Phosphate International Pty Ltd
Level 1 GPO | 261 Queen Street, Brisbane QLD 4000
www.phosphateinternational.com

23 June 2017

RPI Act Development Assessment Team
Department of Infrastructure, Local Government and Planning
PO Box 15009
City East Qld 4002

Via email: RPIAct@dilgp.qld.gov.au

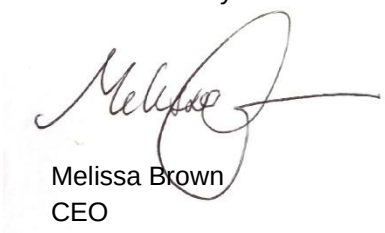
Dear Sir or Madam

RIDA Application for exploration test pit: RPI17/005/Phosphate International

Please find enclosed an application on behalf of Phosphate International for a regional interests development approval to complete an exploration test pit in the Mount Isa region. Please note that we have conducted a number of pre-application discussions with Kassim Mahomed and Darren Brewer of the Department of Infrastructure, Local Government and Planning in regards to this matter.

We have paid the $6,049 application fee via direct deposit (receipt no 122104485) today using reference **RPI17/005/Phos Int**. Please do not hesitate to contact me on 0433 766 716 or on email at mbrown@phosphateinternational.com if you require further information regarding this application or the project.

Yours sincerely



Melissa Brown
CEO

Regional Planning Interests Act 2014

Assessment application form

Approved under section 94 of the *Regional Planning Interests Act 2014*. Version 2.0 is effective from 13 August 2015.

Before lodging your application

- read RPI Act Guideline 01/14 *How to make an assessment application for a regional interests development approval under the Regional Planning Interests Act 2014* here: www.dilgp.qld.gov.au/RPIAct
- consider contacting the RPI Act Development Assessment Team on 1300 967 433 or email RPIAct@dilgp.qld.gov.au for general queries, or to request a pre-application discussion on the proposed application.

Purpose of application form

This form is to be used when making an assessment application for a regional interests development approval (RIDA) under the *Regional Planning Interests Act 2014* (RPI Act).

Definitions

Expressions highlighted in bold italic type have the same meaning as in the RPI Act or in regulations made under the RPI Act.

How to make the Assessment Application

Section 29 of the RPI Act states:

An assessment application must be—

i. made to the chief executive in the approved form; and

ii. accompanied by a report—

- *assessing the resource activity or regulated activity's impact on the area of regional interest; and*
- *identifying any constraints on the configuration or operation of the activity; and*

iii. accompanied by the fee prescribed under a regulation.

The applicant must complete all sections of the form either on the form or as an attachment.

Where to lodge

Provide **1 electronic copy** and **2 hard copies** of the completed application form and the supporting information to the chief executive:

- **Email** **RPIAct@dilgp.qld.gov.au**
- **Post** RPI Act Development Assessment Team DILGP, PO Box 15009, City East QLD 4002
- **Hand deliver** RPI Act Development Assessment Team DILGP**,** Level 6, 63 George Street, Brisbane.

(For hand deliveries, contact the RIDA Development Assessment Team on 1300 967 433).

1. Property description of the land the subject of the application

Identify all lots or parts of lots on which the activity is proposed, and the total area of disturbance. Provide a map.

Lot on Plan description *(e.g. Lot 1 RP 12345)*	Lot 4 on Plan UN803944
Street address/suburb/locality and post code	Barr Creek Station, 129 Mount Oxide Rd, Gunpowder
Closest town	Gunpowder

2. Application details

Attach a map that clearly shows all relevant areas of regional interest on the land the subject of the application and the corresponding proposed location of the proposed activity/ies.

Identify the area/s of regional interest (ARI) in the application area and the area of the ARI to be disturbed

Area of regional interest (ARI)	Area of disturbance	Area of regional interest (ARI)	Area of disturbance
☐ Priority agricultural area	_____ha	☐ Priority living area	_____ha
☐ Strategic cropping area	_____ha	☒ Strategic environmental area	_____<30___ha

Identify the resource or regulated activity

☒ Resource activity: mining and other resource activities (not petroleum and gas). (*Add the type of mining on this form (e.g. coal, bauxite)* Phosphate Exploration

☐ Resource activity: petroleum and gas

☐ Regulated activity - broadacre cropping *(Only relevant where the application relates to a strategic environmental area*)

☐ Regulated activity - water storage (dam) (O*nly relevant where the application relates to a strategic environmental area)*

Provide a detailed description of the proposed activities

Provide a description of the proposed activities for which approval is sought, location and the surface area of the activities.

Area of regional interest	Activity	Location	Total area of disturbance (ha)
Gulf Rivers Strategic Environmental Area	Test Pit for Phosphate exploration	Lot 4 on Plan UM803944	9.6 ha

Provide a description of current land use

Provide a description of what the land is currently being used for (e.g. horticulture, irrigated cropping, dryland grazing, nature conservation, residential, manufacturing and industrial, etc.) and the surrounding land within a 1km radius.
Attach a map that clearly shows the area and location of all existing land uses and activities on the land the subject of the application, and within a 1km radius of the boundaries of the land that is the subject of the application.

Land uses in and within 1 km of the proposed test pit is low intensity cattle grazing and native vegetation.

3. Supporting information to accompany this application

Report *(addressing matters set out in section 29(b) of the RPI Act)* - included

Maps and site plans *(proposed activities)* - included

Other documents *(optional)* - included Environmental management Plan

4. Other relevant information to accompany this application *Attach map/s to identify the location of this information and lot on plan details.*		
Are there any *resource authorities* or applications for *resource authorities* over all or part of the land the subject of the application? *(e.g. for exploration or resource development)*	☒ Yes EPM25239, issued 09/04/2013 – please see Assessment Application Report for details	☐ No
Is there a *SCL protection decision* over all or part of the land the subject of the application?	☐ Yes *(Provide decision number/s)*	☒ No
Is there an *environmental authority* (EA) over all or part of the land the subject of the application?	☒ Yes EPVX03205315	☐ No
Are there any easements over any part of the land the subject of the application?	☒ Yes please see Assessment Application report for details	☐ No
Attach a current title search for each lot or part of a lot the subject of the application *(NOTE: the searches must be obtained within 3 business days prior to making the application.)*	☒ Tick to confirm title searches are attached.	
Is an exemption from public notification for the assessment application under section 34(3) of the RPI Act sought?	☐ Yes	☒ No

5. Land owner details		
Name of all land owner/s	Alfred Arthur Lanskey	
Postal address/s	Alfred and Linda Lanskey PO Box 3143, Mt Isa	
Telephone/mobile number/email address/s	07 47489196 barrcreek@gmail.com	
Is the applicant the owner (as defined in schedule 1 to the RPI Act) of the land the subject of the application?	☐ Yes	☒ No Lot 4 on UN803944
Is it necessary, under section 30 of the RPI Act, to provide a copy of the application to the owner of the land? *(NOTE: proof of delivery will be required.)*	☒ Yes	☐ No

6. Applicant/authorised person details *Section 28 of the RPI Act prescribes who may be the applicant for a RIDA for a resource activity or regulated activity to be carried out in an area of regional interest. The decision about the application is issued to the applicant. The applicant need not be the owner of the land. The authorised person is the contact person for the applicant and need not be the applicant. However, formal documents, such as any requirement notice and the decision about the application, will be sent to the applicant at the address for service stated below.*	
Applicant/s name (individual or company name in full), include ABN or ACN number if applicable	ACN 132 668 314 Pty Ltd ACN 132 668 314
Applicant's postal address and email address for service	PO Box 1982, Brisbane, Queensland, 4000 mbrown@phosphateinternational.com
Authorised contact person for applicant: name, position and company	Melissa Brown CEO, Phosphate International
Contact phone number and mobile number	07 32126000 and 0433766716
Contact email address	mbrown@phosphateinternational.com

7. Electronic documentation

Does the applicant consent to receiving documents relating to this assessment application, required or permitted to be provided under the *Regional Planning Interests Act 2014* or any other statute, in an electronic format?	☒ Yes ☐ No

8. Application fee *(Fees are prescribed in the Regional Planning Interests Regulation 2014)*

Amount payable	$6,049.00	
Reference number *(Contact RIDA assessment team for a reference number)*	RPI17/005/Phosphate International	
Payment option *(Contact RIDA assessment team for account details)*	☒ Direct deposit	Date deposited: 23 June 2017
	☐ Cheque attached	

9. Use and Disclosure of Information Statement

The information is collected in accordance with the RPI Act and will be used by Queensland Government Agencies for the processing and assessment of your assessment application, and may involve the chief executive:

1. and other officers of the DILGP, and any consultants engaged by or on behalf of the chief executive, reviewing the information provided for the purpose of considering and assessing your assessment application
2. providing a copy of the assessment application to relevant Queensland Government Agencies prescribed as assessing agencies for the assessment application (including the local government), the Gasfields Commission or any person asked to provide advice or comment on the assessment application.

The assessment application and the accompanying report will also be made publically available on the DILGP website from the time the assessment application is made until the time it lapses or is withdrawn or, if is decided, until the end of the last period during which an appeal may be made against a decision on the application. However, information will not be made publicly available on the DILGP website to the extent that it is provided by an owner of land (as defined in schedule 1 to the RPI Act) (an *owner*) who is not the applicant, and is commercial-in-confidence or personal information, and that owner has not consented to its disclosure, or to the extent that it is information which is considered to be sensitive security information.

Where an application proposes a resource or regulated activity in a priority agricultural area (PAA) and the applicant is required to provide information about the productive capacity or operation of a priority agricultural land use to address the prescribed solutions in the Regional Planning Interests Regulation 2014 (Schedule 2, Part 2), the information is to be provided in a separate document attached as an appendix to the assessment application report and the application must:-

- identify the source of the information provided, including whether the information was provided by an owner other than the applicant
- state whether an owner other than the applicant agrees to the information being made publicly available on the DILGP website; and if so
    - provide the express written agreement of that owner to the information being made publicly available on the DILGP website.

If an owner, other than the applicant, does not provide express written agreement, the information will not be made available on the DILGP website with the other application information. You may also be required to publicly notify your application. A notice about the chief executive's decision relating to your application will also be publicly notified.

Your personal details will not be disclosed for a purpose outside this assessment process, except where required by legislation (including the *Right to Information Act 2009*). This information may be stored in a database by DILGP.

The information collected will be retained as required by the *Public Records Act 2002*.

10. Declaration

☒ By making this application, I declare that all the information in this application is true and correct and that I have read and understood the '*Use and Disclosure of Information statement'* on this form.

Signature of applicant/authorised person	Print name and position	Date
	Melissa Brown, CEO	23 June 2017

Office use only	Date received	
	RIDA reference number	
	Source number	

Supporting information for Regional Interests Development Application (RIDA Assessment Application Report

Barr Creek Project (EPM 25239)

Proposed Exploration Test Pit

Contents

1. INTRODUCTION

Phosphate International (**Applicant**) proposes to undertake an exploration test pit for a bulk sample of phosphate on EPM 25239 as part of the Barr Creek Project approximately 130 km northwest of Mount Isa (see Figure 1). The exploration test pit will affect land contained in the Gulf Rivers Strategic Environmental Area (see Schedule 1 for the location). This is an application for a Regional Interests Development Approval to allow the exploration to proceed.

The Applicant holds an existing Environmental Authority (EPVX 03205315) and is seeking to amend that authority through a site specific environmental authority amendment. The application has been submitted in conjunction with this application to the Department of Environment and Heritage Protection.

1.1 Applicant

Phosphate International, through its wholly owned subsidiary ACN 132 668 314 Pty Ltd, is the current holder of EPM 25239.

1.2 Property and tenure details

The table below summarises property and tenure details for the subject land. A copy of the land title is included in Schedule 1.

Table 1: Property and tenure details

Category	Particulars
Real property description	Lot 4 on UN803944
Tenure	Lands Lease
Lessee	Alfred Lanskey
Purpose for lease grant	No purpose defined

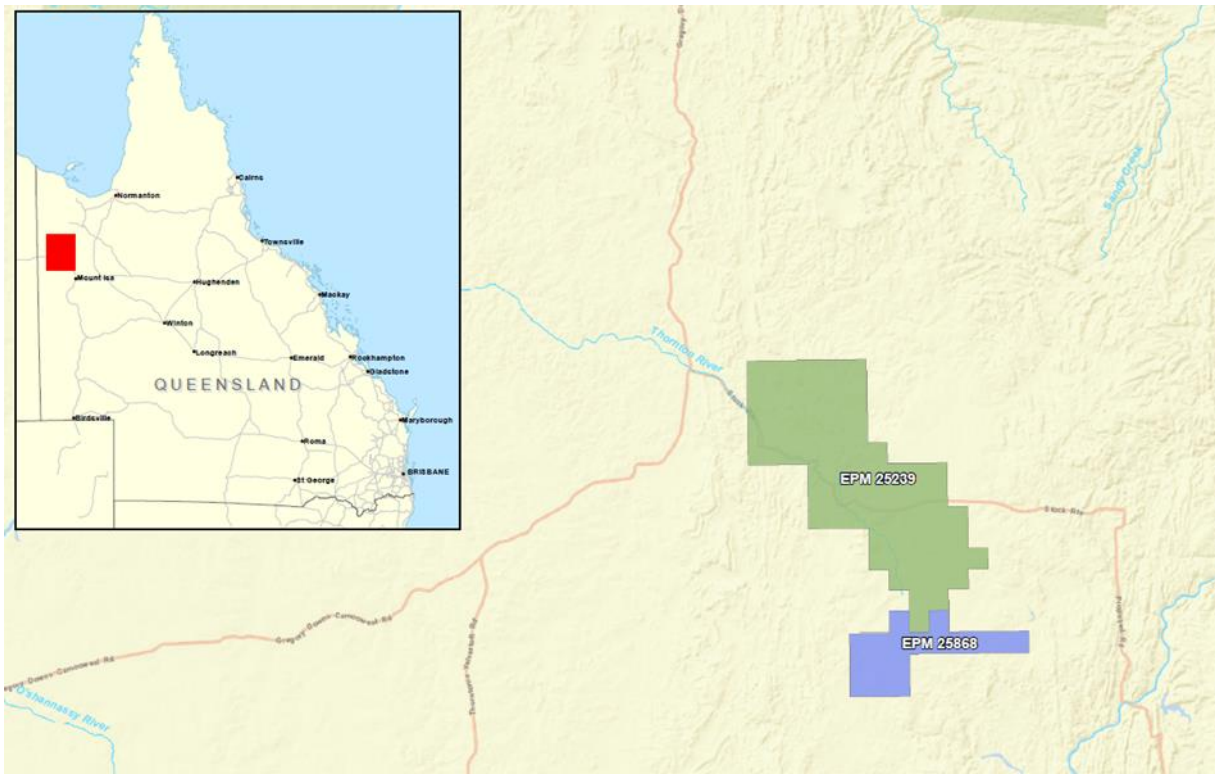


Figure 1: Location of EPM 25239

2. PROPOSED EXPLORATION ACTIVITIES

2.1 Exploration test pit

The Applicant is proposing to develop a sample pit for the collection and removal of a bulk sample of rock phosphate. The exploration test pit will be undertaken using conventional methods and will be carried out using an approved and accredited contractor.

The design of the pit will require a pit floor of approximately 20m x 40m with an overall pit slope of 30 degrees and a footprint of 155m x 170m allowing for the removal of approximately 70,000 tonnes of phosphatic material and approximately 290,000 tonnes of overburden. The total tonnage to be extracted is approximately 360,000 tonnes and the size of the footprint will be 2.6 hectares.

The exploration program is proposed to take 13 weeks and will be completed with a ten on and four off roster, with exploration to stop during the four days allowing for servicing and maintenance of the site. The crew will consist of 11 people. Due to the design of the pit and confined working spaces, small mining vehicles will be used such as a 65t excavator and 40t articulated dump trucks.

The contractor will:

- Clear land, remove and store topsoil for re-use
- Strip overburden and haul to nominated stockpile
- Extract ore and haul to the four nominated resource stockpiles
- Undertake rehabilitation work on waste stockpiles at the end of the Test Pit works

The full area of disturbance under this application is 11.64ha with 9.6ha for the exploration test pit (see Schedule 2 for the full exploration test pit design and the previous disturbance of 2.04ha for the 2015 drill program.

2.2 Access roads

Access to the proposed site is by sealed highway north from Mount Isa to the Lady Annie turnoff to the north. A sealed road established by Glencore accesses the Lady Annie Mine and Mine Camp. From Lady Annie Mine the road to Barr Creek Station is an unsealed gravel road passing mine infrastructure and follow the mine water pipeline and cleared powerline. The access road passes over a number of gullies, channels and small alluvial creeks on an otherwise hard base wet weather road. Once onto Barr Creek Station, the road descends from the Tertiary paleo surface and follows the base of the western slope to a set of yards at the northern extremity of D8.

Parts of EPM25239 have been subject to exploration in the past and, wherever possible, existing farm roads will be used or upgraded to facilitate site access. Minor grading of existing roads may be required. Roads are typically formed using a front end leader to sweep material from the surface. Where necessary, vegetation and topsoil will be stockpiled at approximately 50 metre intervals; however, only limited vegetation or earth is likely to require disturbance in this terrain.

The width of new access roads is usually the width of the front end loader blade used to clear roads (approximately five metres) but will be restricted to a maximum of seven metres wide. New roads will be constructed along natural grades wherever possible.

2.3 Camp site and facilities

It is proposed that the contractor will supply and set up temporary mine offices, crib room and ablution block to support the operation. An igloo style workshop with 40 foot shipping containers will also be established to assist field management activities (see Figure 2 for an indicative layout).

All contractors will housed offsite at the Lady Annie Mine Camp, approximately 30km from the site and will be bused in and out each day.

A waste management plan will be in place during the exploration program and can be reviewed in section 9.10 of the Environmental Management Plan (EMP) (see Schedule 3).

2.4 Water supply

There is a limited requirement for water for the exploration test pit. Water demands include haul road dust suppression, stockpile dust suppression and potable water. Water for dust suppression will be trucked into site from an approved external source (likely to be Lady Annie Mine) and potable water will be sourced from Mount Isa.

2.5 Timing

Exploration activities will be undertaken during the northern dry season (April to November) to avoid periods of high rainfall in the region. The program is expected to take approximately three months and a decision to commence mining or to rehabilitate the site immediately will be made at that time, depending on the outcome of the exploration test pit.

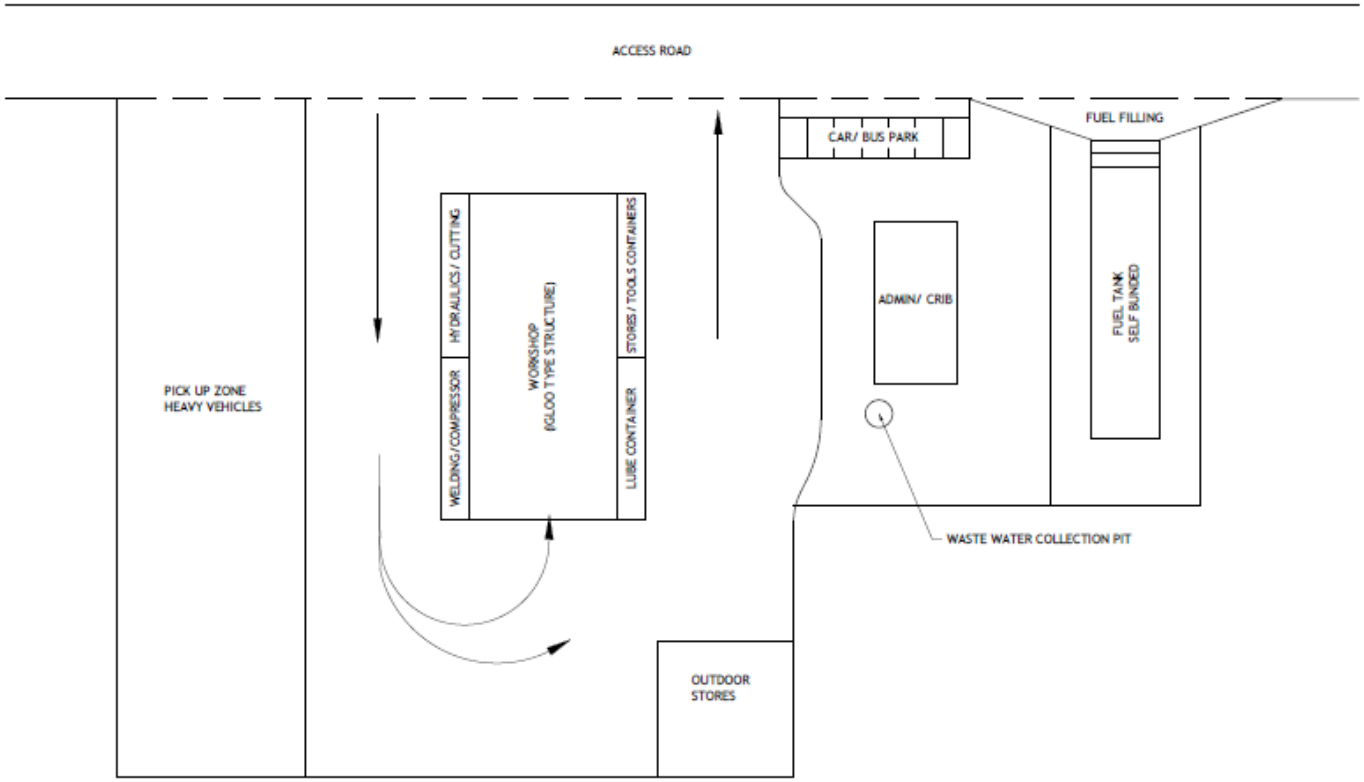


Figure 2: Indicative layout of MIA area

3. ENVIRONMENTAL ATTRIBUTES

The relevant environmental attributes for the Gulf Rivers Strategic Environmental Area (SEA) are:

- the natural hydrologic processes of the area are characterised by natural, unrestricted flows in and along watercourses and estuaries
- overflow from watercourses onto the flood plains of the area, or the other way
- natural flow paths of water across flood plains connecting waterholes, lakes and wetlands in the area; and
- natural flow in and from groundwater and springs

The natural geomorphic processes of the area characterised by:

- natural erosion
- the transport and deposit of sediment by water throughout the catchment and along the watercourse systems and estuaries

The functioning riparian processes of the area characterised by native riparian vegetation associated with watercourses, estuaries, lakes, floodplains and wetlands.

The functioning wildlife corridors in the area are characterised by

- natural habitat in the water course systems
- permanent water holes and springs

The natural water quality in the watercourse channels and aquifers and on flood plains in the area are characterised by physical, chemical, and biological attributes that support and maintain natural aquatic and terrestrial ecosystems.

The relevance of the above environmental attributes to the proposed test pit activities is described below.

3.1 Hydrologic processes

Regional

Landform of the proposed project area is generally described as moderately undulating lands (Australian Soil Information System 2017) rising from the project area towards the east (Queensland Government 2017). The D8 prospect is situated around a north tending arm of the tertiary paleo surface known as the Desert. In the northern area it occurs as a thin plateau approximately 50m wide in width with gradual scree slopes down to a ground surface approximately 20m below. Topographical heights range between 312.5m and 338.5m ASL. This pronounced topographical high drains east, north and west.

Local

The proposed activities are located outside of the extent of the flood area for all available mapped flood extents and is dominated by highly permeable sands with a typically low runoff coefficient. Notwithstanding, the area of the proposed activities would experience intermittent surface water flows during storm events, causing localised ponding of surface water. An existing dam catches drainage

from the northern aspect of the plateau while the eastern and western aspects drain into poorly defined gullies eroded somewhat near outcropping Cambrian sediments. West of D8 lies the Thornton River which flows north into the drainage of the Gregory River (Figure 3 and page 25 of the EMP).

Figure 3: Topography and waterways

3.2 Geomorphic processes

Regional

Surface geology is dominated by Silica deposits associated with Cambrian sedimentation.

Local

Soils in the project area are generally described as hard pedal duplex soils (Australian Soil Information System 2017). Logs from exploration drilling identified a variety of soil and rock layers within the test pit evaluation and surrounding areas (Tera Search 2016). Surface soils were generally sands over sand/siltstone. Depth and thickness vary as a result of weathering and the dispersion of Iron through the profile. These materials are subject to ongoing transport processes. However, the typically minimal gradient of the area and location of the proposed activities outside of the extent of the flood area for all available mapped flood extents would limit significant short-term geomorphic change.

3.3 Riparian process

Riparian habitats

The extent of riparian vegetation associated with the Thornton River and its tributaries broadly corresponds to those areas mapped as containing endangered RE 1.3.15 ,1.3.6 and 1.3 .7b (Figure 4), comprising sparse woodlands with an over storey of eucalypt species, shrub layer and a ground layer of tussock grasses.

Fringing river red gum (*Eucalyptus camaldulensis*) Coolabah (*E.coolabah*) woodland are characteristic on levees and banks of substantial waterways in the region however, the mapping scale in north-west Queensland (1:100,000) means that narrow remnants of this RE are mapped as a sub-dominant component of larger polygons containing least concern RE types. In practice, river red gum woodlands form a narrow fringe of 10-15 m either side of substantial drainage channels (eg Thornton River main channels) with isolated trees encountered up to 50 m away from these locations.

The proposed test pit is one kilometre from the closest watercourse, riparian zone and Regional Ecosystem containing riparian vegetation. There are no known groundwater sources in the area, including the Great Artesian Basin and springs that support waterhole persistence and ecosystems away from the main channel.

There are no mapped watercourses or wetlands in the immediate vicinity of the project area (see Figure 5 and page 73 of EMP). A recorded wetland (including the landholder's dam) to the north is isolated from the site by west draining contours (as confirmed during the post wet season site visit, April 2017).

Figure 4: Regional Ecosystem (Biodiversity Status) of Thornton River Region (taken from Queensland Globe)

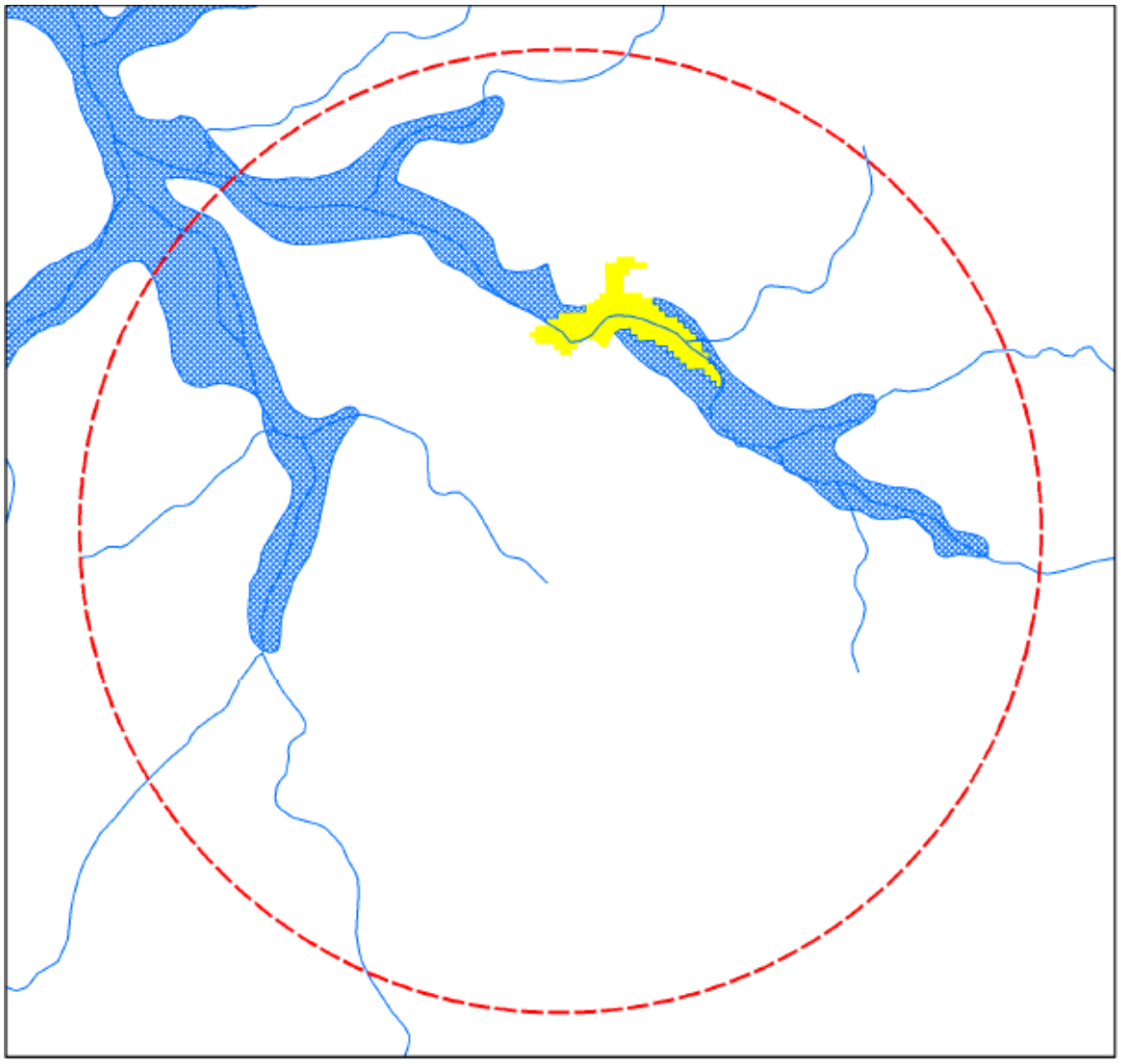


Figure 5: Queensland Wetland Data – Wetlands and waterways

Terrestrial Habitats

Regional ecosystem (**RE**) mapping and aerial photography indicate that away from waterways, vegetation communities in the exploration area are characteristic of those elsewhere in the bioregion – very sparse, low open eucalypt and acacia woodlands on skeletal soils with an understorey of spinifex (*Triodia spp.*). Terrestrial habitats would be expected to provide food and shelter for a range of fauna species adapted to harsh environments and prolonged dry periods.

The regional ecosystems mapped within the project area include RE 1.11.2a / 1.7.1a / 1.7.5b / 1.5.13 - *Eucalyptus leucophloia* low open woodland / *Eucalyptus leucophloia* low open woodland on silcrete and lateritic surfaces / *Acacia shirleyi* low woodland on lateritic scarps and hills / *Eucalyptus pruinosa* low open woodland; and 1.5.1/1.7.7b – *Eucalyptus miniata* woodland on red earths on laterised plateaus / *Corymbia capricornia* low open woodland on silcrete. These REs do not include any riparian vegetation.

The biodiversity status of these regional ecosystems is listed as no concern at present (Table 2). Endangered sub-dominant regional ecosystems are mapped occurring in association with creek lines near to the site (Figure 4), but not at the proposed exploration test pit site.

A search of the EPBC protected matters database indicated there may be six species of invasive plants that occur within the project area (Schedule 3, EMP Appendix B), however the site inspection conducted in April 2017 did not identify these species in the project area.

Table 2: Summary of disturbance to Regional Ecosystems

RE Codes	Summary description	Biodiversity status	Regional ecosystem	Structure category	Disturbance
1.5.1	*Eucalyptus miniata woodland* on red earths on laterised plateaus	No concern at present	Of concern	Sparse	
1.7.2x1	Low open woodland of *Eucalyptus miniata* and/or *Corymbia Capricornia +/- Eucalyptus pruniosa* with a dense shrub layer and sparse mixed ground layer. Occurs on sandsheets overlying Tertiary surfaces.	No concern at present	Least concern	Very sparse	1.2ha
1.7.1	Low open woodland of *Eucalyptus leucophloia* and/or *Corymbia aspera* and/or *E. normantonensis* over *Trioda* spp. Occurs on scarps and dissected areas of eroded Tertiary plateaus; skeletal soils formed largely on the exposed weathered zone.	No concern at present	Least concern	Very sparse	8.4ha

3.4 Wildlife corridors

The proposed activities would be located in an area of minimal wildlife corridors due to the negligible-poor connectivity within REs 1.7.1 and 1.5.1 consisting of open woodland and shrub land on sand sheets.

Riverine vegetation communities typically function as movement corridors for a range of fauna species, including those listed as threatened under state or commonwealth legislation.

3.5 Water quality

3.5.1 Surface water

The exploration area is located in the headwaters of the Nicholson River catchment. It comprises the Thornton River and a number of smaller tributaries. All are intermittent streams, with stream flow variability reflecting the decreasing rainfall gradient with distance from the coast (refer Davis and Dowe 2005). There are two mapped minor watercourses directly adjacent to the north and intersected by the proposed site infrastructure boundary. Additionally, a rural water storage is approximately half a kilometre north of the project area (Figure 5).

Historical flow data for the Thornton River at Rosehill Bore, which is located approximately 55 km downstream of the target area is summarised below.

Table 3: Historical Flow Data for Thornton River

Gauging station	Period of record	Annual flow (mega litres)		Average no. of cease to flow days
		Minimum	Maximum	
912110A – Thornton River at Rosehill Bore	1 Oct 70 to 1 Oct 88	1,911	459,634	201.5

The Thornton River is characterised by intermittent seasonal flow conditions, typically flowing for around five months per year past the Rosehill Bore gauging station. Flow conditions are strongly seasonal (main flows following rainfall between December and March) and would also be influenced by inter-annual rainfall variability. The exploration area is located in the catchment headwaters of the Thornton River, where the number of no flow days is expected to be higher than at downstream gauging stations.

The main channels of the river effectively become part of the terrestrial environment during no flow periods. Tributaries of the Thornton River are essentially dry drainage features that carry flow only after significant rain. A post wet season site visit indicates these are likely to be considered ephemeral streams (a stream that flows only briefly during and following a period of rainfall in the immediate locality).

Limited water quality data is available from the Thornton River gauging station (912110A) (approximately 55 km downstream of the target area). Periodic sampling between 1974 and 1987 (DNRM 2015) indicates the following:

- predominantly low salinity (EC levels ranged from 600 to 800 uS/cm)

- pH levels are neutral to slightly alkaline (range 7.6-8.1)
- turbidity and total suspended solids were low however, levels would be expected to increase significantly during significant flow events due to erosion from grazing activity in the catchments
- no elevated concentrations of nutrients or heavy metals are evident (all recordings were well within Queensland Water Quality Guideline target values)

Note that there is unlikely to have been any significant changes in land use since this data was collected (ie catchment land use is predominantly grazing and native forest).

Although very sparse, terrestrial and riparian vegetation would have some filtering effect on sediment inputs from the surrounding catchment. However, turbidity and total suspended solids would be expected to increase during significant flow events due to the nature of the vegetation and erosion from grazing activity.

3.5.2 Groundwater

The exploration area is located at the south-eastern extent of the Nicholson Groundwater Management Area (GMA). Significant regional groundwater resources are associated with Cambrianage limestone and dolomite formations located to the north and west, to a lesser extent, adjacent sandstone formations (see Davis and Dowe 2005). However, geology underlying the Thornton River comprises lower porosity Proterozoic siltstone and no significant groundwater is expected (Dr Simon Beams, pers. comm.). The absence of significant groundwater resources in the target area is supported by the apparent absence of baseflow to the Thornton River during dry periods (see Table 3 above).

There are records of three sub-artesian bores within 15 km of the Project area, the closest is approximately 8.5 kilometres to the north (RN32778) (Queensland Government 2017). No data records exists for these bores (Queensland Government 2017). There are no groundwater dependent ecosystems recorded as present within the Project area (Queensland Government 2017).

The drilling program conducted in 2015 confirmed there was an absence of groundwater in the area. The exploration drilling did not encounter any water to a maximum depth drilled of approximately 270mRL (Beams 2016). It is therefore considered unlikely that the proposed project will intercept a significant groundwater aquifer.

3.6 Climate

The exploration area is located approximately 130 km northwest of Mount Isa in a region characterised by a semi-arid climate with monsoonal influences. The region typically experiences hot summers and mild to warm winters with daily temperatures ranging from 23°C to 37.2°C in summer and from 8.6°C to 27 .3°C in winter.

Average annual rainfall in the region totals 503 .9 millimetres, with the majority of this rain falling during the summer months although summer wet seasons do not occur every year (DNPRSR 2013). The El-Nino Southern Oscillation (ENSO) exerts significant influence on inter-annual climate variability across the region, producing marked fluctuations in the amount, timing and distribution of rainfall. As such, there is considerable year-to-year variation, particularly during the summer months, ranging from 'failed' wet seasons, to 'normal' conditions and above average rainfall and tropical cyclone activity (Davis and Dowe 2005).

Environmental attributes for the exploration area have been extrapolated from a range of published data sources supplemented by field inspections by the supervising geologists for the project conducted in November 2015 and landholder records.

Rainfall data for nearby Calton Hill Station (approximately 65 km to the southeast) is summarised below.

Table 4 Rainfall data for Calton Hills Station (1900 to current)

Month	Rainfall (mm)		
	Mean	10 percentile	90 percentile
January	120.6	14.2	251.5
February	115.7	12.6	256.2
March	77.1	0.0	177.6
April	18.0	0.0	69.9
May	11.8	0.0	42.5
June	11.3	0.0	41.3.
July	3.6	0.0	9.0
August	2.3	0.0	4.1
September	10.2	0.0	32.9
October	18.8	0.0	54.6
November	37.0	0.0	86.9
December	81.9	14.5	183.6
Annual	503.9	251.3	761.7

3.7 Land use

Land tenure underlying the EPM is leasehold. Barr Creek Station is approximately 237,000 ha. The test pit site, being 10 ha equates to 0.004% of the property. Existing land uses comprise low intensity cattle grazing with the landholder running around 2,000 head of cattle on native pastures and native vegetation. Of note there is an electricity easement that runs across the property that is approximately five kilometres from the proposed exploration test pit.

4. POTENTIAL IMPACTS

Mineral exploration, particularly in this terrain, is considered a low impact activity. All activities will be managed in accordance with the Code of Environmental Compliance for Exploration and Mineral Development Projects (Code) and Phosphate International's site based EMP.

The initial purpose of the EMP is to provide supporting information to the amendment of Environmental Authority EPVX03205315 (EA) for the development of the proposed exploration test pit for the collection and removal of 70,000 tonnes of phosphate. The EMP demonstrates an appropriate level of planning and management has been considered for environmental and other considerations at this stage of exploration.

Subsequently the EMP is an instrument for providing a design and management framework for the exploration project, as well as an operational framework for minimising and controlling identified risks. The EMP will be provided to all contractors engaged to complete the exploration test pit to ensure the required outcomes are achieved.

4.1 Hydrologic processes

The test pit and associated infrastructure has been designed to limit disruption to local hydrological processes (see Schedule 2 and Schedule 4).

Preliminary field inspections have been undertaken by exploration geologists to peg the test pit and roads required for the exploration program. These inspections have established that the site can be accessed via existing farm roads with limited upgrading as they are currently used by road trains to transport cattle from the property's main cattle yard adjacent to the proposed test pit. The access roads would not be upgraded with flood immunity, allowing the natural passage of surface water to avoid impacts to the existing surface hydrology.

The proposed construction of the test pit, would include the construction of two berms to:

- divert overland flow of clean water around the project area and minimise potential erosion (minimal overland flow would be diverted due to the low runoff coefficient of the surrounding permeable sands)
- capture and store any dirty water runoff from the project site in a sediment dam (minimal disruption to hydrological processes is expected due to the small footprint of the test pit relative to the sub-catchment area)

Exploration drilling has established that there is no ground water in the area, therefore no disturbance to ground water hydrology is expected.

There is limited natural groundcover in the surrounding area and turbidity and Total Suspended Solids loads to waterways would be expected to increase naturally during times of high rainfall. The construction program will be timed to coincide with the dry season in northern Australia and to avoid periods of flow in local waterways.

Given the location and nature of the proposed activities, and implementation of the above design and management measures, there would be no widespread or irreversible impacts on the hydrologic processes within the Gulf SEA.

4.2 Geomorphic processes

The proposed activities would be located away from the sources or areas of significant geomorphic processes. The proposed site is approximately one kilometre from the closest watercourse and outside of the extent of the flood area for all available mapped flood extents. Following the completion of the exploration test pit activities the area will be stabilised and rehabilitated. Given the distance to these major sources of geomorphic change and the surface geology at the location of the proposed activities, it is not envisaged that there would be widespread or irreversible impacts on the geomorphic processes within the Gulf Rivers SEA.

4.3 Riparian process

The proposed activities would not impact riparian processes as they would be located approximately one kilometre from the riparian zones, watercourses and Regional Ecosystems containing riparian vegetation. Accordingly, the proposed activities would not cause a widespread or irreversible impact on riparian processes within the Gulf Rivers SEA.

4.4 Wildlife corridors

Wildlife corridors in the exploration area are associated with the main channel of the Thornton River, one kilometre from the proposed site.

The proposed activities would not impact wildlife corridors due to the negligible-poor connectivity within REs 1.7.1. and 1.5.1 consisting of very sparse, low open eucalypt and acacia woodlands with an understorey of spinifex (*Triodia spp.*). Accordingly, the proposed activities would not cause a widespread or irreversible impact on wildlife corridors within the Gulf Rivers SEA.

4.5 Water quality

Construction for the proposed activities is scheduled to be completed outside of the wet season and would be undertaken approximately one kilometre from the closest watercourse. Notwithstanding the large distance to the closest watercourse and limited sediment available in the area of the proposed activities dominated by fine to medium quartz sand, erosion controls will be implemented in accordance with the EMP.

Given the location and nature of the proposed activities, and implementation of the above management measures, the proposed activities would not cause a widespread or irreversible impact on water quality within the Gulf Rivers SEA.

4.6 Assessment criteria

Part 5, Schedule 2 of the *Regional Planning Interests Regulation 2014* (RPIR) provides criteria for assessment by agencies. In accordance with Section 14(3) of the RPIR, if the application

demonstrates compliance with either of the prescribed solutions stated in Part 5, Schedule 2, the proposed activity will meet the required outcome for the regional interest.

Critically, the application demonstrates that the prescribed solution provided in s15(1)(a) will be met as the proposed activities are located in a section of the SEA that is largely devoid of relevant environmental attributes. The RPI Guideline 05/14 Carrying out Resource Activities and Regulated Activities in a Strategic Environmental Area provides examples of how activities would meet the s15(1)(a) prescribed solution, including the following:

RPI Guideline Example – s15(1)(a) prescribed solution	**Relevance to the application**
The activity will not have any direct or indirect release of contaminants to waters including groundwater from the operation of the activity	The proposed activities would not include the direct or indirect release of contaminants to waters, achieved by • Test pit design • Site based EMP
The activity will not result in any potential or actual adverse effect on a wetland, lake, watercourse or spring	The proposed activities would be carried out approximately one kilometre from any lake, watercourse or spring. At its closest point, the proposed test pit is located approximately one kilometre from the Thornton River. A berm will be constructed up-slope of the pit to divert overland flow past the site. A sediment dam and associated drains will be built below the pit and stockpile area to capture any run off from the site and minimise potential sediment and erosion impacts on the river. Following the completion of the test pit, disturbed land would be stabilised and rehabilitated.
Water storage dams are located off stream or not in major watercourses	The proposed sediment dam is located off stream
Undertaking construction activities in times when there is no water present	The proposed activities would be conducted during the dry season being April to November and would not be undertaken when surface water is present
The activity will not inhibit the overflow or flow of surface water in or out of the wetland or watercourse post- construction	At its closest point, the proposed test pit is located approximately one kilometre from the Thornton River. A berm will be constructed up-

	slope of the pit to divert overland flow around the site. However, this diversion would not inhibit or decrease the flow of surface water that would currently flow towards the river. Similarly, access tracks would not be constructed with flood immunity, allowing the natural passage of surface water to avoid impacts to the existing surface hydrology.
Operation of the activity will not result in actual or potential adverse effects on groundwater	Pre-construction investigations have established there is no ground water present in the vicinity of the test pit site. Operation of the proposed activities do not include the direct or indirect discharge of contaminants to groundwater.
The activity will not result in the clearing of native vegetation within or adjoining watercourses, lakes, wetlands or springs	The proposed activities would not include the clearing of native vegetation within or adjoining watercourses, lakes, wetlands or springs. Following the completion of activities, disturbed land would be stabilised and rehabilitated
The activity is separated from wildlife corridors by an appropriate buffer (eg 500 metres) and will not result in actual or potential adverse effects onto the integrity or functioning of the corridor.	There are no known wildlife corridors within 500 metres of the proposed activities

The application also demonstrates the prescribed solution provided in s15(1)(b) will also be met

Part 5, Schedule 2 of the *Regional Planning Interests Regulation 2014*	**Relevance to the application**
14 Required outcome The activity will not result in a widespread or irreversible impact on an environmental attribute of a strategic environmental area.	The proposed activities would not result in a widespread or irreversible impact on each of the environmental attributes as provided in Sections 4.1-4.6. Notwithstanding, the application also demonstrates that the required outcome would be achieved as the proposed activities would be undertaken in accordance with the below prescribed solution.
15 Prescribed solution 1 The application demonstrates either a. the activity will not, and is not likely to, have a direct or indirect impact on an environmental attribute of the strategic environmental area	The proposed activities are located in a section of the SEA that is largely devoid of relevant environmental attributes as described in Section 4.1-4.6. Accordingly, the proposed activities are not likely to have a measurable impact on the environmental attributes of the SEA, especially given the management/mitigation measures described throughout Section 9 of the EMP.
b. all of the following i. if the activity is being carried out in a designated precinct in the strategic environmental area—the activity is not an unacceptable use for the precinct	The proposed activities do not include any of the unacceptable uses prescribed by Section 15(2) of the Regional Planning Interests Regulation 2014. • the activity is not being carried out in a designated precinct • no impact
ii. the construction and operation footprint of the activity on the environmental attribute is minimised to the greatest extent possible	The combined construction and operation footprint of the proposed test pit is confined to 9.6ha. This has been achieved by • utilising existing farm roads to access the site • disturbance footprint for the proposed test pit has been minimized through innovative design and selective site clearing • an existing camp at Lady Annie Mine located outside of EPM 25239 will be utilised to avoid disturbance associated with construction of a camp

iii. the activity does not compromise the preservation of the environmental attribute within the strategic environmental area	The proposed activities are located in a section of the SEA that is largely devoid of relevant environmental attributes as described in Section 4.1-4.6. Accordingly, the proposed activities would not compromise the preservation of relevant environmental attributes within the strategic environmental area, especially given the management/mitigation measures described throughout Section 9 of the EMP.
iv. if the activity is to be carried out in a strategic environmental area identified in a regional plan—the activity will contribute to the regional outcomes, and be consistent with the regional policies, stated in the regional plan	The Cape York Regional Plan does not identify the Gulf Rivers Strategic Environmental Area. • No impact

5. REFERENCES

Beams, S (2016) *D-Eight Evaluation of Test Pit Location and Material Properties*, Terra Search Report, Queensland

Davis, A. and Dowe, J. (2005) *Ecological Assessment of the Freshwater Wetlands in the Nicholson-Gregory Catchment, North-Western Queensland*, Report 04/10, Australian Centre for Tropical Freshwater Research, James Cook University

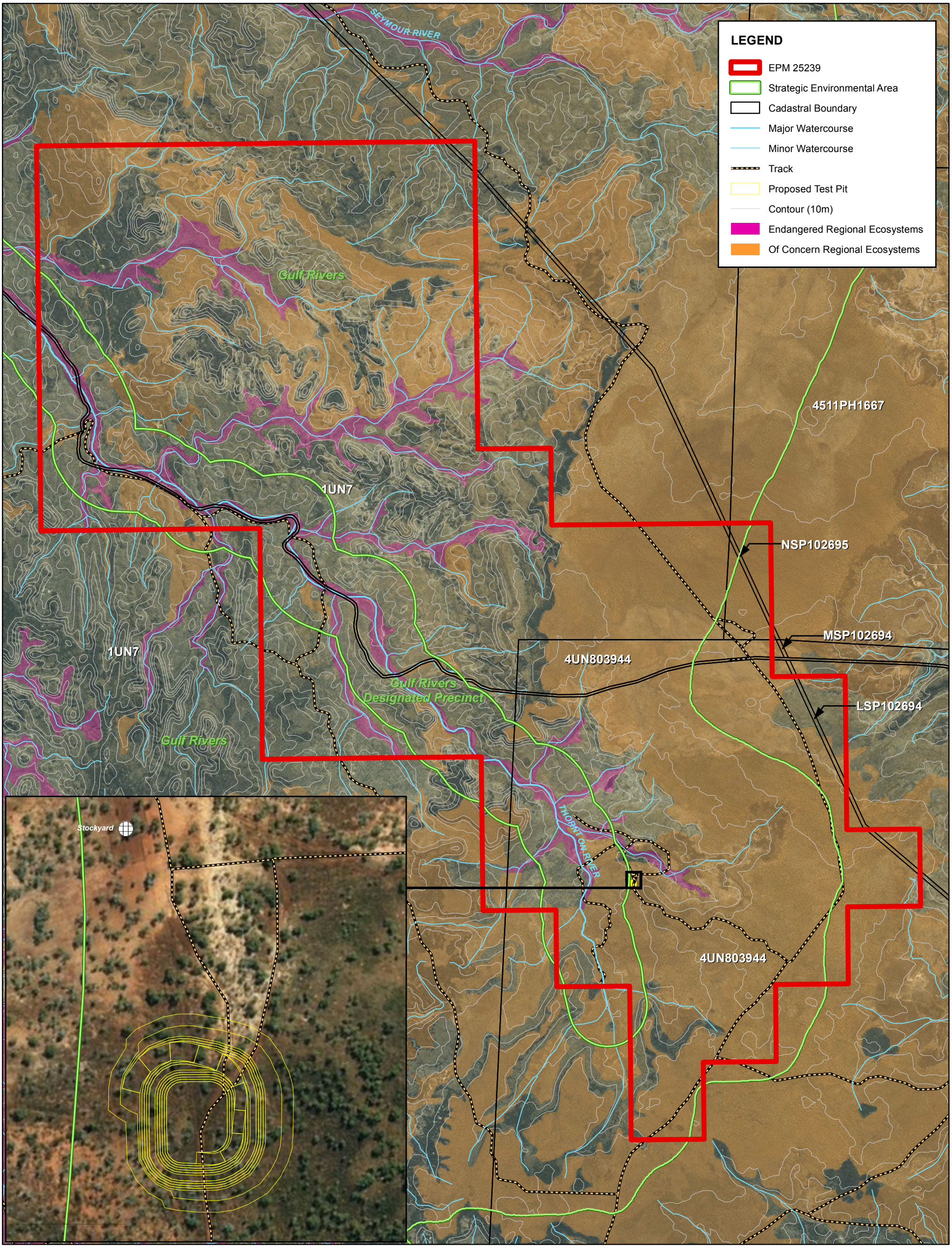
Department of Infrastructure and Planning (2010) *North West Regional Plan*, Queensland Government, Brisbane

Department of National Parks, Recreation, Sports and Racing (2013) *Planned Burn Guidelines: North West Bioregion of Queensland*, Queensland Government, Brisbane

Department of Natural Resource and Mines (2015) *Site water quality table for 912110A - Thornton River at Rosehill Bore*, accessed online at https://www.dnrm.qld.gov.au/water/water-monitoringand-data/portal

SCHEDULE 1

Exploration test pit location



NOTES
Imagery: ESRI Basemap

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0 1 2 3 4
Kilometres
Coordinate System:
GDA 1994 MGA Zone 54

CLIENT	PHOSPHATE INTERNATIONAL
PROJECT	EPM 25239
TITLE	OVERVIEW MAP
DATE	APRIL 2017

RLMS

PHOSPHATE INTERNATIONAL

Layout: A3 Portrait

WKSP D:\Data\Phosphate\Phosphate_EPM.mxd
Created on 13/04/2017 by KR

SCHEDULE 2

Title Search

CURRENT STATE TENURE SEARCH
DEPT OF NATURAL RESOURCES AND MINES, QUEENSLAND

Request No: 26254387
Search Date: 22/06/2017 16:14 Title Reference: 17669225
Date Created: 25/10/1995

DESCRIPTION OF LAND

Tenure Reference: PH 8/5553

Lease Type: ROLLING TERM LEASE

LOT 4 CROWN PLAN UN803944
Local Government: MOUNT ISA

For exclusions / reservations for public purposes refer to Plan CP UN803944

Area: 47800.000000 Ha. (ABOUT)

No Land Description

No Forestry Entitlement Area

Purpose for which granted:
NO PURPOSE DEFINED

TERM OF LEASE

Term and day of beginning of lease

Term: 28 years 9 months commencing on 01/07/1989

Expiring on 31/03/2018

Extended to 31/12/2046

REGISTERED LESSEE

Dealing No: 703606720 01/10/1999

ALFRED ARTHUR LANSKEY

CONDITIONS

CONDITIONS

A126 SPECIFIED CONDITIONS FOR: Term Lease
PURPOSE: Rolling term lease - Pastoral

STATUTORY CONDITIONS:

Statutory conditions are the general mandatory conditions of a lease and binds the lessee in accordance with Part 2 Division 1 of the Land Act.

1. Permitted Use: The lessee must use the land only for the purpose for which the tenure was issued under the Land Act 1994.
2. Duty of Care: The lessee has the responsibility for a duty of care, for the land under the Land Act 1994.
3. Rent/Instalment: The lessee must pay the annual rent/instalment in accordance with the Land Act 1994 and the Land Regulation 2009.
   For further information on how annual rent is determined, refer to the department's website at www.dnrm.qld.gov.au.
4. Noxious plants: The lessee must keep noxious plants on the land under control. If the lessee does not comply with this condition, the Minister may bring the noxious plants under control, the cost of which will be recovered from the lessee.
5. Information to Minister: The lessee must give the Minister administering the Land Act 1994, information the Minister asks for about the tenure.
6. Monies for Improvements: No money for improvements is payable by the State on the forfeiture, surrender or expiry of this lease but money may be payable if the State receives payment from an incoming lessee or buyer for the improvements on the land. However, the previous lessee may apply to the Minister to remove the improvements that belong to the lessee, within a period of 3 months from the date of the forfeiture, surrender, or expiry of this lease. The lessee may only undertake the removal of the improvements in the presence of an authorised representative of the department, if required by the Minister. The lessee may only remove those improvements if all monies due from the lessee to the department under this lease have been paid.

REGULATORY-CONDITIONS:

A regulatory condition relates to a lease , in accordance with the Land Regulation.

1. Indemnity: The lessee indemnifies and agrees to keep indemnified the Minister, and the State of Queensland and its Representatives, (the "Indemnified parties") against all liability, costs, loss and expenses including claims in negligence (including any claims, proceedings or demands bought by any third party, and any legal fees, costs and disbursements on a solicitor and client basis) ("Claim") arising from or incurred in connection with:
   a. the granting of this lease to the lessee;

CONDITIONS

b. the lessee 's use and occupation of the land; or
c. personal injury (including sickness and death) or property damage or loss in connection with the performance (or attempted purported performance or non-performance) of the lease or a breach of the lease by the lessee .

The lessee hereby releases and discharges to the full extent permitted by law, the Indemnified parties from all actions, claims, proceedings or demands and in respect of any loss, death, injury, illness or damage (whether personal or property and whether special, direct, indirect or consequential financial loss) arising out of the use and occupation of the lease.
To the full extent permitted by law, the Minister, the State of Queensland and their Representatives will not be liable to the lessee for any special, indirect or consequential damages, including consequential financial loss arising out of the use and occupation of the lease.

2. Public Liability: The lessee must effect a public liability insurance policy with an insurer authorised under the Insurance Act 1973 (Commonwealth) or, if not so authorised then only with the Minister's approval, which can be given or withheld in the Minister's sole discretion, naming the lessee as the insured covering legal liability for any loss of, or damage to any property and for the injury (including death) to any person arising out of anything done or omitted on or about the land or any improvements thereon and against all claims, demands, proceedings, costs, charges, and expenses whatsoever (including claims in negligence) Such policy must:
   a. be for an amount of not less than $20 million and have no per event sublimit or such higher amounts as the Minister may reasonably require.
   b. be effected on a "claims occurring" basis; and
   c. be maintained at all times during the currency of the lease, and upon receipt of any notice of cancellation, the lessee must immediately effect another public insurance policy in accordance with the terms of the lease .

   The lessee must, as soon as practicable, inform the Minister, in writing, of the occurrence of any event that the lessee considers is likely to give rise to a claim under the policy of insurance effected and must ensure that the Minister is kept fully informed of subsequent actions and developments concerning the claim.
   The lessee must renew such policy, at the lessee's expense, each year during the currency of this lease.
   The condition will be satisfied if the lessee is the State of Queensland or a statutory authority eligible for cover under the Queensland Government Insurance Fund and is insured and continues to be insured by the Queensland Government Insurance Fund.
   This condition will be satisfied if the lessee is the Commonwealth of Australia or a statutory authority eligible for cover under the Comcover Insurance Fund and is insured and

CONDITIONS

continues to be insured by Comcover.

3. Access: The provision of access, further access or services to the land will not be the responsibility of the State.
4. Survey Costs: If the land needs to be surveyed or re-surveyed the lessee must do this at their own cost under the Survey and Mapping Infrastructure Act 2003. This survey plan must be lodged in the land registry within the specified time.
5. Extension: The lease is subject to the extensions of rolling term leases provision of the Land Act 1994 and the Minister must grant an extension of the term of a rolling term lease if the lessee makes an application in the approved form. The extension will be for the original term of the lease and may be given subject to condition changes.
6. Jurisdiction: The lessee is subject to the Land Act 1994 and all other relevant Queensland and Commonwealth legislation.
7. Compliance with Laws - the lessee must comply with all lawful requirements of the -
   a. Local Government; and
   b. any department within the Queensland or Commonwealth governments (including the department administering the Land Act 1994), local authority or statutory instrumentality having jurisdiction over the land, or the development, use and occupation of the land, in regard to its use, occupation and development of the land.

SPECIAL-CONDITIONS:----------

These conditions relate to this lease.

Improvements or development on or to the land

1. The lessee must during the whole term of the lease, to the satisfaction of the relevant authorities, maintain all improvements and boundary fencing on the land in a good and substantial state of repair.

Quarry material

1. The lessee must allow any person authorised under the Forestry Act 1959 access to the leased land for the purpose of cutting and removing timber or removing other forest products, or quarry material, or other material from the leased land.
   Except as hereinafter provided the lessee must not interfere with any forest products or remove any quarry material (including any stone, gravel, sand, earth, soil, rock, guano or clay which is not a mineral within the meaning of the Mineral Resources Act 1989) or other material upon the leased land without the permission of the Minister administering the Land Act 1994 except under the authority of and in compliance in every respect with the requirements or a permit, licence, agreement or contract granted or made under the Forestry Act 1959.

CURRENT STATE TENURE SEARCH
DEPT OF NATURAL RESOURCES AND MINES, QUEENSLAND

Request No: 26254387
Search Date: 22/06/2017 16:14 Title Reference: 17669225
Date Created: 25/10/1995

ENCUMBRANCES AND INTERESTS

1. Rights and interests reserved to the Crown by
   Lease No. 17669225

2. RESUMPTION EASEMENT No 703693413 15/11/1999 at 10:16
   burdening the land
   NORTH QUEENSLAND ELECTRICITY CORPORATION LIMITED A.C.N. 078
   848 978
   over
   EASEMENTS K,L AND M ON SP102694

3. MORTGAGE No 706410986 05/03/2003 at 14:45
   QUEENSLAND RURAL ADJUSTMENT AUTHORITY

4. MORTGAGE No 711879558 26/08/2008 at 08:52
   SUNCORP-METWAY LTD A.B.N. 66 010 831 722

5. AMENDMENT OF LEASE CONDITIONS No 715930188 04/08/2014 at 05:00
   THE CONDITIONS OF THE WITHIN TENURE ARE HEREBY AMENDED.

ADMINISTRATIVE ADVICES

Dealing	Type	Lodgement Date	Status
716870375	ADMIN NOTING	06/11/2015 12:15	CURRENT
	SEE DEALING FOR RELEVANT LEGISLATION		

UNREGISTERED DEALINGS - NIL

Caution - Charges do not necessarily appear in order of priority

** End of Current State Tenure Search **

Information provided under section 34 Land Title Act(1994) or
section 281 Land Act(1994)

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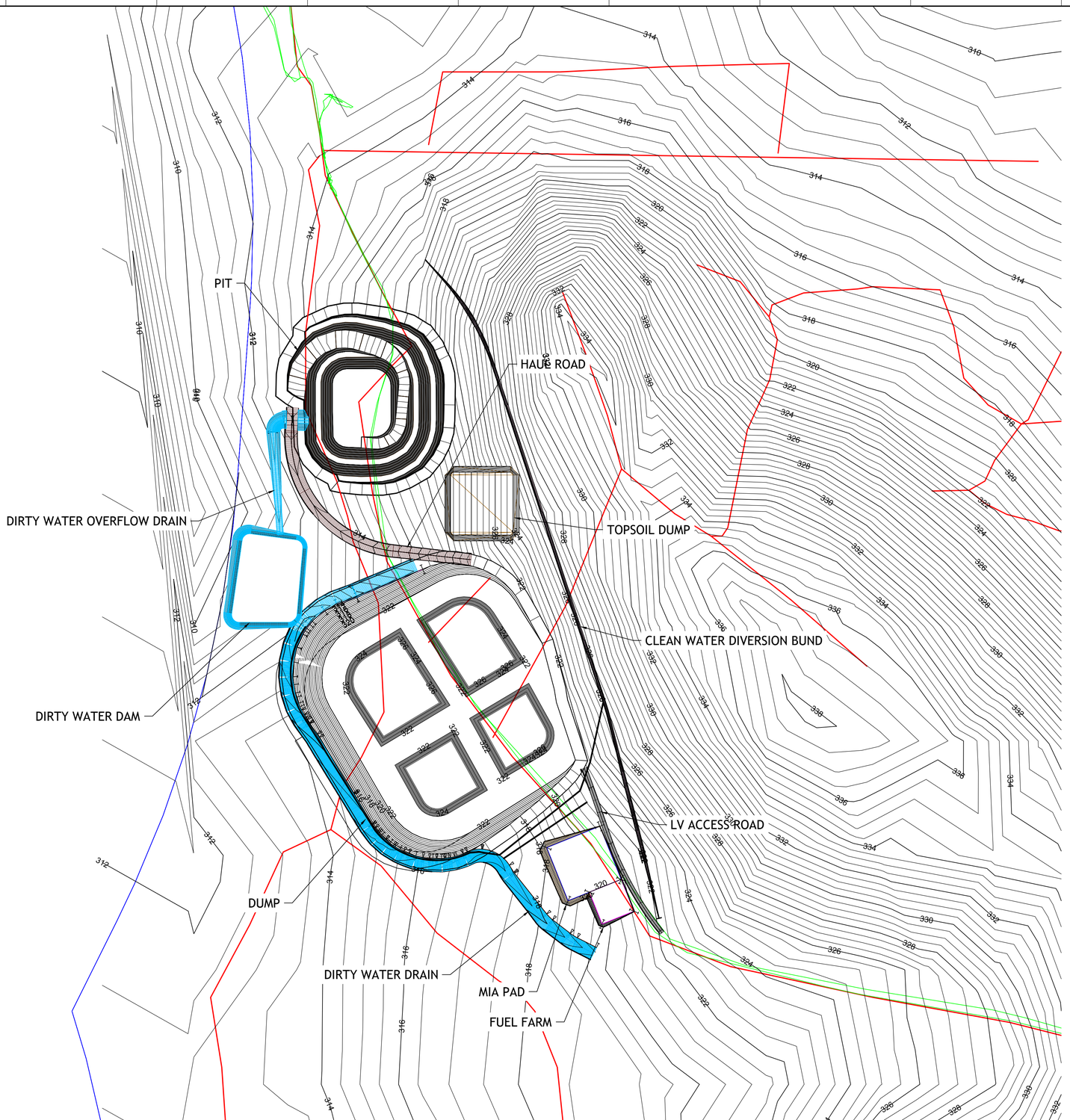
Requested By: D-ENQ GLOBAL X

SCHEDULE 3

Exploration test pit design



DISTURBED AREA

ITEM	AREA (m^2)	AREA (ha)
HAUL ROAD	2597	.2597
LIGHT VEHICLE ACCESS ROAD	700	0.0700
CLEAN WATER DIVERSION	1310	0.1310
DIRTY WATER DRAIN	2440	0.2440
DIRTY WATER DAM	5630	0.5630
DIRTY WATER OVERFLOW DRAIN	1100	0.1100
PIT	21483	2.1483
TOPSOIL DUMP	4100	0.4100
DUMP	52700	5.2700
MIA PAD	3152	0.3152
FUEL FARM PAD	1066	0.1066
TOTAL	**96278**	**9.6278**

PRELIMINARY FOR INFORMATION ONLY

DRAWING NUMBER	DESCRIPTION
DRAWING REFERENCE	

REV	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	ENGINEER	APPROVED
B	24/05/17	CONTOUR LEVELS ADDED	AE	PDY	PDY	PDY
A	13/02/17	FIRST DRAFT - DISTURBED AREADS	AE	PDY	PDY	PDY

IN THE ABSENCE OF THE APPROVED SIGNATURE, THIS DRAWING SHALL BE TREATED AS PRELIMINARY

	DATE
DRAWN AE	13/02/17
DESIGNED AE	13/02/17
CHECKED PDY	13/02/17
ENGINEER PDY	13/02/17
APPROVED PDY	13/02/17

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CLIENT: PHOSPHATE INTERNATIONAL
PROJECT: BARR CREEK PROJECT TEST PIT
TITLE: DISTURBED AREAS

DRAWING STATUS: NOT FOR CONSTRUCTION
CLIENT DWG NO:
SCALE: 1:2000 | GRID | DATUM | SIZE: A1
DWG NO: 4463-40-DWG-EV-00001 | REV: B

C:\Users\aeudey\Desktop\Projects\5 -2017\4463 - Phosphate International\4463-40-DWG-EV-00001.dwg - andrew eudey - 24/05/2017 1:08:45 PM

SCHEDULE 4

Environmental Management Plan

wave international

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Phosphate International

Barr Creek Phosphate Project

DRAFT ENVIRONMENTAL MANAGEMENT PLAN

4463-20-EV-00001

engineering asset management project delivery

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wave international
DETERMINE • DESIGN • DELIVER

BARR CREEK PHOSPHATE PROJECT – DRAFT ENVIRONMENTAL MANAGEMENT PLAN

Project Brief

JOB NUMBER	4463
PROJECT	BARR CREEK PHOSPHATE PROJECT – ENVIRONMENTAL MANAGEMENT PLAN
CLIENT	PHOSPHATE INTERNATIONAL
CLIENT CONTACT	MELISSA BROWN, CHIEF EXECUTIVE OFFICER
CLIENT ADDRESS	LEVEL 1 GPO, 261 QUEEN STREET, BRISBANE QLD 4001 AUSTRALIA

Document Status

REV	DATE	DESCRIPTION	BY
A	23 February 2017	DRAFT Environmental Management Plan	JT
B	18 May 2017	DRAFT Environmental Management Plan	JT / PdY
C	19 May 2017	DRAFT Plan	MB
D	24 May 2017	DRAFT Environmental Management Plan	JT / PdY
E	12 June 2017	FINAL	JT

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1 INTRODUCTION

1.1 PROJECT BACKGROUND

Phosphate International (PI) was founded to explore for phosphate in Northern Australia and to disrupt the phosphate fertiliser market in Australia. The company has secured an inferred JORC resource in the North West Minerals province (near Mt Isa) of high quality rock phosphate which is targeting farmers that need to meet the growing demand for choice in using separated nitrogen, carbon and phosphate in their crop solutions. PI is looking to prove it has a commercial grade resource with real technology solutions to meet a growing market need.

The proposed test pit location is identified as the D-Eight target (the Project area) and is within EPM25239 which consists of 71 sub-blocks covering about 230 square kilometres. The Project area is located about 130 kilometres north-northwest of Mount Isa in northwest Queensland (Figure 1). The tenement is held by ACN 132 668 314 Pty Ltd, a wholly owned subsidiary of PI, and was granted on the 3rd of March 2014 for a period of 5 years.

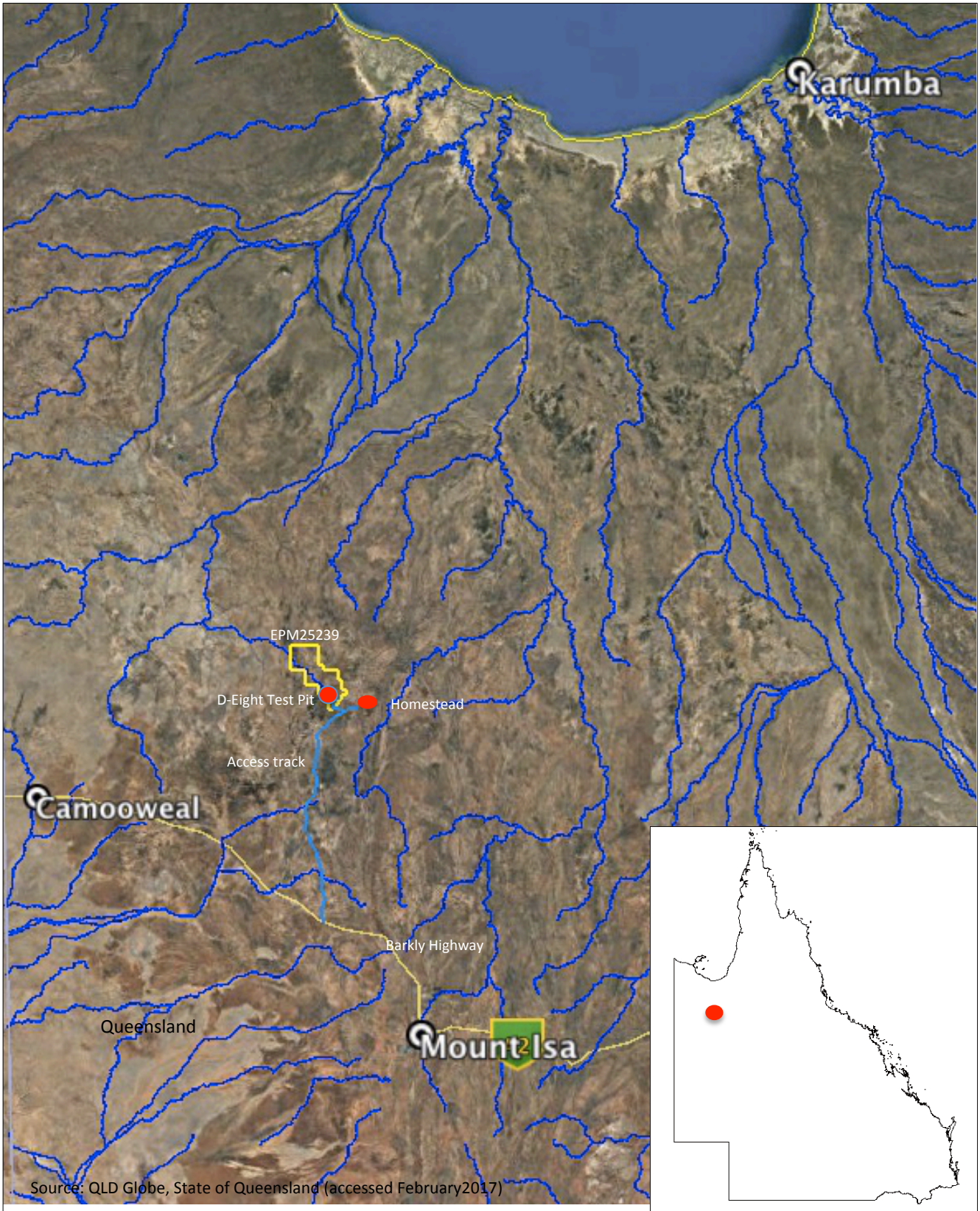
PI has drilled its tenements and has an inferred JORC status for 13Mt at an average of 12.9% with a max of 35.6% of phosphate (P_2O_5) in the Project area. Results of this drilling are reported in Beams et al, 2016 including a fully documented JORC estimate (Table 1). The overall resource has a much larger target (at least three more areas) to cover the Desert & Desert South areas. PI has recently been granted an additional southern tenement that it will look to explore.

PI is proposing to develop a sample pit for the collection and removal of a bulk sample of the rock phosphate target product (the Project). The target product will then be sent to Port of Townsville by truck for shipping to a testing facility overseas. An amendment to the Environmental Authority is required to enable the development of the test pit. Supporting the amendment application is this Environmental Management Plan (EMP). The EMP has been developed following a rigorous risk assessment process. The risk assessment was undertaken prior to the site and site infrastructure being designed. The outcomes of the risk assessment and environmental objectives were used as inputs into the project planning and site infrastructure design process.

Table 1.1-JORC results. D-Eight Inferred JORC resource estimates (Beams et al, 2016; Report; Terra Search TS2016/009)

Zone	# Blocks	Block Volume	SG	Tonnage (Mt)	Ave Grade ($\%P_2O_5$)	Min Grade ($\%P_2O_5$)	Max Grade ($\%P_2O_5$)
High Grade							
North	402	1600	1.7	1.09	23.8	11.1	35.6
South	700	1600	1.7	1.90	21.3	14.0	31.1
West 1	117	1600	1.7	0.32	19.1	15.6	21.5
West 2	83	1600	1.7	0.23	19.6	16.5	23.9
High Grade Total	1302	1600	1.7	**3.54**	**21.8**	11.1	35.6
Low Grade							
North	811	1600	1.7	2.21	8.9	2.5	17.7
South	2099	1600	1.7	5.71	10.3	2.7	24.0
West	782	1600	1.7	2.13	9.1	4.2	16.8
Low Grade Total	3692	1600	1.7	**10.04**	**9.8**	2.5	24.0

D-Eight Total Inferred							
Zone	**# Blocks**	**Block Volume**	**SG**	**Tonnage (Mt)**	**Ave Grade ($\%P_2O_5$)**	**Min Grade ($\%P_2O_5$)**	**Max Grade ($\%P_2O_5$)**
Total	4994	1600	1.7	**13.58**	**12.9**	2.5	35.6



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Legend

- EPM25239
- Access track
- Rivers

Environmental Management Plan – Barr Creek Phosphate Project
Figure 1 – Site Location

0 40 km

wave international
DETERMINE · DESIGN · DELIVER

Drawing ID: 0064.01
Created: JT Checked: NT
Revision: 1.1
Date: 13/06 /2017

1.2 ENVIRONMENTAL POLICY

The proposed test pit will occur in the Mount Isa region with limited environmental issues. PI's environmental policy is to:

- Minimise the effects of its activities on the environment
- Contribute to the Financial Assurance program to assist the Qld government to rehabilitate affected areas
- Protect the health of employees and residents of the Mount Isa region
- Be a leader in environmental sensitivity and care.

In addition, PI is committed to:

- Complying with applicable environmental laws and regulations
- Applying appropriate environmental standards
- Providing education and awareness programs for all employees on environmental policy, standards and procedures
- Consulting with the community on environmental matters.

PI accepts responsibility to protect the environment by implementing sound environmental objectives. In order to fulfil these objectives, we recognise the need to comply with existing environmental legislation and set high environmental standards for the entirety of our operation and embrace the principals of ecologically sustainable development.

1.3 PURPOSE OF ENVIRONEMNTAL MANAGEMENT PLAN

The initial purpose of this Environmental Management Plan (EMP) is to provide supporting information to the amendment of the Environmental Authority EPVX03205315 (EA) for the development of a sample pit at the Project area for the collection and removal of 70 000 tonnes of phosphate. The EMP demonstrates an appropriate level of planning and management has been considered for environmental and other considerations at this stage of the Project.

Subsequently this EMP is an instrument for providing a design and management framework for the Project, as well as an operational framework for minimising and controlling identified risks. The EMP will be provided to contractors engaged to develop the test pit to ensure the required outcomes are achieved.

1.4 DOCUMENT REVIEW

To ensure this EMP is providing appropriate environmental management guidance it will be reviewed where a significant change to the Project description or other significant events occur that warrant additional reviews. Triggers for what may constitute a significant event include:

- Changes to legislation
- Identification of new environmental values associated with the Project
- Change in risk
- Lessons learned from a major incident or activity

1.5 LEGAL AND OTHER OBLIGATIONS

The following is a list of legislation and regulations that the EMP will comply with:

1.5.1 COMMONWEALTH:

- *Environment Protection and Biodiversity Conservation Act 1999*
- *Native Title Act 1993*
- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*
- *National Greenhouse and Energy Reporting Act 2007*
- *National Environment Protection Council Act 1994*
- *Energy Efficiency Opportunities Act 2006*

1.5.2 STATE:

- *Aboriginal Cultural Heritage Act 2003*
- *Clean Energy Act 2008*
- *Environment Protection Act 1994*
- *Environmental Protection Regulation 2008*
- *Environmental Protection (Waste Management) Regulation 2000*
- *Nature Conservation Act 1992*
- *Nature Conservation (Protected Plants) Conservation Plan 2000*
- *Nature Conservation (Wildlife Management) Regulation 2006*
- *Queensland Heritage Act 1992*
- *State Development and Public Works Organisation Act 1971*
- *Waste Reduction and Recycling Act 2011*

1.5.3 POLICIES AND OTHER

- Noise:
    - *Environmental Protection (Noise) Policy 2008*
    - *AS 2436-2010 – Guide to noise and vibration control on construction, demolition and maintenance sites*
- Water quality:
    - *Environmental Protection (Water) Policy 2009*
- Air quality:
    - *Environmental Protection (Air) Policy 2008*
- Other:
    - *Environmental Management System Standard AS/NZS ISO 14001*
    - *Risk Management Standard AS/NZS 31000*

2 ENVIRONMENTAL MANAGEMENT FRAMEWORK

PI has adopted a risk-based approach to drive the delivery of the EMP for the Project. To support this approach, an initial Environmental Risk Evaluation for the Project was undertaken. This approach has been adopted as it will allow ease of refinement should the sample prove commercial grade and quality and PI decide to seek approval to create a phosphate mine.

The Environmental Management Framework is based around the principles of adaptive management, whereby measurable management objectives are identified for all relevant Project environmental factors, and the risk of not being able to meet these objectives, due to the undertaking of specific activities, is determined. The adaptive management process (Figure 2) also offers a framework for continual improvement and an ongoing ability to maintain environmental values in the Project area. This is a continuous cycle known as the plan-do-check-act cycle.

This EMP and its framework have been developed with reference to *ISO 14001 Environmental Management Systems*, but it is not intended this EMP will be certified against, or be strictly in accordance with this standard.

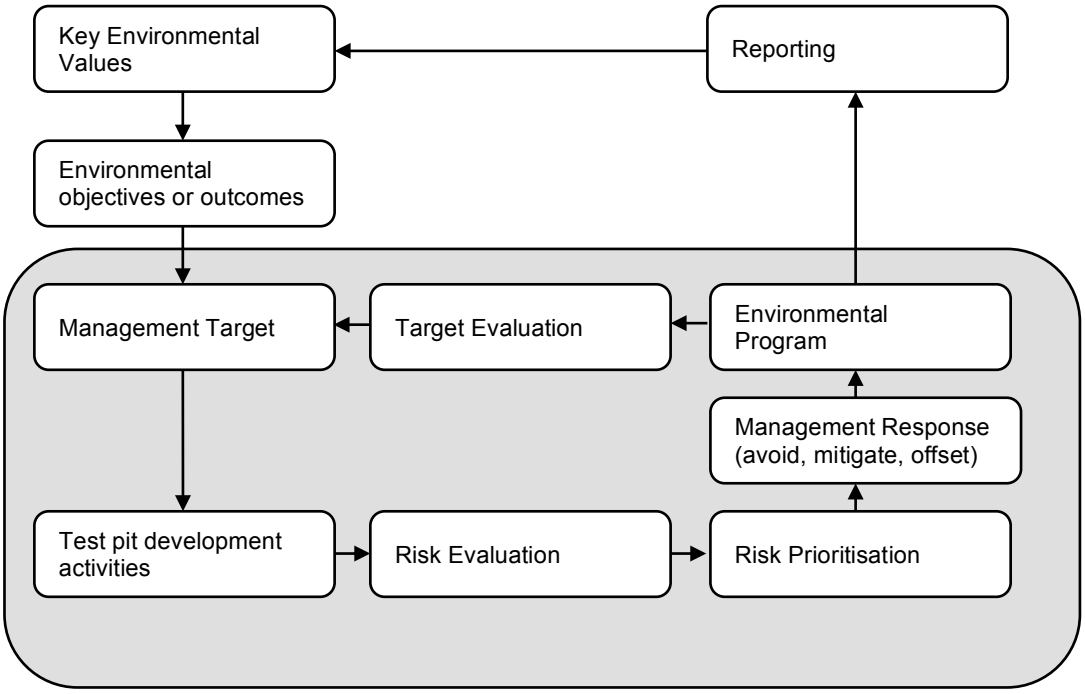

Figure 2: Environmental Management Framework in Action.

2.1 ENVIRONMENTAL RISK EVALUATION PROCESS

The aim of the Environmental Risk Evaluation is to assess the potential or realised effects of the Project activities on the environmental values in the Project area, referred to as 'Key Environmental Values' (KEV). KEVs can be broadly classified into four groups – land, air, water and social (Table 2.1). There are a number of environmental factors associated with each KEV.

The outcomes of the evaluation are used to identify the need for specific environmental management measures, which are in-turn incorporated into this EMP.

Table 2.1-Project area key environmental values and identifiable environmental factors.

KEY ENVIRONMENTAL VALUE	ENVIRONMENTAL FACTORS
Land	Soils, flora and vegetation, weeds and pests, fauna, flooding, sedimentation and erosion, waste generation
Air	Noise, dust, emissions, odour, lighting
Water	Surface water, groundwater, aquatic ecology/wetlands, sedimentation and erosion
Social	Tourism, amenity, traffic, waste generation, Indigenous heritage, European heritage, agriculture/pastoral operations, climate and climate change

Management measures may include a range of design and environmental management programs, procedures or initiatives. The evaluation process also allows a repeatable mechanism for evaluating the effectiveness of management measures that are currently adopted, identification of areas for improvement, or draws attention to areas that have insufficient management in place.

Each stage within the Environmental Management Framework process is defined below:

1. Identify KEVs and the various environmental factors that sit within each. This is achieved by an assessment on State and Commonwealth environment registers and databases, as well as on the ground studies, reports and observations, including the work undertaken as part of the environmental impact assessment process.
2. Determine an effective Management Objective and Management Target (see Section 2.2) for each of the environmental factors of the KEVs.
3. Compile a list of Project-specific activities undertaken as part of project delivery (see Section 4.1).
4. An unmitigated risk evaluation is then conducted to evaluate the environmental effects that may arise from each Project activity to determine the potential that exists for the activity to impact on PI's (or the mining contractor's) ability to meet the defined management objectives.:
    a. The initial evaluation does not take into account any design and environmental procedures, programs, initiatives or other controls that may be common practise in this type of project that contribute to avoiding, minimising or mitigating environment impacts. This is known as an unmitigated Environmental Risk Evaluation and is what might occur in the absence of any controls.
5. Identify design and environmental management measures (control measures) that will be used / are currently in place to avoid, minimise or mitigate each risk.
    a. Once the unmitigated impacts are understood, determine controls that can be implemented to reduce the risk of the impacts occurring. Controls can be developed that may either reduce the likelihood of an impact occurring, or reduce the severity of the impact when it occurs. It should be noted that it is rare for a single control to address both likelihood and severity. Multiple controls are usually required to reduce both.
6. A residual risk evaluation is conducted:

a. This second evaluation accounts for the change in risk profile as a result of all the existing risk mitigation measures, to arrive at a residual risk. That is, the risk assessment is undertaken for a second time taking into account the control measures that are proposed to be implemented.

7. Identify improvement opportunities and re-evaluate these risks through the adaptive management process.3
    a. This final step is used as part of the continual improvement cycle. The risk assessment is a live document that should be re-visited as knowledge improves. Reductions in risk profiles should be investigated when the risk of an incident occurring is still considered unacceptable. Opportunities also exist for improvements if risks are considered acceptable but are not as low as reasonably practical.

The risk assessment for this EMP was undertaken using available desktop information and site inspections.

Once risks are identified, the likelihood of any associated environmental impacts on KEVs being realised, as a result of project activities, is assessed for each the KEVs against the environmental risk evaluation consequence categories (Table 2.2). The initial evaluation is undertaken without consideration of any controlling provisions that may be considered standard operating procedures and assesses the likelihood of not meeting the management objective for each KEV.

Table 2.2-Environmental Risk Evaluation Consequence Categories.

CONSEQUENCE CATEGORY	NO EFFECT	VERY HIGH EFFECT
Environmental Impacts	Single onsite event with negligible harm / loss	Offsite impact with permanent harm / loss
Matters of National Environmental Significance and Matters of State Environmental Significance	Isolated incident	Permanent harm / loss of MNES and MSES
Social and Community	Minor disruption to social amenity	Permanent or long term social change in social or community balance
PI Reputation and Credentials	Isolated incident	National adverse media coverage Loss of environmental credentials / certification

2.2 MANAGEMENT OBJECTIVES

To effectively evaluate and manage the potential or realised impacts on KEVs, management objectives have been developed for each of the KEV's environmental factors. These management objectives have been developed to the scale of the Project and will be revisited if the Project progresses to a future stage.

Table 2.3-Project environmental management objectives.

KEY ENVIRONMENTAL VALUE	ENVIRONMENTAL FACTORS	MANAGEMENT OBJECTIVES	TARGET
Land	Soil	Minimise contamination and land disturbance.	No decrease in soil quality below baseline.
Land	Flora and fauna	Avoid any conservation significant flora and no clearing outside required footprint.	Retain significant flora and fauna communities, where possible. Implement management activities to minimise impact on connectivity, structure and function of ecosystems the site is associated with. Only the discrete areas marked for infrastructure and other project areas will be cleared. The site layout has been designed to keep the required footprint of disturbance to less than 10 ha.
Land	Weeds and pests	Control any weeds and pests to minimise risk of establishment and spreading beyond site boundaries.	Ensure no outbreak of weeds and pests escape the site boundaries. Eradicate any weeds and pests following collection of bulk sample and leaving the site in maintenance mode.
Land	Flooding	Minimise flooding impacts.	Design site infrastructure to appropriate engineering standards to minimise potential flooding impacts.
Land	Sedimentation and erosion	Minimise the transport of soil off-site during both construction and ongoing operation.	Ensure that all development is undertaken in accordance with sediment and erosion control plans.
Land	Waste generation	Minimise waste generation and maximise recycling and reuse of materials and ensure correct handling of waste.	No uncontained materials. Presence and use of recycling receptacles (where appropriate). Provision of adequate quarantine waste facilities. Minimise waste through procurement of low waste goods and services.
Air	Noise	Minimise noise impacts.	Design equipment and operations to minimise noise emissions. Do not exceed agreed noise criteria at the relevant environmental receptor monitoring sites. Where exceedances occur, undertake the necessary measures to reduce noise emissions to below noise reference criteria at relevant environmental receptor monitoring sites. Minimise noise nuisance.
Air	Dust	Minimise dust impacts.	Design equipment and operations to minimise dust emissions.

KEY ENVIRONMENTAL VALUE	ENVIRONMENTAL FACTORS	MANAGEMENT OBJECTIVES	TARGET
			Do not exceed agreed human health reference criteria at relevant environmental receptor monitoring sites. Where exceedances occur, undertake the necessary measures to reduce dust emissions to below agreed human health reference criteria at relevant environmental receptor monitoring sites. Minimise dust nuisance.
Air	Emissions	Minimise air emissions.	Design equipment and operations to minimise air emissions.
Air	Odour	Minimise odour impacts.	Design equipment and operations to minimise odour emissions.
Air	Lighting	Minimise lighting impacts.	Minimise nuisance from lighting by directing light away from sensitive receptors where appropriate to do so.
Water	Surface water	Minimise impacts to surface water quality.	Minimise the potential impact of mine development on local surface water resources. Design stormwater, and erosion and sediment control in accordance with relevant guidelines. Comply with the conditions of any relevant Environmental Authority concerning stormwater management and stormwater discharges.
Water	Groundwater	Minimise impacts to groundwater quality.	Minimise the potential impact of test pit development on local groundwater resources.
Water	Aquatic ecology / wetlands	No net loss of wetland values. No change to the condition assessment of streams and waterways outside the boundaries of the site.	No wetlands or ecosystems were identified within the project area. No change to aquatic ecology / wetland values for areas outside the project area.
Water	Sedimentation and erosion	Minimise the transport of soil and sediment off-site during both construction and ongoing operation.	Ensure that all design and test pit development is undertaken in accordance with sediment and erosion control plans.
Social	Tourism	Minimise negative socio-economic impacts on the tourism sector and help enhance any positive impacts.	Identify opportunities to partner with the existing visual character of the area.
Social	Amenity	Minimise the impact of site development on the overall visual	Identify opportunities to partner with the existing visual character of the area.

KEY ENVIRONMENTAL VALUE	ENVIRONMENTAL FACTORS	MANAGEMENT OBJECTIVES	TARGET
		amenity of the area.	
Social	Traffic	Minimise the impact of construction and operation traffic on the local road network. Minimise the impact of construction and operation traffic on local amenity.	Undertake all construction and operational activities in accordance with traffic management plans.
Social	Waste generation	Minimise waste generation and maximise recycling and reuse of materials, and ensure correct handling of waste.	No uncontained waste materials. Presence and use of recycling receptacles (where appropriate). Minimise waste through procurement of low waste goods and services.
Social	Indigenous heritage	Avoid unnecessary disturbance to identified cultural heritage sites.	Undertake all construction activities in accordance with cultural heritage management plans.
Social	European heritage	Avoid unnecessary disturbance to identified European heritage sites.	Undertake all activities in accordance with cultural heritage management plans.
Social	Agriculture/ pastoral operations	Minimise the impact on agricultural operations in the area.	Finalise agreements with affected agricultural / pastoral operations prior to the commencement of activities.
Social	Climate and Climate change	Minimise Greenhouse Gas Emissions from activities at the test pit.	Implement Greenhouse reduction initiatives.

3 PROJECT AREA ENVIRONMENTAL VALUES

Table 3.1- Description of environmental values associated with the Project and the region.

ENVIRONMENTAL VALUE	ASPECT	DESCRIPTION
Land	Landform and soils	Soils of the project area are generally described as hard pedal red duplex soils (Australian Soil Information System 2017). Logs from exploration drilling identified a variety of soil and rock layers within the test pit evaluation and surrounding areas, however they could generally be described as sands over sand/siltstone (Terra Search 2016). Depths and thicknesses vary as a result of weathering and the dispersion of iron throughout the profile (Terra Search 2016).
	Flora and vegetation (including weeds and pests)	The regional ecosystems mapped within the project area include (Department of Environment and Heritage Protection 2017a) (Appendix A) (Figure 3): • 1.11.2a / 1.7.1a / 1.7.5b / 1.5.13 - *Eucalyptus leucophloia* low open woodland / *Eucalyptus leucophloia* low open woodland on silcrete and lateritic surfaces / *Acacia shirleyi* low woodland on lateritic scarps and hills / *Eucalyptus pruinosa* low open woodland;and • 1.5.1/1.7.7b – *Eucalyptus miniata* woodland on red earths on laterised plateaus / *Corymbia capricornia* low open woodland on silcrete). The biodiversity status of these regional ecosystems is listed as "*no concern at present*" (DEHP 2017c). Endangered – Sub-dominant regional ecosystems are mapped occurring in association with creek lines near to the site (Department of Environment and Heritage Protection 2017a) (Appendix A) (Figure 3), but not at the test pit site. A search of the EPBC protected matters database indicated there may be 6 species of invasive plants that occur within the project area (Department of Environment and Energy 2017) (Appendix B), but the site inspection did not identify these species at the test pit site.
	Fauna (including pests)	No matters of state environmental significance were identified through a Matters of State Environmental Significance search (Department of Environment and Heritage Protection, 2017) (Appendix C). Using the *Protected Matters Search Tool* it was identified that 12 listed threatened species or their habitat and 9 migratory species or their habitat may occur within or adjacent to the project area (Department of Environment and energy 2017). The search also identified 6 invasive animals that may occur within the project area (Department of Environment and Energy 2017) (Appendix B).

ENVIRONMENTAL VALUE	ASPECT	DESCRIPTION
	Topography (Flooding, sedimentation and erosion)	Landform of the project area is generally described as moderately undulating lands (Australian Soil Information System 2017) rising from the project area towards the east (Queensland Government 2017) (Figure 4). Surface water is generally expected to flow north, north-west from the project area towards the Thornton River (Queensland Government 2017).
	Waste generation	There are no existing waste generating activities at the site of or in the general area of the Project.
	Protected Areas	The Project area is within a statewide ecological corridor, but is not listed as within any other protected area (e.g. national park, state forest or reserve). Directly to the west of the project site is a Strategic Environmental Area (designated precinct) and there is an area of regulated vegetation impacting the eastern area of the site (Department of Environment and Heritage Protection 2017). The Strategic Environmental Area and the area of Regulated Vegetation are mapped as a MSES (Department of Environment and Heritage Protection 2017b) (Figure 5) (Appendix C).
Air	Noise	There are no existing noise generating activities at the site or near to the Project area. The nearest sensitive receptor is a homestead and is approximately 12 km to the east.
	Dust	There are no existing dust generating activities at the site or near to the Project area. The nearest sensitive receptor is a homestead and is approximately 12 km to the east.
	Emissions	There are no existing emissions generating activities at the site or near to the Project area. The nearest sensitive receptor is a homestead and is approximately 12 km to the east.
	Odour	There are no existing odour generating activities at the site or near to the Project area. The nearest sensitive receptor is a homestead and is approximately 12 km to the east.
	Lighting	There are no existing light generating activities at the site or near to the Project area. The nearest sensitive receptor is a homestead and is approximately 12 km to the east. There are also no known light sensitive fauna species associated with the site or the project area.
Water	Surface water	There are two mapped minor watercourses directly adjacent to the north and intersected by the proposed site infrastructure boundary. A site visit indicates these are likely to be considered ephemeral streams (a stream that flows only briefly during and following a period of rainfall in the immediate locality). The Project area is also beside the Gulf Rivers Strategic Environmental Area. This environmental area incorporates the Thornton River approximately 1 km to the west of the project site and which the two watercourses ultimately flow into. Additionally, a rural water storage is approximately

ENVIRONMENTAL VALUE	ASPECT	DESCRIPTION
		0.5 km north of the Project area (Queensland Government 2017) (Figure 4).
	Groundwater	Exploration drilling did not encounter any water to a maximum depth drilled of approximately 270mRL (Terra Search 2016). There are records of three sub-artesian bores within 15 km of the Project area, the closest is approximately 8.5 kms to the north (RN32778) (Queensland Government 2017). No data exists for these records (Queensland Government 2017). There are no groundwater dependent ecosystems recorded as present within the Project area (Queensland Government 2017).
	Aquatic ecology / wetlands	There are no mapped watercourses or wetlands in the vicinity (as confirmed during the site visit, April 2017).
Social	Tourism	No tourism activities are currently undertaken at or near to the project area. The Project area is within Barr Creek Station. Barr Creek Station is an operating pastoral station.
	Amenity	Public access to the project area is not permitted, as it is an operational pastoral station. There are no public facilities near to the Project area.
	Traffic	The Project will utilise a private access route to the project area from Mt Isa along the Barkly Highway, onto the Lady Annie Mine access road onto a private access track through the property. Trucks will utilise existing roads and highways to transport the bulk sample to the Port of Townsville. This road is the landholder haul road used by four deck cattle road trains.
	Indigenous heritage	It is unknown if any cultural heritage assessments have been undertaken for the Project area.
	European heritage	No sites are listed on the *Queensland Heritage Register* as occurring within or near to the Project area (Department of Environment and Heritage Protection 2017c).
	Agriculture/ pastoral operations	The Project is within the Barr Creek pastoral station. PI has undertaken significant consultation with the operator of Barr Creek pastoral station and has agreements in place for this project.

ENVIRONMENTAL VALUE	ASPECT	DESCRIPTION
	Climate and Climate change	The closest weather station with monthly climate statistics is Camooweal Township (site #: 037010 (Bureau of Meteorology [BoM] 2017). The region is characterised by a semi-arid climate with monsoonal influences, typically experiencing hot summers and mild to warm winters (BoM 2017). Daily temperatures range from 38.0 degrees in December to 25.8 degrees in July (BoM 2017). Average annual rainfall in the region is likely to be between 402 mm (Camooweal) and 461 mm (Mt Isa Aero; site #: 029127), with the highest average monthly falls in January (99 mm, Camooweal; 119 mm, Mt Isa Aero) and the lowest average monthly falls in August (3 mm, Camooweal; 4 mm, Mt Isa Aero).

Legend

- Site infrastructure
- Access track
- Regional ecosystem boundaries

Environmental Management Plan – Barr Creek Phosphate Project
Figure 3 – Regional Ecosystem Mapping

0 150 m

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Legend

- Site infrastructure
- Waterway
- Contours
- Access track

Environmental Management Plan – Barr Creek Phosphate Project
Figure 4 – Topography and Waterways

0 100 meters

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Legend

- Site infrastructure
- Strategic Environmental Area (designated precinct)
- Regulated Vegetation
- Regulated Vegetation (intersecting a watercourse)
- Access track

Environmental Management Plan – Barr Creek Phosphate Project
Figure 5 – Matters of State Environmental Significance

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0 300 m

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4 PROJECT ENVIRONMENTAL MANAGEMENT

4.1 PROJECT ACTIVITIES

Project activities associated with the Project are listed in Table 4.1 in association with the various work areas. These activities guide the risk assessment as they are what have the potential to impact on the KEVs.

Table 4.1-Project activities.

WORK AREAS	ACTIVITIES
Roads and road access	• No clearing of vegetation is required to widen roads, create laydown areas and construct drains • Import road base / fill material • Confirm undulated crossings are accessible
Establishment and operation of site facilities (i.e. offices, crib room, ablution facilities, laydown areas, workshops and storage facilities)	• Design • Mobilisation and installation of offices, electrical equipment, waste management services • Earthworks / soil disturbance • Waste generation • Refuelling • Vehicle (heavy and light) machinery movement
Removal and stockpiling of overburden, removal, stockpiling and loading of phosphate product	• Removal of vegetation • Earthworks / soil disturbance for excavation of pit • Refuelling • Vehicle (heavy and light) machinery movement
Rehabilitation of site for care and maintenance mode	• Earthworks / soil disturbance for stabilisation of the pit and stockpiles • Refuelling • Vehicle (heavy and light) machinery movement

4.2 RISK ASSESSMENT OUTCOMES

The unmitigated risk evaluation for the KEVs for the Project is shown in Table 4.2. Environmental management measures were developed to reduce the risk to as low as reasonably practical (ALARP) (see Environmental Management Plans in Section 9). These will be implemented throughout the Project and also identify the key parties responsible for their governance and implementation.

The residual risk to each KEV for the Project is shown in Table 4.3. The Environmental Risk Assessment is attached at Appendix A.

Table 4.2-Unmitigated risk evaluation outcomes for the project.

			Activity / Work Package			
	KEV	Environmental Factor	Roads and road access	Establishment and operation of offices, crib room, ablution facilities, laydown areas, workshops and storage facilities	Removal and stockpiling of overburden, removal, stockpiling and loading of phosphate product	Rehabilitation of site for care and maintenance mode
Environmental Factors	Land	Soils (eg contamination)				
		Flora and vegetation				
		Fauna				
		Weeds and Pests				
		Flooding				
		Sedimentation and Erosion				
		Waste Generation				
	Air Quality	Noise				
		Dust				
		Emissions				
		Odour				
		Lighting				
	Water	Surface water quality				
		Groundwater quality				
		Aquatic ecology / wetlands				
	Social	Tourism				
		Amenity				
		Traffic				
		Indigenous heritage				
		European heritage				
		Agricultural and pastoral operations				
		Climate and climate change				

Legend:

	Very low
	Low
	Moderate
	Significant
	High
	Extreme

Table 4.3- Residual risk evaluation outcomes for the Project.

	KEV	Environmental Factor	Activity / Work Package: Roads and road access	Establishment and operation of offices, crib room, ablution facilities, laydown areas, workshops and storage facilities	Removal and stockpiling of overburden, removal, stockpiling	Rehabilitation of site for care and maintenance mode
Environmental Factors	Land	Soils (eg contamination)				
		Flora and vegetation				
		Fauna				
		Weeds and Pests				
		Flooding				
		Sedimentation and Erosion				
		Waste Generation				
	Air Quality	Noise				
		Dust				
		Emissions				
		Odour				
		Lighting				
	Water	Surface water quality				
		Groundwater quality				
		Aquatic ecology / wetlands				
	Social	Tourism				
		Amenity				
		Traffic				
		Indigenous heritage				
		European heritage				
		Agricultural and pastoral operations				
		Climate and climate change				

Legend:

	Very low
	Low
	Moderate
	Significant
	High
	Extreme

5 TRAINING, COMPETENCY AND AWARENESS

A training needs analysis shall be conducted for each person mobilising to site. The training needs analysis shall form the basis for the training requirements for the project. Training shall be provided by a combination of formal and informal processes on a continuous basis, as identified by the Project Skills Register. Training shall be carried out utilising any combination of PI / contractor training personnel, supervisory staff or third party training personnel. Training requirements will be discussed at safety and environment meetings, and management meetings to prioritise training needs.

Personnel shall be informed of the contents of the Project Skills Register, as well as their responsibilities under the EMP, through inductions and a series of Tool Box Meetings in conjunction with the HSE Advisor and the Project Manager.

The Project Skills Register shall include, but not be limited to the following items, which are considered to be compulsory for all personnel required to perform those tasks:

- A Project Specific Induction
- Project Specific Environmental Training
- Specific skills, licences or approvals required by personnel to undertake high risk activities or activities that have the potential to cause environmental harm.

The HSE Advisor shall maintain the Project Skills Register for site personnel.

5.1 SITE INDUCTION

All employees and sub-contractors commencing work on site shall complete the a Site Induction prior to entry.

The purpose of site induction is to inform employees, sub-contractors and visitors of the identified environmental risks associated with the project and the remedies to be used and control to be implemented.

The induction of a new worker to the site is of critical importance in quickly assimilating them into the working team, in creating constructive work attitudes and environmental awareness.

5.2 ONGOING TRAINING AND COMMUNICATION

Targeted ongoing training will include communication through opportunities such as toolbox meetings, pre-start meetings, notices and signs. The implementation of these strategies and the material will be developed prior to site mobilisation and throughout the life of the Project as relevant topics arise.

5.2.1 TOOLBOX MEETINGS

The Project shall hold Toolbox Meetings each week, which include all site personnel and all sub-contractor personnel on site (either at the one Toolbox Meeting or otherwise holding a separate meeting for sub-contractors).

All attendees at Toolbox Meetings are to sign the Meeting Attendance Sheet. Copies of Minutes and action items arising from such meetings shall be held by the Site HSE Manager/Advisor.

5.2.2 PRE-START MEETINGS

The project shall ensure that pre-start meetings are held each day for each work group prior to commencing work on the particular activity for the day. The meeting shall be conducted by the supervisor/leading hand and ensure that the work to be carried out is understood, that the proper tools and equipment are available and a current JHA is in place for the activity in hand. This is to ensure that environmental management is taken as seriously as all other activities relating to the project.

All site personnel are required to sign the Pre-start Meeting Attendance Sheet. Late attendees are also required to read the Pre-start Meeting Minutes and sign-off on the Attendance Sheet before commencing work.

5.2.3 NOTICES AND SIGNS

Relevant notices and signs shall be prominently displayed in such a manner as to ensure personnel in the vicinity are made obviously aware of the potential hazard. Posters shall be utilised within amenities as a general reminder and changed on a regular basis to reduce familiarity.

Notices and signs will be displayed in accordance with the project signage plan.

6 ENVIRONMENTAL INSPECTION AND AUDITING

6.1 ENVIRONMENTAL INSPECTIONS

Regular environmental inspections of the work areas shall be carried out to identify environmental risks. These inspections are a necessary part of minimizing risks to the environment.

As a minimum, a physical inspection shall be conducted weekly to identify environmental risks and monitor how procedures are going in the workplace by the Project Manager, a Supervisor and/or the HSE Advisor.

Non-compliances from these inspections shall be actioned and signed off when complete. Once action items have all been completed, the Project Manager shall sign off the checklist as complete. The completed checklist is returned to the HSE Adviser for filing.

Where an employee identifies an environmental aspect in the workplace, they are to rectify it and/or make it safe if they are able to do so without putting themselves, others or the environment at further risk. The hazard or issue must then be reported to their immediate Supervisor.

The hazard/issue should be dealt with as soon as possible after being reported to the Supervisor. If it cannot be rectified within one working day, an incident report shall be raised and a solution implemented as soon as practicable. As a minimum, interim measures should be put in place to prevent any adverse consequences until such time that the issue can be satisfactorily resolved.

Where the issue concerns work which involves an immediate threat to the environment, the Supervisor/Project Manager may direct that work cease.

6.2 ENVIRONMENTAL AUDITS

Internal Environmental audits will be carried out during the project. Records of audits will be kept.

6.3 AUDIT REPORTING

An Environmental Audit Report may be required as part of Environmental Authority conditions. If so, these will be prepared in accordance with EA scheduling requirements, or within two weeks if now timelines are specified, following each environmental audit.

6.4 ADAPTIVE MANAGEMENT

This EMP has adopted an adaptive management approach that is used when assessing the effectiveness of the controlling provisions in meeting the KEV management objectives. Due to the relatively short nature of the test pit evaluation phase of the Project, a formal review of the EMP is not proposed. However there are a number of triggers to instigate a review of the whole, or parts of the EMP, this includes a review of the environmental risk register. Examples of what may trigger a review include:

- A change to the Project scope of works, including contract specification changes
- Changes to Project delivery methodology

- A significant legislative change that has the potential to change the risk profile of an activity conducted as part of the Project
- When an environmental program has determined an impact is not consistent with KEV management objectives
- A significant environmental incident that may impact on the Project's ability to meet KEV management objectives
- Regulator request
- Introduction of improved procedures and practices.

If this plan is amended as a result of the review, it shall be reissued in accordance with PI's document control system.

7 INCIDENT REPORTING, CORRECTIVE AND PREVENTATIVE ACTIONS

7.1 ENVIRONMENTAL INCIDENTS AND NON-CONFORMANCES

An environmental incident is an event resulting in temporary or permanent cumulative or immediate adverse effects on the environment occurring through the appropriate or inappropriate delivery of activities associated with the Project.

A non-conformance is a non-fulfilment of a committed requirement. Non-conformances may refer to the system or to environmental performance (ie legislative). Any staff member may report a non-conformance or potential non-conformance at any time for action.

Non-conformances can include:

- Non-conformance with this EMP or its requirements
- PI's Environmental Policy non-conformance
- Breach of EA or other approval conditions.

The purpose of reporting incidences and non-conformances is to ensure they are investigated to determine the cause so that corrective and preventive actions can be put in place to continually improve the system.

All personnel have the responsibility for identifying environmental incidences and non-conformances. All personnel are responsible for ensuring environmental incidences and non-conformances are reported.

All environmental incidents shall be notified to the site HSE Manager / Advisor as soon as possible and before the close of business on the day of the incident. The site HSE Manager / Advisor or their delegate must notify the relevant authority within 24 hours of any environmental incident.

Additionally, the Project Manager, or a delegate, will immediately notify the Project Environmental Manager of any environmental incident that has the potential to impact on the receiving environment in the vicinity of the Project area.

An Incident Report Form will be completed and filed accordingly. The Incident Report Form includes relevant personnel contact details.

7.2 COMPLAINTS

Complaints will be treated as an incident. An Incident Report Form will be completed and filed accordingly. All complaints will be recorded on the Project Complaints Register.

All complaints will include follow up with the complainant to communicate the outcomes of the complaint investigation.

7.3 CORRECTIVE AND PREVENTIVE ACTIONS

The need for corrective and preventive action will be identified through an incident (or non-conformance) and their subsequent investigation. Corrective and preventive actions will be determined from the investigation and

documented on the incident report. In some cases, the need for corrective or preventive action will be determined before an incident occurs. In these cases, the situation is documented as a potential incident, and corrective and preventive action recorded on the incident report and followed up as documented.

7.4 ACCIDENT AND INCIDENT REPORTING

All accidents, incidents and complaints shall be notified to the Project Environmental Manager immediately followed by a summary report as soon as possible and before the close of business on the day of the incident.

An incident report shall be raised and the incident investigated.

The HSE Manger / Advisor shall prepare a weekly summary environment performance report.

7.5 PROJECT PERSONNEL EMERGENCY CONTACT DETAILS

Table 7.1- Project personnel emergency contact details

POSITION	CONTACT DETAILS
NAME Project Manager Phosphate International	Mobile: Telephone: Email:
NAME Contractor Representative Contractor	Mobile: Telephone: Email:
NAME Site Supervisor Contractor	Mobile: Telephone: Email:
NAME Site HSE Contractor	Mobile: Telephone: Email:
NAME Project Environmental Advisor Phosphate International or Contractor	Mobile: Telephone: Email:

7.6 Roles and Responsibilities

7.6.1 SITE ORGANISATIONAL STRUCTURE

This EMP is based upon the following Project organisation structure:

INSERT ORG CHART – final org chart to be determined during commercial negotiations with contractor and inserted into EMP.

7.6.2 ROLES AND RESPONSIBILITIES OF PROJECT PERSONNEL

Roles and responsibilities, specific to environmental management of the Project, have been developed for each role on this Project:

Project Manager:

- Actively promote environmental requirements on site and lead by example
- Ensure adequate resources are available for environmental requirements
- Implement and ensure adherence to the EMP
- Challenge and correct any at risk behaviours
- Hold their management team accountable for environmental requirements
- Accept and ensure actions from site inspections are carried out
- Ensure the development and coaching of superintendents and supervisors
- Ensure that all works are carried out to comply with environmental requirements
- Manage sub-contractors and Vendors in relation to environmental requirements
- Work ethically with all team members and outside parties
- Implement meetings with other supervisors and or sub-contractors to ensure the project environmental requirements are not jeopardized.

Supervisors:

- Actively promote environmental requirements on site and lead by example
- Ensure adequate resources are available for environmental requirements
- Implement and ensure adherence to the EMP
- Ensure their team is competent and if necessary hold the correct licenses
- Demonstrate leadership, commitment and accountability for effective environmental requirements
- Challenge and correct any at risk behaviours
- Ensure their team work packs are adequate to include environmental requirements
- Ensure weekly environmental inspections are carried out and submitted
- Participate in the development of JHAs to include any environmental requirements
- Ensure emergency plans are in place and adequate in the event of an environmental issue
- Participate in investigations
- Help resolve environmental issues in the workplace
- Deliver toolbox meetings including environmental topics and information
- Conduct pre-start meeting with their work team
- Ensure plant and equipment is fit for purpose and maintenance requirements are carried out
- Ensure all site procedures are being followed.

Environmental Advisors

- Advise management and employees on environmental issues
- Maintain a current knowledge of legislation
- Participate in pre-start meetings
- Participate in the development of JHAs when required
- Help develop and implement initiatives to promote the environment
- Demonstrate leadership, commitment and accountability for effective environmental requirements
- Gather and report environmental statistics
- Help with site inspections
- Challenge and correct any at risk behaviours
- Participate in investigations
- Generate emergency response plans.

8 EMERGENCY RESPONSE

Employees and subcontractors shall adhere to any site specific Emergency Response Plan for the Project. Copies of these plans are to be available for review at all times. This information shall be delivered and reinforced at the tool box meeting by the Supervisor or HSE Advisor.

Emergency response management will be managed through the Project Health and Safety Management Plan, this includes emergency spill response and identification of first responders onsite. All employees will be trained in emergency spill response procedures as part of their site induction. The MSDS for each substance will include reference to spill response procedures. Emergency contact details will be located with all hazardous and dangerous substances.

9 ENVIRONMENTAL MANAGEMENT PLANS

The following EMPs have been developed based on the outcomes of the environmental risk assessment and will be updated to include any conditions attached to approvals.

9.1 AIR QUALITY AND EMISSIONS MANAGEMENT PLAN

9.1.1 Overview

A reduction in air quality, primarily through dust and emissions generation, has the potential to cause impacts on sensitive receptors. Sensitive receptors may include human, fauna and flora. The key sensitive receptors identified for the Project include onsite operational personal. Other sensitive receptors identified include homesteads. The nearest homestead is approximately 12 km to the east and not expected to be impacted. No fauna or flora species were identified that are likely to be impacted by the Project. Outside the immediate Project area it is not expected there will be any significant risks to the environment associated with air quality and emissions. Although the risk assessment did not identify any significant risks, PI is committed to ensuring that their activities do not create excessive emissions and have developed environmental controls to minimise emissions and impacts to air quality.

9.1.2 Potential Impacts

A number of activities have the potential to create emissions affecting air quality. These include, but aren't necessarily limited to:

- Dust generated from the operation of vehicles, equipment and machinery, vegetation removal and bare soil areas
- Odour from ablution facilities
- Exhaust emissions from the operation of vehicles, equipment and machinery.

9.1.3 Environmental Controls

ACTION	PERSON RESPONSIBLE	WHEN
Dust		
All employees to visually monitor dust generation during road construction activities.	All	Entire project
All dust complaints will be recorded and reported to the Client.	Supervisor	Entire project
Materials or spoil transported in open trucks or bins and from the site will be covered if there is potential for dust to be generated.	Transport operator	Entire project
Dust is to be controlled (where applicable) by regular watering of unsealed roads, work areas and stockpiles.	Supervisor	Entire project
Mobile plant and equipment is to be restricted to designated routes.	Plant operators	Entire project
Road material to be inspected for dust suppression suitability, if not suitable, consultation with landholders and other relevant stakeholders, where appropriate, regarding impacts to stock feed to be undertaken.	Project Manager	Project planning
Site specific management controls to be developed based on the outcomes of consultation with landholders and other relevant stakeholders, where appropriate.	Project Manager	Project planning

All air quality management controls to be developed in consultation with workplace health and safety management plan to ensure cohesion between plans.	Project Manager	Project planning
Odour		
Any odour complaints will be recorded.	Project Manager	Entire project
All odour complaints will be rectified as soon as possible by solving the problem at the source.	Project Manager	Entire project
The most likely sources of odour include waste and amenities facilities. These will be managed through the Waste Management Plan.	Project Manager	Entire project
Emissions – air quality		
All equipment used on site shall have fitted standard emission control exhaust systems.	Project Manager	Entire project
All plant and machinery to be inspected and repaired as necessary prior to operation to identify any operational faults or leaks.	Plant operator	Entire project
All plant and machinery to be inspected (daily), maintained and repaired as necessary throughout the project.	Plant operator	Entire project
Plant and equipment maintenance records will be kept.	Plant operator	Entire project
Minimise consumption of fuel, for example, through shutting down equipment, machinery and vehicles when not in use.	Plant operator	Entire project
Consideration will be given when purchasing goods to ensure that goods do not contain ozone depletion material. If a suitable replacement can be obtained, by reviewing cost and supply, these will be purchased in preference to ozone depleting substances.	Project Manager	Entire project

9.2 CULTURAL HERITAGE MANAGEMENT PLAN

9.2.1 Overview

No European heritage sites are registered within the Project area. However, due to the remote nature of the Project area and no site specific indigenous heritage information there is a risk culturally significant sites may be disturbed during the Project. PI is committed to the protection and preservation of all items and areas of cultural heritage significance and has developed controls. These will be developed over time to suit the various stages of the Project.

9.2.2 Potential Impacts

Due to the lack of available information any work has the potential to disturb items of cultural significance.

9.2.3 Environmental Controls

ACTION	PERSON RESPONSIBLE	WHEN
A cultural heritage assessment has been undertaken prior to access tracks.	Project Manager	Project Planning
All site personnel will be educated regarding cultural heritage should artefacts be encountered.	All	Site induction

Should items of cultural significance be discovered, personnel will act according to the following: • Stop work in the vicinity of the item; • Notify the Project Manager who shall contact the Client's Environmental Representative; • Leave items where they were found; • If items are dislodged by machinery, make a note of where they came from; and • The Project Environmental Representative shall have Cultural Heritage Consultant on call to come to site to inspect artefacts and advise on what action to take.	All	Entire project

9.3 ENERGY EFFICIENCY MANAGEMENT PLAN

9.3.1 Overview

The purpose of energy efficiency is to reduce the amount of energy required to facilitate the Project. As such, PI is committed to the minimisation of energy use throughout the life of the Project.

9.3.2 Potential Impacts

Inefficient use of energy contributes an increase in greenhouse gases beyond what is necessary for the delivery of the Project.

9.3.3 Environmental Controls

ACTION	PERSON RESPONSIBLE	WHEN
Educate personnel, through site induction and site wide notices, of the importance of energy efficiency.	Project Manager	Site induction
Minimise use of office consumables (e.g. printing).	All	Entire project
Request minimal packaging from suppliers.	Project Manager / Procurement	Entire project
Reuse materials that may be fit for another purpose, considering other work groups.	All	Entire project
Minimise consumption of fuel, for example, through shutting down equipment, machinery and vehicles when not in use.	All	Entire project
All plant and equipment to be inspected and repaired as necessary prior to operation to identify any operational faults or leaks.	Equipment owners / operators	Pre-mobilisation
All plant, vehicles and equipment to be inspected (daily), maintained and repaired as necessary throughout the project.	Operators	Daily
Plant, machinery and equipment maintenance records will be kept.	Operators	Daily

9.4 HAZARDOUS SUBSTANCES AND DANGEROUS GOODS MANAGEMENT PLAN

9.4.1 Overview

A number of hazardous substances will be present on site during delivery of the Project. The risk assessment identified that hazardous substances and dangerous goods are a potential source of contamination for a number of KEVs. Hazardous substances and dangerous goods need appropriate management to minimise the risk of contamination or risks to human health. The Hazardous Substances and Dangerous Goods Management Plan reflects hazardous substances and dangerous goods management in the Health and Safety Management Plan.

9.4.2 Potential Impacts

Inappropriate storage or use of hazardous substances and dangerous goods may result in contamination or impacts to human health.

9.4.3 Environmental Controls

ACTION	PERSON RESPONSIBLE	WHEN
Bulk fuel and oil will be stored at the Lady Annie mine fuel farm (upto 50 000 L). A smaller fuel tank will be located on site (upto 20 000 L) that will be filled using service vehicles.	Project Manager	Entire project
No chemical or chemical substance shall be brought into the Project area unless a Safety Data Sheet (SDS) has been supplied.	Contractor	Entire project
All personnel handling chemicals or hazardous substances must be informed of the requirements for the safe transport, storage, use and emergency treatment, as detailed in the SDS.	All	Entire project
A hazardous materials register shall be maintained in the storage area.	Contractor	Entire project
All hazardous substances and dangerous goods shall be stored and used as per the relevant Australian Standard.	Contractor	Entire project
A copy of the SDS is to be kept onsite for easy access by personnel.	Contractor	Entire project
Permission is to be sought by Contractors from Phosphate International prior to mobilising Hazardous Substances and Dangerous Goods to site.	Project Manager / Contractor	Entire project
Contractors are required to provide a full list of all hazardous substances and dangerous goods they propose to use or bring to site prior to mobilisation to site.	Project Manager / Contractor	Pre-mobilisation
A register is to be developed for all hazardous substances and dangerous goods onsite.	Contractor	Pre-mobilisation
Hazardous substances shall be stored under cover and in a manner that will prevent deterioration of goods and to prevent environmental contamination (e.g., bunded to capture any spillage or leakage).	Contractor	Entire project
Corrosive materials to be stored and handled in accordance with AS3780.8:2008 (Class 8 Substances – Corrosives).	Contractor	Entire project
Fuel, oils and chemicals in containers to be stored in impervious bunded area with capacity of at least 110% of largest container/tanker in a self-bunded tank.	Contractor	Entire project
All fuel, oils and chemical containers must have their contents clearly	Contractor	Entire project

labelled.		
Spill clean-up kits including absorbent materials are to be kept at each storage facility and site of use.	Contractor	Entire project
All site personnel will be trained in the use of spill kits.	Contractor	Induction
Drip trays or alternate method will be used to collect fluids and debris during mechanical or roadside repairs.	Contractor	Entire project
All employees will be trained in spill response. This will be included in site inductions.	Contractor	Induction

9.5 NOISE MANAGEMENT PLAN

9.5.1 Overview

There is not expected to be an impact to the community as the nearest sensitive receptor (excluding site workforce) is approximately 12 km tot eh east (homestead). Although the risk assessment did not identify any significant risks associated with noise generation and noise management it is still appropriate to minimise noise generation where possible. It is also important to note that noise management is also addressed through the HSE plan. This noise management plan reflects noise management in the HSE plan. The HSE plan will provide specific management requirements, however the environmental controls below provide for best practice and will be implemented.

9.5.2 Potential Impacts

Excessive noise from Project activities has the potential to affect site personnel.

9.5.3 Environmental Controls

ACTION	PERSON RESPONSIBLE	WHEN
The quietest plant and equipment that can be selected to undertake works will be used, where possible.	Contractor	Pre-mobilisation
Where possible efficient noise suppression and muffling devices will be installed on equipment, and equipment will be maintained in good working order.	Contractor	Pre-mobilisation
Plant, machinery and equipment maintenance records will be kept.	Contractor	Entire project
Noise levels from generators, compressors and other noise emitting plant and equipment shall be routinely monitored to ensure equipment is operating within realistic industry standards.	Project Manager	Entire project
All noise complaints will be recorded and reported to the Client immediately following receipt of the complaint.	Site supervisors	Entire project

9.6 FLORA AND VEGETATION MANAGEMENT PLAN

9.6.1 Overview

Flora and vegetation is required to be cleared for facilities and infrastructure within the Project area. Conservation significant vegetation and MSES are mapped as potentially occurring within the Project area. It is

also important to manage and conserve vegetation outside the approved clearing area. Initial site specific flora and vegetation investigations have been undertaken.

Utilisation of the risk assessment approach identified opportunities to mitigate land clearing through avoiding unnecessary clearing activities. The information from the risk assessment was used to provide guidance in the design stage. The most significant opportunity example will be in the avoidance of clearing for the maintenance grading and reshaping of the access track into the site. The access track is currently used by the property owner to truck cattle off site. There are a number of areas that are already cleared. These will be utilised for passing bays. Reducing the clearing area addresses vegetation management and also secondary impacts such as increased erosion and loss of topsoil. The site plan has been designed to keep the required level of clearing to less than 10 ha. Only the discrete areas designed for site infrastructure and facilities will be cleared.

9.6.2 Potential Impacts

There is a potential conservation significant vegetation may be impacted through inadvertent clearing or the introduction of weeds and pests to the site. Other vegetation, including MSES may also be impacted by inadvertent clearing or the introduction of weeds and pests.

9.6.3 Environmental Controls

ACTION	PERSON RESPONSIBLE	WHEN
Only vegetation required to be cleared for project areas and infrastructure will be cleared.	Contractor	Entire project
All areas proposed to be cleared will be pegged and marked.	Project Environmental Advisor	Pre-mobilisation
Incorporate outcomes of risk assessment into project design and alignment will minimise the area of vegetation required to be cleared and avoid areas of endangered regional ecosystems.	Project Manager	Project planning
Inspect all vehicles entering the site for signs of weed and pests; treat appropriately if present.	Contractor	Entire project
Inspect all material leaving site for signs of weeds or pests; treat appropriately if present.	Contractor	Entire project
Undertake visual inspections monthly for weeds on site and implement appropriate actions if weeds are becoming established on site.	Contractor – while on site Project Manager – when contractor leaves site	Entire project
Mobile plant and equipment is to be restricted to designated routes.	Operator	Entire project
A topsoil pile management strategy will be developed once topsoil and volumes required to be managed are understood. Depending on the outcomes the following controls will be in place for access track upgrade:	Project Manager	Project planning
Vehicles are to arrive clean and leave clean (develop a procedure that is appropriate for this site location to ensure any cleaning is undertaken prior to mobilising for site to minimise risk of vehicles	Project Manager	Project planning

being turned away at the gate).		
Rehabilitation and stabilisation of bare areas will utilise topsoil to utilise the existing seed bank.	Contractor	Entire project

9.7 FAUNA MANAGEMENT PLAN

9.7.1 Overview

Due to the remote nature of the site fauna is likely to utilise the Project area. Although desktop information indicates there are no MSES and EPBC listed species likely to occur in the area, undertaking the risk assessment process highlighted a number of management and mitigation activities that can be undertaken to manage protected fauna, as well as cattle that may be within or adjacent to the Project area.

9.7.2 Potential Impacts

Fauna has the potential to be affected through clearing activities or by becoming trapped in open trenches or pits.

9.7.3 Environmental Controls

ACTION	PERSON RESPONSIBLE	WHEN
Any fauna habitat specifically to be retained will be pegged and marked.	Project Environmental Advisor	Pre-mobilisation
Mobile plant and equipment is to be restricted to designated routes.	Operators	Entire project
All vegetation to be cleared is to be inspected for fauna at the following intervals: - 3 days before clearing - 2 days before clearing - 1 day before clearing - day of clearing.	Contractor / fauna spotter catcher	Pre and during clearing activities
Any fauna to be found is to be moved by a suitably qualified fauna spotter catcher.	Contractor / fauna spotter catcher	Pre and during clearing activities
A suitably qualified fauna spotter catcher is to be present during all clearing works.	Contractor	Clearing activities
Ensure only qualified personnel are to engage with fauna.	All	Entire project
Personnel will be educated not to feed, handle or interact with any fauna.	Project Manager / Contractor	Inductions
All injured or sick fauna are to be reported to environmental personnel. A wildlife carer will be engaged to care for the sick or injured animal.	All	Entire project
Vehicle speeds to be minimised to reduce the risk of animal strike.	Operators	Entire project
Consultation with landholder to be undertaken to discuss the opportunity to remove cattle from access road during construction period.	Project Manager	Project planning
Consultation with landholder to be undertaken to develop site specific	Project Manager	Project planning

gate and fence management strategy, to exclude stock from the project area.		
Inspect all material leaving site for signs of weeds or pests; treat appropriately if present.	Supervisors	Entire project
Undertake visual inspections monthly for weeds on site and implement appropriate actions if weeds are becoming established on site.	Contractor - while onsite Project Environmental Advisor - Contractor leaves site	Entire project
Mobile plant and equipment is to be restricted to designated routes.	Operators	Entire project
Inspect any open trenches daily for trapped fauna.	Supervisors	Entire project

9.8 Topsoil Management Plan

9.8.1 Overview

The soils of the project area are thin, sandy gravelly soils. Development of the project has the potential to significantly degrade the soils. A more detailed topsoil pile management strategy will be developed once topsoil and volumes required to be managed are further understood.

9.8.2 Potential Impacts

The key potential impacts include degradation or loss of topsoil and / or its structure. Mobilisation of soils leads to erosion, and the sedimentation and siltation of waterways and drainage lines.

9.8.3 Environmental Controls

ACTION	PERSON RESPONSIBLE	WHEN
Develop site specific top soil pile management plan. The topsoil pile management plan should be refined with reference to the Project's surface water management design.	Project Manager / Contractor	Prior to mobilisation to site
Reduce the clearing footprint by utilising site design features (e.g. overburden used to create ROM pad where stockpiles are located).	Design engineer / Contractor	Project planning and design

9.9 TRAFFIC MANAGEMENT PLAN

9.9.1 Overview

Traffic management for the project is comprised of onsite (the Project area and access road) and offsite. Onsite traffic is related to the interactions of quarry equipment, including heavy and light vehicles, other equipment and personnel. Offsite traffic management is related to transport vehicles (heavy and light) and their interaction with roads, other commercial vehicles and the general public along the proposed route between the Project area and Port of Townsville. On public roads, compliance with Local and State road user rules and regulations will in general be the applicable management standard in addition to any specific operational rules imposed by Phosphate International for its specific traffic and transport movements.

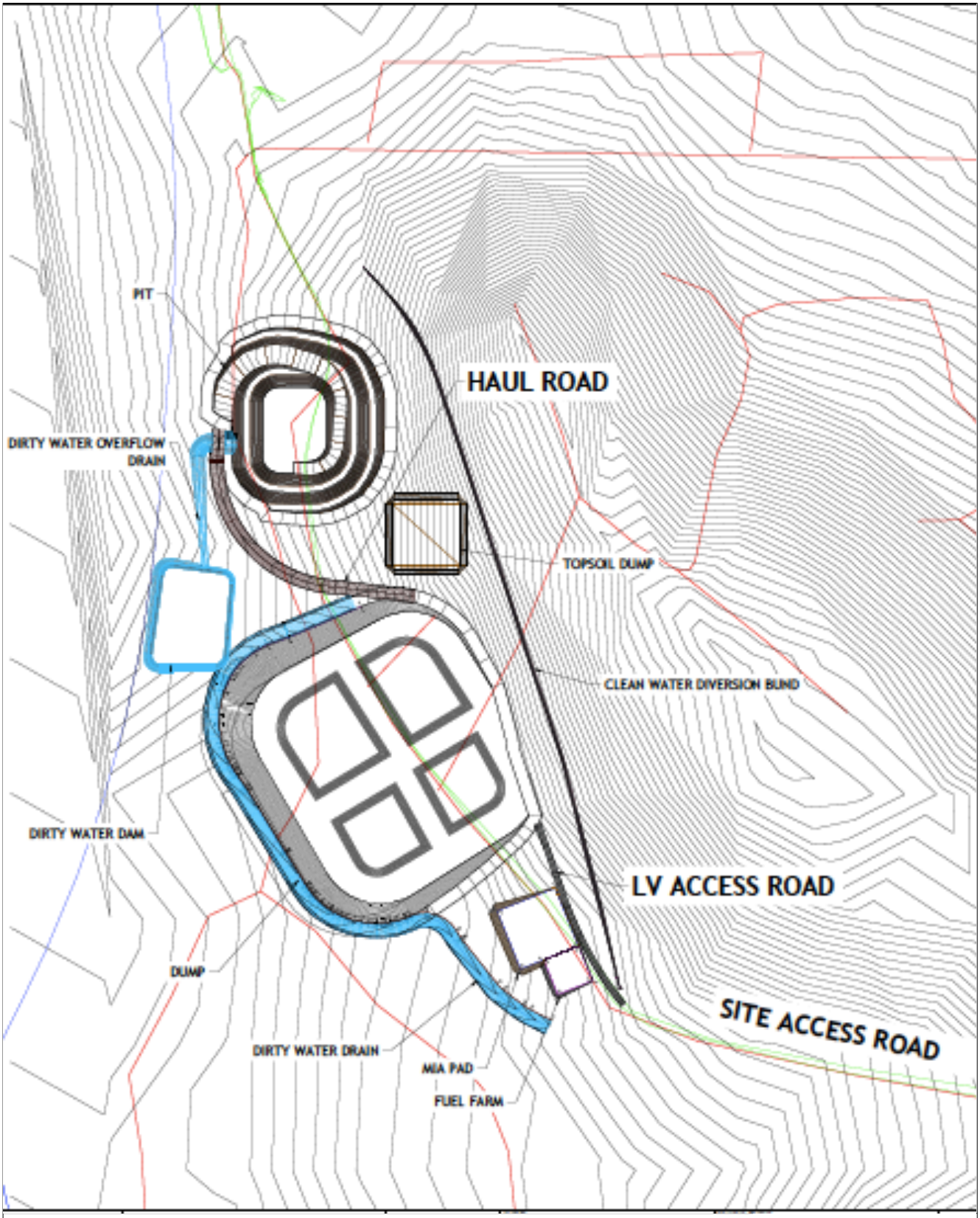
The proposed test pit site will be accessed from the Barclay Highway to the Lady Annie Mine access Road via McNamara's Road, the current access constructed and maintained to the Lady Annie and Lady Loretta Mines, and from there via the partially constructed existing property access road to the Barr Creek Homestead. The test pit access will deviate off the homestead access road approximately 12km before its termination at the Homestead and follow landholder tracks used to haul cattle off the property with road trains. This proposed test pit site access route from the Barclay Highway is as shown in Figure 1. This route provides access to both the proposed mine site and to the proposed accommodation facilities at the Lady Annie mine site.

At the commencement of the construction activities, the Barr Creek access road, currently a formed up, single lane unsealed dirt track will be improved by grading and shaping the natural materials and with undulated crossings improved to provide a relatively smooth surface through the crossing. To minimise impacts on the environment, the upgrade works will generally be limited to the width of the existing property access track with some minor works undertaken in current cleared areas to provide for vehicles passing one another during the construction and operational phases. Throughout both the construction and operational phases of the Project, ongoing grading and maintenance will be undertaken on the access road to maintain it in a trafficable condition to minimise risks of damage to vehicles and personnel, maintain driver comfort levels and maintain in a satisfactory condition the Barr Creek property access for the owners. At the completion of the Project a final maintenance grade will be undertaken to ensure that the property access is in a better condition than prior to the commencement of this Project activities.

During both the construction and operational phases the access road between Lady Annie and the mine site will be used daily for the transport of personnel to and from the accommodation at Lady Annie. Throughout the construction and operational phase of this Project, service vehicles, personnel transport vehicles and haul vehicles will also use the entire road and access between the Barkley Highway and the mine. Haul vehicles used to transport the phosphate bearing ore will be road registered, weight compliant B-Double or similar type trucks. From McNamara's Road the ore will be transported via the Barclay Highway, a Federally funded National Highway, and other existing Local, State and Federal public roads to the Port of Townsville.

Onsite roads are as shown in Figure 6. These roads provide access to the operational areas of the site and are designed to minimise interaction between mining and non-mining vehicles and ease of access to operational deliveries and personnel. These roads are general two lane and constructed using natural gravels found on site. Drainage is provide as shown in Figure 6.

All vehicles required to travel on the access road and McNamara's Road throughout the Project will be registered vehicles. All personnel driving or operating these vehicles and equipment will be suitable licenced drivers and appropriately ticketed and experienced to operate the plant they are controlling safely and in accordance with site controls.



Environmental Management Plan –
Barr Creek Phosphate Project
Figure 6 – Site infrastructure

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Traffic management has different objectives to environmental management and focuses principally on interactions with road surfaces and addressing safety interactions with other vehicles and personnel. The objectives of this traffic management plan are to:

OBJECTIVES	TARGET
To effectively manage project related traffic to minimise the conflict between vehicles utilising both public and private roads.	Effective management of traffic in a manner that ensures there is minimal conflict between project vehicles, other vehicles and road surfaces on public roads.
To ensure project related vehicles interact with other non-project related vehicles in as safe a manner as possible.	Effective management of project traffic that ensures the safest possible interactions between all vehicles and personnel.
HV and LV separation in the mine operational areas.	Effective management of project traffic and personnel that ensures the safest possible interactions between all vehicles and personnel.

Planned off site construction activities will be limited to:

- Maintenance grading and reshaping of the existing access road between the Lady Annie mine site access road and the mine area. The current standard of the existing access is shown in Photo xx below
- Upgrading of existing undulated crossings to enable safe passage of vehicles. Works to be limited to removal of large boulders and stones within a 4m wide vehicle path and placement of suitable pavement type materials through the lower sections of the creek invert. An existing typical creek crossing on the existing access road is shown in Plates 1 and 2
- Minor drainage works to direct overland flows away from the roadway to prevent scouring and degradation of the road pavement.

Plate 1: Looking up access track from low point iun topgraphy

Plate 2: Section of access road looking down into topographical low point and back up

Planned on site construction activities will include:

- Thirteen week program
- Construction of a haul road from the proposed mine pit to the product storage pad
- Construction of cut off and diversion drains and diversion bunds
- Construction of a product storage pad
- Construction of a sedimentation dam
- Construction of a Mine Infrastructure Area including hardstand and parking areas for heavy and light vehicles and equipment and wastes storage area
- Installation of a self-bunded fuel tank and a bunded delivery and discharge area
- Installation of a workshop and a site management office
- Installation of a power supply generator.

During the construction phase of the project, the vehicles and equipment needed to undertake the above activities will be transported to site at commencement and other service type vehicles will regularly service the site for the duration of the mining activities. At the completion of the mining activities the majority of this equipment will be transported off site. Some of the vehicles and/or items of equipment may be retained for future operational type activities such as truck loading and road maintenance.

It is proposed that the construction workforce of approximately 10 persons will be bussed to the accommodation at Lady Annie at start and finish of each shift rotation and between the accommodation and proposed mine site on a daily basis. This will minimise the amount of daily vehicle movements.

The construction equipment likely to be used for the construction of the site facilities is:

- A Low loader to transport tracked equipment
- Excavator
- Motor Grader
- Rollers (smooth drum and possibly sheeps foot)
- Tracked dozer
- Rubber tyred loader
- Mining trucks
- Semi-trailer trucks
- Truck and dog trailers
- Rigid trucks.

Other mobile plant and equipment accessing the site during the construction period will include:

- Fuel / lube delivery trucks
- Waste services truck
- Busses
- Light vehicles (e.g. 4WD wagons and utes).

During the operational phase of the Project, traffic travelling to and from site will generally be limited to:

- Busses and light vehicles for personnel transport
- Fuel / lube delivery trucks
- Waste services truck
- Semi-trailers, B-Doubles or similar ore haul vehicles.

For the purposes of the Traffic Management Plan consultation has either commenced with, or will be undertaken with:

- Department of Natural Resources and Mines

- Mount Isa City local government
- CST Minerals, owner of Lady Annie Mine.

This traffic management plan provides an overview of the key traffic management outcomes to be implemented for the Project. It will be provided to the mining contractor who will develop a more detailed traffic management plan that is applicable to their proposed delivery methodology and the final detailed site plans. It is important this be developed in consultation with the quarry contractor to ensure their operation specific methodology and practices are implement within the major structural framework.

9.9.2 Potential Impacts

The Project traffic has the potential to impact on public and private road conditions and create safety and hazard management issues on public roads, along the access track and within the mining area.

9.9.3 Traffic Management Controls

ACTION	PERSON RESPONSIBLE	WHEN
All vehicles registered and obey traffic controls. All drivers licenced and experienced.	All personal	At all times
Undertake initial maintenance grade and undertake regular grading throughout the Project	Project Manager	At commencement of project then as needed.
Movement of heavy equipment and machinery to be in accordance with current road rules, where possible to be undertaken outside higher volume traffic times to minimise interaction with the public and considering property owner movements to and from the Barr Creek homestead.	Operators	At all times
Movement of heavy equipment and machinery to be in accordance with current Qld road rules and where possible to be undertaken considering property owner movements to and from the Barr Creek homestead.	Operators	At all times
Onsite traffic management plan to where possible include HV and LV separation and parking / loading / unloading areas for light and heavy vehicles, including designated personnel access paths.	Project Manager / Contractor	At all times
Standard operating procedures (SOP) to be developed by the mining operator to manage on site traffic.	Contractor	Prior to mobilisation to site
Designated separation between light and heavy vehicles around site where feasible.	Project Manager / Contractor	At all times
SOPs for site including specific zone designations, provision of radio equipment within all site vehicles to allow for communication between vehicles when entering and/or leaving specific zones, driver training and certification, daily Pre-Start meetings, ongoing monitoring of driver behaviour.	Project Manager / Contractor	At all times
Designated separation between personnel and vehicles around site where feasible. Clearly marked vehicle only and personnel only zones. Interaction zones to be governed by clearly defined SOP.	Project Manager / Contractor	At all times
SOPs for site including pedestrian and driver training, daily Pre-Start	Project Manager	Developed prior

meetings, ongoing monitoring of pedestrian and driver behaviour, clear signposting and markings.	/ Contractor	to mobilisation to site
During travel, continuous radio communications to be maintained.	Operators	At all times
Dedicated pull off bays to be established in existing cleared zone alongside the access track at intervals suitable to ensure radio communications are achieved between vehicles travelling on the access track.	Project Manager	Access track construction
SOP established to define a radio channel and frequency suitable for site use and local travellers use. Consider use of signage at Lady Annie end of the access track advising of transport movements and radio call up protocol.	Project Manager / Contractor	Developed prior to mobilisation to site
SOP established to require a call up at each pull of zone to establish that the access track is clear up to the next clear zone.	Project Manager / Contractor	Developed prior to mobilisation to site
Transport vehicles to be fitted with monitoring devices to ensure Federal and State road rules and regulations adhered to by all drivers	Operators	Developed prior to mobilisation to site
Drivers to be included in site random drug and Alcohol testing program.	Project Manager / Contractor	At all times
Transport operator required to ensure that lead time between trucks allows for adverse conditions to clear (dust) well in advance of a following vehicle.	Operator	During truck movements
Clear demarcation of designated loading zones at the product storage area	Project Manager / Contractor	At all times
SOP for priority of vehicles within the product storage area	Project Manager / Contractor	Developed prior to mobilisation to site
Wherever possible busses used to transport personnel from the accommodation site and a drop off / pick up point in Mt Isa.	Project Manager / Contractor	At all times
Use of private vehicles to travel to the accommodation to not be condoned except in extenuating circumstances.	Project Manager / Contractor	At all times
Busses used to transport personnel to and from the accommodation site to the mine site. Managers / supervisors may be considered exempt and permitted to travel in 4WD vehicles as they will be required on site.	Project Manager / Contractor	At all times
Use of private vehicles to travel to the site banned.	All staff	At all times

9.10 WASTE MANAGEMENT PLAN

9.10.1 Overview

During the course of the project, domestic and industrial waste will be generated. PI's underlying philosophy is to reduce, reuse and recycle. The risk assessment process identified a number of potential sources of waste along with mitigation controls. Not only is waste a potential source of pollution but poor waste management practices also have the potential to lead to impacts to stakeholders and community relationships.

9.10.2 Potential Impacts

Uncontrolled, or poorly controlled, waste has the potential to create poor site hygiene and contaminated areas.

9.10.3 Environmental Controls

ACTION	PERSON RESPONSIBLE	WHEN
Wastes requiring disposal will be transported by a licensed waste carrier to an appropriate licensed waste landfill and records kept.	Contractor	Entire project
Waste segregation will be undertaken, isolating general waste (packing timber, steel, wire, cables, aluminium, clay/sand/gravel, concrete, paper, cardboard, plastic, food waste) from regulated waste (waste oils, oil filters, oily rags, used absorbent, old chemical/paint/fuel/oil drums, batteries, acids, alkalis, welding rods, sewerage sludge, and used tyres) and separate recyclable material.	Contractor	Entire project
All waste will be collected and transported off site for disposal or recycling.	Contractor	Entire project
Recyclable wastes (include batteries, tyres, glass, paper, scrap metal, aluminium cans and timber) is to be transferred by a licensed waste carrier to an appropriate recycling facility where possible.	Contractor	Entire project
Waste must be stored neatly in appropriately labelled bins, containers or stockpiles; with hazardous wastes stored in such a manner that stormwater run-off does not come into contact with the waste.	Contractor	Entire project
Waste collection bins/areas will be located on site and minimise the amount of waste generated through avoidance, re-use and recycling strategies.	Contractor	Entire project
Records of the following will be kept: • Date of pickup of waste • Description of waste • Cross reference to the relevant waste transport documentation • Quantity of waste • Origin of waste • Destination of waste • Intended fate of waste, e.g. type of waste treatment, reprocessing or disposal.	Contractor	Entire project
Records of each waste transfer will be kept on site at all times until the completion of the Project. Monthly reports will be provided by the waste disposal contractor to PI detailing all waste transfers.	Contractor	Entire project
Used spill kit material will be disposed of in accordance with the requirements of the material cleaned up with the spill kit.	Contractor	Entire project
Temporary amenities will be implemented, including portable toilets. These amenities will be serviced by the service provider with all wastes to be removed and disposed of off-site, by a private contractor, in accordance with relevant legislation and local policies. All amenities will be isolated at the end of each shift to prevent overflow.	Contractor	Entire project
All personnel must use ablution facilities at all times.	All	Entire project
Personnel caught not using ablution facilities may be ejected from site, at the discretion of PI.	All	Entire project

9.11 WATER QUALITY MANAGEMENT PLAN

9.11.1 Overview

Management of water quality is a key objective for the effective delivery of environmental management in this Project. Risks to both ground and surface water were assessed through the risk assessment. While no significant risk to groundwater was identified, there is a potential risk to surface water requiring careful management.

The outcomes of the risk assessment and guidance provided in surface and stormwater management guidelines (DEHP 2016) were used to design the surface water management infrastructure and other site infrastructure (e.g. pits, roads, etc) concurrently (Figure 6). This holistic design approach has allowed for an efficient design that not only meets the requirement of relevant guidelines but also minimises the area required for the Project.

9.11.2 Potential Impacts

Key potential impacts to water quality for this project are associated with surface water. Increased potential for sedimentation and erosion and spills of hazardous materials area the key risks to water quality. Despite the focus on surface water quality management many of the environmental controls would be the same applied to manage potential impacts to ground water.

9.11.3 Environmental Controls

ACTION	PERSON RESPONSIBLE	WHEN
Spill kits will be located with plant, equipment and at hazardous material storage sites.	Contractor	Entire project
Chemicals, fuels and other contaminants on floating plant will be stored in a bund to prevent uncontrolled spills.	Contractor	Entire project
All employees will be trained in spill response (in Project Specific Induction).	All	Induction
All plant, equipment and vehicles to be inspected and repaired as necessary prior to operation to identify any operational faults or leaks.	Operators	Entire project
All plant, equipment and vehicles to be inspected (daily), maintained and repaired as necessary throughout the project.	Operators	Entire project
Plant, equipment and vehicle maintenance records will be kept.	Operators	Entire project
Fuel tanks will be monitored regularly and maintained to prevent leakage.	Operators	Entire project
Fuel tanks will have cut off valves.	Contractor	Entire project
Absorbents will be used to clean up spills.	Operators	Entire project
Road designs will incorporate water management and controls.	Project Manager / Contractor	Project planning
Erosion and sediment control plans will be prepared for road construction and maintenance activities.	Project Manager	Project planning
Drainage lines, diversion drains, channels and batter chutes (where applicable) designed to manage runoff: - have been designed to manage 1 in 10 storm event - have been designed to capture most events, including capture of sediment and release rates to allow for future events.	Project Manager	Project planning

9.12 WEEDS AND PESTS MANAGEMENT PLAN

9.12.1 Overview

Movement of machinery from one location to the other has the potential to spread weeds and pests to the site. Potential sources of weeds and pests were identified during the risk assessment process. Once the potential sources were identified appropriate management and mitigation opportunities were developed.

9.12.2 Potential Impacts

Weeds and pests have the potential to cause environmental and economic harm. Environmentally they can invade areas and change the ecology of an area. Economically, they have the potential to reduce food for stock if they are unpalatable and outcompete feed species.

9.12.3 Environmental Controls

ACTION	PERSON RESPONSIBLE	WHEN
All vehicles to be free of dirt and seeds, and reproductive material, and be clean before arrival.	Project Manager / Contractor	Pre-mobilisation
All vehicles are to come clean and leave clean.	Operators	Entire project
Vehicles to carry documentation stating they have been cleaned prior to mobilising to site.	Operators	Entire project
Inspect all vehicles entering the site for signs of weed and pests; treat appropriately if present.	Contactor	Entire project
Reject any vehicles that are dirty and can't be treated appropriately before entering the site.	Project Manager / Contractor	Entire project
Inspect all material leaving site for signs of weeds or pests; treat appropriately if present.	Contractor	Entire project
Vehicle cleaning station to be provided to clean vehicles prior to leaving site.	Contractor	Entire project
Undertake visual inspections monthly for weeds on site and implement appropriate actions if weeds are becoming established on site.	Contractor - while onsite, Project Manager - when Contractor leaves site	Entire project
Mobile plant and equipment is to be restricted to designated routes.	Contractor - while onsite Project Environmental Advisor - Contractor leaves site	Entire project
Weed inspections to be undertaken prior to the commencement of track upgrades, then pre and post wet season for the life of the project.	Contractor - while onsite, Project Environmental Advisor - Contractor leaves site	Entire project

Management plan to list declared weeds known to be in area based on mapping or site specific assessment and attach specific control measures for each species.	Project Environmental Advisor	Project planning

10 REFERENCES

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Appendix A – Regional Ecosystem Biodiversity Status Report

Queensland Government

Department of Environment and Heritage Protection

Environmental Reports

Regional Ecosystems

Biodiversity Status

Area of Interest: Longitude: 139.16908 Latitude: -19.57778

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or area of interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "Central co-ordinates" option, the resulting assessment area encompasses an area extending for a 2km radius from the input coordinates.

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 1994). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

The matters of interest reported on in this document are based upon available state mapped datasets. Where the report indicates that a matter of interest is not present within the AOI (e.g. where area related calculations are equal to zero, or no values are listed), this may be due either to the fact that state mapping has not been undertaken for the AOI, that state mapping is incomplete for the AOI, or that no matters of interest have been identified within the site.

The information presented in this report should be considered as a guide only and field survey may be required to validate values on the ground.

Important Note to User

Information presented in this report is based upon the Queensland Herbarium's Regional Ecosystem framework. The Biodiversity Status has been used to depict the extent of "Endangered", "Of Concern" and "No Concern at Present" regional ecosystems in all cases, rather than the status used for the purposes of the *Vegetation Management Act 1999* (VMA). Mapping and figures presented in this document reflect the Queensland Herbarium's Remnant and Pre-clearing Regional Ecosystem Datasets, and not the certified mapping used for the purpose of the VMA.

For matters relevant to vegetation management under the VMA, please refer to the Department of Natural Resources and Mines website

https://www.dnrm.qld.gov.au/

Please direct queries about these reports to: Queensland.Herbarium@dsitia.qld.gov.au

Disclaimer

Whilst every care is taken to ensure the accuracy of the information provided in this report, the Queensland Government makes no representations or warranties about its accuracy, reliability, completeness, or suitability, for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which the user may incur as a consequence of the information being inaccurate or incomplete in any way and for any reason.

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Summary Information

The following table provides an overview of the AOI with respect to selected topographic and environmental themes. Refer to **Map 1** for locality information.

Table 1: Area of interest details

Area of Interest	139.16908,-19.57778 with 2 kilometre radius
Size (ha)	1256.6
Local Government(s)	MOUNT ISA CITY
Bioregion(s)	Northwest Highlands
Subregion(s)	Mount Isa Inlier
Catchment(s)	Nicholson

The table below summarizes the extent of remnant vegetation classed as "Endangered", "Of concern" and "No concern at present" classified by Biodiversity Status within the area of interest (AOI).

Table 2: Summary table, biodiversity status of regional ecosystems within the AOI

Biodiversity Status	Area (Ha)	% of AOI
Endangered	24.2	1.9
Of concern	131.0	10.4
No concern at present	510.7	40.6
Total remnant vegetation	665.8	53.0

Refer to **Map 2** for further information.

Regional Ecosystems

1. Introduction

Regional ecosystems are vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil. Descriptions of Queensland's Regional ecosystems are available online from the Regional Ecosystem Description Database (REDD). Descriptions are compiled from a broad range of information sources including vegetation, land system and geology survey and mapping and detailed vegetation site data. The regional ecosystem is regularly reviewed as new information becomes available. A number of vegetation communities may form a single regional ecosystem and are usually distinguished by differences in dominant species, frequently in the shrub or ground layers and are denoted by a letter following the regional ecosystem code (e.g. a, b, c).

The Queensland Herbarium has developed a methodology for mapping regional ecosystems across Queensland. As new information is obtained, the descriptions and status of regional ecosystems is updated. Regional ecosystems and broad vegetation groups descriptions in the format of Sattler and Williams (1999) are maintained in the Regional Ecosystem Description Database (REDD). Vegetation communities and regional ecosystems are amalgamated into the higher level classification of broad vegetation groups (BVGs).

This report provides information on the type, status, and extent of vegetation communities, regional ecosystems and broad vegetation groups present within a user specified area of interest. Please note, for the purpose of this report, the Biodiversity Status is used. This report has not been developed for application of matters relevant to the *Vegetation Management Act 1999* (VMA). Additionally, information generated in this report has been derived from the Queensland Herbarium's Regional Ecosystem Mapping, and not mapping certified for the purposes of the VMA. If your interest/matter relates to regional ecosystems and the VMA, users should refer to the Department of Natural Resources and Mines website.

https://www.dnrm.qld.gov.au/

With respect to the Queensland Biodiversity Status,

"Endangered" regional ecosystems are described as those where:

- remnant vegetation is less than 10 per cent of its pre-clearing extent across the bioregion; or 10-30% of its pre-clearing extent remains and the remnant vegetation is less than 10,000 hectares, or
- less than 10 per cent of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss*, or
- 10-30 per cent of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss and the remnant vegetation is less than 10,000 hectares; or
- it is a rare** regional ecosystem subject to a threatening process.***

"Of concern" regional ecosystems are described as those where:

- the degradation criteria listed above for 'Endangered' regional ecosystems are not met and,
- remnant vegetation is 10-30 per cent of its pre-clearing extent across the bioregion; or more than 20 per cent of its pre-clearing extent remains and the remnant extent is less than 10,000 hectares, or
- 10-30 percent of its pre-clearing extent remains unaffected by moderate degradation and/or biodiversity loss.****

and "No concern at present" regional ecosystems are described as those where:

- remnant vegetation is over 30 per cent of its pre-clearing extent across the bioregion, and the remnant area is greater than 10,000 hectares, and
- the degradation criteria listed above for 'Endangered' or 'Of concern' regional ecosystems are not met.

**Severe degradation and/or biodiversity loss is defined as: floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 50 years even with the removal of threatening processes; or soil surface is severely degraded, for example, by loss of A horizon, surface expression of salinity; surface compaction, loss of organic matter or sheet erosion.*

***Rare regional ecosystem: pre-clearing extent (1000 ha); or patch size (100 ha and of limited total extent across its range).*

****Threatening processes are those that are reducing or will reduce the biodiversity and ecological integrity of a regional ecosystem. For example, clearing, weed invasion, fragmentation, inappropriate fire regime or grazing pressure, or infrastructure development.*

*****Moderate degradation and/or biodiversity loss is defined as: floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 20 years even with the removal of threatening processes; or soil surface is moderately degraded.*

2. Remnant Regional Ecosystems

The following table identifies the remnant regional ecosystems and vegetation communities mapped within the AOI, the associated short description, Biodiversity Status using the Queensland Herbarium's framework and the extent area present within the selected AOI. Please note, where heterogeneous vegetated patches (mixed patches of remnant vegetation mapped as containing multiple regional ecosystems) occur within the AOI, they have been split and listed as individual regional ecosystems (or vegetation communities where present) for the purposes of the table below. In such instances, associated area figures have been generated based upon the estimated proportion of each regional ecosystem (or vegetation community) predicted to be present within the larger mixed patch.

Table 3: Remnant regional ecosystems, description and status within the AOI

Regional Ecosystem	Short Description	BD Status	Area (Ha)	% of AOI
1.11.11	None	None	58.8	4.7
1.11.2a	Eucalyptus leucophloia low open woodland	No concern at present	164.2	13.1
1.11.8	None	None	10.7	0.9
1.3.15	None	None	84.6	6.7
1.3.6a	Corymbia aparrerinja, Corymbia terminalis open woodland on sandy terraces	Of concern	12.1	1.0
1.3.6e	None	None	6.1	0.5
1.3.7b	Eucalyptus camaldulensis woodland on channels and levees (south)	Endangered	24.2	1.9
1.5.1	Eucalyptus miniata woodland on red earths on laterised plateaus	Of concern	118.9	9.5
1.5.13	None	None	174.0	13.8
1.7.1a	Eucalyptus leucophloia low open woodland on skeletal soils on lateritic scarps and plateaus	No concern at present	346.5	27.6
1.7.5a	None	None	4.6	0.4
1.7.5b	None	None	120.0	9.5
1.7.7a	None	None	111.0	8.8
1.7.7b	None	None	21.0	1.7

Refer to **Map 2** for further information. **Map 3** also provides a visual estimate of the distribution of regional ecosystems present before European settlement.

Table 4 provides further information in regards to the remnant regional ecosystems present within the site with respect to the extent of remnant vegetation remaining within the bioregion, the 1:1,000,000 broad vegetation group (BVG) classification, whether the regional ecosystem is identified as a wetland, and extent of representation in Queensland's Protected Area Estate. For a description of the vegetation communities within the AOI and classified according to the 1:1,000,000 BVG, refer to **Table 6**.

Table 4: Remnant regional ecosystems within the AOI, additional information

Regional Ecosystem	Remnant Extent	BVG (1 Million)	Wetland	Representation in protected estate
1.11.11	None	None	None	None
1.11.2a	In 2013, remnant extent was > 10,000 ha and >30% of the pre-clearing area remained	19a	None	Low
1.11.8	None	None	None	None
1.3.15	None	None	None	None
1.3.6a	In 2013, remnant extent was > 10,000 ha and >30% of the pre-clearing area remained	16c	Floodplain (other than floodplain wetlands).	Low
1.3.6e	None	None	None	None
1.3.7b	In 2013, remnant extent was > 10,000 ha and >30% of the pre-clearing area remained	16a	Riverine wetland or fringing riverine wetland.	Low
1.5.1	In 2013, remnant extent was > 10,000 ha and >30% of the pre-clearing area remained	14b	None	Low
1.5.13	None	None	None	None
1.7.1a	In 2013, remnant extent was > 10,000 ha and >30% of the pre-clearing area remained	19a	None	Low
1.7.5a	None	None	None	None
1.7.5b	None	None	None	None
1.7.7a	None	None	None	None
1.7.7b	None	None	None	None

Representation in Protected Area Estate: High greater than 10% of pre-clearing extent is represented; Medium 4 - 10% is represented; Low less than 4% is represented, No representation.

Map 6 displays the distribution of mapped wetland systems within the area of interest.

The following table lists known special values associated with a regional ecosystem type.

Table 5: Remnant regional ecosystems within the AOI, special values

Regional Ecosystem	Special Values
1.11.11	None
1.11.2a	None
1.11.8	None
1.3.15	None
1.3.6a	Significant sub-regional fauna habitat due to the number and size of trees with hollows.
1.3.6e	None
1.3.7b	Important seasonal water bird habitat; regional corridor for fauna.
1.5.1	None
1.5.13	None
1.7.1a	None
1.7.5a	None

Regional Ecosystem	Special Values
1.7.5b	None
1.7.7a	None
1.7.7b	None

3. Remnant Regional Ecosystems by Broad Vegetation Group

BVGs are a higher-level grouping of vegetation communities. Queensland encompasses a wide variety of landscapes across temperate, wet and dry tropics and semi-arid climatic zones. BVGs provide an overview of vegetation communities across the state or a bioregion and allow comparison with other states. There are three levels of BVGs which reflect the approximate scale at which they are designed to be used: the 1:5,000,000 (national), 1:2,000,000 (state) and 1:1,000,000 (regional).

A comprehensive description of BVGs is available at:

https://publications.qld.gov.au/dataset/vegetation-qld/resource/921fa786-e6d5-4a8a-9b0c-e532d2ce3f32

The following table provides a description of the 1:1,000,000 BVGs present and their associated extent within the AOI.

Table 6: Broad vegetation groups (1 million) within the AOI

BVG (1 Million)	Description	Area (Ha)	% of AOI
None	None	590.7	47.0
14b	Woodlands dominated by Eucalyptus tetrodonta (Darwin stringybark) (or E. megasepala (Melville Island bloodwood)) or E. chartaboma (or E. miniata (Darwin woollybutt)), with Corymbia clarksoniana (grey bloodwood) on erosional surfaces, residual sands and occasionally alluvial plains. (land zones 5, 3, 7, 10, 2) (CYP, GUP, EIU, NWH, [DEU])	118.9	9.5
16a	Open forest and woodlands dominated by Eucalyptus camaldulensis (river red gum) (or E. tereticornis (blue gum)) and/or E. coolabah (coolabah) (or E. microtheca (coolabah)) fringing drainage lines. Associated species may include Melaleuca spp., Corymbia tessellaris (carbeen), Angophora spp., Casuarina cunninghamiana (riveroak). Does not include alluvial areas dominated by herb and grasslands or alluvial plains that are not flooded. (land zone 3) (MGD, BRB, GUP, CHC, MUL, DEU, EIU, NWH, SEQ, [NET, WET]) (All bioregions except CYP and CQC)	24.2	1.9
16c	Woodlands and open woodlands dominated by Eucalyptus coolabah (coolabah) or E. microtheca (coolabah) or E. largiflorens (black box) or E. tereticornis (blue gum) or E. chlorophylla on floodplains. Does not include alluvial areas dominated by herb and grasslands or alluvial plains that are not flooded. (land zone 3) (All bioregions except WET, principally GUP, BRB, MUL).	12.1	1.0
19a	Low open woodlands dominated by Eucalyptus leucophloia (snappy gum) with Triodia spp. dominated ground layer, mainly on hills and ranges. (land zones 11, 7, 5, 12, 9, 10) (NWH, GUP, MGD)	510.7	40.6

Refer to **Map 4** for further information. **Map 5** also provides a representation of the distribution of vegetation communities as per the 1:5,000,000 BVG believed to be present prior to European settlement.

4. Technical and BioCondition Benchmark Descriptions

Technical descriptions provide a detailed description of the full range in structure and floristic composition of regional ecosystems (e.g. 11.3.1) and their component vegetation communities (e.g. 11.3.1a, 11.3.1b). See:

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/technical-descriptions/

The descriptions are compiled using site survey data from the Queensland Herbarium's CORVEG database. Distribution maps, representative images (if available) and the pre-clearing and remnant area (hectares) of each vegetation community derived from the regional ecosystem mapping (spatial) data are included. The technical descriptions should be used in conjunction with the fields from the regional ecosystem description database (REDD) for a full description of the regional ecosystem.

Quantitative site data from relatively undisturbed sites are extracted from CORVEG and summarized to provide information specific to each vegetation community.

Technical descriptions include the attributes: tree canopy height and cover and native plant species composition of the predominant layer, which are used to assess the remnant status of vegetation under the *Vegetation Management Act 1999*.

However, as technical descriptions reflect the full range in structure and floristic composition across the climatic, natural disturbance and geographic range of the regional ecosystem, local reference sites should be used where possible (Neldner et al. 2012 (PDF)* section 3.3.1 of:

http://www.qld.gov.au/environment/assets/documents/plants-animals/herbarium/herbarium-mapping-methodology.pdf

The technical descriptions are subject to review and are updated as additional data becomes available.

When conducting a BioCondition assessment, these technical descriptions should be used in conjunction with BioCondition benchmarks for the specific regional ecosystem, or component vegetation community.

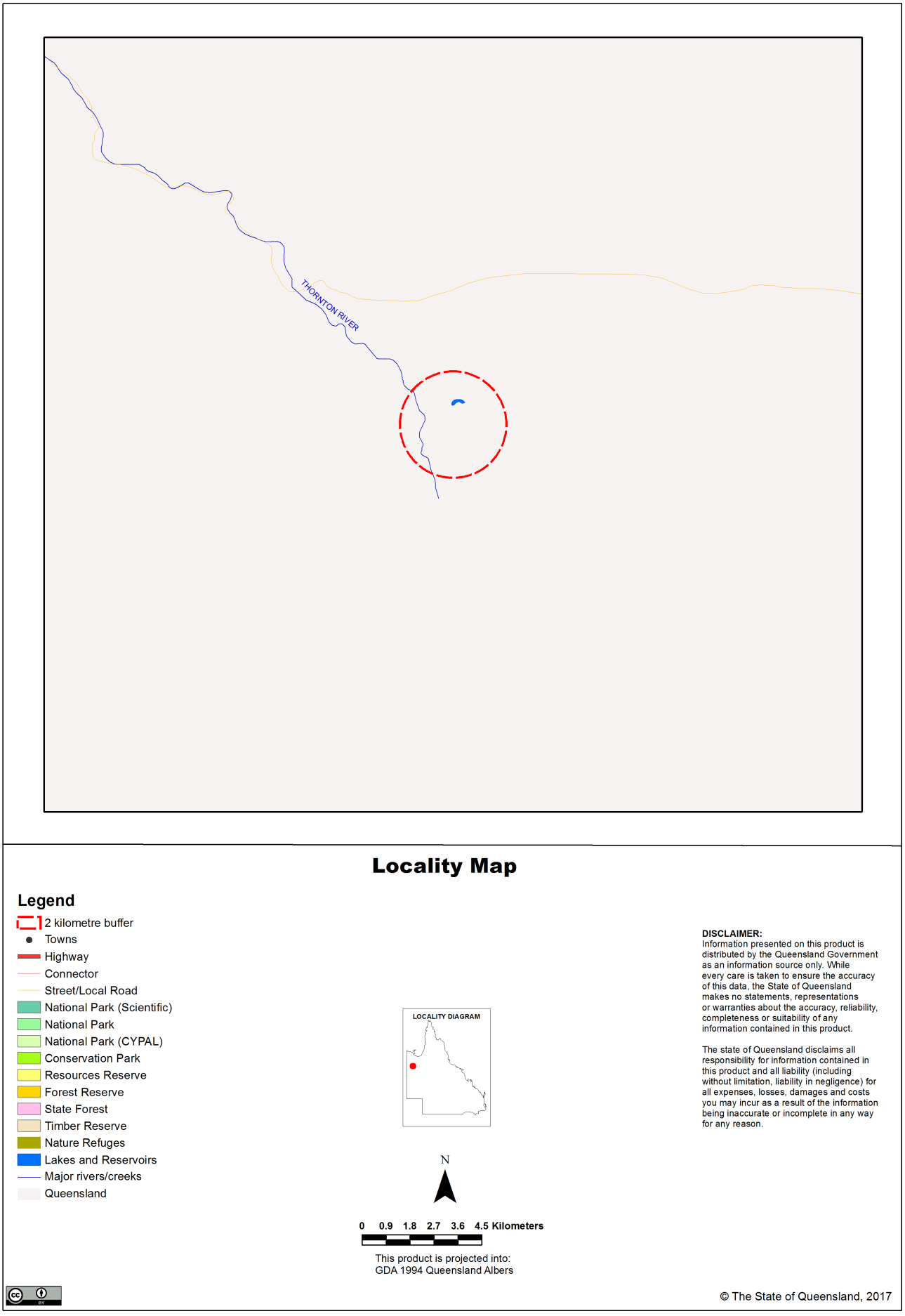
http://www.qld.gov.au/environment/plants-animals/biodiversity/benchmarks/

Benchmarks are subject to review based on additional data and expert opinion. Benchmarks are based on a combination of quantitative and qualitative information and should be used as a guide only. Benchmarks are specific to one regional ecosystem vegetation community, however, the natural variability in structure and floristic composition under a range of climatic and natural disturbance regimes has been considered throughout the geographic extent of the regional ecosystem. Local reference sites should be used for this spatial and temporal (seasonal and annual) variability.

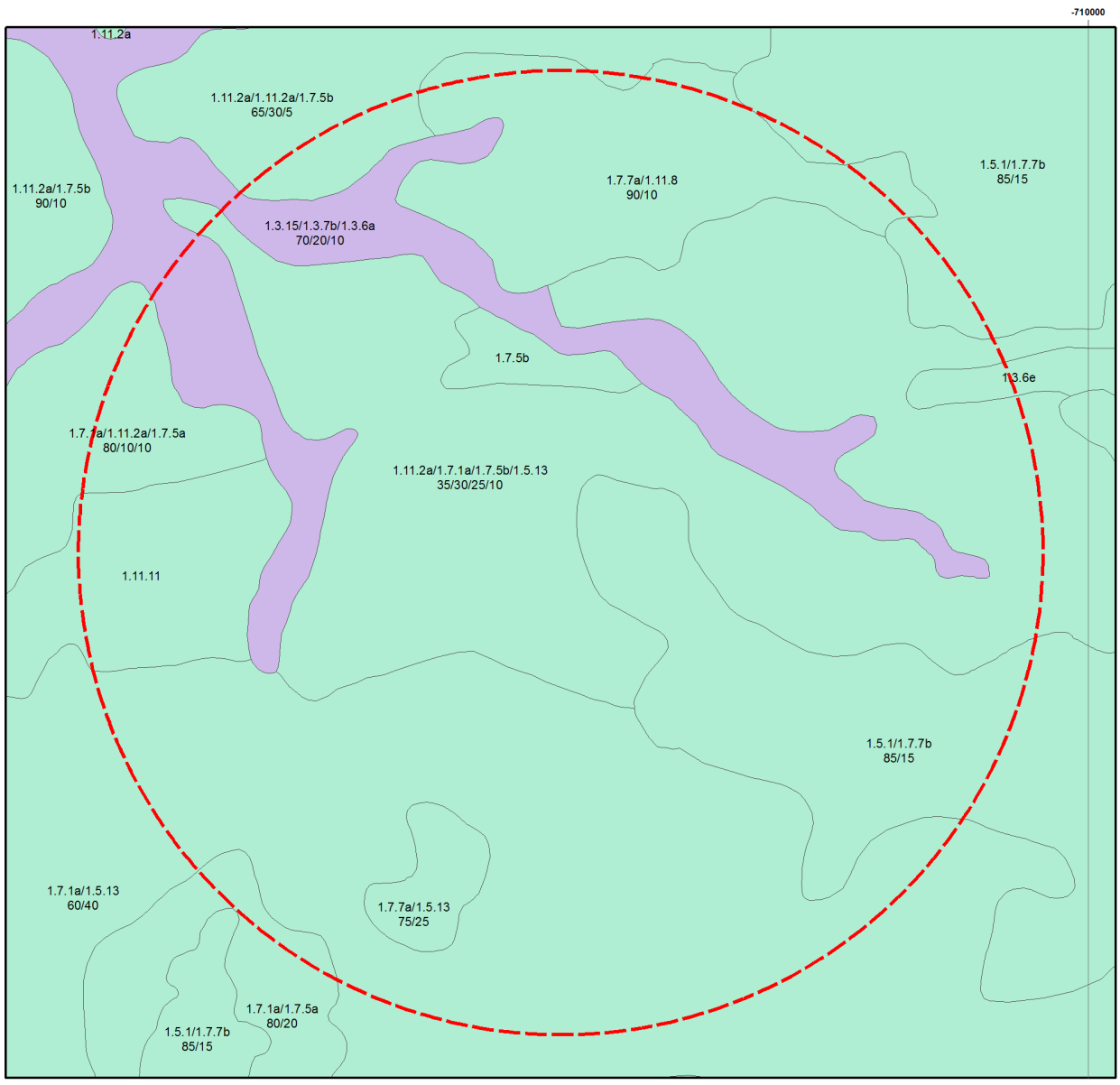
Table 7: List of remnant regional ecosystems within the AOI for which technical and biocondition benchmark descriptions are available

Regional ecosystems mapped as within the AOI	Technical Descriptions	Biocondition Benchmarks
1.11.11	Not currently available	Not currently available
1.11.2a	Not currently available	Not currently available
1.11.8	Not currently available	Not currently available
1.3.15	Not currently available	Not currently available
1.3.6a	Not currently available	Not currently available
1.3.6e	Not currently available	Not currently available
1.3.7b	Not currently available	Available
1.5.1	Not currently available	Not currently available
1.5.13	Not currently available	Not currently available
1.7.1a	Not currently available	Not currently available
1.7.5a	Not currently available	Not currently available
1.7.5b	Not currently available	Not currently available
1.7.7a	Not currently available	Not currently available
1.7.7b	Not currently available	Not currently available

Maps
Map 1 - Location



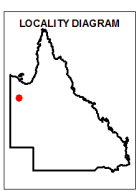
Map 2 - Remnant regional ecosystems

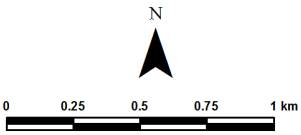


Remnant 2015 Regional Ecosystems

Biodiversity Status

- 2 kilometre buffer
- Endangered - Dominant vegetation
- Endangered - Sub-dominant
- Of Concern - Dominant
- Of Concern - Sub-dominant
- No concern at present
- Non-remnant vegetation, cultivated or built environment
- Plantation
- Water
- Cadastral Boundaries





This product is projected into GDA 1994 Queensland Albers

Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem linework reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The precision of polygon boundaries or positional accuracy of linework is 100 metres.

Regional ecosystems are defined as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil.

The polygons are labelled by regional ecosystem (RE); where more than one RE occurs, the percentage of each is labelled. The label consists of 3 components: bioregion, land zone, and vegetation community – the dominant canopy species. e.g.: RE 12.3.3. Descriptions of REs are found online. Use the search term "Regional Ecosystem Framework".

Regional ecosystem mapping at 1:100,000 map scale is derived from the following sources: 1:80,000 B&W 1960's aerial photography, Landsat TM imagery, geology, soils, land systems data, field survey and historical records.

Remnant woody vegetation is defined as vegetation that has not been cleared or vegetation that has been cleared but where the dominant canopy has >70% of the height and >50% of the cover relative to the undisturbed height and cover of that stratum and is dominated by species characteristic of the vegetation's undisturbed canopy.

Non-remnant vegetation includes regrowth and disturbed native vegetation.

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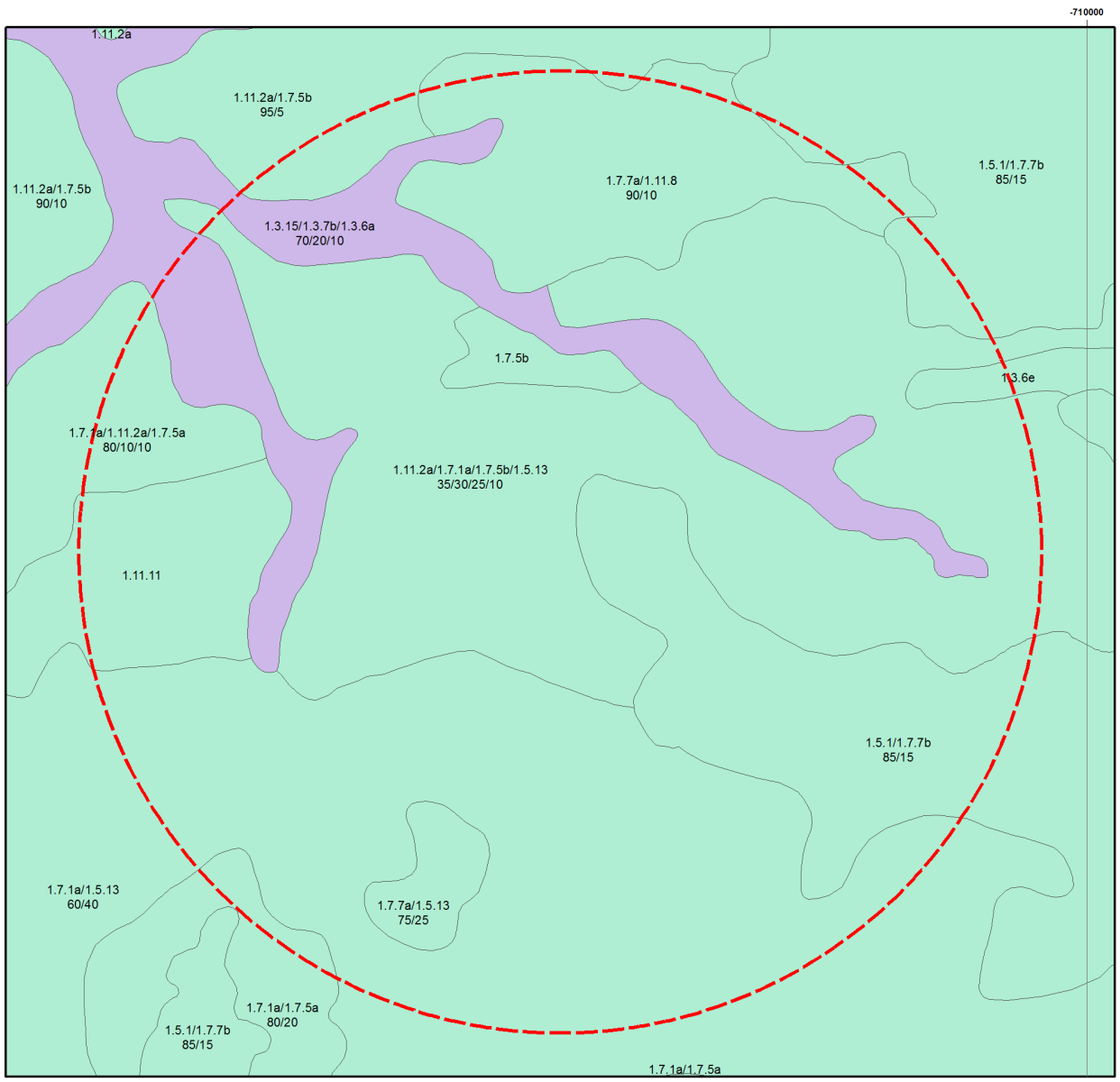
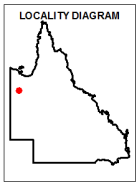
Map 3 - Pre-clearing remnant regional ecosystems

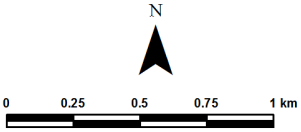


Pre-clearing Regional Ecosystems

Biodiversity Status

- 2 kilometre buffer
- Endangered - Dominant vegetation
- Endangered - Sub-dominant
- Of Concern - Dominant
- Of Concern - Sub-dominant
- No concern at present
- Water
- Cadastral Boundaries





This product is projected into GDA 1994 Queensland Albers

Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem linework reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The precision of polygon boundaries or positional accuracy of linework is 100 metres.

Regional ecosystems are defined as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil.

The polygons are labelled by regional ecosystem (RE); where more than one RE occurs, the percentage of each is labelled. The label consists of 3 components: bioregion, land zone, and vegetation community – the dominant canopy species. e.g.: RE 12.3.3. Descriptions of REs are found online. Use the search term "Regional Ecosystem Framework".

Regional ecosystem mapping at 1:100,000 map scale is derived from the following sources: 1:80,000 B&W 1960's aerial photography, Landsat TM imagery, geology, soils, land systems data, field survey and historical records.

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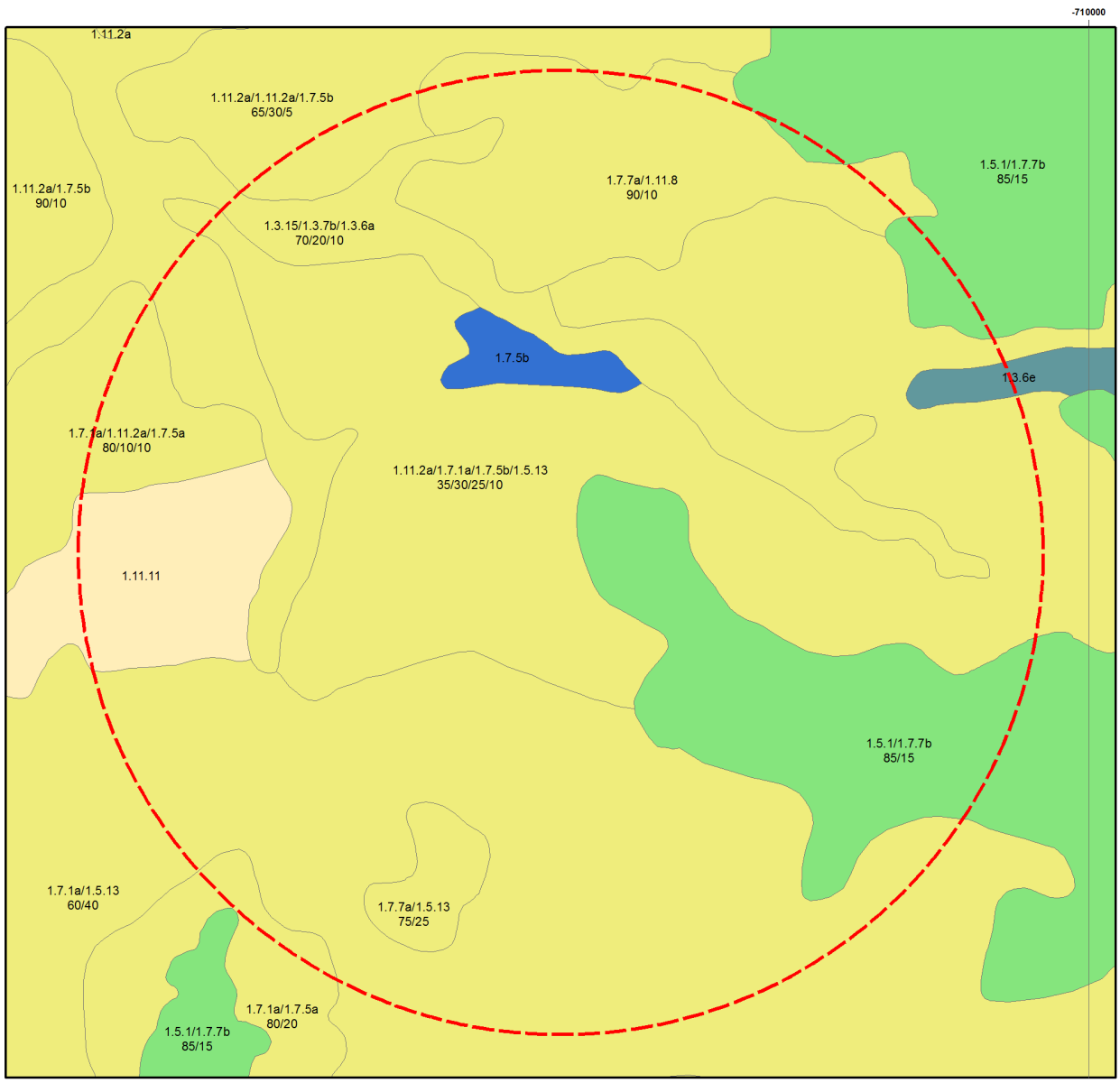
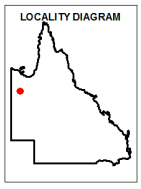
Map 4 - Remnant regional ecosystems by BVG (5M)

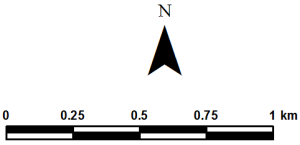


Remnant 2015 Regional Ecosystems coloured by Broad Vegetation Groups

Broad Vegetation Groups
BVG5M Description (BVG1M codes)

- 2 kilometre buffer
- 1. Rainforests and scrubs (1-7b)
- 2. Wet eucalypt open forests (8-8b)
- 3. Eucalypt woodlands to open forests (mainly eastern Qld) (9-15b)
- 4. Eucalypt open forests to woodlands on floodplains (16-16d)
- 5. Eucalypt dry woodlands on inland depositional plains (17-18d)
- 6. Eucalypt low open woodlands usually with spinifex understorey (19-19d)
- 7. Callitris woodland - open forests (20a)
- 8. Melaleuca open woodlands on depositional plains (21-22c)
- 9. Acacia aneura (mulga) dominated open forests, woodlands and shrublands (23-23b)
- 10. Other acacia dominated open forests, woodlands and shrublands (24-26a)
- 11. Mixed species woodlands, open woodland - (inland bioregions) includes wooded downs (27-27c)
- 12. Other coastal communities or heaths (28-29b)
- 13. Tussock grasslands, forblands (30-32b)
- 14. Hummock grasslands (33-33b)
- 15. Wetlands (swamps and lakes) (34-34g)
- 16. Mangroves and saltmarshes (35-35b)
- Non-remnant vegetation, cultivated or built environment
- Water
- Cadastral Boundaries





This product is projected into GDA 1994 Queensland Albers

Broad Vegetation Groups (BVG) of Queensland are applied by look up table to the regional ecosystem vegetation communities. Each polygon is coloured by the dominant BVG5M and the component regional ecosystems labelled. Where more than one regional ecosystem occurs, the percentage of each is labelled.
Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem linework reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The precision of polygon boundaries or positional accuracy of linework is 100 metres.
Regional ecosystems are defined as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil. The label consists of 3 components: bioregion, land zone, and vegetation community – the dominant canopy species. e.g.: RE 12.3.3. Descriptions of REs are found online. Use the search term "Regional Ecosystem Framework".
Regional ecosystem mapping at 1:100,000 map scale is derived from the following sources: 1:80,000 B&W 1960's aerial photography, Landsat TM imagery, geology, soils, land systems data, field survey and historical records.
Remnant woody vegetation is defined as vegetation that has not been cleared or vegetation that has been cleared but where the dominant canopy has >70% of the height and >50% of the cover relative to the undisturbed height and cover of that stratum and is dominated by species characteristic of the vegetation's undisturbed canopy.
Non-remnant vegetation includes regrowth and disturbed native vegetation.

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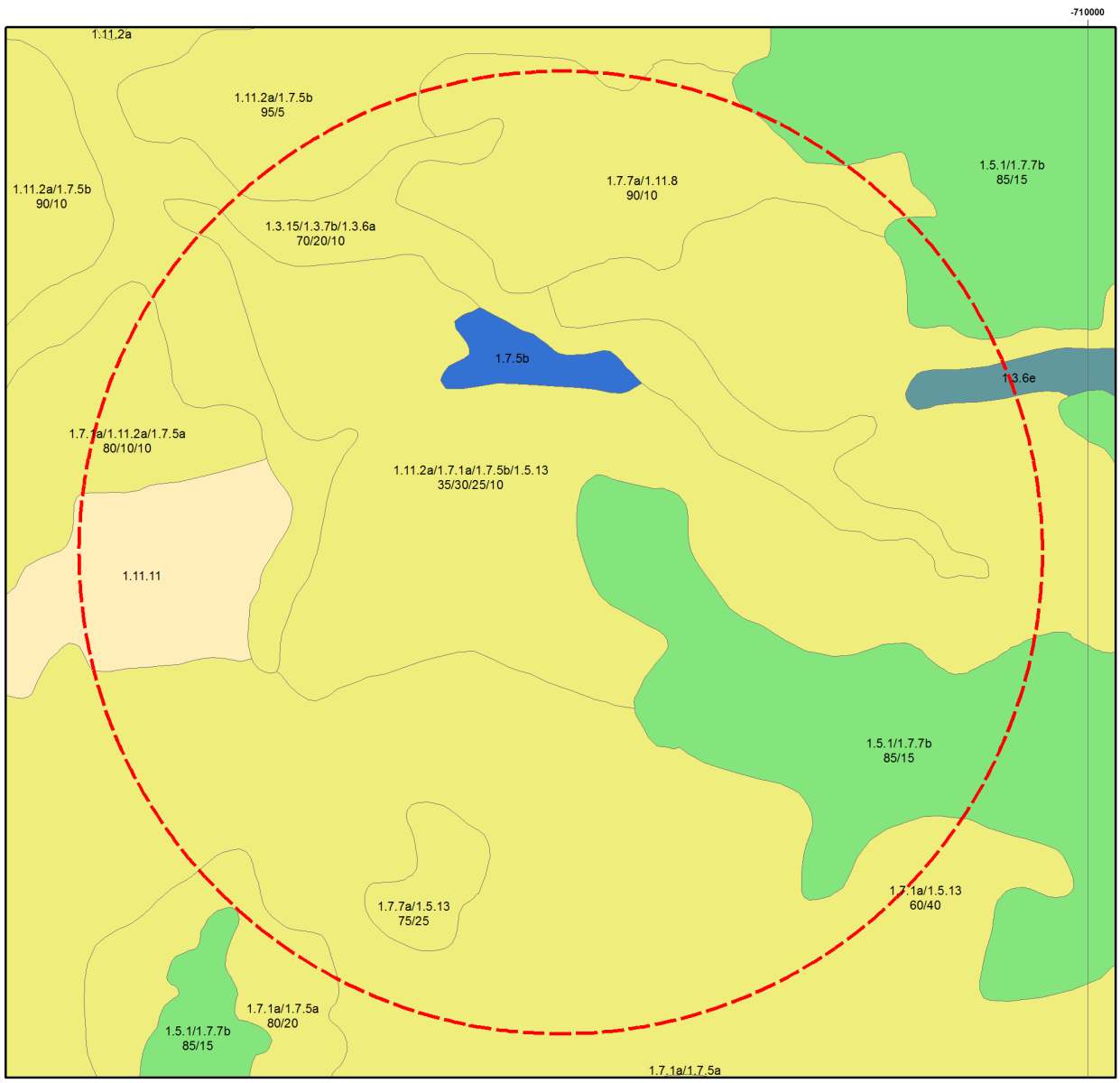
Map 5 - Pre-clearing remnant regional ecosystems by BVG (5M)



Pre-clearing Regional Ecosystems coloured by Broad Vegetation Groups

Broad Vegetation Groups
BVG5M Description (BVG1M codes)

- 2 kilometre buffer
- 1. Rainforests and scrubs (1-7b)
- 2. Wet eucalypt open forests (8-8b)
- 3. Eucalypt woodlands to open forests (mainly eastern Qld) (9-15b)
- 4. Eucalypt open forests to woodlands on floodplains (16-16d)
- 5. Eucalypt dry woodlands on inland depositional plains (17-18d)
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- 7. Callitris woodland - open forests (20a)
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- 10. Other acacia dominated open forests, woodlands and shrublands (24-26a)
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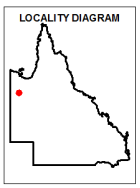
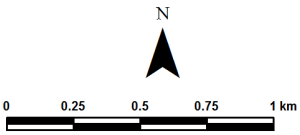
- 12. Other coastal communities or heaths (28-29b)
- 13. Tussock grasslands, forblands (30-32b)
- 14. Hummock grasslands (33-33b)
- 15. Wetlands (swamps and lakes) (34-34g)
- 16. Mangroves and saltmarshes (35-35b)
- Water
- Cadastral Boundaries





This product is projected into GDA 1994 Queensland Albers

Broad Vegetation Groups (BVG) of Queensland are applied by look up table to the regional ecosystem vegetation communities. Each polygon is coloured by the dominant BVG5M and the component regional ecosystems labelled. Where more than one regional ecosystem occurs, the percentage of each is labelled.
Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem linework reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The precision of polygon boundaries or positional accuracy of linework is 100 metres.
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The label consists of 3 components: bioregion, land zone, and vegetation community – the dominant canopy species. e.g.: RE 12.3.3. Descriptions of REs are found online. Use the search term "Regional Ecosystem Framework".
Regional ecosystem mapping at 1:100,000 map scale is derived from the following sources: 1:80,000 B&W 1960's aerial photography, Landsat TM imagery, geology, soils, land systems data, field survey and historical records.

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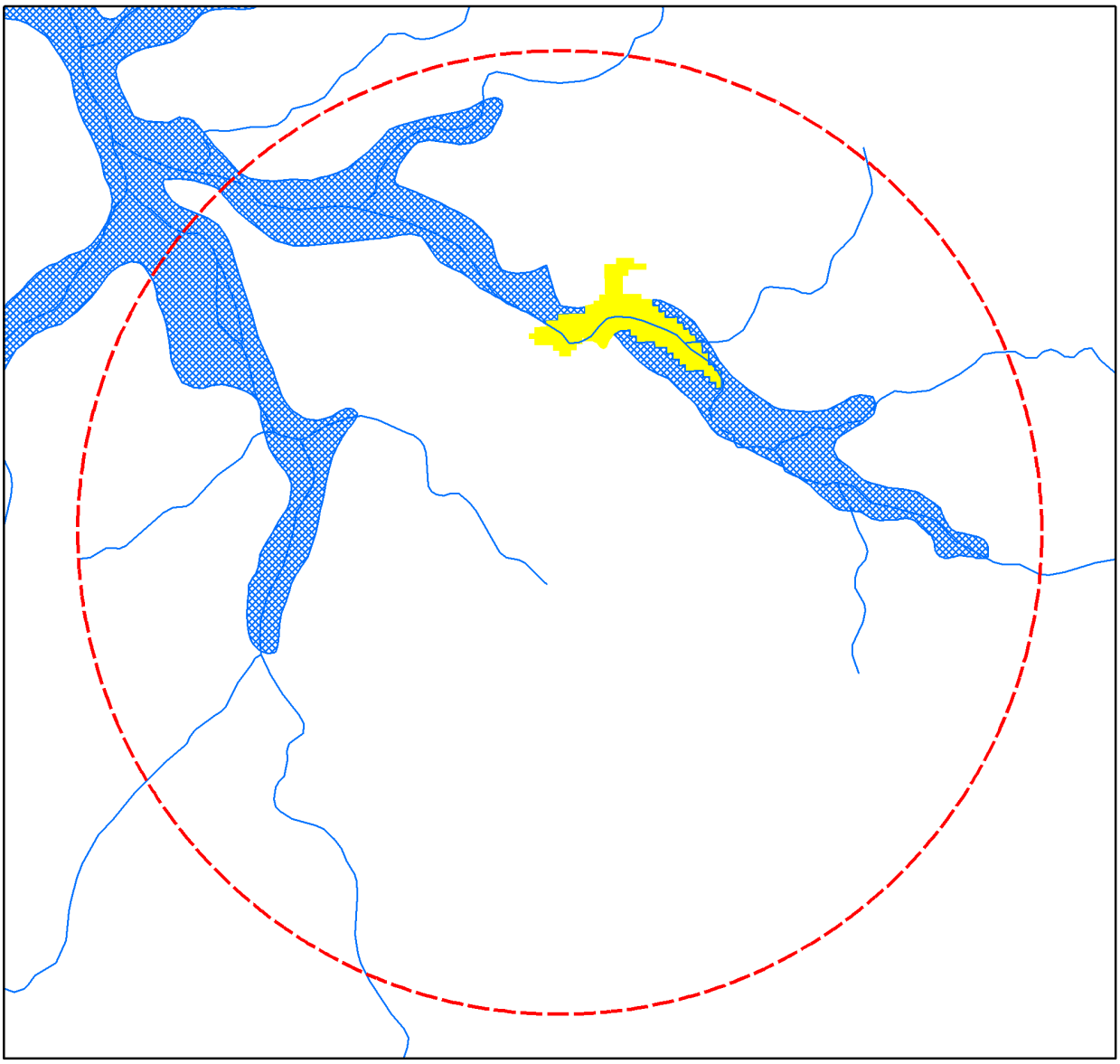
Map 6 - Wetlands and waterways



Queensland Wetland Data

Legend

- 2 kilometre buffer
- Towns (gazateer)

Queensland Wetland Data

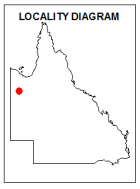
- Riverine Drainage Lines
- Springs

Wetland System - Water Bodies

- Marine Waterbodies
- Estuarine Waterbodies
- Riverine Waterbodies
- Lacustrine Waterbodies
- Palustrine Waterbodies

Wetland System - Regional Ecosystems

- Marine RE
- Estuarine RE
- Riverine RE
- Lacustrine RE
- Palustrine RE
- RE 51-80% wetland (mosaic units)
- RE 1-50% wetland (mosaic units)



N

0 180 360 540 720 900 m

This product is projected into:
GDA 1994 Queensland Albers

Accuracy information: The positional accuracy of wetland data mapped at a scale of 1:100,000 is +/-100m with a minimum polygon size of 5ha or 75m wide for linear features, except for areas along the east coa st which are mapped at the 1:50,000 scale with a positional accuracy of +/-50m, with a minimum polygon size of 1ha or 35m wide for linear features. Wetlands smaller than 1ha are not delineated on the wetland data. Consideration of the effects of mapped scale is necessary when interpret ing data at a larger scale, e.g. 1:25,000. For property assessment, digital linework should be used as a guide only. The extent of wetlands depicted on this map is based on rectified 2013 Landsat ETM+ imagery supplied by Statewide Landcover and Trees Study (SLATS), Department of Science, Information Technology and Innovation (DSITI). The extent of water bodies is based on the maximum extent of inundation derived from available Landsat imagery up to and including the 2013 imagery.

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Links and Other Information Sources

The Department of Environment and Heritage's Website -

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/

provides further information on the regional ecosystem framework, including access to links to the Regional Ecosystem Database, Broad Vegetation Group Definitions, Regional Ecosystem and Land zone descriptions.

Descriptions of the broad vegetation groups of Queensland can be downloaded from:

https://publications.qld.gov.au/dataset/vegetation-qld/resource/921fa786-e6d5-4a8a-9b0c-e532d2ce3f32

The methodology for mapping regional ecosystems can be downloaded from:

http://www.qld.gov.au/environment/assets/documents/plants-animals/herbarium/herbarium-mapping-methodology.pdf

Technical descriptions for regional ecosystems can be obtained from:

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/technical-descriptions/

Benchmarks can be obtained from:

http://www.qld.gov.au/environment/plants-animals/biodiversity/benchmarks/

For further information associated with the remnant regional ecosystem dataset used by this report, such as the year at which the extent of remnant is reflective of, refer to the metadata associated with the relevant Remnant Regional Ecosystems of Queensland dataset (version listed in **Appendix 1**) and which is available through the Queensland Government Information System portal,

http://dds.information.qld.gov.au/dds/

The Queensland Globe is a mapping and data application implemented inside the Google Earth TM application. As an interactive online tool, Queensland Globe allows you to view and explore Queensland maps, imagery (including up-to-date satellite images) and other spatial data, including regional ecosystem mapping. To further view and explore regional ecosystems over an area of interest, access the Biota Globe (a component of the Queensland Globe). The Queensland Globe can be accessed via the following link:

http://www.dnrm.qld.gov.au/mapping-data/queensland-globe

References

Neldner, V.J., Wilson, B.A., Thompson, E.J., and Dillewaard, H.A. (2012). *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland*. Queensland Herbarium, Department of Science, Information Technology, Innovation and the Arts.

(http://www.qld.gov.au/environment/assets/documents/plants-animals/herbarium/herbarium-mapping-methodology.pdf)

Neldner, V.J., Niehus R.E., Wilson, B.A. McDonald, W.J.F. and Ford, A.J. (2014). The Vegetation of Queensland. Descriptions of Broad Vegetation Groups. Queensland Herbarium, Department of Science, Information Technology, Innovation and the Arts.

(https://publications.qld.gov.au/dataset/vegetation-qld/resource/921fa786-e6d5-4a8a-9b0c-e532d2ce3f32)

Sattler, P.S. and Williams, R.D. (eds) (1999). *The Conservation Status of Queensland's Bioregional Ecosystems*. Environmental Protection Agency, Brisbane.

Appendices

Appendix 1: Source Data

The dataset listed below is available for download from:

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/download/

- Regional Ecosystem Description Database

The datasets listed below are available for download from:

http://dds.information.qld.gov.au/dds/

- Remnant Regional Ecosystems of Queensland
- Pre-clearing Vegetation Communities and Regional Ecosystems of Queensland
- Queensland Wetland Data Version - Wetland lines
- Queensland Wetland Data Version - Wetland points
- Queensland Wetland Data Version - Wetland areas

Appendix 2 - Acronyms and Abbreviations

AOI	- Area of Interest
DNRM	- Department of Natural Resources and Mines
EHP	- Department of Environment and Heritage Protection
GDA94	- Geocentric Datum of Australia 1994
GIS	- Geographic Information System
RE	- Regional Ecosystem
REDD	- Regional Ecosystem Description Database
VMA	- *Vegetation Management Act 1999*

Appendix B – *Environment Protection and Biodiversity Conservation Act 1999* Protected Matters Search Report

Australian Government

Department of the Environment and Energy

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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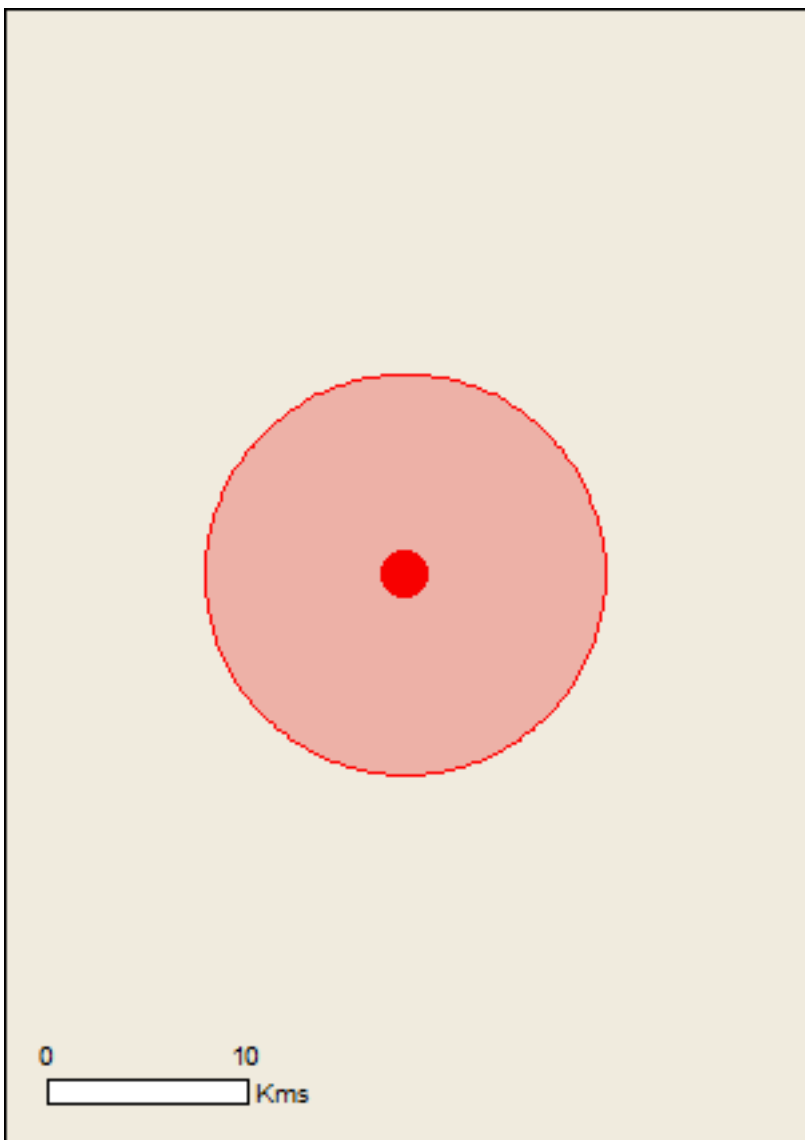
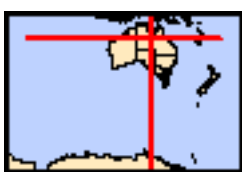


This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates

Buffer: 10.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	12
Listed Migratory Species:	9

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	15
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	12
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Amytornis dorotheae Carpentarian Grasswren [558]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat likely to occur within area
Pseudantechinus mimulus Carpentarian Antechinus [59283]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Acanthophis hawkei Plains Death Adder [83821]	Vulnerable	Species or species habitat likely to occur within area
Elseya lavarackorum Gulf Snapping Turtle [67197]	Endangered	Species or species habitat may occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat may occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Reptiles		
Crocodylus johnstoni Freshwater Crocodile, Johnston's Crocodile, Johnston's River Crocodile [1773]		Species or species habitat may occur within area

Extra Information

Invasive Species	[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Frogs		

Name	Status	Type of Presence
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
Camelus dromedarius Dromedary, Camel [7]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Plants		
Acacia nilotica subsp. indica Prickly Acacia [6196]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
Jatropha gossypifolia Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Parthenium hysterophorus Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat likely to occur within area
Prosopis spp. Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-19.57778 139.16908

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Appendix C – Matters of State Environmental Significance Report

Queensland Government

Department of Environment and Heritage Protection

Environmental Reports

Matters of State Environmental Significance

Area of Interest: Longitude: 139.16908 Latitude: -19.57778

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or area of interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "Central co-ordinates" option, the resulting assessment area encompasses an area extending for a 2km radius from the point of interest.

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 1994). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

The matters of interest reported on in this document are based upon available state mapped datasets. Where the report indicates that a matter of interest is not present within the AOI (e.g. where area related calculations are equal to zero, or no values are listed), this may be due either to the fact that state mapping has not been undertaken for the AOI, that state mapping is incomplete for the AOI, or that no values have been identified within the site.

The information presented in this report should be considered as a guide only and field survey may be required to validate values on the ground.

Please direct queries about these reports to: Planning.Support@ehp.qld.gov.au

Disclaimer

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Table of Contents

Assessment Area Details

The following table provides an overview of the area of interest (AOI) with respect to selected topographic and environmental values.

Table 1: Summary table, AOI details

Area of Interest	139.16908,-19.57778 with 2 kilometre radius
Size (ha)	1256.6
Local Government(s)	MOUNT ISA CITY
Bioregion(s)	Northwest Highlands
Subregion(s)	Mount Isa Inlier
Catchment(s)	Nicholson

Refer to **Map 1** for locality information.

Matters of State Environmental Significance (MSES)

MSES Categories

Queensland's State Planning Policy (SPP) includes a biodiversity State interest that states:

'The sustainable, long-term conservation of biodiversity is supported. Significant impacts on matters of national or state environmental significance are avoided, or where this cannot be reasonably achieved; impacts are minimised and residual impacts offset.'

The MSES mapping product is a guide to assist planning and development assessment decision-making. Its primary purpose is to support implementation of the SPP biodiversity policy. While it supports the SPP, the mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations. Similarly, the SPP biodiversity policy does not override or replace specific requirements of other Acts or regulations.

The SPP defines matters of state environmental significance as:

- Protected areas (including all classes of protected area except coordinated conservation areas) under the *Nature Conservation Act 1992*;

- Marine parks and land within a 'marine national park', 'conservation park', 'scientific research', 'preservation' or 'buffer' zone under the *Marine Parks Act 2004*;

- Areas within declared fish habitat areas that are management A areas or management B areas under the Fisheries Regulation 2008;

- Threatened wildlife under the *Nature Conservation Act 1992* and special least concern animals under the Nature Conservation (Wildlife) Regulation 2006;

- Regulated vegetation under the *Vegetation Management Act 1999* that is:

  • Category B areas on the regulated vegetation management map, that are 'endangered' or 'of concern' regional ecosystems;

  • Category C areas on the regulated vegetation management map that are 'endangered' or 'of concern' regional ecosystems;

  • Category R areas on the regulated vegetation management map;

  • Regional ecosystems that intersect with watercourses identified on the vegetation management watercourse and drainage feature map;

  • Regional ecosystems that intersect with wetlands identified on the vegetation management wetlands map;

- Strategic Environmental Areas under the *Regional Planning Interests Act 2014*;

- Wetlands in a wetland protection area of wetlands of high ecological significance shown on the Map of Referable Wetlands under the Environmental Protection Regulation 2008;

- Wetlands and watercourses in high ecological value waters defined in the Environmental Protection (Water) Policy 2009, schedule 2;

- Legally secured offset areas.

Refer to **Appendix 1** for a description of MSES categories.

MSES Values Present

The MSES values that are present in the area of interest are summarised in the table below:

Table 2: Summary of MSES present within the AOI

MSES Criteria 1 - STATE CONSERVATION AREAS	0.0 ha	0.0%
1.1 Protected Areas	0.0 ha	0.0%
1.2 Marine Parks	0.0 ha	0.0%
1.3 Fish Habitat Areas	0.0 ha	0.0%
MSES Criteria 2 - WETLANDS AND WATERWAYS - area features	549.1 ha	43.7%
MSES Criteria 2 - WETLANDS AND WATERWAYS - linear features	0.0 km	Not applicable
2.1 High Ecological Significance wetlands on the map of Referable Wetlands	0.0 ha	0.0%
2.2 High Ecological Value (HEV) wetlands	0.0 ha	0.0%
2.2 High Ecological Value (HEV) waterways **	0.0 km	Not applicable
2.3 Strategic Environmental Areas (SEA)	549.1 ha	43.7%
MSES Criteria 3 - SPECIES	0.0 ha	0.0%
3.1 Threatened species and Iconic species	0.0 ha	0.0%
MSES Criteria 4 - REGULATED VEGETATION - area features	139.9 ha	11.1%
MSES Criteria 4 - REGULATED VEGETATION - linear features	9.5 km	Not applicable
4.1 Vegetation Management Regional Ecosystems and Remnant Map *	139.9 ha	11.1%
4.2 Vegetation Management Wetland Map *	0.0 ha	0.0%
4.3 Vegetation Management Watercourse Map **	9.5 km	Not applicable
MSES Criteria 5 - OFFSET AREAS	0.0 ha	0.0%
5.1 Legally secured offset areas	0.0 ha	0.0%
Total MSES (criteria 1.1, 1.2, 1.3, 2.1, part of 2.2, 2.3, 3.1, 4.1, 4.2 and 5.1) calculated for area features only	688.9 ha	54.8%

Please note that the area and percent area figures in the table above will not necessarily add up to the "Total MSES" figures due to overlapping values.

**The total extent area of regulated vegetation (Criteria 4.1) may be overestimated due to the presence of dominant and/or subdominant non-regulated regional ecosystems in mixed patches of vegetation, i.e. the total area of mixed vegetated patches is included irrespective of whether the patch consists only partly of endangered, of concern or wetland regional ecosystems.*

***The total linear extent of watercourses may be overestimated in some instances, as both banks (rather than the centreline) of waterbodies and larger watercourses where present are mapped by the State, increasing the extent of linear features*.

Additional Information with Respect to MSES Values Present

Criteria 1 - State Conservation Areas

1.1 Protected Areas

(no results)

1.2 Marine Parks

(no results)

1.3 Fish Habitat Areas

(no results)

Refer to **Map 2 - MSES Criteria 1 - State Conservation Areas** for an overview of the relevant MSES.

Criteria 2 - Wetlands and Waterways

2.1 High Ecological Significance wetlands on the Map of Referable Wetlands

(no results)

2.2 High Ecological Value (HEV) wetlands

(no results)

2.2 High Ecological Value (HEV) waterways

(no results)

2.3 Strategic Environmental Areas

Description of the Strategic Environmental Area	Datasource
Designated Precinct	Strategic Environmental Area

Refer to **Map 3 - MSES Criteria 2 - Wetlands and Waterways** for an overview of the relevant MSES.

Criteria 3 - Species

3.1 Threatened species and Iconic species

Threatened and/or iconic species habitat within the AOI (derived from records/essential habitat mapping)

(no results)

**NCA E or V - Endangered or Vulnerable status under the NCA; VMA ehab - VMA essential habitat; Iconic - Iconic species.*

To request a species list for an area, or search for a species profile, access Wildlife Online at:
https://www.qld.gov.au/environment/plants-animals/species-list/

Koala bushland habitat

(no results)

Dugong areas

(no results)

Refer to **Map 4 - MSES Criteria 3 - Species** for an overview of the relevant MSES.

Criteria 4 - Regulated Vegetation

4.1 Endangered and Of Concern regional ecosystems and Category R Regulated Vegetation

Regulated Vegetation Description	Regional Ecosystem Patch	VMA status
rem_oc	1.5.1/1.7.2x1	O-dom

For further information relating to regional ecosystems in general, go to:
https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/
For a more detailed description of a particular regional ecosystem, access the regional ecosystem search page at:
https://environment.ehp.qld.gov.au/regional-ecosystems/

4.2 Vegetation Management Wetlands

(no results)

Wetlands datasource

Not applicable

4.3 Watercourses shown on the Vegetation Management Watercourse and Drainage Feature Map

A vegetation management watercourse is mapped as present

Watercourses datasource

Vegetation Management Watercourse Map

Refer to **Map 5 - MSES Criteria 4 - Regulated Vegetation** for an overview of the relevant MSES.

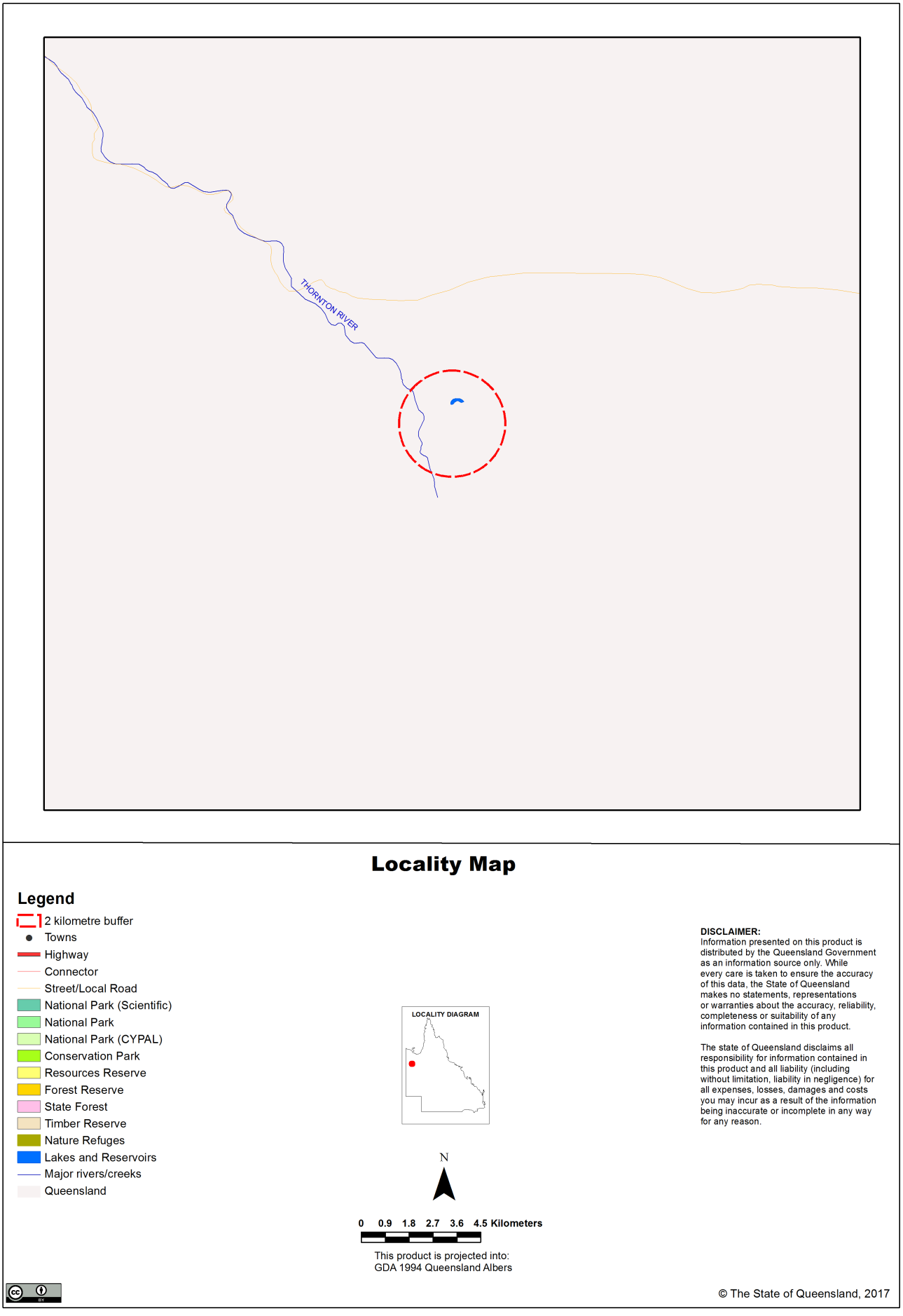
Criteria 5 - Offset Areas

5.1 Legally secured offset areas

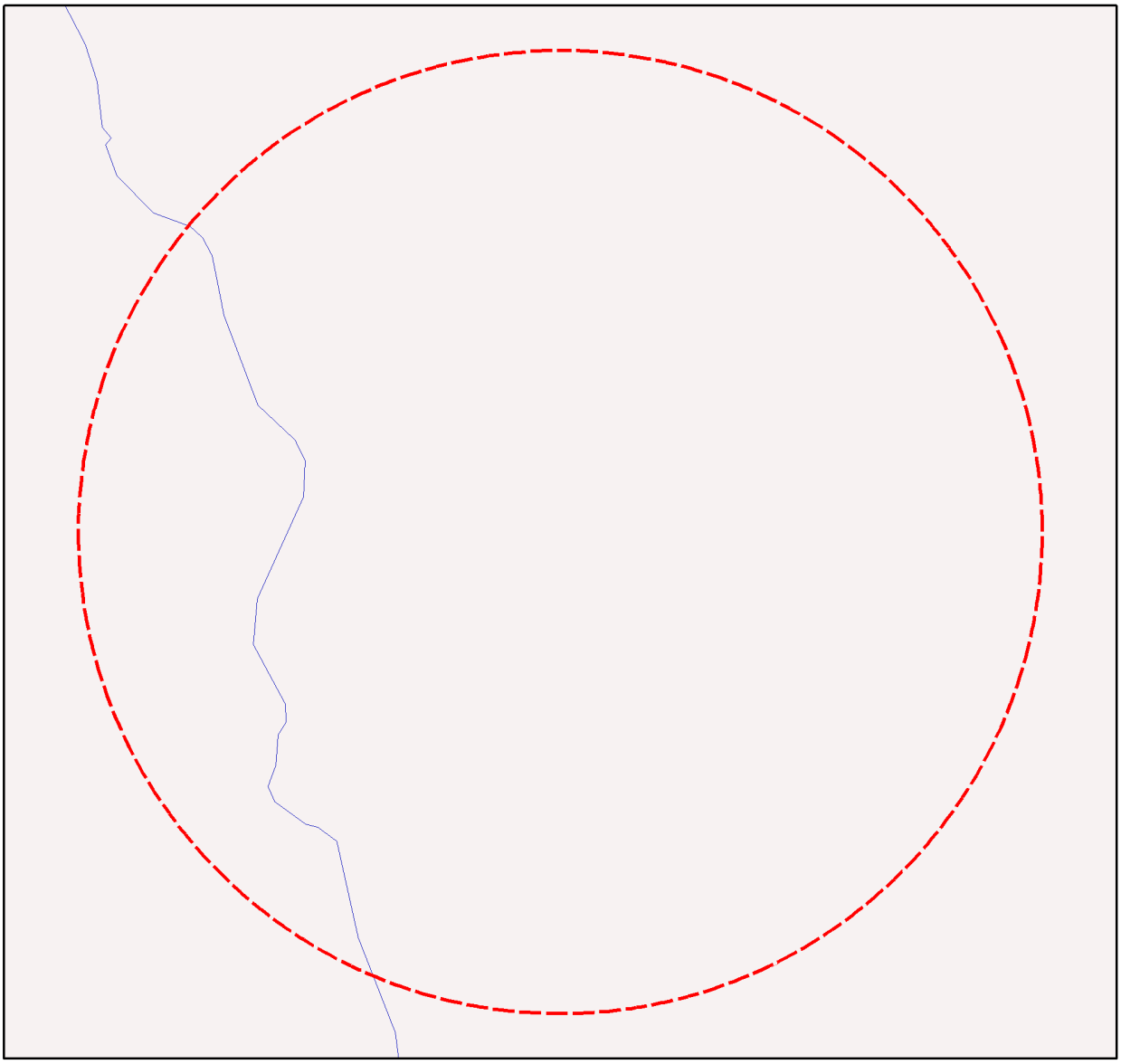
(no results)

Refer to **Map 6 - MSES Criteria 5 - Offset Areas** for an overview of the relevant MSES.

Maps
Map 1 - Location



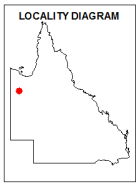
Map 2 - MSES Criteria 1 - State Conservation Areas



MSES Criteria 1- State Conservation Areas

Area of Interest

- 2 kilometre buffer
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- MSES Protected area
- MSES Declared fish habitat area
- MSES Marine park



N

0 0.15 0.3 0.45 0.6 0.75 Kilometers

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GDA 1994 Queensland Albers

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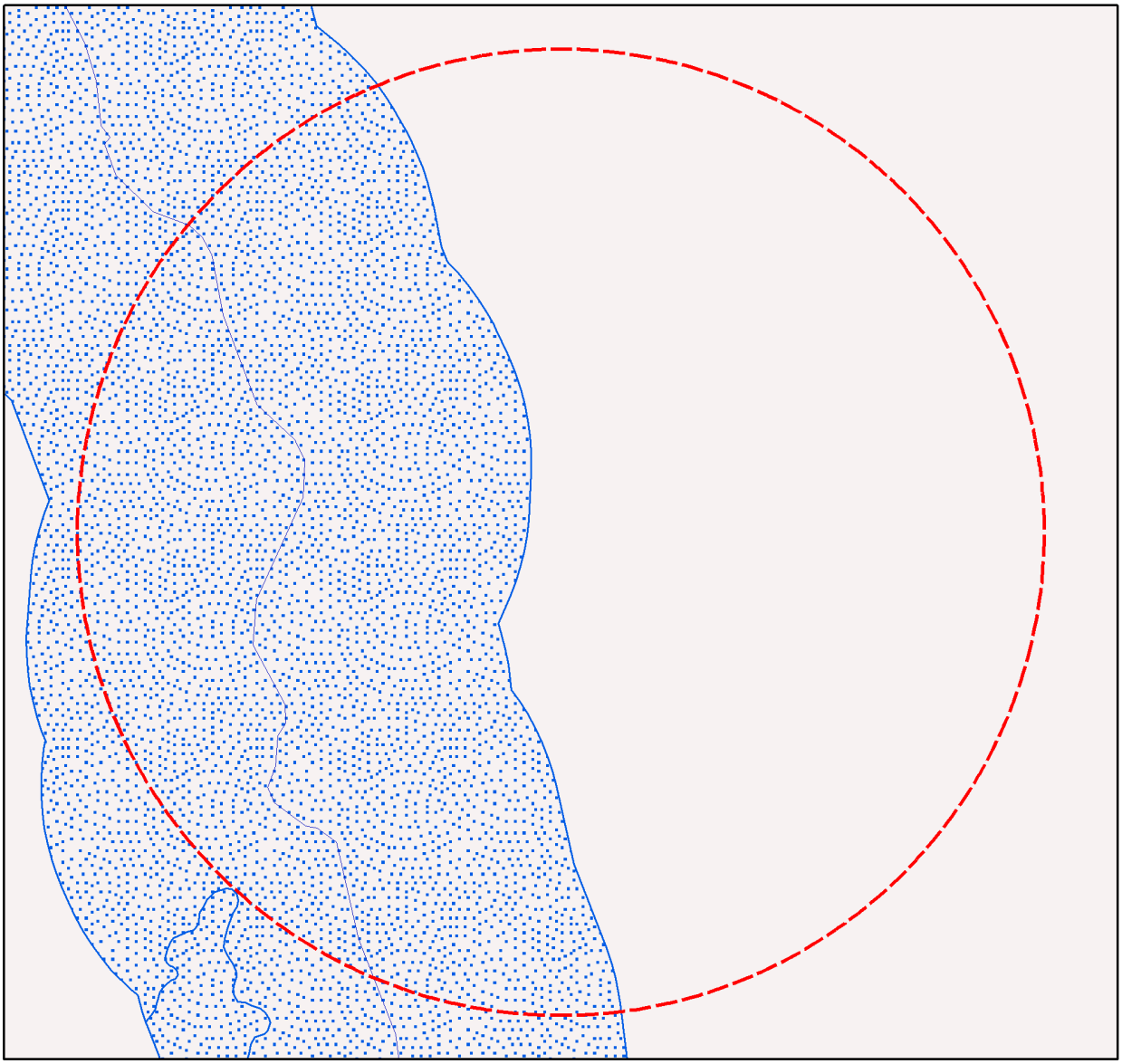
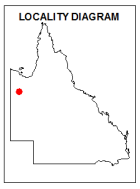
Map 3 - MSES Criteria 2 - Wetlands and Waterways



MSES Criteria 2 - Wetlands and Waterways

Area of Interest

- 2 kilometre buffer
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- MSES - High ecological value waters (watercourses)
- MSES - Strategic environmental area (designated precinct)
- MSES - High ecological value waters (wetland)
- MSES - High ecological significance wetlands



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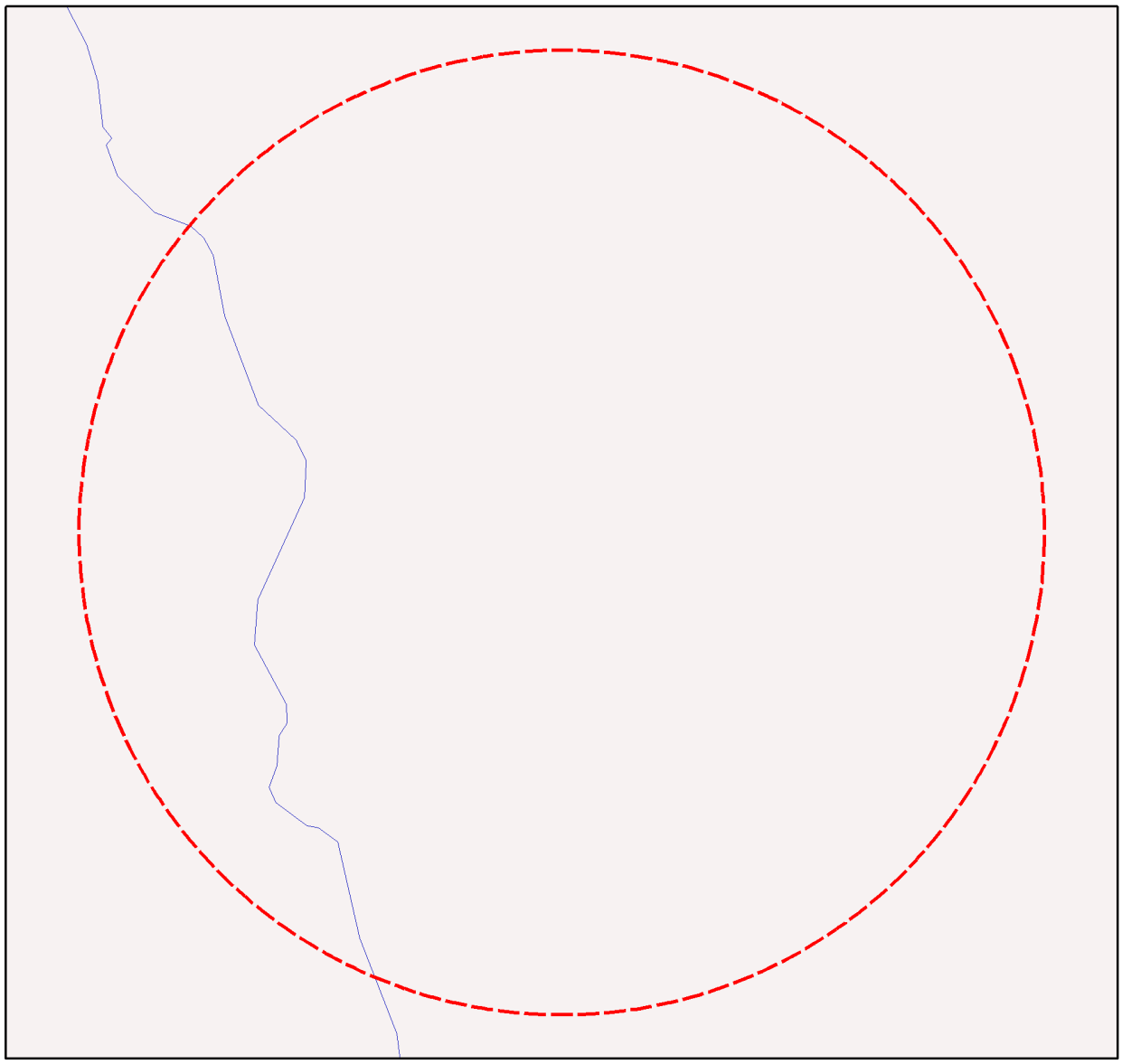
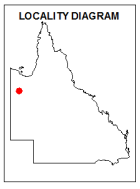
Map 4 - MSES Criteria 3 - Species



MSES Criteria 3 - Species

Area of Interest
- 2 kilometre buffer
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- MSES - Wildlife habitat



N

0 0.15 0.3 0.45 0.6 0.75 Kilometers

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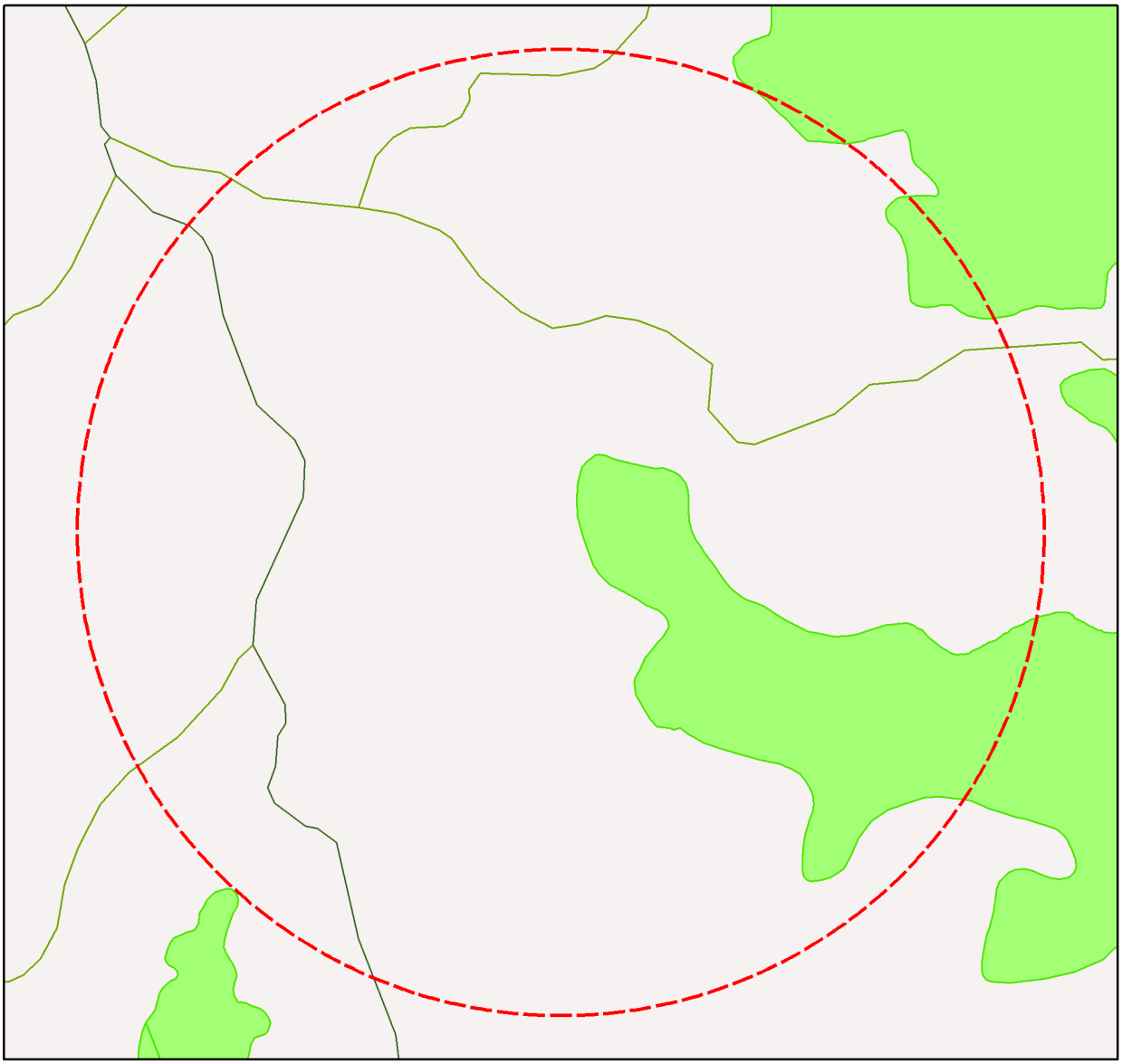
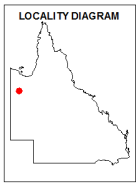
Map 5 - MSES Criteria 4 - Regulated Vegetation



MSES Criteria 4 - Regulated Vegetation

Area of Interest

- 2 kilometre buffer
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- MSES - Regulated vegetation (intersecting a watercourse)
- MSES - Regulated vegetation



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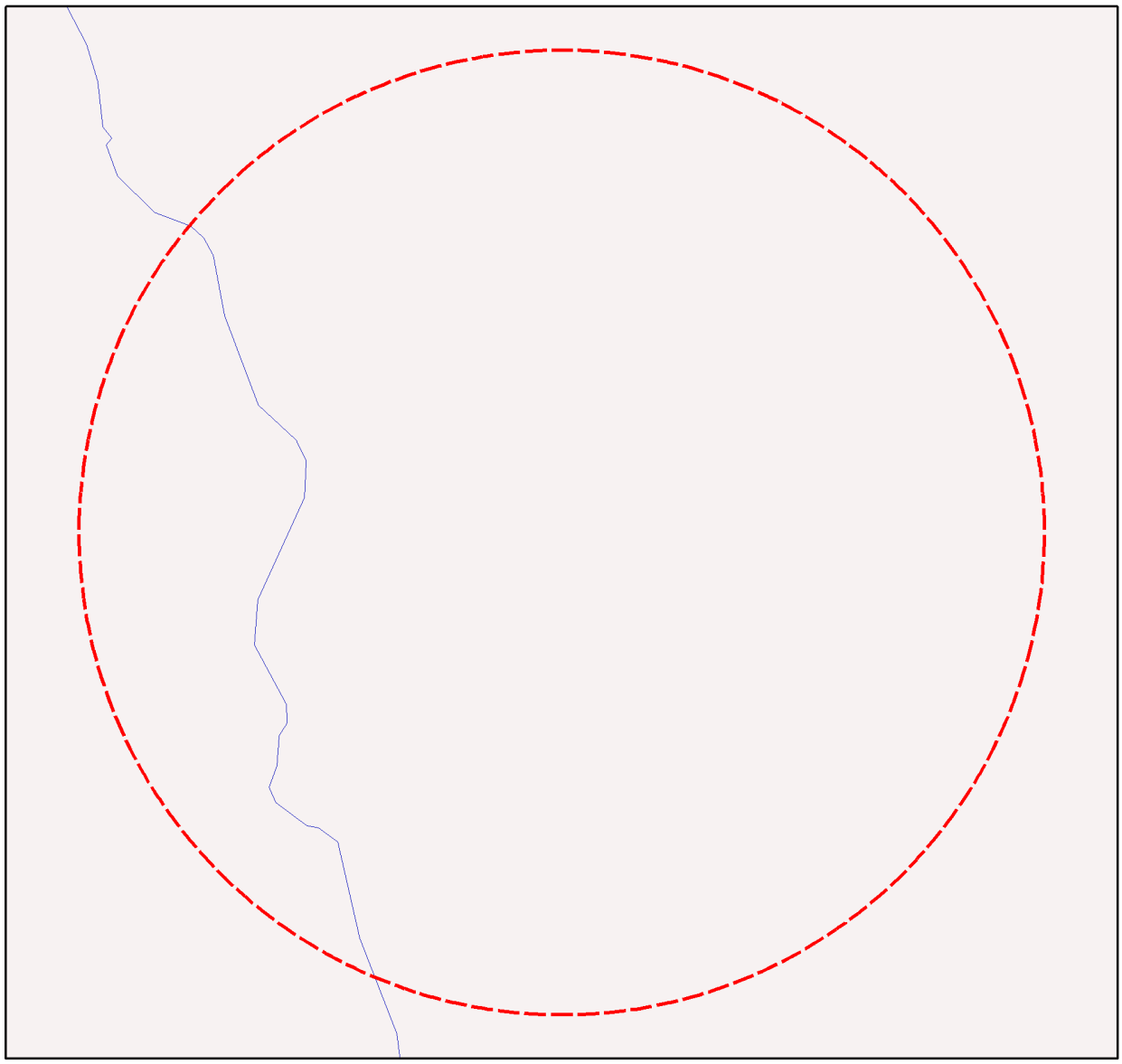
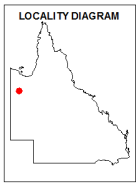
Map 6 - MSES Criteria 5 - Offset Areas



MSES Criteria 5 - Offset Areas

Area of Interest

- 2 kilometre buffer
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- MSES - Legally secured offset area



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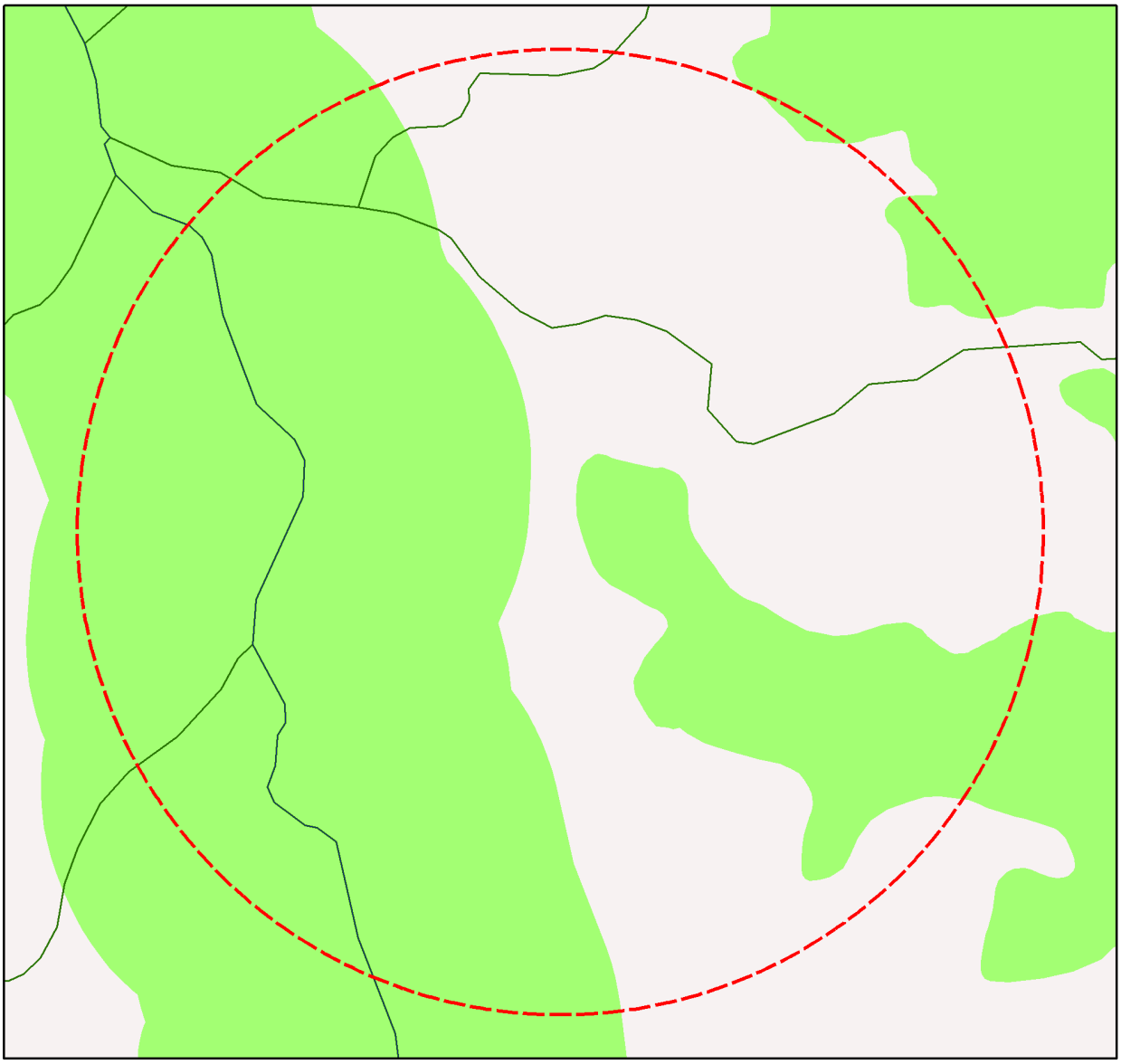
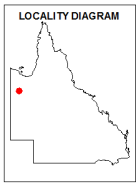
Map 7 - Matters of State Environmental Significance



Matters of State Environmental Significance

Area of Interest

- 2 kilometre buffer
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Matters of State Environmental Significance (watercourses)
- Matters of State Environmental Significance (areas)



N

0 0.1 0.2 0.3 0.4 0.5 Kilometers

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Appendices

Appendix 1 - Matters of State Environmental Significance (MSES) Criteria

Feature Name	Description
1.1 Protected Areas (NCA)	Protected areas under the *Nature Conservation Act 1992*, except coordinated conservation areas.
1.2 Marine Parks (MPA)	The following State marine parks zones under the *Marine Parks Act 2004*: - Marine National Park zone; - Marine Conservation Park zone; - Scientific Research zone; - Preservation zone; - Buffer zone.
1.3 Fish Habitat Areas (FA)	The following areas under the *Fisheries Act 1994* including: All fish habitat areas.
2.1 'High Ecological Significance' wetlands on the Map of Referable Wetlands	All natural wetlands that are 'High Ecological Significance' (HES) on the Map of Referable Wetlands. Exclude: any amendments to the Map of Referable Wetlands.
2.2 High Ecological Value (HEV) wetlands and waterways (EP Act)	Natural wetlands and waterways that occur in HEV (maintain) freshwater and estuarine areas under the Environmental Protection (Water) Policy.
2.3 Strategic Environmental Areas (RPI Act)	Designated precinct areas under the *Regional Planning Interests Act 2014*.
3.1 Threatened species and Iconic species (NCA)	Habitat for: Threatened wildlife under *Nature Conservation Act 1992* including: 'Endangered' and 'Vulnerable' species. Special least concern animals under the *Nature Conservation Act 1992* including: Koala (outside SEQ); Echidna and Platypus.
4.1 Vegetation Management Regional Ecosystem and Remnant Map (VMA)	Include VMA 'Endangered' and 'Of Concern' remnant (Category A and B) and high value regrowth (Category C) REs and Category R (GBR regrowth watercourse) areas from the Regulated Vegetation Management Map.
4.2 Vegetation Management Wetland Map (VMA)	Wetlands that are lakes and swamps shown on the Vegetation Management Wetlands Map.
4.3 Vegetation Management Watercourse and Drainage Feature Map (VMA)	Watercourses shown on the Vegetation Management Watercourse and Drainage Feature Map.
5.1 Legally secured offset areas (VMA, EP Act, SPA, TIA, EA)	Offset areas legally secured under a covenant, conservation agreement or development approval condition.

The Queensland Government's "Method for mapping - matters of state environmental significance for use in land use planning and development assessment" can be downloaded from:

http://www.ehp.qld.gov.au/land/natural-resource/method-mapping-mses.html.

Appendix 2 - Source Data

The datasets listed below are available on request from:

http://qldspatial.information.qld.gov.au/catalogue/custom/index.page

- Matters of State environmental significance
- Matters of State environmental significance drainage lines
- Boundaries of the Great Barrier Reef Marine Park

Note: MSES mapping is a regional-scale representation of the definition for MSES under the State Planning Policy (SPP). The compiled MSES mapping product is a guide to assist planning and development assessment decision-making. Its primary purpose is to support implementation of the SPP biodiversity policy. While it supports the SPP, the mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations. Similarly, the SPP biodiversity policy does not override or replace specific requirements of other Acts or regulations.

MSES mapping is not based on new or unique data. The primary mapping product draws data from a number of underlying environment databases and geo-referenced information sources. MSES mapping is a versioned product that is updated generally on a twice-yearly basis to incorporate the changes to underlying data sources. Several components of MSES mapping made for the current version may differ from the current underlying data sources. To ensure accuracy, or proper representation of MSES values, it is strongly recommended that users refer to the underlying data sources and review the current definition of MSES in the State Planning Policy, before applying the MSES mapping.

Underlying data sources used to develop individual releases of complied MSES mapping include, but are not limited to:

- Regulated vegetation including:
  - Regulated Regional Ecosystems and Regrowth
  - Regulated Essential habitat
  - Regulated Wetlands
  - Regulated Watercourses and Drainage
  - Former Regrowth

- Queensland Wetland Mapping (v3)
- Essential Habitat Mapping
- Protected Areas
- Marine Parks
- Fish Habitat Areas
- Strategic Environmental Areas
- The Map of Referable Wetlands:
  - Wetland Protection Areas (HES wetlands in the GBR)
  - Wetland Management Areas (contains other HES wetlands)

Datasets reflective of the above matters can be downloaded via the Queensland Spatial Catalogue:

http://qldspatial.information.qld.gov.au/catalogue/custom/index.page

Appendix 3 - Acronyms and Abbreviations

AOI	- Area of Interest
EHP	- Department of Environment and Heritage Protection
EP Act	- *Environmental Protection Act 1994*
EPP	- Environmental Protection Policy
GDA94	- Geocentric Datum of Australia 1994
GEM	- General Environmental Matters
GIS	- Geographic Information System
MSES	- Matters of State Environmental Significance
NCA	- *Nature Conservation Act 1992*
RE	- Regional Ecosystem
SPP	- State Planning Policy
VMA	- *Vegetation Management Act 1999*

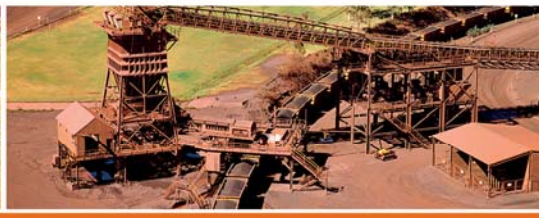
SCHEDULE 5

Civil Design Criteria for Water Management

wave international

DETERMINE • DESIGN • DELIVER





Phosphate International

Barr Creek Sample Pit

Civil Design Criteria

4463-30-RPT-CI-00001

engineering asset management project delivery

Project Brief

Job Number	**4463**
Project	Barr Creek Sample Pit
Document Title	Civil Design Criteria
Document Ref	4463-30-RPT-CI-00001
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1 DESIGN CRITERIA

The following sections of this Report detail the parameters used to estimate design rainfall event runoff flows for the Barr Creek Trial Sample Pit Project and detail the capacities of the various structure designed to capture the design storm event from the disturbed surfaces and direct them to the site storage dam.

The governing criteria are found in the Department of Environment and Heritage Protection (DEHP) Guideline – Stormwater and Environmentally Relevant Activities.

Part 1 High Erosion Hazard Sites requirements for the treatment of rainfall and runoff are:

- All concentrated stormwater flows (including 'clean' stormwater and 'dirty' stormwater) should have concentrated flow paths, such as drainage lines, diversion drains, channels and batter chutes (where applicable) which have been designed, constructed, effectively armoured and maintained to convey the runoff from events up to and including the average recurrence interval (ARI) of 1 in 10 critical duration ARI storm event without causing water contamination, sheet, rill or gully erosion, sedimentation, or damage to structures or property.

1.1 Design Rain Fall Intensity for overland drains design

The design rainfall to determine sizing of the site capture drains was determined using Queensland Urban Drainage Manual (QUDM). The Critical storm duration was determined to be 17 minutes (using Friend's and Mannings equations). The Intensity-Frequency-Duration data from the Bureau of Meteorology was used to determine that the design rainfall intensity for the determination of drain sizing was 42.5mm. (see figure 1.1).

	Annual Exceedance Probability (AEP)						
Duration	63.2%	50%#	20%*	10%	5%	2%	1%
1 min	2.24	2.57	3.56	4.20	4.80	5.56	6.12
2 min	3.83	4.42	6.14	7.19	8.13	9.18	9.89
3 min	5.41	6.24	8.66	10.2	11.5	13.1	14.2
4 min	6.90	7.94	11.0	13.0	14.7	16.9	18.4
5 min	8.29	9.53	13.2	15.6	17.7	20.4	22.3
10 min	13.9	16.0	22.2	26.2	30.0	34.9	38.5
15 min	18.1	20.7	28.7	34.0	38.9	45.3	50.0
30 min	25.9	29.7	41.3	48.7	55.7	64.6	71.0
1 hour	33.7	38.8	54.0	63.7	72.7	83.8	91.8
2 hour	40.9	47.2	66.0	78.0	89.2	103	113
3 hour	44.8	51.8	72.9	86.4	99.0	115	127
6 hour	51.6	59.9	85.3	102	118	140	156
12 hour	59.8	69.6	101	123	144	175	198
24 hour	70.8	82.9	123	152	181	223	257
48 hour	85.7	101	152	191	231	286	330
72 hour	96.0	113	173	217	263	326	375
96 hour	104	123	187	235	285	352	405
120 hour	109	129	197	248	300	370	426
144 hour	113	134	205	256	310	382	440
168 hour	117	138	209	261	315	390	449

Figure 1.1 - Intensity-Frequency-Duration Table (Source: Bureau of Meteorlogy)

1.2 Design Sedimentation Dam Volume

The design volume for the site sedimentation dam is required to be based on a 24 hour storm event with a 10 year ARI, plus a sediment storage capacity of 50% of the upper settling volume, all in accordance with Part 1 of the aforementioned DEHP guidelines. The sizing of the dam is based on 8ha reporting to the sediment dam and 2ha reporting to the open pit. These criteria and reporting area require a design upper settling capacity of 12.2ML based on the Q10 24 hour of 152mm as shown in Figure 1.1 and a 6.1ML sediment storage capacity. Total required sediment dam design storage capacity is 18.3ML. Average design inflow to the sedimentation dam over a 24 hour period for the design storm event is 0.173m^3/sec.

1.3 Design Overland Flow Rate

Based on the steepest design slope of the site and using the rational method as per QUDM, the peak design overland flow rate was determined to be 0.55m^3/s.

2 DESIGN VALUES

2.1 Overland Dirty Water Drain Capacity

The overland dirty water drain between the MIA and the product or storage pad drain is required to contain a flow of 0.55m³/s. The design capacity of the drain sized as shown in Figure 2.1, determined using manning's equation, is 3.21m³/s (shown figure 2.1).

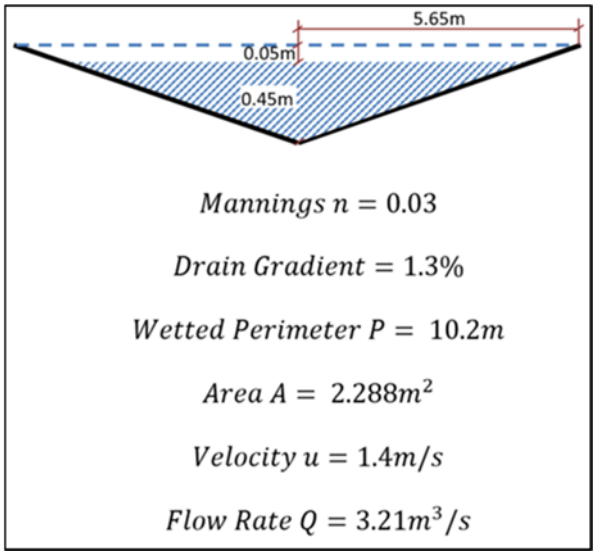

Figure 2.1 Overland Dirty Water Drain criteria

2.2 Dirty Water Drain Capacity at the base of the storage Pad

The dirty water drain (at the base of the storage pad) is required to contain a flow of 0.55m³/s. The design capacity of the drain sized as shown in Figure 2.2, determined using manning's equation, is 2.66m³/s (shown figure 2.2).

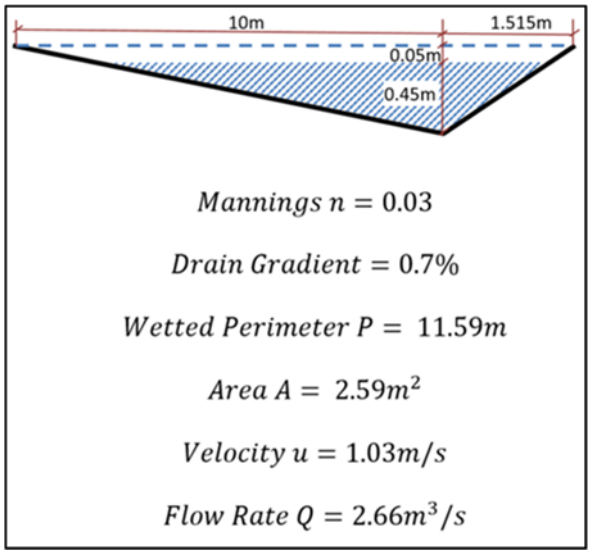

Figure 2.2 Overland Dirty Water Drain criteria (at base of storage pad)

2.3 Sedimentation Dam Overflow Drain Capacity

The sedimentation dam overflow drain capacity is required to contain a flow of 0.55m³/s. The design capacity of the drain sized as shown in Figure 2.3, determined using manning's equation, is 0.60m³/s (shown figure 2.3).

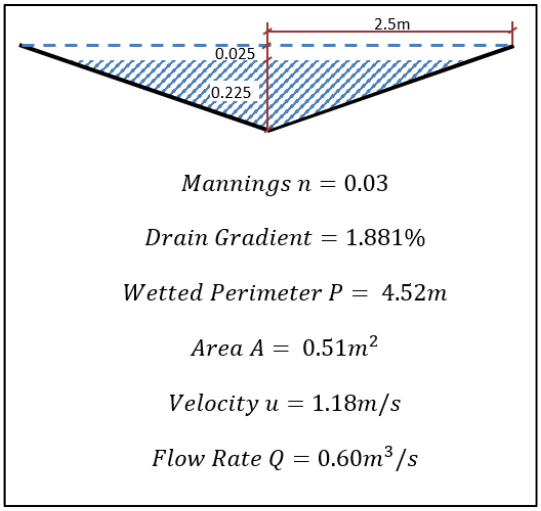

Figure 2.3 Sedimentation Dam Overflow Drain criteria

2.4 Sedimentation Dam Volume

The sedimentation dam has been designed to allow the retention of 24ML of dirty water before the dam will divert water to the pit using the dam overflow drain described in section 2.3 above.