Appendix C

Preliminary Contamination Assessment Report

Preliminary Contamination Assessment Report

Fitzroy to Gladstone Pipeline (FGP) Project

Gladstone Area Water Board

→ The Power of Commitment

GHD Pty Ltd | ABN 39 008 488 373

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Last saved date	17 December 2021
File name	Preliminary Contamination Assessment Report | Fitzroy to Gladstone Pipeline (FGP) Project
Author	Amy McCormack, Shannon Brown, Angus Hughes
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Client name	Gladstone Area Water Board
Project name	GAWB FGP Secondary Approvals
Document title	Preliminary Contamination Assessment Report | Fitzroy to Gladstone Pipeline (FGP) Project
Revision version	Rev 0
Project number	12559247

Document status

Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S4	0	A McCormack S Brown A Hughes	V Wilton		S Wilson		17/12/2021

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1. Introduction

Gladstone Area Water Board (GAWB) initially engaged GHD Pty Ltd (GHD) to undertake an approvals gap analysis and develop a proposed approvals program of works associated with the pre-construction phase of the Fitzroy to Gladstone Pipeline (FGP) Project (herein referred to as the Project).

The Project alignment (herein referred to as the site or alignment) and infrastructure is shown in Figure 1.1.

As part of the gap analysis (GHD 2021) it was identified that a review of the contamination status of the Project alignment had not been undertaken since publication of the Environmental Impact Statement (EIS) (Arup, 2008). Understanding of the contamination conditions and whether construction of the pipeline will intersect contaminated land would help to inform whether contamination management measures are required during design, construction and operation of the Project.

As part of the EIS (Arup, 2008) an initial contamination assessment was conducted along the alignment and five properties of interest were identified. The properties and potential contaminating activities identified were:

– Lot 101 on DS185 (waste storage and disposal)
– Lot 1 on RP911260 (landfill)
– Lot 91 on SP122250 (railway yard)
– Lot 7 on SP145439 (rifle range)
– Lot 140 on SP122252 (railway).

Design changes to the alignment have occurred since 2008 and, as such, GHD was engaged by GAWB to undertake a preliminary contamination assessment of properties that are within, and immediately surrounding, the revised alignment to assist GAWB in understanding potential contamination risks associated with historical use.

This report is subject to, and must be read in conjunction with, the limitations set out in Section 9.

1.1 Project appreciation

We understand that GAWB propose to commence early works on the Project as early as practicable, likely to be sometime from April 2022.

The proposed Project consists of a 115 km pipeline, water treatment plant at Alton Downs and associated infrastructure to transport up to 30 GL of water per annum from an intake point at Laurel Bank on the Fitzroy River to GAWB's existing water infrastructure at Yarwun.

The pipeline will run within the proposed Stanwell-Gladstone Infrastructure Corridor State Development Area (SGIC SDA) for most of its length before connecting with the existing GAWB raw water network near Yarwun, in the Gladstone State Development Area (GSDA).

Key infrastructure associated with the Project will include:

– The 115 km long underground pipeline
– An intake and pump station on the Fitzroy River
– A water treatment plant (WTP), reservoir and pump station at Alton Downs
– A booster pump station and reservoir at Raglan
– A reservoir at Aldoga.

The Project received State approval under the *State Development and Public Works Organisation Act 1971* (SDPWO Act) on 2 February 2010 and Commonwealth approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 4 November 2011.

1.2 Regulatory framework

This preliminary contamination assessment was undertaken with reference to the following state and/or nationally legislation and recognised publications:

- *Environmental Protection Act 1994*
- *Environmental Protection Regulation 2019*
- *National Environmental Protection* (Assessment of Site Contamination) *Measure 1999* including the NEPM (Assessment of site Contamination) Amendment Measure 2013 (NEPM 2013).
- Department of Environment and Science (DES), 2015. Queensland Auditor Handbook for Contaminated Land, Module 5: Contaminated land investigation documents, auditor certification and compliance assessment, 2015.

1.3 Objective

The objective of this preliminary contamination assessment was to assess the environmental setting and current and historical land use along the alignment to gain an understanding of likely areas of potential contamination and provide recommendations to manage identified areas of potential contamination.

1.4 Purpose

The purpose of this report is to document the approach and findings of the assessment to assist GAWB in understanding the contamination conditions along the alignment.

1.5 Scope of work

GHD completed the following scope of works as part of this assessment:

- High-level review of the EIS (Arup, 2008) to understand the contaminated conditions previously identified.
- Review of the Gladstone to Fitzroy Pipeline Stage 2 Detailed Assessment – Environmental Technical Report (SMEC, 2021).
- Review of land zoning along the alignment to identify possible areas of potential contamination (based on zoning and likely land use).
- Review of the general hydrogeology, hydrology and geological profile of the alignment.
- Review of current and historical aerial photographs (available on Queensland Globe) for select areas of interest identified during this assessment.
- Review of the Department of Environment and Science (DES) Environmental Management Register (EMR) and Contaminated Land Register (CLR) records for selected lots previously identified in the EIS (Arup, 2008) and other properties of interest identified during this assessment.
- A search of the DES *Environmental Protection Act 1994* public register for environment notifications and enforcement action records specific to the previously identified EMR-listed properties and other properties of interest identified during this assessment.
- Preparation of a high-level Conceptual Site Model (CSM) to identify the most likely contaminant source-pathway-receptor linkages that could be present for the FGP construction and operation.
- Preparation of this report documenting the findings of the investigation and recommendations for further investigations, if required.

Our assessment was facilitated through use of the FGPS2 OA web portal and spatial information system produced by SMEC and complemented by search of publicly available environmental databases, such as Queensland Globe and the DES environmental management registers.

Fitzroy River Intake & Pump Station

Alton Downs WTP, Pump Station & Reservoir

Raglan Pump Station & Reservoir

Aldoga Reservoirs

Fitzroy River
Alligator Creek
YAMAMBA ROAD
YEPPOON ROAD
NEILS ROAD
TANBY ROAD
SCENIC HIGHWAY
LAKES CREEK ROAD
EMU PARK ROAD
KEPPEL SANDS ROAD
CAPRICORN HIGHWAY
EVERGREEN ROAD
LEICHHARDT HIGHWAY
BURNETT HIGHWAY
Dee River
Don River
Callide Creek
Centre Creek
Raglan Creek
Langmorn Creek
Six Mile Creek
GLADSTONE MT LARCOM ROAD
HANSON ROAD
GLADSTONE BENARABY ROAD
SANDS ROAD

YEPPOON
EMU PARK
GRACEMERE
MOUNT MORGAN
DUARINGA
MOUNT LARCOM
GLADSTONE
CALLIOPE
BARALABA
AGNES WATER
BILOELA
THANGOOL
MIRIAM VALE
MOURA

Legend
- Major watercourse lines
- Rail network
- Alignment
- Watercourse areas
- Highway
- Secondary Road
- Local Connector Road
- Street/Local Road
- Private or Restricted Road
- 4WD and Track
- Unconstructed Road
- Ferry
- Bikeway/Walkway

Google Earth
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus

Paper Size ISO A3
0 2.5 5 7.5 10
Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

GAWB
Preliminary Contamination Assessment

Project No. 12560941
Revision No. A
Date 24/11/2021

Project alignment and infrastructure

FIGURE 1.1

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Print date: 17 Dec 2021 - 10:38

Data source: GHD Alignment (2021) DoR- Road, Rail, Waterways - (2021). Image © 2021 Google Earth, Data SIO, NOAA, U.S. Navy, NGA, GEBCO Image Landsat / Copernicus - Date extracted (20211123).
Created by: sbrown4

2. Site details and environmental setting

2.1 Site details

The Project will run from the Fitzroy River to the GAWB's existing water infrastructure at Yarwun approximately 115 km north. The dominant land use along the alignment is grazing and agricultural land use. There is also a mix of extractive uses, conservation and natural environments.

Key Project elements are detailed in Table 2.1 and displayed in Figure 2.1.

For the purposes of this assessment, our desktop review was limited to land within a 300 m buffer of the proposed alignment and to the parcels of land related to Project infrastructure (as described in Table 2.1).

Table 2.1 Key project infrastructure

Element	Description
Underground pipeline	An underground pipeline approximately 115 km long and 1 m in diameter from Laurel Bank near Rockhampton to Yarwun just north of Gladstone. The pipe will be buried for its full length with varying cover depending upon pipe material, ground conditions and loading. The right of way (ROW) will generally be 30 m. The pipeline trench will generally be between 2 m deep, and 5 m deep depending on the design and topography. The top of the excavation trench will generally be 12 m wide but could be up to 16 m wide in some locations depending on trench wall soil stability and the design.
Intake and pump station on the Fitzroy River near Laurel Bank	The intake point will be on the Fitzroy River near Laurel Bank adjacent to an existing intake point operated by SunWater to provide water to the Stanwell Energy Park. A pump station associated with the intake will be located at the same site. The intake and pump station will consist of a combined single structure located in the riverbank.
Water treatment plant, storage reservoir and pump station	The WTP site is approximately 3 km from the intake site at Alton Downs. The total area of the Alton Downs WTP site is approximately 11.5 ha.
Booster pump station and storage reservoir	The booster pump station site is located in the vicinity of Raglan in Gladstone Regional Council Local Government Area (LGA). This will be located approximate at the midway of the alignment. The reservoir will have a capacity of 15 ML.
Storage reservoir	The main storage reservoir is to be located at Aldoga, near Mount Larcom. The reservoir will have a capacity of 100 ML.

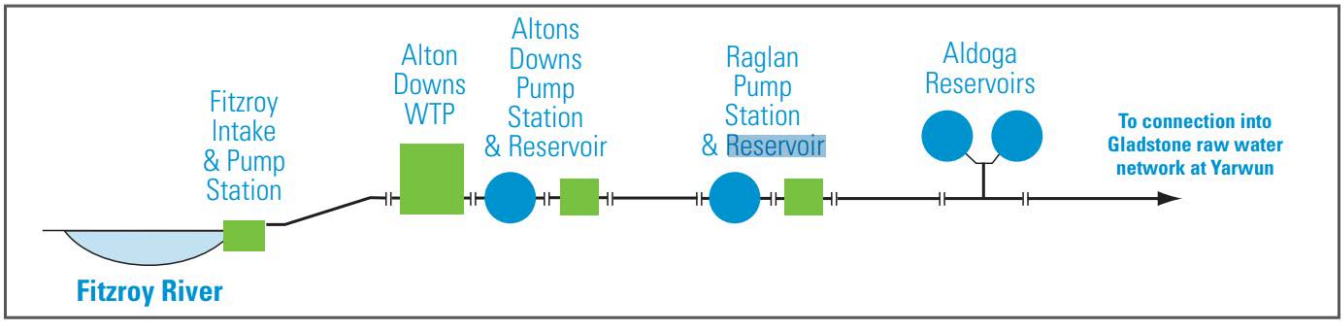


Figure 2.1 Schematic of key project infrastructure

2.2 Land uses

The alignment is located along, adjacent to or in the vicinity off the following:

– Infrastructure including roads, rail lines, powerlines, gas pipelines and a fibre optic line.
– Dams, pondage banks, fences and gates.
– Extractive industries are present in the vicinity of the alignment including quarrying, landfills and land where exploration permits for minerals are held.

– The racecourse reserve at Raglan, which is classified as Open Space – Recreational.
– Established agricultural properties.
– Several rural residential areas including Alton Downs, Gracemere, Bajool, Marmor, Raglan, Mount Larcom and Gladstone.
– Recreational areas used for water skiing (Fitzroy River) and boating and fishing activities (Raglan Creek).
– An existing explosives manufacturing facility located to the west of Bajool and the Port Alma salt works located to the east of Bajool.

2.3 Land zoning and tenure

The Project is located in the Rockhampton and Gladstone regional council LGAs. The Rockhampton and Gladstone regional council planning schemes were reviewed to identify land zoning for the Project.

For alignment within the Gladstone Regional Council LGA, land is primarily zoned as Special Purpose or Rural. The pipeline Right of Way (ROW) intersects a reserve within this LGA that is designated as Sport and Recreation (Lot 167 on CP859402).

For alignment within the Rockhampton Regional Council LGA, land is primarily zoned as Rural, with some Special Purpose. It is noted that the Special Purpose zoning is largely government owned utilities including railway and road infrastructure.

Land tenure along the alignment largely comprises easements, freehold, and leasehold. The other project infrastructure such as Fitzroy River Intake, Alton Downs WTP, pump stations and reservoirs are located in freehold land.

It should be noted a large proportion of the Project is within the SGIC SDA and GSDA managed by the Office of the Coordinator-General.

2.4 Topography

Based upon the Queensland Globe elevation overlay, the regional topography ranges between 10 m and 50 m Australian Height Datum (mAHD), with a peak of 110 mAHD at Mount Larcom. The topography between the Fitzroy River and Gladstone is generally a gently undulating landform of low hills and flat plains, with some coastal ranges north of the Fitzroy River and east of Mount Larcom. The alignment crosses numerous watercourses and drainage lines between the Fitzroy River and Gladstone.

2.5 Soil

Soil types have been mapped for the Project using the Atlas of Australian Soils dataset. The Project intersects several dominant soil types including:

– Sodosols: Sodosols are soils which display a strong texture contrast between surface and subsoils. These soils generally have a weak structure in the surface with a firm to hard setting surface condition. The subsoils are sodic in nature and are generally quite dense, coarsely structured and disperse when wet.
– Vertosol: Vertosols are clay-rich soils which display strong cracking when dry and shrink and swell during the wetting and drying phases. They are distinguished based on the nature of the surface horizon and the colour and chemical properties of the subsoil horizons.
– Tenosols: Tenosols have a weakly developed soil profile which is typically very sandy and without obvious horizons. These soils can have a range of surface conditions and textures but are generally shallow and rocky. Tenosols can be susceptible to soil creep, sheet and rill erosion.
– Ferrosol: Ferrosols do not have a strong texture contrast between surface horizons and upper subsoil horizon. They have relatively high levels of free iron oxide (Fe > 5 %). They are generally strongly acid throughout with the pH ranging from 4.5-5.6 in the surface horizon to 4.4 -5.2 in the subsoil. The clay content is considerably high (>45%).

2.6 Acid sulfate soils

Under the Gladstone Regional Council Planning Scheme, the Project from Raglan to the most southern extent is situated within the acid sulfate soils (ASS) trigger area. Similarly, under the Rockhampton Regional Council Planning Scheme the northern extent of the Project is situated within the ASS trigger area.

As identified in the Environmental Technical Report (SMEC, 2021) the northern extent of the alignment, in the vicinity of the Fitzroy River, is mapped as alluvial soils (Qa-WLD geology unit) and has an elevation below 10 mAHD, highlighting a potential risk of ASS. However, the majority of the corridor is mapped as having a low to extremely low probability of ASS. Near Gladstone, the Project intersects the mapped 'ASS of the Tannum Sands to Gladstone area, Central Queensland', which indicates a potential risk of ASS or potential acid sulfate soils (PASS) occurring. It is noted that a preliminary ASS investigation was undertaken for the EIS (Arup, 2008) and identified ASS near Raglan Creek, in an area with low lying mangroves. Based on the above, it is considered likely that there are additional areas that have potential for ASS due to the Project's proximity to the coast and waterways.

2.7 Geology

The Queensland Globe 1:100,000 detailed surface geology indicates that the alignment is underlain by a range of lithological profiles. The distribution of the geology units is described in Table 2.2 and displayed in Figure 2.2. Table 2.2 shows the units in sequence of occurrence from surface from north to south.

Table 2.2 Summary of regional geology along the alignment

Unit	Symbol	Age	Summary
Quaternary Alluvium	Qa	Quaternary	Sand, silt, mud and gravel
Stratified unit (including volcanic and metamorphic)	Qe	Quaternary	Clay, silt, sand; estuarine and deltaic deposits
Stratified unit (including volcanic and metamorphic)	Cr	Early carboniferous	Dark grey mudstone, siltstone, felsic volcaniclastic sandstone, polymictic conglomerate, ooid-bearing sandstone and conglomerate with mudstone rip-up clasts; oolitic and pisolitic limestone and minor skeletal limestone; rare rhyolitic ignimbrite
Capella Creek Group, Erebus beds, Marble Waterhole beds, Craigilee beds, Calliope beds, Munbooree beds, Dunollie beds, Pumpkin Hut Mudstone, unnamed sedimentary and volcanic units	Dc	Early devonian - middle devonian	Basaltic to rhyolitic volcaniclastic sandstone and conglomerate (and minor lavas), siltstone, mudstone, chert, jasper and fossiliferous limestone
Mount Alma Formation, Balaclava Formation, Lochenbar Formation, Mount Hoopbound Formation, Tanderra Volcanics, Channer Creek beds, Three Moon Conglomerate	DCa	Late devonian - early carboniferous	Feldspatholithic sandstone, siltstone and conglomerate and breccia with basaltic, andesitic, and (less commonly) felsic volcanic clasts; minor mafic lava and rare ignimbrite; local limestone
Arenite-mudrock	DCc	Late devonian - carboniferous	Strongly deformed arenite, mudstone, chert and minor mafic volcanics; locally grades into mica schist, gneiss, amphibolite, quartzite
Granitoid	PRg	Late permian - early triassic	Granite, granodiorite, tonalite, diorite and gabbro
Berserker Group, Double Mountain Volcanics, Peninsula Range Volcanics	Pk	Early permian	Siltstone, fine to coarse-grained lithofeldspathic sandstone, intermediate to felsic intrusive and extrusive domes and volcanic breccia with lesser conglomerate

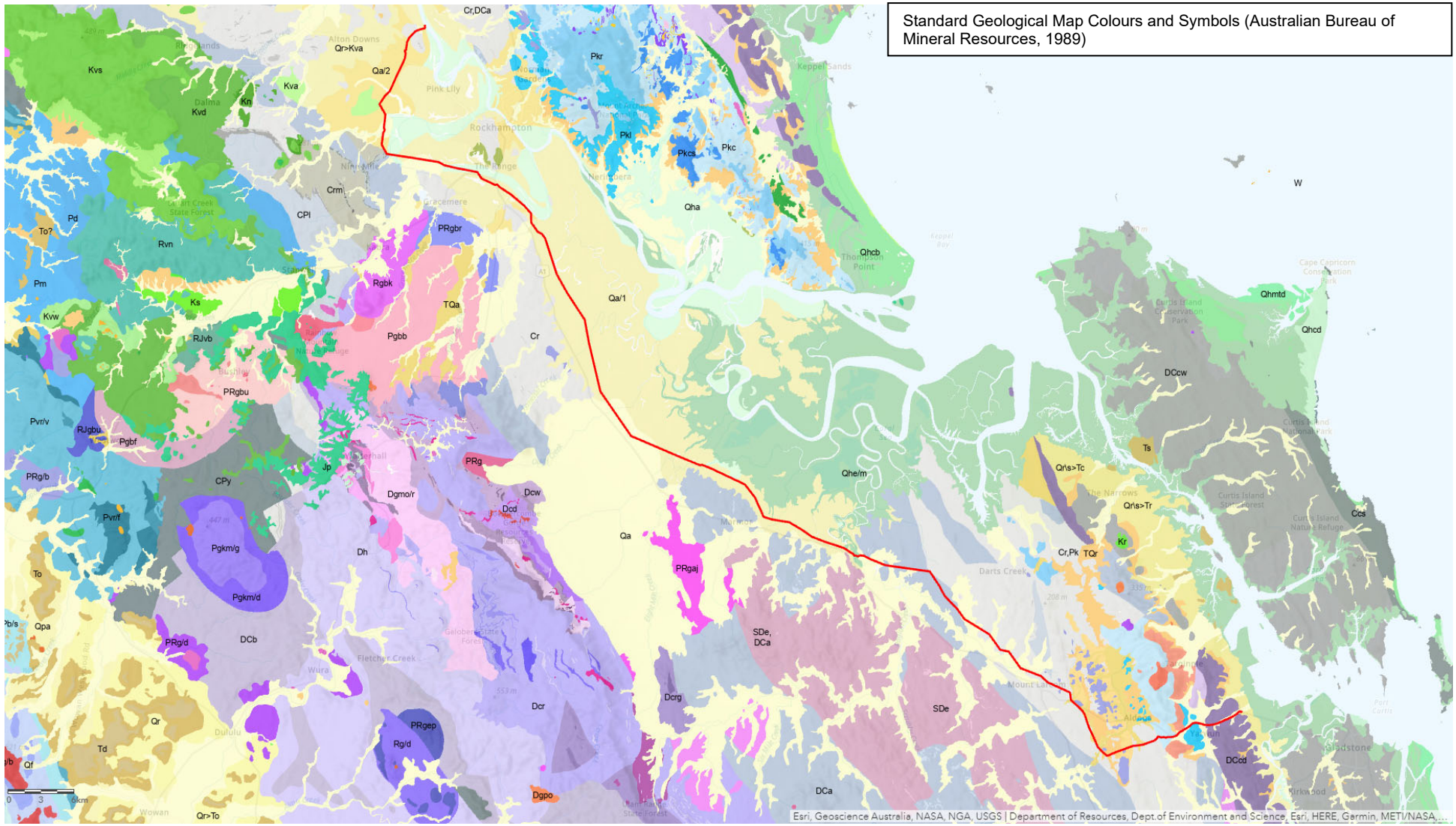


Figure 2.2 Surface geology along the alignment

2.8 Hydrogeology

Using Queensland Globe, over 200 groundwater bores were identified to be located within 1 km of the alignment. The EIS (Arup, 2008) described existing groundwater conditions and usage in project corridor as follows:

– Hydrogeology in the Fitzroy to Bajool region is characterised by the presence of medium to high-plasticity clays that extend to around 8 m to 10 m below the surface.
– Beneath the clay, there are water bearing alluvial sand aquifers in some areas.
– Depth to water in the aquifers the Bajool to Gladstone region is generally in the order of 10 m to 20 m.
– The aquifers are underlain by basalt and granitic formations.
– Groundwater is very saline and would require significant treatment to reach a potable standard.
– The spatial distribution and quantity of yields from aquifers potentially affected by the pipeline indicate a limited potential for the development of centralised urban groundwater supply system.
– Water bores in the area are used for agricultural usages and secondary residential usages.

Groundwater bores in the vicinity of the alignment indicate that the groundwater level is generally <5 m from the surface, except potentially around the Fitzroy River Intake where existing bores indicate that it may be between 5-200 m from the surface in some locations (BOM, 2019).

2.9 Hydrology

The Project is located within the Fitzroy River and Calliope River drainage basins. As detailed in Environmental Technical Report (SMEC, 2021), the Fitzroy River has a long and well-documented history of flooding. Major floods can result from either the Dawson or the Mackenzie Rivers, although significant flooding in the Rockhampton area can also occur from heavy rain in the local area below Riverslea. Under the Queensland Globe flood overlay, the Calliope River is also mapped as being subject to flooding hazards.

The Project crosses a number of waterways, including watercourses and drainage features mapped under the *Water Act 2000*. Other rivers, creeks and drainage lines not mapped under the *Water Act 2000* are also crossed by the alignment. Eight major creeks are traversed by the alignment, these include: Lion, Gavial, Inkerman, Twelve Mile, Marble, Horrigan, Raglan and Larcom creeks (refer to Figure 3.1).

In the EIS (Chapter 9, Water Resources and Water Quality; Arup, 2008) a surface water quality assessment was conducted at the Fitzroy River against the Queensland Water Quality Guidelines (QWQG) found consistently high concentrations of turbidity, low levels of dissolved oxygen and high levels of total nitrogen nitrates, total phosphorus and metals.

3. Aerial imagery and photography review

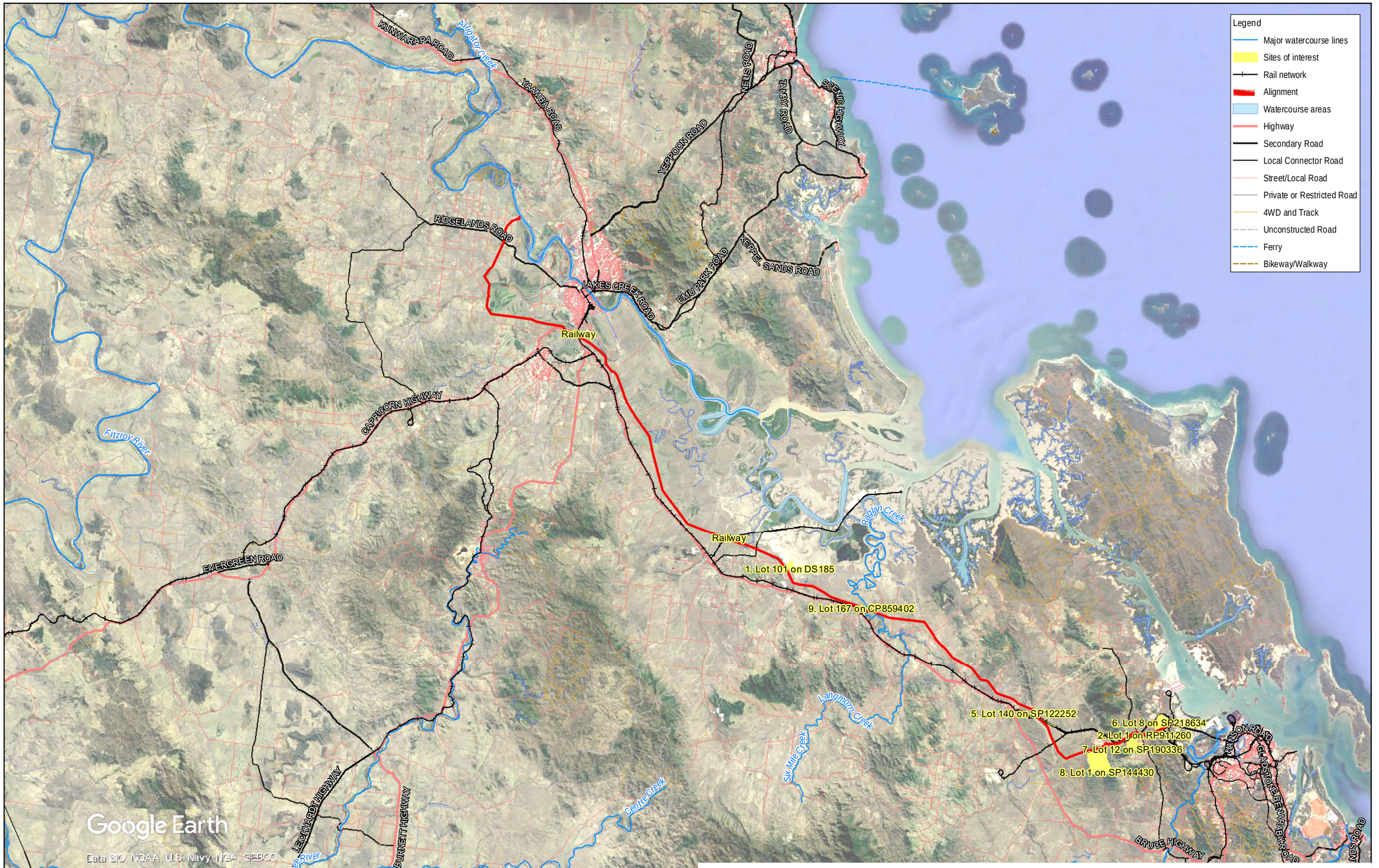
In the EIS (Arup, 2008) for the Project, a preliminary contamination assessment of the proposed alignment was undertaken and five lots of interest were identified, primarily based entries within the DES Environmental Management Register, namely:

1. Lot 101 on DS185 (Marmor) – Waste storage
2. Lot 1 on RP911260 (Yarwun) – Landfilling and waste storage
3. Lot 91 on SP122250 (Yarwun) – Railway corridor
4. Lot 7 on SP145439 (Yarwun) – Alumina refinery and firing range
5. Lot 140 on SP122252 (Mount Larcom) – Railway corridor.

As part of our current assessment, GHD firstly reviewed the current aerial imagery of the alignment to identify additional properties of interest. Four additional properties of interest, located within 400 m of the alignment, and which may pose a potential contamination risk (if contamination is confirmed to be present):

6. Lot 8 on SP218634 (Yarwun) – Yarwun Alumina Refinery
7. Lot 12 on SP190336 (Yarwun) – Yarwun Quarry
8. Lot 1 on SP144430 (Yarwun) – Rio Tinto Alcan Red Mud Repository
9. Lot 167 CP859402 and Lot 168 on CP859401 (Raglan) – Racecourse reserve.

A map of the identified sites of interest are displayed in Figure 3.1. A review of current and historical aerial imagery for these Lots is provided in Section 3.1. These nine sites are referred to herein as the ‘sites of interest’.



Data Disclaimer

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Paper Size ISO A3

0 2.5 5 7.5 10

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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GHD

GAWB
Preliminary Contamination Assessment

Sites of interest

Project No. 12560941
Revision No. A
Date 17/12/2021

FIGURE 3.1

Data source: GHD Alignment (2021) DoR- Road, Rail, Waterways - (2021). Image © 2021 Google Earth, Data SIO, NOAA, U.S. Navy, NGA, GEBCO Image Landsat / Copernicus - Date extracted (20211123).
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3.1 Current aerial imagery

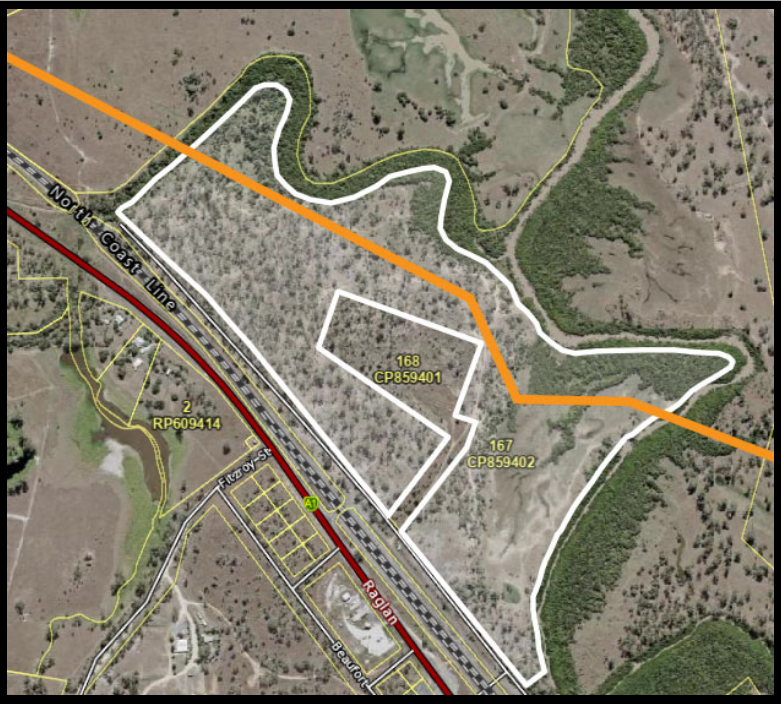
GHD firstly reviewed the current aerial imagery of the alignment to identify sites of interest from a contamination perspective. These are shown in Table 3.1. Following this initial review a more detailed historical and regulatory review was undertaken as detailed in the sections below. It is noted that in Table 3.1 the orange line indicates the approximate location of the pipeline.

Table 3.1 Aerial review of possible contamination sites

Description of site	Aerial photograph
1. Lot 101 on DS185 The alignment intersects the middle of the property previously identified in the EIS (Arup, 2008) as being listed on the EMR and a contamination risk due to waste storage.	
2. Lot 1 on RP911260 The alignment intersects the middle of the property previously identified in the EIS (Arup, 2008) as being listed on the EMR and to be a contamination risk due to landfilling and waste storage.	

Description of site	Aerial photograph
3. Lot 91 on SP122250 The alignment intersects the railway allotment to the west. This property has previously been identified in the EIS (Arup, 2008) as being listed on the EMR and a contamination risk from railway operations.	
4. Lot 7 on SP145439 The alignment intersects the allotment directly south of the Alumina refinery. This property has previously been identified in the EIS (Arup, 2008) as being listed on the EMR and a contamination risk from being an alumina refinery and firing range .	
5. Lot 140 on SP122252 The alignment intersects the railway allotment to the east. This property has previously been identified in the EIS (Arup, 2008) as being listed on the EMR and a contamination risk from railway operations.	

Description of site	Aerial photograph
6. Lot 8 on SP218634 The Yarwun Alumina Refinery is 50 m north of the alignment, as identified by GHD during our initial review of aerial photography along the alignment.	
7. Lot 12 on SP190336 The Yarwun Quarry is approximately 300 m south of the alignment, as identified by GHD during our initial review of aerial photography along the alignment.	

Description of site	Aerial photograph
8. Lot 1 on SP144430 The Rio Tinto Alcan Red Mud Repository is approximately 250 m south of the alignment, as identified by GHD during our initial review of aerial photography along the alignment.	
9. Lot 167 on CP859402 The alignment intersects a reserve in Raglan that is zoned as Sport and Recreation. This reserve was identified as a racecourse reserve in the EIS (Arup, 2008).	

3.2 Historical aerial photographs

Historical aerial photographs of the identified properties were reviewed using QImagery and Queensland Globe, as summarised in Table 3.2. Historical aerial photographs of each lot on plan are included in Appendix A.

Table 3.2 Historical aerial review of possible contaminated sites

Lot on plan	Aerial review
1. Lot 101 on DS185 Potential contamination source: Waste Storage	**1956** The property consisted of untouched bushland. Bills road, which runs along the southwestern boundary had been constructed, however remained unsealed at this point in time.
	1973 The property had been cleared, which is considered likely to have been for agricultural purposes. Two dams had been constructed in the northwest corner of the property.
	1985 The property remained primarily unchanged to the 1973 aerial imagery. The two dams were inundated with water, likely due to flooding or rainfall in the region.
	1990 Ground disturbance was noted adjacent to the dams in the northwest corner of the property.
	1999 The 1999 historical aerial photograph appeared to be similar to the 1990 aerial photograph.
	2004 The 2004 historical aerial photograph appeared to be similar to the 1990 and 1999 aerial photograph.
	2010 In the 2010 aerial photograph a small industrial building had been constructed in the approximate centre of the property. No other observable changes were noted.
	2014 In the 2014 historical aerial photograph a larger industrial building had been constructed adjacent to Bills Road. This building had two cylindrical tanks. A smaller shed to the northwest of the industrial building had also been constructed. Unsealed access tracks were evident connecting this building to the smaller building noted in 2010 and the man-made dams located to the northwest border of the property.
	2020 In the 2020 aerial photograph no observable changes were evident from the 2014 aerial imagery.
2. Lot 1 on RP911260 Potential contamination source: Landfilling and Waste Storage	**1956** In 1959 the property consisted of uncleared bushland. Calliope River Road and Lindher Road, which are located to the west of the property had been constructed by this point in time, however remained unsealed. Some access tracks were visible.
	1965 In the 1965 aerial imagery, the property primarily remained unchanged. A large area of ground disturbance related to land clearing was observable to the east of the property.
	1983 In the 1983 aerial imagery the property primarily remained unchanged. Construction was underway for the railway line running along the southern boundary of the property.
	1992 In the 1992 aerial imagery, ground disturbance was observable in the northern portion of the property. It is noted that access routes via both Calliope River Road and Lindher Road connected the property to the landfill southwest of the property and the Yarwun Alumina Refinery to the north.
	1996 In the 1996 aerial imagery further ground disturbance was evident. Some stored material seemed to be present in the norther portion of the property.
	2010

Lot on plan	Aerial review
	In the 2010 aerial imagery a large industrial building with black storage containers was evident to the northeast corner of the property.
	2014 In the 2014 aerial imagery all infrastructure from the property had been removed, access tracks still traversed the property.
	2020 In the 2020, aerial imagery the property remained primarily unchanged from the 2014 imagery. The property appeared to be vacant at this point in time.
3. Lot 91 on SP122250 Potential contamination source: Railway Corridor	**1959** In the 1959 historical aerial photograph the railway line had been constructed by this point in time. The adjacent land was primarily untouched with the exception of some clearing for agricultural purposes and ground disturbance related to landfilling to the southeast of the allotment.
	1965 In the 1965 historical aerial further clearing of the surrounding land was evident, possibly related to the construction of railway yards and storage areas. The ground disturbance related to quarrying had increased in size to the southeast of the allotment.
	1980 In the 1980 historical aerial photograph further clearing of the surrounding area had occurred.
	1989 In the 1989 historical aerial photograph, the railway line was seemingly ongoing railway upgrades. The land parcels adjacent to the railway line had undergone clearing and some storage of materials was evident. Particularly to the north of the railway line and to the west of the allotment. The quarry to the southeast had increased in size and encroached into the railway allotment.
	1996 In the 1996 historical aerial the ground disturbance previously noted to the west of the allotment had grown over. Railway yards with stored materials including metal and stockpiled gravel was evident. Some infrastructure was also evident, with some of the infrastructure being bunded.
	2021 In the 2021 aerial photograph, the property and overall landscape primarily remained unchanged.
4. Lot 7 on SP145439 **6.** Lot 8 on SP218634 Potential contamination source: Alumina refinery and firing range	**1959** In the 1959 aerial photograph both lots had been subject to some clearing by this time, however the majority of the land was untouched bushland.
	1973 In the 1973 aerial photograph both lots had undergone additional land clearing. Some residential infrastructure was present to the northwest of Lot 8 on SP2186344.
	1981 In the 1981 aerial photograph ground disturbance was evident throughout both allotments. This ground disturbance was related to the development of the port and terminal to the north and coal terminal to the south.
	1992 In the 1992 aerial photograph a large man-made dam had been developed to the northeast of Lot 8 on SP218634. Road infrastructure was present running along the eastern boundaries of both allotments. Some ground disturbance was noted over Lot 8 on SP218634. This was possibly associated with the development of the Yarwun Refinery.
	2003 In the 2003 aerial photograph the Yarwun Refinery (Lot 8 on SP218634) had been established by this time. The Yarwun Refinery's infrastructure encroached onto Lot 7 on SP145439.
	2008 In the 2008 historical aerial photograph, the Yarwun Refinery had expanded and continued to encroach onto Lot 7 on SP145439. Access tracks connected the refinery (Lot 8 on SP218634) to Lot 7 on SP145439. Given that the North Coast railway line is located along the southern boundary of the property it is likely that the material generated at the refinery was loaded onto the rail carts through Lot 7 on SP145439. An electrical powerline traversed the middle of the property.

Lot on plan	Aerial review
	2015 In the 2015 historical aerial photograph, further clearing of Lot 7 on SP145439 was evident, this is likely associated with the expansion of the refinery (Lot 8 on SP218634). It is noted that the wastewater from the refinery is directly to the north of Lot 7 on SP145439.
	2021 In the 2021 aerial imagery the properties remained primarily unchanged. Some evidence of dumping was evident on Lot 7 on SP145439 in the approximate centre of the property along the access track exiting the property to the west.
5. Lot 140 on SP122252 Potential contamination source: Railway corridor	**1959** In the 1959 aerial imagery the railway corridor had been established at this point in time. There was a large area of ground disturbance to the west of the allotment associated with the construction of the Mount Larcom showground area. To the south of the Mount Larcom showground area, infrastructure associated with the railway was evident.
	1965 In the 1965 aerial imagery the allotment remained primarily unchanged from the 1959 imagery. Land clearing and ground disturbance was noted to the west of the allotment.
	1981 In the 1981 historical photograph land clearing and ground disturbance was observed directly adjacent to the alignment, most likely related to railway upgrades and the creation of laydown and storage areas.
	1994 In the 1994 historical aerial photograph, further ground disturbance was observable to the north of the alignment. Some stored railway infrastructure was observable to the north.
	2007 In the 2007 aerial imagery the ground disturbance previously observable had largely grown over.
	2017 In the 2017 aerial imagery, the area previously used for storage of rail infrastructure was seemingly abandoned at this point in time. Some remaining rail infrastructure was present outside the allotment.
7. Lot 12 on SP190336 Potential contamination source: Quarrying	**1959** In the 1959 aerial imagery the quarry operation had been established by this point in time. Some infrastructure was evident to the north of the property adjacent to the railway line.
	1969 In the 1969 aerial photograph, the quarry operation had expanded with further land clearing and ground disturbance noted.
	1979 In the 1979 aerial photograph the property remained primarily unchanged. The boundary between the railway corridor and quarry was not distinguishable in the aerial photograph.
	1996 In the 1996 imagery the operation had expand significantly. An onsite dam was observable, and a black cylindrical shape was evident likely related to stockpiled material. A wall of trees separated the railway corridor boundary with the quarry; however, an access track connected the quarry to the railway corridor.
	2012 In the 2012 photograph the black stockpiled material was no longer evident. The quarrying operation was once again more developed with further infrastructure present. The wall of trees separating the railway corridor with the quarry had largely been cleared. A larger dam was constructed in the approximate centre of the quarry operations.
	2020 In the 2020 aerial photograph, the property was similar to that observed in 2012. It is noted that there was limited to no distinction between the quarry and railway corridor boundary.
8. Lot 1 on SP144430	**1959** In the 1959 aerial photograph the property consisted of untouched vegetation.
	1965

Lot on plan	Aerial review
Potential contamination source: Alcan Red Mud Repository	In the 1965 aerial photograph some uniform clearing was evident. Ground disturbance was noted in the centre of the allotment.
	1981 In the 1981 aerial photograph further clearing was evident. The ground disturbance observed in the approximate centre of the allotment had expanded in size and was observed to be more cylindrical in shape.
	1994 In the 1994 aerial imagery the ground disturbance had expanded slightly. Some infrastructure was noted to the north of the ground disturbance.
	2007 In the 2007 aerial imagery the Alcan Red Mud Repository had been established by this point in time. This repository expanded to the north of Aldoga Road, where a laydown and storage area was present.
	2014 In the 2014 aerial imagery the Alcan Red Mud Repository had expanded further south. The laydown and storage area located north of Aldoga Road had also expanded to include more storage infrastructure and laydown areas. Metal parts were observable within the laydown area as well as storage containers.
	2020 In the 2020 aerial photograph the operation had expanded to the west. The storage yard to the north had been vacated by this point in time. Limited infrastructure remained and all stored materials had been removed.
9. Lot 167 on CP859402 Potential contamination source: Racecourse	**1956** In the 1956 aerial photograph the property had largely been cleared. Some small buildings and ground disturbance was evident north of the railway line, which ran along the southwestern boundary of the property.
	1973 In the 1973 aerial photograph an access track traversed the centre of the property and entered the property in the southeast corner of the property connecting the property to Raglan township. A small constructed dam was noted to the southeast corner of the property.
	1985 In the 1985 aerial photograph ground disturbance was evident to the south of the property, likely associated with upgrades to the railway infrastructure.
	1994 In the 1994 aerial photographs further dirt access tracks were evident throughout the property. This is likely associated with racetrack riding.
	2004 In the 2004 aerial photograph further ground disturbance in a circular shape was evident in the middle of the property.
	2010 In the 2010 aerial photograph the property was primarily unchanged. Additional racetrack dirt roads were evident and a fenced area in the middle of the property (Lot 168) was observable.
	2020 In the 2020 aerial photograph the Raglan racetrack was well established at this point in time.

4. Regulatory review

As part of the desktop review, information was obtained from a number of publicly available regulatory sources to enable a greater understanding of historical and current land use along the alignment, including former site practices which may have the potential to cause contamination.

4.1 EMR and CLR

A search was undertaken of the DES EMR and CLR for the sites of interest. A paid search of the EMR and CLR is done on a lot-by-lot basis.

Given the size of the Project and possible large number of individual lots, the Contaminated Land Assessment team at DES was contacted by GHD to determine if all properties listed on the EMR and CLR along the alignment could be easily identified by DES and provided without undertaking individual lot on plan searches. DES confirmed that a search of the EMR and CLR could only be undertaken on an individual lot basis, and they were unable to provide a list of all EMR/CLR listed properties along the alignment.

As such, a search of the EMR and CLR was undertaken for only the identified sites of interest, as described in Table 4.1. EMR/CLR records are provided in Appendix A.

Table 4.1 EMR and CLR search results

Lot Plan & Location	Register	Notifiable Activity Description
1. Lot 101 on DS185 (Marmor)	EMR	**Notifiable activity:** Waste storage, treatment or disposal - storing, treating, reprocessing or disposing of regulated waste (other than at the place it is generated), including operating a nightsoil disposal site or sewage treatment plant where the site or plant has a design capacity that is more than the equivalent of 50,000 persons having sludge drying beds or on-site disposal facilities.
2. Lot 1 on RP911260 (Yarwun)	EMR	**Notifiable activity:** Landfill - disposing of waste (excluding inert construction and demolition waste). Lot 1 on RP911260 was subdivided from Lot 1 on RP618672 (Boat Creek Road, Yarwun, Qld, 4694), which is included on the EMR. Subdivided new parcels will remain on the EMR unless it can be shown that they are not located near the contaminating activity.
3. Lot 91 on SP122250 (Yarwun)	EMR	**Notifiable activity:** Railway yards – operating a railway yard including goods-handling yards, workshops and maintenance areas. Lot 91 on SP122250 was subdivided from Lot 1 on RP601330 (Butler Street, Yarwun, Qld, 4680), which is included on the EMR. Subdivided new parcels will remain on the EMR unless it can be shown that they are not located near the contaminating activity.
4. Lot 7 on SP145439 (Yarwun)	EMR	**Notifiable activity:** Yarwun Alumina Refinery and Gun, pistol or rifle range – operating a gun, pistol or rifle range. Lot 7 on SP145439 was subdivided from Lot 3 on CP860100 (Mt. Miller Road 4680), which is included on the EMR. Subdivided new parcels will remain on the EMR unless it can be shown that they are not located near the contaminating activity.
5. Lot 140 on SP122252 (Mount Larcom)	EMR	**Notifiable activity:** Hazardous contaminant – this site has been subject to possible high arsenic levels along rail corridor.
6. Lot 8 on SP218634	EMR	**Notifiable activity:** – Livestock dip or spray race – operating a livestock dip or spray race facility. – Smelting or refining – fusing or melting metalliferous metal or refining the metal. – Abrasive blasting – carrying out abrasive blast cleaning (other than cleaning carried out in fully enclosed booths) or disposing of abrasive blasting material. – Chemical manufacture or formulation – manufacturing, blending, mixing or formulating chemicals if -

Lot Plan & Location	Register	Notifiable Activity Description
		– (a) the chemicals are designated dangerous goods under the dangerous goods code; and – (b) the facility used to manufacture, blend, mix or formulate the chemicals has a design production capacity of more than 1 t per week. – Chemical storage – (other than petroleum products or oil under item 29) - storing more than 10 t of chemicals (other than compressed or liquefied gases) that are dangerous goods under the dangerous goods code. – Coal fired power station – operating a coal fired power station. – Electrical transformers - manufacturing, repairing or disposing of electrical transformers. – Metal treatment or coating - treating or coating metal including, for example, anodising, galvanising, pickling, electroplating, heat treatment using cyanide compounds and spray painting using more than 5 L of paint per week (other than spray painting within a fully enclosed booth). – Mineral processing - chemically or physically extracting or processing metalliferous ores. – Petroleum product or oil storage - storing petroleum products or oil – – (a) in underground tanks with more than 200L capacity; or – (b) in above ground tanks with – – (i) for petroleum products or oil in class 3 in packaging groups 1 and 2 of the dangerous goods code - more than 2, 500L capacity; or – (ii) for petroleum products or oil in class 3 in packaging groups 3 of the dangerous goods code - more than 5,000L capacity; or – (iii) for petroleum products that are combustible liquids in class C1 or C2 in Australian Standard AS1940, 'The storage and handling of flammable and combustible liquids' published by Standards Australia - more than 25, 000L capacity. – Waste storage treatment or disposal - storing, treating, reprocessing or disposing of regulated waste (other than at the place it is generated), including operating a nightsoil disposal site or sewage treatment plant where the site or plant has a design capacity that is more than the equivalent of 50, 000 persons having sludge drying beds or on-site disposal facilities.
7. Lot 12 on SP190336	Not listed	Not listed
8. Lot 1 on SP144430	EMR	– Waste storage treatment or disposal - storing, treating, reprocessing or disposing of regulated waste (other than at the place it is generated), including operating a nightsoil disposal site or sewage treatment plant where the site or plant has a design capacity that is more than the equivalent of 50, 000 persons having sludge drying beds or on-site disposal facilities. – Abrasive blasting – carrying out abrasive blast cleaning (other than cleaning carried out in fully enclosed booths) or disposing of abrasive blasting material. – Chemical manufacture or formulation – manufacturing, blending, mixing or formulating chemicals if – – (a) the chemicals are designated dangerous goods under the dangerous goods code; and – (b) the facility used to manufacture, blend, mix or formulate the chemicals has a design production capacity of more than 1 t per week. – Chemical storage – (other than petroleum products or oil under item 29) - storing more than 10 t of chemicals (other than compressed or liquefied gases) that are dangerous goods under the dangerous goods code. – Coal fired power station – operating a coal fired power station. – Electrical transformers - manufacturing, repairing or disposing of electrical transformers. – Metal treatment or coating - treating or coating metal including, for example, anodising, galvanising, pickling, electroplating, heat treatment using cyanide compounds and

Lot Plan & Location	Register	Notifiable Activity Description
		spray painting using more than 5 L of paint per week (other than spray painting within a fully enclosed booth). – Mineral processing - chemically or physically extracting or processing metalliferous ores.
9. Lot 167 on CP859402	Not listed	Not listed.

4.2 Environmental authorities

Environmental Authority (EA) records registered to properties within the alignment (either current or historical) were reviewed using the EAs Location overlay on the SMEC Project web portal and DES *Environmental Protection Act 1994* Public Register search. All results are provided in Table 4.2 and EA records are provided in Appendix A.

Table 4.2 EA records for past contaminated land

Lot number	Date effecti ve	Status	EA reference	Description
6. Lot 8 on SP218634	14 Dec 2018	Granted	EA0001611	ERA: ERA 08 – Chemical storage 5. Storing 200 cubic metres or more of chemicals that are liquids, other than chemicals mentioned in items 1 to 3, under subsection (1)(d). ERA 07 – Chemical manufacturing 6(b). Manufacturing more than 100t but no more than 10,000t of inorganic chemicals. Items 1 to 4 apply to items that are not inorganic chemicals.
7. Lot 12 on SP190336	12 Dec 2013	Granted	EPPR00325413	ERA 16 – Extraction and Screening 3(c). Screening more than 1,000,000 tonnes of material in a year. ERA 16 – Extracting and Screening 2(c). Extracting (other than dredging) more than 1,000,000 tonnes of material in a year.
2. Lot 1 on RP911260 **3.** Lot 91 on SP122250 **4.** Lot 7 on SP145439 **8.** Lot 1 on SP144430 Lot 6 on SP235022 Lot 7 on SP145439, Lot 54 on SP137048 Lot 1 on RP911260 Lot 27 on SP115227 Lot 79 on CP911258 Lot 23 on SP115225 Lot 13 on RP620157 Lot 91 on SP122250	5 June 2020	Granted	EPPR00926513	EA 62 – Resource recovery and transfer facility operation 1(d). Operating a facility for receiving and sorting, dismantling, baling or temporarily storing Category 1 regulated waste. ERA 08 – Chemical Storage 5. Storing 200+ cubic metres of liquid chemicals (other than chemical mentioned in items 1 to 3, under subsection (1)(d). ERA 16 – Extraction and Screening 3(c). Screening more than 1,000,000 tonnes of material in a year. ERA 31 – Mineral processing 2(b). Processing more than 1,000,000 tonnes of mineral material (other than coke) in a year. ERA 60 – Waste disposal 1(d). Operating a facility for disposing more than 200,000 tonnes of waste mentioned in subsection (1)(a) in a year. ERA 14 – Electricity generation 1. Generation electricity by using gas at a rated capacity of 10 MW+ electrical. ERA 50 – Mineral bulk material handling 2. Loading or unloading 100 tonnes + of bulk materials in a day (other than loading or unloading mention in item 3 or storing bulk materials). ERA 15 – Fuel burning. Using fuel burning equipment that is capable of burning at least 500 kg of fuel in an hour.

Lot number	Date effecti ve	Status	EA reference	Description
Lot 21 on SP115224 Lot 7 on SP177782 Lot 20 on SP115224 Lot 7 on SP228453				ERA 08 – Chemical storage 3. Storing 500 cubic metres + of chemicals of class C1 or C2 combustible liquids under AS 1940 or dangerous goods class 3 under subsection (1)(c). ERA 08 – Chemical storage 4. Storing 200 tonnes + of chemicals that are solids or gases (other than chemicals mentioned in items 1 to 3 under subsection (1)(d). ERA 62 – Resource recovery and transfer facility operation 1(c). Operating a facility for receiving and sorting, dismantling, baling or temporarily storing category 2 regulated waste. ERA 16 – Extraction and Screening 2(c). Extracting (other than by dredging) 1,000,000 tonnes + of material in a year. ERA 50 – Mineral and bulk material handling 1(a). Loading or unloading 100 tonnes + of minerals in a day (other than loading or unloading mentioned in item 3 or storing 50,000 tonnes + of minerals within 5 km of the highest astronomical tide or 1 km of a watercourse.

4.3 Statutory enforcement actions

Statutory enforcement actions are issued by DES to an individual or company for non-compliance with a condition of an EA or the *Environmental Protection Act 1994*. The DES *Environmental Protection Act 1994* Public Register search was undertaken for the sites of interest to determine any statuary enforcement actions issued. These findings are displayed in Table 4.3.

Table 4.3 Statutory enforcement actions

Lot on Plan	Enforcement number and type	Issued to	Issued date	Comments
8. Lot 1 on SP144430	STAT915: Environmental Evaluation	RTA Yarwun Pty Ltd	15/04/2015	An environmental evaluation notice was issued by the DES in regard to groundwater expression outside the boundary of the residue management area (tailings dam). Following this Yarwun Pty Ltd submitted an environmental report which addressed the departments concern. DES concluded that given the water quality results obtained contamination was evident within the groundwater (high salinity, low pH and high total dissolved solids).
8. Lot 1 on SP144430	STAT1072: Environmental Protection Order	RTA Yarwun Pty Ltd	19/08/2016	Two areas outside the boundary of RTA Yarwun Pty Ltd residue management area had groundwater expressions as a result of the tailings dam. The lots effected were as followed: Lot 68 on SP272417, Lot 8 on SP245936 and Lot 7 on SP177782. It is noted that the Project is proposed to intersect Lot 68 on SP272417.

4.4 Defence related disturbance

4.4.1 Unexplained ordnance (UXO)

Unexploded ordnance (UXO) has not been identified within or near the Project area.

4.4.2 Defence PFAS Investigation & Management Program

The alignment is not located within the Department of Defence's PFAS investigation and management sites database.

5. Areas of environmental interest

5.1 Site risk rating

A preliminary risk ranking exercise was undertaken to classify whether the potential contaminated sites identified during our assessment are likely pose a high, moderate or low risk to human health or the environment based on the preliminary contamination assessment.

In the absence of sampling data to confirm the presence or absence of contamination at the sites of interest, the risk ranking provided should be considered of a preliminary nature. To provide consistency in ranking the sites, the following decision rules were used to form the basis of the ranking system:

– On the basis of the findings of this assessment, what is the 'likelihood' that land contamination may be present within the bounds of the alignment.
– The 'consequence' that potential contamination may have a significant impact on potential receptors during construction and operation of the Project, and subsequent requirements for further assessment, management and/or remediation of contamination.

A summary of the risk categories is provided in Table 5.1.

Table 5.1 Risk rating

Classification	Definition
High Risk	Previous use of the site includes storage, use or handling of fuel and/or chemicals, often in above or below ground storage tanks, and areas of extensively disturbed ground possibly indicating the presence of buried fill material of unknown origin, or stockpiled material of unknown origin. A high potential risk exists for construction of the Project should contamination be present in the subsurface at significant concentrations.
Moderate Risk	Previous uses of the site or area includes industrial land use, storage of vehicles, industrial equipment or scrap metal, general unclassified minor dumping or stockpiling of unknown origin, and some localised evidence of site surface disturbance indicating potential fill material of unknown origin. A moderate potential risk exists for construction of the Project should contamination be present in the subsurface at significant concentrations. The area of contamination is likely to be limited to the immediate vicinity of the source and is likely to be present within a smaller footprint than that potentially present at the high-risk sites.
Low Risk	Sites or areas that are vacant and/or have shown no obvious significant development or potentially contaminating current or historical uses. Significant contamination is unlikely to be present at these sites.

5.2 Areas of environmental interest

Based on the review of available site information, historical aerial photographs, and understanding of site and surrounding area land uses, the following potential areas of environmental interest (AEI), from a contamination perspective, have been identified and summarised in Table 5.2. To provide a context on the potential significance and relative contamination risk posed by each AEI for the sites along the alignment, a risk rating for each AEI has been allocated.

Table 5.2 Areas of environmental interest (contamination)

Area of Concern	Activity	Potential contaminants of concern	Description	Risk rating
1. Lot 101 on DS185	Waste storage	Residues from industrial waste, heavy metals, solvents, acid, ash, polyfluoroalkyl substances (PFAS), and asbestos.	This Lot is listed on the EMR for the waste storage, treatment or disposal - storing, treating, reprocessing or disposing of regulated waste (other than at the place it is generated). Based on review of historical aerials it is likely that this allotment has been subject to this land use since 2004. The alignment intersects the property approximately 100 m to the north of the infrastructure identified (via aerial imagery). As such, it is considered the historical waste storage at this site could be encountered during construction works.	Moderate risk
2. Lot 1 on RP911260	Landfilling and waste storage	Heavy metals, asbestos, organic acids, nutrients. polyfluoroalkyl substances (PFAS), and hydrocarbons	This Lot is listed on the EMR as Lot 1 on RP911260, which was subdivided from Lot 1 on RP618672 (Boat Creek Road, Yarwun, Qld, 4694), which is included on the EMR for landfill activities. This parcel will remain on the EMR unless it can be shown that the site is not located near the contaminating activity. It is noted that as the Lot was previously connected to the landfill, ERA's currently exist over the site. A review of aerial imagery illustrates some historical ground disturbance and possibly waste storage from 1992. A large industrial building with black storage containers was also evident to the northeast corner of the site in 2010. The Lot is currently vacant. The alignment intersects the centre of the Lot. Given the previous industrial use of the land, there is potential for contamination to be present that could be encountered during construction of the Project.	Moderate risk
3. Lot 91 on SP122250 **5.** Lot 140 on SP122252 Other railway crossings (Lot 3 on SP101558 and Lot 1 on SP234061) and areas adjacent to railway crossings where the alignment intersects	Railway yards/corridor	Hydrocarbons, phenolics, heavy metals (inc. arsenic), pesticides, herbicides and asbestos	Both Lot 91 on SP122250 and Lot 140 on SP122252 are identified on the EMR. Lot 91 on SP12252 is listed on the EMR as a railway yard including goods-handling yards, workshops and maintenance areas. Lot 140 on SP122252 is listed on the EMR for hazardous contaminant as it has been subject to possible high arsenic levels along the rail corridor. Where the Project intersects the North Coast Line, there is a higher risk for encountering potential contamination due to historical railway corridor management practices. Particularly as there are a number of potential contamination sources from the railway corridor's previous land use (i.e., scrap metal storage, potential storage and use of fuels and chemicals, use of herbicides/pesticides on the site and surrounding areas). In addition, the corridor is near industrial use on the approach to Gladstone, including the quarry and landfill operation (Lot 91 on SP122250) and Alumina refinery (Lot 140 on SP122252). It is noted that Lot 91 on SP122250 currently has ERAs that exist over the area due to its connection with the landfill operation to the northeast of the Lot.	High risk

Area of Concern	Activity	Potential contaminants of concern	Description	Risk rating
			The alignment intersects Lot 91 on SP122250 in the western portion of the site and Lot 140 on SP122252 in the eastern portion of the site. It is noted that the alignment also intersects railway networks on two other occasions.	
4. Lot 7 on SP145439 **6.** Lot 8 on SP218634	Alumina refinery Gun, pistol or rifle range	Heavy metals, radioactive material, polychlorinated biphenyls (PCBs), dichlorodiphenyltrichloroethane (DDT), organochlorine (OC), polyfluoroalkyl substances (PFAS), and hydrocarbons Heavy metals i.e., Lead	The Yarwun Alumina Refinery is located on Lot 8 on SP218634 and has historically encroached into Lot 7 on SP145439. There are two ERAs that currently exist over Lot 8 on SP218634, these being: ERA 08 – Chemical storage and ERA 07 – Chemical manufacturing. Ground disturbance was evident over both allotments since 1981. This disturbance was largely related to the development of the refinery. However, there was also some ground disturbance related to the development of the port and terminal to the north and coal terminal to the south in the early 1980s. The alignment directly intersects Lot 7 on SP145439, which has been subject to ground disturbance from the alumina refinery. Both lots are currently listed on the EMR: – Lot 8 on SP218634 is listed on the EMR for a number of notifiable activities (Section 4.1) including livestock dips, smelting, abrasive blasting, chemical manufacture and storage, electrical transformers, metal treatment or coating, mineral process and petroleum storage. – Lot 7 on SP145439 is listed on the EMR for Yarwun Alumina Refinery and Gun, pistol or rifle range – operating a gun, pistol or rifle range (Lot 7 on SP145439 was subdivided from Lot 3 on CP860100, which is included on the EMR).	Moderate risk
7. Lot 12 on SP190336	Quarrying	Heavy metals, hydrocarbons, herbicides, pesticides	Lot 12 on SP190336 has been subject to quarrying as early as 1959. Quarrying can have a direct impact on water quality within the area. There are two ERA's that currently exist over Lot 12 on SP190336, these being: 16 – ERA 16 – Extraction and Screening 2(c) and 3(c). The Yarwun Quarry is approximately 300 m south of the alignment. Although historically it has encroached into the railway corridor it is unlikely that this will pose a gross contamination risk.	Low risk
8. Lot 1 on SP144430	Red mud repository	Heavy metals, hydrocarbons	The Rio Tinto Alcan Red Mud Repository is approximately 2.7 km x 2.2 km and is approximately 250 m from the alignment. In historical aerial photographs, the Lot had encroached to the north and in approximately 2004 the repository had expanded north of Aldoga Road to include storage infrastructure and laydown areas. Metal parts were observable within the laydown area as well as storage containers. As such, there may be contaminated soils within the vicinity of the Lot as a result of the red mud residues and storage infrastructure The Lot is listed on the EMR for waste storage treatment or disposal, abrasive blasting, chemical manufacture formulation, chemical storage,	Moderate risk

Area of Concern	Activity	Potential contaminants of concern	Description	Risk rating
			coal fired powered station, electrical transformers, metal treatment or coating and mineral processing. Two statutory enforcement actions for Lot 1 on SP144430 have been issued by DES. Both related to groundwater expressions as a result of pressure from the tailings dam. The lots effected were as followed: Lot 68 on SP272417, Lot 8 on SP245936 and Lot 7 on SP177782. DES concluded that given the water quality results obtained in the 2015 and 2016 inspections contamination was evident within the groundwater (high salinity, low pH and high total dissolved solids). It is noted that the alignment will intersect Lot 68 on SP272417.	
9. Lot 167 on CP859402	Racecourse reserve	Hydrocarbons, metals	Historical aerial photographs show the Lot being used for racetrack riding since the 1980s. Some ground disturbance was evident to the south of the site, adjacent to the railway corridor and most likely related to railway upgrades. The Lot was not identified on the EMR and/or CLR.	Low risk
Other – Surrounding land uses	Surrounding land uses	Pesticides, herbicides, arsenic, DDT and OC	Historical aerial photographs of the Project are generally consistent with agricultural use, including grazing and cropping. Activities likely to be associated with these land uses include the use of pesticides, presence of cattle dips and unidentified dump sites.	Low risk
Other – Acid Sulfate Soils (ASS)	Disturbance of ASS	Sulfuric acid	In the Environmental Technical Report (SMEC, 2021) it was noted the majority of the corridor is mapped as having a low to extremely low probability of ASS. Near Gladstone, the alignment intersects the mapped 'ASS of the Tannum Sands to Gladstone area, Central Queensland', which indicates a potential risk of ASS or PASS occurring. However, a preliminary ASS investigation was undertaken for the EIS (Arup, 2008) and identified ASS near Raglan Creek, in an area with low lying mangroves. Based on the above, it is considered likely that there are additional areas that have potential for ASS due to the Project's proximity to the coast and waterways.	Moderate risk

6. Preliminary conceptual site model

A conceptual site model (CSM) is a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The development of a CSM is an essential part of all contamination investigations and provides the framework for identifying contamination sources and how potential receptors may be exposed to contamination.

Based on the information collected as part of this desktop assessment, the following high level CSM has been developed to identify the most likely potential sources of contamination, contaminant pathways, receptors and exposure pathways for the Project, as summarised in Table 6.1. It should be noted that individual Lots may have separate source-pathway-receptors linkages that have not been identified below; however, the high level CSM provides a basic overview of the most likely linkages.

Table 6.1 Preliminary conceptual site model

Potential sources of contamination	Potential contamination sources: – Waste storage – Residues from industrial waste, heavy metals, solvents, acid, PFAS and ash. – Railway yards / corridors – Hydrocarbons, phenolics, heavy metals (inc. arsenic), nutrients, pesticides, herbicides and asbestos – Alumina refinery – Heavy metals, radioactive material, PCB's, DDT, OC, PFAS and hydrocarbons – Gun, pistol or rifle range – Heavy metals i.e., lead – Quarrying - Heavy metals, hydrocarbons, herbicides and pesticides – Racecourse reserve – Hydrocarbons, metals – Surrounding land uses – Pesticides, herbicides, arsenic, DDT and OC.
Potential Receptors	Potential receptors are considered to be: – Future site users and workers (including maintenance works of utility services) and construction workers involved in the Project. – Groundwater beneath the alignment. – Off-site groundwater receptors (if contamination is disturbed and travels offsite) – Waterways intersected by the alignment. – Down-gradient waterways. – Adjacent site users including the local community or adjacent land users, flora and fauna (in the instance that contamination has migrated off site). – Protected environmental values as per the *Environmental Protection Act 1994* and Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (EPP).
Potential Exposure Pathways	Potential exposure pathways of contamination are considered to be: – Leaching of soil contaminants into shallow / perched groundwater (if present). – Lateral migration of contamination in the groundwater. – Vapour intrusion from the volatilisation of soil or groundwater impacts to indoor or outdoor air both on and off site. – Ingestion or dermal contact with contaminated soil and/or groundwater during construction or maintenance works. – Ingestion of impacted groundwater if extracted for beneficial use down-gradient of the area. – Impact on aquatic ecosystems from discharge of potentially contaminated surface water and groundwater into down-gradient surface water bodies.

7. Conclusions and recommendations

7.1 Conclusions

The objective of this preliminary contamination assessment was to assess the environmental setting and current and historical land use along the alignment to gain an understanding of likely areas of potential contamination, as well as to provide recommendations to manage identified areas of potential contamination.

Based on the results of the scope of works presented in Section 1.5 of this report, and in accordance with the limitations presented in Section 9, several AEIs along the alignment have been identified as having potential for contamination to be present as listed in Table 7.1.

Each of the sites have been allocated a risk rating based on the desktop information review and likelihood of contamination being present and posing a risk of harm to human health or the environment for construction and operation of the Project.

Whilst the sites/areas detailed in Table 7.1 have been identified as having a potentially moderate or high risk of contamination being present, the presence or absence of contamination has not been confirmed as no sampling data has been collected or reviewed as part of this assessment.

Table 7.1 Summary of potentially moderate and high-risk sites

ID	Activity and potential contaminant(s) of concern	Reasoning	Risk
1. Lot 101 on DS185	Waste storage	This Lot is listed on the EMR for the waste storage, treatment or disposal - storing, treating, reprocessing or disposing of regulated waste (other than at the place it is generated). Based on review of historical aerials it is likely that this allotment has been subject to this land use since 2004. The alignment intersects the property approximately 100 m to the north of the infrastructure identified (via aerial imagery). As such, it is considered the historical waste storage at this site could be encountered during construction works.	Moderate risk
2. Lot 1 on RP911260	Landfilling and waste storage - Heavy metals, asbestos, organic acids, nutrients, PFAS and hydrocarbons	This Lot is listed on the EMR as Lot 1 on RP911260, which was subdivided from Lot 1 on RP618672 (Boat Creek Road, Yarwun, Qld, 4694), which is included on the EMR for landfill activities. This parcel will remain on the EMR unless it can be shown that the site is not located near the contaminating activity. It is noted that as the Lot was previously connected to the landfill, ERAs currently exist over the site. A review of aerial imagery illustrates some historical ground disturbance and possibly waste storage from 1992. A large industrial building with black storage containers was also evident to the northeast corner of the site in 2010. The Lot is currently vacant. The alignment intersects the centre of the Lot. Given the previous industrial use of the land, there is potential for contamination to be present that could be encountered during construction of the Project.	Moderate risk
3. Lot 91 on SP122250 **5.** Lot 140 on SP122252 Other railway	Railway yards/corridor - Hydrocarbons, phenolics, heavy metals (inc. arsenic), nutrients, pesticides, herbicides and asbestos	Both Lot 91 on SP122250 and Lot 140 on SP122252 are identified on the EMR. Lot 91 on SP12252 is listed on the EMR as a railway yard including goods-handling yards, workshops and maintenance areas. Lot 140 on SP122252 is listed on the EMR for hazardous contaminant as it has been subject to possible high arsenic levels along the rail corridor. Where the alignment intersects the North Coast Line, there is a higher risk for encountering potential contamination due to historical railway corridor management practices. Particularly as there are a number of potential contamination sources from	High risk

ID	Activity and potential contaminant(s) of concern	Reasoning	Risk
crossings (Lot 3 on SP101558 and Lot 1 on SP234061) and areas adjacent to railway crossings where the FGP intersects		the railway corridors previous land use (i.e., scrap metal storage, potential storage and use of fuels and chemicals, use of herbicides/pesticides on the site and surrounding areas). In addition, the corridor is near industrial use on the approach to Gladstone, including the quarry and landfill operation (Lot 91 on SP122250) and Alumina refinery (Lot 140 on SP122252). It is noted that Lot 91 on SP122250 currently has ERAs that exist over the area due to its connection with the landfill operation to the northeast of the Lot. The alignment intersects Lot 91 on SP122250 in the western portion of the site and Lot 140 on SP122252 in the eastern portion of the site. It is noted that the alignment also intersects railway crossings on two other occasions.	
4. Lot 7 on SP145439 **6.** Lot 8 on SP218634	Alumina refinery - Heavy metals, radioactive material, PFAS and hydrocarbons Gun, pistol or rifle range - Heavy metals i.e., Lead	The Yarwun Alumina Refinery is located on Lot 8 on SP218634 and has historically encroached into Lot 7 on SP145439. There are two ERAs that currently exist over Lot 8 on SP218634, these being: ERA 08 – Chemical storage and ERA 07 – Chemical manufacturing. Ground disturbance was evident over both allotments since 1981. This disturbance was largely related to the development of the refinery. However, there was also some ground disturbance related to the development of the port and terminal to the north and coal terminal to the south in the early 1980s. The alignment directly intersects Lot 7 on SP145439, which has been subject to ground disturbance from the alumina refinery. Both lots are currently listed on the EMR. – Lot 8 on SP218634 is listed on the EMR for a number of notifiable activities (Section 4.1) including livestock dips, smelting, abrasive blasting, chemical manufacture and storage, electrical transformers, metal treatment or coating, mineral process and petroleum storage. – Lot 7 on SP145439 is listed on the EMR for Yarwun Alumina Refinery and Gun, pistol or rifle range – operating a gun, pistol or rifle range (Lot 7 on SP145439 was subdivided from Lot 3 on CP860100, which is included on the EMR).	Moderate risk
8. Lot 1 on SP144430	Red mud repository - Heavy metals	The Rio Tinto Alcan Red Mud Repository is approximately 2.7 km x 2.2 km and is approximately 250 m from the alignment. In historical aerial photographs, the Lot had encroached to the north and in approximately 2004 the repository had expanded north of Aldoga Road to include storage infrastructure and laydown areas. Metal parts were observable within the laydown area as well as storage containers. As such, there may be contaminated soils within the vicinity of the Lot as a result of the red mud residues and storage infrastructure The Lot is listed on the EMR for waste storage treatment or disposal, abrasive blasting, chemical manufacture formulation, chemical storage, coal fired powered station, electrical transformers, metal treatment or coating and mineral processing. Two statutory enforcement actions for Lot 1 on SP144430 have been issued by DES. Both related to groundwater expressions as a result of pressure from the tailings dam. The lots effected were as followed: Lot 68 on SP272417, Lot 8 on SP245936 and Lot 7 on SP177782. DES concluded that given the water quality results obtained in the 2015 and 2016 inspections contamination was evident within the groundwater (high salinity, low pH and high total	Moderate risk

ID	Activity and potential contaminant(s) of concern	Reasoning	Risk
		dissolved solids). It is noted that the alignment will intersect Lot 68 on SP272417.	
Other – Acid Sulfate Soils	Disturbance of ASS	In the Environmental Technical Report (SMEC, 2021) it was noted the majority of the corridor is mapped as having a low to extremely low probability of ASS. Near Gladstone, the Project intersects the mapped 'ASS of the Tannum Sands to Gladstone area, Central Queensland', which indicates a potential risk of ASS or PASS occurring. However, a preliminary ASS investigation was undertaken for the EIS (Arup, 2008) and identified ASS near Raglan Creek, in an area with low lying mangroves. Based on the above, it is considered likely that there are additional areas that have potential for ASS due to the Project's proximity to the coast and waterways.	Moderate risk

It is also important to note that other areas of contamination may be present within the alignment that have not been identified by our assessment and, as such, an Unexpected Finds Protocol should be included in the Contaminated Land Plan to be prepared by a Suitably Qualified Person (SQP) (as prescribed in the EP Act 1994) and implemented by the Contractor during construction of the Project.

7.2 Recommendations

Based on the findings of this assessment, the following is recommended:

- Undertake a detailed site investigation (DSI) during the pre-construction phase of moderate and high risk sites, including soil and/or water sampling, of the AEIs and confirm their contamination status. These investigations should assess the requirement for site remediation and/or management of contamination prior to bulk earthworks being undertaken. At a minimum, investigations should consider sampling and analysis for all relevant contaminants of potential concern. The investigation should be undertaken with consideration of the general framework described in the National Environment Protection (Assessment of Site Contamination) Measure 1999 (Amended 2013).
- Prior to undertaking the DSI, a Sample Analysis and Quality Plan (SAQP) should be prepared by an SQP to described the aim of the investigation, methodology, sampling techniques, laboratory analysis schedule, and quality control measures to be implemented during the DSI.
- Depending on the findings of the DSI, and whether significant contamination is encountered that would impact the Project, a Remediation Action Plan (RAP) should be prepared to describe the remedial and / or management measures to be adopted for the Project to ensure contaminations do not pose an unacceptable risk of harm to human health or the environment.
- An Unexpected Findings Protocol should be prepared and included in the Construction Environmental Management Plan, specific for contamination management and which should be implemented during earthworks and construction.
- An investigation of ASS/PASS should also be undertaken during the pre-construction phase to confirm the ASS conditions prior to construction. This includes the collection of soil samples in areas identified by geotechnical investigations as high risk ASS areas. The ASS investigation should be undertaken with reference to the *National ASS Manual 2018* and *Queensland ASS Management Guideline 2014*. Depending on the results of the ASS investigation, an ASS Management Plan should then be prepared and implemented during construction.
- Where contaminated soil is identified on an EMR-listed property, a Disposal Permit is required prior to removal and offsite disposal of any contaminated soil, with reference to the *DES (2020) Guidelines on the disposal permit to remove, treat and dispose of contaminated soil*.

8. References

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9. Limitations

This report has been prepared by GHD Pty Ltd (GHD) for the Gladstone Area Water Board (GAWB) and may only be used and relied on by GAWB for the purpose agreed between GHD and GAWB as set out in Section 1.4 of this report. No other person may use or rely on this report for any purpose. It is not intended to be copied or provided to any other person.

GHD disclaims all liability and responsibility to any person other than GAWB arising in connection with this report and excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in this report and are subject to the scope limitations set out in this report. The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of this report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that this report was prepared.

GHD has prepared this report on the basis of information provided by GAWB and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD disclaims liability in connection with such unverified information, including errors and omissions in this report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on assumptions and exclusions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

In preparing this report, GHD has assumed the following in relation to the material it received, unless otherwise specifically stated, and this report is therefore subject to these assumptions and to the other limitations and assumptions which appear in the body of this report ("the Assumptions"):

– the information provided in the material was true and accurate in all respects and contained no material errors or omissions
– the persons, officers and advisors who provided advice to GHD and/or assisted at the site visit were competent to answer the questions that they answered.
– all documents and records examined by GHD were genuine, complete and up to date.
– there are no defaults or contraventions under any permit or licence conditions, agreement or instrument other than those set out in the material reviewed by GHD.
– all employees of GAWB who are aware of any information which has not otherwise been specifically made known to GHD and which could affect the correctness of the opinions expressed in this report, have communicated that information to GHD.

Nothing has come to the attention of GHD that has led it to believe that such Assumptions are not correct or that it would be unreasonable to rely on the Assumptions in the circumstances. However, if any of our assumptions are not accurate or the advice GHD has relied on is incorrect, the opinions GHD has expressed will need to be re-examined and may need to be changed.

The opinions, conclusions and any recommendations in this report are based on a search and review of desktop information in connection with the site and specific site conditions. Site conditions at other parts of the site may be different from the site conditions identified during our review. Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, infrastructure and vegetation. As a result, not all relevant site features and conditions may have been identified in this report. GHD disclaims responsibility for any matter that could not be identified.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this report. GHD does not accept responsibility arising from, or in connection with, any change to the Site conditions. GHD is also not responsible for updating this report if the site conditions change.

GHD shall not be liable to any person for any error in, omission from, or false or misleading statement in, any other part of this report.

Appendices

Appendix A

Desktop search results

Environmental Authorities

Permit

Environmental Protection Act 1994

Environmental authority EA0001611

This environmental authority is issued by the administering authority under Chapter 5 of the Environmental Protection Act 1994.

Environmental authority number: EA0001611

Environmental authority takes effect on a date to be decided later.

Environmental authority holder(s)

Name(s)	Registered address
Air Liquide Australia Ltd	9th Floor 380 St Kilda Road MELBOURNE VIC 3004

Environmentally relevant activity and location details

Environmentally relevant activity/activities	Location(s)
Prescribed ERA, ERA 07 - Chemical Manufacturing, 6: Manufacturing, in a year, the following quantities of inorganic chemicals, other than inorganic chemicals to which items 1 to 4 apply, (b) more than 1000t but not more than 10,000t	Lot 8/SP218634
Prescribed ERA, ERA 08 - Chemical Storage, 5: storing 200 cubic metres or more of chemicals that are liquids, other than chemicals mentioned in items 1 to 3, under subsection (1)(d)	Lot 8/SP218634

Additional information for applicants

Environmentally relevant activities

The description of any environmentally relevant activity (ERA) for which an environmental authority (EA) is issued is a restatement of the ERA as defined by legislation at the time the EA is issued. Where there is any inconsistency between that description of an ERA and the conditions stated by an EA as to the scale, intensity or manner of carrying out an ERA, the conditions prevail to the extent of the inconsistency.

An EA authorises the carrying out of an ERA and does not authorise any environmental harm unless a condition stated by the EA specifically authorises environmental harm.

A person carrying out an ERA must also be a registered suitable operator under the Environmental Protection Act 1994 (EP Act).

Contaminated land

It is a requirement of the EP Act that an owner or occupier of contaminated land give written notice to the administering authority if they become aware of the following:

ABN 46 640 294 485

- the happening of an event involving a hazardous contaminant on the contaminated land (notice must be given within 24 hours); or
- a change in the condition of the contaminated land (notice must be given within 24 hours); or
- a notifiable activity (as defined in Schedule 3) having been carried out, or is being carried out, on the contaminated land (notice must be given within 20 business days);

that is causing, or is reasonably likely to cause, serious or material environmental harm.

For further information, including the form for giving written notice, refer to the Queensland Government website www.qld.gov.au, using the search term 'duty to notify'.

Take effect

Please note that, in accordance with section 200 of the EP Act, an EA has effect:

a) if the authority is for a prescribed ERA and it states that it takes effect on the day nominated by the holder of the authority in a written notice given to the administering authority-on the nominated day; or
b) if the authority states a day or an event for it to take effect-on the stated day or when the stated event happens; or
c) otherwise-on the day the authority is issued.

However, if the EA is authorising an activity that requires an additional authorisation (a relevant tenure for a resource activity, a development permit under the Planning Act 2016 or an SDA Approval under the State Development and Public Works Organisation Act 1971), this EA will not take effect until the additional authorisation has taken effect.

If this EA takes effect when the additional authorisation takes effect, you must provide the administering authority written notice within 5 business days of receiving notification of the related additional authorisation taking effect.

If you have incorrectly claimed that an additional authorisation is not required, carrying out the ERA without the additional authorisation is not legal and could result in your prosecution for providing false or misleading information or operating without a valid environmental authority.

Tristan Roberts
Department of Environment and Science
Delegate of the administering authority
Environmental Protection Act 1994

Date issued: 14 December 2018

Enquiries:
Extraction, Energy and Chemical Industries Assessment
Department of Environment and Science
Phone: 1300 130 372
Email: palm@des.qld.gov.au

ABN 46 640 294 485

Obligations under the Environmental Protection Act 1994

In addition to the requirements found in the conditions of this environmental authority, the holder must also meet their obligations under the EP Act, and the regulations made under the EP Act. For example, the holder must comply with the following provisions of the Act:

- general environmental duty (section 319)
- duty to notify environmental harm (section 320-320G)
- offence of causing serious or material environmental harm (sections 437-439)
- offence of causing environmental nuisance (section 440)
- offence of depositing prescribed water contaminants in waters and related matters (section 440ZG)
- offence to place contaminant where environmental harm or nuisance may be caused (section 443)

Conditions of environmental authority

Agency interest: General	
Condition number	**Condition**
G1	Any breach of a condition of this environmental authority must be reported to the **administering authority** as soon as practicable within 24 hours of becoming aware of the breach. **Records** must be kept including full details of the breach and any subsequent actions taken.
G2	**Activities** under this environmental authority must be conducted in accordance with the following limitations: a) The amount of chemicals manufactured in a year must not exceed 10,000t; b) The chemicals authorised to be manufactured under this environmental authority are liquid oxygen and liquid nitrogen.
G3	All reasonable and practicable **measures** must be taken to prevent or minimise environmental harm caused by the **activities**.
G4	All **records** must be kept for a period of at least five years and provided to the **administering authority** upon request.
G5	Chemicals, fuels and oils in containers of greater than 15 litres must be stored within a **secondary containment system.**
G6	All analyses required under this environmental authority must be carried out by a laboratory that has National Association of Testing Authorities (**NATA**) certification, or an equivalent certification, for such analyses.
G7	When required by the **administering authority**, monitoring must be undertaken in the manner prescribed by the **administering authority** to investigate a complaint of **environmental nuisance** arising from the **activity**. The monitoring results must be provided within 10 business days to the **administering authority** upon its request.
G8	The holder of this environmental authority must record the following details for all environmental complaints received: a) Date and time complaint was received b) Name and contact details of the complainant c) Nature of the complaint d) Investigations undertaken e) Conclusions formed f) Actions taken
G9	All plant and equipment must be maintained and operated in their proper and effective condition. Records must be kept of plant operating conditions.
Agency interest: Air	
Condition number	**Condition**

A1	Other than as permitted within this **environmental authority**, odours or airborne contaminants must not cause **environmental nuisance** to any **sensitive place** or **commercial place**.
A2	The holder of this approval is authorised to release oxygen, nitrogen and other inert atmospheric components to the atmosphere when carrying out **normal operations.**

Agency interest: Land

Condition number	Condition
L1	Contaminants must not be released to land.
L2	A stormwater management plan must be developed and implemented by 18 March 2019 which must provide for, as a minimum, the following functions: a) Prevent or minimise the contamination of stormwater; b) Diverting uncontaminated run off around areas disturbed by the activity, or where contaminants or wastes are stored or handled; and c) Contaminated stormwater is collected and treated or disposed of in accordance with the conditions of this authority.

Agency interest: Acoustic

Condition number	Condition
N1	Other than as permitted within this environmental authority, noise generated by the **activity** must not cause **environmental nuisance** to any **sensitive place** or **commercial place.**

Agency interest: Waste

Condition number	Condition
W1	All waste generated in carrying out the **activity** must be lawfully reused, recycled or removed to a facility that can lawfully accept the waste.
W2	**Incompatible wastes** must not be mixed in the same container or waste storage area.

Agency interest: Water

Condition number	Condition
WT1	Contaminants must not be released to any waters.
WT2	If the holder of this environmental authority gives or transfers ownership of the cooling tower blowdown water to another person(s), the holder of this environmental authority must: (a) prior to giving such cooling tower blowdown water or transferring ownership of such cooling tower blowdown water to that person(s), obtain from that person and record details of how that person intends to comply with the general environmental duty in respect of the use and disposal of such cooling tower blowdown water, particularly in relation to environmental sustainability of any cooling tower blowdown water disposal, protection of public health and protection of environmental values of waters;

	(b) only give or transfer ownership of such cooling tower blowdown water in accordance with a written agreement between the person carrying out the activities under this environmental authority and that person(s); (c) upon becoming aware that the person is not or is not likely to comply with the general environmental duty, and/or the written procedure in condition WT2 (a), cease the giving and transferring ownership of such cooling tower blowdown water, as the case may be.

Definitions

Key terms and/or phrases bolded in this environmental authority are defined in this section. Where a term is not defined, the definition in the *Environmental Protection Act 1994*, its regulations or environmental protection policies must be used. If a word remains undefined it has its ordinary meaning.

Term	Definition
Administering authority	means the Department of Environment and Science or its successors or predecessors.
Appropriately qualified person(s)	means a person or persons who has professional qualifications, training, skills and experience relevant to the EA requirement and can give authoritative assessment, advice and analysis in relation to the EA requirement using the relevant protocols, standards, methods or literature.
Commercial place	means a place used as a workplace, an office or for business or commercial purposes and includes a place within the curtilage of such a place reasonably used by persons at that place.
Environmental nuisance	as defined in Chapter 1 of the *Environmental Protection Act 1994*.
Environmental value	as defined in Chapter 1 of the *Environmental Protection Act 1994*.
General waste	means waste other than regulated waste.
Incompatible waste	means waste that may chemically react when: 1. placed in proximity to other wastes; and/or 2. mixed with other wastes.
Normal operations	means 24 hour operation and includes start up and shut down of the equipment.
Measures	have the broadest interpretation and includes plant, equipment, physical objects, monitoring, procedures, actions, directions and competency.
NATA	means National Association of Testing Authorities.
Receiving environment monitoring program	means a monitoring program designed to monitor and assess the potential impacts of controlled and/or uncontrolled releases of contaminants to the environment from the **activity**.
Records	include breach notifications, written procedures, analysis results, monitoring reports and monitoring programs required under a condition of this authority
Secondary containment system	means a system designed, installed and operated to prevent any release of contaminants from the system, or containers within the system, to land, **groundwater**, or surface waters.
Sensitive place	includes the following and includes a place within the curtilage of such a place reasonably used by persons at that place: 1. a dwelling, residential allotment, mobile home or caravan park, residential marina or other residential premises; or 2. a motel, hotel or hostel; or 3. a kindergarten, school, university or other educational institution; or

	4. a medical centre or hospital; or 5. a protected area under the *Nature Conservation Act 1992*, the *Marine Parks Act 2004* or a World Heritage Area; or 6. a public park or garden; or 7. for noise, a place defined as a sensitive receptor for the purposes of the Environmental Protection (Noise) Policy 2008.
Waters	includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water, natural or artificial watercourse, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and **groundwater** and any part thereof.

Appendices

END OF ENVIRONMENTAL AUTHORITY

Permit[1]

Environmental Protection Act 1994

Environmental authority EPPR00325413

This environmental authority is issued by the administering authority under Chapter 5 of the Environmental Protection Act 1994.

Permit[1] number: EPPR00325413

The amended environmental authority takes effect on the date the delegate signs this document

The anniversary date of this environmental authority is 25 October. An annual return and the payment of the annual fee which is currently will be due each year on this day.

Environmental authority holder(s)

Name	Registered address
Earth Commodities Gladstone Pty Ltd	Level 1, 23 Chapman Place EAGLE FARM QLD 4009

Environmentally relevant activity and location details

Environmentally relevant activities	Location(s)
16-(2c) **Extractive** - extracting, other than by dredging, in a year, more than 1000000t of material 16-(3c) **Screening** - screening, in a year, more than 1000000t of material	Lot 11 Plan SP190336 Lot 12 Plan SP190336 94 Quarry Road, YARWUN QLD 4680

Additional information for applicants

Environmentally relevant activities

The description of any environmentally relevant activity (ERA) for which an environmental authority is issued is a restatement of the ERA as defined by legislation at the time the approval is issued. Where there is any inconsistency between that description of an ERA and the conditions stated by an environmental authority as to the scale, intensity or manner of carrying out an ERA, then the conditions prevail to the extent of the inconsistency.

An environmental authority authorises the carrying out of an ERA and does not authorise any environmental harm unless a condition stated by the authority specifically authorises environmental harm.

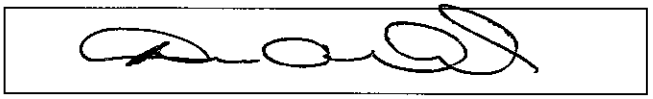
A person carrying out an ERA must also be a registered suitable operator under the *Environmental Protection Act 1994* (EP Act).

12/12/13

[1] Permit includes licences, approvals, permits, authorisations, certificates, sanctions or equivalent/similar as required by legislation

Contaminated land

It is a requirement of the EP Act that if an owner or occupier of land becomes aware a notifiable activity (as defined in Schedule 3 and Schedule 4) is being carried out on the land, or that the land has been, or is being, contaminated by a hazardous contaminant, the owner or occupier must, within 22 business days after becoming so aware, give written notice to the chief executive.



Signature

12/12/2013

Date

Don Arnold
Department of Environment and Heritage Protection
Delegate of the administering authority
Environmental Protection Act 1994

Enquiries:
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Website www.ehp.qld.gov.au

Obligations under the *Environmental Protection Act 1994*

In addition to the requirements found in the conditions of this environmental authority, the holder must also meet their obligations under the EP Act, and the regulations made under the EP Act. For example, the holder must comply with the following provisions of the Act:

- general environmental duty (section 319)
- duty to notify environmental harm (section 320-320G)
- offence of causing serious or material environmental harm (sections 437-439)
- offence of causing environmental nuisance (section 440)
- offence of depositing prescribed water contaminants in waters and related matters (section 440ZG)
- offence to place contaminant where environmental harm or nuisance may be caused (section 443)

Conditions of environmental authority

The environmentally relevant activity(ies) conducted at the location as described above must be conducted in accordance with the following site specific conditions of approval.

Agency interest: General	
Condition number	**Condition**
A1	This environmental authority permits the operation of extracting (other than by dredging) and screening a maximum of 1,500,000t of material at the authorised place in a year.
A2	All reasonable and practicable **measures** must be taken to minimise the likelihood of environmental harm being caused.
A3	Any breach of a condition of this environmental authority must be reported to the **administering authority** as soon as practicable, or at most, within 24 hours of the registered operator becoming aware of the breach. Records must be kept including full details of the breach and any subsequent actions undertaken.
A4	Other than as permitted by this environmental authority, the **release of a contaminant into the environment** must not occur.
A5	All information and records that are required by the conditions of this environmental authority must be kept for a minimum of five (5) years. Environmental monitoring results must be kept until surrender of this environmental authority. All information and records required by the conditions of this environmental authority must be provided to the **administering authority** upon request.
A6	An **appropriately qualified person(s)** must monitor, record and interpret all parameters that are required to be monitored by this environmental authority and in the manner specified by this environmental authority.
A7	All analyses required under this environmental authority must be carried out by a laboratory that has **NATA** certification, or an equivalent certification, for such analyses, or as authorised by the administering authority.

12/12/13

A8	When required by the **administering authority**, monitoring must be undertaken in the manner prescribed by the **administering authority** to investigate a complaint that is not considered by the **administering authority** to be frivolous or vexatious, of environmental nuisance arising from the **activity**. The monitoring results must be provided to the **administering authority** upon request.
A9	The **activity** must be undertaken in accordance with written procedures that: (a) identify potential risks to the environment from the activity during routine operations, closure and an emergency; (b) establish and maintain control measures that minimise the potential for environmental harm; (c) ensure plant, equipment and measures are maintained in a proper and effective condition; (d) ensure plant, equipment and measures are operated in a proper and effective manner; (e) ensure that staff are trained and aware of their obligations under the *Environmental Protection Act 1994*; and (f) ensure that reviews of environmental performance are undertaken at least annually.
A10	Within three (3) months of this environmental authority taking effect, the registered operator must provide financial assurance in the amount and form required by the administering authority.
A11	The financial assurance is to remain in force until the administering authority is satisfied that no claim on assurance is likely.
Agency interest: Air	
Condition number	**Condition**
B1	Odours or airborne contaminants which are **noxious** or **offensive** or otherwise unreasonably disruptive to public amenity or safety must not cause environmental nuisance to any **nuisance sensitive place** or **commercial place**.
B2	The release of dust and/or particulate matter resulting from the activity must not cause environmental nuisance to any **nuisance sensitive place** or **commercial place**.
B3	Release of dust or particulate, exceeding the following levels, when measured at any **nuisance sensitive place**, is considered as an environmental nuisance: (a) dust deposition of 120 mg/m^2/day, when measured in accordance with Australian Standard AS 3580.10:2003 *Methods of sampling and analysis of ambient air – Determination of particulate matter – Deposited matter – Gravimetric method* (or more recent edition); or (b) a concentration of particulate matter with an aerodynamic diameter of less than 10 micrometres (PM10) suspended in the atmosphere of 50 micrograms per cubic metre over a 24 hour averaging period, at a **nuisance sensitive place** downwind of the site, when monitored in accordance with: i. Australian Standard AS 3580.9.6:2003 *Ambient Air – Particulate Matter – Determination of suspended particulate PM10 high-volume sampler with size –*

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	selective inlet – gravimetric method; or ii. Any alternative method of monitoring PM10 that may be permitted by the *Air Quality Sampling Manual* as published by the administering authority.
B4	When requested by the administering authority, dust and particulate monitoring must be undertaken within a reasonable timeframe nominated by the administering authority, to investigate any complaint of environmental nuisance caused by dust and/or particulate matter. The results of the monitoring must be notified to the administering authority within 14 days following completion of the monitoring.
B5	Monitoring must be carried out at a place(s) relevant to the potentially affected **nuisance sensitive place** and at upwind control sites and must include: (a) for a complaint alleging dust nuisance, dust deposition; and (b) for a complaint alleging adverse health effects caused by dust, the concentration per cubic metre of particulate matter with an aerodynamic diameter of less than 10 micrometre (µm) (PM_{10}) suspended in the atmosphere over a 24 hour averaging time.
Agency interest: Water	
Condition number	**Condition**
C1	There must be no release of contaminants to waters.
C2	The stormwater runoff from disturbed areas, generated by (up to and including) a **24 hour storm event with an average recurrence interval of 1 in 10 years** must be retained on site or managed to remove contaminants before release.
Agency interest: Noise	
Condition number	**Condition**
D1	Noise resulting from the activity must not cause an environmental nuisance at any **nuisance sensitive place**.
D2	When required by the **administering authority**, noise monitoring must be undertaken in accordance with the associated AS 1055.1:1997 *Acoustics – Description and measurement of environmental noise*, and the results notified within 14 days to the **administering authority**. Monitoring must include: (a) $L_{Aeq, adj, T}$; (b) **Background** noise (Background) as $L_{Aeq, adj, T}$; (c) $MaxL_{pA,T}$; (d) the level and frequency of occurrence of any impulsive or tonal noise; (e) atmospheric conditions including wind speed and direction;

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<table>
<tr><td></td><td>(f) effects due to extraneous factors such as traffic noise; and
(g) location, date and time of recording.</td></tr>
<tr><td>D3</td><td>Blasting activities must not exceed the limits for peak particle velocity and air blast overpressure in Table 2—Blasting noise limits when measured at any sensitive place or commercial place in accordance with the associated monitoring requirements.
Table 2—Blasting noise limits
<table>
<tr><th>Blasting criteria</th><th>Blasting limits</th></tr>
<tr><td>Airblast overpressure</td><td>115dB (Linear) Peak for 9 out of 10 consecutive blasts initiated and not greater than 120dB (Linear) Peak at any time</td></tr>
<tr><td>Ground vibration peak particle velocity</td><td>5mm/second peak particle velocity for 9 out of 10 consecutive blasts and not greater than 10mm/second peak particle velocity at any time</td></tr>
</table></td></tr>
<tr><td>D4</td><td>Blasting must be carried out in accordance with the current edition of the administering authority's Noise and Vibration From Blasting Guideline and with Australian Standard AS 2187.2:2006 Explosives – Storage and use – Use of explosives.</td></tr>
<tr><td>D5</td><td>Unless prior approval is obtained from the administering authority:
(a) blasting is only permitted during the hours of 9am to 3pm Monday to Friday, and from 9am to 1pm on Saturdays;
(b) blasting is not permitted at any time on Sundays or public holidays.</td></tr>
<tr><td>D6</td><td>When required by the administering authority, a blast monitoring program must be developed and implemented to monitor compliance with Table 2—Blasting noise limits at any nuisance sensitive place or commercial place.</td></tr>
<tr><td colspan="2">Agency interest: Land</td></tr>
<tr><td>Condition number</td><td>Condition</td></tr>
<tr><td>E1</td><td>Treatment and management of acid sulfate soils must comply with the current edition of the Queensland Acid Sulfate Soil Technical Manual.</td></tr>
<tr><td>E2</td><td>The holder must complete an investigation into rehabilitation of disturbed areas and submit a site rehabilitation plan at least two (2) years before the closure of the site and its activities for review, comment and acceptance by the administering authority. The plan must be reviewed every two (2) years while operations are being undertaken on site.
The rehabilitation management plan must, at a minimum:
(a) map existing areas of rehabilitation;
(b) include a staged rehabilitation of disturbed areas plan;
(c) develop design objectives for rehabilitation of disturbed areas and post quarry land uses</td></tr>
</table>

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	across the site; (d) specify soil characteristics, soil analysis, soil separation for use on rehabilitation; (e) detail rehabilitation methods applied to areas; (f) contain landform design criteria including end of quarry design; (g) detail how landform design will be consistent with the proposed future use; (h) identify success criteria for areas and itemise revegetation criteria; (i) explain planned native vegetation rehabilitation areas and corridors; (j) identify at least a minimum of one (1) reference and three (3) rehabilitation sites to be used to develop rehabilitation success criteria; (k) describe rehabilitation indicators and the monitoring program to be used; (l) develop a contingency plan for rehabilitation maintenance or redesign; and (m) describe end of quarry landform design plan and post quarry land uses across the site.
E3	Maintenance of rehabilitated areas must take place to ensure: (a) erosion control measures remain effective; (b) plants show healthy growth; (c) any weed infestations are removed and prevented from recurring; (d) plants that have not taken, died or have become diseased are removed and replaced as soon as practical; (e) significant plant losses are examined for possible causes; (f) the rehabilitated land should be capable of withstanding normal disturbances such as fire or flood; and (g) rehabilitated ecosystems must be sustainable in the long-term.
E4	For excavations that are to remain at the completion of extraction activities, the registered operator must: (a) provide safe access to the excavation; (b) ensure that the excavated areas are surrounded by a rock bund and/or fences to make the area safe to the general public; and (c) ensure that water quality in any remaining excavation or from seepage released from the site, complies with the *Queensland Water Quality Guidelines*; however, if the quality of waters in the vicinity of the extraction does not comply with those Guideline values due to the occurrence of natural minerals sourced from the undisturbed geological setting, (c) does not apply to the extent of the natural contamination.
E5	Topsoil must be: (a) removed, where practicable, from areas to be significantly disturbed prior to the commencement of extraction activities; (b) stockpiled in a manner that will preserve its biological and chemical integrity; and

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	(c) used for onsite rehabilitation purposes.
Agency interest: Waste	
Condition number	**Condition**
F1	All waste generated in carrying out the **activity** must be reused, recycled or removed to a facility that can lawfully accept the waste.

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Definitions

Key terms and/or phrases used in this document are defined in this section and **bolded** throughout this document. Applicants should note that where a term is not defined, the definition in the *Environmental Protection Act 1994*, its regulations or environmental protection policies must be used. If a word remains undefined it has its ordinary meaning.

Activity means the environmentally relevant activities, whether resource activities or prescribed activities, to which the environmental authority relates.

Administering authority means the Department of Environment and Heritage Protection or its successor or predecessors.

Airblast overpressure is the energy transmitted from the blast site within the atmosphere in the form of pressure waves. As these waves pass a given position, the pressure of the air rises very rapidly then falls more slowly then returns to the ambient value after a number of oscillations. The pressure wave consists of both audible (noise) and inaudible (concussion) energy. The maximum excess pressure in this wave is known as the peak air overpressure, generally measured in decibels using the linear frequency-weighting.

Appropriately qualified person(s) means a person or persons who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis to performance relative to the subject matter using the relevant protocols, standards, methods or literature.

Background means noise, measured in the absence of the noise under investigation, as $L_{A90,T}$ being the A-weighted sound pressure level exceeded for 90 per cent of the time period of not less than 15 minutes, using Fast response.

Blasting is the use of explosives to fracture:
- rock, coal and other minerals for later recovery; or
- structural components or other items to facilitate removal from a site or for reuse.

Commercial place means a place used as a workplace, an office or for business or commercial purposes and includes a place within the curtilage of such a place reasonably used by persons at that place.

$L_{Aeq\ adj,T}$ means the adjusted A weighted equivalent continuous sound pressure level measures on fast response, adjusted for tonality and impulsiveness, during the time period T, where T is measured for a period no less than 15 minutes when the activity is causing a steady state noise, and no shorter than one hour when the approved activity is causing an intermittent noise.

$Max_{LpA,T}$ means the maximum A-weighted sound pressure level measured over a time period T of not less than 15 minutes, using Fast response.

Measures has the broadest interpretation and includes plant, equipment, physical objects, bunding, containment systems, monitoring, procedures, actions, directions and competency.

NATA means National Association of Testing Authorities.

Noxious means harmful or injurious to health or physical well-being.

Offensive means causing offence or displeasure; is unreasonably disagreeable to the sense; disgusting, nauseous or repulsive.

Prescribed contaminants means contaminants listed within Schedule 9 of the Environmental Protection Regulation 2008.

Release of a contaminant into the environment means to:

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- deposit, discharge, emit or disturb the contaminant
- cause or allow the contaminant to be deposited, discharged, emitted or disturbed
- fail to prevent the contaminant from being deposited, discharged emitted or disturbed
- allow the contaminant to escape
- fail to prevent the contaminant from escaping.

Nuisance sensitive place includes the following and includes a place within the curtilage of such a place reasonably used by persons at that place:

- a dwelling, residential allotment, mobile home or caravan park, residential marina or other residential premises; or
- a motel, hotel or hostel; or
- a kindergarten, school, university or other educational institution; or
- a medical centre or hospital; or
- a protected area under the Nature Conservation Act 1992, the Marine Parks Act 1992 or a World Heritage Area; or
- a public thoroughfare, park or gardens; or
- for noise, a place defined as a sensitive receptor for the purposes of the Environmental Protection (Noise) Policy 2008.

Substantial low frequency noise means a noise emission that has an unbalanced frequency spectrum shown in a one-third octave band measurement, with a predominant component within the frequency range 10 to 200Hz. It includes any noise emission likely to cause an overall sound pressure level at a sensitive place exceeding 55dB(Z).

24 hour storm event with an average recurrence interval of 1 in 10 years means the maximum rainfall depth from a 24 hour duration precipitation event with an average recurrence interval of once in 10 years.

Vibration is the oscillating or periodic motion of a particle, group of particles, or solid object about its equilibrium position.

Waters includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water, natural or artificial watercourse, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and groundwater and any part thereof.

END OF PERMIT

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Permit

Environmental Protection Act 1994

Environmental authority EPPR00926513

This environmental authority is issued by the administering authority under Chapter 5 of the Environmental Protection Act 1994.

Environmental authority number: EPPR00926513

Environmental authority takes effect on 02 March 2020

Environmental authority holder(s)

Name(s)	Registered address
RTA Yarwun Pty Ltd	123 Albert St BRISBANE CITY QLD 4000 Australia

Environmentally relevant activity and location details

Environmentally relevant activity/activities	Location(s)
ERA 31 - Mineral processing 2: Processing, in a year, the following quantities of mineral products, other than coke (b) more than 100,000t	Lot 1 on RP911260, Lot 1 on SP144430, Lot 1 on SP144433, Lot 13 on RP620157, Lot 14 on SP147866, Lot 20 on SP115224, Lot 21 on SP103896, LOT 21 on SP115224, Lot 22 on SP103896, Lot 23 on SP103896, Lot 23 on SP115225, Lot 27 on SP115227, Lot 503 on SP144788, Lot 54 on SP137048, Lot 7 on SP145439, Lot 7 on SP147726, Lot 7 on SP177782, Lot 7 on SP228453, Lot 79 on CP911258, Lot 8 on SP218634, Lot 9 on SP147866, Lot 91 on SP122250
ERA 50 - Mineral and bulk material handling 2: Loading or unloading 100t or more of bulk materials in a day or stockpiling bulk materials	Lot 1 on SP144433, Lot 14 on SP147866, Lot 21 on SP103896, Lot 22 on SP103896, Lot 23 on SP103896, Lot 502 on SP224189, LOT 502 on SP252988, Lot 6 on SP235022, Lot 7 on SP147726, Lot 8 on SP218634, Lot 9 on SP147866
ERA 16 - Extraction and Screening 2: Extracting, other than by dredging, in a year, the following quantity of material (c) more than 1,000,000t	Lot 1 on SP144430, Lot 503 on SP144788, Lot 7 on SP228453, Lot 8 on SP218634

ABN 46 640 294 485

Environmentally relevant activity/activities	Location(s)
ERA 62 - Resource recovery and transfer facility operation 1: Operating a facility for receiving and sorting, dismantling, baling or temporarily storing- (c) category 2 regulated waste ERA 62 - Resource recovery and transfer facility operation 1: Operating a facility for receiving and sorting, dismantling, baling or temporarily storing- (d) category 1 regulated waste	Lot 1 on SP144430, Lot 7 on SP228453, Lot 8 on SP218634
ERA 15 - Fuel burning Using fuel burning equipment that is capable of burning at least 500kg of fuel in an hour	Lot 1 on SP144430, Lot 7 on SP228453, Lot 8 on SP218634
ERA 50 - Mineral and bulk material handling 1: Loading or unloading 100t or more of minerals in a day or stockpiling 50,000t or more of minerals (a) within 5km of the highest astronomical tide or 1km of a watercourse	Lot 1 on SP144433, Lot 14 on SP147866, Lot 21 on SP103896, Lot 22 on SP103896, Lot 23 on SP103896, Lot 502 on SP224189, LOT 502 on SP252988, Lot 6 on SP235022, Lot 7 on SP147726, Lot 8 on SP218634, Lot 9 on SP147866
ERA 08 - Chemical Storage 5: storing 200 cubic metres or more of chemicals that are liquids, other than chemicals mentioned in items 1 to 3, under subsection (1)(d)	Lot 1 on SP144430, Lot 502 on SP224189, LOT 502 on SP252988, Lot 7 on SP228453, Lot 8 on SP218634
ERA 08 - Chemical Storage 3: Storing more than 500 cubic metres of chemicals of class C1 or C2 combustible liquids under AS 1940 or dangerous goods class 3 under subsection (1)(c)	Lot 1 on SP144430, Lot 502 on SP224189, Lot 7 on SP228453, Lot 8 on SP218634
ERA 08 - Chemical Storage 3: Storing more than 500 cubic metres of chemicals of class C1 or C2 combustible liquids under AS 1940 or dangerous goods class 3 under subsection (1)(c)	Lot 1 on SP144430, Lot 502 on SP224189, Lot 7 on SP228453, Lot 8 on SP218634
ERA 16 - Extraction and Screening 3: Screening, in a year, the following quantity of material (c) more than 1,000,000t	Lot 1 on SP144430, Lot 6 on SP235022, Lot 7 on SP228453, Lot 8 on SP218634

Environmentally relevant activity/activities	Location(s)
ERA 14 - Electricity Generation 1: Generating electricity by using gas at a rated capacity of 10MW electrical or more	Lot 1 on SP144430, Lot 7 on SP228453, Lot 8 on SP218634
ERA 60 - Waste disposal 1: Operating a facility for disposing of, in a year, the following quantity of waste mentioned in subsection (1)(a) (d) more than 200,000t	Lot 1 on SP144430, Lot 7 on SP228453, Lot 8 on SP218634
ERA 08 - Chemical Storage 4: storing 200t or more of chemicals that are solids or gases, other than chemicals mentioned in items 1 to 3, under subsection (1)(d)	Lot 1 on SP144430, Lot 502 on SP224189, Lot 7 on SP228453, Lot 8 on SP218634

Additional information for applicants

Environmentally relevant activities

The description of any environmentally relevant activity (ERA) for which an environmental authority (EA) is issued is a restatement of the ERA as defined by legislation at the time the EA is issued. Where there is any inconsistency between that description of an ERA and the conditions stated by an EA as to the scale, intensity or manner of carrying out an ERA, the conditions prevail to the extent of the inconsistency.

An EA authorises the carrying out of an ERA and does not authorise any environmental harm unless a condition stated by the EA specifically authorises environmental harm.

A person carrying out an ERA must also be a registered suitable operator under the *Environmental Protection Act 1994* (EP Act).

Contaminated land

It is a requirement of the EP Act that an owner or occupier of contaminated land give written notice to the administering authority if they become aware of the following:

- the happening of an event involving a hazardous contaminant on the contaminated land (notice must be given within 24 hours); or
- a change in the condition of the contaminated land (notice must be given within 24 hours); or
- a notifiable activity (as defined in Schedule 3) having been carried out, or is being carried out, on the contaminated land (notice must be given within 20 business days);

that is causing, or is reasonably likely to cause, serious or material environmental harm.

For further information, including the form for giving written notice, refer to the Queensland Government website www.qld.gov.au, using the search term ‘duty to notify’.

Take effect

Please note that, in accordance with section 200 of the EP Act, an EA has effect:

a) if the authority is for a prescribed ERA and it states that it takes effect on the day nominated by the holder of the authority in a written notice given to the administering authority-on the nominated day; or

b) if the authority states a day or an event for it to take effect-on the stated day or when the stated event happens; or

c) otherwise-on the day the authority is issued.

However, if the EA is authorising an activity that requires an additional authorisation (a relevant tenure for a resource activity, a development permit under the *Planning Act 2016* or an SDA Approval under the *State Development and Public Works Organisation Act 1971*), this EA will not take effect until the additional authorisation has taken effect.

If this EA takes effect when the additional authorisation takes effect, you must provide the administering authority written notice within 5 business days of receiving notification of the related additional authorisation taking effect.

If you have incorrectly claimed that an additional authorisation is not required, carrying out the ERA without the additional authorisation is not legal and could result in your prosecution for providing false or misleading information or operating without a valid environmental authority.

Filiz Tansley
Department of Environment and Science
Delegate of the administering authority
Environmental Protection Act 1994

Enquiries:
Minerals Business Centre
Department of Environment and Science
Phone: 07 4222 5352
Email: ESCairns@des.qld.gov.au

Date issued: 02 March 2020

Obligations under the *Environmental Protection Act 1994*

In addition to the requirements found in the conditions of this environmental authority, the holder must also meet their obligations under the EP Act, and the regulations made under the EP Act. For example, the holder must comply with the following provisions of the Act:

- general environmental duty (section 319)
- duty to notify environmental harm (section 320-320G)
- offence of causing serious or material environmental harm (sections 437-439)
- offence of causing environmental nuisance (section 440)
- offence of depositing prescribed water contaminants in waters and related matters (section 440ZG)
- offence to place contaminant where environmental harm or nuisance may be caused (section 443)

Legislative Requirements and Conditions of Environmental Authority

Condition

General

G1 In carrying out the activities, all reasonable and practicable measures must be taken to prevent and/or to minimise the likelihood of environmental harm.

G2 Maintenance of measures, plant and equipment

The **holder** must:

(a) install all measures, plant and equipment necessary to ensure compliance with the conditions of this **environmental authority**;

(b) maintain such measures, plant and equipment in a proper and efficient condition; and

(c) operate such measures, plant and equipment in a proper and efficient manner.

G3 Records

The **holder** must record, compile and keep all monitoring results and reports required by this **environmental authority** and present any monitoring results or reports to the **administering authority** when requested, including in an electronic form if requested.

G4 All records required by this **environmental authority** must be kept for at least five (5) years unless otherwise stated in this **environmental authority**.

G5 Environmental Management System

An Environmental Management System (EMS), that includes all the requirements of and conforms with AS/NZS ISO 14001:2004 (Environmental Management Systems - requirements with guidance for use) or more recent versions must be implemented that provides for the effective management of the actual and potential environmental impacts resulting from the carrying out of the activities. Documentation relating to the EMS must be kept.

G6 The **holder** must not implement or amend an EMS (including any associated environmental plan) in a manner that contravenes any condition of this **environmental authority**.

G7 Notification

The **holder** must notify the **administering authority** by telephone as soon as practicable, but within six (6) hours of becoming aware, of any emergency, event or incident which may:

(a) result in the release of contaminants not in accordance with, or reasonably expected not to be in accordance with, the conditions of this **environmental authority**; and

(b) have the potential to cause material or serious environmental harm.

Note: The Pollution Hotline is the most appropriate after-hours contact.

G8 All other releases of contaminants not in accordance or reasonably expected not to be in accordance with the conditions of this **environmental authority** must be reported to the **administering authority** in accordance with (G10).

G9 Written advice detailing the below information must be provided to the **administering authority** within fourteen (14) days following any notification in accordance with condition (G7); and with the monthly compliance report mentioned in condition (G10) following any notification required by condition (G8).

(a) the name of the **holder** of the activities to which this **environmental authority** relates, including the **environmental authority** number;

(b) the name and telephone number of a designated contact person;

(c) the location of the release/event;

(d) the time and date of the release/event;
(e) the time the **holder** became aware of the release/event;
(f) the suspected cause of the release/event;
(g) details of the quantity of substance released;
(h) details of the area of impact;
(i) a description of the resulting effects of the release/event;
(j) the results of any sampling performed in relation to the release/event;
(k) actions taken to mitigate any environmental harm (including **environmental nuisance**) caused by the release/event; and
(l) proposed actions to prevent a recurrence of the release/event.

G10 Monthly compliance report
A monthly compliance report outlining the following must be submitted the **administering authority** within twenty (20) days of the end of each month;
(a) a summary of the months monitoring undertaken as required by this **environmental authority** including details of any non-compliance with the **environmental authority**;
(b) instances of **impeded operational performance of pollution control equipment** within the month;
(c) complaint information as required by condition (C1) received in the month;
(d) written advice regarding releases of contaminants not in accordance or reasonably expected not to be in accordance with the conditions of this **environmental authority** required by condition (G8) within the month; and
(e) a list of release (overflow) events for all release points except W1 during the month.

G11 Monitoring
A **competent person(s)** must conduct any monitoring required by this **environmental authority**.

G12 Equipment calibration
All instruments, equipment and measuring devices used for measuring or monitoring in accordance with any condition of this **environmental authority** must be calibrated, and appropriately operated and maintained.

G13 Records must be kept of calibration data for all instruments, equipment and measuring devices used for measuring or monitoring in accordance with any condition of this **environmental authority** and submitted to the administrating authority when requested.

G14 Trained and experienced operator(s)
All persons engaged in the conduct of the activities, including but not limited to employee(s) and contract staff must:
(a) be trained in the procedures and practices necessary to:
i. comply with the conditions of this **environmental authority**; and
ii. prevent environmental harm during normal operation and emergencies;

(b) be under the close supervision of a trained person as required in (G14)(a); and
(c) maintain records of training required by this condition.

G15 Within eighteen (18) months of the date of this **environmental authority** the **holder** must develop a dispersion model and commence to apply the modelling to any air emission incident that the **holder** reasonably considers (based on available information) may have caused, or has the potential to cause, serious or material environmental harm beyond the **site** boundary. The:

(a) modelling must have the capacity to report within two (2) hours of an incident; and

(b) modelling report must be made available to the **administering authority** within two (2) hours of the model results being available.

G16 Third Party Environmental Auditing
Compliance with conditions of this **environmental authority** must be audited within forty (40) days of completion of **commissioning** and every three (3) years thereafter and for the EMS required by condition (G5) must be audited within six (6) months of the date of this **environmental authority** and every three (3) years thereafter.

G17 The audit(s) required by condition (G16) must be conducted by a **suitably qualified third party auditor**, nominated by the **holder** and accepted by the **administering authority**.

G18 For the audit(s) required by condition (G16) the **holder** must submit a final version of the auditor's report to the **administering authority** within fourteen (14) days of receiving the audit report. The report must be accompanied by a statutory declaration from the auditor, stating that the report accurately represents the findings of the auditor and that the report has been prepared independently of the **holder** and is the independently held opinion of the auditor.

G19 The total financial cost of the audit(s) required in condition (G16) will be the responsibility of the **holder**.

G20 The **holder** must within a reasonable period of time agreed to in writing by the **administering authority** take steps to respond to any recommendations arising from the audit report, including:

(a) investigating any non-compliance issues identified;

(b) as soon as practicable, implementing measures or taking necessary action to ensure compliance with the **environmental authority**; and

(c) provide written advice to the **administering authority** regarding the above.

G21 Scale and intensity of use of the activities
The scale of the alumina refinery and associated ERA(s) authorised under this **environmental authority** is that scale and intensity indicated in the application information titled “RTA Yarwun Pty Ltd - Supporting Information for a MCU ERA development permit application – Environment report for expansion of the refinery dated February 2012, GHD” and the production of not more than 4.0 million tonnes of alumina per year.

Condition

Acoustic

N1 Noise release
All noise from the activities must not exceed an $L_{Aeq,\ adj}$, 1 hour value of 43 dB(A), when measured outside at any **nuisance sensitive place** other than those located on Lot 11 plan SP108408 and Lot 1 plan MPH32292.

N2 If the outside measured noise from activities exceeds an $L_{Aeq,\ adj,\ 1\ hour}$ value of 44 dB(A), and noise complaints are received from residents at a **nuisance sensitive place** located on Lot 11 plan SP108408 and Lot 1 plan MPH32292, then remedial measures must be taken that are acceptable to those residents, or noise attenuation measures must be installed, to reduce

measured noise levels at the relevant **nuisance sensitive place**(s) to a **maximum** $L_{Aeq, adj, 1 hour}$ value of 44 dB(A).

N3 Noise monitoring
When requested by the **administering authority**, noise monitoring must be undertaken within a reasonable and practicable timeframe nominated by the **administering authority** to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the authorised officer) of **environmental nuisance** at any sensitive or **commercial place**, and the results must be notified within fourteen (14) days to the **administering authority** following completion of monitoring. Monitoring must include:

(a) airblast overpressure (dB (Lin) Peak)-when relevant;
(b) $L_{Aeq, adj, 1 hour}$;
(c) $L_{A1, adj, 1 hour}$;
(d) the level and frequency of occurrence of any impulsive or tonal noise from the activities;
(e) atmospheric conditions including wind speed and direction and atmospheric stability;
(f) if there were any effects due to extraneous factors such as traffic noise;
(g) location, date and time of recording; and
(h) location of complainant (if relevant).

N4 The method of measurement and reporting of noise levels must comply with the latest edition of the **administering authority**'s Noise Measurement Manual.

N5 Blasting
A person must not conduct blasting if:

(a) the airblast overpressure is more than 115dB Z Peak for 4 out of any 5 consecutive blasts;
(b) the airblast overpressure is more than 120dB Z Peak for any blast;
(c) the ground vibration is:
  i. for vibrations of more than 35Hz—more than 25mm a second ground vibration, peak particle velocity; or
  ii. for vibrations of no more than 35Hz—more than 10mm a second ground vibration, peak particle velocity.

N6 Within 5km of a **nuisance sensitive place** when blasting is carried out, a monitoring program must be implemented to measure air blast overpressure & vibration and when requested by the **administering authority**, airblast overpressure & vibration monitoring and recording must be undertaken to investigate any complaint of nuisance.

Condition

Air

A1 Weather Monitoring Program
A weather monitoring station must continually measure and record the following meteorological parameters:

(a) air temperature;
(b) relative humidity;
(c) wind direction;
(d) wind speed; and

(e) rainfall.

A2 Releases to the atmosphere
Contaminants must only be released to the atmosphere from the release points and in compliance with the limits identified in Schedule 3, Air - Table 1 (Source description).

A3 Contaminants must not be released to the atmosphere at a concentration or a mass emission rate calculated over the averaging period, as measured at a monitoring point, in excess of that stated in Schedule 3, Air - Table 2 (Contaminants release limits to air), with the exception of:

(a) a **cogeneration exemption**, relating to oxides of nitrogen; and

(b) a **boiler exemption**, relating to sulphur dioxide.

A4 Contaminants must be monitored not less frequently than as set out in Schedule 3, Air - Table 3 (Required release point determinations).

A5 Complaint monitoring
When requested by the **administering authority**, monitoring must be undertaken to investigate any dust, particulate matter, odour or other noxious/offensive environmental complaint of environmental nuisance caused by a release to the atmosphere from the site at any sensitive receptor. The request may outline:

(a) when the monitoring must be commenced;

(b) the duration of the monitoring;

(c) the location of the monitoring;

(d) the methods and relevant standard to be complied with;

(e) any evaluation, inspection and review of potential dust, particulate matter, odour or other noxious/offensive emission sources and associated pollution control systems;

(f) any review and interpretation of monitoring results;

(g) any modelling required; and

(h) the date the results and analysis is to be submitted to the **administering authority**.

A6 If monitoring in condition (A5) indicates that **environmental nuisance** is caused or threatened from the activities, then the **holder** must as soon as practicable implement abatement measures such that the releases from the activities will not result in further **environmental nuisance**.

A7 Monitoring of any releases to the atmosphere required by a condition of this **environmental authority** must be carried out in accordance with the following requirements:

(a) all determinations must be made by a person or body registered by the **NATA** unless otherwise approved by the **administering authority**;

(b) monitoring provisions for the release points listed in Schedule 3, Air - Table 2 (Contaminant release limits to air) must comply with the Australian Standard AS 4323.1 - 1995 'Stationary source emissions Method 1: Selection of sampling positions' (or more recent editions);

(c) all determinations of contaminant releases to the atmosphere must be made in accordance with methods prescribed in the most recent version of the

administering authority's Air Quality Sampling Manual or any other method approved by the **administering authority**;

(d) samples must be taken when emissions are expected to be **representative of actual operating conditions** for the sample frequency period; and

(e) during the sampling period, the following additional information must be gathered:

i. process plant production rate at the time of sampling and detailed commentary on the stability and phasing of the processes leading up to (at least 24 hours) and through the time of sampling; and

ii. raw materials used; and

iii. production rates for the frequency period; and

iv. any other factors that may influence air emissions (e.g. changes to auxiliary air supplies).

A8 Fuel burning

The only type of fuel to be burnt in the gas turbine (co-generation plant) is **natural gas**.

A9 Air Pollution Control Systems

The **holder** must maintain a current inventory of design data and maintenance requirements, including maintenance history for all air pollution control devices operated at the **site**.

A10 Where pollution control systems are installed to treat exhaust gases, dust and vapours from the activities:

(a) they must be maintained and operated in accordance with the manufacturer's operating instructions or manufacture's specifications;

(b) for fabric filter dust collectors, replacement bags must be available and the collectors must, at all times:

i. be fitted with a device (e.g. differential pressure sensor) operational to detect filter medium breakthrough installed across the boundary of the active filter bags;

ii. have a monitoring system including an alarm, installed and operating to alert of filter medium breakthrough, and

iii. be designed and maintained to treat flue gases at maximum rates when one cell is isolated.

(c) or flue gas desulphurisation, the equipment must monitor and record parameters that indicate effective performance, for example scrubber liquor pH and scrubber liquor pump recirculation; and

(d) a standby power supply system must be installed to ensure continuous operation of the air pollution control equipment.

A11 Where monitoring of air pollution control equipment indicates impaired operational performance, standby systems must operate to ensure continuous operation of the air pollution control system or the plant serviced by the air pollution control systems must be safely shut down as soon as practicable, unless otherwise agreed by the **administering authority**.

A12 Emissions Verification Study

The **holder** must undertake a **site**-wide Emissions Verification Study in consultation with the **administering authority** to identify point sources and fugitive emissions to the atmosphere from the activities.

A13 The Emissions Verification Study mentioned in condition (A12) must;

(a) in relation to point sources outlined in Schedule 3, Air-Table 1(source description) be submitted to the **administering authority** within (1) one year of the date of this **environmental authority**; and

(b) in relation to all other fugitive and point source emissions be submitted to the **administering authority** within (5) five years of the date of this **environmental authority**.

A14 Dust and particulate matter nuisance
The release of dust and/or particulate matter resulting from the activities must not cause an **environmental nuisance** at any **nuisance sensitive place**.

A15 Odour nuisance
The release of noxious or offensive odour(s) or any other noxious or offensive airborne contaminant(s) resulting from the activities must not cause any **environmental nuisance** at any **nuisance sensitive place**.

A16 The **holder** must when requested in writing by the **administering authority** contribute to the undertaking of an ambient air monitoring program in consultation with the **administering authority**

A17 By **5 December 2017**, the **holder** must conduct and document an assessment to demonstrate that actual ground level concentrations of non-condensable gases produced as a result of the activities do not present a risk of harm to the receiving environment.
Note: This will involve the analysis of existing data to avoid the need for unnecessary venting of non-condensable gases for the purposes of this assessment, unless otherwise agreed with the administering authority.

A18 The **holder** must conduct and document an assessment of actual ground level concentrations of sulphur dioxide released during a boiler exemption permitted under condition A3, using the Gladstone Regional Air Monitoring Network, to ensure compliance with the relevant air quality objectives for SO2 specified in the Queensland Environmental Protection (Air) Policy 2008.

Condition

Land

L1 Except as otherwise authorised by condition (L2) activities on **site** must be conducted in a way that prevents any potential or actual release of contaminants to land.

L2 There must be no release of contaminants to land other than:

(a) Any **non-continuous spill** of process contaminants in areas identified in **Schedule 2 - Figure 1** known as the 'refinery first flush system' provided that removal of the process contaminants commences within 24 hours of the **holder** becoming aware of the **non-continuous spill**.

(b) Any non-continuous spill of process contaminants in areas identified in **Schedule 2 - Figure 5** provided that removal of the process contaminants commences within 24 hours of the **holder** becoming aware of the **non-continuous spill**.

(c) Any **non-continuous spill** of hydrocarbons provided that removal of the hydrocarbons commences within 24 hours of the **holder** becoming aware of the **non-continuous spill**.

(d) Seawater return spills not exceeding 100 litres.

(e) Thickener underflow or overflow where it is directed to the RMA via the designated channel as shown in **Schedule 2 - Figure 5**.

L3 Rehabilitation of extraction areas

As soon as practicable, but no later than 6 months after completing the extraction activities areas disturbed as a result of extractive and screening activities must be rehabilitated by:

(a) remediation of contaminated **land** caused by the **activity** in accordance with Environmental Protection Act 1994 requirements;

(b) undertaking works to establish a safe, **stable**, non-polluting landform similar to that of surrounding undisturbed areas (or other use as agreed with the landowner), including where relevant;

i. removing any stockpiles;
ii. re-establishing surface drainage lines;
iii. minimising the potential for slumping, subsidence or erosion;
iv. reinstating the **topsoil** if area is going to be revegetated;
v. respreading any cleared vegetation; and
vi. promoting establishment of vegetation of similar species composition and density of cover;

(c) ensuring that the quality of stormwater, water and seepage released from the disturbed areas is such that there is no release of prescribed water contaminates;

(d) ensuring that the water quality of any residual water bodies meets criteria for subsequent uses and does not cause environmental harm; and

(e) removing **infrastructure** from the **site**.

*Note: Where the areas disturbed as a result of extractive and screening activities are to be included in the future **Residue Management Area Dam**, the **holder** must only comply with part (c) and (d) of this condition.*

L4 The only contaminants permitted to be stored in the **Residue Management Area Dam** are residues resulting from refining of bauxite, burning of fuel at and acid sulphate soils from the Rio Tinto Alcan Yarwun refinery in Yarwun.

L5 Residue Management Area Dams

The **hazard category** of the **Residue Management Area Dams** must be **determined** by a **suitably qualified and experienced person** at least once every two (2) years.

L6 Regulated Dams - Location

Residue Management Area Dams must be wholly located within the control points defined in Land— Table 1 (Location of Residue Management Area Dams).

Land — Table 1 Location of Residue Management Area Dams

Name of Regulated Dam	Coordinates	MGA/GDA94
Residue Management Area Dam 1	North-West	302837.943E 7360038.294N
	North- East	304613.533E 7360501.200N
	South-East	305951.024E 7357639.463N
	South-West	303373.838E 7357797.158N

L7 The Residue Management Area Dams must comply with the basic details in Land — Table 2 (Basic Details of Residue Management Area Dams).

Land — Table 2 Basic Details of Residue Management Area Dams

Name of Regulated dam	Hazard Category	Maximum surface area of dam (ha)	Maximum volume of dam (m^3)	Maximum depth of dam (m)*	Use of dam
Residue Management Area Dam 1	High	411 ha	87 Million m^3	55m	The permanent containment of residues resulting from refining of bauxite, burning of fuel at or acid sulphate soils from the Rio Tinto Alcan Yarwun alumina refinery at Yarwun.

Notes:

i. Measured from the natural surface at the bottom of the dam wall to the surface of the crest of the dam.

ii. Maximum surface area of dam (ha) is measured by determining the area that falls within the outer perimeter of the Residue Management Area Dam (being delineated by the outside edge of the exterior roadways and natural embankments (as the case may be) that form the outer bound of the area where residues are contained and associated operational activities are conducted).

L8 All **Residue Management Area Dam**s must meet the **hydraulic performance** criteria specified in Land — Table 3 (**Hydraulic Performance** of Residue Management Area Dams).

Land — Table 3 Hydraulic Performance of Residue Management Area Dams

Name of Regulated dam	Spillway Capacity or Diversion Capacity (Levees) AEP (3)	Design Storage Allowance (Dams other than levees) AEP(1)	Mandatory Reporting Level (Dams other than levees) AEP(3)
Residue Management Area Dam 1	PMF	AEP 1 in 50 for the 3 month wet season plus expected annual process inputs	AEP 1 in 50, 72 hour

Notes:

*i. The **design storage allowance** on 1st November of each year for any high **hazard dam** containing hazardous waste **constructed** within the operational **land** must be equivalent to the run-off from a 1 in 50 **AEP** 3 month wet season plus process inputs for the 3 month wet season. Process inputs refers to the net volume of hazardous minerals, process waste and water, which are being permanently disposed of in the storage facility.*

ii. The critical design storm has a duration that produces the peak discharge for the catchments.

*iii. The **mandatory reporting level** refers to the level below the **spillway** crest, either the **AEP** 1 in 50, 72 hour storm or the **AEP** 1 in 50 wave allowance, whichever is lower.*

L9 Regulated Dams - Certification and operation
The **Residue Management Area Dam**s must be **constructed** in accordance with a **certified design plan** that has been submitted to the **administering authority**, and such that the resulting **dam** will deliver the performance stated in that submitted **design plan** and that **dam** is compliant in all respects with this **environmental authority**.

L10 **Construction** works on the within the **Residue Management Area Dam**, including any modification or lift, must not be commenced unless the **holder** has submitted to the **administering authority** a copy of a **design plan**, together with the **certification** by a RPEQ that the design of the **dam** will deliver the performance stated in that submitted **design plan** and that **dam** it is compliant in all respects with this **environmental authority**.

L11 The **environmental authority holder** must submit:

(a) A copy of a set of 'as **constructed**' drawings to the **administering authority** together with the **certification** of a **suitably qualified and experienced person** that the **dam** 'as **constructed**' will deliver the performance stated in that submitted **design plan** and that **dam** is compliant in all respects with this **environmental authority**; and

(b) the drawings and **certification** in (L11)(a) to the **administering authority** prior to commencing operation of that component of the **Residue Management Area Dam** that was subject to modification or lift referenced in the **design plan** in condition (L10).

L12 An **operational plan** must be kept current for the **Residue Management Area**.

L13 Where an **operational plan** covers **decommissioning** and **rehabilitation**, those operations are to be consistent with the **design plan** for the **Residue Management Area** and the **rehabilitation** requirements of this **environmental authority**.

L14 The **holder** must notify the **administering authority** as soon as possible, but within 24 hours, of the level in the **Residue Management Area Dam** reaching the **mandatory reporting level (MRL)**.

L15 Residue Management Area – Annual inspection and report
The **Residue Management Area** must be inspected annually by a **suitably qualified and experienced person**.

L16 At each annual inspection, the condition and adequacy of all components of the **Residue Management Area Dam** must be assessed:

(a) against the most recent **hazard** assessment report and **design plan**;

(b) against recommendations contained in previous annual inspections reports;

(c) against recognised **dam** safety deficiency **indicators**;

(d) for changes in circumstances potentially leading to a change in **hazard category**;

(e) for conformance with the conditions of this **environmental authority**;

(f) for conformance with the 'as **constructed**' drawings of the **certified design plan**; and

(g) for the adequacy of the available storage in each dam, based on an actual observation or observations taken no more than three months prior to 1 November of each year, of accumulated sediment, state of the containment barrier and the level of liquids in the dam.

L17 At each annual inspection, if a **mandatory reporting level** is required, it must be determined and marked on the **Management Area Dam**.

L18 A final assessment of adequacy of available storage in the **Residue Management Area Dam** must be based on a **dam** level observed within the month of October each year and result in an estimate of the level in that **dam** as at 1 November each year.

L19 For each annual inspection, a report on the condition and adequacy of each dam assessed, **certified** by the **suitably qualified and experienced person** and including any recommended actions to be taken to ensure the integrity of the **Residue Management Area**; must be provided to the **administering authority** by 1 December each year.

L20 De**commissioning**
A De**commissioning** Strategy for the **Residue Management Area** must be documented and submitted to the **administering authority** at least five (5) years prior to the commencement of decommissioning the **Residue Management Area**.

L21 The **Residue Management Area** must be decommissioned in accordance with the De**commissioning** Strategy.

L22 On cessation of operation of a **Residue Management Area Dam**, that **dam** must be maintained so as to avoid environmental harm until that **dam** is decommissioned.

L23 Prior to the cessation of the activities, the **Residue Management Area Dam** must be decommissioned such that it either:

(a) becomes a **stable** landform, that no longer contains **flowable substances**; or

(b) is a **void** authorised by the **administering authority** to remain after **decommissioning**; and

(c) the dams contents is approved or authorised under relevant legislation for a **beneficial use**; and

(d) is compliant with the **rehabilitation** requirements of this **environmental authority**.

L24 Rehabilitation of the Residue Management Area Dam
The **holder** must in consultation with the **administering authority** develop, implement and submit to the **administering authority** a Final Land Use and **Rehabilitation** Plan for that part of the **Residue Management Area Dam** to be decommissioned at least five (5) years prior to such de**commissioning** commencing. The Plan must include, but is not limited to, the following:

(a) disturbance type;

(b) disturbance area;

(c) land use after operations cease;

(d) proposed acceptance criteria including final surface level and contours, final drainage system, landform geotechnical stability criteria including surface settlement, sustainability of drainage works, susceptibility to erosion processes, leachate production, and surface water contamination;

(e) species of vegetation to be planted for the **rehabilitation** program including revegetation acceptance criteria if applicable, taking into consideration the surrounding **land** use;

(f) receiving and run-off water standards; and post operations closure, maintenance and monitoring requirements;

(g) **indicators** for success; and

(h) keeping appropriate records of **rehabilitation** measures implemented including taking of photographs demonstrative or **rehabilitation** achieved and the preparation of annual **rehabilitation** progress reports.

L25 Any amendments to the **Rehabilitation** Plan are to be submitted to the **administering authority**.

L26 All areas significantly disturbed by residue disposal must be rehabilitated in accordance with the acceptance criteria, referred to in the report provided in condition (L24) and as modified by the **administering authority**.

L27 If no modifications are advised by the **administering authority** to the **holder** within twelve months of the receipt of the report by the **administering authority**, then the acceptance criteria referred to in the report will apply.

L28 Once the final **land** use and **rehabilitation** plan in implemented, the **holder** must submit an annual **rehabilitation** progress report to the **administering authority**. The report should be provided with each year's annual return until the **environmental authority** is surrendered or the **administering authority** advises that this reporting is no longer required, (whichever is the earlier).

L29 Waste handling
All regulated waste removed from the **site** must be removed by a person that holds a current approval to transport such waste in accordance with the provisions of the Environmental Protection Act 1994 and sent to a facility that is permitted to accept such waste.

Condition
Social

C1 Complaint response
The **holder** must record the following details for all complaints received and provide this information to the **administering authority** with each month's compliance report:

(a) time, date, name and contact details of the complainant (when authorised by the complainant);
(b) reasons for the complaint;
(c) response and any investigations undertaken;
(d) conclusions formed;
(e) grounds for forming the conclusions; and
(f) any actions taken as a result of the complaint

C2 The **holder** or its representative must, when requested by the **administering authority**, reasonably cooperate with and participate in any community environmental liaison committee established in respect of either the **site** specifically, or the area where the **site** is located.

Condition
Water

W1 Pipelines, diffusers and pump stations
Except as otherwise authorised by this **environmental authority**, there must be no release of contaminants to waters.

W2 Permitted contaminant release and discharge point(s)
Contaminant(s) must only be released directly or indirectly to **waters** at the locations mentioned in Schedule 3, Water - Table 1 (Contaminants, sources and locations for releases to waters) and Schedule 2, Water – Figure 2 – (Release points and monitoring locations), in accordance with the contaminant release conditions and limits in Schedule 3, Water - Table 2 (Release limits and monitoring).

W3 Release circumstances W1
The discharge via release point W1 must be submerged such that the top of the diffuser is at least three and a half (3.5) metres below Lowest Astronomical Tide (LAT).

W4 All contaminants discharged via release point W1 must be released through suitable diffusers to achieve a **minimum** initial dilution of 1:54 within 100 metres of the diffusers under all circumstances.

W5 Where more than one diffuser is installed to serve release point W1, the individual component diffusers must not overlap each other.

W6 Volumes released
The hourly discharge volume of contaminants released to **waters** from discharge location W1 must be measured and records kept. This data must be provided in the specified format to the **administering authority** when requested.

W7 There must be no discharge of contaminants from the **Residue Management Area Dam** (RMD) to **waters** except the seawater return line discharge released to **waters** from discharge location W1.

W8 Measurements of volumes released from W1 must be **determined** by an appropriate method with an accuracy of +/-5%, (e.g. a calibrated flow meter).

W9 Monitoring of releases from W1 for pH and turbidity must involve instrumentation that is continuous, on-line and be able to be recorded and alarmed.

W10 The **maximum** allowable saltwater intake must not exceed 3850m³/per hour.

W11 The **minimum** available storage to be provided for release points W2 and W3 (the first flush ponds) must be not less than the volume equivalent to twenty (20) millimetres of rainfall (per rainfall event) on the catchment served by each pond.

W12 Release monitoring
Monitoring of contaminants released to **waters** and water quality must be undertaken for the quality characteristics and parameters, at the monitoring point(s), and at the frequencies specified in Schedule 3, Water - Table 2 (Release limits and monitoring).

W13 All determinations of water quality must be:

(a) made in accordance with methods prescribed in the latest edition of the **administering authority**'s Monitoring and Sampling Manual; and

(b) carried out on samples that are representative of the discharge; and

(c) samples collected must be analysed by a **NATA certified** laboratory or as approved by the **administering authority** using an approved methodology with sufficient sensitivity (Limit of Reporting) to adequately demonstrate whether or not the water characteristic complies with the relevant release limit prescribed in Schedule 3, Water - Table 2 (Release limits and monitoring).

W14 The pH of discharge **waters** from W3 (eastern first flush) and W2 (northern first flush) must be continually monitored.

W15 Toxic substances (acute and chronic)
Notwithstanding any other condition of this **environmental authority**, there must be no discharge of any contaminants to any **waters** that exhibit toxicity (expressed as a LOEC) to any relevant test organisms in Direct Toxicity Assessments (DTAs) at a wastewater concentration that can be achieved within 10 metres of the diffuser.

W16 Direct Toxicity Assessment (DTA)
The **holder** must undertake DTAs to quantify the toxicity of the wastewater discharge and demonstrate compliance with condition (W15), and to confirm there has been no unacceptable level of toxicity to the test organisms. The DTA must be undertaken as required by and in accordance with the following:

(a) all DTAs must be carried-out by a third party suitably qualified environmental aquatic ecotoxicologist(s) or other experts as required; and
(b) a Routine Direct Toxicity Assessment (Routine DTA) must be undertaken every four (4) years; and
(c) a Confirmation Direct Toxicity Assessment (Confirmation DTA) must be undertaken as soon as practicable after a Toxicological Risk Assessment (TRA) as defined in condition (W17) has determined that an increased toxicological effect is likely. The Confirmation DTA must occur within three (3) months of the change occurring and must utilise test water representative of the change(s). The Confirmation DTA must comply with the DTA requirements in condition W19 and must be undertaken utilising indicator organism(s) sensitive to the change(s) being investigated; and
(d) an Event-based Direct Toxicity Assessment (Event-based DTA) must be undertaken wherever one or more specific trigger limits, indicated in Schedule 3, Water - Table 2 (Release limits and monitoring) for release point W1 are exceeded on four consecutive occasions as measured at the monitoring point W1. The Event-based DTA must be undertaken utilising indicator organisms sensitive to the change. After the third consecutive exceedance, preparations must be made so that should a fourth consecutive exceedance be confirmed, an Event-based DTA can be performed immediately; and
(e) where successive DTA programs have identified specific test species as consistently the most sensitive for the purpose of detecting toxicity, then the suite of test species can be reduced to include only those test species. Any intention to change the numbers or types of toxicity tests used for DTA must be submitted to the **administering authority**.

W17 Toxicological Risk Assessment toxicity testing

A Toxicological Risk Assessment (TRA) must be undertaken to determine whether any proposed or accidental change to the process (including changes to inputs and/or treatment process) is **likely**[1] to result in an increased toxicological effect to aquatic organisms in the receiving environment and this assessment must be submitted to the **administering authority** within 30 days of the assessment being undertaken. Toxicological risk assessment must be undertaken in accordance with the following:

(a) Focus on identifying wastewater quality or receiving environment conditions that may result in toxicity to biota within the mixing zone and must at least consider the wastewater and receiving water quality, temporal context and including supporting evidence for the outcome of the risk assessment; and
(b) Evidence must include the results of a toxicity testing program that will examine the contribution of different water chemistries on toxicity; and
(c) The scope and components of the toxicity testing program must be reviewed by a qualified ecotoxicologist before being submitted to the **administering authority**.

1 likelihood of increased toxicological effect should be assessed using best professional judgment and supported by any available empirical or theoretical evidence. This may include changed chemical profile data at any stage of the effluent treatment process or

independent expert judgement, such as that provided by a third party or government advisory agency through a process of compliance audit.

W18 All DTAs required by this **environmental authority** must comply with the DTA requirements mentioned in condition (W19).

W19 DTA requirements

The DTA must include all specific methods and protocols to determine whether concentrations of toxicants are acutely toxic outside the approved acute toxicity zone or chronically toxic outside the approved chronic toxicity zone to any organisms assessed in the DTA, including:

(a) specific test organisms to be utilised for DTA testing, in accordance with Section 8.3.6.8 of the ANZECC 2000 Guidelines, to provide an accurate indication of acute and chronic toxic effects in the receiving waters, taking into consideration locally occurring species and the nature of any change being investigated;

(b) the selection and characterisation of environmental waters for dilution of the combined waste streams;

(c) characterisation of the wastewater stream, including potential toxicants present. This must include the toxicants of concern mentioned in Schedule 3, Water– Table 3 (Toxicants of concern for Direct Toxicity Assessment);

(d) the nature of the contaminant(s);

(e) acute and chronic DTA testing conducted on end-of-pipe wastewater discharged;

(f) the mixing zone dilution effects likely to be provided by the discharge structure;

(g) test/biological end points;

(h) DTA end-points (including NOEC and LOEC);

(i) quality assurance/quality control;

(j) applicable Toxicity Identification Evaluation (TIE) procedures to be followed should the **administering authority** require such an evaluation; and

(k) reporting of DTA procedure results promptly to the **administering authority**, which must include but not be limited to:

i. NOEC for all bioassay results; and

ii. LOEC for all bioassay results; and

iii. all relevant sample collection information for the combined waste test sample and receiving **environment** dilution water; and

iv. timing of combined waste test sample collection in relation to process performance; and

v. details of any manipulation of the combined waste test sample or receiving **environment** dilution water; and

vi. test sample and receiving **environment** dilution water delivery details; and

vii. results of the chemical analysis of the combined waste test sample for known toxicants of concern, receiving **environment** dilution water, and the test water (combined wastes/receiving water) for each of the dilutions; and

viii. time between test sample collection and commencement of the DTA, and

ix. interpretation of results.

W20 The **holder** must submit a report which includes all requirements of (W19) and the results of DTA testing to the **administering authorit**y no more than twenty (20) days following the completion of the report.

W21 Diffusers validation
The **holder** must provide to the **administering authority** a Diffuser Modelling Validation Plan and implement the plan within six (6) months of the completion of **commissioning**.
The monitoring plan must be undertaken when waste water flows are at **maximum** rates.
The monitoring plan must have the following objectives:

(a) to validate all modelling and investigations related to the diffuser; and
(b) to confirm that expected dilutions predicted in design of the diffuser under specified flow conditions are met as a **minimum**.

W22 The Diffuser Modelling Validation Plan required by condition (W21) must include but not be limited to) the following:

(a) a description of the diffuser as installed;
(b) a description of applicable receiving environmental value and sediment and water quality objectives to be achieved;
(c) sampling of reference sites to determine the background concentration of relevant water quality parameters;
(d) sampling of the water column in the plume to determine and confirm the extent of the acute and chronic toxicity zone;
(e) investigate employing other approaches (e.g. dye-based diffuser validation techniques) where electrical conductivity-based methods are inconclusive;
(f) sufficient samples must be collected to determine the temporal and spatial extent of the toxicity zones within the plume;
(g) the methods for the collection and analysis of samples (including the Quality Assurance and Quality Control protocols adopted);
(h) the methods of analysing the data and responding to the results; and
(i) monitoring must be done by a **competent person**(s) in accordance with methods prescribed in the latest edition of the administering authorities Water Quality Sampling Manual, and carried out on representative samples.

W23 The **holder** must consider any comments provided by the **administering authority** in relation to the Diffuser Modelling Validation Plan.

W24 The **holder** must provide to the **administering authority** a Diffuser Validation Report not more than twenty (20) days after the receipt of results obtained from the Diffuser Modelling Validation Plan. The report must include:

(a) the results of the monitoring required by the Diffuser Modelling Validation Plan;
(b) any deviations and reasons for such deviations from methods stated in the diffuser modelling validation plan;
(c) a determination on the validation of modelling and investigations undertaken;
(d) a statement confirming that **minimum** expected dilutions predicted in design of the diffuser under specified flow conditions are met;
(e) any resulting recommendations for changes that are necessary to minimise the likelihood of environmental harm and size of the initial mixing zone, if **minimum** dilutions are not achieved; and

(f) any resulting recommendations for changes to the Receiving environment Monitoring Program.

W25 A further diffuser validation program must be undertaken if the diffuser structures serving release point W1, once validated, undergo any significant modification of the diffuser structure, depth settings, increases in discharge volumes, or increases in toxicity of the wastewater occur or there is a significant change to local oceanographic conditions.

W26 Receiving Environment Monitoring Program
Within six (6) months of the commencement of this **environmental authority** a Receiving **Environment** Monitoring Program (REMP), focussing on near field and further field impacts, must be developed in consultation with the **administering authority** and then implemented. The program must be based on the outcomes of background environmental investigations, pertaining to the receiving **waters** (i.e. Port Curtis and connected waters) that address at least the following:

(a) description of potentially affected receiving **waters** including key communities and background water and sediment quality characteristics based on accurate and reliable monitoring data that takes into consideration any temporal variation (e.g. seasonality);

(b) description of applicable environmental values and sediment and water quality objectives to be achieved;

(c) any relevant reports prepared by other governmental or professional research organisations that relate to the receiving **environment** within which the REMP is proposed; and

(d) water and sediment quality targets within the receiving **environment** to be achieved, and clarification of contaminant concentrations or levels indicating adverse environmental impacts during the REMP.

W27 In relation to the Receiving **Environment** Monitoring Program required by condition (W26), a report, summarising the findings of the Receiving **Environment** Monitoring Program must be submitted to the **administering authority** annually.

W28 Stormwater management
There must be no release of stormwater that has been in contact with any contaminants at the **site** to any waters, other than in accordance with the conditions of this **environmental authority**.

W29 Erosion and sediment control measures must be implemented and maintained to minimise on site erosion.

W30 Stormwater, Erosion and Sediment Control Plans
Within six (6) months of the date of this **environmental authority** a Stormwater, Erosion and Sediment Control Plan must be developed and implemented for all activities.

W31 The Stormwater, Erosion and Sediment Control Plan mentioned in condition (W30) must include, but is not limited to the below:

(a) the location of the discharge points;

(b) prevention of incident storm water and storm water run-off from contacting wastes or contaminants;

(c) diversion of uncontaminated stormwater away from areas where it may be contaminated by bulk products being loaded or unloaded, wastes, contaminants or other materials;

(d) collection, treatment and disposal of all contaminated storm water run-off;

(e) contaminated stormwater runoff and incident rainfall is collected and treated, reused, or released in accordance with the conditions of this **environmental authority**;
(f) roofing or minimising the size of areas where contaminants or wastes are stored or handled;
(g) revegetating disturbed areas as soon as practicable after the completion of works;
(h) using alternate materials and or processes (such as dry absorbents) to clean up spills that will minimise the generation of contaminated waters;
(i) erosion and sediment control structures are placed and maintained to minimise erosion of disturbed areas and prevent the contamination of any waters;
(j) an inspection and maintenance program for the erosion and sediment control features;
(k) provision for adequate access to maintain all erosion and sediment control measures especially during the wet season months;
(l) additional erosion and sediment control measures on slopes >10%;
(m) surface water monitoring program designed to detect erosion and sediment runoff into **watercourses**; and
(n) identification of remedial actions that would be required to ensure compliance with the conditions of this **environmental authority**.

W32 IECA erosion and sediment control plan
Any significant earthworks and **construction** project that will cause a disturbance to areas must have an implemented erosion and sediment control plan for that project that complies with the International Erosion Control Association (IECA) guidelines.

W33 An erosion and sediment control plan in condition (W32) must be **certified** by a **Certified** Professional in Erosion and Sediment Control (CEPESC) and submitted to the **administering authority** before commencement of the significant earthworks and **construction** project.

W34 Each sediment basin referenced in the erosion and sediment control plan required by condition (W32) must have the capacity to contain and treat all the stormwater runoff from the 85th percentile 5 **day** rainfall depth of 32.8mm.

W35 All discharges from W4, W10, W11, W12, W14 and W15 must be reported to the **administering authority** within 24 hours or the next business day.

W36 By 1 November each year, the **holder** must remove deposited sediment from the W7, W8, W6, W3 and W2 sedimentation ponds to achieve design storage allowance.

W37 The **holder** must visually inspect the ponds, embankments and **spillway** within twelve (12) hours of each overflow event. The inspection must be to determine the effectiveness of the erosion and sediment control measures and integrity of these structures. The inspection must be documented and necessary actions taken to ensure the integrity of the system is maintained. Where the inspection cannot be carried out due to safe access issues, the **administering authority** must be notified within twelve (12) hours of the overflow event and the inspection must be carried out as soon as safe to do so.

W38 Groundwater
The **holder** must not release contaminants to groundwater.

W39 Groundwater must be monitored at least at the locations defined in Schedule 3, Water – Table 4 (Alumina Refinery, Caustic Storage, and Residue Management Dam groundwater monitoring locations).

W40 The **holder** must ensure a groundwater monitoring program is performed which complies with the following requirements:

(a) the program must be able to determine the impacts of the activities on the groundwater quality in the underlying aquifer(s);
(b) the program must include, but not be limited to, a sufficient number of bores installed at locations and depths which yield representative groundwater samples from at least the uppermost aquifer so as to:
    i. detect any seepage of contaminants to groundwater from the site; and
    ii. establish the quality of groundwater affected by any seepage of contaminants.
(c) samples of groundwater must be taken from each bore required by Schedule 3, Water, Table 4 (Alumina Refinery and residue management Area groundwater monitoring locations) at least twice per year; and
(d) the samples obtained in accordance with paragraph (c) of this condition must be analysed for the parameters listed in Schedule 3, Water– Table 5 (Groundwater Monitoring).

W41 Records must be kept of the results of all determinations of the quality of groundwater for a period of at least fifteen (15) years and be made available to the **administering authority** upon request. Results must be presented in graphic form clearly showing variation of analyte concentration for each bore over time and median background concentrations. These records may be electronic.

W42 If the groundwater monitoring required by condition (W39) and (W40) indicates contamination by an analyte which exceeds the '**trigger levels**' the **holder** must notify the **administering authority** as per condition (G7) and (G8) and complete an investigation report into:
(a) the extent of contamination and its mobility characteristics;
(b) the cause of the exceedance;
(c) whether source(s) has been removed;
(d) known depth to water table;
(e) permeability of the strata on the site;
(f) the potential for environmental harm;
(g) identification of potential receptors;
(h) provide the monitoring results;
(i) provide ambient groundwater quality;
(j) interpretation of analyses of any samples taken; and
(k) proposed actions to prevent or minimise environmental harm.

W43 Annual Groundwater Monitoring Report
An annual monitoring report must be prepared each year and submitted to the **administering authority** with each annual return. The report must include but not be limited to:
(a) Any investigation report required by condition (W42);
(b) details of the groundwater monitoring undertaken, including details of the sampling framework applied;
(c) details of the groundwater analysis undertaken, and quality assurance and quality control measures applied;

(d) a summary of the groundwater monitoring results obtained. Results must be presented in numerical and graphical form, showing relevant limits, and a comparison made with the previous twelve (12) months monitoring data; and

(e) an interpretation, evaluation and explanation of the monitoring results and programs by a **specialist in the field** of water quality monitoring and assessment with determinations made as to any impacts on the **environment** and if so the level of environmental harm caused.

W44 When not being sampled, monitoring bores must be sealed with a lockable cap.

W45 Seawater intake
The velocity of seawater being drawn in and around the mouth of the intake pipe structure located at Fisherman's Landing must never exceed 0.6m/s.

W46 There must be no release of **waters** to the receiving **environment** which exhibits any visible hydrocarbon sheen.

W47 **Groundwater Expression Management Plan**
By **19 October 2019**, the **environmental authority holder** must prevent the expression of groundwater to the land identified in the area of Lot 8 on SP245963 and Part 68 on SP 272417 and illustrated in **Schedule 2 – Figure 3.**

W48 By **20 October 2018**, the **environmental authority holder** must implement a Groundwater Expression Management Plan (GEMP) designed by an **appropriately qualified person** that prevents the expression of groundwater to the land identified in the area of Lot 8 on SP245963 and Part 68 on SP 272417 and illustrated in **Schedule 2 – Figure 3**.

W49 The GEMP required by condition W48 must include the following requirements:

- A hydrogeological model that explains the process causing the expression of groundwater to land;
- Details of actions to be undertaken as part of the GEMP to prevent the expression of groundwater to land;
- A groundwater and surface water monitoring program capable of assessing the effectiveness of the GEMP at preventing the expression of groundwater to land and identifying any impacts to environmental values; and
- Key outcomes and measurable indicators to determine if the requirements of condition W47 have been achieved.

W50 The **environmental authority holder** must implement a mitigation strategy to capture the expression of groundwater to land identified in **Schedule 2 – Figure 3** and return to the Residual Management Area Dam.

W51 By **1 November 2020**, achieve the following minimum **stabilisation area** for catchments W2, W3, W7 and W8:

(a) For catchment W7, a minimum **stabilisation area** of 95%.

(b) For catchment W3, a minimum **stabilisation area** of 95%.

(c) For catchment W2, a minimum **stabilisation area** of 50%.

(d) For catchment W8, a minimum **stabilisation area** of 85%.

*Note 1: Refer to **Schedule 2 – Figure 4.***

W52 By **1 November 2020**, the following erosion and sediment control requirements must be achieved:

(a) For catchment W7;
   i. Implement a bitumen seal to the remaining 'Top Warehouse Road'.
   ii. Re-contour and construct road drains to divert runoff from the road away from unsealed areas into drains.

(b) For catchment W3;
   i. Implement road drains and a bitumen seal to the 'stage 2 washer area'.
   ii. Implement at-source erosion controls to two unsealed laydown areas.

(c) For catchment W2;
   i. Implement containment measures to the coal yard, including a bund around the coal stockpile, to prevent run-off and bypassing of the sediment pond.

(d) For catchment W8;
   i. Reshape and revegetate unstable embankments.
   ii. Implement at-source erosion controls along stockpile road to reduce runoff into drains.
   iii. Implement a silt blanket and gabion rock baskets in the W8 Catchment pond.

*Note 1: Refer to **Schedule 2 – Figure 6**.*

Definitions

Key terms and/or phrases used in this document are defined in this section and **bolded** throughout this document. Applicants should note that where a term is not defined, the definition in the *Environmental Protection Act 1994*, its regulations or environmental protection policies must be used. If a word remains undefined it has its ordinary meaning.

"act" means the *Environmental Protection Act 1994.*

"activity" means the environmentally relevant activities carried out by the holder.

"administering authority" means the Department of Environment and Heritage Protection or its successor.

"AEP" means the Annual Exceedance Probability, which is the probability that at least one event in excess of a particular magnitude will occur in any given year.

"associated works" in relation to a dam, means:

a) operations of any kind and all things constructed, erected or installed for that dam; and

b) any land used for those operations.

"AWQ guidelines" means the 'Australian and New Zealand Guidelines for Fresh and Marine Water Quality', volumes 1, 2 and 3, published by ANZECC and ARMCANZ in October 2000 or more recent versions.

"background noise level" means the sound pressure level, measured in the absence of the noise under investigation, as the $L_{A90,T}$ being the A-weighted sound pressure level exceeded for 90% of the measurement time period T of not less than 15 minutes, using Fast response.

"bed and banks" for a watercourse or wetland means land over which the water of the watercourse or wetland normally flows or that is normally covered by the water, whether permanently or intermittently; but does not include land adjoining or adjacent to the bed or banks that is from time to time covered by floodwater.

"beneficial use" refer to *Waste Reduction and Recycling Act 2011.*

"best practice environmental management" of an activity means the management of the activity to achieve an ongoing minimisation of the activity's environmental harm through cost-effective measures assessed against the measures currently used nationally and internationally for the activity. In deciding the best practice environmental management of an activity, regard must be had to the strategic planning by the person carrying out, or proposing to carry out, the activity, the administrative systems put into effect by the person, including staff training and monitoring and review of the systems, the public consultation carried out by the person, the product and process design and waste prevention, treatment and disposal.

'**boiler exemption'** means any of the following:

a) the period of any chemical clean that is performed on the desulphurisation plant, that does not exceed 24 hours unless otherwise agreed to by the administering authority, by circulating acid within the scrubbing vessels of the plant.

b) the period of any impaired operational performance of the desulphurisation plant that does not exceed 3 hours unless otherwise agreed to by the administering authority.

c) the period of any maintenance performed, that does not exceed 24 hours unless

otherwise agreed to by the administering authority, which requires isolation of the desulphurisation plant or its components.

"bund" or **"bunded"** in relation to spill containment systems for fabricated or manufactured tanks or containers designed to a recognised standard means an embankment or wall of brick, stone, concrete or other impervious material which may form part or all of the perimeter of a compound and provides a barrier to retain liquid. Since the bund is the main part of a spill containment system, the whole system (or bunded area) is sometimes colloquially referred to within industry as the bund. The bund is designed to contain spillages and leaks from liquids used, stored or processed above ground and to facilitate clean-up operations. As well as being used to prevent pollution of the receiving environment, bunds are also used for fire protection, product recovery and process isolation.

"certification", **"certifying"** or **"certified"** by a suitably qualified and experienced person in relation to a design plan or an annual report regarding dams, means that a statutory declaration has been made by that person and, when taken together with any attached or appended documents referenced in that declaration, all of the following aspects are addressed and are sufficient to allow an independent audit at any time:

a) exactly what is being certified and the precise nature of that certification;
b) the relevant legislative, regulatory and technical criteria on which the certification has been based;
c) the relevant data and facts on which the certification has been based, the source of that material, and the efforts made to obtain all relevant data and facts; and
d) the reasoning on which the certification has been based using the relevant data and facts, and the relevant criteria.

"cogeneration exemption" means any of the following:

a) "start-up period" while the cogeneration facility is being brought up to 'normal operation' following a period of 'inactivity' – This period can be no longer than 2 hours;
b) "shutdown period" while the cogeneration facility is being taken out of service from 'normal operation' to 'inactivity' - This period can be no longer than 2 hours;
c) "Islanding period" while the gas turbine is operating and supplying electricity only to RTA Yarwun operations;
d) "Extreme Weather Operation" where a cyclone warning of a category 2 or greater is issued by the Bureau of Meteorology (BOM) for the immediate area and the refinery is placed in 'cyclone mode', the gas turbine may be operated below 63.5% until 36 hours after the cyclone warning in raised or the category 2 or greater cyclone warning is cancelled;
e) "AER Directed – Reduced Generator Output" where the National Energy Market operator or any of its agents directs RTA Yarwun to reduce the output of the generator to below 63.5% MCR, for the purpose of power system security, then RTA Yarwun may operate at the directed level until such time as the NEM operator or agent lifts any restriction;
f) "Pipeline Directed – Reduced Generator Output", where the operator of the gas pipeline(s) that supplies the RTA Yarwun site or any of its agents issues RTA Yarwun

with operational notices to reduce gas consumption to a level where the output of the generator is operated below 63.5% MCR then RTA Yarwun may operate at the directed level until such time as the pipeline(s) operator or agent lifts any restriction;
g) “Planed Major Shutdowns”, where a major cogeneration plant shutdown is required by manufacturer’s specifications to occur, a shutdown plan must be submitted to the administering authority outlining within the schedule where operation of the plant must be below 63.5% MCR to achieve successful re-**commissioning**. For the duration outlined in the shutdown period stack emissions; or
h) “Low Rate Operation of Cogeneration for Steam System Maintenance whilst Gas Turbine is Operational”, operation of the gas turbine below 63.5% MCR for steam system maintenance is permitted for 120 hours each year, where the maximum duration of each individual maintenance period shall not exceed 10 hours.

“commercial place” means a work place used as an office or for business or commercial purposes, which is not part of the petroleum activities and does not include employees accommodation or public roads.

“competent person(s)” means a person(s) who has the appropriate skills, training and experience to conduct the monitoring.

“construction” or **“constructed”** in relation to a dam includes physical construction works for the building of a new dam, and modifying or lifting an existing dam, but does not include site preparatory works (in advance of construction) or investigations and testing necessary for purposes of preparing a design plan.

“commissioning” means the stage achieved once alumina production reaches 3 million tonnes per annum annualised for a period of one month.

“dam” means a land-based structure or a void that is designed to contain, divert or control flowable substances, and includes any substances that are thereby contained, diverted or controlled by that land-based structure or void and associated works. A dam does *not* mean a fabricated or manufactured tank or container, designed and constructed to an Australian Standard that deals with strength and structural integrity of that tank or container.

“day” means a business day.

“design plan” is the documentation required to describe the physical dimensions of the dam, the materials and standards to be used for construction of the dam, and the criteria to be used for operating the dam. The documents must include all investigation and design reports, plans and specifications sufficient to hand to a contractor for construction, and planned decommissioning and rehabilitation outcomes; so as to address all hazard scenarios that would be identified by a properly conducted hazard assessment for the structure. Documentation must be such that a ‘suitable qualified and experienced person’ could conduct an independent review without seeking further information from the designer.

"Design Storage Allowance" or **"DSA"** means an available volume, estimated in accordance with the Site Water Management Technical Guideline for Environmental Management of Exploration and Mining in Queensland (DME 1995), that must be provided in a dam as at the first of November each year in order to prevent a discharge from that dam to a

probability (AEP) specified in that guideline. The DSA is estimated based on 100% runoff of wet season rainfall at the relevant AEP, taking account of process inputs during that wet season, with no allowance for evaporation.

"determined" by a suitably qualified and experienced person in relation to a hazard assessment of a dam, means that a statutory declaration has been made by that person and, when taken together with any attached or appended documents referenced in that declaration, all of the following aspects are addressed and are sufficient to allow an independent audit at any time:

a) exactly what has been assessed and the precise nature of that assessment;
b) the relevant legislative, regulatory and technical criteria on which the assessment has been based;
c) the relevant data and facts on which the assessment has been based, the source of that material, and the efforts made to obtain all relevant data and facts; and
d) the reasoning on which the assessment has been based using the relevant data and facts, and the relevant criteria.

"environmental authority" means this environmental authority as defined under the *Environmental Protection Act 1994*.

"dust collector" means a device used for filtering particulate from the air which is otherwise free from fume or gaseous contaminants.

"Dutch Intervention Guidelines target value" means is the baseline concentration value below which compounds and/or elements are known or assumed not to affect the natural properties of the soil as outlined in the most current version of the *Circular on target values and intervention values for soil remediation:* Ministry of Housing, Spatial Planning and Environment Directorate-General For Environmental Protection, Department of Soil Protection.

"dwelling" means any of the following structures or vehicles that is principally used as a residence:

a) a house, unit, motel, nursing home or other building or part of a building;
b) a caravan, mobile home or other vehicle or structure on land; or
c) a water craft in a marina.

"environment" includes:

a) ecosystems and their constituent parts, including people and communities; and
b) all natural and physical resources; and
c) the qualities and characteristics of locations, places and areas, however large or small, that contribute to their biological diversity and integrity, intrinsic or attributed scientific value or interest, amenity, harmony and sense of community; and
d) the social, economic, aesthetic and cultural conditions that affect, or are affected by, things mentioned in paragraphs (a) to (c).

"environmentally relevant activities" is any activity mentioned in Schedule 2 Chapter 4 in the *Environmental Protection Regulation 2008*

"environmental nuisance" means unreasonable interference or likely interference with an environmental value caused by—

a) aerosols, fumes, light, noise, odour, particles or smoke; or

b) an unhealthy, offensive or unsightly condition because of contamination; or
c) another way prescribed by regulation.

"flowable substance" means matter or a mixture of materials which can flow under any conditions potentially affecting that substance. Constituents of a flowable substance can include water, other liquids fluids or solids, or a mixture that includes water and any other liquids fluids or solids either in solution or suspension.

"foreseeable future" is the period used for assessing the total probability of an event occurring. Permanent structures and ecological sustainability should be expected to still exist at the end of a 150 year foreseeable future with an acceptable probability of failure before that time.

"hazard" in relation to a dam as defined, means the potential for environmental harm resulting from the collapse or failure of the dam to perform its primary purpose of containing, diverting or controlling flowable substances.

"hazard category" means a category, either low significant or high, into which a dam is assessed as a result of the application of tables and other criteria in the *Site Water Management Technical Guideline for Environmental Management of Exploration and Mining in Queensland* (DME 1995).

"holder" The holder of an environmental authority for a prescribed ERA is the person who made an application for the authority; or if a transfer application for the authority has been approved under chapter 5, part 9—the person to whom the transferred environmental authority has been issued.

"hydraulic performance" means the capacity of a regulated dam to contain or safely pass flowable substances based on a probability (AEP) of performance failure specified for the relevant hazard category in the *Site Water Management Technical Guideline for Environmental Management of Exploration and Mining in Queensland* (DME 1995).

"impeded operational performance of pollution control equipment" means when the pollution control equipment is not operating to design specification in relation to pollutant removal.

"inactivity" means for the purposes of reducing risk related to the emission of NOx, when there is no ignited gas supply to the burners.

"indicators" and water quality guidelines for an environmental value are decided using the following documents:

1. site specific documents for the water;
2. the '**QWQ guidelines**';
3. the 'AWQ guidelines';
4. other relevant documents published by a 'recognised entity'.

"infrastructure" means water storage dams, roads and tracks, buildings and other structures built for the purpose and duration of the conduct of the environmentally relevant activities, but does not include other facilities required for the long term management of the impact of those activities or the protection of potential resources. Such other facilities include dams other than water storage dams, waste dumps, voids, or stockpiles

and assets, that have been decommissioned, rehabilitated, and lawfully recognised as being subject to subsequent transfer with ownership of the land.

"lake" means:

1. a lagoon, swamp or other natural collection of water, whether permanent or intermittent; and
2. the bed and banks and any other element confining or containing the water.

"land" means any parcel of land *and* area of ground together with any trees, crops or permanently attached buildings and including the airspace above land; and land that is, or is at any time, covered by waters; and waters. Land includes sealed and unsealed areas, road, dirt and soil.

"$L_{Amax\ adj,\ 15\ mins}$" means the average maximum A-weighted sound pressure level; adjusted for noise character and measured over a time period of 15 minutes, using Fast response.

"L_{Amax}" means the instantaneous maximum A-weighted sound pressure level; using Fast response.

"levee", **"dyke"** or **"bund"** means a long embankment that is designed only to provide for the containment and diversion of stormwater or flood flows from a contributing catchment, or containment and diversion of flowable materials resulting from releases from other works, during the progress of those stormwater or flood flows or those releases; and does not store any significant volume of water or flowable substances at any other times.

"Lowest Astronomical Tide (LAT)" The lowest tide level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions.

"mg/L" means milligrams per litre.

"mandatory reporting level" or **"MRL"** means a warning and reporting level determined in accordance with the *Site Water Management Technical Guideline for Environmental Management of Exploration and Mining in Queensland* (DME 1995). An MRL is the lowest level required in a regulated dam to allow either of the following to be retained:

1. the runoff from a 72 hour duration storm at the AEP specified in the Table 5; or
2. a wave allowance at that AEP as estimated using a recognised engineering method.

"maximum" means that the measured value of the quality characteristic or contaminant must not be greater than the release limit stated.

"Maximum Continuous Rating (MCR)" means the maximum output that can be sustained continuously under normal conditions over a day. The maximum actual output can be higher than the MCR.

"minimum" means that the measured value of the quality characteristic or contaminant must not be less than the release limit stated.

"NATA" means the National Association of Testing Authorities, Australia.

"natural gas" includes CSG.

"NEPM groundwater investigation level" means the concentration of a contaminant above which further appropriate investigation and evaluation is required as set out in the

'Guideline on the Investigation Levels for Soil and Groundwater' prepared by the National Environment Protection (assessment of site contamination) Measure 1999 or more recent versions.

"non-continuous spill" means a single and isolated release of a contaminant to land that does not exceed 24 hours in duration and does not cause the potential for environmental harm.

"normal operations" means if the cogeneration facility is operating at a constant rate, whether or not it is operating at full capacity.

"nuisance sensitive place" means any of the following:

1. a dwelling, residential allotment, mobile home or caravan park, residential marina or other residential premises;
2. library and educational institution (including a school, college and university;
3. childcare centre or kindergarten;
4. school or playground;
5. hospital, surgery or other medical institution;
6. protected area, or an area identified under a conservation plan under the *Nature Conservation Act 1992* as a critical habitat or an area of major interest;
7. marine park under the *Marine Parks Act 2004*;
8. park or garden that is open to the public (whether or not on payment of an amount) for use other than for sport or organised entertainment; or
9. a place used as a workplace, an office or for business or commercial purposes and includes a place within the curtilage of such a place reasonably used by persons at that place.

"occasion" means any four sample results for metals and any four (4) 24-hour period where continuous samples indicate an exceedance.

"operational plan" means a document that amongst other things sets out procedures and criteria to be used for operating a dam during a particular time period. The operational plan as defined herein may form part of a plan of operations or plan otherwise required in legislation.

"process contaminants" means liquids and slurries used or produced in the processing of bauxite to alumina and does not include hydrocarbons.

"QWQ guidelines" means the document called '*Queensland water quality guidelines 2009*' or more recent versions.

"range" means that the measured value of the quality characteristic or contaminant must be less than the higher release limit stated and greater than the lower release limit stated.

"recognised entity" means:

1. a local government;

2. a public sector unit;
3. an agency of the Commonwealth or another State, however called, with similar functions to the functions of the chief executive;
4. a ministerial council established by the Council of Australian Governments;
5. the Commonwealth Scientific and Industrial Research Organisation;
6. a research centre completely or partly funded by the Commonwealth;
7. an Australian university;
8. a Queensland regional NRM body;
9. Healthy Waterways Limited ACN 137 943 554; and
10. any other international best proactive guideline including NEPM groundwater investigation level or Dutch Intervention Guidelines target value.

"regulated dam" means any dam in the significant or high hazard category as assessed using the *Site Water Management Technical Guideline for Environmental Management of Exploration and Mining in Queensland* (DME 1995).

"rehabilitation" means the process of reshaping and revegetating land to restore it to a stable landform and in accordance with the acceptance criteria set out in this environmental authority and, where relevant, includes remediation of contaminated land

"**Residue Management Area Dam**" means a dam defined in Land – Table 1 (location of Residue Management Area Dams)

"Residue Management Area" means the land including fresh water dams surrounding the Residue Management Area Dam itself over Lot 1 on SP144430 and Lot 7 on SP228453.

"representative of actual operating conditions" means stack testing must be carried out when production rates are within 10% or greater than the average production rate of 3 months prior (excluding shutdowns) to when the testing is to be undertaken.

"sensitive receptor" means any of the following:

1. a dwelling, residential allotment, mobile home or caravan park, residential marina or other residential premises;
2. library and educational institution (including a school, college and university;
3. childcare centre or kindergarten;
4. school or playground;
5. hospital, surgery or other medical institution;
6. protected area, or an area identified under a conservation plan under the *Nature Conservation Act 1992* as a critical habitat or an area of major interest;
7. marine park under the *Marine Parks Act 2004*;

8. park or garden that is open to the public (whether or not on payment of an amount) for use other than for sport or organised entertainment;
9. a place used as a workplace, an office or for business or commercial purposes; or
10. and includes a place within the curtilage of such a place reasonably used by persons at that place.

"shutdown" refers to any circumstance where the cogeneration plant is not operating for a period of time longer than 15 minutes.

"site" means the land to which the environmental authority attaches.

"**specialist in the field**" in reference to condition A8 of this environmental authority means a person or body possessing the relevant experience and qualifications to perform the required measurements and subsequent interpretation, evaluation and explanation of the monitoring results, trends and programs.

"spillway" means a weir, channel, conduit, tunnel, gate or other structure designed to permit discharges form the dam, normally under flood conditions or in anticipation of flood conditions.

"stable" in relation to land, means land form dimensions are and will remain within tolerable limits now and in the foreseeable future. Issues to be properly considered in regard to whether or not the landform is stable include geotechnical stability, settlement and consolidation allowances, bearing capacity (trafficability), erosion resistance and geochemical stability with respect to seepage, leachate and related contaminant generation.

"stabilisation area" means a catchment area that has effective erosion and sediment source control measures implemented and maintained in accordance with the conditions of the environmental authority.

"suitably qualified and experienced person" in relation to dams means a person who is a Registered Professional Engineer of Queensland (RPEQ) under the provisions of the *Professional Engineers Act 2002*, or at the relevant time holds a 'deemed registration' within the meaning of the *Mutual Recognition (Queensland) Act 1992*; and has knowledge, suitable experience and demonstrated expertise in relevant fields, as set out below:

1. knowledge of engineering principles related to the structures, geomechanics, hydrology, hydraulics, chemistry and environmental impact of dams; and
2. a total of five years of demonstrated expertise in the geomechanics of dams with particular emphasis on stability, geology and geochemistry, and
3. a total of five years of demonstrated expertise in three of the following categories:
    1. investigation and design of dams;
    2. construction, operation and maintenance of dams;
    3. hydrology with particular reference to flooding, estimation of extreme

storms, water management or meteorology;

4. hydraulics with particular reference to sediment transport and deposition, erosion control, beach processes;

5. hydrogeology with particular reference to seepage, groundwater;

6. solute transport processes and monitoring thereof;

7. dam safety.

"suitably qualified third party auditor" means a person with a relevant qualification and at least five (5) years' experience in the field of environmental auditing that is accepted by the administering authority.

"threatening processes" means processes, features and actions that can have a detrimental effect upon the health and viability of an area of vegetation. For example, altered hydrology, land use practices, invasion by pest and weed species, land degradation, edge effects and fragmentation.

"tolerable limits" means a range of parameters regarded as being sufficient to meet the objective of protecting relevant environmental values. For example, a range of settlement for a tailings capping, rather than a single value, could still meet the objective of draining the cap quickly, preventing damage and limiting infiltration and percolation.

"topsoil" means the surface (top) layer of a soil profile, which is more fertile, darker in colour, better structured and supports greater biological activity than underlying layers. The surface layer may vary in depth depending on soil forming factors, including parent material, location and slope, but generally is not greater than about 300mm in depth from the natural surface.

"trigger levels" means an indicator for an environmental value is a physical, chemical, biological or other property that can be measured or decided in a quantitative way.

"upon" means one sample must be taken on release of a discharge event commencing. Where a discharge event has a duration of 24 hours or greater, samples must be taken daily for one week and once a week thereafter.

"void" means any constructed, open excavation in the ground.

"visible dust event" means an event that results in a visible dust moving beyond the lot and plan where the relevant ERA is carried out.

"waters" - includes all or any part of a river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water in natural or artificial watercourses, bed and banks of a watercourse, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and groundwater.

"watercourse" means a river, creek or stream in which water flows permanently or intermittently:

1. in a natural channel, whether artificially improved or not;

2. in an artificial channel that has changed the course of the watercourse; but, in any case, only:

    1. unless a regulation under paragraph (d), (e) or (f) declares otherwise-at every

place upstream of the point (point A) to which the high spring tide ordinarily flows and reflows, whether due to a natural cause or to an artificial barrier;

2. if a regulation has declared an upstream limit for the watercourse-the part of the river, creek or stream between the upstream limit and point A;
3. if a regulation has declared a downstream limit for the watercourse-the part of the river, creek or stream upstream of the limit; or
4. if a regulation has declared an upstream and a downstream limit for the watercourse-the part of the river, creek or stream between the upstream and the downstream limits.

"watercourse" includes the bed and banks and any other element of a river, creek or stream confining or containing water.

"water quality guidelines" are quantitative measures or statements for indicators, including contaminant concentration or sustainable load measures of water that protect a stated environmental value.

"wetland" means an area shown as a wetland on a 'Map of referable wetlands', a document approved by the chief executive (environment). A map of referable wetlands can be viewed at www.ehp.qld.gov.au.

Schedules

Schedule 1—Approved ERA locations

Environmentally Relevant Activities

Location		ERA 8 - 3	ERA 8 - 4	ERA 8 - 5	ERA 14 - 1	ERA 15	ERA 16 - 2(d)	ERA - 16 (c)	ERA 31 - 2(b)	ERA 50 - 1(a)	ERA 50 - 2	ERA 56	ERA 60 -1(d)
Lot	Plan												
503	SP144788			✓						✓	✓		
502	SP224189	✓	✓	✓						✓	✓		
1	SP144433								✓	✓	✓		
23	SP103896								✓	✓	✓		
22	SP103896								✓	✓	✓		
21	SP103896								✓	✓	✓		
14	SP147866								✓	✓	✓		
9	SP147866								✓	✓	✓		
Gladstone - Mt Larcom Rd									✓	✓	✓		
8	SP218634	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	SP235022						✓	✓		✓	✓		
7	SP147726									✓	✓		
7	SP145439								✓				
54	SP137048								✓				
1	RP911260								✓				
Lindherr Rd									✓				
27	SP115227								✓				
Calliope River Rd									✓				
79	CP911258								✓				
23	SP115225								✓				
Halls Road									✓				
13	RP620157								✓				
91	SP122250								✓				
Quarry Rd									✓				
21	SP115224								✓				
20	SP115224								✓				
7	SP177782								✓				
Unnamed Road									✓				
1	SP144430	✓	✓	✓		✓	✓	✓	✓			✓	✓
7	SP228453	✓	✓	✓		✓	✓	✓	✓			✓	✓

Schedule 2—Monitoring, maps and plans

Figure 1 - Refinery Catchment Areas – First Flush Catchment

Figure 2 – Release points and monitoring locations

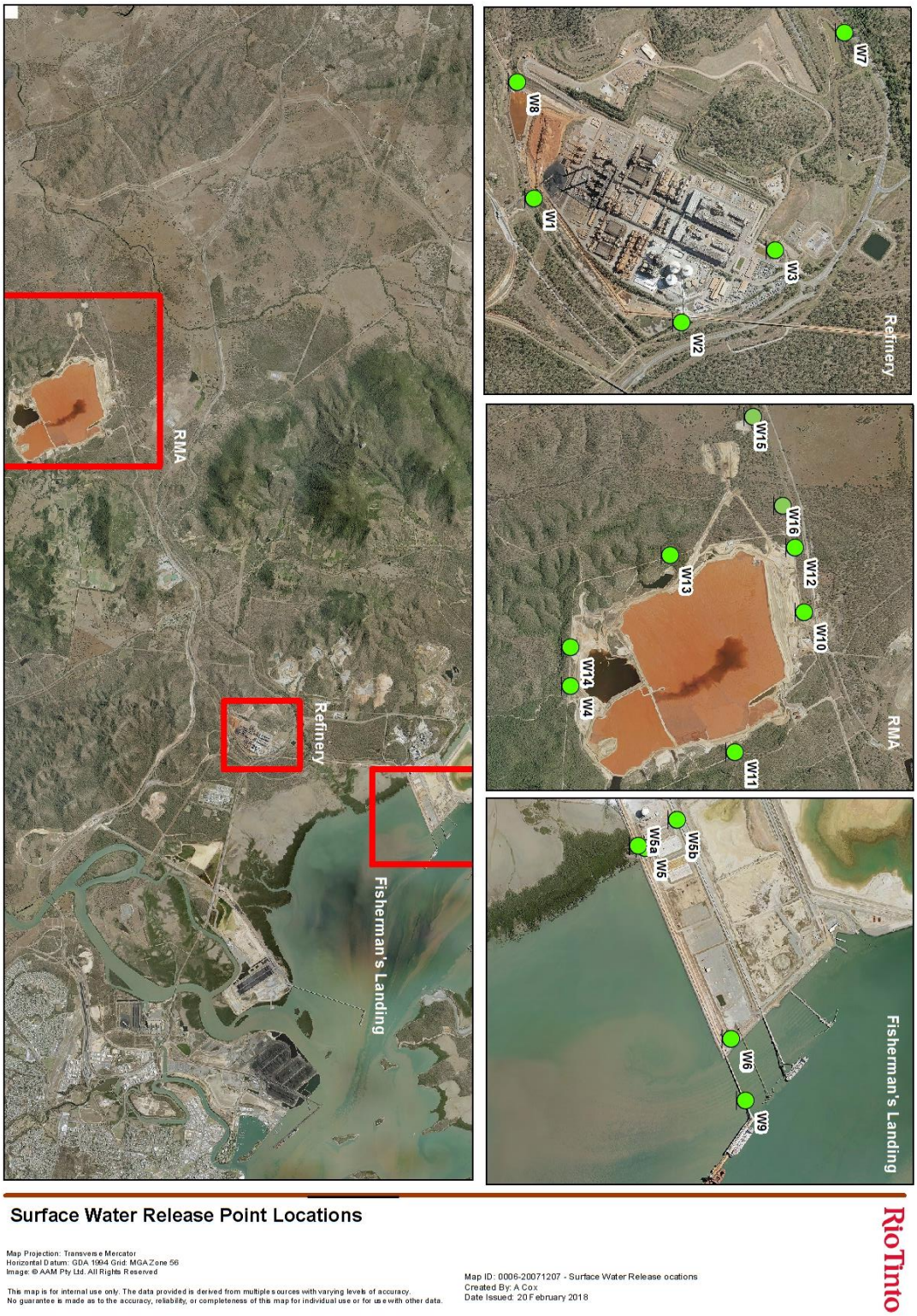

Figure 3 – Groundwater expression area

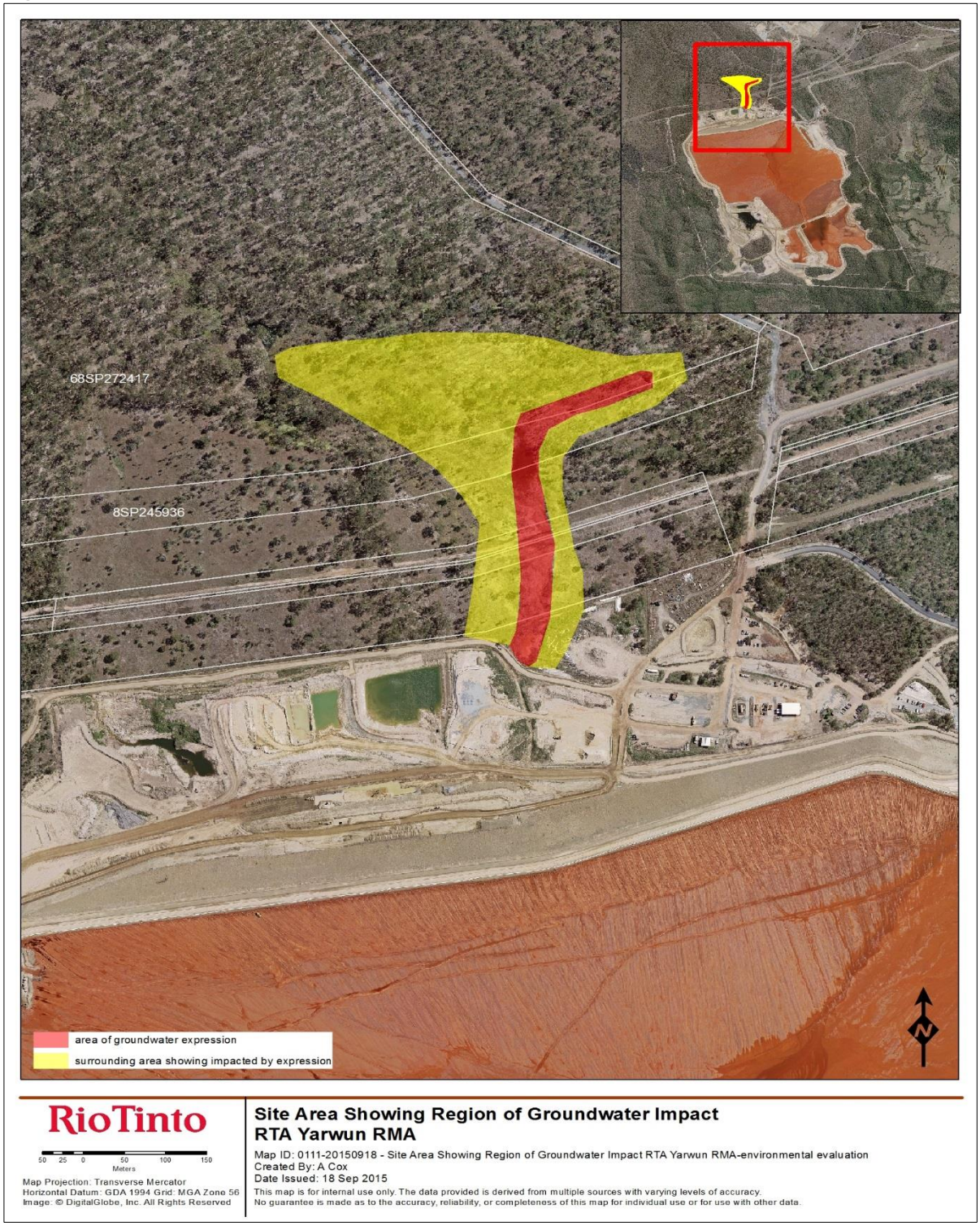

Figure 4 – Refinery catchment areas.

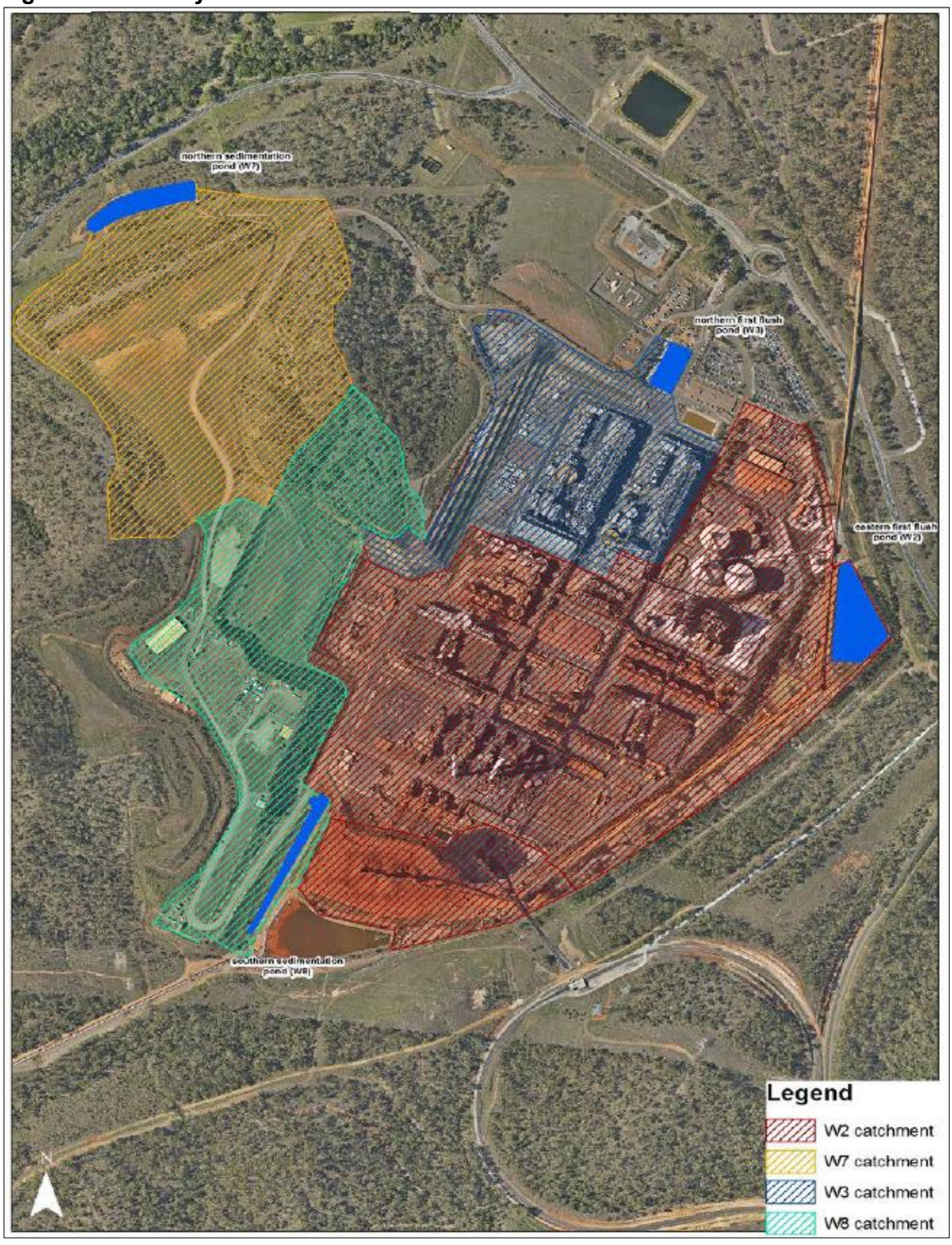

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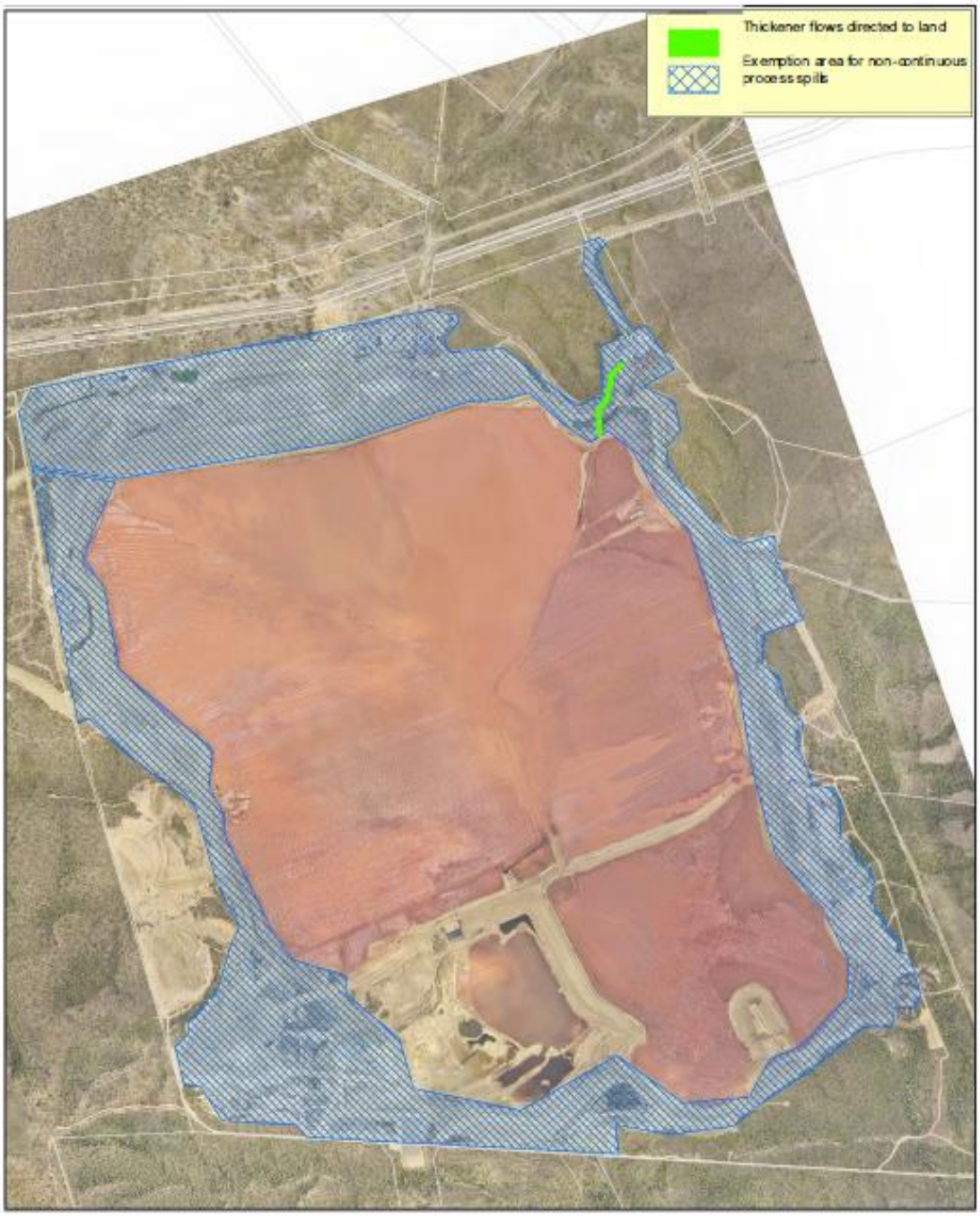
Figure 5 – Condition L2 exemption areas RMA



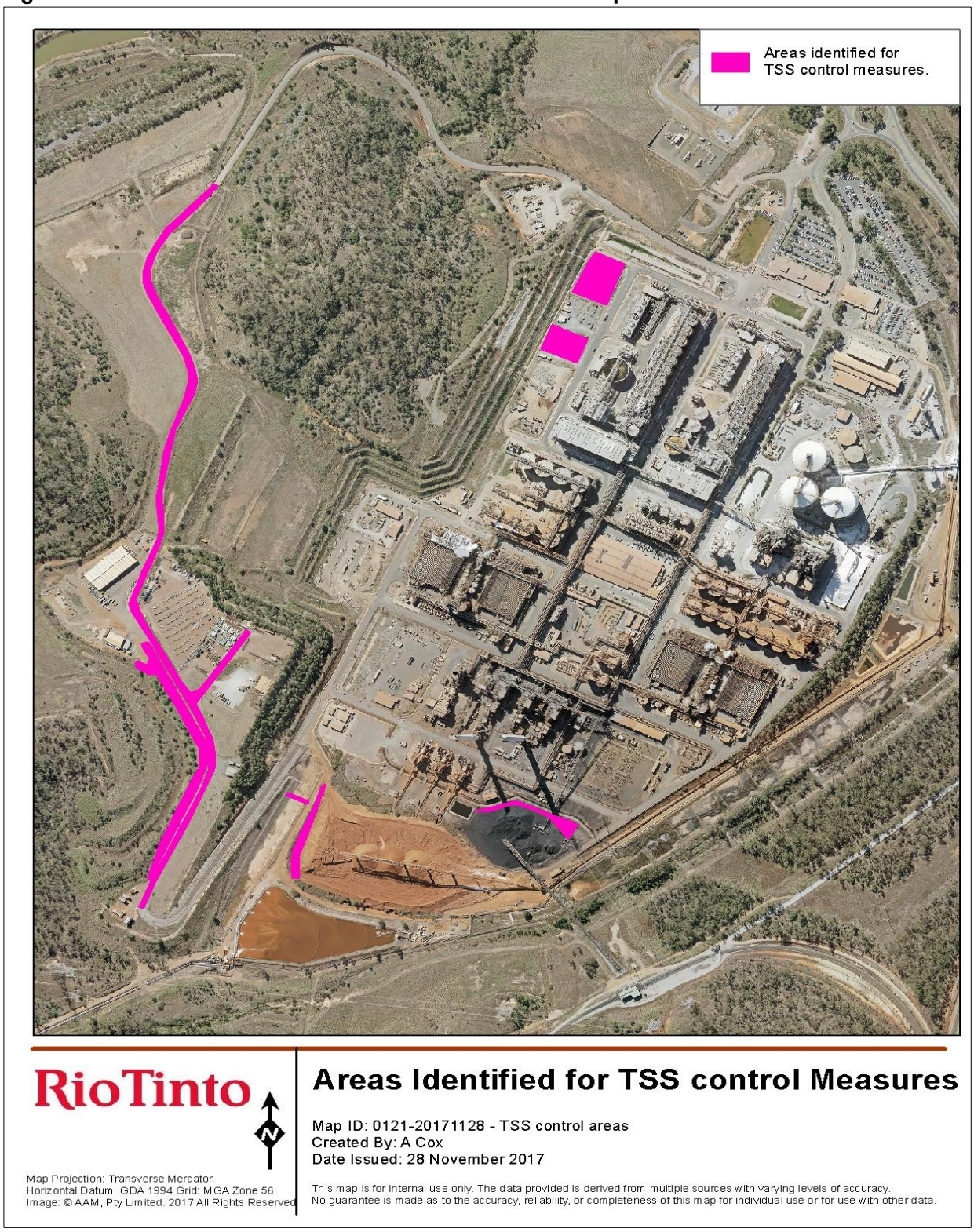
RioTinto

RMA Lot 1 SP144430 Exemption Areas

Created By: A.Cox
Date: 30 January 2020

Queensland Government

Figure 6 – Condition W52 erosion and sediment control requirements



Schedule 3—Monitoring and release limits

Air - Table 1 Source description

Release point number	Source description	Minimum release height (metres - Australian Height Datum)	Minimum Efflux Velocity (metres/second)*	Minimum release temperature (degrees Celsius)*
B1	Boiler 1	120	17	114 *
B2	Boiler 2	120	17	114 *
B3	Boiler 3	120	17	50 *
C1	Calciner 1	60	17	130*
C2	Calciner 2	60	17	130*
C3	Calciner 3	60	17	130*
C4	Calciner 4	60	17	130*
Cogen	Gas Turbine Stack	50	20	149*

Notes:
**__Minimum__ efflux velocities and temperature must be achieved when operating above 80% __Maximum Continuous Rating__ (MCR)*

Air - Table 2 Contaminants release limits to air

Release point	Contaminant release	Maximum concentration release limit	Maximum mass release limit	Averaging Period
B1	Particulates	50mg/Nm3 (dry)	2.7g/s	24 hour rolling average
	Oxides of Nitrogen	500mg/Nm3 (dry)	27g/s	1 hour rolling average
	Sulphur Dioxide	1450mg/Nm3 (dry)	71g/s	1 hour rolling average
	Mercury	0.2mg/Nm3 (dry)	0.009g/s	-
	Total volatile organic compounds (TVOC) as n-propane equivalent	40mg/Nm3 (dry)	1.8g/s	-
B2	Particulates	50mg/Nm3 (dry)	2.7g/s	24 hour rolling average
	Oxides of Nitrogen	500mg/Nm3 (dry)	27g/s	1 hour rolling average
	Sulphur Dioxide	1450mg/Nm3 (dry)	71g/s	1 hour rolling average
	Mercury	0.2mg/Nm3 (dry)	0.009g/s	-

Release point	Contaminant release	Maximum concentration release limit	Maximum mass release limit	Averaging Period
	Total volatile organic compounds (TVOC) as n-propane equivalent	40mg/Nm3 (dry)	1.8g/s	-
B3	Particulates	50mg/Nm3 (dry)	2.7g/s	1 hour block average
	Oxides of Nitrogen	500mg/Nm3 (dry)	27g/s	1 hour rolling average
	Sulphur Dioxide	205mg/Nm3 (dry) (desulphurisation)**	10g/s**	1 hour rolling average
C1	Particulates	100mg/Nm3 (dry)	N/A	24 hour rolling average
	Oxides of Nitrogen	200mg/Nm3 (dry)	N/A	1 hour block average
	Total volatile organic compounds (TVOC) as n-propane equivalent	40mg/Nm3 (dry)	N/A	-
C2	Particulates	100mg/Nm3 (dry)	N/A	24 hour rolling average
	Oxides of Nitrogen	200mg/Nm3 (dry)	N/A	1 hour block average
	Total volatile organic compounds (TVOC) as n-propane equivalent	40mg/Nm3 (dry)	N/A	-
C3	Particulates	100mg/Nm3 (dry)		24 hour rolling average
	Oxides of Nitrogen	200mg/Nm3 (dry)	N/A	1 hour block average
	Total volatile organic compounds (TVOC) as n-propane equivalent	40mg/Nm3 (dry)	N/A	-
C4	Particulates	100mg/Nm3 (dry)		24 hour rolling average
	Oxides of Nitrogen	200mg/Nm3 (dry)	N/A	1 hour block average
	Total volatile organic compounds (TVOC) as n-propane equivalent	40mg/Nm3 (dry)	N/A	-
Cogen	Oxides of Nitrogen	70mg/Nm3 (dry) at 15% O2*	27g/s*	1 hour block average

Notes:
The **maximum concentration release limit and **maximum** mass release limit for the Cogen release point do not apply during a '**cogeneration exemption**'.*

***The **maximum** concentration release limit and **maximum** mass release limit for Sulphur Dioxide at the B3 release point do not apply during a **'boiler exemption'**.*

Air - Table 3 Required release point determinations

Release point number	Determination Required	Frequency*
B1	Particulates	Continuous
	Oxides of Nitrogen	Continuous
	Sulphur Dioxide	Continuous
	Mercury	Quarterly
	Total volatile organic compounds as n-propane equivalent	Quarterly
B2	Particulates	Continuous
	Oxides of Nitrogen	Continuous
	Sulphur Dioxide	Continuous
	Mercury	Quarterly
	Total volatile organic compounds as n-propane equivalent	Quarterly
B3	Particulates	Annually
	Oxides of Nitrogen	Continuous
	Sulphur Dioxide	Continuous
C1	Particulates	Continuous
	Oxides of Nitrogen	Quarterly
	Total volatile organic compounds as n-propane equivalent	Annually (one calciner each quarter)
C2	Particulates	Continuous
	Oxides of Nitrogen	Quarterly
	Total volatile organic compounds as n-propane equivalent	Annually (one calciner each quarter)
C3	Particulates	Continuous
	Oxides of Nitrogen	Quarterly
	Total volatile organic compounds as n-propane equivalent	Annually (one calciner each quarter)
C4	Particulates	Continuous
	Oxides of Nitrogen	Quarterly
	Total volatile organic compounds as n-propane equivalent	Annually (one calciner each quarter)
Cogen	Oxides of Nitrogen	Quarterly

** Note: Sampling equipment must be operated at 85% of total operating capacity to allow for the performance of maintenance activities, and sampling frequency shall be subject to equipment outages for such purposes.*

Water – Table 1 Contaminants, sources and locations for releases to waters

GPS locations for release point	Release Point Descriptor	Contaminants and source	Permitted Waters and locations for the release
311606.000E 7362966.00N	W1	Settled neutralised process effluent, boiler blowdown and stormwater runoff from the alumina plant Effluent Pond to be discharged via diffuser at W9. (W1 is upstream from W9)	Port Curtis via diffuser W9 at Fisherman's Landing wharf
321333.6923E 7363022.587N	W2	Discharge of stormwater runoff from Eastern 1st Flush Pond	Unnamed tributary of Boat Creek at the site boundary
312032.770E 7363636.204N	W3	Discharge of stormwater runoff from Northern 1st Flush Pond	Unnamed tributary of Boat Creek at the site boundary
304605.000E 7357736.00N	W4	Discharge of diverted stormwater from the exterior of the RMA	Gravel Creek
312921.913E 7367213.56N	W5	Discharge of potentially alkaline contaminated stormwater from the Caustic Storage Facility located at Fisherman's Landing	Port Curtis via southern **bund** drain at Fisherman's Landing
312911.2E 7367174.1N	W5a[1]	Water resulting from the neutralisation of residual caustic soda from the caustic bladders to be discharged via diffuser at release point W9, only once every five years unless otherwise agreed to by the administering authority[1].	Port Curtis via diffuser W9 at Fisherman's Landing Wharf
312838.354E 7367431.783N	W5b	Discharge of potentially alkaline contaminated stormwater from the Caustic Storage Facility located at Fisherman's Landing	Port Curtis via northern bund drain at Fisherman's Landing
314032.7868E 7367213.568N	W6	Stormwater and wash down water from wharf sediment **dam** containing alumina and bauxite wash down water from the wharf	Port Curtis via southern **bund** drain at Fisherman's Landing

GPS locations for release point	Release Point Descriptor	Contaminants and source	Permitted Waters and locations for the release
311130.811E 7367712.280N	W7	Discharge of stormwater runoff from Northern Lay-down Area Sedimentation Pond	Unnamed tributary of Boat Creek to the south of Port Curtis Way
311335.670E 7364313.383N	W8	Discharge of stormwater runoff from Southern Lay-down Area Sedimentation Pond	Diversion gulley west of RTA 670 pond, to an unnamed tributary of Boat Creek south of Port Curtis Way adjacent the RTA Yarwun Refinery **site** northern boundary
314389.785153E 7362954.722N	W9	Contaminants and sources mentioned for W1 and W5a	Port Curtis via diffuser at Fisherman's Landing Wharf
303685.3E 7360184.6N	W10	Discharge of diverted stormwater from the exterior of the RMA	Unnamed ephemeral gully from northern boundary
305162.1E 7359458.5N	W11	Discharge of diverted stormwater from the exterior of the RMA	Unnamed ephemeral gully from eastern boundary
303014.5E 7360083.8N	W12	Discharge of diverted stormwater from the exterior of the RMA	Unnamed ephemeral gully from northern boundary
303087.5E 7358786.2N	W13	Discharge of diverted stormwater from the exterior of the RMA	Unnamed ephemeral gully from northern boundary of RMA 2
304047.6E 7357756.4N	W14	Discharge of diverted stormwater from the exterior of the RMA	Gravel Creek
301731.39E 7359633.59N	W15	Discharge of diverted stormwater from RMA2 borrow operations	Unnamed ephemeral gully from northern boundary of RMA2
302757.17E 7360010.37N	W16	Discharge of diverted stormwater from RMA2 borrow operations	Unnamed ephemeral gully from northern boundary of RMA2

Notes:

1. *The release of neutralised residual caustic soda from the caustic bladder at the release point W5a is only permitted when agreed to by the administering authority.*

Water – Table 2 Release limits and monitoring

Monitoring point	Release point	Quality characteristics	Release limit				Minimum Monitoring frequency *
			Minimum	Median	80th percentile	Maximum	
Discharge pipe from alumina plant effluent pond	W1	pH	6.5			9.5	Continuous
		Total Suspended solids					Monthly
		Turbidity				150 NTUs	Continuous
		Aluminium (Filtered)				14**mg/L**	Monthly
		Aluminium (Filtered)		5**mg/L**			Monthly based on a 12 months rolling average
		Vanadium (µg/L – filtered)					Monthly
		Gallium (µg/L – filtered)					
		Molybdenum (µg/L – filtered)					
		Alkalinity (**mg/L**),					
		Total dissolved solids (**mg/L**),					
		Dissolved Oxygen (**mg/L**)					
Eastern 1st Flush Pond at spillway	W2	pH	6.5			9	Daily **upon** discharge
		Total suspended solids			163 **mg/L**[4]		
		Aluminium (Filtered)				3**mg/L**	each release event
		Vanadium (µg/L – filtered)					
		Gallium (µg/L – filtered)					
		Molybdenum (µg/L – filtered)					
		Alkalinity (**mg/L**),					
		Total dissolved solids (**mg/L**),					
		Dissolved Oxygen (**mg/L**)					

Monitoring point	Release point	Quality characteristics	Release limit				Minimum Monitoring frequency *
			Minimum	Median	80th percentile	Maximum	
Northern 1st Flush Pond at spillway	W3	pH	6.5			9	Daily **upon** discharge
		Total suspended solids			163 **mg/L**[4]		
		Vanadium (µg/L – filtered)					Each release event
		Aluminium (Filtered)				3**mg/L**	
		Gallium (µg/L – filtered)					
		Molybdenum (µg/L – filtered)					
		Alkalinity (**mg/L**),					
		Total dissolved solids (**mg/L**),					
		Dissolved Oxygen (**mg/L**)					
RMA diversion drain south east (RMA 1)	For W4						Daily **upon** discharge
		Total Suspended solids (TSS)				50**mg/L** [2]	
		Turbidity				70NTU [1 2]	
Caustic storage facility at spillway	W5	pH	6.5			9	Daily **upon** discharge
Discharge from caustic bladders	W5a	pH	6.5			9.5	Continuous
		Total Suspended solids					Once during discharge
		Turbidity				150 NTU	Continuous
		Aluminium (Filtered)		5mg/L		14**mg/L**	Once during discharge
		Vanadium (µg/L – filtered)					
		Gallium (µg/L – filtered)					
		Molybdenum (µg/L – filtered)					
		Alkalinity (**mg/L**),					

Monitoring point	Release point	Quality characteristics	Release limit				Minimum Monitoring frequency *
			Minimum	Median	80th percentile	Maximum	
		Total dissolved solids (**mg/L**),					
		Dissolved Oxygen (**mg/L**)					
Caustic storage facility – top of bladders	W5b	pH	6.5			9	Daily **upon** discharge
Sediment Pond at discharge to drain	W6	pH	6.5			9	Daily **upon** discharge
		Total suspended solids (TSS)				Greater of 50**mg/L** or within 10% of TSS at background [3]	
Northern Lay-down Area Sediment Pond – discharge to drain	W7	pH	6.5			8.5	Daily **upon** discharge
		Total Suspended Solids (TSS)			85 **mg/L**[4]		
Southern Lay-down Area Sediment Pond – discharge to drain	W8	pH	6.5			8.5	Daily **upon** discharge
		Total Suspended Solids (TSS)			163 **mg/L**[4]		
Diffuser at Fisherman's landing wharf	W9						
	W10	Turbidity				*75 NTU* [1 2]	Daily **upon** discharge

Monitoring point	Release point	Quality characteristics	Release limit				Minimum Monitoring frequency *
			Minimum	Median	80th percentile	Maximum	
RMA diversion drain north (RMA 1)		Total Suspended Solids (TSS)				50**mg/L** [2]	Daily **upon** discharge
RMA diversion drain east (RMA 1)	W11	Turbidity				*75 NTU* [1 2]	Daily **upon** discharge
		Total Suspended Solids (TSS)				50**mg/L** [2]	Daily **upon** discharge
RMA diversion drain north west (RMA 1)	W12	Turbidity				*75 NTU* [1 2]	Daily **upon** discharge
		Total Suspended Solids (TSS)				50**mg/L** [2]	Daily **upon** discharge
RMA diversion drain west (RMA 2)	W13	Turbidity					Daily **upon** discharge
		Total Suspended Solids (TSS)					Daily **upon** discharge
External Spillway Southern boundary of RMA, 200m downstream from RMA internal spillway (RMA 1)	W14	Electrical conductivity				950µs/cm	Daily **upon** discharge
		pH	6.5			8.5	
		Turbidity				75 NTU[12]	
		Total Suspended Solids (TSS)				50 mg/L[2]	
		Vanadium (µg/L - filtered)					Each release event
		Aluminium (filtered)					
		Gallium (µg/L - filtered)					
		Molybdenum (µg/L - filtered)					
		Alkalinity (mg/L)					

Monitoring point	Release point	Quality characteristics	Release limit				Minimum Monitoring frequency *
			Minimum	Median	80th percentile	Maximum	
		Total dissolved solids (mg/L)					
		Dissolved Oxygen (mg/L)					
RMA2 Northern boundary	W15	Turbidity				*75 NTU* [1] [2]	Daily **upon** discharge
		Total Suspended Solids (TSS)				50**mg/L** [2]	
RMA2 Northern boundary	W16	Turbidity				*75 NTU* [1] [2]	Daily **upon** discharge
		Total Suspended Solids (TSS)				50**mg/L** [2]	

Notes:

1. *75 NTU to be used as an interim turbidity **maximum** limit for the release of sedimentation pond water in situations where there is an operational need to discharge from the sedimentation pond prior to a laboratory confirmed TSS result being available. The interim turbidity limit will remain in place until a correlated value is **determined** based on a **minimum** of 24 paired (measure from same sample bottle) data points for turbidity and TSS with a correlation coefficient R2 ≥0.7. The correlation must be developed from data representing TSS ranging from the Limit of Reporting (or ≤10**mg/L** TSS) to ≥50**mg/L**. Once a correlation has been developed in accordance with these requirements, the Turbidity Limit should be amended accordingly.*
2. *This limit is only required to be achieved during the controlled discharge (for example, de-watering activities from excavations and sediment basins) and upon any release that is within the 85th percentile 5 **day** rainfall depth of 32.8mm.*
3. *Background means water quality measured at an upstream location in receiving **waters** unaffected by the activities.*
4. *One of five consecutive samples measured at each release point, is permitted to exceed the release limit.*

Note: Sampling equipment must be operated at 85% of total operating capacity to allow for the performance of maintenance activities, and sampling frequency shall be subject to equipment outages for such purposes.

Water – Table 3 Toxicants of concern for Direct Toxicity Assessment

Toxicant of Concern		
Metals and Metalloids		
Aluminium	Copper	Vanadium
Antimony	Lead	Zinc
Arsenic (total)	Mercury (total)	Molybdenum
Cadmium	Nickel	Gallium
Chromium (total)	Silver	-
Cobalt	Uranium	-

Water - Table 4 Alumina Refinery and Residue Management Dam groundwater monitoring locations

Monitoring Point	AMG Coords (WGS84)	AMG Coords (WGS84)	Surface RL (m)
RGW1	312184.803E	7364021.178N	10.4
RGW5	312163.091E	7363335.353N	15.3
580BH31	303361.360E	7360428.450N	54.6
580BH30	305147.447E	7359435.455N	77.5
580BH07	303132.260E	7358783.861N	83.5
ALD 1	303078.861E	7359615.456N	55.81
CSGW1	312832.501E	7367195.235N	3.6
CSGW2	312752.817E	7367389.799N	3.81
CSGW3	312912.620E	7367457.120N	3.91
CSGW4	312992.520E	7367276.935N	3.83
580BH22C	302882.530E	7359783.779N	66.9
580MB3001	305670.929E	7358217.138N	91.48
580 ED1	304448.830E	7357753.381N	74.1

Notes: Where the codes mean:
RGW – Refinery Groundwater Bore
580BH, 580MB and ALD – Area 580 (Residue Management Area) Groundwater Bore
CSGW – Caustic Storage Groundwater Bore

Water - Table 5 Groundwater monitoring

Quality Characteristic Determination	Monitoring Points	Frequency
For Groundwater Samples		
Water level pH Aluminium, Vanadium, Gallium, Molybdenum (µg/L - all filtered) Fluoride Alkalinity (**mg/L**) Total dissolved solids (**mg/L**) Dissolved Oxygen (**mg/L**) Electrical conductivity (µS/cm) Major ions **mg/L** – (calcium, magnesium, sodium, potassium, chloride, carbonate/bicarbonate and sulphate)	All bores listed in Schedule C – Table 4	Twice per calendar year, not less than 4 months apart

END OF PERMIT

Notice

Environmental Protection Act 1994

Environmental Evaluation

Notice to conduct or commission an environmental evaluation

This notice to conduct or commission an environmental evaluation is issued by the administering authority pursuant to section 326B of the Environmental Protection Act 1994.

RTA Yarwun Pty Ltd
975 Hanson Road
YARWUN QLD 4680

Your reference: EPPR00926513

Our reference: 221024, 101/0006008

15 April 2015

Take notice: that under the *Environmental Protection Act 1994* (the Act) a notice to conduct or commission an environmental investigation is issued to RTA Yarwun Pty Ltd (you) by the administering authority. The administering authority is the Chief Executive of the Department of Environment and Heritage Protection (the department).

The notice to conduct or commission an environmental investigation is issued in respect of the activities of RTA Yarwun Pty Ltd at 975 Hanson Road, Yarwun, QLD, 4680, on land described as Lot 1 SP144430 (the premises).

A. Grounds

The notice to conduct or commission an environmental investigation is issued on the following grounds:

- an activity or proposed activity is causing, or is likely to cause environmental harm.

The facts and circumstances forming the basis for these grounds are:

1. RTA Yarwun Pty Ltd (RTAY) operates the Yarwun Alumina Refinery over 24 tenements located approximately 10 kilometres west of the city of Gladstone.
2. RTAY report that on 29 January 2014 they provided verbal notification to the department of a ground water expression issue.
3. At a meeting on 26 August 2014, RTAY informed the department of two groundwater expressions first observed in 2013, to the north (the Northern Groundwater Expression) and northeast (the Firewater Dams Expression) of the RMA.
4. Department officers inspected the Northern Groundwater Expression (NGE) on Friday 5 September 2014 and observed an area with water ponding on the surface of the land surrounded by a significant area of dead or damaged vegetation. Department officers undertook water quality sampling of the ponded water at the NGE and results found high salinity (53.8 mS/cm).
5. Department officers also inspected the Firewater Dams Expression (FWDE) on Friday 5 September 2014 and observed damp soil up-slope of the small GW1 dam and fire water, the expression was

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ponding in the dams from the surrounding soil. Department officers undertook water quality sampling of the ponded water and the results found high salinity (31.1 mS/cm) and very low pH (2.83).

6. RTA Yarwun have expressed an opinion that, based on evidence collected to date, the expressions are naturally occurring groundwater and that there has been no release of contaminants from the RMA to groundwater.
7. Schedule 9 of the *Environmental Protection Regulations 2008* provides criteria for the definition of a water contaminant, the two of which that are relevant include;
    - a liquid containing suspended or dissolved solids; and
    - a substance that has a pH outside the range 6.5 to 8.5.
8. The water quality results obtained by departmental officers on 5 September 2014 demonstrate that the ponded groundwater expressions contain contaminants as;
    - the *Australian and New Zealand guidelines for fresh and marine water quality* define total dissolved solids (salinity) as the measure of all inorganic salts dissolved in water (see section 4.3.3.5); and
    - the NGE was characterised by very high salinity; and
    - the FWDE was characterised by a low pH of 2.83, outside the pH range 6.5 to 8.5.
9. RTAY provided the department with a report titled *Investigation of dead vegetation north of the RTA Yarwun RMA* dated October 2014 (Report number 590404001561-1). The report found that multiple lines of evidence clearly show the death of the vegetation is a result of salt scalding from the groundwater expression in the area north of the RMA.
10. RTAY provided the department with a report titled *Groundwater Expression at the Rio Tinto Alcan RMA* dated 27 November 2014 (Report number 15188-1). The report found the following;
    - Groundwater expression in the vicinity of the north wall of the RMA was first observed in 2008 with effects on site including road damage and dead vegetation.
    - In 2013 it was observed that an area of dead vegetation and standing water appeared to the north of the RMA boundary, outside of the RTAY tenure.
    - The observed groundwater expression has likely been caused by elevated pressure in the foundation materials below the RMA.
11. Environmental harm as defined by section 14 of the *Environmental Protection Act 1994*, is any adverse effect, or potential adverse effect (whether temporary or permanent and whatever magnitude, duration or frequency) on an environmental value.
12. An environmental value, defined in section 9 of the *Environmental Protection Act 1994*, is a quality or physical characteristic of the environment that is conducive to ecological health.
13. The Queensland Government data set *Biodiversity status of pre-clearing and remnant regional ecosystems series* identifies vegetation at or immediately downstream of the NGE as including regional ecosystem (RE) 11.3.4 - *Eucalyptus tereticornis* and/or Eucalyptus spp. woodland on alluvial plains with VMA class Of Concern.
14. The Of Concern RE 11.3.4 is considered a physical characteristic of the environment that is conducive to ecological health and so is an environmental value under section 9 of the *Environmental Protection Act 1994*.
15. Desktop analysis by the department using available mapping tools indicates that the some of the dead or damaged vegetation is likely RE 11.3.4.

16. The death and damage to the RE 11.3.4 and other surrounding vegetation, is considered environmental harm under section 14 of the *Environmental Protection Act 1994*.
17. A report submitted to the department by RTAY in late 2014, which was prepared by Red Earth Engineering, for the purpose of proposing temporary mitigation options, identified a number of small watercourses which run through the groundwater expression area, with the overall drainage flowing to the north-west in to Larcom Creek.
18. Larcom Creek is included in the *Curtis Island, Calliope River and Boyne River Basins Environmental Values and Water Quality Objectives*, under the *Environmental Protection (Water) Policy 2009*, which lists environmental values by waterway and states the following environmental values are applicable to Larcom Creek;
    - Aquatic ecosystems;
    - Irrigation Farm supply/use;
    - Stock water;
    - Aquaculture;
    - Human consumer;
    - Primary recreation;
    - Secondary recreation;
    - Visual recreation;
    - Drinking water;
    - Industrial use; and
    - Cultural and spiritual values.
19. In the absence of intervention by RTAY, during a rainfall event it is likely that the contaminated ponded water at the NGE and FWDE will migrate to Larcom Creek via the two ephemeral drainage channels which run through the groundwater expression areas. Such a discharge is likely to cause environmental harm to environmental values listed in the Curtis Island, Calliope River and Boyne River Basins Environmental Values and Water Quality Objective.
20. In late 2014 RTAY submitted to the department, a conceptual design for the construction a temporary levee to capture contaminated water accumulated during 24hr 60mm rainfall events as the initial mitigation option to minimise environmental harm while a more permanent solution was investigated.
21. On 26 February 2015, an alternative and preferred mitigation proposal was provided to the department for an extensive channel collection system designed to collect and pump back contaminated stormwater run-off from the groundwater expression areas during low intensity rain events.
22. In order to minimise environmental harm, RTAY confirmed on 24 March 2015 that the first short-term mitigation actions had been undertaken, which involved;
    - the construction of a system comprised of a trench, sump, pipelines and pump, being implemented to collect and transport ponded groundwater at the NGE to the RMA; and
    - the pumping of ponded groundwater from the FWDE to the RMA.

B. Requirements

The report on the environmental investigation must address the following relevant matters:

1. Identify all possible groundwater expressions associated with the Residue Management Area in addition to the already identified Northern Groundwater Expression and Firewater Dams Expression.
2. Identify the source, cause and extent of groundwater expressions associated with the Residue Management Area.
3. Characterise the chemical composition of the groundwater expression water and, with reference to Australia and New Zealand Environment Conservation Council and the Queensland Water Quality Guidelines, identify aspects of the water chemistry that have the potential to cause environmental harm in the receiving environment.
4. Determine the geographical extent of actual and potential contamination in the receiving environment. The investigation must include, but should not necessarily be limited to the following:
    a. identification of the relevant environmental values;
    b. conceptual models that delineate the geographical extent of the actual and potential contamination;
    c. assessments of the impacts on:
        i. water quality for surface and groundwaters including shallow water aquifers on and off the RTAY tenements;
        ii. sediment quality;
        iii. soils;
        iv. flora and fauna;
    d. a comparison and review of previous relevant studies undertaken;
    e. a comparison to valid reference sites.
5. Assessments must be carried out be in accordance with the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) and AusRivas methodology and / or alternative methods where these are justified on the grounds that the alternative methods will provide a relevant and reliable assessment;
6. Based on the investigations undertaken under requirements 1 to 5, determine and report on all available remediation and rehabilitation options, including costs, and detail remedial works required to prevent contaminated water being discharge to the receiving environment and to rehabilitate impacted environmental values. Remediation and rehabilitation options must ensure ongoing protection of the environmental values of the receiving environment.
7. From the options provided in requirement 6 nominate a preferred solution and provide a timetable for implementation of the necessary remedial and rehabilitative works.

The environmental investigation must be carried out, and the environmental report prepared, by a suitably qualified person.

A suitably qualified person is defined as a person who has professional qualifications, training, skills or experience relevant to the nominated subject matter, and can give authoritative assessment, advice and analysis using relative relevant protocols, standards, methods or literature.

The environmental report must be submitted to the department on or before:

- 4:00pm 14 October 2015.

As the recipient of this notice, you are also required to provide a statutory declaration in the form attached, to accompany the environmental report submitted to the department. The suitably qualified person who prepares the environmental report must also provide a statutory declaration in the form attached to accompany the environmental report submitted to the department.

You can view an electronic version of the statutory declaration for a recipient using the following search term (EM494).[1]

An electronic version of the statutory declaration for a suitably qualified person form is available using the search term (EM471).

Take notice:

1. the requirements of the notice to conduct or commission an environmental investigation take effect immediately upon service of this notice;
2. this notice remains in force until further notice from the department; and
3. you are responsible for meeting the costs of conducting or commissioning the environmental evaluation, preparing the environmental report and providing any further information as requested by the department.

C. Reviews and appeals

The provisions regarding reviews of decisions and appeals are found in sections 519 to 539 of the Act.

A person who is dissatisfied with certain decisions of the department, may be able to apply to have the department review that original decision.

Generally, a request to have a decision reviewed must be made:

- within 10 business days of the decision being notified to the person;
- be supported by enough information to enable the department to decide the application for review; and
- be made using the application for review of an original decision form (EM709).

Where an application has been made for a decision to be reviewed, the applicant may also apply to the relevant court for a stay of the decision to secure the effectiveness of the review.

Once the original decision has been reviewed, a person who is dissatisfied with the review decision may be able to appeal against that decision to the relevant court within 22 business days after receiving notice of the review decision.

A person whose interests are or would be adversely affected by a decision of the department may also be able to request a statement of reasons for a decision or a statutory order review under the *Judicial Review Act 1991*.

For further information about reviews and appeals see the:

1. Information sheet - internal review and appeal to the Planning and Environment Court (EM1866).
2. Information sheet - internal review and appeal to the Land Court (EM1157).

You may have other legal rights or obligations and should seek your own legal advice.

[1] This is the publication number. The publication number can be used as a search term to find the latest version of a publication at <www.ehp.qld.gov.au>.

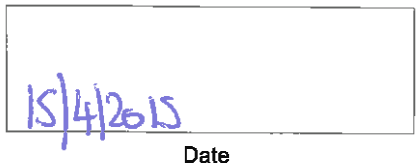
D. Penalty

Failure to comply with a notice to conduct or commission an environmental evaluation is an offence.

1. The maximum penalty for an individual is 300 penalty units, totalling $34,155.
2. The maximum penalty for a corporation is 1500 penalty units, totalling $170,775.

Should you have any queries in relation to this notice, please contact David Love of the department on telephone number (07) 4971 6508.

Signature



Date

Hamish Butler
A/Compliance Manager
Delegate of the Chief Executive
Department of Environment and Heritage Protection
Environmental Protection Act 1994

Enquiries:
PO Box 7230
CAIRNS QLD 4870
Ph: (07) 4222 5334
Email: ESCairns@ehp.qld.gov.au

Statutory Declaration

Environmental Protection Act 1994

Environmental Evaluation

Suitably qualified person

A Statutory Declaration is a written statement of facts that is sworn or declared under the Oaths Act 1867. This Statutory Declaration must be completed by the person who conducted the environmental evaluation and accompany the environmental report submitted to the Department of Environment and Heritage Protection (the department).

Oaths Act 1867

QUEENSLAND
TO WIT

I _____

Insert the name of the person making this declaration

of _____

Insert the street address of the person making this declaration

_____

in the State of Queensland do solemnly and sincerely declare that:

- I am the suitably qualified person and author of an environmental report entitled

_____

Insert title of the environmental report

In accordance with the environmental evaluation issued by the department under the Act to:

_____ _____

Insert name of recipient of the notice — Insert date of the notice

A copy of my report is attached to this statutory declaration and marked "A".

I possess the following qualifications and experience relevant to this environmental evaluation:

_____

I have not knowingly included any false, misleading or incomplete information in the report; and

I have not knowingly failed to reveal any relevant information or document to the department.

ABN 46 640 294 485

I certify that:

- The report addresses the relevant matters for the evaluation and is factually correct; and
- The opinions expressed in it are honestly and reasonably held.

I make this solemn declaration conscientiously believing the same to be true, and by virtue of the *Oaths Act 1867*.

Taken and declared before me, at _____
Insert location

this _____ day of _____ in the year _____
Insert day (e.g. 18th) Insert month Insert year

Signed

(Person making this declaration)

Signed

<INSERT Justice of the Peace / Commissioner for Declarations / Lawyer>

Printed name and registration number (if applicable)

Statutory Declaration

Environmental Protection Act 1994

Environmental Evaluation

Recipient

A Statutory Declaration is a written statement of facts that is sworn or declared under the Oaths Act 1867. In accordance with section 326E of the Environmental Protection Act 1994 (the Act), this Statutory Declaration must be completed by the recipient of an environmental evaluation notice and must accompany the environmental report submitted to the Department of Environment and Heritage Protection (the department).

Oaths Act 1867
QUEENSLAND
TO WIT

I _____

Insert the name of the person making this declaration

of _____

Insert the street address of the person making this declaration

_____

in the State of Queensland do solemnly and sincerely declare that in accordance with section 326E of the *Environmental Protection Act 1994* (the Act), I have:

- not knowingly given any false or misleading information; and
- given all relevant information

to the person who carried out the environmental evaluation, over the period:

_____ to _____

Insert start date — Insert end date

for the purpose of submitting a report in accordance with the environmental evaluation notice issued by the department under the Act to:

_____ _____

Insert name of recipient of the notice — Insert date of the notice

ABN 46 640 294 485

A copy of the report is attached to this statutory declaration and marked "A".

I make this solemn declaration conscientiously believing the same to be true, and by virtue of the *Oaths Act 1867*.

Taken and declared before me, at _____
Insert location

this _____ day of _____ in the year _____
Insert day (e.g. 18th) Insert month Insert year

_____ Signed
(Person making this declaration)

_____ Signed
<INSERT Justice of the Peace / Commissioner for Declarations / Lawyer>

_____
Printed name and registration number (if applicable)

Information sheet

Environmental Protection Act 1994

Internal review and appeal to Land Court

This information sheet forms part of an information notice under the Environmental Protection Act 1994. *It gives a summary of the process for review and appeal under the Environmental Protection Act and subordinate legislation. Refer to ss. 519 to 530 and Part 1 of Schedule 2 of the Environmental Protection Act for complete information about the process for internal review and appeal to the Land Court.*

Introduction

The *Environmental Protection Act 1994* (EP Act) provides for a right of internal review of certain decisions made under the EP Act. Decisions that can be reviewed are listed in Schedule 2 of the EP Act. The EP Act also provides that a dissatisfied person for a review decision listed in Part 1 of Schedule 2 of the EP Act may appeal against the original decision or the review decision to the Land Court.

Summary of the process for internal review and appeal to the Land Court

Chapter 11, Part 3 of the EP Act

Division 1—Interpretation

Section 519 Original decisions

1) A decision mentioned in schedule 2 is an 'original decision'.
2) A decision under an environmental protection policy or regulation that the policy or regulation declares to be a decision to which this part applies is also an original decision.

Section 520 Dissatisfied person

This section nominates the dissatisfied person for an original or review decision.

Division 2—Internal review of decisions

Section 521 Procedure for review

1) A dissatisfied person may apply for a review of an original decision.
2) The application must—
   a) be made in the approved form to the administering authority within—
      i) 10 business days[1] after the day on which the person receives notice of the original decision or the administering authority is taken to have made the decision (the 'review date'); or
      ii) the longer period the authority in special circumstances allows; and
   b) be supported by enough information to enable the authority to decide the application.
3) On or before making the application, the applicant must send the following documents to the other persons who were given notice of the original decision—
   a) notice of the application (the 'review notice');

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b) a copy of the application and supporting documents.

4) The review notice must inform the recipient that submission on the application may be made to the administering authority within 5 business days after the application is made to the authority.

5) If the administering authority is satisfied the applicant has complied with subsections (2) and (3), the authority must, within 10 business days after receiving the application—

a) review the original decision;

b) consider any submissions properly made by a recipient of the review notice; and

c) make a decision (the 'review decision') to—

i) confirm or revoke the original decision; or

ii) vary the original decision in a way the administering authority considers appropriate.

6) The application does not stay (i.e. suspend or stop) the original decision.

7) The application must not be dealt with by—

a) the person who made the original decision; or

b) a person in a less senior office than the person who made the original decision.

8) Within 10 business days after making the review decision, the administering authority must give written notice of the decision to the applicant and persons who were given notice of the original decision.

9) The notice must—

a) include the reasons for the review decision; and

b) inform the person of their right of appeal against the decision.

10) If the administering authority does not comply with subsection (5) or (8), the authority is taken to have made a decision confirming the original decision.

11) Subsection (7) applies despite the *Acts Interpretation Act 1954*, s. 27A.

12) This section does not apply to an original decision made by—

a) for a matter, the administration and enforcement of which has been devolved to a local government—the local government itself or the chief executive officer of the local government personally; or

b) for another matter—the chief executive personally.

13) Also, this section does not apply to an original decision to issue a clean-up notice.

Section 522 Stay of operation of particular original decisions

1) If an application is made for review of an original decision mentioned in schedule 2, part 1 or 2, the applicant may immediately apply for a stay of the decision to—

a) for an original decision mentioned in schedule 2, part 1—the Land Court; or

b) for an original decision mentioned in schedule 2, part 2—the Court.

2) The Land Court or the Court may stay the decision to secure the effectiveness of the review and any later appeal to the Land Court or the Court.

3) A stay may be given on conditions the Land Court or the Court considers appropriate and has effect for the period stated by the Land Court or the Court.

4) The period of a stay must not extend past the time when the administering authority reviews the decision and any later period the Land Court or the Court allows the applicant to enable the applicant to appeal against the review decision.

Division 3—Appeals

Subdivision 1—Appeals to Land Court

Section 523 Review decisions subject to Land Court appeal

This subdivision applies to original decisions mentioned in Schedule 2, Part 1 of the EP Act.

Section 524 Right of appeal

A dissatisfied person who is dissatisfied with the decision may appeal against the decision to the Land Court.

Section 525 Appeal period

1) The appeal must be started within 22 business days after the appellant receives notice of the decision.

2) However, the Land Court may at any time extend the time for starting the appeal.

Section 526 Land Court mediation

1) Any party to the appeal may, at any time before the appeal is decided, ask the Land Court to conduct or provide mediation for the appeal.

2) The mediation must be conducted by the Land Court or a mediator chosen by the Land Court[2].

Section 527 Nature of appeal

The appeal is by way of rehearing, unaffected by the review decision.

Section 528 Land Court's powers for appeal

In deciding the appeal, the Land Court has the same powers as the administering authority.

Section 529 Decision for appeals against refusals under s. 207

1) This section applies if the decision appealed against is a decision under s. 207 to refuse to allow an application for environmental authority (mining lease) to proceed.

2) In deciding the appeal the Land Court must confirm the decision or allow the appeal.

3) If the appeal is allowed—

   a) the relevant period for the administering authority to make the decision is taken to have been extended to when the decision on the appeal is made; and

   b) the authority is taken, at the end of the period, not to have made the decision.

Section 530 Decision for other appeals

1) This section applies if the decision appealed against is not a decision mentioned in s. 529(1).

2) In deciding the appeal, the Land Court may—

   a) confirm the decision;

   b) set aside the decision and substitute another decision; or

c) set aside the decision and return the matter to the administering authority who made the decision, with directions the Land Court considers appropriate.

3) In setting aside or substituting the decision, the Land Court has the same powers as the authority.

4) However, this part does not apply to a power exercised under subsection (3).

5) If the Land Court substitutes another decision, the substituted decision is taken for this Act, other than this subdivision, to be the authority's decision.

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[1] Under the *Environmental Protection Act 1994* business days—'generally, does not include a day between 26 December and 1 January in the following year'.

[2] For information on how to start the appeal, see the *Land and Court Rules 2000*. For information on the conduct of the mediation, see the *Land Court Act 2000*. Information is also available on the Land Court website at <www.landcourt.qld.gov.au>.

Information sheet

Environmental Protection Act 1994

Internal review and appeal to Planning and Environment Court

This information sheet forms part of an information notice under the Environmental Protection Act 1994. *It gives a summary of the process for review and appeal to the Planning and Environment Court under the Environmental Protection Act and subordinate legislation. Refer to ss. 519 - 539 and schedule 2 of the Environmental Protection Act for complete information about the process for internal review and appeal to the Planning and Environment Court.*

Introduction

The *Environmental Protection Act 1994* (EP Act) provides for a right of internal review and appeal against certain decisions made under the EP Act. Decisions that can be reviewed or appealed are listed in schedule 2 of the EP Act and within certain sections of the regulations and subordinate legislation[1] made under the EP Act. The EP Act also provides that a dissatisfied person for a review decision, other than those listed in part 1 of schedule 2 of the EP Act[2], may appeal the decision to the Planning and Environment Court (the Court).

Summary of the process for internal review and appeal to the Court

Chapter 11, Part 3 of the EP Act

Division 1 — Interpretation

Section 519 Original decisions

1) A decision mentioned in schedule 2 is an 'original decision'.
2) A decision under an environmental protection policy or regulation that the policy or regulation declares to be a decision to which this part applies is also an 'original decision'.

Section 520 Dissatisfied person

This section nominates the dissatisfied person for an original or review decision.

Division 2 — Internal review of decisions

Section 521 Procedure for review

1) A dissatisfied person may apply for a review of an original decision.
2) The application must—
   a) be made in the approved form to the administering authority within—
      i) 10 business days[3] after the day on which the person receives notice of the original decision or the administering authority is taken to have made the decision (the 'review date'); or
      ii) the longer period the authority in special circumstances allows ; and
   b) be supported by enough information to enable the authority to decide the application.
3) On or before making the application, the applicant must send the following documents to the other persons who were given notice of the original decision—

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a) notice of the application (the 'review notice');

b) a copy of the application and supporting documents.

4) The review notice must inform the recipient that submission on the application may be made to the administering authority within five business days after the application is made to the authority.

5) If the administering authority is satisfied the applicant has complied with subsection (2) and (3), the authority must, within 10 business days after receiving the application—

a) review the original decision;

b) consider any submissions properly made by a recipient of the review notice; and

c) make a decision (the 'review decision') to—

i) confirm or revoke the original decision; or

ii) vary the original decision in a way the administering authority considers appropriate.

6) The application does not stay the original decision.

7) The application must not be dealt with by—

a) the person who made the original decision; or

b) a person in a less senior office than the person who made the original decision.

8) Within 10 business days after making the review decision, the administering authority must give written notice of the decision to the applicant and persons who were given notice of the original decision.

9) The notice must—

a) include the reasons for the review decision; and

b) inform the person of their right of appeal against the decision.

10) If the administering authority does not comply with subsections (5) or (8), the authority is taken to have made a decision confirming the original decision.

11) Subsection (7) applies despite the *Acts Interpretation Act 1954*, section 27A.

12) This section does not apply to an original decision made by—

a) for a matter, the administration and enforcement of which has been devolved to a local government, the local government itself or the chief executive officer of the local government personally; or

b) for another matter — the chief executive personally.

13) Also, this section does not apply to an original decision to issue a clean-up notice.

Section 522 Stay of operation of original decisions

1) If an application is made for review of an original decision, the applicant may immediately apply for a stay of the decision to—

a) for an original decision mentioned in schedule 2, part 1—the Land Court; or

b) for an original decision mentioned in schedule 2, part 2—the Court.

2) The Land Court or the Court may stay the decision to secure the effectiveness of the review and any later appeal to the Land Court or the Court.

3) A stay may be given on conditions the Land Court or the Court considers appropriate and has effect for the period stated by the Land Court or the Court.

4) The period of a stay must not extend past the time when the administering authority reviews the decision and any later period the Land Court or the Court allows the applicant to enable the applicant to appeal against the review decision.

Division 4 — Appeals to Court

Section 531 Who may appeal

1) A dissatisfied person who is dissatisfied with a review decision, other than a review decision to which subdivision 1[4] applies, may appeal against the decision to the Court.

2) The chief executive may appeal against another administering authority's decision (whether an original or review decision) to the Court.

3) A dissatisfied person who is dissatisfied with an original decision to which s. 521 does not apply may appeal against the decision to the Court.

Section 532 How to start appeal

1) An appeal is started by—

   a) filing written notice of appeal with the registrar of the Court; and

   b) complying with rules of court applicable to the appeal.

2) The notice of appeal must be filed—

   a) if the appellant is the chief executive—within 33 business days after the decision is made or taken to have been made; or

   b) if the appellant is not the chief executive—within 22 business days after the day the appellant receives notice of the decision or the decision is taken to have been made.

3) The Court may at any time extend the period for filing the notice of appeal.

4) The notice of appeal must state fully the grounds of the appeal and the facts relied on.

Section 533 Appellant to give notice of appeal to other parties

1) Within 8 business days after filing the notice of appeal, the appellant must serve notice of the appeal on—

   a) if the appellant is the chief executive—all persons who were given notice of the original decision; or

   b) if the appellant is not the chief executive—the other persons who were given notice of the original decision.

2) The notice must inform the persons that, within 10 business days after service of the notice of appeal, they may elect to become a respondent to the appeal by filing in the Court a notice of election under rules of court.

Section 534 Persons may elect to become respondents to appeal

A person who properly files in the Court a notice of election becomes a respondent to the appeal.

Section 535 Stay of operation of decisions

1) The Court may grant a stay of a decision appealed against to secure the effectiveness of the appeal.

2) A stay may be granted on conditions the Court considers appropriate and has effect for the period stated by the Court.

3) The period of a stay must not extend past the time when the Court decides the appeal.

4) An appeal against a decision does not affect the operation or carrying out of the decision unless the decision is stayed.

Section 535A Stay of decision to issue a clean-up notice

5) This section applies to an application under section 535 for a stay of a decision to issue a clean-up notice.

6) In deciding the application, the Court must have regard to—

   a) the quantity and quality of contamination of the environment that is likely to be caused if the stay is granted; and

   b) the proximity of the place at or from which the contamination incident is happening or happened to a place with environmental values that may be adversely affected by the contamination.

Section 536 Hearing procedures

1) The procedure for an appeal is to be in accordance with the rules of court applicable to the appeal or, if the rules make no provision or insufficient provision, in accordance with directions of the judge.

2) An appeal is by way of rehearing, unaffected by the administering authority's decision.

Section 537 Assessors

If the judge hearing an appeal is satisfied the appeal involves a question of special knowledge and skill, the judge may appoint one or more assessors to help the judge in deciding the appeal.

Section 538 Appeals may be heard with planning appeals

1) This section applies if—

   a) a person appeals against an administering authority's decision (whether an original or review decision) to refuse to grant a registration certificate or to accredit an environmental risk management plan (ERMP); and

   b) a person appeals against the assessment manager's decision under the *Sustainable Planning Act 2009* about a planning or development matter for the premises to which the certificate or the ERMP or the application for the certificate relates.

2) On the application of a party to either of the appeals, the Court may order—

   a) the appeals to be heard together or one immediately after the other; or

   b) one appeal to be stayed until the other has been decided.

3) The application may be made—

   a) by an appellant when starting an appeal or at any time before the appeals are decided; or

   b) by another party at any time before the appeals are decided.

4) This section applies even though the parties, or all of the parties, to the appeals are not the same.

Section 539 Powers of Court on appeal

1) In deciding an appeal, the Court may—

a) confirm the decision appealed against; or

b) vary the decision appealed against; or

c) set aside the decision appealed against and make a decision in substitution for the decision set aside.

2) If on appeal the Court acts under subsection (1)(b) or (c), the decision is taken, for this Act (other than this part), to be that of the administering authority.

Further information

The latest version of this publication can be found at <www.ehp.qld.gov.au>. Note: where available, the publication number (e.g. EM1866 for this document) can be used as a search term.

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[1] The original decisions under the subordinate legislation are subject to change. As at 11 May 2010 they are listed in:

- Regulation 110 of the Environmental Protection Regulation 2008; and
- Regulation 68C of the Environmental Protection (Waste Management) Regulation 2000.

[2] An appeal may be made to the Land Court for original decisions in part 1 of schedule 2.

[3] Under the *Environmental Protection Act 1994* "business days does not include a business day between 26 December and 1 January in the following year".

[4] Subdivision 1 is about appeals to the Land Court and information about this is contained in ss. 519 - 539.

Notice

Environmental Protection Act 1994

Environmental Protection Order

This environmental protection order is issued by the administering authority pursuant to section 358 of the Environmental Protection Act 1994.

RTA Yarwun Pty Ltd
123 Albert Street
BRISBANE QLD 4000

Your reference: EPPR00926513

Our reference: 101/0006008|n4743187|CA34297

19 August 2016

Dear Mr McGibbon

Take notice: that under the *Environmental Protection Act 1994* (the Act) this environmental protection order (EPO) is issued to RTAY Yarwun Pty Ltd (you) by the administering authority. The administering authority is the Chief Executive of the Department of Environment and Heritage Protection (the department).

The EPO is issued in respect to the activities of RTAY Yarwun Pty Ltd at 975 Hanson Road, Yarwun, QLD, 4680 on land described as Lot 1 SP144430 (the premises).

A. Grounds

This EPO is issued on the following grounds:

- The administering authority is satisfied, because of an environmental evaluation conducted by the person, unlawful environmental harm is being, or is likely to be, caused.

The facts and circumstances forming the basis for these grounds are:

- RTA Yarwun Pty Ltd (RTAY) is permitted to undertake ERA 60 Waste Disposal, in order to dispose of residue from the process of alumina refining at the premises. The residue is disposed of in a tailings dam in the area known as the Residue Management Area (RMA).
- RTAY observed two areas of groundwater expression in 2013:
    - An area to the north of the RMA boundary, outside of the RTAY tenure, called the Northern Groundwater Expression (NGE).
    - An area to the northeast of the RMA boundary, on the RTAY tenure and within a car park and fire water dams, called the Fire Water Dam Expression (FWDE).

ABN 46 640 294 485

- At a meeting on 26 August 2014 RTAY informed the department of the two groundwater expressions first observed in 2013 to the north and northeast of the RMA; the NGE and the FWDE.
- Departmental officers inspected the NGE on Friday 5 September 2014 and observed an area with water ponding on the surface of the land surrounded by approximately 7ha (as estimated by RTAY) of dead vegetation. Departmental officers undertook water quality sampling of the ponded water at the NGE and results found high salinity (53.8 mS/cm).
- RTA Yarwun Pty Ltd provided (the department) with a report titled Investigation of dead vegetation north of the RTA Yarwun RMA dated October 2014 (Report number 590404001561-1). The report found that multiple lines of evidence clearly show the death of the vegetation is a result of salt scalding from the naturally saline groundwater expression in the area north of the RMA. The report found that decant water from the RMA was not present in the groundwater expressed in the impacted area.
- The department issued an Environmental Evaluation (EE) Notice to RTA Yarwun Pty Ltd on 15 April 2015. The EE broadly required the source, cause and extent of groundwater expressions associated with the residue management area to be investigated.
- RTA Yarwun Pty Ltd submitted an EE Report to the department on 14 October 2015.
- The EE Report identified the likely cause of the groundwater expressions as groundwater pressure in the foundation materials beneath the RMA and progressive mounding of underlying naturally saline groundwater within the foundation materials beneath the RMA. The increased downward pressure of the tailings is thought to be compressing the natural ground underlying the RMA. A comparison of the chemical signatures of water from toe drains, various piezometers, the Firewater dam and RMA decant water was undertaken in addition to geophysical surveying. All seepage, piezometer and dam water samples were found to be groundwater and not seepage from the RMA.
- The Report also indicates the location of the RMA dam in the valley floor is potentially limiting the movement of groundwater from the topographic high in the east, resulting in increased pressures in the vicinity of the dam.
- The EE Report identified both groundcover and tree vegetation within and close to the site is being impacted by expressed saline groundwater. As a result of the expressed groundwater salt scalding has occurred in this area. Sump EC concentrations fluctuated between 20,000 and 50,000 µS/cm over the period December 2014-August 2015.
- The Queensland Government data set Biodiversity status of pre-clearing and remnant regional ecosystems series identifies vegetation at or immediately downstream of the groundwater expression as remnant vegetation containing Of Concern regional ecosystems (RE) 11.3.
- Environmental harm as defined by section 14 of the Environmental Protection Act 1994 is any adverse effect, or potential adverse effect (whether temporary or permanent and whatever magnitude, duration or frequency) on an environmental value.
- An environmental value, defined in section 9 of the Environmental Protection Act 1994 is a quality or physical characteristic of the environment that is conducive to ecological health or public amenity or safety.
- The Of Concern regional ecosystem is considered to be a physical characteristic of the environment that is conducive to ecological health and therefore is an environmental value under section 9 of the Environmental Protection Act 1994.
- Based on the EE Report provided by RTA Yarwun Pty Ltd and observations made by departmental officers, the department is of the opinion that the operation of the RMA has caused and is likely to

continue to cause unlawful environmental harm. The department acknowledges the efforts RTAY have made to mitigate the environmental impact(s) of the groundwater expression via the implementation of the short term management strategy (STMS).

B. Requirements

In accordance with this EPO, you are required to do the following:

1. RTAY must develop and implement a Long Term Management Strategy (LTMS):

    a. By 22 December 2016, you must develop and provide the department with a copy of the pre-feasibility study for an appropriate LTMS to relieve the observed groundwater pressures and to prevent saline groundwater expression.
    b. By 30 May 2018, you must develop and provide the department with a copy of the feasibility study for an appropriate LTMS.
    c. You must implement the LTMS as soon as practically possible after the completion of the feasibility study to ensure sufficient data is available to determine the success of the LTMS.

    Any planned expansion of the Residue Management Area must be taken into consideration when planning for the LTMS to ensure management options are sufficient to prevent expression of groundwater.

2. By 1 November 2016, you must prepare and implement a groundwater-monitoring program to obtain long-term data of event and base flows over several wet seasons to assess the effectiveness of the LTMS.

    The groundwater-monitoring program must be developed by an appropriately qualified person in the fields of hydrogeology and groundwater sampling design.

3. Annually from commencement of the EPO, a groundwater monitoring report must be submitted to the administering authority ensuring that one full wet season (November – April) of data is captured in each report.

    The report must include but is not limited to:

    - Details of the monitoring undertaken, including details of the sampling framework applied;
    - Details of the groundwater analysis undertaken and quality assurance and quality control measures applied;
    - A summary of the monitoring results obtained; and
    - An interpretation, evaluation and explanation of the results by an appropriately qualified person in the field of water quality monitoring and assessment with determinations made as to the nature and extent of any environmental impact on the receiving environment and the success of the LTMS.

4. You must develop and submit to the administering authority a rehabilitation feasibility study for the impacted area (Lot 68 SP272417, Lot 8 SP245936, Lot 7 SP177782). The feasibility study is to be submitted at same time of requirement 1 (b) 30 May 2016. The feasibility study must be completed by a suitably qualified person.

    RTAY must submit a copy of the rehabilitation feasibility study to the administering authority and implement if deemed suitable by the department.

    RTAY must consider:

- The likely success of re-establishing a viable plant community; and
- The alternative of securing a biodiversity offset.
- Planned operational land use of the impacted area.

5. You must notify the administering authority as soon as practically possible of becoming aware of any monitoring result that indicates the presence of decant water from the RMA in groundwater and/or surface water.

6. By 1 November 2016, you must prepare and implement a surface water-monitoring program to assess the effectiveness of the implemented LTMS at preventing the contamination of receiving waters from saline groundwater expressions.

   The surface water-monitoring program must be developed by an appropriately qualified person and must include but is not limited to:

   - Monitoring of surface water quality must include but not limited to the following parameters:
     - Insitu monitoring pH, temperature, dissolved oxygen, electrical conductivity.
     - Laboratory analysed (NATA accredited) samples for major ions and metals (dissolved and total).
   - Sampling must include the following locations:
     - Site(s) immediately downstream of the saline groundwater expression area;
     - Upstream reference site(s);
   - Downstream monitoring site(s) that are representative of;
     - All downstream watercourses; and
     - All downstream water types, such as swamps, freshwater streams and estuaries.
   - Sampling must be undertaken monthly and within 48 hours of a heavy rainfall event (heavy rainfall event is defined as >35mm in 24 hours).
   - Review of the surface water monitoring results to ensure early detection of decant signatures in surface water.

7. From commencement of the EPO, a surface water monitoring report must be submitted to the administering authority by 31st July each calendar year the EPO is in effect ensuring that one full wet season (November - April) of data is captured in each report.

   The report must include but is not limited to:

   - Details of the monitoring undertaken, including details of the sampling framework applied;
   - Details of the analysis undertaken and quality assurance and quality control measures applied;
   - The following statistics for each parameter at each sampling location:
     - 20th percentile;
     - Median or 50th percentile;
     - 80th percentile;
     - Mean, minimum and maximum.
   - A summary of the monitoring results obtained; and

- An interpretation, evaluation and explanation of the results by an appropriately qualified person in the field of water quality monitoring and assessment with determinations made as to the nature and extent of any environmental impact on the receiving environment from the saline ground water expression.

8. The EPO will remain in force for a period of three years. From 30 September 2016 to 30 September 2019.

C. Obligations

If you propose to dispose of the place or business to which the EPO relates, you **must** advise the buyer of the existence of this EPO.

If you cease to carry out the activity to which this EPO relates, you **must** give written notice of ceasing to carry out the activity to the department within 10 days of ceasing the activity.

Take notice:

1. the requirements of this order take effect immediately upon service of the order;
2. failure to comply with this order is an offence under the Act;
3. this order remains in force until further notice from the administering authority.

D. Penalty

Failure to comply with an EPO is an offence.

1. The maximum penalty for an individual for wilfully contravening an EPO is 6250 penalty units, totalling $761,875 or five years imprisonment.
2. The maximum penalty for a corporation for wilfully contravening an EPO is 31,250 penalty units, totalling $3,809,375.
3. The maximum penalty for an individual for contravening an EPO is 4500 penalty units, totalling $548,550
4. The maximum penalty for a corporation for contravening an EPO is 22,500 penalty units, totalling $2,742,750

Failure to provide written notice to the buyer is an offence.

1. The maximum penalty for an individual is 50 penalty units, totalling $6095.
2. The maximum penalty for a corporation is 250 penalty units, totalling $30,475.

Failure to provide written notice within 10 business days of ceasing the activity to the department is an offence.

3. The maximum penalty for an individual is 50 penalty units, totalling $6095.
4. The maximum penalty for a corporation is 250 penalty units, totalling $30,475.

Section 3 of the Penalties and Sentences Regulation 2015 prescribes the monetary value of a penalty unit.

E. Reviews and appeals

The provisions regarding review of decisions and appeals may be found in sections 519 to 539 of the Act.

A person who is dissatisfied with certain decisions of the department, may be able to apply to have the department review that original decision.

Generally, a request to have a decision reviewed must be made:

1. within 10 business days of the decision being notified to the person;
2. be supported by enough information to enable the department to decide the application for review; and
3. be made using the application for review of an original decision form (EM709).[1]

Where an application has been made for a decision to be reviewed, the applicant may also apply to the relevant court for a stay of the decision to secure the effectiveness of the review.

Once the original decision has been reviewed, a person who is dissatisfied with the review decision may be able appeal against that decision to the relevant court within 22 business days after receiving notice of the review decision.

A person whose interests are or would be adversely affected by a decision of the department may also be able to request a statement of reasons for a decision or a statutory order review under the *Judicial Review Act 1991.*

For further information about reviews and appeals see the information sheet - internal review and appeal to the Planning and Environment Court (EM1866). You may have other legal rights or obligations and should seek your own legal advice.

Should you have any queries in relation to the notice, please contact David Love on telephone number 49716508

Signature

19/9/16

Date

Rebecca Booker

Compliance Manager, Minerals

Delegate of the Chief Executive

Department of Environment and Heritage Protection

Environmental Protection Act 1994

Enquiries:

PO Box 5065 GLADSTONE QLD 4650

Ph: (07) 49716512

Email: cwes_glastone@ehp.qld.gov.au

[1] This is the publication number. The publication number can be used as a search term to find the latest version of a publication at <www.ehp.qld.gov.au>.

Environmental Management Register Search Results

Department of Environment and Science (DES)
ABN 46 640 294 485
400 George St Brisbane, Queensland 4000
GPO Box 2454, Brisbane QLD 4001, AUSTRALIA
www.des.qld.gov.au

SEARCH RESPONSE
ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Shannon Brown
L-13 The Rocket 203 Robina Town Centre Drive
Robina QLD 4226

Transaction ID: 50737495 EMR Site Id: 42557 17 November 2021
Client Reference:
Cheque Number:

This response relates to a search request received for the site:
Lot: 91 Plan: SP122250

EMR RESULT

The above site IS included on the Environmental Management Register.

The site you have searched has been subdivided from the following site, which IS included on the EMR or the CLR.

Lot: 1 Plan: RP601330
Address: BUTLER STREET
YARWUN QLD 4680

The site has been subject to the following Notifiable Activity or Hazardous Contaminant.
RAILWAY YARDS - operating a railway yard including goods-handling yards, workshops and maintenance areas.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

All search responses include particulars of land listed in the EMR/CLR when the search was generated.
The EMR/CLR does NOT include:-

1. land which is contaminated land (or a complete list of contamination) if DES has not been notified
2. land on which a notifiable activity is being or has been undertaken (or a complete list of activities) if DES has not been notified

If you have any queries in relation to this search please phone 13QGOV (13 74 68)

Administering Authority

Department of Environment and Science (DES)
ABN 46 640 294 485
400 George St Brisbane, Queensland 4000
GPO Box 2454, Brisbane QLD 4001, AUSTRALIA
www.des.qld.gov.au

SEARCH RESPONSE
ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Shannon Brown
L-13 The Rocket 203 Robina Town Centre Drive
Robina QLD 4226

Transaction ID: 50737494 EMR Site Id: 53125 17 November 2021
Client Reference:
Cheque Number:

This response relates to a search request received for the site:
Lot: 101 Plan: DS185

EMR RESULT

The above site IS included on the Environmental Management Register.
Lot: 101 Plan: DS185
Address: TOONDA/PT ALMA ROAD
ULAM (R) 4702

The site has been subject to the following Notifiable Activity or Hazardous Contaminant.
WASTE STORAGE, TREATMENT OR DISPOSAL - storing, treating, reprocessing or disposing of regulated waste (other than at the place it is generated), including operating a nightsoil disposal site or sewage treatment plant where the site or plant has a design capacity that is more than the equivalent of 50, 000 persons having sludge drying beds or on-site disposal facilities.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

All search responses include particulars of land listed in the EMR/CLR when the search was generated.
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SEARCH RESPONSE
ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Shannon Brown
L-13 The Rocket 203 Robina Town Centre Drive
Robina QLD 4226

Transaction ID: 50737493 EMR Site Id: 20783 17 November 2021
Client Reference:
Cheque Number:

This response relates to a search request received for the site:
Lot: 1 Plan: RP911260

EMR RESULT

The above site IS included on the Environmental Management Register.

The site you have searched has been subdivided from the following site, which IS included on the EMR or the CLR.

Lot: 1 Plan: RP618672
Address: BOAT CREEK ROAD
YARWUN QLD 4694

The site has been subject to the following Notifiable Activity or Hazardous Contaminant.
LANDFILL - disposing of waste (excluding inert construction and demolition waste).

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

All search responses include particulars of land listed in the EMR/CLR when the search was generated.
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2. land on which a notifiable activity is being or has been undertaken (or a complete list of activities) if DES has not been notified

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SEARCH RESPONSE
ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Shannon Brown
L-13 The Rocket 203 Robina Town Centre Drive
Robina QLD 4226

Transaction ID: 50737492 EMR Site Id: 37992 17 November 2021
Client Reference:
Cheque Number:

This response relates to a search request received for the site:
Lot: 7 Plan: SP145439

EMR RESULT

The above site IS included on the Environmental Management Register.

The site you have searched has been subdivided from the following site, which IS included on the EMR or the CLR.

Lot: 3 Plan: CP860100
Address: MT. MILLER ROAD
NOT ADVISED 4680

The site has been subject to the following Notifiable Activity or Hazardous Contaminant.
GUN, PISTOL OR RIFLE RANGE - operating a gun, pistol or rifle range.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

All search responses include particulars of land listed in the EMR/CLR when the search was generated.
The EMR/CLR does NOT include:-

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If you have any queries in relation to this search please phone 13QGOV (13 74 68)

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SEARCH RESPONSE
ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Shannon Brown
L-13 The Rocket 203 Robina Town Centre Drive
Robina QLD 4226

Transaction ID: 50737491 EMR Site Id: 54061 17 November 2021
Cheque Number:
Client Reference:

This response relates to a search request received for the site:
Lot: 140 Plan: SP122252

EMR RESULT

The above site IS included on the Environmental Management Register.
Lot: 140 Plan: SP122252
Address: MOUNT LARCOM
MOUNT LARCOM 4680

The site has been subject to contamination from a hazardous contaminant as follows:
HAZARDOUS CONTAMINANT - This site has been subject to a hazardous contaminant. Refer to the summary given below.
Possible high arsenic levels along rail corridor.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

All search responses include particulars of land listed in the EMR/CLR when the search was generated.
The EMR/CLR does NOT include:-

1. land which is contaminated land (or a complete list of contamination) if DES has not been notified
2. land on which a notifiable activity is being or has been undertaken (or a complete list of activities) if DES has not been notified

If you have any queries in relation to this search please phone 13QGOV (13 74 68)

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SEARCH RESPONSE
ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Shannon Brown
L-13 The Rocket 203 Robina Town Centre Drive
Robina QLD 4226

Transaction ID: 50738834 EMR Site Id: 70683 23 November 2021
Client Reference:
Cheque Number:

This response relates to a search request received for the site:
Lot: 1 Plan: SP144430

EMR RESULT

The above site IS included on the Environmental Management Register.
Lot: 1 Plan: SP144430
Address: 293 MYLREA ROAD
ALDOGA QLD 4694

The site has been subject to the following Notifiable Activity or Hazardous Contaminant.

WASTE STORAGE, TREATMENT OR DISPOSAL - storing, treating, reprocessing or disposing of regulated waste (other than at the place it is generated), including operating a nightsoil disposal site or sewage treatment plant where the site or plant has a design capacity that is more than the equivalent of 50, 000 persons having sludge drying beds or on-site disposal facilities.

ABRASIVE BLASTING - carrying out abrasive blast cleaning (other than cleaning carried out in fully enclosed booths) or disposing of abrasive blasting material.

CHEMICAL MANUFACTURE OR FORMULATION - manufacturing, blending, mixing or formulating chemicals if -

(a) the chemicals are designated dangerous goods under the dangerous goods code; and
(b) the facility used to manufacture, blend, mix or formulate the chemicals has a design production capacity of more than 1 t per week.

CHEMICAL STORAGE - (other than petroleum products or oil under item 29) - storing more than 10 t of chemicals (other than compressed or liquefied gases) that are dangerous goods under the dangerous goods code.

COAL FIRED POWER STATION - operating a coal fired power station.

ELECTRICAL TRANSFORMERS - manufacturing, repairing or disposing of electrical transformers.

METAL TREATMENT OR COATING - treating or coating metal including, for example, anodising, galvanising, pickling, electroplating, heat treatment using cyanide compounds and spray painting using more than 5 L of paint per week (other than spray painting within a fully enclosed booth).

MINERAL PROCESSING - chemically or physically extracting or processing metalliferous ores.

While sites are listed on the EMR using the lot and plan description, a mining lease may affect only a limited area of the lot. In many instances with rural properties, only a small area may be potentially affected by the mining activities and the ongoing landuse is unaffected. More detailed information relating to the location of the mining activities may be held by the Department of Environment and Science or the Department of Natural Resources, Mines and Energy.

PETROLEUM PRODUCT OR OIL STORAGE - storing petroleum products or oil -
(a) in underground tanks with more than 200L capacity; or
(b) in above ground tanks with -
(i) for petroleum products or oil in class 3 in packaging groups 1 and 2 of the dangerous goods code - more than 2, 500L capacity; or
(ii) for petroleum products or oil in class 3 in packaging groups 3 of the dangerous goods code - more than 5, 000L capacity; or
(iii) for petroleum products that are combustible liquids in class C1 or C2 in Australian Standard AS1940, 'The storage and handling of flammable and combustible liquids' published by Standards Australia - more than 25, 000L capacity.
SMELTING OR REFINING - fusing or melting metalliferous metal or refining the metal.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

All search responses include particulars of land listed in the EMR/CLR when the search was generated. The EMR/CLR does NOT include:-

1. land which is contaminated land (or a complete list of contamination) if DES has not been notified
2. land on which a notifiable activity is being or has been undertaken (or a complete list of activities) if DES has not been notified

If you have any queries in relation to this search please phone 13QGOV (13 74 68)

Administering Authority

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ABN 46 640 294 485
400 George St Brisbane, Queensland 4000
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www.des.qld.gov.au

SEARCH RESPONSE
ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Shannon Brown
L-13 The Rocket 203 Robina Town Centre Drive
Robina QLD 4226

Transaction ID: 50738836 EMR Site Id: 88957 23 November 2021
Client Reference:
Cheque Number:

This response relates to a search request received for the site:
Lot: 8 Plan: SP218634

EMR RESULT

The above site IS included on the Environmental Management Register.
Lot: 8 Plan: SP218634
Address: 975 HANSON ROAD
THE NARROWS 4695

The site has been subject to the following Notifiable Activity or Hazardous Contaminant.
LIVESTOCK DIP OR SPRAY RACE - operating a livestock dip or spray race facility.

For the majority of rural properties only a small area may be affected by the chemicals used in livestock dips and spray races. The Department of Environment and Science may hold further information relating to the location of the dip site within this property.
SMELTING OR REFINING - fusing or melting metalliferous metal or refining the metal.
ABRASIVE BLASTING - carrying out abrasive blast cleaning (other than cleaning carried out in fully enclosed booths) or disposing of abrasive blasting material.
CHEMICAL MANUFACTURE OR FORMULATION - manufacturing, blending, mixing or formulating chemicals if -
(a) the chemicals are designated dangerous goods under the dangerous goods code; and
(b) the facility used to manufacture, blend, mix or formulate the chemicals has a design production capacity of more than 1 t per week.
CHEMICAL STORAGE - (other than petroleum products or oil under item 29) - storing more than 10 t of chemicals (other than compressed or liquefied gases) that are dangerous goods under the dangerous goods code.
COAL FIRED POWER STATION - operating a coal fired power station.
ELECTRICAL TRANSFORMERS - manufacturing, repairing or disposing of electrical transformers.
METAL TREATMENT OR COATING - treating or coating metal including, for example, anodising, galvanising, pickling, electroplating, heat treatment using cyanide compounds and spray painting using more than 5 L of paint per week (other than spray painting within a fully enclosed booth).
MINERAL PROCESSING - chemically or physically extracting or processing metalliferous ores.

While sites are listed on the EMR using the lot and plan description, a mining lease may affect only a limited area of the lot. In many instances with rural properties, only a small area may be potentially affected by the mining activities and the ongoing landuse is unaffected. More detailed information relating to the location of the mining activities may be held by the Department of Environment and

Science or the Department of Natural Resources, Mines and Energy.

PETROLEUM PRODUCT OR OIL STORAGE - storing petroleum products or oil -
(a) in underground tanks with more than 200L capacity; or
(b) in above ground tanks with -
(i) for petroleum products or oil in class 3 in packaging groups 1 and 2 of the dangerous goods code - more than 2, 500L capacity; or
(ii) for petroleum products or oil in class 3 in packaging groups 3 of the dangerous goods code - more than 5, 000L capacity; or
(iii) for petroleum products that are combustible liquids in class C1 or C2 in Australian Standard AS1940, 'The storage and handling of flammable and combustible liquids' published by Standards Australia - more than 25, 000L capacity.
WASTE STORAGE, TREATMENT OR DISPOSAL - storing, treating, reprocessing or disposing of regulated waste (other than at the place it is generated), including operating a nightsoil disposal site or sewage treatment plant where the site or plant has a design capacity that is more than the equivalent of 50, 000 persons having sludge drying beds or on-site disposal facilities.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

All search responses include particulars of land listed in the EMR/CLR when the search was generated. The EMR/CLR does NOT include:-

1. land which is contaminated land (or a complete list of contamination) if DES has not been notified
2. land on which a notifiable activity is being or has been undertaken (or a complete list of activities) if DES has not been notified

If you have any queries in relation to this search please phone 13QGOV (13 74 68)

Administering Authority

Department of Environment and Science (DES)
ABN 46 640 294 485
400 George St Brisbane, Queensland 4000
GPO Box 2454, Brisbane QLD 4001, AUSTRALIA
www.des.qld.gov.au

SEARCH RESPONSE

ENVIRONMENTAL MANAGEMENT REGISTER (EMR)
CONTAMINATED LAND REGISTER (CLR)

Shannon Brown
L-13 The Rocket 203 Robina Town Centre Drive
Robina QLD 4226

Transaction ID: 50738835 EMR Site Id: 23 November 2021
Cheque Number:
Client Reference:

This response relates to a search request received for the site:
Lot: 12 Plan: SP190336
94 QUARRY RD
YARWUN

EMR RESULT

The above site is NOT included on the Environmental Management Register.

CLR RESULT

The above site is NOT included on the Contaminated Land Register.

ADDITIONAL ADVICE

All search responses include particulars of land listed in the EMR/CLR when the search was generated.
The EMR/CLR does NOT include:-

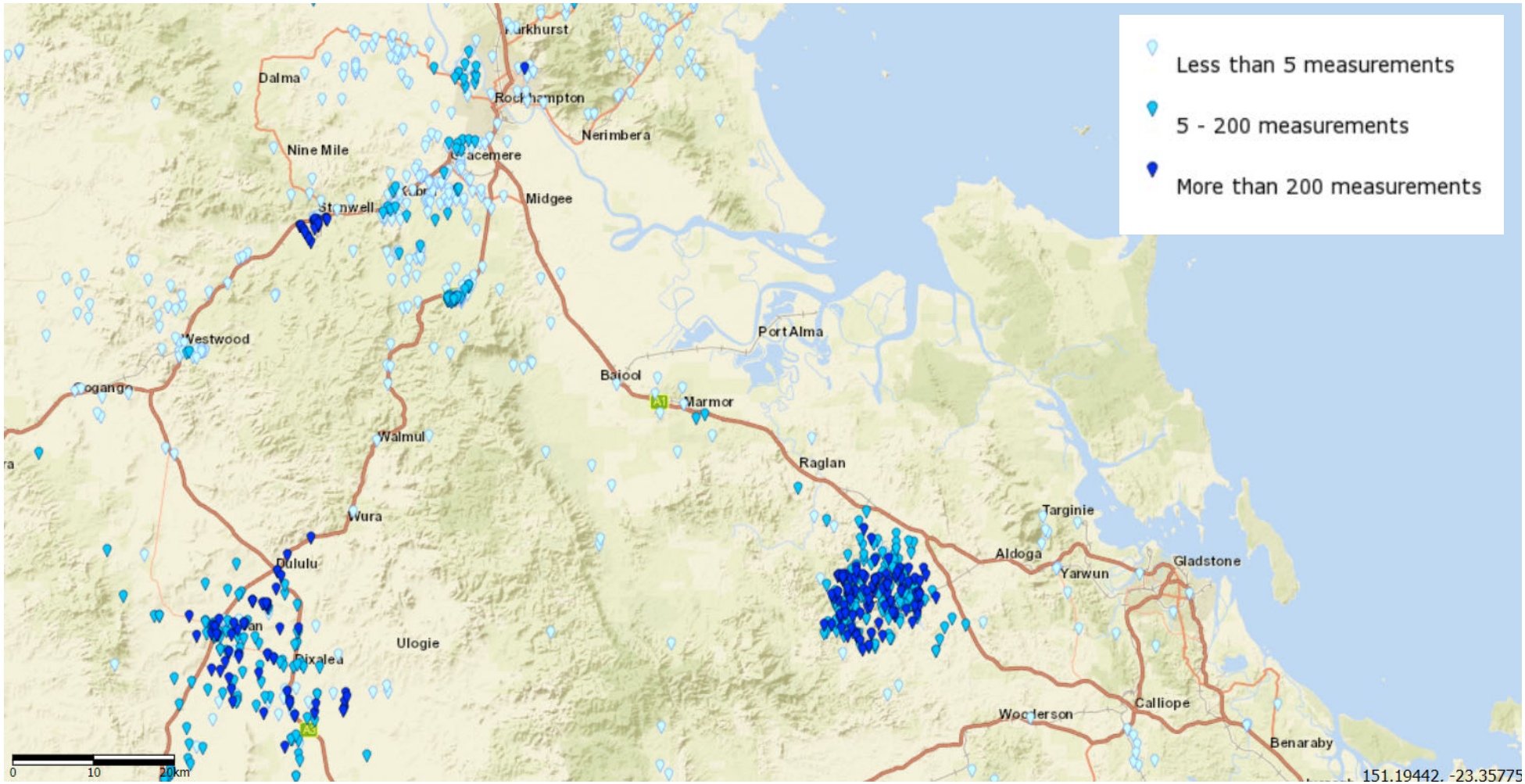
1. land which is contaminated land (or a complete list of contamination) if DES has not been notified
2. land on which a notifiable activity is being or has been undertaken (or a complete list of activities) if DES has not been notified

If you have any queries in relation to this search please phone 13QGOV (13 74 68)

Administering Authority

Groundwater Bore Records

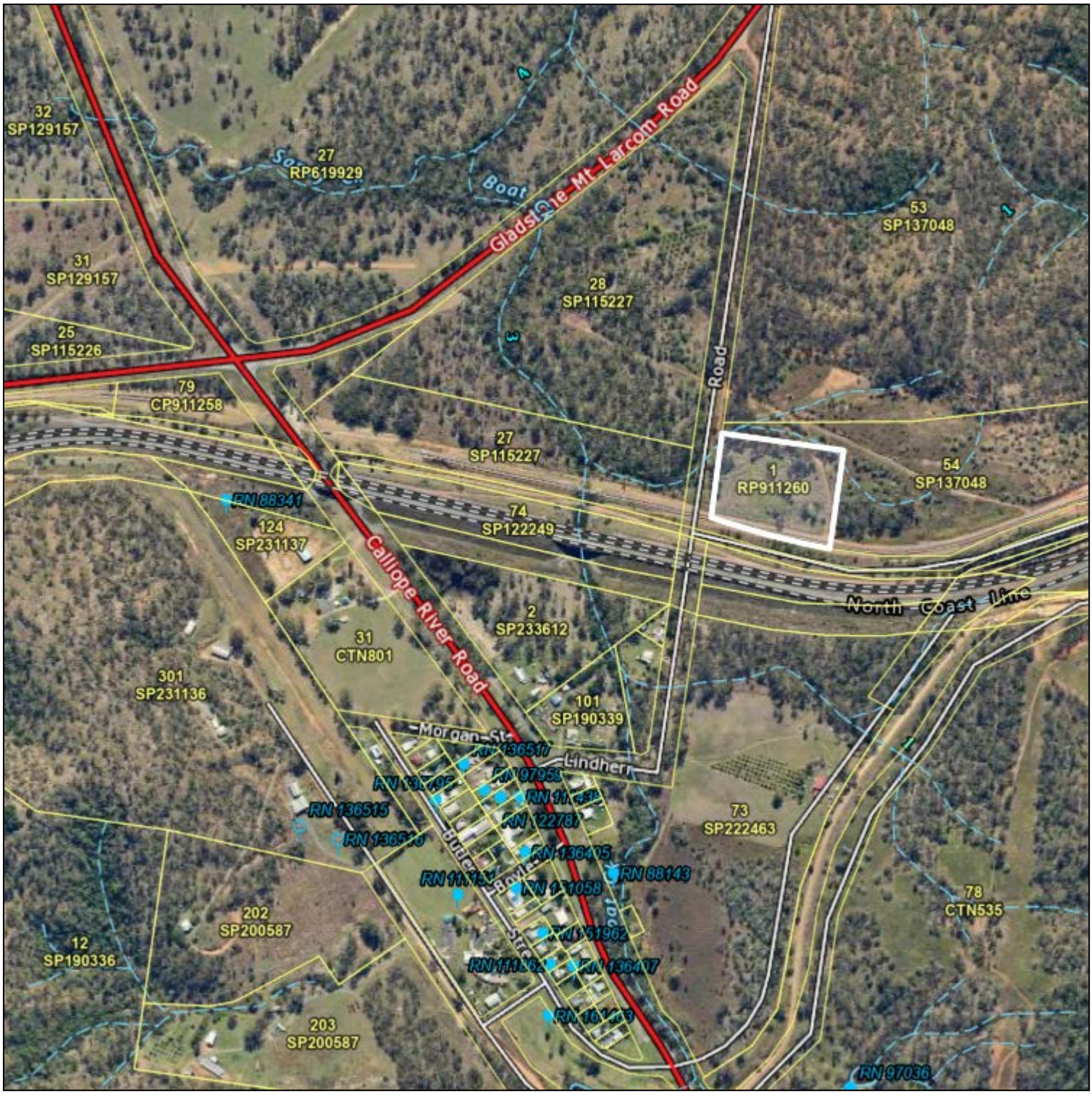
BOM Groundwater Bores



1RP911260 (hydrology and groundwater bore)

23°50'6"S 151°7'9"E

23°50'6"S 151°8'2"E



23°50'55"S 151°7'9"E

23°50'55"S 151°8'2"E

A product of

Queensland Globe

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Legend located on next page

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0 250 metres

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Queensland Government
Department of Resources

1RP911260 (hydrology and groundwater bore)

Legend

Coastline

Lake

Lake

Reservoir

Reservoir

Canal line

Canal

Canal area

Canal area

Watercourse line

Major - perennial

Major - non perennial

Minor - perennial

Minor - non perennial

Watercourse area

Watercourse area

Water area edge

Watercourse stream order

Registered water bores [RDMW and private]

Artesian bore

Artesian bore (abandoned but useable)

Artesian bore (abandoned and destroyed)

Artesian bore, ceased to flow

Artesian bore, ceased to flow (abandoned but useable

Artesian bore, ceased to flow (abandoned and destroyed)

Sub-artesian facility

Sub-artesian facility (abandoned but useable)

Sub-artesian facility (abandoned and destroyed)

Surface water facility

Surface water facility (abandoned but useable)

Surface water facility (abandoned and destroyed)

Land parcel

Parcel

Land parcel - gt 1 ha

Parcel

Attribution

Maxar

1RP911260 (hydrology and groundwater bore)

Legend

Land parcel - gt 10 ha

Parcel

Land parcel - gt 1000 ha

Parcel

Land parcel label

Land parcel label - gt 1 ha

Land parcel label - gt 10 ha

Land parcel label - gt 1000 ha

Road Crossing

Bridge

Tunnel

Road

Highway

Main

Local

Private

Railway

Cities and Towns

7SP145439 (hydrology and groundwater bore)

23°49'7"S 151°8'2"E

23°49'7"S 151°9'58"E

23°50'53"S 151°8'2"E

23°50'53"S 151°9'58"E

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N

0 500 metres

Scale: 1:18055

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Queensland Government
Department of Resources

7SP145439 (hydrology and groundwater bore)

Legend

Coastline

Coastline

Lake

Lake

Reservoir

Reservoir

Canal line

Canal

Canal area

Canal area

Watercourse line

Major - perennial

Major - non perennial

Minor - perennial

Minor - non perennial

Watercourse area

Watercourse area

Water area edge

Watercourse stream order

Registered water bores [RDMW and private]

Artesian bore

Artesian bore (abandoned but useable)

Artesian bore (abandoned and destroyed)

Artesian bore, ceased to flow

Artesian bore, ceased to flow (abandoned but useable

Artesian bore, ceased to flow (abandoned and destroyed)

Sub-artesian facility

Sub-artesian facility (abandoned but useable)

Sub-artesian facility (abandoned and destroyed)

Surface water facility

Surface water facility (abandoned but useable)

Surface water facility (abandoned and destroyed)

Land parcel

Parcel

Land parcel - gt 1 ha

Parcel

Attribution

Maxar

7SP145439 (hydrology and groundwater bore)

Legend

Land parcel - gt 10 ha

Parcel

Land parcel - gt 1000 ha

Parcel

Land parcel label

Land parcel label - gt 1 ha

Land parcel label - gt 10 ha

Land parcel label - gt 1000 ha

Railway

Road crossing

Bridge

Tunnel

Cities and Towns

Road

Highway

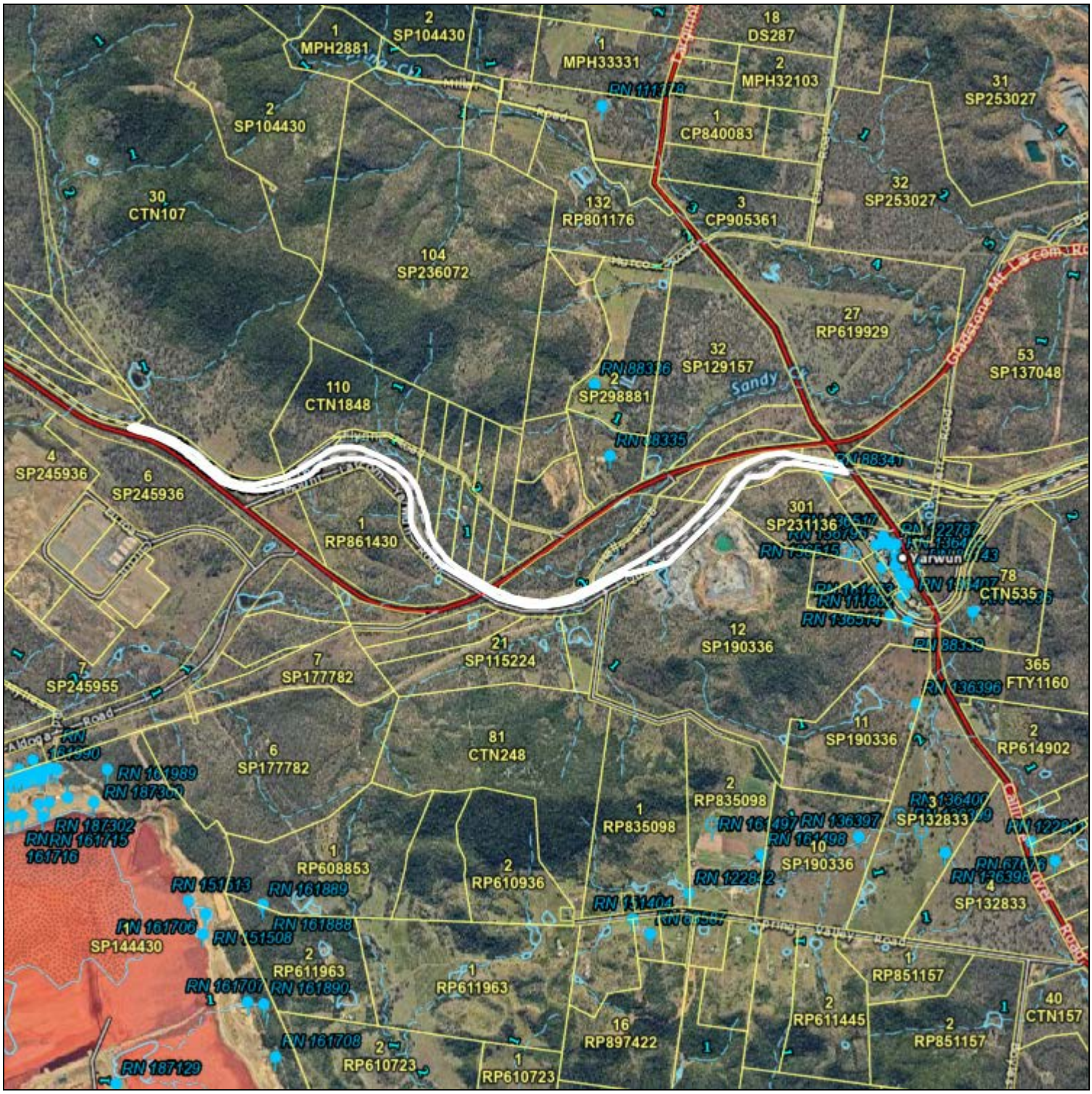
Main

Local

Private

23°48'57"S 151°4'24"E

23°48'57"S 151°8'15"E



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23°52'28"S 151°8'15"E

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Queensland Government
Department of Resources

Legend

Coastline

Coastline

Lake

Lake

Reservoir

Reservoir

Canal line

Canal

Canal area

Canal area

Watercourse line

Major - perennial

Major - non perennial

Minor - perennial

Minor - non perennial

Watercourse area

Watercourse area

Water area edge

Watercourse stream order

Registered water bores [RDMW and private]

Artesian bore

Artesian bore (abandoned but useable)

Artesian bore (abandoned and destroyed)

Artesian bore, ceased to flow

Artesian bore, ceased to flow (abandoned but useable

Artesian bore, ceased to flow (abandoned and destroyed)

Sub-artesian facility

Sub-artesian facility (abandoned but useable)

Sub-artesian facility (abandoned and destroyed)

Surface water facility

Surface water facility (abandoned but useable)

Surface water facility (abandoned and destroyed)

Land parcel

Parcel

Land parcel - gt 1 ha

Parcel

Attribution

Maxar

Legend

Land parcel - gt 10 ha

Parcel

Land parcel - gt 1000 ha

Parcel

Land parcel label

Land parcel label - gt 1 ha

Land parcel label - gt 10 ha

Land parcel label - gt 1000 ha

Road crossing

Bridge

Tunnel

Railway

Cities and Towns

Road

Highway

Main

Local

Private

101DS185 (hydrology and groundwater bore)

23°38'60"S 150°42'34"E

23°38'60"S 150°44'29"E

23°40'46"S 150°42'34"E

23°40'46"S 150°44'29"E

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0 500 metres

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Queensland Government
Department of Resources

101DS185 (hydrology and groundwater bore)

Legend

Coastline

Lake

Lake

Reservoir

Reservoir

Canal line

Canal

Canal area

Canal area

Watercourse line

Major - perennial

Major - non perennial

Minor - perennial

Minor - non perennial

Watercourse area

Watercourse area

Water area edge

Watercourse stream order

Registered water bores [RDMW and private]

Artesian bore

Artesian bore (abandoned but useable)

Artesian bore (abandoned and destroyed)

Artesian bore, ceased to flow

Artesian bore, ceased to flow (abandoned but useable

Artesian bore, ceased to flow (abandoned and destroyed)

Sub-artesian facility

Sub-artesian facility (abandoned but useable)

Sub-artesian facility (abandoned and destroyed)

Surface water facility

Surface water facility (abandoned but useable)

Surface water facility (abandoned and destroyed)

Land parcel

Parcel

Land parcel - gt 1 ha

Parcel

Attribution

Maxar

101DS185 (hydrology and groundwater bore)

Legend

Land parcel - gt 10 ha

Parcel

Land parcel - gt 1000 ha

Parcel

Land parcel label

Land parcel label - gt 1 ha

Land parcel label - gt 10 ha

Land parcel label - gt 1000 ha

Road Crossing

Bridge

Tunnel

Road

Highway

Main

Local

Private

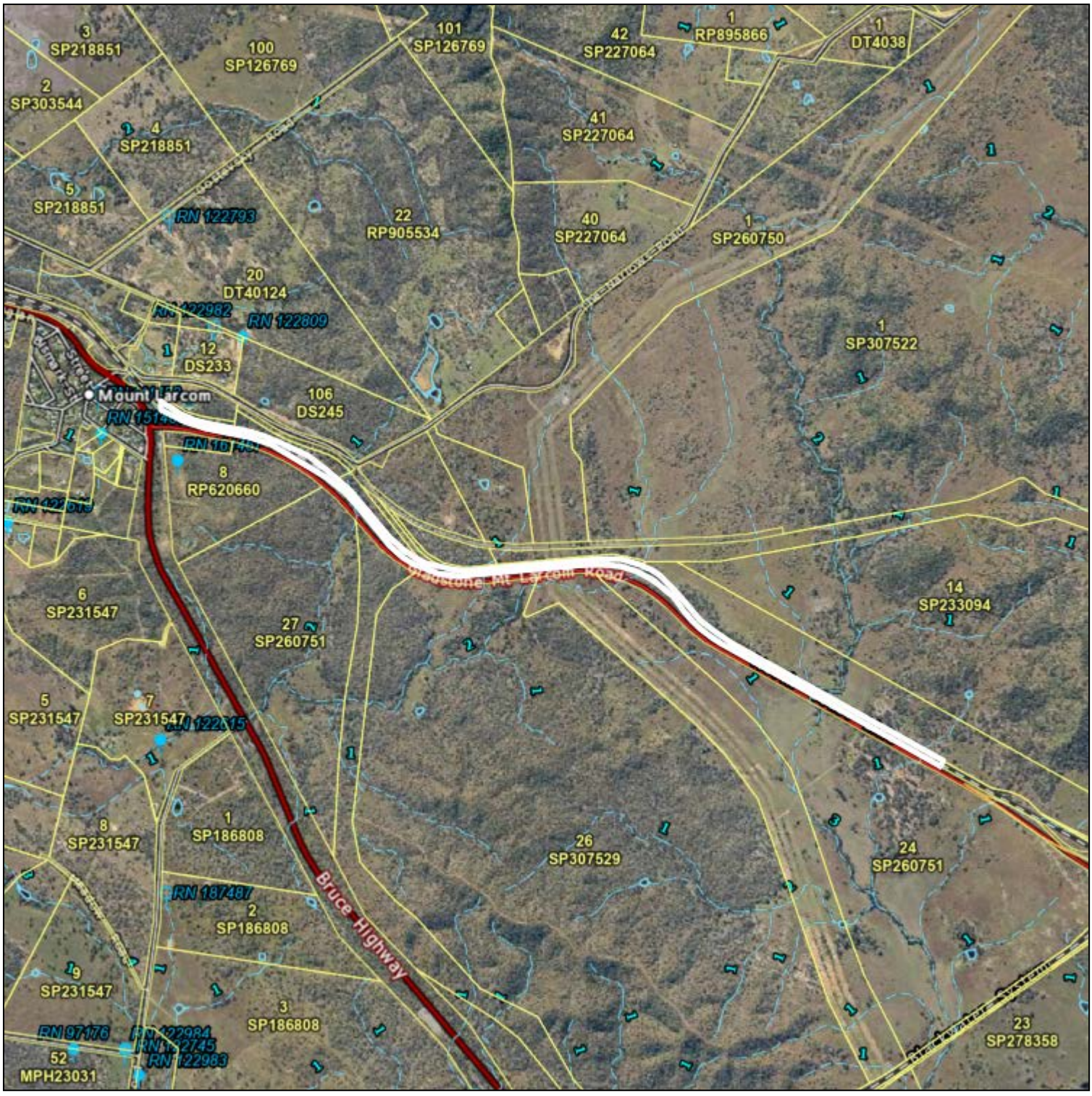
Railway

Cities and Towns

140SP122252 (hydrology and groundwater bore)

23°47'25"S 150°58'26"E

23°47'25"S 151°2'17"E



23°50'57"S 150°58'26"E

23°50'57"S 151°2'17"E

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Legend located on next page

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0 1 km

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Queensland Government
Department of Resources

140SP122252 (hydrology and groundwater bore)

Legend

Registered water bores [RDMW and private]

- Artesian bore
- Artesian bore (abandoned but useable)
- Artesian bore (abandoned and destroyed)
- Artesian bore, ceased to flow
- Artesian bore, ceased to flow (abandoned but useable
- Artesian bore, ceased to flow (abandoned and destroyed)
- Sub-artesian facility
- Sub-artesian facility (abandoned but useable)
- Sub-artesian facility (abandoned and destroyed)
- Surface water facility
- Surface water facility (abandoned but useable)
- Surface water facility (abandoned and destroyed)

Coastline

Lake

Lake

Reservoir

Reservoir

Canal line

Canal

Canal area

Canal area

Watercourse line

- Major - perennial
- Major - non perennial
- Minor - perennial
- Minor - non perennial

Watercourse area

Watercourse area

Water area edge

Watercourse stream order

Land parcel

Parcel

Land parcel - gt 1 ha

Parcel

Attribution

Maxar

140SP122252 (hydrology and groundwater bore)

Legend

Land parcel - gt 10 ha

Parcel

Land parcel - gt 1000 ha

Parcel

Land parcel label

Land parcel label - gt 1 ha

Land parcel label - gt 10 ha

Land parcel label - gt 1000 ha

Cities and Towns

Road crossing

Bridge

Tunnel

Railway

Road

Highway

Main

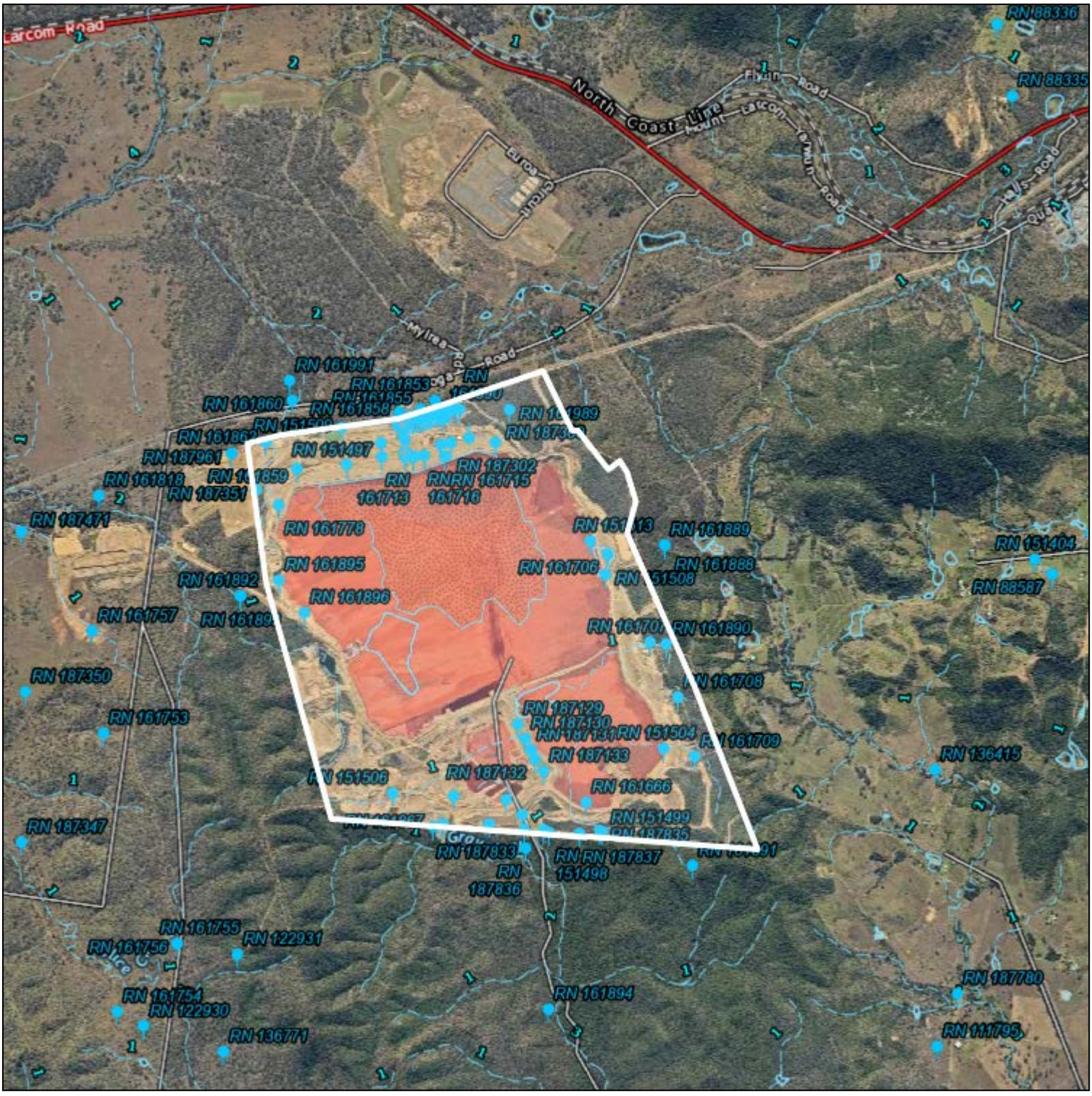
Local

Private

Lot 2/RP608546 (hydrology and groundwater bore)

23°50'7"S 151°2'58"E

23°50'7"S 151°6'49"E



23°53'38"S 151°2'58"E

23°53'38"S 151°6'49"E

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Queensland Government
Department of Resources

Lot 2/RP608546 (hydrology and groundwater bore)

Legend

Coastline

Coastline

Lake

Lake

Reservoir

Reservoir

Canal line

Canal

Canal area

Canal area

Watercourse line

Major - perennial

Major - non perennial

Minor - perennial

Minor - non perennial

Watercourse area

Watercourse area

Water area edge

Watercourse stream order

Registered water bores [RDMW and private]

Artesian bore

Artesian bore (abandoned but useable)

Artesian bore (abandoned and destroyed)

Artesian bore, ceased to flow

Artesian bore, ceased to flow (abandoned but useable

Artesian bore, ceased to flow (abandoned and destroyed)

Sub-artesian facility

Sub-artesian facility (abandoned but useable)

Sub-artesian facility (abandoned and destroyed)

Surface water facility

Surface water facility (abandoned but useable)

Surface water facility (abandoned and destroyed)

Road Crossing

Bridge

Tunnel

Railway

Attribution

Maxar

Lot 2/RP608546 (hydrology and groundwater bore)

Legend

Road

- Highway
- Main
- Local
- Private

Cities and Towns

Lot 2/RP608546 (hydrology and groundwater bore)

23°40'19"S 150°43'18"E

23°40'19"S 150°44'16"E

23°41'12"S 150°43'18"E

23°41'12"S 150°44'16"E

A product of

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0 250 metres

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Queensland Government
Department of Resources

Lot 2/RP608546 (hydrology and groundwater bore)

Legend

Coastline

Coastline

Registered water bores [RDMW and private]

Artesian bore

Artesian bore (abandoned but useable)

Artesian bore (abandoned and destroyed)

Artesian bore, ceased to flow

Artesian bore, ceased to flow (abandoned but useable

Artesian bore, ceased to flow (abandoned and destroyed)

Sub-artesian facility

Sub-artesian facility (abandoned but useable)

Sub-artesian facility (abandoned and destroyed)

Surface water facility

Surface water facility (abandoned but useable)

Surface water facility (abandoned and destroyed)

Lake

Lake

Reservoir

Reservoir

Canal line

Canal

Canal area

Canal area

Watercourse line

Major - perennial

Major - non perennial

Minor - perennial

Minor - non perennial

Watercourse area

Watercourse area

Water area edge

Watercourse stream order

Road Crossing

Bridge

Tunnel

Attribution

Maxar

Lot 2/RP608546 (hydrology and groundwater bore)

Legend

Road

- Highway
- Main
- Local
- Private

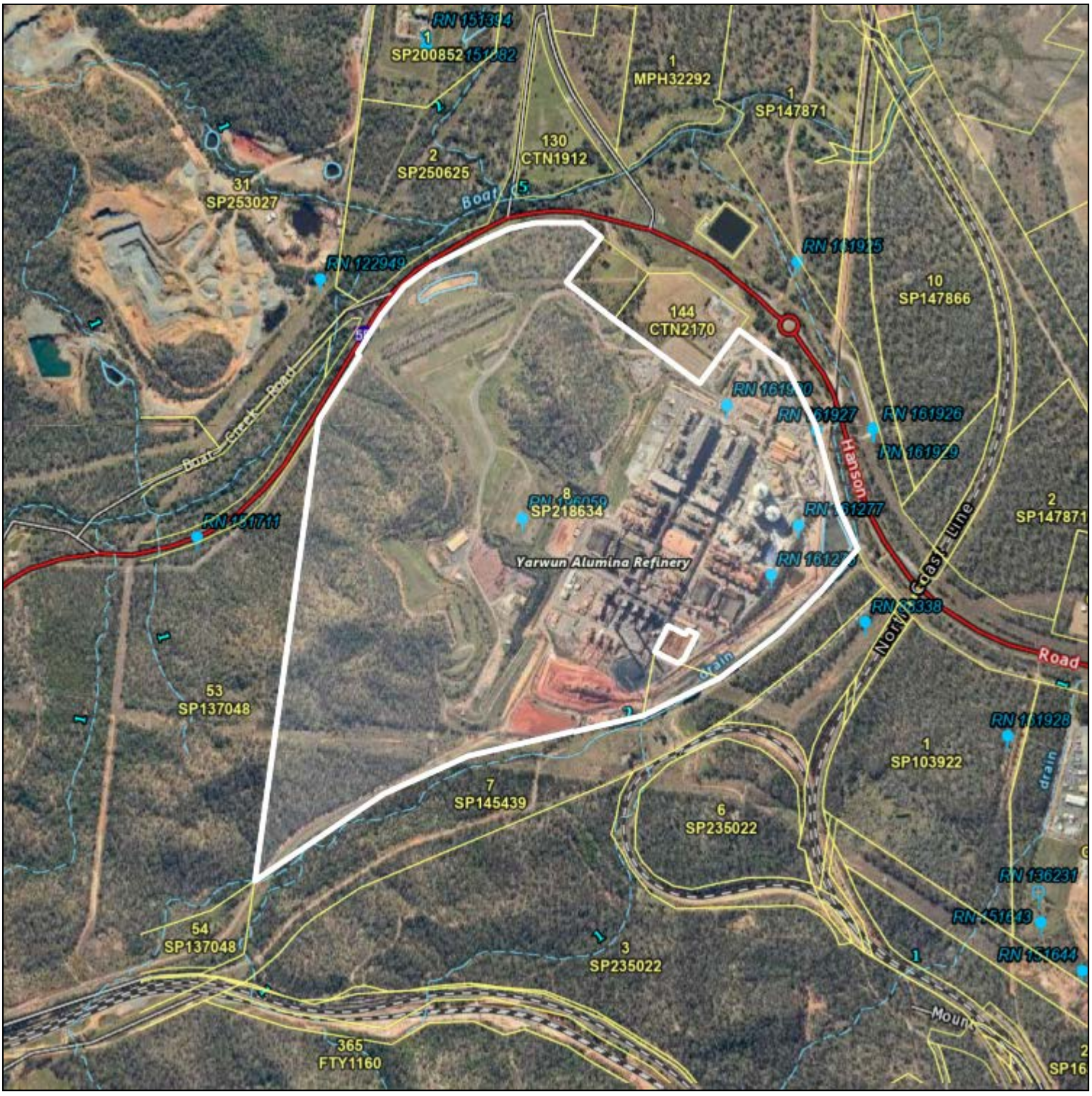
Railway

Cities and Towns

Lot 8/SP218634 (hydrology and groundwater bore)

23°48'51"S 151°7'59"E

23°48'51"S 151°9'54"E



23°50'37"S 151°7'59"E

23°50'37"S 151°9'54"E

A product of

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Scale: 1:18055

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Queensland Government
Department of Resources

Lot 8/SP218634 (hydrology and groundwater bore)

Legend

Coastline

Coastline

Lake

Lake

Reservoir

Reservoir

Canal line

Canal

Canal area

Canal area

Watercourse line

Major - perennial

Major - non perennial

Minor - perennial

Minor - non perennial

Watercourse area

Watercourse area

Water area edge

Watercourse stream order

Registered water bores [RDMW and private]

Artesian bore

Artesian bore (abandoned but useable)

Artesian bore (abandoned and destroyed)

Artesian bore, ceased to flow

Artesian bore, ceased to flow (abandoned but useable

Artesian bore, ceased to flow (abandoned and destroyed)

Sub-artesian facility

Sub-artesian facility (abandoned but useable)

Sub-artesian facility (abandoned and destroyed)

Surface water facility

Surface water facility (abandoned but useable)

Surface water facility (abandoned and destroyed)

Land parcel

Parcel

Land parcel - gt 1 ha

Parcel

Attribution

Maxar

Lot 8/SP218634 (hydrology and groundwater bore)

Legend

Land parcel - gt 10 ha

Parcel

Land parcel - gt 1000 ha

Parcel

Land parcel label

Land parcel label - gt 1 ha

Land parcel label - gt 10 ha

Land parcel label - gt 1000 ha

Road Crossing

Bridge

Tunnel

Road

Highway

Main

Local

Private

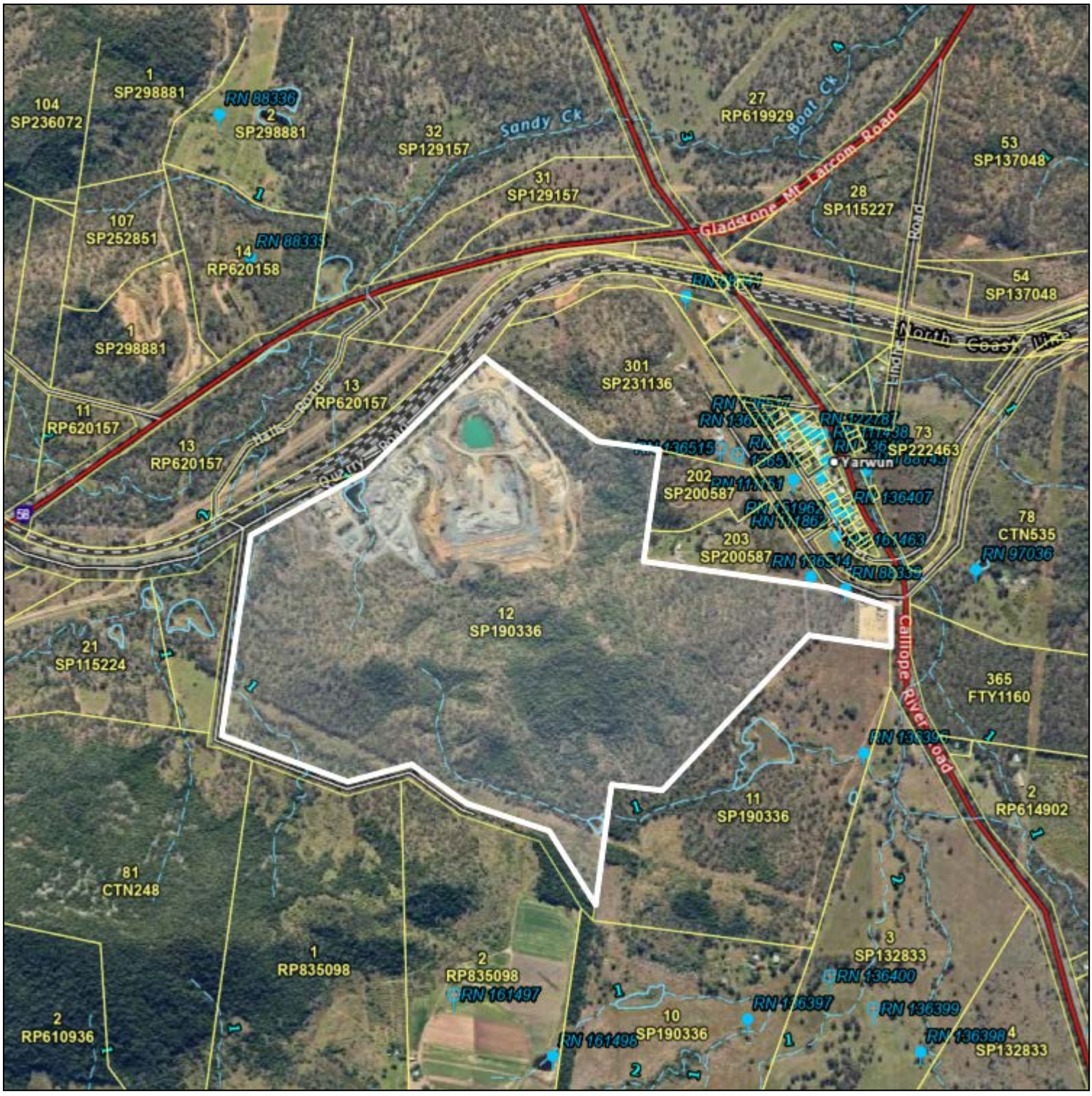
Railway

Cities and Towns

Lot 12/SP190336 (hydrology and groundwater bore)

23°49'60"S 151°6'7"E

23°49'60"S 151°8'2"E



23°51'46"S 151°6'7"E

23°51'46"S 151°8'2"E

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Queensland Government
Department of Resources

Lot 12/SP190336 (hydrology and groundwater bore)

Legend

Coastline

Coastline

Registered water bores [RDMW and private]

Artesian bore

Artesian bore (abandoned but useable)

Artesian bore (abandoned and destroyed)

Artesian bore, ceased to flow

Artesian bore, ceased to flow (abandoned but useable

Artesian bore, ceased to flow (abandoned and destroyed)

Sub-artesian facility

Sub-artesian facility (abandoned but useable)

Sub-artesian facility (abandoned and destroyed)

Surface water facility

Surface water facility (abandoned but useable)

Surface water facility (abandoned and destroyed)

Lake

Lake

Reservoir

Reservoir

Canal line

Canal

Canal area

Canal area

Watercourse line

Major - perennial

Major - non perennial

Minor - perennial

Minor - non perennial

Watercourse area

Watercourse area

Water area edge

Watercourse stream order

Land parcel

Parcel

Land parcel - gt 1 ha

Parcel

Attribution

Maxar

Lot 12/SP190336 (hydrology and groundwater bore)

Legend

Land parcel - gt 10 ha

Parcel

Land parcel - gt 1000 ha

Parcel

Land parcel label

Land parcel label - gt 1 ha

Land parcel label - gt 10 ha

Land parcel label - gt 1000 ha

Road crossing

Bridge

Tunnel

Road

Highway

Main

Local

Private

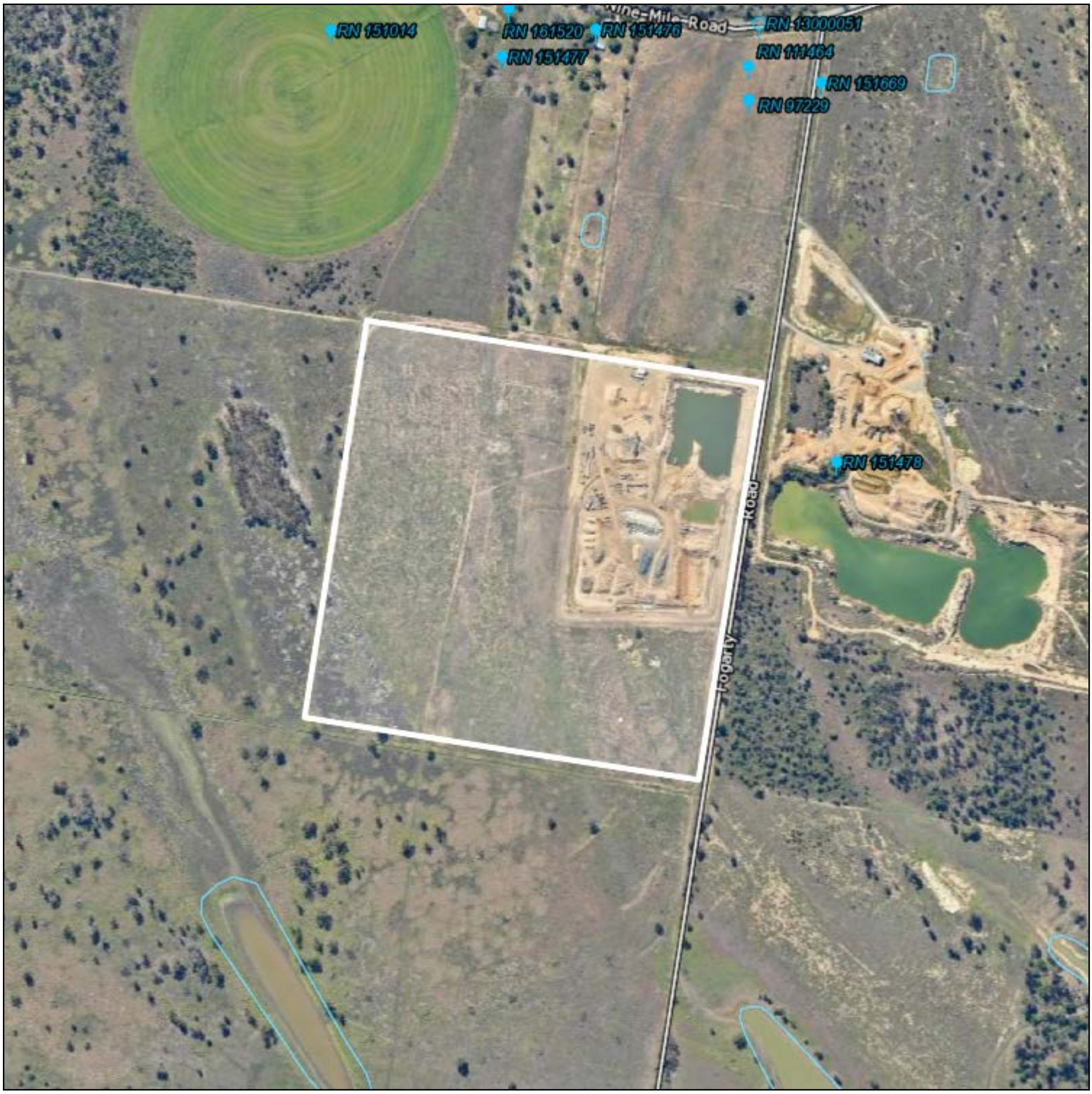
Railway

Cities and Towns

Lot 250/R2621 (hydrology and groundwater bore)

23°23'10"S 150°26'22"E

23°23'10"S 150°27'19"E



23°24'3"S 150°26'22"E

23°24'3"S 150°27'19"E

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Scale: 1:9027

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Print date: 11/11/2021

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Queensland Government
Department of Resources

Lot 250/R2621 (hydrology and groundwater bore)

Legend

Coastline

Coastline

Lake

Lake

Reservoir

Reservoir

Canal line

Canal

Canal area

Canal area

Watercourse line

Major - perennial

Major - non perennial

Minor - perennial

Minor - non perennial

Watercourse area

Watercourse area

Water area edge

Watercourse stream order

Registered water bores [RDMW and private]

Artesian bore

Artesian bore (abandoned but useable)

Artesian bore (abandoned and destroyed)

Artesian bore, ceased to flow

Artesian bore, ceased to flow (abandoned but useable

Artesian bore, ceased to flow (abandoned and destroyed)

Sub-artesian facility

Sub-artesian facility (abandoned but useable)

Sub-artesian facility (abandoned and destroyed)

Surface water facility

Surface water facility (abandoned but useable)

Surface water facility (abandoned and destroyed)

Road Crossing

Bridge

Tunnel

Railway

Attribution

Maxar

Lot 250/R2621 (hydrology and groundwater bore)

Legend

Road

- Highway
- Main
- Local
- Private

Cities and Towns

Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
88338	Sub-Artesian Facility	Existing		Rockhampton	3360 - GLADSTONE REGIONAL

Details

Description	P108		
Parish	897 - CALLIOPE		
Original Name	OFFICE LICENCE ONLY		
Driller Name			
Drill Company			
Const Method	CABLE TOOL		
Bore Line			
D/O File No	515/030/0282	**Polygon**	
R/O File No	30-0282	**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date		**Data Owner**	
Roles	Water Supply		

Location

Latitude	23-49-51	**Basin**	1320
Longitude	151-09-31	**Sub-area**	
GIS Latitude	-23.830876784	**Lot**	1
GIS Longitude	151.158551632	**Plan**	RP612126
Easting	312438		
Northing	7363279	**Map Scale**	104 - 1: 100 000
Zone	56	**Map Series**	M - Metric Series
Accuracy	SKET	**Map No**	9150
GPS Accuracy		**Map Name**	GLADSTONE
Checked	Yes	**Prog Section**	

Casing

2 ***records for RN*** **88338**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	01/10/1969	1	0.00	23.80	Steel Casing	4.760	WT - Wall Thickness	152
A	01/10/1969	2	21.90	23.80	Perforated or Slotted Casing		AP - Aperture Size	152

Strata Logs

5 ***records for RN*** **88338**

Rec	Top (m)	Bottom (m)	Strata Description

Bore Report

From Year:

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	12.80	SOIL & GRITTY CLAY
2	12.80	23.77	MED TO HARD GRANITE(????) SOFT BANDS
902			SWL 23/10/69 - 11.2 M
903			BAILER TEST - 1.0 L/S
910			WRC COND 10/69 - 1880 MICROS/CM

Stratigraphies

2 *records for RN* **88338**

Source	Rec	Top (m)	Bottom (m)	Strata Description
DNR	1	0.00		DOONSIDE FORMATION
DNR	2	0.00		DOONSIDE FORMATION

Aquifers

2 *records for RN* **88338**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	17.40		GNTE - Acid Intrusive, Granite	23/10/1969	-11.20	N			Y	WZ	DOONSIDE FORMATION
2	22.00	23.80	GNTE - Acid Intrusive, Granite			N	COND 1880	1.00	Y	WZ	DOONSIDE FORMATION

Pump Tests Part 1

1 *records for RN* **88338**

Pipe	Date	Rec	RN of Pumped Bore	Top (m)	Bottom (m)	Dist (m)	Meth	Test Types	Pump Type	Suction Set (m)	Q Prior to Test (l/s)	Dur of Q PR (mins)	Pres on Arriv (m)	Q on Arriv (l/s/)
A	23/10/1969	1	88338	21.90	23.80		PUM	CQ						

Pump Tests Part 2

1 *records for RN* **88338**

Bore Report

From Year:

Pipe	Date	Rec	Test Dur (mins)	SWL(m)	Recov Time (mins)	Resid DD (m)	Max DD or P RED (m)	Q at Max DD (l/s)	Time to Max DD (mins)	Max Q (l/s)	Calc Stat HD (m)	Design Yield (l/s)	Design BP (m)	Suct. Set (m)	Tmsy (m2/Day)	Stor
A	23/10/1969	1	360	-12.62			2.70	0.95	360			1.52	20.70		17	

Bore Conditions

0 *records for RN* **88338**

Elevations

0 *records for RN* **88338**

Water Analysis Part 1

2 *records for RN* **88338**

Pipe	Date	Rec	Analyst	Analysis No	Depth (m)	Meth	Src	Cond (uS/cm)	pH	Si (mg/L)	Total Ions (mg/L)	Total Solids (mg/L)	Hard	Alk	Fig. of Merit	SAR	RAH
A	23/10/1969	1	GCL	44034	22.00	PU	GB	1880	7.6		1256.55	1042.56	486	350	1.0	4.5	
A	09/09/1970	1	GCL	46660	22.00	PU	GB	1710	7.1		1221.20	982.30	439	385	0.9	4.6	

Water Analysis Part 2

2 *records for RN* **88338**

Pipe	Date	Rec	Na	K	Ca	Mg	Mn	HCO3	Fe	CO3	Cl	F	NO3	SO4	Zn	Al	B	Cu
A	23/10/1969	1	227.0		84.0	67.0		421.0		3.0	430.0	0.55		24.0				
A	09/09/1970	1	222.0		82.0	57.0		470.0			355.0	0.20		35.0				

Water Levels

1 *records for RN* **88338**

Pipe	Date	Time	Measure (m)	Meas	Point	Remark	Meas	Type	Coll Auth	Coll	Method	Project	Quality	
A	23/10/1969		-11.20	N	Natural Surface		ACT	Actual	NR	NR	Not Recorded		130	Data is of unknown quality

Wire Line Logs

0 *records for RN* **88338**

Field Measurements

0 *records for RN* **88338**

Bore Report

From Year:

Special Water Analysis

0 *records for RN* **88338**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
88339	Sub-Artesian Facility	Existing	01/05/1986	Rockhampton	3360 - GLADSTONE REGIONAL

Details

Description	P41 ROAD RES. ADJ. TO LOT1 RP889920		
Parish	897 - CALLIOPE		
Original Name	OFFICE LICENCE ONLY		
Driller Name			
Drill Company			
Const Method	ROTARY RIG		
Bore Line			
D/O File No	515/030/1470	**Polygon**	
R/O File No	30-1470	**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date		**Data Owner**	
Roles	Water Supply		

Location

Latitude	23-50-57	**Basin**	1320
Longitude	151-07-37	**Sub-area**	
GIS Latitude	-23.8491481	**Lot**	
GIS Longitude	151.12683914	**Plan**	
Easting	309234		
Northing	7361213	**Map Scale**	104 - 1: 100 000
Zone	56	**Map Series**	M - Metric Series
Accuracy	SKET	**Map No**	9150
GPS Accuracy		**Map Name**	GLADSTONE
Checked	Yes	**Prog Section**	

Casing

2 ***records for RN*** **88339**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	01/05/1986	1	0.00	12.20	Polyvinyl Chloride		WT - Wall Thickness	150
A	01/05/1986	2			Perforated or Slotted Casing		AP - Aperture Size	150

Strata Logs

4 ***records for RN*** **88339**

Rec	Top (m)	Bottom (m)	Strata Description

Bore Report

From Year:

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	12.20	NO DETAILS
902			SWL 7/86 - 3.0 M
903			AIR TEST - 2.5 L/S
910			WRC COND - 5530 MICROS/CM

Stratigraphies

0 *records for RN* **88339**

Aquifers

1 *records for RN* **88339**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	12.20		MDST - Mudstone	01/07/1986	-3.00	N	5530 US/CM	2.50	Y	FR	BERSERKER GROUP

Pump Tests Part 1

0 *records for RN* **88339**

Pump Tests Part 2

0 *records for RN* **88339**

Bore Conditions

0 *records for RN* **88339**

Elevations

0 *records for RN* **88339**

Water Analysis Part 1

0 *records for RN* **88339**

Water Analysis Part 2

0 *records for RN* **88339**

Water Levels

1 *records for RN* **88339**

Pipe	Date	Time	Measure (m)	Meas	Point	Remark	Meas	Type	Coll Auth	Coll	Method	Project	Quality	
A	01/07/1986		-3.00	N	Natural Surface		ACT	Actual	NR	NR	Not Recorded		130	Data is of unknown quality

Bore Report

From Year:

Wire Line Logs

0 *records for RN* **88339**

Field Measurements

0 *records for RN* **88339**

Special Water Analysis

0 *records for RN* **88339**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
88341	Sub-Artesian Facility	Existing	12/10/1976	Rockhampton	3360 - GLADSTONE REGIONAL

Details

Description	R246		
Parish	897 - CALLIOPE		
Original Name	OFFICE LICENCE ONLY		
Driller Name	BEASLEY J		
Drill Company	HILLGROVE DRILLING		
Const Method	ROTARY		
Bore Line			
D/O File No	515/030/2230	**Polygon**	
R/O File No	30-2230	**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date		**Data Owner**	
Roles	Water Supply		

Location

Latitude	23-50-28	**Basin**	1320
Longitude	151-07-20	**Sub-area**	
GIS Latitude	-23.841227429	**Lot**	124
GIS Longitude	151.12211853	**Plan**	CTN1362
Easting	308742		
Northing	7362084	**Map Scale**	104 - 1: 100 000
Zone	56	**Map Series**	M - Metric Series
Accuracy	SKET	**Map No**	9150
GPS Accuracy		**Map Name**	GLADSTONE
Checked	Yes	**Prog Section**	

Casing

3 ***records for RN*** **88341**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	12/10/1976	1	0.00	18.10	Polyvinyl Chloride		WT - Wall Thickness	152
A	12/10/1976	2	15.10	17.10	Perforated or Slotted Casing		AP - Aperture Size	152
A	12/10/1976	3	17.10	20.00	Open Hole			165

Strata Logs

7 ***records for RN*** **88341**

Bore Report

From Year:

Rec	Top (m)	Bottom (m)	Strata Description	
1	0.00	4.60	BROWN CLAY	
2	4.60	16.50	DARK BROWN WEATHERED VOLCANICS	
3	16.50	17.00	FRACTURED GREEN VOLCANICS	WATER
4	17.00	20.00	HARD GREEN VOLCANICS	
902			SWL 12/10/76 - 5.42 M	
903			AIR TEST - 4.4 L/S	
910			WRC COND - 5100 MICROS/CM	

Stratigraphies

1 *records for RN* **88341**

Source	Rec	Top (m)	Bottom (m)	Strata Description
DNR	1	0.00		BERSERKER GROUP

Aquifers

1 *records for RN* **88341**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	13.00	17.00	VOLC - Volcanic	12/10/1976	-5.42	N	COND 5100	4.40	Y	FR	BERSERKER GROUP

Pump Tests Part 1

1 *records for RN* **88341**

Pipe	Date	Rec	RN of Pumped Bore	Top (m)	Bottom (m)	Dist (m)	Meth	Test Types	Pump Type	Suction Set (m)	Q Prior to Test (l/s)	Dur of Q PR (mins)	Pres on Arriv (m)	Q on Arriv (l/s/)
A	20/10/1976	1	88341	15.00	17.00		PUM	SD						

Pump Tests Part 2

1 *records for RN* **88341**

Pipe	Date	Rec	Test	SWL(m)	Recov	Resid	Max DD	Q at	Time to	Max Q	Calc	Design	Design	Suct.	Tmsy	Stor

Bore Report

From Year:

		Dur (mins)	Time (mins)	DD (m)	or P RED (m)	Max DD (l/s)	Max DD (mins)	(l/s)	Stat HD (m)	Yield (l/s)	BP (m)	Set (m)	(m2/Day)
A	20/10/1976	1	300	-5.30		3.01	3.85	300		8.50	15.00		111

Bore Conditions

0 *records for RN* **88341**

Elevations

0 *records for RN* **88341**

Water Analysis Part 1

1 *records for RN* **88341**

Pipe	Date	Rec	Analyst	Analysis No	Depth (m)	Meth	Src	Cond (uS/cm)	pH	Si (mg/L)	Total Ions (mg/L)	Total Solids (mg/L)	Hard	Alk	Fig. of Merit	SAR	RAH
A	20/10/1976	1	GCL	70771	20.00	PU	GB	4900	7.3	70	2690.50	2627.33	2077	215	5.6	1.6	

Water Analysis Part 2

1 *records for RN* **88341**

Pipe	Date	Rec	Na	K	Ca	Mg	Mn	HCO3	Fe	CO3	Cl	F	NO3	SO4	Zn	Al	B	Cu
A	20/10/1976	1	170.0	0.5	436.0	240.0		262.0			1490.0	0.30	9.7	82.0				

Water Levels

1 *records for RN* **88341**

Pipe	Date	Time	Measure (m)	Meas	Point	Remark	Meas	Type	Coll Auth	Coll	Method	Project	Quality	
A	12/10/1976		-5.42	N	Natural Surface		ACT	Actual	NR	NR	Not Recorded		130	Data is of unknown quality

Wire Line Logs

0 *records for RN* **88341**

Field Measurements

0 *records for RN* **88341**

Special Water Analysis

0 *records for RN* **88341**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
111438	Sub-Artesian Facility	Existing	15/10/1999	Rockhampton	3360 - GLADSTONE REGIONAL

Details

Description			
Parish	897 - CALLIOPE		
Original Name	BOYLE		
Driller Name	FRIEMUTH H		
Drill Company	DEPCO		
Const Method	ROTARY		
Bore Line			
D/O File No	520/001/7	**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date		**Data Owner**	DNR
Roles	Water Supply		

Location

Latitude	23-50-42	**Basin**	1320
Longitude	151-07-34	**Sub-area**	
GIS Latitude	-23.844961776	**Lot**	3
GIS Longitude	151.12616046	**Plan**	RP604826
Easting	309159		
Northing	7361676	**Map Scale**	503 - 1: 50 000
Zone	56	**Map Series**	M - Metric Series
Accuracy	SKET	**Map No**	9150-3
GPS Accuracy		**Map Name**	
Checked	Yes	**Prog Section**	

Casing

3 ***records for RN*** **111438**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	15/10/1999	1	0.00	12.19	Polyvinyl Chloride	5.900	WT - Wall Thickness	140
A	15/10/1999	2	9.14	12.19	Perforated or Slotted Casing			
A	15/10/1999	3	0.00	12.19	Gravel Pack			165

Strata Logs

1 ***records for RN*** **111438**

Bore Report

From Year:

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	12.19	A

Stratigraphies

0 *records for RN* **111438**

Aquifers

1 *records for RN* **111438**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	10.97	12.19	GNTE - Acid Intrusive, Granite	15/10/1999	-2.44	N	4000 US/CM	1.77	Y	WZ	BERSERKER GROUP

Pump Tests Part 1

0 *records for RN* **111438**

Pump Tests Part 2

0 *records for RN* **111438**

Bore Conditions

0 *records for RN* **111438**

Elevations

0 *records for RN* **111438**

Water Analysis Part 1

0 *records for RN* **111438**

Water Analysis Part 2

0 *records for RN* **111438**

Water Levels

1 *records for RN* **111438**

Pipe	Date	Time	Measure (m)	Meas	Point	Remark	Meas	Type	Coll Auth	Coll	Method	Project	Quality
A	15/10/1999		-2.40	R	Reference Point		NR	Not Recorded	NR	NR	Not Recorded	130	Data is of unknown quality

Wire Line Logs

0 *records for RN* **111438**

Field Measurements

1 *records for RN* **111438**

Bore Report

From Year:

Pipe	Date	Depth (m)	Conduct (uS/cm)	pH	Temp (C)	NO3 (mg/L)	DO2 (mg/L)	Eh (mV)	Alkalinity (mV)	Samp	Method	Samp	Source
A	15/10/1999	12.20	4000							PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore

Special Water Analysis

0 ***records for RN*** **111438**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
111458	Sub-Artesian Facility	Abandoned but Still Usable	05/05/1954	Rockhampton	3360 - GLADSTONE REGIONAL

Details

Description			
Parish	2798 - LANGMORN		
Original Name			
Driller Name	B C SAINSBURY		
Drill Company	IWSC		
Const Method	CABLE TOOL		
Bore Line			
D/O File No	520/001(97)	**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date		**Data Owner**	
Roles	Water Supply		

Location

Latitude	23-48-41	**Basin**	1300
Longitude	150-58-46	**Sub-area**	
GIS Latitude	-23.811392592	**Lot**	1
GIS Longitude	150.979537644	**Plan**	MPH2774
Easting	294169		
Northing	7365190	**Map Scale**	253 - 1: 25 000
Zone	56	**Map Series**	M - Metric Series
Accuracy		**Map No**	9050-21
GPS Accuracy		**Map Name**	
Checked	Yes	**Prog Section**	

Casing

2 ***records for RN*** **111458**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	05/05/1954	1	0.00	7.30	Standard Screwed Swelled Black	4.760	WT - Wall Thickness	152
A	05/05/1954	2	7.30	11.73	Open Hole			

Strata Logs

4 ***records for RN*** **111458**

Rec	Top (m)	Bottom (m)	Strata Description

Bore Report

From Year:

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	3.00	CLAY & STONES
2	3.00	6.40	ROTTEN SHALE ROCK
3	6.40	9.30	BLUE DIORITE
4	9.30	11.73	SHALE

Stratigraphies

0 *records for RN* **111458**

Aquifers

2 *records for RN* **111458**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	5.50		SHLE - Shale						N	FR	CRANA BEDS
2	10.40		SHLE - Shale	05/05/1954	-3.00	N	TS 2437MG/L	0.50	Y	FR	CRANA BEDS

Pump Tests Part 1

0 *records for RN* **111458**

Pump Tests Part 2

0 *records for RN* **111458**

Bore Conditions

0 *records for RN* **111458**

Elevations

0 *records for RN* **111458**

Water Analysis Part 1

1 *records for RN* **111458**

Pipe	Date	Rec	Analyst	Analysis No	Depth (m)	Meth	Src	Cond (uS/cm)	pH	Si (mg/L)	Total Ions (mg/L)	Total Solids (mg/L)	Hard	Alk	Fig. of Merit	SAR	RAH
A	05/05/1954	1	GCL	13995	11.70	BA	GB		7.8		2861.30	2328.86	497	859	0.3	14.6	7.24

Water Analysis Part 2

1 *records for RN* **111458**

Bore Report

From Year:

Pipe	Date	Rec	Na	K	Ca	Mg	Mn	HCO3	Fe	CO3	Cl	F	NO3	SO4	Zn	Al	B	Cu
A	05/05/1954	1	748.2		47.6	91.8		1047.5			776.0	0.80		149.4				

Water Levels

0 *records for RN* **111458**

Wire Line Logs

0 *records for RN* **111458**

Field Measurements

0 *records for RN* **111458**

Special Water Analysis

0 *records for RN* **111458**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
122757	Sub-Artesian Facility	Abandoned and Destroyed	11/03/2005	Rockhampton	6370 - ROCKHAMPTON REGIONAL COUNCIL

Details

Description			
Parish	4161 - SAN JOSE		
Original Name			
Driller Name	ORR, JAMES THOMAS		
Drill Company	ABCO DRILLING		
Const Method	ROTARY AIR		
Bore Line			
D/O File No	520/001/30	**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date	07/04/2005	**Data Owner**	
Roles	Water Supply		

Location

Latitude	23-40-04	**Basin**	1300
Longitude	150-43-21	**Sub-area**	
GIS Latitude	-23.6677165	**Lot**	86
GIS Longitude	150.7223884	**Plan**	DS185
Easting	267709		
Northing	7380707	**Map Scale**	
Zone	56	**Map Series**	
Accuracy	GPS	**Map No**	
GPS Accuracy	20	**Map Name**	
Checked	Yes	**Prog Section**	

Casing

2 *records for RN* **122757**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	11/03/2005	1	0.00	9.00	Grout			
A	11/03/2005	2	9.00	27.50	Cuttings or other fill between casing and hole wall			

Strata Logs

9 *records for RN* **122757**

Rec	Top (m)	Bottom (m)	Strata Description

Bore Report

From Year:

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	0.30	TOP SOIL, BROWN
2	0.30	0.60	CLAY, BROWN
3	0.60	5.00	WEATHERED ROCK, GREY
4	5.00	6.00	WEATHERED BASALT, GREY-WHITE
5	6.00	8.50	BASALT, BLUE-GREY, HARD
6	8.50	12.20	BASALT, QUARTZ, RED-BROWN, SOFT
7	12.20	16.70	BASALT, BLUE, HARD
8	16.70	19.00	LIMESTONE, BLUE-WHITE, MED-HARD
9	19.00	27.50	BSLT, LIGHT BLUE, HARD

Stratigraphies
0 *records for RN* **122757**

Aquifers
0 *records for RN* **122757**

Pump Tests Part 1
0 *records for RN* **122757**

Pump Tests Part 2
0 *records for RN* **122757**

Bore Conditions
0 *records for RN* **122757**

Elevations
0 *records for RN* **122757**

Water Analysis Part 1
0 *records for RN* **122757**

Water Analysis Part 2
0 *records for RN* **122757**

Water Levels
0 *records for RN* **122757**

Wire Line Logs
0 *records for RN* **122757**

From Year:

Field Measurements

0 ***records for RN*** **122757**

Special Water Analysis

0 ***records for RN*** **122757**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
122758	Sub-Artesian Facility	Abandoned and Destroyed	11/03/2005	Rockhampton	6370 - ROCKHAMPTON REGIONAL COUNCIL

Details

Description			
Parish	4161 - SAN JOSE		
Original Name			
Driller Name	ORR, JAMES THOMAS		
Drill Company	ABCO DRILLING		
Const Method	ROTARY AIR		
Bore Line			
D/O File No	520/001/30	**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date	07/04/2005	**Data Owner**	
Roles	Water Supply		

Location

Latitude	23-40-02	**Basin**	1300
Longitude	150-43-24	**Sub-area**	
GIS Latitude	-23.6672794	**Lot**	86
GIS Longitude	150.7233565	**Plan**	DS185
Easting	267807		
Northing	7380757	**Map Scale**	
Zone	56	**Map Series**	
Accuracy	GPS	**Map No**	
GPS Accuracy	20	**Map Name**	
Checked	Yes	**Prog Section**	

Casing

2 *records for RN* 122758

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	11/03/2005	1	0.00	10.60	Grout			
A	11/03/2005	2	10.60	42.60	Cuttings or other fill between casing and hole wall			

Strata Logs

10 *records for RN* 122758

Rec	Top (m)	Bottom (m)	Strata Description

Bore Report

From Year:

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	0.30	TOPSOIL, BROWN
2	0.30	2.40	CLAY, YELLOW-GREY
3	2.40	3.30	CLAY, BROWN
4	3.30	4.20	CLAYEY GRAVEL, BROWN
5	4.20	9.10	WEATHERED BASALT, BLUE-GREY, SOFT
6	9.10	13.70	WEATHERED BASALT, BLUE-GREY, MED-HARD
7	13.70	14.30	BASALT, BLUE, HARD
8	14.30	17.00	BASALT, BLUE-GREY, MEDIUM-HARD
9	17.00	29.00	BASALT, BLUE, MED-HARD
10	29.00	42.60	BASALT, BLUE, MED-HARD

Stratigraphies
0 *records for RN* **122758**

Aquifers
0 *records for RN* **122758**

Pump Tests Part 1
0 *records for RN* **122758**

Pump Tests Part 2
0 *records for RN* **122758**

Bore Conditions
0 *records for RN* **122758**

Elevations
0 *records for RN* **122758**

Water Analysis Part 1
0 *records for RN* **122758**

Water Analysis Part 2
0 *records for RN* **122758**

Water Levels
0 *records for RN* **122758**

Wire Line Logs
0 *records for RN* **122758**

Bore Report

From Year:

Field Measurements

0 *records for RN* **122758**

Special Water Analysis

0 *records for RN* **122758**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
136514	Sub-Artesian Facility	Existing	16/10/2007	Rockhampton	3360 - GLADSTONE REGIONAL

Details

Description			
Parish	897 - CALLIOPE		
Original Name			
Driller Name	K BOURNE		
Drill Company	DEPCO DRILLING		
Const Method	ROTARY AIR		
Bore Line			
D/O File No	520/001/7	**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date	25/10/2007	**Data Owner**	
Roles	Water Supply		

Location

Latitude	23-50-56	**Basin**	1320
Longitude	151-07-33	**Sub-area**	
GIS Latitude	-23.8488231	**Lot**	41
GIS Longitude	151.125822	**Plan**	CTN67
Easting	309130		
Northing	7361248	**Map Scale**	103 - 1: 10 000
Zone	56	**Map Series**	
Accuracy	GPS	**Map No**	9150
GPS Accuracy	20	**Map Name**	GLADSTONE
Checked	Yes	**Prog Section**	

Casing

4 ***records for RN*** **136514**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	16/10/2007	1	0.00	21.30	Polyvinyl Chloride	5.900	WT - Wall Thickness	140
A	16/10/2007	2	15.20	21.30	Perforated or Slotted Casing	4.000	AP - Aperture Size	
A	16/10/2007	3	6.00	21.30	Gravel Pack	5.000	GR - Gravel Size	
A	16/10/2007	4	0.00	6.00	Grout			140

Strata Logs

4 ***records for RN*** **136514**

Bore Report

From Year:

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	0.30	SOIL
2	0.30	9.10	WEATHERING
3	9.10	17.00	DECOMPOSED *
4	17.00	21.30	DIRITE

Stratigraphies

0 *records for RN* **136514**

Aquifers

1 *records for RN* **136514**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	16.70	17.00	XXXX - Unknown	16/10/2007	-21.00	N	2000	1.26	Y	FR	BERSERKER GROUP

Pump Tests Part 1

0 *records for RN* **136514**

Pump Tests Part 2

0 *records for RN* **136514**

Bore Conditions

0 *records for RN* **136514**

Elevations

0 *records for RN* **136514**

Water Analysis Part 1

0 *records for RN* **136514**

Water Analysis Part 2

0 *records for RN* **136514**

Water Levels

0 *records for RN* **136514**

Wire Line Logs

0 *records for RN* **136514**

Field Measurements

0 *records for RN* **136514**

Special Water Analysis

0 *records for RN* **136514**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
136700	Sub-Artesian Facility	Existing	30/06/2006	Rockhampton	6370 - ROCKHAMPTON REGIONAL COUNCIL

Details

Description			
Parish	4161 - SAN JOSE		
Original Name			
Driller Name	ORR, JAMES THOMAS		
Drill Company	ABCO		
Const Method	ROTARY AIR		
Bore Line			
D/O File No	520/00130	**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date		**Data Owner**	
Roles	Water Supply		

Location

Latitude	23-40-02	**Basin**	1300
Longitude	150-43-21	**Sub-area**	
GIS Latitude	-23.6672222	**Lot**	86
GIS Longitude	150.7225	**Plan**	DS185
Easting	267720		
Northing	7380762	**Map Scale**	
Zone	56	**Map Series**	M - Metric Series
Accuracy		**Map No**	9050
GPS Accuracy		**Map Name**	BAJOOL
Checked	Yes	**Prog Section**	

Casing

3 ***records for RN*** **136700**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	29/06/2006	1	0.00	28.65	Polyvinyl Chloride			140
A	29/06/2006	2	19.51	28.65	Perforated or Slotted Casing			
A	29/06/2006	3	0.00	5.79	Grout			

Strata Logs

7 ***records for RN*** **136700**

Bore Report

From Year:

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	0.30	TOPSOIL , GRAVEL BROWN
2	0.30	1.52	CLAY RED BROWN
3	1.52	2.74	CLAY YELLOW GREY
4	2.74	3.66	CLAY RED -GREY
5	3.66	24.08	SILTSTONE YELLOW-BROWN, DAMP, MED-SOFT
6	24.08	28.65	SILTSTONE, YELLOW-BLUE, SLIGHT FRACTURS 79FT TO 85FT
7			.025L/S BY 85FT, 85FT TO 94FT YELLOW-BLUE MED

Stratigraphies

0 *records for RN* **136700**

Aquifers

1 *records for RN* **136700**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	24.08	28.65	MDST - Mudstone	29/06/2006	-10.06	N	1800PPM	0.03	N	FR	MOUNT HOLLY FORMATION

Pump Tests Part 1

0 *records for RN* **136700**

Pump Tests Part 2

0 *records for RN* **136700**

Bore Conditions

0 *records for RN* **136700**

Elevations

0 *records for RN* **136700**

Water Analysis Part 1

0 *records for RN* **136700**

Water Analysis Part 2

0 *records for RN* **136700**

Water Levels

0 *records for RN* **136700**

Wire Line Logs

0 *records for RN* **136700**

Bore Report

From Year:

Field Measurements

0 *records for RN* **136700**

Special Water Analysis

0 *records for RN* **136700**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
151465	Sub-Artesian Facility	Existing	08/07/2011	Rockhampton	3360 - GLADSTONE REGIONAL

Details

Description			
Parish	2798 - LANGMORN		
Original Name			
Driller Name	FORD, KENNETH FRANCIS		
Drill Company	FORD DRILLING		
Const Method	ROTARY AIR		
Bore Line			
D/O File No	520/001/97	**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date	10/07/2011	**Data Owner**	
Roles	Sub-Artesian Monitoring		

Location

Latitude	23-48-49	**Basin**	1300
Longitude	150-58-47	**Sub-area**	
GIS Latitude	-23.81357358	**Lot**	3
GIS Longitude	150.9796912	**Plan**	DSN801264
Easting	294188		
Northing	7364948	**Map Scale**	104 - 1: 100 000
Zone	56	**Map Series**	M - Metric Series
Accuracy		**Map No**	9050
GPS Accuracy		**Map Name**	BAJOOL
Checked	Yes	**Prog Section**	2

Casing

5 ***records for RN*** **151465**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	08/07/2011	1	0.00	18.00	Polyvinyl Chloride	11.000	WT - Wall Thickness	140
A	08/07/2011	2	12.00	18.00	Screen	2.000	AP - Aperture Size	
A	08/07/2011	3	10.00	18.00	Gravel Pack	5.000	GR - Gravel Size	170
A	08/07/2011	4	5.00	10.00	Cuttings or other fill between casing and hole wall			170
A	08/07/2011	5	0.00	5.00	Grout			170

Bore Report

From Year:

Strata Logs

5 *records for RN* **151465**

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	1.00	BROWN TOPSOIL
2	1.00	6.00	BROWN CLAY
3	6.00	12.00	BROKEN VOLCANICS
4	12.00	15.00	VOLCANICS
5	15.00	18.00	VOLCANICS

Stratigraphies

0 *records for RN* **151465**

Aquifers

1 *records for RN* **151465**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	12.00	18.00	VOLC - Volcanic	08/07/2011	-2.00	N	1850 MS/CM	0.30	Y	FR	ROCKHAMPTON GROUP

Pump Tests Part 1

0 *records for RN* **151465**

Pump Tests Part 2

0 *records for RN* **151465**

Bore Conditions

0 *records for RN* **151465**

Elevations

0 *records for RN* **151465**

Water Analysis Part 1

0 *records for RN* **151465**

Water Analysis Part 2

0 *records for RN* **151465**

Water Levels

0 *records for RN* **151465**

Wire Line Logs

0 *records for RN* **151465**

Bore Report

From Year:

Field Measurements

0 *records for RN* **151465**

Special Water Analysis

0 *records for RN* **151465**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
151478	Sub-Artesian Facility	Existing	05/08/2011	Rockhampton	6370 - ROCKHAMPTON REGIONAL COUNCIL

Details

Description			
Parish	4035 - ROCKHAMPTON		
Original Name			
Driller Name	SAINSBURY, RICHARD BRUCE		
Drill Company	R&G DRILLING PTY LTD		
Const Method	CABLE TOOL		
Bore Line			
D/O File No	520/001/29	**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date	15/08/2011	**Data Owner**	
Roles	Water Supply		

Location

Latitude	23-23-32	**Basin**	1300
Longitude	150-27-06	**Sub-area**	
GIS Latitude	-23.39226159	**Lot**	432
GIS Longitude	150.4516596	**Plan**	LIV401245
Easting	239544		
Northing	7410755	**Map Scale**	104 - 1: 100 000
Zone	56	**Map Series**	M - Metric Series
Accuracy		**Map No**	8951
GPS Accuracy		**Map Name**	RIDGELANDS
Checked	Yes	**Prog Section**	2

Casing

6 ***records for RN*** **151478**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	15/08/2011	1	0.00	19.86	Stainless Steel	9.200	WT - Wall Thickness	273
A	15/08/2011	2	22.85	23.85	Screen	0.060	AP - Aperture Size	220
A	15/08/2011	3	21.85	22.85	Screen	0.040	AP - Aperture Size	220
A	15/08/2011	4	19.85	21.85	Screen	0.030	AP - Aperture Size	220
X	15/08/2011	5	0.00	5.00	Grout			350

Bore Report

From Year:

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
X	15/08/2011	6	0.00	19.86	Gravel Pack			270

Strata Logs

7 *records for RN* **151478**

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	0.60	BACKFILL
2	0.60	1.80	BROWN CLAY
3	1.80	6.00	BROWN CLAYEY SAND
4	6.00	17.80	FINE TO COARSE SAND
5	17.80	18.00	CLAY BAND GREY
6	18.00	23.60	FINE TO COARSE SAND & GRAVEL
7	23.60	29.40	CLAY-BOUND GRAVEL, NO WATER

Stratigraphies

0 *records for RN* **151478**

Aquifers

1 *records for RN* **151478**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	6.70	23.60	SAND - Sand	15/08/2011	-6.70	N	3800 MS/CM	31.50	Y	UC	FITZROY RIVER ALLUVIUM

Pump Tests Part 1

0 *records for RN* **151478**

Pump Tests Part 2

0 *records for RN* **151478**

Bore Conditions

0 *records for RN* **151478**

Elevations

0 *records for RN* **151478**

Bore Report

From Year:

Water Analysis Part 1	**0** *records for RN* **151478**
Water Analysis Part 2	**0** *records for RN* **151478**
Water Levels	**0** *records for RN* **151478**
Wire Line Logs	**0** *records for RN* **151478**
Field Measurements	**0** *records for RN* **151478**
Special Water Analysis	**0** *records for RN* **151478**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
151508	Sub-Artesian Facility	Existing	18/07/2011	Rockhampton	3360 - GLADSTONE REGIONAL

Details

Description			
Parish	3374 - MT LARCOM		
Original Name			
Driller Name	MCLEAN, WAYNE ROBERT		
Drill Company	BURNETT DRILLING CO.		
Const Method	ROTARY MUD		
Bore Line			
D/O File No	520/001/40	**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date	05/09/2011	**Data Owner**	
Roles	Sub-Artesian Monitoring		

Location

Latitude	23-51-58	**Basin**	1320
Longitude	151-05-06	**Sub-area**	
GIS Latitude	-23.86609029	**Lot**	1
GIS Longitude	151.0851094	**Plan**	SP144430
Easting	305009		
Northing	7359280	**Map Scale**	104 - 1: 100 000
Zone	56	**Map Series**	M - Metric Series
Accuracy		**Map No**	9150
GPS Accuracy		**Map Name**	GLADSTONE
Checked	Yes	**Prog Section**	34232

Casing

7 ***records for RN*** **151508**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	18/07/2011	1	0.00	12.50	Polyvinyl Chloride	5.000	WT - Wall Thickness	30
A	18/07/2011	2	12.50	18.50	Screen	0.400	AP - Aperture Size	30
A	18/07/2011	3	3.00	15.00	Centraliser			
X	18/07/2011	4	11.00	18.50	Gravel Pack	2.000	GR - Gravel Size	98
X	18/07/2011	5	18.50	18.70	Bentonite Seal			98

Bore Report

From Year:

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
X	18/07/2011	6	10.00	11.00	Bentonite Seal			98
X	18/07/2011	7	0.00	10.00	Grout			100

Strata Logs

4 *records for RN* **151508**

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	1.00	GRAVEL/CLAY - LIGHT BROWN
2	1.00	10.00	FRACTURED SILTSTONE - GREY/BROWN
3	10.00	16.00	SILACEOUSFRACTURED SILTSTONE
4	16.00	20.30	ARENITE, FINE TO COURSE GRAINED - GREY

Stratigraphies

0 *records for RN* **151508**

Aquifers

1 *records for RN* **151508**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	12.50	18.50	SSTO - Siltstone	18/07/2011	-9.99	N			Y	PS	ROCKHAMPTON GROUP

Pump Tests Part 1

0 *records for RN* **151508**

Pump Tests Part 2

0 *records for RN* **151508**

Bore Conditions

0 *records for RN* **151508**

Elevations

0 *records for RN* **151508**

Water Analysis Part 1

0 *records for RN* **151508**

Water Analysis Part 2

0 *records for RN* **151508**

Bore Report

From Year:

Water Levels

0 *records for RN* **151508**

Wire Line Logs

0 *records for RN* **151508**

Field Measurements

0 *records for RN* **151508**

Special Water Analysis

0 *records for RN* **151508**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
151508	Sub-Artesian Facility	Existing	18/07/2011	Rockhampton	3360 - GLADSTONE REGIONAL

Details

Description			
Parish	3374 - MT LARCOM		
Original Name			
Driller Name	MCLEAN, WAYNE ROBERT		
Drill Company	BURNETT DRILLING CO.		
Const Method	ROTARY MUD		
Bore Line			
D/O File No	520/001/40	**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date	05/09/2011	**Data Owner**	
Roles	Sub-Artesian Monitoring		

Location

Latitude	23-51-58	**Basin**	1320
Longitude	151-05-06	**Sub-area**	
GIS Latitude	-23.86609029	**Lot**	1
GIS Longitude	151.0851094	**Plan**	SP144430
Easting	305009		
Northing	7359280	**Map Scale**	104 - 1: 100 000
Zone	56	**Map Series**	M - Metric Series
Accuracy		**Map No**	9150
GPS Accuracy		**Map Name**	GLADSTONE
Checked	Yes	**Prog Section**	34232

Casing

7 ***records for RN*** **151508**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	18/07/2011	1	0.00	12.50	Polyvinyl Chloride	5.000	WT - Wall Thickness	30
A	18/07/2011	2	12.50	18.50	Screen	0.400	AP - Aperture Size	30
A	18/07/2011	3	3.00	15.00	Centraliser			
X	18/07/2011	4	11.00	18.50	Gravel Pack	2.000	GR - Gravel Size	98
X	18/07/2011	5	18.50	18.70	Bentonite Seal			98

Bore Report

From Year:

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
X	18/07/2011	6	10.00	11.00	Bentonite Seal			98
X	18/07/2011	7	0.00	10.00	Grout			100

Strata Logs

4 *records for RN* **151508**

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	1.00	GRAVEL/CLAY - LIGHT BROWN
2	1.00	10.00	FRACTURED SILTSTONE - GREY/BROWN
3	10.00	16.00	SILACEOUSFRACTURED SILTSTONE
4	16.00	20.30	ARENITE, FINE TO COURSE GRAINED - GREY

Stratigraphies

0 *records for RN* **151508**

Aquifers

1 *records for RN* **151508**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	12.50	18.50	SSTO - Siltstone	18/07/2011	-9.99	N			Y	PS	ROCKHAMPTON GROUP

Pump Tests Part 1

0 *records for RN* **151508**

Pump Tests Part 2

0 *records for RN* **151508**

Bore Conditions

0 *records for RN* **151508**

Elevations

0 *records for RN* **151508**

Water Analysis Part 1

0 *records for RN* **151508**

Water Analysis Part 2

0 *records for RN* **151508**

Bore Report

From Year:

Water Levels

0 *records for RN* **151508**

Wire Line Logs

0 *records for RN* **151508**

Field Measurements

0 *records for RN* **151508**

Special Water Analysis

0 *records for RN* **151508**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
161276	Sub-Artesian Facility	Existing	24/06/2015	Rockhampton	3360 - GLADSTONE REGIONAL

Details

Description			
Parish	897 - CALLIOPE		
Original Name	BH02		
Driller Name	MONTELEONE, PETER		
Drill Company	GEODRILL AUSTRALIA		
Const Method	ROTARY MUD		
Bore Line			
D/O File No		**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date	07/07/2015	**Data Owner**	
Roles	Mine Monitoring		

Location

Latitude	23-49-47	**Basin**	1320
Longitude	151-09-21	**Sub-area**	
GIS Latitude	-23.8296017922	**Lot**	8
GIS Longitude	151.1557678744	**Plan**	SP218634
Easting	312153		
Northing	7363417	**Map Scale**	
Zone	56	**Map Series**	
Accuracy		**Map No**	
GPS Accuracy		**Map Name**	
Checked	Yes	**Prog Section**	

Casing

5 ***records for RN*** **161276**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	24/06/2015	1	0.00	17.00	Polyvinyl Chloride	5.000	WT - Wall Thickness	60
A	24/06/2015	2	17.00	20.00	Perforated or Slotted Casing	1.000	AP - Aperture Size	60
X	24/06/2015	3	0.00	6.50	Grout			200
X	24/06/2015	4	6.50	7.00	Bentonite Seal			96
X	24/06/2015	5	7.00	20.00	Gravel Pack			96

Bore Report

From Year:

Strata Logs

5 *records for RN* **161276**

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	4.50	GRAVELLY CLAY (FILL)
2	4.50	8.00	SILTY CLAY (NATURAL)
3	8.00	9.50	GRAVELLY CLAY
4	9.50	10.50	GRAVELLY CLAY/WEATHERED ROCK
5	10.50	20.00	MW ROCK (BEDROCK)

Stratigraphies

0 *records for RN* **161276**

Aquifers

0 *records for RN* **161276**

Pump Tests Part 1

0 *records for RN* **161276**

Pump Tests Part 2

0 *records for RN* **161276**

Bore Conditions

0 *records for RN* **161276**

Elevations

0 *records for RN* **161276**

Water Analysis Part 1

0 *records for RN* **161276**

Water Analysis Part 2

0 *records for RN* **161276**

Water Levels

0 *records for RN* **161276**

Wire Line Logs

0 *records for RN* **161276**

Field Measurements

0 *records for RN* **161276**

Special Water Analysis

0 *records for RN* **161276**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
161276	Sub-Artesian Facility	Existing	24/06/2015	Rockhampton	3360 - GLADSTONE REGIONAL

Details

Description			
Parish	897 - CALLIOPE		
Original Name	BH02		
Driller Name	MONTELEONE, PETER		
Drill Company	GEODRILL AUSTRALIA		
Const Method	ROTARY MUD		
Bore Line			
D/O File No		**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date	07/07/2015	**Data Owner**	
Roles	Mine Monitoring		

Location

Latitude	23-49-47	**Basin**	1320
Longitude	151-09-21	**Sub-area**	
GIS Latitude	-23.8296017922	**Lot**	8
GIS Longitude	151.1557678744	**Plan**	SP218634
Easting	312153		
Northing	7363417	**Map Scale**	
Zone	56	**Map Series**	
Accuracy		**Map No**	
GPS Accuracy		**Map Name**	
Checked	Yes	**Prog Section**	

Casing

5 ***records for RN*** **161276**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	24/06/2015	1	0.00	17.00	Polyvinyl Chloride	5.000	WT - Wall Thickness	60
A	24/06/2015	2	17.00	20.00	Perforated or Slotted Casing	1.000	AP - Aperture Size	60
X	24/06/2015	3	0.00	6.50	Grout			200
X	24/06/2015	4	6.50	7.00	Bentonite Seal			96
X	24/06/2015	5	7.00	20.00	Gravel Pack			96

Bore Report

From Year:

Strata Logs

5 *records for RN* **161276**

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	4.50	GRAVELLY CLAY (FILL)
2	4.50	8.00	SILTY CLAY (NATURAL)
3	8.00	9.50	GRAVELLY CLAY
4	9.50	10.50	GRAVELLY CLAY/WEATHERED ROCK
5	10.50	20.00	MW ROCK (BEDROCK)

Stratigraphies

0 *records for RN* **161276**

Aquifers

0 *records for RN* **161276**

Pump Tests Part 1

0 *records for RN* **161276**

Pump Tests Part 2

0 *records for RN* **161276**

Bore Conditions

0 *records for RN* **161276**

Elevations

0 *records for RN* **161276**

Water Analysis Part 1

0 *records for RN* **161276**

Water Analysis Part 2

0 *records for RN* **161276**

Water Levels

0 *records for RN* **161276**

Wire Line Logs

0 *records for RN* **161276**

Field Measurements

0 *records for RN* **161276**

Special Water Analysis

0 *records for RN* **161276**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
161277	Sub-Artesian Facility	Existing	23/06/2015	Rockhampton	3360 - GLADSTONE REGIONAL

Details

Description	BH01		
Parish	897 - CALLIOPE		
Original Name	BH01		
Driller Name	MONTELEONE, PETER		
Drill Company	GEODRILL AUSTRALIA		
Const Method	ROTARY MUD		
Bore Line			
D/O File No		**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date	07/07/2015	**Data Owner**	
Roles	Mine Monitoring		

Location

Latitude	23-49-42	**Basin**	1320
Longitude	151-09-24	**Sub-area**	
GIS Latitude	-23.82824791	**Lot**	8
GIS Longitude	151.15657214	**Plan**	SP218634
Easting	312233		
Northing	7363568	**Map Scale**	
Zone	56	**Map Series**	
Accuracy		**Map No**	
GPS Accuracy		**Map Name**	
Checked	Yes	**Prog Section**	

Casing

5 ***records for RN*** **161277**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	23/06/2015	1	0.00	15.00	Polyvinyl Chloride	4.950	WT - Wall Thickness	60
A	23/06/2015	2	15.00	18.00	Perforated or Slotted Casing	1.000	AP - Aperture Size	60
A	23/06/2015	3	6.00	18.00	Gravel Pack			96
X	23/06/2015	4	5.50	6.00	Bentonite Seal			96
X	23/06/2015	5	0.00	5.50	Grout			96

Bore Report

From Year:

Strata Logs

3 *records for RN* **161277**

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	4.50	CLAY, GRVELLY, FILL
2	4.50	7.00	CLAY, GRAVELLY, NATURAL
3	7.00	18.00	CLAY, SILTY, SANDY

Stratigraphies

0 *records for RN* **161277**

Aquifers

0 *records for RN* **161277**

Pump Tests Part 1

0 *records for RN* **161277**

Pump Tests Part 2

0 *records for RN* **161277**

Bore Conditions

0 *records for RN* **161277**

Elevations

0 *records for RN* **161277**

Water Analysis Part 1

0 *records for RN* **161277**

Water Analysis Part 2

0 *records for RN* **161277**

Water Levels

0 *records for RN* **161277**

Wire Line Logs

0 *records for RN* **161277**

Field Measurements

0 *records for RN* **161277**

Special Water Analysis

0 *records for RN* **161277**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
161277	Sub-Artesian Facility	Existing	23/06/2015	Rockhampton	3360 - GLADSTONE REGIONAL

Details

Description	BH01		
Parish	897 - CALLIOPE		
Original Name	BH01		
Driller Name	MONTELEONE, PETER		
Drill Company	GEODRILL AUSTRALIA		
Const Method	ROTARY MUD		
Bore Line			
D/O File No		**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date	07/07/2015	**Data Owner**	
Roles	Mine Monitoring		

Location

Latitude	23-49-42	**Basin**	1320
Longitude	151-09-24	**Sub-area**	
GIS Latitude	-23.82824791	**Lot**	8
GIS Longitude	151.15657214	**Plan**	SP218634
Easting	312233		
Northing	7363568	**Map Scale**	
Zone	56	**Map Series**	
Accuracy		**Map No**	
GPS Accuracy		**Map Name**	
Checked	Yes	**Prog Section**	

Casing

5 ***records for RN*** **161277**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	23/06/2015	1	0.00	15.00	Polyvinyl Chloride	4.950	WT - Wall Thickness	60
A	23/06/2015	2	15.00	18.00	Perforated or Slotted Casing	1.000	AP - Aperture Size	60
A	23/06/2015	3	6.00	18.00	Gravel Pack			96
X	23/06/2015	4	5.50	6.00	Bentonite Seal			96
X	23/06/2015	5	0.00	5.50	Grout			96

Bore Report

From Year:

Strata Logs

3 *records for RN* **161277**

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	4.50	CLAY, GRVELLY, FILL
2	4.50	7.00	CLAY, GRAVELLY, NATURAL
3	7.00	18.00	CLAY, SILTY, SANDY

Stratigraphies

0 *records for RN* **161277**

Aquifers

0 *records for RN* **161277**

Pump Tests Part 1

0 *records for RN* **161277**

Pump Tests Part 2

0 *records for RN* **161277**

Bore Conditions

0 *records for RN* **161277**

Elevations

0 *records for RN* **161277**

Water Analysis Part 1

0 *records for RN* **161277**

Water Analysis Part 2

0 *records for RN* **161277**

Water Levels

0 *records for RN* **161277**

Wire Line Logs

0 *records for RN* **161277**

Field Measurements

0 *records for RN* **161277**

Special Water Analysis

0 *records for RN* **161277**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
161467	Sub-Artesian Facility	Existing	24/02/2016	Rockhampton	3360 - GLADSTONE REGIONAL

Details

Description			
Parish	6000 - NO LONGER USED		
Original Name			
Driller Name	SUTTON, JASON		
Drill Company	BGD		
Const Method	ROTARY AIR		
Bore Line			
D/O File No		**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date	30/05/2016	**Data Owner**	
Roles	Water Supply		

Location

Latitude	23-48-54	**Basin**	1300
Longitude	150-59-03	**Sub-area**	
GIS Latitude	-23.81504796	**Lot**	8
GIS Longitude	150.98422833	**Plan**	RP620660
Easting	294653		
Northing	7364791	**Map Scale**	
Zone	56	**Map Series**	
Accuracy		**Map No**	
GPS Accuracy		**Map Name**	
Checked	Yes	**Prog Section**	

Casing

6 ***records for RN*** **161467**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	24/02/2016	1	0.00	49.00	Polyvinyl Chloride	6.000	WT - Wall Thickness	140
A	24/02/2016	2	38.00	47.00	Perforated or Slotted Casing	1.000	AP - Aperture Size	140
X	24/02/2016	3	0.00	6.00	Grout			200
X	24/02/2016	4	6.00	8.00	Bentonite Seal			200
X	24/02/2016	5	8.00	49.00	Gravel Pack			200

Bore Report

From Year:

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
X	24/02/2016	6	6.00	42.00	Centraliser			

Strata Logs

7 *records for RN* **161467**

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	5.00	FILL
2	5.00	12.00	WEATHERED ROCK
3	12.00	40.00	MUDSTONE
4	40.00	41.00	SMALL FRACTURES
5	41.00	45.00	MUDSTONE
6	45.00	46.00	SMALL FRACTURES
7	46.00	49.00	MUDSTONE

Stratigraphies

0 *records for RN* **161467**

Aquifers

2 *records for RN* **161467**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	40.00	41.00	MDST - Mudstone	24/02/2016	-13.00	N	POTABLE	0.10	Y	FR	ROCKHAMPTON GROUP
2	46.00	49.00	MDST - Mudstone	24/02/2016	-13.00	N	POTABLE	0.11	Y	PS	ROCKHAMPTON GROUP

Pump Tests Part 1

1 *records for RN* **161467**

Pipe	Date	Rec	RN of Pumped Bore	Top (m)	Bottom (m)	Dist (m)	Meth	Test Types	Pump Type	Suction Set (m)	Q Prior to Test (l/s)	Dur of Q PR (mins)	Pres on Arriv (m)	Q on Arriv (l/s/)
A	24/02/2016	1	161467				PUM			46.00				

Pump Tests Part 2

1 *records for RN* **161467**

Bore Report

From Year:

Pipe	Date	Rec	Test Dur (mins)	SWL(m)	Recov Time (mins)	Resid DD (m)	Max DD or P RED (m)	Q at Max DD (l/s)	Time to Max DD (mins)	Max Q (l/s)	Calc Stat HD (m)	Design Yield (l/s)	Design BP (m)	Suct. Set (m)	Tmsy (m2/Day)	Stor
A	24/02/2016	1	120	-13.00			33.00	0.11						46.00		

Bore Conditions

0 *records for RN* **161467**

Elevations

0 *records for RN* **161467**

Water Analysis Part 1

0 *records for RN* **161467**

Water Analysis Part 2

0 *records for RN* **161467**

Water Levels

0 *records for RN* **161467**

Wire Line Logs

0 *records for RN* **161467**

Field Measurements

1 *records for RN* **161467**

Pipe	Date	Depth (m)	Conduct (uS/cm)	pH	Temp (C)	NO3 (mg/L)	DO2 (mg/L)	Eh (mV)	Alkalinity (mV)	Samp	Method	Samp	Source
A	24/02/2016		1560	6.9						PU	Pump - Other or Flowing Bore	GB	Groundwater - from Bore

Special Water Analysis

0 *records for RN* **161467**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
161716	Sub-Artesian Facility	Existing	01/12/2017	Rockhampton	3360 - GLADSTONE REGIONAL

Details

Description			
Parish	6000 - NO LONGER USED		
Original Name	DPMW6		
Driller Name	SAINSBURY, RICHARD BRUCE		
Drill Company	J & S DRILLING		
Const Method	ROTARY AIR		
Bore Line			
D/O File No		**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date	08/12/2017	**Data Owner**	
Roles	Sub-Artesian Monitoring		

Location

Latitude	23-51-35	**Basin**	1320
Longitude	151-04-28	**Sub-area**	
GIS Latitude	-23.85964821	**Lot**	1
GIS Longitude	151.07439683	**Plan**	SP144430
Easting	303908		
Northing	7359979	**Map Scale**	
Zone	56	**Map Series**	
Accuracy		**Map No**	
GPS Accuracy		**Map Name**	
Checked	Yes	**Prog Section**	

Casing

10 ***records for RN*** **161716**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	01/12/2017	1	0.00	48.00	Polyvinyl Chloride	3.350	WT - Wall Thickness	60
A	01/12/2017	2	36.00	48.00	Perforated or Slotted Casing	1.000	AP - Aperture Size	60
X	01/12/2017	3	0.00	10.00	Polyvinyl Chloride	8.800	WT - Wall Thickness	160
X	01/12/2017	4	0.00	10.00	Grout			250
X	01/12/2017	5	0.00	32.00	Grout			143

Bore Report

From Year:

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
X	01/12/2017	6	32.00	34.00	Bentonite Seal			143
X	01/12/2017	7	34.00	48.00	Gravel Pack	3.000	GR - Gravel Size	143
X	01/12/2017	8	48.00	49.00	Bentonite Seal			143
X	01/12/2017	9	49.00	53.00	Cuttings or other fill between casing and hole wall			143
X	01/12/2017	10	3.00	47.00	Centraliser			

Strata Logs

4 *records for RN* **161716**

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	1.50	WEATHERED SILTSTONE
2	1.50	8.50	SILTSTONE: FIRM
3	8.50	10.00	SILTSTONE: HARD
4	10.00	56.00	BLUE SILTSTONE

Stratigraphies

0 *records for RN* **161716**

Aquifers

1 *records for RN* **161716**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	36.00	48.00	SSTO - Siltstone			N	7.25 MS		Y	PS	ROCKHAMPTON GROUP

Pump Tests Part 1

1 *records for RN* **161716**

Pipe	Date	Rec	RN of Pumped Bore	Top (m)	Bottom (m)	Dist (m)	Meth	Test Types	Pump Type	Suction Set (m)	Q Prior to Test (l/s)	Dur of Q PR (mins)	Pres on Arriv (m)	Q on Arriv (l/s/)
A	01/12/2017	1	161716				PUM			48.00				

Pump Tests Part 2

1 *records for RN* **161716**

Bore Report

From Year:

Pipe	Date	Rec	Test Dur (mins)	SWL(m)	Recov Time (mins)	Resid DD (m)	Max DD or P RED (m)	Q at Max DD (l/s)	Time to Max DD (mins)	Max Q (l/s)	Calc Stat HD (m)	Design Yield (l/s)	Design BP (m)	Suct. Set (m)	Tmsy (m2/Day)	Stor
A	01/12/2017	1		-3.72										48.00		

Bore Conditions

0 *records for RN* **161716**

Elevations

0 *records for RN* **161716**

Water Analysis Part 1

0 *records for RN* **161716**

Water Analysis Part 2

0 *records for RN* **161716**

Water Levels

0 *records for RN* **161716**

Wire Line Logs

0 *records for RN* **161716**

Field Measurements

0 *records for RN* **161716**

Special Water Analysis

0 *records for RN* **161716**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
161927	Sub-Artesian Facility	Existing	08/08/2018	Rockhampton	3360 - GLADSTONE REGIONAL

Details

Description			
Parish	6000 - NO LONGER USED		
Original Name			
Driller Name	SIDELNIK, DANIEL		
Drill Company	J & S DRILLING		
Const Method	ROTARY AIR		
Bore Line			
D/O File No		**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date	31/08/2018	**Data Owner**	
Roles	Sub-Artesian Monitoring		

Location

Latitude	23-49-32	**Basin**	1320
Longitude	151-09-26	**Sub-area**	
GIS Latitude	-23.82569001	**Lot**	8
GIS Longitude	151.15710886	**Plan**	SP218634
Easting	312284		
Northing	7363852	**Map Scale**	
Zone	56	**Map Series**	
Accuracy		**Map No**	
GPS Accuracy		**Map Name**	
Checked	Yes	**Prog Section**	

Casing

5 ***records for RN*** **161927**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	08/08/2018	1	0.00	20.70	Polyvinyl Chloride	5.000	WT - Wall Thickness	64
A	08/08/2018	2	20.70	26.70	Perforated or Slotted Casing	0.500	AP - Aperture Size	64
X	08/08/2018	3	0.00	13.15	Grout			150
X	08/08/2018	4	13.15	14.10	Bentonite Seal			150
X	08/08/2018	5	14.10	26.70	Gravel Pack	3.000	GR - Gravel Size	150

Bore Report

From Year:

Strata Logs

2 *records for RN* **161927**

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	8.00	GRAVEL/SANDS CLAYS
2	8.00	21.00	CLAYS WITH SILT/SAND

Stratigraphies

0 *records for RN* **161927**

Aquifers

1 *records for RN* **161927**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	14.50	21.10	CLAY - Clay			N			Y	SC	QUATERNARY - UNDEFINED

Pump Tests Part 1

0 *records for RN* **161927**

Pump Tests Part 2

0 *records for RN* **161927**

Bore Conditions

0 *records for RN* **161927**

Elevations

0 *records for RN* **161927**

Water Analysis Part 1

0 *records for RN* **161927**

Water Analysis Part 2

0 *records for RN* **161927**

Water Levels

0 *records for RN* **161927**

Wire Line Logs

0 *records for RN* **161927**

Field Measurements

0 *records for RN* **161927**

Special Water Analysis

0 *records for RN* **161927**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
161930	Sub-Artesian Facility	Existing	11/08/2018	Rockhampton	3360 - GLADSTONE REGIONAL

Details

Description			
Parish	6000 - NO LONGER USED		
Original Name			
Driller Name	SIDELNIK, DANIEL		
Drill Company	J & S DRILLING		
Const Method	ROTARY AIR		
Bore Line			
D/O File No		**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date	31/08/2018	**Data Owner**	
Roles	Sub-Artesian Monitoring		

Location

Latitude	23-49-30	**Basin**	1320
Longitude	151-09-16	**Sub-area**	
GIS Latitude	-23.82499904	**Lot**	8
GIS Longitude	151.15444892	**Plan**	SP218634
Easting	312012		
Northing	7363925	**Map Scale**	
Zone	56	**Map Series**	
Accuracy		**Map No**	
GPS Accuracy		**Map Name**	
Checked	Yes	**Prog Section**	

Casing

5 ***records for RN*** **161930**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	11/08/2018	1	0.00	15.00	Polyvinyl Chloride	5.000	WT - Wall Thickness	64
A	11/08/2018	2	15.00	18.00	Perforated or Slotted Casing	0.500	AP - Aperture Size	64
X	11/08/2018	3	0.00	12.60	Grout			150
X	11/08/2018	4	12.60	13.80	Bentonite Seal			150
X	11/08/2018	5	13.80	18.00	Gravel Pack			150

Bore Report

From Year:

Strata Logs

2 *records for RN* **161930**

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	8.00	GRAVELS/SANDS/CLAY
2	8.00	12.00	CLAYS/SILT/SANDS

Stratigraphies

0 *records for RN* **161930**

Aquifers

1 *records for RN* **161930**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	15.00		CLAY - Clay SAND - Sand			N			Y	SC	QUATERNARY - UNDEFINED

Pump Tests Part 1

0 *records for RN* **161930**

Pump Tests Part 2

0 *records for RN* **161930**

Bore Conditions

0 *records for RN* **161930**

Elevations

0 *records for RN* **161930**

Water Analysis Part 1

0 *records for RN* **161930**

Water Analysis Part 2

0 *records for RN* **161930**

Water Levels

0 *records for RN* **161930**

Wire Line Logs

0 *records for RN* **161930**

Field Measurements

0 *records for RN* **161930**

Special Water Analysis

0 *records for RN* **161930**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
187131	Sub-Artesian Facility	Existing	03/02/2019	Rockhampton	3360 - GLADSTONE REGIONAL

Details

Description			
Parish	6000 - NO LONGER USED		
Original Name	BH03		
Driller Name	ANDERSON, TIMOTHY		
Drill Company	J & S DRILLING		
Const Method	ROTARY MUD		
Bore Line			
D/O File No		**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date	15/03/2019	**Data Owner**	
Roles	Sub-Artesian Monitoring		

Location

Latitude	23-52-32	**Basin**	1320
Longitude	151-04-51	**Sub-area**	
GIS Latitude	-23.87560016	**Lot**	1
GIS Longitude	151.08071967	**Plan**	SP144430
Easting	304576		
Northing	7358221	**Map Scale**	
Zone	56	**Map Series**	
Accuracy		**Map No**	
GPS Accuracy		**Map Name**	
Checked	Yes	**Prog Section**	

Casing

5 ***records for RN*** **187131**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	03/02/2019	1	0.00	13.50	Polyvinyl Chloride	5.000	WT - Wall Thickness	60
A	03/02/2019	2	10.50	13.50	Perforated or Slotted Casing	0.400	AP - Aperture Size	60
X	03/02/2019	3	0.00	8.50	Grout			115
X	03/02/2019	4	8.50	9.50	Bentonite Seal			115
X	03/02/2019	5	9.50	14.00	Gravel Pack			115

Bore Report

From Year:

Strata Logs

2 *records for RN* **187131**

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	13.00	ENGINEERED FILL (BOULDERS, PEBBLES, GRAVELS WITH CLAY)
2	13.00	14.00	LIGHT YELLOW/BROWN MED CLAY

Stratigraphies

0 *records for RN* **187131**

Aquifers

1 *records for RN* **187131**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	10.50	13.50	CGRY - Clayey Gravel	03/02/2019	-10.68	N	BRACKISH		Y	SC	

Pump Tests Part 1

1 *records for RN* **187131**

Pipe	Date	Rec	RN of Pumped Bore	Top (m)	Bottom (m)	Dist (m)	Meth	Test Types	Pump Type	Suction Set (m)	Q Prior to Test (l/s)	Dur of Q PR (mins)	Pres on Arriv (m)	Q on Arriv (l/s/)
A	03/02/2019	1	187131				PUM		AIR					

Pump Tests Part 2

1 *records for RN* **187131**

Pipe	Date	Rec	Test Dur (mins)	SWL(m)	Recov Time (mins)	Resid DD (m)	Max DD or P RED (m)	Q at Max DD (l/s)	Time to Max DD (mins)	Max Q (l/s)	Calc Stat HD (m)	Design Yield (l/s)	Design BP (m)	Suct. Set (m)	Tmsy (m2/Day)	Stor
A	03/02/2019	1	180	-10.68												

Bore Conditions

0 *records for RN* **187131**

Elevations

0 *records for RN* **187131**

Water Analysis Part 1

0 *records for RN* **187131**

Bore Report

From Year:

Water Analysis Part 2

0 *records for RN* **187131**

Water Levels

0 *records for RN* **187131**

Wire Line Logs

0 *records for RN* **187131**

Field Measurements

0 *records for RN* **187131**

Special Water Analysis

0 *records for RN* **187131**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
196042	Sub-Artesian Facility	Existing	13/05/2021	Rockhampton	6370 - ROCKHAMPTON REGIONAL COUNCIL

Details

Description			
Parish	6000 - NO LONGER USED		
Original Name			
Driller Name	WATKINSON, ANTHONY		
Drill Company	JAB DRILLING		
Const Method	ROTARY AIR		
Bore Line			
D/O File No		**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date	26/05/2021	**Data Owner**	
Roles	Water Supply		

Location

Latitude	23-41-07	**Basin**	1300
Longitude	150-43-50	**Sub-area**	
GIS Latitude	-23.685197664	**Lot**	
GIS Longitude	150.7306038114	**Plan**	
Easting	268578		
Northing	7378784	**Map Scale**	
Zone	56	**Map Series**	
Accuracy		**Map No**	
GPS Accuracy		**Map Name**	
Checked	Yes	**Prog Section**	

Casing

6 ***records for RN*** **196042**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	13/05/2021	1	0.00	25.00	Polyvinyl Chloride			140
A	13/05/2021	2	13.00	25.00	Perforated or Slotted Casing	1.000	AP - Aperture Size	140
X	13/05/2021	3	0.00	2.00	Steel Casing	6.400	WT - Wall Thickness	200
X	13/05/2021	4	0.00	8.00	Grout			190
X	13/05/2021	5	8.00	10.00	Bentonite Seal			190

Bore Report

From Year:

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
X	13/05/2021	6	10.00	25.00	Gravel Pack			190

Strata Logs

3 *records for RN* **196042**

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	2.00	FILL/OVERBURDEN/ROCKS
2	2.00	18.00	WEATHERED SILTSTONE: HARD
3	18.00	25.00	BLUE ROCK

Stratigraphies

0 *records for RN* **196042**

Aquifers

1 *records for RN* **196042**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	18.00		SSTO - Siltstone	13/05/2021	-10.00	N	BRACKISH	0.25	Y	WZ	MOUNT ALMA FORMATION

Pump Tests Part 1

0 *records for RN* **196042**

Pump Tests Part 2

0 *records for RN* **196042**

Bore Conditions

0 *records for RN* **196042**

Elevations

0 *records for RN* **196042**

Water Analysis Part 1

0 *records for RN* **196042**

Water Analysis Part 2

0 *records for RN* **196042**

Water Levels

0 *records for RN* **196042**

Bore Report

From Year:

Wire Line Logs

0 *records for RN* **196042**

Field Measurements

1 *records for RN* **196042**

Pipe	Date	Depth (m)	Conduct (uS/cm)	pH	Temp (C)	NO3 (mg/L)	DO2 (mg/L)	Eh (mV)	Alkalinity (mV)	Samp	Method	Samp	Source
A	13/05/2021		3300							XX	Unknown	GB	Groundwater - from Bore

Special Water Analysis

0 *records for RN* **196042**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
196059	Sub-Artesian Facility	Existing	23/06/2021	Rockhampton	3360 - GLADSTONE REGIONAL

Details

Description			
Parish	6000 - NO LONGER USED		
Original Name	B07		
Driller Name	PARDOEN, DANIEL		
Drill Company	NUMAC DRILLING		
Const Method	AUGER		
Bore Line			
D/O File No		**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date	28/06/2021	**Data Owner**	
Roles	Sub-Artesian Monitoring		

Location

Latitude	23-49-41	**Basin**	1320
Longitude	151-08-54	**Sub-area**	
GIS Latitude	-23.8280685472	**Lot**	8
GIS Longitude	151.1483887072	**Plan**	SP218634
Easting	311399		
Northing	7363577	**Map Scale**	
Zone	56	**Map Series**	
Accuracy		**Map No**	
GPS Accuracy		**Map Name**	
Checked	Yes	**Prog Section**	

Casing

4 ***records for RN*** **196059**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	23/06/2021	1	0.00	4.00	Polyvinyl Chloride	5.000	WT - Wall Thickness	60
A	23/06/2021	2	4.00	12.00	Perforated or Slotted Casing	0.500	AP - Aperture Size	60
X	23/06/2021	3	0.00	3.50	Grout			150
X	23/06/2021	4	3.50	12.00	Cuttings or other fill between casing and hole wall			150

Strata Logs

4 ***records for RN*** **196059**

Bore Report

From Year:

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	5.00	FILL - SANDY CLAY
2	5.00	7.00	FILL - GRAVELS
3	7.00	10.00	FILL - SANDY CLAYS
4	10.00	12.00	WEATHERED SANDSTONE

Stratigraphies
0 *records for RN* **196059**

Aquifers
0 *records for RN* **196059**

Pump Tests Part 1
0 *records for RN* **196059**

Pump Tests Part 2
0 *records for RN* **196059**

Bore Conditions
0 *records for RN* **196059**

Elevations
0 *records for RN* **196059**

Water Analysis Part 1
0 *records for RN* **196059**

Water Analysis Part 2
0 *records for RN* **196059**

Water Levels
0 *records for RN* **196059**

Wire Line Logs
0 *records for RN* **196059**

Field Measurements
0 *records for RN* **196059**

Special Water Analysis
0 *records for RN* **196059**

Bore Report

From Year:

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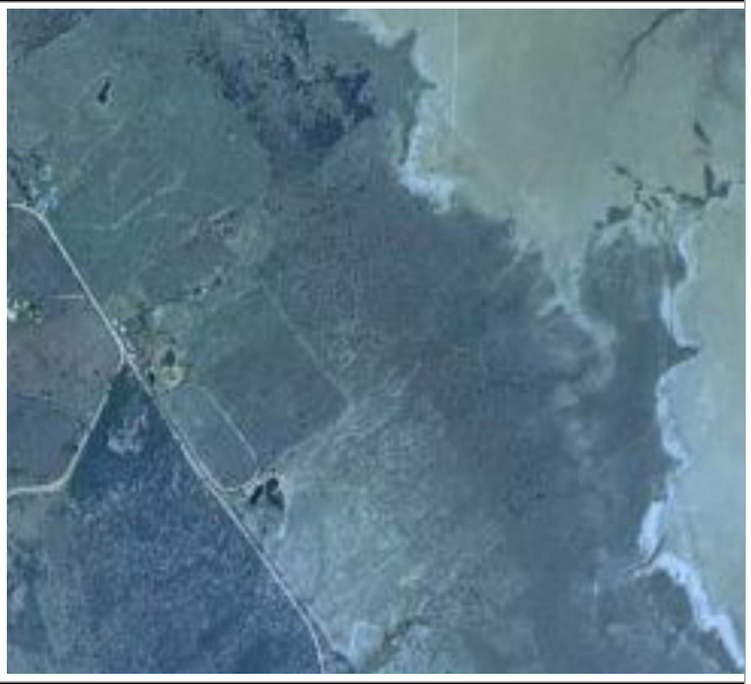
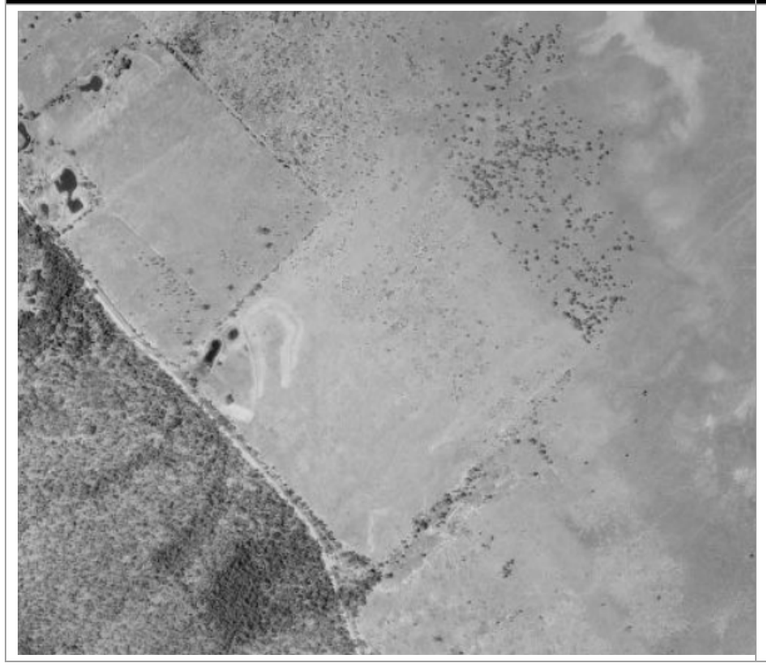
Historical Aerial Photographs

Aerial review

Lot 101 on DS185		
1956	1973	1985
		
1990	1999	2004
		

Aerial review

Lot 101 on DS185		
2010	2014	2020
		

Aerial review

Lot 1 on RP911260		
1956	1965	1983
		
1992	1996	2010
		

Aerial review

Lot 1 on RP911260		
2014	2020	
		

Aerial review

Lot 91 on SP122250
1959

1965

Aerial review

Lot 91 on SP122250
1980

1989

Aerial review

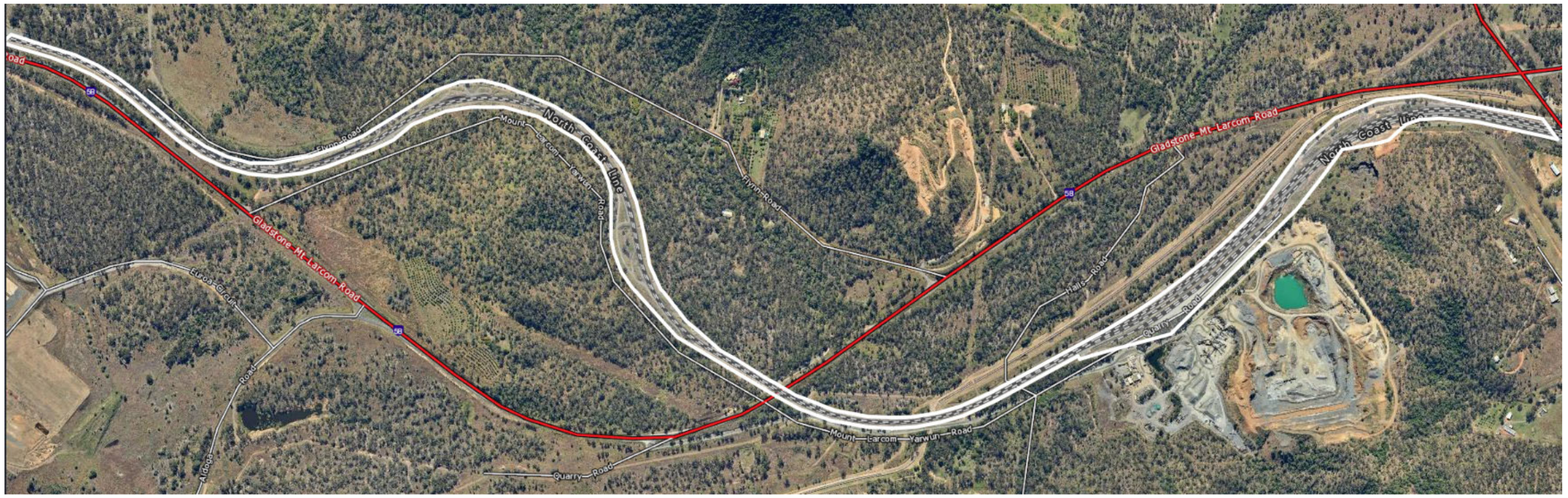
Lot 91 on SP122250

1996

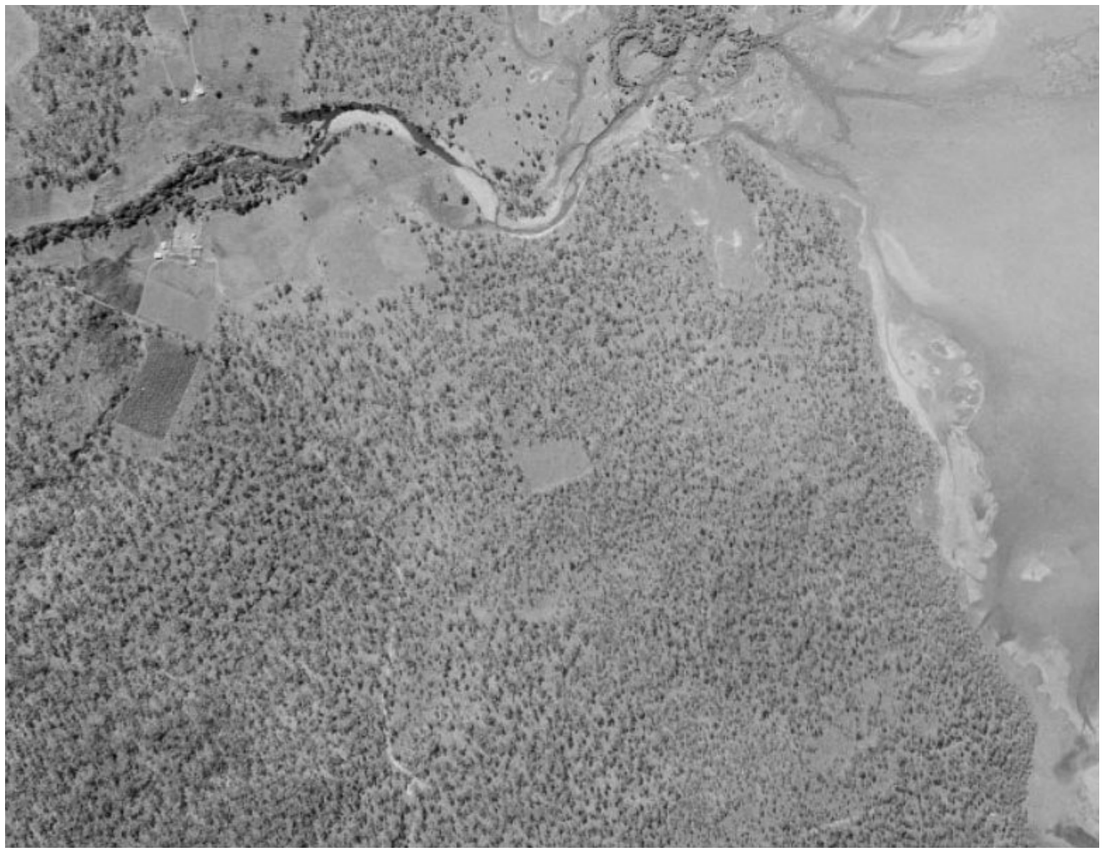
2015

Aerial review

Lot 91 on SP122250
2021



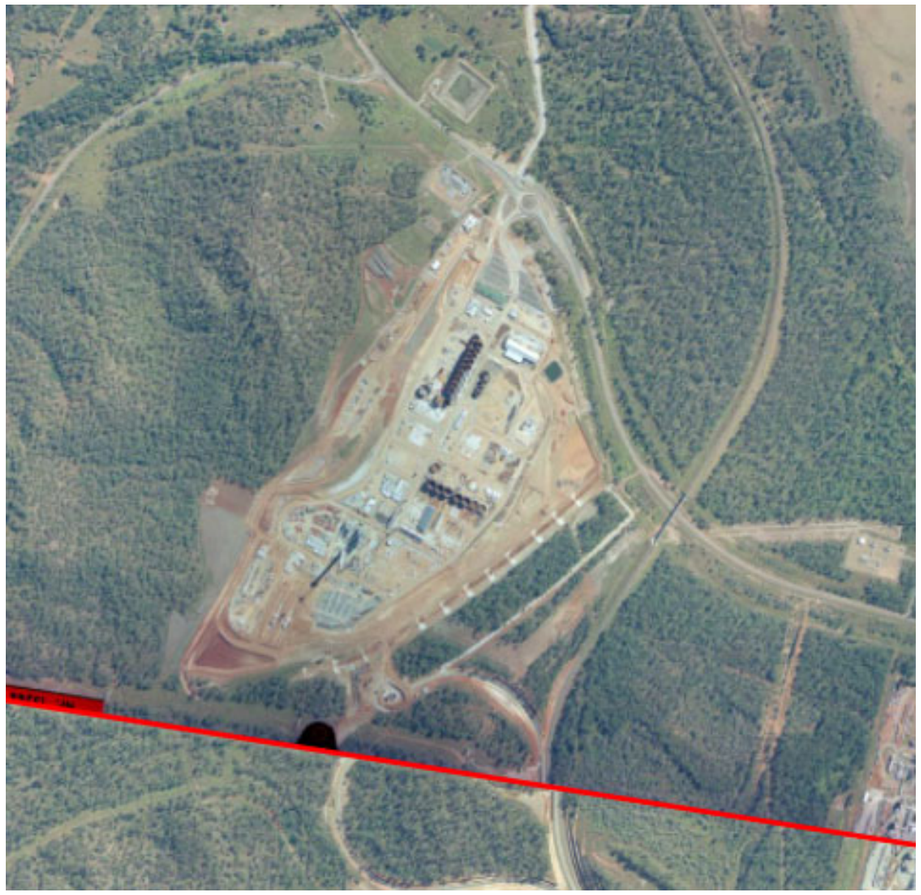
Aerial review

Lot 7 on SP145439 and Lot 8 on SP218634	
1959	1973
	

Aerial review

Lot 7 on SP145439 and Lot 8 on SP218634	
1981	1992
	

Aerial review

Lot 7 on SP145439 and Lot 8 on SP218634	
2003	2009
	

Aerial review

Lot 7 on SP145439 and Lot 8 on SP218634	
2015	2020
	

Aerial review

Lot 140 on SP22252
1959

Aerial review

Lot 140 on SP22252
1965

Aerial review

Lot 140 on SP22252

1981

Aerial review

Lot 140 on SP22252
1994

Aerial review

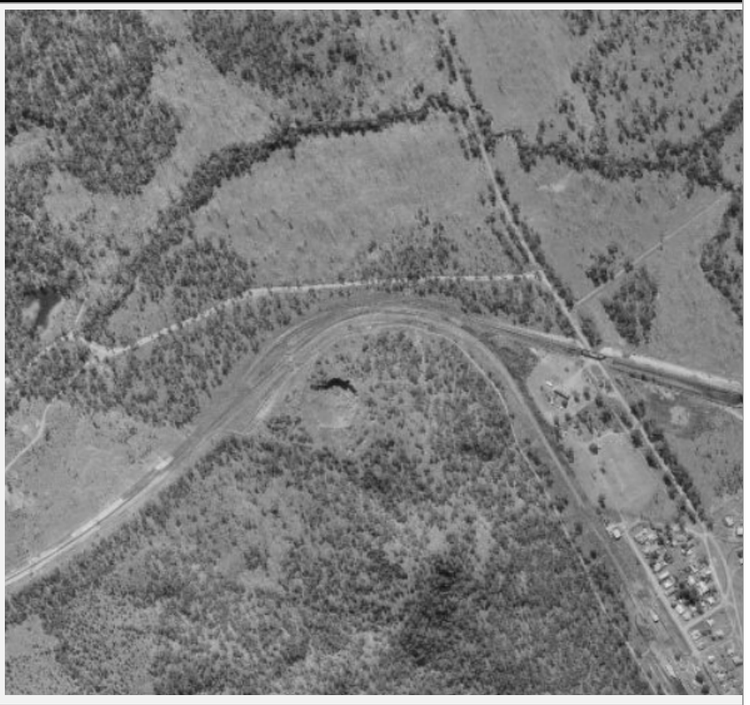
Lot 140 on SP22252
2007

Aerial review

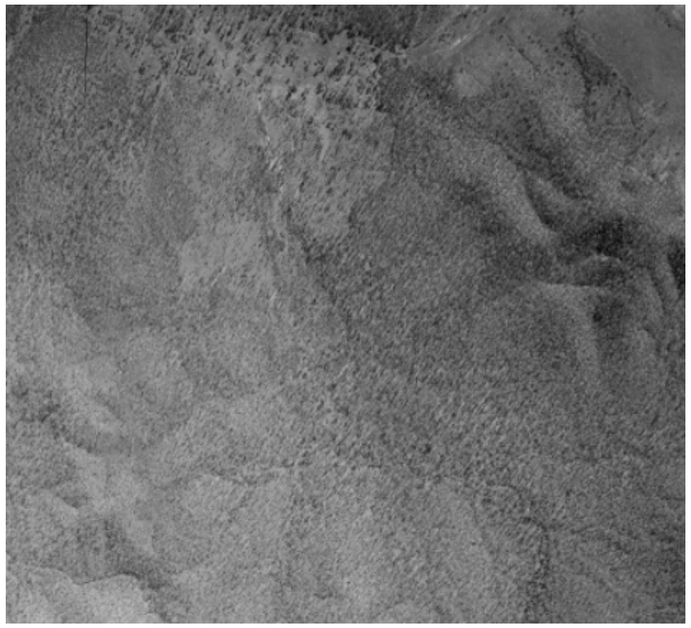
Lot 140 on SP22252

2017

Aerial review

Lot 12 on SP190336		
1959	1969	1979
		
1996	2012	2020
		

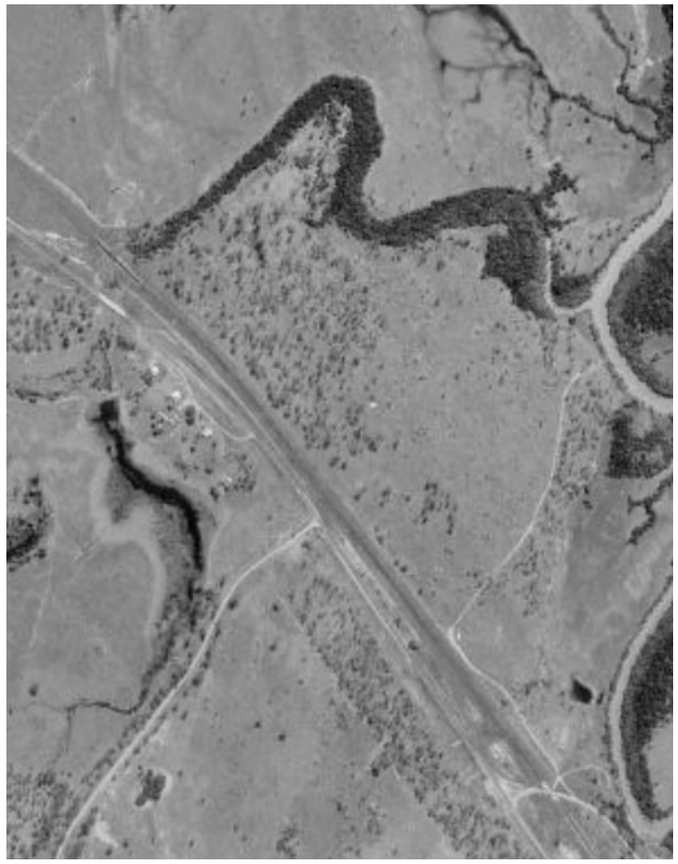
Aerial review

Lot 1 on SP144430		
1959	**1965**	**1981**
		
1992	**2007**	**2014**
		

Aerial review

Lot 1 on SP144430		
2020		
		

Aerial review

Lot 167 & 168 on CP859402		
1956	1973	1985
		

Aerial review

Lot 167 & 168 on CP859402		
1994	2004	2010
		

Aerial review

Lot 167 & 168 on CP859402		
2020		
		

Appendix B

Site specific environmental setting

Table A.1 QLD Globe desktop searches of environmental setting

Site	Geology	Hydrology	Groundwater bore records
1. Lot 101 on DS185	The dominant geology is Qa/1-YARROL/SCAG (alluvium). – Lithological summary: Clay, silt, sand and gravel: intermediate terraces of flood plain alluvium. The north-east area of the site's dominant rock is Qhe/m-YARROL/SCAG (miscellaneous unconsolidated sediments). – Lithological summary: Mud, sandy mud, muddy sand and minor gravel: estuarine channels and banks, supratidal flats and coastal grasslands.	There are three dams located on the south-west area of the site.	3 x registered groundwater boreholes within 320 m of the site. – RN136700 – RN122757 (abandoned and destroyed) – RN122758 (abandoned and destroyed).
2. Lot 1 on RP911260	The dominant rock is Stanthorpe Granite/a (arenite-mudrock). – Lithological summary: Chert, jasper, mudstone, siltstone, lithic sandstone, limestone and altered basalt.	There are two unnamed waterways that intersect the north-east and north-west corners of the site.	The closest groundwater bore is approximately 470 m south-west of the site. – RN111438
3. Lot 91 on SP122250	The site has four geology types and are listed in order from west to east of the site. The far western site's dominant rock is Chalmers Formation (mixed sedimentary rocks and felsites). – Lithological summary: Siltstone, lithic sandstone, rhyolitic to andesitic volcaniclastic breccia, rhyolitic and dacitic tuff, minor andesitic tuff. The next surface geology is TQr-QLD (colluvium as the dominant rock). – Lithological summary: Clay, silt, sand, gravel and soil; colluvial and residual deposits (generally on older land surfaces). The next surface geology is Qa-QLD (alluvium as the dominant rock). – Lithological summary: Clay, silt, sand and gravel; flood-plain alluvium. The east area of the site has the Lakes Creek Formation (arenite-mudrock as the dominant rock). – Lithological summary: Siltstone and lithic sandstone.	The site is intersected by 5 unnamed streams and Sandy Creek. There are 7 unnamed reservoirs that are adjacent to the site.	There is a groundwater bore 40 m south of the east area of the site. – RN88341.
4. Lot 7 on SP145439	There are two geology types in this site. The major surface geology is Qa-QLD (alluvium as the dominant rock). – Lithological summary: Clay, silt, sand and gravel; flood-plain alluvium. The minor geology (which is in the west-east area of the site) has the Doonside Formation (arenite-mudrock as the dominant rock). – Lithological summary: Chert, jasper, mudstone, siltstone, lithic sandstone, limestone and altered basalt.	There is a waterway with several legs that runs parallel through the western portion of the site.	3 x registered groundwater boreholes 200m within the site. – RN161277 – RN161276 – RN88338.
5. Lot 140 on SP122252	There are five geology types in this site. Half of the site on the western side has the same geology, while the eastern half has a variety of four geology types.	There are four unnamed waterways that intersect the site. There is also an unnamed waterway that	3 x registered groundwater boreholes 400m within the site.

Site	Geology	Hydrology	Groundwater bore records
	The western side of the site has the Rockhampton Group (dominant rock that is sedimentary). – Lithological summary: Dark grey mudstone, siltstone, felsic volcaniclastic sandstone, polymictic conglomerate, ooid-bearing sandstone and conglomerate with mudstone rip-up clasts; oolitic and pisolitic limestone and minor skeletal limestone; rare rhyolitic ignimbrite. The eastern side of the site has the following geology: – TQa-QLD. Alluvium is the dominant rock. – Lithological summary: Locally red-brown mottled, poorly consolidated sand, silt, clay, minor gravel; high-level alluvial deposits (generally related to present stream valleys but commonly dissected) – TQr\r-YARROL/SCAG. Colluvium is the dominant rock. – Lithological summary: Red soil; colluvial and residual deposits derived from mafic rocks – PRg/b-YARROL/SCAG. Gabbroid is the dominant rock. – Lithological summary: Grey, fine to coarse-grained, equigranular to porphyritic gabbro, hornblende diorite and quartz diorite to biotite-hornblende quartz monzodiorite – TQr-QLD. Colluvium is the dominant rock. – Lithological summary: Clay, silt, sand, gravel and soil; colluvial and residual deposits (generally on older land surfaces).	runs parallel to the west area of the site.	– RN151465 – RN111458 (abandoned but still useable) – RN161467.
6. Lot 8 on SP218634	This site has two geology types. The main geology spreads across the north, west and east portion of the site. The dominant geology is Doonside Formation (arenite-mudrock). – Lithological summary: Chert, jasper, mudstone, siltstone, lithic sandstone, limestone and altered basalt. The secondary geology in the southern portion of the site is Qa-QLD (alluvium). – Lithological summary: Clay, silt, sand and gravel; flood-plain alluvium.	There is a lake in the north area and a reservoir and canal lines in the east of the site (in the Yarwun Alumina Refinery). There are several legs from Boat Creek in the north and west area of the site and several legs from an unnamed watercourse stream in the south-west area of the site.	5 x registered groundwater boreholes within the site. – RN196059 – RN161276 – RN161277 – RN161927 – RN161930
7. Lot 12 on SP190336	This site has two geology types. The main type is within the middle (north to south) area of the site. The dominant geology is Lakes Creek Formation (arenite-mudrock). – Lithological summary: Siltstone and lithic sandstone. The secondar geology is present in the far west and east areas of the site. The dominant geology is Qa-QLD (alluvium). – Lithological summary: Clay, silt, sand and gravel; flood-plain alluvium.	There are two reservoirs (one in the north-west area and one in the south area). There are several legs from Sandy Creek in the north-west area of the site as well as several waterway streams throughout the site.	2 x registered groundwater boreholes within 30m of the site. – RN88339 – RN136514.

Site	Geology	Hydrology	Groundwater bore records
8. Lot 1 on SP144430	This site has two geology types. The main geology is present within the entire east, west and south area. The dominant geology is Rockhampton Group (sedimentary rock). – Lithological summary: Dark, grey mudstone, siltstone, felsic volcaniclastic sandstone, polymictic conglomerate, ooid-bearing sandstone and conglomerate with mudstone rip-up clasts; oolitic and pisolitic limestone and minor skeletal limestone; rare rhyolitic ignimbrite. The secondary geology is present in a small area of the northern portion. The dominant geology is TQa-QLD (alluvium). – Lithological summary: Locally red-brown mottled, poorly consolidated sand, silt, clay, minor gravel; high-level alluvial deposits (generally related to present stream valleys but commonly dissected).	There are three reservoirs within the site (stored red mud slurry). There are three water course streams in the southern area, with one stream coming from Gravel Creek.	There are over 50 registered groundwater boreholes within the site. For simplification, 1 borehole in each section of the site was taken. – North (RN161716) – South (RN187131) – East (151508) – West (RN151508)
9. Lot 2 on RP608546	This site has three geology types. The main geology is present in the north and west portion of the site. The dominant geology is Mount Alma Formation (arenite-mudrock). – Lithological summary: Thinly interbedded fine-grained sandstone and siltstone and thick beds of conglomerate with andesitic to dacitic clasts and siltstone rip-up-clasts. The secondary geology is present in the south portion of the site. The dominant geology is Qa-QLD (alluvium). – Lithological summary: Clay, silt, sand and gravel; flood-plain alluvium. The minor geology is present along the eastern side of the site. The dominant geology is Qa/1-YARROL/SCAG (alluvium). – Lithological summary: Clay, silt, sand and gravel: intermediate terraces of flood plain alluvium.	There are three reservoirs along the eastern side of the site. There is an unnamed watercourse stream that runs approximately 70m north of the site. There is another unnamed watercourse stream that runs diagonal to the south-west corner.	1 x registered groundwater bore approximately 110m south of the site. – RN196042.
10. Lot 250 on R2621	The site has one geology type. The dominant geology is Qa/1-YARROL/SCAG (alluvium). – Lithological summary: Clay, silt, sand and gravel: intermediate terraces of flood plain alluvium.	There are no watercourses within the site. There is a reservoir approximately 160m north of the site. There are three lakes within 600m south of the site.	1 x registered groundwater bore approximately 130m east of the site. – RN151478.