

ACI OPERATIONS PTY LTD
NORTH STRADBROKE ISLAND PROJECT
ENVIRONMENTAL MANAGEMENT
OVERVIEW STRATEGY
MINING LEASE Nos. 1132 and 1124

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**ACI OPERATIONS PTY LTD
NORTH STRADBROKE ISLAND PROJECT**

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OVERVIEW STRATEGY**

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ACI OPERATIONS PTY LTD
NORTH STRADBROKE ISLAND PROJECT
ENVIRONMENTAL MANAGEMENT
OVERVIEW STRATEGY
MINING LEASE Nos. 1132 and 1124

1.0 INTRODUCTION

This North Stradbroke Island Project Environmental Management Overview Strategy (EMOS) has been prepared in respect of Mining Lease Numbers 1132 and 1124. Project management is by ACI Industrial Minerals, an operating division of ACI Operations Pty Ltd. Table 1 provides a summary of tenement details.

TABLE 1

ACI, NORTH STRADBROKE ISLAND PROJECT TENEMENTS

Lease No.	Lease Holder	% Interest	Expiry	Lease Area (ha)	Present Disturbed Area	Maximum Area allowed Disturbed	Comment s/Activity
1124	ACI Operations Pty Ltd	100%	30.04.09	247.1	7.0	35.0*	Mining & Processing
1132	ACI Operations Pty Ltd	100%	30.04.11	485.62	-	35.0	Mining & Processing

* Increase to 35.0 ha applied for with this EMOS revision, compared with 25.0 ha approved in the previous EMOS revision

ACI's North Stradbroke Island operations commenced in 1969 on ML 1124. The operation supplies silica sand to Queensland Glass Manufacturers, foundries, and the construction industry, as well as exporting to a number of overseas destinations.

The North Stradbroke Island Project is planned to continue for at least 50 years and this EMOS describes commitments which will control impacts for the term of the operation. Extensions to the mine life are highly probable once drilling programmes have confirmed the economic reserves of the exploration areas.

The commitments describe minimum acceptable standards and/or methods which, when satisfied, will allow for surrender of leases following the completion of mining. The commitments are numbered sequentially throughout the document and incorporate the previous Special Lease Conditions relevant to the leases and other statutory requirements.

The commitment list will form the audit list required to perform the Environmental Audit accompanying each Plan of Operations. The Plan of Operations will address each

commitment. Techniques which form part of the control strategies and which are used to contain impacts to acceptable levels are introduced in this EMOS and will be detailed in each Plan of Operations. A Plan of Operations will be submitted within 2 months after the approval of this EMOS document (**Milestone 1**).

Appendix 1 is a listing of documents that support the commitments made in this EMOS and on which this EMOS is based. These documents have either been previously submitted to the Department or will be made available upon request.

The purpose of this EMOS amendment is to present a revised mining plan for ML 1132.

1.1 ACI ENVIRONMENTAL POLICY

It is ACI Industrial Minerals Division's policy to achieve a high standard of environmental care in conducting its business as a resources and industrial company contributing to society's material needs. ACI Industrial Minerals Division's approach to environmental management seeks continuous improvement in performance by taking account of evolving scientific knowledge and community expectations.

ACI Industrial Minerals Division will comply with all applicable laws, regulations and standards, uphold the spirit of the law, and where the laws do not adequately protect the environment, apply standards that minimise any adverse environmental impacts resulting from its operations, products or services.

1.2 EMOS OBJECTIVES

The EMOS proposes the acceptable levels of environmental impact for the project together with the associated control measures necessary to achieve the following objectives:

- ♦ Good stewardship of natural resources, consistent with safe and efficient mining practice;
- ♦ Minimal disturbance of land;
- ♦ Conservation of flora and fauna habitats;
- ♦ Confirmation of the success of impact control measures by means of monitoring and environmental audits (due diligence);
- ♦ Compliance with all statutory requirements;
- ♦ Rehabilitation to an acceptable post-disturbance land use and land capability;
- ♦ Rehabilitation to a stable post-disturbance landform;
- ♦ Preservation of water quality; and
- ♦ Consultation with interested parties at major project variations.

This EMOS also addresses three objectives identified for mining from "The National Strategy for Ecologically Sustainable Development" which are:

- ♦ to ensure sound environmental practices throughout the mining industry (EMOS document);
- ♦ to provide appropriate community returns from mineral resource developments (Section 9); and

- ♦ to improve community consultation and information exchange, and to improve performance in occupational health and safety.

The EMOS discusses the environmental impacts of the project. Each impact is treated as follows:

- ♦ The impact is discussed briefly in terms of its nature and significance;
- ♦ Appropriate targets or criteria are defined for limiting impacts to an acceptable level;
- ♦ The planned methods or strategies for controlling impacts to within the environmental protection targets are outlined;
- ♦ Critical processes, decisions and milestones relating to implementing the control strategies are identified;
- ♦ Where applicable, the control strategies are related to statutory requirements; and
- ♦ A monitoring programme is described for validating the performance of the control strategies.

An acceptable level of change appropriate to the pre-mining condition of the project area is defined for each impact, together with a strategy for controlling or limiting the impact within the project area. Each of the environmental protection control strategies is based upon proven and economically viable methods and is presented as a commitment.

Commitment No.1

ACI Operations Pty Ltd will mine in accordance with all statutory requirements applicable to the Project leases.

2.0 PROJECT SUMMARY

This project is an existing silica sand mining and processing operation on south-east Queensland's North Stradbroke Island. Figure 1 shows the locality. Mining and processing is currently occurring on ML 1124 located approximately 5 km north-east of Dunwich. ML 1132 is held as reserves and is not presently being mined. The two mining leases are not contiguous with ML 1132 being located south of Amity Point. Figure 2(a) shows lease locations.

The process of exchanging ML 1132 for equivalent resources elsewhere on the island is being facilitated with the DME. However, because of the lead time required to obtain grant of MLA's 7064, 50135, and 50136, it is necessary to schedule the ML 1132 reserve into the mining plan to replace the depleting reserve on ML 1124.

In the event that the resources in ML 7064 are mined and no other resources are available then it is necessary to schedule the mining of reserves on ML 1132.

2.1 MINING METHOD

Operations on Project Lease ML 1124 consists of open cut excavations for ore and beneficiation into high grade silica sand by methods described briefly as follows:

- ♦ The silica sand is dry mined by a front end loader and taken to a feed hopper. The sand then passes through a trommel screen where roots and organics are removed. The screened sand is pumped in slurry form to the processing plant.
- ♦ At the processing plant, the sand undergoes gravity separation to remove heavy minerals.
- ♦ The heavy mineral product is concentrated, stockpiled and sold separately.
- ♦ Reject material consisting of fine silica and clay is pumped away with wash water and settled in the settling dams. The simplified flow diagram in Figure 3 details this process.

Similar methods will be used on ML 1132.

2.2 SITE INFRASTRUCTURE

The only mining infrastructure presently on ML 1132 consists of exploration tracks. The infrastructure on ML 1124 consists of:

- ♦ processing plant;
- ♦ administration building;
- ♦ lunch room;
- ♦ laboratory;
- ♦ plant nursery;
- ♦ vehicle parking areas;
- ♦ maintenance workshop;
- ♦ access roads;
- ♦ production bores (3); and
- ♦ one monitoring bore.

The infrastructure layout on ML 1124 is shown on Figure 4(a).

As the ML 1124 reserve approaches exhaustion, this infrastructure will be transferred to ML 1132, in a similar (but not necessarily identical) layout.

2.3 HANDLING AND TRANSPORT

Material is principally moved around the site by a combination of front end loaders and pipelines.

Processed material is transported off-site by truck.

This system will continue in a similar fashion on ML 1132. It might be necessary, in the interim period when the operations are shifting from ML 1124 to ML 1132, to truck some material from ML 1132 to ML 1124

3.0 LAND RESOURCES

The current site of operations is located on topography described as low-lying heath land to slightly undulating dunes. The vegetation on site varies from low woodland with dense heath understorey to open forest with medium understorey.

3.1 LAND TENURE AND BACKGROUND LAND HOLDERS

The project site lies within Redland Shire, under the jurisdiction of the Redland Shire Council.

Both leases are held over Unallocated State land currently the subject of a Native Title Application. The Mining Leases were granted in 1975, and correspondingly are not subject to Native Title until lease surrender. Lease boundaries are shown in Figure 2(a).

The nearest townships are Dunwich (ML 1124) and Amity (ML 1132). There is a small residential development known as Myora Springs to the immediate south-west of ML 1124.

3.2 POTENTIAL IMPACTS ON LAND RESOURCES

Potential impacts on land resources arise from the following activities:

- ♦ Clearing of vegetation and fauna displacement;
- ♦ Modification of topography (removal of product and overburden);
- ♦ Modification of hydrology;
- ♦ Waste disposal methods;
- ♦ Rehabilitation strategies; and
- ♦ Aboriginal cultural and social interests.

3.2.1 Pre-Mining Land Capability/Land Use

The pre-mining capability land use of the lease areas is bushland. This statement is qualified by the assertion by the Department of Family and Community Services that aboriginal people attach cultural and other social interests in part of the land.

Appendices 3(a) and 3(b) outline the limited agricultural potential of the soils of ML 1124 and ML 1132 respectively and subsequently the agricultural land capability for the lease areas has been categorised as Class VIII. (The podsol soils are limited by their poor nutrient status and are unsuitable for either cultivation or grazing.)

As this area is not agricultural this classification is not considered valid. The land capability/land use is referred to as "Bushland".

The site is typified by gradients of 2% up to 20%. The average gradient of the planned mine path is 10%. It is envisaged that all areas to be mined will be returned to the pre-existing contours with a height reduction of 5 to 8 metres depending on resource depth.

3.2.1.1 ML 1124

The planned mine path consists of two community types with another fringing on the area.

Type 1 Community

Open Forest

The open forest is dominated by Blackbutt (*Eucalyptus pilularis*), reaching 15 to 20 metres height, Pink Bloodwood (*E. intermedia*), Rusty Gum (*Angophora costata*), White Cypress (*Callitris columellaris*), Cypress (*Callitris rhomboidea*) and tall specimens of Black She-oak (*Allocasuarina littoralis*) are sometimes interspersed with the Blackbutt. This forest often has a middle storey of Wallum Banksia (5 to 10 metres tall) and Prickly Broom-heath (2 to 5 metres tall) and grassy ground cover.

Type 2 Community

Open Shrub lands

The open shrub lands (Banksia Tree-heath) are dominated by scattered Wallum Banksia (*Banksia aemula*) over a dense heath understorey characteristically containing Grass Trees (*Xanthorrhoea johnsonii*), Beard heaths (*Leucopogon spp.*), Tea-tree (*Leptospermum flavescens*), stunted Black She-oak (*Allocasuarina littoralis*), Geebung (*Persoonia virgata*), Boronia species (*Boronia rosmarinifolia*, *B. saffrolifera*), Conesticks (*Petrophile spp.*), Parrot-pea (*Dillwynia peduncularis*), Twist rush (*Caustis recurvata*) and Prickly Moses (*Acacia ulicifolia*), to mention a few of the more common species. These open shrub lands have limited distribution on the tops of ridges.

Type 3 Community

Creek/Swamp Vegetation

The creek/swamp areas are dominated by *Melaleuca quinquenervia* with *Leptospermum speciosum*, *Eucalyptus robusta* and *Banksia aemula*.

There is considerable variation in vegetation across the area associated with changes in topography, soils, aspect, degree of exposure to prevailing winds and rain.

The vegetation varies from open shrub land with heath understorey on high exposed south east facing slopes, through medium open forest to creek and swamp vegetation types. See Figure 4(b).

3.2.1.2 *ML 1132*

A flora and fauna assessment of ML 1132 was undertaken in May 1999. It concluded that the vegetation of the site was not endangered, nor of special significance at the local or regional level. Retaining of thirty metre buffers, free of clearing, was recommended around some perimeters.. The report will be included with the revised Plan of Operations.

3.2.2 Post-Mining Land Capability/Land Use

3.2.2.1 *ML 1124*

The land is being and will continue to be progressively rehabilitated to reflect as nearly as possible the pre-mining land use and capability, that is, bushland. ACI commissioned botanical surveys in 1989 and 1994 to assess the extensive rehabilitation work on site over the life of the project. Annual transect monitoring is being conducted.

Table 2 summarises the pre-mining vegetation association and land use for the ML 1124 lease area, the current estimates of maximum areas for all disturbance types for the life of mining on ML 1124 and post-mining vegetation association and land use.

3.2.2.2 *ML 1132*

A land capability assessment for ML 1132 has been completed. The pre-mining land use and capability is bushland.

TABLE 2

**ESTIMATED AGGREGATE TOTAL OF DISTURBED AREAS
AT THE PROJECT SITE FROM MARCH 1995, FOR THE DURATION OF MINING
ON ML 1124**

Disturbance Category	Max. Area		Land Use		Vegetation Community Type	
	At any one Time	Life of Mine (ha)	Pre disturbance	Post disturbance	Pre disturbance	Post disturbance
Infrastructure						
Nursery	0.05	0.05	Bushland	Bushland	1	1
Maintenance	0.02	0.02	Bushland	Bushland	1	1
Workshop						
Administration	1.38	1.38	Bushland	Bushland	1	1
Buildings						
Vehicle	0.05	0.05	Bushland	Bushland	1	1
Parking						
Processing	0.50	2.50	Bushland	Bushland	1	1
Plant						
Stockpile	2.50	5.00	Bushland	Bushland	1	1
Mine Area	25.00	150.00	Bushland	Bushland	1/2	1/2
Haul Roads	1.00	2.00			1/2	1/2
Access Roads	2.00	4.00	Bushland	Public Access	1/2	1/2
Tracks	2.50	5.00			1/2	1/2
TOTAL	35.00	170.00				

The previous EMOS allowed for a disturbance at any one time of 15 ha for the mining area of the operation. Changes in the mining operation and changes in the thickness and depth of the reserves have required that this allowance be increased to 25ha.

Disturbances on ML 1132 will be similar, once the plant is relocated from ML 1124. There will, however, be a short overlap period when the 4.5 ha of disturbance for plant and adjacent infrastructure is duplicated on both leases. This will result in a peak of disturbance at any one time of 39.5 ha, which will drop back to 35.0 ha when the old plant area has been rehabilitated.

The life of mine total disturbance on ML 1132 is expected to be 380 ha. Details will be provided in the revised Plan of Operations.

ACI will endeavour to keep the area of disturbance at any given time to a minimum.

The area south of the East Coast Road will be mined in preference to the central area, provided that:-

- ACI and Government reach a financially and operationally suitable arrangement for mining the area south of the road; and

- all subsequent necessary approvals, including but not limited to bore licences and road access, are in place for the southern area six months before reserves on ML 1124 are exhausted.

The mine plan for this sequence is shown in Figure 2(b).

If the above conditions are not fulfilled six months prior to the exhaustion of reserves on ML 1124, the mining sequence will be as shown on the plan in Figure 2(c).

Commitment No. 2

The current estimated area to be disturbed for the life of mining on ML 1124 and ML 1132 will be less than 550 ha with a maximum area disturbed and not rehabilitated of 40 ha at any one time. This area does not include previously mined and successfully rehabilitated areas. The ML 1132 mining plan is shown in figure 2(b); however, if approvals are not available in time, the previously approved plan shown in Figure 2(c) will be used.

Commitment No. 3

Disturbed land will be progressively rehabilitated to achieve suitable post-mining land use of bushland as indicated in Table 2. Relevant target criteria are described in Commitment 7 and will be attained over two successive years.

Factors such as slope, soil pH and salinity will be important determinants of the capability of post-mining land. Table 3 lists the targets for each of the key factors for attaining an acceptable post-mining land capability (bushland) based on the pre-mining capability.

TABLE 3

TARGET CRITERIA FOR POST-MINING LAND CAPABILITY

FACTOR	UNITS	POST-MINING CRITERIA	SOURCE
Slope	%	2-20 α	<i>Pre-mining surveys</i>
pH (1:5) (soil:water) (0-200 mm)	pH	4.00 - 6.00	<i>DME, 1995 ♣</i>
sodicity (0-200 mm)	ESP	<20	<i>DME, 1995 ♣</i>
salinity (EC _{1:5}) (0-200 mm)	dS/cm	<0.1 α	<i>Pre-mining surveys</i>

This criteria may vary with the completion of future soil surveys. Milestone 4 was achieved with the completion of the next series of pre-mining surveys two months prior to disturbance of new areas (ML 1132). Details are contained in the Plan of Operations..

α *Target for post-mining land capability will be as per pre-mining surveys plus 5%.*

♣ *Target agreed on during meetings between ELP and DME in 1995.*

Commitment No. 4

Post-mining land capability classes of bushland are defined as being achieved when the targets in Table 3 have been attained to a minimum root zone depth of 200 mm, which may be interpreted as the root zone depth of rehabilitation species, at a scale supporting a mapping accuracy of 1:10,000.

Commitment No. 5

Any areas, in addition to the total area nominated in Commitment 2, will be surveyed (for soils, land capability, habitat, fauna and archaeological/anthropological features at an intensity supporting a 1:10,000 survey) prior to the commencement of disturbance associated with mining activities. The EMOS and Plan of Operations will be subsequently resubmitted or varied at least 2 months prior to commencement of any disturbance outside of the total area nominated in Commitment 2.

Commitment No. 6

Land will be accepted as being suitable for the nominated land use when the criteria for determining the achievement of the required post-mining land use, as detailed in the Plan of Operations, have been met.

The land use criteria will, as a minimum, demonstrate that:

- landforms are stable
- water quality is acceptable, and
- vegetation community development in rehabilitated areas can be shown to be trending towards a self sustaining, self regenerating and maintenance free system that will result in bushland that is consistent with similar communities in nearby undisturbed (by mining) environments.

3.3 LAND IMPACT CONTROL STRATEGIES

The measurement of successful rehabilitation and control strategies can only be assessed upon the establishment of:

- measurable standards to be achieved for stability of reconstructed landforms;
- measurable standards at which rehabilitation is considered successful;
- an achievable and sustainable rehabilitation rate; and
- measurable standards of on-site and off-site surface and groundwater quality.

Control strategies for limiting the impacts of project development on land resources are planned to include the use of the following proven methods:

- ♦ Implementation of practical landform designs to minimise erosion, limit adverse visual impacts and promote stability in each area as it is rehabilitated (See Section 3.3.1);
- ♦ Progressive rehabilitation and revegetation of disturbed areas to stable self-sustaining landforms (Section 3.4);
- ♦ Selective stripping, stockpiling and management of surface topsoil material suitable for later use as a growth or erosion control medium (Section 3.5.1);
- ♦ Education of staff and/or contractors and control and review of their work practices; and
- ♦ Building on current experience from existing rehabilitated areas and continuing trials for selection of species and methodologies for revegetation.

3.3.1 Land Stability Controls and Standards

Landform stability standards relate to attaining a stable final landform as measured by parameters including gully formation and rates of soil loss. Design indicators are shown in Table 4.

TABLE 4
LANDFORM DESIGN INDICATORS

(A) Maximum Design Indicators For Landform Stability			
Land Capability	Gully Width (m)	Gully Depth (m)	Total Soil Loss (tonnes/ha/yr)
VIII	<2	<1	<20

(B) Maximum Slope Length For Variable Slopes	
Slope Grade (%)	Various Slope Lengths (m) For Land Capability Class Bushland
>30	25
20 - 30	50
10 - 20	80
5 - 10	120
< 5	170

Commitment No. 7

The land stability definitions for the North Stradbroke Island Project are as follows:

- a) *Gully dimensions will not exceed the dimensions shown in Table 4;*
- b) *The rate of soil loss will be less than 20 tonnes per hectare per year; and*
- c) *No maintenance activity is required to sustain the nominated levels of the indicators shown in (a) and (b) for three successive years.*

Commitment No. 8

Reconstructed landforms will be monitored to assess their stability.

3.3.2 Land Contamination, Controls and Standards

Land contamination threshold criteria adopted for the project are shown in Table 5. Due to the nature of the target ore and the fact that the processing operation relies purely on gravity separation with no use of hazardous materials, no land contamination problems are envisaged from the mining and processing operations.

Land contamination could however, potentially arise from the following sources:

- ♦ vehicle/machinery maintenance operations;
- ♦ improper disposal of oily wastes;
- ♦ refuelling operations; and
- ♦ runoff from the heavy mineral stockpile.

The strategy for the prevention of land contamination includes:

- ♦ A due diligence programme consisting of a management system which clearly allocates responsibility for compliance functions to specific personnel and reporting functions to others together with training programmes to ensure all personnel are aware of environmental responsibilities and duties;
- ♦ All vehicle and machinery maintenance activities will be carried out in an appropriately constructed area;
- ♦ Construction of appropriate spill containment facilities for refuelling and oil storage areas;
- ♦ All oily wastes will be sent off-site for recycling; and
- ♦ Bunding and a drainage sump will be installed for runoff from the heavy mineral stockpile.

Commitment No. 9

The potential for land contamination will be minimised by implementation of the control strategy outlined in Section 3.3.2.

TABLE 5
RESPONSE CRITERIA FOR CONTAMINATED LAND

VARIABLE	RESPONSE CRITERIA (Refer Note 1)	SURFACE REMEDIALTION CRITERIA (Refer Note 2)	SURFACE REMEDIALTION CRITERIA SOURCE
Salinity ($EC_{1:5}$ dS/m)	1.1	1.5	Pre-mine soil surveys
pH	4	4-6.5	Pre-mine soil surveys
Total Petroleum Hydrocarbons (mg/kg)	500	1,000	DME Guidelines (1993)
PCB (mg/kg)	0.3	1	ANZECC (1992)
Cadmium (mg/kg)	1	3	ANZECC (1992)
Lead (mg/kg)	150	300	ANZECC (1992)
Selenium (mg/kg)	10	20	ANZECC (1991) ^W
Arsenic (mg/kg)	10	20*	ANZECC (1992)
Mercury (mg/kg)	0.5	1	ANZECC (1992)
Zinc (mg/kg)	100	200	ANZECC (1992)
Radiation (μ Sv/h)	0.2 + background	$\times 0.2$ + background	NHMRC (1980, 1985, 1989)

* Health Based Level = 100 mg/kg

^W Draft Guidelines which preceded the current ANZECC 1992 Guidelines which have no recommended level for Selenium

1. "Response Criteria" are levels which trigger a requirement for further assessment of the risk posed to human health and the environment.
2. "Surface Remediation Criteria" are the levels to which site remediation should be achieved for near-surface contamination, if these levels were above natural background levels.

Commitment No. 10

Any areas of land contamination that result from mining and its associated activities will be remediated prior to lease surrender.

3.3.2.1 Waste Management Strategy

The identified sources of waste from the project include:

- ♦ sediment-laden runoff waters from disturbed areas;
- ♦ sewage effluent;
- ♦ oily wastes from workshop and maintenance areas;
- ♦ office paper and lunchroom wastes (putrescible waste);
- ♦ settling pond fines;
- ♦ cleared vegetation; and
- ♦ runoff from the heavy mineral stockpile.

Strategies for dealing with runoff waters and sewage effluent are detailed in Section 4.3 and summarised as:

- ♦ recycling of water;
- ♦ settling ponds/sediment traps to restrict off-lease release; and
- ♦ standard septic sewage system with no overflow anticipated.

Sewage will be treated as per "DPI Conditions for on site sewage treatment and disposal systems".

Strategies for dealing with oily wastes are detailed in Section 3.3.2 and summarised as:

- ♦ oily waste will be sent off-site for recycling;
- ♦ drains surrounding workshop area retain wastes within a confined area.

All office and lunchroom wastes, as with the solid wastes (non hazardous) are disposed of off-site in the local landfill site administered by the Redland Shire Council.

Waste characterisation was performed on the reject material (**Milestone 5**). The results were reported in Appendix 2 of the July 1996 Plan of Operations. The material was non-hazardous, allowing the dams to be backfilled, contoured and revegetated, when the plant area is decommissioned. A similar waste characterisation will be performed on ML 1132 reject material, 12 months after the start of production on that lease.

Cleared vegetation is used extensively in the rehabilitation process. The smaller and lighter material is used as brush-matting with the consequence that many seeds are returned to the site to further enhance the establishment of local provenance genotypes. The larger branches, including logs, are strategically placed throughout the newly prepared areas to increase habitat diversity.

The heavy mineral stockpile has an approximate volume of 500 m³ at any one time. The minerals are transported (when in sufficient volume) to a mineral sand company. The stockpile is located on a hard clay pan base. A bund is in place to exclude "clean" runoff from mixing with the minerals. A sump is also in place to catch any contaminated runoff. Background radiation levels were measured and reported in the first annual Monitoring Report. These areas will be assessed at end of mining to determine the extent of heavy mineral concentration. The area may be excavated and reprocessed to separate the heavy minerals which will be transported to the usual company.

Commitment No. 11

Effective waste management will be ensured by implementing the waste management strategy outlined in Section 3.3.2.1.

3.4 REHABILITATION TARGETS

Land will be regarded as successfully rehabilitated when the nominated targets for that land for the following have been met:

- ♦ land capability and land use (Section 3.2.2);
- ♦ land form stability (Section 3.3.1);

- ♦ land contamination (Section 3.3.2 - Commitment 9); and
- ♦ receiving water standards (Section 4.3).

Commitment No. 12

All areas to be disturbed on the ACI North Stradbroke Island Project mining leases will be recontoured to final landform and revegetated using the designs and methods outlined within two years after becoming available (that is, after disturbance ceases). Some areas will be declared "reserved for future disturbance" and Department of Mines and Energy agreement sought for such areas in each Plan of Operations.

The total project area disturbed and not revegetated at any time will not exceed 40 hectares.

Commitment No. 13

Land will be regarded as successfully rehabilitated when the commitments for:

- (a) land use (Section 3.2.2);*
- (b) landform stability (Section 3.3.1);*
- (c) land contamination (Section 3.3.2); and*
- (d) receiving water standards (Section 4.3)*

have been met.

3.5 REHABILITATION METHODS

In order to meet the targets for successful rehabilitation, the rehabilitation methods for the ACI North Stradbroke Island Project leases will consist of:

- a) pre-mining preparation;
- b) recontouring to acceptable slopes after disturbance (final landform design);
- c) appropriate surface preparation and erosion control;
- d) revegetation and habitat reconstruction;
- e) monitoring; and
- f) maintenance (if necessary) for each disturbance type.

3.5.1 Pre-mining Preparation

Prior to any earthworks commencing, surveys as detailed in Sections 7.0 and 8.0 will be undertaken.

Vegetation

Prior to mining an area, all vegetation is surveyed to quantify species diversity. The area is then cleared and stripped of existing topsoil.

Topsoil is stripped for later use as a growth medium and source of seeds, propagules, root-stock and micro-organisms necessary for successful rehabilitation. This material will be stored in windrows or other suitable stockpile landform. It is preferable to re-use this material within six months in order to get the most benefit from the natural micro-biota and propagule sources contained within it. If however, circumstances dictate that the material will be stored for a year or longer, a stabilising cover crop will be sown on the stockpiles.

Commitment No. 14

Topsoil management will be in accordance with guidelines detailed in Section 3.5.1.

It is also important to ensure that sediment-laden runoff from the stripped areas does not become a problem. Appropriately sized and located containment structures will be installed and maintained until successful rehabilitation has been achieved.

Commitment No. 15

All areas to be disturbed will have containment structures (or sumps) installed prior to or during the first year of disturbance. They will be sized according to the following formula:

$$\text{structure volume m}^3 = \text{disturbed area (m}^2\text{)} \times \frac{1:10 \text{ (6hr) storm event (mm)}}{1,000} \times \text{runoff coefficient}$$

These will be maintained until the disturbed areas are successfully rehabilitated.

These structures are directly rehabilitated. No capping is required. The surface is covered with topsoil and revegetated.

3.5.2 Final Landform Design

The target silica body is the leached A-2 horizon. The mining method employed is very selective and ensures that lower horizons will not be disturbed. This in essence means that the original contours of the site will remain intact albeit an average of eight (8) metres (thickness of A2 horizon) lower. Where the lowered landform meets undisturbed landforms, connecting slopes consistent with the angle of naturally occurring slopes, will be constructed.

Commitment No. 16

The final landform will reflect the original contours but with a reduction in height. Where the mined areas meet the original contours the connecting slopes will have:

- ♦ ***landform as indicated in Table 4; or***
- ♦ ***20° within 30m of the East Coast Road.***

Settling Dams

Currently the site supports four process water dams designed to settle reject material and in particular, organic matter. This material will be regularly removed from the dams, dried and used in the rehabilitation process. Water is recycled between these process dams. Two sediment traps are also located on site to trap runoff from ML 1124 before reaching Cooroon Cooroonpah Creek. Sediment traps will be located on ML 1132 to trap runoff before it exits the lease.

Buildings

If at the end of the mining operation no beneficial use for the buildings can be found, they will be removed. Concrete pads and other buildings-related infrastructure (pipes, cables, etc) will be ripped up and removed from the site and the areas rehabilitated.

In the event that the local authority, DEH (National Parks) or DPI (Forestry Service) are nominated to become future land managers of the surrendered lease areas, they will be contacted to determine whether any infrastructure should remain.

Roads

Any roads and tracks not required by the local authority or adjacent land holders will be rehabilitated. Roads will be ripped and revegetated. Tracks will be left to revegetate naturally unless ripping is required. Some areas have established well naturally and ripping would set back rehabilitation.

Fire Breaks

The fire breaks as required by the Queensland Fire Service (QFS) will be maintained as indicated by the written directive of the QFS. These are not mining related disturbances.

Sediment Dams

Any sediment dams not required by the local or administering authority will be rehabilitated.

Sediment dams will be backfilled and reshaped into the final landform contours and revegetated at the completion of mining.

Water Diversions

If the final topography dictates that permanent water diversions are necessary, it will be necessary to stabilise these to protect their intended function.

Commitment No. 17

Rehabilitation of disturbed land will be carried out using the strategy described in Section 3.5 to the standard outlined in Commitment 4.

3.5.3 Surface Preparation

Stockpiled topsoil is replaced to an average depth of approximately 200 mm. In some areas, the compacted "pan" is lightly ripped at the discretion of staff prior to replacement of soil. Once in place, the soil is raked to provide a relatively uniform surface.

Brush matting is used extensively as an erosion controlling mulch. Terolas, a bituminised emulsion, has also been used to minimise aeolian erosion of newly established rehabilitation sites.

Habitats identified in pre-mining surveys will be recreated as closely as practicable to the pre-disturbance condition. For example, gully and log numbers will be reconstructed close to the pre-mining number. Where possible, reformed gullies will be secured with brush matting so as to minimise erosion within EMOS guidelines.

3.5.4 Revegetation Methods

After appropriate surface preparation as outlined in 3.5.3, disturbed land will be revegetated by the following methods to the standards in Commitment 5:

- ♦ topsoil spreading;
- ♦ transplant *Xanthorrhoea johnsonii* directly;
- ♦ sow pasture grass of sorghum to establish revegetation site by minimising wind or water erosion for up to twelve months;
- ♦ endemic species emerge from seed stock in topsoil;
- ♦ annual vegetation survey to compare rehabilitation species diversity with pre-mining species diversity (similarity index: Section 3.2.2);
- ♦ regular direct planting occurs to encourage species diversity and composition as well as broadcast seeding;
- ♦ absent or deficient species are introduced from tube stock in the on site nursery
- ♦ areas that are not establishing an effective vegetative cover to minimise soil loss will be divided into smaller areas with windbreaks of appropriate construction; and
- ♦ brushmatting containing viable seed placed in sub-optimal revegetation areas.

Fertiliser use is generally kept to a minimum due to the typically limited nutrient requirement of endemic species.

Commitment No. 18

Revegetation methods will comprise:

- ♦ *Direct seeding of sorghum, planting of nursery-raised stock and/or the use of seed bearing brush matting.*
- ♦ *Fertiliser will be spread initially at a rate governed by the nutrient status of the surface material to assist stabilisation of grass species only.*

Commitment No. 19

Revegetated areas will be monitored annually until the nominated standards have been met for two consecutive years (see Section 11.0 for monitoring details).

Revegetated areas will be surveyed for fauna at five yearly intervals until the nominated revegetation standards have been met, and then prior to lease surrender.

Results of the surveys will be used to modify rehabilitation methods as necessary. Fauna recolonisation will not be used as a measure of rehabilitation success.

Commitment No. 20

Sampling intensities sufficient to support a 1:10,000 scale survey will occur.

3.5.5 Monitoring and Maintenance

Monitoring of post-mining land use characteristics is briefly described in Section 11.0 and will be presented in the subsequent Plan of Operations.

Maintenance will be performed to promote acceptable cover or to repair failed areas. Regular monitoring and surveillance will be undertaken in accordance with the Plan of Operations. Actions considered appropriate to rectify any causes of revegetation failure will be commenced after identification of the problem.

Commitment No. 21

Rehabilitated land will be monitored in accordance with programmes described in the Plan of Operations to determine whether the targets for landform stability and revegetation goals are being achieved.

4.0 WATER RESOURCES

4.1 SITE HYDROLOGY

The main surface drainage (ML 1124) is Cooroon Cooroonpah Creek, located along the east-north east boundary. The upper reach of this creek is generally dry and only flows during extended rain periods. The stream below sample point 2 (on Figure 5) feeds an estuarine wetland on the western side of the East Coast Road. The creek flows into Moreton Bay and as far as is known, physical uses are limited to recreation. Advice from Quandamooka spokespeople assert that there is spiritual significance attached to the creek.

Groundwater is encountered approximately 10m below the surface in the vicinity of the processing plant. The site contains three licensed production bores. Site groundwater

monitoring will occur using these bores and one monitoring bore on ML 1124 (**Milestone 8**). Figure 5 shows the site water management layout.

Up to three production bores and monitoring bore/s will be established as necessary on ML 1132.

4.2 POTENTIAL IMPACTS ON WATER RESOURCES

The potential impacts on water resources are as follows:

- ♦ contamination of surface water;
- ♦ contamination of groundwater;
- ♦ alteration (lowering) of groundwater level; and
- ♦ impact on spiritual significance of Cooroon Cooroonpah Creek.

The potential contamination sources associated with the ACI Operations North Stradbroke Island project are outlined in Table 6 as follows:

TABLE 6
POTENTIAL WATER CONTAMINANT SOURCES AT THE ACI NORTH STRADBROKE ISLAND PROJECT

Source	Type
Stockpiles (topsoil)	Runoff containing sediment, organic matter, and dissolved salts
Mine Dewatering	Solute laden pit water, ground waters, direct rainfall and seepage
Process Water	Sediment and dissolved and organic material from overflow of drains and settling dams or pipeline failure
Settling Dams	Dissolved salts, fines or clay, and organic material
Infrastructure	Runoff from roads etc containing oils
Sewerage	Septic tank on plant site containing bacterial and organic matter
Disturbed Unrehabilitated Areas	Runoff containing sediment, organic matter, and dissolved salts

4.3 WATER IMPACT CONTROL STRATEGIES

Since no hazardous materials are used in the beneficiation process and all materials used are non-hazardous, no nominated hazardous parameters or commitments are necessary. Leachates comprise silica sand only. Since the sand washing plant uses no pollutants, no pollution of the groundwater is expected.

The water management system will consist of discharge water quality monitoring, groundwater monitoring, process water ponds, settling dams and three production bores. The aims of the water management system are:

- ♦ to protect off-site water quality/quantity (including springs);
- ♦ to ensure the product is available for development;

- ♦ to ensure water is available for processing mine products; and
- ♦ to maintain the quality/quantity of the groundwater surrounding the mine site.

The mechanics of loss of water from the lease are:

- ♦ evaporation;
- ♦ seepage from water impoundments;
- ♦ overland flow during runoff events;
- ♦ evapotranspiration;
- ♦ export from the lease as product; and
- ♦ groundwater movement.

Dams, and a water monitoring regime will be installed and maintained to control and monitor water quality and quantity on the leases. Their target levels for achieving control are given in Table 8.

The three production bores are used to supply water for the sand washing plant and for on site maintenance and amenities.

The general strategy is to use the bore water in the sand washing plant and then divert the waters either to a process water pond or settling dam where the fines are flocculated and water is recycled through the plant (See Figure 3).

The use of wells and containment structures in the water management scheme and the constraints on the water management design are briefly described as follows:

A: Production Bores

Used as the main supply of water for the sand washing plant. Water will be supplied pursuant to DNR WR licence requirements.

B: Process Water Plants

Water from the wells will be pumped into these ponds before being used in the sand washing plant.

C: Reject Material Dams

The processing involves the separation of heavy minerals from the sand by passing wet sand through the processing plant. The heavy minerals are retained while wet sand is pumped into a secondary refining process where product sand is separated from silica fines and clay. Fines and water are pumped to the flocculation tank. Reject material is pumped into the settling dam. This allows the excess water to return to the ground.

D: Groundwater

The standing level of groundwater on the mining site is 9.95m below the ground at well No. PB4. A groundwater quantity and quality monitoring programme has been recommended as follows:

Quality and quantity monitoring is performed every three months on ACI production bores, and the monitoring bore. The DNR has installed an automatic depth reader on the monitoring bore. See Figure 5 for the locations. Parameters are outlined in Table 8.

The target resource is white. Any sand containing iron (yellow in colour) will contaminate the resource. Excavator operators do not continue removal of material containing yellow sand. The yellow sand has a typical depth of 2 to 3 metres before meeting the "coffee rock" protecting the indurated layer.

Commitment No. 22

Mining will not breach the "coffee rock" that protects perched aquifers on North Stradbroke Island.

E: Downstream Users

Drainage is through Cooroon Cooroonpah Creek, located along the east-north east boundary. The upper reach of this creek is generally dry and is only active during extended rain periods. The lower reach flows via an estuarine wetland into Moreton Bay. ACI are the end-of-stream industrial users.

Commitment No. 23

Water control structures will be designed according to criteria presented in Table 7.

TABLE 7

WATER MANAGEMENT DESIGN TARGETS

Infrastructure	Estimated AEP (3 monthly)	Minimum Design Storm	Spillway Design Storm	Referable Dam/DPI WR License Held
Return (Makeup) Dams	1:10	1:10 (72 hr)	1:20	N/A
Settling Dams	1:10	1:10 (6 hr)	1:10	N/A

Commitment No. 24

The quality of discharge water will be compatible with the uses made of such waters immediately downstream of the ACI, North Stradbroke Island Project leases and background (upstream) water quality at the respective lease boundaries. A review of this commitment will be made with each Plan of Operations.

The Environmental Protection Policy (EPP) Water suggests that the value of the water will be enhanced or protected when the indicators (parameters in the commitment) do not exceed

water quality guidelines for those indicators. The EPP does not nominate a set of indicators for North Stradbroke Island requiring measurement.

The EPP will be reissued from time to time, with the inclusion of waters in Schedule 1. When the waters of North Stradbroke Island are included in the schedule, the parameters in the EMOS will be reviewed.

Commitment No. 25

Water samples will be taken from boreholes at three monthly intervals, and analysed for the nominated water quality parameters as defined in Table 8. Results will be assessed and any significant variation in any parameter will be addressed immediately.

The EPP Water is currently underdeveloped with respect to groundwater. The DNR has yet to develop and implement environmental plans to protect groundwater.

This commitment will be reviewed after the plans have been released.

TABLE 8
TARGETS FOR RECEIVING WATER QUALITY

Site	Measure	Units	Maximum Level (Ecosystem Protection)	Reference
See Figure 5	pH	-	4.0-7.0	Cumulative Background Data
	Conductivity	µS/cm	<300 µS/cm	Cumulative Background Data
	Turbidity	-	<10% change in seasonal mean	ANZECC, 1992
	Mn	mg/L		Cumulative Background Data
	Fe	mg/L	10.00	Cumulative Background Data
	Ca	mg/L		Cumulative Background Data
	Na	mg/L		Cumulative Background Data
	K	mg/L		Cumulative Background Data
	Mg	mg/L		Cumulative Background Data
	Cl	mg/L		Cumulative Background Data
	Nitrate	mg/L		Cumulative Background Data
	Phosphate	mg/L		Cumulative Background Data
	Sulphate	mg/L		Cumulative Background Data

To be determined by background samples

Commitment No. 26

Downstream water quality at the lease boundary will not exceed the receiving water targets specified in Table 8 or background levels (defined at the lease boundary or upstream of any disturbance off lease ± 1 standard deviation). Water quality parameters will be reviewed upon the release of the Queensland Environmental Protection Policy on water. EMOS amendments will be made where required.

As for Commitment No. 24, the parameters for downstream water quality in the EMOS will be reviewed once the waters of North Stradbroke Island are included in Schedule 1 of the EPP Water.

5.0 NOISE

5.1 NOISE IMPACTS

A number of noise sources are located on site. In normal operating circumstances these include:

At the mine:

- ♦ 1 x front end loader;
- ♦ 1 x electric motor; and
- ♦ 1 x bulldozer (periodic use)

At the plant:

- ♦ 2 x end loader; and
- ♦ 3 x electric motor.

ACI Operations Pty Ltd has commissioned Environmental and Licensing Professionals Pty Ltd to outline and undertake an environmental noise survey. The aim of the survey is to establish whether the noise levels experienced from the mine, exceed the Department of Environment Guidelines of $L_{A_{bg},T}+5$.

The air and noise monitoring programme is Supporting Document 2 of Appendix 1. In respect of noise, samples were taken around the mine site to determine operating noise levels over a twenty-four hour period. The sample sites were located within the lease boundary and in the neighbouring properties.

5.2 NOISE CONTROL STRATEGIES

The Environmental Noise Survey-identified problem areas, the management of which were included in the Plan of Operations (**Milestone 9**).

Commitment No. 27

The statutory requirement in respect of noise will be adhered to at the ACI North Stradbroke Island Operations as outlined in the Queensland Environmental Protection Policy for Noise.

The EPP Noise requires that the acoustic environment of Queensland be protected for the purposes of community well-being and individual well-being. The goal for Queensland's acoustic environment in residential areas is 55dBA.

ACI will not create "unreasonable noise."

6.0 AIR QUALITY

6.1 IMPACTS ON AIR QUALITY

There are several sources of dust on the mining lease. These sources include:

- ♦ mine face;
- ♦ new rehabilitation areas;
- ♦ stockpiles; and
- ♦ unsealed roads.

The results of an air quality monitoring programme were included in the Plan of Operations.

Commitment No. 28

The target criteria in respect of air quality for ACI will continue to be adhered to as per the Environmental Protection Policy Air and additional investigations and control strategies will be employed where required.

The goals set in Schedule 1 of the EPP are the maximum levels for air quality indicators to protect Queensland's air quality. ACI will prevent "unreasonable releases."

6.2 DUST CONTROL STRATEGIES

To suppress dust emissions from the mine face, a sprinkler system has been installed. Additionally, other measures to control dust on site presently include the erection of canvas windbreaks and the application of bituminised mulch to stabilise the soil in problem areas. The increased mine area will also be subject to dust suppression measures. A further control measure will include a hessian fence along the perimeter of the unrehabilitated area along the East Coast Road and the planting of a dense vegetative windbreak between the road and the hessian windbreak.

Overall an integrated approach to dust suppression will be applied. This will incorporate the use of data obtained from the weather station to indicate conditions under which entrainment will occur; water sprinklers on the mine face, stockpiles and water application on unsealed areas; sealing with commercial preparation on high risk areas; and hessian windbreaks with vegetation in other areas.

7.0 CONSERVATION VALUES

ACI commissioned a botanist in 1989 to survey the vegetation endemic to ML 1124 and a proposed extension to determine if any unique or significant vegetation types or species, or areas which could be difficult to rehabilitate, existed on site. Some areas outlined in this

report as having vegetative significance will continue to be preserved, as it pertains to areas of the existing lease.

The report is listed as Supporting Document No. 3 of Appendix 1. A fauna survey was completed on ML 1124 on previously undisturbed areas. Issues identified from this survey were included and management options presented in the Plan of Operations.

Any new disturbance will be preceded by surveys. A flora and fauna assessment of ML 1132 was undertaken in May 1999. It concluded that the vegetation of the site was not endangered, nor of special significance at the local or regional level. Retaining of thirty metre buffers, free of clearing, was recommended around some perimeters. The report will be included in the Plan of Operations.

Commitment No. 29

The Project will respond to any Statutory Requirement of the State or local government with respect to any conservation issues that may arise in the future. Management procedures will be developed when significant features are identified in pre-mining surveys.

8.0 HERITAGE AND CULTURAL VALUES

The undisturbed lease area will be the subject of anthropological and archaeological surveys. These surveys will be conducted in consultation with the Quandamooka Land Council. Issues identified from this survey will be included and management options will be presented in the Plan of Operations.

For ML 1132, an anthropological and archaeological survey was conducted by Bonhomme Craib & Associates. No historical or indigenous sites were located within the study area. It was recommended that no archaeological cultural heritage constraint be placed on the proposed development. The report will be included in the Plan of Operations.

Commitment No. 30

Issues identified in the surveys and management options will be discussed with the Quandamooka Land Council and other community groups and negotiated outcomes will be in compliance with legislation and inserted in the Plan of Operations and the EMOS amended as required.

9.0 SOCIAL ISSUES

The social impacts associated with the following environmental issues were previously addressed in the following sections.

- ♦ Section 3.2.2 land use changes;
- ♦ Section 4.3- downstream water quality;
- ♦ Section 5.0- noise levels;
- ♦ Section 6.0- dust levels;
- ♦ Section 7.0 conservation issues; and
- ♦ Section 8.0 cultural heritage issues.

The social impacts associated with these issues include community concerns regarding cultural heritage and potential impacts on public amenity.

These issues are to be addressed initially through identification and quantification of the impacts through fauna surveys, water quality data collection, addressing concerns regarding air and noise and surveying for cultural heritage significance of the lease area.

Control strategies derived from the characterisation of these issues will be formulated in the Plan of Operations. These control strategies will be audited annually and submitted to the Department of Mines and Energy.

Commitment No. 31

The statutory requirements in respect of social issues for the ACI, North Stradbroke Island Project will continue to be adhered to (as outlined above) and additional investigations and control strategies will be employed where required.

9.1 COMMUNITY CONSULTATION

In order to address community concerns associated with the activities on ML 1124 and ML 1132, the following structure is proposed:

- ♦ All written concerns and complaints received from the North Stradbroke Island community;
 - (a) will be documented; and
 - (b) will be addressed by the mine.
- ♦ Resolution with the writer of the issues will be attempted independently by the mine and where no mutually satisfactory solution can be agreed to, then ACI will seek mediation from the Department of Mines and Energy.

Commitment No. 32

ACI will address social issues and community concerns of the North Stradbroke Island community through on-going consultation with the community.

ACI will address the written concerns and complaints of the NSI community. Mediation by the DME will be sought on unresolved issues.

All matters raised by the community will be documented, including resolved issues and will be reported annually to the DME.

Commitment No. 33

A register of complaints will be kept on site. Complaints will be responded to by the Mine Manager within two weeks of receipt.

9.2 COMMUNITY RETURNS

The mine contributes a significant revenue to the State of Queensland through:

- ♦ royalty payments;
- ♦ taxes;
- ♦ export income;
- ♦ Port Authority revenue; and
- ♦ rent.

The mine contributes a significant revenue to the local community through:

- ♦ rates to the Redland Shire Council;
- ♦ employment of North Stradbroke Island residents;
- ♦ purchases of infrastructure, plant and consumables locally; and
- ♦ utilisation of other service and specialist industries.

Future planned exploration and feasibility activities may expand these benefits in the long term.

Non revenue raising returns to the North Stradbroke Island community includes:

- ♦ Water quality data for groundwater and stream flows previously unmonitored or discontinued from State monitoring programmes;
- ♦ Investigation into cultural heritage areas/issues of significance;
- ♦ Investigation into fauna populations pre and post mining; and
- ♦ Ongoing assessment of flora and land stabilisation techniques.

10.0 RESEARCH/STUDY PROGRAMMES

Commitment No. 34

The research/studies outlined in Table 9 will be completed for the ACI, North Stradbroke Island Project and additional investigations and control strategies will be employed where required. Consultation with local landowners will also occur.

All of the activities outlined in Table 9 have either been completed, or incorporated into an ongoing programme of monitoring.

11.0 ENVIRONMENTAL MONITORING

Commitment No. 35

The monitoring programme outlined in the Plan of Operations will be completed for the ACI, North Stradbroke Island Project Mine Leases and additional investigations and control strategies will be employed where required.

The monitoring programme addresses topics including:

- land resources
- water resources
- air quality
- noise
- conservation values, and
- cultural values.

These are described in more detail in Table 7 of the Plan of Operations.

Commitment No. 36

A detailed review of monitoring methods employed and to be employed will be included with each Plan of Operations to be submitted.

TABLE 9

**RESEARCH PROGRAMMES AT THE
ACI, NORTH STRADBROKE ISLAND PROJECT**

Scope of Work Activity	Researcher Technical Staff	Schedule - Commence and Completion Dates										Comments
		March 1995	August 1995	March 1996	August 1996	March 1997	August 1997	March 1998	August 1998	March 1999	August 1999	
1. Revegetation of mined areas and settling dams	ACI											To be reported in Monitoring Report Annually
2. Establish water quality data base for Cooroon Cooroonpah Cr*	ACI ELP											To be reported in Monitoring Report Annually 3 monthly sampling of sites 1 and 2.
3. Noise study	ELP											Completed
4. Investigate dust levels	ACI ELP											Completed
5. Respirable dust investigation	ELP											Completed
6. Fauna/habitat Survey of undisturbed areas	ACI/ELP											Completed
7. Anthropology /archaeology Survey of undisturbed areas	To be Advised											Completed

* 3 monthly sampling of Sites 1 and 2.

Commitment No. 37

An internal company performance assessment including an interpretation of all monitoring results will be completed by the anniversary of the Plan of Operations submission date each year to ensure successful operation of control strategies, compliance with statutory requirements, and to confirm that milestones in the Plan of Operations have been met. (Milestone 12)

12.0 OVERVIEW STRATEGY

The control strategies described above will be introduced as required to maintain impacts to the nominated acceptable levels and to maintain the area of land disturbed and not rehabilitated to below the nominated area.

12.1 STAFF RESPONSIBILITIES

The ACI, North Stradbroke Island Project employs Environmental and Licensing Professionals to implement the reporting and monitoring requirements of the commitments in this EMOS. The Mine Manager is responsible for overseeing routine monitoring and research duties and for implementing and coordinating the environmental programme.

12.2 MILESTONES

The EMOS provides a framework for drawing together the separate, but interrelated processes for managing the environmental impacts of the mining activities to within acceptable levels of change. These processes are:

- ♦ Identification and assessment of the potential impacts;
- ♦ Development of impact control measures with associated target values, or criteria (goals); and
- ♦ Monitoring to check the performance of each impact control measure.

The milestones shown in Table 10 were all achieved.

Commitment No. 38

The milestones identified in Table 10 will trigger a review of the EMOS. If the environmental management strategies are required to vary, the EMOS will be varied accordingly and resubmitted to the Department of Mines and Energy for approval.

TABLE 10**SUMMARY OF MILESTONES ASSOCIATED WITH THE EMOS**

MILESTONES	COMMENCEMENT DATE	MILESTONE COMPLETION DATE	EMOS SECTION
1 Submit Plan of Operations	-	2 months after approval of EMOS	Section 1.0
2 Mine Shutdown	-	2045	Section 1.0
3 Apply for Lease Surrender	-	2045	Section 1.0
4 Complete Soil Surveys		2 months prior to disturbance	3.2.2
5 Characterise Fines	Within 4 months of approval of EMOS	Submission of Plan of Operations	Section 3.3.2.1
6 Fauna/Habitat Survey		Minimum 2 months prior to disturbance	3.5.1
7 Archaeological/Anthropological Surveys		Minimum 2 months prior to disturbance	3.5.1
8 Groundwater Monitoring Programme	Plan of Operations commencement	Ongoing	4.1
9 Noise Study	March 1995	2 weeks	Section 5.2
10 Air Quality Study	March 1995	Initial - 3 months	Section 6.1
11 Revegetation Trials	December 1994	December 1999	Section 10.0
12 Submit Annual Monitoring Report	-	Anniversary of Plan of Operations submission and annual thereafter	Section 11.0

TABLE 11**STANDARDS REVIEW AND LICENSING REQUIREMENTS**

REQUIREMENT	TRIGGER	EMOS SECTION
Review water target standards	Release of EPA policy for water	Section 4.3, Table 8
Review noise target standards	Release of EPA policy for noise	Section 5.2
Review air target standards	Release of EPA policy for air	Section 6.2
Review EMOS	Release of EPA policy for mining	Section 1.2

Table 11 lists the triggers for the review of EMOS requirements. This EMOS revision incorporates such a review of water, noise, and air targets. Further reviews of these will be undertaken as the Environmental Protection Policies are further developed. Table 12 is an index to the various targets/standards outlined in this EMOS. These targets are subject to the auditing procedures of the North Stradbroke Island Project.

TABLE 12**INDEX OF EMOS TARGETS**

TARGET	EMOS SECTION
Landform stabilisation and vegetation criteria	3.2.2
Landform Design	3.3.1
Land Contamination	3.3.2
Rehabilitation Targets	3.4
Water Storage Design	4.3
Water Quality targets	4.3
Noise Levels	5.2
Air Quality	6.2
Conservation Values	7.0
Cultural Heritage Issues	8.0

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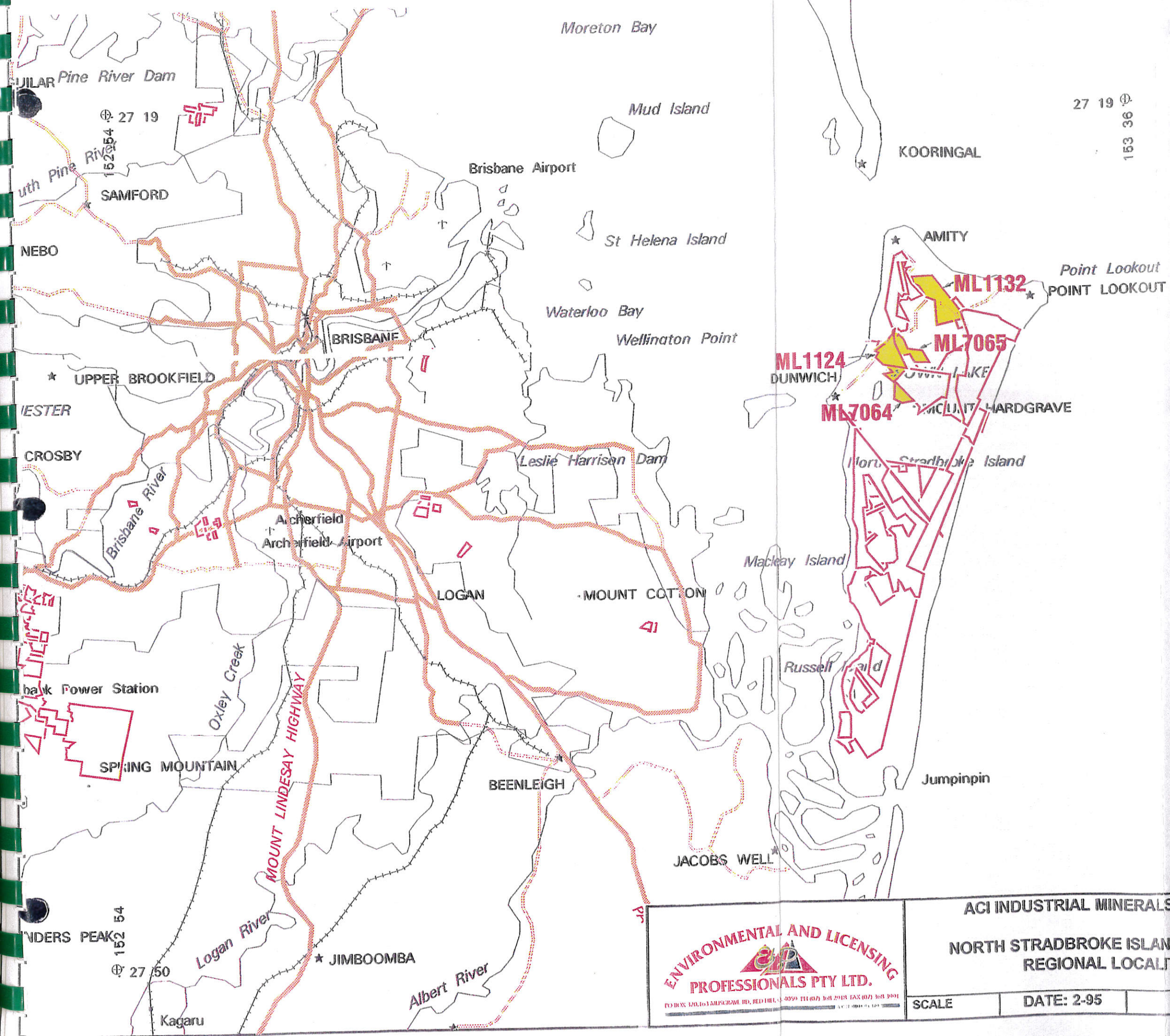
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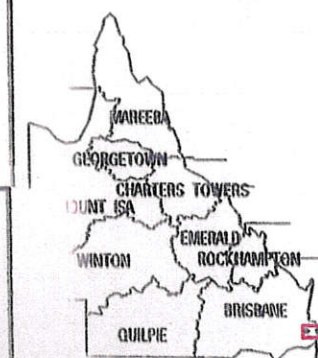
FIGURES



Projection: Transverse Mercator
Zone: 56

Scale 1:250 000
5 km 0 5

Requested By: brisong1
Date: 08 Mar 95
Time: 3:48 PM



ENVIRONMENTAL AND LICENSING
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ACI INDUSTRIAL MINERALS PTY LTD
NORTH STRADBROKE ISLAND PROJECT
REGIONAL LOCALITY

SCALE DATE: 2-95 FIGURE 1

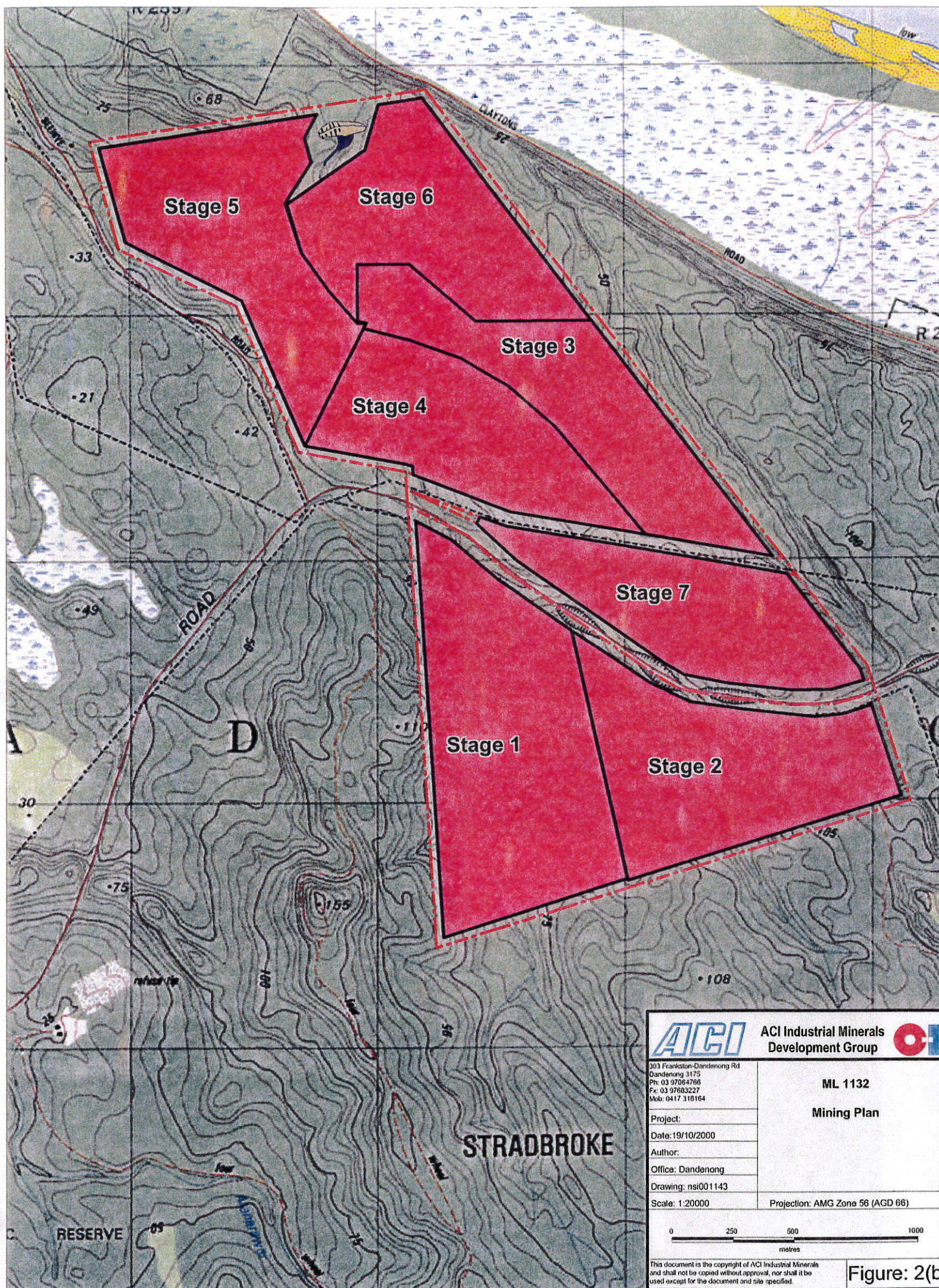
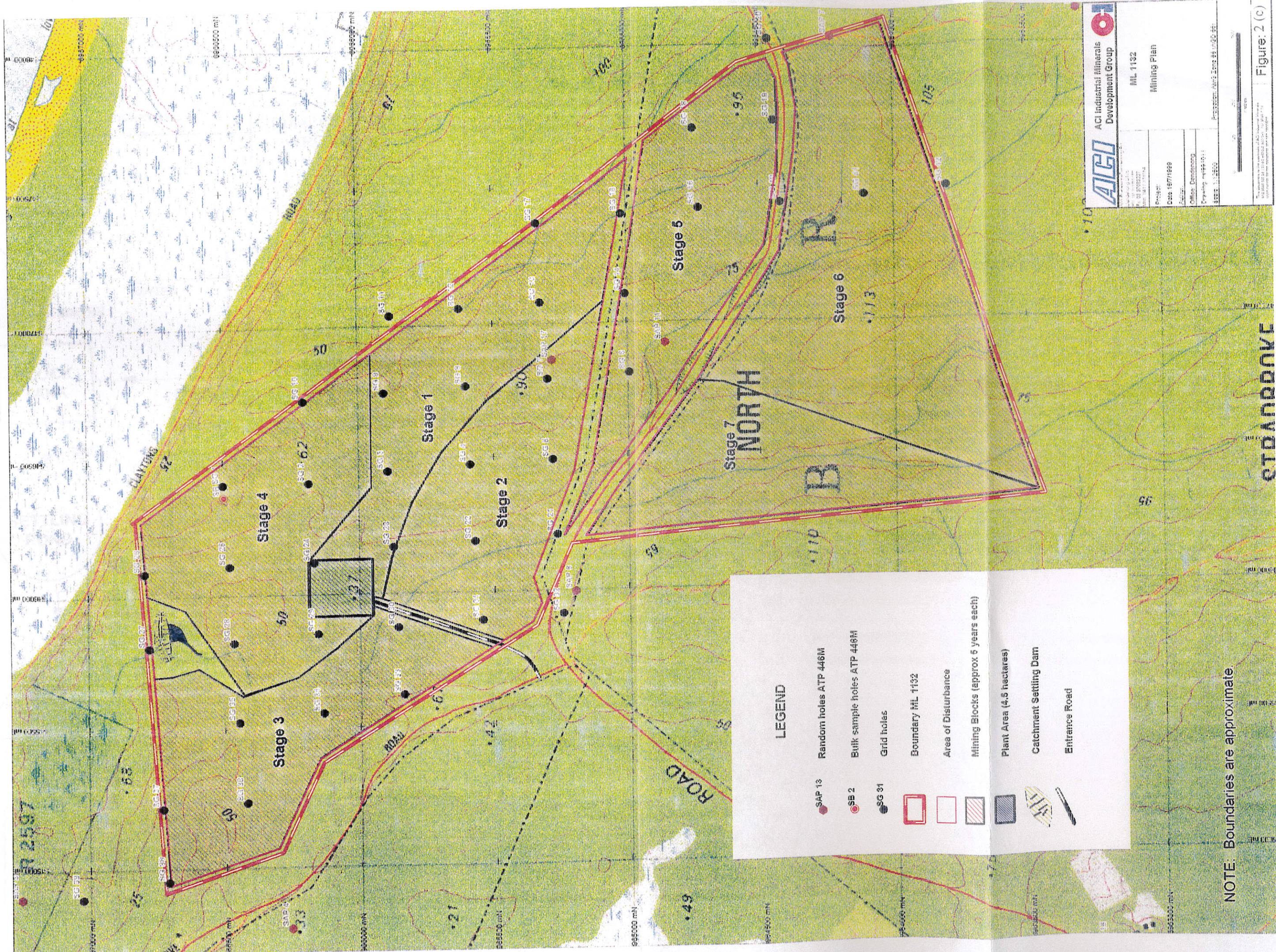
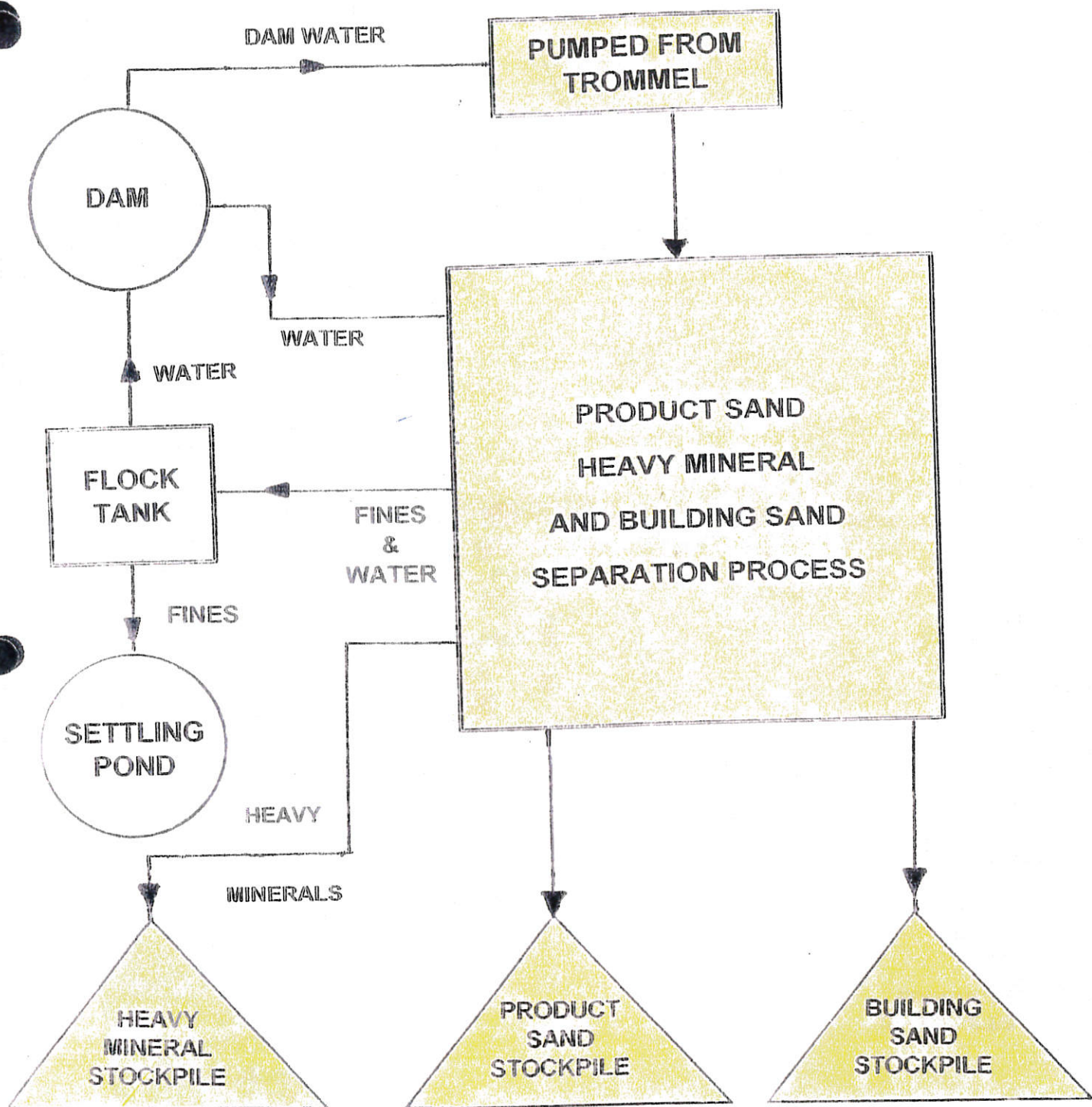


Figure: 2(b)





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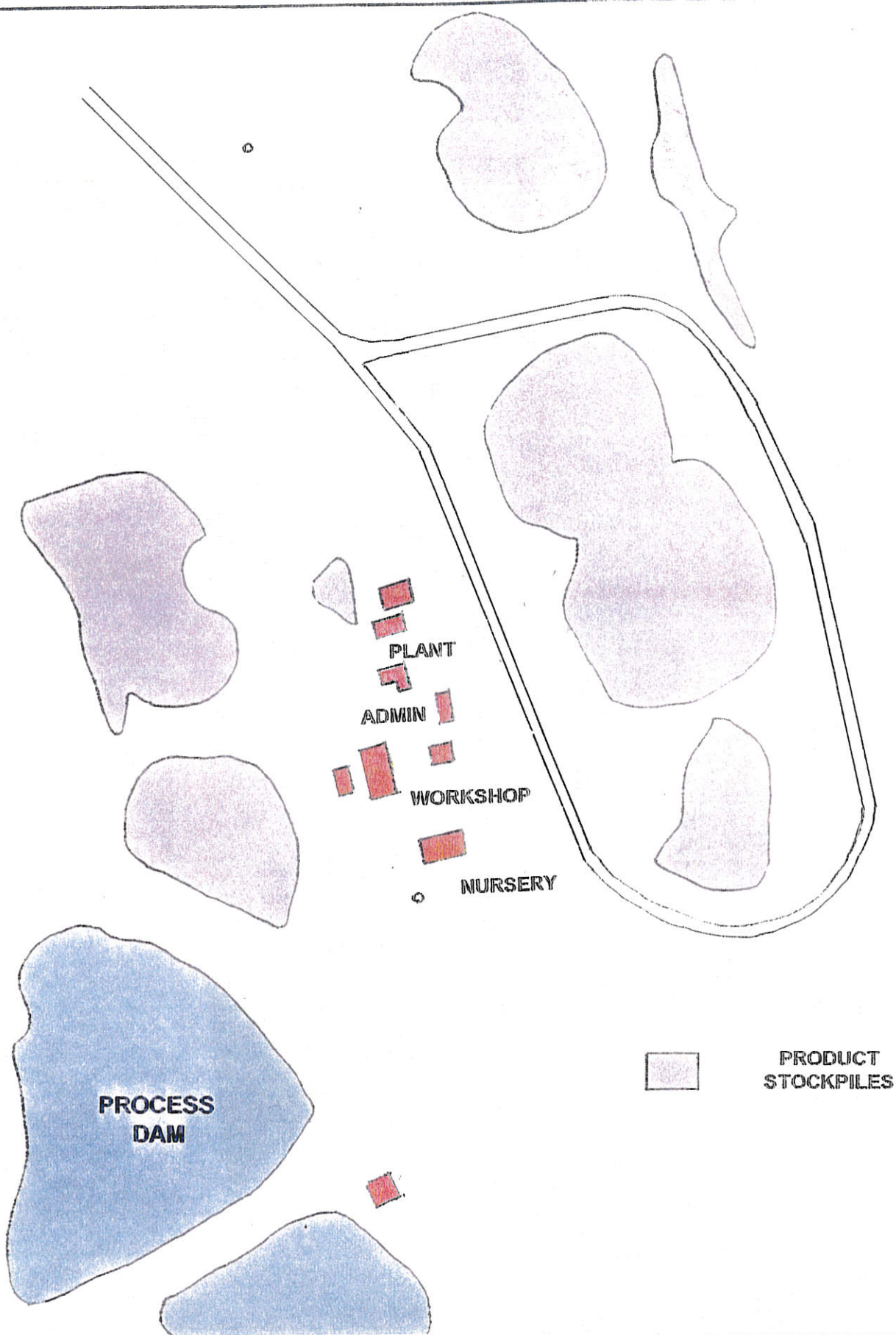
ACI INDUSTRIAL MINERALS PTY LTD

NORTH STRADBROKE ISLAND PROJECT
 PROCESS FLOW DIAGRAM

SCALE

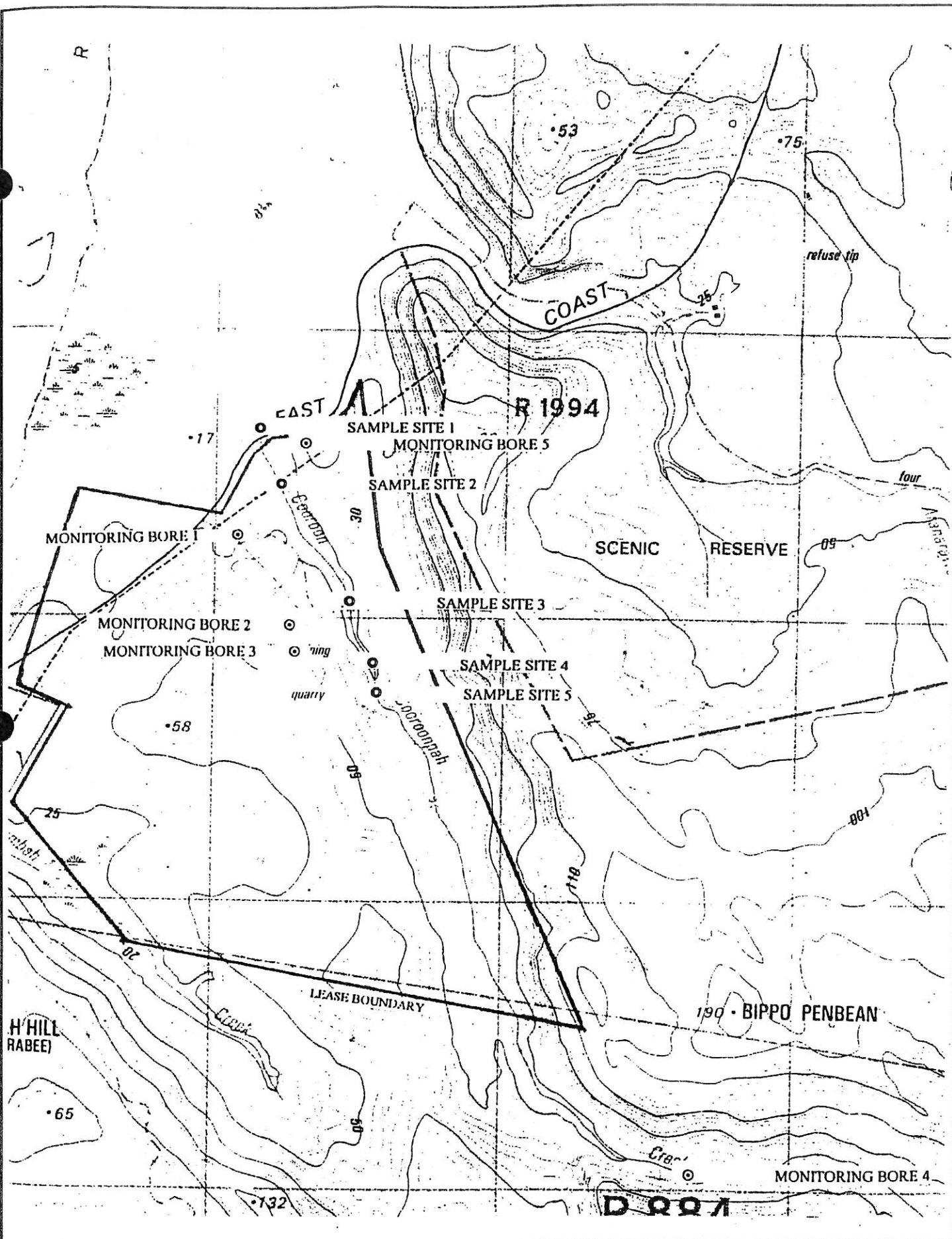
DATE: 2-95

FIGURE 3



-  OPEN SHRUBLAND
-  MEDIUM OPEN FOREST
-  CREEK AND SWAMP
-  AREA CURRENTLY DISTURBED FOR MINING (DECEMBER 1994)
-  REHABILITATED AREAS





ACI INDUSTRIAL MINERALS
NORTH STRADBROKE ISLAND
SITE WATER MANAGEMENT

SCALE 1:17 500

JANUARY 1996

FIGURE 5

APPENDIX 1

List of EMOS Supporting Documents

LIST OF SUPPORTING DOCUMENTS

1.	ACI Plan of Operations 1990
2.	Air and Noise Monitoring Programme, ELP (1994)
3.	"Areas of Vegetative Significance in ACT's Proposed New Lease Area" - Nerina du Preez (1989)
4.	ACI Plan of Operations April 1997
5.	"Flora and Fauna Assessment at ML 1132, North Stradbroke Island" - Anembo Consultants (1999)
6.	"Cultural Heritage Study ML 1132, North Stradbroke Island" – Bonhomme Craib & Associates (1999)