

## Flow Chart the Rehabilitation Process

### Topic: Mining and Rehabilitation

#### Background Information

The rehabilitation process occurs through a series of steps. These include landscaping, pre-ripping, soil return, final contour ripping, seeding, planting recalcitrant species and fertilising, followed by ongoing monitoring.

#### What You Need To Do

Develop a detailed flow chart of the rehabilitation process.

#### Extension/Alternatives

Flowchart the mining and rehabilitation processes – can you make a cycle?

#### Curriculum Links

**English:** Writing, Viewing

**Society and Environment:** Place and Space, Natural and Social Systems, Resources, Active Citizenship - Ecological Sustainability

**Science:** Life and Living, Earth and Beyond

#### Values

Environmental Responsibility

Conservation of the environment:

Sustainable development:

## Teacher Resources

### Rehabilitation Process:

#### Rehabilitating mined areas and roads

Each year, mine pits that have had the ore removed and roads are no longer needed are rehabilitated. The long term objective of Alcoa's mine rehabilitation is to establish a self-sustaining Jarrah Forest ecosystem, planned to enhance or maintain conservation, timber, water, recreation and other forest values. Alcoa's rehabilitation process has been developed and improved over the past 35 years, and currently involves a number of important steps.

#### Landscaping

Large rocks are buried, vertical pit faces are flattened down and the pit floor is smoothed to blend the mined area into the surrounding landscape.

#### Pre-ripping

Pre-ripping breaks up the compaction of the pit floor caused by heavy rubber-tyred mining equipment. This helps roots to penetrate through the soil profile.

#### Soil return

The overburden and topsoil layers are returned. Wherever possible, fresh topsoil is directly returned to rehabilitated areas from pits that have been recently cleared. This maximises the topsoil seed store, which is important for maximising the number of plant species in rehabilitated areas.

#### Final contour ripping

*Final contour ripping* is undertaken on contour to increase the soil's water storage capacity. This contour ripping is undertaken with a multi-tine or a winged tine. Contour ripping creates mounds in the rehabilitation which are important for erosion control. In flat areas and areas with a low potential to erode, the rip lines may be partially flattened by a heavy bar dragged behind the ripping dozer.

#### Seeding

*Seeding* is achieved in the same process. Attached to the dozer which performs the contour ripping is a mechanical seeding machine which spreads the rehabilitation seed mix behind the dozer. This seed mix has been specially formulated by Alcoa's Marrinup Nursery and contains 50-80 species.

### **Recalcitrant planting**

Despite a large amount of research, there are some species that Alcoa is unable to establish from the seed in the topsoil or applied seed mix. These plants include many grasses and hedges that produce little viable seed. Alcoa grows seedlings of these species through tissue culture (cloning) or cuttings at the Marrinup Nursery, and plants these seedlings by hand in the rehabilitated areas.

### **Teacher Resources**

#### **Rehabilitation Process continued.**

##### **Fertilising**

To improve the establishment and early growth rates of trees and understorey in revegetated areas, fertiliser is applied by helicopter to the newly rehabilitated areas during August of each year.

##### **Ongoing monitoring and management of rehabilitated areas**

In March each year when the rehabilitation is nine months old, the previous year's rehabilitation is monitored to check that the number of established plants meets targets agreed by Department of Environment and Conservation (DEC) and Alcoa, and to identify any areas which need further treatment to control weeds or repair any erosion damage.

At 15 months of age, botanical species richness (number of different plant species) is monitored against internal and government standards (see details under "Mine Rehabilitation and Biodiversity" below).

##### **Relinquishment of mined areas to the State**

The Mine Management Planning Liaison Group (MMPLG) in consultation with the community and other stakeholders have developed a set of Completion Criteria for rehabilitation areas. Due to improvement in rehabilitation standards and techniques, two sets of completion criteria exist for pre-1988 and post-1988 rehabilitation. These criteria were developed to allow government agencies to assess whether rehabilitation is of a satisfactory standard so that Alcoa can hand the land back to CALM for future management.