

Rehabilitation Management **Cherrabah Granite Mine February 2017**

Introduction

This Rehabilitation Management Plan addresses the work required to remediate mine workings on Lot 1000 SP268215. The plan has been prepared on the following basis:

- Proposed disturbed areas on site will include the pit extraction, processing and stockpiling areas, which have been identified in the site layout plan. These areas will require progressive rehabilitation as the operation proceeds.
- Assessing each of the disturbed areas on site to determine the type of rehabilitation required and the likely timeline for rehabilitation.
- Scheduling the most appropriate time to complete rehabilitation in terms of seasonal conditions.
- Post-operation land use, most likely eco-tourism/natural bushland.
- Some areas including roads, water storage etc. will remain at the completion of the operation to facilitate property access and for bushfire management purposes.

Site Characteristics

The topography of the site is characterised by large granitic outcrops and immediately associated footslopes. The exposed section of the main granite outcrop is approximately 60m x 150m with extensions to the south. The western boundary of the outcrop contains an ephemeral watercourse (stream order 1) which flows north towards the Condamine River. Following site inspections, vegetation across the site is generally in high quality condition in areas where vegetation may grow. Small pockets of small trees (<2m) and shrubs populate the crevices in the granite outcrop where decomposed granite has been caught with years of weathering. The outcrops are however, predominantly void of vegetation. Within the proposed operational areas there exists Remnant Vegetation 'of concern'. A small section of this will need to be cleared so that the hardstand area can be constructed. Two vegetation communities were identified: RE 13.12.2 New England Blackbutt, Youman's Stringybark woodland on igneous rocks and RE 13.12.4 Broad-leaved White Mahogany, Queensland Blue Gum open forest on igneous rocks.

Soil cover comprises decomposed granite from the weathering of the granite outcrops with scattered cobbles and boulders within the topsoil. There is no topsoil within the extraction area and minimal topsoil with the processing and stockpiling area. It is envisaged up to 0.3m topsoil depth exists across this area. During the site developing construction works, topsoil will be removed, stockpiled and maintained until its use during rehabilitation, Figures 1 and 2 show the typical ground cover and conditions on the site. The current site is suitable for native bushland and due to its location and topography is likely to remain as a similar land use post-mine development.



Figure 1 - View of the top of the Extraction Area showing how the vegetation within the Extraction Area forms in the crevices of the outcrop



Figure 2 - View from the stockpile area showing typical vegetation communities adjacent to the Extraction Area outcrop

Erosion Management

Some areas on site are prone to mild erosion due to the steep land; however, with minimal soil cover and non-dispersive soils, erosion is limited to these areas of concentrated flow. Minimal mitigation measures are required where the erosion has reached the underlying rock. Where earthmoving is required appropriate erosion control measures will be implemented including diversion bunds, contour drains, table drains with rock bars and if required temporary erosion controls such as sediment fences. Erosion can significantly slow the rehabilitation process and therefore appropriate measures must be implemented. The operators will ensure that erosion is controlled by:

- Only disturbing areas that are required for operation of the mine;
- The installation of erosion controls such as diversion drains, contour drains, catch drains and sediment retention as required; and
- Encouraging natural regeneration of the final profiles by reducing access from site vehicles (no through access).

Weed Management

For the general mine operation, the spread of weeds to and from the site will be controlled using an integrated weed management approach. Guidelines will be set so that any vehicles/plant that have presumed to have come in contact with contaminated soil or noxious weeds will be washed down prior to leaving site. Any listed noxious weeds identified on site will be actively eradicated in an on-going site rehabilitation program. The weed management strategy for rehabilitated areas will incorporate the following steps;

- Monitoring in the form of monthly observations by site personnel for weeds of management concern (groundsel and fireweed etc.);
- Eradication of weeds identified during the monitoring program in accordance with the 'Weed Control Methods' issued by the Department of Primary Industries & Fisheries (DPI).
- Eradication of weeds of concern in accordance with the Queensland Biodiversity Act 2014;
- Promotion of weed management and identification in site induction.

Methods of weed control that may be required include the following;

- Chemical control;
- Mechanical control;
- Biological control; and
- Manual control.

Herbicides, if used, will be stored and used as per the MSDS with the appropriate approvals. Generally due to the limited access and relatively small area, weeds within rehabilitation areas will be selectively removed manually or chemically.

Rehabilitation Methodology

The rehabilitation methodology on site is primarily driven by the designated final land use, which will return the land to native bushland in the processing and stockpiling area, whilst the outcrop will remain as open pit water storage but will be fenced. The on-site dams will also remain for firefighting purposes, but the land around it will be returned to native bushland.

Rehabilitation of the mine operation will be carried out in stages, as some areas will be operational for more than 10 years. Separate rehabilitation methodologies are used for the extraction areas and the processing and stockpiling areas. Final slope profile for the extraction areas is currently designed with a 90° face angle, 5m bench height and 5m bench width. This design is based on assumed geotechnical specifications; however ongoing analysis is required of the face stability as the mine progresses. At various places around the pit overburden may be placed as a 'bridge' between the benches to allow wildlife passage however each bench will be integrated into the surrounding topography at the edge of the pit. The base of the pit will be left as water storage with a ramp for egress.

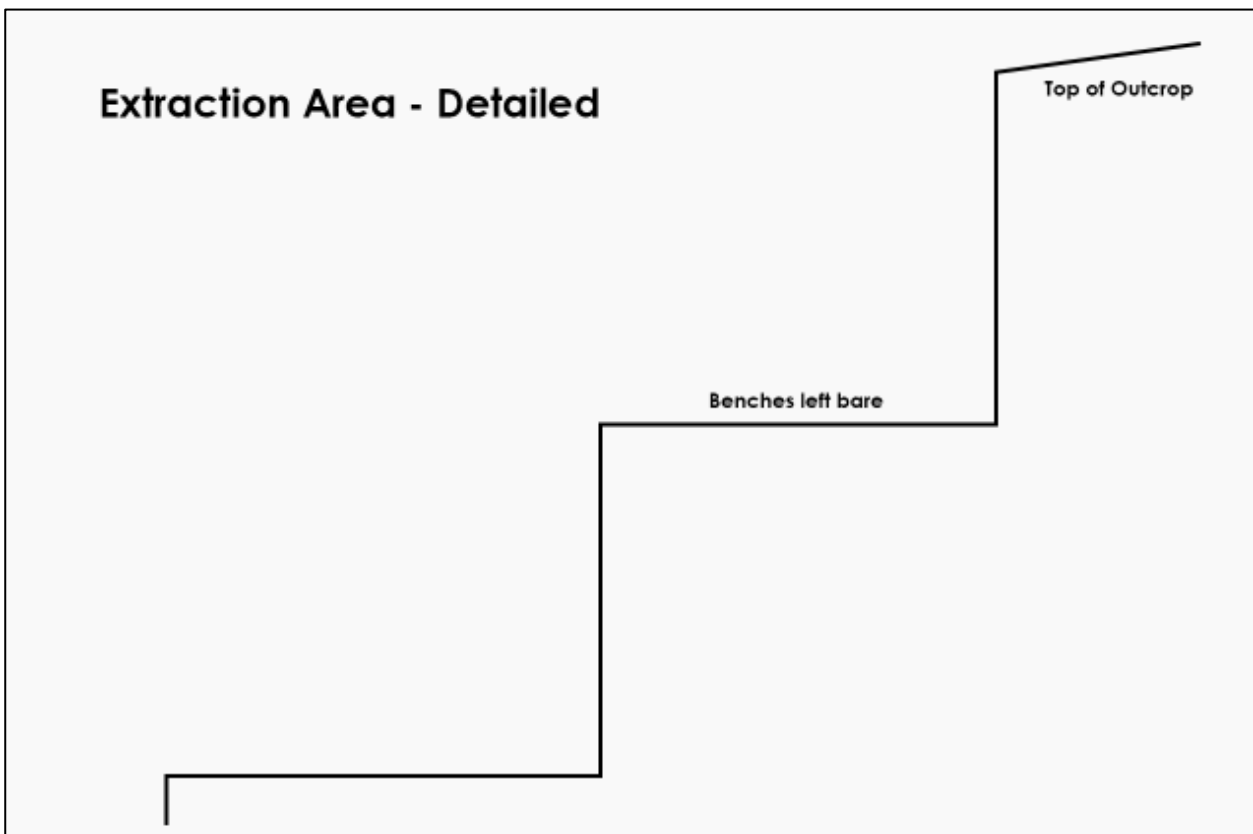


Figure 3 - bench profile

The processing and stockpiling areas are generally flatter and contain compacted roads and laydown areas. These areas will be contoured to suit the final rehabilitation profile (with appropriate drainage) and compacted areas will be deep ripped followed by topsoil placement.

Rehabilitation Plan_V1.1 attached details the rehabilitation required in each area of the mine.

Rehabilitation Watering

A watering regime may be required if adverse weather conditions are encountered during the initial stages of rehabilitation (the first 6-12 months). Care should be taken to ensure that the selected watering regime is suitable for the area, considering daily evaporation and soil erosion susceptibility. The use of water from the in-pit sump shall be sufficient for ongoing watering requirements.

Topsoil Management

Topsoil management is an integral part to the rehabilitation of the mine. Best Practice Management of topsoil will ensure minimal seed bank sterilisation and will reduce supplementary planting in the long run. Best Practice Management can be achieved by the following steps;

1. Develop a plan for handling and storing topsoil prior to stripping in the first place, this will assist the alignment of earthworks clearing and rehabilitation activities and result in minimal time for topsoil to be stockpiled.
2. If topsoil is stockpiled, ensure stockpiles are kept to a maximum of 1.5m high for duration of less than 12 months. Stockpiles should be seeded with a fast growing 'cover crop' to protect the surface from raindrop erosion. Stockpile location should be away from concentrated overland flow and ensure erosion control measures (sediment barrier/fence) are implemented for all topsoil stockpiles to prevent soil loss.
3. Spread topsoil evenly and minimise compaction by restricting heavy vehicle traffic.
4. Once placed, ensure appropriate erosion controls are in place to prevent topsoil loss through concentrated flows.

Rehabilitation Timing

Rehabilitation is generally undertaken as soon as feasible, due to the significant life of the mine most of the processing and stockpiling areas will remain active for the life of the project and will be rehabilitated upon completion of the operation.

As no rehabilitation is needed on terminal faces as extraction in each stage is completed, a progressive rehabilitation plan is not required for the extraction area.

Monitoring

Monitoring of rehabilitation activities and performance should be carried out monthly until a self-sustaining stage is reached. During the monitoring process emphasis on the following checklist should be made;

1. Clearly identify and delineate rehabilitation areas to ensure areas are visible and site traffic is restricted;
2. Check monthly rainfall and plant condition to determine if additional watering is required;
3. Monitor soil erosion during the initial stage until soil is stabilised, implement additional erosion control measures if required;
4. Identify areas where natural revegetation is lacking and prepare for supplementary planting by contacting local nurseries;
5. Identify and record weed locations and species to assist in nuisance weed eradication;

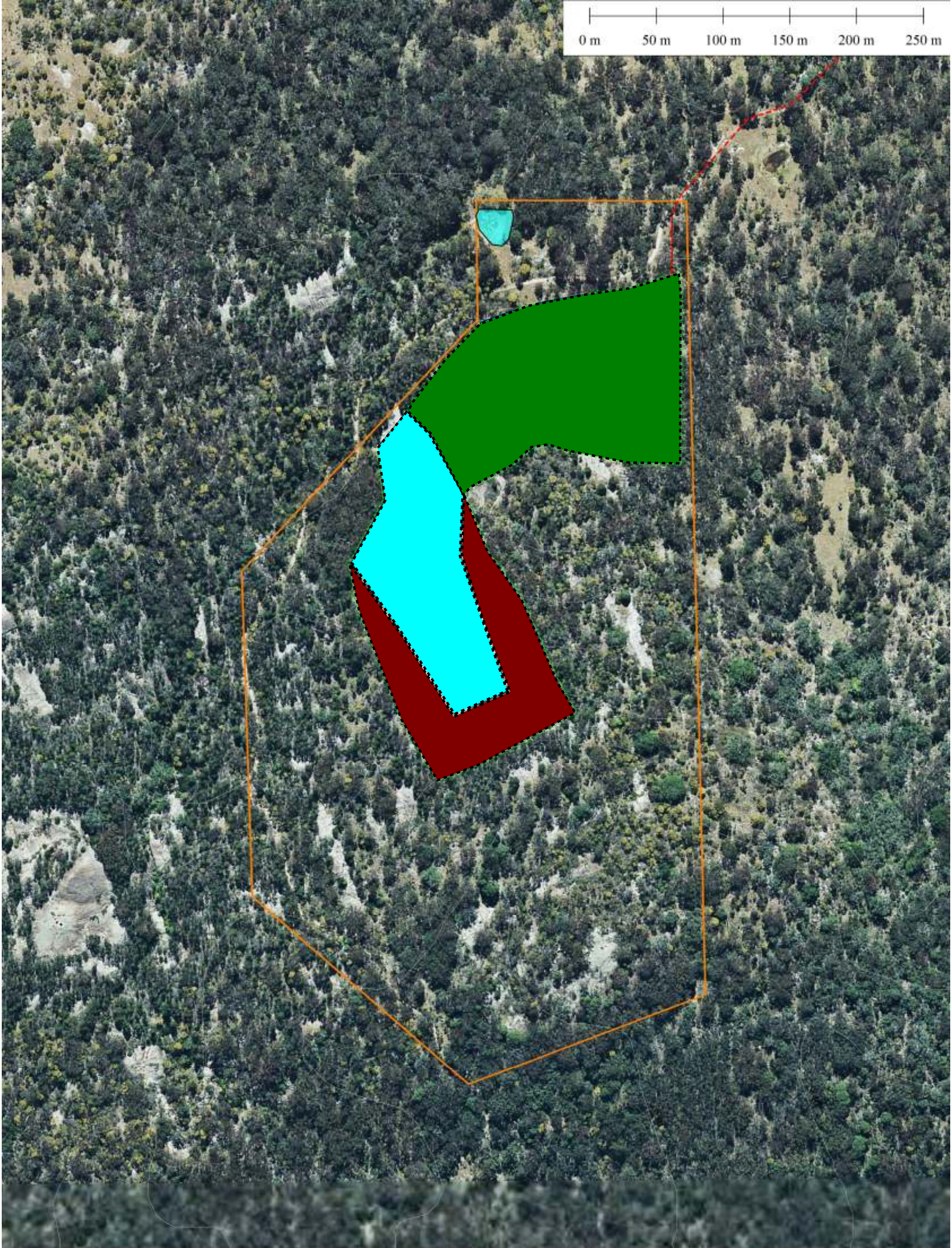
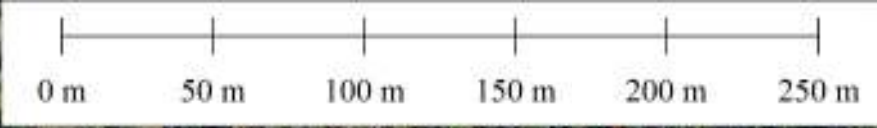
Reporting

Once rehabilitation commences, an annual Rehabilitation Report shall be completed as per the requirement in the Site Based Management Plan. A copy of this annual report shall be kept on site for the life of the mine. Regular review of yearly rehabilitation performance should be made to ensure Best Practice Management is achieved for site rehabilitation.

Table 3 shows the key issues in relation to the Rehabilitation Management Plan.

TABLE 3: Key Issues – Rehabilitation Management Plan

| Key Issue | Methodology | Comments |
|--|---|---|
| Overall disturbed area | Monitor disturbance on an annual basis and report as required. Project future disturbance and correlate with actuals. | Survey disturbed area on a regular basis using aerial survey methods or via ground surveys. |
| Managing topsoil | Ensure that double handling is kept to minimum, where possible stockpile topsoil for a maximum of 12 months. | Develop an extraction and rehabilitation schedule for each operating stage to best utilise topsoil. |
| Ensuring successful native vegetation regeneration | Monitor the progress of ongoing rehabilitation sites, minimise disturbance from livestock and site vehicles. | Requires ongoing monitoring to ensure rehabilitation is suited to the final land use. |
| Weed Management | Monitor weeds growth on newly rehabilitated areas, remove and dispose of nuisance weeds. | Early intervention is an effective method of controlling weeds. |



LEGEND

- ML Boundary
- Mine Access Road
- Site Disturbed Area
- Basins/Dams
- Internal Roads
- Native Bushland Rehabilitation
- Long Term Water Storage
- Benched Pit



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| Scale | 1:2,500 | Datum | GDA94 |
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Aerial Photo: QLD Globe 18/06/2013
Contours: NSW Globe & Drone Survey 12/16