

# **Alcoa World Alumina Australia Darling Range Bauxite Mine Rehabilitation Completion Criteria**

## **Introduction:**

Revised and formally accepted by MMPLG  
15 March 2007

## **Appendix 1:**

Current Era (Post 1988) Rehabilitation  
Revised and formally accepted by MMPLG  
15 March 2007

## **Appendix 2.**

Early Era (pre-1988) Rehabilitation  
Formally accepted by MMPLG, 5 June 2002



Department of  
**Industry and Resources**

**Introduction**

**To**

**Completion Criteria**

**For**

**Alcoa's Bauxite Mine  
Rehabilitation**

**Revised and formally accepted by the MMPLG  
15 March 2007**

# COMPLETION CRITERIA ALCOA'S BAUXITE MINE REHABILITATION

## 1. Introduction

It has been recognised by the mining industry, government authorities and the public that criteria are needed to determine when mine rehabilitation is complete. Industry is looking for criteria that indicate the success of its rehabilitation and enable it to determine when its liability for the area ceases. Governments also want successful rehabilitation to ensure they are not inheriting an ongoing liability. Finally, the public wants to know that the rehabilitation will be successful and a sustainable land use will be restored.

In 1995 a ministerial condition of approval of Alcoa's Wagerup refinery expansion to 3.3 million tonnes defined the requirements for development of completion criteria for rehabilitation. The condition delegated responsibility for development of the completion criteria program to the Mining and Management Program Liaison Group (MMPLG)<sup>1</sup>. The condition requires:

- Public consultation prior to finalisation of the completion criteria;
- Public access to the completion criteria upon finalisation;
- Five yearly review and revision of the completion criteria via the MMPLG and public consultation;
- Application of best practice environmental management principles; and
- Certificate of acceptance supplied to Alcoa by the Department of Environment and Conservation (DEC) on behalf of the State.

This document outlines the process and contains the completion criteria that have been developed for bauxite mine rehabilitation by Alcoa World Alumina Australia and DEC in consultation with government departments represented on the MMPLG and non-government organisation representatives.

## 2. Background

Alcoa operates two bauxite mines in the Northern Jarrah Forest of the Darling Range in Western Australia. A third mine at Jarrahdale ceased mining operations in 1998, with rehabilitation completed in 2001. The company's annual production of alumina in 2005 was 7.8 million tonnes from 29.3 million tonnes of bauxite.

Mining currently requires the clearing of approximately 550 hectares of forest per year. Each year Alcoa rehabilitates a similar area. Since mining commenced in 1962 to the end of 2006 Alcoa had cleared 15,900 hectares and rehabilitated 13,200 hectares.

The rehabilitation eras noted in Table 1 reflect step changes in rehabilitation practices. The early 1966-1970 rehabilitation consists of plantations of either *Pinus* or *Eucalyptus* species native to the eastern states of Australia, planted after very limited site preparation. These species were chosen for their resistance to *Phytophthora cinnamomi*, which is the plant pathogen responsible for the disease known as jarrah dieback. The 1971-1977 rehabilitation, again consisting of plantations, included more surface treatments such as landscaping and ripping. The 1978-1987 rehabilitation has a broader range of floristic characteristics established by seeding understorey species but with few *Eucalyptus* species native to the Darling Range. This rehabilitation aimed at establishing a functioning and self-sustaining eucalypt forest. The post-1988 rehabilitation has been undertaken by direct seeding indigenous species, with jarrah as the dominant *Eucalyptus* species. Rehabilitation is now aimed at restoring a self-sustaining jarrah forest ecosystem. The objective is to restore the

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MMPLG - The liaison group comprising relevant WA Government agencies chaired by the Department of Industry and Resources (DoIR) Website <http://www.doir.wa.gov.au>

land uses of the jarrah forest: water catchment, timber, restricted recreation and conservation values.

During the development of completion criteria rehabilitation was inspected to test the criteria in the field. The draft completion criteria and standards were applied at the Jarrahdale Mine during closure of the site, and areas that did not meet the criteria were reviewed with DEC. Table 1 shows the amount of rehabilitation that has been re-rehabilitated because it did not meet the completion criteria.

**Table 1: Mined areas rehabilitated and re-rehabilitated (all mines).**

Rehabilitation Era	Area (hectares)	Percent of Total Rehabilitation	Re-rehabilitated Area (hectares)
1966-1970	108	0.6%	77.6
1971-1977	691	5.3%	68.3
1978-1987	2,797	21.2%	19.6
1988 -2006	9609	72.8%	7.5ha
<b>Total</b>	<b>13,200</b>	<b>100%</b>	<b>173</b>

Since the early 1980s Alcoa has had an extensive research program into the establishment, sustainability and management of ecosystems developing on rehabilitated bauxite mines. Alcoa's Environmental Research Group, in collaboration with universities, CSIRO and Government departments has developed a comprehensive portfolio of projects examining many facets of ecosystem recovery in rehabilitated areas. Many long-term studies are looking at:

- Vegetation establishment, survival and succession;
- Vegetation productivity, sustained growth and structure development;
- Fauna colonisation and habitat development;
- Ecosystem processes such as soil development and nutrient cycling, and the recolonisation of specific fauna groups such as ants, spiders and termites that are involved in these processes;
- Microbiological studies including recolonisation by mycorrhizal fungi, microbial biomass and respiration;
- Effects of various establishment treatments such as deep ripping, topsoil handling, seeding and fertiliser application on vegetation growth and development;
- Resilience of vegetation to disease, insect attack, drought and fire;
- Vegetation water use and effects on ground water levels and catchment yields.

The completion criteria are supported in many instances by these research findings.

### 3. Working Arrangements

In 1979 a set of prescriptions for how operations, including rehabilitation, should be conducted in State Forest, was agreed with the State Government Forests Department (now DEC). These prescriptions (known as the Alcoa/DEC Working Arrangements) captured the best practice operations of the time and, in the case of rehabilitation, prescribed performance criteria for the establishment phase. These arrangements are regularly reviewed and updated to reflect improvements in knowledge from research, technology and operational understanding. The working arrangements do not however include important matters such as the integration of the management of rehabilitated minepits with the management of the surrounding forest, or the cessation of Alcoa's financial and legal liability for specified areas.

### 4. Completion Criteria

Completion criteria provide the government and Alcoa with clear direction for management of mine rehabilitation on a regional basis. They also give a description of the desired state of rehabilitation that is measurable and applicable to the surrounding lands influenced by Alcoa's operations, before the State will agree that any obligation for ongoing financial input or legal responsibilities by Alcoa effectively ceases.

The objective of completion criteria is to ensure areas will display self-sustaining characteristics of a forest ecosystem, which give DEC confidence to manage them in the long term (based on the intended land use) within normal forest management procedures and without input of extraordinary resources.

## **5. Development of Completion Criteria for Current Era Rehabilitation**

In 1993, a joint Alcoa/DEC working group was established to identify completion criteria and propose standards for areas rehabilitated since 1988 (current era rehabilitation). The completion criteria were based on a set of principles that were considered appropriate for mine rehabilitation in the Northern Jarrah Forest namely:

- Meets landuse objectives;
- Is integrated into the landscape;
- Exhibits sustained growth and development;
- Vegetation is as resilient as jarrah forest; and
- Can be integrated with forest management.

Specific completion criteria and standards have been identified for individual aspects of rehabilitation that demonstrate these principles (**See Appendix 1: Completion Criteria for 1988 onwards - Current Era Rehabilitation**).

### **5.1 Community Consultation – Current Era Rehabilitation**

The completion criteria were reviewed in consultation with representatives from all the state government agencies responsible for the management of land or environmental issues, industry, academia and the public, including representatives of the conservation movement.

In April 1997 a workshop attended by 40 people was held on completion criteria. The workshop included:

- Explanation of the State Agreement Act and MMPLG process;
- Forest Policy and expectations for rehabilitated areas (DEC);
- Development of completion criteria (Alcoa);
- Working through the completion criteria by visiting various stages of the rehabilitation process; and
- Questions and feedback from the workshop participants.

The draft completion criteria documents were made available to the workshop participants and the public and submissions were invited. After responses were provided for submissions made to the Minister for Environment and the Environmental Protection Authority, the MMPLG approved the completion criteria for the current era of rehabilitation in 1998.

Subsequent reviews of the completion criteria are undertaken by an Alcoa/DEC working group. The working group's recommends changes to the completion criteria to the MMPLG for its approval. The MMPLG then approves that the completion criteria be advertised to gain input from the public. This is achieved by including a notice about the completion criteria in the Department of Environment and Conservation's regular Monday advertisement in the West Australian newspaper. The relevant documents are made accessible to the public on the Department of Industry and Resources web site. All comments from the public are assessed by the Alcoa/DEC working group and any recommended changes are sent to the MMPLG for final approval.

## 5.2 Applying the Completion Criteria – Current Era Rehabilitation

The assessment of rehabilitation against the completion criteria is applied throughout the various stages of the rehabilitation operations and during the early years of ecosystem development. This ensures that corrective actions can be carried out while the Alcoa operations are still nearby.

The steps required to receive a certificate of acceptance include:

1. **Self-certification** by Alcoa occurs at the various stages of completion, supported by monitoring data and self-audit checklists. These have been developed to check and record that each required task is carried out to the agreed standard. Assessment at the late stage occurs after the site has stabilised and the vegetation is well established.
2. **DEC audits** Alcoa's rehabilitation checklists and monitoring data are provided annually to DEC, or on request, to allow audits of the rehabilitation at any time.
3. **Final assessment and inspection** is carried out by DEC, relevant regulatory authorities (ie DoIR & DOCEP) and relevant water management agencies to confirm that self-certification is complete and standards have been met.
4. **MMPLG reviews** self-certification and relevant land and water management agencies recommendations. The MMPLG then authorises DEC to issue a certificate of acceptance.
5. **DEC issues a certificate of acceptance** on behalf of the state government.

It is envisaged that certificates of completion will be for sub-regions, not individual pits. In 2006 a certificate of Acceptance was issued to Alcoa for 975 hectares of the former Jarrahdale minesite (within the Wungong Catchment). This was to allow Water Corporation to undertake forest thinning program to increase water run-off into the Wungong Dam.

The completion criteria will be reviewed regularly to include new research findings or operational practices.

## 6. Development of Completion Criteria for Early Era (pre-1988) Rehabilitation

Completion criteria for current rehabilitation have been developed and implemented. They include sign-off at the various stages of rehabilitation (planning, very early, early, mid and late stage). Completion criteria for rehabilitation prior to 1988 have been developed retrospectively, so are based on assessment at the late stage only.

The completion criteria developed for the current era rehabilitation were used as a basis for the early era rehabilitation completion criteria. The principles are the same as those used for current era rehabilitation (see section 5).

Specific criteria and standards, which demonstrate the completion criteria principles, have been identified for individual aspects of rehabilitation (**See Appendix 2: Completion Criteria for Early Era (pre-1988) Rehabilitation**).

### 6.1 Community Consultation – Early Era (pre-1988) Rehabilitation

A representative from the Conservation Council of Western Australia was invited to participate in the DEC and Alcoa team responsible for developing and reviewing completion criteria for the early era of rehabilitation. The Government departments represented on the MMPLG along with a Conservation Council representative reviewed the draft completion criteria,

toured rehabilitation areas that had been assessed against the standards, and provided feedback.

The second phase of the public consultation process consisted of mailing out the explanatory document along with the draft completion criteria documents to all those who participated in the 1997 consultation workshop, along with other parties who had expressed an interest but were unable to attend. Public comment was then invited (West Australian newspaper 16 July 2001) on the development of Early Era (pre-1988) completion criteria for Alcoa's bauxite mining rehabilitation in the Darling Range. The relevant documents were made accessible to the public on the then Department of Industry and Resources web site. The MMPLG provided responses to the four submissions from the public as a result of the mail out and the advertisement in the West Australian newspaper. Subject to some minor changes to the document suggested by government agencies and the public consultation, the MMPLG approved the completion criteria for the early era (pre-1988) rehabilitation in May 2002. The introduction along with the Current Era (post-1988) and Early Era (pre-1988) completion criteria are available on DoIR's web site [www.doir.wa.gov.au](http://www.doir.wa.gov.au)

For subsequent reviews see Section 5.1

## **6.2 Applying the Completion Criteria – Early Era (pre-1988) Rehabilitation**

The completion criteria and standards are used to assess the need for any remedial work. Areas that were rehabilitated prior to 1988 are likely to require varying degrees of rework. The Alcoa/DEC Working Arrangements, which include a mine rehabilitation prescription, have existed since 1979, so rework is likely to be minor for rehabilitation completed after 1979.

The completion criteria are being applied retrospectively so assessment sheets have been developed to review the rehabilitation in the field. Historic rehabilitation records and aerial photographs are also used to assist with the assessment. The sheets were developed and modified after testing them over a range of rehabilitation quality and age. The Rehabilitation Assessment Sheet records:

- Rehabilitation prescription applied;
- Soil preparation (eg; scarification or ripping);
- Tree form;
- Tree crown vigour;
- Understorey cover;
- Litter accumulation;
- Legume density;
- Presence of volunteer species (weeds);
- Jarrah presence and stage (seedling, lignotuber, coppice, sapling pole);
- Approximate stocking rate;
- Extent of remnant infrastructure (e.g. contour banks, pit faces, designed waterways, erosion, research trials); and
- Post rehabilitation management.

Assessment results and photographs taken at each site are stored in Alcoa's Geographical Information System to assist DEC with future management of the rehabilitation. The assessments indicate whether the site is exhibiting sustained growth and development. If a site receives a low score it is reviewed with DEC to determine the need for corrective action and the extent of rework to improve the site. Re-work prescriptions aim to favour the re-establishment of jarrah forest species and suppress the re-establishment of non-indigenous species. Areas that do not meet the standards due to the presence of significant infrastructure, such as pit faces, are automatically reviewed with DEC regardless of growth on the site. Some additional works like the installation of access tracks and waterholes for fire management are carried out to facilitate the integration of management of the rehabilitated areas with the surrounding forest. The sites are reviewed in a local and regional context.

The completion criteria allow sites with historical or recreational values to be retained even though they may not meet all the standards outlined in the criteria. A management plan for these areas must be developed which defines ongoing responsibilities for future

management. The management plan must be approved by the MMPLG to ensure it does not compromise other land use objectives for the area.

Extensive re-work has been carried out at Langford Park, part of the now decommissioned Jarrahdale Mine, where some areas of early rehabilitation were not progressing. Langford Park also includes a popular recreational area where people gather for barbecues, picnics and walks through the rehabilitation. The site includes toilet facilities, an adventure playground, a lake, picnic sites and potential camping sites. Retaining these facilities will mean the area does not meet all the completion criteria yet the site has considerable value to the community. The development of a management plan and endorsement by the MMPLG has allowed this area to be retained for recreational use by the community.

## **7. Future Management**

The objective of completion criteria is to provide rehabilitated areas that display self-sustaining characteristics of a forest ecosystem, which give DEC confidence to manage them in the long term without input of extraordinary resources.

When, on a regional basis, the rehabilitation has been assessed as having met the completion criteria, Alcoa will request endorsement from the MMPLG, and subject to that endorsement, DEC will issue a certificate of completion.

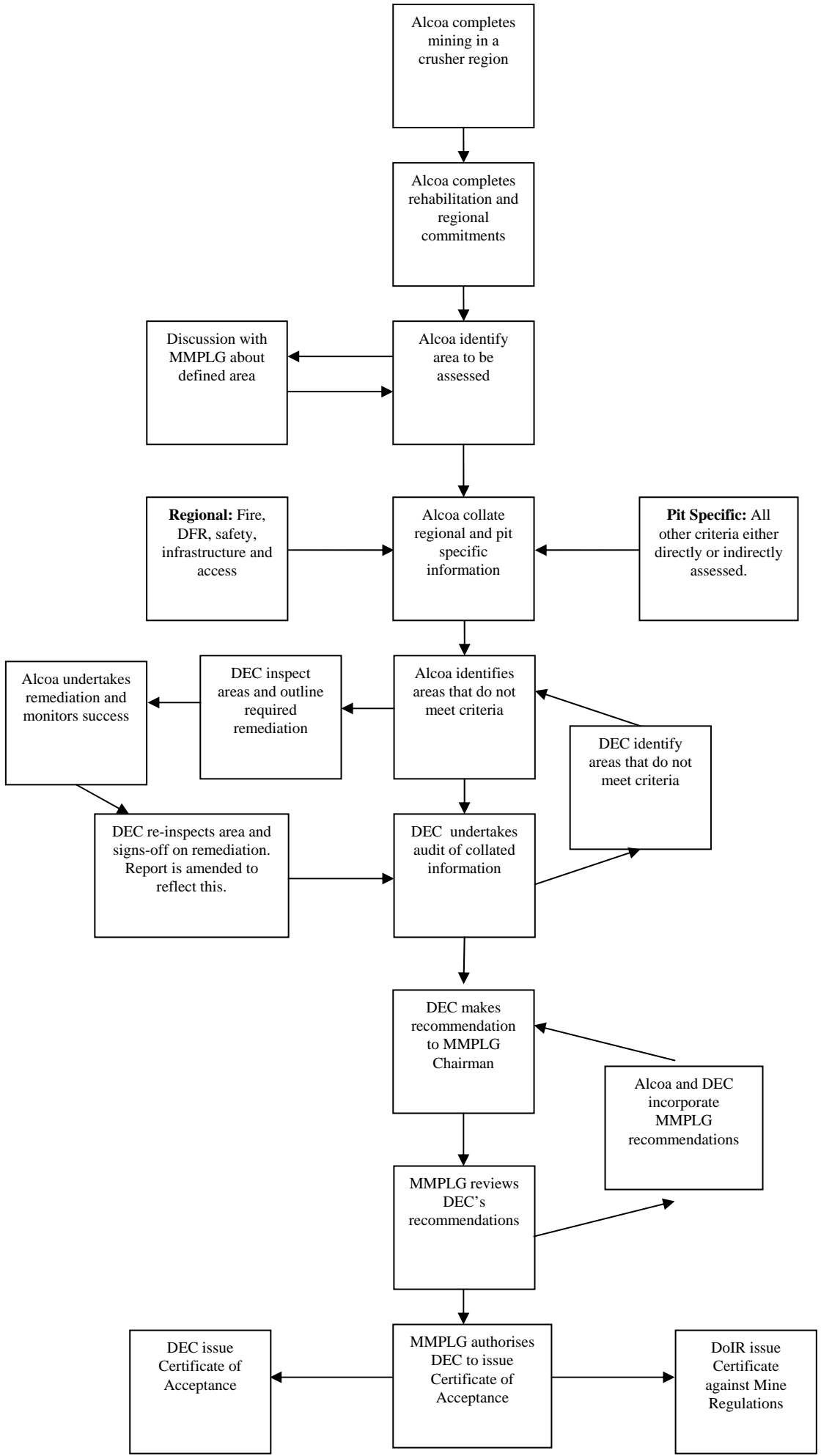
Alcoa's environmental department has developed a substantial body of knowledge on the establishment and sustainability of jarrah forest species in bauxite mine rehabilitation. In consultation with DEC, Alcoa will help develop guidelines for future management of rehabilitated areas.

The completion criteria require the development of a fire management protocol for the rehabilitation. This includes a plan to protect young wildfire susceptible rehabilitation and to progressively prescribe burn the rehabilitated areas to bring their fire management into line with that of the adjacent native forest.

Guidelines for management of early era rehabilitation, which is dominated by non-jarrah forest tree species, will aim to favour the re-establishment of jarrah forest species and the suppression of non-indigenous species.

## **8. Detailed Process for Sign-off**

A detailed process for obtaining a certificate of acceptance from DEC was developed in 2004 and endorsed by the MMPLG.



**Appendix 1.**

**Completion Criteria**

**For**

**Current Era Rehabilitation**

**Post 1988**

**Revised and formally accepted by the MMPLG  
15 March 2007**

# Appendix 1: Completion Criteria for 2005 onwards - Current Era Rehabilitation

Review completed and approved by MMPLG 15 March 2007

## 1. PLANNING

### 1.1 LANDUSE

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>1.1.1 Identification of Landuse</b></p> <p>Has a landuse plan been agreed with government?</p>	<p>Area meets landuse purposes or combination of purposes as outlined in the Conservation Commission's Forest Management Plan 2004-2013 (i.e. Managed for conservation, recreation, timber production, protection of quantity and quality of water resources or by other purposes prescribed by regulation). The Minister for State Development, on advice from the MMPLG, approves Five Year Mine Plans and Mining and Management Programs each year. The submission includes mining and rehabilitation programs.</p>	<p>Rehabilitation prescriptions are consistent with the designated multiple landuse objectives for the jarrah forest.</p>	<p>Area has a priority landuse and management plan agreed through the MMPLG (e.g. recreation, heritage, water resource).</p>

# Appendix 1: Completion Criteria for 2005 onwards - Current Era Rehabilitation

Review completed and approved by MMPLG 15 March 2007

## 1. PLANNING

### 1.2 EXISTING ENVIRONMENT

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>1.2.1 Dieback Mapping</b> Has the mining region been mapped for dieback?</p>	Area mapped for dieback according to procedures outlined in the Alcoa/DEC Working Arrangements.	Area mapped for dieback according to procedures outlined in the Alcoa/DEC Working Arrangements.	Dieback lines may need to be periodically re-checked.
<p><b>1.2.2 Flora and Fauna Surveys</b> Have appropriate flora and fauna surveys been completed ahead of clearing?</p>	Flora and fauna surveys have been completed and management plans proposed for any identified rare or threatened species.	Surveys completed and management plans implemented.	Management plans should be regularly reviewed.
<p><b>1.2.3 Heritage Surveys</b> Have appropriate heritage surveys been completed ahead of clearing?</p>	Heritage surveys have been completed ahead of clearing and sites identified.	Identified sites are marked in the field and avoided, if possible. If the sites cannot be avoided, permission to disturb them must be sought from the Department of Indigenous Affairs.	Identified sites should be periodically checked to ensure that they have not been disturbed.

# Appendix 1: Completion Criteria for 2005 onwards - Current Era Rehabilitation

Review completed and approved by MMPLG 15 March 2007

## 1. PLANNING

### 1.3 SUSTAINABLE GROWTH AND DEVELOPMENT

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>1.3.1 Rehabilitation Planning</b></p> <p>Has a rehabilitation plan or procedures been developed for the area?</p>	<p>Rehabilitation plans or procedures exist according to prescriptions outlined in the Alcoa/DEC Working Arrangements.</p>	<p>Prescriptions for rehabilitation planning outlined in the Alcoa/DEC Working Arrangements are implemented.</p>	<p>Prescriptions may need to be altered according to site specific requirements and/or continual improvement outcomes.</p>

# Appendix 1: Completion Criteria for 2005 onwards - Current Era Rehabilitation

Review completed and approved by MMPLG 15 March 2007

## 1. PLANNING

### 1.4 INTEGRATED LANDSCAPE

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<b>1.4.1 Visual</b> Has a landscape plan been developed for the area?	The visual aspects of mining have been considered in Mine Planning, specifically the view of mining operations from public access areas. The Minister for State Development, on advice from the MMPLG, approves on an annual basis the Mining and Management Programs (MMPs), ie Five Year Mine Plans that contain mining and rehabilitation programs.	Programs to manage visual aspects of the mining, where relevant, are included in the annual Mining and Management Programs for approval through the MMPLG.	Implementation of aesthetic programs for prescribed areas.

# Appendix 1: Completion Criteria for 2005 onwards - Current Era Rehabilitation

Review completed and approved by MMPLG 15 March 2007

## 1. PLANNING

### 1.4 INTEGRATED LANDSCAPE

Criteria and Intent*	Guidelines For Acceptance	Standard	Corrective Action
<p><b>1.4.2 Accessibility</b> Have the access requirements for the region been agreed with stakeholders?</p>	<p>Mine Access plans are reviewed annually against the Forest Access plan and agreed with DEC and the Water Corporation. Access also discussed with neighbours and local government, as appropriate, during Mining and Management Programs consultation.</p> <p>The Minister for State Development, on advice from the MMPLG, approves on an annual basis the Mining and Management Programs (MMPs), ie Five Year Mine Plans</p>	<p>Agreed access requirements are catered for in the plan.</p>	<p>Upgrade or provide access as per agreed plans.</p>

# Appendix 1: Completion Criteria for 2005 onwards - Current Era Rehabilitation

Review completed and approved by MMPLG 15 March 2007

## 1. PLANNING

### 1.5 INTEGRATED MANAGEMENT

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>1.5.1 Dieback Forest Rehabilitation (DFR)</b> Has an annual DFR program been agreed with DEC?</p>	<p>Areas within designated mining sub-region, which have been affected by dieback, may or may not receive a treatment based on an assessment checklist. Acceptance will be based on whether a proposed treatment has or has not been carried out.</p> <p>DEC provides Alcoa with an annual plan and summary of completed DFR.</p> <p>The appropriate DEC District Manager must sign record sheets that indicate DFR treatment will not be carried out in an area. These sheets must be included in the annual summary.</p>	<p>Areas within the annual plan meet the selection criteria for DFR treatment and are rehabilitated according to the prescriptions in the Alcoa/DEC Working Arrangements.</p>	<p>Areas not meeting the prescription are retreated.</p>

# Appendix 1: Completion Criteria for 2005 onwards - Current Era Rehabilitation

Review completed and approved by MMPLG 15 March 2007

## 1. PLANNING

### 1.5 INTEGRATED MANAGEMENT

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>1.5.2 Fire</b> Has a fire management plan been developed and agreed with DEC?</p>	<p>Annual and rolling five year burn plans have been prepared by DEC following consultation with Alcoa. These plans are based on updated fire risk assessments undertaken for each mining region. The plan is approved by the DEC District Manager.</p>	<p>The plan addresses the long term requirements of fire management of the region including:</p> <ul style="list-style-type: none"> <li>• Reduction of fuel level in the forest to reduce the risk of wildfire; and</li> <li>• Reduction of fire risk in the rehabilitation to allow integration with unmined forest management.</li> </ul>	<p>Burning, silvicultural treatment or flattening of understorey may be considered as outlined in the plan.</p>

# Appendix 1: Completion Criteria for 2005 onwards - Current Era Rehabilitation

Review completed and approved by MMPLG 15 March 2007

## 2. VERY EARLY (END OF MINING TO SEEDING)

### 2.1 INTEGRATED LANDSCAPE

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>2.1.1 Landform Design</b></p> <p>(a) Are the mine pit areas landscaped to blend in with the surrounding forest?</p> <p>(b) Does the maximum slope represent an erosion hazard?</p>	<p>Landform design will not cause an impediment to access for DEC's operations or be an ongoing liability.</p> <p>Self-certification by Alcoa annually and audit by DEC confirms landform design is acceptable.</p> <p>Landform design will be deemed acceptable unless DEC writes to Alcoa within three months of self-certification to advise otherwise.</p>	<p>No landscaped pit is to have a slope greater than 15 degrees for more than 20 metres unless it is on contour of the surrounding forest floor, but must always be less than 18 degrees. There are to be no cuttings or drains narrower than 3 metres, nor with a face steeper than 15 degrees (i.e. no short, steep topographical disruptions).</p>	<p>Re-landscaping or re-rehabilitation maybe required if deemed necessary during DEC audits.</p>

# Appendix 1: Completion Criteria for 2005 onwards - Current Era Rehabilitation

Review completed and approved by MMPLG 15 March 2007

## 2. VERY EARLY (END OF MINING TO SEEDING)

### 2.2 SUSTAINABLE GROWTH AND DEVELOPMENT

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>2.2.2 Rehabilitation Establishment</b></p> <p>(a) Have areas of caprock been fractured by blasting or ripping?</p> <p>(b) Is there an adequate cover of topsoil?</p> <p>(c) Does the rehabilitation have adequate ground fauna habitat?</p>	<p>All caprock should have been broken by ripping or blasting. Small areas less than 0.1 of a hectare are acceptable.</p> <p>Topsoil should be spread across the whole rehabilitated area. Areas (less than 0.5 hectares) not receiving topsoil are acceptable provided these areas do not exceed 10% of the rehabilitated area.</p> <p>Self-certification by Alcoa annually and audit by DEC confirms rehabilitation has adequate ground habitat material.</p> <p>Fauna habitat will be deemed adequate unless DEC writes to Alcoa within three months of self-certification to advise otherwise.</p>	<p>No area greater than 0.1 of a hectare has unbroken caprock.</p> <p>Topsoil is spread over a minimum of 90% of the rehabilitated area.</p> <p>Rehabilitation will include one constructed habitat per 2 hectares.</p> <p>Habitat requirements are detailed in the Alcoa/DEC Working Arrangements.</p>	<p>Areas of caprock not broken over 0.1 of a hectare must be broken and revegetated.</p> <p>Topsoil, seeding, planting and/or fertiliser to be applied to the bare areas.</p> <p>Additional fauna habitat may be added provided they do not compromise the water control on the site.</p>

# Appendix 1: Completion Criteria for 2005 onwards - Current Era Rehabilitation

Review completed and approved by MMPLG 15 March 2007

## 2. VERY EARLY (END OF MINING TO SEEDING)

### 2.2 SUSTAINABLE GROWTH AND DEVELOPMENT

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>2.2.2 Rehabilitation Establishment (cont.)</b></p> <p>(d) Has the area been deep ripped?</p>	<p>All ripping must prevent turbid surface water runoff and soil erosion.</p> <p>Ripping must be undertaken as per criteria established in Alcoa/DEC Working Arrangements.</p> <p>Self-certification by Alcoa annually and audit by DEC confirms rehabilitation ripping is acceptable.</p> <p>The ripping is deemed acceptable unless DEC writes to Alcoa within three months of self-certification to advise otherwise.</p>	<p>No uncontrolled water runoff or unacceptable soil erosion. Unacceptable erosion is that which:</p> <ul style="list-style-type: none"> <li>• Restricts access through the area by a four-wheel drive vehicle;</li> <li>• Is unstable and degrading; or</li> <li>• Will compromise landuse objectives.</li> </ul> <p>As a guideline, erosion gullies longer than 100 m should be inspected with DEC. These are identified as part of the 9 month monitoring.</p>	<p>Rehabilitated areas that do not meet the standard will be inspected by DEC and erosion control methods applied if required.</p>

# Appendix 1: Completion Criteria for 2005 onwards - Current Era Rehabilitation

Review completed and approved by MMPLG 15 March 2007

## 3. EARLY (FROM ESTABLISHMENT TO 5 YEARS)

### 3.1 SUSTAINABLE GROWTH AND DEVELOPMENT

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>3.1.1 Establishment of Overstorey</b></p> <p>Are there appropriate numbers of both jarrah and marri to meet the multiple landuses?</p>	<p>Rehabilitated areas must have a stocking rate which will meet designated landuses.</p> <p>Alcoa must submit 9-month monitoring data to DEC annually. DEC must review and advise Alcoa of acceptance or request corrective actions.</p> <p>Establishment of overstorey will be deemed acceptable unless DEC writes to Alcoa within three months of self-certification to advise otherwise.</p>	<p>The average number of stems per hectare based on 9 month establishment monitoring will meet the following standards:</p> <ul style="list-style-type: none"> <li>• Minimum: 600 eucalypt stems per hectare;</li> <li>• Minimum: 150 marri stems per hectare;</li> <li>• Maximum: 2500 eucalypt stems per hectare (with the exception of haul roads and pits less than 2 ha);</li> <li>• Target: 1300 eucalypt stems per hectare.</li> </ul> <p>Vegetation establishment monitoring is undertaken as defined in the Alcoa/DEC Working Arrangements.</p>	<p>Rehabilitated areas that do not meet the minimum standard will be inspected by DEC and planted or seeded if required.</p> <p>Rehabilitated areas that do not meet the maximum standard will be inspected by DEC and thinned to reduce tree density back to the identified acceptable range if required.</p>

# Appendix 1: Completion Criteria for 2005 onwards - Current Era Rehabilitation

Review completed and approved by MMPLG 15 March 2007

## 3. EARLY (FROM ESTABLISHMENT TO 5 YEARS)

### 3.1 SUSTAINABLE GROWTH AND DEVELOPMENT

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>3.1.2 Establishment of Understorey</b></p> <p>(a) Is there an adequate legume density?</p>	<p>Alcoa must submit 9-month monitoring data to DEC annually. DEC must review and advise Alcoa of acceptance or request corrective actions.</p> <p>Establishment of understorey will be deemed acceptable unless DEC writes to Alcoa within three months of self-certification to advise otherwise.</p>	<p>The minimum number of legumes in a rehabilitated area will be 0.5 per square metre based on 9-month establishment monitoring.</p> <p>Vegetation establishment monitoring as defined in the Alcoa/DEC Working Arrangements.</p>	<p>Rehabilitated areas that do not meet the standard will be inspected by DEC and planted or seeded if required.</p>

# Appendix 1: Completion Criteria for 2005 onwards - Current Era Rehabilitation

Review completed and approved by MMPLG 15 March 2007

## 3. EARLY (FROM ESTABLISHMENT TO 5 YEARS)

### 3.1 SUSTAINABLE GROWTH AND DEVELOPMENT

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>3.1.2 Establishment of Understorey (cont.)</b></p> <p>(b) Is there adequate plant species richness?</p>	<p>Areas to have a representative number of forest species present.</p> <p>Alcoa must submit 15-month species richness monitoring data to DEC annually. DEC must review and advise Alcoa of acceptance or request corrective actions.</p> <p>Establishment of adequate species richness will be deemed acceptable unless DEC writes to Alcoa within three months of self-certification to advise otherwise.</p>	<p>Minimum of 60% of forest controls based on 15-month monitoring.</p> <p>Monitoring at 15 months and the calculation of species richness is undertaken as defined in the Alcoa/DEC Working Arrangements.</p>	<p>Rehabilitated areas that do not meet the standard will be inspected by DEC and planted or seeded if required.</p>

# Appendix 1: Completion Criteria for 2005 onwards - Current Era Rehabilitation

Review completed and approved by MMPLG 15 March 2007

## 3. EARLY (FROM ESTABLISHMENT TO 5 YEARS)

### 3.2 RESILIENCE OF VEGETATION

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>3.2.1 Weeds</b> Is weed invasion a problem for establishment of native species in rehabilitated areas?</p>	<p>Area must not show evidence that declared weed competition is restraining sustainable development of native species.</p> <p>Alcoa must submit 9-month monitoring data to DEC annually. Alcoa must indicate where weed spraying has occurred. DEC must review and advise Alcoa of acceptance or request further corrective actions.</p> <p>Weed invasion will be deemed acceptable unless DEC writes to Alcoa within three months of self-certification to advise otherwise.</p>	<p>Perennial declared weeds &lt;50 plants per hectare based on 9 month establishment monitoring.</p> <p>Vegetation establishment monitoring is undertaken as defined in the Alcoa/DEC Working Arrangements.</p>	<p>Rehabilitated areas that do not meet the standard will be inspected by DEC and treated if required.</p>

# Appendix 1: Completion Criteria for 2005 onwards - Current Era Rehabilitation

Review completed and approved by MMPLG 15 March 2007

## 4. MID TO LATE (5-15 YEARS VEGETATION AGE)

### 4.1 RESILIENCE OF VEGETATION

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<b>4.1.1 Resilience to Fire</b>			
Does the rehabilitation have the potential to regenerate after a wildfire?	Guidelines for acceptance refer to the report: <i>"DEC/Alcoa Working Group to progress a common understanding of the Completion Criteria - rehabilitation can be integrated with forest management (2006)"</i>	The site is capable of recovering from a wildfire.	Treatments may be needed such as reseeded, planting or form pruning of areas if they do not meet the standard.

# Appendix 1: Completion Criteria for 2005 onwards - Current Era Rehabilitation

Review completed and approved by MMPLG 15 March 2007

## 4. MID TO LATE (5-15 YEARS VEGETATION AGE)

### 4.1 RESILIENCE OF VEGETATION

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>4.1.2 Dieback</b> Is there an adequate stocking of resistant native tree species?</p>	<p>A dieback resistant eucalypt species at an adequate stocking rate needs to be present.</p>	<p>100 stems/ha of marri or other resistant native tree species to be present.</p>	<p>Plant resistant species as required.</p>
<p><b>4.1.3 Insects</b> Is the area being preferentially attacked by insects? If so, is insect damage causing adverse impact on the health of the plant?</p>	<p>An assessment should be made as to the extent of any insect damage (crown or bole damage) and determine whether the rehabilitation is being selectively attacked in the region?</p>	<p>The infestation of rehabilitation by insects is no greater than in the unmined forest.</p>	<p>Carry out corrective action where a treatment is required.</p>

# Appendix 1: Completion Criteria for 2005 onwards - Current Era Rehabilitation

Review completed and approved by MMPLG 15 March 2007

## 4. MID TO LATE (5-15 YEARS VEGETATION AGE)

### 4.2 LANDUSE

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p>4.2.1 Recreation Where recreation is a priority have recreation plans been implemented?</p>	<p>The area needs to meet the requirements of any MMPLG agreed recreation management plan.</p>	<p>Recreation plan implemented.</p>	<p>Undertake prescribed work as required.</p>
<p>4.2.2 Timber Production Are there adequate numbers of both jarrah and marri to meet the timber production requirements?</p>	<p>Areas capable of producing sawlogs.</p>	<p>Each rehabilitation pit has a minimum of 300 stems of jarrah or marri per hectare with a straight bole for a minimum of 2.1 m.</p>	<p>Silvicultural treatment may be required (e.g. form pruning, planting or seeding).</p>

# Appendix 1: Completion Criteria for 2005 onwards - Current Era Rehabilitation

Review completed and approved by MMPLG 15 March 2007

## 4. MID TO LATE (5-15 YEARS VEGETATION AGE)

### 4.2 LANDUSE

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>4.2.3 Catchment Protection</b> Does the site conform to water catchment management guidelines?</p>	<p>Catchment is protected by ensuring stream water quality standards are met, stream flows are maintained and there is a stable surface. Vegetation density meets the needs of streamflow quality and quantity and designated landuses.</p>	<p>Areas will be stable with no evidence of recent erosion which would compromise stream water quality as determined by aerial photograph inspection.</p> <p>There are no areas greater than 0.5 of a hectare with less than 0.5 perennial native plants per square metre as identified from aerial photography and ground truthing.</p> <p>Turbidity monitoring is carried out according to the Water Working Arrangements.</p>	<p>Areas of 0.5 hectares or greater not stocked at the rate of 0.5 perennial native plants per square meter will be inspected with DEC and reseeded or planted if required.</p>

# Appendix 1: Completion Criteria for 2005 onwards - Current Era Rehabilitation

Review completed and approved by MMPLG 15 March 2007

## 5. REGIONAL CLOSURE

### 5.1 ACCESS AND SAFETY

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>5.1.1 Accessibility</b></p> <p>(a) Is there adequate management access to the site or region?</p> <p>(b) Have all artificial barriers and signs been removed?</p>	<p>Final access plans have been implemented according to annually reviewed plans. It is envisaged that access plan sign-off will be progressively undertaken on a forest block basis. DEC and Water Corporation provide letter to Alcoa indicating that access plan has been implemented to their satisfaction.</p> <p>The Minister for State Development, on advice from the MMPLG, approves the final decommissioning plan. The final implemented access plan will be deemed acceptable unless DEC or Water Corporation writes to Alcoa within 12 months of cessation of mining to advise otherwise.</p>	<p>The final access plan has been implemented.</p>	<p>Upgrade or provide access as per agreed plans.</p>

# Appendix 1: Completion Criteria for 2005 onwards - Current Era Rehabilitation

Review completed and approved by MMPLG 15 March 2007

## 5. REGIONAL CLOSURE

### 5.1 ACCESS AND SAFETY

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>5.1.2 Mine Infrastructure</b> Has agreement been made with Government on the use of mine infrastructure such as culverts, overpasses, underpasses, crusher sites, conveyors etc. at the cessation of mining in the area?</p>	<p>Requirements will be determined on a site by site basis. Removal of infrastructure will be outlined in decommissioning plans for each crusher region and presented to the MMPLG for approval after consultation with relevant stakeholders.</p> <p>Updates during implementation of decommissioning plan are provided to the MMPLG annually.</p>	<p>Unless agreed with Government all infrastructure will be removed and the site rehabilitated.</p> <p>Written sign-off from the Department of Industry and Resources – Mining Environment Division.</p>	<p>Gain approval from the MMPLG on appropriate use or retention of infrastructure.</p>
<p><b>5.1.3 Mine Safety</b> Are there any potential mining caused hazards to people?</p>	<p>All sites must be safe to access as determined by a Mines Safety Inspector.</p>	<p>All areas meets safety criteria and Department of Consumer and Employment Protection provides a letter to Alcoa indicating that they have met their safety obligations in the decommissioning phase.</p>	<p>All safety hazards to be removed as required.</p>

# Appendix 1: Completion Criteria for 2005 onwards - Current Era Rehabilitation

Review completed and approved by MMPLG 15 March 2007

## 5. REGIONAL CLOSURE

### 5.2 INTEGRATED MANAGEMENT

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>5.2.1 Fire</b> Does the site have the capacity to be integrated into DEC's risk management plans?</p>	<p>Fire risk management plans for the mining regions have been agreed to and/or implemented.</p>	<p>The rehabilitation is capable of being burnt in a mosaic pattern with the surrounding forest.</p> <p>A financial liability will be retained by Alcoa for areas that are too young to be completely resilient to fire (see 4.1.1). This provision would decrease over time as the rehabilitation aged and should not prevent sign-off.</p>	<p>Form pruning, silvicultural treatment or flattening of understorey to meet the fire risk management plan requirements.</p>

# Appendix 1: Completion Criteria for 2005 onwards - Current Era Rehabilitation

Review completed and approved by MMPLG 15 March 2007

## 5. REGIONAL CLOSURE

### 5.2 INTEGRATED MANAGEMENT

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>5.2.2 Dieback Forest Rehabilitation (DFR)</b>            Have DFR programs been completed in the designated mining region as per agreement with DEC?</p>	<p>Annual DFR plans have been implemented throughout the duration of mining in the region.</p> <p>Extent of requirement for DFR is agreed and implemented within three years of mining being completed in the region.</p> <p>The final DFR plan will be deemed acceptable unless DEC or Water Corporation writes to Alcoa within 36 months of cessation of mining to advise otherwise.</p>	<p>Mining envelope has been treated according to the prescriptions defined in the Alcoa/DEC Working Arrangements.</p> <p>Alcoa have received a letter from DEC indicating that their DFR responsibilities have been met.</p>	<p>Areas are given a DFR treatment.</p>

# Appendix 1: Completion Criteria for 2005 onwards - Current Era Rehabilitation

Review completed and approved by MMPLG 15 March 2007

## 5. REGIONAL CLOSURE

### 5.2 INTEGRATED MANAGEMENT

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>5.2.3 Weeds</b> Are there any declared weed problems requiring treatment?</p>	<p>Mining activities in the region has not led to a spread of weeds* in unmined forest areas.</p> <p>* Weeds are defined as perennial invasive shrub or tree species that are unwanted and threaten to invade the unmined jarrah forest.</p>	<p>Declared weed numbers meet category P4 of the Agricultural Protection Board Classification System.</p> <p>An aerial photograph is inspected to identify potential weed infestation and areas are inspected with DEC. A letter from DEC is provided to Alcoa outlining that no weed problems have been identified.</p> <p>The final weed assessment will be deemed acceptable unless DEC writes to Alcoa within 6 months to advise otherwise.</p>	<p>Spray areas not meeting standard with recommended herbicides.</p>

**Appendix 2.**

**Completion Criteria**

**For**

**Early Era Rehabilitation**

**Pre 1988**

**Formally accepted by the MMPLG  
5 June 2002**

## Appendix 2: Completion Criteria for Early Era (pre-1988) Rehabilitation

June 2002

### 1. LANDUSE

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>1.1 Identification of land-use priority</b> Have potential land uses been recognised, agreed to and catered for?</p> <ul style="list-style-type: none"> <li>• Timber production</li> <li>• Recreation</li> <li>• Water catchment</li> <li>• Conservation</li> <li>• Heritage</li> </ul>	<p>Area meets multiple landuse principles as outlined in the Department of Conservation and Land Management (CALM) Forest Management Plan. ie; State forest will be a multiple land use managed within the constraints of a harnessed catchment.</p> <p>Areas must be sustainable to meet land use, if not corrective action may be required.</p>	<p>Area meets designated landuse.</p>	<p>Site must be reviewed with CALM to determine site specific corrective actions.</p> <p>Identify treatments available to correct situation if any.</p>
<p><b>1.2 Catchment Protection</b> Does the site conform to catchment management guidelines?</p>	<p>Catchment is protected by ensuring stream water quality standards are met, and there is a stable surface. Vegetation cover meets the needs of catchment protection and designated land use.</p>	<p>Area is stable with no evidence of recent erosion that would compromise stream water quality as determined by visual inspection.</p>	<p>Site must be reviewed with CALM, Water Corporation and Water &amp; Rivers Commission to determine site specific corrective actions.</p> <p>Sites with erosion compromising stream water quality or land access will be reworked.</p>

## Appendix 2: Completion Criteria for Early Era (pre-1988) Rehabilitation

June 2002

### 1. LANDUSE

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>1.3 Timber production</b> Does the site meet the timber production requirements for its age?</p>	<p>Where timber production is a primary landuse the site is evaluated against a Rehabilitation Assessment Sheet<sup>1</sup>.</p>	<p>Site meets agreed timber production standard for its age and species using the Rehabilitation Assessment Sheet (Site score &gt; 1).</p>	<p>Sites with scores &lt;1 must be reviewed with CALM to determine site specific corrective actions based on area and risk of site degrading.</p> <p>Where re-work is planned the aim should be to re-establish more eucalypts which are endemic to the location and site.</p>
<p><b>1.4 Recreation &amp; Heritage</b> Where recreation or heritage is a priority have management plans been implemented?</p>	<p>CALM, Water &amp; Rivers Commission and Water Corporation will be consulted in the development of management plans.</p> <p>Rehabilitation meets the requirements of any agreed recreation management plans.</p>	<p>The area meets the requirements of the agreed recreation management plan.</p>	<p>Sites are reviewed with CALM, Water &amp; Rivers Commission and Water Corporation to determine any site specific corrective actions that may be required to meet the recreation management plan.</p>

<sup>1</sup> An Assessment Sheet has been developed using the Silviculture Guidelines 1/95 (selection of tree crops) as a guide (see Appendix).

## Appendix 2: Completion Criteria for Early Era (pre-1988) Rehabilitation

June 2002

### 2. SUSTAINABLE GROWTH AND DEVELOPMENT

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>2.1 Sustainability of overstorey</b></p>			
<p>(a) Do the trees have healthy crowns?</p>	<p>Sustainability is evaluated against a Rehabilitation Assessment Sheet<sup>2</sup>.</p>	<p>Adequate numbers of trees with correct canopy requirements. (Site score &gt; 1).</p>	<p>Sites with scores &lt;1 must be reviewed with CALM to determine site specific corrective actions based on area and risk of site degrading.</p>
<p>(b) Do the trees have good form?</p>	<p>Sustainability is evaluated against a Rehabilitation Assessment Sheet.</p>	<p>Adequate numbers of trees with correct form (Site score &gt; 1).</p>	<p>Sites with scores &lt;1 must be reviewed with CALM to determine site specific corrective actions based on area and risk of site degrading.</p>
<p>(c) <i>Are there an appropriate number of trees?</i></p>	<p>Rehabilitated areas have a stocking rate that meets proposed landuse.</p>	<p>An average of 350 stems per hectare to be present at 12 years.<sup>3</sup></p>	<p>Sites with less than an average of 350 stems per hectare or more than 1250 stems per hectare must be reviewed with CALM to determine site specific corrective actions based on area and risk of site degrading.</p>

<sup>2</sup> An Assessment Sheet has been developed using the Silviculture Guidelines 1/95 (selection of tree crops) as a guide (see Appendix).

<sup>3</sup> Based on information from Abbott, I., and Loneragan, O. 1986. Ecology of jarrah (*Eucalyptus marginata*) in the northern jarrah forest of Western Australia. Bulletin No. 1. Dept. of Conservation and Land Management, Perth, W.A. 60-61pp.

## Appendix 2: Completion Criteria for Early Era (pre-1988) Rehabilitation

June 2002

### 2. SUSTAINABLE GROWTH AND DEVELOPMENT

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>2.2 Sustainability of Understorey<sup>4</sup></b></p> <p>(a) Is there an adequate legume content?</p>	<p>Nutrient cycling is performing adequately as represented by healthy crowns and good form in overstorey (Site score &gt;1).</p>	<p>Observation of the adequacy of nutrient cycling. (Site score &gt;1).</p>	<p>Sites with scores &lt;1 must be reviewed with CALM to determine site specific corrective actions based on area and risk of site degrading.</p>
<p>(b) Are there any areas greater than 0.5ha without understorey?</p>	<p>Areas up to 0.5ha that do not meet the standard are acceptable provided they are not greater than 10% of the pit.</p>	<p>There are no areas greater than 0.5ha without understorey.</p>	<p>Areas of 0.5ha or greater without understorey must be reviewed with CALM to determine site specific corrective actions based on area and risk of site degrading.</p>

<sup>4</sup> Refers to areas where understorey was originally prescribed. Rehabilitation pre-1978 is timber plantation, understorey was not prescribed.

## Appendix 2: Completion Criteria for Early Era (pre-1988) Rehabilitation

June 2002

### 3. INTEGRATED LANDSCAPE

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>3.1 Landform</b> (a) Topography - does the final topography blend in with the surrounding landscape?</p>	<p>Topographical disruptions as a result of the mining operations do not restrict currently prescribed land uses.</p>	<p>The final topography will not have a slope greater than 15 degrees for more than 20 metres unless the slope is similar to the surrounding forest. There are to be no cuttings or drains narrower than 3 metres, nor with a face steeper than 15 degrees ie; no short, steep topographical disruptions.</p>	<p>Sites that do not meet the standard must be reviewed with CALM to determine site specific corrective actions.</p> <p>Where an agreed alternative land use does not meet the Landform standard, future management must be agreed on by CALM/Alcoa/Water Corporation/Water &amp; Rivers Commission eg; Langford Park recreation area.</p> <p>Typical impediments may be :</p> <ul style="list-style-type: none"> <li>• Pit faces</li> <li>• Contour banks with sharp crowns or made out of rocks</li> <li>• Deep rock pitched channels or drains</li> <li>• Sump walls</li> <li>• Haul road embankments</li> <li>• Grade banks/waterways</li> </ul>

## Appendix 2: Completion Criteria for Early Era (pre-1988) Rehabilitation

June 2002

### 3. INTEGRATED LANDSCAPE

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>3.1 Landform</b> (b) Hydrology - have in-pit sumps and other drainage structures (slots/bunds) been rehabilitated?</p>	<p>Sumps may be retained with the approval of CALM, Water &amp; Rivers Commission and Water Corporation. Sump function needs to have ceased before it is considered for rehabilitation.</p>	<p>All in-pit sumps to be rehabilitated unless agreed to be retained by CALM, Water &amp; Rivers Commission and Water Corporation.</p>	<p>Sites that do not meet the standard must be reviewed with CALM to determine site specific corrective actions.</p> <p>Some sumps may need to be removed, ripped, battered or backfilled before scarifying and seeding. Most sumps will only need to be scarified and seeded.</p>
<p><b>3.2 Accessibility</b> Does the final topography allow access for the currently prescribed land uses?</p>	<p>The final topography allows access by a four-wheel drive vehicle.</p> <p>Specific landforms may be retained for their heritage or educational values as agreed with CALM.</p>	<p>The final topography allows access by a four-wheel drive vehicle.</p>	<p>Sites that do not meet the standard must be reviewed with CALM to determine site specific corrective actions.</p>

## Appendix 2: Completion Criteria for Early Era (pre-1988) Rehabilitation

June 2002

### 3. INTEGRATED LANDSCAPE

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>3.3 Safety</b> Are there any hazards in addition to what normally occurs in the forest?</p>	<p>Site is comparable to the forest in terms of hazards.</p>	<p>In addition to meeting Landform and Accessibility criteria there must be no unsafe holes in rehabilitation caused by subsidence, root digs, trenches, exposed culverts.</p>	<p>Sites that do not meet the standard must be reviewed with CALM to determine site specific corrective actions. Man made safety hazards may need to be removed.</p>
<p><b>3.4 Visual compatibility</b> Is the area visually compatible with surrounding landform?</p> <p>If recreation has been identified as the major land use, or if the area has high visibility (eg; adjacent to Albany Highway). consideration should be given to the aesthetics of the site<sup>5</sup>.</p>	<p>Topography, landform and vegetation are compatible with surrounding landscape.</p>	<p>The rehabilitation is visually compatible with the surrounding landscape.</p>	<p>Sites that are not visually compatible must be reviewed with CALM to determine site specific corrective actions.</p> <p>Burning sub-regions will integrate rehabilitation with surrounding forest.</p> <p>Re-work of rehabilitation areas should aim to introduce provenance correct species and correct landform incompatibilities.</p>

<sup>5</sup> The Guidelines for the Classification of Visual Resource Management Public Sensitivity Levels (may, 1991) can be used as a guide to determine the level of significance for the area.

## Appendix 2: Completion Criteria for Early Era (pre-1988) Rehabilitation

June 2002

### 3. INTEGRATED LANDSCAPE

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<b>3.5 Soil Stability</b> Is the pit surface stable and resistant to erosion and slumping?	Area is stable and the surface vegetated.  There is no sign of slumping.	Pit is stable and covered with soil and plants.	Sites that do not meet the standard must be reviewed with CALM to determine site specific corrective actions. Man made hazards may need to be removed.  Areas of erosion and slumping may require treatment.

## Appendix 2: Completion Criteria for Early Era (pre-1988) Rehabilitation

June 2002

### 4. RESILIENCE OF VEGETATION

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>4.1 Dieback</b> Is there an adequate stocking of resistant tree species?</p>	Area has an adequate stocking rate of dieback resistant tree species <sup>6</sup> .	100 stems/ha of dieback resistant species to be present at 12 years.	Sites that are unacceptable must be reviewed with CALM to determine site specific corrective actions based on area and risk of site degrading. Plant resistant species as required.
<p><b>4.2 Insects and Pathogens</b> Are insects or pathogens preferentially attacking the area? If so, is damage causing significant adverse impact on the health of the plant?</p>	An assessment has been made as to the extent of any insect or pathogen damage (crown or bole damage) and determine whether the rehabilitation is being selectively attacked in the region?	No minimum standard. Level of damage within the range of what naturally occurs in the jarrah forest.	Carry out corrective action where a treatment is required.
<p><b>4.3 Weeds</b> Are there any agricultural or environmental weeds requiring treatment?</p>	Area meets the guidelines established by the Agricultural Protection Board and any CALM/Alcoa jointly agreed weeds.	Declared weed numbers meet category P4 of the Agricultural Protection Board Classification System (species specific).  Weeds do not exceed the levels occurring in jarrah forest analogues.	Sites that are unacceptable must be reviewed with CALM to determine site specific corrective actions. P4 requirements aim to prevent infestation spreading beyond existing boundaries of infestation.

<sup>6</sup> Based on information from Abbott, I., and Loneragan, O. 1986. Ecology of jarrah (*Eucalyptus marginata*) in the northern jarrah forest of Western Australia. Bulletin No. 1. Dept. of Conservation and Land Management, Perth, W.A. 60-61pp.

## Appendix 2: Completion Criteria for Early Era (pre-1988) Rehabilitation

June 2002

### 5. INTEGRATED MANAGEMENT

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>5.1 Fauna</b> Does the region have adequate fauna habitat?</p>	<p>The region has adequate habitat<sup>7</sup>.</p>	<p>Number of habitat per hectare based on regional assessment as per silviculture specification 1/95.</p>	<p>Regions that are unacceptable must be reviewed with CALM to determine corrective actions.</p> <p>CALM – Forest Products Division may consider leaving additional habitats in regions with mining rehabilitation.</p>
<p><b>5.2 Dieback Forest Rehabilitation (DFR)</b> Have DFR programs been completed in the designated mining sub-region as per agreement with CALM?</p>	<p>Areas within designated mining envelopes, which have been affected by dieback, may or may not receive a treatment based on assessment (see CALM/Alcoa Working Arrangements).</p> <p>Acceptance will be based on whether a proposed treatment has or has not been carried out.</p>	<p>Mining sub-region has been treated according to operational details.</p>	<p>Areas are given a DFR treatment.</p>

<sup>7</sup> The Criteria for Management of Fauna Habitat CALM Silvicultural specification 1/95 (Appendix 5) is used as a guide.



## Appendix 2: Completion Criteria for Early Era (pre-1988) Rehabilitation

June 2002

### 5. INTEGRATED MANAGEMENT

Criteria and Intent	Guidelines For Acceptance	Standard	Corrective Action
<p><b>5.4 Access/Roading</b> Is there adequate management access to the site or region?</p>	<p>Access plans have been agreed to and are being implemented using CALM standards for roads.</p> <p>Roads not required for ongoing access have been be rehabilitated.</p>	<p>A regional Access Plan has been implemented.</p>	<p>Upgrade or provide access as per agreed plans.</p>
<p><b>5.5 Infrastructure</b> Has agreement been made with Government on the use of mine infrastructure such as culverts, overpasses, crusher sites, gates, signs, conveyors and dams at mine closure?</p>	<p>Requirements will be determined on a site by site basis. All infrastructure has been removed unless agreed with the MMPLG.</p> <p>Non-inert waste matter generated as a result of the mining operations has been removed from catchments managed as Priority 1, to the satisfaction of the Government water catchment management agency.<sup>8</sup></p>	<p>Infrastructure has been removed and rehabilitation meets criteria or agreement has been reached to retain infrastructure.</p>	<p>Sites that are unacceptable must be reviewed with CALM to determine site specific corrective actions.</p>

<sup>8</sup> In accordance with Landfill Waste Classification and Waste Definitions, Department of Environmental Protection (1996).