DA From 1 – Development application details

Approved form (version 1.4 effective 15 December 2023) made under section 282 of the Planning Act 2016.

This form **must** be used to make a development application **involving code assessment or impact assessment**, except when applying for development involving only building work.

For a development application involving **building work only**, use *DA Form 2 – Building work details*.

For a development application involving **building work associated with any other type of assessable development (i.e. material change of use, operational work or reconfiguring a lot)**, use this form (*DA Form 1*) **and** parts 4 to 6 of *DA Form 2 – Building work details.*

Unless stated otherwise, all parts of this form **must** be completed in full and all required supporting information **must** accompany the development application.

One or more additional pages may be attached as a schedule to this development application if there is insufficient space on the form to include all the necessary information.

This form and any other form relevant to the development application must be used to make a development application relating to strategic port land and Brisbane core port land under the *Transport Infrastructure Act 1994*, and airport land under the *Airport Assets (Restructuring and Disposal) Act 2008.* For the purpose of assessing a development application relating to strategic port land and Brisbane core port land, any reference to a planning scheme is taken to mean a land use plan for the strategic port land, Brisbane port land use plan for Brisbane core port land, or a land use plan for airport land.

Note: *All terms used in this form have the meaning given under the Planning Act 2016, the Planning Regulation 2017, or the Development Assessment Rules (DA Rules).*

PART 1 – APPLICANT DETAILS

1) Applicant details	
Applicant name(s) (*individual or company full name*)	Janean Pastoral Co
Contact name *(only applicable for companies)*	Janean Pastoral Co c/- Justin Schultz
Postal address *(P.O. Box or street address)*	Warrie, Chelmer Rd, St George 4487 QLD
Suburb	St George
State	QLD
Postcode	4487
Country	Australia
Contact number	0447 007 324
Email address *(non-mandatory)*	warrie2@outlook.com
Mobile number *(non-mandatory)*	0447 007 324
Fax number *(non-mandatory)*	NA
Applicant's reference number(s) *(if applicable)*	[#668287]

2) Owner's consent
2.1) Is written consent of the owner required for this development application?
☒ Yes – the written consent of the owner(s) is attached to this development application ☐ No – proceed to 3)

PART 2 – LOCATION DETAILS

3) Location of the premises *(complete 3.1) or 3.2), and 3.3) as applicable)*

***Note**: Provide details below and attach a site plan for any or all premises part of the development application. For further information, see DA Forms Guide: Relevant plans.*

3.1) Street address and lot on plan

☒ Street address **AND** lot on plan (a*ll lots must be listed*), ***or***

☐ Street address **AND** lot on plan for an adjoining or adjacent property of the premises *(appropriate for development in water but adjoining or adjacent to land e.g. jetty, pontoon. All lots must be listed).*

a)	Unit No.	Street No.	Street Name and Type	Suburb
			Beltana Road	St George 4487
	Postcode	Lot No.	Plan Type and Number *(e.g. RP, SP)*	Local Government Area(s)
		4	BLM761	Balonne Shire Council
b)	Unit No.	Street No.	Street Name and Type	Suburb
	Postcode	Lot No.	Plan Type and Number *(e.g. RP, SP)*	Local Government Area(s)

3.2) Coordinates of premises *(appropriate for development in remote areas, over part of a lot or in water not adjoining or adjacent to land e.g. channel dredging in Moreton Bay)*

***Note**: Place each set of coordinates in a separate row.*

☒ Coordinates of premises by longitude and latitude

Longitude(s)	Latitude(s)	Datum	Local Government Area(s) *(if applicable)*
149° 1'20.22"E	28° 5'59.52"S	☒ WGS84 ☐ GDA94 ☐ Other:	Balonne Shire Council

☐ Coordinates of premises by easting and northing

Easting(s)	Northing(s)	Zone Ref.	Datum	Local Government Area(s) *(if applicable)*
		☐ 54 ☐ 55 ☐ 56	☐ WGS84 ☐ GDA94 ☐ Other:	

3.3) Additional premises

☐ Additional premises are relevant to this development application and the details of these premises have been attached in a schedule to this development application

☐ Not required

4) Identify any of the following that apply to the premises and provide any relevant details

☐ In or adjacent to a water body or watercourse or in or above an aquifer

Name of water body, watercourse or aquifer:

☐ On strategic port land under the *Transport Infrastructure Act 1994*

Lot on plan description of strategic port land:

Name of port authority for the lot:

☐ In a tidal area

Name of local government for the tidal area *(if applicable)*:

Name of port authority for tidal area *(if applicable)*:

☐ On airport land under the *Airport Assets (Restructuring and Disposal) Act 2008*

Name of airport:

☐ Listed on the Environmental Management Register (EMR) under the *Environmental Protection Act 1994*	
EMR site identification:	
☐ Listed on the Contaminated Land Register (CLR) under the *Environmental Protection Act 1994*	
CLR site identification:	

5) Are there any existing easements over the premises?

Note: Easement uses vary throughout Queensland and are to be identified correctly and accurately. For further information on easements and how they may affect the proposed development, see DA Forms Guide.

☐ Yes – All easement locations, types and dimensions are included in plans submitted with this development application

☒ No

PART 3 – DEVELOPMENT DETAILS

Section 1 – Aspects of development

6.1) Provide details about the first development aspect

a) What is the type of development? *(tick only one box)*

☒ Material change of use ☐ Reconfiguring a lot ☐ Operational work ☐ Building work

b) What is the approval type? *(tick only one box)*

☒ Development permit ☐ Preliminary approval ☐ Preliminary approval that includes a variation approval

c) What is the level of assessment?

☐ Code assessment ☒ Impact assessment *(requires public notification)*

d) Provide a brief description of the proposal *(e.g. 6 unit apartment building defined as multi-unit dwelling, reconfiguration of 1 lot into 3 lots)*:

Green ammonia fertilizer production facility.

e) Relevant plans

***Note**: Relevant plans are required to be submitted for all aspects of this development application. For further information, see DA Forms guide: Relevant plans.*

☒ Relevant plans of the proposed development are attached to the development application

6.2) Provide details about the second development aspect

a) What is the type of development? *(tick only one box)*

☐ Material change of use ☐ Reconfiguring a lot ☒ Operational work ☒ Building work

b) What is the approval type? *(tick only one box)*

☒ Development permit ☐ Preliminary approval ☐ Preliminary approval that includes a variation approval

c) What is the level of assessment?

☒ Code assessment ☐ Impact assessment *(requires public notification)*

d) Provide a brief description of the proposal *(e.g. 6 unit apartment building defined as multi-unit dwelling, reconfiguration of 1 lot into 3 lots)*:

Access road and new buildings for Green ammonia fertilizer production facility.

e) Relevant plans

***Note**: Relevant plans are required to be submitted for all aspects of this development application. For further information, see DA Forms Guide: Relevant plans.*

☒ Relevant plans of the proposed development are attached to the development application

6.3) Additional aspects of development

☐ Additional aspects of development are relevant to this development application and the details for these aspects that would be required under Part 3 Section 1 of this form have been attached to this development application

☐ Not required

Section 2 – Further development details

7) Does the proposed development application involve any of the following?	
Material change of use	☒ Yes – complete division 1 if assessable against a local planning instrument
Reconfiguring a lot	☐ Yes – complete division 2
Operational work	☒ Yes – complete division 3
Building work	☒ Yes – complete *DA Form 2 – Building work details*

Division 1 – Material change of use

***Note**: This division is only required to be completed if any part of the development application involves a material change of use assessable against a local planning instrument.*

8.1) Describe the proposed material change of use			
Provide a general description of the proposed use	Provide the planning scheme definition *(include each definition in a new row)*	Number of dwelling units *(if applicable)*	Gross floor area (m^2) *(if applicable)*
Green ammonia fertilizer facility	Impact assessment		1.8 Ha (total facility)

8.2) Does the proposed use involve the use of existing buildings on the premises?
☐ Yes
☒ No

Division 2 – Reconfiguring a lot

***Note**: This division is only required to be completed if any part of the development application involves reconfiguring a lot.*

9.1) What is the total number of existing lots making up the premises?
1

9.2) What is the nature of the lot reconfiguration? *(tick all applicable boxes)*	
☐ Subdivision *(complete 10))*	☐ Dividing land into parts by agreement *(complete 11))*
☐ Boundary realignment *(complete 12))*	☐ Creating or changing an easement giving access to a lot from a constructed road *(complete 13))*

10) Subdivision				
10.1) For this development, how many lots are being created and what is the intended use of those lots:				
Intended use of lots created	Residential	Commercial	Industrial	Other, please specify:
Number of lots created				

10.2) Will the subdivision be staged?	
☐ Yes – provide additional details below ☒ No	
How many stages will the works include?	1
What stage(s) will this development application apply to?	1

11) Dividing land into parts by agreement – how many parts are being created and what is the intended use of the parts?				
Intended use of parts created	Residential	Commercial	Industrial	Other, please specify:
Number of parts created				

12) Boundary realignment			
12.1) What are the current and proposed areas for each lot comprising the premises?			
Current lot		Proposed lot	
Lot on plan description	Area (m^2)	Lot on plan description	Area (m^2)
12.2) What is the reason for the boundary realignment?			

13) What are the dimensions and nature of any existing easements being changed and/or any proposed easement? *(attach schedule if there are more than two easements)*				
Existing or proposed?	Width (m)	Length (m)	Purpose of the easement? *(e.g. pedestrian access)*	Identify the land/lot(s) benefitted by the easement

Division 3 – Operational work

***Note**: This division is only required to be completed if any part of the development application involves operational work.*

14.1) What is the nature of the operational work?		
☒ Road work	☐ Stormwater	☐ Water infrastructure
☐ Drainage work	☐ Earthworks	☐ Sewage infrastructure
☐ Landscaping	☐ Signage	☐ Clearing vegetation
☐ Other – please specify:		
14.2) Is the operational work necessary to facilitate the creation of new lots? *(e.g. subdivision)*		
☐ Yes – specify number of new lots:		
☒ No		
14.3) What is the monetary value of the proposed operational work? *(include GST, materials and labour)*		
$ 20000		

PART 4 – ASSESSMENT MANAGER DETAILS

15) Identify the assessment manager(s) who will be assessing this development application
Balonne Shire Council
16) Has the local government agreed to apply a superseded planning scheme for this development application?
☐ Yes – a copy of the decision notice is attached to this development application
☐ The local government is taken to have agreed to the superseded planning scheme request – relevant documents attached
☒ No

PART 5 – REFERRAL DETAILS

17) Does this development application include any aspects that have any referral requirements?
***Note**: A development application will require referral if prescribed by the* Planning Regulation 2017.

☐ No, there are no referral requirements relevant to any development aspects identified in this development application – proceed to Part 6

Matters requiring referral to the **Chief Executive of the *Planning Act 2016*:**

☐ Clearing native vegetation
☐ Contaminated land *(unexploded ordnance)*
☒ Environmentally relevant activities (ERA) *(only if the ERA has not been devolved to a local government)*
☐ Fisheries – aquaculture
☐ Fisheries – declared fish habitat area
☐ Fisheries – marine plants
☐ Fisheries – waterway barrier works
☒ Hazardous chemical facilities
☐ Heritage places – Queensland heritage place *(on or near a Queensland heritage place)*
☐ Infrastructure-related referrals – designated premises
☐ Infrastructure-related referrals – state transport infrastructure
☐ Infrastructure-related referrals – State transport corridor and future State transport corridor
☐ Infrastructure-related referrals – State-controlled transport tunnels and future state-controlled transport tunnels
☐ Infrastructure-related referrals – near a state-controlled road intersection
☐ Koala habitat in SEQ region – interfering with koala habitat in koala habitat areas outside koala priority areas
☐ Koala habitat in SEQ region – key resource areas
☐ Ports – Brisbane core port land – near a State transport corridor or future State transport corridor
☐ Ports – Brisbane core port land – environmentally relevant activity (ERA)
☐ Ports – Brisbane core port land – tidal works or work in a coastal management district
☐ Ports – Brisbane core port land – hazardous chemical facility
☐ Ports – Brisbane core port land – taking or interfering with water
☐ Ports – Brisbane core port land – referable dams
☐ Ports – Brisbane core port land – fisheries
☐ Ports – Land within Port of Brisbane's port limits *(below high-water mark)*
☐ SEQ development area
☐ SEQ regional landscape and rural production area or SEQ rural living area – tourist activity or sport and recreation activity
☐ SEQ regional landscape and rural production area or SEQ rural living area – community activity
☐ SEQ regional landscape and rural production area or SEQ rural living area – indoor recreation
☐ SEQ regional landscape and rural production area or SEQ rural living area – urban activity
☐ SEQ regional landscape and rural production area or SEQ rural living area – combined use
☐ SEQ northern inter-urban break – tourist activity or sport and recreation activity
☐ SEQ northern inter-urban break – community activity
☐ SEQ northern inter-urban break – indoor recreation
☐ SEQ northern inter-urban break – urban activity
☐ SEQ northern inter-urban break – combined use
☐ Tidal works or works in a coastal management district
☐ Reconfiguring a lot in a coastal management district or for a canal
☐ Erosion prone area in a coastal management district
☐ Urban design
☐ Water-related development – taking or interfering with water
☐ Water-related development – removing quarry material *(from a watercourse or lake)*
☐ Water-related development – referable dams
☐ Water-related development –levees *(category 3 levees only)*
☐ Wetland protection area

Matters requiring referral to the **local government:**

☐ Airport land

☐ Environmentally relevant activities (ERA) (*only if the ERA has been devolved to local government)*

☐ Heritage places – Local heritage places

Matters requiring referral to the **Chief Executive of the distribution entity or transmission entity:**

☐ Infrastructure-related referrals – Electricity infrastructure

Matters requiring referral to:

- The **Chief Executive of the holder of the licence**, if not an individual
- The **holder of the licence**, if the holder of the licence is an individual

☐ Infrastructure-related referrals – Oil and gas infrastructure

Matters requiring referral to the **Brisbane City Council:**

☐ Ports – Brisbane core port land

Matters requiring referral to the **Minister responsible for administering the *Transport Infrastructure Act 1994*:**

☐ Ports – Brisbane core port land *(where inconsistent with the Brisbane port LUP for transport reasons)*

☐ Ports – Strategic port land

Matters requiring referral to the **relevant port operator**, if applicant is not port operator**:**

☐ Ports – Land within Port of Brisbane's port limits *(below high-water mark)*

Matters requiring referral to the **Chief Executive of the relevant port authority:**

☐ Ports – Land within limits of another port *(below high-water mark)*

Matters requiring referral to the **Gold Coast Waterways Authority:**

☐ Tidal works or work in a coastal management district *(in Gold Coast waters)*

Matters requiring referral to the **Queensland Fire and Emergency Service:**

☐ Tidal works or work in a coastal management district *(involving a marina (more than six vessel berths))*

18) Has any referral agency provided a referral response for this development application?

☐ Yes – referral response(s) received and listed below are attached to this development application

☒ No

Referral requirement	Referral agency	Date of referral response

Identify and describe any changes made to the proposed development application that was the subject of the referral response and this development application, or include details in a schedule to this development application *(if applicable).*

PART 6 – INFORMATION REQUEST

19) Information request under Part 3 of the DA Rules

☒ I agree to receive an information request if determined necessary for this development application

☐ I do not agree to accept an information request for this development application

***Note**: By not agreeing to accept an information request I, the applicant, acknowledge:*

- *that this development application will be assessed and decided based on the information provided when making this development application and the assessment manager and any referral agencies relevant to the development application are not obligated under the DA Rules to accept any additional information provided by the applicant for the development application unless agreed to by the relevant parties*
- *Part 3 of the DA Rules will still apply if the application is an application listed under section 11.3 of the DA Rules.*

Further advice about information requests is contained in the DA Forms Guide.

PART 7 – FURTHER DETAILS

20) Are there any associated development applications or current approvals? *(e.g. a preliminary approval)*

☐ Yes – provide details below or include details in a schedule to this development application
☒ No

List of approval/development application references	Reference number	Date	Assessment manager
☐ Approval ☐ Development application			
☐ Approval ☐ Development application			

21) Has the portable long service leave levy been paid? *(only applicable to development applications involving building work or operational work)*

☐ Yes – a copy of the receipted QLeave form is attached to this development application
☒ No – I, the applicant will provide evidence that the portable long service leave levy has been paid before the assessment manager decides the development application. I acknowledge that the assessment manager may give a development approval only if I provide evidence that the portable long service leave levy has been paid
☐ Not applicable *(e.g. building and construction work is less than $150,000 excluding GST)*

Amount paid	Date paid (dd/mm/yy)	QLeave levy number (A, B or E)
$		

22) Is this development application in response to a show cause notice or required as a result of an enforcement notice?

☐ Yes – show cause or enforcement notice is attached
☒ No

23) Further legislative requirements

Environmentally relevant activities

23.1) Is this development application also taken to be an application for an environmental authority for an **Environmentally Relevant Activity (ERA)** under section 115 of the *Environmental Protection Act 1994*?

☒ Yes – the required attachment (form ESR/2015/1791) for an application for an environmental authority accompanies this development application, and details are provided in the table below
☐ No

***Note**: Application for an environmental authority can be found by searching "ESR/2015/1791" as a search term at www.qld.gov.au. An ERA requires an environmental authority to operate. See www.business.qld.gov.au for further information.*

Proposed ERA number:		Proposed ERA threshold:	
Proposed ERA name:			

☒ Multiple ERAs are applicable to this development application and the details have been attached in a schedule to this development application.

ERA number*	Threshold*	Name of ERA*	New or existing ERA(s)	I can comply with the eligibility criteria*	I can comply with all the standard conditions*
2-1(b). [Existing EA 3373]	10000 SCUs	2-1(b). Cattle feedlotting: >1,000-10,000 SCU. [AES = 28]	☐ New - DA ☐ New - EA ☒ Existing	☐ Yes ☐ N/A	☐ Yes ☐ No
7-6(b) [AES = 115]	10,000 t/yr	6(b) Inorganic chemical manufacturing (other than items 1-4): >1,000-10,000t/yr	☒ New - DA ☒ New - EA ☐ Existing	☒ Yes ☐ N/A	☒ Yes ☐ No
8-1 [AES = 51]	>50t	1. Chemical storage 50t or more of chemicals of dangerous goods Class 1 or Class 2, division 2.3 in containers of at least 10m3 [ammonia (Class 2) stored in pressure vessels >10m3)	☒ New - DA ☒ New - EA ☐ Existing	☒ Yes ☐ N/A	☒ Yes ☐ No

Hazardous chemical facilities

23.2) Is this development application for a **hazardous chemical facility**?

☒ Yes – *Form 69: Notification of a facility exceeding 10% of schedule 15 threshold* is attached to this development application [NH3, H2]

☐ No

***Note**: See www.business.qld.gov.au for further information about hazardous chemical notifications.*

Clearing native vegetation

23.3) Does this development application involve **clearing native vegetation** that requires written confirmation that the chief executive of the *Vegetation Management Act 1999* is satisfied the clearing is for a relevant purpose under section 22A of the *Vegetation Management Act 1999*?

☐ Yes – this development application includes written confirmation from the chief executive of the *Vegetation Management Act 1999* (s22A determination)

☒ No

***Note**: 1. Where a development application for operational work or material change of use requires a s22A determination and this is not included, the development application is prohibited development.*

2. See https://www.qld.gov.au/environment/land/vegetation/applying for further information on how to obtain a s22A determination.

Environmental offsets

23.4) Is this development application taken to be a prescribed activity that may have a significant residual impact on a **prescribed environmental matter** under the *Environmental Offsets Act 2014*?

☐ Yes – I acknowledge that an environmental offset must be provided for any prescribed activity assessed as having a significant residual impact on a prescribed environmental matter

☒ No

***Note**: The environmental offset section of the Queensland Government's website can be accessed at www.qld.gov.au for further information on environmental offsets.*

Koala habitat in SEQ Region

23.5) Does this development application involve a material change of use, reconfiguring a lot or operational work which is assessable development under Schedule 10, Part 10 of the Planning Regulation 2017?

☐ Yes – the development application involves premises in the koala habitat area in the koala priority area

☐ Yes – the development application involves premises in the koala habitat area outside the koala priority area

☒ No

***Note**: If a koala habitat area determination has been obtained for this premises and is current over the land, it should be provided as part of this development application. See koala habitat area guidance materials at www.des.qld.gov.au for further information.*

Water resources

23.6) Does this development application involve **taking or interfering with underground water through an artesian or subartesian bore, taking or interfering with water in a watercourse, lake or spring, or taking overland flow water under the *Water Act 2000***?

☐ Yes – the relevant template is completed and attached to this development application and I acknowledge that a relevant authorisation or licence under the *Water Act 2000* may be required prior to commencing development

☒ No

***Note**: Contact the Department of Natural Resources, Mines and Energy at www.dnrme.qld.gov.au for further information.*

DA templates are available from https://planning.dsdmip.qld.gov.au/. If the development application involves:

- *Taking or interfering with underground water through an artesian or subartesian bore: complete DA Form 1 Template 1*
- *Taking or interfering with water in a watercourse, lake or spring: complete DA Form1 Template 2*
- *Taking overland flow water: complete DA Form 1 Template 3.*

Waterway barrier works

23.7) Does this application involve **waterway barrier works?**

☐ Yes – the relevant template is completed and attached to this development application

☒ No

DA templates are available from https://planning.dsdmip.qld.gov.au/. For a development application involving waterway barrier works, complete DA Form 1 Template 4.

Marine activities

23.8) Does this development application involve **aquaculture, works within a declared fish habitat area or removal, disturbance or destruction of marine plants?**

☐ Yes – an associated *resource* allocation authority is attached to this development application, if required under the *Fisheries Act 1994*

☒ No

***Note**: See guidance materials at www.daf.qld.gov.au for further information.*

Quarry materials from a watercourse or lake

23.9) Does this development application involve the **removal of quarry materials from a watercourse or lake** under the *Water Act 2000?*

☐ Yes – I acknowledge that a quarry material allocation notice must be obtained prior to commencing development
☒ No

***Note**: Contact the Department of Natural Resources, Mines and Energy at www.dnrme.qld.gov.au and www.business.qld.gov.au for further information.*

Quarry materials from land under tidal waters

23.10) Does this development application involve the **removal of quarry materials from land under tidal water** under the *Coastal Protection and Management Act 1995?*

☐ Yes – I acknowledge that a quarry material allocation notice must be obtained prior to commencing development
☒ No

***Note**: Contact the Department of Environment and Science at www.des.qld.gov.au for further information.*

Referable dams

23.11) Does this development application involve a **referable dam** required to be failure impact assessed under section 343 of the *Water Supply (Safety and Reliability) Act 2008* (the Water Supply Act)?

☐ Yes – the 'Notice Accepting a Failure Impact Assessment' from the chief executive administering the Water Supply Act is attached to this development application
☒ No

***Note**: See guidance materials at www.dnrme.qld.gov.au for further information.*

Tidal work or development within a coastal management district

23.12) Does this development application involve **tidal work or development in a coastal management district**?

☐ Yes – the following is included with this development application:
- ☐ Evidence the proposal meets the code for assessable development that is prescribed tidal work *(only required if application involves prescribed tidal work)*
- ☐ A certificate of title

☒ No

***Note**: See guidance materials at www.des.qld.gov.au for further information.*

Queensland and local heritage places

23.13) Does this development application propose development on or adjoining a place entered in the **Queensland heritage register** or on a place entered in a local government's **Local Heritage Register**?

☐ Yes – details of the heritage place are provided in the table below
☒ No

***Note**: See guidance materials at www.des.qld.gov.au for information requirements regarding development of Queensland heritage places.*

Name of the heritage place:		Place ID:	

Brothels

23.14) Does this development application involve a **material change of use for a brothel**?

☐ Yes – this development application demonstrates how the proposal meets the code for a development application for a brothel under Schedule 3 of the *Prostitution Regulation 2014*
☒ No

Decision under section 62 of the *Transport Infrastructure Act 1994*

23.15) Does this development application involve new or changed access to a state-controlled road?

☐ Yes – this application will be taken to be an application for a decision under section 62 of the *Transport Infrastructure Act 1994* (subject to the conditions in section 75 of the *Transport Infrastructure Act 1994* being satisfied)
☒ No

Walkable neighbourhoods assessment benchmarks under Schedule 12A of the Planning Regulation

23.16) Does this development application involve reconfiguring a lot into 2 or more lots in certain residential zones (except rural residential zones), where at least one road is created or extended?

☐ Yes – Schedule 12A is applicable to the development application and the assessment benchmarks contained in schedule 12A have been considered

☒ No

***Note**: See guidance materials at www.planning.dsdmip.qld.gov.au for further information.*

PART 8 – CHECKLIST AND APPLICANT DECLARATION

24) Development application checklist	
I have identified the assessment manager in question 15 and all relevant referral requirement(s) in question 17 ***Note**: See the Planning Regulation 2017 for referral requirements*	☐ Yes
If building work is associated with the proposed development, Parts 4 to 6 of *DA Form 2 – Building work details* have been completed and attached to this development application	☐ Yes ☐ Not applicable
Supporting information addressing any applicable assessment benchmarks is with the development application ***Note**: This is a mandatory requirement and includes any relevant templates under question 23, a planning report and any technical reports required by the relevant categorising instruments (e.g. local government planning schemes, State Planning Policy, State Development Assessment Provisions). For further information, see DA Forms Guide: Planning Report Template.*	☐ Yes
Relevant plans of the development are attached to this development application ***Note**: Relevant plans are required to be submitted for all aspects of this development application. For further information, see DA Forms Guide: Relevant plans.*	☐ Yes
The portable long service leave levy for QLeave has been paid, or will be paid before a development permit is issued (*see 21*)	☐ Yes ☐ Not applicable

25) Applicant declaration

☒ By making this development application, I declare that all information in this development application is true and correct

☒ Where an email address is provided in Part 1 of this form, I consent to receive future electronic communications from the assessment manager and any referral agency for the development application where written information is required or permitted pursuant to sections 11 and 12 of the *Electronic Transactions Act 2001*

***Note**: It is unlawful to intentionally provide false or misleading information.*

Privacy – Personal information collected in this form will be used by the assessment manager and/or chosen assessment manager, any relevant referral agency and/or building certifier (including any professional advisers which may be engaged by those entities) while processing, assessing and deciding the development application. All information relating to this development application may be available for inspection and purchase, and/or published on the assessment manager's and/or referral agency's website.

Personal information will not be disclosed for a purpose unrelated to the *Planning Act 2016*, Planning Regulation 2017 and the DA Rules except where:

- such disclosure is in accordance with the provisions about public access to documents contained in the *Planning Act 2016* and the Planning Regulation 2017, and the access rules made under the *Planning Act 2016* and Planning Regulation 2017; or
- required by other legislation (including the *Right to Information Act 2009*); or
- otherwise required by law.

This information may be stored in relevant databases. The information collected will be retained as required by the *Public Records Act 2002.*

PART 9 – FOR COMPLETION OF THE ASSESSMENT MANAGER – FOR OFFICE USE ONLY

Date received: | Reference number(s):

Notification of engagement of alternative assessment manager	
Prescribed assessment manager	
Name of chosen assessment manager	
Date chosen assessment manager engaged	
Contact number of chosen assessment manager	
Relevant licence number(s) of chosen assessment manager	

QLeave notification and payment *Note: For completion by assessment manager if applicable*			
Description of the work			
QLeave project number			
Amount paid ($)		Date paid (dd/mm/yy)	
Date receipted form sighted by assessment manager			
Name of officer who sighted the form			

All Energy Pty Ltd
www.allenergypl.com.au

Moonie River Renewables (MRR)

Ammonia Production Facility.

Additional Information Report

All Energy Pty Ltd

CONFIDENTIAL

REPORT ISSUE AUTHORISATION

PROJECT: Moonie River Renewables (MRR) Ammonia Production Facility.

AUTHORS:

Dr. Gareth M. Forde

Registered Practicing Engineering Queensland – Environmental Engineering;
Registered Practicing Engineering Queensland – Chemical Engineering;
Chartered Engineer (Engineers UK);
BE (Hons I, Chemical), University of Queensland;
PhD, Chemical Engineering, Cambridge University, UK;
Clean Energy Regulator - Greenhouse and Energy Auditor;
Chartered Scientist (Science Council, UK);
Graduate Certificate HigherEd, Monash University;
Fellow of the Institute of Chemical Engineers;
Fellow of the Cambridge Commonwealth Trust;
Fellow of the Victorian Endowment for Science, Knowledge and Innovation; &
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Date	Purpose of Issue	Rev
19/11/2025	Rev0	0
28/11/2025	Rev1	1

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1 Project Details

1.1 Moonie River Renewables

Moonie River Renewables (referred hereon as the 'Project') will involve the generation and storage of renewable electricity via a ground-mounted solar array and battery system, then used to split purified river and/or ground water into hydrogen and oxygen gas. The renewable hydrogen will then be reacted with nitrogen from the air in a conventional Haber-Bosch synthesis reactor under elevated temperate, pressure, and using a catalyst to produce renewable anhydrous ammonia for fertiliser application. The concept design for the proposed fertiliser production plant and relationship to the existing farming infrastructure is shown below.

Figure 1: Panoramic view of ammonia facility (fore ground) looking towards the south-west with existing farming infrastructure in the background.

The design will include the following aspects:

- 14.7 MWp of ground-mounted, East-West orientated solar panels
- 10 MW of hydrogen electrolyser capacity, producing up to 2,000 Nm3/hr @ 99.999% purity. Water consumption of the electrolyser is 2.4 m3/h
- Nitrogen generation by pressure swing adsorption from air. N2 output 700 Nm3/h @ 99.9995% purity
- NH3 synthesis loop producing up to 0.82 tonnes/h of anhydrous ammonia
- Adiabatic / direct -air cooling system to reduce water consumption and achieve a high co-efficient of performance.

- 8,000 gpd (0.03 ML/day) reverse osmosis system followed by deionisation cartridges. Based on the quality of Moonie River water, after micro filtration to remove suspended sediments, recovery rate of RO expected to be up to 70%, or as low as 50%.
- 39,000 m3 of H2 and 13,000 m3 of N2 storage, representing 20 tonnes of NH3 production capacity.
- Anhydrous ammonia storage at 17 barg and loadout system.

1.2 Why Ammonia and Why now?

Australia must develop sovereign capacity to produce nitrogen fertiliser as:

- **Australia currently imports >90% of its N-fertiliser.** Fertiliser is not always available due to internation supply and shipping issues: National Farmers Federation President Hamish McIntyre noted in an interview with the ABC on 2nd November 2025 that for the first time cropping operations were not able to access the urea that was required, resulting in 1.5 tonnes / Ha less normal, which is 60% to 75% less than the Australian average.

- **Fertiliser is expensive:** quoting a Rabobank Australia article, fertilizer "prices remain high against historical levels", and are "going up by escalator, but coming down via the stairs" with "markets likely to remain volatile". All Energy Pty Ltd has been tracking ammonia and urea pricing for several years and determined that there is a cost import of approximately $300 to 500 per tonne for N-fertilizer supplied to regional Queensland over and above the long run internationally traded market pricing which may be attributed to the long supply chain and profiteering of the different supply chain levels.

- **Ammonia provides the opportunity to dramatically reduce GHG emissions.** Cotton farmers product an export product which must complete in international markets. In-field fertiliser emissions equate to 39.3% of farm emissions with nitrogen Fertiliser production emissions representing 27.9%[1]. Compare to the Nox, CO2, leaching and N volatilisation emissions for urea of 5.432 to 8.39 t CO2-e per tonne N applied in urea (depending upon the method factors used), ammonia has emissions of 1.401 t CO2-e, hence offers a reduction in fertiliser life cycle emissions of 74 to 83% less, and total cropping farm GHG emissions reduction of 57 to 61%.

- **Urea is expensive.** Fertiliser represents 16 to 29% of cropping input costs, with urea only being 46% nitrogen whilst ammonia is 82% nitrogen, hence fertiliser efficiency is a key area for productivity improvement. A transparent and up to date fertilizer pricing index is the USA's Department of agriculture Illinois Production Cost Report https://www.ams.usda.gov/mnreports/ams_3195.pdf**.** Illinois "Free on Board" pricing i.e. excluding delivery on 14th November 2025 was particularly high:
    - Ammonia: $AUS 1293/ton = $AUS 1739 per tonne N excluding delivery.

[11] Simmons, Aaron; Muir, Sally; Brock, Pip, "LCA as a tool for identifying greenhouse gas mitigation opportunities in Australian cropping systems", Conference Proceedings of the 3rd LCANZ and NZLCM Centre Life Cycle Assessment Conference, 2014/09/02.

- Urea: $AUS 943 / ton = $1045 / tonne excluding delivery = $1864 / tonne N.
- Urea: assuming $1095/tonne deliver to farm, as an “ammonium equivalent” (i.e. accounting for N content of each) = $1952 / tonne.

- **Lack of nitrogen is almost as bad as a drought:** Lack of N has 87.5% of the yield losses of a drought[2].

- **Creating Renewable Industries in the Region:** Production of distributed anhydrous ammonia on farm or at a central hub location (e.g. gin) will avoid the production emissions from imported fossil fuel (natural gas) either in the form of urea or anhydrous. Scope 1, 2 and upstream Scope 3 have been calculated for a modular plant in QLD which shows 98.57% lower GHG emissions compared to 3.5 t CO2/t NH3 for grey ammonia. Mono-Ammonia-Phosphate represents 11.9% of cropping emissions has the potential for a similar percentage reduction. These are Scope 3 emissions but are included in Life Cycle Emissions and mandatory ESG reporting.

  Fertiliser chemical manufacturing creates 7.3 indirect jobs for each direct job, thereby providing considerable GDP benefits to the regions. Table 1 below compares ammonia manufacturing with other industries[3]. With an expected seven (7) FTEs created, with this indirect multiplier the direct and indirect jobs created utilising the multiplier below is estimated at towards 58.1 (includes trucking, maintenance, supporting jobs and flow on agricultural jobs within the wider region).

Table 1: Full time equivalent multipliers for different industries.

Industry	Direct jobs	Total indirect jobs
Crop production	100.0	129.6
Animal production	100.0	180.4
Oil and gas extraction	100.0	537.3
Coal mining	100.0	500.4
Metal ore mining	100.0	472.9
Animal slaughtering and processing	100.0	380.9
Fertilizer, and other agricultural chemical manufacturing	**100.0**	**730.0**
Pharmaceutical and medicine manufacturing	100.0	574.8
Agriculture, construction, and mining machinery manufacturing	100.0	415.0

1.3 Why the Balonne Region?

Data analytics suggests that cropping operations in the Balonne Region are routinely paying $AUS 300 to $500 for transport, bunkering and margins to wholesalers / retailers over and above the long run global trading prices of nitrogen fertilizers. Hence, being in a remote area that also requires fertilizer provides a strong economic incentive.

[22] Michigan State University, Department of Agronomy.

[3] Updated employment multipliers, Economic Policy Institute, accessed 7 Aug 2025.

A fertilizer manufacturing plant provides the following benefits:

1. **Regional jobs,** long term employment and skills development.
2. **Sovereign capacity & fertilizer security** as >90% currently imported.
3. **Lowers cost of production** for cropping – existing ammonia fertilizer market.
4. Aligns with region's Economic Pillars.
5. Recovery of renewable steam for adjacent grain flaking operation.
6. Improves N-retention in soil – less runoff.
7. Upskill / reskill for the green economy.
8. Economic diversification & resilient regional community.

Figure 2: Balonne Shire's Economic Pillars. Source: Balonne Shire Council.

Agriculture represents 34.6% of jobs and generates more than 77% of the Balonne Councils $698 mil GDP[4]. The value of the ammonia produced by a plant output of 3501 tpa ammonia if sold at market rates would have a monetary value of $4.28 mil pa (includes green credits). However, could contribute the equivalent value of to $4.53 mil pa or 0.65% of the council's GDP.

If considering how the locally produced ammonia can offset N-fertiliser costs from urea, then the value generated is $6.83 mil pa.

Balonne Shire [44] 2024-25-annual-report.pdf, accessed 19th Nov 2025.

2 Presentations and Meetings

The Moonie River Renewables facility / green ammonia plant for Balonne Shire has been presented at the following meetings:

- Balonne Shire Council REFF Project Summary Meeting, St George QLD, 6th Nov 2025.
- Joint Chemical Engineering Society of Engineers Australia and The Institute of Chemical Engineers, “Sovereign Chemical Manufacturing in Australia - Ammonia as an example”, QUT Gardens Point Brisbane, 30th October 2025.
- Invited by the **Queensland State Government's Dept State Development, Infrastructure and Planning to present at the 2025 Cloncurry Mining Conference** on "Energy: Megatrends and Where to Start", with an emphasis on soverign capacity for ammonia production. Refer presentation attached.
- Invited to present at the **Western Queensland Alliance of Councils (WQAC) Assembly 20th Aug 202,** St George QLD on “Regional Ammonia Production”.
- Balonne Shire Council, Project Update, St George QLD, 30th January 2025.
- Public Presentation, Dirranbandi (hosted by Balonne Council in collaboration with Exclusion Fencing Workshop; via video call), 23 Sept 2024.
- Public Presentation, Bollon (hosted by Balonne Council in collaboration with Exclusion Fencing Workshop; via video call), 23 Sept 2024.
- Public Presentation, Thallon (hosted by Balonne Council in collaboration with Exclusion Fencing Workshop; via video call 24 Sept 2024.
- Public Presentation, St George (hosted by Balonne Council in collaboration with Exclusion Fencing Workshop; via video call), 24 Sept 2024.
- South Asia Regional Infrastructure Connectivity (SARIC) program - Building a Hydrogen Economy to Support Hard to Abate Sectors, **Funded by the Federal Government's Dept Foreign Affairs and Trade**. Presented to international delegates on "Ammonia" and how to generate low emissions ammonia. Refer presentation attached, at the University of Queensland, St Lucia, 9th Sept 2024.
- Pre-lodgement Meeting with Toowoomba SARA Office, Major Hazards Facility Branch, Dept Environment and Science, and Dept State Development, Infrastructure and Planning, 11th Sept 2024.
- Balonne Shire Council, Project briefing in St George QLD, 21st July 2024.
- Green Ammonia as a key opportunity for the South West Region of Councils (SWROC) Mayors and CEOs meeting, 30th April 2024.

3 Total Capital Investment

The table below summarises the main CAPEX elements of the project

Element	CAPEX
Ammonia Plant: Haber-Bosch reactor, balance of plant, amenities, weigh bridge (includes contingency allowance)	$24.12 mil
PV Solar (includes contingency allowance)	$15.06 mil
Total	$ 39.17 mil

A full equipment list is provided in Appendix 9.1.

Via the use of high MWh / MWp panes and high efficiency plant equipment, overall utilisation is estimated at 31.1% (average over a year), with nominal ammonia production at 0.82 tph, annual production is estimated at 2084 tpa ammonia.

4 Business Case for a Modular Ammonia Plant

The following figures shows a sensitivity analysis for how the current market price of n-fertiliser impacts the payback period of the plant. The green dot shows the current Free On Board (FOB) price of ammonia in the United States on 14th November 2025 i.e. excludes delivery. The orange dot shows the price of urea FOB Port of Brisbane ($$895/t)[5] converted to an "ammonia equivalent" price which allows for the nitrogen concentration, with the yellow dot adding an additional allowance of $200/t delivery to the farm, then converted to an "ammonia equivalent" price which allows for the nitrogen concentration.

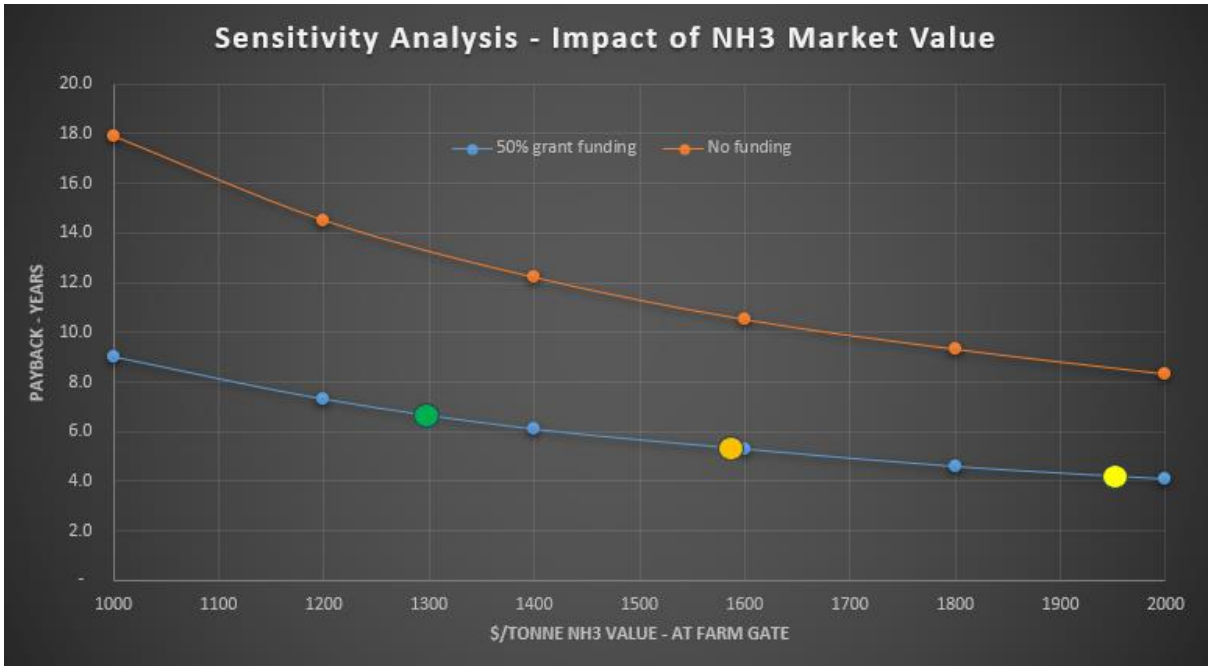


Figure 3: Simple payback period for different values of the ammonia produced (assumes 50% CAPEX funding).

As can be seen, for those farming operations able to utilise ammonia, the $/tonne N delivered can be highly competitive with urea.

[55] Buy Urea Bulk ex port $895+pt prompt 87753 in Port of Brisbane QLD | LocalAg, accessed 19th Nov 2025.

5 Site Location Information

General Description of Site

The site of the proposed development is currently utilised as grazing land and a cattle feedlot with associated grain processing facility. The broad landscape description for land surrounding the site is an “undulating lowland; poplar box woodland with few shrubs, massive earths and duplex soils”. This land is described as strategic cropping land but only assessed as grazing land. The site is above flood level from the peak flood in 2010. The soils are typically a red sandy clay. The topography of the site can be described as gentle to flat; typical slopes are less than 1% with the alluvium being even flatter.

As per the information in “Vegetation management report, For Lot: 4 Plan: BLM761”, Department of Resources, 2024, the property:

- is not located in the Wet Tropics of Queensland World Heritage Area
- the project will occur on Category X area,
- the project is to occur on non-coastal land,
- the proposed land is Agricultural land Class A,
- there are no High risk protected plants flora.
- The land is not a koala priority area nor a koala habitat regional ecosystem.

Climate

Climate is hot semi-arid with very hot summers and mild winters with cool nights. Average maxima significantly vary from 19.8 °C (67.6 °F) in July to 35.3 °C (95.5 °F) in January. Mean annual rainfall, concentrated in the summer is low, 478.3 mm (18.83 in), and occurs within 45.2 rainfall days. The town is sunny, averaging 173.5 clear days and only 72.6 cloudy days annually. Extreme temperatures have ranged from −4.4 °C (24.1 °F) on 24 June 1949 and 11 July 1918 to 47.2 °C (117.0 °F) on 3 January 2014.

Wind Conditions

Figure below shows the 9 am wind rose pattern for St George, approximately 30 km West of Moonie River Feedlot. The 9 am wind rose shows that approximately 32% of the recorded wind comes from a north to northeast direction, with the highest wind speeds predominantly from the north at greater than 30 km/h.

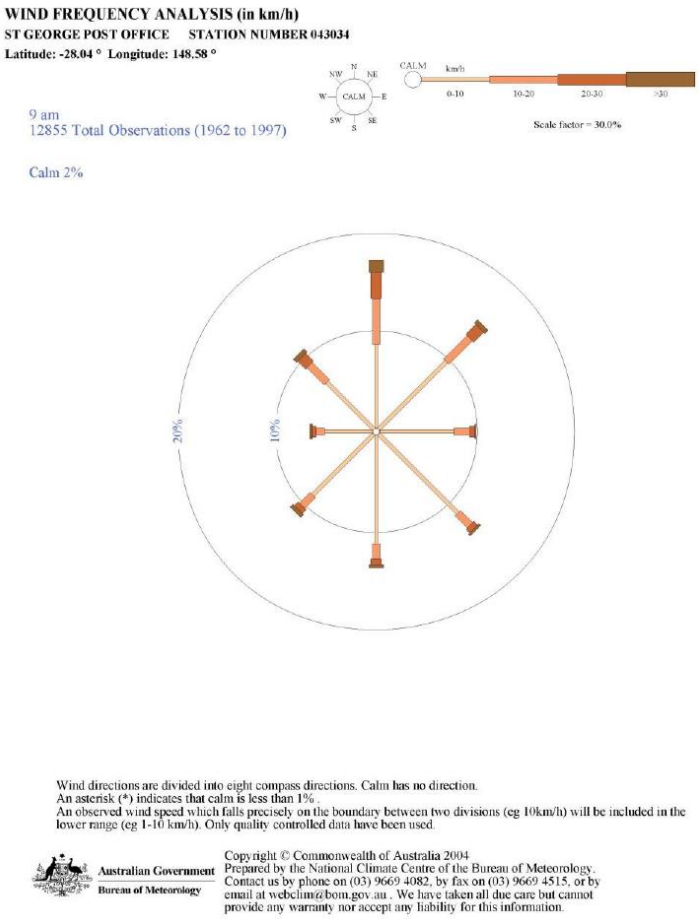


Figure 4: 9am wind rose pattern for St George post office, approx 30km West of the proposed development site

Below shows the 3 pm wind rose pattern for St George, approximately 30 km east of Moonie River Feedlot. The 3 am wind rose shows that approximately 22% of the recorded wind comes from a southwest direction, with the highest wind speeds predominantly from the southwest at greater than 30 km/h. Southerly winds make up 15% of the wind rose at 3 pm, mostly comprised of speeds less than 10 km/h.

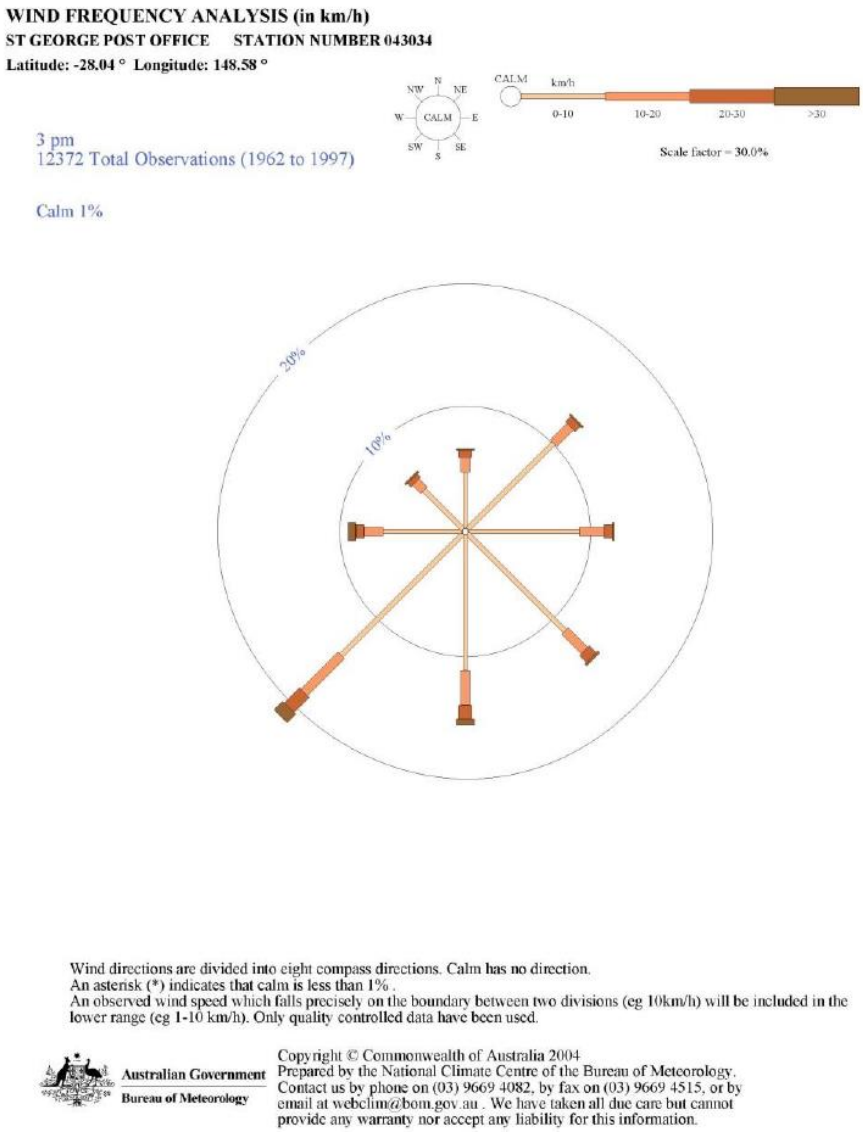


Figure 5: 3pm wind rose pattern for St George post office, approx 30km West of the proposed development site

Surface Water

The existing feedlot site is bunded on the upside to stop clean water run on, and a full drainage system to capture all contaminated effluent runoff from the site itself is operational. The site is above flood height of 2010 (current recorded record). The site is also outside the mapped floodplain of the Moonie River valley.

The feedlot CDA meets the design criteria set out in the *national guide lines*. The design also minimises the take of water to that sufficient to protect environmental values.

A search of the *Development Assessment Mapping System* on the proposed development site revealed no trigger areas for referable wetlands.

Ground Water

There are no intentions to use shallow groundwater as a water supply for the proposed feedlot. To our knowledge there is no alluvium bores in this reach of the Moonie river as the aquifer is very confined and low in yield as confirmed by mapping. There are significant GAB

bores in the area but connectivity to this aquifer is very low and this development is not expected to affect this aquifer.

Water Supply

There is one existing source of water for the proposed feedlot from a water license on the Moonie River. This water license with a nominal volume of 72ML is calculated to be suitable to meet demands.

Cultural Heritage and Archaeology

The area has been cleared and there are no apparent items of cultural heritage significance. A search of the data base has been undertaken with no results being found.

The area planned to be developed has been cleared and has undergone significant disturbance as a result of past activities. There are no archaeological features apparent.

Plot Number and Applicable Overlays

Plot number: Lot 4, BLM761

The land is zoned Rural by the Balonne Shire Council.

SARA DA Mapping

SARA DA Mapping Overlay	Sub-Categories	Any Applicable?
SEQ Regional Plan Triggers	• SEQ significant tourist activity area • SEQ major enterprise and industrial area • SEQ development area • SEQ northern inter urban break • SEQ regional plan land use categories	None applicable
QLD Heritage	• QLD heritage place	None applicable
Unexploded Ordnance	• Areas with substantial potential for UXO	None applicable
Coastal Protection	• Coastal management district • Coastal building line • Coastal area – erosion prone area • Coastal area – medium storm tide inundation area • Coastal area – high storm tide inundation area	None applicable
Fish Habitat Areas	• Fish habitat management area A • Fish habitat management area B • QLD waterways for water barrier works • Major (tidal)	Not applicable

Water Resources	• Water resource planning area boundaries • Great artesian water resource plan area	Yes - both
Wetland Protection Areas	• Wetland protection area trigger area • Wetland protection area wetland	None applicable
Native Vegetation Clearing	• Regulated vegetation management map (other categories) • Vegetation management coastal and non-coastal bioregions and subregions • Essential habitat • Regulated vegetation management map (category A and B extract) • Vegetation management regional ecosystem map	Regulation vegetation management category X[6] Non-coastal bioregion Regulated vegetation management map category B area in far South Eastern corner of lot. Will be very far from proposed development on Northern side. Vegetation management regional ecosystem status rem_end
Koala Habitat in SEQ Region	• Koala priority area • Koala habitat area • Key resource area	None applicable
Maritime Safety and Development	• Navigable waterways • Developed marina or state boat harbour area • Developed tidal waterway area	None applicable
Port of Brisbane	• Core port land	None applicable
Priority ports	• Gladstone master planned area (MPA) • Townsville MPA • Abbot Point MPA • Hay Point and Mackay MPA	None applicable
State Transport	• State transport corridor • Areas within 25m of a state transport corridor • Future state transport corridor • State controlled road intersection • State controlled transport tunnel • Planned upgrades • Public passenger transport facilities • Excluded area	Project will involve use of the Moonie Highway – state controlled road along with state controlled road intersections of Moonie Hwy and Warrie Rd & Chelmer Rd

[6] *Planning Regulation 2017*

	• Limited access roads	

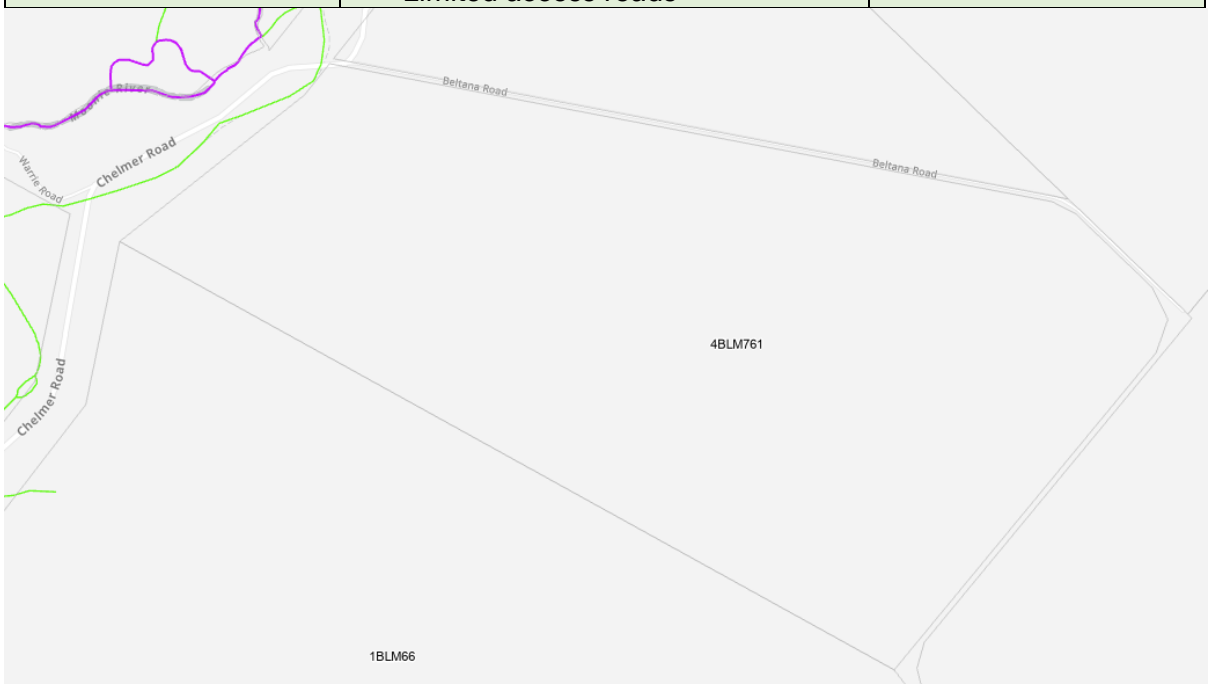


Figure 6: QLD Waterways for waterway barrier works overlay

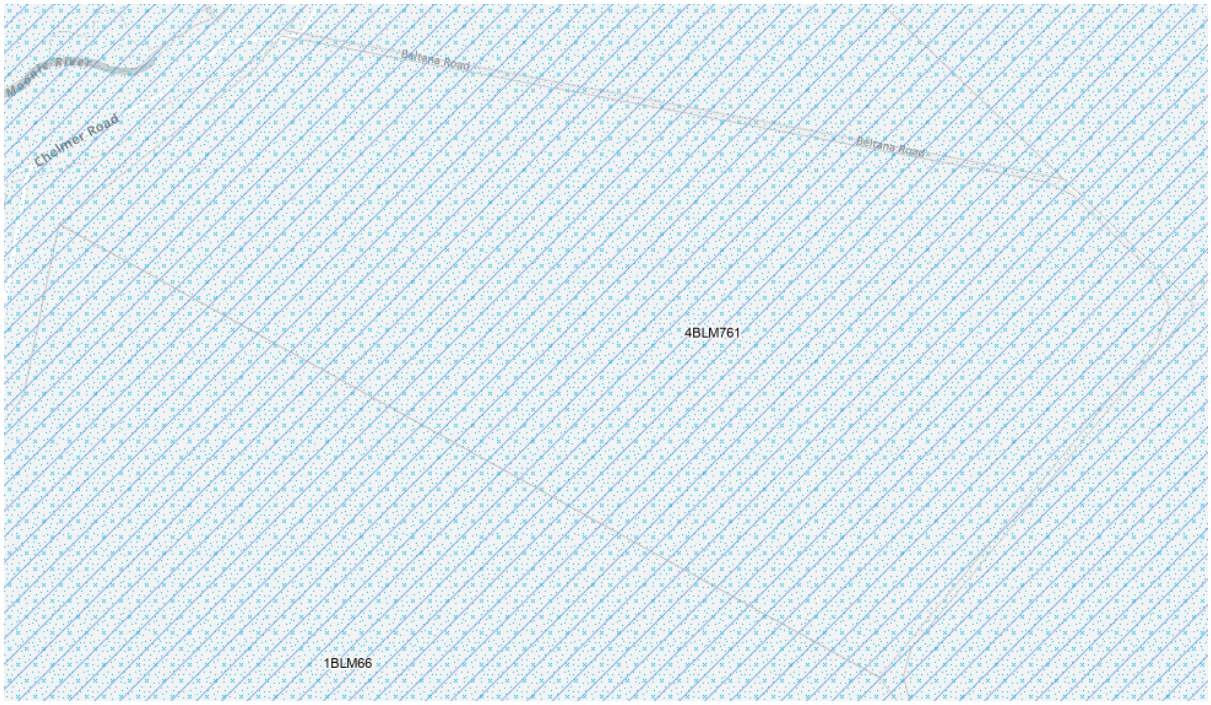


Figure 7: Water resource overlays

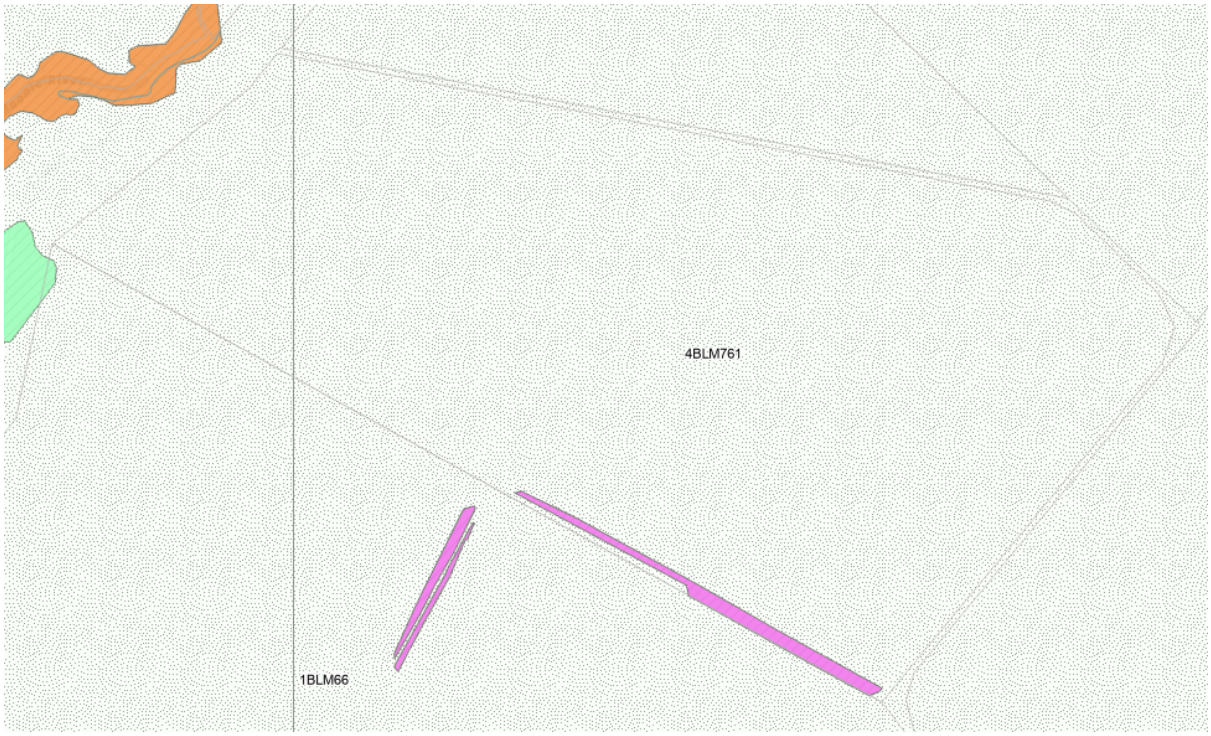


Figure 8: Native vegetation overlays. The site has previously been cleared, stick raked, and ploughed. There is no remnant vegetation in close proximity to the proposed development location on the centre-Northern boundary of the plot

Non-SARA DA Mapping

Non-SARA DA Mapping Overlay	Sub-Categories	Any Applicable?
Local Government Areas		Balonne Shire
Easements		None applicable
Electricity Infrastructure	• Ergon electricity substation • Energex easement • Energex electricity substation • Powerlink easement • Powerlink electricity substation • Ergon easement	None applicable
Noise Attenuation Zone for Off-Road Motorcycling Facility		None applicable
Koala Habitat in SEQ Region	• Identified koala broad hectare area	None applicable
Airport Land (Cairns and Mackay Only)	• Cairns airport zone and precinct plan • Mackay airport zone and precinct plan	None applicable
Ports	• Port limits • Strategic port land • Priority ports	None applicable

SPP Assessment Benchmark Mapping

SPP Assessment Benchmark Mapping Overlay	Sub-Categories	Any Applicable?
Liveable Communities		None applicable
Mining and Extractive Resources	• Key resource area – resource/processing area • Key resource area – separation area • Key resource area – transport route • Key resource area – transport route separation area	None applicable
Water Quality	• Water supply buffer area • Water resource catchments • High ecological value water areas	None applicable
Natural Hazards Risk and Resilience	• Flood hazard area – level 1 – QLD floodplain assessment overlay • Flood hazard area – local government flood mapping area • Bushfire prone area • Erosion prone area • Medium storm tide inundation area • High storm tide inundation area	Moonie River floodplain encroaches on approx. Western third of plot. QRA supply “Phase 1” Areas identified as medium potential bushfire intensity on Southern boundary, as well as Chelmer Rd and along Moonie River. May affect evacuation of persons by usual route

Figure 9: Flood hazard overlay

Figure 10: Bushfire prone area overlay

Other State Planning Matters

Other State Planning Overlays	Sub-Categories	Any Applicable?
Regional Plans	• Strategic environmental area • Dark sky area • Regional biodiversity value • Regionally significant scenic amenity • Renewable energy investigation area • Townsville urban area • Priority agricultural expansion area • Regional land use categories • Agroforestry/reforestation area • Regional greenspace network • Regional biodiversity corridor • Priority agricultural area	None applicable
Areas of Regional Interest	• Strategic cropping area • Strategic environmental area • Priority agricultural area • Priority living area	Strategic cropping area[7]
Caboolture West Interim Structure Plan		None applicable
Superseded SEQ Regional Plans	• August 2023 • August 2017 • July 2009 • October 2008 • October 2006 • March 2006 • June 2005 • February 2005 • October 2004	None applicable
Priority Development Areas		None applicable
State Development Areas		None applicable
Infrastructure Designations		None applicable

[7] SCA defined under *Regional Planning Interests Act 2014*

6 Proposed Development/Activity

The proposed activity will involve the generation and storage of renewable electricity via a ground-mounted solar array and battery system, used to split purified river and/or ground water into hydrogen and oxygen gas. The renewable hydrogen will then be reacted with nitrogen from the air in a conventional Haber-Bosch synthesis reactor under elevated temperate, pressure, and using a catalyst to produce renewable anhydrous ammonia for fertiliser application.

The concept design for the proposed fertiliser production plant and relationship to the existing feedlot is shown below for stage 1 capacity, with the potential to expand in modules based on local offtake demand.

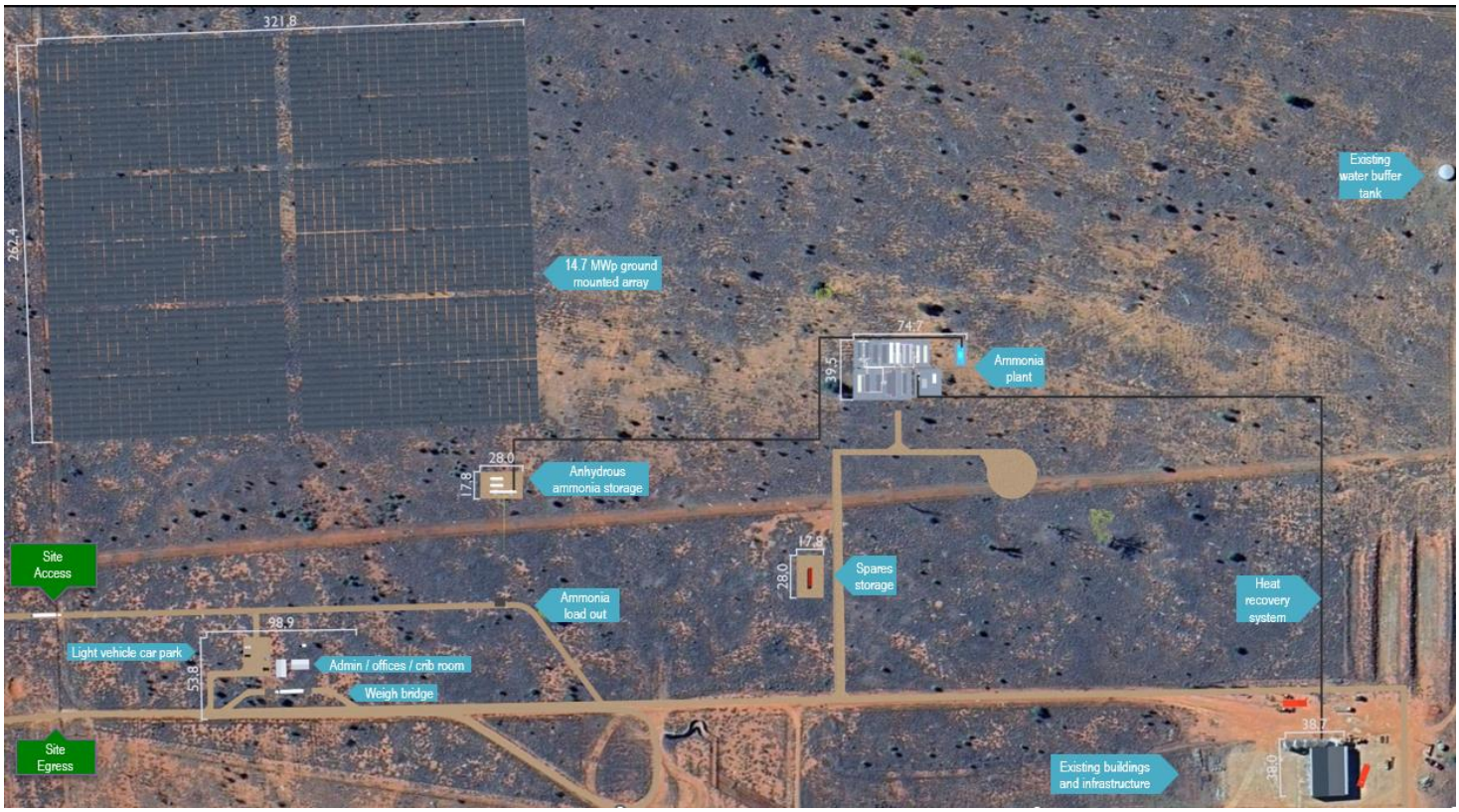


Figure 11: Site plan view. The footprint of the facility is 447m x 625m (28 Ha), with most of this surface area being the solar array or buffer space between the elements of the facility. A higher resolution site plan view is provided as a separate document.

Figure 12: Location plan view. The facility is placed approximately in the centre of Lot No.4, Plan Type BLM761. As can be seen, a dead-end council road (Beltana Road; which provides access for the property and one other property to the east) bisects the lot, with the facility being over 2.4 km from the closest major road (Chelmer Road) and over 4.1 km from the closest homestead. A higher resolution location plan view is provided as a separate document.

The plant is located 294km west-south west of Toowoomba, and 44 km east of St George, surrounded by cattle grazing property.

The design will include the following aspects:

- 14.7 MWp of ground-mounted, East-West orientated solar panels
- 10 MW of hydrogen electrolyser capacity, producing up to 2,000 Nm3/hr @ 99.999% purity. Water consumption of the electrolyser is 2.4 m3/h
- Nitrogen generation by pressure swing adsorption from air. N2 output 700 Nm3/h @ 99.9995% purity
- NH3 synthesis loop producing up to 0.82 tonnes/h of anhydrous ammonia
- Adiabatic cooling system to reduce water consumption
- 8,000 gpd (0.03 ML/day) reverse osmosis system followed by deionisation cartridges. Based on the quality of Moonie River water, after micro filtration to remove suspended sediments, recovery rate of RO expected to be up to 70%, or as low as 50%.
- 39,000 m^3 of H2 and 13,000 m^3 of N2 storage, representing 20 tonnes of NH3 production capacity.
- Anhydrous ammonia storage at 17 barg and loadout system.
- Existing site controlled drainage area (CDA), drainage system, sedimentation basis, and holding ponds are in place. Drainage – both natural and controlled – is to the north and west, and can be contained within the CDA and directed towards the proposed sedimentation basin and holding pond.

An annotated image of the 3D CAD model of the plant is provided below.

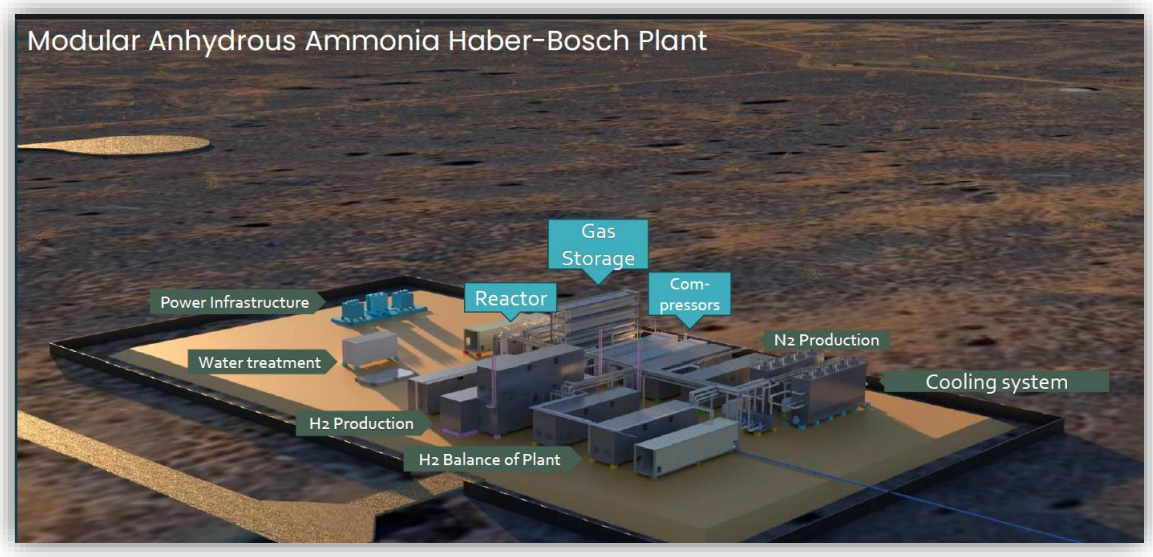


Figure 13: Annotated 3D rendering of the ammonia plant.

Balonne Shire Council Planning Scheme 2024

For land zoned rural in the BSC, renewable energy facilities are classed as a code-assessed development with the general development code, rural zone code, and flood hazard overlay code specified as assessment benchmarks. For all other uses (of which green ammonia production is expected to be categorised) the assessment pathway is specified as impact assessed with the planning scheme as the assessment benchmark.

Environmentally Relevant Activities (ERAs)

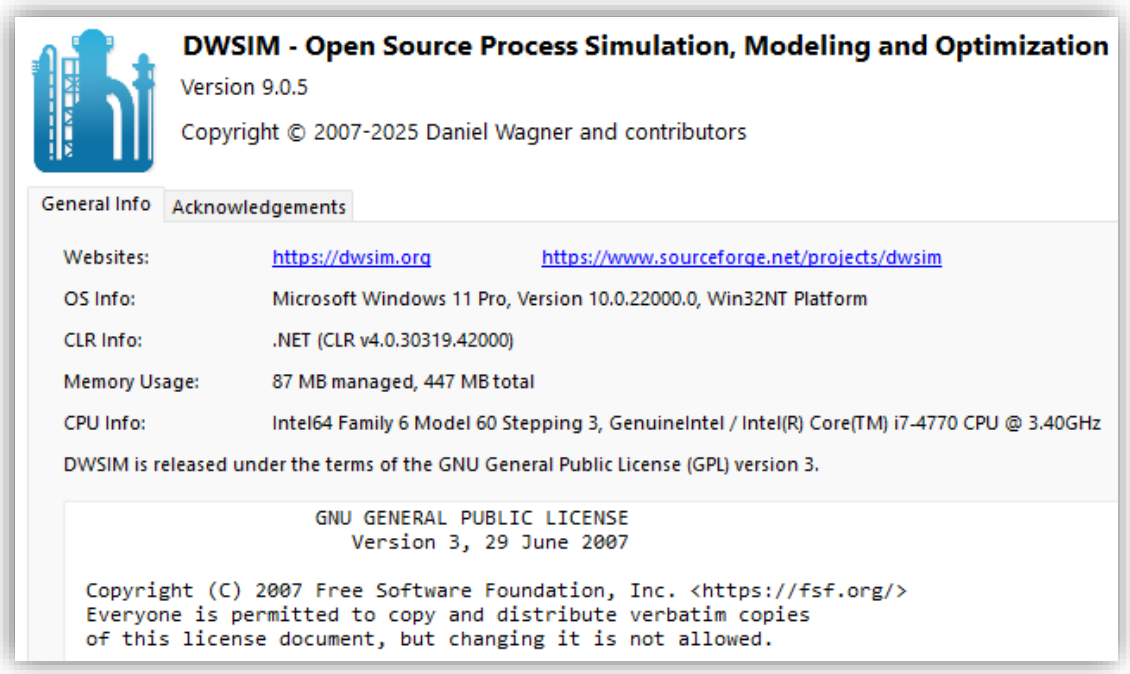
The existing site ERA is intensive animal feedlotting greater than 1,000 SCU but less than 10,000 SCU, with an aggregate environmental score (AES) of 28.

New ERAs as part of the proposed activity are

> 7-6(b) Inorganic chemical manufacturing (other than items 1-4): >1,000-10,000t/yr [AES = 115]
>
> 8-1 Chemical storage 50t or more of chemicals of dangerous goods Class 1 or 2. (ammonia is a class 2.3 dangerous good and will be primary stored in its anhydrous liquid form under pressure). chemical. [AES = 51]

Proposed measures for minimising and managing wastes

To understand the inlet and outlet flows from the plant a detailed “Digital Twin” (advanced process model) was developed and run on the following platform:



The creation of a digital twin enables a very detailed understanding of the facility. The basis of the model is as follows:

- Final product of 99.5% purity anhydrouns ammonia produced at a nominal output of 0.82 tonner per hour.
- A purge of the recycle gas stream is required to prevent the build up of inerts (i.e. argon and helium from the N2 gas stream) within the Haber Bosch reactor. It is assumed that 1% of unreacted gas is purged. As the Haber Bosch reactor operates with a slight excess of N2 to drive the consumptino of the more expensive H2,
- From a stoichiometric perspective, 0.82 tph anhydrous ammonia at 99.5% mass purity, requires 145.227 kg ph H2. Accounting for 1% losses for purging, an inlet of 146.694 kg ph H2 is required.

The requires nomination of:

[1] H2 feed: Mass flow of raw water is increased into the H2 plant until at least 149.42 kg ph of H2 is available for the Haber Bosch reactor plant. The H2 gas is to be 99.97 mol% H2, contain <5 ppm H2O and < 5 ppm O2, with the balance as inert N2. 30% of inlet raw water exits as RO /DI plant retentate / backflush water.

[2] N2 feed: the input of the raw air is increased until the mass of N2 in the feed is at least 0.6900421 tph. The aim is to reduce Oxygen to < 5 ppm and Water vapor < 5 ppm. Argon is not a catalyst poison, but takes up reactor volume hence is desirable to be < ~0.1 mol%. To achieve a higher purity, the PSA captures a lower % of the N2 (assumed at 70% capture rate for the model).

Component	Symbol	Molar %
Nitrogen	N_2	78.08%
Oxygen	O_2	20.95%
Argon	Ar	0.97%

After allowing for water vapour:

Component	Symbol	Molar %
Water	H2O	5.56%
Nitrogen	N_2	73.74%
Oxygen	O_2	19.79%
Argon	Ar	0.91%

As an industrial manufacturing facility, then aim is for 100% containment of all feedstock, intermediate chemicals and product to maximise output from the plant. That is, the plant is designed for zero loss of molecules to air or land, as the loss of any reactants or products impacts the economics of the facility.

The following are co-products (i.e. not waste streams) that will be utilised on-site or have a future value:

- Produced water: 625 kg/h made up of RO/DI retentate (580 kg/h), condenser water from the N2 plant (41 kg/h) and ammonia scrubbed out of the purge stream (4 kg/h). Reverse osmosis retentate and de-ionising column backwash will be collected and used for ammonia scrubbing in the first equilibrium scrubbing vessel, then condensate water further utilised in the second equilibrium scrubbing vessel. The produced water exiting the plant contains ~0.7% w/w ammonia and will be piped to the existing composting operations, as the ammonia will increase the biologically available nitrogen in the compost. Due to the large liquid flows, low ammonia flows in the purge and hydrophilicity of ammonia, >97% of the ammonia is captured in the scrubber system. Aditional water can be utilised in the scrubber where required and the scrubber run at higher operating pressures where more NH3 capture is desired. Generally, pastures on the Darling Downs are nutrient hungry hence utilisation of aqueous ammonia provides a source of nitrogen for the surrounding grazing land.

- Oxygen vent: 1196 kg/h. In the short term, the O2 vent stream will not be utilised. However, in the medium term uses include production of medical grade O2, production of ozone for waste water treatment (council water treatment facilities) and ozone for long term grain storage. The oxygen vent stream will be mostly O2 (99.5 mol%) with the balance as mostly water with some trace amounts of H2, nitrogen and argon.

The main sources of waste will be:

- Packaging materials as part of operating (and constructing) an industrial facility.

- Office and kitchen waste.

- Black water from ammenities treated in septic system.

- Exhaust vent from the N2 plant: mostly O2 (61 mol%) and nitrogen (36 mol%), with trace amounts of argon and water. 422 kg/h.

- Exhaust vent from the H2 plant Pressure Swing Adsorbent (PSA) vent: contains mostly water with some H2 and trace amounts of O2, N2 and argon. Flow: 8.1 kg/h.

- Exhaust vent from purge gas scrubber; contains mostly nitrogen with some unreacted hydrogen (from the Haber Bosch reactor), with trace amounts of ammonia, water, oxygen and argon.

- Intermittent releases may occur from the safety release valves present on the pressure vessels.

Further details on the proposed measures for waste management are provided in the "Additional Information" attachment.

Impact on Environmental Values, Risk Assessment, and Mitigation

	NH3 Manufacturing	Hydrogen Manufacturing	NH3 Storage
Environmental Values Likely to be Affected Potential Impacts and Risk (Consequence * Probability)	**Air quality:** Emissions may include trace quantities of ammonia, nitrogen oxides (NO_x), and fugitive dust from material handling and truck movements. Local air quality values could be affected without appropriate containment and ventilation systems. Expected probability is certain, magnitude of consequence above baseline air quality impacts from existing feedlot is negligible.	**Air Quality:** Hydrogen production via electrolysis produces minimal air emissions; however, potential exists for oxygen venting and water vapour release. Expected probability of oxygen release is certain, consequence insignificant **Water Resources:** Electrolysis requires high-purity water. Water sourcing, treatment, and discharge must ensure no adverse	**Air Quality:** Fugitive emissions or accidental releases of ammonia vapour pose potential local air quality and odour impacts. Proper containment, leak detection, and ventilation are essential to protect nearby receptors. Unlikely probability but significant expected consequence of occurrence **Surface Water and Groundwater:** A spill or tank failure could lead to

	Surface water: Potential contamination risks from process spills, washdown water, or stormwater runoff containing ammonia or nitrates. Site water management systems must protect the beneficial uses of nearby waterways and groundwater aquifers. Expected magnitude of consequence is major with unlikely probability. **Soil quality and land capability.** Accidental leaks or overflows of ammonia solution or process chemicals may alter soil pH or nutrient levels, affecting local soil health. Expected magnitude of consequence is major with unlikely probability. **Flora and fauna habitat:** local remnant vegetation and grasslands. Vegetation and fauna may be indirectly affected by airborne ammonia deposition, or by changes in water quality downstream of the site. Expected magnitude of consequence is major with unlikely probability due to	impact on regional water availability or quality. Proposed activity water take will operate within site's existing water license, and discharge volume of saline reject from desalination plant will be insignificant against volume of the Moonie River. **Noise and Vibration:** Compressors, pumps, and cooling systems could influence local acoustic values if not acoustically treated. Likely expected probability but insignificant magnitude of consequence against the baseline noise of the feedlot. **Land and Soil:** Minor risk of electrolyte leakage or contamination from water treatment chemicals (e.g. caustic soda, acids). Unlikely probability with moderate consequence.	ammonia contamination in stormwater or infiltration to groundwater, impacting aquatic ecosystems and drinking water sources. Unlikely probability but severe expected consequence of occurrence **Soil and Vegetation:** Anhydrous ammonia is highly reactive and can cause localised soil sterilisation and vegetation damage in the event of a leak. Unlikely probability but significant expected consequence of occurrence **Human Health and Safety:** Ammonia is toxic and corrosive; uncontrolled releases could pose significant safety risks. Emergency management plans are required to protect on-site workers and the surrounding community. With proper training, considered possible with severe consequence if occurs.

	the proposed development operating upstream of the Moonie River rock weir. **Local amenity** not considered further due to no adjacent sensitive receptors and no local amenity impacts above the baseline from the existing feedlot.		
Mitigation and Management Measures	- Enclosed process and vent scrubbing systems. - Bunded chemical and product storage. - Stormwater segregation and lined containment areas. - Regular leak detection and maintenance programs. - Noise attenuation (acoustic enclosures, setbacks).	- Optimised water recovery and recycling. - Discharge to approved treatment system or reuse. - Noise barriers and equipment placement to meet EPP (Noise) limits. - Secondary containment and emergency spill response systems.	- Pressure-rated, design registered tanks with containment bunding. - Ammonia detection, alarm and emergency vent systems. - Spill response and evacuation procedures. - Regular integrity testing and operator training. - Buffer zones and vegetative screening.
Remediation	- Purge and inert all process systems using nitrogen or dry air to remove residual gases. - Drain and neutralise any ammonia or electrolyte solutions. - Triple-rinse tanks and pipelines before deconstruction. - Certified disposal of chemical residues through licensed waste facilities.	- Recycle metals, glass and electronic components through approved e-waste programs. - Recover and reuse hydrogen system components where feasible. - Clean, purge and dismantle ventilation and scrubber systems. - Dispose of filter and packing media as regulated waste if contaminated.	- Remove all aboveground tanks, piping and bunding. - Excavate and test soils beneath containment areas. - Remediate soils exceeding criteria under *EPP (Water)* and *Guideline: Assessment and Management of Contaminated Land in Queensland (2018)* – typically via excavation and off-site disposal or in situ neutralisation. - Decommission and

			seal bund drains and sumps.

Vehicle Movements

The following vehicle movement estimate excludes construction and is for steady state operation of the ammonia facility. As anhydrous ammonia is a concentrated high value chemical, the truck movements to and from site will be quite modest.

The facility layout allows for separate access and egress to ensure that vehicles move in a single direct on one-way roads. Separate parking areas for light and heavy vehicles improves separation between light and heavy vehicle movements.

Vehicle	**Vehicle information**	**Tonnes per annum**	**Tones per week**	**Vehicle movements per week, including access and egress**
B-double	**34 tonnes anhydrous Ammonia (NH3)**	2084	40.076	2.4
Light vehicles – ave. 5 FTEs onsite	Assumes single passenger			70
Light vehicles – ave. 3 visitors per business day	Average of 3 visitor / contractor / maintenance vehicles per business day			30

Hazardous Chemicals

Refer to the attached sheet "AEPL-HM-MRR-Contained hazardous materials calculation sheet" for additional information. Summary of contained quantities of Schedule 15 hazardous materials as per the *Work Health and Safety Regulation 2011* in process vessels, piping, storage, and loadout as follows:

	Ammonia (NH3)	**Hydrogen (H2)**	**Acetylene (C2H2)**	**LPG**	**Diesel**	**Oxygen (O2)**
Calculated Quantity (tonnes)	164.39	0.92	0.02	0.02	1.12	0.02
Uplift Contingency Factor	5%	5%	50%	50%	50%	5%
Total tonnes "qx"	172.61	0.96	0.03	0.03	1.69	0.03
MHF Threshold tonnes "Qx"	200	50	50	200	50,000	2,000
qx/Qx Ratio (Fraction of MHF Threshold)	0.863	0.0192	0.006	0.00013	0.00003	0.000012

Aggregate ratio for all hazardous chemicals is 0.883 – below the MHF designation but above the 10% manifest and placard quantity for NH3.

Summary information from the catalyst "AMOMAX 10 PLUS"[8] SDS attached document "A10 PLUS 1.5-3" translated from Mandarin to English via Google Translate. References are the *Hazardous Substances Data Bank,* American *Centre for Disease Control,* and individual chemical SDSs available online.

Chemical	Information	Oral	Dermal	Inhalation	PBT Information (Persistent, Bioaccumulative, Toxic)	Criteria for Toxicity
Wustite (iron (ii) oxide)	Not classifiable as a human carcinogen					No evidence thresholds exceeded
Iron (ii) oxide (rust)	Relatively safe. Avoid chronic exposure to dust or fumes	LD50 > 15,000 mg/kg	No data available	No data available	This product does not contain any known or suspected substance	No evidence thresholds exceeded
Aluminium oxide (alumina)	Relatively safe. Chronic exposure can lead to health risks	LD50 > 10000 mg/kg	Not classified	5.09 mg/L/4h	The product is not considered harmful to aquatic organisms or to cause long-term adverse effects in the environment.	No evidence thresholds exceeded
Calcium oxide <5% w/w (quicklime)	Caustic	LD50 (rat, female): > 2,000 mg/kg	LD50 (rabbit, male and female): > 2,500 mg/kg	LC50 (rat, male and female): > 6.4 mg/l	The substance is not PBT / vPvB	No evidence thresholds exceeded
Potassium oxide <1% w/w	Strong base	LD50 (rat, male and female): > 2,000 mg/kg	LD50 (rat, male and female): > 5,000 mg/kg	No data available	The substance is not PBT / vPvB	No evidence thresholds exceeded

Greenhouse Gas Emissions

A detailed separate report summarising the Scope 1, 2, and 3 emissions and addressing the requirements of the "Guideline; Greenhouse gas emissions; Environmental Protection Act 1994" for the Moonie River Renewables Facility is provided.

The project may be considered to be in the "Low emitter" emissions category as the combined Scope 1 and 2 emissions are estimated at 32.88 t CO2-e pa (i.e. well below the 25,000 tpa threshold).

[8] Wustite (oxide of iron) based catalyst

General Site Remediation

General site remediation measures for groundwater and surface water, and soil and land are expected to include

- Undertake baseline groundwater and surface water quality assessment post-decommissioning.
- If exceedances detected, implement pump-and-treat, monitored natural attenuation, or reactive barrier remediation as required.
- Monitor water quality until contaminant levels meet background or agreed closure criteria.
- Conduct contaminated land site assessment in accordance with *EP Act 1994, Part 8 (Contaminated Land)*.
- Remediate impacted soils (excavation, bioremediation, chemical stabilisation) to meet human health and ecological criteria.
- Regrade, re-topsoil and revegetate disturbed areas to prevent erosion.
- Break up and crush concrete; test for contamination.
- Dispose of contaminated concrete as regulated waste; clean concrete may be reused as fill on site.
- Restore pre-development drainage lines where practicable.
- Install erosion and sediment control measures.
- Stabilise surfaces with topsoil and local native vegetation.
- Remove all aboveground structures unless designated for reuse.
- Grade and rehabilitate the site to visually blend with surrounding land use.
- Plant native vegetation to reinstate visual screening.

Fauna

The standard fauna that generally inhabit areas on or around cropping and grazing zones have been observed during initial site visits. No threatened or endangered faunal species have been observed or reported in the area.

Odour Receptors and Visual Amenity

The closest receptors are all homesteads, shown in Figure 11, with distances to the northern receptor then moving clockwise being 4.1, 7.1, 5.1, 7.2 and 4.8 km respectively. The predominant wind is from the north (9am) and southwest (3pm) as discussed earlier.

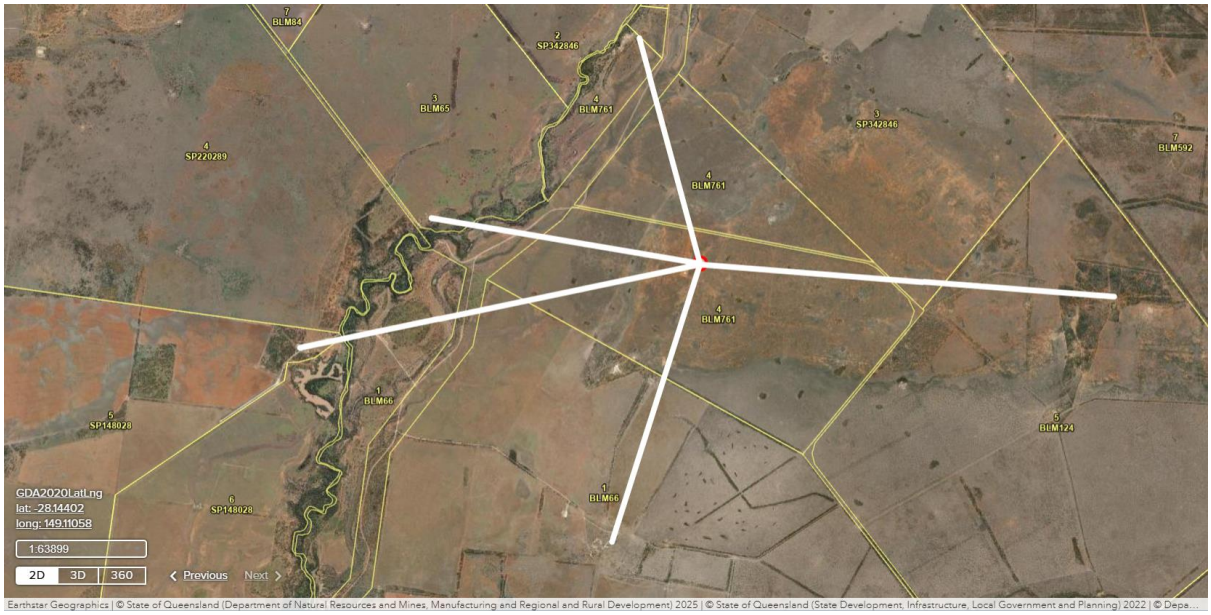


Figure 14: Receptor map. Site plan view. The footprint of the facility is 447m x 625m (28 Ha), with most of this surface area being the solar array or buffer space between the elements of the facility. A higher resolution site plan view is provided as a separate document.

The proposed development will not be visible from any major road, township or homestead. Process plant will be containerised, with the only free-standing equipment being the ammonia storage tanks which is consistent with fetiliser storage depots and on-farm storage within the local area that is commonly visible from major roads and within townships.

7 Relevant sections of SDAP State Code 22: Environmentally relevant activities

Performance outcomes	Acceptable outcomes	Response to PO
All ERAs		
PO1 Development is suitably located and designed to avoid or mitigate **environmental harm** to the acoustic **environment**.	**AO1.1** Development meets the acoustic quality objectives for sensitive receptors identified in the Environmental Protection (Noise) Policy 2019.	The site is located well away from areas of community interest and as such it is not expected to have any impact on community amenity with regards to the acoustic environment. Above the baseline acoustic impact of the existing approved feedlot operation, the additional proposed development's operation will be insignificant. Any noise or vibration producing plant including pumps, compressors, and blowers will be appropriately dampened or attenuated via mechanical means such as vibration isolation pads, with any residual noise controlled by barriers and the absorption by the surrounding environment (trees)
PO2 Development is suitably located and designed to avoid or mitigate **environmental harm** to the air **environment**.	**AO2.1** Development meets the air quality objectives of the Environmental Protection (Air) Policy 2019.	The processes do not generate liquid effluents or emissions of matter into the atmosphere; only some small amounts of ventilation of oxygen and nitrogen, and minimum ventilation of hydrogen in the daily commissioning of the system, and a small purge of the recycle gas to avoid build up of inerts. Oxygen: ~1584 kg/h Recycle purge after scrubbing: ~14.06 kg/h (68% H2, 32% N2, 0.15% Argon, 0.08% water, 0.02% NH3, trace O2). Gas monitors throughout the system will signal alarms if gas emissions reach unsafe levels.
PO3 Development (other than **intensive animal industry** for **poultry farming**), is suitably located and designed to avoid or	No acceptable outcome is prescribed.	Above the baseline odour impact of the existing approved feedlot operation, the additional proposed

mitigate **environmental harm** on adjacent **sensitive land uses** caused by odour.		development's operation will be insignificant. Three of the primary emissions from site: N2, O2, and H2 (trace) are all odourless. NH3 does have a strong odour, however emissions of this gas from the plant will be little to none. Suitably rated and sealed compressors, pipework, and storage vessels will be installed and maintained, with ammonia detection sensors for personal safety to rapidly identify leaks.
PO4 Development is suitably located and designed to avoid or mitigate **environmental harm** to the receiving waters **environment**.	**AO4.1** Development meets the management intent, water quality guidelines and objectives of the Environmental Protection (Water and Wetland Biodiversity) Policy 2019.	The location of the proposed development is planned to be within a CDA. The CDA and the location on the ridge should contain any potential adverse factors. The existing levee bank, controlled drainage area, and topography of the site will minimise any adverse effect beyond the site. This will be supplemented with tank hardstands, bunding on storage, regular testing and maintenance. The primary water emission will be saline reject from reverse osmosis at approximately 1.5 – 2x the incoming salinity (dependent on RO recovery fraction generally 50-70%) of Moonie River or GAB bore water. For a purified water consumption of 2.9 m3/tonne NH3 produced, at the maximum capacity of the plant, this will represent a discharge of 20.3 ML. Assuming an average Moonie River discharge of 6 m3/s this is a return of 0.01% at double salinity. An ERA is triggered for water treatment desalination of 0.5 ML or more of water per day. Treatment system rated to 8000 gpd or 0.03 ML/day, hence well below the ERA threshold.

PO5 Development is designed to include elements which: 1. prevent or minimise the production of **hazardous contaminants** and **waste** as by-products; or 2. contain and treat **hazardous contaminants** on-site rather than releasing them into the **environment**; and	No acceptable outcome is prescribed.	Outside of initial construction, commissioning, and maintenance/repaid, no additional material waste is expected. The AMOMAX catalyst. The charge as specified by the plant manufacturer is 60 cf (1.7 m3) with a service life of 10 years.
Performance outcomes	**Acceptable outcomes**	
3. provide secondary containment to prevent the accidental release of **hazardous contaminants** to the **environment** from spillage or leaks.		See above PO4 for existing site containment and operation within controlled drainage area. Secondary containment bunding around the final NH3 storage tank will be implemented.
PO6 Environmentally hazardous materials located onsite are stored to avoid or minimise their release into the **environment** due to inundation during flood events.	No acceptable outcome is prescribed.	The location of the proposed plant is well outside the Moonie River flood overlay so this is not expected to be a concern. All storage of final product ammonia will be outside of flood inundation areas.
All development – matters of state environmental significance		
PO7 Development is designed and sited to: 1. avoid impacts on **matters of state environmental significance**; or 2. minimise and mitigate impacts on **matters of state environmental significance** after demonstrating avoidance is not reasonably possible; and 3. provide an **offset** if, after demonstrating all reasonable avoidance, minimisation and mitigation measures are undertaken, the development results in an acceptable **significant residual impact** on a **matter of state environmental significance**. Statutory note: For Brisbane core port land, an offset may only be applied to development on land identified as E1 Conservation/Buffer, E2	No acceptable outcome is prescribed.	The proposed development area has been cleared and has undergone significant disturbance as a result of past grazing activities. There are no apparent items of cultural heritage significance or archaeological features apparent. A search of Government databases has been carried out to verify this. The proposed development area is not within area protected fauna or flora, native vegetation, wetland, protected habitat, or heritage trigger areas.

Open Space or Buffer/Investigation in the Brisbane Port LUP precinct plan.		

8 GHG Emissions Estimation and Abatement Plan

As required under the “Guideline; Greenhouse gas emissions; Environmental Protection Act 1994” a Greenhouse Gas Estimate and Abatement plan was generated and is provided as a separate document.

The table below shows the Scope 1, 2 and 3 emissions estimate for the ammonia plant. Overall, emissions will be ~98% lower than “business as usual” grey ammonia. When the CO2 and reduced fugitive emissions associated with urea are considered, the overall emissions reduction potential is even greater.

			GHG emissions t CO2-e pa						
			SCOPE 1			Scope 2	Scope 3 - Upstream	TOTAL	%
Activity	Annual Activity D	Units	CO2	CH4	N2O				
Scope 1 GHG Emissions ESTIMATE									
Lubricating oil combusted / consumed [rotating equipment] (Petroleum based oil)	1.4080	kL pa	0.759	0.000	0.00		0.9833		0.56%
Forklift at 1.8 L/hr for 500 hr pa (Diesel)	900.00	L pa	2.43	0.000	0.02		0.6010		0.34%
Maintenance vehicle (Diesel)	10,400.00	L pa	28.06	0.004	0.20		6.9449		3.94%
Emergency power generator incl. testing (Diesel)	520.00	L pa	1.40	0.000	0.01		0.3472		0.20%
Scope 2 - Net Grid Power Consumption ESTIMATE									
Power draw from grid	-	kWh pa							
Scope 3 GHG Emissions ESTIMATE [Excludes construction and downstream emissions]									
7 FTEs commute to work: 53km each way site to St George, 100% commute via car; 0.2109 kg CO2-e / km	89040	km					18.7785		10.66%
Building and facility maintenance and repair services and spares: CAPEX multiplier	$ 442,602.18	$ pa					79.6684		45.24%
Trucking of anhydrous ammonia site an average of 90km, 3502 tpa; 0.06944 kg CO2-e/(t.km)	350,200.0	t.km					24.32		13.81%
Waste - Commercial and Industrial	8.2	tpa					10.7120		6.08%
Waste - Recycling	0.4	tpa					0.0000		0.00%
Untreated water (surface water, rainwater, brackish)	8,640.34	m^3					0.0000		0.00%
DI adsorbent	0.10	tpa					0.8600		0.49%
Grid power Scope 3 emissions: 0.11 kg CO2-e/kWh	-	kWh pa					0.0000		0.00%
TFI Energy Savings by sending Thermal Energy to AD tank rather than existing cooling system									
TBA [for CoP 3, estimated at 77.84 kWe]	0	GJ pa							
Total Facility emissions: Scope 1, 2 and upstream Scope 3.			32.65	0.00	0.23				18.67%
					32.88		143.2133	176.10	
Scope 3 DOWNSTREAM Excluded									
Emissions from usage of ammonia									
Composting - assume 100% aerobic composting									

Emissions per unit	MRR	Yara "YURI"	Notes
H2	0.1775	0.26	
Ammonia: kg CO2-e/kg NH3	0.0503	0.109	Less transportation required.

9 Attachments

9.1 Total Capital Investment

Ammonia Plant: $24.12 mil

PV Solar: $15.06 mil

Total Capital Investment: $39.18 mil

Equipment list:

KEY VENDOR PACKAGES	Sub-System	Equipment / Material	Quantity	Unit
Ammonia Module	N2 generation (7000 Nm3/hr @ 99.9995% purity) 265 kWe		1	Package talusTen systems excluding H2 generation and water treatment, inclusive of installation $US 10mil
	PSA			
	Air compressor			
	NH3 synthesis. 0.82 tph, min turndown 0.2 tph (24%). 70 kWe	Capacity to produce up to 19.8 tpd of NH3 if run at full capacity. Requires supply of 3.5 tpd H2		
	HB loop			
	Hydraulic cylinder compression			
	Controls - 100 sensors tracking pressure, levels, temperatures, flow rates, motor speeds, amp current, analog positions, discrete position switches. Real time display and historical archive			
	Cooling water 25 kWe 50:50 water glycol 17 MMBtu/hr = 4.98 MWt	Note: probably overrated as this is the design spec inclusive of electrolysis sub-system. Confrming reduced cooling duty		
	Adiabatic water cooler (3 cells)			
	Primary gas storage (approx 20 tonnes NH3 production capacity)	Note: can exclude H2 buffering		
	39,000 Nm3 H2			
	13,000 Nm3 N2			
	System power profile			
	Peak load 11.5 MW			
	Standby load 500 kW			
	Ramp up 30-60 minutes			
	Ramp down 75 seconds			
	Certifications and safety			
	Pressure vessels: ASME VIII div 1			
	Process and piping and vessels (non ASME VIII): ASME B31.3			
	Gas detection area monitors for NH3, H2, O2			
	Area declassified per NFPA			

	All electrical equipment UL standard			
	IEC62443 for industrial automation and controls systems			
	ISO/IEC27002 for cybersecurity			
BoP ESTIMATE	**All Energy Pty Ltd estimates for site integration / local subcontractor scope**			
		Equipment / Material	**Quantity**	**Unit**
	Pressure vessel design verification; Pressure vessel registration.		1	1
	AS3000 and Hazardous Area verification		1	1
	Freight			
	Freight - talus - Shipping		1	
	Freight - talus - port to site		1	
	Import duty: ammonia plant		5%	
	Shipping Freight insurance		3%	
	Civil / structural / enabling	**Equipment / Material**	**Quantity**	**Unit**
	Civil / Structural Design			
	Site clearing & grubbing		2,000.0	m2
	Bulk site earthworks			
	Detailed earthworks (trimming & compaction, clean fill)			
	Ground surface leveling and compaction			
	Concrete apron and equipment slabs: Heavily trafficed areas only - Ammonia load out.	25 Mpa 152mm thickness concrete	1,310.5	m2
	Site drainage & underground services		400	m
	Crushed gravel / blue stone for non-concrete surfaces		1,000	m2
	Screw pilings	On Site Pile Testing; HDG Screw Pile 3.0m long 80kN 76.1x4mm CHS,250x8mm Helix; Hot Dipped Galvanised - Container - Bearer Plate - 300x210x8mm;MS;HA350;M36x75; Hot Dipped Galvanised - Container - Connector Plate - 170x100x8mm;MS;HA350; Raised Floor Site Establishment Fee; RPEQ Form 16 Certification.	104.00	per Screw
	Admin office, offices, meeting and ammenities: Bldg 1	Includes delivery	1.0	Quantity
	Control room, cribb room, offices/storage: Bldg 2	Includes delivery	1.0	Quantity
	Steel frame building [industrial maintenance / storage shed]		1	sheds 10x10m
	Telephone and Internet Services / STARLINK			
	Monitoring Equipment (e.g. cameras)			
	Signage			
	Anchoring	Per container	24	
	Plant perimeter fencing		400.0	m
	Weigh bridge		1.0	
	Amenities block	Demountable	1.0	Quantity

	Access / Egress Roads	Excludes grading and earthworks.	758.0	m, at 5m width
	Electrical connection	**Equipment / Material**	**Quantity**	**Unit**
	Detailed Design and Documentation		1	
	Power conduit and cable to connect MSB to Vendor Package SB. Including trenching, conduit/cable laying, reinstate fill, compaction.	3 phase connection, 480V 50 HZ. 4C+E wire	50	m
	Quality check of power cables (megger test, continuity etc according to local specs)		1	
	Labour estimate (assuming all equipment pre-fabricated offsite)		320	hours
	MSB / MCC and associated installation for 3 Phase, 400 V power.	5 MVA from Ergon PMTs; 3.9 MW load.	1	Unit
	Trenched cabling between MSB and loads (excavation, conduit, insulated cabling, refill, compaction)		674.3	m
	Site Sundries - Electrical (Test & Commission; Site establishment & prelims; Administration, supervision, project management & QA)		1	
	Electrical protection			
	Container eathing - utilise ground screws		24	Quantity
	Lightning protection on plant and storage vessels		4	Quantity
	Mechanical / Plumbing connections	**Equipment / Material**	**Quantity**	**Unit**
	Process water supply - connection from battery limit to ammonia plant	Blue line metric poly 63mm PN12	337	m
	Process water supply piping elbow		10	Quantity
	Fire water pipe incl. install	Galvanised steel pipe	400	m
	Fire water pipe elbows		6	Quantity
	Pipe supports		48	Quantity
	Rainwater collection system			
	Water drains from Vendor Package to drain (Sewering: 225mm HDPP, trenched to 0.5m in light soil; back filled; compacted).	HDPP	70.5	m
	Water pipeline, connection from battery limit	Blue line metric poly 63mm PN12	44	m
	Ammonia connection from plant to storage tanks	ND32 ASTM A106 B	324	m
	Ammonia from storage to loadout	ND100 ASTM A106 B	121.5	m
	Valves, vents, fittings		5	Multiplier on straight cost
	Installation labour assuming equipment prefabricated off site where possible		1440	Hours
	Ammonia storage and loadout	**Equipment / Material**	**Quantity**	**Unit**
	Storage tanks purchase incluses compressed ammonia load out system (all 2nd hand)	39.4kL (~20 t)	7	Quantity
	Freight		7	Quantity
	Installation & labour		7	
	Custody Metering Skid: utilise weigh bridge			
	Coriollis meter 1.5" for 35 tph load out		0	Quantity
	Custody Metering System BoP			

	Pipework, Y-strainer, valves			
	T&P sensor			
	Skid mounting and weather protection			
	Vapour return system (vent from road train back to storage)			
	Slab			
	Ancilliaries			
	Installation			
	Electrical			
	Comms (ethernet and SIM backup)			
	Design			
	Delivery & Insurance			
	Fire detection and suppression			
	Flame detector. 24V DC.	AS3000 IECEx	4	$ 15,041.56
	CO2 automatic extinguishing system		1	$ 3,687.00
	Heavy commercial fire water tank	2 x 180kL Standalone gal steel tanks	2	$ 62,500.00
	Tank booster assembly			
	100mm Mounted hose connected to hydrant point 54m		3	$ 3,690.00
	Fire reel and hydrant cabinet		3	$ 650.00
	Pumps to AS2419/AS 2118; incl. drive base and control panel	Containerised system		
	Electric; ; 2hr rated.			
	Diesel - Standby with fuel tank and batteries			
	Jacking Pump - 3 phase with accumulator 0.3L/s @ 800 kPa			
	Aspirating Smoke Detection System Site-wide [VESDA]			
	Fire indicator panel 50 alarm groups			
	Flashing warning light		3	
	Fire bell		3	
	Spring fire hydrant 80mm connect to 100mm with T-riser and thrust block		3	
	Signs			
	Y-strainer, valves			
	T&P sensor			
	Weather protection			
	Slab			
	Ancilliaries			
	Installation			
	Electrical			
	Comms (ethernet and SIM backup)			
	Design			
	Delivery & Insurance			

	Spare parts	Allowance in vendor package.		
	Ammonia Specific Personal Protective Equipment			
	Self-Contained Breathing Apparatus	Powered Air Purifying Respirator & CleanAIR Protective Face Shield Kit. TH3.	20	Respirators
	Face masks		20	Face masks
	Hearing protection		20	Protection
	Coveralls		20	Coveralls
	Chemical gloves		20	Gloves
	Ammonia Specific Safety Equipment			
	Emergency eye wash / shower combination station		8	stations
	Emergency eye wash bottle station		6	stations
	Personal detectors			
	Wind sock		1	wind sock
	Ammonia / gas leak detection system	**Equipment / Material**	**Quantity**	**Unit**
	Fixed point detector; sensor: 0 – 100% LEL, Remote junction box, Remote calibration adapter, *Final positions and quantities based on gas mapping assessment		6	
	Ultrasonic Gas Detector, Polytron 8900, Acoustic gas leak detector (>10 bar), 56 to 115 dBA, *Final positions and quantities based on gas mapping assessment		2	
	Alarm outputs; Combined Sounder Beacon, (IP 65) non Ex version for safe area, operation only.24V DC, 90 dB		2	
	Gas mapping		1	
	Gas Detection Controller: for 8 inlets; Regard 7000, Dashboard – HMI, AI input module, Modbus communication module, Relay output, Power supply, Panel building, engineering and documentation		1	
Steam	Hot gas exchanger to raise steam from a hot gas process stream (BKU); kettle style heat exchanger; suitable for ~5k SCUs.		1	
	HX Electrical installation			
	HX Mechanical installation			
	Trenched and lagged steel steam piping; 5 Barg steam.	Allowance for trenching, steel pipe supply, lagging, backfill, compaction, testing.	324	510
OWNER'S COSTS				
	OWNERS COSTS			
	Land Purchase / Lease			
	Owners Project Management Team			
	Legal Advisors			

	Insurance Consultant			
	Industrial Relations Consultant			
	Project Insurance			
	All Statutory Requirements incl. Permits & Approvals (refer below)			
	Technology Licenses			
	PRE-PRODUCTION COST			
	Frent End Engineering Design / Detailed Design not included in TCI			
	Staff & labour costs			
	Administration expenses			
	Training (safety, etc)			
	Recruitment & relocation			
	Reagents & consumables			
	Power during commissioning (gen set hire)			
	Insurance spares			
	Consumables spares			
	Commissioning spares			
	Safety supplies & Training			
	Maintenance Tools & Equipment			
	Office Equipment & Furniture			
	Computing Hardware & Software			
	CONTINGENCIES			
	Package Contingency - Supplers & Contractors			
	EPC Contingency			
	Project Contingency			
	Escalation			
	Force majeur			

Solar Array:

Panels	630W Yingli Solar 'Bifacial' / double Glass / Framed; CIF Port of Brisbane
Medium voltage power converter	SC3450UD-MV
Inverters	ST2752UX Liquid-Cooled
Ground Mounting	Pile driving plus support frame
	Sungrow local controller
	DC Isolation Cabinet
	AC & DC Consumables
	Engineering
	Labour Mechanical
	Project Management
	Earth works
	Logistics - Electrical
	Logistics - Supports
	Inverter Structure
	Cable Tray
	PVDB
	Freight - Electrical
	Freight - supports
	Specialist contractors & Living Away from Home Allowance (LAHA)
	O&M Documentation
	Labour - Electrical
	TOTAL - Before credits
	$/kW

9.2 Process Flow Diagram

9.3 DA form 1 – Development Application Details

9.4 DA form 2 – Building Work Details

9.5 GHG Abatement Plan – Moonie River Renewables (MRR) Ammonia Production Facility.

9.6 Calculation of hazardous quantities – "AEPL-HM-MRR-Contained hazardous materials calculation sheet"

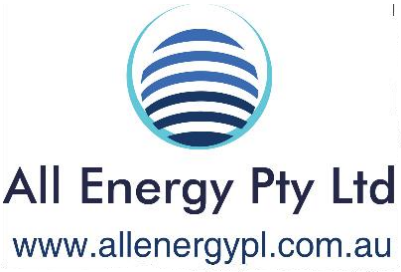
9.7 Form-73-notification-manifest-quantity-workplace-mqw 20251107

9.8 IDAS attachment for an application for an environmental authority ESR-2015-1791 20251028

9.9 Facility Drawings

- All Energy Pty Ltd - Moonie River Renewables - AEPL-Location Plan-20251128.A
- All Energy Pty Ltd - Moonie River Renewables - AEPL-Site Plan View-20251128.A

GHG Emissions Estimation and Abatement Plan



Abstract

This report addresses the requirements outlined in the “Guideline; Greenhouse gas emissions; Environmental Protection Act 1994” for Moonie River Renewables (MRR) Ammonia Production Facility. Options for Greenhouse Gas Abatement are summarised including short term as well as strategic / longer terms projects.

All Energy Pty Ltd

2025

PROJECT: GHG Abatement Plan – Moonie River Renewables (MRR) Ammonia Production Facility.

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REVISION

Date	Purpose	Rev	Authors
4/11/2025	Draft for Discussion	A	GF / MB
19/11/2025	Final	B	GF / MB

All Energy Pty Ltd: ABN 95 16 9802 555, ACN 16 9802 555; Telephone: 0437 249 745; Email: info@allenergypl.com.au

Table of Contents

Executive Summary

This report addresses the requirements outlined in the "Guideline; Greenhouse gas emissions; Environmental Protection Act 1994" for the Moonie River Renewables Facility, including:

- Project details.
- Greenhouse Gas emissions reference point / inventory - level of emissions against which ongoing reduction of GHG emissions will be assessed throughout the life of the project (reference point). This has been estimated for Scopes 1, 2 and 3.
- Emissions mitigation and management practices.
- Risk assessment outlinnig the scale of expected GHG emissions from the activity and how they are expected to contribute to climate change impacts on Queensland's environmental values

The project may be considered to be in the "Low emitter" emissions category as the combined Scope 1 and 2 emissions are estimated at 32.88 t CO2-e pa (i.e. well below the 25,000 tpa threshold).

Due to the short supply chains, the Moonie River Renewables Facility is estimated to have lower emissions per tonne ammonia than other similar facilities.

1 Project Details

1.1 Moonie River Renewables

Moonie River Renewables (referred hereon as the 'Project') will involve the generation and storage of renewable electricity via a ground-mounted solar array and battery system, then used to split purified river and/or ground water into hydrogen and oxygen gas. The renewable hydrogen will then be reacted with nitrogen from the air in a conventional Haber-Bosch synthesis reactor under elevated temperate, pressure, and using a catalyst to produce renewable anhydrous ammonia for fertiliser application.

The concept design for the proposed fertiliser production plant and relationship to the existing feedlot is shown below for stage 1 capacity, with the potential to expand in modules based on local offtake demand.

The design will include the following aspects:

- 14 MWp of ground-mounted, East-West orientated solar panels
- 10 MW of hydrogen electrolyser capacity, producing up to 2,000 Nm3/hr @ 99.999% purity. Water consumption of the electrolyser is 2.4 m3/h
- Nitrogen generation by pressure swing adsorption from air. N2 output 700 Nm3/h @ 99.9995% purity
- NH3 synthesis loop producing up to 0.82 tonnes/h of anhydrous ammonia
- Adiabatic / direct -air cooling system to reduce water consumption and achieve a high co-efficient of performance.

- 8,000 gpd (0.03 ML/day) reverse osmosis system followed by deionisation cartridges. Based on the quality of Moonie River water, after micro filtration to remove suspended sediments, recovery rate of RO expected to be up to 70%, or as low as 50%.
- 39,000 m3 of H2 and 13,000 m3 of N2 storage, representing 20 tonnes of NH3 production capacity.
- Anhydrous ammonia storage at 17 barg and loadout system.
- Existing site controlled drainage area (CDA), drainage system, sedimentation basis, and holding pond proposed to be used for the activity. Refer to the attached feedlot MCU application “Moonie River Feedlot Application_revB” for details of the sedimentation system and holding ponds design.

1.2 Background

The "Guideline; Greenhouse gas emissions; Environmental Protection Act 1994"[1] sets out the minimum expectations for GHG emissions information to be provided with applications for new environmental authorities (EAs). It also supports the administering authority[2] in considering GHG emission information when making decisions on new or amended EAs under the EP Act. This guideline supports rigorous, defensible, and transparent decision making in relation to GHG emissions. This guideline applies to EAs for resource and prescribed environmentally relevant activities (ERAs).

The existing site ERA is intensive animal feedlotting greater than 1,000 SCU but less than 10,000 SCU, with an aggregate environmental score (AES) of 28.

The two (2) new ERAs as part of the proposed activity are:

- 7-6(b) Inorganic chemical manufacturing (other than items 1-4): >1,000-10,000t/yr [AES = 115], and
- 8-1 Chemical storage 50t or more of chemicals of dangerous goods Class 1 or 2. (ammonia is a class 2.3 dangerous good and will be primary stored in its anhydrous liquid form under pressure). chemical. [AES = 51].

[1] ESR/2024/6819 • Version 1.00 • Last reviewed: 15 MAY 2024 Department of Environment, Science and Innovation, accessed 13th Feb 2025.
[2] The administering authority is the relevant local government for ERAs devolved under s. 133 of the Environmental Protection Regulation 2019, DAF for ERAs 2, 3 and 4 or the Department of Environment, Science and Innovation (the department) for all other ERAs.

2 Estimate of GHG emissions likely to be generated by the activities of the Project

2.1 Carbon Footprint Introduction & Boundary

A carbon footprint calculates all of the Scope 1, 2 and 3 emissions for an operation[3]. Scope 1 emissions are direct in that they come straight out of a tail pipe or boiler stack. Indirect emissions are most commonly emissions associated with using electricity. Scope 3 emissions are everything else, where generally the upstream Scope 3 emissions (i.e. all good and services used by an organisation) are included in a carbon footprint whilst downstream Scope 3 emissions (e.g. emissions associated with the use of a product) are excluded, however both up and downstream have been estimated for this Project.

For example, diesel has direct Scope 1 emissions from combustion in a compression ignition engine, and the upstream Scope 3 emissions due to the emissions associated with exploration, extraction, refining and transport.

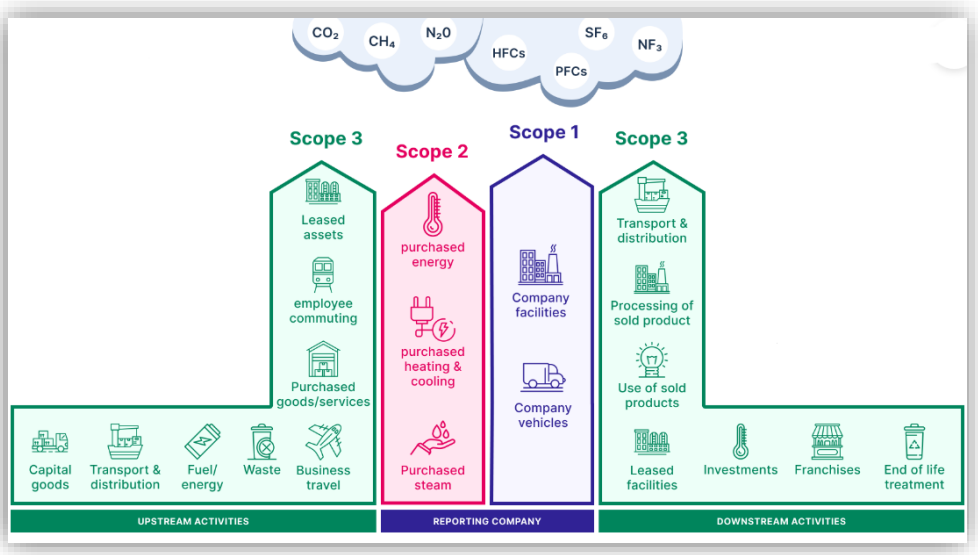


Figure 1: Typical sources of Scope 1, 2, 3 GHGs.

Boundary: Scope 1, Scope 2 and Scope 3 emissions have been included in the carbon footprint. The approach utilised for the review is in keeping with the carbon accounting principles as per the GHG Protocol[4], ISO 14064 and the National Greenhouse Emissions reporting Scheme Measurement (Determination).

[3] https://ghgprotocol.org/, accessed 7th March 2025.
[4] ghg-protocol-revised.pdf (ghgprotocol.org)

3 Management practices proposed to be implemented to reduce GHG emissions

Proposed management practices should demonstrate that all reasonable and practical measures have been applied to manage GHG emissions through best practice design, process, technology, and management. The GHG abatement hierarchy provided in Figure 1 illustrates the preferred prioritisation of management practices to be implemented to minimise GHG emissions.

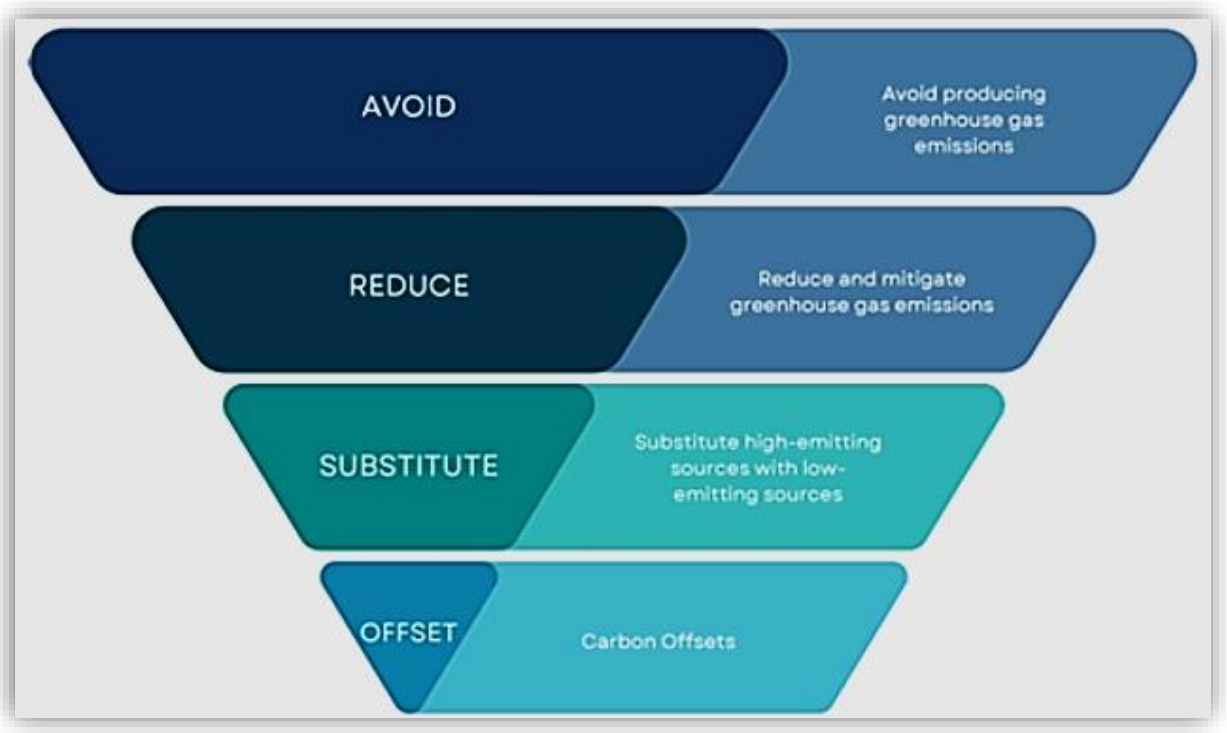


Figure 2: Abatement hierarchy showing preference of avoiding and reducing emissions sources, with offset through third party credits to be considered as a last initiative

Examples of the GHG abatement hierarchy contained within this report include:

AVOID: options to completely remove fossil fuels and grid power from the site thereby removing fugitive emissions and fossil fuel Scope 1 emissions, efficiency gains outlined in section 6 such as waste heat recovery to reduce energy usage.

REDUCE: utilising available pressurised water at the plant (RO concentrate) in the scrubber system rather than additional water, thereby reducing pumping energy costs; consider options for incorporating wood / paper / cardboard and FOGO into the feedlot manure composting operations to reduce organics to landfill.

SUBSTITUTE: into the future, supporting councils to change from chlorine to ozone (from oxygen by-product) for water dosing and/or swimming pool treatment as a lower emissions, local and less toxic option. Even accounting for O2 supply chain costs, ozone from pure oxygen is ~70% cheaper than via corona discharge of air.

OFFSET: not expected to be required for this project.

4 GHG Inventory / Reference Point

The GHG emissions reference point is the level of emissions against which ongoing reduction of GHG emissions will be assessed throughout the life of the Project[5]. Hence, the "reference point" is as per document "JetZero_GHG_Calculator_v8_QLD-Guidelines.xl" (summarised in Table 1 below).

The GHG reference point is based on projected GHG emissions prior to implementation of the GHG abatement. The Project, according to the GHG Reference Point, will be below the 25,000 t CO2-e pa expected GHG emissions (Scope 1 and Scope 2) hence is to be considered a small emitter. This hence does not require calculation of a GHG emissions inventory (Scope 1, 2 and 3), however these were calculated as part of preparation for the PGO Scheme.

The Project Scope 1 emissions are calculated to be below the Safeguard Mechanism Threshold of 100,000 tpa CO2-e (covered emissions under the Safeguard Mechanism do not include Scope 2 and 3).

The level of emissions against which ongoing reduction of GHG emissions will be assessed throughout the life of the Project is as per the "reference point" which is the projected GHG emissions prior to detailed design, optioneering, and implementation of the GHG abatement plan.

A summary of the "reference point" is provided in the following table for the first full year of operation (Y1). The emissions per unit will depend highly upon production outputs; with the assumption that the plant produces 3501.75 tpa anhydrous ammonia (51% utilisation). Initially, the plant may produce less ammonia (starting at ~2084.04 tpa for the initial solar array sizing at 30% utilisation), then the solar array, battery storage and H2 / N2 storage increasing to meet demand, up to a rated capacity of 7300 tpa.

COPYRIGHT ALL ENERGY TY LTD - NOT TO BE USED OR REPRODUCED WITHOUT WRITTEN PERMISSION			GHG emissions t CO2-e pa						
			SCOPE 1			Scope 2	Scope 3 - Upstream	TOTAL	%
Activity	Annual Activity D	Units	CO2	CH4	N2O				
Scope 1 GHG Emissions ESTIMATE									
Lubricating oil combusted / consumed [rotating equipment] (Petroleum based oil)	1.4080	kL pa	0.759	0.000	0.00		0.9833		0.56%
Forklift at 1.8 L/hr for 500 hr pa (Diesel)	900.00	L pa	2.43	0.000	0.02		0.6010		0.34%
Maintenance vehicle (Diesel)	10,400.00	L pa	28.06	0.004	0.20		6.9449		3.94%
Emergency power generator incl. testing (Diesel)	520.00	L pa	1.40	0.000	0.01		0.3472		0.20%
Scope 2 - Net Grid Power Consumption ESTIMATE									
Power draw from grid	-	kWh pa							
Scope 3 GHG Emissions ESTIMATE [Excludes construction and downstream emissions]									
7 FTEs commute to work: 53km each way site to St George, 100% commute via car; 0.2109 kg CO2-e / km	89040	km					18.7785		10.66%
Building and facility maintenance and repair services and spares: CAPEX multiplier	$ 442,602.18	$ pa					79.6684		45.24%
Trucking of anhydrous ammonia site an average of 90km, 3502 tpa; 0.06944 kg CO2-e/(t.km)	350,200.0	t.km					24.32		13.81%
Waste - Commercial and Industrial	8.2	tpa					10.7120		6.08%
Waste - Recycling	0.4	tpa					0.0000		0.00%
Untreated water (surface water, rainwater, brackish)	8,640.34	m^3					0.0000		0.00%
DI adsorbent	0.10	tpa					0.8600		0.49%
Grid power Scope 3 emissions: 0.11 kg CO2-e/kWh	-	kWh pa					0.0000		0.00%
TFI Energy Savings by sending Thermal Energy to AD tank rather than existing cooling system									
TBA [for CoP 3, estimated at 77.84 kWe]	0	GJ pa							
Total Facility emissions: Scope 1, 2 and upstream Scope 3.			32.65	0.00	0.23				18.67%
					32.88		143.2133	176.10	
Scope 3 DOWNSTREAM Excluded									
Emissions from usage of ammonia									
Composting - assume 100% aerobic composting									
Emissions per unit	MRR	Yara "YURI"	Notes						
H2	0.1775	0.26							
Ammonia: kg CO2-e/kg NH3	0.0503	0.109	Less transportation required.						

[5] "Guideline - Greenhouse gas emissions", Environmental Protection Act 1994, Department of Environment, Science and Innovation, ESR/2024/6819, Version 1.00, Last reviewed: 15 MAY 2024.

Table 1: Annual emissions footprint of MRR.

Reference used in preparation of the reference point were:

- Future Made in Australia (Guarantee of Origin) Methodology Determination 2025: trucking, light vehicles, Scope 3 fuel emissions.
- NGERS Measurement Determination
- Ielab Scope 3 GHG emissions Factors, forecasted for 2021: 0.18 kg CO2-e/$
- AusLCI_1.42_EF_Published; https://www.climatiq.io/data/emission-factor
- Wood and Fibre Science, 50(3), 2018, pp1-45, https://www.swst.org/wp/wp-content/uploads/2017/06

5 GHG Emissions Mitigation and Management Practices

5.1 Summary of Key Areas Considered

This section takes into account the GHG emissions reference point and emissions reduction targets for the Project to then develop possible emissions reduction measures.

The project will have an active and keen interest in minimising Scope 1, 2 and 3 emissions due to the PGO.

5.1.1 Electricity

Options include:

- Carbon negative power by utilising materials diverted from landfill to make power (e.g. waste wood to gasification to power).
- PV solar utilising direct DC into the electrolyser to achieve higher efficiencies,
- PV solar utilising direct DC into battery storage to achieve higher efficiencies,
- Improved energy efficiency such as more efficient fans and pumps on the utility cooling system.

5.1.2 Scope 1 Emissions

- Converting vehicle fleet to being electric,
- Converting vehicle fleet to run on ammonia (technology in development both for ammonia to H2 and direct ammonia fuel cells),
- Zero emissions lubricating oils (e.g. bio-lubes; recycled lubes).
- Eliminating diesel gensets.
- Eliminating wastes via 100% recycling.

6 Summary of Emissions Reduction Program Options and Risk Assessment

Each abatement options must be considered according to the "SMART" principles.

- specific,
- measurable,
- achievable,
- realistic, and
- time-bound (following the SMART principles).

Risk assessment details including cost, practicality, effectiveness, and risks of each measure (including risks associated with the availability of new technologies);

Table 2: Risk assessment and preliminary estimated cost/benefit of direct abatement initiatives.

Emissions Reduction Option	Timeframes for implement-ation	Estimated reduction of emissions / Effectiveness	Cost	Practicality & Ongoing monitoring	Risks of each measure including risks associated with the availability of new technologies
Waste to heat and Power via backpressure turbine optimised to thermal steam requirements	Can be implemented upon plant commissioning or retrofitted where appropriate boiler is specified. System optimised to provide required steam for plant with power from superheated steam sent through a back pressure turbine (~17%).	Reduction in scope 1 (some minor methane & nitrous oxide GHGs due to high temp combustion). Opportunity for the avoided landfill emissions (~77,438 t CO2-e pa assuming 1.7 t CO2-e/t landfilled wood), making ~3 MWe.	$31mil ($25 mil for 20 MWt mixed waste moving grate boiler and allow $6mil for supply & install of back pressure turbine).	Capital intensive; specialised workforce; large and ongoing solid fuel demand hence multiple long term supply contracts required. Plant SCADA data can be used monitor power requirement. Stringent emissions requirements may require continuous air monitoring.	Fuel availability is the biggest risk. Secondly the water requirement. 45,552 tpa mixed waste = ~2 B-doubles per day of fuel. Risk of not adhering to environmental emissions where fuel is contaminated; multiple stages of flue gas handling are required increasing CAPEX. A core risk is the availability of the right fuel at the right specification at the right price for 20 years or more (life of plant) to justify the higher CAPEX for a solid fuel boiler. Still requires additional sources of power i.e. PV+battery and/or grid power.
Waste to syngas to power; no water required.	2040	Opportunity for the avoided landfill emissions (~7800 t CO2-e pa per 140 kW).	$0.6 mil for a 140 kW. Viability hinges on a gate fee, however there is no landfill levy in Balonne.	Proven "off the shelf" technology. Higher P10 particulate emissions than PV – may require continuous emissions monitoring.	Would require a long term fuel supply agreements with multiple sources and a gate fee.

Emissions Reduction Option	Timeframes for implement-ation	Estimated reduction of emissions / Effectiveness	Cost	Practicality & Ongoing monitoring	Risks of each measure including risks associated with the availability of new technologies
Run cooling water system at as high a temperature as possible (50/70DegC); then trim via boiler make-up preheating; process pre-heating.	Run "digital twin" model during detailed design.	TBC.	Minor – no cost for cooling water setpoint, integrate with other process waste heat	Full pinch analysis of plant recommended to highlight efficiency gains.	Check unit operation set points for viability of 50 DegC or higher inlet cooling water.
Cascade hecooling system from lowest to highest cost: heat to be removed from heat exchange, then direct air cooling, then refrigeration (for chilling).	Run "digital twin" model during detailed design.	TBC	Heat exchangers and interconnecting pipework.	Technically complex and can be a high CAPEX with long payback.	Increases flow cross overs – ensure suitable materials of construction and add inspections to maintenance schedule.
Setpoint review especially on ramping	Run modelling during detailed design.	Check opportunities for setpoint review throughout plant e.g. compressed air pressures.	No additional CAPEX.	Technically simple however may slow down process.	Require longer residence time. Would need to ensure product quality.
Vehicle electrification	When cost < diesel	Up to 90% emissions reduction	Seeking parity	Difficulty in remote areas	Cost and lifetime of batteries. Fire risk. Specialised maintenance. Long distances in regional areas.
Vehicles fuelled on ammonia	When cost < diesel	Up to 90% emissions reduction	Seeking parity	Difficulty to service in remote areas	Cost and lifetime of vehicle. Specialised maintenance.

7 Monitoring and auditing

MMR is considering registering for the Guarantee of Origin Scheme, and as such would be required to develop a rigorous program for monitoring GHG emissions auditing.

When considering the mandatory Environmental and Social Governance (ESG) reporting requirements now enshrined into law in Australia, it anticipated that the Project would exceed two of the three criteria outlined in the first table. Hence, the Project is not expected to be part of the mandatory reporting cycle with reasonable assurance on Scope 1, 2 and 3 emissions.

Auditing is a very formal work with specific connotations. Ultimately, most Australian businesses are moving towards "Reasonable Assurance" on scope 1, 2 and 3 emissions, which implies that the level of rigour applied to annual financial reports will also be applied to GHG emissions.

First annual reporting periods starting on or after	Large entities and their controlled entities meeting at least two of three criteria:			National Greenhouse and Energy Reporting (NGER) Reporters
	Consolidated revenue	EOFY consolidated gross assets	EOFY employees	
1 July 2024 Group 1	$500 million or more	$1 billion or more	500 or more	Above NGER publication threshold
1 July 2026 Group 2	$200 million or more	$500 million or more	250 or more	All other NGER reporters
1 July 2027 Group 3	$50 million or more	$25 million or more	100 or more	N/A

Figure 3: Reasonable assurance reporting periods by entity size

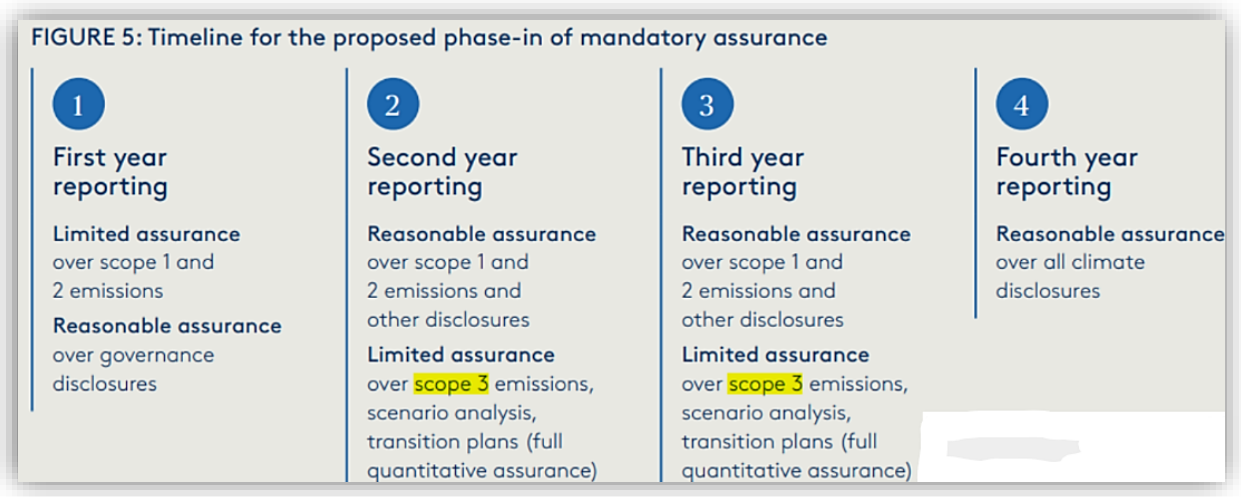


Figure 4: Pathway from limited assurance over Scope 1 and 2 to reasonable assurance of all climate disclosures

8 Reporting

MRR will develop a program for periodic reporting on progress towards the GHG emission reduction targets outlined in the GHG Abatement Plan, expected to align with the PGO scheme.

Reporting against the emission reduction targets stated in the GHG Abatement Plan must be publicly available. The annual emissions calculations, when above the National Greenhouse and Energy Reporting Scheme (NGERS) threshold, must be signed off annually by the company Chief Executive Officer (CEO) (or similar).

The annual GHG Report will form the basis of the annual public ESG report.

The GHG Abatement Plan includes commercial-in-confidence information, hence Jet Zero requests that details are treated as confidential and are not made publicly available. Jet Zero is an early mover in the SAF industry and requires the use of patents, trade secrets, Non-Disclosure Agreements (NDAs) / Commercial Disclosure Agreements (CDAs) and the like to ensure that commercial-in-confidence information is not made public.

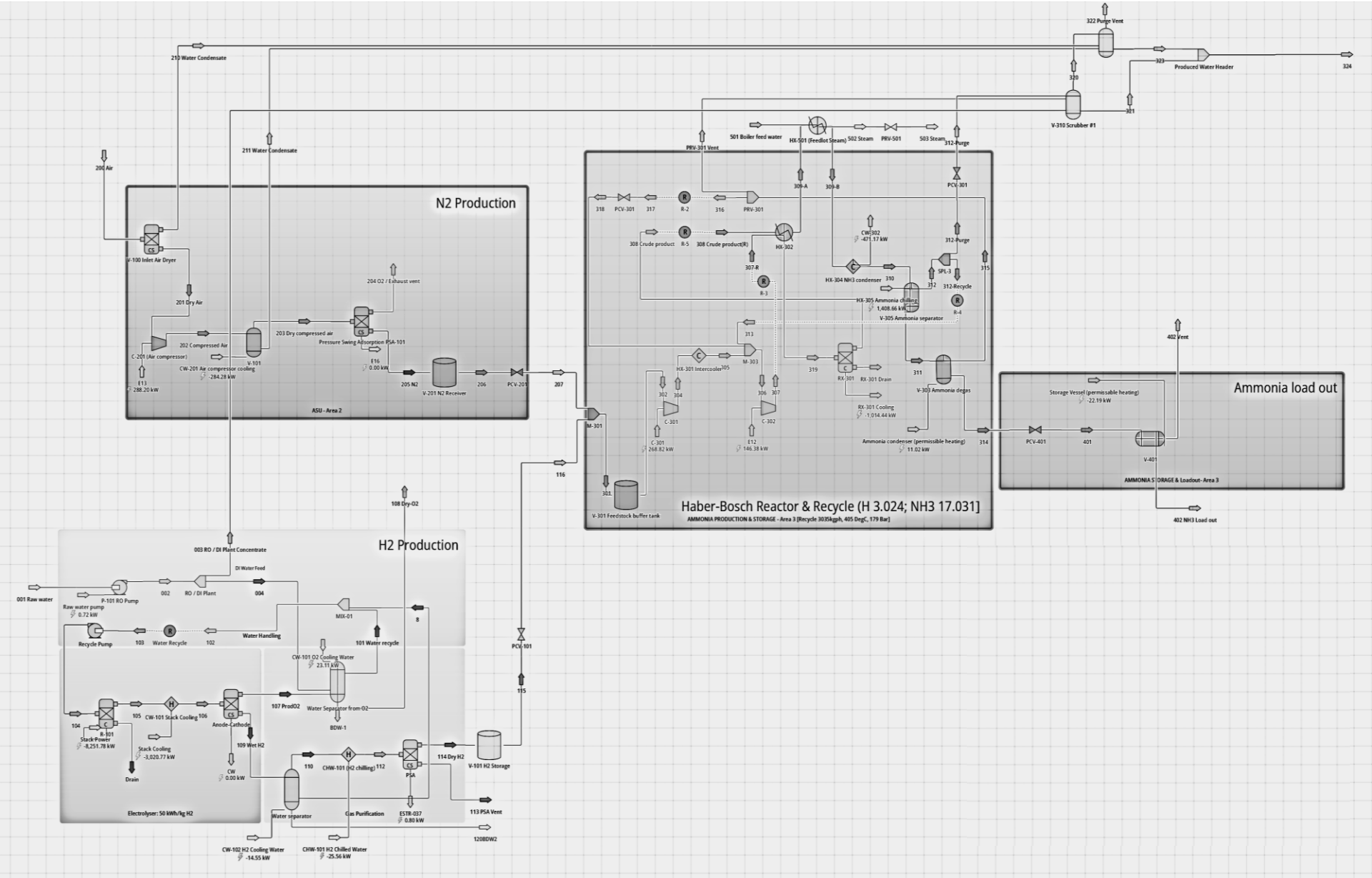
9 Contribution to climate change impacts on Queensland's environmental values: GHGs.

The Project "reference point" is 32.88 t CO2-e emissions pa which is 0.000026% of QLD's GHG net emissions of 124.1 Mt CO2-e pa[6].

Over a 30 year life of plant, the net avoided emissions are estimated at 257,348 t CO2-e pa (assuming an emissions intensity of 2.5 t CO2-e / t NH3 for steam methane reforming) which is estimated at 0.21% of QLD's GHG net emissions of 124.1 Mt CO2-e pa[7] (noting most fertilizer is imported, hence these scope 1 emissions are attributable to areas outside of Australia).

Where EfW utilising materials diverted from landfill to generate power, the net avoided emissions could be reduced even further.

[6] https://www.qld.gov.au/environment/climate/climate-change/climate-science,-analytics-and-reporting/emissions-data, accessed 7th March 2025.
[7] https://www.qld.gov.au/environment/climate/climate-change/climate-science,-analytics-and-reporting/emissions-data, accessed 7th March 2025.



CONFIDENTIAL DOCUMENT

Preliminary Design – NOT FOR CONSTRUCTION.

MOONIE RIVER RENEWABLES – AMMONIA PRODUCTION FACILITY

REV.	DATE	BY	CHECKED
A	20251027	GMF	MCB

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AEPL-PFD-20251027

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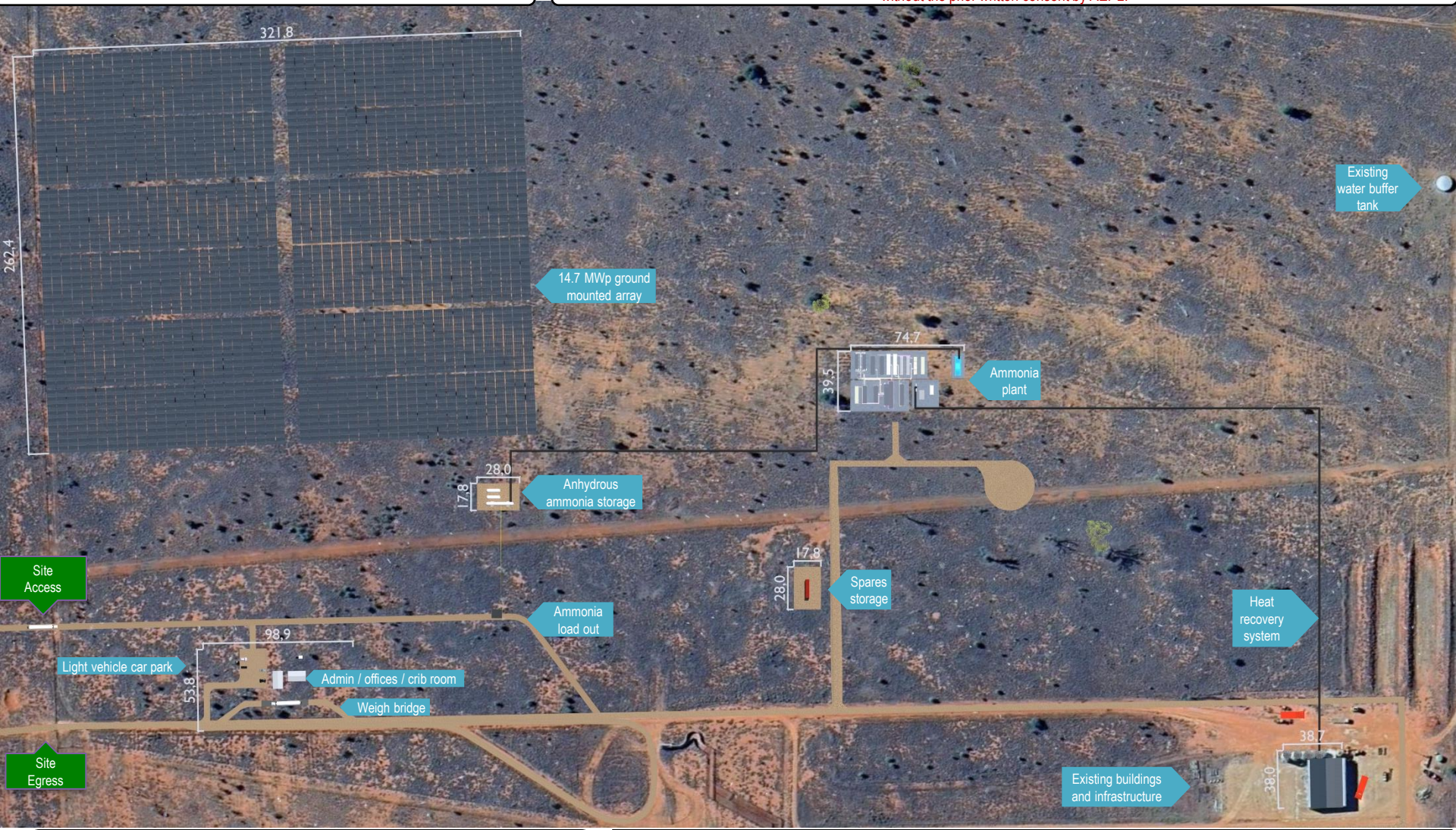

Preliminary Design – NOT FOR CONSTRUCTION.

SITE ADDRESS	Beltana Road, St George QLD 4487
REAL PROPERTY	Lot No.4, Plan Type BLM761
LOCAL GOVERNMENT AREA	Balonne Shire Council

0 m 50 m 100 m

MOONIE RIVER RENEWABLES

AMMONIA PRODUCTION FACILITY – SITE PLAN VIEW

REV.	DATE	BY	CHECKED
A	20251128	GMF	MCB

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DWG Page: 1 / 1
AEPL-SPV-20251128.A

NOTES:
ELEVATION DATUM ASSUMED
UNDERGROUND SERVICES TO BE VEERIFIED BY RELEVANT AUTHORITIES
ORIENTATION MGA94 ASSUMED
ORIENTATION MGA94 ASSUMED

REVISION						REFERENCES
25/12/24	B	ISSUED AS CONCEPT	BP	MB	GF	
11/12/24	A	ISSUED AS CONCEPT	BP	MB	GF	
DATE	REV	REMARKS	DRN	CKD	PSD	

SCALES
0 0.5 1.0 1.5 2.0 2.5 METRES 1:50
0 500 1000 1500 2000 2500 MILLIMETRES 1:50

CONSULTANT LOGO
All Energy Pty Ltd
www.allenergypl.com.au

DRAWN BP | DESIGNED GF
CHECKED GF | CHECKED MB
APPROVED GF

MOONIE RIVER RENEWABLES
LAYOUT STAGE 1
GENERAL ARRANGEMENT

CONTRACT NUMBER

DRAWING NUMBER 1 | SHEET 1 OF 3 | REV. B