3 Water Street Red Hill 4059
T: +61 7 3368 1033
E: information@ardent-group.com.au
W: ardent-group.com.au
ABN: 38 609 696 764

PROGRESSIVE REHABILITATION AND CLOSURE PLAN

AGRIPOWER AUSTRALIA LIMITED
CONJUBOY DIATOMACEOUS EARTH PROJECT (ML 10279)

EA NUMBER: EPML00392513
EA HOLDERS: GREENVALE SILICON PTY LTD AND DIATOMACEOUS EARTH INVESTMENTS PTY LTD
EA HOLDER CONTACT DETAILS: c/- Ardent Group Pty Ltd PO BOX 320, RED HILL QLD 4059

AGP008_V02
18 OCTOBER 2021
VERSION 02

Document Control Sheet

Ardent Group Pty Ltd	
Street Address:	3 Water Street, Red Hill Qld 4059
Postal Address:	PO Box 320 Red Hill Qld 4059
Phone:	+61 7 3368 1033
Email:	Information@ardent-group.com.au
Web:	www.ardent-group.com.au

Project:	AGP008	Issue Date:	18 OCTOBER 2021
Title:	PROGRESSIVE REHABILIATION AND CLOSURE PLAN (VERSION 01)		
Project Manager:	RICHARD SMITH		
Author:	MARGARET HARRIS		
Client:	AGRIPOWER AUSTRALIA LIMITED		
Client Contact:	JONATHAN ROBBESON / PETER PRENTICE		

Revision Number	Date
Rev A	SEPTEMBER 2020
Rev B	FEBRUARY 2021
Rev C	APRIL 2021
01	28 APRIL 2021
02	18 OCTOBER 2021

Number of Copies									
Revision Number	A	B	C	D	00	01	02	03	04
Ardent Group File							x		
Client							x		
Department							x		

Table of Contents

APPENDICES

PART A – REHABILITATION PLANNING PART

1 PROJECT PLANNING

1.1 BASELINE INFORMATION

The Conjuboy Diatomaceous Earth Project (hereafter "Project") comprises Mining Lease (ML) 10279, Mineral Development Licences (MDL) 325 and 326, and Exploration Permits for Minerals (EPM) 13236, 13995, 19573 and 25110. The holder of all tenements within the Project is Greenvale Silicon Pty Ltd (80%) and Diatomaceous Earth Investments Pty Ltd (20%).

The tenement subject to this Progressive Rehabilitation and Closure Plan (PRC Plan) is ML 10279, which was granted over a "whole surface area" of 133.066 hectares. It is located near Conjuboy in the Charters Towers Region local government area and was granted in 2003 for the mining of diatomaceous earth (DE).

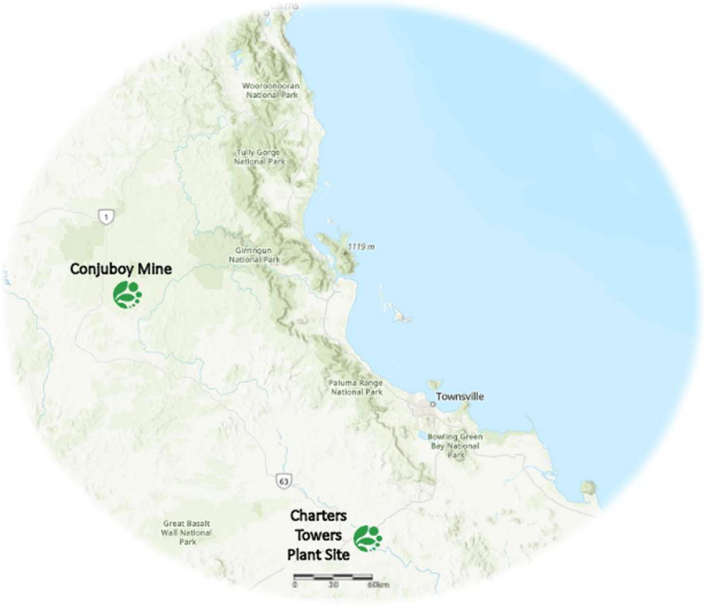


Figure 1 – Conjuboy Mine and Processing Plant Location

1.1.1 Topography

The ML is surrounded by gently sloping lava plains of McBride Basalt (olivine basalt) which are locally dissected. Elevation within the ML area ranges between 500 and 550m. The ML10279 is located on an area covered sporadically with a thin layer (up to 2m) of basalt which covers a laterally persistent sedimentary layer of Diatomite, which to the south has been eroded to uncover an area known as "Greasy Plain".

1.1.2 Climate

The climate of the area is typical of monsoonal northern Australia with most rain falling in the months of December to March, followed by a dry winter. Mean annual rainfall for Conjuboy Station (30061 – 1964-2020) is 663mm. The area is often referred to as the dry tropics or semi-arid sub-tropics.

1.1.3 Geological setting

The lease area lies on the margins of a basalt dome of about 5,000km^2 that forms the McBride Plateau.

The dome comprises numerous basalt lavas that flowed radially outward from 164 volcanic centres. The volcanic centres range from low hills formed by eroded plugs to well preserved cones with craters. The site is adjacent to a low basalt wall that represents the southernmost extension of the lava flows. Lacustrine sediments, including diatomaceous earth were deposited prior to the basalt emplacement. Quaternary Alluvial deposits (clays) occupy dissected areas.

The basement rocks are exposed south of the McBride basalt margin. They include Early Proterozoic to Paleozoic schist, gneiss, migmatite, granite, mafic intrusive rocks, and metamorphosed volcanic and sedimentary rocks. Cambro-Ordovician granite (the Ringwood Park Microgranite) is the only basement lithology cropping out within the southern parts of the Conjuboy MDLs 325 and 326. Figure 2 Geology and cadastre surrounding the Conjuboy Project, shows the local geology in the ML area.

Lacustrine claystone, sandstone and conglomerate occupy a shallow, irregular basin of lake sediments extending about 100km^2. Basalt flows are thought to have dammed ancient drainage features to form the lake. The lake sediments which rest directly on basement rocks were subsequently buried by later basalt flows which have preserved these sedimentary deposits from erosion.

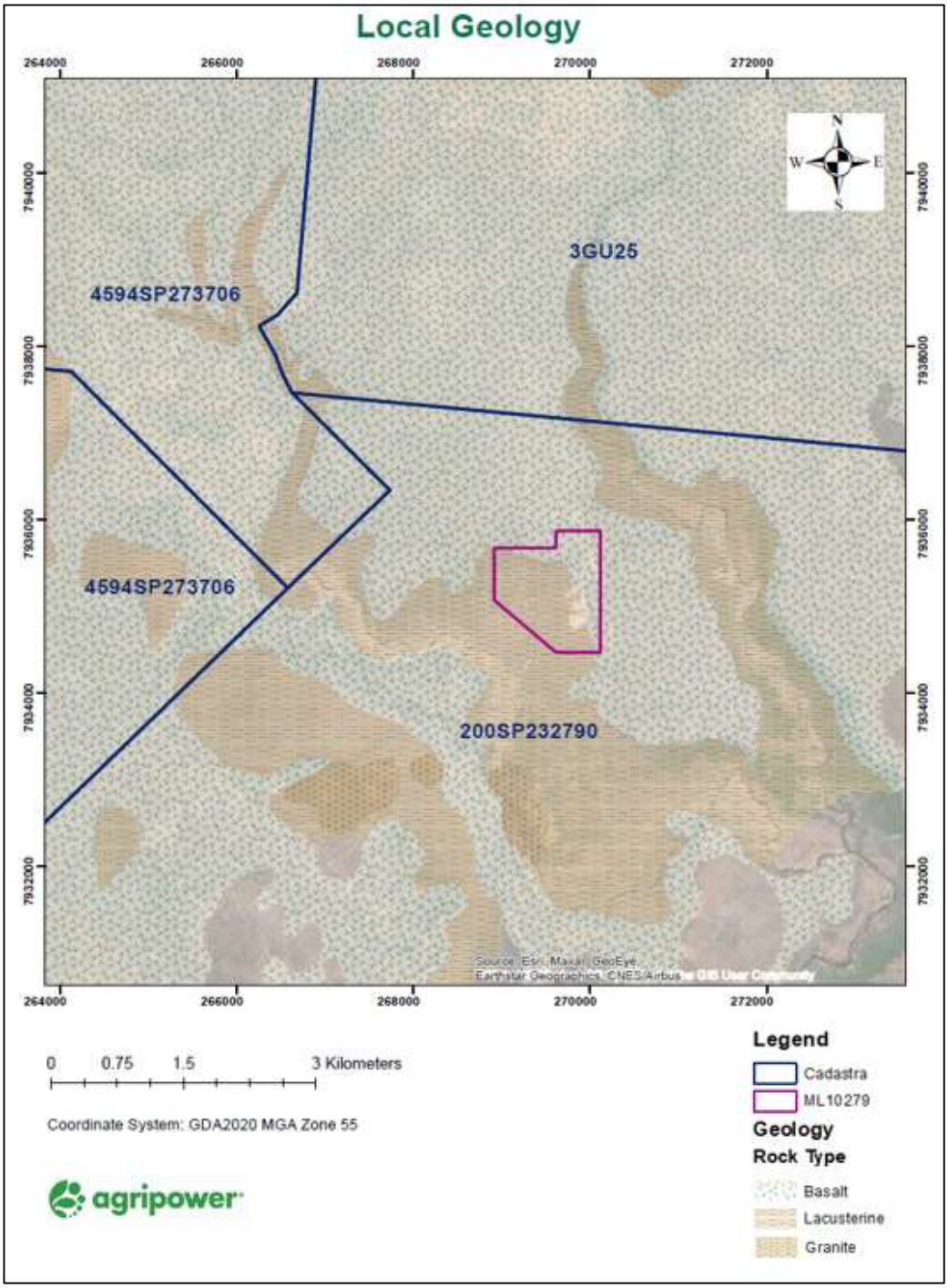


Figure 2 Geology and cadastre surrounding the Conjuboy Project

1.1.4 Site Hydrology and Fluvial Networks

The site is within the catchment of Wyandotte Creek and flows into Dry River, a tributary of the Burdekin River. Drainage from the lease area is dendritic and during the wet season, ephemeral water flows into Wyandotte Creek via the unnamed tributary. The waterways on the lease area are first order streams which form a second order tributary of Wyandotte Creek. The first order streams have relatively small catchment and are bounded by a basalt wall to the north and east. Flow in the intermittent creeks is dependent on seasonal rain and is unlikely to persist after rain events. Downstream surface water uses include agriculture, potable water and recreational uses.

The dry tropics are characterized by episodic summer rainfall, with most of the annual river flow occurring in a short period of time, after which rivers typically contract into a series of waterholes of varying permanence and hydrologic connectivity. The waterways are mostly ephemeral, only flowing after largely unpredictable rainfall and runoff, ceasing to flow within days, supporting aquatic organisms whose life cycles are adapted to these conditions. Surface flow in stream order waterways 1 to 3 will almost certainly be largely ephemeral, especially in areas where sand may be the dominant substrate. However, intermittent pools would possibly persist on some of the more significant waterways (stream order 4 and above) particularly at locations which may have less permeable clay and rock substrates.

1.1.5 Groundwater Levels and Properties

Groundwater is primarily used for watering stock and irrigation of fodder crops. The Conjuboy-Gilldale area and principally the open pit region on ML10279 contains groundwater of variable quality due to prolonged contact with localised rock units. Groundwater permeates through geological horizons as aquifers and are differentiated from each other as separate/ semi-separate aquifers.

Groundwater at the Conjuboy Project is divided between two discernible semi-disconnected aquifers. The primary aquifer which is essentially unconsolidated and porous decomposed basalt and the secondary body which behaves more as an aquitard within lacustrine sediments. This aquitard forms the mineral body mined from the Gilldale pit on ML10279. Aquifer layers are listed from the surface down in Table 1 and depicted in Figure 3.

Hydrogeological properties of geological units and chemistry from various government environmental reports have reported for aquifers in the Greenvale aquifer of pH 7.9 and conductivity 1582 µS/cm (50th percentile).

Groundwater ages vary between 5 to 120 years, these ages have been allocated to the McBride Basalt.

Table 1: Hydrogeological properties of geological units chemistry

Aquifer/Aquitard Layer	Description
BASALT (0- 22 L/Sec)	• Very little to no water (compared to that hosted in sedimentary rock and alluvium) • Weathered and fissured Basalt (1- 22 L/Sec) • Vesicle or fissure hosted water- Hard water • Intra Basalt layer alluvium- secondary and fed from vesical hosted water and fractures within the basalt.
LACUSTRINE SEDIMENTS (DE) (~1-18 L/Sec Indicative value with modal supply likely less than 1 litre a second in the actual diatomite)	• Hosted in pore space fill and separated by swelling clays. • Localised trapping from ionic dissolution (e.g. Limonitic staining). • Water hosted in DE maybe secondary to Basaltic groundwater. • Hosted in Cracks and fissures within diatomite- small disjointed aquifers or interstitial though as a whole the diatomite exists as an impermeable barrier or aquitard.

1.1.6 Basalt Aquifers

Basaltic groundwater usually yields moderately saline groundwater, of typical basaltic composition, being dominated by HCO_3 with even cations. The basalts, as with other fractured rock aquifers, are vulnerable to contamination. This is because rapid recharge from the surface limits the filtering and protecting chemical environment of the soil layer. The storage capacity of a fracture zone may also be hydrologically isolated so that accumulated contaminants are unable to disperse.

Bore reports suggest the strips of alluvium around the streams are of low salinity, NaCl chemistry suggesting an alluvial origin is unlikely. However, small yields of saline Na-Ca-HCO_3 groundwater can be obtained from local fractured basement trap rock at depth, though some of the granite extrusions produced no water showing a lack of fractures and fissures present at least locally.

Basalts of this region are Mg-HCO_3 dominant and of moderate size, consisting of two large basalt tablelands, with a combined area of 9,876km^2, in the Upper Burdekin Sub-basin. The tablelands are divided by trap rocks of the Greenvale Craton Zone. The aquifer system is mostly deep to very deep, extending from 28m to 86m, with 65 per cent of the bores being attributed to basalt, with the rest mostly granite. The data record for the area are however considered limited. The recorded salinity is usually moderate to occasionally low, being between 779µS/cm and 1,550µS/cm. Most of the samples, including all the basalts, are moderate in salinity and dominated by HCO_3 with evenly distributed cations.

1.1.7 Lacustrine Sediment Aquifers

Information on groundwater hosted in Diatomaceous Earth deposits is limited as most of the work has been done on investigations into the use of DE for improving water quality than as a natural host. Diatomaceous earth has been described as an aquitard (aquiclude) or barrier to groundwater in most instances.

Diatomite is known to be highly porous, but its permeability is limited, owing to its very fine-grained nature. Although the diatomite deposit will become saturated by recharge events, it is not considered to represent a significant aquifer unit and is unlikely to permit further vertical infiltration of groundwater. It is considered that the mining operation will not change the chemistry of the groundwater due to the low permeability and neutral nature of the Diatomite.

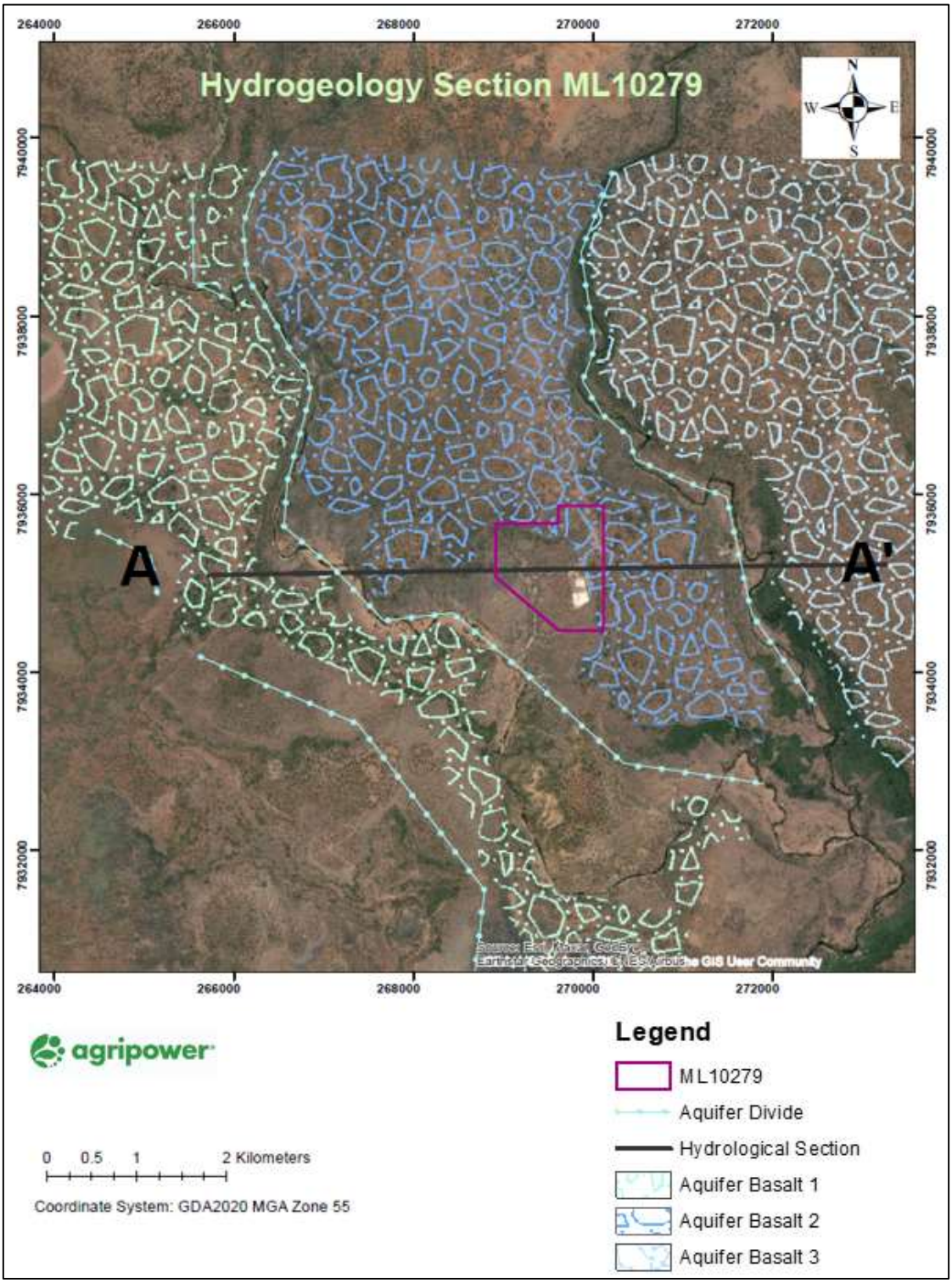


Figure 3 Hydrogeological section location, and aquifers on the Conjuboy Project (ML10279)

1.1.8 Soil Types and Properties

The pre-disturbance soil mapping of the lease area include:

- Red Ferrosol (A1) – red clay soils on basalt (very dark brown, very slightly stony light firm clay),
- Red Ferrosol/Rudosol (A2) – stony red clay soils on basalt (very dark brown very slightly stony light soft clay),
- Black Vertosol (B1) – Dark cracking clay (dark grey stone-free medium very strong clay),
- Tenosol/Calcarosol (C1) – Shallow grey silt loam under tea trees (light greyish brown weak silt loam),
- Red Vertosol (D1) – Red/brown cracking clay (very dark brown, very slightly stony light very strong clay) and
- Tenosol (E1) – greyish brown weak silt loam.

Salvageable surface soils exist on site (30-40cm thick) are collected and stockpiled on site ready to be used in rehabilitation. Some subsoils are sodic and potentially dispersive and are unsuitable for use in rehabilitation and should not be exposed unnecessarily. The distribution of soil types is shown in Figure 4.

The physical description of those soil units (as described in Appendix 3 and reproduced in Table 2 below) will be used to dictate the depth of topsoil to be stripped prior to disturbance for pit development.

Table 2 Topsoil stripping depth by soil type

Soil Unit	Topsoil depth (m)	Topsoil attributes	Subsoil colour
A1	0.1	Very dark brown clay loam	Soil becomes red brown
A2	0.1	Very dark brown clay loam	Soil becomes red brown
B1	0.3	Very dark greyish brown/Black cracking clay	Colour change is difficult to judge. Use total depth as indicator.
C1	0.15	Light greyish brown to greyish brown clay silt	Diatomaceous earth (white)
D1	0.3	Very dark brown to reddish brown clay	Colour change is difficult to judge. Use total depth as indicator.
E1	0	Greyish brown silt loam over white diatomaceous earth	Not to be striped and stored

Topsoil is stripped to depth (using above guidance) using a dozer or loader.

The polygons for each soil type have been measured and the recommended stripping depth applied to determine whether soil availability will meet topsoil rehabilitation cover estimate (refer Section 5.1.3).

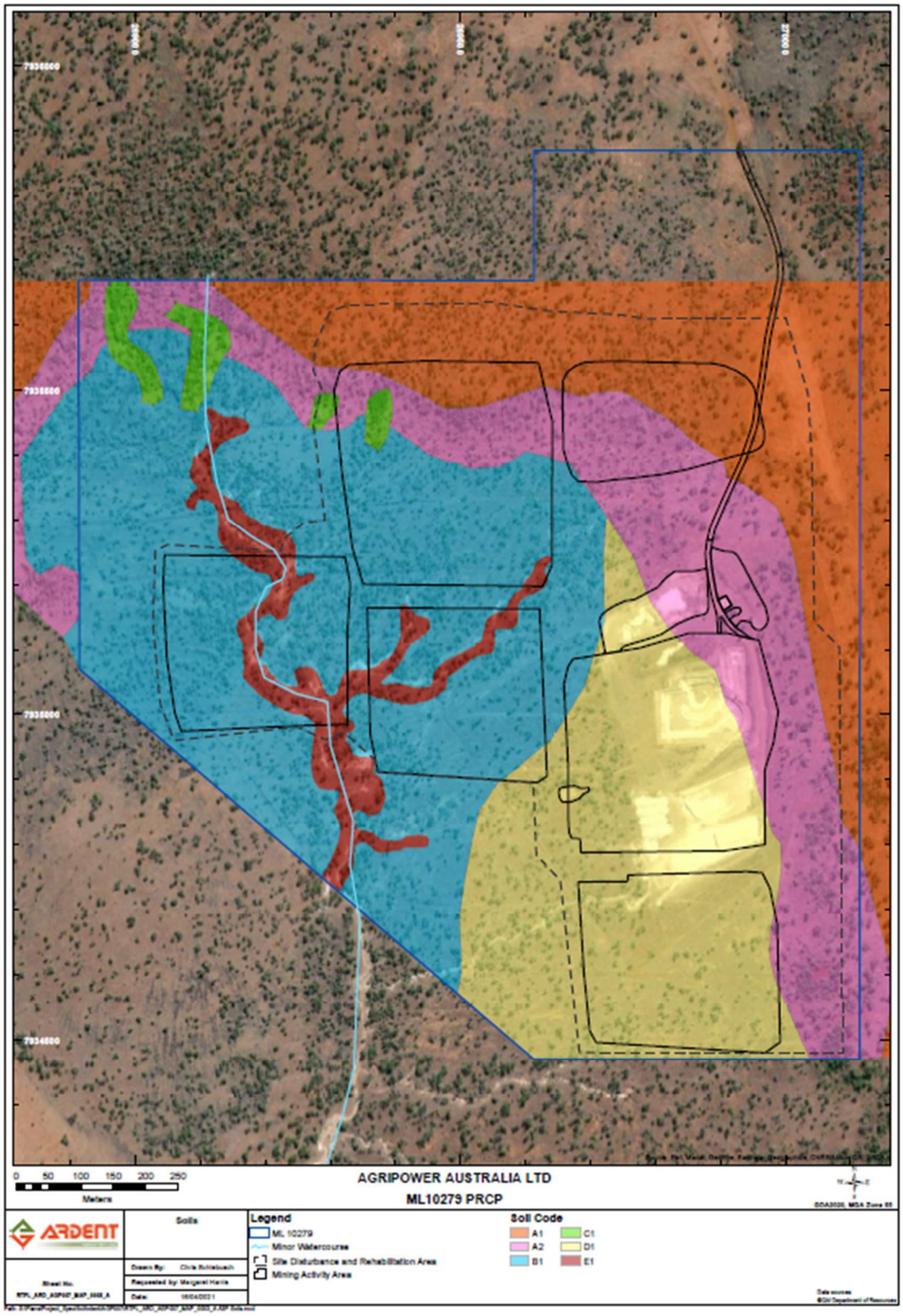


Figure 4: Soil Types over ML 10279

1.1.9 Land Stability

The area is used for cattle grazing on native pastures. There was evidence of soil degradation associated with that land use in the form of accelerated erosion along cattle tracks, watercourse bank damage and severe treading where soils were wet on the pre-mining land surface. Wyandotte Creek has a mean annual stream bank erosion rate of up to 0.5t/yr and mean annual sediment load of up to 50t/ha/yr.

No major structural geology features were observed in and around the open pit. The diatomite is finely bedded but this is almost tabular and flat dipping. The predominant structural features are sub vertical sedimentary dykes. These are probably neptunean dykes and are infilled with various angular clasts and Leonardite, calcrete and dolomite. These vary in thickness from a few millimeters up to 30 cm.

All major structures observed in the open pit were mapped during the pit inspection, with the following results;

- 93% of all structures observed where dykes;
- These dykes range in dip from 55° to 90° but are generally steep with an average dip of 84°;
- These dykes appear to have a random strike orientation;
- The remaining 7% of the observed structure was jointing, with one structure showing indications of micro faulting.

The combination of flat dipping bedding in the diatomite along with sub-vertical dykes is favourable from a geotechnical point of view. No structures were observed that could cause instability by undercutting the faces.

The field strength estimates summarised below are for the C unit, as units A and B are poorly exposed and would be mostly removed during pre-strip;

- The UCS is estimated to be between 3 and 10 MPa. This value is based on standard field strength estimating techniques (Hoek & Bray, 1974);
- The base friction angle is estimated at between 20° and 30°;
- The cohesion was estimated using the Rocscience package, Roclab (2013). For the low confining stresses expected at shallow depth, Roclab predicts a cohesion of 53 kPa and a friction angle of 43°.
- However, field estimates of friction angle are much lower than this and the material appears to have a relatively high cohesion, in the range of 0.2 to 1.0 MPa;
- The rock mass quality was estimated using the Geological Strength Index to be 30.

Testing of the basaltic lava cap is unnecessary, as this is a very high strength material and would only fail along discontinuities in a shallow, open pit scenario.

1.1.10 Agricultural Land Class

The Department of Agriculture and Fisheries define the ML10279 area as Agricultural Land Class “B”, which is defined as “Limited crop land that is suitable for a narrow range of current and potential crops due to severe limitations, but is highly suitable for pastures. Land may be suitable for cropping with engineering or agronomic improvements” *(https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/agribusiness/agricultural-land-audit/land-classes)*.

1.1.11 Vegetation Communities and Ecological Data

ML10279 lies within the Kidston/Undara-Toomba Basalt provinces of the Einasleigh Uplands bioregion, east of the Great Dividing Range. An open narrow-leaved ironbark (*Eucalyptus crebra*) woodland with grass understory has developed on the McBride Basalt plains in the north of the lease area. In the dissected areas on alluvial and colluvial deposits, open Mt Molloy Box (*Eucalyptus leptophleba*) woodland with a grassy understory is dominant.

The regional ecosystems (RE) within the lease area are all no concern at present (NC) status:

- RE 9.3.2 Mt Molloy Box on alluvium
- RE 9.8.1 Ironbark on red soil plains and rocky rises
- RE 9.3.10 Mountain Coolibah, Black Tea Tree and springs on black soil plains

Grass understory is the native pasture used for grazing in the area of the ML10279. No threatened ecological communities are considered to occur within the ML10279 boundary. No mapped essential habitat or flora trigger map/species record occur within the ML10279 area.

1.1.12 Fauna Presence and Populations

Pre-disturbance field investigations observed native and introduced species over the lease area, including 2 reptiles, 16 birds and 6 mammals. An aquatic ecology survey was also undertaken in the ephemeral creeks. Habitat diversity within the lease area is low and can be broadly described as eucalypt woodland with a shrub and grass understory. The floristic and structural differences between the RE's described above are small and unlikely to constitute discrete habitat types and are unlikely to constitute critical habitat for any fauna species. Notable habitat structures within the woodland complex include rock screes and hollow-bearing trees. The features are common on a local and regional scale. Wyandotte Creek downstream of the lease area has some permanent pools which that provides refugia for aquatic organisms in the semi-arid environment.

Appendix 7 includes a copy of the pre-disturbance fauna investigation, the updated conservation status of those species observed (as separate revised Table 3.7 of Appendix 7) and WildNet reports for species, conservation significant species and pest species lists for the ML area and buffer.

1.1.13 Pre-mining Land Use

The pastoral holding is used for grazing of beef cattle on native pastures. The zoning is/was rural. The land suitability of the area proposed for pit excavation is assessed as unsuitable for cultivation but suitable for grazing based on QDME (1995) criteria.

1.1.14 Landholders

ML 10279 (133 ha) is entirely within the Wyandotte Property boundary, a Grazing Homestead Perpetual Lease, Lot 200 on SP232790 (37,520 ha). The landholders are E. J. and M. J. Masterson. The landholders breed, fatten and sell beef cattle on the property and in some areas irrigate fodder-growing paddocks (lucerne and sorghum). A compensation agreement exists with this holder pursuant to the requirements of the *Mineral Resources Act 1989.*

1.2 PROJECT DESCRIPTION

This PRC Plan relates to the mining activities on ML 10279, operated by Greenvale Silicon Pty Ltd which is a wholly owned subsidiary of Agripower Australia Limited.

The Conjuboy Diatomaceous Earth Project is located approximately 48 kilometres north of Greenvale and approximately 210 kilometres northwest of Townsville, in Far North Queensland (Figure 5), in the Charters Towers Regional Council.

The mine's primary activity encompasses the extraction of Diatomaceous Earth (DE) for testing and trials in Agriculture and also for sales. DE is a very high source of "Plant Available Silicon" (PAS) and is certified for use in organic agriculture in Australia, India, USA and European Union.

The project operation is a simple excavation, crush / screen and stockpile of the target ore profile which is transported by road to the processing facility located at Charters Towers.

The Diatomite bearing horizon reaches up to 25m thick locally, thinning to 10m in the west and south. The site within ML 10279 is estimated to contain 55 million cubic metres of JORC diatomite resources suitable for processing.

1.3 TENURES TO WHICH PRC PLAN RELATES

The Conjuboy Diatomaceous Earth Project comprises of ML 10279, Mineral Development Licence (MDL) 325 and MDL 326, and Exploration Permits for Minerals (EPMs) 13236, EPM 25110, EPM 19573 and EPM 13995.

Details of the ML, which is the subject of this PRC Plan, are outlined in Table 3.

Table 3: Tenement Information

Tenement	Area	Original Grant Date	Most Recent Term Sought	Status	Term End Date
ML 10279	133 ha	28 /10/2004	50 years	Granted	27/10/2054

ML10279 is located over pre-requisite tenure (MDL 325) which is held by Greenvale Silicon Pty Ltd (80%) and Diatomaceous Earth Investments Pty Ltd (20%).

The MDL's were granted on 1st May 2001 over an area of 3,562.5 hectares and has been maintained in good standing since that date. The MDL 325 adjoins MDL 326 and EPM 13236, EPM 25110, EPM 19573 and EPM 13995, which are all held in the same percentages by the same parties. The location of these tenements is shown in Figure 5.

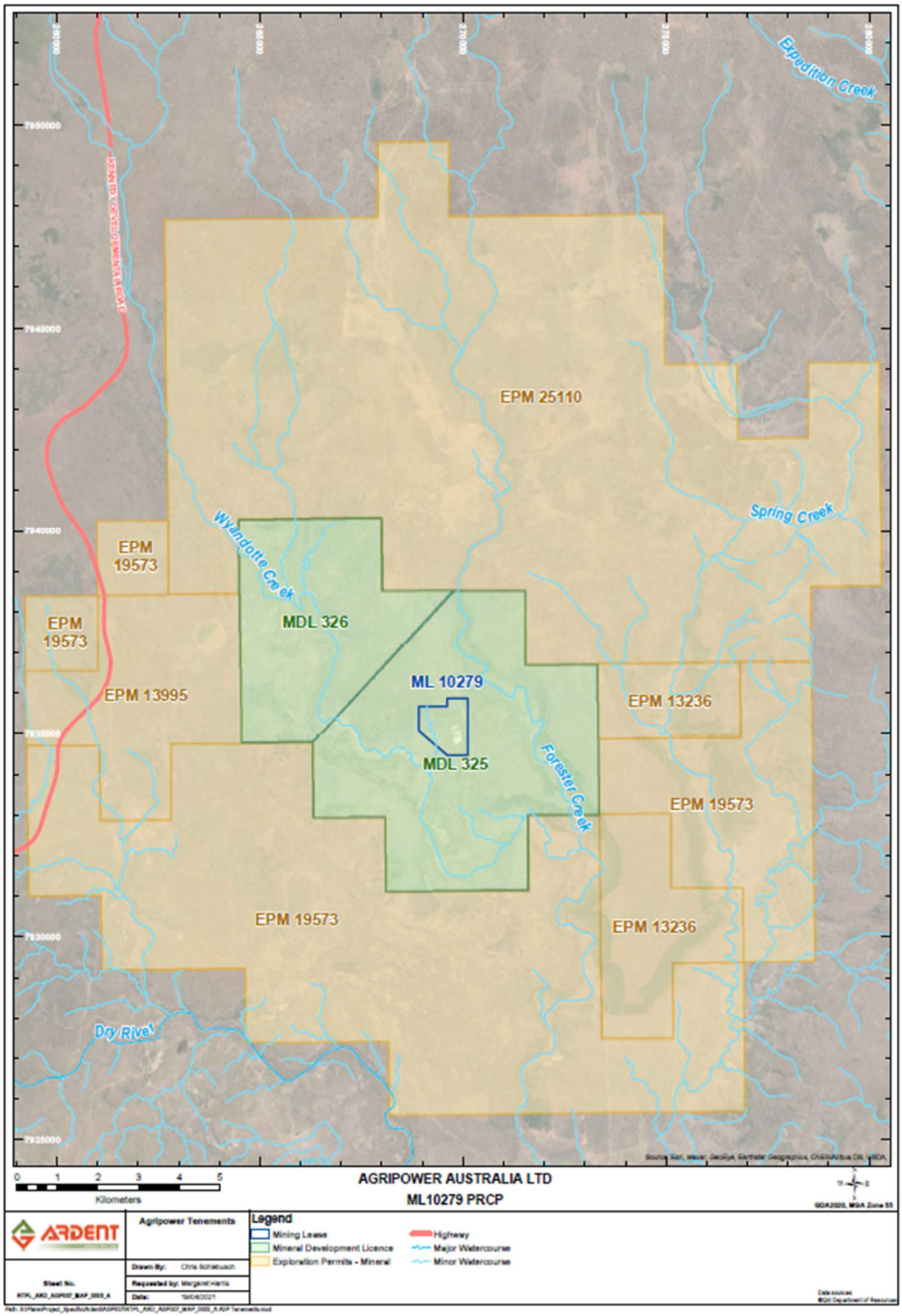


Figure 5 Location of Conjuboy Project Tenements

1.3.1 Relevant Activities and Primary Mine Features

The relevant activity for ML 10279 is mining, which is authorised under Environmental Authority (EA) EPML00392513. The Environmentally Relevant Activity (ERA) on ML10279 is ERA 21. The primary mine features on the ML include the areas described below and illustrated in Figure 6.

1.3.1.1 Roads, tracks and park-up areas

Access from the designated lease access road to the activity area within ML10279 is via a 15m wide unsealed all weather road. The expected life of mine disturbance for access roads is 1.10ha. There are currently no agreements with the landholder in respect of retention of site roads.

1.3.1.2 Overburden and waste dumps

The overburden stockpile volume generated by the excavation activities is estimated to be 3m per pit area. The progression of activities will maintain a rolling total at any one time of approximately 1.0 hectares, but the life of mine disturbance for this mine feature is expected to be 6.1 hectares.

Topsoil stockpiles generated in excavation preparation are expected to be overlaid on the overburden dump footprint but have a distinct operational area of approximately 0.5 hectares. The life of mine disturbance for this feature is expected to be 3 hectares.

1.3.1.3 Ore stockpiles/drying pads

The campaign style mining operation requires the temporary stockpiling of ore for removal to the Charters Towers processing facility. The size of these temporary ore stockpiles is 1.1 hectares with a life of mine disturbance for this feature expected to be 1.1 hectares.

1.3.1.4 Water management structures

For offsite water quality protection, a small settlement pond is located downstream of the activity area. The settlement pond is currently less than 0.1 hectares with a life of mine disturbance for this feature expected to be 0.1 hectares.

1.3.1.5 Open pits

The open pit excavation footprint for the safe removal of ore includes internal access ramps, safety bund and pit fence, walls and pit floor. A total of five excavations are expected for the life of mine disturbance at 200,000 tonnes per annum (tpa) operation. The pit fence will remain to exclude stock from the operational and rehabilitation areas within the initial mine activity area and is expected to be extended to enclose active areas until mine closure. Its perimeter is the enclosed mine activity area. The operational safety bund will extend with the pit perimeter for each pit until its removal is safe to do so. The total footprint for open pits over the life of mine is 42.82 hectares.

The pit excavations adopted the following design parameters:

- Bench Face Angle (BFA) of 20^{o} has been adopted into design.
- Berm width = 5m
- Bench height = 2.5m

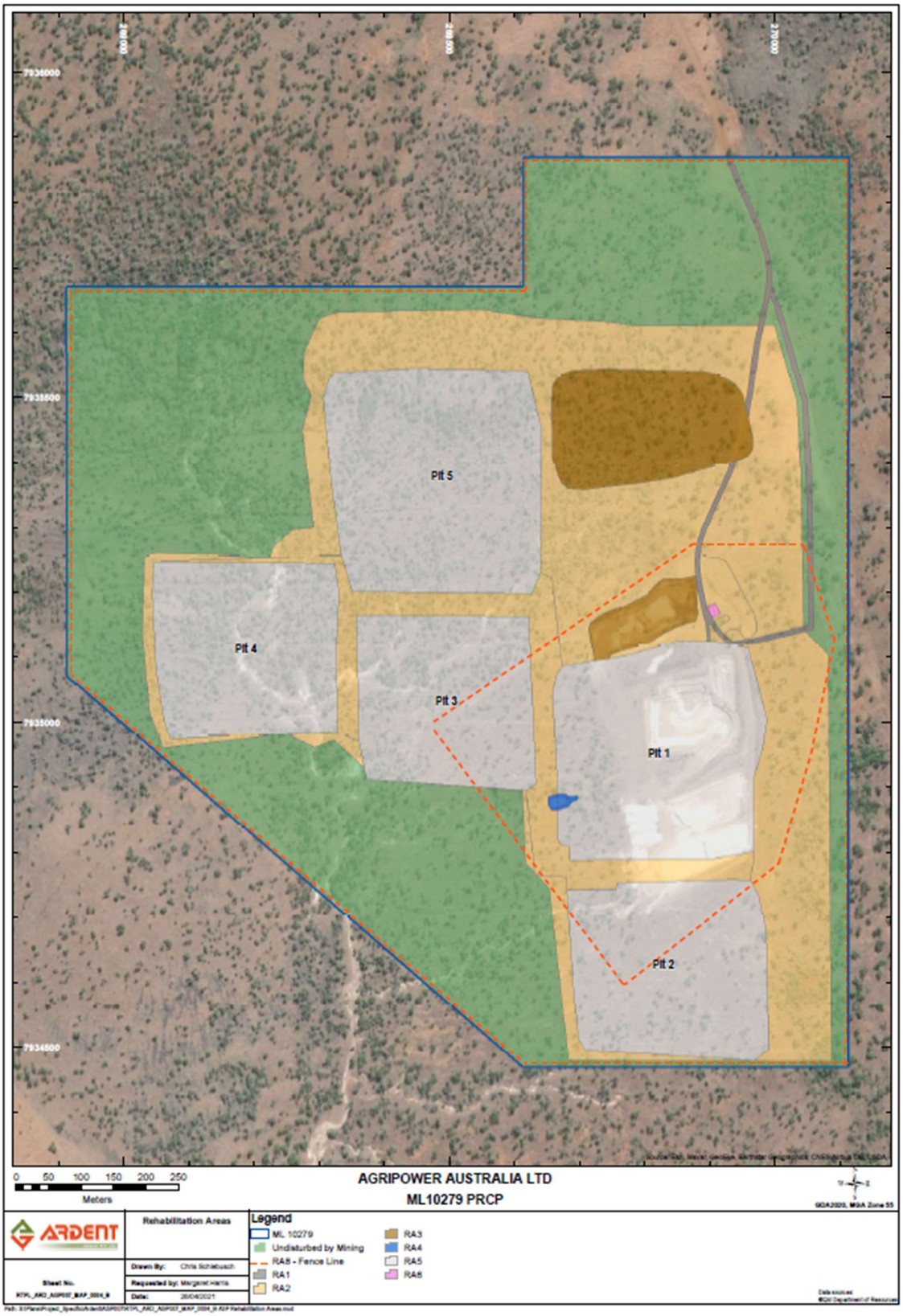


Figure 6: Location of Primary Mine Features

These design parameters yield an inter-ramp slope angle of 15°. These slope design parameters are considered conservative given the local slope performance and exposures of DE in the river cuttings (Wyandotte Creek). The design criteria for safe mine operations were:

Zone	BFA	Berm Width	Bench Height
Soil and A horizon	30°	4m	3m
B and C1	40°	4m	3m
C2-C6	80°	3m	6m
Main Pit Ramp	60° below ramp	3m	6m

The compensation agreement with the landholder includes retention of a perimeter fence for a minimum of 4 years. The fence will be removed following 4 year achievement of cover. Posts will be removed and wire removed at the achievement of stability and revegetation milestones and no additional works required.

1.3.1.6 Minor fuel storage (10Kl) and designated service area

The majority of refuelling and maintenance occurs off site, however a designated area for emergency servicing has been made. The total for this temporary feature for life of mine disturbance is 0.02 hectares.

1.3.1.7 Cleared areas between pits and stockpiles

The extraction pit perimeters and transition areas between stockpiled materials will become disturbed to varying degrees throughout the life of mine. A conservative estimate of these areas is provided for the life of mine at 31.2 hectares.

1.3.2 Duration of Relevant Activities

The total project life could be in excess of 50 years. It is anticipated that mining will continue in small campaigns up until 2022 for a 200,000 tpa operation. At this rate, each campaign will be carried out over a 3-4 month period each year, during the dry season only. The mine will be on 'care and maintenance' when mining is not being conducted. Table 4 is the provisional mine sequence upon which this PRC Plan is based.

Table 4 Provisional Mine Sequence

Pit	Mine Start	Mine End	Backfilled	Rehabilitation complete
Pit 1	2022	2028	2030	2034
Pit 2	2028	2033	2035	2039
Pit 3	2033	2037	2039	2043
Pit 4	2037	2040	2042	2046
Pit 5	2040	2047	2049	2053

Rehabilitation of the mined area will be on a continuous basis only once each area has been mined to its economic limit. Once this occurs, the stripped overburden can be placed directly back into the open pit, when it has been deemed safe to do so.

1.4 LAND OUTCOME IDENTIFICATION

1.4.1 DESIGN FOR CLOSURE

The land outcome identified in EPML00392513 for the entire ML10279 area is Low Intensity Grazing ('LIG'). The final landform design proposed for the relevant activities are as outlined below.

1.4.1.1 Roads, tracks and park-up areas

Access tracks within ML10279 will be ripped and seeded and returned to use as LIG.

1.4.1.2 Overburden and waste dumps

Overburden will be stabilized for the duration of surface storage and returned to the mine excavation as backfill when safe to do so. Overburden surface storage footprint will be ripped, topsoiled and seeded and returned to use as LIG.

1.4.1.3 Ore stockpiles/drying pads

Ore stockpiles/drying pads will be ripped, topsoiled and seeded and returned to use as LIG.

1.4.1.4 Water management structures

The settling pond will be maintained throughout the rehabilitation of the site to settle sediment laden runoff whilst rehabilitated areas achieve stability milestones. The structure will be removed and seeded to return to use as LIG.

1.4.1.5 Open pits

Active pits will be progressively backfilled using overburden throughout mining. Material will be returned in reverse sequence and the surface contoured, spread with stored topsoil and seeded. Pit walls will be made safe.

A schematic of the final profile is shown below in Figure 7.

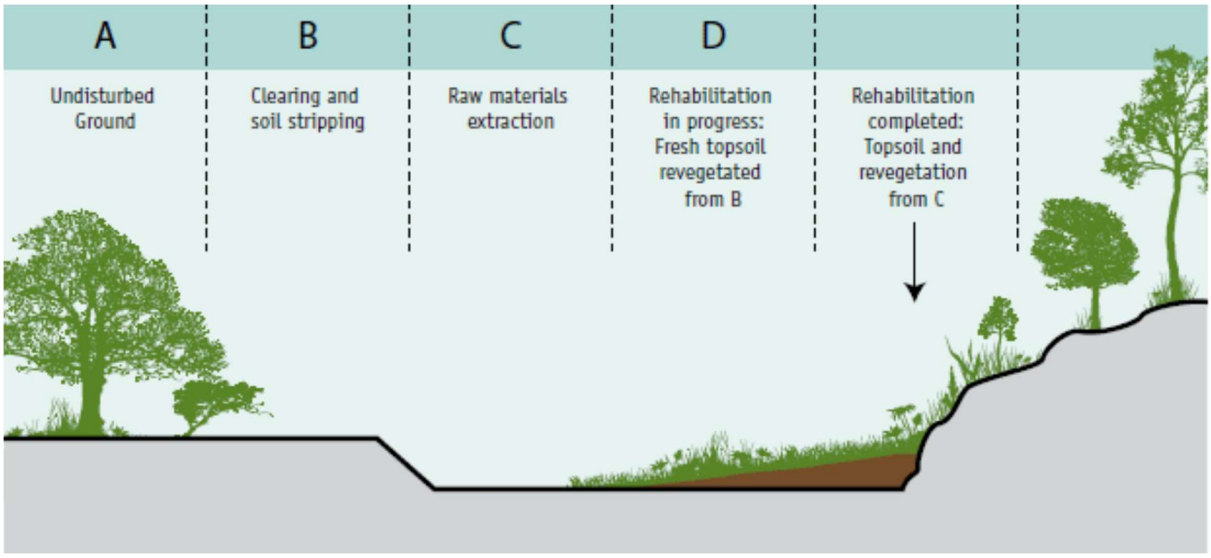


Figure 7: Schematic of pit backfilling and rehabilitation

1.4.1.6 Minor fuel storage (10Kl) and designated service area

While fuel is only stored on ML10279 for the duration of the mining campaigns.

Any and all excess stored fuel will be removed from site upon closure. Surface materials will be tested and scraped and either bioremediated via in situ landfarming methods (Environmental Protection Authority (NSW), 2014) or if suitable, disposed of at a suitable facility to receive that waste. The fuel and designated service area will be ripped, topsoiled and seeded and returned to use as LIG.

1.4.1.7 Cleared areas between pits and stockpiles

Cleared areas (such as walls between pits) disturbed throughout mine development will be reprofiled, topsoiled, ripped and seeded to return to use as LIG.

1.4.1.8 Undisturbed land

The land surrounding the relevant activities is used for LIG. The fenced area within ML10279 is referred to as the Initial Mine Activity Area it contains both undisturbed and disturbed land.

1.4.2 STATUS OF EXISTING REHABILITATION

There have been no completed rehabilitation works on the site. However, stabilisation of stockpiled materials, such as overburden and topsoil are an operational requirement and have been completed on a continual basis in previous years.

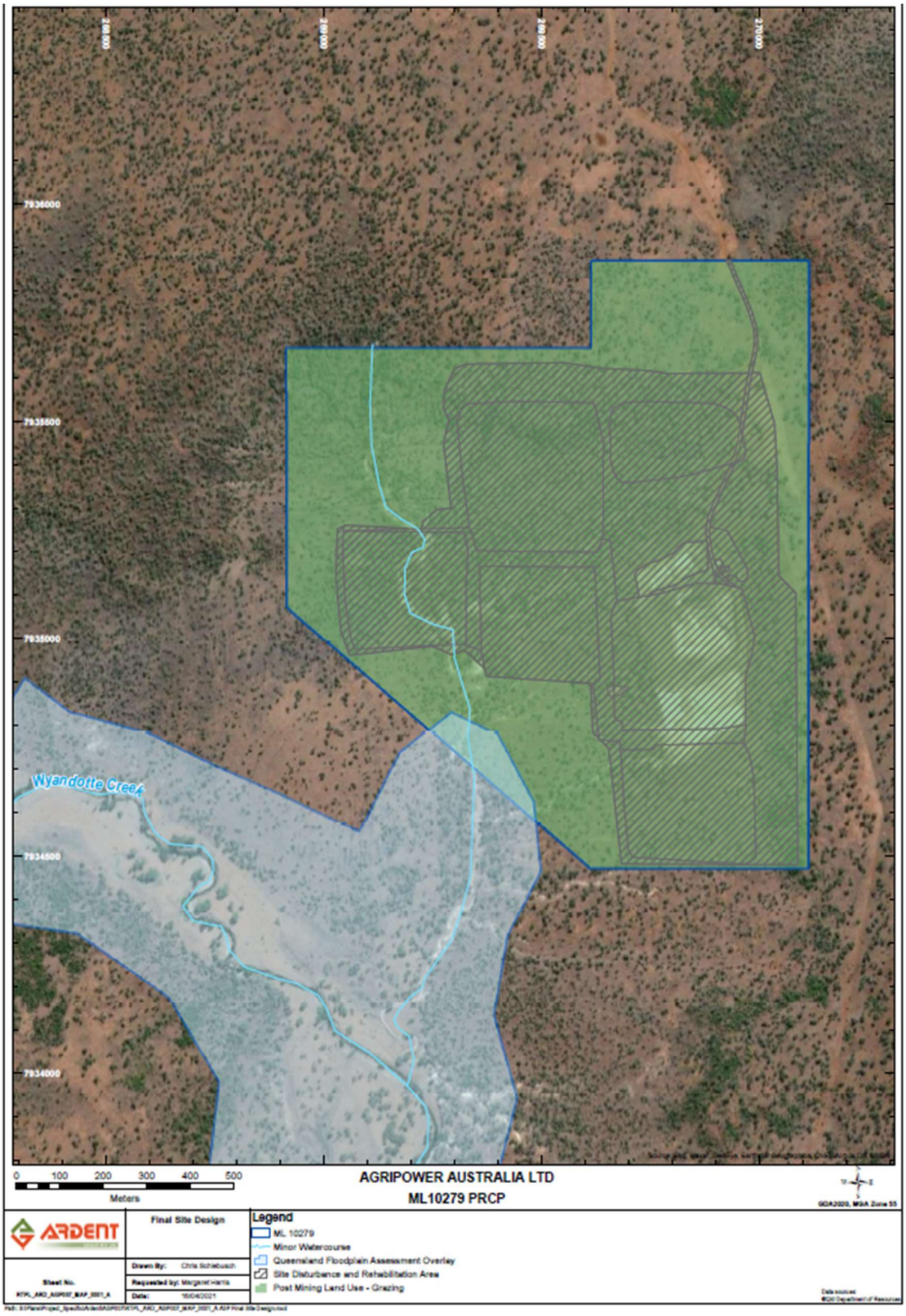


Figure 8: Final Site Design for PMLU Grazing

1.5 REHABILITATION PLANNING

1.5.1 Rehabilitation Areas to be Transitioned from LOD

Table 5 identifies the relevant activities on the mine site, the predicted duration of each activity, the site and extent and the potential for the relevant activities to be progressively rehabilitated.

Table 5 Rehabilitation areas and availability of progressive rehabilitation

Rehabilitation Area	Relevant Activity	ID Code	Duration of Relevant Activity	Size/extent of Relevant Activity	Progressive Rehabilitation Possible	Justification for Timing
Extraction pits	Open pits	RA5	Life of mine	48.82	Yes	Pit locations will fluctuate over life of mine. Final footprint will be rehabilitated following cessation of operations.
	Overburden and waste dumps	RA3	Life of mine	6.06*	Yes	Stockpile locations will fluctuate with pit excavation. Final footprint will be rehabilitated following cessation of operations.
	Cleared areas between pits and stockpiles	RA2	Life of mine	31.19	Yes	Reprofiling and pit backfilling works will require additional areas over the life of mine. Pit perimeter and adjacent areas will be rehabilitated sequentially with the pits.
Processing	Roads, tracks and park up areas	RA1	Life of mine	1.10	No	Required until cessation of operations and rehabilitation activities.
	Ore stockpile/drying pad	RA3	Life of mine	*	No	Required until cessation of operations. *Included in pit footprint
	Minor fuel storage and designated service area	RA6	Life of mine	0.02	No	Required until cessation of operations.
Settling pond	Water management structure	RA4	Life of mine	0.08	No	Settling pond required for water quality protection until other relevant activities meet stability milestone criteria

2 COMMUNITY CONSULTATION

2.1 DETAILS OF CONSULTATION IN DEVELOPING THIS PRC PLAN

2.1.1 Stakeholder Identification

The primary stakeholders identified for the project at the time of application were:

- the landholders of the MLA area and access road connection from Kennedy Developmental Road,
- the local government authority – then Dalrymple Shire Council (Charters Towers Regional Council),
- State Government Authorities responsible for mining – the Department of Natural Resources and Mines and Environmental Protection Agency (as they were in 2003).

The nearest township, Greenvale, is over 40km southeast of ML10279. The entire locality (6,126km^2) has a population of 232 people (2016 Census).

The application for ML10279 and the accompanying EA (mining approvals) was made in 2003 and the site has been operational since the grant in October 2004.

2.1.2 Community Consultation Register

The Post-Mining Land Use (PMLU) proposed and accepted in the mining approvals and forming the basis of compensation hearings and agreements agreed to in the Land and Environment Court is low intensity grazing (LIG). The information in Table 6 has been obtained from the application processes.

Table 6 Community Consultation Register

DATE OF CONSULTATION	COMMUNITY MEMBER/ STAKEHOLDER	TYPE OF CONSULTATION	INFORMATION PROVIDED	LAND USE OUTCOME PRESENTED	COMMITMENTS/OUTCOMES OF ENGAGEMENT
February 2003	Regional community	Advertisements in the Greenvale Gazette (28/2/03), Townsville Bulletin (25/2/03) of the environmental authority application	EA application materials including EMOS	LIG	No public comment received
February 2003	Mr Henry Daniel, Gilldale Station	Environmental Authority Application notice	EA application materials including EMOS	LIG	Compensation Agreement (December 2003) with mine access landholder and neighbour, Mr Daniel of Gilldale Station (23/12/03), addressing the requirement for installation of all-weather gravel road of 20 metres and cattle grids where access cuts through existing fencing, annual financial compensation for loss of land grazing potential during mine grant period, installation of water supply and power supply to pumping equipment. In 2012 Mr. Daniels sold Gilldale Station (Lot 3GU25) to Mr. Peter Prentice who is still the current landholder. Mr. Daniels passed away in 2013. Actions taken prior to sale.
	Mr Edward Masterson Wyandotte Station and his legal representative	Environmental Authority Application notice	EA application materials including EMOS	LIG	Compensation Agreement (28/10/2003) with mining lease area landholder Mr Masterson - Rehabilitation of a strip is to occur when mining is completed on that strip (within two years); • Vegetation must be established consisting of the same or similar grass species and within the range of density of cover of that of the immediate

DATE OF CONSULTATION	COMMUNITY MEMBER/ STAKEHOLDER	TYPE OF CONSULTATION	INFORMATION PROVIDED	LAND USE OUTCOME PRESENTED	COMMITMENTS/OUTCOMES OF ENGAGEMENT
	at Townsville PO Box				surrounding areas adjoining the mined area, not disturbed by mining. (Indian cooch or like introduced grass must not be used. It is noted that Indian cooch is a prevalent species in the area and may be difficult to now control). • Proactive action must be taken to harvest and sow native seeds (i.e. Mitchell grass, Blue grass and Kangaroo grass) for the purposes of rehabilitation of the areas disturbed by mining such that rehabilitation to natural state of each area mine is effected within four (4) years of completion of mining of that area, taking into account weather, rainfall, drought and acts of God. • Fencing of rehabilitated areas in a manner that will exclude cattle, kangaroo and feral animals from inhabiting the area. Fencing must remain for a minimum period of four (4) years. • Rehabilitation of areas disturbed by mining activities to a stable landform free of pits or depressions from mining activities, similar to that of surrounding areas not disturbed by mining. The wishes of the landholder on rehabilitation technique have been incorporated into the principles adopted in the drafting of this PRC Plan.
	Dalrymple Shire Council, Charters Towers	Environmental Authority Application notice	EA application materials including EMOS	LIG	Dalrymple Shire Council made no submission on the MLA or EA application
20/2/2003 to 21/3/2003	Regional community	Public display of mining	EA application materials	LIG	No submissions on the MLA or EA application were received

DATE OF CONSULTATION	COMMUNITY MEMBER/ STAKEHOLDER	TYPE OF CONSULTATION	INFORMATION PROVIDED	LAND USE OUTCOME PRESENTED	COMMITMENTS/OUTCOMES OF ENGAGEMENT
		approvals applications at Environmental Protection Agency Townsville District Office; Office of the Mining Registrar, Charters Towers	including EMOS		
2003-2020	Mr Masterson	Ad hoc landholder discussions	Access and activities	LIG	No alteration to proposed land use outcome raised.

2.2 DETAILS OF ONGOING CONSULTATION ON REHABILITATION

2.2.1 Objectives for Community Consultation

As the Project approaches the initial rehabilitation activities for the site, a series of engagement phases will be initiated with the primary stakeholders for the project.

The objective of this engagement will be to inform the stakeholders of the near future and long-term activities on the site to gauge their level of interest and any local experience and knowledge inputs to the methodology for rehabilitation.

2.2.2 Methods of Engagement

Informal communications with the landholder have been the nature of consultation and issue resolution from the initial development proposal to date. A more structured information exchange will develop as the rehabilitation processes commence.

The consultation activities will include:

- Ad hoc contact points and one on one meetings where current activities and near future events can be exchanged such as mining, exploration and general access provisions.
- Primary stakeholder letters to present information on the project and timeframes for activities;
- Regulatory authority information to report on project progress.
- Media releases to inform the wider community in the event of significant milestones that may have interest to the local region as well as archived material via the company website on developments.
- Website https://www.agripower.com.au/mining includes frequently asked questions (FAQ) and has over 50,000 site visits.
- E-Newsletter (2017, 2018 and 2019) historically used for promotion of silica product and company information, but is established and available to include rehabilitation data.

2.2.3 Consultation frequency

The following table outlines the consultation program for this PRC Plan.

Table 7: Consultation Plan for PRC Plan

Activity	Purpose	Task	Timing
Landholder letters	Invite landholder to one on one meeting prior to initiation of rehabilitation works	Draft and send letter to landholder	Q3 2022
Landholder meetings	Inform the landholder of upcoming rehabilitation works and design	Face to face (where possible) exchange of information and request for feedback prior to commencement of works	3 months prior to works.
Website updates	Inform wider community of project developments and to host FAQ and to update for questions arising from contacts on that site	Keep website current	Quarterly consideration of new information/questions.
E-newsletter	Include annual rehabilitation milestones to wider community	Include updated data for each annual publication	Annual
Regulatory authority information	Maintain contact with key state government stakeholders to keep project developments understood	Phone call to delegates on project status	Annual
Statutory reporting	Fulfil reporting obligations under PRC Plan	Compile and present annual report to DES	Annual

Information exchanges with the landholder will include the final landform design implementation and rate. Success of rehabilitation trials and progress toward milestone criteria will also be shared. Any issues arising will be managed through a process of:

- Regular communication.
- Feedback and follow-up on issues raised.
- Close out of issues raised with the stakeholder recorded.

3 POST-MINING LAND USE ('PMLU')

The agreed post-mining land use for the whole of ML 10279 has been defined as Low Intensity Grazing (LIG).

This outcome is supported by baseline assessment of soil, water and vegetation and included explicitly in the EA for ML10279.

3.1 CONSISTENCY OF PMLU AND COMMUNITY OUTCOMES

The landholder has explicitly required that the land disturbed by mining on their property be returned to the use of grazing, consistent with the remainder of their property and that the land is stable to support that use.

3.2 CONSISTENCY OF PMLU AND PLANNED GOVERNMENT LAND OUTCOMES

The Dalrymple Shire Council planning scheme (2006) had identified the land over which ML10279 is located as "rural". The Charters Towers Regional Town Plan Zone Map (2019) has the same zone designation.

The Queensland agricultural land audit has identified the active pit area as secondary use – mining.

The surrounding area is characterised as "production from relatively natural environments" and a secondary use as "grazing native vegetation". ML10279 area is classified as Agricultural Land Class B meaning it has limited crop land potential. At the time of the ML10279 application (2002), the proposed land outcome for all disturbances on ML10279 was low intensity grazing.

4 NON-USE MANAGEMENT AREAS

4.1 STATEMENT OF WHY NUMA IS NOT APPLICABLE

The Conjuboy Diatomaceous Earth Project has defined low intensity grazing post mining land use for all mining disturbances. There have been no non-use management areas (NUMA) described or anticipated for the entire mining lease area.

The mining process does not involve the excavation, storage or exposure of acid producing materials and does not include any mineral processing which causes the concentration of contaminants, so that the post-mining landforms are all able to be made safe, non-polluting and maintain a water quality consistent with the proposed PLMU of low intensity grazing.

The rehabilitated mine pit is not located within a flood plain.

5 REHABILITATION MANAGEMENT METHODOLOGY

The following section summarises the baseline and operational information gathered that relates to the rehabilitation methods selected for each relevant activity to achieve the PLMU of low intensity grazing.

The assembled information has been reproduced in the appendices to this plan, with the relevant outcomes extracted in the sections below.

The whole site and all relevant activities have been designated as suitable for achieving a PLMU of low intensity grazing, the methods for each and the applicable source information is listed in Table 8 below.

Table 8 Relevant Activity, rehabilitation method and source information

Relevant Activity/Rehabilitation Area	Rehabilitation Method	Source information
RA 1 Roads, tracks and park up areas	The ML area has a short section of earthen road connecting to the lease access. The proposed rehabilitation method to return the surface disturbance to the PMLU is to resurface with minor earthworks, final trim to ensure runoff does not concentrate and deep rip to encourage soil moisture and recolonization of native pasture grasses. There has been no formal agreement with the landholder executed for the retention of this disturbance.	***Appendix 3*** Soil Assessment ***Appendix 7*** Flora and Fauna Assessment and Revegetation Information
RA 2 Overburden and waste dumps	The overburden and waste dumps are designed to be medium term structures destined for backfill within the pit as mining progresses and backfill operations are safe to be conducted. As such it is the footprint of the area designated for temporary storage that requires rehabilitation when the area is no longer required for surface storage The proposed rehabilitation method for the site to return to the PMLU is the bulk push of stockpiled material into the adjacent pit (for reshaping within that domain) in a sequence reversing that of excavation so as to maintain a profile generally consistent with the pre-mining order (i.e. overburden, sub-soils and lastly topsoil). The surface should not have exposed subsoils remaining as their likely sodic nature will reduce the rehabilitation outcomes. Reshaping to landform with slope consistent with stability for PMLU being less than 10^{o} (the topographic attribute determinant of land classification is safe machinery movement which is achievable on up to 14^{o} (DSITI and DNRM, 2015)	***Appendix 3*** Soil Assessment ***Appendix 5*** Final Landform Design Information ***Appendix 7*** Flora and Fauna Assessment and Revegetation Information

Relevant Activity/Rehabilitation Area	Rehabilitation Method	Source information
	Deep rip of final surface to encourage surface roughness to increase soil moisture and to decrease erodibility. Direct seeding with native grass and tree/shrub mix and fertilizer application if required.	
RA 3 Ore stockpile/drying pad	Bulk push to adjacent pit prior to backfilling with available overburden for final pit contour. Reshaping to landform with slope consistent with stability for PMLU being less than 10° (DSITI and DNRM, 2015). Deep rip of final surface to encourage surface roughness to increase soil moisture and to decrease erodibility. Direct seeding with native grass and tree/shrub mix and fertilizer application if required.	***Appendix 3*** Soil Assessment ***Appendix 5*** Final Landform Design Information ***Appendix 7*** Flora and Fauna Assessment and Revegetation Information
RA 4 Water management structure	When final landform earthworks and revegetation is assessed as successful, the remaining water within the storage will be drained and sediments removed to void. The dam retaining wall will be removed. Reshaping to achieve landform with slope consistent with landform stability to meet PMLU being less than 10° (DSITI and DNRM, 2015). Direct seeding of tree/shrub species and fertilizer application will be completed.	***Appendix 7*** Flora and Fauna Assessment and Revegetation Information
RA 5 Open pits	Backfill progressively over final operating years to achieve free draining levels graded into the existing contours. Pit perimeter reshaping and trim to achieve landform with slope consistent with landform stability to meet PMLU being less than 10° (DSITI and DNRM, 2015)	***Appendix 5*** Final Landform Design Information ***Appendix 7*** Flora and Fauna Assessment and Revegetation Information

Relevant Activity/Rehabilitation Area	Rehabilitation Method	Source information
	Structural works for water management allowing for safe surface carriage of water where level transitions are necessary. Installation of contour berms at 45-60m intervals on backfilled pit slopes. Direct seeding with native grass and tree/shrub mix and fertilizer application if required. Maintain fence around mine working area for 4 years until completion criteria are satisfied.	
RA 6 Minor fuel storage and designated service area	Removal from site of all structures and storage units from the footprint following end of bulk earthworks. Assessment of areas of potential contamination to be completed and where necessary completion of bioremediate of lightly ripped surface or if necessary, removal of contaminated materials from site to a suitably licensed facility to receive hydrocarbon contaminated soils. Minor earthworks to trim the surface to a slope consistent with achieving PMLU being less than 10^{o} (DSITI and DNRM, 2015). Deep rip of final surface to encourage surface roughness to increase soil moisture and to decrease erodibility. Direct seeding with native grass and tree/shrub mix and fertilizer application if required.	***Appendix 7*** Flora and Fauna Assessment and Revegetation Information

5.1 General Rehabilitation Practices

5.1.1 Hydrogeological implications

Appendix 1 contains reproductions of the baseline assessment of the site including a description of the hydrogeological setting of ML10279. Figure 9 shows a schematic of the backfilled pit within the geological landscape.

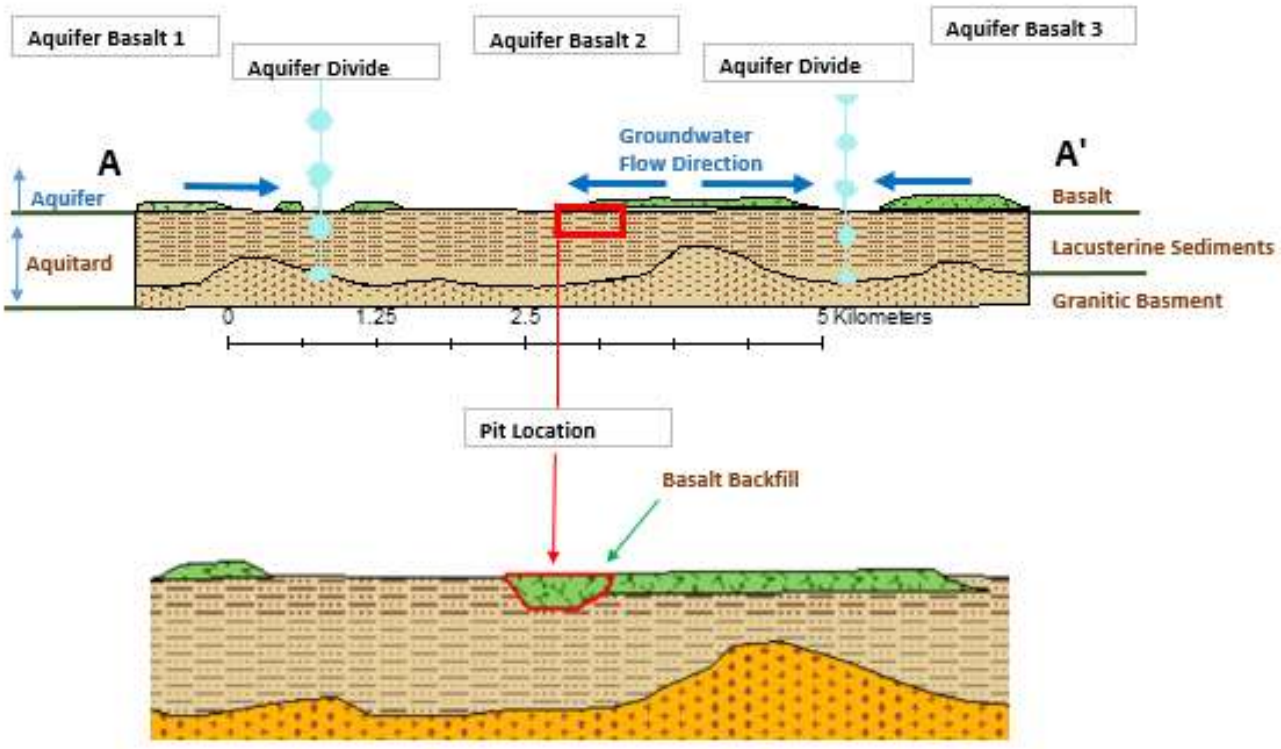


Figure 9 Cross Section of geology and aquifer.

Backfill of the pit will be formed from the local basalt and lacustrine sediment overburden replacing the diatomaceous earth and clay that forms the relatively imperviable aquitard below the water table.

At the pit location groundwater occurs in quantities to be described as an aquifer to several metres before clay levels in the underlying diatomite become relatively impermeable as indicated in the figure below.

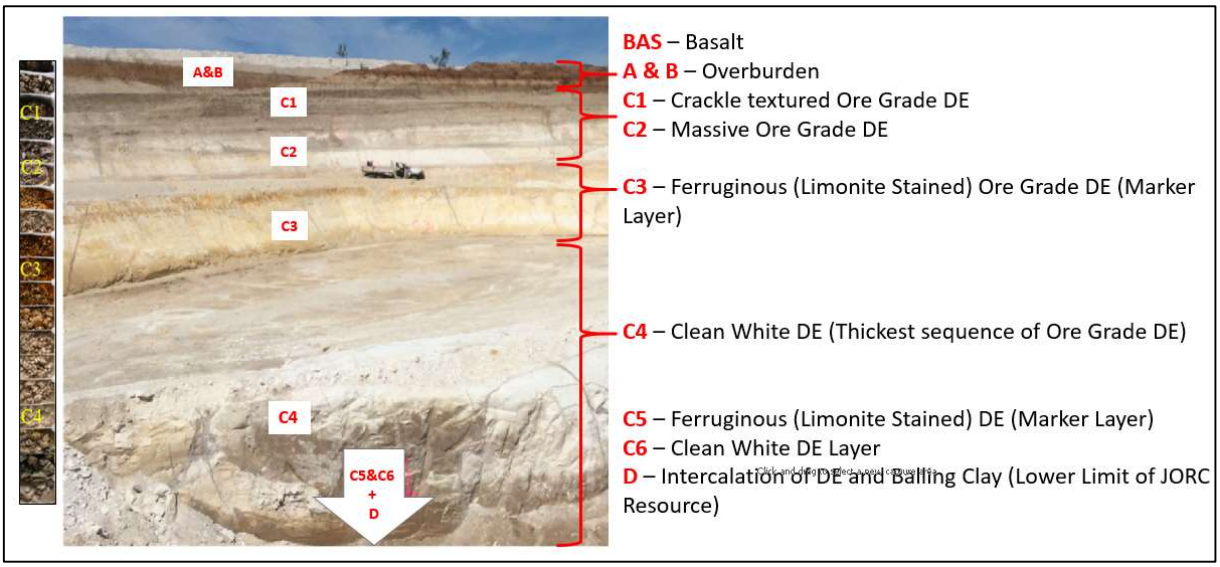


Figure 10 Lithology of the Gilldale pit showing diatomaceous earth and clay.

The target ore zone has been characterised as an aquitard. The backfilled material will be largely within C6 ore zone (i.e. diatomaceous earth) at least 2 metres from the ore zone floor. It is not expected that there will be vertical infiltration through the backfilled material into the underlying basalt aquifer but will behave consistent with the other surrounding basaltic overburden material.

It is highly unlikely that the backfilled pit will affect groundwater chemistry or supply to the immediate surrounding area. As the backfill material is made up of existing locally occurring basaltic overburden, groundwater intrusion is expected to have the same effect as what is currently occurring on the surrounding countryside.

The diatomaceous earth layer that may become saturated by recharge events is not considered to represent a significant aquifer unit and unlikely to permit further vertical infiltration of groundwater. It is considered that the mining operation will not change the chemistry of the groundwater due to the low permeability and neutral nature of the diatomaceous earth. The mining activity does not appear likely to intersect the local, primary groundwater host.

Figure 11 shows the nearest groundwater dependent ecosystem (GDE) of record at 7.45km west of the pit extent with an elevation of 521m. The pit development and rehabilitation will not have an effect on this location due to the aquifer divides that occur between the pits and this location. Adjacent landholder bores for agricultural supply are more likely to have effect on the mapped GDE area.

Model of post-rehabilitation ponding shows that it is not likely to have surface water accumulating on the backfilled pit area (refer Figure 12).

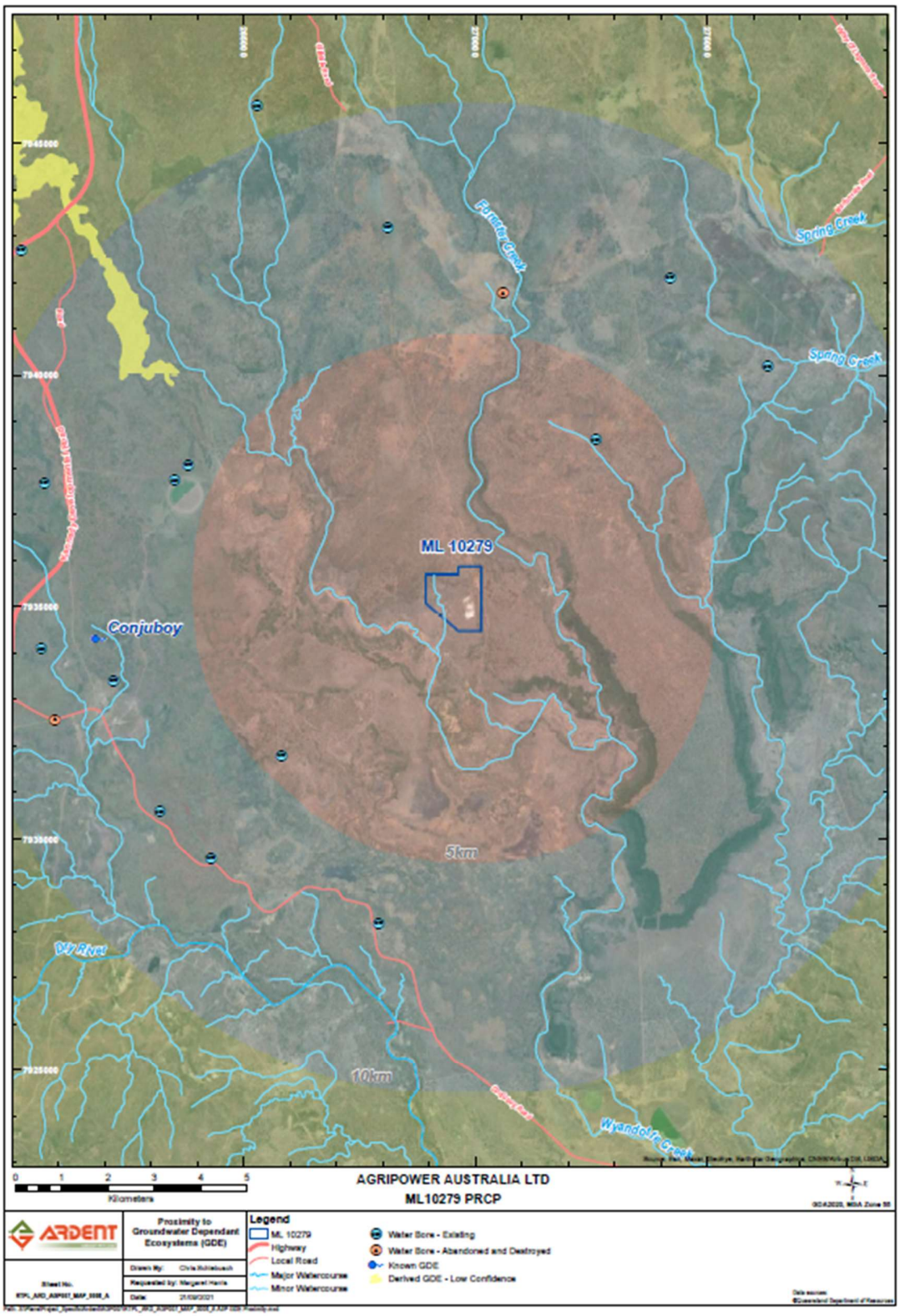


Figure 11 Groundwater Dependent Ecosystem proximity to ML10279

5.1.2 Flooding implications

Wyandotte Creek stream gauging station (120117A) historical data suggests that in most years the summer flow peaks range from 10,000 to 25,000ML and it is expected that these flows would not inundate the site. However, extreme monthly flows in excess of 50,000 ML may inundate the site.

Appendix 2 contains the excerpts of the original EMOS relating to these data regarding flooding. The records of NRME stream discharge for Wyandotte Creek show 1981 as the only year during its operation to approach the stream volume mentioned in the EMOS. The rainfall events of that period were less than 1% AEP, however a model of the 1% AEP at the ML shows that inundation would not impinge the current or proposed pit extent.

The current Flood hazard area – Level 1 - Queensland floodplain assessment overlay extends into the southwestern border of ML10279 area. No disturbances are planned for that area. Flooding is not expected to have impact on rehabilitation success.

The final landform design drainage analysis in 3D Dig shows that the backfilled pits will be free draining in the landscape as shown in Figure 12 below.

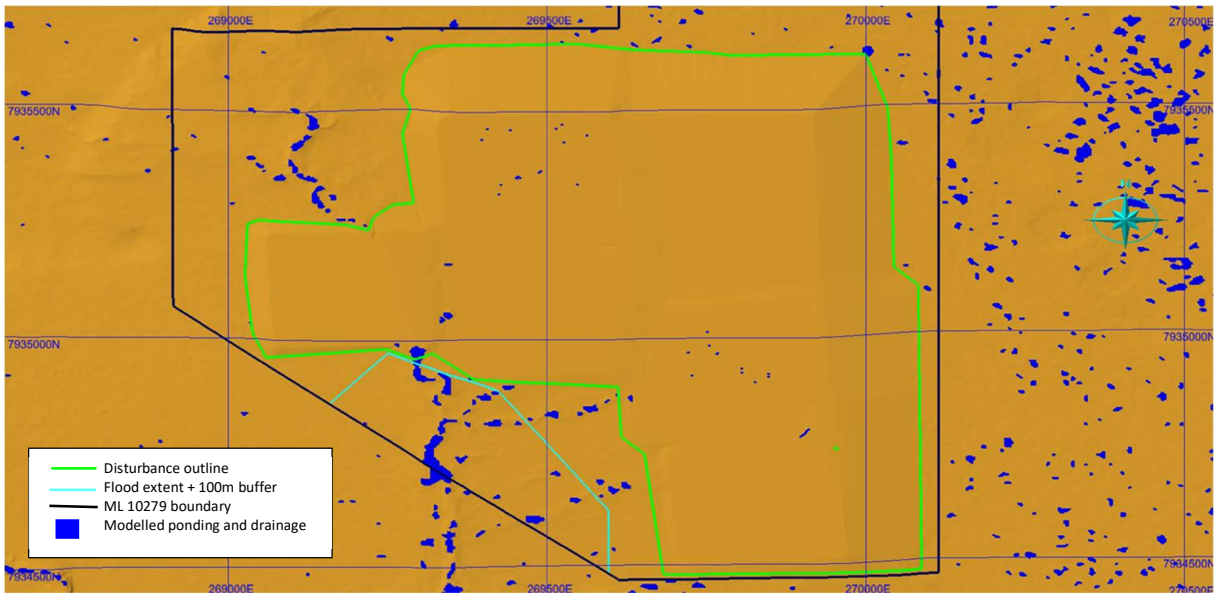


Figure 12: Drainage and ponding of final landform footprint

Note: Natural ponding in areas not disturbed (Black – ML10279 boundary, Green – Area of disturbance, Blue – Ponding and drainage)

5.1.3 Soil use implications

The soil assessment (Appendix 3) identified that some soils identified "have physical or chemical limitations in the subsoils (B1 and D1) and it will be necessary to ensure that this subsoil does not become mixed with topsoil during stripping operations". The impact of mixed topsoil/subsoil will render the rehabilitation media less productive and a potentially unstable surface treatment. As a result, overburden and topsoil are stockpiled separately on site.

The identified soils within the Mine Activity Area disturbed by excavation pits are predominantly D1 and B1. A2 materials will be used directly to backfill as it is unsuitable for surface rehabilitation media. The limited extent of E1 and A1 soils have not been used to calculate topsoil yield. The following information pertaining to these soils' suitability for rehabilitation and estimated quantity.

Mapping Unit A2 – Red Ferrosol

- Unsuitable for rehabilitation due to basalt cobbles and boulders (60-90%)
- Encountered in road access and easternmost extent of pit 1, northern extent of pit 5 and stockpile areas.

Mapping Unit B1 – Black Earth

- Topsoil depth 30cm to be salvaged for rehabilitation works.
- 0-30cm Exchangeable Sodium Percentage (ESP) range 1-2% on acidic to neutral soil would not indicate application of gypsum.
- Moderate Cation Exchange Capacity (CEC)
- Overlays sodic soils from 30-100cm. Overburden to be stored separately from salvage topsoil to avoid mixing.

Mapping Unit D1 – Red Vertosol

- Topsoil depth 30cm to be salvaged for rehabilitation works.
- 0-30cm ESP range 1-5% on acidic to neutral soil would not indicate application of gypsum for use at surface.
- Moderate CEC
- Overlays sodic subsoils from 30-100cm. Overburden to be stored separately from salvage topsoil to avoid mixing.

The assessment identifies suitable resources that can be salvaged and recommends stripping depths for each soil unit but does not instruct separation of the units, only exclusive stockpiling of subsoils. The instructed restoration is the reinstatement of the soil profile when backfilling the excavation in the order it was removed overburden, then subsoils and finally topsoil.

The only specific instruction on "capping" is in the instance of exposure of exposed sodic soils, that they should be covered with salvaged surface soil and revegetated. An erosion and sediment control plan should be progressively implemented throughout mine life. The B1 and D1 subsoils show ESP results of up to 9% which would require amelioration if exposed on the final landform profile. Rates of application would be implemented as per Table 13.

The out of pit storage of overburden which includes potentially sodic material (in the 30cm-1m interval of B1 and D1 soils) is only a factor in the early stages of development (i.e. Pit 1 and 2). As the backfilling program progresses at the rate of pit development, overburden, including potentially sodic material will be returned to pit for reprofiling. The highest ESP for sub soils was 17.9% which was at a single location. This falls in the light to moderate range of sodicity hazard (Food and Agriculture Organisation, 1988).

The LongPaddock subsoil dispersibility report (included in Appendix 3 of the PRCP) for the location that includes the ML area is mapped as non-dispersive. The proposed management of encountered sodic

subsoils is separate stockpiling from topsoil, deep placement within backfilled pit areas and if present, treatment with gypsum prior to the application of topsoil.

The operational volume of topsoil stockpiled in 2017 was 7,250BCM which would be sufficient to apply 15cm to the first 4.8ha of disturbance. Subsequent topsoil harvesting from mine expansion will yield estimated volumes in Table 9. No topsoil replacement depth was recommended in the assessment, but the project has adopted 15cm for the purposes of rehabilitation planning.

Table 9 Topsoil yield by soil type for disturbance footprint

Class	AREA (ha)	AREA (m2)	Depth of soil type (m)	Yield (m3)
A1	13.596	135959	0.10	13,595.90
A2	18.819	188191	0.10	18,819.10
C1	0.453	4533	0.15	679.95
D1	20.723	207231	0.30	62,169.30
E1	3.179	31792	0	0
B1	24.188	241877	0.3	72,563.10
All soil total				**167,827.35**

When the yield total is compared with the topsoil requirement to achieve a minimum 15cm cover over all disturbances (Table 9 of the PRC Planning Part), this exceeds the demand.

Details of the required volume of topsoil to prepare site disturbances for revegetation area presented in Table 10.

Table 10 Topsoil required for site surface disturbance

Site	Area (ha)	Area (m2)	Thickness (m)	Volume (m3)
Footprint excl roads, area between current & new stockpiles	75.34	753,419.8	0.15	113,013.0
Area between stockpile footprints	46.80	46,800.2	0.15	7,020.0
Total	122.14			**120,033.0**

Sequence of soil preparation and how it is achieved

1. Topsoil to be stripped over surface and stockpiled separately from subsoil storage.
2. Stored topsoil to be kept to a minimum height (<2m)
3. Stored free from traffic and erosive agents.
4. Stockpile to be sown with cover grass seed from revegetation mix and maintained weed free until use in backfilling and surface revegetation.
    - Topsoil stockpiles should be used in order of creation, that is oldest stockpiles should be used first.

- Initial pit areas to be removed to stockpile area (Figure 13 reproduced Figure 4 from current Plan of Operations) to be used in backfilling sequence.
- Later topsoil yield can be applied directly to backfilled pit areas and sown with revegetation mix directly.
- A minor stockpile to be maintained from final pit (Pit 5) to use in that pit's backfilling and surface revegetation.

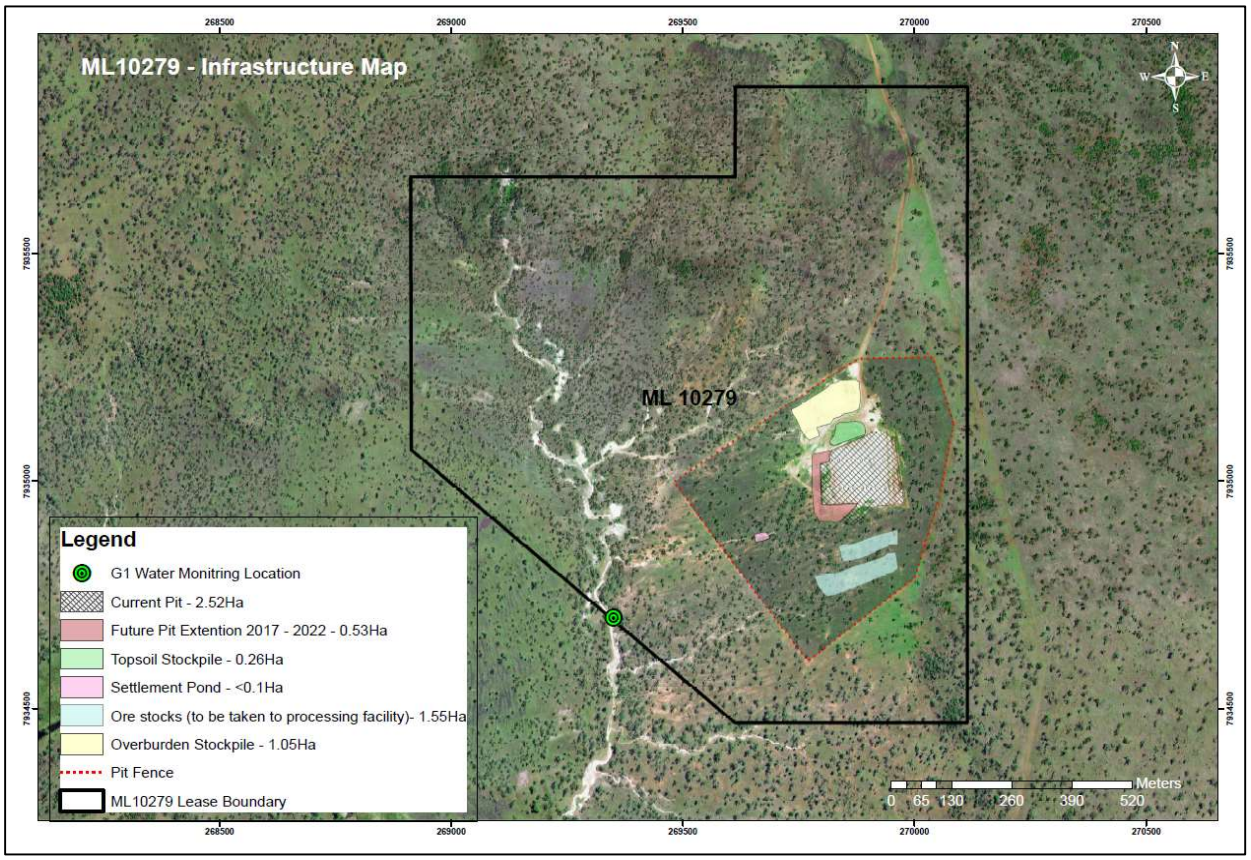


Figure 13 Topsoil and Overburden stockpiles from initial pit development (Plan of Operations)

Subsequent management techniques to achieve a stable condition

Sodic subsoils may be encountered in any of the five pits based on soil survey results. Application of gypsum prior to spreading of topsoil will be assessed via either a field assessment method for dispersion (Sugar Research Australia, n.d.) or by laboratory analysis to confirm effective application rate.

Upslope diversions that have been installed for operational activities will remain in place following backfilling to reduce risk of erosion on newly established surfaces.

Slopes will be contour ripped following topsoil application and prior revegetation seeding.

Sediment controls will be applied on slopes at intervals of 30-60m depending on final grade of backfilled pit area while vegetation cover is establishing.

Sediment controls may be reinstalled following any slow establishment or reseeding if indicated at the 12-month post-seeding.

No specific fertiliser treatment has been recommended for the establishment of native pasture (See section 5.1.8 on revegetation), however yields may be improved for *Themeda* and *Astrebla sp.* and with low nitrogen fertiliser applications of 50kg/ha if cover development performance is poor. Success of revegetation species strike rate will depend on weed-free rehabilitation media and N soil levels.

Pre-mining erosion rates were reported as 0.5t/year for the Wyandotte Creek area (See section 1.1.7 and Appendix 3).

5.1.4 Waste Characterisation and implication

The nature of diatomite within the reserve for extraction is understood to have no acid generating potential. The chemical nature of the diatomaceous earth is constant across the entire exploration target and mine development area. The basin containing the diatomite deposit has a shallow consistent base and does not have any/many ridges or high spots in it. The diatomite basin is cut by both Wyandotte and Spring Creek's and these paleochannels have eroded the lacustrine diatomite from some areas of the resource. However, no major erosion of the lacustrine diatomite layers occurs near ML10279 and the target area.

There are no intrusions or "waste" material replacing the diatomite under the basalt cover in ML10279 and near the target area.

Confirmation sampling of the basalt materials, diatomite from target ore zones and overburden material was undertaken to verify this understanding of the target area. The full results of acid generation analysis and water leachable metals are presented in Appendix 4.

All materials sampled have a negative acid production potential and net acid generation rate of <0.1kg H_2SO_4/t. The water leachable metals for all materials are lower than the receiving water quality standards set for the site in Schedule C – Table 2 Receiving water contaminant limits.

In light of these results no specific waste (overburden or exposed ore) treatment is proposed in the rehabilitation design.

No placement restrictions arise from the chemical character of the waste material. The placement order (reverse of extraction) is sufficient to support the reinstatement of the backfilled landform.

5.1.5 Landform design and implication

The final landform design has been informed by the long term mine plan development model. Copies of stepwise development are included in Appendix 5. The principles applied to the final landform include:

- the backfilling of excavated voids using the overburden materials from active mining areas so as to minimise the total disturbed area at any one time and reduce total materials handling throughout operations.

- Creation of a water shedding surface on the backfilled void.
- Creation of landform slopes that allow the return of land to PMLU of low intensity grazing.
- Backfilled void slopes integrated with the pre-disturbance mine contours.

The contours of the pre-mining landscape include a step down to the resource location which determines the grade direction for the post-mining landform design.

Slope lengths for backfilled pits range from 8 degrees for over 125 metres to <5 degrees for over 300m.

Slopes will include contour berms at 45 to 60 m intervals respectively to reduce erosion potential. Contour berms will be within the design length of 1500m as per Soil Conservation Guideline for Queensland (Department of Science, Information Technology and Innovation, 2015) to reduce risk of failure.

Stability risks

The primary risks associated with the slope length relate to the early establishment of vegetation and erosion rates. By reducing the velocity of water on the bare slopes using contour banks and placed sediment controls, the chance of improved vegetative cover is increased. A grassed drain will be installed to divert runoff from eroding the reprofiled landform before the revegetation milestones can be achieved. The drain will need to maintain function for at least 4 years until the rehabilitated landform reaches the vegetation cover milestones. The drain will discharge via level spreader onto adjacent undisturbed land within the ML.

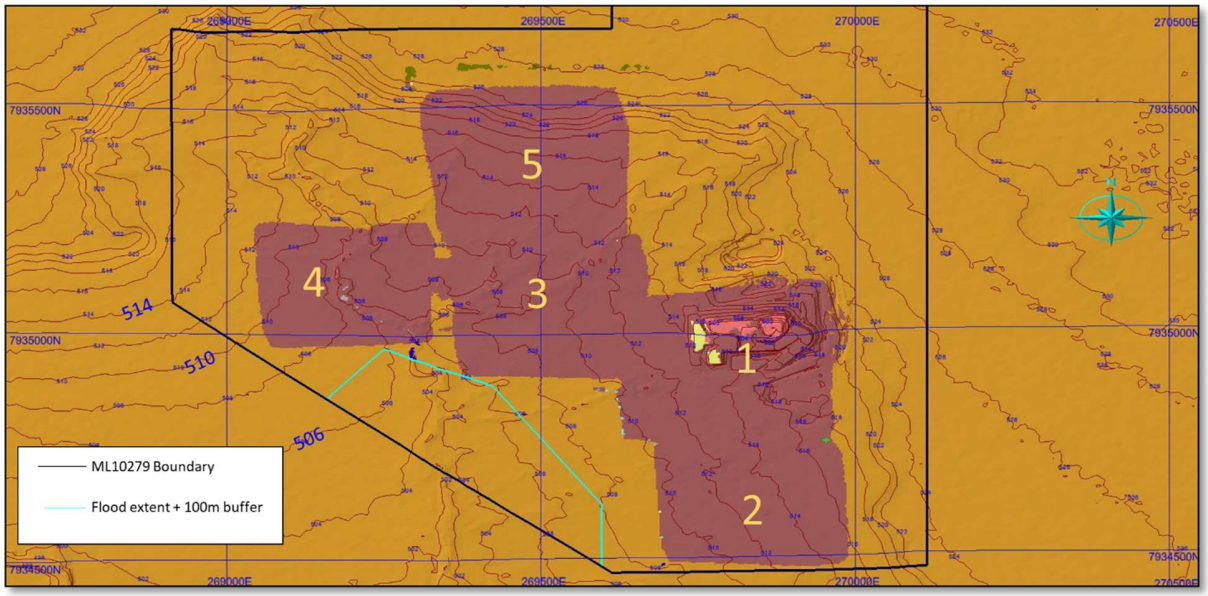


Figure 14 Mine void footprint overlay on pre-mining contours

The sequence of mining (Pit 1 to Pit 5) in a stepwise manner to allow for the surface placement of ore and waste until the receiving void is safe to receive wastes directly. The waste of Pit 1 will be stockpiled to the north of the excavation. Pit 2 waste returned to Pit 1 will be placed to uniform depth with initial campaign wastes following. Commencement of Pit 3 will initiate backfilling of Pit 2. The surface stockpile

of waste will be exhausted by this stage and direct placement of waste to Pit 2 and Pit 3 will commence at the initiation of Pit 4. The initiation of Pit 5 will commence the completion of Pit 3 and the shallower Pit 4. Waste excess from Pit 5 and adjoining pit wall will be dozed to create a continuous contour landscape. Backfilled material integrity is expected to be enhanced by the retention of internal wall divisions between pit developments.

Table 11 Mine waste volumes placed into backfill

Volume ('000 m³)	Pit 1	Pit 2	Pit 3	Pit 4	Pit 5	Stockpile Rehandle	Extra for Rehab	Totals
Dumped Trucked Volume	616	268	229	245	793	0	451	2,604
Dumped Dozed Volume	481	93	0	45	643	0	0	1,263
Stockpile Rehandle	0	0	0	0	0	650	0	650
Loose Volume into Backfill	1,097	361	229	290	1,437	650	451	4,519

The progression of pit development and rehabilitation is shown in the images below.

Scope and assessment criteria of geotechnical assessment

The scope of assessment for a geotechnical engineer is to prepare a geotechnical assessment of the final slope status, geometry (<10°), condition and engineering characteristics, such as material strength, assessment of failure mechanisms and acceptability of failure based on consequence and probability, factor of safety over the life of slope.

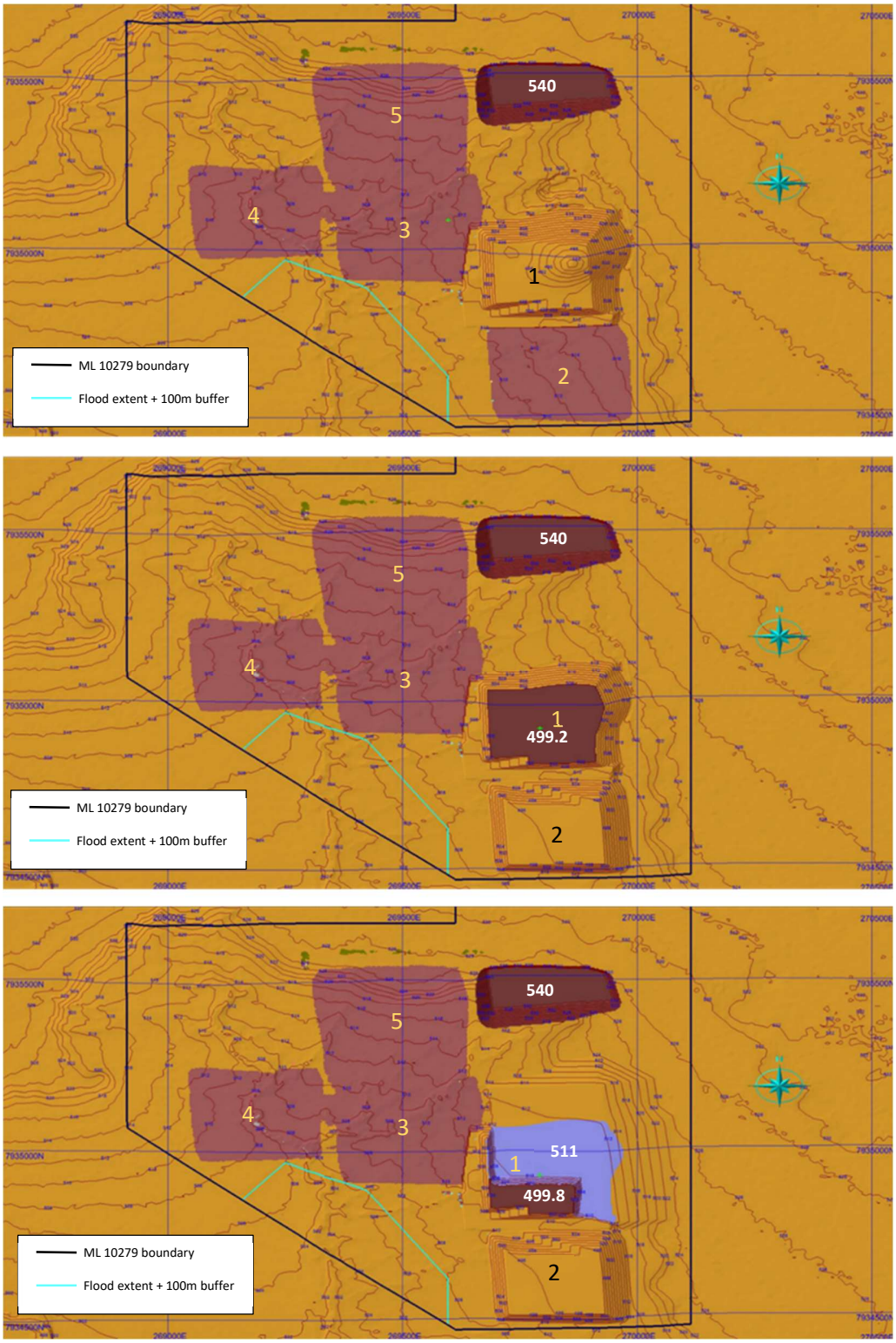


Figure 15: Sequence Pit 1 and Pit 2 development

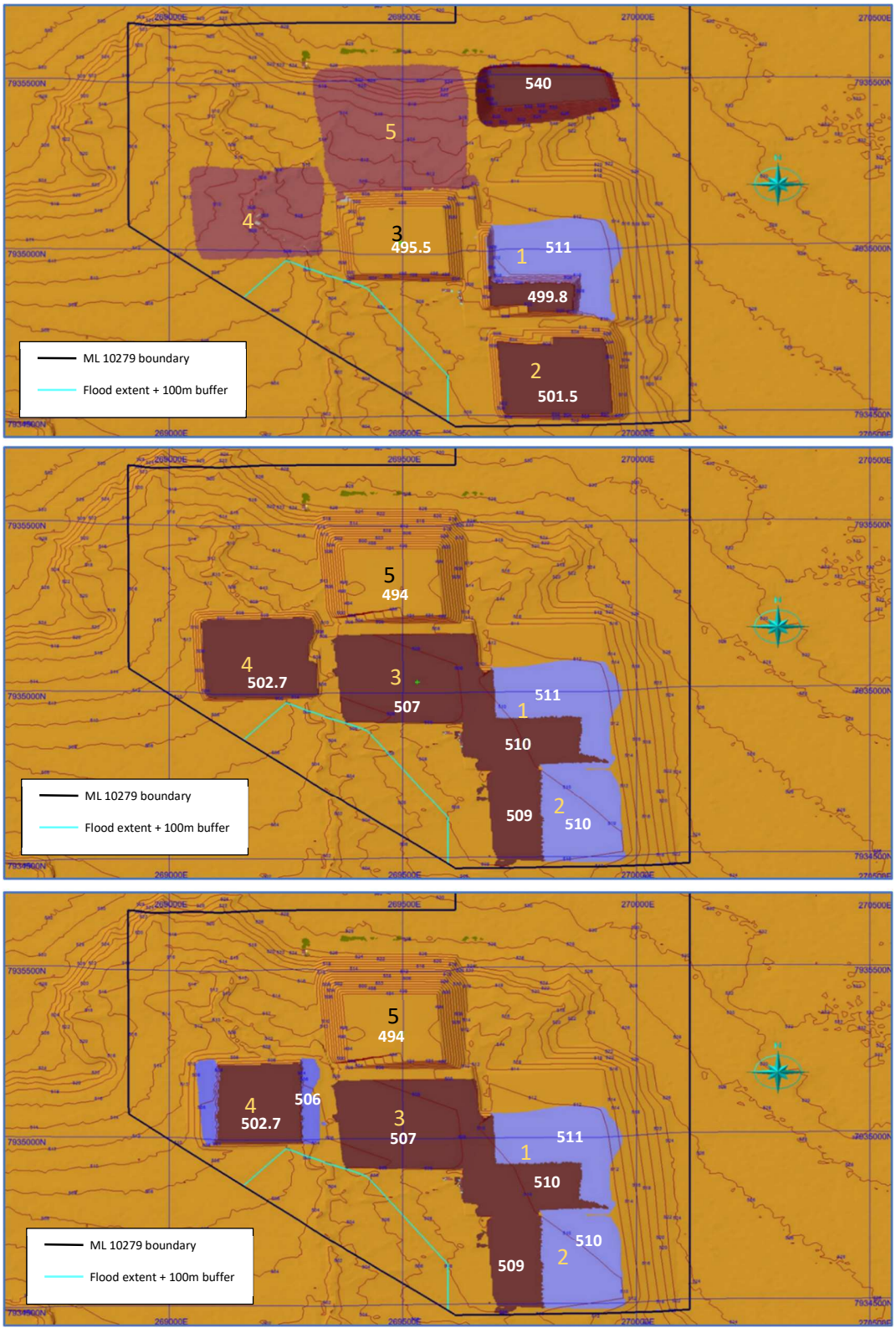


Figure 16 Backfilling sequence for Pits 1-4

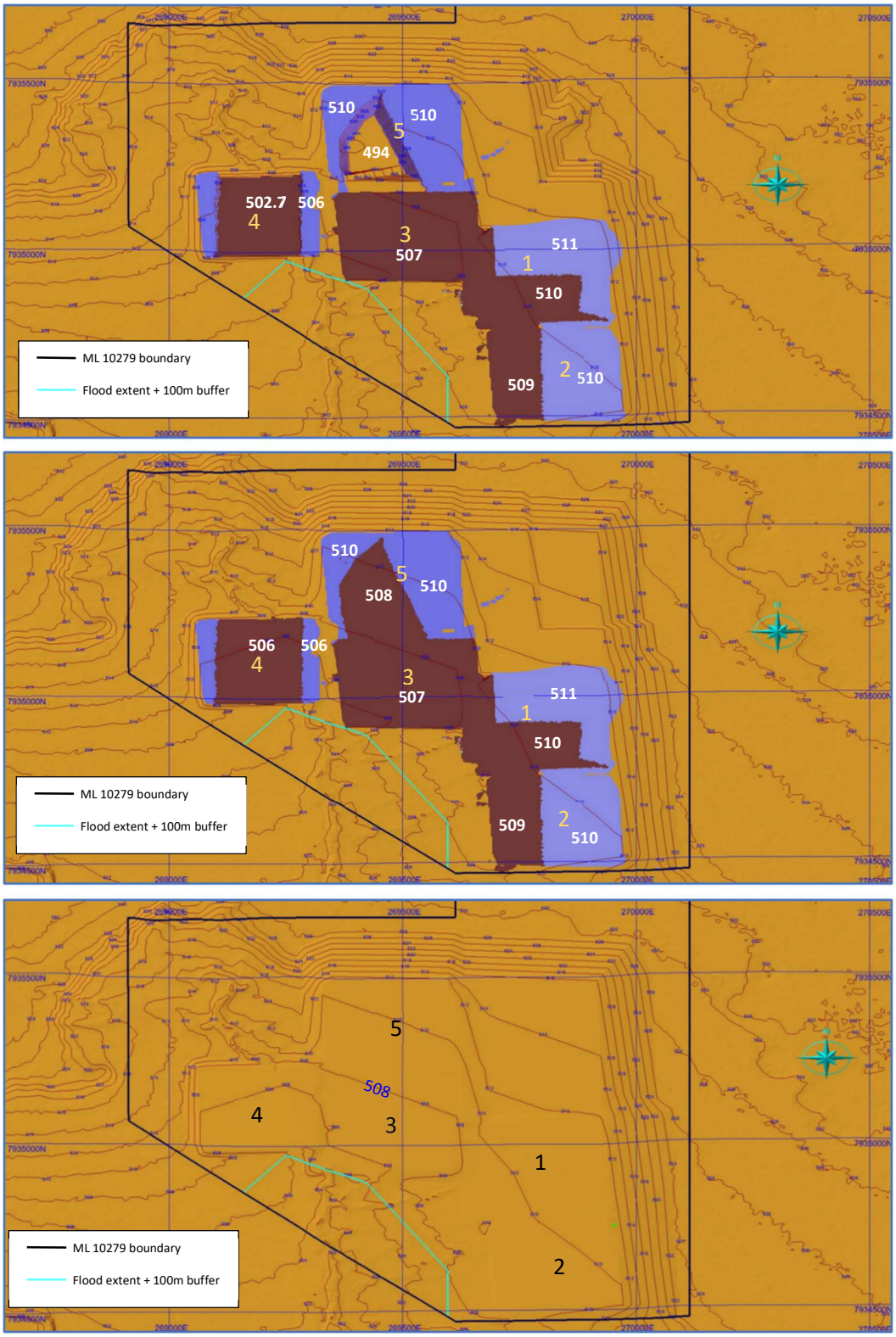


Figure 17 Pit 5 backfill and final landform profile

The final landform design meets the design criteria of slopes of <10 degrees and water-shedding (non-ponding) landform. The cross-sections below illustrate the slope and drainage analysis of the design meeting the criteria. The cross-section images include the pre-mine profile, void exhaustion profile and backfilled and reprofiled lines through Pits 1, 3 and 4 (Figure 19), Pits 3 and 5 (Figure 20) and Pits 1 and 2 (Figure 21) with vertical exaggeration (x3) to emphasise the landform for illustrative purposes.

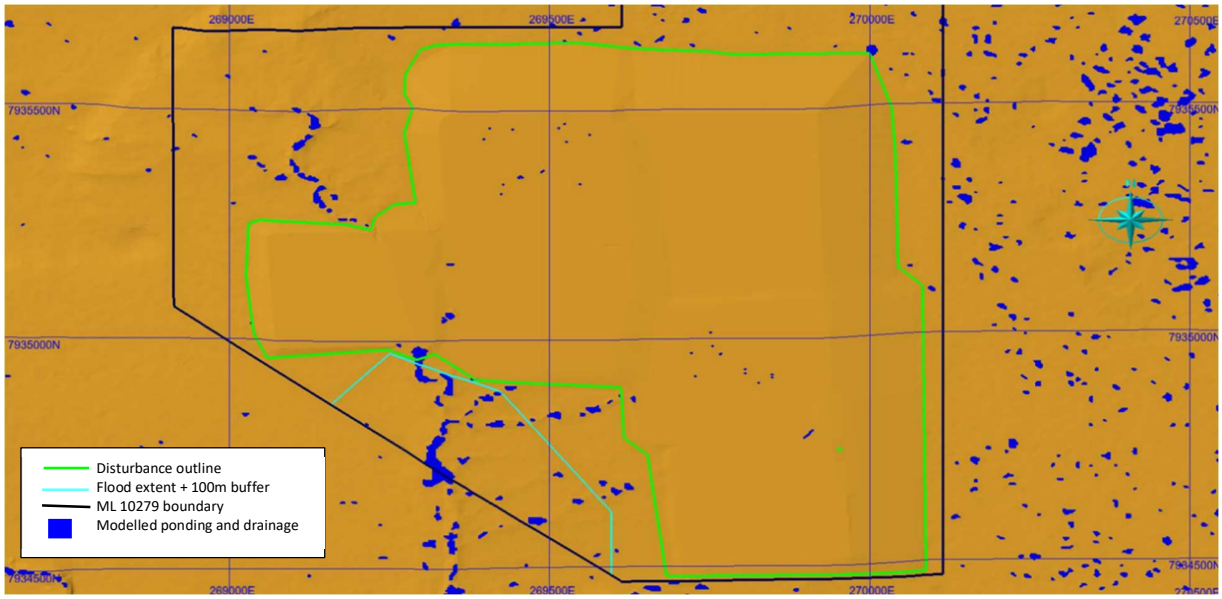


Figure 18 Drainage analysis of final landform design in 3D Dig

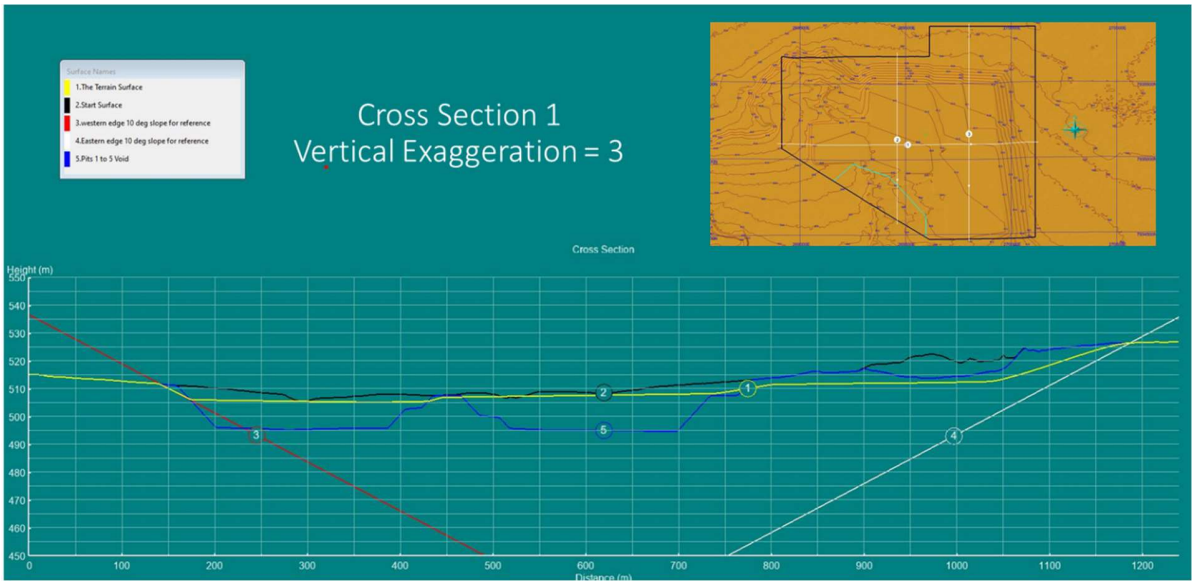


Figure 19 Cross-section Pits 1, 3 and 4

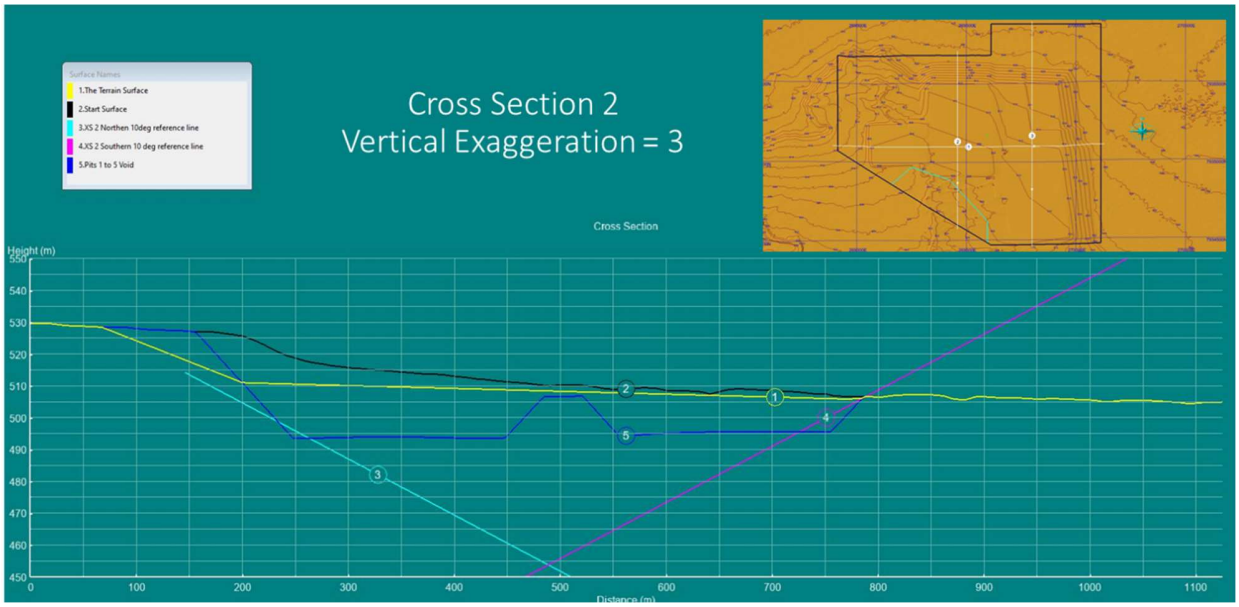


Figure 20 Cross-section Pits 3 and 5

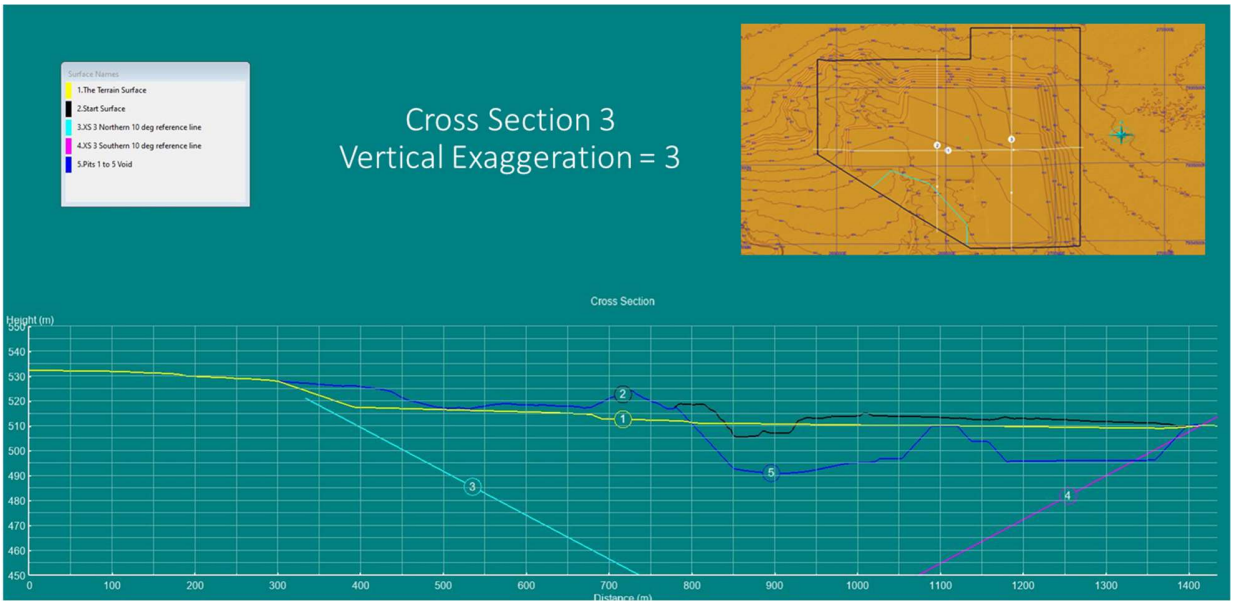


Figure 21 Cross-section Pits 1 and 2

5.1.6 Cover Design

There are no processing or mine waste generated requiring a capping cover on ML10279. Sodic soil management is described in section 5.1.3 above.

5.1.7 Water Management

Environmental values (EVs) reflect the uses and values of water. EVs for Burdekin Basin waters have been identified and most fresh waters in the Burdekin River Basin include EVs for stock watering, farm supply,

recreation, aquatic ecosystems and cultural and spiritual values. Draft Water Quality Objectives (WQOs) have been prepared for review and consultation for the Burdekin Basin (DSITI, 2017).

The application process for ML 10279 identified the downstream water uses as the environmental values and included receiving water quality standards under which the mine has operated. Table 12 below includes the criteria for Schedule C – Table 2 of the EA are considered to set the closure standard in the absence of published WQOs for the Burdekin River Basin – Upper Burdekin River sub-catchment waters. The baseline assessment for Water is included as Appendix 6.

Table 12 Surface Water Quality standards

Parameter	Units	Limit Type	Contaminant Limits (EA)
Total dissolved solids	mg/L	Maximum	4000
pH	pH units	Acceptable range	6.5-9.0
Turbidity	mg/L	Maximum	10% seasonal mean
Sulphate	mg/L	Maximum	1000
Fluoride	mg/L	Maximum	2
Cadmium	mg/L	Maximum	0.01
Mercury	mg/L	Maximum	0.002
Arsenic	mg/L	Maximum	0.5
Copper	mg/L	Maximum	1
Chromium	mg/L	Maximum	1.0
Lead	mg/L	Maximum	0.1
Nickel	mg/L	Maximum	1.0
Zinc	mg/L	Maximum	20

The closure design has no watercourse diversions or long-term management requirements, infiltration or seepage interventions, dewatering requirements or on-going water management and reduction or treatment requirements.

Catchment management targets include minimum 70% late dry season groundcover on grazing land (NQ Dry Tropics, 2016).

5.1.8 Revegetation Plan

The aim of the revegetation plan is to achieve a stable, self-sustaining groundcover of native pasture species, free from weeds and invasive introduced grasses in a density and richness consistent with the surrounding landholding.

The species mix is targeted to achieve groundcover at percentages which can conserve soil stability and species density and richness of the surrounding land and be exclusive of the noxious weeds of the region to meet the landholder's expectation of resumption of a grazing land use over the ML area.

Appendix 7 includes the baseline flora and fauna survey reports and some information relating to the successful treatment and timing of revegetation of native pasture species recommended by DPI. The pre-disturbance surveys conducted in 2002 identified the following regional ecosystems in the area of the ML

RE. 9.3.2 and RE9.8.1. Limited areas of RE 9.3.10 were identified but only associated with watercourse margins, which are not being disturbed by the activity.

The key flora species for the disturbed area revegetation are a mix including:
Native pasture species mix:

a. *Heteropogon contortus*
b. *Heteropogon triticeus*
c. *Themeda triandra*
d. *Grewia retusifolia*

At an initial seeding rate of not less than 3kg/hectare/species for which fertiliser application to promote growth will be established in revegetation trials.

As per the landholder requirements, the following native pasture species will also be included in the reseeding mix:

- *Astrebla sp* (Mitchell grass)
- *Dichanthium sericium* (Queensland bluegrass)

at an initial seeding rate of 1kg/hectare/species (Scattini, 2008) and (Phelps, 2008) which are expected to improve strike rate by the inclusion of low N fertiliser.

Native tree and shrub mix including:

a. *Petalostigma pubescens*
b. *Ficus opposita*
c. *Diospyos geminata*
d. *Hakea arboescens*
e. *Brachychiton diversifolius*
f. *Corymbia erythophloia*
g. *Corymbia dallachiana*
h. *Eucalyptus leptophleba*
i. *Eucalytpus crebra*

At an initial seeding rate of not less than 200g/hectare/species which do not require fertiliser to establish growth.

The strike rate of the native pasture seed mixes will be subject to trials on the initial landform area to determine if proportions, success and survival are achieved over successive years (See section 6.3.1.3).

Any areas within the landform that accumulates water, may also include:

a. *Carissa ovata,*
b. *Capparis umbonata*
c. *Indigofera linnea*
d. *Lomandra multiflora*
e. *Melaluca braceata*

The preference is that native species seeds are collected from the site itself or adjacent landholdings. It may be desirable to apply low nitrogen fertilizer (50kg/ha) on pastures targeted for seed harvesting as it may increase seed head yield.

Weed control measures will be essential to manage the successful establishment of native grazing pasture and has been identified as a protection of habitat integrity in the baseline fauna assessment.

The weeds of concern include:

a. Parthenium weed
b. Noogoora burr
c. Prickly acacia
d. American rat's tail grass
e. Giant Paramatta grass
f. Lantana

The landholder had specific requirements for the exclusion of Indian cooch (*Bothriochloa pertusa*) from the rehabilitation area.

Revegetation seeding timing for the native pastures are to be planned for Autumn when temperatures and soil moisture are ideal.

Establishment of 75-85% groundcover on <10^{o} slope is considered sustainable for the soil type and post-mining land use of grazing according to (NSWDPI, 2005) and consistent with the timeseries LongPaddock Forage Report for Lot 200 on SP232790 in Appendix 3.

Fencing that is operationally installed for the protection of livestock is to be retained for 4 years after the final seeding and growth on disturbed areas to allow for resilience in the pasture before cattle are admitted, as per the landholder's request.

Topsoil sourced from the site stripped prior to disturbance is the proposed rehabilitation media. The recommended topsoil stripping rates for rehabilitation is commonly 10cm and up to 30cm depending upon soil group. A topdressing depth of 15cm uniformly across the backfilled excavation profile will allow for contour ripping and surface establishment of groundcover species.

The final landform design with a moderate slope (between 5-11^{o}) on moderate to high erodibility soils (loams and self-mulching black earths) would need to maintain 75- 85% groundcover to sustain a soil loss of <2t/ha/yr under a use of grazing (NSWDPI, 2005).

Where sodic soil exposure at surface is identified, gypsum application will be included in the surface treatment, prior to revegetation. Following an Exchangeable Sodium Percentage assessment, gypsum will be applied at the rates as follows:

Table 13 A guide to the rate of gypsum application required according to the degree of dispersion (sodicity), exchangeable sodium percentage and pH of the soil

Dispersive behaviour or sodicity rating	Exchangeable sodium percentage (ESP %)	Gypsum application rate on neutral to acid soils (t/ha)	Gypsum application rate on alkaline soils (t/ha)
Slight	6–10	0–1.5	1.0–2.5
Moderate	10–15	2.5	5.0
Severe	>15	5.0	5.03

Source: https://www.agric.wa.gov.au/dispersive-and-sodic-soils/managing-dispersive-sodic-soils

Reference sites for revegetation assessments

Location of reference sites considered to be representative of the ML disturbance areas but within the ML perimeter are located as follows:

- Site characteristics considered representative of the 133ha ML area based on vegetation cover, slope, soil characteristics. RE is largely uniform across the site and land use outcome is grazing and not RE dependent.

  Analogue site 1: Soil group B1
  Analogue site 2: Soil group D1

Data to be collected from each analogue site:
Soil:

- Slope;
- topsoil depth;
- subsoil sodicity;
- erosion estimate (rill count and volume estimation).

Vegetation:

- species count;
- cover percentage;
- form distribution (groundcover/mid-storey/canopy);
- weed percentage;
- habitat features.

Vegetation transects

Vegetation transects will consist of a modified BioCondition survey using fixed 100 m x 50 m vegetation transects will be established and monitored throughout the Project Area with the following information recorded in regards to vegetation structure:

- RE;
- Canopy species and relative abundance;
- Canopy minimum, maximum and average height;
- Crown cover;
- Shrub species and relative abundance;
- Shrub average height;

- Shrub canopy cover;
- Weed cover;
- Ground cover;
- Ground layer species and individual percentage cover;
- Percentage cover of bare ground and organic material.

5.1.9 Tailings Storage Facilities

This project has no tailings storage facilities.

5.1.10 Voids

All voids will be backfilled with native materials from the mining activity. Final landform profiles are described in Section 5.1.5. The voids are located above the floodplain and have been designed to be free draining surfaces.

The revegetation of backfilled surfaces using native pastures are expected to achieve stability at the cover identified in the revegetation plan (Section 5.1.8) and for the final landform maximum slope of 10°.

5.2 MILESTONES TO BE TRANSITIONED

Significant events or steps required to achieve PMLU from the EA include the receiving water contaminant limits presented in Schedule C – Table 2 to be adopted as milestone criteria. The location for assessment should include that identified in Schedule C - Table 1 of EPML00392513 (page 6).

5.3 MILESTONES TO BE DEVELOPED

5.3.1 General rehabilitation milestones applicable to any disturbance areas

The following milestones are applicable to any of the disturbance areas and are enumerated in sequence of application and expected achievement.

Table 14 Rehabilitation Milestones

Milestone Reference	Rehabilitation Milestone	Milestone Criteria
RM1	Removal of infrastructure and storage vessels	a) All buildings demolished and removed
RM2	Landform reprofiling and trim complete	a) Surface contours reinstated and integrated with adjacent undisturbed land with maximum slope of 10° b) Light ripping to improve infiltration c) Surface drainage does not concentrate flow d) Sediment controls installed
RM3	Surface treatment	a) Soil used from topsoil stockpiled for use as rehabilitation media and is weed-free prior to use and assess N level in stored soil. b) Topsoil applied over whole footprint area to thickness of not less than 15cm. c) Ameliorants and fertilizer applied according to recommendations arising from rehabilitation trials.
RM4	Revegetation (native pasture grazing)	a) Seeding of native pasture species mix including: a. *Heteropogon contortus* b. *Heteropogon triticeus* c. *Themeda triandra* d. *Grewia retusifolia* At a rate of not less than 3kg/hectare/species. Landholder species of: e. *Astrebla sp* (Mitchell grass) f. *Dichanthium sericium* (Queensland bluegrass) At an initial seeding rate of 1kg/hectare/species b) Seeding native tree and shrub mix including: a. *Petalostigma pubescens* b. *Ficus opposite* c. *Diospyos geminate* d. *Hakea arboescens* e. *Brachychiton diversifolius* f. *Corymbia erythophloia* g. *Corymbia dallachiana* h. *Eucalyptus leptophleba* i. *Eucalytpus crebra* At a rate of not less than 200g/hectare/species. c) Achieve groundcover projective foliage cover of >75% of analogue site for successive years (excluded from grazing). d) Strike rate of native grass seeding to be recorded.

Milestone Reference	Rehabilitation Milestone	Milestone Criteria
RM5	Achievement of surface requirements	a) Achieve native species dominance for groundcover of >75% similarity of analogue site for successive years. b) Assessment of weed contribution to total groundcover to be <10%. c) No active rill or gully development across reinstated surface.
RM6	Achievement of post-mining land use to stable condition for grazing	a) Certification from a suitably qualified person that the area has achieved stable condition. b) Surface stability to be less than 0.5t/ha/annum loss through erosion. c) Groundcover has achieved >75% of analogue site. d) Surface water quality sampled (DES, 2017) from the area complies with the following: a. Total dissolved solids <4000 mg/L b. pH between 6.5-9.0 c. Turbidity (mg/L) +10% of seasonal mean d. Fluoride <2 mg/L e. Cadmium <0.01 mg/L f. Mercury <0.002 mg/L g. Arsenic <0.5 mg/L h. Copper <1 mg/L i. Chromium <1 mg/L j. Lead <0.1 mg/L k. Nickel <1 mg/L l. Zinc <20 mg/L e) A contaminated land survey carried out by an appropriately qualified person indicates that no contamination unsuitable for the PMLU is occurring. f) Certification of no weed and pest species abundance identified in the rehabilitated areas are no greater than at reference sites by a suitably qualified person.

5.3.2 Relevant Activity Specific Milestones

5.3.2.1 Roads, tracks and park up areas

Milestone Reference	Rehabilitation Milestone	Milestone Criteria
RM7	Surface preparation of road	a) Deep rip along recontoured surface b) Surface suitable for native grass re-establishment without topsoil placement (based on trial outcomes)

5.3.2.2 Overburden and waste dumps and Ore stockpile/drying pad

Milestone Reference	Rehabilitation Milestone	Milestone Criteria
RM8	Removal of stored materials	a) Waste/overburden/ore removed from footprint area to pit
RM9	Achievement of surface requirements	a) Certification by a suitably qualified person that no sodic materials have been exposed nor remain at surface (if excavated) or have been treated with gypsum application.

5.3.2.3 Water management structure

Milestone Reference	Rehabilitation Milestone	Milestone Criteria
RM10	Removal of retaining structure	a) Drainage of water stored. b) Drying of sediments therein c) Removal of retaining wall and sediments to pit

5.3.2.4 Open pits

Milestone Reference	Rehabilitation Milestone	Milestone Criteria
RM11	Backfill of pits	a) Backfilling of ore/ waste/overburden to pit. b) All major earthworks within pit footprint complete. c) Batter slopes meet final design specifications. d) Installation of contour berms on backfilled landform. e) Integration of natural ground level with backfilled pit profile complete. f) Installation of upslope drainage for pit perimeter areas to provide erosion protection on slopes prior to vegetation cover criteria met.
RM12	Achievement of post-mining land use to stable condition for grazing	a) Backfilled pits assessed as geotechnically stable by a suitably qualified geotechnical engineer so that no slumping is observed or expected in placed material. b) Stability assessment includes final slope status and geometry (<10^{o}), condition and engineering characteristics and assessment of failure mechanisms. c) Final landform slope lengths and angles consistent with landform design criteria.

6 RISK ASSESSMENT

AS ISO 31000:2018 *Risk Management – Guidelines* (Standards Australia, 2018) describes risk assessment as the overall process of risk identification, risk analysis, risk evaluation and risk treatment. Each of these aspects must be included in the risk assessment in the rehabilitation planning part.

6.1 Identification, Risk Assessment and Management of Closure Issues

The systematic identification and management of mine closure risks is part of the overall site risk management process.

The purpose of this section is to undertake a high-level risk assessment which identifies the potential risks associated with the period following rehabilitation and mine closure. The scope covers risks to the successful achievement of PMLU - Grazing. Potential health and safety hazards that may affect site workers were not assessed as part of this risk assessment process as generally there are no site workers following mine closure.

A risk assessment has been undertaken in accordance with the principles outlined in ISO31000:2018 taking into account the areas of impact, events and their causes and potential consequences for the period following mine closure. An assessment of likelihood and consequence of associated risks have been made based to determine unmitigated risk. Definitions of likelihood and consequence of the risk are shown in Table 15 and Table 16. Table 17 demonstrates how the overall risk level is determined. Proposed mitigation measures are specified. The residual risk based on effective and ongoing implementation of the mitigation measures was then determined.

Table 15: Likelihood Definition

Likelihood	Definition
Almost Certain; >90%; (5)	Greater than 90% likelihood of occurring. Has happened, will probably happen during the mine life and there is no reason to suspect it won't happen in the post-closure period.
Likely; 30% - 90%; (4)	Likelihood of occurring is equal to or more than 30% and less than 90%. This consequence is not uncommon in the mining industry/local area
Possible 10-29%; (3)	Likelihood of occurring is equal to or more than 10% and less than 30%. There is a possibility of this risk occurring as it has occurred before (albeit infrequently) in the mining industry/local area
Unlikely; 3% - 9% (2)	Likelihood of occurring is more than or equal to 3% and less than 10%. There are no specific circumstances to suggest this could happen.
Improbable; <3%; (1)	Likelihood of occurring is less than 3%. It would require a substantial change in circumstances to create an environment for this to occur, and even then, this is a rare occurrence.

Table 16: Consequence Definition

Consequence Type	Insignificant (1)	Minor (2)	Moderate (3)	High (4)	Major (5)
PMLU not being achieved	Lasting days or less; affecting small area (metres); groundcover affected with no loss of stability.	Lasting weeks; affecting limited area (tens of metres); groundcover affected on rehabilitated surfaces only and/or land slip of rehabilitated surface/profile or one incident of surface water quality deterioration.	Lasting months; affecting extended area (hundreds of metres); groundcover affected within Mine Activity Area only and/or erosion or slumping of rehabilitated surface/profile or successive incidents of surface water quality deterioration.	Lasting years; affecting area on ML area beyond the Mine Activity Area and undisturbed land; landform failure requiring remobilisation of rehabilitation efforts. Off lease impacts potential to cause environmental harm.	Permanent impact; affecting area beyond ML area and landholder property, reducing productivity of affected land permanently.

Table 17: Risk Level Matrix

Likelihood	Consequence Scale				
	Insignificant (1)	Minor (2)	Moderate (3)	High (4)	Major (5)
Almost Certain; >90%; (5)	5 (Medium)	10 (Significant)	15 (Significant)	20 (High)	25 (High)
Likely; 30% - 90%; (4)	4 (Medium)	8 (Medium)	12 (Significant)	16 (High)	20 (High)
Possible 10-29%; (3)	3 (Low)	6 (Medium)	9 (Medium)	12 (Significant)	15 (Significant)
Unlikely; 3% - 9% (2)	2 (Low)	4 (Medium)	6 (Medium)	8 (Medium)	10 (Significant)
Improbable; <3%; (1)	1 (Low)	2 (Low)	3 (Low)	4 (Medium)	5 (Medium)

The risk assessment outcome, including proposed mitigation measures are shown in Table 18. The table is presented with each rehabilitation area (RA) identified separately where an event is unique to its circumstance or listed where an event may apply regardless of location.

Table 18: Risk Assessment of Mine Closure

C = Consequence L= Likelihood R = Risk

RISK TO PMLU OUTCOME			Unmitigated Risk			Residual Risk			
RA	Cause	Event	C	L	R	Mitigation	C	L	R
1/2/3/4/5/6	Weed invasion of rehabilitated areas	Groundcover of native pastures fails	3	4	12	• Complete weed eradication from topsoil stockpile prior to use. • Ensure fertilizer use is low release to allow native species to out compete weeds. • Keep weed hygiene measures in place for entire rehabilitation activity schedule. • Consider weed control on areas adjacent to the Mine Activity Area. • Selective weed eradication on revegetated areas based on weed type and control susceptibility.	2	3	6
	Extended drought event		3	3	9	• Exclude stock until establishment of regrowth. • Reseed area in the first available wet season following extended drought.	2	3	9
	Unrestricted livestock access prior to RM5 achievement		4	4	16	• Maintain Mine Activity Area fence until RM5 criteria are met.	2	2	4
	Native fauna access prior to RM5 achievement		4	3	12	• Maintain Mine Activity Area fence until RM5 criteria are met. • Install tree guards around base of immature tree/shrubs in critical areas (slopes and slope toes).	2	3	6
	Vehicle access prior to RM5 achievement		3	3	9	• Install safety bund to restrict access to backfilled pit. • Install ramp bund. • Maintain Mine Activity Area fence until RM5 criteria are met.	2	1	2
	Exposure of contaminated or sodic soil at surface		3	2	6	• Inspection by suitably qualified person of potentially contaminated or exposed areas prior to reshaping and confirmation post-shaping • Installation of runoff controls to limit the potential for erosive events.	2	2	4
	Low native pasture seed strike rate		3	3	9	• Implementing findings of revegetation trials for seed mix with best strike rate.	2	3	6

RISK TO PMLU OUTCOME			Unmitigated Risk			Residual Risk			
RA	Cause	Event	C	L	R	Mitigation	C	L	R
						• Monitoring of groundcover over successive years to commence remedial actions at the soonest possible season. • Reseed as required for improved strike rate. • Increase seeding of landholder preferred species of *Astrebla sp* and *Dichanthium sericium*.			
	Bushfire event alters surface cover		2	3	6	• Following a failed recovery season, reseed area with native pasture species mix. • Recommence groundcover monitoring assessment.	2	3	6
	Flooding event alters surface cover		3	2	6	• Following a failed recovery season, reseed area with native pasture species mix. • Recommence groundcover monitoring assessment.	3	2	6
	Unsuitable seed blend used for ground conditions (microrelief)		3	3	9	• Reseed area with either RE9.3.10 mix if inundation or persistent water accumulation or increase seeding of landholder preferred species of *Astrebla sp* and *Dichanthium sericium*.	2	3	6
9	Soil loss from topsoiled areas	Instability of regraded surface	3	3	9	• Installation of runoff controls to limit the potential for erosive events. • Confirmation of final profile <10^{o} over backfilled and topsoiled areas. • Maintain Mine Activity Area fence until RM5 criteria are met.	2	2	4
	Slumping of placed materials on slope		3	3	9	• Confirmation of final profile <10^{o} over backfilled and topsoiled areas. • Where placed material meets in situ materials key into slope and install water management to direct runoff to dedicated structures and away from placed materials.	2	2	4
	Water management installations fail		3	3	9	• Maintain water management installations throughout rehabilitation schedule and annually prior to each wet season. • Inspect status of installations following wet season.	2	2	4
	Stock access damages topsoiled areas		3	3	9	• Maintain Mine Activity Area fence until RM5 criteria are met.	2	1	2

RISK TO PMLU OUTCOME			Unmitigated Risk			Residual Risk			
RA	Cause	Event	C	L	R	Mitigation	C	L	R
2/3/6	Exposure of sodic materials in the profile	Reprofiled landform failure	3	2	6	• Inspection by suitably qualified person of potentially contaminated or exposed areas prior to reshaping and confirmation post-shaping • Installation of runoff controls to limit the potential for erosive events.	2	2	4
	Final landform design angle or slope length is not suitable for material used at time of rehabilitation		3	3	9	• Geotechnical assessment to confirm available material can be installed as stable and if not include benching to final profile to decrease slope angle and length.	2	2	4
	Groundwater intrusion weakens backfilled material geotechnical competency		2	2	4	• Pit hydrogeological assessment and closure model recommendations implemented	2	1	2
	Gully formation on rehabilitated surface changing site water dynamics		3	2	6	• Geotechnical assessment of pit wall stability • Implementation of recommendations of geotechnical assessment. • Installation of further water management controls to preserve rehabilitation.	2	2	4
1/6	Exposure of contaminated or sodic soil at surface	Water quality fails to meet criteria	3	2	6	• Contaminated land assessment prior to closure • Removal of sodic materials at surface for burial in pit • Monitoring of water quality downstream throughout rehabilitation and closure period	2	2	4
	Surface application of gypsum on rehabilitation area washes into watercourse altering pH		2	2	4	• Rip gypsum into surface prior to topsoiling and/or seeding. • Monitoring of water quality downstream throughout rehabilitation and closure period.	2	1	2
	Groundcover failure results in sediment laden runoff from rehabilitation area		3	3	9	• Implementing findings of revegetation trials for seed mix with best strike rate • Monitoring of groundcover over successive years. • Reseed as required for improved strike rate.	2	2	4

RISK TO PMLU OUTCOME			Unmitigated Risk			Residual Risk			
RA	Cause	Event	C	L	R	Mitigation	C	L	R
						• Install temporary sediment control fences.			
	Surface expression of groundwater at altered landform profile causes runoff to watercourse.		2	2	4	• Installation of temporary sediment control fences and seeding of location with RE9.3.10 species to increase water uptake and decrease runoff. • Monitoring of water quality downstream throughout rehabilitation and closure period.	2	1	2
1/2/3/4/5/6	Failure of successive years achievement of native pasture grass.	Rehabilitation not self-sustaining for grazing	3	3	9	• Monitoring trial locations and applying revised methodologies to final landform at scale.	2	2	4
	Failure to achieve water quality criteria over successive wet seasons		3	3	9	• Include upstream water quality sampling to provide a reasonable local alternative to the Schedule C Table 2 water quality limits.	3	1	3
	Failure to achieve groundcover rate within 5 years after seeding		3	3	9	• Increase seeding of landholder preferred species of *Astrebla sp* and *Dichanthium sericium*.	2	2	4
	Failure for successive years to achieve erosion loss limit of 0.5t/ha/annum		3	3	9	• Include analogue site assessment of erosion loss rates to provide a reasonable temporal alternative to the single point baseline assessment. • Reinspect sodic soil surface expression and apply ameliorant treatment.	3	2	6

The majority of the risks identified were rated as being associated with risks at medium level based on the unmitigated risk. The significant/high unmitigated risks identified within the scope of the risk assessment related to entry to the rehabilitation area by stock or native fauna and weed infestation. These risks were then reduced to low or medium once the mitigation measures were implemented.

It should be noted that the above risk assessment is high level. It should also be highlighted that the residual risk is based on the effective and ongoing implementation of the mitigation measures documented in Table 18.

6.2 Risk Treatment Plan

The bases for selection of the various risk treatments are recorded in Table 19 below. The risk mitigations are presented in approximate sequence of application for each cause. It is possible that early treatments may be sufficient for risk eradication and that the full range of options may not be necessary for the mitigative effect to be completed.

Table 19: Risk Treatment Selection

RISK TO PMLU OUTCOME		Treatment of Risk			
Cause	Mitigation	Selection rationale	Responsibility	Actions and Performance measures	Reporting/Monitoring/Timing
Groundcover of native pastures fails					
Weed invasion of rehabilitated areas	Complete weed eradication from topsoil stockpile prior to use.	timely application of control in rehabilitation schedule	Operations manager	Apply suitable herbicide to weed infested areas seasonally	Record weed status of stockpiled soils prior to re-spreading on regraded landforms
	Ensure fertilizer use is low release to allow native species to out compete weeds.	meets native species recommended outcome	Rehabilitation manager	Source suitable fertiliser for use throughout rehabilitation period	Record rate of use and weed emergence
	Apply weed hygiene measures for entire rehabilitation activity schedule.	protection of surrounding environment	Rehabilitation manager	Keep operational weed hygiene measures in place for entire rehabilitation activity schedule.	Record equipment and maintain hygiene records
	Consider weed control on areas adjacent to the Mine Activity Area.	cost-benefit in post-closure period	Operations manager	Engage in discussions with landholder about coordinated weed control measures	Implement prior to rehabilitation period completion

RISK TO PMLU OUTCOME		Treatment of Risk			
Cause	Mitigation	Selection rationale	Responsibility	Actions and Performance measures	Reporting/Monitoring/Timing
	Selective weed eradication on revegetated areas based on weed type and control susceptibility.	protection of surrounding environment	Rehabilitation manager	Surveillance of rehabilitation areas for weed emergence	Record weed emergence
Extended drought event	Exclude stock until establishment of regrowth.	timely application of control in rehabilitation schedule	Rehabilitation manager	Engage in discussions with landholder about maintaining perimeter fence.	Maintain fence for at least 4 years
	Reseed area in the first available wet season following extended drought.	cost-benefit in post-closure period	Rehabilitation manager	Check rainfall records for Greenvale regional area to confirm conditions	Record rate of application of seed and timing
Unrestricted livestock access prior to RM5 achievement	Maintain Initial Mine Activity Area fence until RM5 criteria are met.	timely application of control in rehabilitation schedule	Rehabilitation manager	Engage in discussions with landholder about maintaining perimeter fence.	Implement prior to rehabilitation period completion
Native fauna access prior to RM5 achievement	Maintain Initial Mine Activity Area fence until RM5 criteria are met.	timely application of control in rehabilitation schedule	Rehabilitation manager	Engage in discussions with landholder about maintaining perimeter fence.	Implement prior to rehabilitation period completion
	Install tree guards around base of immature tree/shrubs in critical areas (slopes and slope toes).	cost-benefit in post-closure period	Rehabilitation manager	Observations of growth and groundcover to include signs of predation on emerging vegetation	Photo-monitoring of emerging tree/shrubs
Vehicle access prior to RM5 achievement	Install safety bund to restrict access to backfilled pit.	timely application of control in	Rehabilitation manager	Final landform design plan/schematic to include	Photo-monitoring of installed feature

RISK TO PMLU OUTCOME		Treatment of Risk			
Cause	Mitigation	Selection rationale	Responsibility	Actions and Performance measures	Reporting/Monitoring/Timing
		rehabilitation schedule		location and materials for installation	
	Install ramp bund.	timely application of control in rehabilitation schedule	Rehabilitation manager	Final landform design plan/schematic to include location and materials for installation	Photo-monitoring of installed feature
	Maintain Initial Mine Activity Area fence until RM5 criteria are met.	timely application of control in rehabilitation schedule	Rehabilitation manager	Engage in discussions with landholder about maintaining perimeter fence.	Implement prior to rehabilitation period completion
Exposure of contaminated or sodic soil at surface	Inspection by suitably qualified person of potentially contaminated or exposed areas prior to reshaping and confirmation post-shaping	protection of surrounding environment	Rehabilitation manager	Engage person with soil qualifications to prepare inspection report. Implement report recommendations in rehabilitation works	Record implemented works and sampling results where recommended.
	Installation of runoff controls to limit the potential for erosive events.	timely application of control in rehabilitation schedule	Rehabilitation manager	Final landform design plan/schematic to include location and materials for installation	Photo-monitoring of installed feature
Low native pasture seed strike rate	Implementing findings of revegetation trials for seed mix with best strike rate.	timely application of control in rehabilitation schedule	Rehabilitation manager	Source suitable native seed supply for use throughout rehabilitation period	Record rate of application of seed and timing

RISK TO PMLU OUTCOME		Treatment of Risk			
Cause	Mitigation	Selection rationale	Responsibility	Actions and Performance measures	Reporting/Monitoring/Timing
	Monitoring of groundcover over successive years to commence remedial actions at the soonest possible season.	timely application of control in rehabilitation schedule	Rehabilitation manager	Engage suitably qualified person to review seasonal monitoring data to determine actions required to improve strike rate	record implemented works and sampling results where recommended.
	Reseed as required for improved strike rate.	cost-benefit in post-closure period	Rehabilitation manager	Reseed at locations requiring remedial works	Record implemented works and sampling results where recommended.
	Increase seeding of landholder preferred species of *Astrebla sp* and *Dichanthium sericium*.	cost-benefit in post-closure period	Rehabilitation manager	Engage in discussions with landholder about preferred seeding species for remedial works	Records implemented works and sampling results where recommended
Bushfire event alters surface cover	Following a failed recovery season, reseed area with native pasture species mix.	cost-benefit in post-closure period	Rehabilitation manager	Undertake monitoring in a suitable recovery period and recommendations about reseeding options	Record implemented works and sampling results where recommended.
	Recommence groundcover monitoring assessment.	cost-benefit in post-closure period	Rehabilitation manager	Engage suitably qualified person to undertake monitoring	Record monitoring and analysis of revegetation trend
Flooding event alters surface cover	Following a failed recovery season, reseed area with native pasture species mix.	cost-benefit in post-closure period	Rehabilitation manager	Undertake monitoring in a suitable recovery period and recommendations about reseeding options	Record implemented works and sampling results where recommended.
	Recommence groundcover monitoring assessment.	cost-benefit in post-closure period	Rehabilitation manager	Engage suitably qualified person to undertake monitoring	Record monitoring and analysis of revegetation trend

RISK TO PMLU OUTCOME		Treatment of Risk			
Cause	Mitigation	Selection rationale	Responsibility	Actions and Performance measures	Reporting/Monitoring/Timing
Unsuitable seed blend used for ground conditions (microrelief)	Reseed area with either RE9.3.10 mix if inundation or persistent water accumulation or increase seeding of landholder preferred species of *Astrebla sp* and *Dichanthium sericium.*	cost-benefit in post-closure period	Rehabilitation manager	Reseed at locations requiring remedial works	Record implemented works and sampling results where recommended.
Instability of regraded surface					
Soil loss from topsoiled areas	Installation of runoff controls to limit the potential for erosive events.	timely application of control in rehabilitation schedule	Rehabilitation manager	Final landform design plan/schematic to include location and materials for installation	Photo-monitoring of installed feature
	Confirmation of final profile <10^{o} over backfilled and topsoiled areas.	timely application of control in rehabilitation schedule	Rehabilitation manager	Measure profiles as installed, prior to topsoiling and revegetating final landforms	Photo-monitoring of completed earthworks
	Maintain Mine Activity Area fence until RM5 criteria are met.	timely application of control in rehabilitation schedule	Rehabilitation manager	Engage in discussions with landholder about maintaining perimeter fence.	Implement prior to rehabilitation period completion
Slumping of placed materials on slope	Confirmation of final profile <10^{o} over backfilled and topsoiled areas.	timely application of control in rehabilitation schedule	Rehabilitation manager	Measure profiles as installed, prior to topsoiling and revegetating final landforms	Photo-monitoring of completed earthworks

RISK TO PMLU OUTCOME		Treatment of Risk			
Cause	Mitigation	Selection rationale	Responsibility	Actions and Performance measures	Reporting/Monitoring/Timing
	Where placed material meets in situ materials key into slope and install water management to direct runoff to dedicated structures and away from placed materials.	timely application of control in rehabilitation schedule	Rehabilitation manager	Final landform design plan/schematic to include areas for keying and locations for installation of water management structures	Photo-monitoring of completed earthworks
Water management installations fail	Maintain water management installations throughout rehabilitation schedule and annually prior to each wet season.	timely application of control in rehabilitation schedule	Rehabilitation manager	Engage suitably qualified person to undertake inspection of water management installations throughout rehabilitation schedule	Record implemented works and sampling results where recommended.
	Inspect status of installations following wet season.	timely application of control in rehabilitation schedule	Rehabilitation manager	Engage suitably qualified person to undertake inspection of water management installations until closure approved	Record implemented works and sampling results where recommended.
Stock access damages topsoiled areas	Maintain Mine Activity Area fence until RM5 criteria are met.	timely application of control in rehabilitation schedule	Rehabilitation manager	Engage in discussions with landholder about maintaining perimeter fence.	Implement prior to rehabilitation period completion
Reprofiled landform failure					
Exposure of sodic materials in the profile	Inspection by suitably qualified person of potentially contaminated or exposed areas prior to reshaping and confirmation post-shaping	timely application of control in rehabilitation schedule	Rehabilitation manager	Engage person with soil qualifications to prepare inspection report. Implement report recommendations in rehabilitation works	Record implemented works and sampling results where recommended.

RISK TO PMLU OUTCOME		Treatment of Risk			
Cause	Mitigation	Selection rationale	Responsibility	Actions and Performance measures	Reporting/Monitoring/Timing
	Installation of runoff controls to limit the potential for erosive events.	timely application of control in rehabilitation schedule	Rehabilitation manager	Final landform design plan/schematic to include location and materials for installation	Photo-monitoring of installed feature
Final landform design angle or slope length is not suitable for material used at time of rehabilitation	Geotechnical assessment to confirm available material can be installed as stable and if not include benching to final profile to decrease slope angle and length.	timely application of control in rehabilitation schedule	Rehabilitation manager	Engage suitably qualified person to undertake geotechnical assessment of final landform design and material competency	Implement recommendations prior to commencing rehabilitation works.
Groundwater intrusion weakens backfilled material geotechnical competency	Pit hydrogeological assessment and closure model.	cost-benefit in operational period	Operations manager	Engage suitably qualified person to undertake monitoring	Implement recommendations prior to commencing rehabilitation works.
Gully formation on rehabilitated surface changing site water dynamics	Geotechnical assessment of pit wall stability	timely application of control in rehabilitation schedule	Rehabilitation manager	Engage suitably qualified person to undertake geotechnical assessment of final landform design and material competency	Implement recommendations prior to commencing rehabilitation works.
	Implementation of recommendations of geotechnical assessment.	timely application of control in rehabilitation schedule	Rehabilitation manager	Final landform design plan/schematic to include location and materials for installation of recommendations	Implement recommendations prior to commencing rehabilitation works.

RISK TO PMLU OUTCOME		Treatment of Risk			
Cause	Mitigation	Selection rationale	Responsibility	Actions and Performance measures	Reporting/Monitoring/Timing
	Installation of further water management controls to preserve rehabilitation.	timely application of control in rehabilitation schedule	Rehabilitation manager	Final landform design plan/schematic to include location and materials for installation	Photo-monitoring of installed feature
Water quality fails to meet criteria					
Exposure of contaminated or sodic soil at surface	Contaminated land assessment prior to closure	timely application of control in rehabilitation schedule	Rehabilitation manager	Engage person with soil qualifications to prepare inspection report. Implement report recommendations in rehabilitation works	Record implemented works and sampling results where recommended.
	Removal of sodic materials at surface for burial in pit	timely application of control in rehabilitation schedule	Rehabilitation manager	Quantify and record location of burial and treatment applied if any.	Photo-monitoring of completed earthworks
	Monitoring of water quality downstream throughout rehabilitation and closure period	timely application of control in rehabilitation schedule	Rehabilitation manager	Engage suitably qualified person to undertake monitoring each wet season	Record monitoring and analysis of water quality trend
Surface application of gypsum on rehabilitation area washes	Rip gypsum into surface prior to topsoiling and/or seeding.	timely application of control in rehabilitation schedule	Rehabilitation manager	Apply gypsum to treatment areas prior to application of topsoil	Records implemented works and rates of application

RISK TO PMLU OUTCOME		Treatment of Risk			
Cause	Mitigation	Selection rationale	Responsibility	Actions and Performance measures	Reporting/Monitoring/Timing
into watercourse altering pH	Monitoring of water quality downstream throughout rehabilitation and closure period.	timely application of control in rehabilitation schedule	Rehabilitation manager	Engage suitably qualified person to undertake monitoring each wet season	Record monitoring and analysis of water quality trend
Groundcover failure results in sediment laden runoff from rehabilitation area	Implementing findings of revegetation trials for seed mix with best strike rate	timely application of control in rehabilitation schedule	Rehabilitation manager	Source suitable native seed supply for use throughout rehabilitation period	Record rate of application of seed and timing
	Monitoring of groundcover over successive years.	cost-benefit in post-closure period	Rehabilitation manager	Engage suitably qualified person to review seasonal monitoring data to determine actions required to improve strike rate	record implemented works and sampling results where recommended.
	Reseed as required for improved strike rate.	cost-benefit in post-closure period	Rehabilitation manager	Reseed at locations requiring remedial works	Record implemented works and sampling results where recommended.
	Install temporary sediment control fences.	timely application of control in rehabilitation schedule	Rehabilitation manager	Final landform design plan/schematic to include location and materials for installation	Photo-monitoring of installed features
Surface expression of groundwater at altered	Installation of temporary sediment control fences	cost-benefit in the post-closure period	Rehabilitation manager	Final landform design plan/schematic to include location and materials for installation	Photo-monitoring of installed features

RISK TO PMLU OUTCOME		Treatment of Risk			
Cause	Mitigation	Selection rationale	Responsibility	Actions and Performance measures	Reporting/Monitoring/Timing
landform profile causes runoff to watercourse.	seeding of location with RE9.3.10 species to increase water uptake and decrease runoff.	cost-benefit in the post-closure period	Rehabilitation manager	Engage in discussions with landholder about watercourse seeding species for remedial works	Photo-monitoring of emerging tree/shrubs
	Monitoring of water quality downstream throughout rehabilitation and closure period.	timely application of control in rehabilitation schedule	Rehabilitation manager	Engage suitably qualified person to undertake monitoring each wet season	Record monitoring and analysis of water quality trend
Rehabilitation not self-sustaining for grazing					
Failure of successive years achievement of native pasture grass.	Monitoring trial locations and applying revised methodologies to final landform at scale.	timely application of control in rehabilitation schedule	Rehabilitation manager	Implement best trial outcome strategy and recommendations	Record monitoring of rehabilitated landform and analysis of revegetation trend
Failure to achieve water quality criteria over successive wet seasons	Include upstream water quality sampling to provide a reasonable local alternative to the Schedule C Table 2 water quality limits.	cost-benefit in the operational period	Operations manager	Engage suitably qualified person to undertake monitoring each wet season	Record monitoring and analysis of water quality trend for revision of target water quality prior to prior to final rehabilitation works
Failure to achieve groundcover rate within 5 years after seeding	Increase seeding of landholder preferred species of *Astrebla sp* and *Dichanthium sericium*.	cost-benefit in the post-closure period	Rehabilitation manager	Engage in discussions with landholder about preferred seeding species for remedial works	Records implemented works and sampling results where recommended

RISK TO PMLU OUTCOME		Treatment of Risk			
Cause	Mitigation	Selection rationale	Responsibility	Actions and Performance measures	Reporting/Monitoring/Timing
Failure for successive years to achieve erosion loss limit of 0.5t/ha/annum	Include analogue site assessment of erosion loss rates to provide a reasonable temporal alternative to the single point baseline assessment.	cost-benefit in the operational period	Operations manager	Engage suitably qualified person to undertake monitoring in the operational period	Record monitoring and erosion rate for analogue site for revision of target erosion rate prior to final rehabilitation works
	Reinspect sodic soil surface expression and apply ameliorant treatment.	cost-benefit in the post-closure period	Rehabilitation manager	Engage person with soil qualifications to prepare inspection report. Implement report recommendations in remediation works	Records implemented works and rates of application

6.3 Rehabilitation Trials

Two rehabilitation trials have been considered necessary to support the rehabilitation milestones. The first trial is a seed mix strike success rate on topsoiled landform, the second is direct seeding to ripped road surfaces.

6.3.1 Trial 1 – Seed Mix Strike Rate

6.3.1.1 Objective

To determine whether the ratio and combination of seeds for native pasture revegetation can achieve the desired groundcover and diversity on the rehabilitated landform and to determine the success rate of germination for the seed types consistent with the RE 9.3.2 and RE 9.8.1 grasses with and without the use of a low nitrogen fertiliser. Depending on the underlying subsoil sodicity characteristics, ameliorants may also be applied.

6.3.1.2 Design

On backfilled, profiled and topsoiled in pit slope initiate revegetation with the native pasture seed mix on plots with a variety of proportions and fertilizer application (low nitrogen fertilizer at a rate of less than 50kg/ha). The native grasses requested by the landholder will not be incorporated in the trial as their proportion in mixed seed is supported by common practice/grazing advice.

Trial 1 location selected for the backfilled and reprofiled Pit 1 available in year 2030. The underlying land characteristics will be backfilled pit as per sequence in rehabilitation method with topsoil spread of 15cm and overall slope of 8°. The seed mix will be applied with and without fertiliser as per trial. No previous trials have been carried out on site.

6.3.1.3 Detail

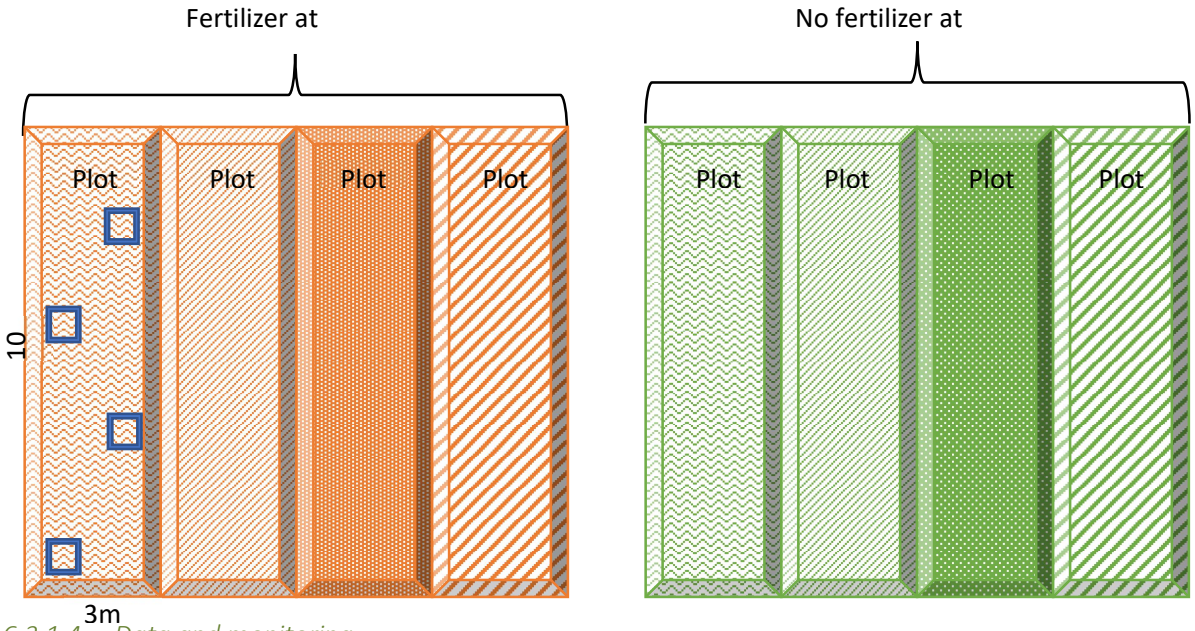
The rehabilitated pit area designated for trial of seed mix (3kg/species/hectare) should be strip prepared into 3m x 10m plots for planting in Autumn in the following proportions:

Table 20 Species Strike Rate Trial proportion and treatment

Plot	Native grass species	Percentage by weight	Fertilizer
1	*Heteropogon contortus*	50	At planting
	Heteropogon triticeus	10	
	Themeda triandra	30	
	Grewia retusifolia	10	
2	*Heteropogon contortus*	25	At planting
	Heteropogon triticeus	25	
	Themeda triandra	25	
	Grewia retusifolia	25	
3	*Heteropogon contortus*	40	At planting
	Heteropogon triticeus	10	
	Themeda triandra	40	
	Grewia retusifolia	10	
4	*Heteropogon contortus*	30	At planting
	Heteropogon triticeus	10	

Plot	Native grass species	Percentage by weight	Fertilizer
	Themeda triandra	50	
	Grewia retusifolia	10	
5	*Heteropogon contortus*	50	NIL
	Heteropogon triticeus	10	
	Themeda triandra	30	
	Grewia retusifolia	10	
6	*Heteropogon contortus*	25	NIL
	Heteropogon triticeus	25	
	Themeda triandra	25	
	Grewia retusifolia	25	
7	*Heteropogon contortus*	40	NIL
	Heteropogon triticeus	10	
	Themeda triandra	40	
	Grewia retusifolia	10	
8	*Heteropogon contortus*	30	NIL
	Heteropogon triticeus	10	
	Themeda triandra	50	
	Grewia retusifolia	10	

A trial plot layout to example such as below:



6.3.1.4 *Data and monitoring*

The trial will require the following data to be collected at inception:

- Depth of topsoil, slope and soil moisture estimate.
- Photo location of surface preparation.
- Rainfall record for week commencing trial.
- Daily temperature.
- Any weed populations within the trial area and treatment date.
- Full description of seed mix proportion and quantity used for each plot.

Quarterly monitoring of trial plots for the following data:

- Date of emergence of seedlings and identification when possible
- Photographic record of rate of growth
- Quadrat measurements (1m x1m) for 4 samples per plot:
    - Density of groundcover (Meat and Livestock Australia Ltd, 2019)
    - Species diversity (count of species both as planted and natural recruitment of other species) (Habich, 2001)
    - Successful germination and growth.
    - Weed invasion.
    - Obvious damage or intrusion.

6.3.1.5 Timing

Trial to commence on in pit revegetation before Autumn 2032 and continue monitoring for not less than 2 wet seasons (2035).

6.3.1.6 Success

Where a treatment yields the target groundcover of 75% or greater and <10% weed cover it will be deemed suitable for use in final site in pit rehabilitation. Failure to produce representation of any particular species will be analysed in relation to its seeding proportion and fertilizer application and seasonality. Similarity with a selected reference/analogue site will also be a criterion.

Limitations for Trial 1 include the germination conditions at time of assessment of trial plots may not be representative of conditions for main rehabilitation areas and locally sourced seeds may not be consistently available between trial initiation and each rehabilitation effort.

6.3.2 Trial 2 – Direct seeding success

6.3.2.1 Objective

To determine whether species mix will establish at a rate consistent with grazing land use on trafficked surface without topsoil.

6.3.2.2 Design

Deep rip former stockpile area of not less than 2 x 20 metre section and apply native grass seed mix at 3kg/species and 2 sections with deep ripping and no seed application.

6.3.2.3 Detail

Locate area no longer used for mining activities within the Mine Activity Area (ie fenced from stock access) for surface treatment of deep ripping and seeding in alternate strips at full width.

In season (Autumn) apply seed mix of

- *Heteropogon contortus*
- *Heteropogon triticeus*
- *Themeda triandra*
- *Grewia retusifolia*

At a rate of 3kg/ha per species to 2 non-consecutive sections of 20m x 5m width and apply no seed mix to the intervening sections. Gypsum to be applied at one section of ripped and seeded and one section of ripped only.

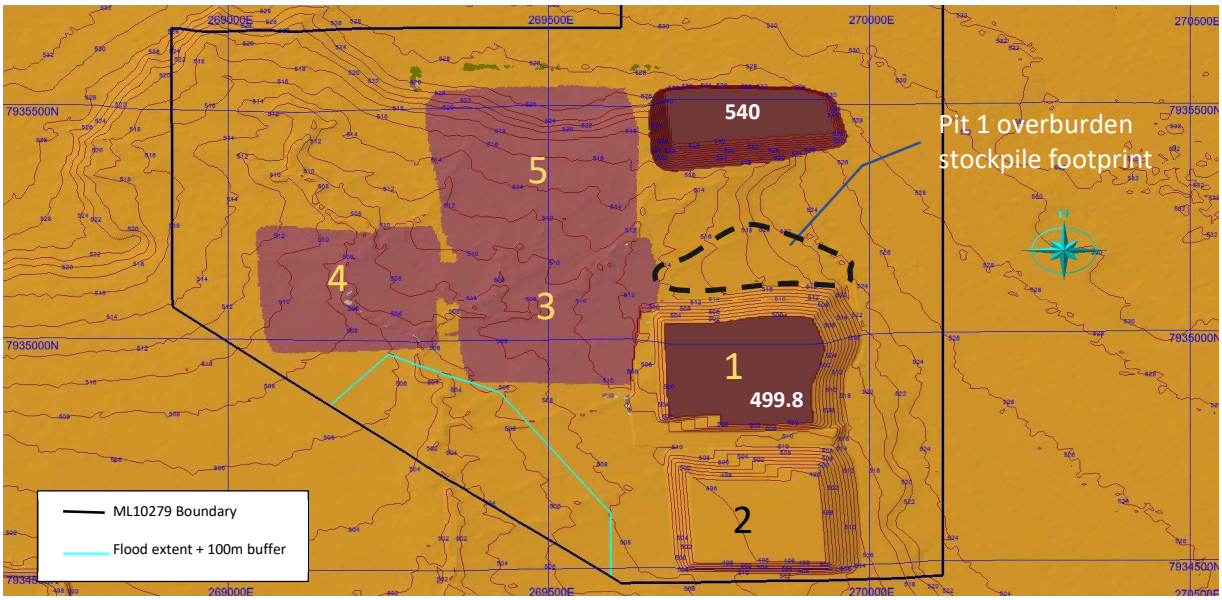


Figure 22: Suitable location for rehabilitation trial 2

6.3.2.4 Data and monitoring

The trial will require the following data to be collected at inception:

- Depth of ripping
- Photo location of surface preparation (gypsum/no gypsum)
- Rainfall record for week commencing trial
- Daily temperature
- Any weed populations within the trial area and treatment date.
- Full description of seed mix proportion and quantity.

Quarterly monitoring of trial plots for the following data:

- Date of emergence of seedlings and identification when possible
- Photographic record of rate of growth
- Quadrat measurements (1m x1m) for 4 samples per plot:
    - Density of groundcover
    - Species diversity
    - successful germination and growth
    - Weed invasion

6.3.2.5 Timing

Trial to commence on road surface before Autumn 2035 and continue monitoring for not less than 2 wet seasons (2037).

6.3.2.6 Success

Where a treatment yields the target groundcover of 75% or greater and <10% weed cover it will be deemed successful for use in final site access road rehabilitation.

7 MONITORING AND MAINTENANCE

The program of monitoring and maintenance of the milestones and milestone criteria are presented in **Table 21**.

Table 21: Rehabilitation Milestone and Criteria Monitoring Program

Milestone Reference	Rehabilitation Milestone	Milestone Criteria	Schedule of Monitoring	Schedule of analysis and reporting	Review	Method of monitoring
RM1	Removal of infrastructure and storage vessels	a) All buildings demolished or removed	Once at completion of actions	First year post closure	NA	Photo of location with date
RM2	Landform reprofiling and trim complete	a) Surface contours reinstated and integrated with adjacent undisturbed land with maximum slope of 10^{o}	Once at completion of actions	First year post closure	NA	Clinometer reading for every 100m of slope
		b) Light ripping to improve infiltration			NA	Photo of location with date
		c) Surface drainage does not concentrate flow			Annual following installation	Drone photo of location annually in wet season
		d) Sediment controls installed			Annual following installation	Photo of location with date
RM3	Surface treatment	a) Soil used from topsoil stockpiled for use as rehabilitation media and is weed-free prior to use and assess N level in stored soil.	Once at completion of actions	First year post closure	NA	Photo of location with date Stockpiled soil sample analysed for Nitrate Nitrogen at laboratory

Milestone Reference	Rehabilitation Milestone	Milestone Criteria	Schedule of Monitoring	Schedule of analysis and reporting	Review	Method of monitoring
		b) Topsoil applied over whole footprint area to thickness of not less than 15cm. c) Ameliorants and fertilizer applied according to recommendations arising from rehabilitation trials.			NA NA	Topsoil depth measurement every 100m of slope Record of actions and amount applied
RM4	Revegetation (native pasture grazing)	a) Seeding of native pasture species mix including: *a. Heteropogon contortus* *b. Heteropogon triticeus* *c. Themeda triandra* *d. Grewia retusifolia* At a rate of not less than 3kg/hectare/species.	Once at completion of actions	First year post closure	Following trial outcomes	Record of actions and amount applied
		b) Seeding native tree and shrub mix including: *a. Petalostigma pubescens* *b. Ficus opposite* *c. Diospyos geminate* *d. Hakea arboescens* *e. Brachychiton diversifolius* *f. Corymbia erythophloia* *g. Corymbia dallachiana* *h. Eucalyptus leptophleba* *i. Eucalytpus crebra* At a rate of not less than 200g/hectare/species.	Once at completion of actions	First year post closure	NA	Record of actions and amount applied

Milestone Reference	Rehabilitation Milestone	Milestone Criteria	Schedule of Monitoring	Schedule of analysis and reporting	Review	Method of monitoring
		c) Achieve groundcover projective foliage cover of >75% of analogue site for successive years (excluded from grazing).	Quarterly from completion of action	Annual until successive years achievement	NA	Groundcover assessment (Meat and Livestock Australia Ltd, 2019) (Meat and Livestock Australia Ltd, 2019)
		d) Strike rate of native grass seeding to be recorded.	Quarterly from completion of action	Annual until greater than 50% cover achievement	Reseed if unsuccessful germination in first year	Photo of location with date
RM5	Achievement of surface requirements	a) Achieve native species dominance for groundcover of >75% similarity of analogue site for successive years.	Annual commencing second year following seeding	Annual until successive years achievement	If analogue site is destroyed or significantly affected by landholder activities	(Habich, 2001) abundance similarity data gathering.
		b) Assessment of weed contribution to total groundcover to be <10%.	Annual commencing second year following seeding	Annual until greater than 50% native pasture species cover achievement	Treatment if >10% measured	Groundcover assessment (Meat and Livestock Australia Ltd, 2019)
		c) No active rill or gully development across reinstated surface.	Annual commencing second year following seeding	Annual until greater than 50% native pasture	Treatment if gullies >1 measured or rilling of >10/100m	Reinstated slope measurement/transect photography to allow determination of soil loss

Milestone Reference	Rehabilitation Milestone	Milestone Criteria	Schedule of Monitoring	Schedule of analysis and reporting	Review	Method of monitoring
				species cover achievement		
		d) Evidence of pre-disturbance native fauna recorded in rehabilitation area.	Annual commencing fourth year following seeding	Annual until successive years achievement		Photo of location with date
RM6	Achievement of post-mining land use to stable condition for grazing	a) Certification from a suitably qualified person that the area has achieved stable condition.	Once after successive years of achievement of groundcover >75%	First year following achievement of groundcover milestone		Statement from suitably qualified person
		b) Surface stability to be less than 0.5t/ha/annum loss through erosion.	Once after successive years of achievement of groundcover >75%	Annual until successive years achievement		Reinstated slope and transect photography to allow determination of soil loss
		c) Groundcover has achieved >75% analogue site for successive years.	Annual commencing second year following seeding	Annual until successive years achievement	If analogue site is destroyed or significantly affected by	Groundcover assessment (Meat and Livestock Australia Ltd, 2019)

Milestone Reference	Rehabilitation Milestone	Milestone Criteria	Schedule of Monitoring	Schedule of analysis and reporting	Review	Method of monitoring
					landholder activities	
		d) Surface water quality from the area complies with the following: i. Total dissolved solids <4000 mg/L ii. pH between 6.5-8.5 iii. Suspended solids <25 mg/L iv. Total nitrogen <370 µg/L v. Total phosphorous <70 µg/L vi. Chlorophyll-a <5µg/L vii. Dissolved oxygen between 85-110% viii. Conductivity <540µS/cm ix. Sulphate <3mg/L	Annual commencing second year following seeding	Annual until greater than 50% native pasture species cover achievement	Alternate milestone values	Undisturbed upstream samples taken at the same time to provide background comparison to milestone values using (DES, 2017) Sampling method
		e) A contaminated land survey carried out by an appropriately qualified person indicates that no contamination unsuitable for the PMLU is occurring.	Once after second year following seeding	First year following achievement of groundcover milestone		Statement from suitably qualified person
		f) Certification of no weed and pest species abundance identified in the rehabilitated areas are no greater than at reference sites by a suitably qualified person.	Once after successive years of achievement of groundcover >75%			

Milestone Reference	Rehabilitation Milestone	Milestone Criteria	Schedule of Monitoring	Schedule of analysis and reporting	Review	Method of monitoring
RM7	Surface preparation of road	a) Deep rip along recontoured surface	Once at completion of actions	First year post closure	NA	Photo of location with date
		b) Surface suitable for native grass reestablishment without topsoil placement (based on trial outcomes)	Once at completion of actions	First year post closure	Trial outcomes indicate surface preparation must include topsoil	Photo of location with date
RM8	Removal of stored materials	a) Waste/overburden/ore removed from footprint area to pit	Once at completion of actions	First year post closure	NA	Photo of location with date
RM9	Achievement of surface requirements	a) Certification by a suitably qualified person that no sodic materials have been exposed nor remain at surface (if excavated) or have been treated with gypsum application.	Once at completion of actions	First year post closure	NA	Statement from suitably qualified person supported by ESP analysis of grab sample of surface material if suspected sodic exposure
RM10	Removal of retaining structure	a) Drainage of water stored.	Once at completion of actions	First year post closure	NA	Photo of location with date
		b) Drying of sediments therein	Once at completion of actions			
		c) Removal of retaining wall and sediments to pit	Once at completion of actions			
RM11	Backfill of pit	a) Backfilling of ore waste/overburden to pit		First year post closure	NA	Photo of location with date

Milestone Reference	Rehabilitation Milestone	Milestone Criteria	Schedule of Monitoring	Schedule of analysis and reporting	Review	Method of monitoring
		b) All major earthworks within pit footprint complete c) Batter slopes meet final design specifications d) Installation of contour berms on backfilled landform e) Integration of natural ground level with backfilled pit profile f) Installation of upslope drainage for pit perimeter areas to provide erosion protection on slopes prior to vegetation cover criteria met	Once at completion of actions			
RM12	Achievement of post-mining land use to stable condition for grazing	a) Backfilled pits assessed as geotechnically stable by a suitably qualified geotechnical engineer so that no slumping is observed or expected in placed material.	Once at completion of actions	First year post closure	NA	Statement from suitably qualified person
		b) Stability assessment includes final slope status and geometry (<10°), condition and engineering characteristics and assessment of failure mechanisms.			NA	Statement from suitably qualified person
		c) Final landform slope lengths and angles consistent with landform design criteria			NA	Photo of location with date

8 References

Department of Science, Information Technology and Innovation. (2015, August 24). *Soil conservation guidelines for Queensland.* Retrieved from Chapter 7 - Contour Banks: https://www.publications.qld.gov.au/dataset/soil-conservation-guidelines/resource/8850848a-11c0-43b9-9463-855cd1cc943b

DES. (2017). *Monitoring and Sampling Manual: Environmental Protection (Water) Policy.* Brisbane: State of Queensland.

DSITI. (2017). *Draft Environmental Values and Water Quality Guidelines: Burdekin River Basin fresh and estuarine waters.* Brisbane: The State of Queensland.

DSITI and DNRM. (2015). Guidelines for agricultural land evaluation in Queensland. Brisbane, Queensland.

Environmental Protection Authority (NSW). (2014). *Best Practice Note: Landfarming.* Sydney: Environmental Protection Authority. Retrieved February 24, 2021, from https://www.epa.nsw.gov.au/~/media/EPA/Corporate%20Site/resources/clm/140323landfarmbpn.ashx

Food and Agriculture Organisation. (1988). *FAO Soils Bulletin 39.* ROME: FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS.

Habich, E. F. (2001). *Ecological Site Inventory.* Bureau of Land Management, Rangeland Management. Denver: National Science and Technology Center.

Meat and Livestock Australia Ltd. (2019). *More Beef from Pastures online manual*. Retrieved January 6, 2021, from Meat & Livestock Australia Limited: https://mbfp.mla.com.au/pasture-growth/tool-22-assessing-groundcover/#

NQ Dry Tropics. (2016). Burdekin Region Water Quality Improvement Plan. Townsville, Qld.

NSWDPI. (2005, January). Maintaining groundcover to reduce erosion and sustain production. Tamworth, NSW.

Phelps, D. D. (2008, December). *Pastures Australia Fact Sheets Mitchell Grasses.* Retrieved from Pastures Australia: https://keys.lucidcentral.org/keys/v3/pastures/Html/Mitchell_grasses.htm

Scattini, D. W. (2008, December). *Pastures Australia Fact Sheets Queensland Bluegrass.* Retrieved from Pastures Australia: https://keys.lucidcentral.org/keys/v3/pastures/Html/Queensland_Bluegrass.htm

Standards Australia. (2018). *ISO 31000:2018 Risk Management – Guidelines.* Standards Australia.

Sugar Research Australia. (n.d.). *Sugar Research Australia/Publications*. Retrieved from Nelson 2000 - Sodic Soils Field Guide: https://sugarresearch.com.au/growers-and-millers/nutrient-management/six-easy-steps-toolbox/refining-nutrients-for-specific-circumstances/sodic-soils/nelson-2000-field-guide-diagnosis-of-sodicity-and-related-problems-of-soil-and-irrigation-water-in-the-su

PROGRESSIVE REHABILITATION AND CLOSURE PLAN
AGRIPOWER AUSTRALIA LTD

Appendix 1: HYDROGEOLOGICAL INFORMATION

PROGRESSIVE REHABILITATION AND CLOSURE PLAN
AGRIPOWER AUSTRALIA LTD

Appendix 2: FLOODING INFORMATION

PROGRESSIVE REHABILITATION AND CLOSURE PLAN
AGRIPOWER AUSTRALIA LTD

Appendix 3: SOIL AND LAND USE ASSESSMENT AND INFORMATION

PROGRESSIVE REHABILITATION AND CLOSURE PLAN
AGRIPOWER AUSTRALIA LTD

Appendix 4: WASTE CHARACTERISATION INFORMATION

PROGRESSIVE REHABILITATION AND CLOSURE PLAN
AGRIPOWER AUSTRALIA LTD

Appendix 5: LANDFORM DESIGN INFORMATION

PROGRESSIVE REHABILITATION AND CLOSURE PLAN
AGRIPOWER AUSTRALIA LTD

Appendix 6: WATER RESOURCE INFORMATION

PROGRESSIVE REHABILITATION AND CLOSURE PLAN
AGRIPOWER AUSTRALIA LTD

Appendix 7: FLORA AND FAUNA ASSESSMENT, WILDNET REPORTS AND REVEGETATION INFORMATION