Anglesea Mine Revegetation Strategy Technical Study

Introduction

Alcoa's Anglesea mine is located at Anglesea, in south western Victoria, approximately 35 kilometres from Geelong. The Anglesea Mine supplied brown coal to the Anglesea Power Station since its inception in 1969 until shutdown in August 2015. The operation, including both mine and power station, has now entered an interim monitoring period whilst the final Closure Plan is being developed prior to implementation.

The mine is located within the Anglesea River catchment, a relatively small scale river system, with a catchment area of approximately 885ha. The two main tributaries of the Anglesea River are Marshy Creek, which flows from the north, and Salt Creek which flows from the west with its last kilometre diverted around the northern edge of the Alcoa mining area prior to the commencement of mining in the 1960's.

The mine was operated on an open-cut backfilling arrangement, allowing for progressive rehabilitation to take place to the extent where approximately 35% of the disturbed area (325Ha) has already been revegetated in line with approvals at the time of revegetation. The area remaining to be revegetated will be dependent on any final lake size and other land form and land use issues that are yet to be developed.

Alcoa has a legislative requirement to manage the mine as depicted in the endorsed Work Plan, including all aspects relating to revegetation outlined in the Mine Closure Plan. The disturbed mining area is largely leased Crown Land that will eventually be returned to the Crown, however there is also a section of freehold land located within the disturbed mining area.

Background

The Work Plan requires a Closure Plan that depicts the final landform at the cessation of mining to comprise a final lake void surrounded by safe and stable batters and revegetated areas. The plan also depicts the re-diversion of Salt Creek approximately back to its original path.

With the operation shutdown, the closure concept for the Mine Closure Plan now requires technical specification and therefore a technical study of the proposed site revegetation strategy is required.

The disturbed area comprises various zones historically associated with the mining activity, including old mine workings, overburden disposal areas (both revegetated and awaiting revegetation), haul roads and tracks, workshops and amenities buildings, river diversion and stream systems, and small wetlands and holding ponds.

There is a general absence of topsoil available for revegetation with only a limited amount of topsoil and subsoil expected to be made available through some batter reshaping. It is expected that this resource will be used to cover prioritised areas using methods developed in the latter part of the mine revegetation program.

There is potential for the final lake to have variable heights determined by seasonal influences and any associated vegetation strategy will need to consider this aspect, and make the appropriate recommendations.

The hydrological, hydrogeotechnical and geotechnical aspects of the final Mine Closure Plan will be fully evaluated through separate technical studies. However, it is anticipated that as applicable data becomes available, it will be shared across the three studies, including at regularly scheduled data sharing meetings.

Quality Assurance

This Technical Study may be subject to a third party independent peer review prior to finalisation.

In addition to this and as part of the final submission of the Mine Closure Plan to the Department of Economic Development, Jobs, Transport and Resources (Earth Resources Regulation), it will be subject to further independent review including by the department's Technical Review Board.

Initial Context for the Study

To give the Technical Study context, the following provides a conceptual framework that will help inform and guide the required technical work. The Mine Closure Plan should:

- Be consistent with the key principles in the existing endorsed work plan
- Ensure that all landforms will be safe and sustainable in the long term
- Understand there will be a lake of some form, with the dimensions, quality, fill rates, etc. still to be determined
- Be consistent with the Guiding Principles (to be updated following stakeholder consultation) set out below:
    Provide a safe and stable landform for future uses.
    Value and complement the natural environment.
    Support a diverse range of future uses and outcomes.
    Honour the various cultural and heritage values of the area.
    Complement the future of the Anglesea Region.
- Focus on landform for alternative use within the disturbed area (considerate of community feedback) rather than land use at this stage
- Be considerate of revegetation strategy consistent with alternative use, not necessarily re-vegetation to original heath but sensitive to the surrounding natural environment and local indigenous species, and so as not to exacerbate fire risk into the future
- Include consideration of two options for the lake including connectivity to Salt Creek (inflow) and also to the Anglesea river (outflow), or as captured storage
- Include that Coal Mine Road access for emergency services (at least) is required in a similar location (doesn't have to be exactly the same) to current into the future, re-routing considerate of risk (if appropriate) could be considered
- Be considerate of long term management, monitoring and maintenance requirements
    - Target implementation of 'set and forget' (i.e. revegetation methods and type/quality that will reduce long-term management requirements)
    - Transition from manage to monitor based on agreed closure criteria
    - Residual risk should be no worse than 'background' risk

Using the context above, inclusive of the Guiding Principles, Alcoa requires that a Technical Study be undertaken to determine the revegetation and management strategies associated with these various zones that have been identified across the disturbed area.

Expected Outcomes

- Develop a comprehensive and integrated Mine Revegetation Strategy that is consistent with the proposed Mine Closure Plan and encapsulates all the disturbed area zones against all appropriate aspects.
- Determine current Fire Rating and if appropriate, indicate any methodology for the reduction of risk considering regional location, dimensional aspects and vegetation type. Additionally, provide an overview of vegetation types composed of indigenous native vegetation that provide a reduced fire risk and are able to be grown in commonly found and available soil types from within the mining disturbed area.
- Complete a Cultural Heritage Management Plan (CHMP) for the current undisturbed natural vegetation areas that may be disturbed as part of the final Mine Closure Plan implementation and submit for approval to the registered Aboriginal Party and Aboriginal Affairs Victoria.
- Develop a potential management and monitoring program for the various elements described in the Mine Revegetation Strategy.
- Establish potential 'Completion Criteria' for monitoring the above proposed outcomes that indicates that long term stability has been reached and that the monitoring program can cease.
- Recommend revegetation options, informed by both community 'aspirations', and also by community expertise and experience, for each Zone.

Mine Revegetation Strategy Scope of Work

The Revegetation Strategy being developed as part of the final Mine Closure Plan involves undertaking a comprehensive study across all the identified Zones listed below, covering all indicated aspects relative to those Zones. Whilst the Mine Closure Plan is developing (and being informed by other technical studies) and the land form/use for each zone has not yet been established, the Scope of Work needs to be in logical phases.

Phase 1 will focus on those aspects of the total Mine Revegetation Strategy that can be conducted prior to other contributing elements being fully developed.

Phase 2 will only be possible once a significant proportion of the contributing land-form (and therefore potential land-use) elements have been evaluated and agreed.

During the development of both phases, there is an expectation that the consultant will need to engage with relevant groups within government and the community to ensure that appropriate sources of knowledge and existing expertise is incorporated into the Technical Study.

Zones

- Existing revegetated areas
- Overburden backfill areas including small wetlands and holding ponds
- Haul roads and tracks
- Fire Service Dam area
- Salt Creek diversion channel
- Workshops, amenities and various other buildings and structures
- Freehold area
- Other various disturbed areas
- Proposed lake area, surrounding batters and associated potential stream banks

Aspects

- Landform (and therefore potential end land use)
- Visual Integration/Compatibility
- Soils – current physical and chemical properties
- Soils – treatment/enhancement to any proposed/required physical and chemical properties
- Hydrology, Erosion Control and Sediment Control
- Site Preparation
- Climate
- Fire Overlay
- Revegetation strategy
- Species List
- Fauna and Flora
- Pest plants, pathogens (phytophthora) and animals
- Potential Completion Criteria
- Monitoring Programme
- Any ongoing management requirements

Phase 1:

1. Conduct a comprehensive document review of all historic land management research, data, procedures and issues at the Anglesea minesite.
2. Not including the natural topsoil and subsoil and building on the historic data available regarding physical and chemical soil types across the disturbed area, evaluate the various zones (considering the context provided above) to determine if the current soil types found in those zones are suitable to promote various vegetation types composed of local indigenous native vegetation, inclusive of grasses. From the survey, determine the availability and quantity (based on effective optimum depths) of preferred soil types that may be best suited to promote growth as described above.
3. Evaluate the soil types to determine the viability of planting a non-indigenous annual grass (such as Ryecorn - Secale cereal or other sterile species) cover crop to prevent erosion and await the establishment of possible alternative land use activities.
4. Identify any risks to the natural environment associated with any proposed revegetation, either temporary or long term.
5. Although the existing historically 'revegetated areas' zone has been well documented, complete an analysis of any issues or risks to the natural environment as it is expected that these areas will not be modified again as part of the overall final Mine Closure Plan unless the study identifies significant risks. Amongst others, issues/risks that need to be considered are degree of erosion, vegetation performance, invasive species and wildlife interactions, and response of the vegetated areas to land slope and aspect.
6. Undertake a review of all the current (and any proposed) revegetated areas to determine current Fire Rating and if appropriate, indicate any methodology for the reduction of risk considering regional location, dimensional aspects and vegetation type.
7. Provide an overview of vegetation types composed of local indigenous native vegetation that provide a reduced fire risk and are able to be grown, considerate of local climatic conditions, in commonly found and available soil types from within the mining disturbed area.
8. Undertake a technical study of the 'potential final lake, surrounding batters and associated stream banks' zone, using relevant strategies from the Initial Context as outlined above for guidance, and covering all appropriate aspects. Additional consideration should be given to the possible height fluctuations of any final lake due to seasonal variation, organic loading and planting of the lake, prevention of erosion from the lake wave action and erosion along the stream banks from flows during flood periods.
9. Provide an overview of methodology and potential timeframes to support various and any proposed revegetation strategy in each of the zones.
10. Evaluate all current disturbed area revegetation (inclusive of the Roche Brothers mine to the west of the current operation and other earlier plantings around the mine perimeter) for planted invasive pest plants and recommend appropriate strategies including advantages/disadvantages to contain any identified risks.
11. Complete a Cultural Heritage Management Plan (CHMP) for the current undisturbed natural vegetation areas that may be disturbed as part of the final Mine Closure Plan and submit for approval to the registered Aboriginal Party and Aboriginal Affairs Victoria. The areas expected to be effected are sections of the western batter, potential re-diversion of Salt Creek, Fire Service Dam etc.

Phase 2

After being informed by other technical studies, the potential land form (and hence potential future land use) for each zone can be advised by Alcoa (including consultation with government departments and the community). Once this is available Phase 2 is expected to consist of:

1. Using the outcomes of Phase 1, the land form for the Mine Closure Plan developed from the other Technical Studies and appropriate elements of the land use concepts, develop a comprehensive and integrated Mine Revegetation Strategy that encapsulates all the disturbed area zones against all appropriate aspects.
2. Facilitate, inclusive of Alcoa, a Risk Assessment process consistent with AS/NZ ISO 31000:2009) that documents and assesses each potential risk or impact identified through this Scope of Work.
3. Develop a potential management and monitoring program for the various elements described in the Mine Revegetation Strategy.
4. Establish potential 'Completion Criteria' for the monitoring above that indicates that long term stability has been reached and that the monitoring program can cease.
5. Further detail is expected to be added to Phase 2 informed by Phase 1 and other associated technical studies.