# 19.0 Rehabilitation and Decommissioning

## 19.1 Background

Alcan Gove has been undertaking active rehabilitation at the mine site since soon after mining began in 1971. The objective for rehabilitation at the mine from the beginning has been is to ensure that the structure and composition of the final vegetation community is the same as that which was removed and that it is self-sustaining to the same extent as the original community. This objective is based on the wishes of traditional owners and the implementation of the program is conducted with the support and involvement of local Aboriginal people. A high level success in mine rehabilitation at Alcan Gove has been measured using techniques developed by the CSIRO. A Northern Territory University PhD study has also been conducted on the use of rehabilitated areas by birds. The diversity and number of birds using older rehabilitated areas have been shown in this study to be comparable with surrounding un-cleared vegetation.

Extensive research has also been undertaken in developing effective strategies for rehabilitation at the residue disposal area (RDA). Two decommissioned residue disposal areas (Taylor's Pond and Northern Pond) have previously been revegetated. However, because these early disposal areas utilised a "wet disposal" technique they were more difficult to successfully revegetate compared to the current disposal areas which use a "dry stacking" technique. The revegetation of the decommissioned has not been completely effective and options to improve the standard of revegetation of these areas are being examined. The other residue disposal areas are still in use.

Alcan Gove has a closure plan aimed at identifying the preferred final land use and closure criteria for each of the following operations areas:

- Mine and conveyor corridor;
- Refinery and port;
- Residue disposal area; and
- Town (Nhulunbuy).

This closure plan has been submitted to the Northern Territory Department for Business, Industry and Resource Development (DBIRD) under the *Mining Management Act and Regulations 2001* and has been approved in principle.

The closure plan is the basis for the provision of a security for the eventual return of the mine, refinery and associated areas to the traditional owners.

## 19.2 Rehabilitation and Closure Standards

Alcan Gove mining operations are regulated by the *Mining Management Act (2001)*. The Act requires existing and proposed new mines to obtain an Authorisation to carry out mining activities. To obtain the Authorisation, it is necessary to have prepared an approved Mining Management Plan which must also include a "plan and costing of closure activities". In response to this requirement, Alcan Gove has developed a closure strategy for the site. This section presents the key components of that closure strategy.

Alcan's Environment Health and Safety (EHS) Policy has some guiding principles related to closure, including the following:

- Minimise any adverse environmental impact from operations and business practices;
- Use natural resources and energy more efficiently through the effective use of management systems that continually improve EHS performance;
- Comply with legal requirements and Alcan's internal standards; and
- Engage in open and transparent communication with stakeholders to achieve greater environmental, health and safety understanding and to improve performance.

Alcan Gove is also a signatory to the Australian Minerals Industry Code for Environmental Management. This code stipulates seven principles of environmental management which include planning for mine closure. The Minerals Council of Australia (MCA) "Strategic Framework for Mine Closure" (MCA, 2000) provides a consistent approach to mine closure planning across Australia and has been adopted as the basis of the Alcan Gove closure plan.

The following broad closure goals that have been adopted by Alcan Gove recognise the above:

- Develop an integrated, holistic and fundamentally risk based closure plan to provide a structured framework for closure;
- Maximise the opportunities for longer term post operational employment;
- Develop beneficial landscapes;
- Preserve the rich and varied historical heritage of the area.;
- Construct landforms that are made of safe and stable in both the geotechnical and geochemical sense; and
- Ensure that the process of closure and lease relinquishment occurs in an orderly, cost effective and timely manner.

## 19.3 Mine and Conveyor Corridor

Table 19.3.1 shows the various land use activities (domains) and their respective areas within the mine and conveyor corridor area.

**Table 19.3.1**
**Mine and Conveyor Corridor Domains**

| Domain Name | Brief Description | Approx Area (ha) |
|---|---|---|
| Mining in Progress | Land that has been cleared and overburden stripped in preparation for mining, mining in progress, and areas where mining has been completed but rehabilitation has not commenced. Also includes related haul roads within the area. | 302 |
| Cleared Mine Land | Land that has been cleared in preparation for overburden stripping and mining. | 736 |
| Ore Body | Land that has an exploitable reserve in-situ that has had minimal disturbance. | 3,570 |
| Airport – Mined | Portion of Gove Airport that is to be mined. | 42 |
| Gove Airport | Airport operations and proposed western runway extension servicing Gove community. Also includes Bureau of Meteorology and related facilities. | 94 |
| Mine Infrastructure | Area includes offices, crusher, workshops and oily water treatment facility. | 10.6 |

| Domain Name | Brief Description | Approx Area (ha) |
|---|---|---|
| Mine Laydown | Land that is cleared but not mined. Largely used for laydowns, runoff mine dumps and training activities. | 27.4 |
| Mine Rehab | Land where mining has been completed and rehabilitation has commenced, completed or under monitoring and maintenance. Also includes haul roads, access roads, firebreaks and most of the bore field that bisect rehabilitation areas. | 2,296 |
| Conveyor Corridor | This corridor contains the conveyor, transfer stations, water pipeline, power transmission lines, fibre optic cable and access roadway. | 290 |
| Mine Lease Balance | SML 11 Part 1 land that will not be utilized. Also included are main roads and access tracks. | 12,980 |
| Mine Waste Dumps | Areas that have been or are currently being used as a waste dumps. | 5.5 |

### 19.3.1 Mine Rehabilitation

Mining and mine rehabilitation at Alcan Gove is an integrated process which is carried out progressively to minimise the area of disturbance at any one time. Development of the rehabilitation plan and its implementation is the responsibility of mine management and the operators. The mine plan fully integrates all rehabilitation activities under the guidance of a contracted rehabilitation consultant. Rehabilitation planning includes the following:

- Assessment and design of drainage control and slopes;
- Soil types;
- Topsoil management;
- Species mix;
- Seed collection ; and
- Seed application.

In preparation for mining, timber is chain cleared, raked into windrows and burnt. Topsoil and sub-soil are stripped and placed on the mine floor (previously mined area) and deep ripped prior to seeding. This minimises the need for topsoil stockpiling and reduces the loss of seed viability for most species.

Seeds from native tree and shrubs indigenous to the mine lease are collected, dried, cleaned and fumigated. Annual collections are used to maintain the diversity in the floral gene pool. Local Yolngu people are engaged to assist with seed collection.

Seeding of native plants and broadcasting of grass/fertiliser mix on soils placed on the mine floor occurs during November and December The seed in the topsoil is normally sufficient for the regeneration of ground cover and grasses. However, mid and upper canopy tree regeneration from the topsoil is poor and requires additional seed to be sown. An average seed mix contains up to 20 species of native seed (0.4 to 0.6 kg/ha). The seeding rates vary depending on soil structure, organic material, and the anticipated seed bank in the topsoil.

Experience has shown that a single application of superphosphate at 150 - 200 kg/ha is adequate to promote early growth. Mixed and broadcast with the fertiliser are the pasture grasses *Chloris gayana* and *Sorgum almum*. These pasture grasses protect the soil from erosion and provide a microclimate that promotes the germination and establishment of native trees. Within four to five years, these grasses fade out due to competition from native

vegetation and decline in fertility. No other fertiliser is used, and the phosphorus is readily taken up by the aluminium and iron sesqui-oxides in the bauxite.

At the request of the local community, *Vitex glabrata* and *V. acuminata* (Yolghu name "Wundan") have also been planted in the rehabilitation areas. These small deciduous trees produce black berries which are harvested and eaten by Aboriginal people. Seeds of these species are collected and hand-planted in new rehabilitation areas.

After mining, the topography and drainage morphology is gently undulating and mostly internally draining due to the shallow depth of excavation to extract ore, and the high infiltration rates of the gravelly soils. Runoff water quality is managed at the mine by ensuring that all open pits drain internally and that infiltration exceeds the potential for pit overflow. An extreme rainfall event in April 1999 was the only time in 30 years of operation where significant water was retained in mine pits for more than a few days. This virtually eliminates the opportunity for mosquito breeding in these areas.

Erosion is controlled by minimising the size of catchments within the operating and rehabilitated areas and is assisted by the gently undulating nature of the bauxite plateau and naturally high infiltration rates. Most of the sediment that is carried by surface flows is deposited into the internal drainage system and hence does not flow off-site. In addition, it is standard practice as part of mine planning to leave a significant buffer of land between the edge of the plateau and excavation for mining.

Successful revegetation is achieved at the mine with one-off applications of fertiliser at a low rate. Consequently there is minimal risk of nutrient-contaminated groundwater or surface water. Monitoring of groundwater has shown no deterioration of groundwater quality in the area since mining operations began over 30 years ago.

### 19.3.2 Mine Closure Criteria

For the mine and conveyor corridor there are two proposed final land uses, namely:

- Return to natural vegetation; and
- Retain key infrastructure for community use and other business enterprises.

The nominated success criteria for each of these proposed land uses are outlined below. At this stage the criteria are fairly general and are indicative only of the type of criteria that will be used. Ongoing stakeholder consultation and research programs (current and planned) will ensure the criteria become specific to site environmental, social and economic conditions appropriate for the time of closure. These criteria will be the threshold or trigger levels to establish the necessary monitoring programs that will help measure eventual success of the closure strategies.

#### 19.3.2.1 Natural Vegetation

The proposed final land use for the natural vegetation areas is a diverse and self-sustaining native vegetation community compatible with the surrounding environment and land use.

The proposed criteria to be used to measure the success of the closure strategy for the natural vegetation areas are:

- Revegetation system functionality – Ecosystem Function Analysis (EFA) for nutrient cycling, stability and infiltration.
- Specific indicators including:
  - floristic mix (framework & traditional owner desired species)
  - macro fauna (birds)

– soil properties (eg physical/chemical properties, soil fauna).

An indicator of the mine rehabilitation success is the research project undertaken by the CSIRO Division of Wildlife and Ecology through the Australian Mineral Industries Research Association Ltd (AMIRA). The "Indicators of Ecosystem Rehabilitation Success and Selection of Demonstration Sites" 1996 includes Alcan Gove as a benchmark site for tropical Northern Australia. The project aimed to identify indicators that can be easily monitored to determine the progress of rehabilitated sites towards the natural ecosystems or a defined land use. Rehabilitation ages used for the EFA were 2, 6 and 16 years. These were compared witha control site (unmined Eucalypt woodland). For some of the indicators (soil stability and nutrient cycling) the 16 year old rehabilitation had significantly higher indices than the control site. This is due to exclusion of fire from the rehabilitation, as compared to local forest that is usually burnt every year.

#### 19.3.2.2 Retained Infrastructure

The infrastructure that may be retained at closure for subsequent community use would include:

- Gove Airport (currently managed and operated by the Nhulunbuy Corporation Ltd);
- Main roads (Yirrkala Road and Bulman Road) access tracks and strategic fire breaks (currently managed and operated by the NT Government Department of Infrastructure Planning and Environment);
- Half of the bore field and associated water supply infrastructure;
- Mine workshop, fuel storage, oily water facility and offices (suitable for a civil contractor); and
- The power and water reticulation.

The proposed success criteria for retained infrastructure include:

- Retained infrastructure meets appropriate building and safety codes;
- A viable entity is nominated enabling transfer of facility, lease, sublease or area; and
- Runoff water quality meets nominated standards.

### 19.3.3 Mine Closure Timing

Closure of the mine is a progressive process, in that the area rehabilitated annually more or less equates to the area accessed for mining. For the mine and conveyor infrastructure, closure will occur when the ore body has been exhausted. Adequate reserves of bauxite are estimated to be available within approved lease areas to supply the proposed expanded refinery for the next 23 years to year 2026. However this date could extend if modifications to the refinery process are made to enable higher silica levels to be managed.

Future exploration activities outside current lease areas could also extend the operational life of the mine and conveyor infrastructure for a number of years, thus further delaying closure. Should viable resources be identified outside of the existing lease area, further approvals would be required before mining could commence.

## 19.4 Refinery and Port

Table 19.4.1 shows the areas of land which have similar closure requirements (domains) that occur in the refinery and port area.

**Table 19.4.1**
**Refinery and Port Domains**

| Domain Name | Brief Description | Approx Area (ha) |
|---|---|---|
| Export Wharf | Facility utilised for export of bauxite & alumina, & receipt of caustic & fuel oil. | 12.7 |
| Cargo Wharf and Foreshore Road | Facility used for the receipt of general dry goods & limestone, & export of hydrate. | 16.7 |
| Harbour Tank Farm | Fuel oil and caustic bulk storage facilities. | 10.7 |
| Port Office and Hydrate Shed | Port office, hydrate shed and hardstand. Includes an acid tank and associated bund. | 3.3 |
| Light Fuel Tank Farm | Storage facilities for petrol, diesel, av-gas, jet fuel, lubes and greases. | 2.7 |
| Workshops | Workshop buildings, contractor buildings and associated laydown areas, plus roadways and refinery sewage plant. | 8.0 |
| Oily Water Facility | Oily water treatment unit. | 0.3 |
| Office Complex | Office complex, green space (Banyan Park), gatehouse, carparks and small laydown area. | 4.6 |
| Refinery Laydown Area | Scrap metal yard, partially disturbed areas, fire fighting training area, sandblasting facility etc. | 11.0 |
| Red and White Side - Caustic | Red side and white side production areas within the refinery. | 3.6 |
| Power Station | Steam power station, diesel power station and associated ancillary plant. | 2.6 |
| Seawater Channel | Seawater channel and western channel leading to the refinery outfall. | 0.8 |
| Bauxite Stockpiles | Stockpile area for the storage of bauxite for refinery and export. | 16.4 |
| Stockpile Creek | Stockpile Creek collects surface runoff from the north-east portion of red side, bauxite stockpiles and surrounds. | 5.6 |
| Export Conveyor and Pipelines | The area contains the conveyor line for bauxite & alumina export and pipelines for receipt of caustic and fuel oils. | 9.9 |
| Lime Plant, Calcination and Silos | Lime plant, calcination and alumina silos and associated laydown and stockpile areas. | 13.7 |
| Foreshore West | Foreshore area to the west of the refinery. | 22.5 |
| Northern Beach | This area extends eastwards from the alumina silos to the top of the conveyor laydown area. | 17.7 |
| Conveyor Laydown | Area previously used for the burning of conveyor belts, now used as a general purpose laydown and construction/ building waste transfer. | 2.9 |
| Melville Bay Road | Area includes green areas beside Melville Road to the east and west of the Stockpile Creek mouth. Also includes the residue pipelines to the RDA. | 31.9 |
| Seawater Intake | Intake facilities includes pipework, pumps and pier supporting structure. | 1.1 |

### 19.4.1 Refinery Rehabilitation

As all refinery and port areas are currently operational, rehabilitation of disturbed land has not yet commenced. Erosion and sediment control procedures existing on the site include the use of vegetated and hardstand areas to

minimise erosion and the use of surface water drains to minimise overland flow. Open areas not actively used are stabilised and/or landscaped.

### 19.4.2 Refinery Closure Criteria

For the refinery and port there are three proposed final land uses, namely:

- Return to natural marine ecosystem and coastal/terrestrial vegetation;
- Hardstand areas suitable for commercial or industrial activities; and
- Key infrastructure retained for other business enterprises.

The nominated success criteria for each of these proposed land uses are outlined below. At this stage the criteria are fairly general and are indicative only of the type of criteria that will used. Ongoing stakeholder consultation and research programs (current and planned) will ensure the criteria become specific to site environmental, social and economic conditions appropriate for the time of closure. These criteria will help determine the threshold or trigger levels established to measure eventual success of the closure strategies.

#### 19.4.2.1 Natural Marine Ecosystem and Coastal/Terrestrial Vegetation

Proposed completion criteria for marine ecosystem include:

- Colonisation of sea floor by macro benthic organisms comparable with control sites; and
- Marine sediment contaminants within standards set for local conditions utilising the processes and/or trigger values outlined in national guidelines (ANZECC, 2000).

The proposed criteria to be used to measure the success of the closure strategy for the coastal/terrestrial vegetation areas include:

- Revegetation system functionality – EFA for nutrient cycling, stability and infiltration.
- Specific indicators for:
  - floristic mix (framework and traditional owner desired species)
  - soil properties (eg physical/chemical properties, soil fauna)

#### 19.4.2.2 Hardstand Suitable for Commercial or Industrial Activities

Within the refinery area all process equipment will be removed, any residual soil contamination will be remediated, the ground will be stabilised against erosion and, where necessary, a drainage system will be installed.

The proposed criteria to be used to measure the success of the closure strategy for the hardstand areas include:

- Runoff water quality meets nominated standards based on national guidelines (surface and groundwater);
- Hardstand areas suitable for construction of commercial or industrial infrastructure; and
- A financially viable entity/organisation is nominated, enabling successful transfer of a facility, lease, sublease or parcel of land.

#### 19.4.2.3 Retained Infrastructure

The infrastructure proposed to be retained at closure for subsequent community use includes:

- Cargo wharf, port office and hydrate shed;
- Light fuel tank farm;
- Workshops;
- Front offices;
- Strategic roads; and
- Ancillary power station (diesel generators).

The proposed criteria to be used to measure the success of the closure strategy for the retained infrastructure include:

- Retained infrastructure meets appropriate building and safety codes;
- A viable entity is nominated enabling transfer of facility, lease, sublease or area; and
- Runoff water quality meets nominated standards (surface and groundwater).

### 19.4.3 Refinery Closure Timing

It is likely that the refinery could continue to operate well beyond 2053, the time at which leases would need to be renewed.

## 19.5 Residue Disposal Area

Table 19.5.1 shows the various land use activities and their respective areas (based on the current extent of disturbance) that occur in the residue disposal area.

**Table 19.5.1**
**Residue Disposal Area Domains**

| Domain Name | Brief Description | Approx Area (ha) |
|---|---|---|
| Yacht Club | Facilities include club house, boat ramp, carpark, washdown pad, boat sheds, boat park. | 1.8 |
| Industrial & Scale Dump (SPL215) | Old scale dump that may have been used for some industrial waste disposal. | 2.7 |
| Duck Pond (West) | Old borrow pit, now filled with fresh water. | 1.4 |
| Sewage Ponds | Four ponds in series including an initial settling pond. Facility services Gunyangarra, Yacht Club and Wallaby Beach. | 1.4 |
| Concrete Batching Area | Area previously used as a concrete batching plant during the construction stages of the refinery. | 2.9 |
| Remnant Vegetation - Drimmie Head Rd | Native vegetation, Drimmie Head Road and minor tracks surrounding sewage ponds. | 30.2 |
| Wallaby Beach Construction Site | Old construction camp site adjacent to Wallaby Beach. | 7.6 |
| Wallaby Beach Houses | Wallaby Beach residential area. | 5.4 |

| Domain Name | Brief Description | Approx Area (ha) |
|---|---|---|
| Wallaby Beach Rubbish Dumps | Old rubbish dumps opposite YBE entrance road. | 8.7 |
| Wallaby Beach Remnant Vegetation | Remnant coastal vine thicket vegetation east of Wallaby Beach community. | 5.4 |
| Northern Pond (West) | The western portion of Northern Pond that has been revegetated. | 33.6 |
| Northern Pond (East) | The eastern portion of Northern Pond that has been revegetated. | 49 |
| Taylor's Pond | Industrial/scale dump and residue disposal pond on the south-east side of the Northern Pond. | 15.9 |
| Macassar Soak & Drainage Channel | Seasonal wetland at base of Northern Pond - eastern end and discharge channel to Arafura Sea. | 3.3 |
| Melville Bay Rd Scale Dumps | Two scale dumps opposite town tip on southern side of Melville Bay Rd. | 3.1 |
| Taylor's Pond Drainage/Duck Pond | Drainage line from Taylor's Pond to Duck Pond outfall, including Taylor's Pond wetland and Duck Pond. | 8.0 |
| Water Treatment Facility | Water treatment pond and labyrinth. | 30.3 |
| Industrial & Scale Dumps (SPL403) | Two dump sites located within the Water Treatment Facility. The western dump extends across the Duck Pond drainage channel to the Sewage ponds. | 8.8 |
| Bauxite residue Ponds | Pond 3, 3/4, 4, 5 used for bauxite residue disposal. | 311 |
| Liquor Storage | Liquor storage pond - Pond 6. | 99 |
| Emergency Storage | Pond 7 and adjacent disturbed areas. | 95 |
| RDA Balance | Land that is largely undisturbed that surrounds the RDA to the south and west up to the lease boundary. | 872 |
| Oil & Drum Dumps | Oily waste and drum disposal sites within operational RDA stacking areas. | 1.7 |
| Chemical Dump | Waste chemical disposal sites within operational RDA stacking areas. | 0.1 |
| Asbestos Dump | Asbestos disposal sites within operational RDA stacking areas. | 1.8 |
| Active Industrial & Scale Dump | Active industrial disposal site within operational RDA stacking areas. | 4.9 |

### 19.5.1 RDA Rehabilitation

To date, revegetation has been undertaken at the two decommissioned residue disposal areas (Taylor's Pond and Northern Pond) and the leases relinquished. However all of the disposal areas within the existing lease areas are still operational and hence no revegetation has yet occurred.

Trials and research projects have been carried out on the RDA since the early 1970s. More recent trials undertaken since 1995 include:

- Revegetation trials;
- Plant establishment in bauxite residue;
- Bauxite residue capping options;
- Residue neutralisation;

- Erosion potential characterisation;
- Water use by plants;
- Salt- water balances;
- Characterising of capping material;
- Materials handling; and
- Revegetation strategy development.

At this stage it is envisaged that the most appropriate revegetation method will supported use of neutralised residue sand. The dry stacked residue mud will then be covered with a capillary-break layer of up to one metre of neutralised residue sand. The sand will be allowed to leach its excess salt content before being covered with a cap of subsoil and topsoil layers. In addition to preventing the capillary rise of alkaline water, the sand will also provide the bulk of the growing medium and soil water for plant growth. The topsoil will then be sown with a selection of grasses and trees to stabilise the landform. As research is ongoing and evolving with improved industry knowledge and on-site trials, the rehabilitation techniques are expected to improve. The revegetated surface will be sloped and drained to ensure the rainfall runs off and does not pond on top of the residue. The optimal rehabilitation strategies for the area are yet to be decided.

A range of options is available for the final landform to be used at the RDA. The preferred landforms and batter slopes for the RDA at closure are summarised in Table 19.5.2.

**Table 19.5.2**
**Preferred Landforms and Batter Slopes**

| Landform | Example | Batter Slope | Batter Shape | Comments |
|---|---|---|---|---|
| No runoff from the top area | Ridge line or water retaining top | 1 in 20 or flatter | Linear | Adopt 1 in 33 (mud farming angle) |
| | | 1 in 8 | Concave or stepped with 7% intervals | Stepped preferred due to ease of maintenance and access |
| | | 1 in 5 | Stepped with 3% intervals | |
| Runoff from the top | 3% “domed” final top profile | 1 in 20 or flatter | Linear | Adopt 1 in 33 (mud farming angle) |
| | | 1 in 8 | Stepped with 3% intervals | |
| | | 1 in 5 | Stepped with 3% intervals | Marginal erosion stability for longer slopes |

The existing and proposed final heights of the RDA ponds are given in Table 17.8.2.

Based on Table 19.5.2, planning for the final landform has adopted a stepped profile comprising steep sections and flatter sections. Irrespective of the final landform adopted, a major purpose of the final (rehabilitated) landform will be to encapsulate the residue, and to prevent contact between the residue and the external environment. For this landform design to be successful, erosion (rill and gully development) will need to be prevented by controlling slope gradient, preventing concentrated flow and ensuring adequate vegetation cover. Currently, to reduce erosion at the

residue disposal area, a sterile variety of vetiver grass (*Vetiveria sp*) is used to stabilise the steeper slopes on the pond walls. This grass was chosen because of its deep root growth and ability to cover large areas quickly.

The Pond 5 batter slopes are recognised as being too steep for long-term protection against erosion with the existing vegetated surface. Options being assessed for the closure of Pond 5 include:

- Reshape the batter slopes to a gradient of 20% or less and incorporate drainage berms. To reduce the batter slopes, the embankment will have to be pushed inwards as there is no opportunity to move the base outwards due to the proximity of Melville Bay.
- Make the surface of the batter slope erosion resistant by using a rock mulch layer.

The status of the existing surface water and groundwater conditions at the RDA is described in Sections 11 and 12.

### 19.5.2 RDA Closure Criteria

For the RDA there are four proposed final land uses, namely:

- Stable landform with self-sustaining vegetation;
- Stable vegetated landform suitable for residential or commercial uses;
- Natural vegetation; and
- Retained infrastructure.

The nominated success criteria for these proposed land uses are outlined below. At this stage the criteria are fairly general and are indicative only of the type of criteria that will used. Ongoing stakeholder consultation and research programs (current and planned) will ensure the criteria become specific to site environmental, social and economic conditions appropriate for the time of closure. These criteria will help determine the threshold or trigger levels established to measure eventual success of the closure strategies

#### 19.5.2.1 Vegetation Areas

For the first three of the above-mentioned land uses which relate to vegetation, the proposed success criteria are as follows:

- Revegetation system functionality – EFA for nutrient cycling, stability and infiltration.
- Specific indicators for:
  - floristic mix
  - soil properties (eg physical/chemical properties, soil fauna)
  - water quality meets nominated standards (surface and groundwater).

As the residue/waste water neutralisation process is implemented (Section 4.5), the alkaline residue stored at the RDA will be overlain by saline residue. Over time, any seepage from the RDA into the groundwater can be expected to become less alkaline and more saline. As described in Section 19.5.1, the rehabilitated surface of the RDA will be vegetated and sloped to enable rainfall to run off the surface to reduce the amount of water that ponds on the top. This will reduce the amount of water available to seep into the residue and, over time, the amount of seepage into the groundwater. The existing groundwater monitoring system will be used to confirm the seepage effects from the closed residue disposal ponds.

#### 19.5.2.2 Retained Infrastructure

Sewage ponds would be retained to continue servicing Gunyangara and Gove Yacht Club, as well as any potential new residential/commercial developments. Eventual closure criteria for the sewage ponds would include:

- Ponds meet all regulatory requirements;
- A viable entity is nominated enabling transfer of facility, lease, sublease or area; and
- Water quality meets nominated standards based on national guidelines (surface and groundwater).

### 19.5.3 RDA Closure Timing

Decommissioning of the RDA will be a progressive process so that new areas will be developed as current operational areas are decommissioned and revegetated.

The final closure time for the RDA will match that for the refinery.

## 19.6 Town (Nhulunbuy)

The long-term objective for Nhulunbuy is "normalisation" (ie management by a local body council rather than the Nhulunbuy Corporation). It is expected that over time the township will continue to grow and the proportion of the township that directly depends on Alcan Gove's operations will diminish. It is expected to continue to act as a regional centre for the long term.

## 19.7 Stakeholder Engagement

Since the mine was established in the early 1970s, there has been open dialogue with traditional owners on the rehabilitation of mined land. During mine establishment, discussions between Alcan Gove, government and traditional owners resulted in agreement to the request of the traditional owners that mined areas would be returned to natural forest systems suitable for Aboriginal hunting and gathering. This has formed the basis of the rehabilitation goal.

Further discussion with the traditional owners on the final land use for the RDA will be undertaken to ensure that the landform and vegetation cover meets the future land use requirements. These discussions will form the basis for an agreed final land use that will be realised in the closure plan. In addition to direct discussions with the traditional owners, Alcan Gove has facilitated the establishment of the following two reference groups to provide ongoing regional stakeholder consultation:

- Regional Community Reference Group - the members of this group include representatives of the traditional owners of the Alcan Gove leases, Aboriginal community councils, ATSIC, the Northern Land Council and government and non-government organisations.
- Nhulunbuy Community Reference Group - this group represents the Nhulunbuy community and includes representatives from business, the town administration, community organisations, churches, government departments and youth.

Closure issues for Alcan Gove are one of the common interests of the reference groups. Specific topics to be considered include land use objectives, completion criteria, environmental indicators and the design of rehabilitated landforms. As closure plans are developed, they will be discussed with these groups and input received will be considered in refining the closure strategies.