

Appendix 8 Rehabilitation Management Plan and Schedule

**Alcoa of Australia
Limited**

**Rehabilitation
Management Plan and
Schedule**

**Huntly and Willowdale
Mine**



Version	Description of Changes	Date
V1	Publication of Final	20 June 2024

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Abbreviations

ABBREVIATION / TERM	DESCRIPTION
ADWG	Australian Drinking Water Guidelines (2011)
ALCOA	Alcoa of Australia Limited
BAM ACT	<i>Biosecurity and Agricultural Management Act 2007 (WA)</i>
BC ACT	<i>Biodiversity Conservation Act 2016 (WA)</i>
CCID	Completion Criteria Identification
CC WA	Completion Criteria / Working Arrangements
DAFF	Department of Agriculture, Fisheries and Forestry
DAWR	Department of Agriculture and Water Resources
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEC	Department of Conservation (now DBCA)
DFES	Department of Fire and Emergency Services
DPAW	Department of Parks and Wildlife (now DBCA)
DPIRD	Department of Primary Industries and Regional Development
DRT	Direct Return Topsoil
EP Act	<i>Environmental Protection Act 1986 (WA)</i>
EPA	Environmental Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)</i>
FMP	Fauna Management Plan
FVMP	Flora and Vegetation Management Plan
GDV	Groundwater Dependent Vegetation
ML1SA	Mineral Lease 1SA

MMP	Mining and Management Program (2023-2027 MMP)
MMPLG	Mining and Management Plan Liaison Group
OCA1	Operation Control Area (Zone 1)
OCA2	Operation Control Area (Zone 2)
RMPS	Rehabilitation Management Plan and Schedule
RPZ	Reservoir Protection Zone
UAV	Unmanned Arial Vehicle
WA	Western Australia
WAOL	Western Australian Organism List
WoNS	Weeds of National Significance
WRMP	Water Resources Management Plan

Definitions

TERM	DESCRIPTION
Activities	Refers to mining activities, and infrastructure development and sustainment.
Average pit slope	Average slope of a pit area based on Department of Land Administration (DOLA) derived slope dataset.
Baseline	Baseline data is considered to be monitoring data collected prior to any mining activities occurring. Once mining activities commence, these sites may become impact monitoring locations and the baseline data used to identify any potential impact.
Clearing for mining	Refers to Alcoa's activities after FPC harvesting – removing native vegetation from the mining area in readiness for stripping of topsoil.
Completion Criteria	Completion Criteria are agreed standards that indicate the success of rehabilitation and enable Alcoa to identify the standards to apply for handback/relinquishment. These are developed with, and approved by, the MMPLG on the advice of DBCA.
Completion Criteria Identification	A number allocated to an area of completed rehabilitation for the purposes of data collection and record keeping.
Contour ripping	The act of utilising a dozer mounted ripping tine implement to rip the ground creating windrows and furrows on contour to control surface water movement and enhance water infiltration.
Drainage event or failure of drainage	Event where surface water runoff from the mining disturbance footprint to surrounding environment except where turbidity is measured below 25 NTU.
Drainage controls	Controls to manage surface water runoff from the mining disturbance footprint to surrounding environment
Direct return topsoil	Topsoil removed from a pit that has been cleared in late spring to early summer of the same year.
Landscaping	Means the moving or shaping of land, including but not limited to — (a) resloping or altering disturbed surface topography for the purpose of shaping the landform to blend with the adjacent landscape surface; and (b) movement, placement or removal of bauxite or other material; and (c) ripping for the purpose of shaping the landform to blend with the surrounding environment;
Mining activities	All mining relations activities undertaken by Alcoa within ML1SA. This includes: <ul style="list-style-type: none"> • exploration • native vegetation clearing • topsoil and over-burden removal • pit development and operation • haul road, access road and causeway construction and operation • utilities (power, water, electricity) construction and operation

TERM	DESCRIPTION
	<ul style="list-style-type: none"> • construction and operation of Mine Facilities (for example, workshops, water treatment plants) Rehabilitation of pits and infrastructure
Mining Avoidance Zone	Spatial area which prohibits mine pits and infrastructure, with the exception of monitoring and management activities which have minimal impacts.
Open area	Areas that are cleared, not yet rehabilitated.
Other operations	Adjunct activities associated with mining, infrastructure, and rehabilitation
Pre-landscape ripping	The act of breaking ground to depth utilising a bulldozer mounted straight tine to generate material for landscaping or relieving compaction of the ground.
Post- landscape ripping (Pre-ripping)	The act of breaking ground to depth utilising a bulldozer mounted winged tine to relieve compaction of the ground
Reference	Reference data or sites are considered to be monitoring locations which are not considered to be impacted by mining activities. Reference data or sites may be used if insufficient baseline data is used.
Rehabilitation	In relation to an area that has been disturbed, includes — <ul style="list-style-type: none"> (a) stabilisation of the area; and (b) restoration of the landforms of the area to a state that is as close as practicable to their original undisturbed state; and (c) the return of the native vegetation of the area to a state that is as close as practicable to its original undisturbed state;
Rehabilitation season	Rehabilitation is undertaken all year round with a focus on the drier period for some activities. Weather dependent activities are undertaken typically from October to late April in the following year.
Stabilise	In relation to an area that has been disturbed, means carry out landscaping, ripping and other appropriate operations to prevent erosion of sediment, promote infiltration and manage surface water runoff.

1 Executive Summary

The Rehabilitation Management Plan and Schedule (RMPS) has been prepared by Alcoa of Australia Limited (Alcoa) for the Huntly and Willowdale bauxite mines located within Alcoa's Mining Lease 1SA (ML1SA). This RMPS has been developed in accordance with the Mining and Management Program (2023-2027 MMP) Approval Conditions (Western Australian Government 2023).

The RMPS specifically addresses potential impacts of rehabilitated areas to the environmental values of the surrounding forest and associated water resources, prior to handback of rehabilitation to the State. The purpose of the RMPS is to:

- Document management of rehabilitated areas to minimise impacts to environmental values.
- Demonstrate how rehabilitation is prioritised within public drinking water catchment areas through a detailed rehabilitation schedule.

The RMPS addresses management of the following environmental values:

- Surrounding forest and associated Flora and Vegetation and Fauna values.
- Water resources inclusive of water ecosystems and public drinking water areas.

The RMPS aligns with current Rehabilitation Completion Criteria (Department of State Development 2015). It should be noted that the Rehabilitation Completion Criteria is currently under revision with DBCA (as per the Mining and Management Program Approval condition 23). The RMPS will be updated as a result of this review and will further incorporate outcomes of ongoing research programs and enhancements to rehabilitation activities.

The RMPS should also be read in conjunction with Alcoa's Rehabilitation Design Manual, scheduled for submission by 31 December 2024. The purpose of the Rehabilitation Design Manual is to provide a scientific based framework outlining Alcoa's rehabilitation design process. It will provide detailed descriptions of the rehabilitation methodologies, accompanied by the associated processes and procedures. Additionally, it defines the protocols for monitoring and reporting to ensure adherence to completion criteria standards.

Executive Summary Table 1-1 presents the environmental outcomes and objectives for the rehabilitated areas to be met through implementation of the RMPS, as well as the management targets to measure achievement of the associated environmental objectives.

Table 1-1: Environmental criteria to measure achievement of environmental objectives

EMP Name	Rehabilitation Management Plan and Schedule (RMPS) WA Mining
Proponent Name	Alcoa of Australia Limited
Ministerial Statement Number	Willowdale Mine (Wagerup Refinery): <ul style="list-style-type: none"> Ministerial Statement 1157 (preceding statements: 728, 897, 1069) Huntly Mine (Kwinana and Pinjarra Refinery): <ul style="list-style-type: none"> Ministerial Statement 646
State Agreements	<ul style="list-style-type: none"> Alumina Refinery (Kwinana) Agreement Act 1961 Alumina Refinery (Wagerup) Agreement Act 1978 & Acts Amendment Act 1978 Alumina Refinery (Pinjarra) Agreement Act 1969 Alumina Refinery (Alcoa) Amendment Act 1987
Purpose of this EMP	To outline Alcoa's management processes for minimising impacts to environmental values from rehabilitated areas and how rehabilitation is prioritised within public drinking water catchment areas.
Key Environmental Factor/s, outcome/s and/or objectives	
	<p>Environmental Outcome</p> <ul style="list-style-type: none"> Manage rehabilitation areas to minimise impact to the surrounding forest and meet rehabilitation establishment trajectories. <p>Environmental Objectives</p> <ul style="list-style-type: none"> Minimise impacts to surrounding forest, flora and vegetation and fauna values from rehabilitated areas. Minimise impacts to surface water from rehabilitated areas. Minimise changes to hydrogeological regimes from rehabilitated areas. <p>Management Target/s</p> <ul style="list-style-type: none"> No significant introductions or persistence of new weed species (environmental and declared) or weed competition that restrains sustainable development of native species. No significant increase to the rate of dieback spread from rehabilitated areas to uninfested rehabilitation or forest. Rehabilitated areas support ecological values (flora, vegetation and fauna) No significant impact to surface water values as a result of an increase in turbidity from erosion from rehabilitated areas. No significant impact to groundwater values as a result of hydrogeological regime changes from rehabilitated areas.

2 Context, Scope and Rationale

The Rehabilitation Management Plan and Schedule (RMPS) has been prepared to outline Alcoa's management processes for minimising rehabilitation impacts to environmental values, at the Huntly and Willowdale bauxite mines, located within Alcoa's Mining Lease 1SA (ML1SA). The scope of the RMPS applies to rehabilitated areas once rehabilitation activities have ceased and prior to handback.

The RMPS specifically addresses the risks and potential impacts of rehabilitated areas to the environmental values of the surrounding forest and associated water resources, prior to handback of rehabilitation to the State. The purpose of the RMPS is to:

- Document management of rehabilitated areas to minimise impacts to environmental values
- Demonstrate how rehabilitation is prioritised within public drinking water catchment areas through a detailed rehabilitation schedule

The RMPS outlines the monitoring and management processes ensuring that Alcoa meets Completion Criteria outcomes in preparation of Rehabilitation Handback. This RMPS aligns with current Rehabilitation Completion Criteria (Department of State Development 2015). It should be noted that the Rehabilitation Completion Criteria is currently under revision with DBCA (as per the Mining and Management Program Approval condition 23). The RMPS will be updated as a result of this review and will further incorporate outcomes of ongoing research programs and enhancements to rehabilitation activities.

The RMPS has been developed, in accordance with the:

- Final Mining and Management Program (MMP) 2023-2027 (Alcoa 2023) and Associated Approval Conditions (Western Australian Government 2023)
 - Alcoa's bauxite mine rehabilitation program – completion criteria and overview of area certification process – 2015 revision (Department of State Development 2015)
 - Alcoa / DEC (DBCA) working arrangements bauxite mining operations 2011-2015 (Alcoa 2011)
 - Technical guidance flora and vegetation surveys for Environmental Impact Assessment (EPA 2016)
- Instructions: How to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans (EPA 2024).

It should be noted that risks, controls, and potential impacts associated with rehabilitation execution activities, including, but not limited to, planning, scheduling, landscaping, soil return, contour ripping, seeding, planting, and fertilising are detailed in the following documents:

- Rehabilitation Schedule (Appendix A)
- Rehabilitation Design Manual (under development as per MMP approval condition 26(c).
- Completion Criteria and Overview of Area Certification Process 2015 Revision (Department of State Development 2015)
- Alcoa / DEC (DBCA) Working Arrangements Bauxite Mining Operations 2011-2015 (Alcoa 2011)
- Technical Guidance Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016)
- Drainage Design Manual (under development as per MMP approval condition 26(b)
- Drainage Control Management plans and any conceptual rehabilitation designs
- Fauna Management Plan (V0) (Alcoa 2023)
- Water Resources Management Plan (Draft) (Alcoa 2023)
- Flora and Vegetation Management Plan (V0) (Alcoa 2023)
- Recreational Trails and Facilities Management Plan (V1) (Alcoa 2023)

2.1 Huntly and Willowdale Mine Regions

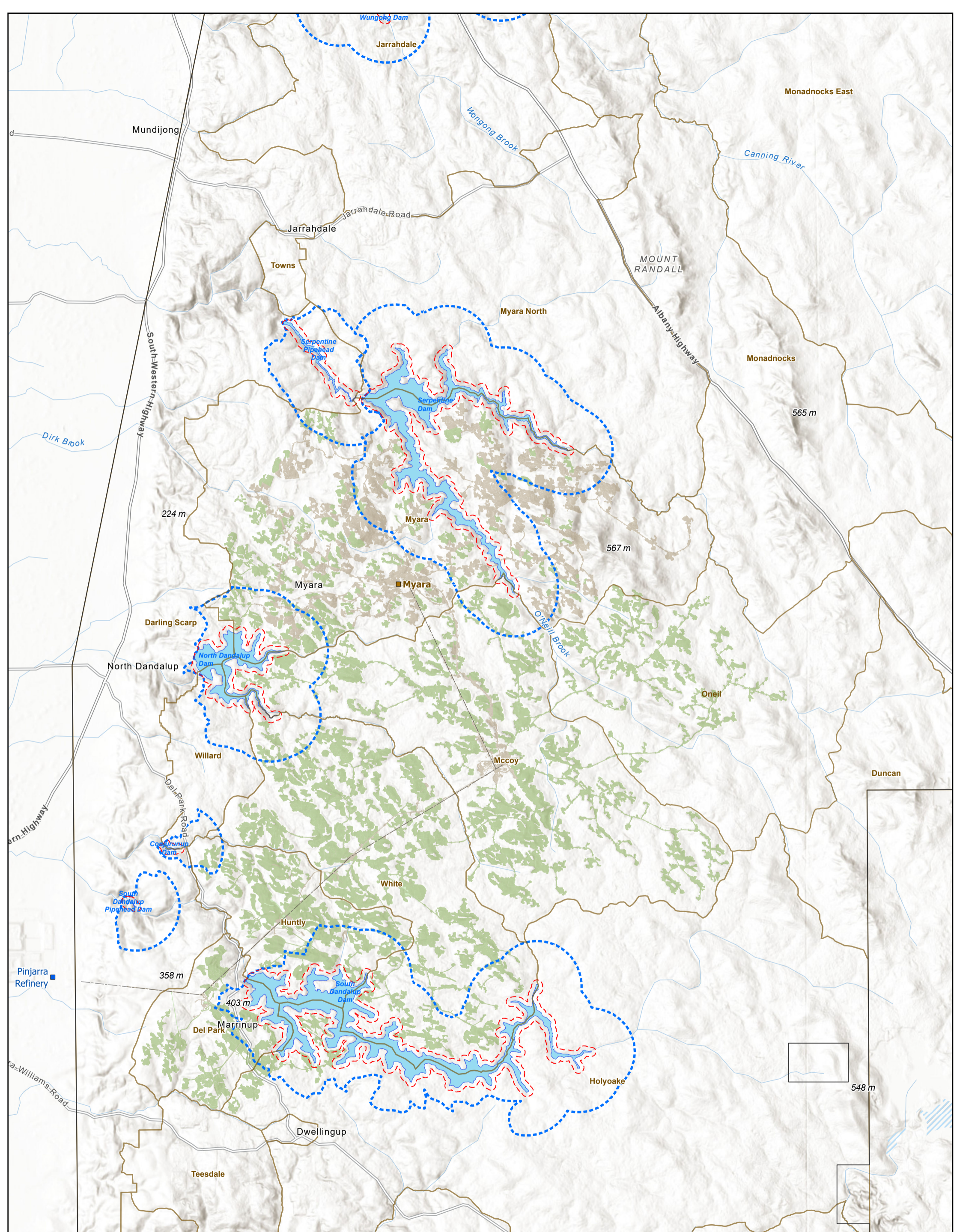
Alcoa's Western Australian (WA) mining operation is comprised of the Huntly and Willowdale mines, located within ML1SA. To the north of the Huntly mine (Myara North Region) lies the former Jarrahdale mine, which operated from 1963 – 1998 and is now closed and rehabilitated.

Huntly Mine

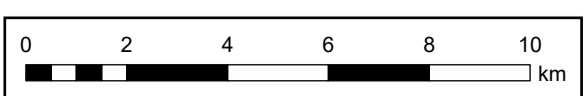
The Huntly mine (Figure 2-1) is primarily located within the Shire of Serpentine Jarrahdale and the Shire of Murray and extends from Dwellingup in the south to Jarrahdale in the north. The mine lies within Dwellingup and Jarrahdale State Forest and is broadly bordered by Serpentine National Park and the Darling Scarp to the west, the Monadnocks Conservation Park and Albany Highway to the east, Dwellingup and Pinjarra-Williams Road to the south and the former Jarrahdale Mine to the north. The mine supplies bauxite to the Kwinana and Pinjarra alumina refineries and has been in operation since 1972 over six mine regions (Del Park, Huntly 1 & 2, White, McCoy, O'Neil and Myara), with a further two regions proposed (Myara North and Holyoake) (Figure 2-1).

Willowdale Mine

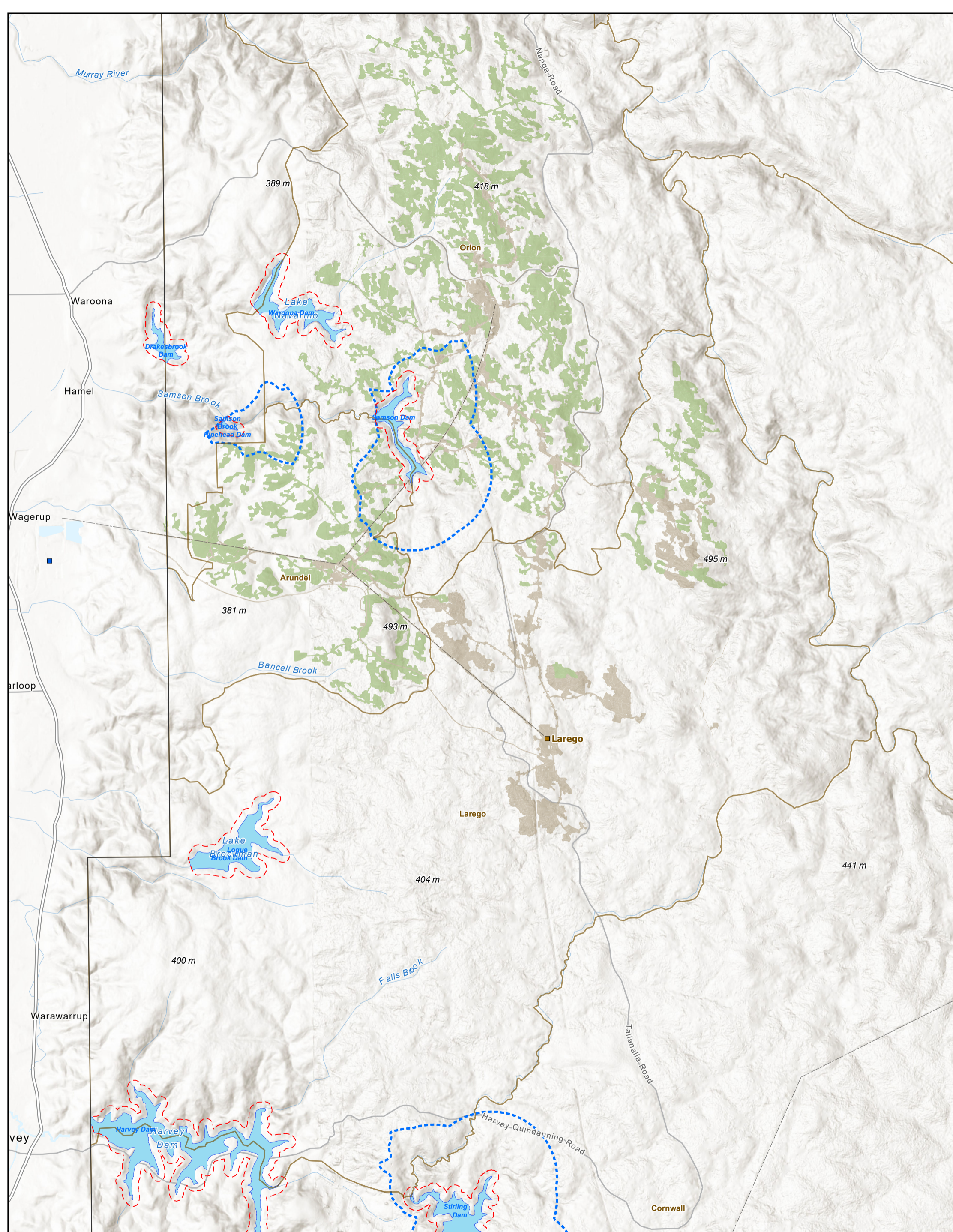
The Willowdale mine (Figure 2-2) is located within the Shire of Waroona and the Shire of Harvey and is broadly bordered by Lane Pool Reserve in the east and north-east, the Darling Scarp to the west and Harvey Dam and surrounding rural land to the south-east. The mine predominantly lies within Dwellingup State Forest and Lane Pool Reserve. The mine supplies bauxite to the Wagerup Alumina Refinery and has been in operation since 1984 and is comprised of three mine regions (Arundel, Orion and Larego) (Figure 2-2).



- MLISA
- Regions
- Reservoir Protection Zone (RPZ)
- Rehabilitation
- Cleared Areas
- OCA1 Top Water Line 200m Buffer



Fauna Management Plan	
Figure 2-1: Huntly Mine Overview	
Scale: 1:150,000	Date Printed: 18/06/2024



- MLISA
- Regions
- Reservoir Protection Zone (RPZ)
- Rehabilitation
- Cleared Areas
- OCA1 Top Water Line 200m Buffer



Fauna Management Plan	
Figure 2-2: Willowdale Mine Overview	
Scale: 1:100,000	Date Printed: 18/06/2024

2.2 Rehabilitation Overview

Alcoa's rehabilitation objective is to establish and return to the State a self-sustaining Jarrah Forest ecosystem that meets agreed forest values that will support similar management practices as employed in the surrounding Northern Jarrah Forest.

Rehabilitation activities consist of:

- Soil Stripping and storage
- Pre-landscaping ripping
- Landscaping
- Post-landscaping ripping
- Soil Return
- Fauna Habitat Return
- Contour Ripping
- Seeding and Planting, and
- Fertilising

Further information on rehabilitation activities is summarised in Appendix A.

2.2.1 Historical Rehabilitation Performance (Quantity)

Alcoa's operations have a total disturbance footprint of approximately 28,000ha, of which approximately 22,500ha has been rehabilitated (earthworks completed, area has received topsoil and seed, and revegetation in various ages of regrowth).

For the Huntly, Willowdale and Jarrahdale mines, approximately 77%, 75% & 100% have been rehabilitated respectively. At the Jarrahdale mine 1,355 ha has received a 'certificate of acceptance' from the landholder (DBCA), a precursory requirement for mine lease relinquishment.

Alcoa's native vegetation clearing to date, total rehabilitated areas and total cleared land un-rehabilitated (open area) are summarised in Table 2-1 and displayed in Figure 2-3 and Figure 2-4.

Table 2-1: Rehabilitation extents for Huntly, Willowdale and Jarrahdale mines (to June 2023)

Land area category	Huntly	Willowdale	Jarrahdale
Total area of native vegetation clearing to date (ha) ¹	17,416	6,728	4,030
Total area of completed rehabilitation (ha) ²	13,418	5,041	4,030
Total area of vegetation clearing un-rehabilitated open area (ha)	3,998	1,687	0
Total area of rehabilitation handed back (completion criteria met) (ha)	0	0	1355
Total area of rehabilitation yet to be submitted to MMPLG for assessment (ha)	13,418	5,041	2,675

Further information on the rehabilitation age and relevant completion criteria are detailed in Table 2-2 and Table 2-3 respectively.

Table 2-2: Rehabilitation age for Huntly, Willowdale and Jarrahdale mines (to June 2023)

Rehabilitation Age	Huntly	Willowdale	Jarrahdale
< 1 year	271	182	

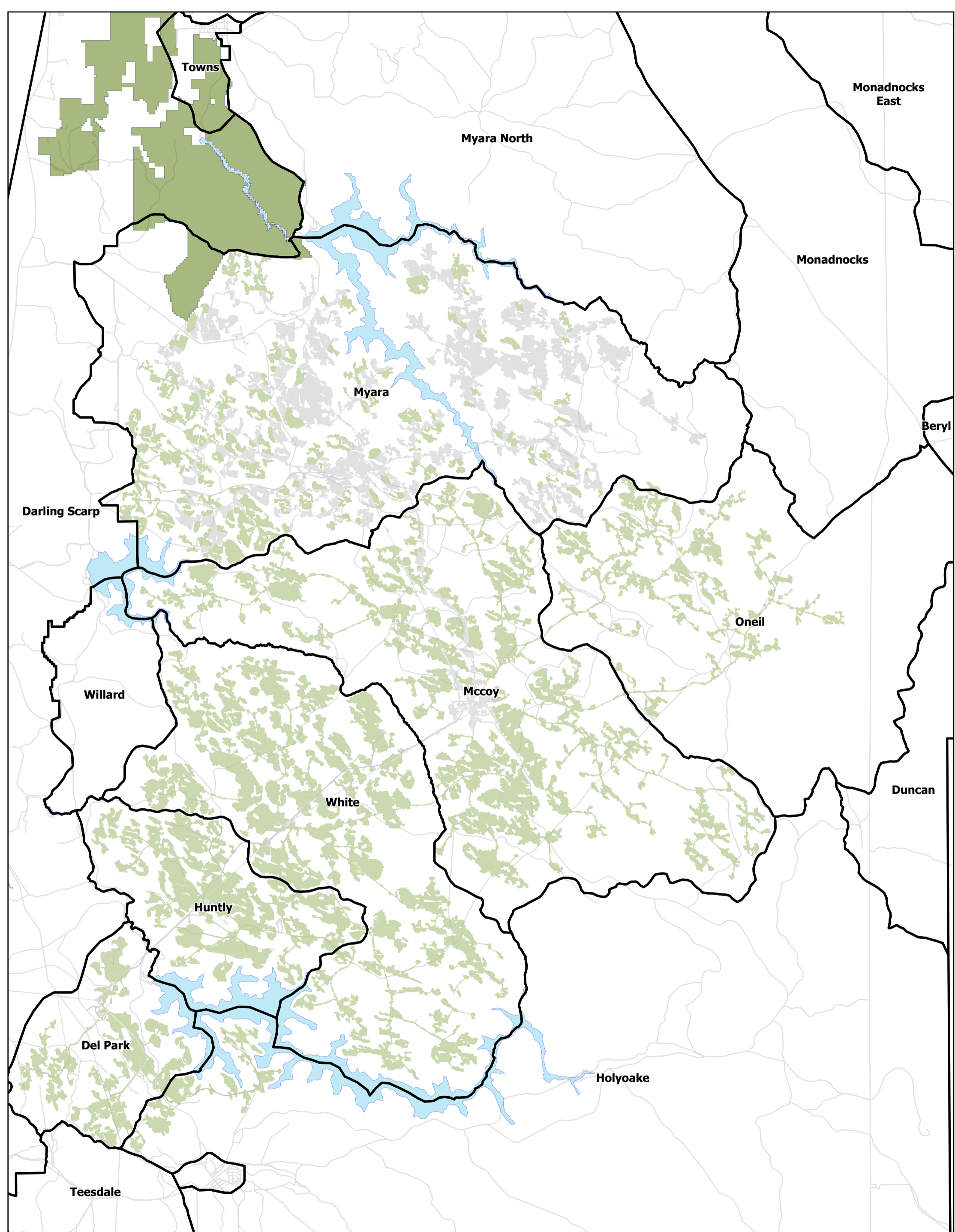
¹ cleared land is defined as having been logged and understorey debris removed in readiness for stripping of topsoil.

² rehabilitated land is defined as having been topsoiled and contour ripped and seeded

Rehabilitation Age	Huntly	Willowdale	Jarrahdale
1 – 2 years	746	344	
3 – 8 years	2,293	796	
9 -14 years	2,687	965	
15 – 18 years	1,580	672	
19 – 34 years	3,904	1,911	2,193
35+	1,937	170	1,838
Total	13,418	5,041	4,030

Table 2-3: Rehabilitation age by Completion Criteria for Huntly, Willowdale and Jarrahdale mines (to June 2023)

Rehabilitation Age by Completion Criteria	Huntly	Willowdale	Jarrahdale
Completion Criteria 1966 to 1987			
35+	1,768	100	1,706
Total	1,768	100	1,706
Completion Criteria 1988 to 2004			
19 – 34 years	3,553	1,770	2,193
35+	169	70	132
Total	3,722	1,840	2,324
Completion Criteria 2005 to 2015			
9 -14 years	2,687	965	-
15 – 18 years	1,580	672	-
19 – 34 years	351	142	-
35+	-	-	-
Total	4,617	1,779	-
Completion Criteria 2016 Onwards			
< 1 year	271	182	-
1 – 2 years	746	344	-
3 – 8 years	2,293	796	-
Total	3,311	1,322	-



Legend

- Rehabilitation
- Cleared Areas
- National Parks
- Major Dams
- Mining Regions

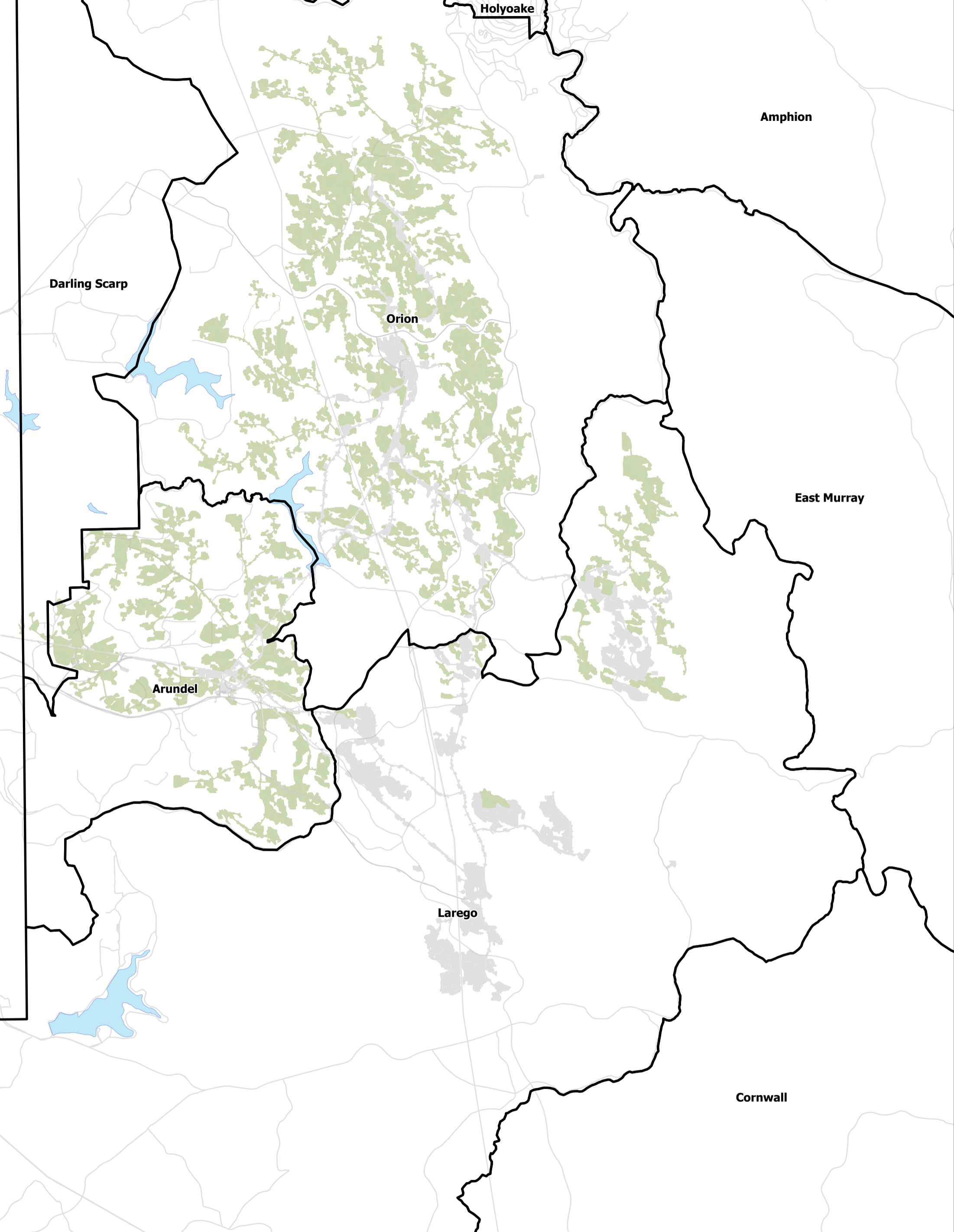


2023 – 2027 Mining and Management Plan

Figure 2-3 Rehabilitation and Open areas
–Huntly

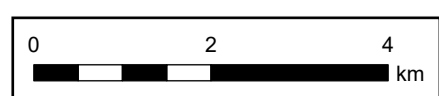
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Date Printed: 30/10/2023



Legend

- Rehabilitation
- Cleared Areas
- Mining Regions
- Major Dams



2023 – 2027 Mining and Management Plan

Figure 2-4: Rehabilitation and Open areas
–Willowdale

Scale: 1:85,380	Date Printed: 1/11/2023
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2.2.2 Current Rehabilitation Planning

Alcoa undertakes progressive rehabilitation throughout its Huntly and Willowdale operations as areas become available, actively reducing its open footprint.

In conjunction with mine planning processes, Alcoa completes a review of its rehabilitation plan on an annual basis. The review includes but is not limited to:

- Execution team capacity.
- Alcoa's mining and clearing plans reviewed in context to the requirements of the rehabilitation plan.
- Seed and plant supply requirements.
- Prioritising rehabilitation within public drinking water catchment areas.
- Ensuring delivery meets Completion Criteria.
- Ensuring an increase in rehabilitated area is delivered annually, with 3,159ha executed over the period of 2024 to 2027.
- Review over-achievement / under-achievement of the previous annual targets and update the targets for future years.

As shown in Figure 2-5 below, the Five-Year Schedule forecasts quantities which feeds into the 36-month Rehabilitation Schedule, whereas the 36-Month Schedule incorporates the actual pits which are planned to be rehabilitated. Finally, an Annual Rehabilitation Plan is developed for implementation.

The current Five Year and 36 Month Rehabilitation Schedules are contained in Appendix B and will be included in future MMP submissions. The Rehabilitation Schedule will improve transparency and decrease open areas.

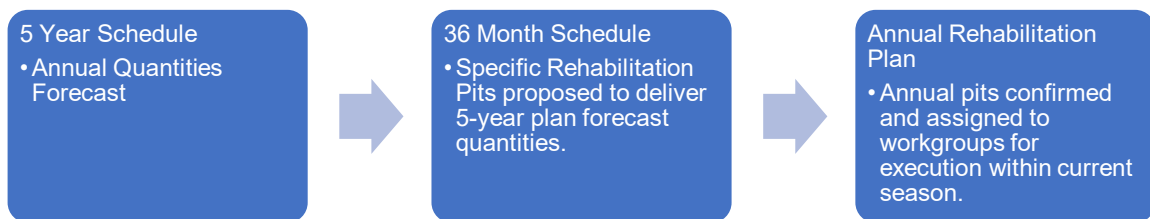


Figure 2-5: Rehabilitation Schedule Details

2.2.3 Rehabilitation Performance (Quality)

Alcoa's rehabilitation performance is measured against Completion Criteria. This is the agreed standards with DBCA and provides performance metrics that indicate the success of rehabilitation towards a goal of relinquishment of land back to the State and cessation of a proponent's liability and management requirements.

Alcoa's current rehabilitation monitoring framework assesses rehabilitation performance against Completion Criteria throughout the various stages of mine site rehabilitation - ranging from planning, rehabilitation execution and then passing through different levels of ecosystem development. An overview of the rehabilitation process, monitoring and adaptive management timeline is depicted in Figure 2-6 below and detailed within Appendix A.

Through ongoing monitoring and research, Alcoa continues to strive for continuous improvement of our rehabilitation to restore a self-sustaining Jarrah Forest ecosystem.

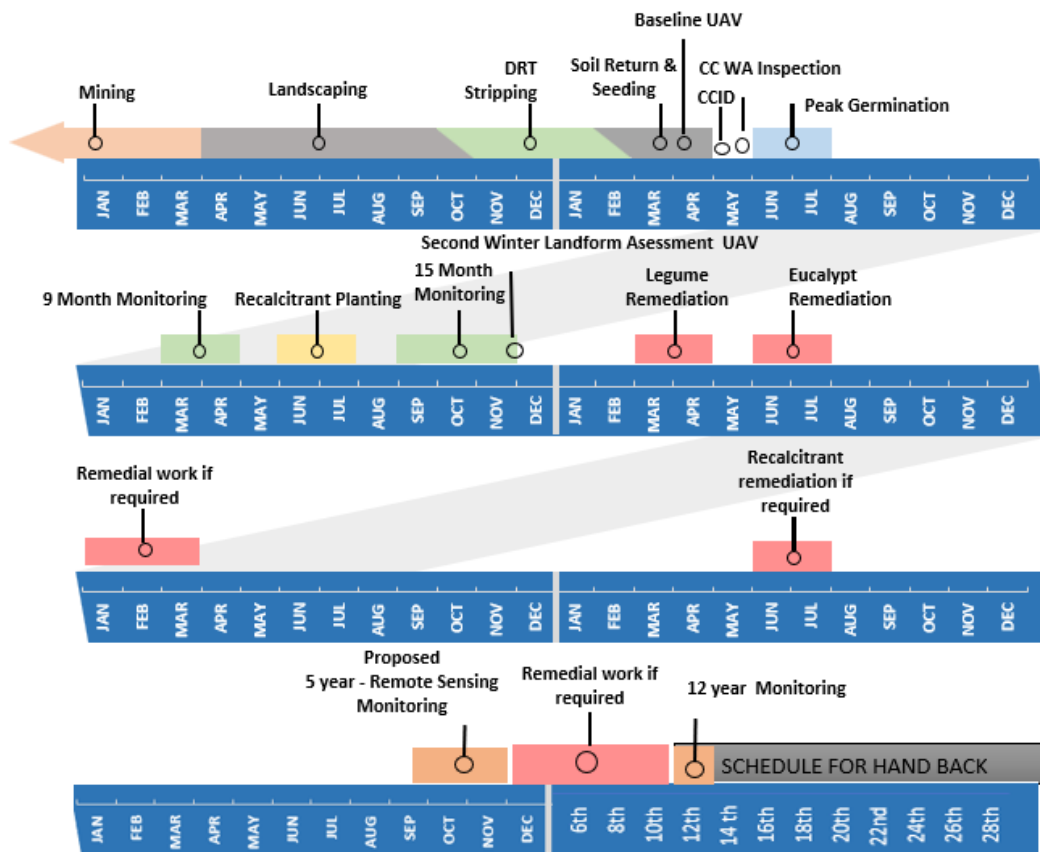


Figure 2-6: Rehabilitation Monitoring Timeline

2.2.4 Mitigation and Remediation Activities

Mitigation and remediation activities are planned and executed where rehabilitation has not performed as expected, is not on a trajectory to meet Completion Criteria or poses a risk to the surrounding forest values. These activities may be conducted in any age of rehabilitation to ensure Alcoa meets the relevant Completion Criteria Standards of that era and minimises any potential impact to the surrounding forest. These activities are identified through field inspections and other monitoring activities.

Where a rehabilitation concern is identified as a risk to the surrounding forest and / or associated catchment, immediate temporary controls (ITC) are implemented to ensure that the risk is negated or minimised, and remediation prioritised. Risks identified within rehabilitation boundaries that do not pose a risk to the surrounding forest and associated catchments are scheduled secondary to the prioritised ITC activities.

Any detection of non-conformance with the performance metrics and targets is reported, investigated and corrective actions implemented via Alcoa's incident reporting system. This process ensures that there is continuous improvement in rehabilitation practice.

Corrective actions may include the following remediation works:

- Additional planting and seeding to correct plant species richness and stem density.
- Additional earthworks and/or seeding and planting to correct landform instability (high slope, bare areas, water collection points, subsidence, erosion and sedimentation).
- Additional earthworks to correct aesthetics or remove surface impediments (landscape integration, rocks on the surface preventing fire vehicle access).
- Complete remediation of the area to correct inadequate pit floor ripping, inadequate soil profile thickness and / or poor contour ripping.
- Remediation of fire breaks after wildfire

Remediation is always completed using the smallest earthmoving machinery and resources possible to minimise disturbance to surrounding establishing rehabilitation.

2.3 Key Environmental Factors

This RMPS has been developed to manage and maintain the key environmental values, detailed in Table 2-4, associated with Alcoa's rehabilitated areas, the surrounding forest and associated catchments.

Table 2-4: Key environmental values, potential impacts and potential pathways as addressed in this RMPS

Environmental Value	Pathways	Potential Impacts (direct/indirect)
Flora and Vegetation <ul style="list-style-type: none"> • Surrounding forest 	<ul style="list-style-type: none"> • Introduced weed species / spread • Dieback disease (and other disease) • Altered hydrological regimes – ground and surface water • Sediment movement • Altered accessibility to rehabilitation and / or forest 	<ul style="list-style-type: none"> • Loss of biodiversity • Decline in health and / or change in habitat composition • Increased exposed / bare areas • Delayed vegetation growth • Increased weed presence • Reduction of dieback free forest • Increased rate of dieback spread • Erosion of the rehabilitation or forest floor
Fauna <ul style="list-style-type: none"> • Surrounding forest 	<ul style="list-style-type: none"> • Introduced weed species / spread • Dieback disease • Altered hydrological regimes – ground and surface water • Sediment movement • Altered accessibility to rehabilitation and / or forest 	<ul style="list-style-type: none"> • Loss of biodiversity • Loss of habitat • Decline in health or availability of forage/food • Reduced or increased ground or surface water impacting fauna drinking sites
Water <ul style="list-style-type: none"> • Public Drinking Water Source Areas • Non-Public Drinking Water Source Areas • Streams • Reservoirs Surface water <ul style="list-style-type: none"> • Surrounding forest Groundwater <ul style="list-style-type: none"> • Surrounding forest 	<ul style="list-style-type: none"> • Inadequate establishment of flora and vegetation in rehabilitation • Surface water movement into rehabilitation, forest or streams / reservoirs • Erosion to the rehabilitation or forest floor • Sediment deposition in rehabilitation or forest or stream / reservoir 	<ul style="list-style-type: none"> • Change in hydrological/hydrogeological regimes • Change in stream flow and / or levels • Change in available water to the reservoirs • Sediment deposition in rehabilitation or forest • Increased turbidity in streams and reservoirs • Increased rate of dieback spread to uninfested areas

2.4 Condition Requirements

2.4.1 Mining and Management Program (2023-2027 MMP) Conditions

Alcoa must comply with the following Ministerial Approval Conditions (Western Australian Government 2023) documented in Table 2-5. These conditions relate specifically to rehabilitation and have been summarised.

Table 2-5: MMP Conditions/Commitments

#	Condition/Commitments
Overarching conditions and Interpretation	
1	<p>In this document, subject to the context:</p> <p>"rehabilitation", in relation to an area that has been disturbed, includes -</p> <ul style="list-style-type: none"> (a) stabilisation of an area; and (b) restoration of the landforms of the area to a state that is as close as practicable to their original undisturbed state; and (c) the return of the native vegetation of the area to a state that is as close as practicable to its original undisturbed state; <p>"stabilise", in relation to an area that has been disturbed, means carry out landscaping, ripping and other appropriate operations to prevent erosion of sediment, promote infiltration and manage surface water runoff, and</p> <p>"stabilisation" has a corresponding meaning;</p> <p>In complying with the following conditions, Alcoa shall ensure compliance by its officers, employees, contractors, subcontractors and agents.</p>
4	<p>Any clearing, exploration, mining or other operations permitted by this MMP approval must be implemented by Alcoa to meet the following environmental objectives:</p> <ul style="list-style-type: none"> a) avoiding or otherwise minimising clearing within 50 metres of Black Cockatoo nesting trees; and b) avoiding or otherwise minimising discharge of environmentally hazardous material outside of containment infrastructure. <p>- If:</p> <ul style="list-style-type: none"> c) clearing within 50 metres of Black Cockatoo nesting trees; and/or d) discharges of environmentally hazardous material outside of containment infrastructure, <p>cannot be avoided, Alcoa must provide, to the satisfaction of the State Development Minister, a written report explaining why the relevant avoidance cannot be met prior to the clearing being undertaken.</p>
Operational restrictions	
5	<p>Alcoa must not undertake any clearing, exploration, mining or other operations:</p> <ul style="list-style-type: none"> a) within 1km of the top water level of any water reservoir; or b) within the Serpentine Pipehead Dam Catchment; c) in any area with an average slope greater than 16% within the Reservoir Protection Zone of any water reservoir; or d) within 10 metres of any Black Cockatoo nesting trees or Black Cockatoo significant trees.
6	<p>Condition 5 does not apply to:</p> <ul style="list-style-type: none"> a) stabilisation or rehabilitation activities; or b) environmental monitoring activities; or c) use and maintenance of existing infrastructure; or d) modification of existing road infrastructure with the written consent of the State Development Minister; or e) construction of drainage control infrastructure; or f) mining within 1 kilometre of the top water level of any water reservoir in Myara Central and Myara South carried out before 30 June 2024.
7	<p>If any activity described in paragraphs (b) – (f) of condition 6 is undertaken, the disturbance must be stabilised either within 12 months of the relevant activity ceasing, or within the first available rehabilitation season, whichever is earliest.</p> <p>Alcoa must implement drainage controls in the affected area until the area is stabilised.</p>
Management Plans	
From the date of the MMP approval:	

#	Condition/Commitments
15	<p>Alcoa must prepare the management plans referred to below and submit them to the State Development Minister for approval within the timeframes outlined in condition 17 and where relevant, in accordance with Environmental Protection Authority's Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans (EPA, 2021):</p> <ul style="list-style-type: none"> a) Rehabilitation Schedule and Management Plan that: <ul style="list-style-type: none"> i. initially satisfies the requirements of condition 17(b), and then as part of any subsequent MMP submission; ii. demonstrates that condition 7 has been complied with; iii. includes a detailed rolling 5 yearly stabilisation/rehabilitation schedule that meets completion criteria and demonstrates an increase each consecutive year in the area (ha) in which stabilisation and rehabilitation activities are being undertaken over the next 4 years, achieving a minimum of 3,159 ha of rehabilitation (cumulative) over this period (2024-2027); and iv. demonstrates that Alcoa is prioritising rehabilitation within public drinking water catchment areas.
17	<p>Alcoa must submit the management plans to the State Development Minister within the following time periods, or such other time period should the State Development Minister determine, following a request from Alcoa:</p> <ul style="list-style-type: none"> b) Rehabilitation Schedule and Management Plan, by 30 June 2024;
18	<p>The management plans required under condition 17 must contain evidence to demonstrate compliance with relevant Operational restrictions and Clearing restrictions conditions, and must also include:</p> <ul style="list-style-type: none"> a) threshold criteria and trigger criteria that are relevant to the environmental impacts that the plans are mitigating and managing; b) monitoring parameters, sites, control/reference sites, methodology, timing and frequencies, which will be used to measure threshold criteria and trigger criteria; c) methodology for determining alternate monitoring sites as a contingency if proposed sites are not suitable in the future; d) data collection and analysis methodologies; e) adaptive management methodology; f) contingency measures which will be implemented if threshold criteria or trigger criteria are not met; and g) reporting requirements.
19	<p>The management plans required under condition 17 must, also contain provisions which demonstrate whether conditions 4 (a) and (b) and relevant Operational restrictions and Clearing restrictions conditions are reasonably likely to be met, and must also include:</p> <ul style="list-style-type: none"> a) management actions; b) management targets; c) contingency measures if management targets are not met; and d) reporting requirements.
20	<p>Upon submission of each management plan, Alcoa must to the extent practicable:</p> <ul style="list-style-type: none"> a) implement the submitted management plan(s) until receiving notice from the State Development Minister confirming that the management plan(s) satisfies the relevant requirements (i.e. is approved); and b) following approval by the State Development Minister, implement the most recently approved version of the management plan.
21	<p>Alcoa:</p> <ul style="list-style-type: none"> a) may review, revise and re-submit to the State Development Minister any management plan listed in condition 17 at any time provided it meets the relevant requirements of that management plan, including any consultation that may be required when preparing the management plan; and b) must review and revise any management plan listed in condition 17 and ensure it meets the relevant requirements of that management plan, including any consultation that may be required when preparing the management plan, as and when directed by the State Development Minister.
22	<p>Approved management plans, and any revised management plans, must be published on Alcoa's website and provided to the State Development Minister in electronic form suitable for on-line publication</p>

#	Condition/Commitments
	within twenty (21) business days of being implemented, or being required to be implemented (whichever is earlier).
23	Rehabilitation Completion Criteria Alcoa will consult with the DBCA in the drafting of a revised set of Rehabilitation Completion Criteria and once agreed, provide these to the State Development Minister by 31 December 2024.
Public Availability of Data	
38	Alcoa must make the following documents publicly available on its Website: <ul style="list-style-type: none"> b) any Management Plan required in accordance with Conditions 13-17 within twenty (21) business days of being implemented, or being required to be implemented (whichever is earlier);

2.4.2 Alcoa's Bauxite Mine Rehabilitation Program – Completion Criteria and Overview of Area Certification Process (2015 Revision)

Alcoa's Wagerup Ministerial Statement 728 (2006) defines the requirements for development of completion criteria for rehabilitation and the delegated responsibility for the development of the completion criteria program to the Mining and Management Program Liaison Group (MMPLG). The condition requires:

- Public consultation prior to finalisation of the Rehabilitation Completion Criteria;
- Public access to the Completion Criteria upon finalisation;
- Regular 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 now DBCA) on behalf of the State.

The Rehabilitation Completion Criteria identifies the standards that post mining rehabilitation must meet to ensure that landforms are stable and self-sustaining. Once Completion Criteria for the mining area are met, Alcoa may then apply to hand over ownership of the land to the State Government. Rehabilitated areas are assessed against the Completion Criteria applicable at the time the rehabilitated area was initially seeded/planted.

The completion criteria for different periods are:

- Completion criteria for early era (pre-1988) (Department of Industry and Resources 2007).
- Rehabilitation Completion Criteria for 1988-2004 (Department of Industry and Resources 2007).
- Rehabilitation Completion Criteria for 2005-2014 (Department of Industry and Resources 2007).
- Rehabilitation Completion Criteria for 2016 Onwards (as shown in Table 2-6) (Department of State Development 2015).

Table 2-6: Relevant Rehabilitation Completion Criteria for 2016 onwards (Department of State Development 2015)

Criteria & Intent	Guidelines for acceptance	Standard
2. Rehabilitation Earthworks		
2.1 Integrated Landscape		
<p>2.1.1 Landscape Design The mine pit areas are landscaped to be stable and to blend with the surrounding forest</p>	<p>Landscaping must be completed to ensure effective surface water management. Landscape design will not cause an impediment to access for Parks and Wildlife's operations or be an ongoing financial or management liability. Self-certification by Alcoa annually and/or inspection by Parks and Wildlife confirm landscape design is acceptable. Landform design that meets the standard will be deemed acceptable unless Parks and Wildlife writes to Alcoa within three months of self-certification to advise otherwise.</p>	<p>Slopes must always be less than 18 degrees.</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.</p>
2.2 Sustainable Growth and Development		
<p>2.2.1 Rehabilitation establishment (a) Waste islands will be effectively rehabilitated</p>	<p>Waste islands will have caprock shattered and topsoil spread and scarified to prevent impeding vehicular or rubber tyred machine for fire access.</p>	<p>No area greater than 0.1 of a hectare has unbroken caprock. Trafficability to agreed Alcoa/Parks and Wildlife Working Arrangements (Alcoa 2011).</p>
<p>(b) There is an adequate cover of topsoil across the rehabilitated area.</p>	<p>Topsoil return and coverage is uniform within each individual rehabilitated pit.</p>	<p>Direct return (or agreed surrogates) topsoil is spread over the rehabilitated area. No area >0.1 ha has no topsoil coverage. The cumulative area without topsoil does not exceed 10% of the rehabilitated pit.</p>
<p>(c) The rehabilitated area has adequate ground fauna cover</p>	<p>Self-certification by Alcoa annually and inspection by Parks and Wildlife confirms rehabilitation has adequate ground habitat material.</p>	<p>(c) Rehabilitation will include one constructed habitat per 2 hectares.</p>

Criteria & Intent	Guidelines for acceptance	Standard
(d) The area has been contour ripped.	Ripping must be undertaken as per criteria established in Alcoa/Parks and Wildlife Working arrangements (Alcoa 2011). Self-certification by Alcoa annually and inspection by Parks and Wildlife (where applicable) confirms rehabilitation ripping is acceptable. Ripping that meets the standard is deemed acceptable unless Parks and Wildlife writes to Alcoa within three months of self-certification to advise otherwise. Ripping does not prevent access for fire line construction by front end loader	No uncontrolled water runoff or unacceptable soil erosion in or adjoining the pit. Unacceptable erosion is that which: <ul style="list-style-type: none"> - restricts access through the area by 4-wheel drive vehicles - is unstable and degrading, or - will compromise landuse objectives. Gully erosion will not exceed: <ul style="list-style-type: none"> - 30cm depth and - 30cm width, and - 100m in length - areas of unintended deposition >0.1 ha These areas will be identified as part of 9-month monitoring
(e) The pit floor has been ripped.	Ripping must be undertaken as per criteria established in Alcoa/Parks and Wildlife Working arrangements (Alcoa 2011). Self-certification by Alcoa annually and inspection by Parks and Wildlife (where applicable) confirms pit floor ripping is acceptable.	Pre-rip to be undertaken in accordance with Alcoa/Parks and Wildlife Working arrangements (Alcoa 2011). Rip compacted pit floor to at least 1.2 m, excluding batters and waste islands.
2.3 Catchment Protection		
2.3.1 Catchment Protection Rehabilitated areas conform to water catchment management guidelines.	Rehabilitated surfaces are stable and water quality standards are met.	Turbidity monitoring is carried out according to the Water Working Arrangements (Alcoa, DWER and Water Corporation 2019). Areas will be stable with no evidence of recent erosion which would compromise stream water quality. There are no areas greater than 0.1 hectare with less than 0.5 native plants per square metre as identified from aerial photography or ground truthing on a 5-yearly basis.
3. Early Establishment – First 5 Years		

Criteria & Intent	Guidelines for acceptance	Standard
3.1 Vegetation Establishment		
<p>3.1.1 Establishment of overstorey (a) The overstorey stocking of both jarrah and marri to meet standards</p>	<p>Rehabilitated areas must have a stocking rate which will meet designated land uses. Alcoa must submit 9-month monitoring data to Parks and Wildlife annually. Parks and Wildlife must review and advise Alcoa of acceptance or request corrective actions. Establishment of overstorey that have achieved the standard will be deemed acceptable unless Parks and Wildlife writes to Alcoa within three months of self-certification to advise otherwise agreed.</p>	<p>The average number of stems/ha within a pit (9-month monitoring data):</p> <ul style="list-style-type: none"> - Minimum: 600 eucalypt stems/ha - Maximum: 1400 eucalypt stems/ha - Target: 1000 eucalypt stems/ha (except haul roads and pits <2ha). - Minimum: 200 marri stems/ha - Minimum: 150 jarrah stems/ha. <p>No rehabilitated sites (>2ha in size) have areas >0.5ha (as identified from either 9mth monitoring or subsequent review of aerial imagery at ~5yrs of age) with <100 stems/ha.</p>
<p>3.1.2 Establishment of understorey (a) There is an adequate legume density early in regeneration</p>	<p>Alcoa must submit 9-month monitoring data to Parks and Wildlife annually. Parks and Wildlife must review and advise Alcoa of acceptance or request corrective actions. Vegetation establishment monitoring to occur as defined in the Alcoa/Parks and Wildlife Working Arrangements (Alcoa 2011).</p>	<p>Minimum legumes 0.5 per square metre averaged over a pit assessed at 9-months. Monitoring as defined in the Alcoa/Parks and Wildlife Working Arrangements (Alcoa 2011).</p>
<p>(b) There is adequate plant species richness.</p>	<p>Areas to have a representative number of forest species present. Alcoa must submit 15-month species richness and density monitoring data to Parks and Wildlife annually. Parks and Wildlife must review and advise Alcoa of acceptance or request corrective actions. Monitoring at 15 months and the calculation of species richness and density is undertaken as defined in the Alcoa/Parks and Wildlife Working Arrangements (Alcoa 2011). A joint decision should be made about treatment of pits that have not met the criteria and whether a total rework is justified.</p>	<p>The species richness in monitoring plots in rehabilitated areas to be >60% of the average species richness in monitoring plots established in unmined forest. The assessment in rehabilitated areas is based on monitoring at 15 months. The 15-month monitoring of rehabilitated areas and the calculation of species richness is undertaken as defined in the Alcoa/Parks and Wildlife Working Arrangements (Alcoa 2011).</p>

Criteria & Intent	Guidelines for acceptance	Standard
(c) There is an adequate density of resprouter species, as defined by Bell (2001).	(c) Monitoring at 15 months and the calculation of resprouter density is undertaken as defined in the Alcoa/Parks and Wildlife Working Arrangements (Alcoa 2011).	Minimum number of surviving resprouter species will be 200 plants/ha.
3.2 Resilience of Vegetation		
<p>3.2.1 Weeds No evidence that significant introductions of new weed species* (environmental and declared) are persisting or that weed competition is restraining sustainable development of native species. **A naturalised non-indigenous plant species, that adversely affects the health, survival or regeneration of local provenance indigenous plant species in Alcoa's rehabilitation and unmined forest</p>	Alcoa must submit 9-month monitoring data and maps of weed presence, including any new Declared or environmental weeds the Alcoa/Parks and Wildlife Working Arrangements (Alcoa 2011), to Parks and Wildlife annually. Alcoa must seek Parks and Wildlife advice on appropriate treatment, if any, and indicate where treatment has occurred. Parks and Wildlife must review and advise Alcoa of acceptance or request further corrective action within three months of self-certification.	Vegetation establishment monitoring is undertaken as defined in the Alcoa/Parks and Wildlife Working Arrangements (Alcoa 2011) and indicates that the intent of this criteria is being met.
4. Vegetation 12 Years and Older		
4.1 Resilience of Vegetation		
<p>4.1.1 Resilience of Fire Affected Vegetation The rehabilitation is capable of persisting at the required standard following bushfire</p>	Sufficient stems are available following the fire to provide a stocked stand. Actions are consistent with the current version of the Alcoa/Parks and Wildlife Working Arrangements (Alcoa 2011).	A minimum of 300 stems/ha including: A minimum of 150 stems/ Jarrah; and a minimum of 45 stems/ha Marri.
<p>4.1.2 Dieback Overstorey Tree species not susceptible to dieback</p>	Tree species not susceptible to dieback are present at an adequate stocking rate.	Minimum 200 marri stems/ha at 9 months monitoring.
<p>4.1.3 Other forest diseases Rehabilitation is not preferentially attacked by non-dieback forest diseases.</p>	An assessment has been made of the extent and severity of any damage-non dieback or forest disease- (crown or bole damage) and whether the	The disease expression in rehabilitation is no greater than in the un-mined forest.

Criteria & Intent	Guidelines for acceptance	Standard
	rehabilitation is being selectively damaged in the crusher region. The disease expression in rehabilitation is no greater than in the un-mined forest.	
4.1.4 Insects Rehabilitation is not preferentially attacked by insects	An assessment has been made of the extent and severity of any insect damage (crown or bole damage) and whether the rehabilitation is being selectively damaged in the crusher region.	The infestation of rehabilitation by insects is no greater than in the unmined forest.
4.1.5 Drought	Mining rehabilitation areas are not showing evidence of being preferentially affected by drought.	There is no obvious variation or differential to unmined forest.
4.2 Landuse Including Timber Production		
4.2.1 Timber Production There is an adequate density of both jarrah and marri to meet timber production requirements. The timber production landuse criteria only apply to the percentage of rehabilitated area that had a timber production landuse prior to mining, i.e. if 15% of the area mined had no timber production potential, then only 85% of the rehabilitated area needs to meet the timber production landuse criteria.	Areas capable of producing sawlogs.	The average number of stems/ha: - Minimum: 500 eucalypt stems/ha - Maximum: 1300 eucalypt stems/ha - Target: 900 eucalypt stems/ha (except haul roads and pits <2ha). - Minimum: 200 marri stems/ha - Minimum: 150 jarrah stems/ha. Based on review of aerial imagery, no rehabilitated sites (>2ha in size) have areas >0.5ha with <100 stems/ha. At time of hand back the subject region has a minimum of 250 stems/ha combined total of Jarrah/Marri with the potential to produce a straight bole with a minimum of 3 m of potential future sawlog (excludes stump height). Evidence provided from plot monitoring, research studies, random sampling and aerial photography will be used to estimate density and potential bole length.
4.2.2 Proposals to carry out thinning on rehabilitated mine sites	Heavily stocked stands may be thinned by an agreed proponent to encourage sawlog production or achieve other management objectives	Stands above the required minimum may be thinned to 300 stems/ha at any time after age 15. The densest stands will be preferentially targeted for prescribed burning or silvicultural thinning, if appropriate

Criteria & Intent	Guidelines for acceptance	Standard
Where a proposal is made by a proponent to thin rehabilitated stands, this will be considered by Alcoa and Parks and Wildlife.		or applicable, through the use of Catchment Management Plans as provided for in the Forest Management Plan 2014-2023 (Conservation Commission of Western Australia 2013) and set out in the Working Arrangements (Alcoa 2011).
4.2.3 Management of understorey There is an adequate understorey layer in the regenerated pit.	Understorey vegetation meets the expected species richness, density and cover.	Evidence from permanent monitoring plots, and research trials that understorey cover density and richness are within the respective ranges observed in forest reference sites.
4.2.4 Management of Fire Risk The rehabilitation has been prescribed burnt (at least once) or a wildfire has burnt the area, or the area is on an approved Parks and Wildlife burning plan.	The rehabilitation has been burnt by prescribed fire or wildfire or the area is on an approved Parks and Wildlife burning plan.	100% of the rehabilitated areas have received a prescribed fire or a wildfire or the area is on an approved Parks and Wildlife burning plan.

2.4.3 Alcoa / DEC (DBCA) Working Arrangements Bauxite Mining Operations 2011-2015

In addition to Completion Criteria, the Alcoa / DBCA (formerly DEC) Working Arrangements provide a framework for overseeing Alcoa's field operations and management of rehabilitation in State Forest at Huntly and Willowdale. This collaborative arrangement between Alcoa and DBCA provides a structured approach to manage mining and rehabilitation operations effectively and efficiently. The Working Arrangements consist of detailed prescriptions, which specify objectives, strategies, technical specifications, and works programme requirements including timing, resourcing and funding.

2.4.4 Water Working Arrangements

These working arrangements have been developed to set out the cooperative and efficient manner in which the Department of Water and Environmental Regulation (DWER), Water Corporation and Alcoa will work together to manage Alcoa's mining activities in Western Australia; with regard to water resource management and protection. The Working Arrangements (2019) are written and reviewed jointly between DWER, Water Corporation and Alcoa. They are designed to cover a five-year period however they may be updated at any time when significant new information becomes available. The intent of the Working Arrangements is to maintain a coordinated approach to the management of mining operations and the protection of Public Drinking Water Source Areas (PDWSA). They provide a clear picture of the relationships between the three organisations and the agreed procedures that are to be followed. The Working Arrangements are intended to outline the procedures and guiding principles for this interaction, and do not give rise to any legal or contractual obligations upon any party. These Working Arrangements are not intended to limit the statutory functions, rights and obligations of the DWER and the Water Corporation. Where there is a conflict between any practice or activity undertaken pursuant to these Working Arrangements and to the observance of any right or obligation of the DWER or Water Corporation, the latter will prevail.

2.5 Rationale and Approach

This RMPS provides objectives-based provisions for potential impacts associated with the environmental values specific to Alcoa's rehabilitated areas. Objective-based provisions have been applied where a level of uncertainty exists that prevents setting reasonable and achievable objectives and measurable criteria. In this case, management targets have been developed to measure the success of management actions in achieving the environmental outcome.

Supplementary provisions such as research studies or additional indicators have been proposed to be applied to address values where a degree of uncertainty and complexity exists.

2.5.1 Key assumptions and uncertainties

The key assumptions and uncertainties are considered to include:

- the extent to which climatic factors outside of Alcoa's control will affect surface water and groundwater regimes.
- the extent to which climatic factors outside of Alcoa's control will affect the spread of weeds and fire.
- the extent to which climatic factors (i.e. climate change) outside of Alcoa's control will impact on the health and extent of populations of significant flora and vegetation values.
- the extent to which local hydrological changes to water flows will directly or indirectly impact on the health and extent of populations of flora and vegetation values.
- the extent to which potential erosion and subsequent turbidity could impact public drinking water reservoirs with consideration of mitigation activities and dilution.
- the extent to which the Forest Management Plan (Conservation and Parks Commission 2023) will alter timber production completion criteria outcomes.
- The extent to which renegotiation of completion criteria will impact the processes required to manage rehabilitation.

3 RMPS Components

This section of the RMPS identifies the provisions that Alcoa will implement to ensure that the defined environmental objectives are met. A summary of the Objective Management-based provisions is presented in Table 3-1 with specific objective-based provisions detailed in Table 3-2.

Monitoring has been designed to inform, through management targets, if the corresponding environmental objectives are being achieved. Further detail on monitoring programmes, in particular reviews against Completion Criteria (Department of State Development 2015) and response actions are detailed in Table 3-3.

This RMPS will be updated to align with the adaptive management approach (refer to Section 4 Adaptive Management and Review of the EMP).

Table 3-1: Objectives and Targets

Environmental Value	Activities	Impacts	Environmental objectives	#	Management Targets
Flora/Vegetation and Fauna <ul style="list-style-type: none"> Surrounding forest Flora individuals, populations, and habitat Fauna individuals, population, and habitat 	<ul style="list-style-type: none"> Rehabilitation management and remediation activities 	<ul style="list-style-type: none"> Loss of biodiversity Decline in health and / or change in habitat composition Increased exposed / bare areas Delayed vegetation growth Increased weed presence Reduction of dieback free forest Increased rate of dieback spread Erosion of the rehabilitation or forest floor Loss of constructed habitat piles Decline in health or availability of forage Reduced or increased ground or surface water impacting fauna drinking sites 	Minimise impacts to surrounding forest, flora and vegetation and fauna values from rehabilitated areas.	1	No significant introductions or persistence of new weed species (environmental and declared) or weed competition that restrains sustainable development of native species.
				2	No significant increase to the rate of dieback spread to uninfested rehabilitation or forest from rehabilitated areas.
				3	Rehabilitated areas support ecological values (flora, vegetation and fauna).
Public Drinking Water Areas <ul style="list-style-type: none"> Streams Reservoirs Surface Water <ul style="list-style-type: none"> Tributaries leading into reservoirs and ecosystem: <ul style="list-style-type: none"> Aquatic fauna Aquatic vegetation; and Associated riparian vegetation Potential refugial zones for terrestrial and aquatic fauna Groundwater <ul style="list-style-type: none"> Groundwater Dependent Vegetation (GDV) Surrounding forest 	<ul style="list-style-type: none"> Change in hydrological regimes Change in stream flow and / or levels Change in available water to the reservoirs Erosion to the rehabilitation or forest floor Sediment deposition in rehabilitation or forest Increased turbidity in streams and reservoirs Increased rate of dieback spread to uninfested areas 	Minimise impacts to surface water from rehabilitated areas.	Minimise changes to hydrogeological regimes from rehabilitated areas.	4	No significant impact to surface water values as a result of an increase in turbidity from erosion from rehabilitated areas.
				5	No significant impact to groundwater values as a result of hydrogeological regime changes from rehabilitated areas.

Table 3-2: Objective Based Management Provisions

Objective-based					
#	Management targets	Management actions	Monitoring	Timing / frequency of monitoring / actions	Reporting
1	No significant introductions or persistence of new weed species (environmental and declared) or weed competition that restrains sustainable development of native species.	<p>Adherence to Completion Criteria (Department of State Development 2015) & Alcoa/DBCA Working Arrangements (Alcoa 2011).</p> <p>Weed and Seed Hygiene Inspections of equipment and vehicles during rehabilitation and remediation activities.</p> <p>QA/QC processes are in place for seed and plants delivered to site for use in rehabilitation.</p> <p>Autumn (9 month), Spring (15 month) and >12-year botanical monitoring programs identify weed presence in the rehabilitated pits.</p> <p>Where new weed incursions are identified, they will be appropriately treated, removed, and managed as soon as is reasonably practicable.</p> <p>Rehabilitated areas that do not meet the standard will be inspected by DBCA and treated by Alcoa if required.</p>	<p>Autumn (9 month) and Spring (15 month) botanical monitoring programs and >12-year botanical monitoring programs.</p> <p>Visual observations identify weed species recorded within rehabilitation or surrounding forest which have not been previously recorded within historical surveys.</p>	<p>Autumn (9 month), Spring (15 month) and >12-year botanical monitoring programs after each rehabilitation season.</p> <p>Ad hoc identification of weeds during in-field inspections.</p>	<p>Where an impact to the surrounding forest is identified an incident notification and investigation report will be sent to DBCA.</p> <p>Alcoa Rehabilitation Report</p> <p>Autumn (9 month) and Spring (15 month and >12 years) Botanical Monitoring Reports.</p> <p>Alcoa Annual Environmental Report</p>
2	No significant increase to the rate of dieback spread to uninfested rehabilitation or forest from rehabilitated areas.	<p>Adherence to Completion Criteria (Department of State Development 2015) & Alcoa/DBCA Working Arrangements (Alcoa 2011) – dieback hygiene protocols.</p> <p>Access to the site is restricted through the gated perimeter of the operational mine.</p> <p>Dieback hygiene protocols are adhered to during remediation activities.</p> <p>Where drainage concerns / issues are identified as a potential risk for dieback spread i.e. water / sediment movement outside of the rehabilitated area – immediate temporary controls are applied – these can include redirecting water / sediment away from the compromised location, via pipes, pumps and constructed in-pit trenches, drains or sumps.</p> <p>Remediation plans are developed, recorded and rework is completed during the Spring and Summer months, reducing the risk of further dieback spread.</p>	<p>Autumn (9 month) botanical monitoring program of rehabilitation – stocking rate of 200 stems marri trees/ha</p> <p>Ad hoc field inspections identifying localised changes in health and / or collapse of rehabilitation or surrounding forest vegetation.</p> <p>Where a breach of water or sediment has occurred from a dieback rehabilitated area, undertake a dieback review of surrounding forest.</p>	<p>Autumn (9 month) botanical monitoring program after each rehabilitation season.</p> <p>Dieback monitoring initiated in response to field observations of vegetation changes in the surrounding forest or a breach of water or sediment from a dieback rehabilitated pit to dieback free forest – as required.</p> <p>Botanical monitoring prior to handback.</p>	<p>Where an impact to the surrounding forest is identified an incident notification and investigation report will be sent to DBCA.</p> <p>Alcoa Annual Rehabilitation Report</p> <p>Autumn (9 month) and Spring (15 month) botanical monitoring Reports</p> <p>Alcoa Annual Environmental Report</p>
3	Rehabilitated areas support ecological values (flora, vegetation and fauna).	<p>Establish vegetation / flora density and species richness to Completion Criteria standards (Department of State Development 2015).</p> <p>Construct fauna habitats in rehabilitation to the Completion Criteria Standards (Department of State Development 2015)</p> <p>Identified weeds are treated / removed in rehabilitation.</p> <p>Where botanical monitoring indicates that Completion Criteria Standards (Department of State Development 2015) have not been met,</p>	<p>Visual observations of germination and / or growth in comparably aged rehabilitation that has passed botanical monitoring.</p> <p>Autumn (9 month) and Spring (15 month) botanical monitoring programs</p> <p>>12-year botanical monitoring program</p> <p>Recording of all constructed fauna habitat numbers and locations.</p>	<p>Autumn (9 month), Spring (15 month) and >12-year botanical monitoring programs after each rehabilitation season.</p> <p>Annual Completion Criteria inspections with DBCA at finalisation of the rehabilitated area.</p>	<p>Where an impact to the surrounding forest is identified an incident notification and investigation report will be sent to DBCA.</p> <p>Alcoa Annual Rehabilitation Report</p> <p>Autumn (9 month) and Spring (15 month) botanical monitoring Reports</p>

	<p>additional seeding and planting will be undertaken to correct plant species richness and stem density.</p> <p>Where constructed fauna habitats are found to be deficient in numbers or quality, habitats will be improved in quality and /or additional fauna habitats added to rehabilitated area.</p> <p>Ongoing research and studies.</p>			Alcoa Annual Environmental Report
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Objective/s: Minimise impacts to surface water from rehabilitated areas
Key environmental values: Water (ground and surface water)
Key impacts and risks: Change in hydrological regimes, change in stream flow and / or levels, change in available water to the reservoirs, erosion to the rehabilitation or forest floor, sediment deposition in rehabilitation or forest, increased turbidity in streams and reservoirs, increased rate of dieback spread to uninfested areas

Objective-based

#	Management targets	Management Actions	Monitoring	Timing / frequency of actions	Reporting
4	No significant impact to surface water values as a result of an increase in turbidity from erosion from rehabilitated areas.	<p>Prioritise rehabilitation within public drinking water catchments, as per the 5 Year and 36 Month Rehabilitation Schedule (Appendix B).</p> <p>Rehabilitation targets ensures open areas are minimised.</p> <ul style="list-style-type: none"> Integrate progressive rehabilitation into mine planning and operational activities. Undertake rehabilitation activities in a timely and committed way to enable maximisation of progress on rehabilitation areas. Schedule of rehabilitation to consider potential priority areas informed by current monitoring trends, including water quality monitoring (salinity), groundwater levels and/or scale where relevant. <p>Rehabilitation pit designs are developed based on Completion Criteria standards (Department of State Development 2015).</p> <p>Rehabilitation slope storage capacity is designed utilising the rehabilitation water model based upon 1% AEP 24-hour design event considering antecedent see Appendix C. The designs minimise the risk of drainage events, and potential dieback breaches from the rehabilitated areas into forest.</p> <p>Key rehabilitation mobile equipment is GPS assisted to meet Completion Criteria (Department of State Development 2015).</p> <p>Pre-landscaping ripping is carried out in compacted areas, under pit faces, under areas receiving fill and through in-pit haul roads with the straight tine to improve infiltration.</p> <p>Post-landscape ripping is carried out across the final landscaped pit, prior to contour ripping with a winged tine and / or straight tine (in rocky areas) to improve infiltration and root penetration.</p> <p>Contour ripping is carried out to control surface water runoff and improve infiltration.</p> <p>Post rehabilitation UAV survey and analysis - collected in the second winter to identify any erosion that does not meet completion criteria or effects trafficability of the area: No uncontrolled water runoff or unacceptable soil erosion in or adjoining the pit. Unacceptable erosion is that which:</p>	<p>Rehabilitation review – seasonal tracking against targets and final season review of completed rehabilitation.</p> <p>UAV survey analysis determines compliance to Completion Criteria (Department of State Development 2015).</p> <p>Internal Rehabilitation Process Checklists - visual inspection of areas during progressive infield checks.</p> <p>Ad-hoc DBCA inspections of rehabilitated areas.</p> <p>Annual initial Completion Criteria Inspections completed with DBCA.</p> <p>Ad-hoc visual identifications - water or sediment that is identified exiting rehabilitated areas is reported immediately, immediate temporary controls put in place and plans developed for repair / remediation.</p> <p>Autumn (9 month) and Spring (15 month) botanical monitoring Reports - identify areas not meeting stocking rates.</p> <p>Post second winter UAV analysis identifies requirements for remediation of erosion not meeting Completion Criteria standards (Department of State Development 2015).</p>	<p>Rehabilitation Targets and Quality – tracked weekly and annually at the end of the rehabilitation season.</p> <p>Regular UAV flights – as required to confirm compliance to Completion Criteria.</p> <p>Autumn (9 month) and Spring (15 month) botanical monitoring programs after each rehabilitation season.</p> <p>Ad-hoc field inspections.</p> <p>Annual- initial Completion Criteria Checklist Inspections with DBCA – carried out as each pit is completed.</p> <p>Post rehabilitation, second winter UAV survey and analysis to assess erosion potential – annual program 24 months post rehabilitation.</p>	<p>Where completion criteria standards cannot be met or a variation is required - Alcoa is to provide documentation and advice to DBCA, where self-certification has resulted in non-standard outcomes. Subject to review and consideration by DBCA and assessment and approval granted by MMPLG.</p> <p>Turbidity events and / or drainage events are communicated to Water Corporation as per the Alcoa/Water Corporation Working Arrangements (2019).</p> <p>Where an impact to the surrounding forest is identified an incident notification and investigation report is sent to DBCA.</p> <p>Alcoa Annual Rehabilitation Report</p> <p>Autumn (9 month) and Spring (15 month) botanical monitoring Reports</p> <p>Alcoa Annual Environmental Report</p>

	<ul style="list-style-type: none"> - restricts access through the area by 4 wheel drive vehicles - is unstable and degrading, or - will compromise landuse objectives. <p>Gully erosion will not exceed:</p> <ul style="list-style-type: none"> - 30cm depth and - 30cm with, and - 100m in length - areas of unintended deposition >0.1 ha <p>No rehabilitated sites (>2ha in size) have areas >0.5ha (as identified from either 9mth (Autumn) monitoring or subsequent review of aerial imagery at ~5yrs of age) with <100 stems/ha.</p> <p>Areas of 0.1 hectares or greater not stocked at the rate of 0.5 native plants per square metre will be reseeded or planted if required to meet the overall rehabilitation objective (Section 3 of the Completion Criteria Certification Process Overview document (Department of State Development 2015)</p> <p>Seed is returned to the rehabilitation through the seedbank of the soil and collected seed is broadcast during/post contour ripping within 1 week of contour ripping.</p> <p>Planting of tube stock occurs in the second winter post contour ripping.</p> <p>Fertilising of vegetation occurs in the second Spring post contour ripping.</p> <p>Stream turbidity monitors are installed, and data collected as per the Annual Stream Monitoring Review AUACDS-2056-661 Maintain and Review the Turbidity Monitoring Network (MIN) (Alcoa 2016).</p> <p>Where stabilisation concerns are identified as a potential risk for water / sediment movement outside of the rehabilitated pit – immediate temporary controls are applied – these can include redirecting water / sediment away from the compromised location, via pipes, pumps, digging in-pit trenches or sumps.</p> <p>Remediation plans are developed, and rework is completed during the Spring and Summer months.</p> <p>Refer to Water Resources Management Plan (Draft) (Alcoa 2023)</p>			
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Objectives: *Minimise changes to hydrogeological regimes from rehabilitated areas.*

Key environmental values: *Water (ground and surface water)*

Key impacts and risks: *Change in hydrological regimes, change in stream flow and / or levels, change in available water to the reservoirs, erosion to the rehabilitation or forest floor, sediment deposition in rehabilitation or forest, increased turbidity in streams and reservoirs, increased rate of dieback spread to uninfested areas*

Objective-based					
#	Management targets	Management Actions	Monitoring	Timing / frequency of actions	Reporting
5	No significant impact to groundwater values as a result of hydrogeological regime changes from rehabilitated areas.	<p>Establish rehabilitation density to Completion Criteria standard (Department of State Development 2015).</p> <p>Where ground water expresses in the rehabilitated pit and is a risk to the surrounding forest, water levels will be reduced via pumping to an alternate area that allows infiltration.</p>	<p>Ad hoc field inspections identifying localised changes in health and / or collapse of surrounding forest vegetation.</p> <p>Autumn (9 month) and Spring (15 month) and (>12 years) botanical monitoring ensuring adequate vegetation establishment</p>	<p>Ad-hoc field inspections</p> <p>Autumn (9 month) and Spring (15 month) botanical monitoring programs after each rehabilitation season</p>	Where an impact to the surrounding forest is identified an incident notification and investigation report will be sent to DBCA.

	<p>Groundwater Level is reviewed as part of rehabilitation designs:</p> <ul style="list-style-type: none"> Areas identified as moderate or high risk in the Groundwater Risk Assessment Framework will continue groundwater monitoring for a minimum of two years post rehabilitation landform completion. After which, the requirement for ongoing groundwater monitoring and management activities will be reviewed. Where ongoing groundwater monitoring is not required, the groundwater piezometers will be decommissioned. <p>Optimise rehabilitation and minimise open areas as per Management Target 4</p> <p>Clearing induced groundwater rise predictive tool implementation and continuous improvement.</p> <p>Regolith depth mapping to support groundwater level assessment and rehabilitation planning.</p> <p>Refer to Water Resources Management Plan (Draft) (Alcoa 2023)</p>	<p>Groundwater Monitoring Program</p>	<p>Groundwater monitoring bores – long term monitoring program – as per the groundwater monitoring program.</p>	
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Table 3-3: Monitoring Program

#	Management Targets	Monitoring	Details	Timing	Frequency	Completion Criteria		
						Intent	Standard	Response Actions
1	No significant introductions or persistence of new weed species (environmental and declared) or weed competition that restrains sustainable development of native species.	Vegetation Monitoring Rehabilitation Initial Completion Criteria Inspection Checklists conducted with DBCA.	Autumn – 9 Month Monitoring – Transect Monitoring Spring – 15 Month Monitoring – Permanent Plot Monitoring Spring- >12 years Monitoring - Permanent Plot Monitoring Botanical permanent forest plot Monitoring ³ Permanent rehabilitation monitoring plots will be monitored periodically to observe the trajectory of vegetation re-establishment, and prior to handback to ensure that completion criteria are met.	Autumn – 9 Month Monitoring Spring – 15 Month Monitoring Spring - >12 Years Spring - Long Term Monitoring	Annual - Autumn 9 Month and Spring 15 Month following rehabilitation completion. Rehabilitated areas are reviewed against Completion Criteria at 12 years or more prior to handback.	3.2.1 Weeds No evidence that significant introductions of new weed species* (environmental and declared) are persisting or that weed competition is restraining sustainable development of native species. **A naturalised non-indigenous plant species, that adversely affects the health, survival or regeneration of local provenance indigenous plant species in Alcoa's rehabilitation and unmined forest recorded within historic surveys.	Vegetation establishment monitoring is undertaken as defined in the Alcoa/Parks and Wildlife Working Arrangements (Alcoa 2011) and indicates that the intent of this criteria is being met.	Where any new weed incursions are identified through in-field inspections or botanical monitoring, weeds will be appropriately treated, removed and managed as soon as is reasonably practicable. Where weed spread is identified in the surrounding forest / DBCA will be advised. Recorded weed species will be reviewed against the current Western Australian Organism List (DPIRD, 2024) and DBCA's (2014) weed species' ecological impact and invasiveness ranking for the south-west and internal database updated.
3	Rehabilitated areas support ecological values (flora, vegetation and fauna).		Alcoa and DBCA representatives assess rehabilitated pits against the initial rehabilitation Completion Criteria Standards (Department of State Development 2015)	Completion Criteria Assessment – at the completion of each rehabilitated area.	Annual - initial Completion Criteria Assessment – at the completion of each rehabilitated area.	3.1.2 Establishment of Understorey and 4.2.3 Management of understorey (a) There is an adequate legume density early in regeneration. (b) there is adequate plant species richness. (c) There is an adequate density of resprouter species, as defined by Bell (2001).	(a) Minimum legumes 0.5 per square metre averaged over a pit assessed at 9-months. Monitoring as defined in the Alcoa/Parks and Wildlife Working Arrangements (Alcoa 2011). (b) The species richness in monitoring plots in rehabilitated areas to be >60% of the average species richness in monitoring plots established in unmined forest. The assessment in rehabilitated areas is based on monitoring at 15 months. The 15-month monitoring of rehabilitated areas and the calculation of species richness is undertaken as defined in the Alcoa / Parks and Wildlife Working Arrangements (Alcoa 2011). (c) Minimum number of surviving resprouter species will be 200 plants/ha.	Where botanical monitoring indicates that Completion Criteria Standards (Department of State Development 2015) have not been met additional seeding and / or planting will be conducted. Re-monitoring post remedial seeding and / or planting occurs during the following monitoring period. Alcoa will provide documentation and advice to DBCA, where self-certification has resulted in non-standard outcomes. Subject to review and consideration by DBCA and assessment and approval granted by MMPLG.

³ Defining a reference ecosystem is a necessary step in setting standards for completion criteria. The reference ecosystem is within the Northern Jarrah Forest IBRA sub-region. Alcoa uses analogue sites as the botanical reference, which are 'adjacent or near-by sites from which the necessary attributes to can be quantified to develop completion criteria'. These analogue sites are termed 'permanent plots' at Alcoa and are 20 x 20 m plots (containing quadrats) which have been established in the unmined forest, adjacent to mining areas and in the same Havel (1975) vegetation units (P, S, T), hence very similar to the pre-mining conditions. Botanical species density and cover from these plots has been collected since 1991.

#	Management Targets	Monitoring	Details	Timing	Frequency	Completion Criteria		
						Intent	Standard	Response Actions
						(d) There is adequate understorey layer in regenerated pits.	(d) Evidence from permanent monitoring plots, and research trials that understorey cover density and richness are within the respective ranges observed in forest reference sites.	
						3.1.1 Establishment of Overstorey (a) The overstorey stocking of both jarrah and marri to meet standards	The average number of stems/ha within a pit (9 month – Spring monitoring data): - Minimum: 600 eucalypt stems/ha - Maximum: 1400 eucalypt stems/ha - Target: 1000 eucalypt stems/ha (except haul roads and pits <2ha). - Minimum: 200 marri stems/ha - Minimum: 150 jarrah stems/ha. No rehabilitated sites (>2ha in size) have areas >0.5ha (as identified from either Autumn 9-month monitoring or subsequent review of aerial imagery at ~5yrs of age) with <100 stems/ha.	Where botanical monitoring indicates that Completion Criteria Standards (Department of State Development 2015) have not been met additional seeding and / or planting will be conducted. Re-monitoring post remedial seeding and / or planting occurs during the following monitoring period. Alcoa will provide documentation and advice to DBCA, where self-certification has resulted in non-standard outcomes. Subject to review and consideration by DBCA and assessment and approval granted by MMPLG. Rehabilitated areas that exceed the maximum standard will be inspected by DBCA and may be thinned by Alcoa to reduce tree density back to the identified acceptable range, as required.
						2.2.1 Rehabilitation Establishment (c) The rehabilitated area has adequate ground fauna habitat.	(c) Rehabilitation will include one constructed habitat per 2 hectares.	Where constructed fauna habitats are found to be deficient in numbers or quality, habitats will be improved in quality and /or additional fauna habitats added to rehabilitated area.
2	No significant increase to the rate of dieback spread to uninfested rehabilitation or forest from rehabilitated areas.	Dieback / Drainage Event Investigations	In-field observations Investigation of drainage incidents – sediment and water movement from dieback rehabilitation pit to dieback free forest	As required	As required	4.1.2 Dieback Overstorey Tree species not susceptible to dieback	Minimum 200 marri stems/ha at 9 months monitoring.	Where botanical monitoring indicates that Completion Criteria Standards (Department of State Development 2015) have not been met additional seeding and / or planting will be conducted. Re-monitoring post remedial seeding and / or planting occurs during the following monitoring period. Alcoa will provide documentation and advice to DBCA, where self-certification has resulted in non-standard outcomes. Subject to review and consideration by DBCA and assessment and approval granted by MMPLG.
4	No significant impact to surface water values as a result of an increase in turbidity from erosion from rehabilitated areas.	24-month UAV survey and analysis	Unmanned aerial vehicle (UAV) to assess rehabilitated areas for erosion. Erosion gullies dimensions are calculated. Remedial action may be undertaken based on this monitoring. Post rehabilitation and ad-hoc in-field inspections.	Spring As required	24 months post rehabilitation of pit All year-round rain events	2.2.1 Rehabilitation Establishment The area has been contour ripped.	No uncontrolled water runoff or unacceptable soil erosion in or adjoining the pit. Unacceptable erosion is that which: restricts access through the area by 4-wheel drive vehicles. is unstable and degrading, or will compromise landuse objectives. Gully erosion will not exceed: 30cm depth and	Post rehabilitation and ad-hoc field inspections of rehabilitated areas identifies development of erosion and determines potential risk to the surrounding forest or water values. Where a concern is identified an internal incident is raised and actioned to monitor potential erosion development when identified through visual inspection.

#	Management Targets	Monitoring	Details	Timing	Frequency	Completion Criteria		
						Intent	Standard	Response Actions
							30cm with, and 100m in length areas of unintended deposition >0.1 ha	<p>Where there is an identified risk to the forest and surrounding water values, immediate temporary controls will be executed, and a remediation plan developed. Rework completed during the Spring and Summer months.</p> <p>Where UAV survey indicates observations of areas of potential erosion and / or deposition, the area is inspected by site personnel to assess erosion against completion criteria standards. Where erosion and / or deposition is found to exceed the completion criteria standard, remediation is recorded, planned, executed.</p> <p>Where erosion or deposition is identified outside of the rehabilitated areas, DBCA is to be informed.</p>
		Turbidity Monitoring	<p>A network of real-time telemetry (and manual) turbidity monitors measure stream turbidity across both locations to ensure mining activities do not impact on public or private drinking water supplies and provides an indicator of drainage performance management across the site.</p> <p>Refer to WRMP (Alcoa 2023) for further details.</p>	All year round	All year round	2.3.1 Catchment Protection	Turbidity monitoring is carried out according to the Water Working Arrangements (Alcoa, DWER and Water Corporation 2019)	<p>Where a rehabilitated area is identified as a contributor to a drainage/turbidity event – immediate temporary controls are actioned – these can include redirecting water away from the compromised location, via pipes, pumps, digging in-pit trenches or sumps. Long term remediation plans are developed, and rework is completed during the Spring and Summer months. Refer to Water Resources Management Plan (Draft) (Alcoa 2023)</p>
5	No significant impact to groundwater values as a result of hydrogeological regime changes from rehabilitated areas.	Groundwater Monitoring	As per Water Resources Management Plan (Revision Draft)	All year round	All year round	Not applicable		Refer to Water Resources Management Plan (Draft) (Alcoa 2023)

3.1 Reporting

The reporting requirements relating to the implementation of the RMPS are detailed in Table 3-4.

Table 3-4: Reporting actions

Notification Event	Action	Responsibility	Timing
Completion Criteria or Working Arrangement exceedance/variation	Where completion criteria standards cannot be met or a variation is required - Alcoa to provide documentation and advice to DBCA, where self-certification has resulted in non-standard outcomes. Subject to review and consideration by DBCA and assessment and approval granted by MMPLG.	Environmental Department	As required
Alcoa Rehabilitation Report	A report is compiled of all Completion Criteria Reports for both mine sites	Environmental Department	Annually
Botanical Monitoring Reports	A report is compiled of all Completion Criteria Reports for both mine sites	Environmental Department	Annually
Dieback breaches	Notify DBCA	Environmental Department	As soon as practicable
Drainage events within OCA1, OCA2 and Proclaimed Catchment.	Notify Water Corporation within 24 hours of the event occurring in OCA1 and OCA2. All events will also be reported in the monthly report supplied to Water Corporation and DWER	Environmental Department	Reported within the monthly report to Water Corporation and DWER
MMP Compliance Assessment Report	Preparation of a compliance report to the Minister for State Development.	Environmental Department	Annually
Evaluation and revision of the RMPS	A review of this RMPS will be undertaken every five years. Any significant changes will include consultation with MMPLG.	Environmental Department	Every five years

4 Adaptive Management and Review of the EMP

Alcoa recognises the dynamic nature of ecosystems, the opportunities for improvement through research programs and advancements in technology to progressively inform the Rehabilitation Management Plan and Schedule, which subsequently improves the quality of rehabilitation. Alcoa supports adaptive management under this RMPS.

Alcoa is currently developing, utilising, researching and reviewing a number of the rehabilitation strategies, activities and technological advancements to improve the quality of rehabilitation including:

- Development and execution of engineered rehabilitation pit designs based on the completion criteria standards
- Earthmoving equipment utilising high precision GPS to assist in meeting engineered rehabilitation pit designs
- Development and use of UAV technologies to survey and assess rehabilitation
- Review of the current Completion Criteria (Department of State Development 2015) / Working Arrangements (Alcoa 2011) and associated monitoring framework
- Implementation of a groundwater monitoring program to better understand hydrogeological regimes
- Surface water modelling studies to better inform the development of engineered rehabilitation pit designs
- Development of rehabilitation maintenance / remediation prescriptions to improve remediation quality
- Development and endorsement of associated Environmental Management Plans to provide clarity and alignment across all functions
- Undertake research activities designed to improve rehabilitation efficiency and quality
- Adaptive management of the seed mix in accordance with botanical monitoring results
- Trials to improve the quality and outcomes of the recalcitrant planting program

4.1 Changes to an EMP

Based on result of the review process Alcoa will update and adjust the measures and strategies as per Table 4-1 below.

Table 4-1: Changes to an EMP

Complexity of changes		Minor revisions <input type="checkbox"/>	Moderate revisions <input type="checkbox"/>	Major revisions <input type="checkbox"/>		
Number of Key Environmental Factors		One <input type="checkbox"/>	2-3 <input type="checkbox"/>	> 3 <input type="checkbox"/>		
Date revision submitted to MMPLG: DD/MM/YYYY						
Proponent's operational requirement timeframe for approval of revision		Reason for Timeframe:	< One Month <input type="checkbox"/>	< Six Months <input type="checkbox"/>	> Six Months <input type="checkbox"/>	None <input type="checkbox"/>
Item no.	EMP section no.	EMP page no.	Summary of change	Reason for change		
1.						
2.						
3.						

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APPENDICES

APPENDIX A: Rehabilitation Summary - Alcoa's Current Approach to Rehabilitation, Monitoring and Area Certification

Rehabilitation Summary - Alcoa's Current Approach to Rehabilitation, Monitoring and Area Certification

Rehabilitation Objectives and Values

Alcoa's rehabilitation objective is to establish, and return to the State, a self-sustaining Jarrah Forest ecosystem, that meets the agreed forest values that will support similar management practices as that employed in the surrounding Northern Jarrah Forest (Figure AA-1 example). These forest values are described in Table AA-1.



Figure AA-1: Rehabilitation Example

Table AA-1: Rehabilitation Values and Objectives

Value	Objectives
Water	To ensure that mined areas do not impact water quality and quantity.
Timber	Establish a forest that has the potential for sawlog production.
Recreation	To maintain existing recreational values where possible and to provide increased opportunities for forest based recreational activities in accordance with DBCA district and regional recreation plans.
Land Management	To conserve the residual soil, to control dieback spread and to ensure the rehabilitation areas are resilient to fire hazards.
Landscape	To create a rehabilitated landscape visually compatible with the adjoining Jarrah forest.
Conservation	To encourage the return of flora and fauna assemblages similar to those within the unmined Jarrah forest.

Long-term resilience	Management: to establish and ecosystem that is self-sustaining without ongoing applications of management resources greater than those needed within the unmined forest.
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Common to all rehabilitation goals is the replacement of biological elements, ecosystem function, and the re-establishment of ecological processes that puts the mined areas on a restoration trajectory towards unmined forest.

Completion Criteria

Alcoa's rehabilitation is measured against Completion Criteria developed with and approved by DBCA to meet the agreed objective of a self-sustaining jarrah forest ecosystem that meets multiple forest uses. The completion criteria have evolved over time, being informed by interactions in research and practice. Since 1988 and the introduction of a fully native species overstorey, Alcoa has undertaken rehabilitation with respect to three successions of completion criteria:

- 1988-2004
- 2005-2015
- 2016 to present

Each completion criterion has an associated standard, including both qualitative and quantitative targets, against which Alcoa monitors and reports the rehabilitation performance. Alcoa's current rehabilitation completion criteria (2016 to present) are published on the Alcoa website.

Over these three successions, key completion criteria have related to the establishment of a native species overstorey, which is the primary indicator of vegetation cover and primary productivity in a forest ecosystem, and understorey species, which are the predominant floristic diversity in the Jarrah Forest.

Alcoa's current rehabilitation approach is a careful balance of reintroducing vegetation with the intent of approximating the surrounding forest richness, and ensuring sufficient functional groups are present as the ecosystems progress along a restoration trajectory towards unmined forest.

An overview of Alcoa's mine rehabilitation, monitoring and handback approach is provided below.

Rehabilitation Quality Monitoring

Alcoa's rehabilitation quality monitoring program evaluates rehabilitated areas against the Alcoa WA Mining Rehabilitation Completion Criteria that was developed in consultation with DBCA and other key stakeholders and endorsed by the MMPLG in 2016. The 2016 Completion Criteria was based on the previous four iterations of completion criteria that were first implemented in 1996 and applied to current era rehabilitation practices from 1988. The 2016 criteria reflect the current Alcoa WA Mining mine closure objective, as stated in the section above and are grouped according to eight rehabilitation quality requirements, these being:

- Land use & Management Priority
- Existing Environment
- Integrated Landscape
- Sustainable Growth & Development
- Catchment Protection
- Vegetation Establishment
- Resilience of Vegetation, and
- Land use (including timber production)

Of the eight rehabilitation quality requirements, the first two relate to pre-mining requirements and are not relevant to this discussion. The last six relate specifically to mine rehabilitation requirements and are detailed within Table AA-2.

Table AA-2: Relevant completion criteria excerpted from the 2016 Alcoa completion criteria

Rehabilitation Quality Requirement	Objective of Requirement	Reference	Completion Criteria	Monitoring Method
2.1 INTEGRATED LANDSCAPE	The mine pit areas are landscaped to be stable and to blend in with the surrounding forest. Landscaping must be completed to ensure effective surface water management. Landscape design will not cause an impediment to access for Parks and Wildlife's operations or be an ongoing financial or management liability.	2.1.1 Landscape design	Slopes must always be less than 18 degrees. 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.	Self-certification by Alcoa annually and / or inspection by Parks and Wildlife confirm landscape design is acceptable.
2.2 SUSTAINABLE GROWTH AND DEVELOPMENT	Waste islands will be effectively Rehabilitated. Waste islands will have caprock shattered and topsoil spread and scarified to prevent impeding vehicular or rubber tyred machine for fire access.	2.2.1 a Rehabilitation establishment a Waste Islands	No area greater than 0.1 of a hectare has unbroken caprock. Trafficability to agreed Alcoa/Parks and Wildlife Working Arrangements.	Self-certification by Alcoa annually and / or inspection by Parks and Wildlife confirm landscape design is acceptable.
2.2 SUSTAINABLE GROWTH AND DEVELOPMENT	There is an adequate cover of topsoil across the rehabilitated area. Topsoil return and coverage is uniform within each individual rehabilitated pit.	2.2.2 b Topsoil	Direct return (or agreed surrogates) topsoil is spread over the rehabilitated area. No area >0.1 ha has no topsoil coverage. The cumulative area without topsoil does not exceed 10% of the rehabilitated pit.	Self-certification by Alcoa annually and / or inspection by Parks and Wildlife confirm landscape design is acceptable.
2.2 SUSTAINABLE GROWTH AND DEVELOPMENT	The rehabilitated area has adequate ground fauna habitat.	2.2.3 c Fauna habitat	Rehabilitation will include one constructed habitat per 2 hectares.	Self-certification by Alcoa annually and / or inspection by Parks and Wildlife confirm landscape design is acceptable.

<p>2.2 SUSTAINABLE GROWTH AND DEVELOPMENT</p>	<p>The area has been contour ripped.</p> <p>Ripping does not prevent access for fire line construction by front end loader.</p> <p>No uncontrolled water runoff or unacceptable soil erosion in or adjoining the pit.</p>	<p>2.2.4 d Contour ripping</p>	<p>Unacceptable erosion is that which:</p> <p>restricts access through the area by 4-wheel drive vehicles</p> <p>is unstable and degrading, or will compromise land use objectives.</p> <p>Gully erosion will not exceed:</p> <p>30cm depth and 30cm width, and 100m in length</p> <p>Areas of unintended deposition >0.1 ha</p>	<p>Self-certification by Alcoa annually and / or inspection by Parks and Wildlife confirm landscape design is acceptable.</p>
<p>2.2 SUSTAINABLE GROWTH AND DEVELOPMENT</p>	<p>The pit floor has been ripped.</p>	<p>2.2.5 e Pit floor ripping</p>	<p>Rip compacted pit floor to at least 1.2 m, excluding batters and waste islands.</p> <p>Ripping must be undertaken as per criteria established in Alcoa/Parks and Wildlife Working arrangements.</p>	<p>Self-certification by Alcoa annually and inspection by Parks and Wildlife (where applicable) confirms pit floor ripping is acceptable.</p>
<p>2.3 CATCHMENT PROTECTION</p>	<p>Rehabilitated areas conform to water catchment management guidelines.</p>	<p>2.3.1 Catchment Protection</p>	<p>Areas will be stable with no evidence of recent erosion which would compromise stream water quality.</p> <p>There are no areas greater than 0.1 hectare with less than 0.5 native plants per square metre as identified from aerial photography or ground truthing on a 5-yearly basis.</p>	<p>Alcoa 9- and 15-month monitoring.</p> <p>Alcoa aerial photography, at ~5yrs of age.</p>

3.1 VEGETATION ESTABLISHMENT – First 5 years	The overstorey stocking of both jarrah and marri to meet standards.	3.1.1 Establishment of overstorey	The average number of stems/ha within a pit (9 month monitoring data): · Minimum: 600 eucalypt stems/ha · Maximum: 1400 eucalypt stems/ha · Target: 1000 eucalypt stems/ha (except haul roads and pits < 2 ha). · Minimum: 200 marri stems/ha · Minimum: 150 jarrah stems/ha. No rehabilitated sites (>2ha in size) have areas >0.5ha (as identified from either 9mth monitoring or subsequent review of aerial imagery at ~5yrs of age) with <100 stems/ha.	Alcoa 9- and 15-month monitoring. Alcoa aerial monitoring at ~5yrs of age
3.1 VEGETATION ESTABLISHMENT – First 5 years	There is an adequate legume density early in regeneration.	3.1.2 a Establishment of understorey - legume density	Minimum legumes 0.5 per square metre averaged over a pit assessed at 9-months.	Alcoa 9-month monitoring
3.1 VEGETATION ESTABLISHMENT – First 5 years	There is adequate plant species richness.	3.1.2 b Establishment of understorey - plant species richness	The species richness in monitoring plots in rehabilitated areas to be ≥60% of the average species richness in monitoring plots established in unmined forest.	Alcoa 15-month monitoring
3.1 VEGETATION ESTABLISHMENT – First 5 years	There is an adequate density of resprouter species, as defined by Bell (2001).	3.1.2 c Establishment of understorey - Resprouters	Minimum number of surviving resprouter species will be 200 plants/ha.	Alcoa 9- and 15-month monitoring
3.2 RESILIENCE OF VEGETATION – first 5 years		3.2.1 Weeds	No evidence that significant introductions of new weed species (environmental and declared) are persisting or that weed competition is restraining sustainable	Alcoa 15-month monitoring

			development of native species.	
4.1 RESILIENCE OF VEGETATION 12 years and older	The rehabilitation is capable of persisting at the required standard following bushfire	4.1.1 Resilience of fire affected rehabilitation	A minimum of 300 stems/ha including; A minimum of 150 stems/ha Jarrah; and a minimum of 45 stems/ha Marri.	Alcoa plant survivorship survey. Timing dependent on wildfire and prescribed burn history of the area
4.1 RESILIENCE OF VEGETATION 12 years and older	Tree species not susceptible to dieback are present at an adequate stocking rate.	4.1.2 Dieback	Minimum 200 marri stems/ha at 9 months monitoring.	Alcoa 9-month monitoring
4.1 RESILIENCE OF VEGETATION 12 years and older	Rehabilitation is not preferentially attacked by non-dieback forest diseases.	4.1.3 Other Forest diseases	The disease expression in rehabilitation is no greater than in the un-mined forest.	Alcoa assessment.
4.1 RESILIENCE OF VEGETATION 12 years and older	Rehabilitation is not preferentially attacked by insects	4.1.4 Insects	The infestation of rehabilitation by insects is no greater than in the un-mined forest.	Alcoa assessment.
4.1 RESILIENCE OF VEGETATION 12 years and older	Mining rehabilitation areas are not showing evidence of being preferentially affected by drought.	Drought	There is no obvious variation or differential to unmined forest.	Alcoa assessment.

<p>4.2 LANDUSE (INCLUDING TIMBER PRODUCTION) Proposals to carry out thinning on rehabilitated mine sites</p>	<p>There is an adequate density of both jarrah and marri to meet timber production requirements.</p>	<p>4.2.1 Timber production Areas capable of producing sawlogs</p>	<p>The average number of stems/ha: · Minimum: 500 eucalypt stems/ha · Maximum: 1300 eucalypt stems/ha · Target: 900 eucalypt stems/ha (except haul roads and pits <2 ha). · Minimum: 200 marri stems/ha · Minimum: 150 jarrah stems/ha. Based on review of aerial imagery, no rehabilitated sites (>2ha in size) have areas >0.5ha with <100 stems/ha At time of hand back the subject region has a minimum of 250 stems/ha combined total of Jarrah/Marri with the potential to produce a straight bole with a minimum of 3 m of potential future sawlog (excludes stump height). Evidence provided from plot monitoring, research studies, random sampling and aerial photography will be used to estimate density and potential bole length. The timber production landuse criteria only apply to the percentage of rehabilitated area that had a timber production landuse prior to mining, i.e. if 15% of the area mined had no timber production potential, then only 85% of the rehabilitated area needs to meet the timber production landuse criteria.</p>	<p>Alcoa 9- and 15-month monitoring</p>
<p>4.2 LANDUSE (INCLUDING</p>	<p>Heavily stocked stands may, be</p>	<p>4.2.2 Thinning</p>	<p>N/a</p>	<p>N/a</p>

TIMBER PRODUCTION) Proposals to carry out thinning on rehabilitated mine sites	thinned by an agreed proponent to encourage sawlog production or achieve other management objectives			
4.2 LANDUSE (INCLUDING TIMBER PRODUCTION)	There is an adequate understory layer in the regenerated pit.	4.2.3 Management of understory	Understorey vegetation meets the expected species richness, density and cover.	Alcoa 9- and 15-month monitoring
4.2 LANDUSE (INCLUDING TIMBER PRODUCTION)	The rehabilitation has been prescribed burnt (at least once) or a wildfire has burnt the area, or the area is on an approved Parks and Wildlife burning plan.	4.2.4 Management of Fire Risk	100% of the rehabilitated areas have received a prescribed fire or a wildfire or the area is on an approved Parks and Wildlife burning plan.	Alcoa assessment.

The types of rehabilitation monitoring are described in the sections below.

Rehabilitation Monitoring Program

The 9-month flora monitoring, carried out in 9 months from the onset of the wet season, comprises of transects to monitor Eucalypts and quadrats to monitor legumes. Eucalypt transects are 2 metres wide and 50 meters long, in which emergent *Eucalyptus marginata* (Jarrah) and *Corymbia calophylla* (Marri) seedlings are counted separately. At the end of each transect, four 2x2 meter legume quadrats are established, in which all living native legumes are counted as a single total (Figure AA-2).

Due to the diverse range of pit shapes, transects are not straight lines, but rather meandering paths through the rehabilitation. Establishing transects this way provides the flexibility to evenly cover the entire rehabilitation area and avoids undesired features such as habitat piles and re-established forest tracks.

The survey intensity is set as a percentage of each rehabilitation pit to ensure sufficient coverage. Specifically, the total area monitored for Eucalypt transects is at least 5% of the pit area and the total legume quadrat coverage is at least 0.8% of the pit area. This results in approximately five transect lengths (each with four quadrats) for every hectare of rehabilitation.

During 9-month monitoring, any weed species identified (even if it is outside a transect or quadrat) are recorded opportunistically.

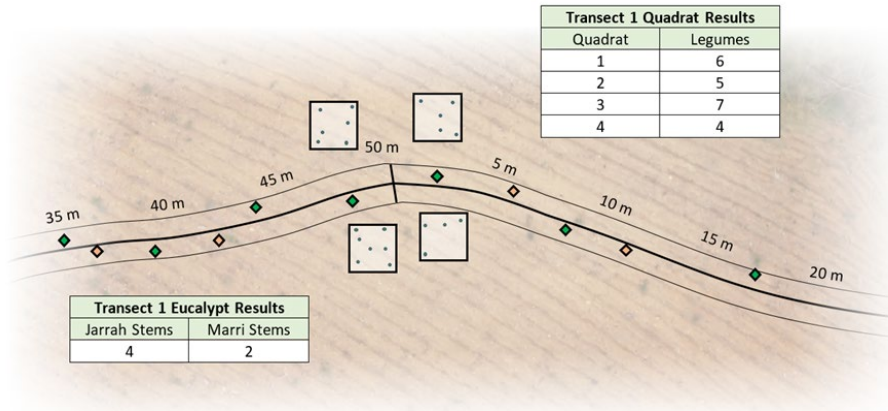


Figure AA-2: 9-month botanical monitoring, demonstrating the end of one Eucalypt transect, and the beginning of another, with associated legume quadrats

The 15-month flora monitoring (Figure AA-3 example) carried out 15 months from the onset of the wet season spring, assesses native species richness. Species richness plots comprise five 4 m x 4 m quadrats inside a 20 m x 20 m plot (Figure AA-4(A)) demarcated with bamboo canes on the corner of each quadrat. These are termed 'temporary plots'. Presence / absence of all living vascular plant species is recorded within in each quadrat. For rehabilitation pits where legume remediation has taken place, the total count of legumes in each quadrat is also recorded. The survey intensity is set at rate equal to one plot every five hectares rounded up (i.e., pits less than 5 hectares are allocated at least one plot, pits between 5 and 10 hectares get two plots etc).

Approximately one in every ten plots is established as a permanent plot. Quadrats in permanent plots are further split into four 2 m x 2 m quadrats, resulting in 20 total quadrats per permanent plot (Figure AA-4(B)). In each permanent plot quadrat, density and cover are also recorded for each living vascular plant species. In addition to being used for 15-month richness, permanent plots form the basis of Alcoa's long term rehabilitation monitoring program, whereby these plots are established to track long-term rehabilitation trajectory.



Figure AA-3: 15-month Flora Monitoring and typical vegetation establishment after 15 months

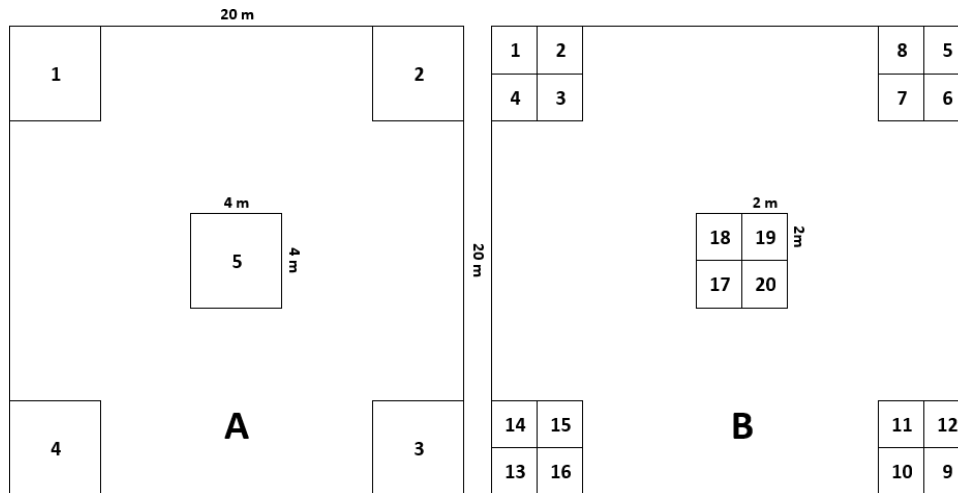


Figure AA-4: Plot design for Temporary plots (A) and Permanent plots (B)

The 24-month erosion monitoring program is to be carried out after the second wet season after rehabilitation has been established. Using stereometrics, the UAV photography is processed to produce Digital Elevation Models (DEMs) and Orthomosaics of the rehabilitated landscape. These two spatial datasets are utilised to assess erosion and measure specific metrics for comparison with the completion criteria.

The 5 year flora monitoring program is to be carried out when rehabilitation is approximately 5 years of age. A combination of aerial imagery and GIS tools will be utilised to identify areas in rehabilitation that have insufficient tree density. High resolution aerial imagery (~1m.px⁻¹) that is captured as close to 5 years post rehabilitation as possible will be loaded into GIS and overlaid with rehabilitation boundaries. Each pit is to be searched for areas of low canopy density, by the prevalence of exposed soil, and where identified, measured for the spatial area of impact. Polygons of areas exceeding the completion criteria metric will then be delineated using polygons. Identified areas may require an on-ground survey or further monitoring to determine if they will require the remediation action of planting Eucalypts.

A rehabilitation resilience monitoring program will be carried out when the rehabilitation reaches an establishment age of 12 years of age or older. A combination of LiDAR, RTK enabled UAV imagery, aerial photography, permanent plot monitoring (Figure AA-4 (B)) and research trials will be utilised to assess rehabilitation performance against resilience completion criteria 4.1.1 to 4.2.3.

Fauna Monitoring

Vertebrate fauna are only a part of the forest rehabilitation process and their progress from pioneering species toward a climax community is interrelated with the vegetation, fungi, microbial and invertebrate community development.

During the very early stages, very few species will colonise the area due to a lack of suitable habitat and higher levels of predation because of a lack of cover and retreat sites. Once the vegetation, invertebrates and microbial activity, etc invades or develops, additional niches open up and more species can colonise the area. In some cases, the abundance of early colonisers (i.e. pioneers) is reduced due to competition and changing habitat conditions. Rehabilitated areas will cycle through many iterations of this process and along the way, species abundance typically increases, and the various species reach population levels suitable for the habitat and resources available, until such time it becomes a climax community.

Alcoa has been running long-term fauna monitoring since 1992, examining faunal return to rehabilitation as it ages. Within broad boundaries, the restoration trajectory in rehabilitated areas will be apparent in vertebrate fauna monitoring data

Rehabilitation Remediation

Alcoa has integrated adaptive management practices within its rehabilitation monitoring program to ensure that the rehabilitation quality is on an appropriate trajectory towards achieving the completion criteria. In some cases, remediation works are required following monitoring surveys to address the following quality issues:

- Plant species richness (species range & spatial distribution)
- Timber production (target species stem density)
- Landform stability (subsidence, erosion & sedimentation)
- Aesthetics (landscape integration, slope, access & drainage)
- Pest & Diseases (Weeds, feral animals, insect infestation & forest disease)

Alcoa implements the practice of returning plant species to the rehabilitation areas at various stages via tube stock planting and legumes seeding. If completion criteria are not met then remediation actions take place. Figure AA-5 describes the timing of rehabilitation, monitoring and remediation interventions that may be applied over the six-year period after mining is completed. If, at 9 month monitoring, legume and eucalypt densities are below completion criteria targets in certain pits, then legumes are seeded into those pits that autumn, and eucalypts are planted the following winter. If the 15 month monitoring identifies pits below the species richness target in the completion criteria, additional species are planted.

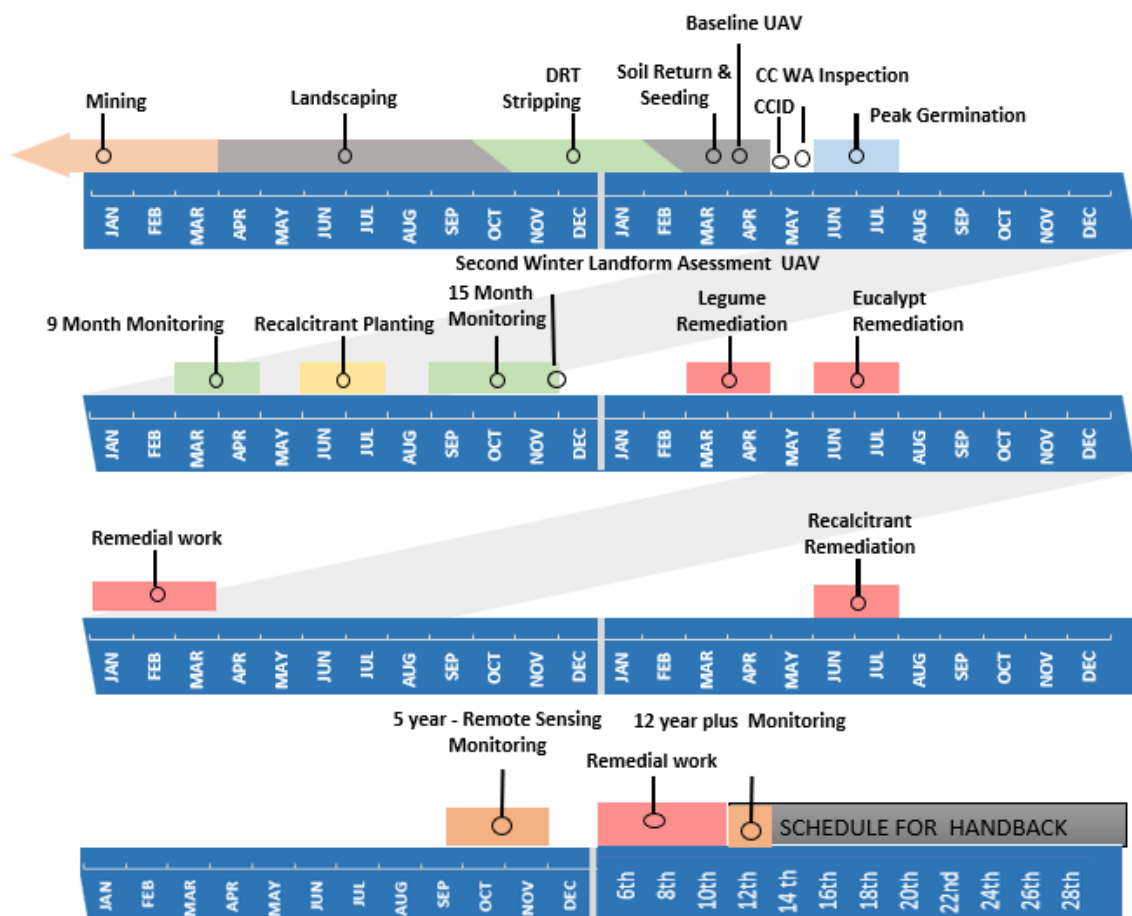


Figure AA-5: Rehabilitation monitoring and remediation timing

If monitoring indicates remediation is required due to erosion, re-work is completed using the smallest earthmoving machinery possible to minimise disturbance to surrounding establishing rehabilitation. During remediation, the soil profile is re-established, contour ripped, re-seeded and re-planted (if required).

Rehabilitation Area Certification Process (Handback)

Alcoa follows an MMPLG agreed approach to rehabilitation area certification and relinquishment of management responsibility. Alcoa refers to these steps as “sign-off” and “handback”, respectively.

Since rehabilitation practices and procedures have evolved over time and Completion Criteria are subject to periodic review, Alcoa’s rehabilitation areas are assessed for handback against differing criteria and expectations depending on the year of establishment (refer Table AA-3).

Rehabilitated areas established up to 1987 reflect the agreed practice at that time of establishing a non-jarrah forest ecosystem with restricted objectives and values and are collectively termed Early Era rehabilitation.

From 1988, with the objective of restoring a self-sustaining jarrah forest ecosystem, criteria were increasingly influenced by ecological considerations.

Table AA-3: Periods of rehabilitation establishment and associated Completion Criteria that are applicable for each period

Rehabilitation establishment year	Applicable Completion Criteria	Reference
1966-1987	Early Era (pre-1988) Rehabilitation. Formally accepted by the MMPLG 5 June 2002.	DoIR (2002, 2007)
1988-2004	Current Era (post-1988) Rehabilitation Formally accepted by MMPLG, 14 October 1998.	DoIR (2002)
2005-2015	Completion Criteria for 2005 onwards - Current Era Rehabilitation. Review completed and approved by MMPLG 15 March 2007.	DoIR (2007)
2016 onwards	This document	

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 operations are still nearby.

An Environment/Rehabilitation checklist has been developed to record the status of rehabilitation in the field. Historic rehabilitation records and aerial photographs are also used to assist with the assessment.

Assessment results and photographs taken at each site are stored in Alcoa’s Geographical Information System to ultimately assist DBCA with future management of the rehabilitation. The assessments indicate whether the site is exhibiting sustained growth and development. If a site is recorded as not meeting one of the criteria, it is recorded within Alcoa’s corrective action management system to inform rework planning.

Areas that do not meet the standards due to the presence of significant infrastructure, such as pit faces, are automatically reviewed with DBCA 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.

Applications for certificates of acceptance (referred to within Alcoa as “sign-off”), which signal successful completion of requirements, will be made by Alcoa on a mining region or sub-region basis, rather than at the individual pit scale. Therefore, it is likely that more than one set of criteria applicable to rehabilitation of different ages will be applicable and applied accordingly in the assessment of overall rehabilitation success.

There is an ongoing process prior to proposed handback of rehabilitated areas for Alcoa to internally monitor and confirm achievement of completion criteria prior to submission of applications for certificates of acceptance. This takes place at the various stages of completion, supported by monitoring data and self-audit checklists. DBCA reviews Alcoa's rehabilitation checklists, and monitoring data are provided to DBCA annually to allow field audits of the rehabilitation and timely feedback to Alcoa where appropriate.

The formal acceptance of rehabilitated areas by the State is achieved through the issue of a Certificate of Acceptance to Alcoa by the DBCA on behalf of the State. The indicative steps required to receive a Certificate of Acceptance are outlined below. Note that timeframes provided are intended to be the maximum required, and endeavours will be made to limit the time taken to the minimum necessary at each phase.

The process, responsibilities and timeline for rehabilitation area sign-off and handback is summarised in Table AA-4.

Table AA-4: Timeline for signoff and handback of completed rehabilitation

STEP	TIMING
1. Alcoa initiates discussion with the MMPLG ² signalling intent to submit an application for a Certificate of Acceptance (Final Submission Report - Section 3.5), including confirmation of the scope and content of the Final Submission Report (based on Appendix B) for the area involved.	Alcoa to initiate.
2. Alcoa provides a draft Final Submission Report to the MMPLG for review and confirmation of content.	Alcoa to initiate.
3. MMPLG reviews the draft Final Submission Report and provides feedback on report content and presentation within 6 weeks.	6 weeks
4. Within 6 weeks Alcoa applies for a Certificate of Acceptance, including a Final Submission Report (Letter and report addressed to DSD attention MMPLG) which is distributed to MMPLG members.	6 weeks or TBA
5. Within 10 weeks of receiving the Final Submission Report, the MMPLG provides an Assessment Report to Alcoa,	8 weeks
6. Within 12 weeks of receiving the MMPLG Assessment Report, Alcoa submits a draft Action Plan to address any issues identified within the Assessment Report.	12 weeks or TBA
7. Within 4 weeks of receiving the draft Action Plan, MMPLG provides feedback to Alcoa identifying any further actions to be included in the Action Plan.	4 weeks
8. Within 12 weeks or as otherwise advised, Alcoa completes activities within the final Action Plan or identifies areas and proposed arrangements to address any 'further requirements' and submits evidence in the form of a Completion Report to the MMPLG.	12 weeks or TBA
9. Within 4 weeks of receipt, MMPLG completes review of the Completion Report and provides advice to Alcoa on the outcome. Then within 2 weeks, the Department of State Development (DSD) places an advertisement in the West Australian and on its website indicating that the MMPLG report on this application and associated documentation is publically available, with any comments accepted during a 4 week period (comments are to be acknowledged by DSD and forwarded to MMPLG members as they are received).	6 weeks
10. Within 6 weeks of the closing date for public comments, DSD and DPaW develop a response to public submissions in consultation with MMPLG members and Alcoa and provides a recommendation to MMPLG regarding the issue of a certificate of acceptance.	6 weeks
11. Within 2 weeks of a recommendation MMPLG meets and confirms a decision on whether to advise DPaW to issue a Certificate of Acceptance.	2 weeks
12. DPaW issues Alcoa with a Certificate of Acceptance within 8 weeks of supporting advice from MMPLG.	8 weeks
Maximum indicative timeframe from submission of draft Final Submission Report to issuing of Certificate of Acceptance	70 weeks
	Government
	Alcoa

Bauxite Mine Rehabilitation Activities and Sequencing

Mine site rehabilitation is integral to operations and occurs concurrently with all other mining activities. The shallow, mosaic nature of bauxite mining means a constantly moving footprint and progressive rehabilitation.

Rehabilitation activities are sequenced, planned and scheduled to achieve both qualitative and quantitative outcomes and targets.

A description of each sequenced rehabilitation activity is provided below:

Timber Harvesting and Clearing

Alcoa works closely with the Western Australian Governments Forest Products Commission (FPC) to ensure mine clearing involves sustainable timber harvesting and maximises wood residue re-use practices.

The harvesting and clearing process and sequence (see Figure AA-6) includes:

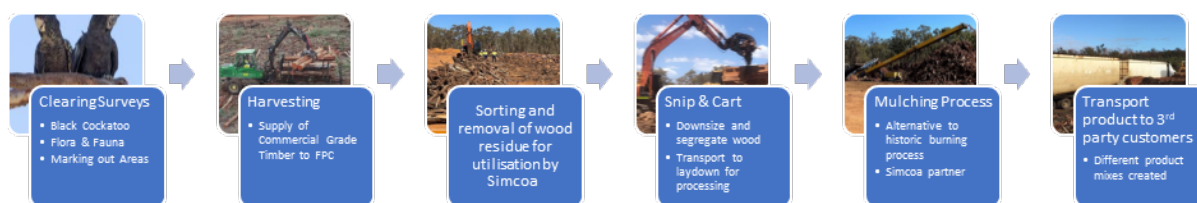


Figure AA-6: Clearing and Harvesting Sequence

- Pre-mining surveys: undertaken by Alcoa including, but are not limited to, heritage, flora, fauna and black cockatoo habitats.
- Harvesting: Harvesting all merchantable log products and retention of 'habitat' logs for subsequent use in mine rehabilitation.
- Sorting and removal: of a portion of the wood residue by third parties: Following timber harvesting activities, Alcoa works with other authorised third parties to further utilise the remaining wood residues. Simcoa Operations Pty Ltd (Simcoa), have access to the wood residues to meet their requirements under the *Silicon (Kemerton) Agreement Act 1987*.
- Snipping & Carting: Downsizing and transportation of remaining wood to laydown for Mulch processing: Alcoa has implemented a non-burning solution for remaining wood residue via a creating a mulch product for supply to 3rd parties.

Soil Stripping

Following timber harvesting and woody residue removal, the soil profile above the caprock is mechanically stripped in two discrete layers, known as topsoil and overburden. Topsoil can be further defined, dependent on its use, as fresh topsoil⁴ or fallow topsoil.

Fresh topsoil is sourced from an area (donor site), cleared nominally from late spring to mid-summer of the commencing rehabilitation season. Fresh topsoil is stripped to a depth of approximately 75mm, where the seed bank is maximised. This soil contains native seed, nutrients and beneficial organisms that support successful revegetation, providing approximately 60% of species diversity in the 'recipient' rehabilitation area. Fresh topsoil can be stored in stockpiles for up to 3 months prior to use in rehabilitation areas.

Topsoil stripped outside of the optimal season and placed in stockpiles (for longer than 3 months), is known to degrade in quality, primarily due to water ingress and composting and is defined as fallow topsoil. This soil is nominally stripped to approximately 100mm, dependent on total soil depth of the cleared area, and is stored in stockpiles for use when reconstructing the soil profile in future rehabilitation areas.

Overburden soil describes the remainder of the soil profile beneath the topsoil and is mechanically stripped down to caprock and stored in separate stockpiles for future use in reconstructing the soil profile in future rehabilitation areas.

Both overburden and topsoil materials are classified according to their dieback infection status and stockpiled separately.

⁴ Fresh topsoil was previously called DRT or direct return topsoil.

Pre-Landscape Ripping

Prior to the reshaping of the landscape, the activity of pre-landscape ripping occurs (see Figure AA-7). Pre-landscape ripping utilises a large straight or winged tine implement attached to a bulldozer, to break ground that has been heavily compacted during the mining process, including pit floor adjacent to the pit faces and through in-pit haul roads. Pre-landscape ripping can be completed throughout the year.

Pre-landscape ripping is additionally conducted across areas of pit floor that will receive more than 0.5m of fill material during the landscaping activity. It is also used to loosen pit floor material that is required to be relocated to meet the design of the rehabilitated area. Pre-landscape ripping must meet a minimum of 1.2m depth with a target of 1.5m. The purpose of pre-landscape ripping is to relieve compaction of the ground prior to landscaping and to assist with the post-landscape ripping activity and intent.



Figure AA-7: Pre-landscape ripping

Landscaping

The objective of landscaping is to establish a stable landform that integrates with the surrounding unmined forest (see [Figure AA-12](#)) and can be completed in most pits throughout the year. Key elements of landscaping are:

- Vertical faces at pit edges are re-shaped to achieve acceptable slope angles that blend in with the surrounding natural forest landscape (see [Figure AA-8](#)).
- Waste island caprock is broken and / or removed and underlying material is battered down to meet completion criteria slope angles or utilised within the pit.
- Pit edges are blended with the surrounding forest floor, taking into consideration soil return depths.
- Pit edge impediments from mining are removed ie, stumps/logs salvaged for fauna habitat construction.
- Bulk cut and fill material movement is completed to meet completion criteria landscaping standards.
- Oversize rock/material is removed from the pit or buried at depth.
- Pits are landscaped to maximise infiltration and minimise surface water runoff that may cause erosion within the pit and sedimentation in the surrounding forest.
- Landscaping finish is smoothed off in preparation for post-landscape ripping activity.
- Long term forest access tracks are reinstated as agreed with DBCA.



Figure AA-8: Landscaping - vertical pit face reshaping and blending

Post-Landscape Ripping

Post-landscape ripping (as shown in Figure AA-9) of the final landscaped pit floor is carried out with a winged tine (Figure AA-10) or a straight tine in extremely rocky areas where the winged tine would be damaged) to a minimum of 1.2 m (target 1.5m). This ripping relieves any further compaction created during the landscaping activity and has been found to;

- create a structured root zone, enabling better vegetation establishment
- increase recharge and plant-available water
- improve surface water infiltration, reducing erosion and
- improve consistency of contour ripping



Figure AA-9: Post-landscape ripping



Figure AA-10: Winged tine ripping

Soil Return

Soil return activities intend to reconstruct the soil profile, in the rehabilitated areas, as was removed during soil stripping activities.

Overburden soil is applied first to the final landscaped surface, with topsoil laid on top of the overburden. Soil return (as shown in Figure AA-11) provides a soil medium for vegetation establishment and sustainable growth.

Fresh topsoil is the final seed rich layer of the complete soil profile. This is applied via a spreader to achieve uniformity across the entire rehabilitated area (Figure AA-12).

A 300mm combined soil profile is targeted however reduced depths of return are permissible on the basis that it is demonstrated that shallower soils were naturally present. The application for approval to use a reduced thickness is usually made on a sub-region basis.

Dependent on ore grade and the timing of development of a mining area, there may be opportunities to return a soil profile, directly from a stripped area to a rehabilitation pit nearby. This is called 'direct' return topsoil and / or overburden. This direct return soil profile activity requires the topsoil from the donor area to be stockpiled for a very short period of time until the overburden is laid onto the landscaped surface. The topsoil is then placed on top of the overburden.

Where dieback free soil is to be returned to a pit, the utmost consideration is given to prioritise the placement of this soil to maximise its longevity. Dieback free soil is placed high in the landscape and wherever possible placed adjacent to dieback free forest.

Soil return is scheduled during dry periods in spring and summer to avoid damage to topsoil structure and negative impact on seed viability during the process.



Figure AA-11: Soil Return



Figure AA-12: Landscaping completion and Fresh Topsoil Return

Fauna Habitat Return

Constructed fauna habitat piles are strategically placed within the rehabilitated areas as shown in [Figure AA-13](#) to provide protection for fauna traversing the area and to encourage fauna back to the area from the surrounding forest. Key elements of fauna habitat establishment are:

- Constructed fauna habitats are established at a target rate of one per hectare (minimum one per two hectares).
- Habitats constructed with large logs and rocks.
- Habitats may exacerbate erosion risk on steep slope and are placed low in the landscape in these circumstances.



Figure AA-13: Constructed Fauna Habitat

Contour Ripping

Contour ripping of the rehabilitated area occurs post fauna habitat pile installation to remove compaction caused by the soil return operations and produce, on contour furrows, that promote surface water infiltration and reduce the risk of surface erosion until the vegetation is established. Key elements of contour ripping are:

- Ripping is carried out on contour with a multi-tine ripping implement.
- Pit edges and waste islands are scarified or shallow ripped to avoid bringing rocks to the rehabilitation surface or disturbing the roots on the forest tree line and
- Fauna habitat piles are rolled over onto the ripped surface to ensure the entire area is contour ripped.

Seeding and planting

Seeds within the topsoil seed bank are the main source of plant species diversity in the rehabilitation. Some species do not store their seed in the soil seed bank, rather, they store it in the canopy. Some species do not set seed, and generally propagate vegetatively. Hence, there are three methods of plant return to the rehabilitation – seeds within the topsoil seed bank, seeds applied with an airseeder or by hand, plants that are planted by hand (Figure AA-14).

Seeding is undertaken either at the same time as (air seeding), or as soon as possible after (target maximum 7 days – hand seeding) contour ripping. Some species within the seed mix are pre-treated to alleviate seed dormancy.

Plant species that do not return from the topsoil seed bank or from applied seed are called “recalcitrant” and are grown from seed (for species where seeds are scarce), cuttings or by tissue culture (Koch 2007).

Key elements of seeding and planting are:

- Seed collection from approved Huntly and Willowdale Mine provenance zones and informed by genetic analysis.
- Application of seed mix including understorey and overstorey species.
- Standard prescription for majority of mine pits is to establish 70 per cent *E. marginata* and 30 per cent *C. calophylla*.
- For stream crossings or low areas within pits, *E. patens* and *E. megacarpa* are used in proportions relating to density in surrounding areas, calculated from permanent monitoring plots in stream zones.
- Mixed understorey seed sown at the rate of 1-2 kg/ha. Seeding as soon as possible after contour ripping operations (preferably within 7 days).

- Seed applied mechanically at time of contour ripping or by hand.
- Planting recalcitrant seedlings, following significant autumn/winter rains in the second year after completion of soil return etc.
- Use of Dieback free nursery stock.
- Rushes and sedges that are subject to browsing by kangaroos are protected by small mesh guards to enhance plant establishment and survival.
- If required, legume reseedling, Eucalypt planting and recalcitrant planting is done in rehabilitated areas where the cover does not meet the required Completion Criteria.



Figure AA-14: Planting

Fertilising

Fertiliser is applied to rehabilitated areas, one year post seeding/planting, in the spring (Figure 15).



Figure AA-15: Fertilisation Application

Applied Research

Alcoa is applying the following standards and guidelines to its rehabilitation practices:

- Commander, L E, ed., 2021 Florabank Guidelines - Best Practice Guidelines for Native Seed Collection and Use. 2nd ed. Australia: FloraBank Consortium.
- Commander, L.E. D.J. Coates, L. Broadhurst, C.A. Offord, R.O. Makinson, and M. Matthes, eds. 2018 Guidelines for the Translocation of Threatened Plants in Australia. 3rd ed. Canberra: Australian Network for Plant Conservation.
- Gann, George D., et al. 2019 "International Principles and Standards for the Practice of Ecological Restoration. Second Edition." Restoration Ecology 27, no. S1: S1-S47.
- Young, R.E., Manero, A., Miller, B.P., Kragt, M.E., Standish, R.J., Jasper, D.A., & Boggs, G.S. (2019). A framework for developing mine-site completion criteria in Western Australia. The Western Australian Biodiversity Science Institute, Perth, Western Australia.
- Broadhurst L, Prober SM, Boggs G, Bush D, Breed MF, Dickson F, Harrison PA, Jellinek S, Lynch AJJ, Rymer PD, Young RE, Commander LE (eds) 2023, Guidelines for embedded experiments in ecological restoration and management in Australia (CSIRO).

Once published, Alcoa will apply the following guidelines:

- Alcoa currently has two active research projects with CRC TiME:
- Natural capital accounting in the mining sector, with Murdoch and Curtin University. This project is looking at the long-term rehabilitation monitoring results and testing the application of a natural capital accounting framework. <https://crctime.com.au/research/projects/project-2-7/>
- Australian Seed Scaling Initiative: this project builds upon new seeding mechanisms to improve rehabilitation. <https://crctime.com.au/research/projects/project-3-13/>

Three PhD research programs are currently underway:

- Savuti Henningson regarding germination of Hibbertia species to improve return to rehabilitation
- Eve McCallum regarding the causes of erosion in rehabilitation.
- Johan Wasserman regarding species diversity in the Jarrah forest and in the rehabilitation.

Research findings will be integrated into management plans and other internal documents. Alcoa has a research bibliography with research articles co-authored by staff members, and thesis of students supervised by staff members undertaken onsite. This research is regularly considered and incorporated into management practices.

APPENDIX B: Rehabilitation Schedule

Alcoa is committed to increasing the completed rehabilitation every year to meet a total of 3,159 ha between 2024 to 2027. The current 2024 Rehabilitation Schedule is presented below and includes the 5-year rolling and 36-month Rehabilitation Schedules. These schedules should be considered indicative and will be further refined on an annual basis as a result of the mine plan, completed rehabilitation in the previous season, and rehabilitation resources.

5 Year rolling Rehabilitation Schedule:

The 5-year rolling Rehabilitation Schedule (Table AB-1) forecasts quantities and feeds into the 36-month Rehabilitation Schedule.

The rehabilitation acceleration project runs over the period 2024 to 2027. As illustrated in the 5- Year Rehabilitation Schedule, the rehabilitation acceleration project demonstrates an increase in rehabilitation area delivered annually and forecasts the execution of 3,159ha over the period.

Table AB-1: 5-year rolling Rehabilitation Schedule

Site	Area (ha)				
	Year 1	Year 2	Year 3	Year 4	Year 5
	2024	2025	2026	2027	2028
Huntly	459	500	596	754	750
Willowdale	182	200	220	248	250
TOTAL	641	700	816	1002	1000
Cumulative Total	641	1,341	2,157	3,159	4,159

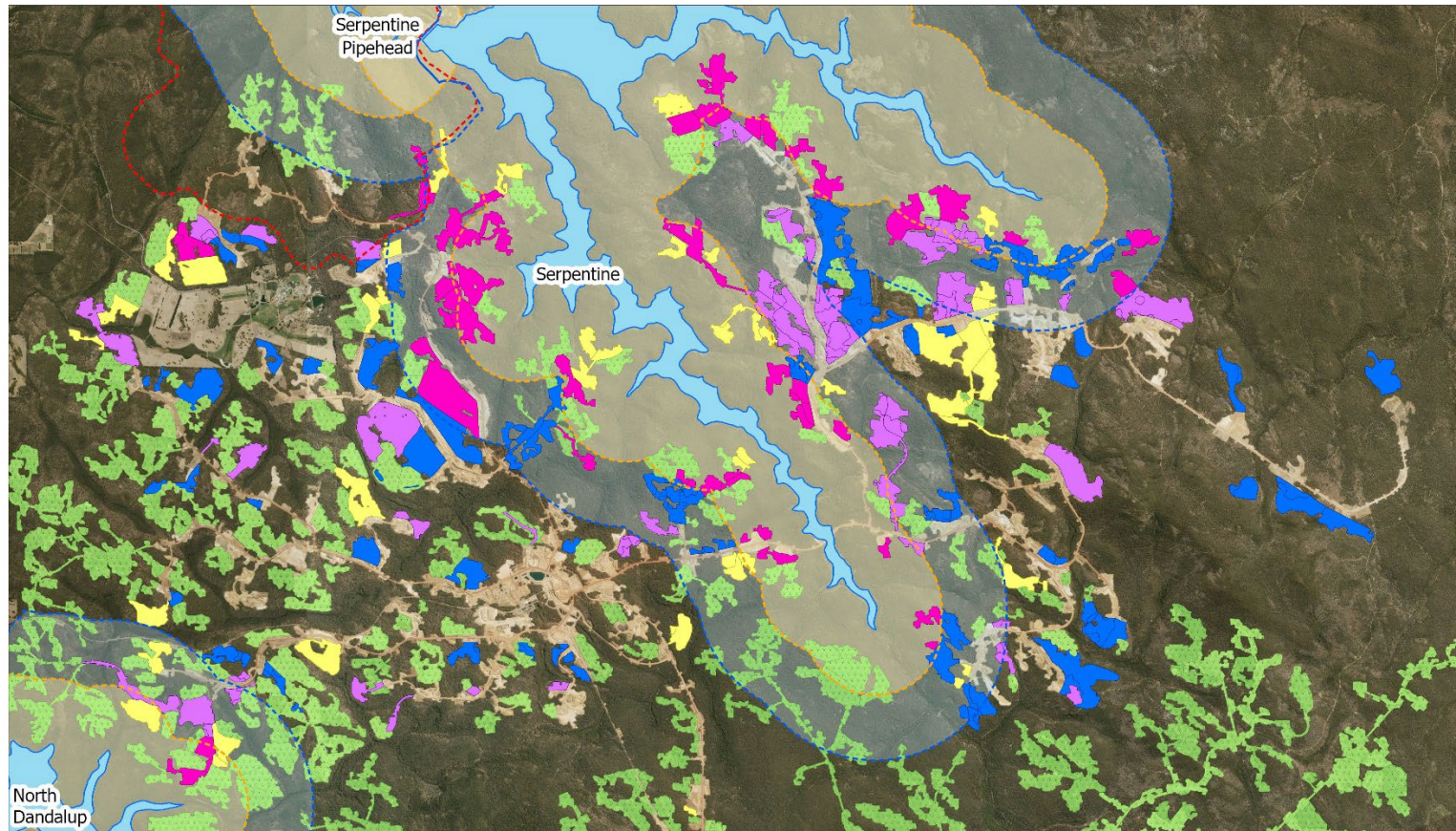
36-month Rehabilitation Schedule:

Alcoa’s WA Mining Medium-Term Planning (“MTP”) team operate within a 36-month period. The 36-month Rehabilitation Schedule is generated from the 5-Year Rehabilitation Schedule with direct consideration with the 36-month Mine Plan. This process identifies specific rehabilitation pits targeted for Rehabilitation prioritising Rehabilitation within the drinking water catchment and compliance to MMP Conditions. The 36-month Mine Plan and 36-month Rehabilitation Schedule are interlinked to exhaust ore from identified Rehabilitation Pits and enable delivery of the Rehabilitation Schedule. The rehabilitation areas are shown in Figure AB-1 and Figure AB-2 for Huntly and Willowdale, respectively.

Alcoa has also prioritised rehabilitation within the MMP Condition 5 defined areas:

- Within 1km of the reservoir
- Within Serpentine Pipehead Catchment
- Within any area with an average slope greater than 16% within an RPZ
- Within 10m of any Black Cockatoo nesting or significant tree

Table AB-2: 36 Month Rehabilitation Schedule – prioritisation of drinking water and Condition 5 defined areas provides further detail.



Huntly Rehab Plan

2025-2027

Updated: 17/06/2024

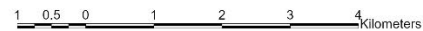
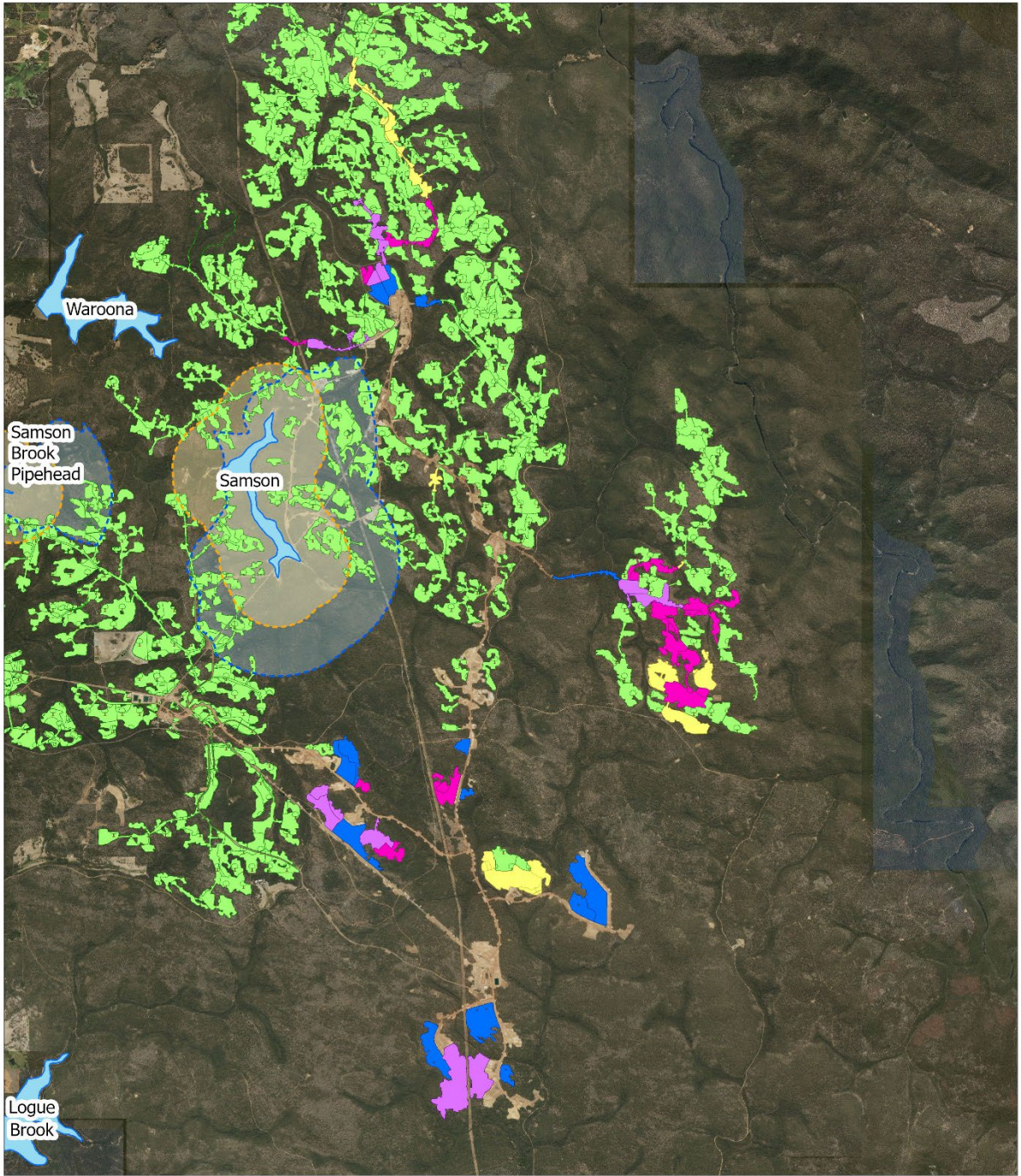


Figure AB-1: Huntly Rehabilitation Schedule 2025-2027



Willowdale Rehab Plan

2025-2027

Updated: 22/05/2024

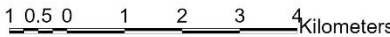


Figure AB-2: Willowdale Rehabilitation Schedule 2025-2027

Table AB-2: 36 Month Rehabilitation Schedule – prioritisation of drinking water and Condition 5 defined areas

Site	Defined Area	Reservoir	Pre-2024 Open Areas	Scheduled Rehabilitated Area (ha)		% of Open Areas Scheduled for Rehabilitation					
				2024	2025	2026	2027	2024	2025	2026	2027
Huntly	within 1km of the top water level of a reservoir	Serpentine Dam	501.9	107.4	278.7	28.0	33.2	21.4	55.5	5.6	6.6
		Serpentine Pipehead	0	0	0	0	0	0	0	0	0
		North Dandalup	43.5	22.0	16.2	4.2	0	50.6	37.2	9.7	0
	Within the Serpentine Pipehead Dam Catchment	Serpentine Pipehead	69.6	1.6	9.6	5.8	0	2.3	13.8	8.3	0
	In any area with an average slope greater than 16% within the Reservoir Protection Zone	-	42.5	0.7	0.8	33.7	6.7	1.6	1.9	79.3	15.8
	Within 10 metres of any Black Cockatoo nesting trees or Black Cockatoo significant trees	-	0.6	0.1	0.2	0.1	0	16.7	33.3	16.7	0
	Within the RPZ	-	1,565.9	212.1	475.2	329.8	260.3	13.5	30.3	21.1	16.6
	Within Public Drinking Water Catchment	-	3,999.6	466.2	500.9	595.5	754.4	11.7	12.5	14.9	18.9
Willowdale	Within 1km of the top water level of a reservoir	Samson Dam	51.5	0	0	0	0	0	0	0	0
		Samson Brook Pipehead	2.0	0	0	0	0	0	0	0	0
	In any area with an average slope greater than 16% within the Reservoir Protection Zone	-	0	0	0	0	0	0	0	0	0
	Within 10 metres of any Black Cockatoo nesting trees or Black Cockatoo significant trees	-	0.1	0	0	0	0	0	0	0	0
	Within the RPZ	-	98.1	0	0	0	0	0	0	0	0
	Within Public Drinking Water Catchment	-	1248.0	77.2	56.3	162.1	242.6	6.2	4.5	13.0	19.4

Table AB-2 Notes:

- Years refers to Rehabilitation Season Year. For example: 2024 refers to the Rehabilitation Season commencing May 2023 and completing May 2024

APPENDIX C: Rehabilitation Soil Profile Hydrology

Alcoa undertook a numerical water modelling assessment of the rehabilitation soil profile reconstructed by Alcoa following bauxite mining. The objective was to evaluate soil profile conditions of rehabilitation surface water runoff to inform the water storage capacity (cubic metres water storage per hectare of rehabilitation) designed by Alcoa within the final rehabilitated surface for the capture of surface water runoff shown below (in Figure AC-1). The assessment was undertaken by O’Kane Consultants (Taylor 2023) with modelling outcomes reviewed by 1) Advisian (Zic 2023), 2) Western Land and Water consulting (Smith 2023).

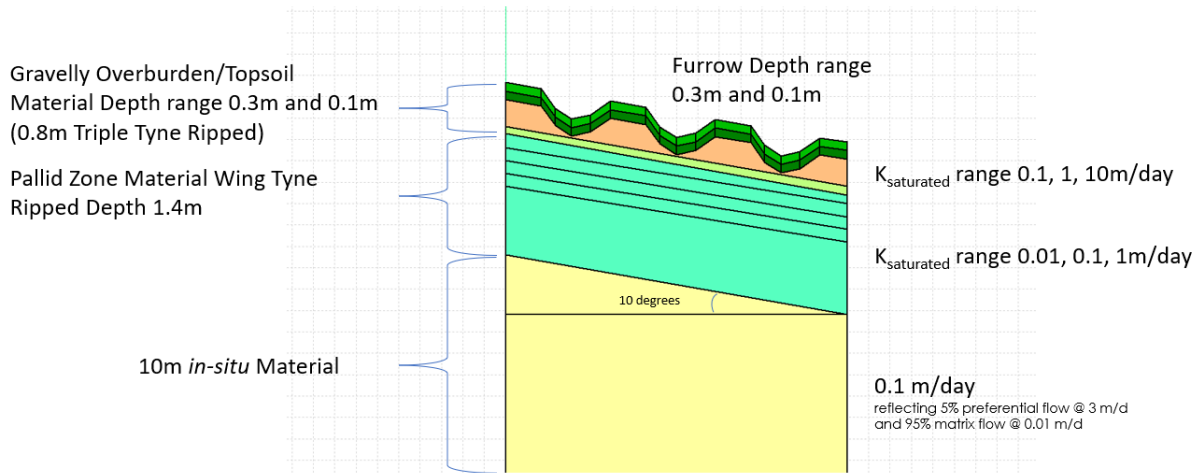


Figure AC-1: Model profile showing range of model setup assumptions

The basis of assumption for saturated hydraulic conductivity and moisture storage curves include reference to Croton and Bari 1997, Ruprecht 1991 and Kew and Gilkes 2006. Findings from the Field Infiltration Rate Test Program on rehabilitation surfaces infiltration rate will be a source of ongoing validation.

The existing water storage capacity designed by Alcoa within the final rehabilitated surface was based upon an analytical rehabilitation water model, which simplified the infiltration and storage properties of the rehabilitation soil profile. This assessment was a numerical expression of the rehabilitation soil profile taking greater account of infiltration and storage properties within and between soil layers, lateral water flow relative to an hourly time step climate file with design rainfall events.

The conceptual model was derived based upon Alcoa’s rehabilitation completion criteria requirements for reconstructed rehabilitation soil profile. The modelling comprised a series of model scenarios to reflect the range of variability within key soil profile parameters such as different soil layers saturated hydraulic conductivity and water storage, depth of contour ripping furrow and depth of gravelly overburden/topsoil layer.

Outcomes of this assessment were a modified water storage capacity for use by Alcoa within rehabilitation designs following consultations with DBCA and associated further Alcoa technical work to validate and enhance rehabilitation soil profile effectiveness.