



# ARUMPO BENTONITE

## Rehabilitation Management Plan

1st July 2022 to 30<sup>th</sup> June 2023

### Summary table

Name of Mine	Arumpo Bentonite Mine Site
Rehabilitation Management Plan commencement date	1 <sup>st</sup> July 2022
Rehabilitation Management Plan revision date and Version number	1 <sup>st</sup> July 2023, Version 1
Mining Lease numbers and expiry dates	ML 1507 (Expiry date 18/03/2044) ML1766 (Expiry date 21/12/2038)
Name of Lease Holder	Arumpo Bentonite Pty Ltd
Date of submission	

# 1.Part 1- Introduction to mining project

## 1.1 History of operations

The existing mining and mining-related activities commenced in 1995 and have been undertaken on a seasonally determined campaign basis since that time, initially from within four mineral claims which allowed Arumpo Bentonite to undertake relatively low-cost, small-scale production of Bentonite and to test the product and develop markets. Having achieved this Arumpo Bentonite converted the Mineral Claims into a Mining Lease. The granting of the mining lease caused the cancellation of the Mineral Claims and has enabled a long-term strategic mining plan to be implemented for the progressive mining, stockpiling and sun drying of product and progressive rehabilitation of pits over a larger area of the identified resource.

Assessment Lease 5 was granted to Arumpo Bentonite commencing on the 25th April 2002 and expired in 2017. Exploration Licence 5360 expired in October 2005 and was replaced by Assessment Lease 35 in 2012. In 2014 there was a reassessment of the Arumpo tenements and AL 35 was relinquished and AL 5 reduced in size.

In 2107 a new SOEE was completed along with a new MLA which was granted as ML 1766 on the 21<sup>st</sup> of December 2017. This is the third MOP for the mine and the first to cover the expanded project area. A DA Amendment was also granted by the Wentworth Shire to cover the new project area.

ML 1507 and ML 1766 are the remaining tenements left of a larger project area encompassing several previous titles. The project hosts the Arumpo Bentonite deposit and mining operation in far western NSW. Figure 1 shows the general location of the Project.

## 1.2 - Current Consents, Authorisations and Licences

Mining Licences:	ML1507 (20/03/2002 – 19/3/2023) ML1677 (21/12/2017 – 20/12/2038)
Development Consent:	Wentworth Shire DA S96/2017/044 (19/07/2017)
EPA Licence:	EPA 10614 (19/4/2002, amended 2017)
Landowner Agreement:	Compensation Agreement with Ken & Daryl Sue (Arumpo Station)
SOEE:	February 2017

## 1.3 Land Ownership & Land Use

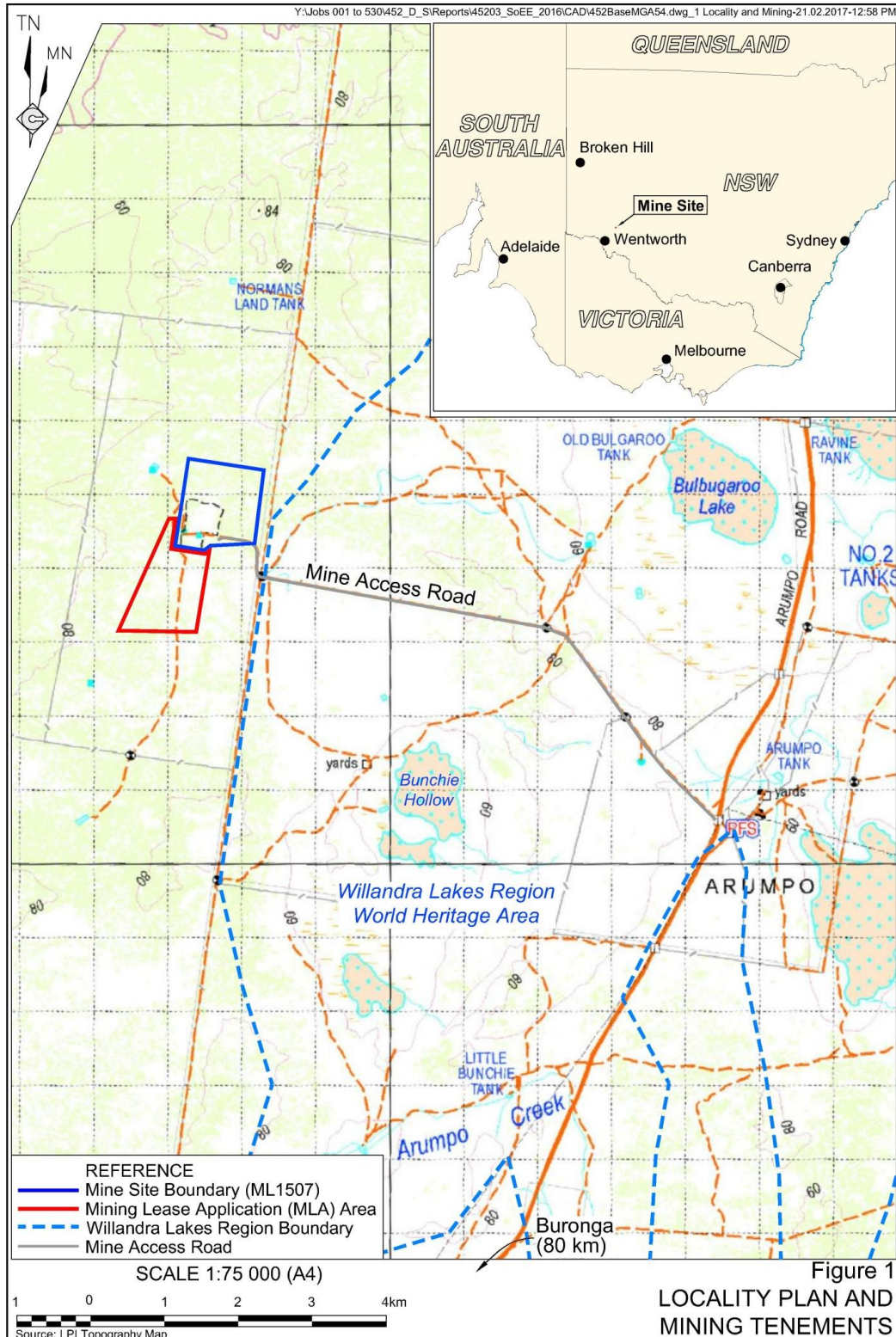
The Mine Site is located within the Wentworth Local Government Area, approximately 80km northeast of Buronga along Arumpo Road. The Mine Site is situated wholly within Lot 1134, DP 762469 on Arumpo Station, which is leased by Messrs Ken and Darryl Sue from the Department of Industry - Lands under Western Lands Lease 1134. Access to the Mine Site is via an approximately 8.5km Mine Access Road that intersects with Arumpo Road. All tracks and roads within the project area, including the Access Road, are ungazetted station tracks. The property is used for wheat production and sheep grazing. The intention is to return the land to a form suitable for grazing.

The project predates and borders the Willandra Lakes World Heritage Area and does not affect this

area, except for the Mine Access Road which was in place at the time of the gazettal of the WLWHA.

Land Tenure	Lease Holder	Mining Leases
WLL Lease 1134	D. Sue	ML1507 and ML1766

### 1.3.1 Land Ownership & Land Use figure



## 2. Part 2 – Final Land use

### 2.1 Regulatory requirements for rehabilitation

Condition	Reference	Application
<p>(a) Land disturbed must be rehabilitated to a stable and permanent form suitable for a subsequent land use acceptable to the Director-General and in accordance with Mining Operations Plan so that: -</p> <ul style="list-style-type: none"> <li>• There is no adverse environmental effect outside the disturbed area and that the land is properly drained and protected from soil erosion.</li> <li>• The state of the land is compatible with the surrounding land and land use requirements.</li> <li>• The landforms, soils, hydrology, and flora require no greater maintenance than that in the surrounding land.</li> <li>• In cases where revegetation is required and native vegetation has been removed or damaged, the original species must be re-established with close reference to the flora survey included in the Mining Operations Plan. If the original vegetation was not native, any re-established must be appropriate to the area and at an acceptable density.</li> </ul>	<p>Lease Conditions - Section 12</p>	<p>ML1507</p>
<p>The lease holder must comply with any direction given by the Director-General regarding the stabilisation and revegetation of any mine residues, tailings or overburden dumps situated on the lease area.</p>	<p>Lease Conditions - Section 13</p>	<p>ML1507</p>
<p>Any disturbance resulting from the activities carried out under this mining lease must be rehabilitated to the satisfaction of the Minister.</p>	<p>Lease Conditions - Section 2</p>	<p>ML1766</p>
<p>If the operation ceases, or the applicant determines that he/she will not continue to proceed with the development of the site, applicant is to restore the site to a condition similar to the topography that existed before the applicant had possession of the site. All earthworks such as banks, processing areas, etc. are to be levelled and ripped as required.</p>	<p>Development Consent S96/2017/004 - Section 41</p>	<p>ML1507 ML1766</p>
<p>Any disturbance resulting from the activities carried out under this mining lease must be rehabilitated to the satisfaction of the Minister.</p>	<p>Development Consent S96/2017/004 - Section 45</p>	<p>ML1507 ML1766</p>

## 2.2 Final land use options assessment

Defined in the Development Consent.

## 2.3 Final land statement

The final landform would emulate the pre-mining landform and incorporate dunes, swales, and flats. The created dunes, though lower than those currently located within the Mine, would be consistent with the overall mix of high and low dunes which occur throughout the local area.

Notwithstanding bulking effects which would occur in association with the excavation and subsequent replacement of the overburden, and the creation of dunes and rises of a lower elevation than occurring prior to mining, it is projected that the final landform will incorporate a shallow depression or void within the area of the final extraction area.

Other project-related features which would form part of the final landform would include the sediment basins which would be retained as future stock and native fauna watering sources and, subject to the requirements of the leaseholders, sections of the final internal access road system.

## 2.4 Final land use and mining domains

### 2.4.1 Final land use and mining domains

Domain Code	Primary Domain / Description	Secondary Doman (Post Mine Use)	Domain Code
1	Infrastructure area – Access roads, drying beds, and plant laydown area.	Rehabilitation area - Grazing	D
3	Water Management Area – Water Sumps (evaporation ponds), stormwater banks	Rehabilitation area - Grazing	D
6	Active Mining area	Rehabilitation area - Grazing	D
	Overburden placement area	Rehabilitation area - Grazing	D
	Topsoil Stockpile areas	Rehabilitation area - Grazing	D
7	Rehabilitation area - Pastoral	Rehabilitation area - Grazing	D

### 2.4.2 Final land use and mining domains

The following mining domains exist within the operational/disturbance areas within the mining leases and are illustrated in the final landform and rehabilitation plan in Section 5.

- Infrastructure Area- Access Roads, drying beds, camp, and laydown area
- Water management area- water sumps, drains and storm water bank
- Active mining area- current mining pit
- Overburden placement area- previous years mining pits
- Topsoil stockpile areas- current topsoil stockpile locations
- Rehabilitation area- areas previously mined and rehabilitated.

### 3.Part 3 – Rehabilitation Risk Assessment

ARUMPO MINE REHABILITATION RISK ASSESSMENT									
GENERAL RISKS									
Risks	Key Impacts	Consequence	Initial Likelihood	Risk Rating	Controls	Consequence	Residual Likelihood	Residual Risk Rating	
Insufficient skills and experience of rehabilitation personnel	Inability to complete key rehabilitation activities	4	4	Very High	Dual filled Mine Manager and Environmental Consultant appointed	2	2	Low	
Lack of clearly defined responsibilities	Lack of understanding of responsibilities	4	4	Very High	Position descriptions, defined objectives, MDP, Rehab Management Plan	2	2	Low	
Insufficient funding/prioritisation of rehabilitation activities	Rehabilitation not completed	5	5	EXTREME	MDP Plans, Rehabilitation Management Plan, Regulatory inspections	2	2	Low	
Active Mining Phase of Rehabilitation									
Risks	Key Impacts	Consequence	Initial Likelihood	Risk Rating	Controls	Consequence	Residual Likelihood	Residual Risk Rating	
Inadequate salvage of top soil	Lack of top soil for rehabilitation completion	3	4	High	300mm of top soil stockpiled, verified by survey, stock balance maintained	2	2	Low	
Mix up of Stockpiles/Buying top soil	Lack of top soil for rehabilitation completion	3	4	High	Stocks labelled on mine plan, separated from product stockpiles	2	2	Low	
Limited Pre-existing Top Soil stocks	Shortage of top soil resource	4	4	Very High	Stock evaluation completed, stocks verified by survey	2	2	Low	
Top soil revegetation clearing conducted in adverse weather or seasonal conditions	Potential damage/loss of resource	4	4	Very High	Tree clearing in late summer/autumn, top soil removal in dry conditions	2	2	Low	
Adverse geochemical/chemical composition of overburden and top soil	Potential PAF material/contamination	1	1	Rare	No PAF material, contaminated soil removed from site	1	1	Rare	
Handling and containment of geochemically or geotechnically unstable tailings	Technical instability of backfill	1	1	Rare	No tailings or processing conducted onsite	1	1	Rare	
Adverse quality and quantity of surface and groundwater	Erosion, Sedimentation, contamination of groundwater	4	4	Very High	Mining well above water table, sediment basins/drain in place, diversion channel to Emu Tank	2	2	Low	
Decommissioning Phase of Rehabilitation									
Risks	Key Impacts	Consequence	Initial Likelihood	Risk Rating	Controls	Consequence	Residual Likelihood	Residual Risk Rating	
Impact on heritage items	Damage to or identification of items of heritage value	4	3	High	Field survey conducted, low risk determined, operations to cease if items discovered, training of site personnel	1	1	Rare	
Hazards associated with retained infrastructure	Failure to remove mine site infrastructure	3	2	Medium	All site infrastructure is portable, except phone tower and pad, some roads to remain with landowner consent	1	1	Rare	
Contamination from associated activities- storage and use of hydrocarbons	Contamination of soil	3	4	High	No bulk liquid storage onsite, hydrocarbons stored in bunded container, PMP, Fuel/Oil spill SOP, hazard inspections, Weekly Mine Site Inspection, S05, Refueling SOP	2	2	Low	
Contamination from associated activities- sewerage	Contamination of soil	4	3	High	Wastewaters contained and disposed of	2	2	Low	
Contamination from associated activities- dirty water	Sedimentation/build-up	2	2	Low	Drains and sumps in place, regularly cleaned out, water diversion in place	1	2	Very Low	
Generation of waste from demolition process	Waste left onsite	2	3	Medium	Site infrastructure is portable, concrete phone tower pad will be removed at mine closure	1	2	Very Low	
Landform establishment phase of Rehabilitation									
Risks	Key Impacts	Consequence	Initial Likelihood	Risk Rating	Controls	Consequence	Residual Likelihood	Residual Risk Rating	
Unstable landform/mass movement due to slope design	Landform failure or backfill	3	3	Medium	Mine Plan for backfill design, 3:1 maximum slope on backfill, compaction during overburden replacement, survey, water management	1	2	Low	
Exposure/release of geochemically/geotechnically adverse material	Contaminated or unstable backfill	1	1	Rare	All backfill material inert, geotechnically stable	1	2	Very Low	
Final landform unsuitable for final land use	Land does not meet requirements for grazing	4	4	Very High	Mine Plan, backfill design, adequate Top soil replacement, stable slope angles, cleared debris replaced, seed application if required, weed spraying undertaken	2	2	Low	
Final landform not suitable for target plant species	Landform does not support regrowth of vegetation	4	4	Very High	As above, ripping of hard stand and laydown areas	2	2	Low	
Growth/Medium Development Phase of Rehabilitation									
Risks	Key Impacts	Consequence	Initial Likelihood	Risk Rating	Controls	Consequence	Residual Likelihood	Residual Risk Rating	
Physical and structural properties of substrate	Substrate unsuitable to support revegetation	3	4	High	Top soil stored in stockpiles, 300mm replaced, replaced late summer/early Autumn, can seed if required	2	2	Low	
Top soil deficit for rehabilitation activities	Lack of top soil for rehabilitation completion	3	4	High	Verification of current stocks, accurate removal of top soil pre-strip, verification of pre-strip volumes by survey, maintain up to date Top soil stock balance	2	2	Low	
Ecosystem and Land use Establishment Phase of Rehabilitation									
Risks	Key Impacts	Consequence	Initial Likelihood	Risk Rating	Controls	Consequence	Residual Likelihood	Residual Risk Rating	
Weed infestation	Introduced weeds or lack of weed control	4	4	Very High	Weed control program in place with Land Owner, vehicle cleaning and inspections prior to entering site, Top soil taken from within mine lease	2	2	Low	
Inappropriate rehabilitation techniques	Inappropriate rehabilitation techniques - including fleet	4	4	Very High	Progressive rehab, Rehab Plans submitted to Regulator, Powers rehab techniques and Approved Plan	2	2	Low	
Inappropriate revegetation species mix for rehab	Introduction of new species or lack of vegetation	4	4	Very High	Top soil stockpiled for final use, sowing program in place, Seed application if required	2	2	Low	
Weather and climate influences	Drought or bush fire	4	4	Very High	Replace Top soil at end of summer, fire break, stumps replace to reduce wind erosion, water management - sumps/drain, diversion bank, can water rehab areas	2	2	Low	
Availability of areas for revegetation in optimal season conditions	Areas rehabbed at wrong time of year - failed rehab	3	3	Medium	Annual Rehab Plan, understanding of key objectives, adequate capital and resources to complete, best practice	2	2	Low	
Ecosystem and Land use development of Rehabilitation									
Risks	Key Impacts	Consequence	Initial Likelihood	Risk Rating	Controls	Consequence	Residual Likelihood	Residual Risk Rating	
Weather and climate influences	Drought, bush fire, climate change	4	4	Very High	Replace Top soil at end of summer, fire break, stumps replace to reduce wind erosion, water management - sumps/drain, diversion bank, can water rehab areas	3	2	M	
Long term water quality/quantity issues	Damage/erosion to rehab areas, build up of sediment	3	3	Medium	Diversion bank in place, water management plan, control of water flow to dam, cleaning/maintenance of sediment traps and drains	2	2	Low	
Damage to rehab areas - caused by fauna, domestic stock, vandalism, vehicles, fire	Potential damage to rehab areas	4	3	High	Wool heap fenced, vehicles to be kept off rehab areas, mine to remote, vandals unlikely, fire break in place, grids installed at access points	2	2	Low	
Limited vegetation redevelopment	Lack of flora from Top soil stocks	4	3	High	Adequate top soil stocks, Top soil management as per SOEL, progressive rehab, exclusion zones on rehab areas, no grazing on mine lease	2	2	Low	
Redisturbance of established rehab areas	rework of rehab areas	3	4	High	Mine Plan in place, areas previously mined have no remaining benetone, use existing roads and infrastructure	2	2	Low	
Inefficient establishment of target species/limited species diversity	Lack of regrowth for grazing purposes	3	3	Medium	Top soil resource from mine site, schedule top soil replacement for correct season, possibility of seeding if required, past successful rehab techniques, stable landform	2	2	Low	
Limited vegetation structural development for final land use	Unable to establish grazing pasture	4	3	High	As above	2	2	Low	
Lack of infrastructure to support final land use	Failure to establish of grazing pasture	3	3	Medium	Fence around lease, water diversion bank, water management - sumps/drain, Access Road to be left in place, firebreak installed, established rehab techniques, inspections, Plans	2	2	Low	
Erosion and failure of landform, water management and storage structures	Failure of landform and rework of water management	4	4	Very High	Stable batter angles in final mine pit, stable landform design, monitoring regrowth, no stock until stable, water management plan and diversions in place	2	2	Low	
Lack of infrastructure to support final land use	Landowner unable to use land for grazing	5	4	Extreme	Access Road to remain, fencing in place, grids at gates, water diversion to dam (off mine lease)	2	2	Low	
Mine subsidence affected areas									
Risks	Key Impacts	Consequence	Initial Likelihood	Risk Rating	Controls	Consequence	Residual Likelihood	Residual Risk Rating	
Extended water ponding	Water ponding in low lying areas	3	3	Medium	Final landform design, water management, sumps/drain, water diversion bank in place	2	2	Low	
Subsidence cracking	Erosion of landform	3	2	Medium	Final gradients of backfill, water management, diversion banks, cross tipping if required	2	2	Low	

### 4.Part 4 – Rehabilitation objectives and rehabilitation completion criteria

Submitted via online portal.

### 5.Part 5 – Rehabilitation objectives and rehabilitation completion criteria

### 6.Part 6 – Rehabilitation implementation

#### 6.1 Life of Mine rehabilitation schedule

#### 6.2 Phases of rehabilitation and general methodologies

##### 6.2.1 Active mining phase

##### a. Soils and materials

Vegetation clearing will be conducted in late Summer or Autumn where practical. A pre-clearing inspection will be conducted prior to commencing on any hollow bearing trees. Clearing will be undertaken using a Front-end loader or tracked dozer with the bucket/blade positioned just above surface level. Shrubs and grasses would be left in-situ and be collected with topsoil stripping operations.

All logs/branches will be stockpiled for future use in the rehabilitation process. Once topsoil has been replaced in rehabilitated areas these will then be placed on top of the areas thus reducing potential wind erosion, to assist in the establishment of vegetation and to provide a habitat for fauna.

Topsoil will be removed to a nominal depth of 300mm and stockpiled in designated locations. Where possible topsoil may be directly placed on previously mined and rehabilitated areas.

Topsoil stockpiles will be left with a rough surface to prevent erosion. Topsoil is a precious resource and will be actively managed to ensure the resource is sufficient to meet final land use requirements.

An up-to-date surveyed account of topsoil resources will be maintained to ensure there is no resource deficit for rehabilitation activities.

It is not anticipated that there will be a topsoil deficit for life of mine rehabilitation.

### **b. Flora**

Revegetation of mined out areas is reliant on natural regeneration of seed contained within the topsoil. To date there has been no requirement to complement with locally sourced seed, seed collection, nursery propagation or other revegetation techniques.

The revegetation/regeneration of ground cover species has been successful over the life of mine and consistent with the landowner's intent to return the land to grazing at the completion of mining.

Minor weed management controls are conducted by the landowner, no weed infestation has occurred because of mining activities to date.

All the vegetation within the Mining Lease is regrowth following clearing in the 1980's and in 2015.

No threatened species were identified during ecological field surveys conducted in 2017.

### **c. Fauna**

Vegetation clearing will be conducted in late Summer or Autumn to minimise potential impact on fauna. To identify any A pre-clearing inspection will be conducted to identify any occupied hollow branches or fauna habitats. If any are identified, they will be moved away from mining activities.

Clearing will be undertaken using a bucket/blade positioned just above ground level to minimise surface disturbance.

Cleared vegetation will either be mulched or stored in designated stockpiles for redistribution over rehabilitated areas.

No threatened species were identified during field surveys conducted on the mining lease. However, it was noted that two species (Mallee Worm-Lizard and

Marble Faced Delma) even though were not identified, it was recommended that all mine personnel receive advice on the identification and mechanisms for their management if they were encountered. To date neither species has been observed at the mine site.

The mine lease is fenced to prevent access from grazing animals.

#### **d. Rock Overburden emplacement**

Overburden is removed by scrapers/ laser buckets and is placed in the previously mined out areas to develop the final landform. The landform is profiled to replicate the surrounding farmland comprising dunes, swales, and flat areas. It is projected that the final landform will have a shallow depression or void in the final extraction area.

Should there be an overburden deficit once mining has been completed the remaining batters will be profiled to a 1:3 (V:H) using the available overburden or low-grade bentonite salvaged from stockpiles or the drying beds.

Any additional material required will be pushed/obtained from previously backfilled areas.

#### **e. Waste Management**

All paper, general waste, domestic waste, recycling, and maintenance consumables are placed in segregated bins. These bins are regularly emptied, and the contents are disposed of at the Buronga Landfill Facility.

Oils and greases are stored in a self-bunded Hydrocarbon container. Any soil contaminated with hydrocarbons is placed in a drum for disposal at the Buronga Landfill Facility.

Portable ablutions are provided onsite and are cleaned/emptied on an as needs basis.

#### **f. Geology and geochemistry**

No onsite processing of bentonite takes place, and no sodic soils/materials exist on site.

#### **g. Material prone to spontaneous combustion**

No spontaneous combustion has occurred onsite and the risk of spontaneous combustion in bentonite is negligible.

#### **h. Material prone to generating mine acid drainage**

No PAF materials or any other geochemical issues of concern have been identified.

#### **i. Ore beneficiation waste management (reject and tailings disposal)**

No on-site processing of bentonite occurs, and no tailings dams are present.



#### **j. Erosion and sediment control**

The site has a system of diversion banks which isolate the mining area from inflowing storm water. The bank design ensures flow rates are low and cause little or no erosion. Internal drains collect potentially sediment laden storm water and direct runoff to containment areas (evaporation sumps). These sumps are regularly cleaned using a Front-End Loader or Excavator.

Once topsoil has been replaced logs and branches previously stockpiled are used to prevent wind erosion and to provide a suitable fauna habitat.

Any weed incursions will be controlled by the Landowner as part of their routine weed control program.

#### **k. Ongoing management of biological resources for use in rehabilitation**

Topsoil (including grasses and other vegetation) will be removed to a nominal depth of 300mm and either placed directly onto rehabilitated areas or stored in designated stockpiles. Stockpiles are left with a rough surface to avoid any unnecessary mechanical working of the soil and are stored to a maximum height of 2 metres to ensure the material retains its natural microbial and structural benefits.

Topsoil stripping and replacement will usually take place in late summer/autumn to coincide with the autumn/winter growth cycle.

Logs/branches that had previously been stockpiled will be redistributed to prevent wind erosion and to assist in revegetation development.

To date propagation of native seeds and/or translocation of other species has not been required.

#### **l. Mine subsidence**

Not applicable

#### **m. Management of potential cultural and heritage issues**

No places or objects of Aboriginal cultural heritage were identified during field surveys conducted in 2017 (Landscape).

The ongoing management of Aboriginal heritage within the Mine relates to staff awareness and contingency measures to be implemented should any unexpected places or objects of Aboriginal cultural heritage significance be identified.

In the unlikely event that previously unidentified Aboriginal cultural heritage places or objects are encountered during ongoing operations, all activities likely to affect the material would cease immediately and the OEH's Environmental Line (Ph: 131 555) contacted to establish an appropriate course of action prior to recommencing the work.

In the unlikely event that human skeletal remains are encountered during ongoing operations, all work with the potential to impact the remains would cease in the

proximity of the remains. The remains would not be handled or otherwise disturbed except to prevent further disturbance. If the remains are thought to be less than 100 years old, the Police or the State Coroner's Office (Ph: 02 9552 4066) would be notified. If there is reason to suspect that the skeletal remains are more than 100 years old and Aboriginal, the Applicant would also contact the OEH's Environmental Line (Ph: 131 555) for advice.

In the unlikely event that an Aboriginal burial is encountered, strategies for its management would need to be developed with the involvement of the Barkandji Native Title Working Group Aboriginal Corporation.

Arumpo Bentonite would provide training to all on-site personnel regarding the potential for places or objects of Aboriginal cultural heritage to occur and contingency actions to be taken relevant to their employment tasks.

Arumpo Bentonite would continue to involve the Barkandji Native Title Working Group Aboriginal Corporation in the operation of the Mine, where it is appropriate to do so.

Landskape (2017) concluded that the potential for disturbing unexpected places or objects of Aboriginal cultural heritage significance within the MLA Area is very low to negligible.

Assuming the implementation of the management and contingency measures described above, the risk of impacting places or objects of Aboriginal cultural heritage significance within the MLA Area is also low.

## **6.2.2 Decommissioning**

### **a. Site security**

The Arumpo mine site is in a remote location on a property managed by western land Lease. There are signs and several gates to get through over several kilometres off Arumpo Road before entering the mining lease area. Public access or someone accidentally entering the mining lease area is very remote.

### **b. Infrastructure to be removed or demolished**

There are no fixed assets on the mining lease, except for the phone tower. The tower will be decommissioned, and the concrete pad removed and disposed of.

All demountable buildings and portable assets will be removed by the mining contractor at the completion of mining activities.

The mine access road will be retained as it forms part of the station track system. Some internal mine roads may also be retained for use and with the permission of the landowner.

Any rock will be removed from hardstand areas prior to ripping. All laydown areas will also be ripped prior to topsoil application.

### **c. Buildings, structures, and fixed plant to be retained**

The mine access road and grids connecting the mine site to Arumpo Road will be retained as they form part of the internal track system. Any onsite road required by the landowner will also be retained.

The diversion bank, internal drainage controls and evaporation sumps will also be retained to minimise the potential for erosion and for use as water storage for domestic stock.

#### **d. Management of carbonaceous/contaminated material**

Limited quantities of hydrocarbons are used onsite. Materials are stored in a self-bunded container when not in use. The potential for any spillage and the associated risk is low.

Any contaminated material will be placed into drums and disposed of at the Buronga Landfill Facility.

#### **e. Hazardous materials management**

A SDS Register contains a list of all hazardous materials used onsite. Any remediation or removal of hazardous materials that exist following the completion of mining will be as per the guidelines outlined in the relevant SDS.

Any contaminated material will be placed in drums and disposed of at the Buronga Landfill Facility.

#### **f. Underground infrastructure**

Not applicable.

### **6.2.3 landform establishment**

#### **a. Water management infrastructure**

There are no major drainage lines or natural surface water bodies within or adjacent to the mine site. Two surface water tanks (Normansland and Emu Tanks) are located to the north and west of the mine lease. The current catch bank directs water to the north and west towards Emu tank and will be retained at the completion of mining.

Bund walls have been constructed around the active mining pits principally for safety but also to prevent overland flows of water into the active mining area. These are continually moved as mining progresses and will be removed at the completion of mining.

The diversion bank, internal drainage controls and evaporation sumps will also be retained to minimise the potential for erosion and for use as water storage for domestic stock. They will be topsoiled to prevent potential erosion.

#### **b. Final landform construction- general requirements**

The final landform would emulate the pre-mining landform and incorporate dunes, swales, and flats. The created dunes, though lower than those currently located within the Mine, would be consistent with the overall mix of high and low dunes which occur throughout the local area.

Notwithstanding bulking effects which would occur in association with the excavation and subsequent replacement of the overburden, and the creation of dunes and rises of a lower elevation than occurring prior to mining, it is projected that the final landform will incorporate a shallow depression or void within the area of the final extraction area.

Other project-related features which would form part of the final landform would include the sediment basins which would be retained as future stock and native fauna watering sources and, subject to the requirements of the leaseholders, sections of the final internal access road system.

It is anticipated that the land would be predominantly returned to grazing following closure of the Mine. Land to the south of the Mine has been previously cleared by the leaseholders with the intention of sowing crops in this location. As a result, the land within the Mine may eventually be used for cropping. It has therefore been determined, in consultation with the leaseholders, that the final landform would have a ground cover suitable for grazing and not be revegetated with a shrub layer or trees.

#### **c. Final landform construction- reject emplacement areas and tailings dams**

No processing of bentonite takes place onsite, and no tailings dams have been constructed.

#### **d. Final landform construction- final voids, highwalls and low wall**

At this stage further drilling is required to complete the exploration of ML1507. It is anticipated that this will occur in the next 3-5 years. The current mine path has approximately 12 years of mine life and it is expected an additional 2-3 years of mining will be added at the completion of drilling.

Once the final mine path design has been established a backfill contouring plan will be developed to ensure the final void meets the final landform design.

The groundwater level sits approximately 18 metres below the base of the mining pit so is not considered

#### **e. Construction of creek/river diversion works**

Not applicable.

### **6.2.4 Growth, medium development**

The growth, medium development phase involves the placement of overburden and topsoil on the final landform and the preparation of the surface for revegetation.

Soil preparation will include the harrowing of the applied topsoil to maximise water infiltration and retention into the substrate and to provide for an adequate seed bed.

The addition of fertiliser and seed application would also be considered, but to date has not been required.

Topsoil will be applied directly from the designated topsoil stockpiles using a tractor and carry scoop. It will be applied to an approximate depth of 300mm. A smudge board will then be used to evenly distribute the soil over the rehabilitated area. Where practical topsoil will be replaced in the late summer/autumn in anticipation of the winter rains.

Once the topsoil has been replaced logs and branches, previously stockpiled, will be distributed over the rehabilitated surface to prevent wind erosion and to provide a suitable fauna habitat.

The diversion bank will prevent the inflow of surface runoff into the rehabilitated area.

Any weed incursions will be controlled by the landowner as part of their routine weed control program.

### **6.2.5 Ecosystem and land use establishment**

This phase involves the activities that are required to develop the ecosystems that are self-sustaining and assist to meet the final completion criteria.

The rehabilitation areas are controlled from feral and domestic stock by the mining lease fence.

Weed infestation is controlled by regular spraying by the landowner as part of the farm lease spraying program.

The water diversion bank and all internal water drains and sumps will be regularly inspected and maintained.

Monitoring of revegetation performance will be undertaken by aerial survey monthly. Any areas of concern will be identified, and mitigation works commenced.

The application of fertiliser has not been required to date to achieve the rehabilitation outcomes but would be considered if applicable.

As the final land use criteria is for agriculture use/grazing a grazing trial would be considered prior to final land use sign off.

### **6.3 Rehabilitation of areas affected by subsidence**

Subsidence of previously backfilled and rehabilitated areas has not occurred to date at the Arumpo Mine.

In the unlikely event that subsidence does occur then the areas will be recompacted with overburden and the topsoil replaced.

Any remediation will be verified by survey to determine profile stability.

## **7.Part 7 – Rehabilitation quality assurance process**

The following process will be implemented throughout the life of mine to ensure rehabilitation outcomes are met.

### **a. active mining (land clearance)**

- Establish key environmental baselines including surface and groundwater studies, soil surveys, archaeological studies, survey records, land capability.
- Exclude grazing, weed and feral animal control, implement fire management.
- Implement pre-clearing procedures to minimise environmental impacts and maximise biological and habitat resources.
- Plan seed harvesting if required.
- Minimise land clearing operations
- Conduct pre-clearance surveys
- Ensure topsoil is stripped when moist and correct mining equipment is used.
- Ensure 300mm of topsoil is removed and stockpiled in designated stockpiles
- Retain all cleared vegetation for use in rehabilitation
- Direct return topsoil if possible

### **Active mining (Production)**

- Develop materials and soil balance and database to include the following- volume of topsoil stockpiled, location, age (date stripped) and quality of stockpiles, any weed control or other works undertaken on stockpiles.
- Topsoil information is to be identified on mine surveys
- Topsoil stockpiles are to be located away from traffic areas and watercourses
- Stockpiles to be located on level ground where possible
- Stockpiles to be designed to maximise surface exposure and to maximum recommended height

- Restrict access onto stockpiles to reduce erosion potential
- Monitor and control weeds on stockpiles
- Develop a site plan for contaminated sites and bioremediation areas (survey plan)
- Monitor surface water, flora/fauna, contamination, archaeology sites if found, land use capability

## **b. Decommissioning**

### **Site Services/Hazardous materials**

- Disconnect electrical services prior to any demolition or removal works
- Disconnect and remove telecommunications where practical
- Remove all site buildings and facilities
- Remove all ore or spillage and hazardous materials
- Assess laydown areas for contamination and undertake any remediation
- Concrete waste to be removed and managed under the PEOA 1991
- Excess ore will be transported to Arumpo Road Processing Plant or removed to backfill.
- Remove all hydrocarbons, lubricants, and hazardous materials

### **Exploration activities**

- Remove all drill pegs, tape, drill cores and other waste
- Remove all drill cores
- Survey and seal all drill holes

### **Landform design**

- Ensure the landform as a minimum meets the requirements of the Development Consent
- **Landform is comparable to surrounding natural landform**
- Use of landform stability principles including reduced slope length and water management structures

### **Managing subsidence- affected areas**

A subsidence management program will be in place until all measurable subsidence has ceased.

Prepare as constructed drawings to verify that drainage and landform has been constructed to design prior to Growth medium development stage.

### **c. Landform Establishment**

#### **Landform design/shape**

Ensure the landform is commensurate with the surrounding natural landform

Ensure slope stability and stability of surface water structures

#### **Final void**

Final void to meet specifications as outlined in the SOEE (re final Batter design)

#### **Water management infrastructure**

Remove excess sediment from surface dams or infill if not required

Reshape dams for their intended use

Install sediment and erosion controls if required

Licence any retained dams (note: none planned at this stage) under Water Management Act 2000.

#### **Managing subsidence affected areas**

Maintain a subsidence monitoring program until all measurable subsidence has ceased

Prepare as constructed drawings to verify landform and drainage has been completed to design before Growth Medium Development Phase.

### **d. Growth Medium Development**

#### **Before commencing rehabilitation (substrate preparation)**

Maintain adequate Topsoil to complete proposed rehabilitation objectives

Implement suitable erosion control measures to minimise soil loss in rehabilitated areas

#### **During Rehabilitation (general timing of rehabilitation activities)**

Schedule all revegetation/topsoil replacement in suitable seasonal conditions

#### **During rehabilitation (general methodologies)**

Use appropriate earthmoving equipment to replace topsoil and vegetation

Scarify topsoil parallel to contour once applied



Remove all access tracks not required by landowner to original condition

Supplement any topsoil deficits with suitable alternative

Replace cleared stumps/trees on rehabilitated surface

#### **e. Ecosystem and Land use Establishment**

##### **During rehabilitation (revegetation-native ecosystem)**

If revegetation is delayed due to unseasonal conditions undertake temporary stabilisation measures.

If seed mix or plant material is required, check availability.

If seeding is required spread the seed as soon as possible after scarifying.

Use appropriate earthmoving equipment to avoid compaction.

Replace tree stumps/vegetation to encourage fauna habitation.

Ensure rehabilitated areas are fenced off from stock

##### **During rehabilitation (revegetation-agricultural land use)**

Implement revegetation techniques to establish grazing areas

##### **Rehabilitation establishment inspections**

Conduct an initial establishment inspection no later than 3 months following the completion of each rehabilitation campaign to determine whether performance issues have occurred or are emerging

Conduct quarterly site inspections to assess soil conditions, erosion, drainage and sediment control, revegetation regrowth rates, weed infestation until site is stable

Use drone to conduct monthly inspection of rehabilitation areas (as part of normal survey activities)

Record the outcome of the inspections and implement any corrective actions necessary

##### **Rehabilitation monitoring program**

Implement a long-term rehabilitation monitoring program to review progress achieved against rehabilitation objectives and rehabilitation completion criteria

Assess the pasture species and stock carrying capacity

Establish a fixed-point photo monitoring program

##### **Rehabilitation management and maintenance program**

Maintain weed and feral animal control

Maintain erosion and drainage control works

Reseed/planting of failed rehabilitation areas (if required)

Maintain intact fence lines and access tracks

Implement a regular site inspection program to monitor rehabilitation performance

## **8.Part 8 – Rehabilitation monitoring program**

### **8.1 Analogue site baseline monitoring**

Using the NSW Land and Soil capability assessment (Soil Conservation Service NSW) the land capability within the Mining Lease has been classified as Class 5 or Class 6 (i.e., land not capable of being regularly cultivated but suitable for grazing)

Using the 5 Class system to classify rural land use (NSW Department of Agriculture) the land within the Mining Lease is classified as Class 5 land, whereby agricultural production is very low because of environmental and economic constraints.

Baseline assessments (Flora, Fauna, Cultural heritage) were conducted prior to the granting of the Mining Lease and again in 2017 when the Statement of Environmental Effects was updated.

As a result of these assessments, and as stipulated in the Development Consent, the final land profile is to emulate the general topography of the pre-mining landform as much as possible.

It is anticipated that the land would be predominantly returned to grazing following the closure of the mine.

### **8.2 Rehabilitation establishment monitoring**

The following inspection regime will be implemented at the commencement of the ecosystem establishment phase. The purpose of which is to enable early identification of issues that have the potential to delay vegetation establishment. To identify if triggers have been met in accordance with the Trigger Action Response Plan and to provide data for the continuous improvement of rehabilitation methods.

- Photographs of rehabilitated areas from designated photo points
- Aerial monthly survey/photos of rehabilitated areas
- Photo analysis and monthly inspections for landform stability, erosion, and vegetation growth.
- Maintain weed and feral animal control

## 9.Part 9 – Rehabilitation research, modelling, and trials

### 9.1 Current rehabilitation research, modelling, and trials

The rehabilitation methods at the Arumpo Mine Site are well established and have proved successful over the last 20 years.

The commencement of drone surveying in 2021 now allows monthly aerial analysis of the mine site.

The use of these photographs will be utilised to monitor rehabilitation progress, vegetation regrowth, erosion and any other issues that may arise.

### 9.2 Current rehabilitation research, modelling, and trials

A final landform model will need to be developed for the remaining mining path until mine closure. It is required to ensure the final landform meets the profile requirements outlined in the development Consent. This model will be required to be developed by 2024.

## 10.Part 10 – Intervention and adaptive management

TRIGGER	ACTION	RESPONSE
Insufficient materials and resources to achieve satisfactory final landform.	<ul style="list-style-type: none"><li>• Review the final landform requirements / associated material requirements</li><li>• Assess these requirements against available resources.</li></ul>	<ul style="list-style-type: none"><li>• Design final landforms in accordance with available resources.</li><li>• Assess availability of alternative sources of materials and their costs (if required)</li><li>• Source additional material where required.</li></ul>

<p>Insufficient topsoil and growth medium material available to achieve satisfactory revegetation</p>	<ul style="list-style-type: none"> <li>• Assess topsoil resources and requirements.</li> </ul>	<ul style="list-style-type: none"> <li>• Assess availability of alternative sources of topsoil/growth medium material, and their costs.</li> <li>• Source additional material where required.</li> </ul>
<p>Landform unstable and unable to achieve revegetation.</p>	<ul style="list-style-type: none"> <li>• Undertake investigations to identify the extent, source, and cause of the trigger.</li> </ul>	<p>Based on the investigation, implement management measures such as:</p> <ul style="list-style-type: none"> <li>• Use of available materials such as rock or stockpiled topsoil to stabilise areas identified</li> <li>• Revegetate bare ground</li> <li>• Assess water management and drainage structures</li> <li>• Where required a specialist engineer may be required to assess the structural integrity and design appropriate remedial measures.</li> </ul>
<p>Excessive erosion and / or sedimentation resulting in land instability and /or vegetation growth issues.</p>	<ul style="list-style-type: none"> <li>• Undertake investigations to identify the extent, source, and cause of the trigger.</li> </ul>	<p>Erosion and sediment control measures may be implemented including:</p> <ul style="list-style-type: none"> <li>• Erosion channels or bare areas will be managed and eliminated where possible</li> <li>• Riparian areas will be managed to prevent instability and erosion where possible and provide similar pre mining flows</li> <li>• Re-designing and construction of appropriate drainage lines</li> <li>• Installation of sediment traps and fences downslope of erosion areas</li> <li>• Use of available materials such as rock or stockpiled topsoil to stabilise areas identified</li> <li>• Supplementary revegetation of any bare areas.</li> </ul>
<p>Poor vegetation establishment and growth.</p>	<ul style="list-style-type: none"> <li>• Review rehabilitation records including methods, weather records, species used and photographs to determine the cause of poor rehabilitation establishment.</li> <li>• Identify appropriate remediation measures.</li> <li>• Ongoing monitoring to confirm supplementary measures have been successful.</li> </ul>	<p>The appropriate supplementary response will reflect the cause of limited vegetation response or growth. This may include:</p> <ul style="list-style-type: none"> <li>• Testing of soil for contaminants, pH, or deficiencies</li> <li>• Supplementary seeding of vegetated areas or topsoil</li> <li>• Investigation into the possibility of utilising irrigation as part of the water management system to promote germination and establishment of vegetation, and</li> <li>• Supplementary vegetation will be designed based on analogue sites and overall ecosystem structure to include the desired vegetation structure and species.</li> </ul>
<p>Weed and / or feral</p>	<ul style="list-style-type: none"> <li>• Rehabilitated areas will be assessed for key weed and feral</li> </ul>	<p>Appropriate management techniques specific to each species will be implemented to limit the</p>

animal infestation	<p>animal species.</p> <ul style="list-style-type: none"> <li>• Where a weed or feral animal species is observed an investigation will be undertaken to determine the extent of the invasion, possible sources, and the appropriate response</li> </ul>	<p>invasion and colonisation of foreign weed and feral animal species such as:</p> <ul style="list-style-type: none"> <li>• Significant weed infestations or noxious weeds will be removed in accordance with relevant guidelines</li> <li>• Implementation of wash down and inspection procedures if required</li> <li>• Vertebrate pests will be managed to be absent or kept under control and monitored on an annual basis.</li> </ul>
Drought	<ul style="list-style-type: none"> <li>• Replace topsoil at end of summer.</li> <li>• Replace stumps to reduce wind erosion</li> </ul>	<ul style="list-style-type: none"> <li>• Water rehabilitation areas to facilitate vegetation</li> </ul>
Bush fire	<ul style="list-style-type: none"> <li>• Fire break in place</li> <li>• Fire extinguishers and water truck onsite</li> </ul>	<ul style="list-style-type: none"> <li>• Control fire if possible</li> <li>• Contact Emergency Services.</li> </ul>

## 11.Part 11 – Review, revision, and implementation

The table below outlines the statutory triggers for the review of the Rehabilitation Management Plan in accordance with the Development Consent, mining lease conditions and other regulatory requirements and statutory approvals. This is to ensure that the Rehabilitation Management plan remains current and relevant, the rehabilitation outcomes are achievable, and the strategy is in place to meet these Outcomes.

TRIGGER	ACTION
Amendment to rehabilitation objectives, rehabilitation completion criteria or final landform development	Review and update Rehabilitation Management Plan
Changes to Risk Control measures in the Rehabilitation Management Plan	Update Risk Matrix and Rehabilitation Management plan
Whenever directed in writing to do so by the Secretary	Update Rehabilitation Management Plan as directed
Changes to mine design or closure plan	Update Rehabilitation Management Plan and associated documents
TARP is activated (threat to rehabilitation)	Update Rehabilitation Management Plan and TARP/Risk Assessment
Annual Review	Update Rehabilitation Management Plan