

## 5 REHABILITATION

This section summarises the approach to rehabilitation and mine closure for the modified Tarrawonga Coal Mine. It describes how the mine would be progressively rehabilitated and integrated into the landscape, and the measures which would be put in place for the long-term protection and management of the site following the cessation of mining.

In accordance with the *Mining Act, 1992*, rehabilitation would be subject to agreement and approval from the relevant regulatory authorities. The rehabilitation concepts presented below are therefore provisional to allow for the consideration of the results of current and proposed investigations, as well as consultation with regulatory authorities and other stakeholders.

The results of rehabilitation investigations and proposed rehabilitation concepts for the Tarrawonga Coal Mine are currently documented in the 2008/2009 AEMR and MOP. Condition 57 of Schedule 4 of the Development Consent requires a Mine Closure Strategy to be prepared at least three years prior to the cessation of mining. This strategy has not yet been prepared.

If the proposed Modification is approved, the MOP would be reviewed and updated, and a Mine Closure Strategy would be prepared to incorporate the rehabilitation concepts and activities for the modified Tarrawonga Coal Mine. TCPL would continue to report on the progress of rehabilitation activities in the AEMR.

### 5.1 REHABILITATION OBJECTIVES

As described in Section 2.1.9, the rehabilitation and final land use objectives for the existing Tarrawonga Coal Mine, as described in the 2005 EIS, 2008/2009 AEMR, and MOP, are as follows.

#### ***Areas affected by mining – short-term***

- Stabilise all earthworks, drainage lines and disturbed areas that are no longer required for mine-related activities.
- Reduce the visibility of mining activities from adjacent properties and the local road network.

#### ***Areas affected by mining – long-term***

- Provide a low maintenance, geotechnically stable and safe landform which is commensurate with a variety of agricultural land uses and/or nature conservation.
- Blend created landforms with the surrounding land fabric.
- Revegetate the majority of the post-mining landform to communities which emulate the existing vegetative communities or those that occurred prior to agricultural related disturbance.

#### ***Areas unaffected by mining***

- Remove grazing pressure from areas of relatively intact native tree, shrub and grassland communities and thereby encourage the extension/diversification of those communities.
- Undertake plantings as a means of extending or encouraging the development of native bushland communities.

TCPL would aim to provide a rehabilitation outcome that balances the alternative land uses that exist in the region by establishing a combination of agricultural land and native woodland on ML 1579. Woodland areas would be created to contribute to the local and regional habitat corridors. Agricultural land would be retained in the southern portion of lease in the areas adjacent to the proposed new soil stockpile (Figure 4-15).

Rehabilitation works at the end of the mine life would be minimised by constructing the final outer slopes of waste emplacements during their development, and by progressively rehabilitating mine landforms and other disturbance areas throughout the mine life as they become available.

## **5.2 FINAL LANDFORM**

At the completion of mining, the key final landforms/features at the modified Tarrawonga Coal Mine would include the following:

- Northern Emplacement, Southern Emplacement and in-filled open cut;
- mine infrastructure areas (e.g. coal crushing and load-out facility, ROM pad, administration areas, workshops, etc.); and
- water storage dams and sediment basins.

### ***Northern and Southern Emplacements***

As for the approved Tarrawonga Coal Mine, the Northern and Southern Emplacements would be rehabilitated to create gently sloping hills in the final landform. These landforms would be constructed predominantly with slopes of 10 degrees ( $^{\circ}$ ) or shallower (none would exceed  $18^{\circ}$ ) and to an elevation consistent with the surrounding landscape.

The original final landform concept for the Northern Emplacement described in the 2005 EIS was for it to form a northern extension of the existing low hill located to the immediate southwest of the coal crushing and load-out facility. The proposed Modification would involve some adjustments to this concept in order to accommodate the additional overburden to be generated by the open cut extension.

The modified Northern Emplacement would be designed to gently slope up from the natural ground surface on the western edge of ML 1579 to a rounded peak of 370 m AHD (Figure 4-15). From here it would gently slope down towards the east, where it would merge with the in-filled open cut and ultimately the undisturbed natural topography at around 330 to 360 m AHD near the eastern edge of ML 1579. The overall effect of this design change on the local and regional landscape is not considered to be significant, as the final slopes of the emplacement would remain the same as described in the 2005 EIS, it would still be shaped to integrate with the natural topography, and the maximum height of the emplacement would still be comparable to naturally occurring hills in the local area. From a visual amenity impact perspective, no significant impacts on privately-owned residences are predicted to occur either during operations or post-closure (Section 4.3).

The 2005 EIS described the Southern Emplacement as effectively replacing a portion of an existing hill removed through mining activities, albeit the new hill would be about 500 m further to the south. The modified Southern Emplacement would not significantly alter this final landform concept other than the new hill would be an additional 100 to 300 m south. The other key characteristics of the final landform design would remain unchanged (i.e. it would still have approximately the same overall shape, the final slopes would be  $10^{\circ}$  or shallower, the maximum height of the emplacement would be 340 m AHD, and the landform would be integrated with the natural topography).

### ***Final Open Cut Void***

The 2005 EIS described the final landform concept for the open cut void as involving pushing back the residual slopes to a grade of approximately 10° through a combination of highwall blasting, dozer pushing and backfilling. The base of the final void would be up to 50 m below the rim of the final void (approximately 265 m AHD) and would be located in the south-east corner of the open cut area. As described in Section 4.9.3, the groundwater assessment conducted for the 2005 EIS predicted that a small, shallow, mildly brackish water body (i.e. approximately 5 m deep) would establish within the final void at approximately 270 m AHD approximately 25 years after mine closure.

The modified open cut would be in-filled and re-shaped in a manner such that the final void would remain in the same location described in the 2005 EIS. It would also have a similar catchment area and depth (i.e. base of approximately 265 m AHD). As a result, the predictions for a shallow lake to form in the void some 25 years after closure remain unchanged. Figures 4-14 and 4-15 show the final landform and offset concepts from the 2005 EIS and the modified Tarrawonga Coal Mine respectively.

Notwithstanding the above, and as described in Section 4.9.3, it should be noted that TCPL is considering the feasibility of further expanding the mine to the east of ML 1597. Subject to TCPL deciding to proceed with this further expansion (and it obtaining the necessary operating approvals), the mine closure concepts for the site would require a more substantial review and revision which would be conducted as part of the environmental impact assessment and approvals process.

## **5.3 DECOMMISSIONING ACTIVITIES**

All infrastructure and facilities would be decommissioned and removed from the site following the cessation of mining, unless otherwise agreed with the regulatory authorities. A summary description of the main items to be decommissioned is provided below.

### ***Coal Crushing and Load-out Facility and ROM Pad***

The coal crushing and load-out facility would be dismantled and removed following the cessation of mining. Any residual coal on the ROM Pad would be removed to the CHPP or buried within the open-cut infill area. The site would then be re-profiled to integrate with the southern batter of the Northern Emplacement and adjoining natural topography. The area would then be contour ripped, topsoiled and revegetated.

### ***Administration, Infrastructure and Workshop Areas***

Buildings, equipment and service infrastructure within the administration, infrastructure and workshop areas would be dismantled and removed. The footprint areas would then be tested for land contamination in accordance with the applicable statutory requirements. Smaller areas of contaminated soil would be treated on-site by contour ripping, spreading and allowed to naturally remediate. Larger areas of contaminated soils would be removed for proper disposal in accordance with the requirements of the relevant regulatory authority. All disturbance areas would then be contour ripped, topsoiled and revegetated.

### ***Access Roads and Tracks***

The majority of internal access roads and tracks on ML 1579 would be ripped and revegetated if they are not required for monitoring and maintenance purposes following the cessation of mining activities. TCPL (as the landowner of “Thuin”) currently intends to retain the main internal access road within ML 1579 following the completion of mining activities. However, should a decision be made for it to be rehabilitated in part or full, the following activities would be undertaken:

- the road would be closed and a lockable gate installed to prevent access from Goonbri Road;
- the bitumen seal would be ripped and disposed of in the open cut in-fill area;
- compacted sub-base and base-course material would be ripped or excavated and disposed of in the open-cut infill area; and
- topsoil would be spread and seeded with pasture species or native tree and shrub species, depending on the land use designated for that section of the road.

The private sections of the coal haulage route between ML 1579 and the CHPP that traverse the “Tarrawonga”, “Kyalla”, “Bungalow” and “Whitehaven” properties would be retained as access roads between those properties and the public road network.

### ***Water Management Infrastructure***

Some of the water storage dams may be retained for future use, subject to consultation with the relevant stakeholders and approval by the regulatory authorities. Sediment dams would remain pending long-term acceptable water quality and may be kept as stock watering points if suitable.

## **5.4 FINAL LAND USE**

The 2005 EIS described the proposed final land use for the site as being a combination of:

- mine landforms and disturbance areas rehabilitated to native vegetation and fauna habitat;
- mine landforms and disturbance areas rehabilitated to enable the re-introduction of cropping and/or cattle grazing;
- an open cut final void waterbody;
- undisturbed areas within ML 1579 that would be fenced to allow the natural re-generation of native vegetation; and
- undisturbed areas within ML 1579 that would continue to be used for cropping and/or cattle grazing.

The proposed land uses for ML 1579 described above would remain unchanged, with the exception of the 61 ha of rehabilitated mine landforms that was proposed to be returned to agricultural land. The proposed area of rehabilitated agricultural land described in the 2005 EIS was situated in a re-contoured shallow valley in the western portion of the in-filled open cut (Figure 4-14). It was proposed in order to counter the loss (through development of the mine) of an area of land with class 3 land capability and land suitability.

TCPL is proposing to change the final land use of this area to native vegetation and fauna habitat for the reasons listed below:

- The proposed modification to the design of the Northern Emplacement and in-filled open cut would mean that the area in question would no longer be a shallow valley, and would instead be a rounded east-west trending hill (Section 5.2). As a result, it is unlikely to be feasible to return the land to class 3 land capability and land suitability.
- The originally proposed area to be returned to agricultural land was to be surrounded by native vegetation and fauna habitat areas on all sides. This would make it difficult to access the area for agricultural activities (i.e. stock and cropping equipment would have to be moved through several hundred metres of the adjoining native vegetation and fauna habitat areas).
- Rehabilitation of this area to native vegetation and fauna habitat would allow better integration with the native vegetation in the Leard State Forest to the north of ML 1579.

## **5.5 GENERAL REHABILITATION PROCEDURES**

Rehabilitation activities at the Tarrawonga Coal Mine would aim to minimise potential environmental impacts and would be conducted using the general procedures summarised below. Rehabilitation would be undertaken during daylight hours where practicable, and watering of roads would be undertaken where required.

### **5.5.1 Vegetation Clearing**

Progressive clearance of vegetation would be undertaken ahead of the advancing mining operation. A vegetation clearance protocol has been developed to minimise the impact of vegetation clearance on flora and fauna for the existing Tarrawonga Coal Mine and is documented in the FFMP.

The FFMP describes the measures to be used to salvage and re-use cleared vegetation, including, the collection and propagation of native seed, incorporation of groundcover into topsoil when it is stripped, use of clearing debris on the rehabilitated landform and salvage of hollow tree trunks and branches.

### **5.5.2 Soil Management**

Soil stripping would be undertaken progressively and stockpiling procedures would aim to minimise degradation prior to it being used for progressive rehabilitation. The soil resource management strategies used at the Tarrawonga Coal Mine are described in Section 4.2.3.

### **5.5.3 Overburden Placement and Shaping**

Overburden would be placed and re-shaped as necessary to create slopes generally 10° or shallower (none would exceed 18°). Wherever practicable, TCPL would design the waste emplacements and conduct the re-shaping so that large rocks or dispersive materials were not placed on the surface of the final landforms. Coarse rejects from the CHPP would be covered with at least 2 m of overburden.

### **5.5.4 Drainage Installation**

Contour banks would be progressively installed on rehabilitated mine landforms. As described in the 2005 EIS, the heights and cross-sectional areas of the individual banks would be determined on the basis of individual sub-catchment areas, but would typically be less than 0.7 m and 3 m<sup>2</sup>, respectively.

Flumes would be constructed on the slopes of the final landforms as necessary to assist in controlling the flow of water off the slopes.

### **5.5.5 Revegetation**

Areas to be revegetated with native vegetation and fauna habitat would initially be stabilized with a non-persistent cover crop. Suitable native plant species for revegetation of mine landforms and disturbance areas would be determined in consultation with the regulatory authorities and landholders.

Species would be selected on a site by site basis depending on nearby remnant vegetation associations, soil types, aspect and site conditions. Drought tolerance would also be a consideration in species selection.

Species selection for revegetation would also be based on re-vegetation lists in the 2005 EIS, FFMP, species recorded within the ML 1579 and surrounds (Appendix F) and results from the rehabilitation monitoring.

In consultation with regulatory authorities and landholders, additional species may be included over time as rehabilitation progresses and the results of ongoing rehabilitation trials become available.

## **5.6 REHABILITATION MONITORING**

Monitoring of rehabilitation activities at the Tarrawonga Coal Mine is currently undertaken through the implementation of monitoring programmes outlined in the MOP and AEMR.

The parameters to be monitored during rehabilitation would be determined in consultation with DII-MR and documented in the MOP. Ongoing monitoring and maintenance of rehabilitation would be conducted to assess:

- progression of rehabilitated land ; and
- effectiveness of rehabilitation techniques used (i.e. evidence of erosion/sedimentation, success of initial grass cover establishment, success of tree and shrub plantings, adequacy of drainage controls, general stability of the rehabilitation site).

The meteorological station would be maintained to provide data on climatic conditions such as temperature and rainfall.

The results and performance of rehabilitation would be reported in the AEMR.