, 500-2000 persons	1.2	4
Medium towns, 125-500 persons	1.1	4
Small towns, 30-125 persons	1.0	4
Small towns, 10-30 persons	0.6	3
Single rural residence	0.3	1
Public area (occasional use)	0.05	0.1

3.3.3. Terrain Factor

The terrain surrounding any site is known to impact on the spread and concentration of odours and must be a consideration in relation to odour behaviour.

Table 9 - Terrain Factor

Terrain	NSW Value	Vic Value
Valley drainage zone	2.0	2.0
Low relief	1.2	1.2
Flat ¹	1.0	1.0
Undulating country between operation and receptor	0.9	NA
High relief or significant hills and valleys between operation and receptor	0.7	0.7

1. Flat terrain is described as less than 10% upslope, 2% downslope and not in valley drainage zone.

3.3.4. Vegetation Factor

Vegetative cover is a major factor in the drag that the earth's surface exerts on air moving over it. Where the surface is rougher (vegetated areas) the more turbulent the air flow which will increase mixing and dilution of air.

Table 10 - Vegetation Factor

Vegetation	NSW Value	Vic Value
Crops only, no tree cover ¹	1.0	1.0
Few trees, long grass ²	0.9	0.9
Wooded country	0.7	
Heavy timber	0.6	0.7
Heavy forest (both upper and lower storey)	0.5	

1. Crops only – annual field crops that are sown on a seasonal basis and that the land is bare. Isolated, scattered or small clumps are not sufficient tree cover to provide a higher value.
2. Few trees is regarded as open country with a permanent covering of grass or pasture or around 1m and a light scattering of timber which is distributed continuously across the buffer area.

3.3.5. Wind Direction Factor

Wind direction in relation to a receptor is an important factor as it has the potential to increase a downwind receptor's exposure to potential odours.

Table 11 - Wind frequency Factor

Wind frequency	NSW Value	Vic Value
High frequency towards receptor ¹	1.5	NA
Normal wind conditions	1.0	
Low frequency towards receptor ²	0.7	

1. High frequency wind towards the receptor if the wind blowing towards the receptor (+/-40 degrees) with a frequency of at least 60% of the time for all hours over a whole year.
2. Low frequency towards the receptor if the wind is blowing towards the receptor (+/- 40 degrees) with a frequency of less than 5% of the time for all hours over a whole year.

3.3.6. Cumulative Effects

Surrounding Premises

In consideration of potential cumulative impacts, a review of other intensive livestock operations and licenced premises has been undertaken. The following map and table indicate that the nearest licenced operation to the project site is located over 10kms to the north west of the site.



Figure 14 - Map showing the location of identified licensed premises and dairy operations within 30kms of site

Note: white radius circles indicate 10km distances

Table 12 - Table detailing surrounding licensed premises and dairy operations

ID	Status	Type	Distance	Direction	Comment
1	Closed	Dairy	1.4km	N to NW	Dairy closed. Adjoining family operation.
2	Closed	Dairy	9.66km	NW	Dairy closed for many years. No known plans to re-open.
3	Operating	Feedlot (cattle)	9.77km	NW	Associated Feedlots - licensed and operating
4	Decommissioned	Dairy	11.3kms	S to SE	Dairy sold – new owners are beef farmers. Milk equipment removed.
5	Operating	Sheep lot (small)	12.4 kms	N to NW	Sheep lot. Small operation.
6	Closed	Feedlot (cattle)	15.0kms	SE	Small lot (14 pens). Currently being decommissioned.
7a	Operating	Piggery	17.0kms	NW	PigCo Piggery.
7b	Closed	Feedlot (cattle)	17.0kms	NW	Laradoc Feedlot closed and decommissioned.
8a	Open	Waste station	18.3kms	SW	Moama waste depot.
8b	Open	Sewerage treatment	18.3kms	SW	Moama sewerage treatment plant.
9	Open	Dairy	27.6kms	W to SW	Dairy – open and operating. Not licensed operation.
10	Open	Feedlot (Cattle)	27.8kms	W to NW	Bunnaloo feedlot – licensed and operating.
11	Closed	Dairy	28.2kms	W to SW	Dairy sold and current owners are beef farmers.
12	Closed	Dairy	28.5kms	SW	Dairy recently closed and converted to beef farming operation.
13	Open	Piggery	30.7kms	NW	Piggery – open and operating.
14	Open	Piggery	31kms	W to SW	Piggery – open and operating.

As identified above, it can be seen that within 30kms of the site, there are six dairy sheds. Of these sheds, only one other shed is in operation with the remaining operations having sold their milking herd and most completely decommissioning the milking infrastructure.

There are eight intensive animal industry operations of varying species and size. Of these, two have been decommissioned, one appears to be a small occasional use sheep-lot, two are licensed feedlots operating over 5,000 head and three are piggeries in operation. The nearest of these operations to the site is an operating cattle feedlot located nearly 10kms to the north west.

The remaining premises are the Murray River Councils waste transfer station and sewerage treatment works that are in operation and located over 18kms to the south east of the project site.

Existing operation

It should also be recognised that the existing operation utilises an open sided, roofed compost barn system to manage additional nutritional cow requirements and protect pastures within the 790-cow operation. This calculation has been provided below to compare the existing required buffer distance and the proposed operation required buffer distance.

Utilising the NSW S Factor method, the following calculation has been utilised:

$$D = N^{0.5} \times S$$

Where:

D =	Required Buffer Distance	As Calculated
N	Number of Cows	790 = 28.1
DCU =	Number of 650kg Cows on area 24hours	790 cows x 1.25 x (24/24)
S=	S factor Calculation	S1 x S2 x S3 x S4 x S5

Utilising the Victorian S Factor method the following calculation has been utilised:

$$D = DCU^{0.5} \times S$$

Where:

D =	Required Buffer Distance	As Calculated
DCU =	Number of 650kg cows on area 24 hours	790 cows x 1.12 x (24/24) = 29.7
S =	S factor Calculation	S1 x S2 x S3 x S4 x S5

A review of the existing operation under the buffer distance requirements is as follows:

Table 13 - Existing operation buffer receptor distance

Receptor	Distance (m)	S1		S2		S3		S4		S5		Buffer	
		N	V	N	V	N	V	N	V	N	V	NSW	VIC
R1	296	95	29	0.3	1	1	1	0.9	1	1	-	721	862
R2	751			0.3	1	1	1	0.9	1	1	-	721	862
R3	924			0.3	1	1	1	0.9	1	1	-	721	862
R4	1,538			0.3	0.2	1	1	0.9	1	1	-	721	173
R5	2,063			0.3	1	1	1	0.9	1	1	-	721	862
R6	1,750			0.3	1	1	1	0.9	1	1	-	721	862
R7	2,210			0.3	1	1	1	0.9	1	1	-	721	862
R8	2,280			0.3	1	1	1	0.9	1	1	-	721	862
R9	3,863			0.3	1	1	1	0.9	1	1	-	721	862
R10	2,578			0.3	1	1	1	0.9	1	1	-	721	862
R11	4,164			0.3	1	1	1	0.9	1	1	-	721	862
R12	3,600			0.3	1	1	1	0.9	1	1	-	721	862
R13	4,642			0.3	1	1	1	0.9	1	1	-	721	862
Moira SF	874			0.05	0.1	1	1	0.9	1	1	-	120	86
Cobb Hwy	333			0.05	0.1	1	1	0.9	1	1	-	120	86
Boundary	244												

It can be seen from the above table that the NSW method requires an existing buffer distance of 721m for all rural residences. This distance is met at all locations except the owner's main house adjoining the existing compost barn.

The Victorian assessment has calculated a larger buffer area being 862m for rural residences. These distances are met at all locations except for the two owners' houses adjoining the existing compost barn.

There is no history of complaints at this site which has been in operation for approx. 15 years. This is consistent with the above met buffer distances.

3.3.7. Result

The following table provides a summary of the calculated required buffer distance for the proposed site utilising the above equations referencing the following:

$$N = 2112^{0.5} = 45.9$$

$$DCU = 2112 \times 1.12 \times (24/24) = 2365^{0.5} = 48.6$$

Table 14 - Proposed operation buffer receptor distance

Receptor	Distance ¹ (m)	S1		S2		S3		S4		S5		Buffer	
		N	V	N	V	N	V	N	V	N	V	NSW	VIC
R1	332	65	20	0.3	1	1	1	0.9	1	1	-	807	973
R2	625			0.3	1	1	1	0.9	1	1	-	807	973
R3	1,057			0.3	1	1	1	0.9	1	1	-	807	973
R4	1,438			0.3	0.2	1	1	0.9	1	1	-	161	195
R5	1,661			0.3	1	1	1	0.9	1	1	-	807	973
R6	1,832			0.3	1	1	1	0.9	1	1	-	807	973
R7	1,880			0.3	1	1	1	0.9	1	1	-	807	973

Receptor	Distance ¹ (m)	S1		S2		S3		S4		S5		Buffer	
		N	V	N	V	N	V	N	V	N	V	NSW	VIC
R8	1,850			0.3	1	1	1	0.9	1	1	-	807	973
R9	2,618			0.3	1	1	1	0.9	1	1	-	807	973
R10	2,665			0.3	1	1	1	0.9	1	1	-	807	973
R11	2,785			0.3	1	1	1	0.9	1	1	-	807	973
R12	3,192			0.3	1	1	1	0.9	1	1	-	807	973
R13	3,100			0.3	1	1	1	0.9	1	1	-	807	973
Moir Forest	927			0.05	0.1	1	1	0.9	1	1	-	134	97
Cobb Hwy	620			0.05	0.1	1	1	0.9	1	1	-	134	97
Boundary	505												

1. Note distance provided is based on closest distance to odour source IE storage dam or barns.

Utilising the NSW calculation methodology, the required buffer distance has been identified as 807m for rural residences. There are two residences located within this buffer area which are owned and lived in by the applicant. All other identified residences are not located within the buffer area. It should however be noted that the buffer distance of 807m is further than the closest property boundary (505m) and, as such, is likely to emit odour at the boundary based on the buffer calculations. This boundary is adjoining the travelling stock route and is buffered from the Cobb Hwy by existing remnant vegetation.

The Victorian method calculates a larger buffer distance however the number of residences remains equal to the NSW method.

The receptor R11 being the nearest outside owned residence is located nearly 2.8kms from the site being 2kms outside the required buffer distance and highly unlikely to be impacted by the operation. Following the examination of both the Victorian freestall buffer and NSW feedlot calculation buffer and the large separation distance from potential odour generating sources on site, it is considered that the Level 1 assessment is adequate for this project assessment.

4. ODOUR MANAGEMENT, CONTROL & MONITORING

4.1. MANAGEMENT

The management of odour is a continuous cyclic process as presented below in **Figure 14**. This section aims to provide a framework whereby the operation licensee and manager can identify, manage and therefore minimise the risk of atypical odour emissions within the operation.

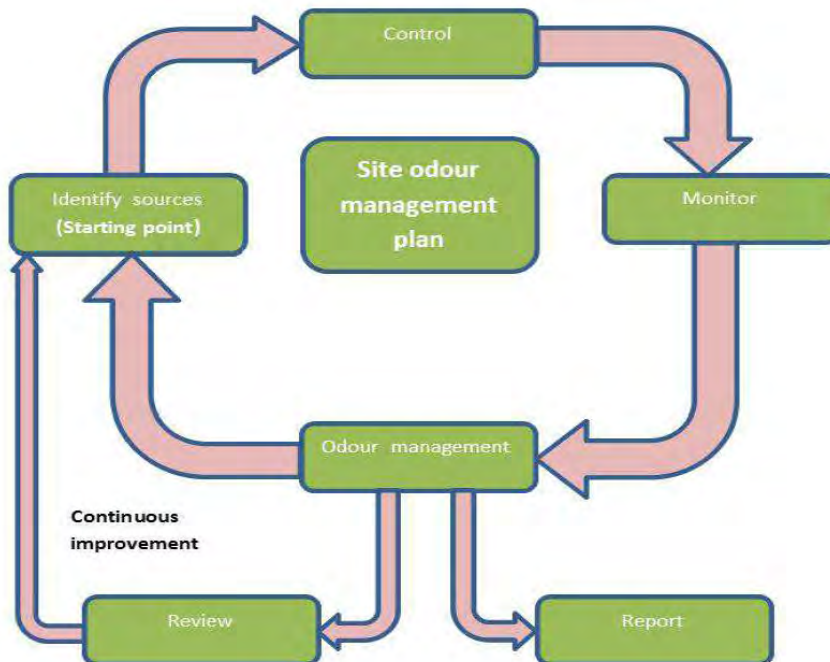


Figure 15 - Odour Management Cycle

The key components that enable the above process to occur are:

- ✓ Plans and Maps,
- ✓ Designs,
- ✓ Responsibilities,
- ✓ Sensitive receptors,
- ✓ Sources,
- ✓ Control,
- ✓ Monitoring,
- ✓ Reporting, and
- ✓ Review.

4.2. CONTROL

The most appropriate hierarchy of odour control is presented in **Figure 15**. The prevention of odour releases is the preferred method rather than control. This method requires good management as well as maintenance and housekeeping procedures. Where it is not practicable to prevent the odour releases, they should be minimised to a level that will not cause odour nuisance.

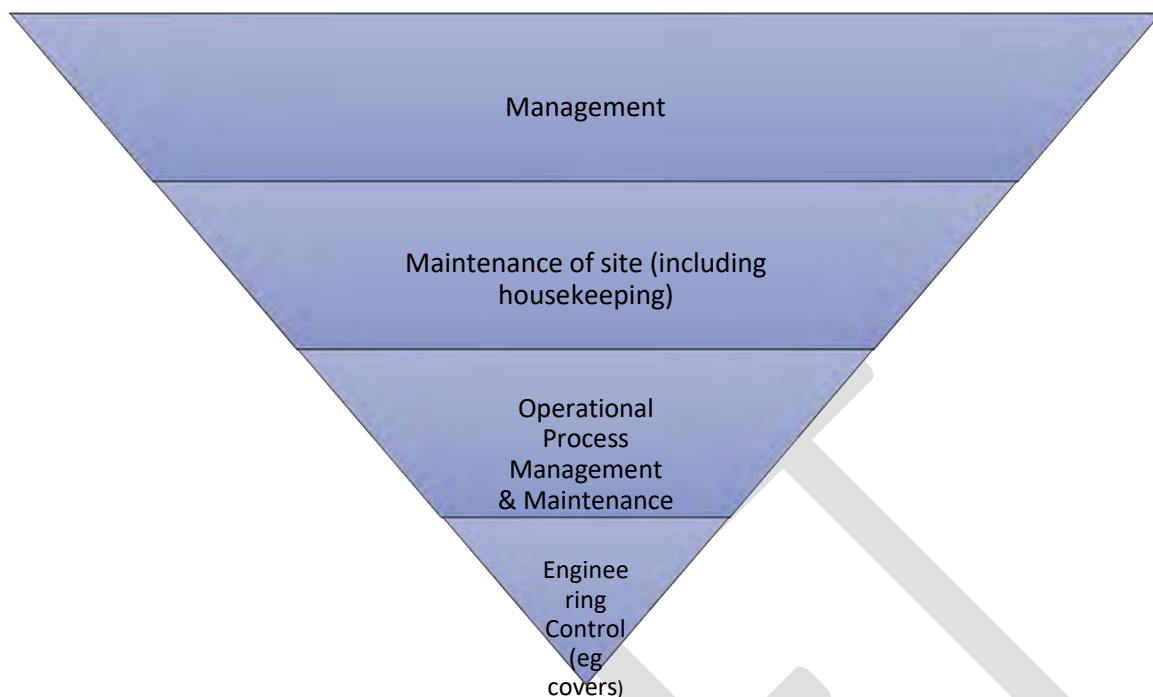


Figure 16 - Preferred Hierarchy of Odour Controls

4.3. MONITORING

4.3.1. Weather Station

The 'Yarrimbah' Dairy operation has a permanent site related weather station being an Envirodata 10 meter maestro weather station which uses sensors that comply with AS/NZ standards.

This weather station allows current, 10min, hourly and daily recording of data including:

- ✓ Wind Speed,
- ✓ Wind Direction,
- ✓ Rainfall,
- ✓ Air Temperature,
- ✓ Relative Humidity,
- ✓ Barometric Pressure,
- ✓ Solar Radiation and
- ✓ Radiant Heat.

The station is currently calibrated yearly with the data being held online on a cloud server operate by Envirodata.

4.3.2. Records

Records of odour complaints will be kept within the operation and will be reviewed as required with this document.

4.4. ODOUR OBSERVATIONS

Should an odour complaint be made relating to the site, the following odour observations will be undertaken.

The observation method uses a standardised scale to record intensity. To ensure a standardised response, the odour descriptors shown in **Table 15** should be utilised. In utilising this scale, an odour with an intensity of 3 or higher would be a detectable odour with a recognisable (i.e. the type of odour is known) character.

Observations should be made every 10 seconds for at least five (5) minutes. Each observation involves the recorder breathing in through their nose normally and recording the odour intensity. Breathing in does not require the person to inhale large amounts of air, but just breathe normally to avoid biasing the observation.

Table 15 - Odour Intensity Scale

Perceived odour strength	Intensity level rating	Interpretation
Extremely strong	6	In normal circumstances, this should be very rare in a field situation. For an offensive type of odour, the reaction would be to immediately mitigate against further exposure. This remains the dominant thought and motivation until the exposure level is reduced. The odour cannot be tolerated.
Very strong	5	The odour character is clearly recognisable. For an offensive type of odour, exposure to this level is considered unpleasant/undesirable to the point that action to mitigate against further exposure is considered or taken.
Strong	4	The odour character is clearly recognisable. For an offensive type of odour, exposure to this level would be considered unpleasant/undesirable.
Distinct	3	The odour character is clearly recognisable. Note that this must still apply even if in a different context or situation - for example, not knowing or expecting what type of odour may be present. The odour is tolerable – even for an offensive odour.
Weak	2	The assessor is reasonably sure that odour is present but not 100% sure of the odour character.
Very weak	1	The odour character is not recognisable. There is probably some doubt whether the odour is actually present. A useful strategy where the odour is borderline between “not perceptible” and “very weak” is to alternate such observations between 0 and 1.
Not perceptible	0	No odour.

Should additional monitoring be required by the regulator, testing should be performed in line with the *Air Quality Sampling Manual* (QEPA, 1997) or other more recent and relevant test methods, including those detailed in the *Approved methods: Sampling and analysis of air pollutants in NSW* (DEC NSW, 2006).

4.4.1. Assessment Process

The process for manual recording is as follows:

- Staff member undertaking recording must have “re-calibrated” their sense of smell prior to undertaking the assessment. This includes moving offsite for at least 1 hour and having a shower and wearing fresh clothes. Wherever possible, the assessment should take place prior to entry to the dairy/freestall barn area.
- Staff are to go to general location of complaint or downwind in the same direction as close as possible in a straight line to the complainant’s location (no entry to private property without permission) and record the following:
 - Date,
 - Time,
 - Immediate odour intensity upon arrival (**Table 15**),
 - Wind Direction at the location and estimate of wind speed based on **Table 16** or portable wind speed sensor,
 - Where odour detected, the activities undertaken at the premises at the time of assessment will be recorded and weather station data from the weather station downloaded, and
 - Odour intensity using the descriptors in **Table 15** will then be recorded every 10 seconds for at least five minutes.
- Information from this form will then be entered into the Manual Odour Assessment Register.
- The information in the register will then be reviewed to identify if there is an activity and/or wind direction/speed at which odour is consistently creating an issue. Following the identification of any activity or wind element, contingency measures will be undertaken where possible to ensure that specific activities do not occur in the related climatic conditions.

Table 16 - Beaufort Wind Descriptors

Force	Wind Speed m/s	Appearance	Descriptor
0	<0.3	Smoke rises vertically, no observable wind	Calm
1	0.3-1.5	Direction of wind shown by smoke drift	Light Air
2	1.5-3.3	Wind felt on face, leaves rustle	Light
3	3.2-5.5	Leaves and small twigs in constant motion	Gentle
4	5.5-8.0	Raises dust and loose paper, small branches are moved	Moderate
5	>8.0	Small trees in leaf begin to sway	Fresh breeze or stronger

A copy of this form and the register of assessments is included in the Appendices.

4.4.2. Ad Hoc Observations

Where a staff or family member makes odour observations while travelling to the property that are not associated with complaints, the observation can simply be recorded as the location, date, time and whether odour was detected, and if it was, what intensity. If no odour is detected, no odour should be recorded (i.e. intensity 0).

DRAFT

5. SITE ODOUR OBJECTIVES

The objective of this assessment and plan is to ensure that the site operates without leading to nuisance odour impacts on surrounding sensitive locations.

The key benchmark will be to ***minimise offsite odour nuisance at sensitive receptors as defined by relevant State Legislation.***

6. RESPONSIBILITIES

The licensed operator and site manager or delegate have responsibility for:

- ✓ Implementation of the OMP,
- ✓ Conformance with the OMP,
- ✓ Training staff with regard to the OMP,
- ✓ Recording and reporting of incidents as required,
- ✓ Updating the plan, and
- ✓ Ensuring corrective actions are taken.

Responsibilities for odour control for staff in addition to the site manager are highlighted in the following sections and as updated from time to time to utilise the experience and staff resources.

Table 17 - Responsibilities and Management Checks

No.	Area	Activity	Description	Interval	Requirement	Checks	Responsibility	Records
1. Accommodation & Feeding								
1.1	Barns	Cleaning	Floodwash of alleys	Twice daily or as required	Alleys are to be maintained in clean condition to ensure animal welfare standards are maintained	- Alleys are clean and safe with low odour levels	All staff	NA
1.2	Natural Instinct	Pen cleaning	Manure scraped from the pen surface down to manure interface layer.	To maintain a manure depth of 50mm or less	Pen manure pack depth not to exceed 50mm to ensure Class 1 conditions.	- Manure removed where possible is moist not wet. - Pen surface protected through maintenance of pen interface. - Manure removed from the pens to be relocated to the composting area.	Manager / Pen Cleaner	NA
1.3	Effluent treatment, bedding	Bedding removal/ effluent cleaning	Transport of bedding materials and manure.	Manure is removed from barns and effluent catchment system transported to adjoining storage pad	No manure spillage to occur during transport.	- Loads not to exceed vehicle capacity. - Preferably undertaken in the morning hours. - Manure and bedding is to be either stored on manure pad or delivered to site just prior to use on paddock.	All Staff	NA
1.4	Natural Instinct area fences	Under-pen fence cleaning	Manure scraped from under fence lines to allow pens to drain and to reduce the risk of anaerobic conditions in the manure. .	When required and prior to pen scraping	Manure height under fences does not inhibit drainage.	- Manure build up under pen fences must not inhibit drainage of pens. - Manure build up should not remain wet. - Material removed to be transported to manure storage area through cleaning activities.	All Staff	NA
1.5	Natural Instinct	Potholes and wet patches	Potholes and wet areas in pens are repaired.	Weekly	Pens to maintain a uniform slope with potholes and wet areas repaired as soon as practical.	- Wet or loose material to be removed from potholes and backfilled, rolled and compacted.	All Staff	NA
1.6	Feed table	Feed Residue	Spoilt or wet feed removed from feed table	Daily	Spoilt or wet feed to be removed from feed table prior to next feed.	- Material to be removed from barns. - Feeding equipment to be maintained to minimise spillage.	All staff	Nutrition records
1.7	Natural Instinct area troughs	NA	Check for leaking troughs.	Daily	All water trough and water leaks to be repaired as soon as practical. If large pen areas become wet, these should be scraped on an as required basis.	- Check troughs not overflowing and trough overflow system working correctly. - Leaks in pipelines to be repaired as soon as possible. - No wet areas	All Staff	NA
2. Drainage								
2.1	Drains/ laneway	Monitoring	Monitor drains for vegetation, erosion, sediment and potholes or wet areas	Weekly	Drains to maintain a smooth uniform free draining surface.	- Drains are checked for vegetation, erosion, sedimentation and potholes or low areas. Issues reported for repair.	All staff	NA
2.2	Drains/ laneways	Maintenance	Cleaning and Maintenance	Where required	Drains to remain free of sediment and blockages.	- Following run-off events, the level of settled sediments in drains and structures is checked. Excess sediment is allowed to dry where possible prior to removal. - Sediment is to be removed and transported to the manure storage pad. - Potholes in earthen lanes or low areas are backfilled and compacted to produce a durable surface. - Drains/laneways are maintained free of vegetation and blockages.	All staff	NA
3. Effluent Pond								
3.1	Pond	Maintenance	Maintenance of pond system	As identified in effluent management plan	Pond to maintain adequate storage space and limit build-up of sludge.	- Ponds are to be cleaned as required during Autumn/Summer period. Walls and floor of system are to be checked for integrity where exposed during cleaning.	Maintenance	NA
3.2	Pond	Cleaning of sediment from pond floor	Ponds are designed to allow deposition of sediment not removed through separation process	As identified by effluent management plan	Sludge levels on pond floor not to utilise entire storage area	- Sediment and sludge from floor collected when pond cleaned and placed on manure storage pad for drying prior to utilisation. Alternatively, if suitable machinery available, sludge may be removed and applied directly to land in conjunction with application requirements.	Manager	Paddock application records
4. Manure Management and Storage								
4.1	Manure storage area	Maintenance Pad	Manure storage pad to be checked to ensure adequate drainage and integrity of pad maintained	Monthly	Integrity of compacted pad to be maintained to a min. of 300mm. clay pad. Water ponding not to occur in a way that would lead to manure not draining.	- Manure pad to be checked for potholes and low points. - Diversion banks and drains to be checked to ensure that they are still intact. - Structures to be checked to ensure they are operating as designed and not blocked.	Manager / Maintenance	NA

Site Objectives and Responsibilities

No.	Area	Activity	Description	Interval	Requirement	Checks	Responsibility	Records
4.2	Manure storage area	Manure Storage	Windrows	NA	Manure windrows to be sited to allow fast drying post rainfall and composting activities can occur.	<ul style="list-style-type: none"> - Manure to be formed in windrows for aging. - Windrows to be oriented with long axis perpendicular to slope to allow free drainage. - Windrows to be shaped to avoid ponding of rain and run-off water. - Wet manure or sludge will not be placed in the main stockpile until it is sufficiently dry. 	All staff	
5. Manure Utilisation								
5.1	Manure utilisation area	Manure application area selection	Selection of area for application of manure.	Planning	Manure not applied in environmental sensitive area. Application areas not overloaded with nutrients. Sensitive receivers not affected by manure application.	<ul style="list-style-type: none"> - Selected manure utilisation areas must meet the following criteria: <ul style="list-style-type: none"> • Area must not exceed annual allocation of manure applied • Soil tests have been undertaken in conjunction with application and not show elevated nutrient levels • Area must not adjoin sensitive receivers 	Farm Manager/ Agronomist	-Soil tests & Agronomy advice
5.2	Manure utilisation area	Manure application area - timing of application.	Applying manure to manure application area	NA	Environmentally sensitive areas are protected from rainfall run off on areas of manure application. Sensitive receivers are protected from potential odour from application of manure.	<ul style="list-style-type: none"> - Prior to application the following checks are made: <ul style="list-style-type: none"> • No spreading to occur for 48 hours prior to or following heavy rain. • Wind speed and direction – no spreading on areas where prevailing wind direction will carry odours towards any sensitive receivers, • Limit large scale spreading of extraordinarily odorous materials • Application not to occur before 7am or after 4pm. 	Farm Manager	-Weather Station and predictions -Paddock records

7. COMPLAINTS MANAGEMENT

The complaints management process is reproduced below:

7.1. OVERVIEW

This complaints management system contains the following elements:

- ✓ Advertised telephone number for complaints,
- ✓ Receive and record the complaint,
- ✓ Process the complaint and outcome of investigations and action taken, and
- ✓ Feedback to complainants and/or the EPA following investigation, as required.

7.2. INTRODUCTION

Complaints will be received via the complaints telephone line TBA or received directly from the EPA. On receipt, complaints will be forwarded immediately to the manager or their representative for investigation, and will be responded to within five business days, should the complainant request a response.

This response will be provided back to complainant through their nominated choice of:

- ✓ Follow up phone call,
- ✓ Email,
- ✓ Letter, or
- ✓ EPA.

7.3. STEP ONE: RECEIVE AND RECORD THE COMPLAINT

All complaints received by the identified complaints telephone line will be recorded. The following information will be requested from the complainant:

- ✓ Personal information of the complainant – ideally their name and contact details (complaints made without personal information will still be recorded and investigated),
- ✓ Nature of complaint,
- ✓ Time of complaint,
- ✓ Location of complaint (to the nearest crossroad, if complainant prefers not to give their exact location),
- ✓ Description of odour (character and strength), if odour complaint,
- ✓ How long the odour has been present, if odour complaint,
- ✓ Wind direction and other pertinent meteorological information (e.g. raining, fog, hot, wind strength), if odour complaint.

If the complaint is received from the EPA, then the details provided by the EPA will be recorded.

7.4. STEP TWO: INVESTIGATE, ASSESS, AND DETERMINE ACTION

Once a complaint has been received and the details recorded, the complaint will be investigated, and an assessment made. For complaints received on the day of the alleged impact, the investigation will be started immediately. For a historical complaint, the investigation will begin as soon as practicable. The aim of the investigations will be as follows:

- ✓ Day of Complaint: To determine strength (intensity) of odour in the area, and that from the operation if present and to identify activities leading to the impact and to determine, based on this and meteorological data, whether the dairy/freestall was likely the source of the alleged impact.
- ✓ Historical Complaint: To identify activities leading to the impact and to determine based on this and meteorological data whether the dairy/freestall was likely the source of the alleged impact.

7.5. STEP THREE – DAY OF COMPLAINT: INVESTIGATE, ASSESS, AND DETERMINE ACTION

The process is as follows:

- ✓ Complaint information is forwarded to the operation manager at the time of complaint for the matter to be investigated,
- ✓ If the location of the complainant is known, a trained staff assessor will travel offsite, shower and put on fresh clothes. This will be performed to allow the assessor to avoid issues with desensitisation.
- ✓ The staff assessor will then travel to the area around the complainant's location and perform an odour survey in line with **Section 4.4** above. The key odour intensity will be 3 and the frequency of observations at and above this value. The character of the odour should be recorded over time, and it should be noted whether the odour is consistent with freestall barn area odour or not. If non-dairy odour is detected, this should still be recorded and

noted as not being dairy/freestall odour, and where possible the odour should be described in generic terms (i.e. manure, wastewater, compost, dead animal, etc).

- ✓ Where possible this survey should be repeated at the complainant's location.
- ✓ The staff assessor should return to the premises and download the weather station data and determine if the winds leading up to the time of the complaint and those during the odour survey process show that the locations are downwind of the freestall barn.
- ✓ If dairy/freestall odour is detected by the field monitoring and wind direction data shows that the location was downwind of the premises, steps will be taken in line with the OMP to reduce odour emissions to an acceptable level. Should the source of the odour be found to be from another site/location, this shall be recorded in the complaint management system.

7.6. STEP THREE – HISTORICAL COMPLAINT: INVESTIGATE, ASSESS, AND DETERMINE ACTION

The process is as follows:

- ✓ Complaint information is forwarded to the operation manager for the matter to be investigated.
- ✓ The complainant's location should be known. If not, the complaint should be recorded with the further action beyond noting the activities performed on site on that day.
- ✓ If the complainant's location is known, the processes performed on site on the days leading up to the complaint should be noted.
- ✓ The weather station data should be downloaded and investigated to determine the frequency of the time that the complainant's location was downwind of the freestall barn and dairy area¹.
- ✓ If the wind direction indicates that the complainant was downwind of the premises on the day, this should be recorded along with rainfall data and corrective actions made. Should the source of the odour be found to be from another site/location, this shall be recorded in the complaint management system.

7.7. STEP FOUR: RESPOND TO THE COMPLAINT

Once the complaint has been assessed, a formal response will be provided to the complainant, if they requested one. Where required, the EPA will also be advised of the formal response.

This response will be provided within five business days of the complaint being made and will include:

- ✓ Time and date of the complaint,
- ✓ Where known, the location of the complaint,
- ✓ The wind strength and direction in the period leading up to the complaint (whilst considering wind speed) or if time not known, the day of the complaint,
- ✓ Overview of activities undertaken at the premises in the period leading up to the complaint (including rainfall in the preceding week) or on the day of complaint lodgement, and
- ✓ Outcomes of the assessment of the complaint.

7.8. STEP FIVE: RECORD AND REPORT THE COMPLAINT

Complaint data will be compiled in a complaints' register to record the quantity and nature of complaints. The register will detail:

- ✓ Number of complaints received,
- ✓ Number of unique complainants where possible to identify,
- ✓ Nature of complaints,
- ✓ Outcomes of complaints, and
- ✓ If complaint was resolved in compliance with this procedure.

Reports and complaint records will be held for a period of seven years after the complaint is made.

7.9. PROMOTION OF COMPLAINTS TELEPHONE LINE

The complaints telephone line will be advertised through signage at the entry to the operation.

¹ Care should be taken to ensure weather station wind roses generated, identify which option of wind direction is chosen i.e. wind blowing to, or wind blowing from. If 'blowing from', the direction shown is the opposite to where the odour would go. If set to 'blowing to', the roses will point towards where the odour would go.

8. DOCUMENT IMPLEMENTATION AND REVIEW

The implementation of this plan is the responsibility the licensee and manager together assisted by all personnel. The OMP will be stored on the Operation Quality Management System. All staff should be made aware of the plan and be aware that it is available to them.

This assessment and plan is a living document and will be reviewed and updated every twelve months or when practices/equipment change or in response to complaints. During any review, the effectiveness of the management should be considered, assessing complaints, monitoring levels, inspections, environmental conditions, training and feedback.

8.1. RECORD KEEPING

The licensee will maintain a record of the following documents for a minimum of seven years. These include:

- ✓ Complaint Form,
- ✓ Register of all complaints received,
- ✓ Manual Odour Assessment Form,
- ✓ Register of all Odour Assessments, (Manual and Outsourced),
- ✓ Soil Tests of Manure Application Areas,
- ✓ Maintenance record identifying the on-going and emergency maintenance tasks undertaken,
- ✓ Record of monitoring results (daily, weekly, monthly etc.), and
- ✓ Records of staff training.

9. CONTINUOUS IMPROVEMENT

To ensure this plan and the management on the site is kept current, this plan and its structure and requirements will undergo review as follows:

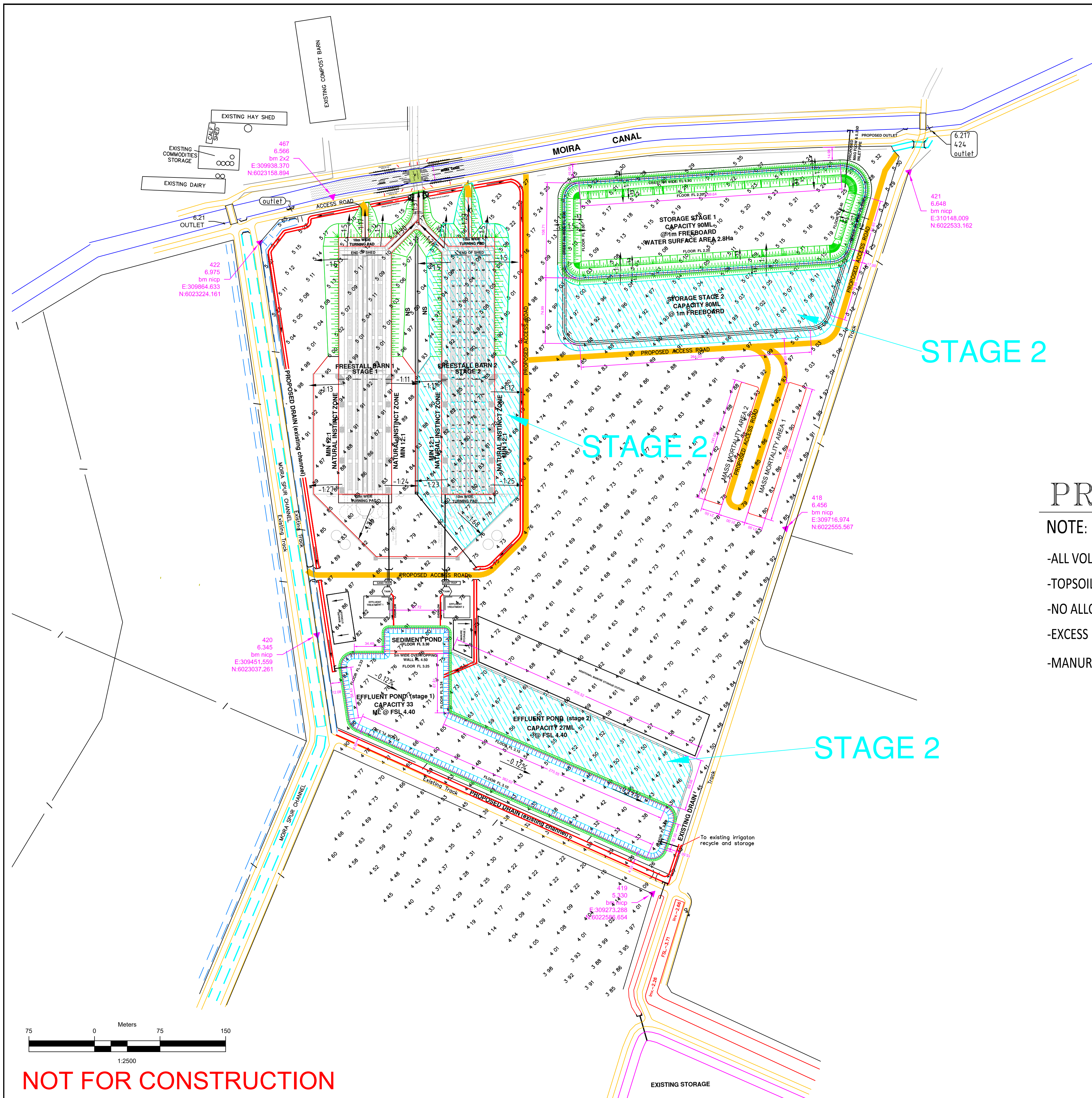
- Regular operational review to check for relevance and opportunities for improvement,
- Whenever any major change to the design or management of the operation occurs,
- Whenever any opportunity to make improvements arises, for example if such opportunities are discovered during complaints investigations, maintenance work or from any major incident, failure, success and the like; and,
- In response to any useful public or others' suggestions.

The review may range from a simple correction, through to a detailed formal review of each element of the plan. Any review must be documented and controlled by ascribing a revised document version number and date on the Document Information Record.



10. APPENDICES

APPENDIX 1 – SITE PLAN



LOCATION MAP.

YARRIMBAH PROPOSED FREESTALL BARN

NOTE:

- ALL VOLUMES CALCULATED @ 1:1.15 COMPACTION RATIO
- TOPSOIL TO BE STRIPPED PRIOR TO CONSTRUCTION AT 0.10m DEPTH
- NO ALLOWANCE HAS BEEN MADE FOR SURROUNDING ACCESS ROADS MANURE STORAGE AREAS
- EXCESS MATERIAL FROM STAGE 1 TO BE PLACED ON SURROUNDING ROADS
- MANURE AND EFFLUENT STORAGE AREAS ARE TO HAVE A MAX. PERMEABILITY EQUAL TO OR LESS THAN $1 \times 10^{-9} \text{M/SEC}$

Yarrimbah Freestall Barn Earthworks Summary

Description	Area (m2)	Cut (m3)	Fill (m3)	Short/Excess (m3)
Feedpad 1/Ramp x2	44000		73600	-73600
Feedpad 2/Ramp x1	38821		72240	-72240
TOTALS	82821	0	145840	-145840
Storage - STAGE 1	42850	69800	18460	51340
Storage - STAGE 2	26760	50000	2940	47060
TOTALS	69610	119800	21400	98400
Sediment Pond	2526	1300	251	1049
Effluent Pond - stage 1	32048	33900	2020	31880
Effluent Pond - stage 2	17870	26000	1000	25000
TOTALS	52444	61200	3271	57929
STAGE 1 Short/Excess (m3)	-73600			
FEEDPAD	51340			
STORAGE	32929			
EFFLUENT/SEDIMENT	10669			
TOTAL	-72240			
STAGE 2 Short/Excess (m3)	-72240			
FEEDPAD	47060			
STORAGE	25000			
EFFLUENT/SEDIMENT	-180			
TOTAL				

NOT FOR CONSTRUCTION

REF.

DATE

DESCRIPTION.

22/09/20

PLAN AMENDED TO SHOWED STAGED PRODUCTION

NO RESPONSIBILITY TAKEN FOR TITLE DEFINITION.

Finished Level Pegs To Be Placed at Clients Instruction Prior to Landforming. Any Internal Channels, Fences etc. Not Required Are To Be Removed Before Landforming. Where Subsoil is Exposed during Landforming, Resoling is Suggested. Breaching is to be Placed Downstream of All Structures. Proposed Channels Are To Be Constructed Out Of Suitable Soils. Where Channels and Drains Stop, Erosion Control is Suggested.

SOIL TESTS MUST BE UNDERTAKEN TO DETERMINE THE SUITABILITY OF ANY PROPOSED RECYCLE DRAIN, SUMP OR STORAGE AREA.

This Plan May Be Subject To Change.

LEGEND

Fence on Boundary

Fence - Internal

Gate

Laneway/Access Tracks

Tree

Timber Belt

Swamp

Gilgai or Crab Hole

Powerline

Channel To Be Removed

Drain To Be Removed

Main Supply Channel

Proposed Farm Supply

Existing Farm Supply

Main Drainage

Farm Drainage

Terrace Line

Fence on Terrace Line

Channel Pad Height

Channel Base Width

Drainage Bed

Drainage Width

Design Bay Elevation

Change of Grade

Flow Direction & Slope

Cut & Fill (in cm.)

Permanent Mark

Bench Mark

Finished Level Peg

House or Shed

Inv. - 8.83

W. - 3.60

F.L. - 9.171

F.L. - 9.102

F.L. - 9.102

GRADE

+12

or

-12

S

H

Grid Peg

Road Crossing Bridge

Farm Crossing Culvert

Drop Structure

Check or Regulator

Farm Crossing & Drop

Farm Crossing & Check

Detheridge Outlet

Dumpy Peg Level

Design Full Supply Level

AREA SURVEYED - Approx 47 Hectares, 110 Acres.

DATUM - SS 4827, RL - 107.927

NOTE - ADD RL - 100.00 TO ALL LEVELS FOR AHD71 DATUM.

Rich River Irrigation Developments.

BAUER

One Step Ahead

FOR A GREENER WORLD

Centerstar - Centre pivot

Linestar - Linear move

Centerliner - Pivoting Linear, Ditch or Hose feed

RICH RIVER IRRIGATION DEVELOPMENTS

PTY LTD A.C.N.106 901 777

DATE. -17/11/20

SCALE. -1: 2500

Rich River Irrigation Developments. P/L.

26 McCulloch Drive, Moama, N.S.W. 2731.

Ph. 03 5482 2564, Fax. 03 5482 1918, Mob. 0427 691 042, Email. web. www.rird.com.au

Client. -Raymond Smith

"Yarrimbah"

Proposed Freestall Barn

SURVEY

JARROD

BASE PLAN

CHRIS

FILE:interim plan/feedlot earthworks.dwg

SHEET

JARROD

SIZE

A1

DRAWING NO.

J000410



APPENDIX 2 – COMPLAINTS MANAGEMENT RECORDS

Yarimbah Dairy

Complaint Report Form

Date complaint received: _____ Date/Time of Complaint: _____

Complaint advised via: Complaints phone line ☐ Phone Direct to Manager ☐ Text to Manager ☐ EPA ☐

Complaint received by: _____

Name of Complainant (if given): _____

Contact Details of Complainant (if given):

Details of Complaint: _____

Follow up Action: Nil required / requested: ☐ Review (next page) ☐ Assessment - See assessment form ☐ Feedback to EPA ☐

Follow up Contact with Complainant (if any): _____

Review of complaint

Weather data relative to the complaint has been reviewed and attached?

Yes☐

Does the wind direction coincide with the complaint period?

Yes☐

No☐

Has there been recent rainfall?

Yes☐

No☐

Date:

What activities were occurring at the time of the complaint?

Livestock deliveries

☐

Livestock processing

☐

Manure is stored on site?

☐

Other:

☐

Pen cleaning

☐

Bunk cleaning

☐

Pond maintenance

☐

Pens

Where any abnormal activities occurring at the time of the complaint?

Yes☐

No☐

If so, what?

Where any elements of the Odour Management Plan no being complied with?

Yes☐

No☐

If so, which element?

Number: Activity:

What is the reason for non-compliance?

Was an additional odour assessment undertaken? (separate form)

Yes☐

No☐

If yes: what is the result of the odour assessment?

Are there follow up actions from this assessment?

Yes☐

No☐

If Yes, what?

This complaint has been assessed by:

This complaint and assessment has been recorded in the register

Yes☐

No☐

Yarimbah Dairy

Odour Assessment

Date: _____ Location: _____

Wind direction: _____ Wind Speed:¹ _____ Complaint Location _____ or _____ Downwind of complaint location

Odour Intensity at arrival:² _____ *See overpage

Time start: _____ Time complete: _____

Intensity Level ²	Minute 1						Minute 2						Minute 3						Minute 4						Minute 5						Minute 6					
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	360
6																																				
5																																				
4																																				
3																																				
2																																				
1																																				
0																																				

Activities being undertaken at the feedlot at time of observation: _____

Assessment Undertaken by: _____ who has "re-calibrated" their sense of smell prior to undertaking this assessment.

I have been offsite for at least an hour, showered and changed into fresh clothes prior to undertaking this assessment.

Signed: _____ Date entered into register: _____

1 **OMP Table 6.2 - Beaufort Wind Descriptors**

Force	Wind Speed	Appearance	Descriptor
0	<0.3	Smoke rises vertically, no observable wind	Calm
1	0.3-1.5	Direction of wind shown by smoke drift	Light Air
2	1.5-3.3	Wind felt on face, leaves rustle	Light Air
3	3.2-5.5	Leaves and small twigs in constant motion	Gentle
4	5.5-8.0	Raises dust and loose paper, small branches are moved	Moderate
5	>8.0	Small leaves in trees begin to sway	Fresh breeze or stronger

2 **OMP Table 6-1 Odour intensity scale from VDI 3940 (1993 and Pitt (2014)**

Perceived odour strength	Intensity level rating	Interpretation
Extremely strong	6	In normal circumstances, this should be very rare in a field situation. For an offensive type of odour, the reaction would be to immediately mitigate against further exposure. This remains the dominant thought and motivation until the exposure level is reduced. The odour cannot be tolerated.
Very Strong	5	The odour character is clearly recognisable. For an offensive type of odour, exposure to this level is considered unpleasant/undesirable to the point that action to mitigate against further exposure is considered or taken.
Strong	4	The odour character is clearly recognisable. For an offensive type of odour, exposure to this level would be considered unpleasant/undesirable.
Distinct	3	The odour character is clearly recognisable. Note that this must still apply even in a different context or situation - for example, not knowing or expecting what type of odour may be present. The odour is tolerable - even for an offensive odour.
Weak	2	The assessor is reasonably sure that odour is present but not 100% sure of the odour character.
Very weak	1	The odour character is not recognisable. There is probably some doubt whether the odour is actually present. A useful strategy where the odour is borderline between "not perceptible" and "very weak" is to alternate such observations between 0 and 1.
Not perceptible	0	No odour

Yarimbah Dairy

COMPLAINT REPORT REGISTER

[illegible]

Yarimbah Dairy

Cleaning / Maintenance Record

[illegible]

Yarmibah Dairy

Odour Assessment Register

[illegible]

Yarimbah Dairy

Manure Application Record

Date	Paddock ID	Application Rate (t/ha)	Prevailing Weather Conditions	Wind Direction	Manure Incorporated	Person Responsible
				N N-NE NE E-NE E E-SE SE S-SE S S-SW SW W-SW W W-NW NW N-NW	Yes / No	
				N N-NE NE E-NE E E-SE SE S-SE S S-SW SW W-SW W W-NW NW N-NW	Yes / No	
				N N-NE NE E-NE E E-SE SE S-SE S S-SW SW W-SW W W-NW NW N-NW	Yes / No	
				N N-NE NE E-NE E E-SE SE S-SE S S-SW SW W-SW W W-NW NW N-NW	Yes / No	
				N N-NE NE E-NE E E-SE SE S-SE S S-SW SW W-SW W W-NW NW N-NW	Yes / No	
				N N-NE NE E-NE E E-SE SE S-SE S S-SW SW W-SW W W-NW NW N-NW	Yes / No	
				N N-NE NE E-NE E E-SE SE S-SE S S-SW SW W-SW W W-NW NW N-NW	Yes / No	
				N N-NE NE E-NE E E-SE SE S-SE S S-SW SW W-SW W W-NW NW N-NW	Yes / No	
				N N-NE NE E-NE E E-SE SE S-SE S S-SW SW W-SW W W-NW NW N-NW	Yes / No	
				N N-NE NE E-NE E E-SE SE S-SE S S-SW SW W-SW W W-NW NW N-NW	Yes / No	
				N N-NE NE E-NE E E-SE SE S-SE S S-SW SW W-SW W W-NW NW N-NW	Yes / No	
				N N-NE NE E-NE E E-SE SE S-SE S S-SW SW W-SW W W-NW NW N-NW	Yes / No	

Yarimbah Dairy

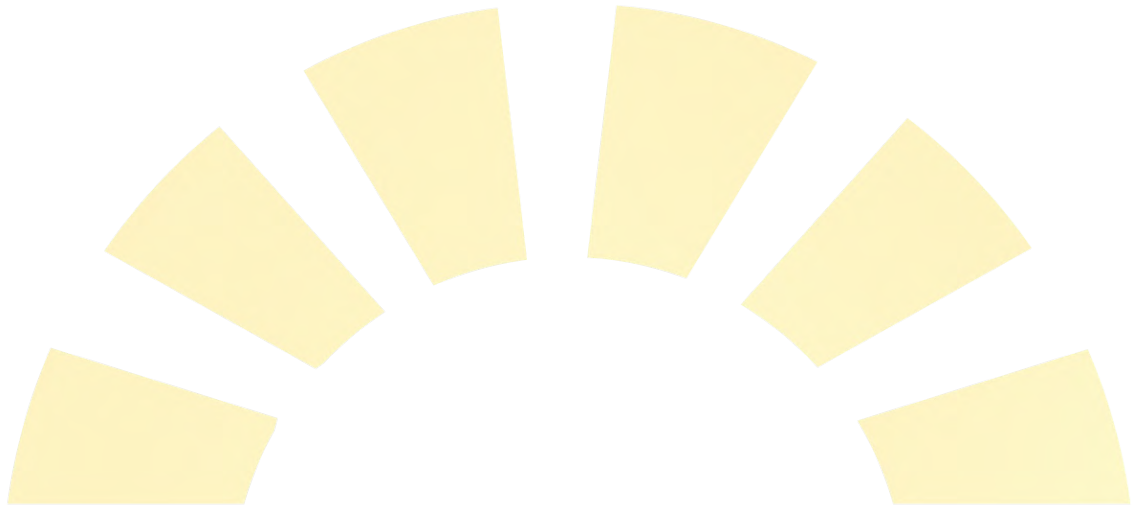
Spoilt Feed Collection Record

[illegible]



Appendix 13

Effluent Management Plan



Effluent Management Plan

Proposed 2,112 dairy cow freestall barn

'Yarrimbah' 2901 Cobb Hwy, Mathoura, NSW

November 2020



Progressive Rural Solutions

www.prsLtd.com.au





Document Information Record

Project Details

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Project:	Construction and Operation of a new diary freestall barn system on 'Yarrimbah', Mathoura NSW
Project No:	128-0

Document Control

Document Title	Effluent Management Plan for the construction and operation of a new diary freestall barn system on 'Yarrimbah', Mathoura NSW				
File Name:	J128 – EfMP – V1R4				
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Author	Clare Fitzpatrick	Position:	Director		
Signature:		Date:	16/11/2020		
Reviewed by:	Clare Fitzpatrick	Position:	Director		
Signature:		Date:	16/11/2020		
Approved by:	Ray Smith	Position:	Owner		
Signature:		Date:	11/11/2020		

Revision history

Version	Issue date	Reason for issue	Author	Reviewed by	Approved by
V1R1	16/06/2020	Initial Document	Clare Fitzpatrick	NA	NA
V1V2	06/11/2020	Draft	Clare Fitzpatrick	M Fitzpatrick	Clare Fitzpatrick
V1V3	11/11/2020	Draft for client review	Clare Fitzpatrick	Client	Clare Fitzpatrick
V1R4	17/11/2020	Final	Clare Fitzpatrick	Clare Fitzpatrick	Owner

Distribution

Version	Recipient	Lodgement	Copies
V1R3	Client for review	Electronic	1
V1R4	Murray River Council for lodgement	Electronic	1
V1R4	WaterNSW	Electronic	1
V1R4	Environment Protection Authority	Electronic	1
V1R4	Client/Contractor	Electronic & Hard	1

Disclaimer

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Related Documents

Type	Author	Name	Date
Environmental Impact Statement	Progressive Rural Solutions	J128-EIS-V1R4	17/11/2020
Design Plans	Rich River Irrigation Developments	J000410 – staged plan	17/11/2020
Layout Plans	Entegra	Layout Plans 1-3	20/08/2020
Certified Plans	Entegra	Certified Plans 1-10	06/11/2020

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1. INTRODUCTION

1.1. PURPOSE

The purpose of this report is to:

- Describe the site in relation to the proposed effluent treatment system,
- Identify and detail the project:
 - Water use requirements,
 - Manure generation within the system,
 - Catchment areas and their integration with the system,
- Detail the proposed effluent management system,
- Complete a total system water balance,
- Identify system nutrients and their utilisation requirements, and
- Provide management requirements and considerations.

This Effluent Management Plan (EfMP) has been developed in conjunction with information gained from the designers and owner/managers taking into account specific variables and management strategies relevant to the property. Site soils, hydrology, design plans and planning overlays relevant to the property have been used in developing this report.

Should any changes occur in relation to the described farm management practices, significant herd number changes or long-term strategies, this plan should be updated and reviewed to reflect the current operating systems and processes.

1.2. OBJECTIVES

This plan reviews the proposed effluent system and management practices to determine that the operation can source/access sufficient assets (water/land/resources) to operate at proposed capacity. This will be undertaken through a water and nutrient balance to ensure that the proposed system will meet industry compliance under the relevant State legislation and planning policies.

1.3. PERSONNEL UNDERTAKING THIS REVIEW

This review has been undertaken by a qualified effluent system designer who has over 20 years combined experience with agricultural management, design, development, construction and natural resource management. This includes an extensive involvement with the review and assessment of agricultural development proposals which considers the natural and built forms within project sites and surrounds. The identification, avoidance of and management of potential project impacts are of high importance. Experience and knowledge are regularly updated by working closely with other experts in field assessments, peer reviews and significant consultation and delivery of referral authority requirements throughout south eastern Australia and the West Australian Kimberley.

Clare Fitzpatrick is qualified effluent designer and holds a Diploma in Applied Science in Agriculture among other qualifications.

1.4. BACKGROUND

The Smith Family is proposing to extend their existing dairy operation from a 790 head compost barn to a 2,112-cow dairy freestall barn system. The freestall barn system will be constructed within an existing irrigation area, separated from the existing barn, milking shed, feed storage and mixing area. The proposed barn system will replace the existing compost barn and be independently managed in relation to water storage, effluent management and controlled drainage. The operation will continue to utilise the existing milking shed and commodities areas. No further consideration of the existing milking shed effluent system will be made within this assessment as the existing effluent system will not interact with the proposal. The existing compost barn will no longer be in operation which will reduce the existing effluent system by a higher capacity than the additional cow numbers processed through the dairy.

The freestall barns are each proposed to house 1,056 cows with each cow housed within the barns provided with access to its own stall. The open sided barns will have a central feed alley and each side a row of single and double stalls creating six lanes within the barns that will be cleaned utilising a flood wash system. The barns will be constructed on a 1% slope allowing sufficient fall for manure removal by floodwash. Adjoining the lower half of each site of the barns is an earthen 'natural instinct' area where cows will be provided access during suitable days.

All works are proposed to occur within an existing highly modified environment. An Environmental Impact Study has been undertaken to review the potential impacts relating to the project works.

The images below provide an overview of the site, a cross section and a plan view of the barn areas.



Figure 1 - Overview of area proposed for barn system

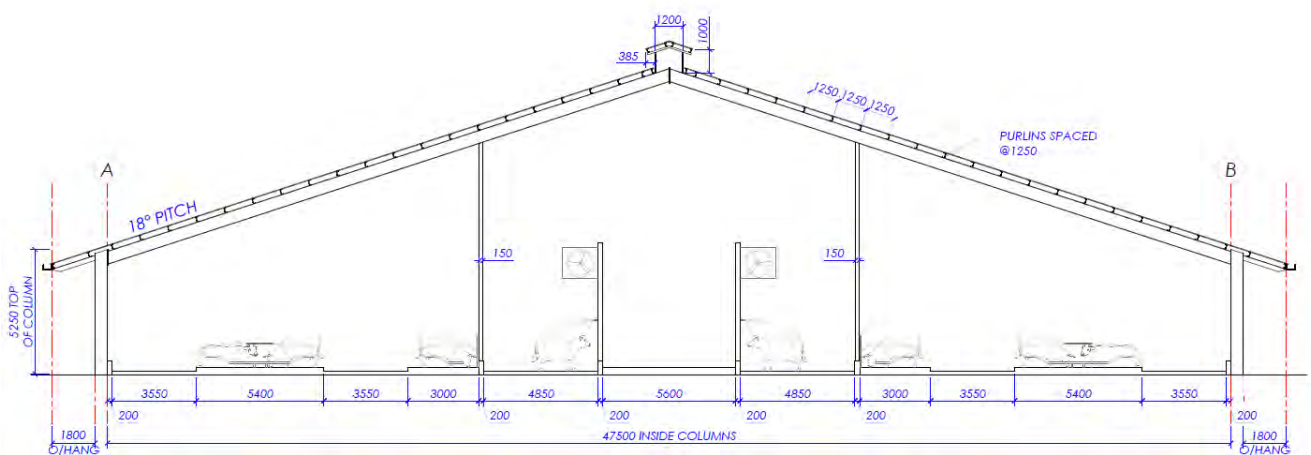


Figure 2 - Cross sectional plan of barn

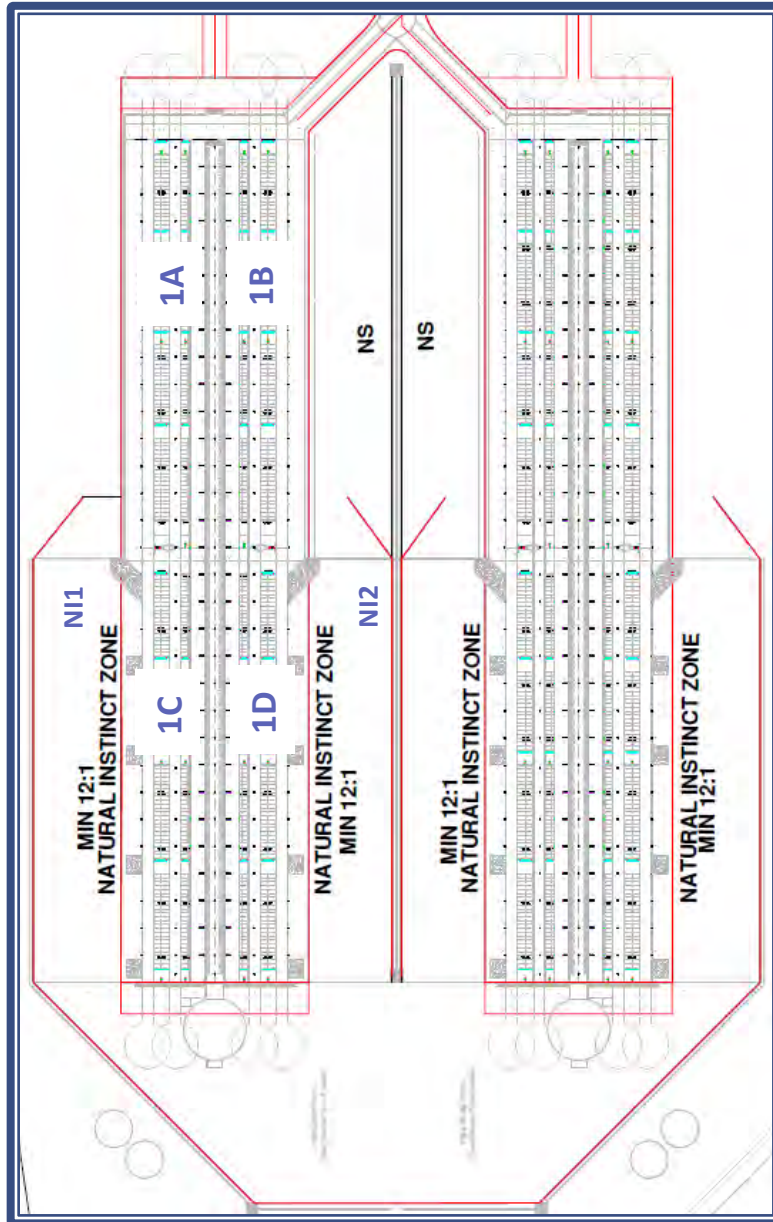


Figure 3 - Plan view of barn

2. SITE DETAILS

2.1. SITE LOCATION

The project is located in the New South Wales Riverina region and the Murray River Council Local Government Area. The project site is located on the property known as 'Yarrimbah' which adjoins the Cobb Hwy between Moama and Mathoura.

The project site, which includes the proposed freestall barns and infrastructure, is located within the existing irrigation area of the property. The site also adjoins the Moira Private Irrigation District's main supply and a spur channel on two sides. The project infrastructure and works are proposed on Lot 2 DP1077844, Lot 117 DP455183, Lot 13 DP751153 and Lot 14 DP 751153 with the remaining portions of the property incorporated for effluent and manure application which will be utilised to grow feed as part of the project operation.

The location of the project site is shown in the figures and tables below.



Figure 4 - Location of project site in relation to the region

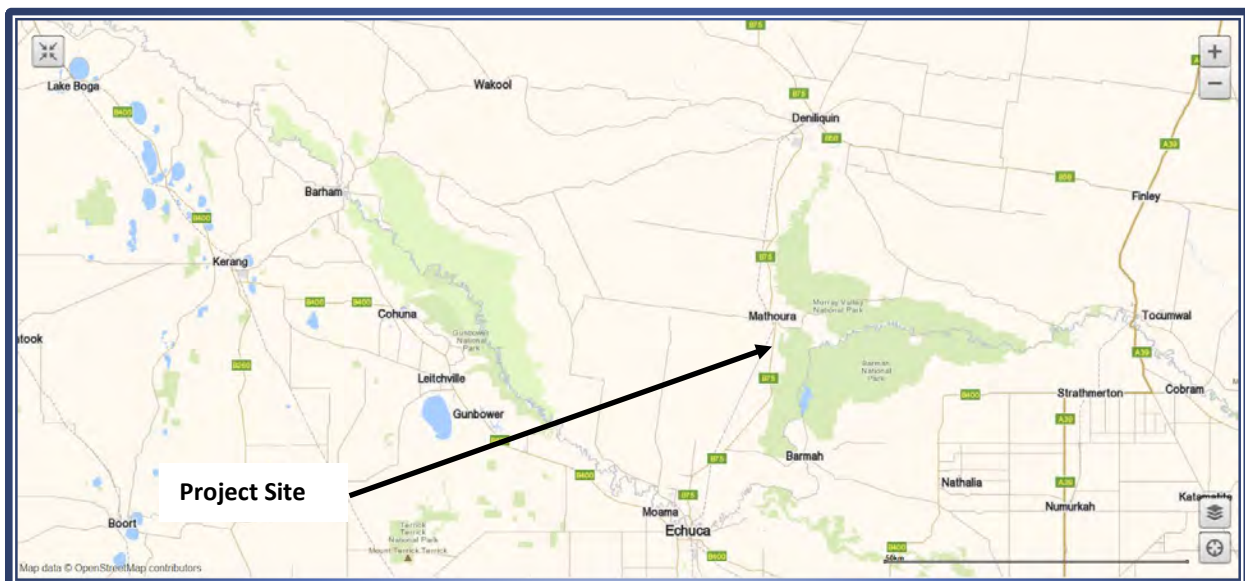


Figure 5 - Location of project site in relation to the local area



The land details of the project are summarised as follows:

Table 1 - Land details of the project

Details	Specific related to project site			
Lot number	2	117	13	14
Deposited Plan	1077844	455183	751153	
Parish	Moirá			
County	Cadell			
Local Shire	Murray River Council			
LEP Zone	Zone RU1 – Primary Production			
Catchment Area	Murray			
IBRA Sub-region	Riverina – Murray Fans			
Mitchell Landscapes	Murray Scalded Plains			
Local Aboriginal Land Council	Moama Local Aboriginal Land Council			
Floodplain Management Plan	Nil			
Land Stature	Freehold			
Area of project works	Approx. 42ha			
Area of this property	Approx. 573ha			
GPS Reference	MGA Zone 55 E:309685 N:6022812			

Other property and connected Lot & DP numbers in relation to the project are:

Table 2 - Property identification details

Property Name	Lot	DP	Parish	County	Total Area (ha)	Irrigation Area (ha)
Yarrimbah	2	1077844	Moirā	Cadell	573	394
	31	751153				
	124	751153				
	12	751153				
	14	751153				
	13	751143				
	117	455183				

A review of overlays in the attached property planning report identifies the following:

Table 3 - Property specific overlays

Overlay	Identified on site		Adjoining Property?
	On Site	On Property	
Crown Land	X	X	Yes
Heritage	X	X	Yes
Flood Planning	X	X	Yes
Landslide Risk	X	X	X
Acid Sulphate Soils	X	X	X
Aboriginal Cultural Heritage Sensitive Landscape?	X	X	Yes
Aboriginal Site Recorded	X	X	Yes
Drinking Water Catchment	X	X	X
Groundwater Vulnerability	X	X	X
Mineral and Land Resource	X	X	X
Obstacle Limitation Surface	X	X	X
Riparian Lands and Watercourses	X	X	X
Salinity	X	X	X
Scenic Protection Land	X	X	X
Terrestrial Biodiversity	X	Yes	X
Wetlands	X	X	Yes
Environmentally Sensitive Land	X	X	X

The table above identifies that the site is not subject to an overlay that may impact the project planning or operation. The property has an identified Terrestrial Biodiversity overlay present on the remnant stands of native vegetation that are located on the southern boundary of the property. The site is zoned RU-1 – Primary Production.

The adjoining areas within the Moira Forest (being within a separate catchment area) are identified as Crown Land, with recorded Aboriginal sites and a sensitive landscape within. That area is also subject to inundation and is a mapped wetland area. This area is not directly adjoining the property and there is no connection between the project site or proposed effluent application areas. The areas are separated by natural and built environment including the top of the Cadell Tilt, the Cobb Hwy and the Moira Private Irrigation Channel system.

2.3. SITE DESCRIPTION AND INFRASTRUCTURE

The project site where infrastructure is proposed has been utilised for irrigated pasture and cropping since the Moira Private Irrigation District's (PID) inception more than 50 years ago. The irrigation system on the site is surrounded by an access track, existing drains and channels. There are four fields within the main area which are supplied from the Moira PID channel on the eastern side. Each field is connected to the existing on-farm irrigation drainage which exits the project area in the south west corner delivering drainage water to the property recycle point and connected storage dam for re-use on the property.



Figure 7 - Image showing existing irrigation layout on the project site

The groundcover on the site consists entirely of introduced species such as grazing oats and pasture species. Standing vegetation on the site consists of single row plantation species that are predominantly non-native to the area and are in varying stages of survival.

There is no existing dairy infrastructure located on this site as this project relates to a new proposal. The existing dairy system will remain as an independent system that will continue to operate as a separate system.

2.4. SITE SURROUNDS

The site being located within a rural area is surrounded by other farming properties. The Moira Private Irrigation District maintains its pump infrastructure and workshop located approx. 1km to the south east of the site. The Cobb Hwy is located to the east being divided from the property boundary by Travelling Stock Reserve. The entrance to the Moira National Park is on the opposite side of the Cobb Hwy located over 650m to the east at its closest point to the site. The nearest known camping and frequent public use area is over 5.5kms from the property.

The site and surrounds are generally flat with a very low relief within the broader area. There is less than a 10m elevation change in the surrounding area – including considering the Cadell Tilt formation. The broader area is described as the Riverine plain and contains isolated stands of vegetation with some scattered paddock trees.

2.5. SITE CLIMATE

Meteorological conditions have the potential to influence a range of project-related activities. An overview of these conditions at the project site and surrounds, with a focus on their potential influencing factors to project related activities has been recorded below.

The climate records utilised in this assessment have been sourced from both the Deniliquin Airport (site 074258) (since 1997) and the Silo data portal (records between 1900 and 2019). The grid point utilised for the Silo search is Lat: -35.95 and Long: 144.85 which is located 10 km to the south west of the site.

A previously decommissioned weather station in the vicinity of the site has been re-activated and upgraded for future use. Records available from this weather station have been provided in addition to the regional data however do not provide 12 months of data for consideration. For future assessment of the climate at the site, the site related weather station will be utilised. This weather station is a Weather Maestro station installed and serviced by Envirodata, which includes the following modular systems:

Table 4 - Weather station recording conditions

Sensor Type	Identification	Operating Range	Accuracy	Resolution
Wind Speed	WS52	0-75m/s	+/- 0.2 m/s	0.1 m/s
Wind Direction	WD50	0-359 degrees	+/- 1 degree	1 degree
Air Temperature	TA70	-20 to 80 deg C	+/- 0.2 deg C	0.025 Deg C
Relative Humidity	RH70	0 to 100%	+/-2% RH (10% - 90% RH) +/- 4% rh (<10% or <90% RH)	0.1% RH
Rain Gauge	RG50	0-700mm/hr	+/- 1% to 200mm/hr +/- 3% to 380mm/hr	0.2mm per tip

The wind speed and wind direction sensors are installed on a 10m high mast in an open environment. The weather station is located at E: 310113, N: 6020661 Zone 55.

CLIMATE RECORDS

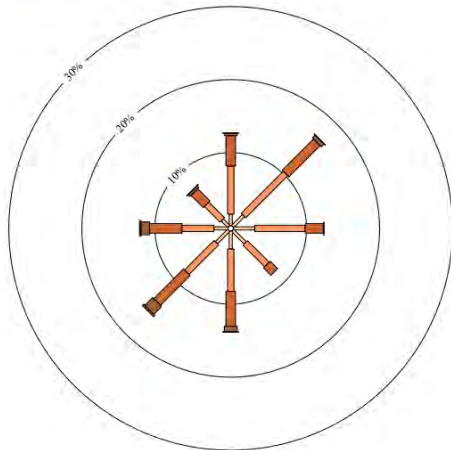
The Deniliquin to Moama area can be described as a semi-arid climate under the Koppen climate classification with warm to hot summers and cool winters. Temperature extremes are quite variable across the year and the highest temperature recorded at Deniliquin was 47.2 degrees on the 25th January 2019. The lowest temperature was -5.6 on the 1st July 2017. The average annual rainfall is 258mm with most rainfall falling in August to October.

Table 5 - Climate Data

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Highest High	47.2	46.6	41.2	39.0	27.0	24.4	23.3	27.6	36.7	37.6	44.0	46.5	47.2
Mean Max	33.4	32.1	28.6	23.6	18.6	15.0	14.4	16.2	19.9	23.9	28.0	30.7	23.7
Mean Min	16.7	16.2	13.5	9.6	6.2	4.0	3.5	4.0	5.9	8.5	12.0	14.4	9.5
Lowest Low	5.7	6.0	3.5	1.0	-2.0	-4.4	-5.6	-5.0	-2.1	-0.6	1.1	5.0	-5.6
Mean rainfall	27	24	29	29	39	39	41	40	37	38	30	29	402
Mean rainfall days	4.4	4.8	4.3	5.5	8.0	12.7	14.3	11.0	8.6	6.4	6.8	5.7	92.5
Mean 9am wind speed	19.5	19.3	17.9	16.4	13.8	14.0	13.7	15.9	17.9	19.2	19.6	17.2	13
Mean 3pm wind speed	20.5	19.2	18.4	17.4	17.7	17.9	18.6	20.3	21.3	21.3	20.3	21.1	19.5
Monthly Evaporation	266	216	174	99	54	35	37	58	91	142	194	245	1612

The annual wind records which are displayed as wind roses for both 9am and 3pm for the Deniliquin Airport have been provided below.

9 am
8073 Total Observations
Calm 2%



3 pm
8076 Total Observations
Calm *

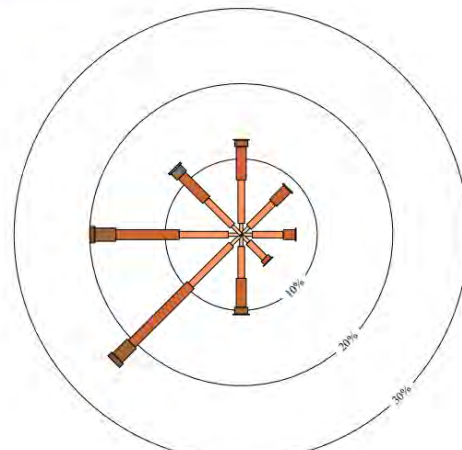


Figure 8 - Average annual wind data from 9am (left) and 3pm (right) showing direction wind blowing from

The site-specific records for period 8th July to 30th September 2020 (being the available timeframe for the station) are shown below.

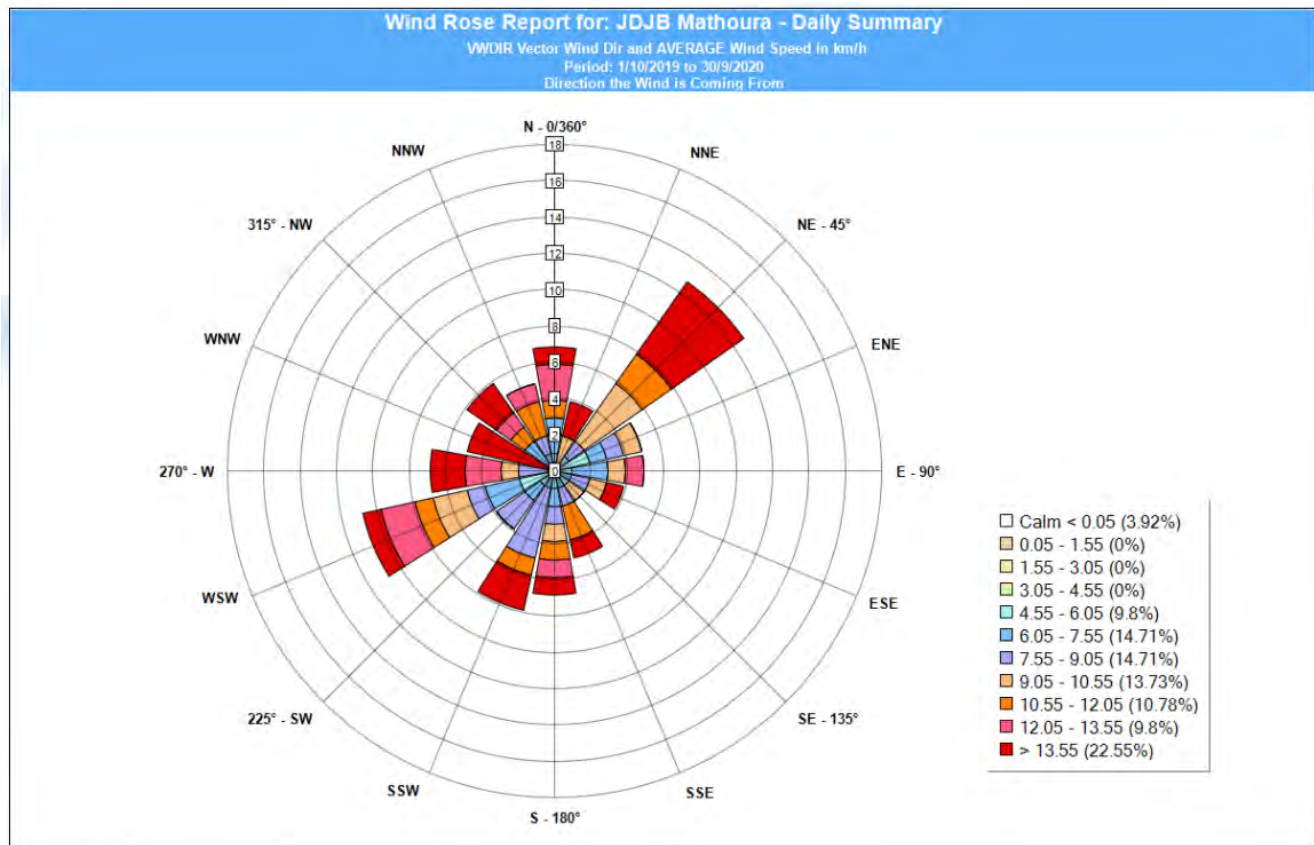


Figure 9 - Site specific wind rose showing the direction the wind is blowing from

It can be identified from the above that the site and surrounds are subject to 'normal wind conditions' with no low or high frequency winds blowing in any specific direction. The main wind direction at the site is from the north-east and the west south-west.

The average rainfall vs evaporation is shown below which identifies that in all months except June and July, evaporation exceeds rainfall. This shows that in an average year the storage periods for effluent is 2 months.

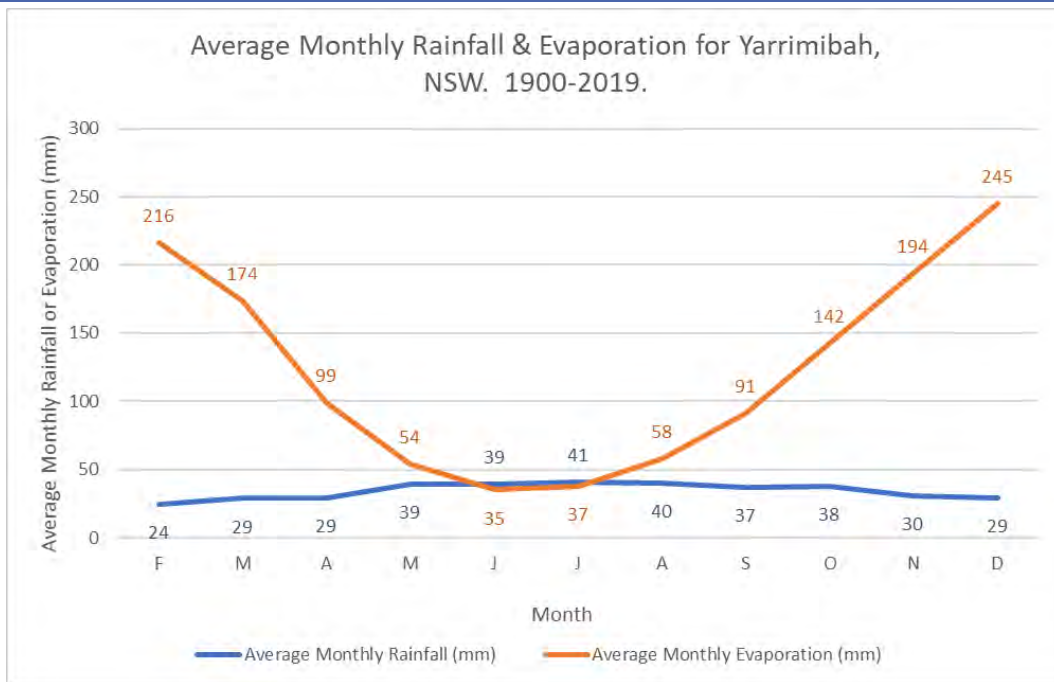
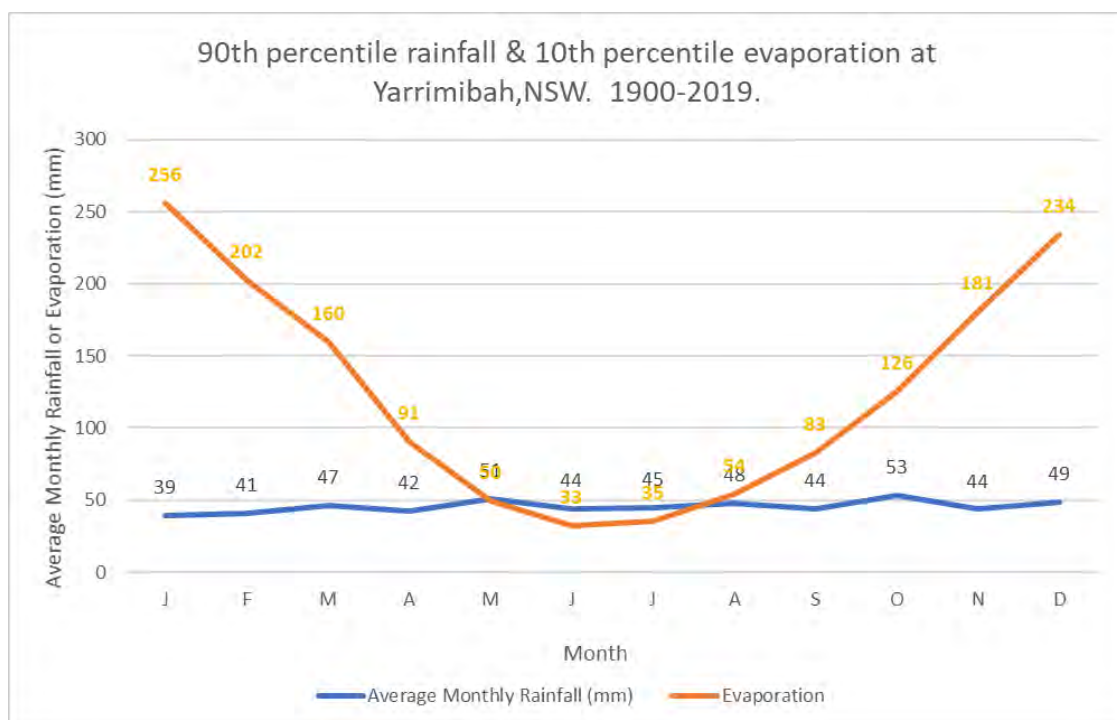


Figure 10 - Rainfall vs evaporation at site in average year

The 90th percentile rainfall vs 10th percentile evaporation is shown below which identifies that in the months of May and August evaporation and rainfall are equal and in the months of June and July rainfall exceeds evaporation. This shows that in a 90th percentile year, the storage period for effluent should include a maximum of four months.


Figure 11 - Rainfall vs evaporation at site in 90th percentile year

3. PROJECT DESCRIPTION

3.1. CURRENT EFFLUENT SYSTEM AND MANAGEMENT

This proposal relates to a proposed freestall barn and effluent system which will be constructed in stages. The existing dairy milking operation is located within a separate area of the property with the Moira Private Irrigation District (PID) main irrigation supply channel dividing the dairy shed system and the freestall barn system. This assessment relates only to the proposed freestall barn system not yet constructed.

3.2. WATER USE INFLOW REQUIREMENTS

The freestall barn proposal requires three separate water inflows to the system. This water is required for:

- Drinking,
- Cooling, and
- Flood wash system for effluent management.

These are further described below.

3.2.1. COW DRINKING REQUIREMENT

Lactating dairy cows can drink over 200L of water per day (Dairy Australia, 2019). A maximum drinking volume of 240L/cow per day has been utilised with a % decrease based on season. This volume has been applied per specialist advice and current operational experience. The system requirements have been estimated as follows:

Table 6 – Estimated cow drinking water requirements

Month	L/Cow/Day	Daily Requirements /barn (L)	Requirement per Barn (ML)	System Requirement (ML)
Jan	240	253,440	7.9	15.7
Feb	228	240,768	6.7	13.5
Mar	204	215,424	6.7	13.4
Apr	192	202,752	6.1	12.2
May	192	202,752	6.3	12.6
June	168	177,408	5.3	10.6
July	168	177,408	5.5	11.0
Aug	168	177,408	5.5	11.0
Sep	180	190,080	5.7	11.4
Oct	204	215,424	6.7	13.4
Nov	216	228,096	6.8	13.7
Dec	240	253,440	7.9	15.7
Total	200 (Avg)	2,534,400	77.0	154.1

The above calculations identify that the operation requires an estimated total of 77ML of drinking water per barn annually – 154ML at full capacity.

3.2.2. COOLING SYSTEM REQUIREMENT

A misting system incorporating cooling fans will be utilised as part of the freestall barn operation. This system will require up to 50,000L/barn/day when in use. A total water use for this system has been provided below based on a percentage of total volume utilised in a month.

Table 7 - Estimated cooling system water requirements

Month	% of days utilised	Total Daily Requirements /barn (L)	Monthly Requirement per Barn (ML)	Total Monthly Requirement (ML)
Jan	100%	50,000	1.6	3.1
Feb	100%	50,000	1.4	2.8
Mar	80%	40,000	1.2	2.5
Apr	30%	15,000	0.5	0.9
May	20%	10,000	0.3	0.6
June	0%	-	0.0	0.0
July	0%	-	0.0	0.0
Aug	0%	-	0.0	0.0
Sep	30%	15,000	0.5	0.9
Oct	60%	30,000	0.9	1.9
Nov	100%	50,000	1.5	3.0
Dec	100%	50,000	1.6	3.1
Total		310,000	9.4	18.8

The above calculations identify that the total estimated water required for cooling per barn is 9.4ML - a total of 18.8ML at full capacity.

3.2.3. FLOODWASH

This assessment relates to a proposed system and provides a basis for design of the system and its ongoing management. The Dairy Flood Wash Calculator V2.7 has been utilised to calculate the adequate flood wash design requirements for the project. The inputs utilised for the calculations are as follows:

Table 8 - Base data utilised in floodwash calculation

Criteria	Input	Rational
Yard Width	11.95m	Based on single side of 1 barn (3.55+3.55+4.85= 11.95)
Yard Length	275m	Total alley length
Yard Slope	1%	Slope of barn pad
Mannings Coefficient (n)	0.02	Stamped concrete
Minimum Flow Depth	75mm	To allow for effective cleaning (recommended depth for feedpads)
Flow Velocity	1m/sec	Minimum velocity for effective cleaning
Results	98,000L	Required flushing volume per barn side

A copy of this calculation output is provided in **Appendix 3**.

The below table identifies the estimated water volume required per barn considering the number of flood washes utilised.

Table 9 - Estimated floodwash water requirements

Wash Area	Single Wash (L)	2 Daily Washes (L)	3 Daily Washes (L)	Total Daily Requirement (ML)	Total Annual Requirement (ML)
Dairy	0	0	0	0	0
Barn 1	196,000	392,000	588,000	0.39	143.1
Barn 2	196,000	392,000	588,000	0.39	143.1
Total (L)	392,000	784,000	1,176,000	0.78	286.16

The calculations provided above identify that the volume of water for flood washing per barn will be 0.39ML per day if undertaking two flood washes. When the operation reaches capacity, a volume of 0.78ML/day is required for washing. This equates to 286ML annually.

3.2.4. TOTAL SYSTEM INPUTS

A Summary of the total water inflows required in the system is as follows:

Table 10 - Total water system inputs

Month	Drinking Water (ML)	Cooling Requirement (ML)	Dairy Shed (ML)	Flood wash (ML)	Total per barn	Total per operation
Jan	7.86	1.55	-	12.15	21.56	43.12
Feb	6.74	1.40	-	10.98	19.12	38.24
Mar	6.68	1.24	-	12.15	20.07	40.14
Apr	6.08	0.45	-	11.76	18.29	36.59
May	6.29	0.31	-	12.15	18.75	37.49
June	5.32	-	-	11.76	17.08	34.16
July	5.50	-	-	12.15	17.65	35.30
Aug	5.50	-	-	12.15	17.65	35.30
Sep	5.70	0.45	-	11.76	17.91	35.82
Oct	6.68	0.93	-	12.15	19.76	39.52
Nov	6.84	1.50	-	11.76	20.10	40.21
Dec	7.86	1.55	-	12.15	21.56	43.12
Total	77.0	9.4	0.0	143.1	229.5	459.0

From the above calculations it is identified that the annual requirement per barn is 229.5ML and 459ML for the operation at full capacity. The highest requirement is 43ML in January and December and the lowest 34ML in June.

The Moira PID system, being one of the sources of supply to the barns, can provide water throughout the irrigation season starting in August and ending in May. Access to groundwater is available year-round. Both supply systems are subject to total volumetric licensing limits. To enable 100% reliability of water to the project, two sources of water are proposed for access at all times. This is proposed as the channel and groundwater system throughout summer and a freshwater storage and groundwater in winter.

In consideration of the availability of water from the Moira PID system, the freshwater storage dam at a capacity of 90ML for stage 1 will adequately cover the freshwater demand in the months of April through to August being a total of 71ML. Similarly, the required volume at total capacity of 142ML is within the proposal total capacity of 170ML. This does not include the ability to utilise the existing licensed bore within the system.

The required system inflows are also within the total volume of allocated groundwater of 1,064ML and below the extraction limit of 800ML demonstrating that there is sufficient capacity within the existing allocated system and proposed storage systems to provide water into the system.

3.3. MANURE GENERATION

The characteristic of manure and effluent is described in the *Effluent and Manure Management Database for the Australian Dairy Industry* as:

$$\text{Total excreta (faeces + urine) (kg/day)} = [\text{milk (kg/day)} \times 0.616] + 46.2$$

The cow production within this operation is aiming for milk production of up to 36l/cow per day.

Utilising the above formular, the total excreta can be calculated as:

Table 11 - Total system excreta (faeces + urine)

Herd Area	Cow/Day (kg)	Barn/Day (kg)	Barn/month (kg)	Barn/Year (kg)	Barn/Year (t)
Barn 1	68.4	72,205	2,202,254	26,354,845	26,355
Barn 2	68.4	72,205	2,202,254	26,354,845	26,355
Total		144,410	4,404,508	52,709,691	52,710

It is important to also identify the different treatment methods and their volumes of the excreta. The proportions of effluent are as follows:

Urine:	60%
Manure:	40%

This operation proposes to install a solids separation system in the future. When incorporated within the treatment system, it is expected that this will remove between 25% and 30% of manure from the system. The remaining 15% of the total effluent will be left as a 'sludge' within the system. The following calculations identify these volumes as:

Table 12 - Effluent system components (urine / solids / sludge)

Herd Area	Total Annual Volume (kg)	Urine Component			Manure Component		
		Annual Prod (L)	Annual Prod (tonnes)	Annual Prod (ML)	Annual Prod (tonne)	Treated (screen) (tonne)	Annual Prod (Sludge) (tonne)
Barn 1	26,354,845	15,812,907	15,813	15.8	10,542	6,589	3,953
Barn 2	26,354,845	15,812,907	15,813	15.8	10,542	6,589	3,953
Total	52,709,691	31,625,815	31,626	31.6	21,083.9	13,177.4	7,906.5

In summary, the system when undertaking solids separation will produce:

- 26,355t of effluent per barn annually - a total of 52,710t,
- 15.8ML of urine per barn annually – a total 31.6ML,
- If no screening is undertaken, the system produces 3,953t of sludge annually – a total 7,906.5t,
- If screening is undertaken the system will produce:
 - 6,589t per barn of screened solids – a total of 13,177t,
 - 3,953t of sludge annually – a total of 7,907t.

3.4. CATCHMENT AREAS

The freestall barn has been incorporated into an existing fully contained 42ha irrigation area. This area can be divided into the following catchment areas that are subject to rainfall and run-off management:

Table 13 - Operation catchment areas by stage

Area	Area (m ²)		Surface type	Run-off Coefficient	Area (m ²)		Run-off Directed to
	Stage 1	Stage 2			Stage 1	Stage 2	
Barn Roof Area	14,160	14,160	Roof	1	14,160	28,320	Tanks
Natural Instinct Area	8,000	8,000	Earthen (bare)	0.8	6,400	12,800	Pond
Drains & Lanes	15,840	11,840	Gravel Lined	0.8	12,672	22,144	Pond
Manure Storage Area	11,000	13,000	Earthen (bare)	0.8	8,800	19,200	Pond
Grassed areas	27,000	19,000	Grassed	0.3	8,100	13,800	Pond
Effluent Pond	35,000	18,000	Water	1	35,000	53,000	Pond
Irrigation Storage			Water	1	18,000	-	Irrigation Storage
Fresh water Storage	42,850	26,760	Water	1	42,850	69,610	Fresh Storage
Remaining area				0.3	-	-	Irrigation Storage
Total Catchment Area	7.60	6.60			70,972	120,944	

The remaining portion of the site is directed outside of the controlled drainage area and follows its current drainage direction to the existing irrigation storage dam.

It can be seen that stage 1 adds a total area of 61,840m² to the effluent pond (excluding water surfaces) and the project at completion adds an area of 113,680m² to the effluent pond. These catchment areas form an important contribution to the winter storage calculations of the effluent pond.

4. EFFLUENT TREATMENT

This section describes the treatment systems proposed as part of the operation.

4.1. SOLIDS TRAP

A solids trap is the first in a series of effluent treatment and management systems. All effluent produced within the barn system will be directed to the trafficable solids trap with the aim of removing sand and gravel from the system. Each barn will have a separate system that allows the independent management of the initial effluent treatment.

Rainfall runoff from the catchment areas is not processed through this system. The trafficable solids traps per barn proposed is shown diagrammatically below:

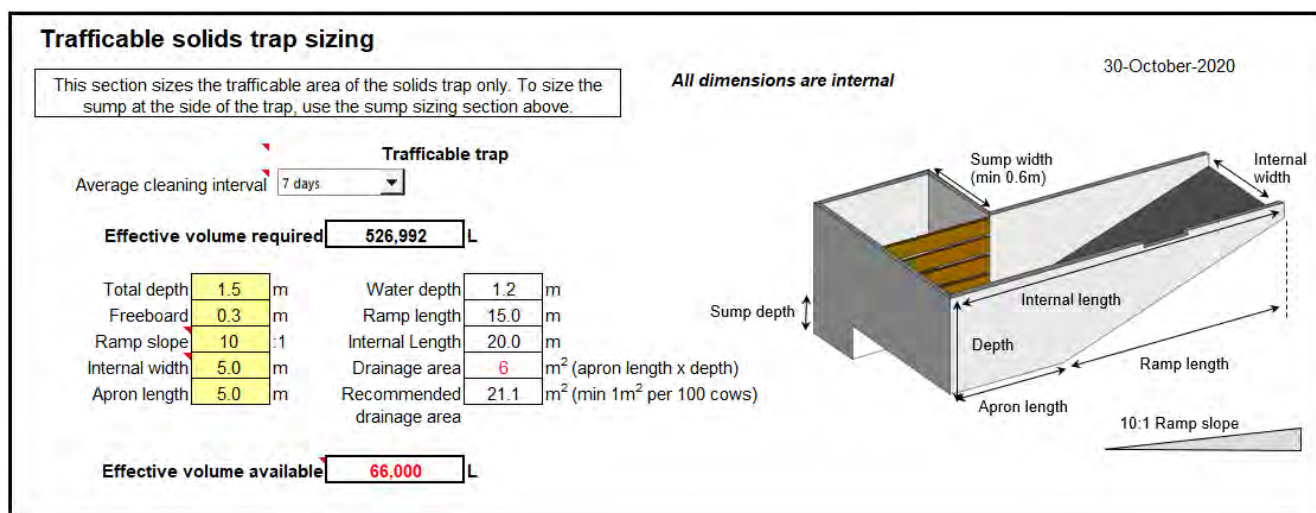


Figure 12 - Trafficable solids trap sizing calculations

The adjoining sump connected to the trap is proposed as the following size:

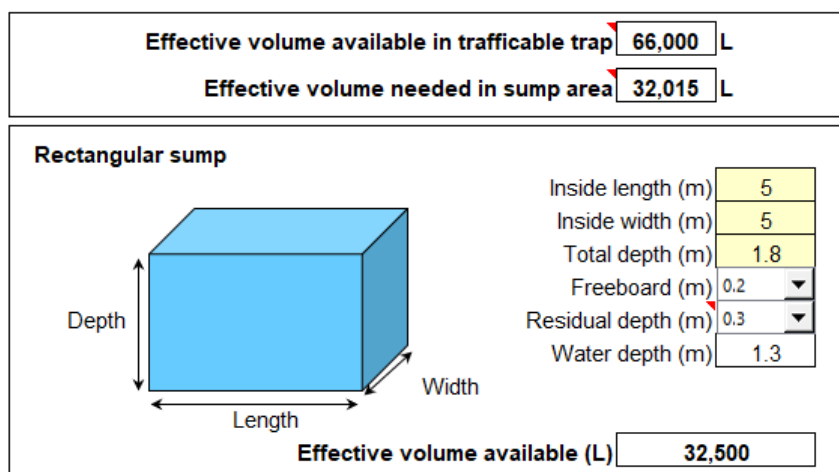


Figure 13 - Trafficable solids trap sump sizing

4.2. SOLIDS SEPARATION SCREEN

This operation has been designed to allow for future effluent processing through a stationary screen system. There are two separate stationary screens that are typically utilised for solids separation which are either an inclined screen or an elevating screen.

An **inclined screen** system has a header tank at the top edge of an inclined screen and as effluent overflows the tank and travels over the screen, liquid passes over the openings of the screen which leaves the solid portion on the screen. These solids are then washed downwards, dropping onto a storage area and draining pad.

An **elevating screen** (or lighted conveyor screen) includes a series of paddles that move the effluent up the screen allowing the liquids to pass through the screen prior to discharging the solids from the upper end onto a draining pad.

Power requirements and maintenance for this type of separation system are low. Ongoing management of an inclined screen requires washing down regularly however the elevating screen does not. Separation efficiencies from this type of system range between 20% and 30% of Total Solids within the system.

With the utilisation of this type of system the following solids are estimated as being removed from the system:

Table 14 - Solids separation volumes

Area	Total Effluent Volume (t)	20% Volume Removed (t)	25% Volume Removed (t)	30% Volume Removed (t)	25% Volume/Month
Barn 1	26,354.85	5,270.97	6,588.71	7,906.45	549
Barn 2	26,354.85	5,270.97	6,588.71	7,906.45	549
Total	52,709.69	10,541.94	13,177.42	15,812.91	1,098

It can be identified from the above calculations that the incorporation of a solids treatment system will remove between 10,542 and 15,813t of manure from the system annually. This averages 549t of manure per month and 1,647t over a 3-month storage period.

In storing separated manure, a triangular cross-sectional area should be utilised. Utilising a centre height of 1.5m for the manure rows a total length of 488m is required per month. In spacing windrows 5m apart, this would require a storage area of 0.5ha per storage month or 1.5ha for a 3-month storage period. As noted above, a 2ha area has been incorporated into the site which allows for the storage of future manure treatment, sludge and separated sand and gravel.

4.3. POND SIZING

The operation will be constructed in stages with earth removed from the effluent ponds utilised to construct the barn pad area. The table below identifies the approximate dimensions and areas of the staged pond and water storage:

Table 15 - Effluent pond sizing dimensions

Pond	Length (m)	Width (m)	Area ¹ (m ²)	Volume (ML)
Sediment Pond	75	30	2,526	3.0
Stage 1	362	33	32,048	33
Stage 2	305	60	26,760	27
Irrigation Storage Dam	390	340	varies	300
Total			61,334	363

1. Area is based on design plan area due to shape of proposed areas.

As identified above, the site requires an average winter storage period of two months and a four-month period to allow for a 90th percentile year. During this storage period, a 90th percentile rainfall volume of 188mm is used as a basis to estimate the volume of additional inflows into the system. This equates to a volume of 6.8ML to consider in the effluent treatment system and storage period for stage 1 and 12.7ML for stage 2.

The effluent Toolkit developed by the Department of Primary Industries, Victoria in conjunction with Diary Australia V11.8, Feb 2018 has been utilised to calculate the effluent pond size requirements against the proposed design and operation. The results are shown below and are divided by stage to ensure compliance at all times.

Stage 1 – 1,056 cows 33ML pond (with trafficable solids trap)

Use this page to size new ponds or to determine if your current system is adequate for your needs

Fill in all yellow cells, review all drop down box options, complete solids pond first

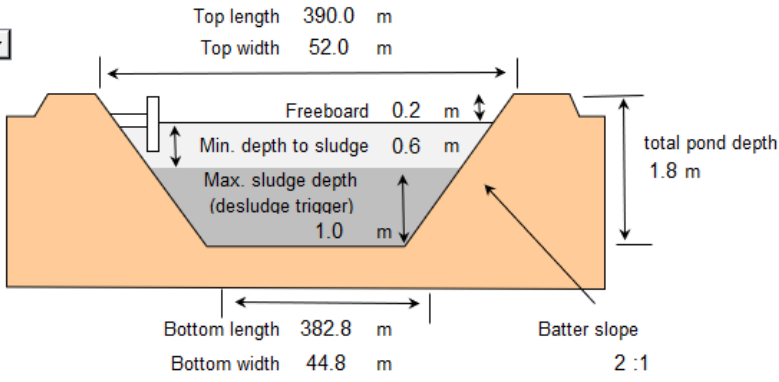
Total water use	392,000	L/day
Total catchment area	35972	m ²
Storage period	4	months
Location	Yarrimbah	

Solids Pond

Type of solids pond Solids collection ditch

% solids at cleanout 15%
Desludge period 1 Years
Min. depth to sludge 0.6

Freeboard (m) 0.2
Internal batter 2 : 1
Top length (m) 390
Top width (m) 52
Total depth (m) 1.8



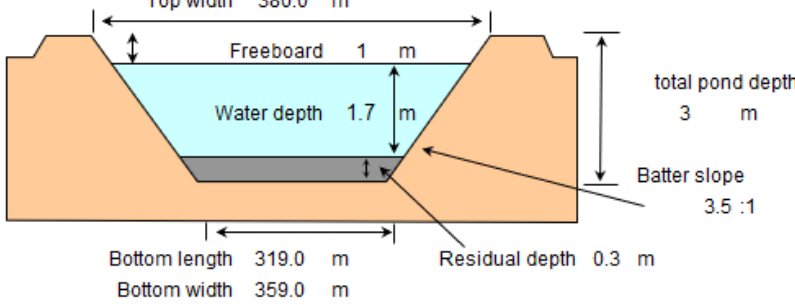
Effective volume (sludge plus supernatant) required 25.96 ML
Effective volume (sludge plus supernatant) available 29.65 ML
Total pond capacity 33.67 ML

Breakdown of effective volume requirements
Sludge volume 14.32 ML
Supernatant volume 11.64 ML

2nd pond

Used for storage

Freeboard (m) 1
Internal batter 3.5 : 1
Residual depth (m) 0.3
Top length (m) 340
Top width (m) 380
Total depth (m) 3



Effective storage required 66.06 ML
Effective storage available 204.09 ML
Total pond capacity 365.36 ML

Breakdown of storage requirements
Net rain on pond surfaces 7.191 ML
Rainfall catchment 6.759 ML
water use + urine 52.113 ML
total effective storage required 66.063 ML
Freeboard 126.696 ML
Residual volume 34.570 ML
total capacity required 227.329 ML

Figure 14 - Effluent pond sizing calculations - Stage 1

In summary:

- The total storage requirement is 29.65ML. The Stage 1 pond has 33.67ML available.
- The total requirement for overflow to the storage is 66ML with 366ML available.
- The storage requirements are met by the site pond and the irrigation storage dam.
- The storage size has been adjusted by length/width to gain the correct storage size and surface area.
- There is a 0.6m buffer allowed between the effluent full supply level and the sludge accumulated level in Pond 1.
- Pond 1 must be cleaned out annually.

Stage 2 – 2,112 cows 60ML pond (with trafficable solids trap)

Pond Sizing

01-November-2020

Use this page to to size new ponds or to determine if your current system is adequate for your needs

Fill in all yellow cells, review all drop down box options, complete solids pond first

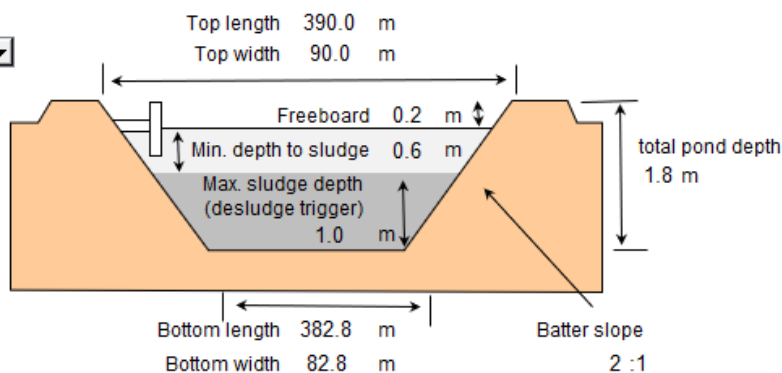
Total water use	784,000	L/day
Total catchment area	67944	m ²
Storage period	4	months
Location	Yarrimbah	

Solids Pond

Type of solids pond

% solids at cleanout
Desludge period Years
Min. depth to sludge

Freeboard (m)
Internal batter :1
Top length (m)
Top width (m)
Total depth (m)


Effective volume (sludge plus supernatant) required ML

Effective volume (sludge plus supernatant) available ML

Breakdown of effective volume requirements

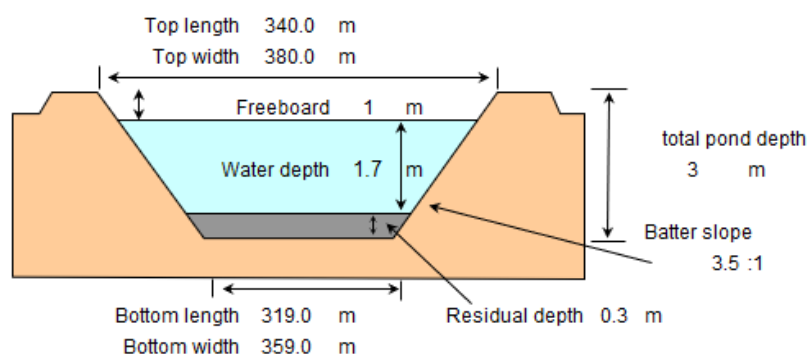
Sludge volume 28.63 ML
Supernatant volume 20.49 ML

Total pond capacity ML

2nd pond

Used for storage

Freeboard (m)
Internal batter :1
Residual depth (m)
Top length (m)
Top width (m)
Total depth (m)


Effective storage required ML

Effective storage available ML

Breakdown of storage requirements

Net rain on pond surfaces 9.975 ML
Rainfall catchment 12.767 ML
water use + urine 104.225 ML
total effective storage required 126.968 ML
Freeboard 126.696 ML
Residual volume 34.570 ML
total capacity required 288.234 ML

Total pond capacity ML

Figure 15 - Effluent pond sizing calculations - Stage 2

In summary:

- The total storage requirement is 53.12ML. The completed pond has 60ML available.
- The total requirement for overflow to the storage is 127ML with 366ML available.
- The storage requirements are met by the site pond and the irrigation storage dam.
- The storage size has been adjusted by length/width to gain the correct storage size and surface area.
- There is a 0.6m buffer allowed between the effluent full supply level and the sludge accumulated level in Pond 1.
- Pond 1 must be cleaned out annually.

5. EFFLUENT IRRIGATION AND NUTRIENT UTILISATION

Effluent and manure produced from dairy and freestall barn systems can provide an important farm system resource and save on fertiliser costs within the system. Best management practices which optimise water, nutrients, and organic matter assist with the avoidance of site contamination (ground and surface waters), reduction of odour, nutrient overloading and large pond sizing and ponding.

This section proposes to identify, the limiting land area for effluent water use and nutrient balancing. This section is provided as a guide only and paddock specific soil tests should be undertaken in conjunction with effluent system tests for future nutrient balances.

5.1. NUTRIENT BUDGETING

5.1.1. LIQUID EFFLUENT APPLICATION

The Victorian DPI Effluent Toolkit utilised for pond sizing also provides a calculator to review effluent application in relation to land area available. Utilising this calculator and the following crop nutrient uptake assumptions, the total area required for irrigation at stage 1 completion is 301ha.

Table 16 - Nutrient budget crop type - Stage 1

Crop	T/ha	Nitrogen	Phosphorus	Potassium
Sorghum grain	12	373.2	60	247.2
No Crop	0	0	0	0
Total		373.2	60	247.2

Total Nutrient Calculator

Total nutrients collected by the effluent system each year

This effluent nutrient budget sets a minimum area of land required to utilise collected nutrients while minimising the risk of excessive nutrient loss through runoff, leaching or volatilisation

Note: This tool is based on the annual nutrient application rate. It does not incorporate advice on maximum rates of nutrient per application. This is of particular importance in the case of Nitrogen, which is highly mobile and will be lost through volatilisation or leaching if not quickly used by the crop.

System details				Fate of Nutrients entering the effluent system			
Annual production	12,967	L/cow		Total nutrient entering effluent system (kg/year)	N 171976	P 30120	K 79607
No cows	1056			Nutrient retained in liquid effluent (kg/year)	85988	18072	71646
Proportion of day on yards	100%			Desludge period	1	years	
System type	Storage			Nutrient contained in sludge upon cleanout (kg)	34395	9036	7961

Nutrient partitioning (%)				Nutrient application details			
Sludge	N 20	P 30	K 10	Maximum nutrient application rate (kg/ha/year)	N 373	P 60	K 247
Liquid	50	60	90				
Loss	30						

Minimum area required for liquid effluent (green water) application system

301.2 ha

Figure 16 - Effluent application area required - stage 1

At project completion utilising a system with minimal solids removal (highest effluent generation), and a nutrient resource utilisation of the following double cropping system, the area required for effluent application is 334ha.

Table 17 - Nutrient budget crop type - stage 2

Crop	T/ha	Nitrogen	Phosphorus	Potassium
Sorghum grain	12	373.2	60	247.2
Wheat	5	371.5	48	268
Highest		373.2	60	268

Total Nutrient Calculator		Total nutrients collected by the effluent system each year		
This effluent nutrient budget sets a minimum area of land required to utilise collected nutrients while minimising the risk of excessive nutrient loss through runoff, leaching or volatilisation				
Note: This tool is based on the annual nutrient application rate. It does not incorporate advice on maximum rates of nutrient per application. This is of particular importance in the case of Nitrogen, which is highly mobile and will be lost through volatilisation or leaching if not quickly used by the crop.				
System details		Fate of Nutrients entering the effluent system		
Annual production	12,967 L/cow			
No cows	2112			
Proportion of day on yards	100%			
System type	Storage			
		N	P	K
		Total nutrient entering effluent system (kg/year)	343952	60240
		Nutrient retained in liquid effluent (kg/year)	171976	36144
		Desludge period	1 years	
		Nutrient contained in sludge upon cleanout (kg)	68790	18072
			159214	143292
Nutrient partitioning (%)		Nutrient application details		
Sludge	N: 20, P: 30, K: 10			
Liquid	N: 50, P: 60, K: 90			
Loss	N: 30			
		Maximum nutrient application rate (kg/ha/year)	N: 745, P: 108, K: 515	
Minimum area required for liquid effluent (green water) application system			334.7	ha

Figure 17 - Effluent application area required - stage 2

The table below provides a summary of the nutrient uptake, loading and required area summary by stage of development.

Table 18 - Stage 1 nutrient calculations

Nutrient	Nutrient uptake (kg/ha)	Loading (1,056 cows) (kg)	Required utilisation area (ha)
Nitrogen (N)	373kg/ha	85,988	230
Phosphorus (P)	60kg/ha	18,072	301
Potassium (K)	247kg/ha	71,646	290

Table 19 - Stage 2 nutrient calculations

Nutrient	Nutrient uptake (kg/ha)	Loading (2,112 cows) (kg)	Required utilisation area (ha)
Nitrogen (N)	745kg/ha	171,976	231
Phosphorus (P)	108kg/ha	35,144	325
Potassium (K)	515kg/ha	143,292	278

As identified above, the area directly available for utilisation of effluent is 352ha. Stage 1 effluent production balances the area available and the required area to effectively utilise the nutrients produced by growing a sorghum seed crop over 301ha.

Stage 2 at full production does not meet the utilisation balance under a single cropping system and will require double cropping to utilise all nutrients. A nutrient balance can be achieved through double cropping with Sorghum grain crop and a wheat silage crop on 334ha.

5.1.2. MANURE AND DRIED SOLIDS APPLICATION

Manure and bedding, where generated from within the system will require utilisation within the operation. This manure has the potential to be utilised in several ways which include pen scrapings from natural instinct area, used bedding in the form of reprocessed dry manure, solids separated from within the effluent system and sludge collected from the pond and stored for drying in the manure storage area.

As identified above, the total manure volume generated by the operation will be up to 53,000t per year at full production (half at stage 1). This manure will be utilised across all owned properties in conjunction with required buffer distances, soil and manure tests. No manure will be spread during times where they could cause an impact to the environment or adjoining residences.

6. WATER BALANCE

A whole of site water balance has been undertaken with the results included in **Appendix 4**.

In summary and as calculated throughout this report the following water is required, managed and utilised as part of stage 1.

Table 20 - Stage 1 water balance summary

	Total Volume (ML)	Max required (ML)	Min required (ML)	Storage/Use Requirement	Requirement met by proposal
Inflow	229.5	21.6	17.1		Yes
Barn Outflow	158.9	13.5	12.19		Yes
Storage Volume	145	15.42	7.31	64.2ML	Yes
Effluent Use	126	64.2	0	301ha	Yes

As shown above the project has the ability to meet the maximum requirements and the storage period requirements with sufficient area to utilise effluent produced as part of the operation in Stage 1.

Table 21 - Stage 2 water balance summary

	Total Volume (ML)	Max required (ML)	Min required (ML)	Storage/Use Requirement	Requirement met by proposal
Inflow	459	43.1	34.2		Yes
Barn Outflow	317	26.9	26.2		Yes
Storage Volume	286	29.08	16.9	99.5ML	Yes
Effluent Use	281	64.2	0	335ha (double)	Yes

As shown above the project has the ability to meet the maximum requirements and the storage period requirements with sufficient area to utilise effluent produced as part of the operation at completion.

7. MANAGEMENT CONSIDERATIONS & CONTINGENCY

With any system, there is a potential for error or component failure. One of the major contributing factors to failure is management – particularly timeframe management. The system design incorporates several components to ensure that in the case of management or equipment failure, there is capacity and a bypass system that can allow autonomous outflow to the effluent pond.

These components include a drainage system with a design full supply level that is managed within an ‘overtopping structure’. This ensures that should a system fail, the effluent will overtop to the next processing area in a controlled way. In this instance, effluent can be re-captured from the effluent solids pond at the start of the system and be re-integrated within the treatment system for solid removal.

The irrigation storage dam provides adequate space for overtopping of the liquid portion of the effluent system. There is sufficient space within the effluent pond to maintain all sludge and solid build up over a 12-month period.

The following list provides additional recommendations for the ongoing management of the system:

Table 22 - Management recommendations

No.	Recommendation
1	Trafficable solids traps should be cleaned out weekly.
2	Effluent pond system should be cleaned out annually with first pond cleaned out as required. This should occur in late summer to allow for sludge drying and sufficient space for winter storage.
3	Sludge stockpiling must be undertaken on the compacted manure storage area and must dry out prior to spreading unless it is to be utilised as sludge within the paddock.
4	Screened manure must be removed from screen areas in line with processing storage design requirements.
5	All manure stored must be located on impervious surface or compacted manure storage area unless it is delivered to paddock prior to spreading.
6	Manure will be applied directly to areas where soil tests for N, P and K have been reviewed and are within acceptable application limits for crop utilisation. Manure should only be utilised with the following buffer distances: <ul style="list-style-type: none"> - 250m from any domestic bore, - 100m from any adjoining rural residence 50m from any natural drainage line, - 50m from any road or rail line, - 50m from the dairy shed and freestall barn area, and - 10m from any boundary.
7	Effluent water from the pond should be integrated into the final irrigation prior to winter storage to ensure maximum winter storage space.
8	The irrigation storage dam must have sufficient ‘air space’ to allow for effluent water to be stored in winter (ie 66ML storage space at stage 1 – 130ML storage space at full production)
9	Effluent water should be tested prior to application following storage period and in conjunction with paddock and crop soil tests where appropriate.
10	No liquid effluent or run-off laden effluent water is to leave the property.
11	Effluent must not be pumped into the Moira PID irrigation channel for disposal
12	Milk must not be introduced to the effluent system. Should milk require disposal, it should be incorporated with irrigation water at a rate of 1:10 and utilised on suitable paddocks
13	Shock and infrequent loadings to the effluent system should be avoided.
14	Drains and pipelines controlling effluent and site catchment water should be inspected regularly to ensure they are operating as designed.
15	A list of service technicians and where possible, spare parts for machinery should be kept on site at all times.
16	Effluent and manure storage areas should be inspected regularly to ensure there are no cracks or faults with the system leading to uncontrolled flows.
17	Ensure the effluent and manure processing machinery is safe to use and staff controlling and working within the vicinity are trained in its operation and safe work practices
18	Never work alone around an effluent pond
19	Maintain access restrictions around effluent ponds and processing areas.



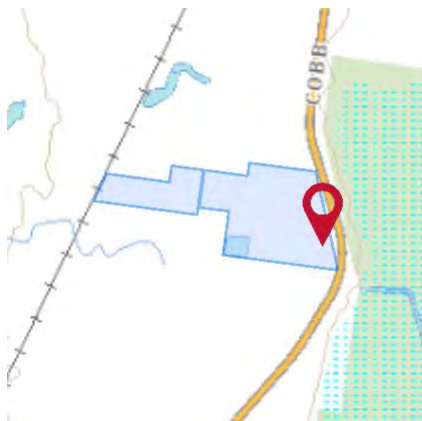
8. APPENDICES

APPENDIX 1 - PROPERTY PLANNING REPORT



Property Report

2813 COBB HIGHWAY MATHOURA 2710



Property Details

Address: 2813 COBB HIGHWAY MATHOURA 2710
 Lot/Section 117/-/DP455183 13/-/DP751153 14/-/DP751153
 /Plan No: 2/-/DP1077844 9/-/DP111270
 Council: MURRAY RIVER COUNCIL

Summary of planning controls

Planning controls held within the Planning Database are summarised below. The property may be affected by additional planning controls not outlined in this report. Please contact your council for more information.

Local Environmental Plans	Murray Local Environmental Plan 2011 (pub. 16-12-2011)
Land Zoning	RU1 - Primary Production: (pub. 16-12-2011) SP2 - Infrastructure: (pub. 16-12-2011)
Height Of Building	NA
Floor Space Ratio	NA
Minimum Lot Size	120 ha
Heritage	NA
Land Reservation Acquisition	NA
Foreshore Building Line	NA
Terrestrial Biodiversity	Terrestrial Biodiversity

Detailed planning information

State Environmental Planning Policies which apply to this property

State Environmental Planning Policies can specify planning controls for certain areas and/or types of development. They can also identify the development assessment system that applies and the type of environmental assessment that is required.

- State Environmental Planning Policy (Affordable Rental Housing) 2009: Land Application (pub. 31-7-2009)
- State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004: Land Application (pub. 25-6-2004)

This report provides general information only and does not replace a Section 10.7 Certificate (formerly Section 149)



Property Report

2813 COBB HIGHWAY MATHOURA 2710

- State Environmental Planning Policy (Concurrences) 2018: Land Application (pub. 21-12-2018)
- State Environmental Planning Policy (Educational Establishments and Child Care Facilities) 2017: Land Application (pub. 1-9-2017)
- State Environmental Planning Policy (Exempt and Complying Development Codes) 2008: Land Application (pub. 12-12-2008)
- State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004: Land Application (pub. 31-3-2004)
- State Environmental Planning Policy (Infrastructure) 2007: Land Application (pub. 21-12-2007)
- State Environmental Planning Policy (Koala Habitat Protection) 2019: Land Application (pub. 20-12-2019)
- State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007: Land Application (pub. 16-2-2007)
- State Environmental Planning Policy (Miscellaneous Consent Provisions) 2007: Land Application (pub. 28-9-2007)
- State Environmental Planning Policy (Primary Production and Rural Development) 2019: Land Application (pub. 28-2-2019)
- State Environmental Planning Policy (Primary Production and Rural Development) 2019: Subject Land (pub. 28-2-2019)
- State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017: Subject Land (pub. 25-8-2017)
- State Environmental Planning Policy No 1—Development Standards: Land Application (pub. 17-10-1980)
- State Environmental Planning Policy No 21—Caravan Parks: Land Application (pub. 24-4-1992)
- State Environmental Planning Policy No 33—Hazardous and Offensive Development: Land Application (pub. 13-3-1992)
- State Environmental Planning Policy No 36—Manufactured Home Estates: Land Application (pub. 16-7-1993)
- State Environmental Planning Policy No 44—Koala Habitat Protection: Land Application (pub. 6-1-1995)
- State Environmental Planning Policy No 50—Canal Estate Development: Land Application (pub. 10-11-1997)
- State Environmental Planning Policy No 55—Remediation of Land: Land Application (pub. 28-8-1998)
- State Environmental Planning Policy No 64—Advertising and Signage: Land Application (pub. 16-3-2001)
- State Environmental Planning Policy No 65—Design Quality of Residential Apartment Development: Land Application (pub. 26-7-2002)

This report provides general information only and does not replace a Section 10.7 Certificate (formerly Section 149)



Property Report

2813 COBB HIGHWAY MATHOURA 2710

Other matters affecting the property

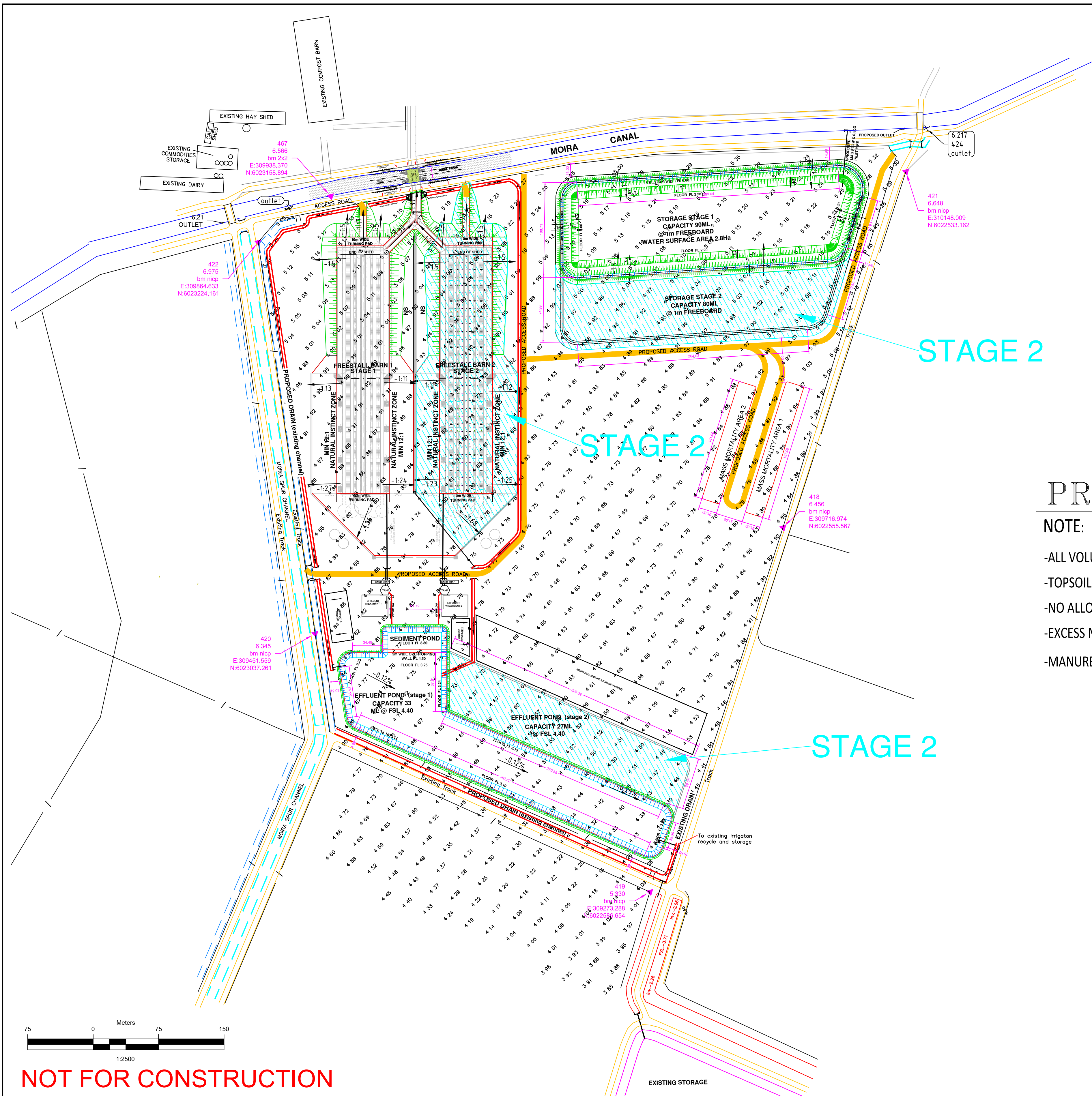
Information held in the Planning Database about other matters affecting the property appears below. The property may also be affected by additional planning controls not outlined in this report. Please speak to your council for more information

1.5 m Buffer around Classified Roads	Classified Road Adjacent
Bushfire Prone Land	Vegetation Buffer
	Vegetation Category
Crown Land	Crown Land
Land near Electrical Infrastructure	This property may be located near electrical infrastructure and could be subject to requirements listed under ISEPP Clause 45. Please contact Essential Energy for more information.
Local Aboriginal Land Council	MOAMA

This report provides general information only and does not replace a Section 10.7 Certificate (formerly Section 149)



APPENDIX 2 - PROJECT DESIGN PLAN



LOCATION MAP.

YARRIMBAH PROPOSED FREESTALL BARN

NOTE:

- ALL VOLUMES CALCULATED @ 1:1.15 COMPACTION RATIO
- TOPSOIL TO BE STRIPPED PRIOR TO CONSTRUCTION AT 0.10m DEPTH
- NO ALLOWANCE HAS BEEN MADE FOR SURROUNDING ACCESS ROADS MANURE STORAGE AREAS
- EXCESS MATERIAL FROM STAGE 1 TO BE PLACED ON SURROUNDING ROADS
- MANURE AND EFFLUENT STORAGE AREAS ARE TO HAVE A MAX. PERMEABILITY EQUAL TO OR LESS THAN $1 \times 10^{-9} \text{M/SEC}$

Yarrimbah Freestall Barn Earthworks Summary				
Description	Area (m2)	Cut (m3)	Fill (m3)	Short/Excess (m3)
Feedpad 1/Ramp x2	44000		73600	-73600
Feedpad 2/Ramp x1	38821		72240	-72240
TOTALS	82821	0	145840	-145840
Storage - STAGE 1	42850	69800	18460	51340
Storage - STAGE 2	26760	50000	2940	47060
TOTALS	69610	119800	21400	98400
Sediment Pond	2526	1300	251	1049
Effluent Pond - stage 1	32048	33900	2020	31880
Effluent Pond - stage 2	17870	26000	1000	25000
TOTALS	52444	61200	3271	57929
STAGE 1	Short/Excess (m3)			
FEEDPAD	-73600			
STORAGE	51340			
EFFLUENT/SEDIMENT	32929			
TOTAL	10669			
STAGE 2	Short/Excess (m3)			
FEEDPAD	-72240			
STORAGE	47060			
EFFLUENT/SEDIMENT	25000			
TOTAL	-180			
TOTALS			Feedpad 1	-73600
			Feedpad 2	-72240
			Storage	98400
			Effluent Sediment PondS	57929
			EXCESS	10489

NOT FOR CONSTRUCTION

REF.

DATE

DESCRIPTION.

22/09/20

PLAN AMENDED TO SHOWED STAGED PRODUCTION

NO RESPONSIBILITY TAKEN FOR TITLE DEFINITION.

Finished Level Pegs To Be Placed at Clients Instruction Prior to Landforming. Any Internal Channels, Fences etc. Not Required Are To Be Removed Before Landforming. Where Subsoil is Exposed during Landforming, Resoling is Suggested. Breaching is to be Placed Downstream of All Structures. Proposed Channels Are To Be Constructed Out Of Suitable Soils. Where Channels and Drains Stop, Erosion Control is Suggested.

SOIL TESTS MUST BE UNDERTAKEN TO DETERMINE THE SUITABILITY OF ANY PROPOSED RECYCLE DRAIN, SUMP OR STORAGE AREA.

This Plan May Be Subject To Change.

LEGEND

Fence on Boundary

Fence - Internal

Gate

Laneway/Access Tracks

Tree

Timber Belt

Swamp

Gilgai or Crab Hole

Powerline

Channel To Be Removed

Drain To Be Removed

Main Supply Channel

Proposed Farm Supply

Existing Farm Supply

Main Drainage

Farm Drainage

Terrace Line

Fence on Terrace Line

Channel Pad Height

Channel Base Width

Drainage Bed

Drainage Width

Design Bay Elevation

Change of Grade

Flow Direction & Slope

Cut & Fill (in cm.)

Permanent Mark

Bench Mark

Finished Level Peg

House or Shed

Inv. - 8.83

W. - 3.60

F.L. - 9.171

F.L. - 9.102

F.L. - 9.102

GRADE

+12

or

-12

S

H

Grid Peg

Road Crossing Bridge

Farm Crossing Culvert

Drop Structure

Check or Regulator

Farm Crossing & Drop

Farm Crossing & Check

Detheridge Outlet

Dumpy Peg Level

Design Full Supply Level

AREA SURVEYED - Approx 47 Hectares, 116 Acres.

DATUM - SS 4827, RL - 107.927

NOTE - ADD RL - 100.00 TO ALL LEVELS FOR AHD71 DATUM.

Rich River Irrigation Developments.

BAUER

One Step Ahead

FOR A GREENER WORLD

Centerstar - Centre pivot

Linestar - Linear move

Centerliner - Pivoting Linear, Ditch or Hose feed

RICH RIVER IRRIGATION DEVELOPMENTS

PTY LTD A.C.N.106 901 777

DATE. -17/11/20

SCALE. -1: 2500

Rich River Irrigation Developments. P/L.

26 McCulloch Drive, Moama, N.S.W. 2731.

Ph. 03 5482 2564, Fax. 03 5482 1918, Mob. 0427 691 042, Email. web. www.rriid.com.au

Client. -Raymond Smith

"Yarrimbah"

Proposed Freestall Barn

SURVEY

JARROD

BASE PLAN

CHRIS

FILE:interim plan/feedlot earthworks.dwg

SHEET

JARROD

SIZE

A1

DRAWING NO.

J000410

APPENDIX 3 - DAIRY FLOODWASH

Version 2.7, April 2008, DPIF, 2008

Yard flood washing facilities

Yard characteristics

Yard width	11.95	m
Yard length	275.00	m
Yard slope	1.00	%
Yard surface roughness (Manning's n)	0.020	

Target yard flow conditions

Minimum flow depth	75	mm
Flow velocity (at minimum flow depth, above)	0.88	m/s
Flowrate (at minimum flow depth, above)	790	L/s
Minimum flow velocity	1.00	m/s
Flow depth (at minimum flow velocity, above)	90	mm
Flowrate (at minimum flow velocity, above)	1,069	L/s

Required yard flow conditions (based on Manning's equation)

Required flow depth	90	mm
Required flow velocity	1.00	m/s
Required flowrate	1,069	L/s

Flushing Volume

Flushing volume for 10 second yard contact time	10,693	L
Flushing volume for one third yard length contact time	98,015	L
Contact time for one third yard length contact time	91.67	seconds

Required flushing volume

Required flushing volume	98,015	L
Required flushing time	91.67	seconds
Flushing volume per metre of yard width	8,202	L.m ⁻¹

Flushing tank details

Flushing tank diameter	D _T	10.00	m
Tank storage height (for required flushing volume)	H _T	1.25	m
Final flushing head over tank outlet	H _a	1.00	m
Initial head over tank outlet	H ₀	2.25	m

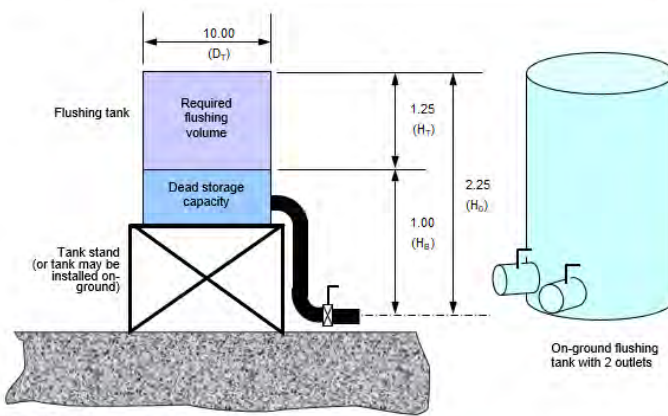
Tank outlet valves and piping

Number of outlet valves	N	3	valves
Outlet valve and pipe diameter	D ₂	0.500	m
Length of pipe from tank to outlet	L	1	m
Hazen-Williams roughness coefficient	C	142	
Headloss co-efficient	k	1.25	
Max pipe friction headloss		0.02	m
Max pipe outlet loss		1.24	m
Total headloss		1.26	m
Time to discharge required flushing volume (numerical calculation)		45.20	seconds

Client name: RL & LJ Smith

Client locality: Yarrmibah

Analysis identification: Freestall - Per side of barn



Note: All dimensions in metres (m)

Max flushing flowrate	2.592	m ³ .s ⁻¹
Flushing flowrate after end of required flushing time	1.729	m ³ .s ⁻¹
Required flushing flowrate	1.069	m ³ .s ⁻¹
Max yard flow velocity	1.43	m.s ⁻¹
Required yard flow velocity	1.00	m.s ⁻¹
Max yard flow depth	152	mm
Required yard flow depth	90	mm



APPENDIX 4 - WATER BALANCE

Stage 1 Whole System Water Balance

Area	Water Supply System		Abbr	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
INFLOW	Cow Drinking Water			ML	7.9	6.7	6.7	6.1	6.3	5.3	5.5	5.5	5.7	6.7	6.8	7.9	77.0
	Cooling Requirements			ML	1.55	1.40	1.24	0.45	0.31	0.00	0.00	0.00	0.45	0.93	1.50	1.55	9.4
	Floodwash Requirements (Monthly)			ML	12.2	11.0	12.2	11.8	12.2	11.8	12.2	12.2	11.8	12.2	11.8	12.2	143.1
	Total Monthly Water Requirement				21.6	19.1	20.1	18.3	18.7	17.1	17.7	17.7	17.9	19.8	20.1	21.6	229.5
BARN OUTFLOW	Water Source - Channel																
	Water Source - Bore																
	Water Source - Storage																
	Barn Outflow																
BARN OUTFLOW	Flood Wash Volume (Month)		A	ML	12.2	11.0	12.2	11.8	12.2	11.8	12.2	12.2	11.8	12.2	11.8	12.2	143.1
	Total Excreata (faeces & Urine)			tonne	2,238	2,022	2,238	2,166	2,238	2,166	2,238	2,238	2,166	2,238	2,166	2,238	26,355
	Urine Volume		B	ML	1.3	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	15.8
	Manure Production			tonne	895	809	895	866	895	866	895	895	866	895	866	895	10,541.9
BARN OUTFLOW	Manure Separated from system			tonne	560	505	560	542	560	542	560	560	542	560	542	560	6,588.7
	Manure Sludge Contribution			tonne	336	303	336	325	336	325	336	336	325	336	325	336	3,953.2
	Total Effluent Volume to Exit Barns		A+B	ML	13.50	12.19	13.50	13.06	13.50	13.06	13.50	13.50	13.06	13.50	13.06	13.50	158.9
CLIMATE	Climate Data																
	Rainfall		MR ⁹⁰ _{Adj}	mm	39	41	47	42	51	44	45	48	44	53	44	49	547.45
	Evaporation		ME ¹⁰ _{Adj}	mm	256	202	160	91	50	33	35	54	83	126	181	234	1504.67
	Effluent Volumes																
EFFLUENT TREATMEN & STORAGE	Barn Outflow		V _{Effluent}	ML	13.50	12.19	13.50	13.06	13.50	13.06	13.50	13.50	13.06	13.50	13.06	13.50	159
	Volume of Runoff		V _{Runoff}	ML	1.405	1.479	1.676	1.522	1.832	1.594	1.603	1.731	1.597	1.921	1.570	1.763	19.7
	Pond Capture Volume		V _{Rainfall}	ML	1.367	1.439	1.631	1.481	1.782	1.551	1.559	1.684	1.554	1.869	1.528	1.716	19.2
	Pond Evaporation		V _{Evaporation}	ML	8.960	7.075	5.594	3.181	1.737	1.147	1.235	1.889	2.906	4.404	6.338	8.199	52.7
EFFLUENT TREATMEN & STORAGE	Net Pond Surface Flux		V _{Flux}	ML	-7.59	-5.64	-3.96	-1.70	0.05	0.40	0.32	-0.20	-1.35	-2.53	-4.81	-6.48	-33.5
	Monthly change in storage		AV	ML	7.31	8.03	11.21	12.88	15.37	15.06	15.42	15.02	13.30	12.88	9.82	8.78	145.08
	Effluent Storage Management & Balance																
	Crop Coefficient (Average Year)		K _c	Sorghum	1.13	0.81	0.62	0	0	0	0	0	0.3	0.4	0.99	1.2	
EFFLUENT TREATMEN & STORAGE	Crop Evapotranspiration		ET _c	mm	289	164	99	0	0	0	0	0	25	50	179	281	1088
	Plant Water Requirement (100% Efficient)			mm	250	123	52	0	0	0	0	0	0	0	136	232	793
	Plant Water Requirement (x % Efficient)			90%	278.0	136.3	58.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	150.7	257.9	881
	Estimated Plant Water Requirement			ML/ha	2.8	1.4	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	2.6	8.8
EFFLUENT TREATMEN & STORAGE	Deficit		D	mm	250	123	52	0	0	0	0	0	0	0	136	232	
	Storage Month?				No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
	Effluent Percentage Irrigated			%	0%	4%	4%	2%	0%	0%	0%	2%	10%	10%	10%	0%	
	Effluent Used			ML	0.0	12.0	12.0	6.0	0.0	0.0	0.0	6.0	30.1	30.1	30.1	0.0	126
EFFLUENT TREATMEN & STORAGE	Distributed Depth			mm	0	4	4	2	0	0	0	2	10	10	10	0	
	Effluent Stored/month			ML	7.3	3.3	2.5	9.3	24.7	39.8	55.2	64.2	47.4	30.2	9.9	18.7	

Therefore recommended Effluent Pond Volume equals 64 ML
Irrigation Area Utilised 301 ha

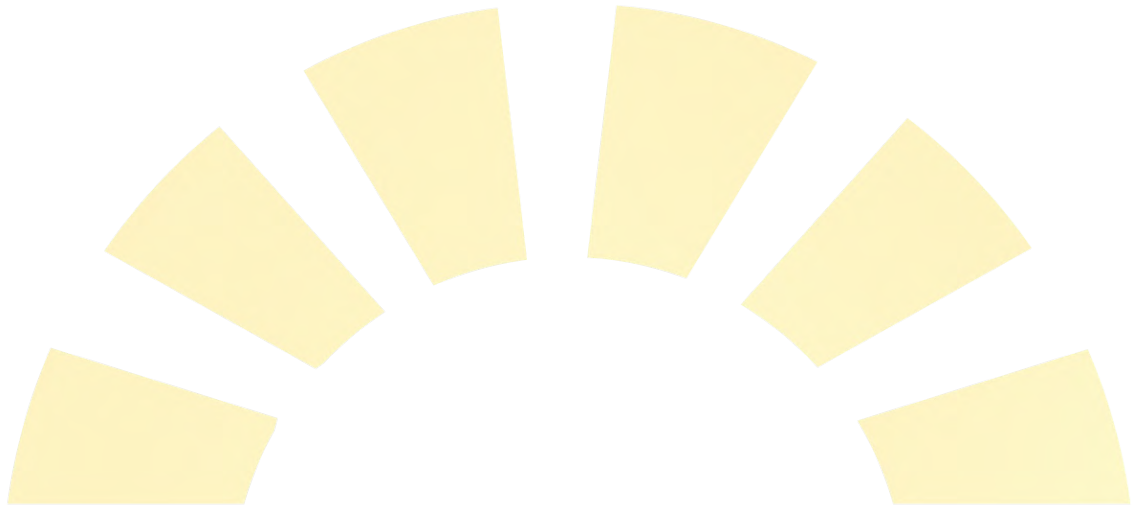
Stage 2 Whole System Water Balance

Area	Water Supply System		Abbr	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
INFLOW	Cow Drinking Water			ML	15.7	13.5	13.4	12.2	12.6	10.6	11.0	11.0	11.4	13.4	13.7	15.7	154.1
	Cooling Requirements			ML	3.1	2.80	2.48	0.90	0.62	0.00	0.00	0.00	0.90	1.86	3.00	3.10	18.8
	Floodwash Requirements (Monthly)			ML	24.3	22.0	24.3	23.5	24.3	23.5	24.3	24.3	23.5	24.3	23.5	24.3	286.2
	Total Monthly Water Requirement				43.1	38.2	40.1	36.6	37.5	34.2	35.3	35.3	35.8	39.5	40.2	43.1	459.0
	Water Source - Channel																
	Water Source - Bore																
	Water Source - Storage																
BARN OUTFLOW	Barn Outflow																
	Flood Wash Volume (Month)		A	ML	24.3	22.0	24.3	23.5	24.3	23.5	24.3	24.3	23.5	24.3	23.5	24.3	286.2
	Total Excreata (faeces & Urine)			tonne	4,477	4,043	4,477	4,332	4,477	4,332	4,477	4,477	4,332	4,477	4,332	4,477	52,710
	Urine Volume		B	ML	2.7	2.4	2.7	2.6	2.7	2.6	2.7	2.7	2.6	2.7	2.6	2.7	31.6
	Manure Production			tonne	1,791	1,617	1,791	1,733	1,791	1,733	1,791	1,791	1,733	1,791	1,733	1,791	21,083.9
	Manure Separated from system			tonne	1,119	1,011	1,119	1,083	1,119	1,083	1,119	1,119	1,083	1,119	1,083	1,119	13,177.4
	Manure Sludge Contribution			tonne	672	607	672	650	672	650	672	672	650	672	650	672	7,906.5
CLIMATE	Total Effluent Volume to Exit Barns		A+B	ML	26.99	24.38	26.99	26.12	26.99	26.12	26.99	26.99	26.12	26.99	26.12	26.99	317.8
	Climate Data																
	Rainfall		MR ⁹⁰ _{Adj}	mm	39	41	47	42	51	44	45	48	44	53	44	49	547.45
	Evaporation		ME ¹⁰ _{Adj}	mm	256	202	160	91	50	33	35	54	83	126	181	234	1504.67
	Effluent Volumes																
	Barn Outflow		V _{Effluent}	ML	26.99	24.38	26.99	26.12	26.99	26.12	26.99	26.99	26.12	26.99	26.12	26.99	318
	Volume of Runoff		V _{Runoff}	ML	1.405	1.479	1.676	1.522	1.832	1.594	1.603	1.731	1.597	1.921	1.570	1.763	19.7
EFFLUENT TREATMEN & STORAGE	Pond Capture Volume		V _{Rainfall}	ML	2.070	2.178	2.469	2.243	2.699	2.349	2.361	2.550	2.352	2.831	2.314	2.598	29.0
	Pond Evaporation		V _{Evaporation}	ML	13.568	10.714	8.470	4.816	2.631	1.736	1.870	2.860	4.400	6.670	9.598	12.415	79.7
	Net Pond Surface Flux		V _{Flux}	ML	-11.50	-8.54	-6.00	-2.57	0.07	0.61	0.49	-0.31	-2.05	-3.84	-7.28	-9.82	-50.7
	Monthly change in storage		AV	ML	16.90	17.32	22.67	25.07	28.89	28.33	29.08	28.41	25.67	25.07	20.41	18.94	286.75
	Effluent Storage Management & Balance																
	Crop Coefficient (Average Year)		K _c	Sorghum	1.13	0.81	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.99	1.2	
	Crop Evapotranspiration		ET _c	mm	289	164	128	73	40	26	28	43	66	101	179	281	1418
	Plant Water Requirement (100% Efficient)			mm	250	123	81	30	0	0	0	0	22	47	136	232	921
	Plant Water Requirement (x % Efficient)			90%	278.0	136.3	90.3	33.8	0.0	0.0	0.0	0.0	24.5	52.5	150.7	257.9	1024
	Estimated Plant Water Requirement			ML/ha	2.8	1.4	0.9	0.3	0.0	0.0	0.0	0.0	0.2	0.5	1.5	2.6	10.2
	Deficit		D	mm	250	123	81	30	0	0	0	0	22	47	136	232	
	Storage Month?				No	No	No	No	Yes	Yes	Yes	Yes	No	No	No	No	
	Effluent Percentage Irrigated			%	0%	10%	5%	9%	5%	0%	0%	0%	15%	15%	15%	10%	
Effluent Used			ML	0.0	33.5	16.8	30.2	16.8	0.0	0.0	0.0	50.3	50.3	50.3	33.5	281	
Distributed Depth			mm	0	10	5	9	5	0	0	0	15	15	15	10		
Effluent Stored/month			ML	16.9	0.7	6.6	1.6	13.7	42.0	71.1	99.5	74.9	49.8	19.9	5.3		

Therefore recommended Effluent Pond Volume equals 100 ML
Irrigation Area Utilised 335 ha

Appendix 14

Land Use Conflict Risk Assessment



Land Use Conflict Risk Assessment

Proposed 2,112 dairy cow freestall barn

'Yarrimbah' 2901 Cobb Hwy, Mathoura, NSW

November 2020



Progressive Rural Solutions

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Project No:	128-0

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Version	Recipient	Lodgement	Copies
V1R3	Client for review	Electronic	1
V1R4	Murray River Council for lodgement	Electronic	1
V1R4	WaterNSW	Electronic	1
V1R4	Environment Protection Authority	Electronic	1
V1R4	Client/Contractor	Electronic & Hard	1

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Related Documents

Type	Author	Name	Date
Environmental Impact Statement	Progressive Rural Solutions	J128-EIS-V1R4	17/11/2020
Design Plans	Rich River Irrigation Developments	J000410 – staged plan	17/11/2020
Layout Plans	Entegra	Layout Plans 1-3	20/08/2020
Certified Plans	Entegra	Certified Plans 1-10	06/11/2020
Biodiversity Test of Significance	Progressive Rural Solutions	J128-BTOS-V1R4	17/11/2020
Aboriginal Cultural Heritage Management Plan	McCardle Cultural Heritage	Yarrimbah	22/09/2020
Odour Assessment & Management Plan	Progressive Rural Solutions	J128-OMP-V1R4	17/11/2020
Effluent Management Plan	Progressive Rural Solutions	J128-EfMP-V1R4	17/11/2020

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1. INTRODUCTION

A Land Use Conflict Risk Assessment (LUCRA) is a system that is used during the planning and design phase of a project to identify and assess the potential for a land use conflict to occur between neighbouring land uses. This process is designed to help land managers and consent authorities assess what conflicts may be present and the potential level of any future land use conflict.

1.1. PURPOSE

The purpose of this Land Use Conflict Risk Assessment is to identify existing land uses of the site and adjoining areas, identify potential conflicts between the proposed land use and the neighbouring land use and highlight or recommend mitigation measures to manage conflicts identified.

1.2. OBJECTIVES

The objectives of the Land Use Conflict Risk Assessment are to:

- Identify and address potential land use conflict issues and risk of occurrence prior to the approval or construction of a new use,
- Objectively assess the effect of a proposed land use on neighbouring land uses,
- Increase the understanding of potential land use conflict to inform and complement development control and buffer requirements, and
- Highlight or recommend strategies to help minimise the potential for land use conflicts to occur.

1.3. REPORT FORMAT

This report is set out in the following format:

Section	Address
1	Introduction, Objectives and Background
2	Information Gathering
3	Land Use Conflict Risk Assessment
4	Conclusion

1.4. BACKGROUND

The Smith Family is proposing to extend their existing dairy operation from a 790 head compost barn to a 2,112-cow dairy freestall barn system. The freestall barn system will be constructed within an existing irrigation area, separated from the existing barn, milking shed, feed storage and mixing area. The proposed barn system will replace the existing compost barn and be independently managed in relation to water storage, effluent management and controlled drainage. The operation will continue to utilise the existing milking shed and commodities areas. No further consideration of the existing milking shed effluent system will be made within this assessment as the existing effluent system will not interact with the proposal. The existing compost barn will no longer be in operation which will reduce the existing effluent system by a higher capacity than the additional cow numbers processed through the dairy.

The freestall barns are each proposed to house 1,056 cows with each cow housed within the barns provided with access to its own stall. The open sided barns will have a central feed alley and each side a row of single and double stalls creating six lanes within the barns that will be cleaned utilising a flood wash system. The barns will be constructed on a 1% slope allowing sufficient fall for manure removal by floodwash. Adjoining the lower half of each site of the barns is an earthen 'natural instinct' area where cows will be provided access during suitable days.

All works are proposed to occur within an existing highly modified environment. An Environmental Impact Study has been undertaken to review the potential impacts relating to the project works.

The images below provide an overview of the site, a cross section and a plan view of the barn areas.



Figure 1 - Overview of area proposed for barn system

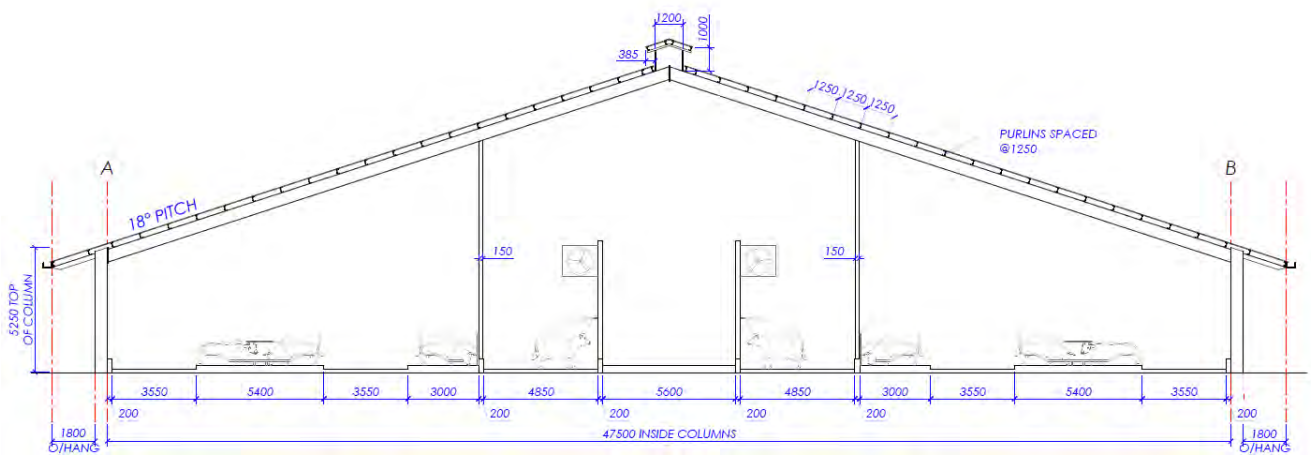


Figure 2 - Cross sectional plan of barn

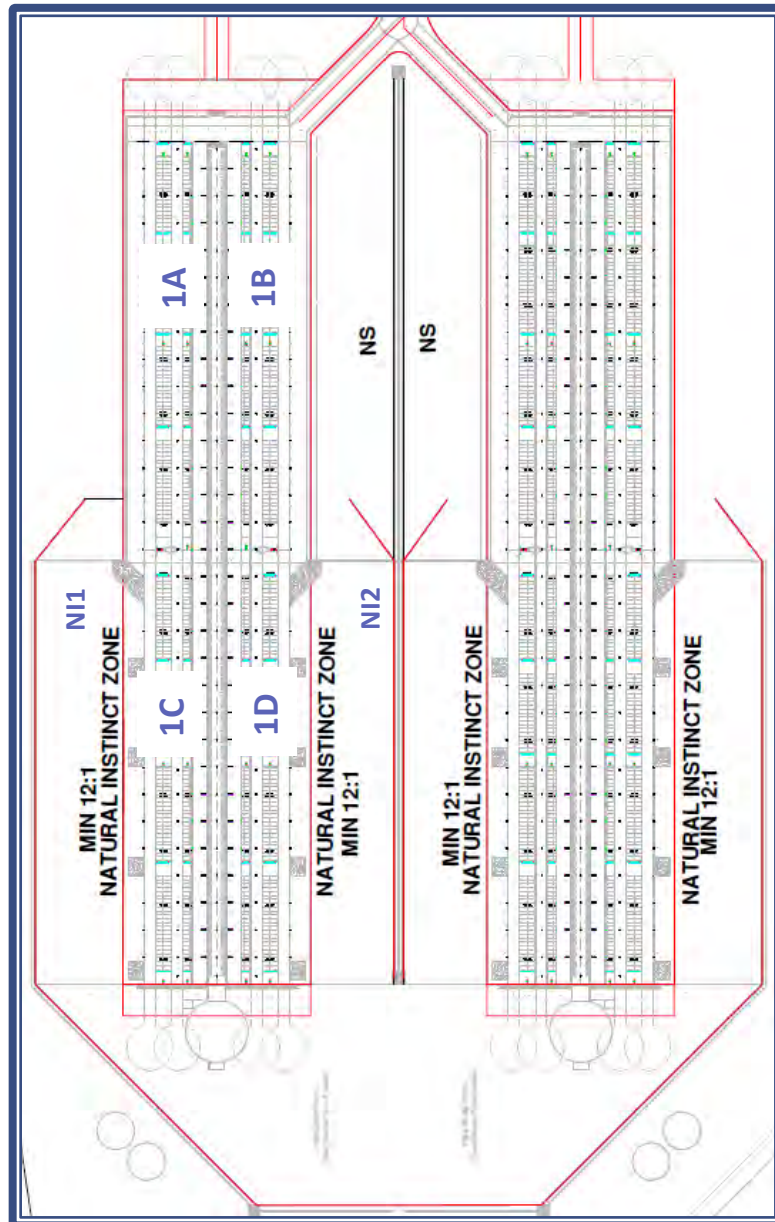


Figure 3 - Plan view of barn

2. INFORMATION GATHERING

2.1. SITE LOCATION

The project is located in the New South Wales Riverina region and the Murray River Council Local Government Area. The project site is located on the property known as 'Yarrimbah' which adjoins the Cobb Hwy between Moama and Mathoura.

The project site, which includes the proposed freestall barns and infrastructure, is located within the existing irrigation area of the property. The site also adjoins the Moira Private Irrigation District's main supply and a spur channel on two sides. The project infrastructure and works are proposed on Lot 2 DP1077844, Lot 117 DP455183, Lot 13 DP751153 and Lot 14 DP 751153 with the remaining portions of the property incorporated for effluent and manure application which will be utilised to grow feed as part of the project operation.

The location of the project site is shown in the figures and tables below.



Figure 4 - Location of project site in relation to the region

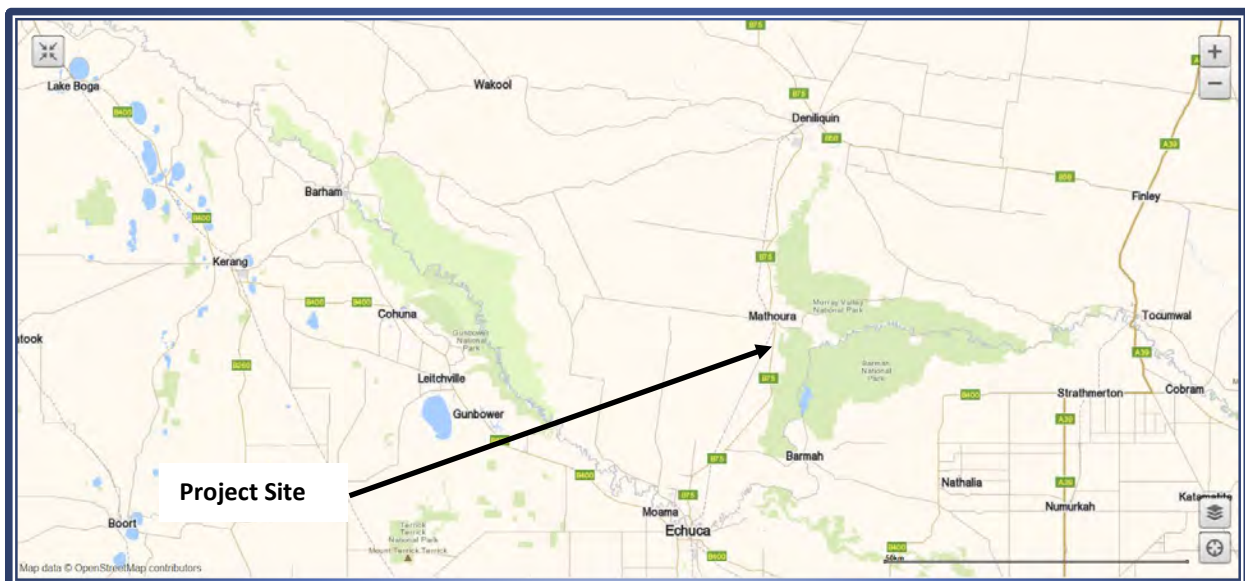


Figure 5 - Location of project site in relation to the local area

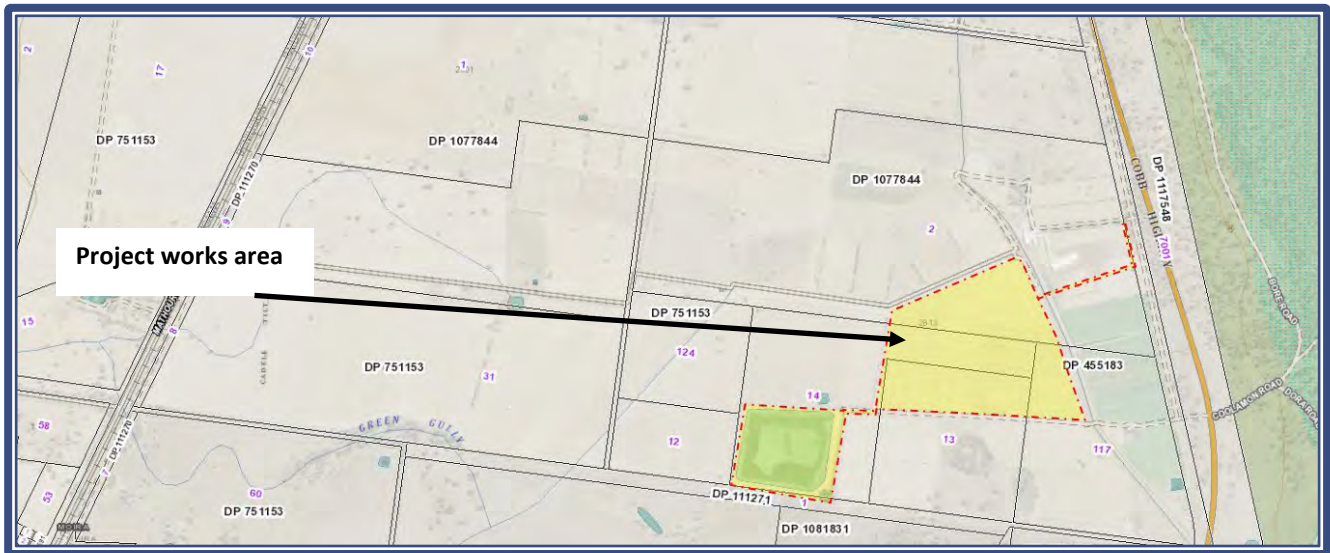


Figure 6 - Location of project in relation to the property

TOPOGRAPHY

Topography of the Riverine Plain ranges from approximately 150ms above sea level in the regions bordering the highlands in the south and eastern flanks to approximately 60ms in the lower lying reaches where the Murray River meets the Murrumbidgee (Google Earth 2020). The general pattern of landfall is to the north and west with the main discharge points of the plain entering the Murray River between Barmah and Robinvale.

The region between Deniliquin and Moama which incorporates the project site is dominated by the Cadell Tilt. The general area slopes away from the top of the tilt towards the Murray River and its tributaries. From the Cadell Tilt west, the fall is a gentle slope whereas from the edge of the Tilt to the East, the fall is of a steeper nature. The Cobb Hwy generally follows the top of the Cadell Tilt through this area.

The local topography of the properties range 6m in elevation from east to west. The elevation in the east area is approximately 105m AHD falling to an elevation of 99m generally towards the Murray River. This covers a length of 16kms.

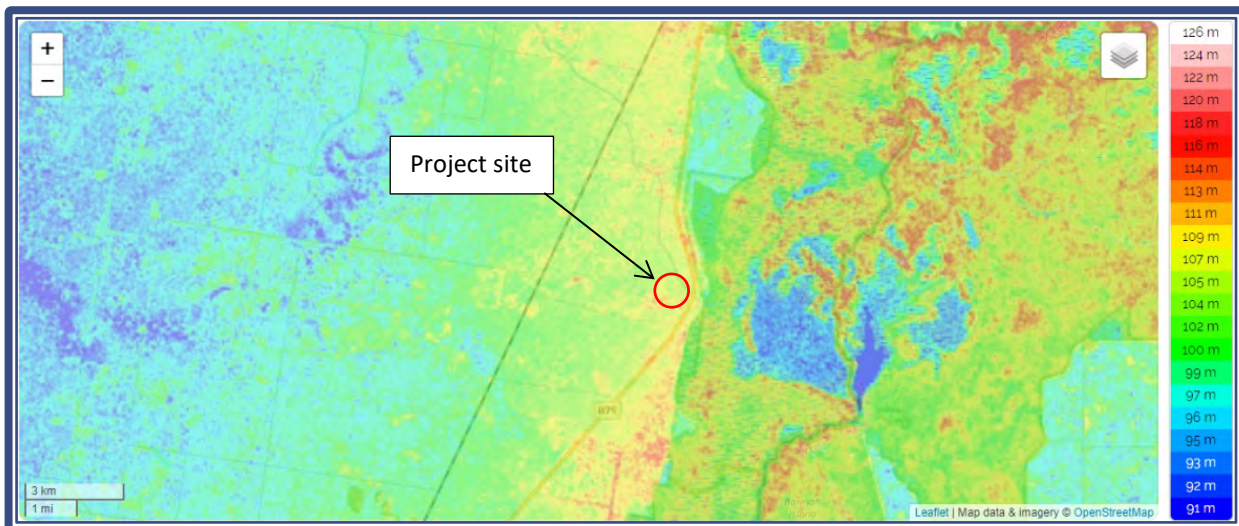


Figure 7 - Local site topography

The project site lies at approximately 105m above sea level. The property is predominantly laid out to irrigation but is separated from surrounding areas by Moira Private Irrigation District channels, roads and the Moama to Deniliquin railway line. The project site is shown below with the existing irrigation layout identifying channels (blue), drains (red) and existing tracks (yellow).



Figure 8 - Site slope and drainage

It must be noted that the entire site is surrounded by existing access tracks and drains that interlink with existing property irrigation drainage management systems. This allows the full control and containment of water on the site and, where appropriate, can prevent the escape of all run-off water from the site.

CLIMATE

Meteorological conditions have the potential to influence a range of project-related activities. An overview of these conditions at the project site and surrounds, with a focus on their potential influencing factors to project related activities has been recorded below.

The climate records utilised in this assessment have been sourced from both the Deniliquin Airport (site 074258) (since 1997) and the Silo data portal (records between 1900 and 2019). The grid point utilised for the Silo search is Lat: -35.95 and Long: 144.85 which is located 10 km to the south west of the site.

A previously decommissioned weather station in the vicinity of the site has been re-activated and upgraded for future use. Records available from this weather station have been provided in addition to the regional data however do not provide 12 months of data for consideration. For future assessment of the climate at the site, the site related weather station will be utilised. This weather station is a Weather Maestro station installed and serviced by Environdata.

The Deniliquin to Moama area can be described as a semi-arid climate under the Koppen climate classification with warm to hot summers and cool winters. Temperature extremes are quite variable across the year and the highest temperature recorded at Deniliquin was 47.2 degrees on the 25th January 2019. The lowest temperature was -5.6 on the 1st July 2017. The average annual rainfall is 258mm with most rainfall falling in August to October.

Table 1 - Climate Data

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Highest High	47.2	46.6	41.2	39.0	27.0	24.4	23.3	27.6	36.7	37.6	44.0	46.5	47.2
Mean Max	33.4	32.1	28.6	23.6	18.6	15.0	14.4	16.2	19.9	23.9	28.0	30.7	23.7
Mean Min	16.7	16.2	13.5	9.6	6.2	4.0	3.5	4.0	5.9	8.5	12.0	14.4	9.5
Lowest Low	5.7	6.0	3.5	1.0	-2.0	-4.4	-5.6	-5.0	-2.1	-0.6	1.1	5.0	-5.6
Mean rainfall	27	24	29	29	39	39	41	40	37	38	30	29	402
Mean rainfall days	4.4	4.8	4.3	5.5	8.0	12.7	14.3	11.0	8.6	6.4	6.8	5.7	92.5
Mean 9am wind speed	19.5	19.3	17.9	16.4	13.8	14.0	13.7	15.9	17.9	19.2	19.6	17.2	13
Mean 3pm wind speed	20.5	19.2	18.4	17.4	17.7	17.9	18.6	20.3	21.3	21.3	20.3	21.1	19.5
Monthly Evaporation	266	216	174	99	54	35	37	58	91	142	194	245	1612

The annual wind records which are displayed as wind roses for both 9am and 3pm for the Deniliquin Airport have been provided below.

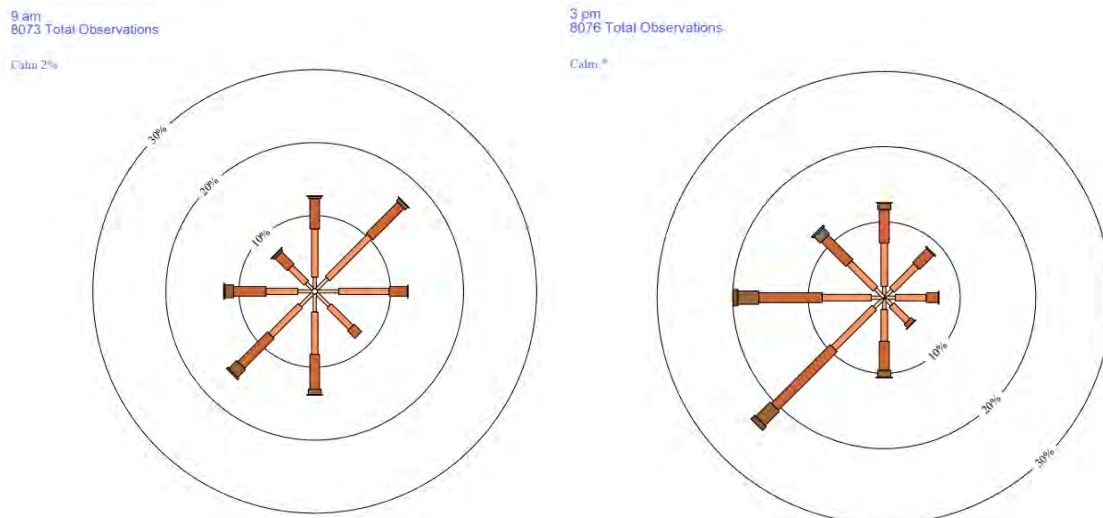


Figure 9 - Average annual wind data from 9am (left) and 3pm (right) showing direction wind blowing from

The site-specific records for period 8th July to 30th September 2020 (being the available timeframe for the station) are shown below.

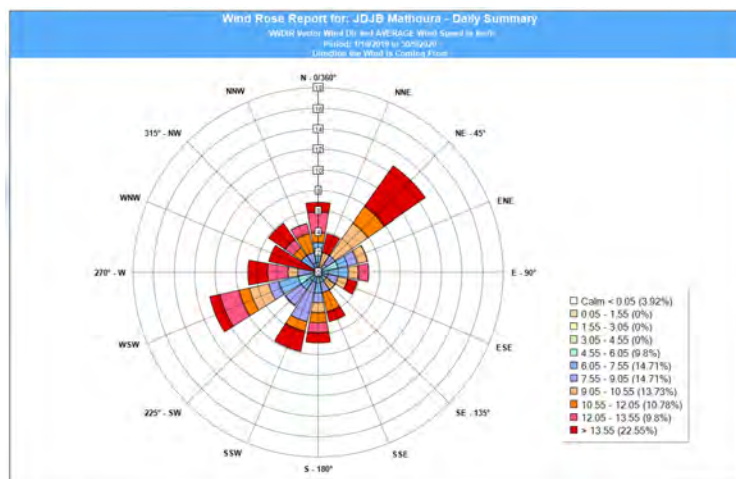


Figure 10 - Site specific wind rose showing the direction the wind is blowing from

It can be identified from the above that the site and surrounds are subject to 'normal wind conditions' with no low or high frequency winds blowing in any specific direction. The main wind direction at the site is from the north-east and the west south-west.

The average rainfall vs evaporation is shown below which identifies that in all months except June and July, evaporation exceeds rainfall.

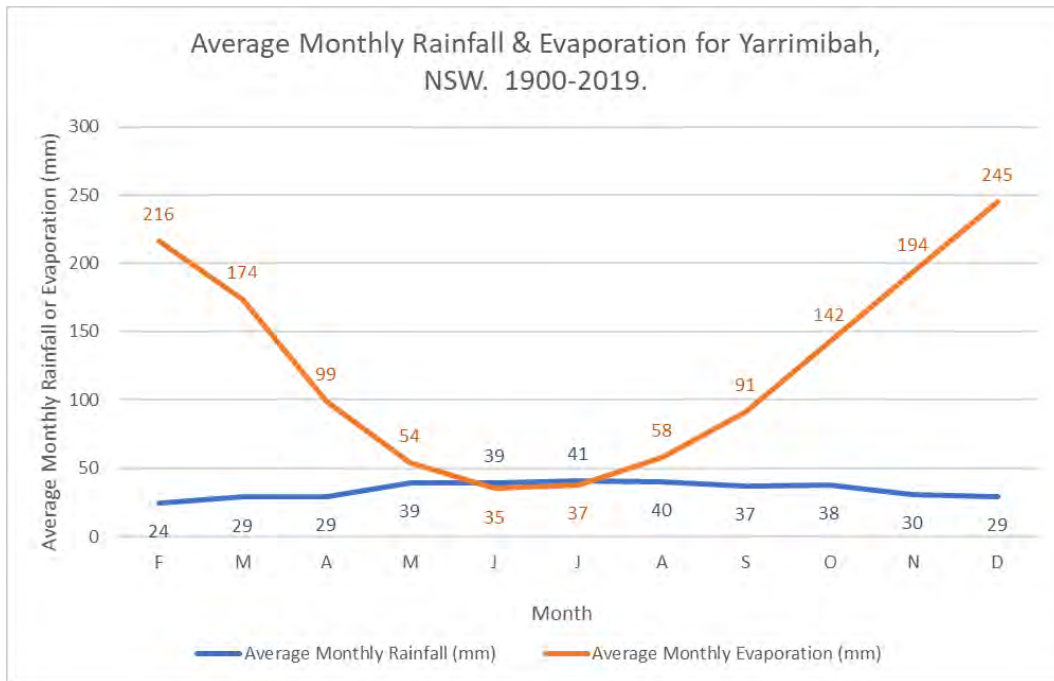


Figure 11 - Rainfall vs evaporation at site in average year

The 90th percentile rainfall vs 10th percentile evaporation is shown below which identifies that in the months of May and August evaporation and rainfall are equal and in the months of June and July rainfall exceeds evaporation. This shows that in a 90th percentile year, the storage periods for effluent should include a maximum of 4 months.

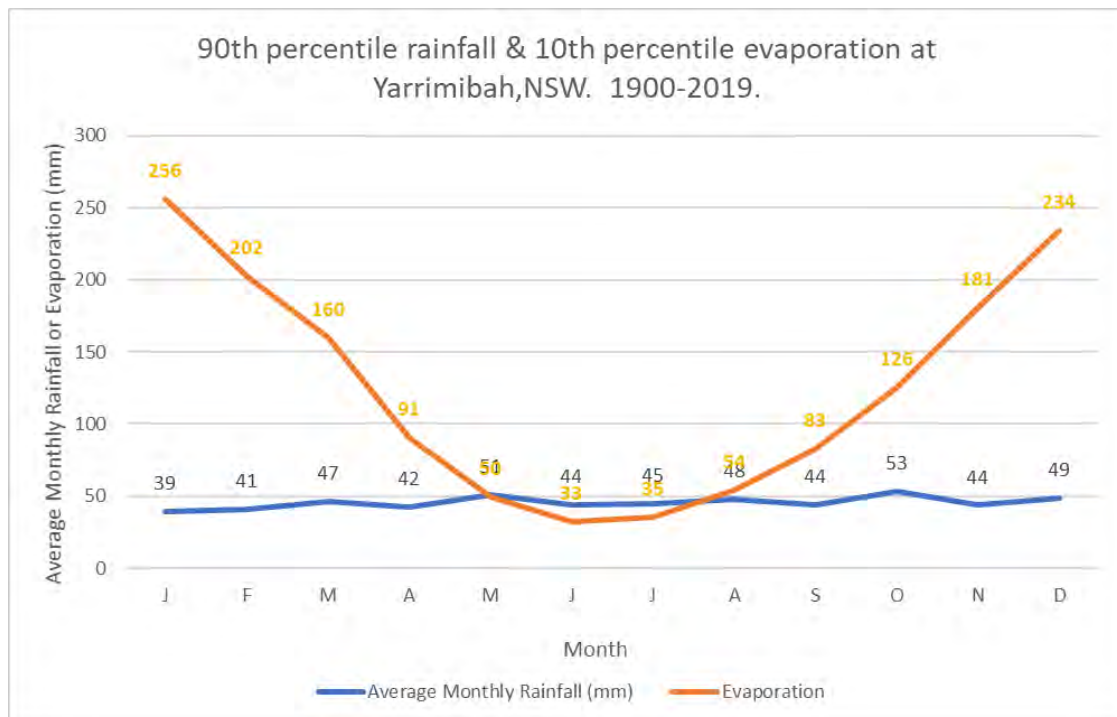


Figure 12 - Rainfall vs evaporation at site in 90th percentile year

2.2. PROPERTY AND SITE DESCRIPTION

The land details of the project are summarised as follows:

Table 2 - Land details of the project

Details	Specific related to project site			
Lot number	2	117	13	14
Deposited Plan	1077844	455183	751153	
Parish	Moirā			
County	Cadell			
Local Shire	Murray River Council			
LEP Zone	Zone RU1 – Primary Production			
Catchment Area	Murray			
IBRA Sub-region	Riverina – Murray Fans			
Mitchell Landscapes	Murray Scalded Plains			
Local Aboriginal Land Council	Moama Local Aboriginal Land Council			
Floodplain Management Plan	Nil			
Land Stature	Freehold			
Area of project works	Approx. 42ha			
Area of this property	Approx. 573ha			
GPS Reference	MGA Zone 55 E:309685 N:6022812			

Other property and connected Lot & DP numbers in relation to the project are:

Table 3 - Property identification details

Property Name	Lot	DP	Parish	County	Total Area (ha)	Irrigation Area (ha)
Yarrimbah	2	1077844	Moirā	Cadell	573	394
	31	751153				
	124	751153				
	12	751153				
	14	751153				
	13	751143				
	117	455183				

A review of overlays in the attached property planning report identifies the following:

Table 4 - Property specific overlays

Overlay	Identified on site		Adjoining Property?
	On Site	On Property	
Crown Land	X	X	Yes
Heritage	X	X	Yes
Flood Planning	X	X	Yes
Landslide Risk	X	X	X
Acid Sulphate Soils	X	X	X
Aboriginal Cultural Heritage Sensitive Landscape?	X	X	Yes
Aboriginal Site Recorded	X	X	Yes
Drinking Water Catchment	X	X	X
Groundwater Vulnerability	X	X	X
Mineral and Land Resource	X	X	X
Obstacle Limitation Surface	X	X	X
Riparian Lands and Watercourses	X	X	X
Salinity	X	X	X
Scenic Protection Land	X	X	X
Terrestrial Biodiversity	X	Yes	X
Wetlands	X	X	Yes
Environmentally Sensitive Land	X	X	X

The table above identifies that the site is not subject to an overlay that may impact the project planning or operation. The property has an identified Terrestrial Biodiversity overlay present on the remnant stands of native vegetation that are located on the southern boundary of the property. The site is zoned RU-1 – Primary Production.

The project site where infrastructure is proposed has been utilised for irrigated pasture and cropping since the Moira Private Irrigation District's (PID) inception more than 50 years ago. The irrigation system on the site is surrounded by an access track, existing drains and channels. There are four fields within the main area which are supplied from the Moira PID channel on the eastern side. Each field is connected to the existing on-farm irrigation drainage which exits the project area in the south west corner delivering drainage water to the property recycle point and connected storage dam for re-use on the property.

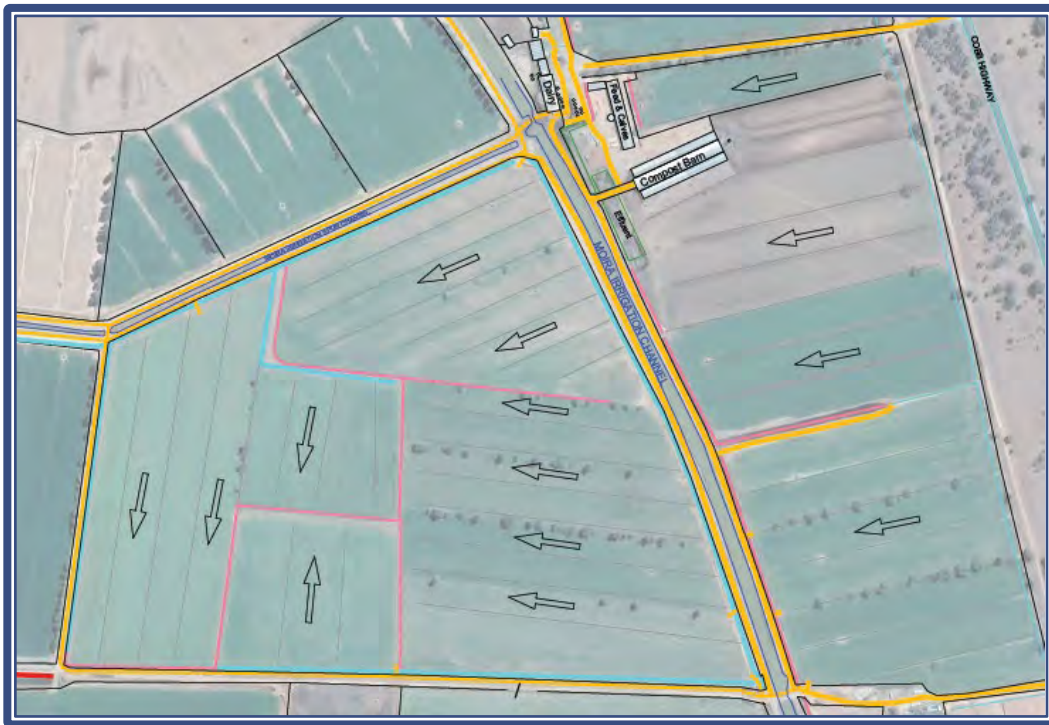


Figure 13 - Image showing existing irrigation layout on the project site

The groundcover on the site consists entirely of introduced species such as grazing oats and pasture species. Standing vegetation on the site consists of single row plantation species that are predominantly non-native to the area and are in varying stages of survival.

There is no existing dairy infrastructure located on this site as this project relates to a new proposal. The existing dairy system will remain as an independent system that will continue to operate as a separate system.

2.3. SURROUNDING LAND USES

The site being located within a rural area is surrounded by other farming properties. The Moira Private Irrigation District maintains its pump infrastructure and workshop located approx. 1km to the south east of the site. The Cobb Hwy is located to the east being divided from the property boundary by Travelling Stock Reserve. The entrance to the Moira National Park is on the opposite side of the Cobb Hwy located over 650m to the east at its closest point to the site. The nearest known camping and frequent public use area is over 5.5kms from the property.

The adjoining areas within the Moira Forest (being within a separate catchment area) is identified as Crown Land, with recorded Aboriginal sites and a sensitive landscape within. That area is also subject to inundation and is a mapped wetland area. This area is not directly adjoining the property and there is no connection between the project site or proposed effluent application areas. The areas are separated by natural and built environment including the top of the Cadell Tilt, the Cobb Hwy and the Moira Private Irrigation Channel.

The surrounding site is predominantly zoned RU1 – Primary Production and the Moira National Park which is zoned E1 (National Parks and Nature Reserves). The zones are detailed further below.

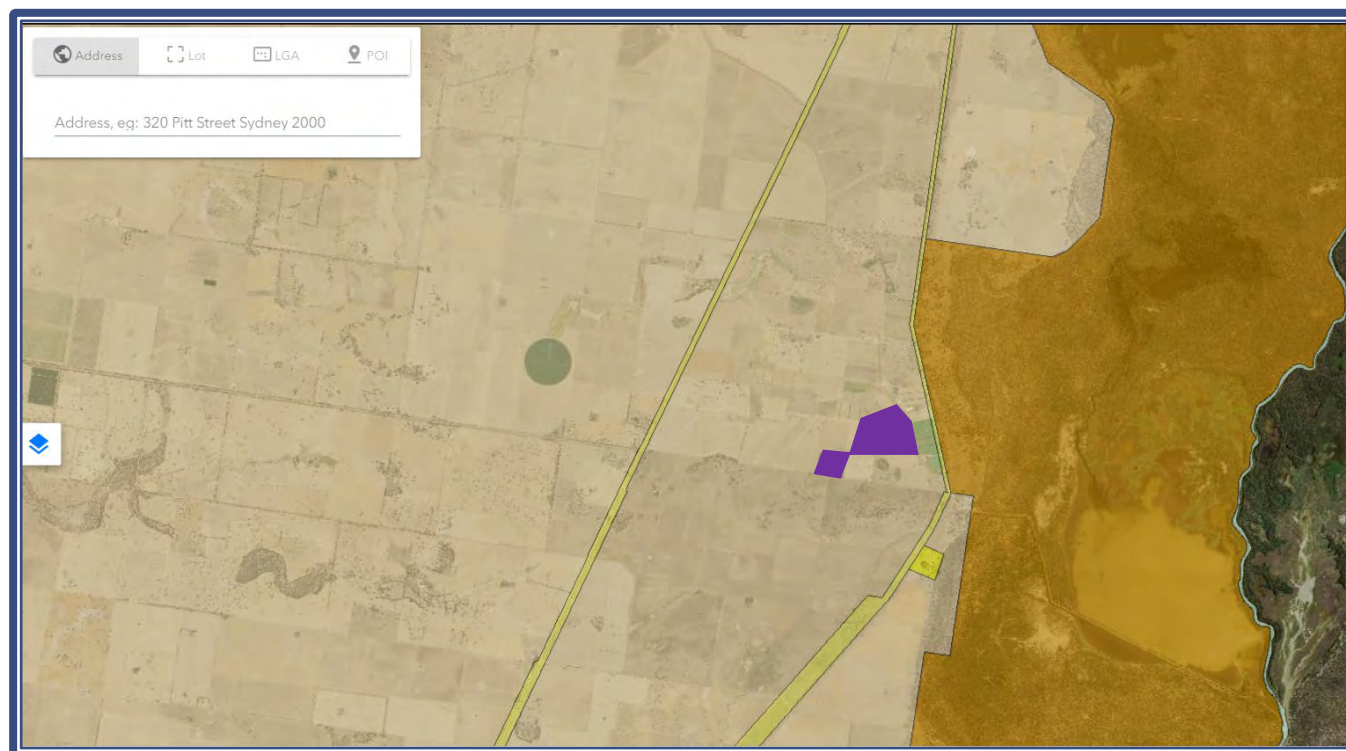


Figure 14 - Image identifying site (purple) and surrounding land use zones

A summary of the land use zones, and their objectives are provided below.

Table 5 - Land Use Zone objectives

Zone	Colour ID on Figure 2	Objectives
RU1 - Primary Production	Light orange	To encourage sustainable primary industry production by maintaining and enhancing the natural resource base, encourage diversity in primary industry enterprise and systems appropriate for the area, minimise the fragmentation and alienation of resource lands and minimise conflicts between land uses within the zone and land uses within adjoining zones.
SP2 – Infrastructure	Light yellow	To provide for infrastructure and related use and prevent development that is not compatible with or that may distract from the provision of infrastructure.
SP3 – Tourist	Dark yellow	To provide a variety of tourist-oriented development and related uses.
E1 – National Parks and Nature Reserves	Dark orange	To enable the management and appropriate use of land that is reserved under the <i>National Parks and Wildlife Act 1974</i> (NPW), to enable uses authorised under the same Act and to identify land that is to be reserved under the NPW Act and to protect the environmental significance of that land.

The property is located between the Cobb Highway on the east being approx. 620m at its closest point and the Moama to Deniliquin Railway line on the western side being 2.9km from the site. The northern adjoining boundary is owned by the applicant's family and the southern property is owned by the applicant. The Moira National Park is situated to the east of the property with the boundary being more than 500m from the site.

The site in relation to surrounding residences and external workplaces is identified below. The map and summary table identifies that there is one residence (green), one temporary stay (yellow) and one storage/workshop area (yellow) within 5kms of the site, not owned by the applicant or their family.

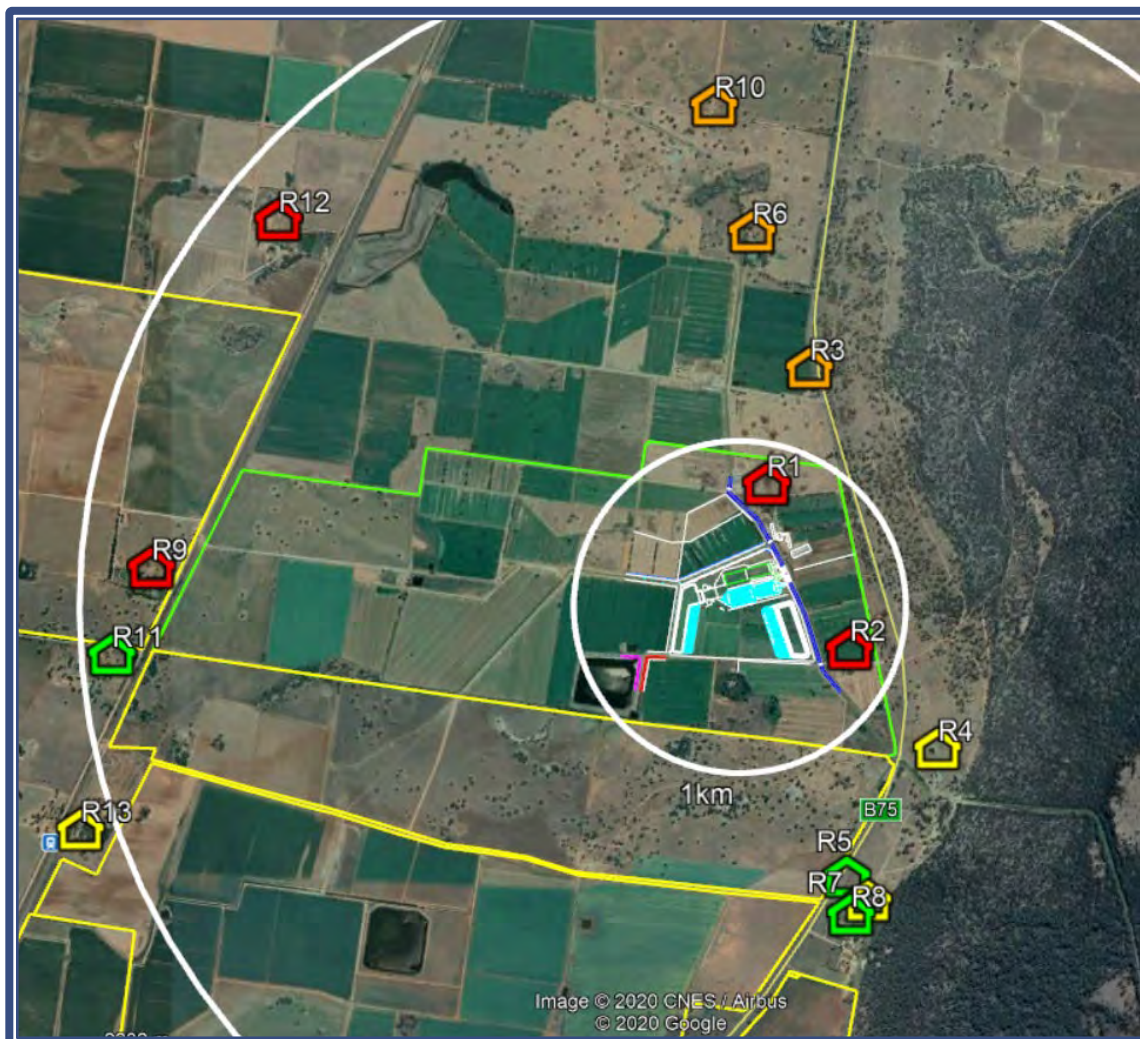


Figure 15 - Project site in relation to surrounding area. White circles 1km & 4kms from centre of project area (Source Google Earth)

Table 6 - Table of receptors

ID	Type	From barn		From effluent system	
		Distance	Direction	Distance	Direction
R1	Yarrimbah House 1*	332m	N	614m	NE
R2	Yarrimbah House 2*	625m	SE	958m	E
R3	Rural Residence – ‘Cotswold Park’ Staff House unoccupied**	1057m	N to NE	1,370m	NW
R4	Moirā PID Workshop	1,438m	SE	1,631m	S to SE
R5	Rural Residence @ ‘Moirā’*	1,661m	S to SE	1,693m	SE
R6	Rural Residence - ‘Cotswold Park’ **	1,832m	N to N-W	1,989mm	N
R7	‘Moirā’ temporary stay buildings*	2,021m	S to SE	1,880m	SE
R8	‘Moirā’ Homestead*	2,063m	S to SE	1,850m	SE
R9	‘Moirā Downs’ House*	3,436m	W	2,618m	W
R10	‘Cotswold Park’ North house**	2,665m	N to NW	2,751m	N
R11	Rural Residence – Owned by staff member	3,735m	W to SW	2,785m	W
R12	‘Moirā Downs’ House*	3,319m	NW	3,192m	NW
R13	Weekend Camping Hut – no power	4,178m	SW	3,100m	SW
	Moirā State Forest	927m	SE	1,370m	E
	Cobb Hwy	620m	E	1,251m	E
	Property Boundary*	505m	E	941	E

* Denotes owned by applicant

** Denotes owned by family

2.4. PROPOSED LAND USE CHANGE & PROJECT DESCRIPTION

The existing operation is an irrigated dairy farm operation that is considered a pasture-based system, which under the *Murray Local Environment Plan (LEP) 2011* is described as:

dairy (pasture-based) means a dairy that is conducted on a commercial basis where the only restriction facilities present are milking sheds and holding yards and where cattle generally feed by grazing on living grasses and other plants on the land and are constrained for no more than 10 hours in any 24 hour period (excluding during any period of drought or similar emergency relief).

Note—Dairies (pasture-based) are a type of **extensive agriculture**.

extensive agriculture means any of the following—

- (a) the production of crops or fodder (including irrigated pasture and fodder crops) for commercial purposes,
- (b) the grazing of livestock (other than pigs and poultry) for commercial purposes on living grasses and other plants on the land as their primary source of dietary requirements, and any supplementary or emergency feeding, or temporary agistment or housing for weaning, dipping, tagging or similar husbandry purposes, of the livestock,
- (c) bee keeping,
- (d) a dairy (pasture-based) where the animals generally feed by grazing on living grasses and other plants on the land as their primary source of dietary requirements, and any supplementary or emergency feeding, or temporary agistment or housing for weaning, dipping, tagging or similar husbandry purposes, of the animals.

As identified above, the operation also utilises a compost barn system within its current operation. This system is considered a '**restricted system**' which is described under the Murray LEP as:

dairy (restricted) means a dairy that is conducted on a commercial basis where restriction facilities (in addition to milking sheds and holding yards) are present and where cattle have access to grazing for less than 10 hours in any 24 hour period (excluding during any period of drought or similar emergency relief). It may comprise the whole or part of a restriction facility.

Note—Dairies (restricted) are a type of **intensive livestock agriculture**.

Intensive livestock agriculture means the keeping or breeding, for commercial purposes, of cattle, poultry, pigs, goats, horses, sheep or other livestock, and includes any of the following—

- (a) dairies (restricted),
- (b) feedlots,
- (c) pig farms,
- (d) poultry farms,

but does not include extensive agriculture, aquaculture or the operation of facilities for drought or similar emergency relief.

The proposal aims to change from the grazing of cows on pasture and utilising the current compost barn system to a full time freestall barn system and increase the number of cows within the operation. This requires the construction of two new barns, a new freshwater storage dam and new effluent treatment and storage system which will incorporate the part time use of the existing storage dam. The existing compost barn is shown below together with an example of the freestall barn system proposed.

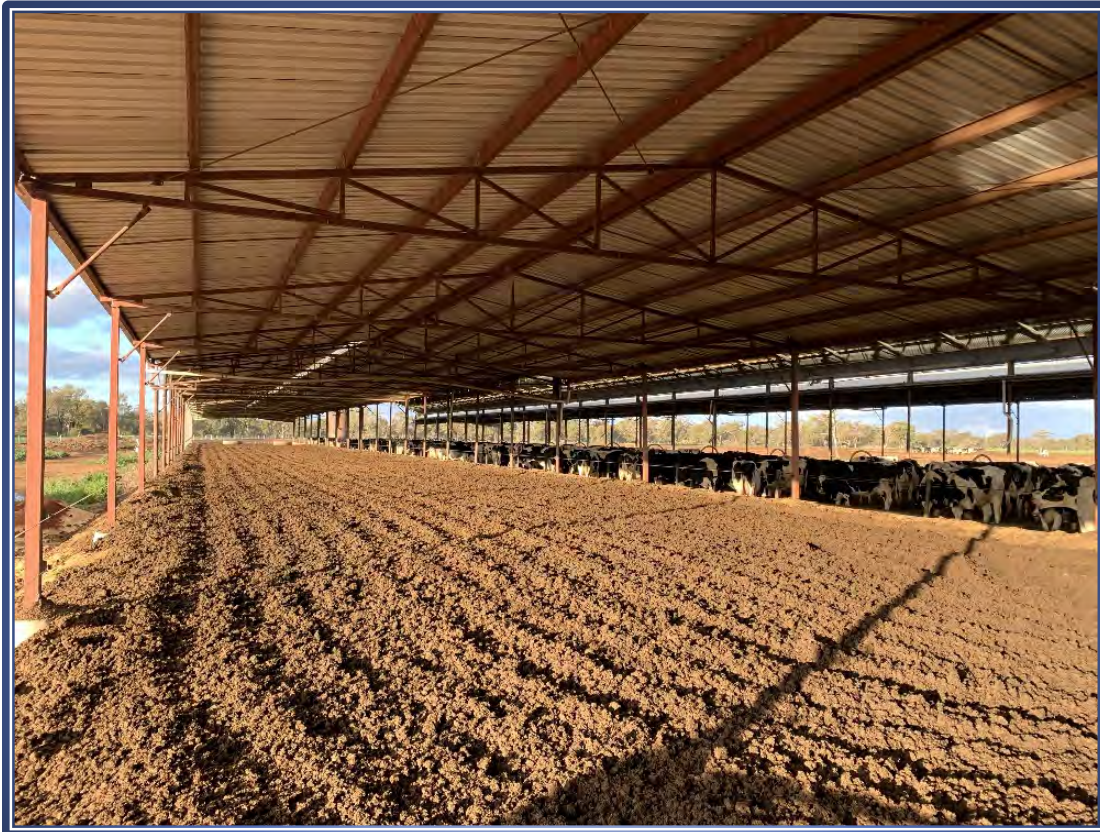


Figure 16 – Photo showing existing 800 cow composting barn



Figure 17 - Photo showing typical freestall barn

3. LAND USE CONFLICT RISK ASSESSMENT

3.1. INTRODUCTION

This section is based on the NSW Department of Primary Industries Factsheet – *Land Use Conflict Risk Assessment Guide* and provides an assessment of the potential for land use conflicts, their associated risks and severity of impacts utilising a probability and consequence matrix.

Table 7 below shows the LUCRA matrix identifies risk ranking from 1 to 25 for each set of probabilities (A-E) and consequences (1-5). A rank of 25 is the highest magnitude of risk, i.e. a highly likely and very serious event. A rank of 1 represents the lowest magnitude of risk, i.e. an almost impossible and very low consequence event. Priority in the assessment is given to those activities listed as high risk.

Table 7 - Risk ranking matrix

PROBABILITY	A	B	C	D	E
Consequence					
1	25	24	22	19	15
2	23	21	18	14	10
3	20	17	13	9	6
4	16	12	8	5	3
5	11	7	4	2	1

Table 8 - Measure of probability

Level	Descriptor	Description
A	Almost certain	Common or repeating occurrence
B	Likely	Known to occur, or 'it has happened'
C	Possible	Could occur, or 'I've heard of it happening'
D	Unlikely	Could occur in some circumstances, but not likely to occur
E	Rare	Practically impossible

Table 9 - Measure of consequence

Level	Descriptor	Description
1	Severe	<ul style="list-style-type: none"> Severe and/or permanent damage to the environment Irreversible Severe impact on the community Neighbours are in prolonged dispute and legal action involved
2	Major	<ul style="list-style-type: none"> Serious and/or long-term impact to the environment Long-term management implications Serious impact on the community Neighbours are in serious dispute
3	Moderate	<ul style="list-style-type: none"> Moderate and/or medium-term impact to the environment and community Some ongoing management implications Neighbour disputes occur
4	Minor	<ul style="list-style-type: none"> Minor and/or short-term impact to the environment and community Can be effectively managed as part of normal operations Infrequent disputes between neighbours
5	Negligible	<ul style="list-style-type: none"> Very minor impact to the environment and community Can be effectively managed as part of normal operations Neighbour disputes unlikely

The above tables are used to identify the risk ranking of the identified potential land use conflicts in the following sections.

3.2. INITIAL RISK IDENTIFICATION AND RISK RATING

This section is compiled as a schedule with each section addressing the potential land use conflict source considering the following:

- Activity/Source of the potential land use conflict,
- Description/Explanation of the activity/source, and
- Risk Rating per the above risk ranking matrix.

Table 10 - Initial risk evaluation

Source/Activity	Description/Explanation	Risk Ranking
Noise	Noise from activities within the site.	3 X D = 9
Dust	Dust generated as a result of site activities	3 X C = 13
Odour	Unpleasant odours impact on neighbouring properties or public.	3 X C = 13
Traffic	Change in traffic to and from site (Increase and timing).	3 X C = 13
Visual Amenity	Amenity of area impacted by operation.	3 X C = 13

3.3. RISK REDUCTION CONTROLS

Potential conflicts have been and will continue to be managed through siting and management of the operation. The site in relation to potential receivers allows for significant buffers to reduce potential sources of conflict. The following specific management strategies and controls will be implemented to reduce the risk of identified sources causing conflict.

3.3.1 NOISE

Noise will be generated as part of the construction and operation of the dairy. Major noise generation activities during construction relate to the earthworks portion of the construction with this proposed to be undertaken across a 16 week period (pending suitable construction conditions).

Noise generating activities during operation are proposed to be minor with noise generated as a result of animal movements, tractor and feed cart movements twice a day and other minor machinery such as electric pumps and cooling fans within the barns.

The provision of large separation distances between sensitive noise receivers and the site, combined with natural buffers of vegetation stands, will ensure low potential for impacts to surrounding areas from noise.

All vehicles will utilise mufflers and sound emissions devices and trucks will not utilise exhaust brakes within or close to the site.

3.3.2 DUST

Construction activities have the potential to generate dust however the site earthworks require compaction (rollers) to occur, including the incorporation of water for the works. This will assist with the minimisation of dust within the site.

Speed limits within the property will be incorporated as required to prevent dust generated on roads.

Where significant dust is created on the construction access track to the site, a water cart will be utilised to aid with dust suppression and prevent dust impacting on adjoining vegetation and the Cobb Hwy.

3.3.3 ODOUR

An Odour Assessment has been undertaken in relation to the proposal. This assessment identified the potential odour sources as the effluent ponds and the barn system with the potential for some emissions from the manure storage area pending volume stored and time of year. Other odour generating activities include the application of manure to paddocks in the vicinity of property boundaries.

Management recommendations have been made in relation to these activities which include maintaining buffer distances from sensitive receivers when applying manure, regular cleaning of natural instinct earthen pads to ensure manure depth does not exceed 50mm and managing other surfaces that have the potential for odour emissions.

An Effluent Management Plan has been undertaken to review management activities in relation to the effluent treatment system. This includes the emptying of the pond leading into winter, including sufficient time to allow for sludge removal, drying and incorporation into paddocks prior to winter, the storage of manure and application of effluent.

3.3.4 TRAFFIC

Traffic to the site will be minimised by drivers and site services carpooling where possible.

Deliveries to site during construction will be undertaken outside high volume periods on the highway and not during school bus timeframes.

Milk tanker deliveries will continue to utilise the existing access point to the property.

3.3.5 VISUAL AMENITY

The new operation is to be sited at a greater distance from public vantage points than the current operation.

No native vegetation is proposed for removal between the public vantage points and the proposed site.

3.3.6 BUFFERS

The recommended buffers for dairy operations are identified in the Environmental management guidelines for the dairy industry (NSW DPI, 2008) with the table 4-2 from this guideline replicated below.

Table 11 - Minimum buffer distances

Feature	Distance from livestock complex	Distance from land application
Well used public road (>50 vehicles/day)	200m	50m
Low usage public road (1-50 vehicles/day)	50m	20m
Major public reservoir	800m	800m
Bore, well or spring supplying potable water	100m	100m
Major River and Creeks	100m	100m
Minor or intermittent watercourses	50m	50m
Dry runoff/erosion gullies on property	10m	10m
Dairy	50m	50m
Neighbouring rural residence	200m	100m
Property boundary	50m	10m

The separation distances identified above represent the industry best practice minimum buffer distances and are considered to reduce the potential for land use conflicts and protect rural production areas and key environmental assets. The proposal more than adequately meets the above buffer distances.

3.4. PERFORMANCE MONITORING

The process as identified in the LUCRA guide aims to identify management strategies which have the potential to affect the probability of an event occurring. The following table identifies the revised risk ranking and related management strategies utilised to ensure that the ranking remains below the target rank.

Table 12 - Management strategies

Potential Conflict	Risk Reduction Control Reference	Risk Ranking	Target Rank
Noise from activities within the site.	Listed section 3.3.1 & 3.3.6	5 x C = 4	<10
Dust generated as a result of site activities	Listed section 3.3.2 & 3.3.6	4 x C = 8	<10
Unpleasant odours impact on neighbouring properties or public.	Listed section 3.3.3 & 3.3.6	4 x C = 8	<10
Change in traffic to and from site (Increase and timing).	Listed section 3.3.4 & 3.3.6	5 x C = 4	<10
Amenity of area impacted by operation.	Listed section 3.3.5 & 3.3.6	5 x C = 4	<10

4. CONCLUSION

The Land Use Conflict Risk Assessment has resulted in an outcome with minor to negligible consequences in the event of a land use conflict occurring. This is primarily managed through project siting, design and appropriate separation distances from potentially sensitive receptors and the proposed mitigation measures can be incorporated with the management systems of the operation. On this basis, it is recommended that, subject to the identified mitigation measures, the development should proceed.



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