CHAPTER 17 REHABILITATION AND FINAL LANDFORM

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17 REHABILITATION AND FINAL LANDFORM

This chapter provides an overview of the proposed land use following mine closure, the rehabilitation and mine closure strategy for the Project.

17.1 INTRODUCTION

The Project Area was a rehabilitated mine site and, until commencement of the decline development in early 2007, had been maintained in care and maintenance since Normandy sold the lease to BHOP in 2001.

Two tourist operations were conducted within the Project Area, these operations ceased with the commencement of the Rasp Decline. A surface mine walking tour through heritage buildings and mining infrastructure at the South Mine where interpretive signage was installed and, an underground tour operating from Delprat Shaft. The mechanical workshop was also used for public functions.

17.2 PROPOSED LAND USE FOLLOWING MINE CLOSURE

17.2.1 Closure concept

The objective at the end of the life of the Project is to return the facility in a condition suitable for continuing tourist operations. The historical significance of the site has been detailed in *Chapter 11* and *Annexure L*. The mining character of the site, including landform elements and a considerable amount of infrastructure will be retained. The rehabilitation strategy and closure concept have been considered during the planning process for the mine including key considerations of final landform, drainage and erosion controls, soils, tailings, safety and heritage. These aspects are discussed in *Section 17.4* and will be addressed further in the rehabilitation and mine closure strategy to be detailed in the conceptual mine closure plan.

The aim for rehabilitation and closure is to reconstruct landforms that are stable and safe, and support the post-Project land use of tourism.

The specific aims of rehabilitation and closure are to:

- retain heritage items (as agreed with BHCC and DEWHA);
- manage stormwater to minimise erosion and restrict the potential for off-site pollution;
- provide final landforms that are safe, stable and sympathetic to the mining heritage of Broken Hill;
- minimise dust generation and adequately contain potentially hazardous material within the landform; and
- install barriers to restrict access to potentially hazardous locations (i.e. decline, shafts or open cut pits).

To meet the expectations and preferences of the local community for post-mining land use the final closure plan, consultation and communications will continue to be undertaken as detailed in *Chapter 4*.

17.2.2 Justification for proposed post-mining land use

The proposed future use of the Project Area as an historic mine site for cultural tourism was developed in response to the following characteristics of the site:

- historical heritage value of individual buildings and items within the Project Area and the site as a whole (refer *Chapter 11*);
- significance as a mine site to the people of Broken Hill for its role in the history and development of Broken Hill;
- represents over 125 years of mining, including educational opportunities provided by demonstrating the changes in mining technology over time;
- definitive character in the visual identity of Broken Hill;
- previous operation of an underground tourist mine (Delprat Shaft) within the Project Area;
- previous operation of a surface mining tour through the South Mine;
- conduct of previous public functions (mechanical workshop); and
- economic benefits associated with the operation of a commercial venture at the site.

17.3 REHABILITATION AND MINE CLOSURE MANAGEMENT STRATEGY

A conceptual mine closure plan (the Plan) will be developed by BHOP prior to submission of the MOP, in consultation with the consultative committee (refer *Section 4.4*) and relevant government agencies including DoP, I&I NSW, BHCC and DEWHA. The Plan will be developed with consideration to relevant regulations, guidelines and polices for mine closure planning and implementation and conditions of consent. The Plan will also address any requirements agreed with DEWHA in a proposed conservation management plan for the Project Areas, currently under consideration. It will address those considerations given in *Section 17.4* and will include:

- objectives for landscape management and rehabilitation;
- a conceptual plan and proposed implementation methodology for decommissioning, landscape management and rehabilitation to achieve the objectives (including an indicative timetable for mine closure) and justification for the plan; and
- post-mining care and maintenance requirements, including any required ongoing monitoring and management.

The Plan will be revised and amended as required on an ongoing basis to reflect any changes to operations. Elements will be considered in planning and implemented on an ongoing basis for the life of the mine, with the aim for progressive rehabilitation where possible. As required by I&I NSW, the final MOP will include the detailed plan for decommissioning and final rehabilitation and landscape.

17.4 REHABILITATION AND ENVIRONMENTAL OUTCOMES

17.4.1 Final landform

Due to more than 125 years of mining within the Project Area, the current landform bears no resemblance to the pre-mining landform. The final landform resulting from this Project will be similar to its present day condition. The following alterations are proposed:

- the existing TSF will be raised 10 m from its current crest elevation, it will be slightly lower that the adjacent TSF;
- tailings will be deposited in the Blackwood Pit; and
- earthworks for plant construction will alter the landform in this area.

These elements will not significantly change the landform and will constitute mine-related landforms, consistent with those throughout the Project Area. Potential visual impacts are addressed in *Chapter 13*. For long-term stability and safety and minimise erosion, final design and rehabilitation for these landforms will include the following:

- any new slope angles and lengths in accordance with regulatory requirements;
- removal and /or containment of hazardous or contaminated material in accordance with regulatory requirements;
- installation of safety bunds; and
- management of drainage and catchment requirements, including water level in voids, groundwater seepage and final water quality.

Progressive rehabilitation will occur where possible, including but not limited to the existing TSF (which will be rehabilitated upon reaching capacity 4.25 years into the life of the Project and once the tailings have stabilised).

Blackwood Pit will be covered with inert waste rock so as to enhance stability and suitably contain any potentially hazardous material. The filling of the Blackwood Pit will stabilise the Pit's western walls thereby stabilising the Delprat House (No 27A and 27B) and the BHP Office complex (British flats).

The 'free areas' of the site, that is areas that will be undisturbed by BHOP and where there is the potential for dust generation, will be treated initially by a chemical dust suppressant and it is proposed to install waste rock as a final treatment.

The waste rock is to be tested prior to use to identify:

- inert waste rock to enable its segregation; and
- waste containing contaminants, including lead, to enable its encapsulation.

It will be screened prior to use to remove any fine material capable of blowing away. As part of the AEMR, landforms will be reviewed annually to determine the quantum of area to be covered and a yearly action plan developed so that coverage of landforms is completed progressively throughout the life of the Project.

Landform features such as final voids and slopes are to be retained as these are consistent with the mining character of the site and are a definitive feature of the visual character of Broken Hill.

17.4.2 Soils

Soils of the Broken Hill town area belong to the Nine Mile Land System (Walker, 1991). This land system incorporates the lower slopes and outwash areas of the Barrier Range. The soils are principally red texture contrast soils (Dr1), which are characterised by sandy topsoils and red clayey subsoils. Small areas of highly saline soils with a covering of white quartz occur on the lower slopes and adjacent to the major creeks. The major forms of erosion are minor to moderate scalding, minor water-sheeting, and some areas of rilling and gullying.

Due to the long history of mining and disturbance on the site, the original soils have been removed and all that remains are shaped overburden piles. As the proposal to undertake further mining of CML7 involves underground operations, and as the surface has previously been rehabilitated, the disturbance of surface soil and impacts in terms of sedimentation and erosion is likely to be minimal.

17.4.3 Drainage and erosion control

Prior to mine closure, the Stormwater Management Plan will be reassessed to confirm that it provides adequate management protocols to minimise the potential for off-site runoff and erosion post closure. This plan will include initial on-site retention and evaporation of storm water, via a series of containment facilities, with overflows directed to the open pits within the Project Area.

17.4.4 Safety

Public safety will be addressed by ensuring landform stability (refer *Section 17.4.1*) and the establishment of appropriate barriers, prior to mine closure. This will restrict access to any hazardous locations i.e. the decline, shafts or open cut pits. Installation of barriers will take place following an audit of the Project Area to identify all potentially hazardous locations within the lease boundaries. This will include but not be limited to the following:

- the Rasp decline portal will be sealed via an appropriate method, such as back fill with waste rock or covering with mesh and steel beams;
- appropriate barriers will be installed where required at open pits, shafts and voids in the Project Area. The requirement for barriers will be determined by a risk assessment giving consideration for future usage. Barriers may include cyclone fencing around the perimeter, safety bunding around the pit, covering of the shaft with steel beams or capping the shaft with concrete;
- access ramps into open pits will be suitably bunded to restrict access; and
- integrity and security of boundary fencing will be assessed and upgraded if necessary to restrict general site access.

17.4.5 Tailings

To provide for the long term stability of, and prevent the generation of dust from the Tailings Storage Facilities (TSF1 and TSF2) the Project has planned to carry out the progressive rehabilitation of the facilities over the life of the Project. *Section 2.6* outlines the operation of the facilities including the following rehabilitation measures:

- inert waste rock to be used for embankment wall construction;
- chemical dust suppressant treatments will be applied during the life of TSF1 and again as required as the surface consolidates post closure. TSF2 will be treated in the same manner as TSF1; and
- inert waste rock or slag will be placed on top of the completed storage facilities once the tailings have sufficiently consolidated to allow safe operation of heavy equipment.

17.4.6 Heritage items

To provide for the viability of a future mining related cultural tourism venture at the site, the Project has been planned to include retention, preservation and some adaptive re-use of remnant historical material and buildings within the Project Area (*Chapter 11*). This will be an ongoing consideration throughout operations with any work on these significant items being undertaken in accordance with the specific programme for the item as outlined in the conservation management plan.

Prior to mine closure BHOP will:

- review all existing heritage items within the Project Area;

- review all new structures and modifications to heritage buildings; and

- advise on what new structures and modifications to heritage buildings are to be retained to represent BHOP's operations at Rasp Mine. It is planned that the historic and modern layers of mining technology will co-exist at the site to demonstrate evolution and technological advances in the mining industry.

Based upon this information and the closure outcome agreed with stakeholders, BHOP will formulate a plan to develop the site as a mining related tourist venture.

17.5 CONCLUSIONS

Implementation of the rehabilitation and mine closure management strategy will preserve the historic mining character of the site for future generations and minimise the potential long-term adverse impacts. Environmental outcomes from the strategy will include rehabilitation of disturbed area, preservation of historic heritage values and implementation of appropriate drainage and erosion controls.