

EMOS: ENVIRONMENTAL MANAGEMENT OVERVIEW STRATEGY

KOGAN CREEK COAL PROJECT **Mining Lease 50074**

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TABLE OF CONTENTS

1. INTRODUCTION	1
2. PROJECT DESCRIPTION	3
2.1 LOCATION	3
2.2 HISTORY	3
2.3 LAND TENURE	4
2.4 GEOLOGY	4
2.5 OPERATION DESCRIPTION	6
2.6 INFRASTRUCTURE	7
2.7 LIFE OF MINE	8
3. ENVIRONMENTAL IMPACTS AND CONTROL	9
3.1 GENERAL	9
3.1.1 Draft EA Conditions	9
3.2 AIR QUALITY	10
3.2.1 Environmental Value of Air	10
3.2.2 Impacts on Air Quality	10
3.2.3 Commitments for Air Quality	12
3.2.3.1 Objective for Air Quality	12
3.2.3.2 Indicators for Air Quality	12
3.2.3.3 Standards for Air Quality	12
3.2.3.4 Control Strategies for Air Quality	12
3.2.4 Draft EA Conditions	14
3.3 WATER MANAGEMENT	16
3.3.1 Environmental Value of Water	16
3.3.2 Impacts on Water	17
3.3.3 Commitments for Water Management	19
3.3.3.1 Objective for Water Management	19
3.3.3.2 Indicators for Water Management	19
3.3.3.3 Standards for Water Management	20
3.3.3.4 Control Strategies for Water Management	20
3.3.4 Draft EA Conditions	22
3.4 NOISE AND VIBRATION	24
3.4.1 Environmental Value of Noise	24
3.4.2 Impacts of Noise	24
3.4.3 Commitments for Noise Control	25
3.4.3.1 Objective for Noise	25
3.4.3.2 Indicators for Noise	25
3.4.3.3 Standards for Noise	25
3.4.3.4 Control Strategies for Noise	26
3.4.4 Draft EA Conditions	27

3.5	WASTE MANAGEMENT	29
3.5.1	Environmental Value of Waste Management	29
3.5.2	Impacts of Waste Management	29
3.5.3	Commitments for Waste Management	29
3.5.3.1	Objective for Waste Management	29
3.5.3.2	Indicators for Waste Management	29
3.5.3.3	Standards for Waste Management	30
3.5.3.4	Control Strategies for Waste Management	30
3.5.4	Draft EA Conditions	31
3.6	LAND MANAGEMENT	32
3.6.1	Environmental Value of Land	32
3.6.2	Impacts on Land	32
3.6.2.1	Land Capability Changes	33
3.6.2.2	Land Use Changes	34
3.6.2.3	Final Void	35
3.6.3	Commitments for Land Management	36
3.6.3.1	Objective for Land	36
3.6.3.2	Indicators for Land Management	37
3.6.3.3	Standards for Land Management	38
3.6.3.4	Control Strategies to Protect Land	39
3.6.4	Draft EA Conditions	45
3.7	NATURE CONSERVATION	46
3.7.1	Environmental Value of Nature Conservation	46
3.7.2	Impacts on Nature Conservation	46
3.7.3	Commitments to Nature Conservation	47
3.7.3.1	Objective for Nature Conservation	47
3.7.3.2	Indicators of Nature Conservation	47
3.7.3.3	Standards of Nature Conservation	47
3.7.3.4	Control Strategies for Nature Conservation	47
3.8	CULTURAL HERITAGE (HISTORIC AND INDIGENOUS)	48
3.8.1	Environmental Value of Cultural Heritage	48
3.8.2	Impacts on Cultural Heritage	48
3.8.3	Commitments to Cultural Heritage	49
3.8.3.1	Objective for Cultural Heritage	49
3.8.3.2	Indicators for Cultural Heritage	49
3.8.3.3	Standards for Cultural Heritage	49
3.8.3.4	Control Strategies for Cultural Heritage	49
3.9	COMMUNITY	50
3.9.1	Environmental Value of Community	50
3.9.2	Impact on Community	51
3.9.3	Commitments to Community	51
3.9.3.1	Objective for Community	51
3.9.3.2	Indicators of Community	51
3.9.3.3	Standards of Community	52
3.9.3.4	Control Strategies for Community	52
3.9.4	Draft EA Conditions	53

3.10 MISCELLANEOUS	53
3.10.1 Environmental Auditing	53
4. ENVIRONMENTAL MONITORING	54
4.1 REVEGETATION AND REHABILITATION MONITORING	54
4.2 SITE WATER QUALITY MONITORING	55
4.3 AIR QUALITY MONITORING	55
4.4 NOISE AND VIBRATION	55
4.5 WASTE MONITORING	55
5. ENVIRONMENTAL REPORTING	56
6. CONTINUOUS IMPROVEMENT	57
6.1 RESEARCH	57
7. STAFF TRAINING	58
8. REFERENCES	64

TABLES

Table 1.	Potential sources of water contamination at the Kogan mine site.	18
Table 2.	Summary of the premining and target postmining land capability of the Kogan Creek Project.	34
Table 3.	Landform design criteria for the Kogan Creek mine site.	40

FIGURES

Figure 1	Kogan Creek Coal Project, Mine Location Map
Figure 2	Kogan Creek Coal Project, Mine Locality Map
Figure 3	Kogan Creek Coal Project, Existing Topography and Mining Limits
Figure 4	Kogan Creek Coal Project, Residences Within Vicinity of Mine
Figure 5	Kogan Creek Deposit, General Stratigraphic Column
Figure 6	Kogan Creek Deposit, Typical Geological Cross Section
Figure 7	Kogan Creek Coal Project, General Arrangement Plan
Figure 8	Kogan Creek Coal Project, Conceptual 20 Year Landform
Figure 9	Kogan Creek Coal Project, Water Management Flow Diagram
Figure 10	Kogan Creek Coal Project, Land Capability Boundaries

ABBREVIATIONS

Aberdare	Aberdare Collieries Pty Ltd
ACARP	Australian Coal Association Research Program
AQC	Allied Queensland Coalfields Ltd
ARI	Average Recurrence Interval
CEPA	Consolidated Electric Power Asia Ltd
CHMP	Cultural Heritage Management Plan
DME	Department of Mines and Energy
DPI	Department of Primary Industries
EA	Environmental Authority
EMOS	Environmental Management Overview Strategy
EPA	Environmental Protection Agency
EPC	Exploration Permit for Coal
EPP	Environmental Protection Policy
ML	Mining Lease
mtpa	million tonnes per annum
NRM	Department of Natural Resources and Mines
POOP	Plan of Operations
QEC	Queensland Electricity Commission
ROM	Run of Mine

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ISON ENVIRONMENTAL PLANNERS

The following table records the issue and revisions of the document. If only a few revisions are made, only the new or revised pages are issued. For convenience, the nature of the revision is briefly noted as well as the page numbers.

Version	Date	Pages / Comments	Origin	Check
OS4.1	28/05/03	Confidential Internal draft - limited distribution	RI	PG
OS4.2	30/06/03	Revised Internal draft - limited distribution	RI	PG
OS4.3	23/07/03	Revised draft - limited external distribution	RI	CS/Gold
OS4.4	19/08/03	Revised draft - EPA comment	RI	
OS4.5	28/01/04	Revised draft (no ash disposal) - for client comment	RI	JH
OS4.6	27/02/04	Revised draft (no ash disposal) - for client comment	RI	JH
OS4.7	7/10/04	Submitted to EPA	RI	JH

1. INTRODUCTION

Aberdare (Aberdare Collieries Pty Ltd), a wholly owned subsidiary of Kogan Creek Power Pty Ltd, is proposing to develop the resources in ML (Mining Lease) 50074 south of Brigalow and near Kogan Creek (Figures 1, 2 and 3). ML 50074 is 2374 ha with surface rights of 2046 ha. This report outlines the EMOS (Environmental Management Overview Strategy) for the Kogan Creek Coal Project.

A transitional EA (Environmental Authority) T3513 exists for the Project. The company wishes to amend the EA to cover the streamlined licensing conditions.

Kogan Creek Power Pty Ltd is a wholly owned indirect subsidiary of CS Energy Limited. Kogan Creek Power and CS Energy are working to develop a 750 MW coal-fired power station adjacent to the Kogan Creek coal deposit. The power station would utilise up to 3 mtpa (million tonnes per annum) of coal under the terms of a contract between the power station owner and Aberdare.

This EMOS has been prepared to allow the mining of coal for sale and delivery to the power station or external customers.

An EMOS is an integral part of the application and processing of an amendment of an EA for a non-standard ML by the EPA (Environmental Protection Agency). This report outlines the EMOS for the Kogan Creek Open Cut Coal Mine.

Section 202 of the Environmental Protection Act states *“The purpose of an EMOS is to propose environmental protection commitments to help the Administering Authority prepare the draft Environmental Authority for the application.”*

An Environmental Authority (mining activities) is an authority issued by the EPA that allows the holder to conduct mining activities that in the absence of that authority would be wrongful or illegal to do so.

As required by Section 203 (1) of the Environmental Protection Act:

“A submitted EMOS must—

- (a) be in the approved form; and*
- (b) describe the following—*
 - (i) each relevant mining lease;*
 - (ii) all relevant mining activities;*
 - (iii) the land on which the mining activities are to be carried out;*
 - (iv) the environmental values likely to be affected by the mining activities;*
 - (v) the potential adverse and beneficial impacts of the mining activities on the environmental values; and*
- (c) state the environmental protection commitments the applicant proposes for the mining activities to protect and enhance the environmental values under best practice environmental management; and*

- (d) *contain enough other information to allow the Administering Authority to decide the application and conditions to be imposed on the Environmental Authority; and*
- (e) *any other matter prescribed under an environmental protection policy or a regulation.”*

As required by Section 203 (2) of the Environmental Protection Act, the environmental protection commitments of this EMOS are intended to:

- (a) be stated in a way that allows them to be measured and to be audited under part 11; and
- (b) state the environmental protection objectives and the standards and measurable indicators, including, for example, objectives for progressive and final rehabilitation and management of contaminated land; and
- (c) include control strategies to ensure the objectives are achieved, including for example, strategies in relation to the mining activities:
 - continuous improvement
 - environmental auditing
 - monitoring
 - reporting
 - staff training.

This EMOS complies with the standard criteria as defined in the *Environmental Protection Act* 1994.

There may be a need to submit future applications for variations of the EA should engineering or market opportunities arise that require significant changes to the proposed operation. Dependent on the scope of any such changes, there would obviously be some impact on the Mine's plans, equipment and infrastructure.

There may also be a need for submission of further applications for variation depending upon the outcome of research and experience locally and overseas. These possible variations are discussed where appropriate.

The EMOS has been prepared by Ison Environmental Planners and the staff of CS Energy on behalf Aberdare, after consultation with officers of the NRM (Department of Natural Resources and Mines) and the EPA.

2. PROJECT DESCRIPTION

2.1 LOCATION

The Kogan Creek Coal Deposit is approximately 9 km south of Brigalow, in the central Darling Downs region of south east Queensland. Brigalow, the nearest commercial centre, (population 56) is a small town on the Warrego Highway 20 km east of Chinchilla (population 3,235) and 280 km west north west of the City of Brisbane. Adjacent to the Warrego Highway is the Western railway line, with Brigalow being approximately 325 km by rail from the export coal loading facilities at the mouth of the Brisbane River (Figures 1 and 2).

The area lies wholly within Chinchilla Shire and is serviced by the towns of Chinchilla and Dalby. Other small townships in the area are Warra, 16 km east of Brigalow and Kogan, 16 km south of the proposed mine site.

The mine site is located in a sparsely populated area with the nearest residence, Glencara, 3.7 km to the east. Other residents to the west of Banana Bridge Road are greater than 4 km from the mine (Figure 5).

2.2 HISTORY

The Kogan Creek Coal Deposit was discovered in 1969 with exploration drilling programs implemented through the 1970's and 1980's to define the resource. A trial pit was excavated in late 1980 but attempts to develop a large export steaming coal project at that time failed.

In early 1990 Aberdare, at that time a wholly owned subsidiary of AQC (Allied Queensland Coalfields Ltd), purchased the Kogan Creek coal resource and carried out extensive studies. In 1992 a second trial pit was excavated and subsequently rehabilitated at the conclusion of the study. In October 1992, AQC submitted a tender to the QEC (Queensland Electricity Commission) for the supply of coal to an existing or new power station. A draft EMOS was submitted with the mining lease application in March 1993.

In 1995, after detailed environmental and engineering investigation and evaluation, the Government of the day decided not to accept any tenders.

Because of delays in the granting of the Kogan Creek mining lease and the results of the QEC tender, AQC acquired the Wilkie Creek coal deposit in late 1993 with mine development commencing July 1994. The successful development and operation of the Wilkie Creek coal mine lead to the suspension of the development of the Kogan Creek coal deposit.

In 1996, with State Government encouragement for private sector infrastructure development in the Surat Basin/Dawson Valley Region, Aberdare again looked at the possible development of Kogan as an integrated mine and Power Station site as well as supplying other domestic or export coal markets.

An assessment report for the EMOS for the Kogan Creek Project prepared by the DME (Department of Mines and Energy) in March 1995 concluded "The final EMOS and Water study report (including the addendum) submitted to the DME are considered to be a fair assessment of the environmental impacts of the Kogan Creek Coal Project. All expected potential impacts have been addressed and the Advisory Bodies are satisfied that the potential environmental impacts can be controlled to within acceptable limits."

Aberdare was subsequently granted ML 50074.

2.3 LAND TENURE

Aberdare has acquired the properties that will be affected by mining. The property belonging to N.H. & E.G. Taylor is within ML 50074 but is not part of the surface area and is not yet acquired. The land held by Taylor is not expected to be affected in the short (20 year) term but in the much longer term could be affected by creek diversion works and extension of mining. At this stage, surface rights are not held for this property.

Figure 3 also shows the open cut resource outline superimposed on the ML 50074. This resource area outline is for the "total" open cut resource. Not all of the resource is held within ML 50074. The ML has been confined to the more attractive resource areas together with areas required for siting of infrastructure.

Within and adjacent to the ML, gazetted road reserves and a rabbit proof fence exist. Application has been made to NRM for temporary road closure and alternative roads and relocation of the rabbit proof fence with the support of the Chinchilla Shire Council and the Rabbit Board.

A camping and water reserve with an excision for road base quarrying is located in the south-east of the ML with a second gravel reserve located on the western side of the Banana Bridge Road. Neither will be affected by mining operations.

2.4 GEOLOGY

The Kogan Creek coal deposit forms part of the Walloon Coal Measures, which were deposited in the Surat Basin during mid-Jurassic times. Sediments of the Surat Basin interfinger with those of the Eromanga Basin in the west and the Moreton Basin in the east. The coal measures and overlying Springbok Sandstone dip shallowly (0° - 4°) to the south west. Minor faulting has been interpreted, but no folding is apparent in the area.

Details of the geology had been presented in reports to the then DME. A brief summary is recorded here for the EMOS. Figure 5 shows the stratigraphic column for the mine site area and Figure 6 shows a typical cross section through the coal deposit.

The Walloon Coal Measures were formed in freshwater swamps, lakes and low velocity streams. They comprise medium to very fine sandstones, siltstones, mudstones, claystones and banded coal seams. With the exception of sporadic bands of calcareous cementing the sandstones are friable and soft, breaking down rapidly on exposure. The claystones normally occur as partings within the coal seams and while competent when dry, become puggy on wetting due to their high montmorillonite and/or bentonite content.

The coal occurs in a number of seams within the Walloon coal measures. However development of Kogan Creek is principally based on mining 3 seams (M, N and O seams). These seams are separated by silty mudstones. The coal averages close to 10 m in combined seam thickness reaching a maximum of 15.8 m in the proposed mining area. The seams are banded, although less extensively than is typical of other Walloon Coal Measure deposits to the south-east. Partings predominantly comprise mudstones and siltstones, with occasional claystones and minor limestone and sandstone. Both the coal seams and stone bands vary markedly in thickness and composition between boreholes, primarily as a result of a lenticular deposition mode.

Kogan Creek coal is classed as high volatile bituminous and is rich in vitrinite and liptinite.

The Springbok Sandstone, conformably overlying the Walloon Coal Measures, is dominated by fine to medium grained sandstones, with evidence of weathering throughout the profile. Hardness ranges from extremely weak to weak, due to the dominance of the weathering derived clay matrix.

During the Late Cretaceous to Early Tertiary eras extensive erosion and pediplanation occurred, resulting in a deep weathering profile and the formation of lateritic bauxite, ironstone and “grey billy” (secondary quartzite) as a duricrust capping. The laterite is widely used in the district for road formation.

Along the Condamine River the Pliocene Chinchilla Sands, comprising soft, weathered sandstones, grits and conglomerates, reach their eastern limit.

Recent deposits include high level sandy gravels representing old river terraces and deposits of eluvial sand and scree on the flanks of many of the hills, ridges and mesas.

Representative overburden and interburden samples were collected from core and chip holes to identify rehabilitation characteristics and to define toxic properties (Ison Environmental Planners 1992a). Chemical analysis comprised pH, salinity, sodicity, and acid potential. The results confirmed that the overburden, typically of the Walloon measures, is sodic and alkaline with no evidence of potential acid generation. Metal scans undertaken on 2 selected interburden samples showed no evidence of toxicity.

The overburden is characterised by a low sulphur content and high inherent acid neutralizing capacity, and is therefore unlikely to be acid forming. Overall, the overburden samples were found to be non-toxic but not generally suitable for use as topsoil. Calcium amendment is required if they are to be used as subsoil. The results show that optimum use of the existing topsoil will be crucial to successful rehabilitation.

All mine infrastructure is located off and away from shallow coal resources.

2.5 OPERATION DESCRIPTION

The proposed Kogan Creek Coal Project will be an open cut operation mining shallow, low stripping ratio coal reserves. The development of the coal resource will require the construction of coal processing, stockpiling and transportation facilities (Figure 7).

The main elements or activities in the development are:

- Presence of a valuable coal resource
- Clearing of any remaining vegetation in advance of mining.
- Selective stripping of available topsoil under supervision to be immediately reused or stockpiled for future use in the rehabilitation program.
- Development of a conventional open cut strip mine.
- Removal of overburden. Overburden is to be initially transported out of pit to form base course for levee banks, haul roads and hardstands. A run of mine coal stockpile area and an out of pit dump will be located to the north of the coal resource but within the boundary of the lease. After the initial strips have been completed most of the over burden will be placed back into the previously mined out strip.
- Overburden will be free dug or blasted depending on economics.
- Selective mining and separation of the coal seams and coal plies from waste bands within the coal formation. Blasting of coal seams is not expected to be necessary.
- A number of different plies/seams (differing qualities) may be mined at any one time for blending to provide a consistent quality feed to the Power Station or for sale.
- Reshaping of spoil dumps, replacement of topsoil and revegetation of the mined out and backfilled area.
- Hauling of coal from the pit by truck to a run of mine coal stockpile area.
- Transport of product coal by conveyor or truck to the adjacent 750MW Kogan Creek Power Station or transported to a rail loading area near the township of Brigalow for rail transport.
- Return of ash from the power station to the mined out pit. During initial period of mining, power station ash will be disposed of in an ash dam located to the south of the power station and then in the out of pit dump within the boundaries of ML 50074. **(This activity will be subject to a separate application for an EA but is included within the EMOS to maintain the integrity of the Activity List)**
- Diversion of Eastern Branch Creek thus freeing up shallow coal reserves.
- Construction of raw water supply and water management structures.
- Establishment of support infrastructure facilities including offices, power and water.
- Direct employment of operating workers and support personnel with the flow on employment through the provision of goods and services.

Coal seams are to be mined separately with partings selectively mined down to 100 mm. The mining contractor must nominate a mining recovery rate which must not be less than 95% to ensure that dilution of coal by overburden and by interburden is minimised and eliminated whenever possible. The anticipated production of coal and overburden removed is set out in the Kogan Creek 20 Year Mine Plan and the Conceptual Mine Dump Design (Runge Pty Ltd Reports 3624a and 4712).

The actual production of coal, overburden removed and disturbance and rehabilitation statistics will be set out in the approved POOP (Plan of Operations).

Kogan will be a conventional open cut coal mining operation using scrapers or excavators and trucks for overburden removal with excavators and trucks for coal extraction and haulage.

The only hazardous materials anticipated to be used on site will be fuel, lubricants and explosives. No other hazardous chemicals are anticipated to be used on site.

A general arrangement plan showing the location of all the proposed mining activities within the lease is presented as Figure 7.

Current planning proposes that direct employment at the mine will build slowly to 70 people as contractors or employees.

2.6 INFRASTRUCTURE

It is anticipated that all of the mine's power requirements will be sourced from the adjacent power station via a direct and dedicated distribution cable. During the power station's construction phase, on site diesel generators will be used on the mine site.

The mine's requirement for water is expected to average 4 kL/day for potable water and 500 kL/day for sub-potable water.

Aberdare holds a licence for 300 ML per annum for a sub-artesian bore located north of the ML 50074. This source is planned to be used to supply both the power station's and the mine's requirements for demineralised and potable water. This will be supplemented by a lower quality supply from two further bores at Lagoon Gully approximately 23 km south of ML 50074 which are licensed to supply 1700 ML per annum to the power station. The combined water usage of the power station and the mine is not expected to exceed 1500 ML per annum

The mine will receive two types of water from the power station as follows:

- Recycled water, originally supplied from the Lagoon Gully bores, will be supplied from the power station's waste water collection pond to provide water to the mine for dust suppression.
- Potable water required for the construction and operating phases of the mine will be sourced from the Kogan Bore but will pass through both the power station's demineralisation plant and potable water treatment plant (Figure 9).

2.7 LIFE OF MINE

The economic life of the power station and the mine will depend principally upon the price and demand for coal and/or electricity. These and other factors dictate the economic cut off with respect to the coal strip ratio. Hence, the economic reserves will vary, the rate of production may vary and the economic life of the mine will vary as these factors change.

The generally accepted economic life for a coal fired power station is 30 years and under current economic assumptions there are more than sufficient reserves of low strip ratio coal to satisfy a power station and mine life of 30 years. Although the current mine plan is only for 20 years, previous studies have shown that the coal reserves are more than adequate to support a 30 year plan using between 2.5 and 3.0 million tonnes pa.

The project intends to mine to the economic limits. The feasibility of highwall mining will be investigated during the mine life. The coal resource is also known to extend to the south, east and west beyond the proposed open cut operations.

The attached drawings show the current plan of mining limits superimposed on the natural surface prior to mining (Figure 3) and the 20 year conceptual landform design (Figure 8).

It must be kept in mind that Aberdare will be further defining the coal resources in ML 50074 and MDL 335. Nothing has been finalised nor have reserves been confirmed to such an extent that a commitment can be given, but there may be the possibility of Aberdare developing additional mines to supply an expansion of the power station or other customers. This and other reasons could require alteration of the mine layout. If there is significant alteration to the mine layout, the EPA and NRM will be consulted.

The proposed coal processing and associated facilities have been ideally located to service the currently proposed operation and any potential expanded project.

3. ENVIRONMENTAL IMPACTS AND CONTROL

3.1 GENERAL

A description of the lease area's environmental characteristics, potential mining impacts and proposed controls has been presented in various reports. This EMOS further refines these issues, draws on the standards and methods for control of impacts from experience at other comparable mine sites and reflects changes in State Legislation, other statutory requirements and Government policy over that time. These standards and controls have been incorporated into the following strategies where appropriate.

Perceived significant impacts from mining are addressed in the following sections. For each impact, the company's commitment to control standards is outlined followed by the strategies to achieve these standards.

Aberdare recognise that management, technical and financial resources need to be provided so that environmental management programmes, control strategies and commitments can be effectively implemented and monitored. On the basis of the assumptions outlined, the strategies identified in this EMOS are technically and financially achievable.

A continual review of environmental performance will be conducted and the results used in developing environmental programs for the mine.

Kogan is committed to adopting good management practices and to mine in accordance with all statutory requirements or amendments at any given time unless written agreement has been sought and received to do otherwise. A number of general EA conditions applicable to all elements have been established.

3.1.1 DRAFT EA CONDITIONS

Schedule A - General Conditions

Financial assurance

- (A1-1) Provide a financial assurance in the amount and form required by the administering authority prior to the commencement of activities proposed under this environmental authority.
- (A1-2) The financial assurance is to remain in force until the administering authority is satisfied that no claim on the assurance is likely.

Maintenance of measures, plant and equipment

- (A2-1) The holder must:
 - a) install all measures, plant and equipment necessary to ensure compliance with the conditions of this environmental authority; and
 - b) maintain such measures, plant and equipment in a proper condition; and
 - c) operate such measures, plant and equipment in a proper manner.

Monitoring

- (A3-1) Record, compile and keep for a minimum of five years all monitoring results required by this environmental authority and make available for inspection all or any of these records upon request by the administering authority.
- (A3-2) Where monitoring is a requirement of this environmental authority, ensure that a competent person(s) conducts all monitoring.

Storage and handling of flammable and combustible liquids

- (A4-1) Spillage of all flammable and combustible liquids must be contained within an on-site containment system and controlled in a manner that prevents environmental harm (other than trivial harm) and maintained in accordance with Section 5.9 of AS 1940 - Storage and Handling of Flammable and Combustible Liquids of 1993.

Definitions

- (A5-1) Words and phrases used throughout this EA are defined in Attachment I – Definitions. Where a definition for a term used in this EA is sought and the term is not defined within this EA, the definitions in the Environmental Protection Act 1994, its Regulations and Environmental Protection Policies must be used.

END OF CONDITIONS FOR SCHEDULE A

3.2 AIR QUALITY

3.2.1 ENVIRONMENTAL VALUE OF AIR

Local airshed is of high quality, compromised only infrequently by diffuse particulates and dust haze produced by pastoral and cropping operations on surrounding lands especially during periods of drought, local transport and forestry activities.

3.2.2 IMPACTS ON AIR QUALITY

The only significant potential air quality impact from the coal mining lease is dust from mining activities. In any earthworks or open cut mining dust is a potential contaminant.

An assessment of potential air pollution from the proposed Kogan Creek coal project has been prepared (Katestone Scientific Pty Ltd 1993).

The various aspects of the proposed operation were reviewed to determine the potential for creating a nuisance to local land owners from the generation of dust and the production of gaseous pollutants. The main areas of concern include the localised impact of several activities that occur within the coal mining lease.

The nature of the coal and the proposed control strategies are such that very little nuisance is expected from the mine activity. The dust generated from the coal mine area itself will normally be taken by the prevailing winds to the north-west and north-east of the site. Current prediction techniques and the experience from other coal mines in Australia suggest that the impact will be below various ambient guidelines for total suspended particulate matter and dust-fall and will decrease rapidly at distances of 1.0 km or more from the centre of mining activity.

In addition to the dust, sulphur dioxide and nitrogen oxides will be emitted from the use of diesel trucks and other equipment on the site and for haulage but these are so small as to make their impact negligible. The generation of minor amounts of gaseous pollutants from diesel usage on and off site will give rise to insignificant concentrations throughout the area.

The site is remote from residence. The maximum 24 hour ambient concentrations of suspended particulates $< \text{PM}_{10}$ due to mining activities will be below the guideline of $150 \mu\text{g}/\text{m}^3$. Annual average dustfall increments are predicted to be below the guideline levels of $120 \text{ mg}/\text{m}^2/\text{day}$.

The impact of the current mine proposal is within existing guidelines and unlikely to cause a nuisance to nearby residents.

Spontaneous combustion of coal can be a local detriment to air quality with some coal measures. The Walloon coals of the Kogan Creek project are not considered to be particularly prone to spontaneous combustion. Nevertheless some problems have been experienced with stockpiles at other mines where proper preventative measures have not been taken. Rotation of coal stockpiles and monitoring for coal heating will be conducted to minimise the risk of spontaneous combustion.

There are no residences in the vicinity of the mine. There is no evidence that crops and/ or pastures adjacent to mining operations will be subject to damage due to excessive dust or coal spillage. Dust will have no effect on farming operations. Levels will not be high enough to have any effects on plant growth or animal production. Photosynthesis in plant leaves due to low light levels will only be affected at extreme dust levels with instantaneous rates over $2,000 \text{ mg}/\text{m}^2$ and under low light level.

Modern mining practices to be adopted by the company will ensure that dust generation is kept to acceptable levels as required by the relevant Government agencies.

In summary:

- The mining activities on the Kogan Creek site are unlikely to generate significant amounts of dust at the nearby residences.
- Dust will have no effect on farming operations. Levels will not be high enough to have any effects on plant growth or animal production.
- Careful attention is required to the design and operation of coal handling activities on the ROM pad, but it is not anticipated that these should generate nuisance.
- The generation of minor amounts of gaseous pollutants from diesel usage will give rise to insignificant concentrations throughout the area.

3.2.3 COMMITMENTS FOR AIR QUALITY

3.2.3.1 Objective for Air Quality

Aberdare will minimise the impacts on ambient air quality levels from operations at Kogan Mine and ensure that emissions are within acceptable measured values and do not affect sensitive receptors.

The management of dust at Kogan Mine seeks to:

- create a satisfactory working environment for the mine workers;
- improve visibility and safety;
- prevent excessive contamination of equipment, nearby residences and the surrounding countryside; and
- meet the air quality goals of the *EPP (Air) 1997*.

3.2.3.2 Indicators for Air Quality

- Levels of fugitive dust.
- Levels of fugitive particulates (PM₁₀).
- The number of legitimate complaints received from surrounding sensitive receptors in relation to air quality (e.g. dust complaints).
- Installation of control strategies and verification that these achieve the design operating parameters.

3.2.3.3 Standards for Air Quality

- No complaints from adjacent sensitive receptors.
- No excessive dust evolution during operations.
- Airborne dust deposition rate measured by funnel deposits will not exceed an average annual 120 mg/m²/day at nearby sensitive receptors.
- Particulates (PM₁₀) will not exceed 150 µg/m³ (24 hour average) at nearby sensitive receptors.
- All monitoring and sampling techniques conducted by or on behalf of Aberdare will be consistent with the Air Quality Sampling Manual, EPA, and applicable Australian Standards.
- If monitoring is undertaken, results will be interpreted on a monthly basis and reported on an annual basis.

3.2.3.4 Control Strategies for Air Quality

Various impact control strategies are available including progressive rehabilitation, establishment of a vegetation screen and maintenance of machinery to minimise visual nuisance, wind-blown dust and other sources of air pollution.

There are operations where fugitive dust is generated, including earth moving and material handling but these are not likely to create problems. Major sources of dust are as follows:

LOADING:

No effective practical control exists for dust arising from loading of overburden or coal into trucks within the mine.

HAULAGE:

Haulage is the most significant source of dust in the mining operation. Hard sealing of temporary haul roads is impractical because of the very heavy loads carried and because the spillage of sharp rock fragments necessitates continual grading to prevent tyre damage. In line with common industry practice haulroads, ramps, tracks and mine areas where there is likely to be a dust source, will be routinely watered. Recycled water is sprayed on to dry areas from large tankers.

TIPPING:

There is no technological control for dust arising from the tipping of overburden from haulage trucks. The site is to be managed to avoid tipping in exposed areas during excessive winds whenever possible and to minimise the distance of fall of the overburden materials. Water trucks will wet disturbed areas whenever mining operations likely to create dust are being undertaken.

COAL HANDLING

The coal handling and conveyor system shall be designed to minimise the emission of coal dust and shall be provided with dust control equipment at coal free fall, loading and transfer points. The design of the dust suppression systems shall ensure that dust levels shall comply with the recommendations of the National Health and Medical Research Council of Australia and shall not exceed 2 mg of respirable dust per cubic metre of air.

If required, coal handling facilities that expose coal to the atmosphere can be fitted with water sprays for dust suppression.

SPONTANEOUS COMBUSTION

At Kogan Creek the virgin coal seams are not expected to provide any problem with spontaneous combustion during operations. Spontaneous combustion has not been an issue during active mining operations at the nearby Wilkie Creek Mine.

The Walloon coals of the Kogan Creek project are not considered to be particularly prone to spontaneous combustion. Nevertheless some problems have been experienced with stockpiles at other mines where proper preventative measures have not been taken. Rotation of coal stockpiles and monitoring for coal heating will be conducted to minimise the risk of spontaneous combustion. Coal that is to be stockpiled for any length of time will be compacted to reduce air/water ingress. Prevailing wind directions will be considered in the layout of stockpiles. The operational height of stockpiles is also minimised to reduce air ingress.

Should any hot spots develop, they will be dug out and dealt with immediately they are noticed. After combustion has been extinguished, the material will be either put through the power station (if otherwise good coal) or compacted and buried.

To the extent required, the following control strategies will be employed at the Kogan Mine to meet the air quality standards required in the EA:

- Haul roads, ramps, tracks and mine areas will be watered by water trucks whenever mining or haulage operations creating dust are being undertaken.
- Land clearing operations to be scheduled in a manner to avoid topsoil stripping when winds are blowing towards sensitive locations and wind speeds are excessive.
- Land clearance is kept to an operational minimum (i.e. to what is required for safe and efficient operations).
- Loose coal stockpiles to be orientated with reference to the prevailing wind direction to reduce exposed surfaces.
- Rehabilitation is conducted as soon as operationally possible on disturbed areas to allow establishment of a protective vegetative cover.
- Where blasting is used, practical controls will include:
 - Correct design of blasts.
 - Restricting blast sizes.
 - Timing of blasts.
 - Where operationally possible, restricting blasting during periods of high winds or when prevailing winds will carry the dust cloud towards sensitive areas.
 - Using selected stemming, where practicable.
- On site vehicular speeds to be limited.
- Roads at the Mine to be constructed and maintained in a manner that promotes surface cohesion and strength.
- Aberdare will establish a consultation strategy with nearby residents to ensure prompt response to perceived problems or to confirm that remedial action is required. Aberdare will establish a complaint register and complaint handling system. If a complaint is received, Aberdare undertakes to thoroughly investigate the complaint, establish the legitimacy of the complaint and undertake remedial action as necessary. Monitoring will be undertaken as required or in response to complaints to establish air quality levels and to assist in establishing the required control mechanism and to confirm controls are adequate.

If required, control strategies will be implemented to promptly address any legitimate complaints and to ensure compliance with the EA. All statutory requirements will be addressed. The following specific strategies have been identified.

3.2.4 DRAFT EA CONDITIONS

SCHEDULE B - AIR QUALITY

Dust nuisance

- (B1-1) Subject to Conditions (B1-2) and (B1-3) the release of dust or particulate matter or both resulting from the mining activity must not cause an environmental nuisance, at any sensitive or commercial place.

- (B1-2) When requested by the administering authority, dust and particulate monitoring must be undertaken within a reasonable and practicable timeframe nominated by the administering authority to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the authorised officer) of environmental nuisance at any sensitive or commercial place, and the results must be notified within 14 days to the administering authority following completion of monitoring.
- (B1-3) If the environmental authority holder can provide evidence through monitoring that the following limits are not being exceeded at any sensitive or commercial place then the holder is not in breach of (B1-1):
- (a) Dust deposition of 120 milligrams per square metre per day, averaged over one month, when monitored in accordance with AS 3580.10.1 Methods for sampling and analysis of ambient air - Determination of particulates - Deposited matter - Gravimetric method of 1991; and
 - (b) A concentration of particulate matter with an aerodynamic diameter of less than 10 micrometre (μm) (PM_{10}) suspended in the atmosphere of 150 micrograms per cubic metre over a 24 hour averaging time, at a sensitive or commercial place downwind of the operational land, when monitored in accordance with:
 - Particulate matter - Determination of suspended particulate PM_{10} high-volume sampler with size-selective inlet - Gravimetric method, when monitored in accordance with AS 3580.9.6 Methods for sampling and analysis of ambient air
 - Determination of suspended particulate matter - PM_{10} high volume sampler with size-selective inlet - Gravimetric method of 1990. or
 - Any alternative method of sampling PM_{10} , which may be permitted by the 'Air Quality Sampling Manual' as published from time to time by the administering authority.
- (B1-4) If monitoring indicates exceedence of the relevant limits in Condition (B1-3), then the environmental authority holder must:
- address the complaint including the use of appropriate dispute resolution if required; or
 - immediately implement dust abatement measures so that emissions of dust from the activity do not result in further environmental nuisance.

END OF CONDITIONS FOR SCHEDULE B

3.3 WATER MANAGEMENT

3.3.1 ENVIRONMENTAL VALUE OF WATER

The key environmental value for water is the physical, chemical and biological integrity of Kogan Creek and its amenity as a water source for stock and irrigation.

A number of reports have been prepared addressing water issues relating to the company's mining lease application (Aberdare Collieries Pty Ltd 1993a, Aberdare Collieries Pty Ltd 1993b, Gutteridge Haskins & Davey Pty Ltd 1993a-c and Ison Environmental Planners 1992b). This section incorporates the results from those reports.

The lease area is traversed by one ephemeral creek, Kogan Creek and its tributary Eastern Branch Creek which report to the Condamine River to the north of the ML. Except for farm dams and a trial mining pit excavated in 1981, no permanent water bodies are present on the ML area.

The proposed mine water management system consists of an operating open pit, final void/s, sediment ponds including an industrial pond and a ROM pond, make up water supplied from the Power Station, stream diversion channel, levee banks and water diversion bunds.

The aim of the mine water management system is to:

- maintain the quality of water leaving the lease area to agreed standards for downstream use.
- ensure minimal interruption to mining operations, through flooding of the pit, surface roads or facilities.
- ensure minimal disturbance to outside properties through flood pattern changes.
- ensure water is available for dust suppression without adversely impacting on water availability to neighbouring properties.
- comply with statutory requirements especially the *Environmental Protection Act* (1994).

The commitment is to prevent any uncontrolled discharge of waste waters from site under the designed conditions. The sizings of various environmental holding ponds and the control strategies have been set to meet this commitment. Based on modelling simulation using the last 70 years of climatic and river flow records, the proposed development will not discharge waste water from site.

The proposed project does not interfere with any significant creeks or water courses except for the diversion of Eastern Branch Creek to provide access to low strip ratio coal. The Eastern Branch Creek diversion assessment and concept design are the subject of the report titled "Eastern Branch Creek Diversion and Condamine River Flood Modelling", MWH Australia Pty Ltd (2003).

Groundwater yield from exploration holes has been very low and no significant groundwater has been encountered in any trial surface mining operations. Available data indicates no sizeable, useable groundwater resource will be affected by the proposed operation.

3.3.2 IMPACTS ON WATER

The mechanism of loss from mining leases of waters are generally:

- evaporation;
- overflow from water impoundments on the leases via spillways;
- export to the power station;
- controlled discharge from water impoundments by pumping or siphoning;
- export from the leases as wetted ROM coal; and
- overland flow during runoff events.

The areas or issues where the Kogan Creek coal project is likely to have impact have been identified as follows:

- water supply
- security of supply for downstream users
- flooding
- water quality (surface and underground)
- stream ecology

WATER SUPPLY AND SECURITY OF SUPPLY

The first two issues relate to the quantity of water available and the concerns that the project would drain an already scarce resource to the detriment of other existing water users. The project will be a relatively small water user and will recycle and conserve storm run off water where possible.

The mine's water requirements will be obtained from a combination of re-use of stormwater from the mine pit, recycling of water from sediment control structures on site and recycling of run-off water from the ROM pad coal handling area with a back up supply of recycled water from the power station.

FLOODING

The construction of the mine and associated infrastructure impinges on the fringe of the Condamine River and Kogan Creek flood plain. At times of major flooding (e.g. ARI 20 to ARI 100 flood) there will be some constriction to flood waters in both the Condamine River flood plain and the Kogan Creek/Eastern Creek system.

The results of the flood studies have indicated that the proposed development with levee banks protecting both pit and infrastructure will have a negligible impact on the flood levels and velocities of the Condamine River. The MWH Australia Pty Ltd (2003) flood study indicates that *"The proposed mine site development increases peak flood levels upstream of the site by a maximum of 0.2 m on the Condamine River for the 1 in 100 year AEP design event."*

Impact upon flood levels in the Kogan Creek and Eastern Branch Creek for ARI 100 flood is of the order of 0.3 m to 0.4 m increase in the levee section of Kogan Creek and immediately upstream of the Eastern Branch Creek diversion. This effect diminishes rapidly upstream. MWH Australia Pty Ltd (2003) flood study indicates that *“The proposed mine site development has virtually no impact on flood levels upstream of the site on Kogan Creek.”* There are no farm improvements at risk in this area.

The study found the proposed mine infrastructure increases flow velocities by approximately 0.2 m/s in the Condamine River and 0.4m/s in Eastern Branch Creek. Local velocities at the north east corner of the site increase as a result of the constriction of flood flows and scour protection is proposed on this corner. The extent of flooding upstream of the mine infrastructure does not substantially change as a result of the flood level increase.

WATER QUALITY

The large areal disturbances on the lease and the coal processing requirements have the potential for contaminant mobilisation on the lease. The potential contaminant sources are shown in the general site plan (Figure 7) and Table 1. They include sediment mobilization from areas to be disturbed by mining as well as chemical elements from dissolved solutes in runoff, groundwater and process waters. Acidity and heavy metal concentrations are not considered to be a problem.

The chief water quality concerns are therefore:

- suspended solids
- salinity

Table 1. Potential sources of water contamination at the Kogan mine site.

SOURCE	TYPE
Cleared areas	Runoff containing sediment.
Coal stockpiles	Runoff containing sediment and dissolved salts.
Mine dewatering	Pit water from groundwater, direct rainfall and runoff from spoil and seepage containing sediment and dissolved salts.
Spoil	Runoff containing sediment and dissolved salts.
Process water	Sediment and dissolved salts from overflow of drains and pipe failure.
Infrastructure	Runoff from roads etc containing oils, sediment, etc

The mechanisms proposed to handle these waters are:

- reuse of the water for dust suppression;
- return to the power station and
- evaporation.

Groundwater is largely confined to the coal seams acting as aquifers. This water is generally saline and often highly saline. Consequently groundwater usage in the district south of the river is limited.

Groundwater movement will be into the pit and cannot contaminate the quality of river water or other local bores.

STREAM ECOLOGY

During the project's development, consultation on the effect of the water sourcing options on stream ecology has been conducted with the EPA, DPI-Fisheries, NRM, Queensland Museum, Chinchilla Shire Council, Chinchilla and District Water Users Association, Condamine-Balonne Water Committee and the Chinchilla Amateur Fishing Club.

Aberdare commissioned Montgomery Watson Hazar to undertake a detailed analysis of the effect on stream ecology of the proposed diversion in the Eastern Branch Creek. The analysis is included in the report titled "Eastern Branch Creek Diversion and Condamine River Flood Modelling", MWH Australia Pty Ltd (2003). The recommendations are to be evaluated in conjunction with the NRM, with NRM being the review agency for the approval as to the suitability of the diversion proposal. If the results of this analysis suggest that a significant detrimental impact might occur the location and design of the channel will be amended. A copy of the current version of the report has been provided to EPA.

3.3.3 COMMITMENTS FOR WATER MANAGEMENT

3.3.3.1 Objective for Water Management

The aim of the mine water management system is to:

- maintain the quality of water leaving the lease to agreed standards for downstream use;
- minimise interruption to mining operations, including flooding of the pit;
- ensure water is available for dust suppression;
- preferentially use water that can not be discharged; and
- comply with statutory requirements.

Aberdare will ensure that water quality, water access, and the physical, chemical and biological characteristics of the water in Kogan Creek and the Condamine River are not degraded by operations at Kogan mine.

3.3.3.2 Indicators for Water Management

- Concentrations at key monitoring points of conductivity/salinity, suspended solids and pH (as an indicator of acidity generation).
- Upstream / downstream water quality variances in relation to the mine site.
- Discharge levels or flows off site.
- The number of legitimate complaints received from surrounding sensitive receptors in relation to water quality.
- Installation of control strategies and verification that these achieve the design operating parameters.

3.3.3.3 Standards for Water Management

The following design criteria for the hydrological systems have been adopted:

- A detention of 24 hours of runoff resulting from a ARI 10 storm and the retention of all water pumped from the pit. During a larger than ARI 10 storm, the volume and turbidity of flow in Kogan Creek and the Condamine River will be such that any contribution from the mine will be negligible, and release of the mine water will therefore be permitted under such circumstances.
- Structures such as channels, embankments and spillways have been based on a ARI 20 storm event. Exceedence of this design storm may result in minor damage to levees and embankments but the costs of repair will be minimal;
- Levees and embankments are based on the ARI 100 flood levels.
- Channels employed in the drainage system are designed to maintain flow velocities below 2.0 m/s in order to avoid scour; and
- No runoff from unrehabilitated areas to pass off site without being routed through a detention dam.

3.3.3.4 Control Strategies for Water Management

Dams, waterways, diversion banks and water recycling schemes are planned to provide catchment separation of clean and dirty water and to manage and control water quality and quantity on the lease.

In developing the drainage plan for the Kogan mine, the following strategy will be employed:

1. Isolate sub-catchments contributing to "clean" and "dirty" runoff.
2. Divert "clean" runoff into the natural watercourses beside the lease so that the water does not enter the mine pits.
3. Intercept runoff from "dirty" areas and convey it to detention settlement ponds.
4. Design the system with maximum flexibility for staged development of the mine.

Dirty water from current mine and recently rehabilitated areas is diverted to sediment ponds, treated by overland flow or other sediment control devices prior to discharge to protect water quality. Water from sediment ponds will be used for haul road watering or pumped to the clean water ponds (Figure 9).

Runoff velocities for the ARI 20 storm in the main channels is to be kept to less than 2.0 m/s as an absolute maximum and less than 1.5 m/s as a desirable maximum.

Fuels and oils will be stored in bunded areas in accordance with Australian Standard AS 1940. Bunded areas will have compacted floors or liners to minimise and prevent seepage losses.

Contaminated water containing oil or other hydrocarbons products will be contained, collected and used on site or treated to reduce hydrocarbon to acceptable levels before release. Waste oil and other hydrocarbons products will be collected and recycled off site by a licensed operator.

Waters will be monitored to ensure compliance with the *Environmental Protection Act 1994* and the EA.

SEDIMENT CONTROL PONDS:

Sediment control ponds act as sumps for sediment laden runoff from all of the various disturbed catchments on the lease including spoil dumps. They are also used as water supply for haul roads watering. The ponds will be cleaned as required to maintain the trap efficiency.

Sediment ponds located within the re-profiled backfill provide temporary settlement capacity for suspended solids during the rehabilitation period and long term surface water sources on the revegetated areas. The ponds are designed to accept a 24 hour ARI 5 rainfall event.

These ponds will be developed as part of the profiled spoil and are not designed to be impermeable. During rehabilitation, water from the ponds will seep into the underlying overburden. Deposited sediment will gradually accumulate in the ponds until revegetation is complete, at which time they will be stable. In extreme rainfall events overflow from the ponds will travel across formed spillways and is ultimately caught by the mining void or sediment ponds placed at the perimeter of the mining area.

During placement and profiling of the overburden the surface will be susceptible to erosion. This will continue until revegetation is complete. During this transition any erosion will be directed to the settling ponds. At the completion of rehabilitation the ponds will become redundant and can be utilised as rural dams or be decommissioned.

The backfill areas are generally sloped at less than 5% to lower the surface runoff velocities. Major channels are designed for flows of less than 2.0 m/second for storms up to the 20 year return period. In some cases, such as the major collector drains, channels will need to handle high runoff velocities. These will be lined and where necessary provided with drop structures to break the flow velocities before entering the settling dams.

PIT VOID:

A pit void or "hole in the ground" is the fundamental component of an open cut operation. This void is backfilled progressively while the void is recreated as the next strip is mined.

The accumulated waters in the pit void vary in quality (saline groundwater, direct precipitation and runoff containing sediments) and will be pumped ultimately to the industrial pond and used as a source for haul road watering or retained in the pit for evaporation. Runoff will be diverted from the voids using designed diversion banks wherever feasible.

DIVERSION CHANNEL:

Eastern Branch Creek is to be diverted from the proposed pit area by construction of a diversion channel and banks. A concept design is included in the report titled "Eastern Branch Creek Diversion and Condamine River Flood Modelling", MWH Australia Pty Ltd (2003). The recommendations are to be evaluated in conjunction with the NRM, with NRM being the review agency for the approval as to the suitability of the diversion proposal. A licence application will be submitted under the *Water Act 2002* to the NRM for this diversion.

All other diversion banks on the lease will be installed for catchment segregation purposes and have been designed to accommodate the ARI 5 year, 24 hour rainfall event. Associated waterways will be designed in order that maximum flow velocity is less than 2.0 m/sec.

CONSTRUCTION PHASE:

During the construction phase water quality downstream will be protected by:

- Carrying out levee, hardstand and diversion works largely in the dry season;
- Any vegetation will be pushed up and left as a barrier to aid erosion control and provide fauna habitat;
- Topsoil will be stripped and placed as a temporary levee around the site works to contain run off;
- Levee banks and diversions will be re-vegetated as soon as possible after each is completed;
- Temporary roads will be re-vegetated when they are no longer required;
- The existing trial pit will be used as a dirty water pond as well as a water source for construction.

FLOODING

Levees and the diversion will be designed to be retained as permanent structures after decommissioning of the mine. The levees will be built well above ARI 100 year flood levels and will be shaped and revegetated to minimise erosion.

WATER QUALITY

Recycling of dirty water is maximised both to keep dirty water ponds in readiness to handle storm events as well as to minimise raw water demand.

Temporary pitwater storages may need to be created from time to time adjacent to the pit either on the high wall side or at the end of the pit. These will allow the pit to be dewatered quickly and allow mining to recommence after rain earlier than it would otherwise be possible. They will be used only to hold excess pit water until pumps can move it to the industrial pond. Licensing of these structures is not expected to be necessary.

All statutory requirements will be adhered to.

3.3.4 DRAFT EA CONDITIONS

Schedule C - Water Management

Release to waters

- (C1-1) Receiving waters affected by the release of process water or storm water contaminated by the mining activities—or both must be monitored at the locations and frequencies defined in Schedule C - Table 1 and comply with the contaminant limits defined in Schedule C - Table 2.

Schedule C - Table 1 Receiving water monitoring locations and frequency ¹

Monitoring point	Latitude (GDA 94)	Longitude (GDA 94)	Monitoring frequency
Kogan Creek Downstream	26° 54.857	150° 46.914	Daily during release from dirty water dams.
Kogan Creek Upstream	26° 56.426	150° 46.089	Daily during release from dirty water dams.
KC Eastern Branch	26° 56.783	150° 46.574	Daily during release from dirty water dams.

NOTE: ¹ Release to Kogan Creek only when flow is greater than 100 mm at the proposed Smith Road bridge over Kogan Creek.

Schedule C - Table 2 - Receiving water contaminant limits ¹

Parameter	Units	Minimum	Maximum
pH		6.0	9.5
Conductivity	µS/cm	-	110% of upstream value
Total Suspended Solids	mg/L	-	110% of upstream value

NOTE: ¹ Release to Kogan Creek only when flow is greater than 100 mm at the proposed Smith Road bridge over Kogan Creek.

(C1-2) The spillway and associated waterways for any dam with high or significant hazard, constructed and operated within the operational land must be designed and maintained to withstand the peak flow for the spillway critical design storm defined in Schedule C - Table 3.

Schedule C - Table 3 Process and Stormwater Dams - Storage design

Name of Dam	Design Storm ⁽¹⁾	Spillway Critical Design Storm ⁽¹⁾
Fresh Water Dams	-	ARI 100
Detention Dams	ARI 10	ARI 20
Sediment Dams	ARI 5	ARI 10

Note ⁽¹⁾: The critical design storm has a duration that produces the peak discharge for the catchments.

Monitoring

- (C1-7) If the results of monitoring show that the limits detailed in Schedule C, Table 2 are exceeded for any of the monitoring points or are 10% higher than background levels defined upstream of any disturbance, an investigation must be conducted to identify possible contamination sources, and remedial actions must be developed and implemented where necessary.

Stream sediment contaminant levels

- (C2-1) All reasonable and practicable erosion protection measures and sediment control measures must be implemented and maintained to minimise erosion and the release of sediment to creeks and other natural water bodies.

Sewage effluent

- (C2-2) Biosolid reuse must comply with the current Environmental Protection Agency operational policy on the management of beneficial use of biosolids from sewage treatment plants and other sources.

END OF CONDITIONS FOR SCHEDULE C

3.4 NOISE AND VIBRATION

3.4.1 ENVIRONMENTAL VALUE OF NOISE

The area is a predominantly rural environment, though when the mine is operational the Kogan Creek Power Station will be in operation. As a result, the existing ambient noise levels which are generally low, particularly during evening and night time periods will have increased. In the Supplementary Impact Assessment Study report the study the selected background noise levels were 34, 34 and 30 dB(A) for day, evening and night respectively. The limits applicable at a receptor for modelling of the power station operation were determined to be 39, 39 and 33 dB(A) for day evening and night respectively. The same study identifies the Overall Noise Level of the Power station as a source at 119.5 dB(A). For the purpose of the EMOS and the proposed EA the Power Station is not considered a commercial place and the definition has been amended to reflect this.

A sound level impact assessment of the proposed Kogan Creek coal project upon local residents has been prepared (David Moore and Associates Pty Ltd 1993).

The location of the nearest residence is described in Section 2.1 and shown in Figure 4.

3.4.2 IMPACTS OF NOISE

The major noise sources are:

- blasting
- operation of mining equipment - overburden and coal extraction
- operation of haul road vehicles

- operation of loading equipment and
- operation of crushers

The environmental values to be enhanced or protected under the Environmental Protection (Noise) Policy “are the qualities of the acoustic environment that are conducive to-

- (a) *The well being of the community or a part of the community, including its social and economic amenity; or*
- (b) *The well being of an individual, including the individual’s opportunity to have sleep, relaxation and conversation without unreasonable interference from intrusive noise.”*

Blasting of overburden will be conducted but assessment has shown that ground vibration and noise due to this source during operation will not be a problem. Any blasting required will be undertaken under strict criteria to protect the amenity of residences. In compliance with Australian Standards and the *EPP (Noise) 1997* vibration at residences is limited to 10 mm/sec.

Coal mining as proposed will be managed so as not to cause intrusive noise at any of the residences at any time in accordance with the *EPP (Noise) 1997*.

Due to the distance to residences, noise nuisance from the project is not a problem. Noise assessment indicates that mining would be inaudible at all of the residences. This will be achieved, if necessary, by adopting appropriate control strategies that are not dependent upon resident action.

3.4.3 COMMITMENTS FOR NOISE CONTROL

3.4.3.1 Objective for Noise

Aberdare will ensure that no unreasonable intrusive noise attributable to mining activities will be heard at any noise sensitive place (e.g. nearby residences). Aberdare will also ensure that blasting remains below statutory levels at any noise sensitive place.

3.4.3.2 Indicators for Noise

Noise indicators to be employed at Kogan Mine include:

- the number of legitimate complaints received from surrounding sensitive receptors in relation to noise;
- noise levels and airblast over pressure measured at any noise sensitive place;
- ground vibration levels measured at any vibration sensitive place or at the mine site perimeter;
- the installation of control strategies and verification that the design operating parameters are achieved.

3.4.3.3 Standards for Noise

Assessment of noise impact and control is addressed by the *EPP (Noise) 1997*, EPA and NRM technical guidelines and AS 1055.2 for off site activities.

Noise, airblast over pressure and ground vibration levels will be maintained below nuisance levels with due consideration of the *EPP (Noise) 1997*.

All noise complaints shall be dealt with using Aberdare's complaints handling procedure to ameliorate legitimate problems.

On site blasting operations will be conducted in accordance with Australian Standard AS 2187.2 Explosives - Use of Explosives. Blasting will not exceed the statutory limits defined in Section 6I of the *Environmental Protection Regulation 1998* at any noise sensitive place.

3.4.3.4 Control Strategies for Noise

Noise control and nuisance is addressed by DME 1995 and EPA guidelines and the Environmental Protection legislation.

If mining noise, blasting noise or vibration impact is required to be reduced, one or more of the following noise mitigation strategies will be considered and implemented as necessary:

- Equipment will be operated in the correct manner to reduce operational sound power levels.
- Correct maintenance of equipment.
- When purchasing new mining equipment, Aberdare will consider the sound power outputs of the machinery.
- Blasting parameters including size and timing will be controlled to ensure compliance.
- Noisier operations will be scheduled during daylight hours only or in-pit during night time hours.
- Selective placement of overburden material.
- Limiting timing of certain operations, e.g. not dumping on top of elevated spoil dumps late at night.
- Development of earth mounds. Mounds should be located as close as possible to the activity. Depending on the line of sight, the noise level reductions provided by a mound located within 50 m of the activity would be 5 dB(A) for a 5 m earth mound whereas a 10 m high mound would reduce noise levels by 12 to 15 dB(A).
- controlling the speed of trucks.
- maintaining the haul road and trucks in good condition.

The company will establish a consultation strategy with nearby residents to ensure timely response to perceived problems. Monitoring will be undertaken as required and in response to complaints to confirm acceptable noise levels. If a complaint is received, Aberdare undertakes to thoroughly investigate the complaint, establish the legitimacy of the complaint and undertake remedial action as necessary. All statutory requirements will continue to be addressed. Appropriate control strategies will be undertaken to promptly address any legitimate complaints from other residences and to ensure compliance.

3.4.4 DRAFT EA CONDITIONS

Schedule D - Noise Management

Noise nuisance

- (D1-1) Subject to Conditions (D1-2) and (D1-3) noise from the mining activity must not cause an environmental nuisance, at any sensitive or commercial place.
- (D1-2) When requested by the administering authority, noise monitoring must be undertaken within a reasonable and practicable timeframe nominated by the administering authority to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the authorised officer) of environmental nuisance at any sensitive or commercial place, and the results must be notified within 14 days to the administering authority following completion of monitoring.
- (D1-3) If the environmental authority holder can provide evidence through monitoring that the limits defined in Schedule D - Table 1 and 2 inclusive, are not being exceeded due to the mining activity then the holder is not in breach of Condition (D1-1).

Monitoring must include:

- a) LA max adj, T ; and
 - b) the level and frequency of occurrence of impulsive or tonal noise; and
 - c) atmospheric conditions including wind speed and direction; and
 - d) location, date and time of recording.
- (D1-4) If monitoring indicates that due to the mining activity the exceedence of the limits in Schedule D - Table 1 and 2, then the environmental authority holder must:
- a) address the complaint including the use of appropriate dispute resolution if required; or
 - b) immediately implement noise abatement measures so that emissions of noise from the activity do not result in further environmental nuisance.
- (D1-5) The method of measurement and reporting of noise levels must comply with the latest edition of the Environmental Protection Agency's Noise Measurement Manual.

Schedule D - Table 1 Noise limits

Noise level dB(A) measured as sound pressure levels	Monday to Saturday			Sundays and public holidays		
	7am - 6pm	6pm - 10pm	10pm - 7am	9am - 6pm	6pm - 10pm	10pm - 9am
Noise measured at a 'Noise sensitive place'						
Lar, 1 hour	50	45	40	50	45	40
Noise measured at a 'Commercial place'						
LA10, adj 10 mins	55	50	45	55	50	45

Schedule D – Table 2 Air blast Overpressure Limits

Location	Monday to Friday 7.00 am – 6.00 pm
	Saturdays, Sundays and Public holidays 8.00 am –5.00 pm
Sensitive or commercial place	Air blast overpressure level of 115 db (linear peak.) for nine (9) out of ten (10) consecutive blasts initiated and not greater than 120 db (Linear peak) at any time.

Vibration nuisance

- (D2-1) Subject to Conditions (D2-2) and (D2-3) vibration from the mining activity must not cause an environmental nuisance, at any sensitive or commercial place.
- (D2-2) When requested by the administering authority, vibration monitoring must be undertaken within a reasonable and practicable timeframe nominated by the administering authority to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the authorised officer), due to the mining activity, of environmental nuisance at any sensitive or commercial place, and the results must be notified within 14 days to the administering authority following completion of monitoring.
- (D2-3) If the environmental authority holder can provide evidence through monitoring that the limits defined in Schedule D - Table 3 are not being exceeded then the holder is not in breach of (D2-1). Monitoring must include:
- a) location of the blast(s) within the mining area (including which bench level); and
 - b) atmospheric conditions including temperature, relative humidity and wind speed and direction; and
 - c) location, date and time of recording.
- (D2-4) If monitoring indicates exceedence due to the mining activity of the relevant limits in Schedule D - Table 3, then the environmental authority holder must:
- a) address the complaint including the use of appropriate dispute resolution if required; or
 - b) immediately implement vibration abatement measures so that vibration from the activity does not result in further environmental nuisance.

Schedule D - Table 3 Vibration limits

Location	Vibration measured
Sensitive or commercial place	5mm/s peak particle velocity for nine (9) out of ten (10) consecutive blasts and not greater than 10 mm/s peak particle velocity at any time

Note: The method of measurement and reporting of vibration levels must comply with the latest edition of the Environmental Protection Agency's vibration and air blast overpressure monitoring guideline.

END OF CONDITIONS FOR SCHEDULE D

3.5 WASTE MANAGEMENT

3.5.1 ENVIRONMENTAL VALUE OF WASTE MANAGEMENT

Wastes and waste disposal will be managed to protect the life, health and well-being of people on and off the mine site, and the diversity of ecological processes and associated ecosystems in and surrounding the mine site that may be affected by waste produced at Kogan mine.

3.5.2 IMPACTS OF WASTE MANAGEMENT

There are a number of potential sources of land and water contamination from operations at Kogan mine, for example:

- vehicle and plant maintenance operations;
- refuelling operations including fuel storage;
- used tyres;
- chemical and process reagent spillage;
- disposal of waste materials;
- putrescable waste (food etc); and
- sewage treatment.

Uncontrolled waste disposal could potentially create land and/or water contamination that may eventually cause serious or material environmental harm.

The following regulated wastes listed in Schedule 7 of the *Environmental Protection Regulation* 1998 are anticipated to be used on site:

- Batteries
- Oil interceptor sludges
- Oils
- Tyres

3.5.3 COMMITMENTS FOR WASTE MANAGEMENT

3.5.3.1 Objective for Waste Management

Aberdare will manage all wastes to avoid any direct or indirect impacts on the health and well being of people and the environment on and surrounding the mine site.

3.5.3.2 Indicators for Waste Management

The main indicators for waste management at Kogan mine are:

- the level/degree of management of all wastes on site in terms of the waste management hierarchy;
- the development of specific methods and targets for reducing regulated wastes and wastes disposed from the site;

- audits to review current waste management practices;
- the types of materials used on site in terms of their potential to cause environmental harm if spilt or misused;
- the storage and handling practices employed for wastes on and off site;
- the level of on-site education in terms of waste management practices;
- the number of legitimate complaints received from surrounding sensitive receptors in relation to waste management; and
- the installation of control strategies and verification that these achieve the design operating parameters.

3.5.3.3 Standards for Waste Management

Aberdare will employ a waste management hierarchy strategy with disposal the last option where no other reasonable economic option is available for minimisation, reuse, recycling or treatment.

A continual review of waste management practices will be undertaken as part of the waste management planning. Waste will be managed in a manner that avoids any injury or adverse effect on people and the environment on and surrounding the Kogan Mine, especially incidents of environmental harm. Fencing and barriers will be erected and maintained to manage stock and wildlife access to waste storage and disposal areas. The period wastes are stored on site for future removal will be minimised.

Licensed operators will be used to remove any regulated wastes off site. Licensed or registered off site specialist facilities will be used for disposal, recycling or re-use of wastes.

Any potential for land contamination will be minimised by the safe and efficient storage, handling and disposal of wastes.

A register of hazardous materials and their location will be kept on site.

Kogan Mine's sewerage treatment systems will be maintained to specification and serviced on a regular basis by a licensed operator.

Fuel storage facilities will be designed, constructed and maintained according to Australian Standard AS 1940.

3.5.3.4 Control Strategies for Waste Management

The goals are to reduce potential health and environmental hazards. Disposal will be the last option where no other reasonably economical option for reuse, recycling or treatment is available. A waste management hierarchy will be instituted which incorporates in order of preference the principles of:

- 1 Waste minimization
- 2 Waste reuse/recycling
- 3 Waste treatment
- 4 Waste disposal

Most wastes will be removed from site for reuse, treatment or disposal.

Strategies will be implemented to prevent land contamination, and should land contamination occur, manage the impacts. Specifically these include:

- Waste minimisation practices to prevent or reduce the generation of waste, avoid excessive packaging and products that cannot be reused or recycled.
- Implementation of safe work practices for minimising the risk of spillage.
- Provide environmental training for all operators exposed to the handling of potentially hazardous substances.
- Construction and use of appropriate spill containment facilities (110% of the volume of the largest tank) for all process reagents and petroleum products storage in accordance with Australian Standard 1940.
- Engineering treatment at industrial and waste management sites to minimise potential adverse impacts and compliance with regulatory requirements. These include oil and grease separators, drainage structures, etc.
- Sewage treatment on site and effluent used for revegetation, or disposed of using infiltration trenches.
- Sludge collected and used in revegetation, buried in the spoil dump or removed from site for safe disposal.
- Unless a viable alternative is available, machinery tyres will be buried at an appropriate depth within the spoil.
- Maintaining a register of location and quantities of hazardous substances including their storage, use and disposal.
- Induction of all staff including contractors in their environmental protection responsibilities and monitoring their performance.
- Encouragement of recycling including provision of recycling collection receptacles and their collection and forwarding for retreatment.
- Classification of waste material into hazard categories prior to disposal.
- The development of contingency and emergency response procedures in the event of spillage or other accidental release of contaminants.

3.5.4 DRAFT EA CONDITIONS

Schedule E - Waste Management

Storage of tyres

- (E1-1) Tyres stored awaiting disposal or transport for take-back and, recycling, or waste-to-energy options - should be stockpiled in volumes less than 3m in height and 200m² in area and at least 10m from any other tyre storage area.
- (E1-2) All reasonable and practicable fire prevention measures must be implemented, including removal of grass and other materials within a 10m radius of the scrap tyre storage area.

Disposal of tyres

- (E2-1) Disposing of scrap tyres resulting from the mining activities in spoil emplacements is acceptable, provided tyres are placed as deep in the spoil as reasonably practicable.
- (E2-2) Scrap tyres resulting from the mining activities disposed within the operational land must not impede saturated aquifers or compromise the stability of the consolidated landform.

END OF CONDITIONS FOR SCHEDULE E

3.6 LAND MANAGEMENT

3.6.1 ENVIRONMENTAL VALUE OF LAND

The land comprises infertile sandstone plateaus, alluvial flats of the creeks that dissect these and the southern margin of the Condamine River alluvial plain. The area is generally unsuitable for agriculture but is suitable for grazing on native and introduced pasture grasses.

The land supports cattle grazing, some fodder cropping and summer and winter cereal cropping on the areas of better soils. A report on the biological and physical assessment of the soils, land capability and farm management for the Kogan Creek coal project has been prepared (Ison Environmental Planners 1993a).

3.6.2 IMPACTS ON LAND

ML 50074 covers an area of approximately 2374 ha with surface rights of 2046 ha. The area of surface rights has been purchased by Aberdare.

The area for which mining is proposed extends east from the Kogan Creek/Eastern Branch Creek alluvial flats back up the higher ground of the sandstone plateau/escarpment. Only minor diversion of the meandering Eastern Branch Creek is required and Kogan Creek is not affected under this EMOS.

Mining and associated activities will result in disturbance of large areas of the project area. Physical excavation of overburden to access the coal resource changes the physical nature of the overburden and its interaction with the environment.

“Swell” is due to the disruption of the natural rock and its break up into discrete particles from large boulders to a fine fraction. Overburden mined and transported to a spoil dump has a volume of approximately 30% greater than the insitu unmined rock. Following breakdown, compaction and settlement when placed in 10 to 20 m lifts, and allowing for the removal of product coal, the net swell is approximately 15%. As a result, overburden can't be contained within the mined excavation. This normally requires a landform with slopes greater than the previous landform. The actual swell or bulking after settlement and compaction of the spoil can only be determined during operations. It is therefore important that the nominated landform design incorporate a degree of flexibility to accommodate changes in loose volumes. The conceptual landform design at year 20 is shown in Figure 8.

The final landscape will not alter the topography outside the limit of the proposed flood levee or bundwall that will be constructed to protect the mine against the ARI 100 year flood event. Hydrology studies indicate that the bundwall will not adversely influence the flow behaviour of Eastern Branch and Kogan Creeks or the Condamine River. The levee will be constructed in accordance with the approval of the NRM.

Overburden near the surface is exposed to weathering processes especially oxidation that changes the chemical and physical nature of the overburden. Salts (and acid if generated) are prone to leaching and movement in surface runoff. Poorly structured and dispersive materials are prone to erosion particularly on slopes.

Overburden has a lower organic matter content, poorer nutrient status, properties more adverse to growth and poorer structure compared to the natural systems. Overburden invariably has higher porosity and lower water holding capacity resulting in greater leaching, surface water runoff and reduced water availability for plant growth. This will alter the capability to support the original vegetation.

With changes to the landform and the physical and chemical properties of the overburden the rehabilitated disturbed area may differ to the pre-mining landscape.

The slope angles / lengths will be greater with the greater risk of erosion from the elevated landforms and potentially dispersive material. The geological stratigraphy and soil profile will be altered resulting in a potentially lower quality material (physically, chemically and biologically) being available in the plant root zone.

The potential effects are:

- Reduced land capability
- Pollution of downstream waterways by sediment and salinity
- Loss of topsoil and plant nutrients beneficial to plant growth
- Unstable landform that restricts subsequent land use

3.6.2.1 Land Capability Changes

The pre-mining capability was determined by a competent soil surveyor based on standard NRM parameters of Rosser et al (1974). Figure 10 and Table 2 shows the land capability classes premining.

Table 2. Summary of the premining and target postmining land capability of the Kogan Creek Project.

CAPABILITY (Class)#	PREMINING		TARGET POSTMINING	
	Area (ha)	% of total area	Area (ha)	% of total area
I	0	0%	0	0%
II	24	1%	12	1%
III	117	6%	93	5%
IV	315	15%	175	9%
V	61	3%	0	0%
VI	429	21%	382	19%
VII	936	46%	1034	51%
VIII	164	8%	350	17%
TOTAL	2046	100%	2046	100%

Rosser et al, 1974.

Land capability is principally class VII being land with limited pastoral suitability, with areas of class IV being land primarily suited to pastoral use but which may be safely used for occasional cultivation with careful management and class VI land not suitable for cultivation but is well suited to pasture improvement. Smaller areas of class II and III, being land suitable for agricultural use with moderate to severe restrictions respectively were also present. There are no class I areas.

For the area disturbed by the actual open cut mining operations the bulking or swell of the overburden and the resulting elevated landform will not allow a return to the pre-existing landform. A conservative landform capability has been adopted to ensure the primary aims of limiting erosion and deterioration of the water quality draining from the area are not compromised. For areas affected by infrastructure, landform changes will not be as pronounced and land capability changes will not be significant. The target post-mining land capability is based on the slope and configuration of the post-mining landform outlined in Figure 8.

It is important to note that the final conceptual landform may change in the future depending on a range of factors, such as community input, economics including coal prices and market demand, and the development of new technologies. Progressive landform changes will be detailed in each POOP.

3.6.2.2 Land Use Changes

The pre-mining land use of the project area is largely restricted to the grazing of cattle on a mixture of native and introduced pasture grasses with limited cash and fodder crops grown on areas of better quality soils. The site is subject to erosion and, without appropriate conservation management, grazing and cultivation of the land is not sustainable. Export of nutrients is occurring as a result of removal by grazing animals and losses due to erosion.

The land use of areas surrounding the mine lease is generally similar although the area to the north and northeast of the proposed development on the floodplain of the Condamine River contain better quality soils.

The principal objective of rehabilitation is to achieve a stable final landform which is adequately vegetated and drained and does not create adverse impact external to the site. The proposed post mining land use of the area is cattle grazing where landform and surface conditions allow. Grazing of cattle will be undertaken on areas rehabilitated following the removal of infrastructure. For some steeper areas where the post-mining landform is not conducive to sustainable cattle grazing, the area will be reafforested with trees and shrubs adapted to the created site conditions, especially species that will allow native fauna to recolonise and the area developed as a wildlife corridor for fauna. Introduced pasture species will be used for erosion control in all areas.

Alternative beneficial land uses will be investigated and considered as mining proceeds. The post-mining landform will permit grazing of introduced pastures, use of the rehabilitated area by local fauna or other appropriate land uses determined by the land owners. Given that the company is the freehold owner of the land to be disturbed, the company will seek to optimise the post mining land use within the natural limitations of the area and consistent with profitable mining of the site. The prime requirement remains to provide a stable post-mining land form and any potential land use must satisfy the primary rehabilitation aims.

The loss of the agricultural value of parts of the area to be mined is acknowledged as an impact of the proposed operation. However, the loss as a percentage on total shire agricultural land is not significant. The proposed rehabilitation plan will ensure that the disturbed area does not adversely affect land outside the proposed mining area. The establishment of grasses, trees and shrubs and the proposed land form will allow subsequent land owners the opportunity to select future uses for the site as long as the proposed uses or intensity of use do not result in degradation of the landscape.

Disturbed areas will include areas required for spoil dumps, sediment dams, diversion banks, bunds, haul roads, built elements and final voids. The location of the various types of disturbance is depicted in Figure 7.

3.6.2.3 Final Void

Backfilling of the final void with rehandled overburden is uneconomic, would destroy previously stabilised landforms and, if required, may make the project non-viable. The mine planning schedule has attempted to ensure spoil from future operations is progressively placed in an adjacent void and unused ramps (if present). It is intended to leave a final void as part of the final landform. The possible location of the final void at the end of the 20 year mine plan is shown in Figure 8.

Given the location of the final void the opportunity to use the void as a water storage structure is possible and will be investigated during the mining operation. Where the final void is to be used for water storage, a research program on final void water quality will be completed during the operation phase to establish its beneficial use for stock or other purposes and appropriate permits and licences obtained.

3.6.3 COMMITMENTS FOR LAND MANAGEMENT

3.6.3.1 Objective for Land

For Kogan the primary aim of the rehabilitation program is to achieve a landscape that is stable geotechnically, not subject to excessive erosion and is non-polluting. The aim is to rehabilitate the spoil dumps, final voids and other disturbed areas to a standard which has minimal effects on adjoining land by limiting soil erosion and deterioration of the quality of water draining from the area to an absolute minimum. The overall aim is to reduce to a minimum the period of time land is left disturbed.

Aberdare's main objectives for land management are:

- to create landforms that are geotechnically stable that are not subject to slumping or erosion;
- control water run off during mining and post mining phases;
- protect downstream water quality and downstream water users;
- ensure maintenance requirements consistent with the proposed land use;
- ensure a self-sustaining vegetation cover can be maintained; and
- to achieve an acceptable post-disturbance land use capability with a pre-determined and agreed beneficial land use

Rehabilitation planning is an integral part of mine planning so that a stable landform can be created during spoil placement without the need for expensive additional earthworks before the area is revegetated.

When designing the postmining landform, including Out-of-Pit spoil dumps and surcharge of pits, the following objectives will apply:

1. Create a land surface that is geotechnically stable and is not subject to slumping or erosion.
2. Create a drainage pattern that will allow the control of water run off of acceptable quality during establishment of the rehabilitated land and post mining phases.
3. Create a final landform in harmony with the existing topography.
4. Contain all spoil placement within the mining lease.
5. Ensure coal resources are not sterilised.
6. Locate the overburden dumps as close as possible to the box cut or mining face to minimise the haul distance.

In line with these broad goals the following definitions are outlined in this section and are required to clarify the rehabilitation standards and statutory requirements of the Kogan project as well as to provide a basis for the auditing of the environmental performance of the mine.

Impacts on land resources are defined by:

- the land suitability changes, the land use potential changes and the rehabilitated landform usage to be achieved.

Control strategies are driven by the definition of:

- the measurable standards of stability of rehabilitated landforms to be achieved;
- the measurable standards at which rehabilitated landforms are considered successfully rehabilitated; and
- the rate of progressive rehabilitation to be implemented over the life of the mine.

Other mines have successfully used pasture grasses to rehabilitate areas previously mined. These areas have been used for cattle grazing. A range of native species will also be planted on site.

Aberdare will promote the following revegetation objectives:

- rehabilitation of mined land with pasture grasses to allow the land use practice of grazing; and
- rehabilitation of some mined land with native trees and shrub species to create diversity and to encourage re-colonisation of native fauna.

A stable condition will be established that will not deteriorate substantially with the projected land use. Maintenance requirements will be consistent with the proposed use of the land for grazing.

Aberdare's mine planning will integrate the landform configuration needed to achieve the desired rehabilitation standard with engineering requirements to establish the most cost efficient technique of mining and spoil handling to create the required shape.

3.6.3.2 Indicators for Land Management

The key indicators of successful land management will be:

- a post mining landform design (e.g. slopes, slope lengths, etc.) that is compatible with the accepted final land use;
- a land surface that is geotechnically stable (e.g. not subject to slumping);
- a vegetation cover that is compatible with the accepted final land use in terms of species selection, 30 % vegetation cover and self-sustainability;
- achievement of the stated post mining land capabilities;
- the minimisation of erosion;
- the creation of a drainage pattern that will allow the control of water run-off to an acceptable standard during and after establishment of rehabilitated land in terms of hydraulic design and water quality;
- a post mining landform design that will contain all spoil placement and disturbance within the mining leases;
- the efficient recovery and use of the on site top soil resource;
- the minimisation of disturbance to what is required for efficient and safe operations;
- the rehabilitation of land as soon as possible after it is freed from operational use;
- the efficient recovery of the known coal reserves and prevention of the sterilisation of surrounding coal resources;

- the minimisation of the haul distance between the mining face and overburden dumps;
- the creation of useable final voids that do not impact on other properties.

3.6.3.3 Standards for Land Management

The final conceptual landform has been developed based on future mine planning and the proposed post mining land use. The mine plan was developed using standard strip mining (open cut) methods, current delineated coal reserves and projected overburden removal and coal production. Landform design is an integral part of mine planning and is developed ahead of the mine path. Currently voids are envisaged at the end of mine life as shown on Figure 8.

The proposed post mining land use has been developed with due consideration to past and current land use practices in the region. The final conceptual landform is based on standard open cut mining methods practiced in Australia. The EPA will be kept informed of final landform development through consultation and by each subsequent POOP.

Disturbed areas will be progressively rehabilitated to the land capability in Table 2 by the time of lease surrender. All areas to be disturbed will be recontoured to final landform and revegetated as soon as possible after disturbance ceases or when no longer reserved for infrastructure or further disturbance. Rehabilitation will be conducted on a progressive basis.

The Schedule of Rehabilitation in each POOP will outline the cost, rate and areas of rehabilitation for the period of the plan. The POOP will provide details of the extent of disturbance. The maximum disturbed area not rehabilitated will not exceed the area nominated in each POOP.

The proposed landform stability standards for the Kogan Mine are:

- to contain rates of soil loss such that vegetative growth and cover is self-sustaining;
- the absence of rill erosion deeper than 250 mm; and
- the maintenance requirements consistent with the nominated land use.

Mine planning will be continually re-evaluated to ensure that the coal reserves are efficiently extracted to maximise recovery and minimise haul distances and the landform design is to suitable specifications.

Aberdare recognises that topsoil is a valuable natural resource. Therefore, all organically enriched soil with suitable edaphic characteristics will be recovered, managed and used to optimise rehabilitation. All suitable topsoil where the electrical conductivity (1:5 soil water solution) is < 1.0 mS/cm or the exchangeable sodium percentage is < 10 will be stripped ahead of the mine path for later use.

In the event that insufficient quality soil as defined above exists for the rehabilitation plan, spoil or other material with suitable physical, chemical and edaphic properties will be used.

Topsoil will either be used immediately or stockpiled for later use. Stockpiled topsoil will be seeded with grass species to reduce erosion loss and to help maintain its biological qualities.

Topsoiling costs are included in the contract mining rates.

Introduced and native grass species will be used for grazing and erosion control. The ACARP (Australian Coal Association Research Program) research has demonstrated that revegetation will be considered adequate when the vegetation cover measured as basal cover exceeds 30%.

At the end of mine life, all remaining mine infrastructure will be removed if not required by the subsequent land user. Any contaminated material considered unacceptable to the proposed end land use will be treated by bioremediation or other procedures, diluted by burial or transported to an approved landfill to remove the contamination. Roads not required for future land use will be ripped and revegetated.

Dams and ponds are to remain after relinquishment of the leases for the use of the landowners and for wildlife and stock. No specific rehabilitation activities will be required for dams and ponds, apart from ensuring their stability at close of mine life.

Final voids are a valuable landform for water storage and recreation. Final voids are subject to stringent safety and environmental guidelines. The following minimum standard for decommissioning has been adopted. Any exposed coal seams with the potential for fire or risk of contamination in the final voids will be covered with inert material. The slopes of the low wall and high wall of any void will be left geotechnically stable. A geotechnical assessment will be conducted to confirm the proposed landform stability. The high and low wall will either be bunded or appropriately fenced to restrict vehicular and stock access. Drainage channels will not discharge over the walls. The high wall and low wall will be protected by an earthen diversion bund (ARI 100 year design capacity) to stop uncontrolled water ingress and to restrict vehicle access. The need to fence the ML and/or highwall will be investigated. Final void terraces and slopes will be revegetated with pasture grasses and native trees. Access for light vehicles will be maintained. This will also provide an escape route for stock or wildlife.

Aberdare will continue to reassess rehabilitation techniques and standards based on current research and 'best practice' environmental guidelines including the Department of Mines and Energy's *Technical Guidelines for Environmental Management of Mining Activities* and Environment Australia's *Best Practice Environmental Management in Mining*.

3.6.3.4 Control Strategies to Protect Land

LANDFORM STABILITY

The major design limitations will be slope angle and slope length. These parameters, in association with the properties of the material being handled, will determine the erosion potential of the dumped materials. Long term geotechnical and surface erosion stability will be maintained within acceptable standards. The final landform and rehabilitated surface will require minimal maintenance by subsequent land users and maintenance requirements will be consistent with the proposed land use.

The location of the various types of disturbance is depicted in Figures 7 and 8.

The following information has been used in establishing the postmining land form presented in the attached drawings. The design criteria for the landforms presented in the attached drawings are drawn from relevant guidelines and rehabilitation experience at comparable mines including Wilkie Creek.

The design also addresses the issues of spoil placement procedures, compaction, post placement settlement, control of water run off and sediment, slope profiles and aesthetics of the final landform. In particular, there is a need to minimise the area of land disturbed by the mining operations.

Slopes over 20% will only be used if special precautions such as terracing or rock armouring are taken. Where it is necessary to use steep slopes, it is important to minimise the catchment area above the slope and therefore the run off water reporting over the slope.

To limit erosion potential of the landform, the slope length will be reduced as the slope angle is increased. Cognisance will be made of climatic influences, especially rainfall intensity. The following criteria have been adopted as the maximum slope length (Table 3).

Table 3. Landform design criteria for the Kogan Creek mine site.

Slope Angle (%)	Vertical Height (m)	Maximum Slope Length (m)
25	20	80
22	24	110
18	28	160
16	32	200
14	33	240
12	33	280
10	32	320
8	28	360
5	25	500

The nominated slope lengths will be considered as absolute maxima and the detailed landform design will attempt to create a drainage pattern to break up slope length and direct the water into controlled waterways. As depicted in the attached drawings, the landforms for the proposed strategy to the end of the mine life are within the nominated criteria. Within the concept of a life of mine, Aberdare will implement the designs in the end of life layout plans submitted with this EMOS.

Studies of the dynamics of natural slopes have shown that convex slopes are unstable and more likely to be subject to erosion as both the quantity of run off water and its velocity increase down the slope. The design has incorporated, wherever possible, concave spoil profiles where the rate of angle change is constant as these are geotechnically the most stable and least prone to erosion.

The principle behind the selection of concave slopes is that the steeper slopes will have smaller catchment areas and hence lower run off volumes. The flatter slopes with greater catchment areas and run off volumes create lower water run off velocities and hence a lower erosion potential.

These criteria will be monitored in order that erosion will be controlled within levels required to achieve self-sustaining vegetation.

Aberdare has also accepted advice from the NRM that erosion rates of <40 t/ha/annum may be acceptable as an interim target. The company has accepted this advice and adopted such a rate dependent on whether the outcome of industry sponsored trials being conducted by the Centre for Mined Land Rehabilitation indicates some other more acceptable figure.

Erosion control will be achieved by the installation of graded banks, designed land surfaces and surface contour ripping initially with the subsequent development of vegetative cover.

The rehabilitation of the site will require different landforms and revegetation techniques for the various types of disturbed areas. The successful implementation of these design criteria depends upon the volume of material to be recontoured, the working area, and the surrounding and underlying topography. Life-of-mine landform plans will be reviewed after any mine plan changes and adjusted accordingly. The current (pre-mining) and concept landform plans are presented (Figures 3 and 8).

A conventional landform has been adopted involving moderate to steep slopes that are ripped across the slope on the contour and suitable seed sown. The final landform will still seek where possible to maximise infiltration, reduce runoff velocity and volumes and to enable quick revegetation of the site. Topsoil and/or other suitable material will be ripped into the spoil and the area sown with appropriate tree and grass species.

Aberdare will continually consider alternative landforms that may exhibit greater stability, allow more control of water and be more cost effective. In the event of favourable results an application will be made to vary the design criteria. In the meantime, progressive rehabilitation will proceed as described.

- Eastern Branch Creek is to be permanently diverted by construction of a diversion in accordance with a licence issued by the NRM. The diversion will be topsoiled, fertilised and sown to pastures.
- Minor bunds and diversion banks will be constructed to divert local runoff from active mining areas. They will be stabilised by the use of topsoil, fertiliser and seed such that active erosion is not apparent.
- Temporary graded banks will be graded flat, ripped and revegetated.

Recontouring and topsoil replacement costs for the Kogan Creek project site are included in the contract mining rates.

LAND USE

As stated earlier, the current proposed post mining land use is light grazing using introduced and native pasture grass species. However, other beneficial land uses will be investigated and considered as mining progresses.

The post-mining landform will permit:

- grazing of introduced and native pastures;
- reintroduction of native flora species to the site;
- the use of the rehabilitated area by local fauna; and/or
- other appropriate land uses determined by the land owners.

The proposed rehabilitation plan will ensure that the disturbed area does not adversely affect land outside the proposed mining area. The establishment of grasses, trees and shrubs and the proposed landform will allow land owners the opportunity to select future uses for the site as long as the proposed uses or intensity of use does not result in degradation of the landscape.

FINAL VOIDS

Final voids will be left as part of the final landform. Given the location of the final voids, the opportunity to use the voids as water storage structures is possible and will be investigated during the mining operation. Final use of the voids for water storage will be assessed in terms of predicted water quality and other hydrological aspects of runoff catchment, rainfall input and evaporation loss.

If an alternative beneficial use of the final void/s cannot be established prior to surrender, the void/s will be left as an isolated void. The high wall and low wall will be protected by a diversion bank (ARI 100 year design capacity) to stop uncontrolled water ingress. Vehicular and stock access will be restricted either by the use of bunds or fencing. Drainage channels will not discharge over the walls. The walls will be left in a geotechnically stable condition as demonstrated during the Mine's operational phase and based on the advice of a competent geotechnical engineer. Access for light vehicles will be maintained. This will provide an escape route for stock or wildlife.

The anticipated locations of the final voids are shown in Figure 8.

3.6.3.4.1 REHABILITATION METHODS

Land will be judged successfully rehabilitated when the landform stability and receiving water standards have been met.

To meet the criteria for successful rehabilitation and stability, rehabilitation will consist of:

- topsoil recovery prior to mining;
- contouring to acceptable slopes;
- burial of any material toxic to plant growth;
- surface preparation;
- topsoiling to appropriate depth;
- seedbed preparation;
- application of soil amendments, fertiliser and seed;
- establishment of a vegetation cover;
- maintenance of vegetation during establishment and
- monitoring to confirm criteria are met.

All soil to a depth where the electrical conductivity of a 1:5 soil water solution is < 1.0 mS/cm or the exchangeable sodium percentage is < 8, will be stripped. In the event that insufficient quality soil exists as defined above for the rehabilitation plan, spoil or other material, from either on or off the site, and with suitable edaphic properties will be used as a substitute.

The initial soil surveys have shown that topsoil is not uniform across the site and must be well managed to optimise its value. Any areas to be disturbed by mining but which have not yet been surveyed in detail will have a topsoil assessment conducted prior to disturbance commencing.

Potentially acidic material is defined as having an acid neutralising capacity with a net potential deficiency of 5t of CaCO_3 equivalent per 1,000t of material and an electrical conductivity > 1.5 mS/cm in a 1:5 soil: water solution. If visual inspection of overburden during drilling programs and active mining identifies any overburden that may produce toxic material, samples will be taken for testing. Any potentially acidic material will be buried to a minimum of 1m using non-toxic spoil. From the testing undertaken to date, **no** toxic spoil has been identified.

Key rehabilitation procedures are:

- Spoil dumps will account for the bulk of the disturbed area and will be progressively created to the specified final landform during dumping.
- Infrastructure sites including fuel storage areas will first have all remaining equipment, plant and buildings not required by the subsequent landuser removed. Any contaminated material considered unacceptable to the proposed end land use will be treated, diluted by burial or transported to an approved land fill to remove the contamination. The sites will be re-contoured by dozer then intensively deep ripped on contour to 0.5m at 1m spacing and re-vegetated.
- Roads not required for future land use will be ripped and re-vegetated.
- Freshwater dams are to be left for the use of the landowners after relinquishment of the lease. No rehabilitation activities will be required.
- All dams, ponds and sediment control dams are to remain. Rehabilitation activities planned include progressive re-vegetation of embankments as well as providing permanent access for wildlife and stock.

During the mine's operation, a program will be undertaken to characterise the coal seams. The aim is to establish the potential for fire and the release of contaminants that will adversely affect the environment where the coal seams are left exposed. Exposed coal seams in the final void that are potential fire or environmental risks will be covered with inert material. Final void terraces and slopes will be revegetated with pasture grasses and native trees. Access for light vehicles will be maintained. This will also provide an escape route for stock or wildlife.

A soil profile will be recreated to provide the basis for the establishment of soil forming processes. While existing topsoil is of low nutrient value it will contain soil microorganisms and plant propagules and hence all available topsoil is to be recovered prior to disturbance and stockpiled for use in the rehabilitation program to ensure the rapid revegetation of critical areas.

Details on topsoil recovery and storage are addressed in a separate report (Ison Environmental Planners 1993a). However, topsoil management will include the following:

Topsoil will be used immediately where possible although topsoil removed initially will need to be stockpiled for some period of time. Long term storage dumps will have the surface contour ripped and sown to pasture grasses. Topsoil stockpiles will not exceed 2 m in height.

Following construction of the landform, ponds, banks and other erosion control structures will be installed. Topsoil will be spread evenly over the surface to be treated. The depth of topsoil used will depend on the quantity of available topsoil but a minimum of 75mm will be used with greater depth used in critical areas. Where feasible the topsoil will be ripped on the contour to key the topsoil into the underlying surface layers.

Experience at other mines has indicated that reforestation can be achieved most effectively and cheaply using direct seeding techniques (rather than planting). Plant densities normally achieved by direct seeding can also help reduce erosion of these sites. However, experience at other coal mines indicates that pasture establishment is necessary on erosion prone sections of the landform. Native tree species will not establish successfully in direct competition with fast establishing exotic pasture species. However, establishing trees and pasture on separate sections of recontoured spoil will gradually see an invasion of grass into treed areas over time. Once trees are established (i.e., after 2 years) the competitive effects of pasture are less critical. It is expected that, under normal conditions, pasture would invade into most parts of a prepared bench within 3 to 4 years.

Seed of pasture grasses, legumes, shrubs and trees will be sown using ground distribution, generally in the October to February period depending on seasonal conditions. The details on the selection of the type and rate of fertiliser and seed will depend on the physical and chemical properties of the surface being treated, the season, prevailing climatic conditions and the available machinery. The aim is to achieve a minimum of 30 % groundcover based on soil disturbance and erosion studies.

Based on the available research it is intended that approximately 250 trees/ha will be established using direct seeding techniques supplemented by planting of tube stock.

Topsoil encourages grass development and there will be circumstances where absence of topsoil will be an advantage such as where trees are to be established.

To avoid the problems of severe grass competition it will be necessary to sow the grass and tree seed separately. Also, as the various seed has different densities care needs to be taken to ensure that segregation of the seed does not occur during the sowing operation. Sowing trees in bands free of grass seed should give the emerging trees 1-2 seasons to get established before any competition from second generation grass (from Oaky Creek and Curragh mines experience). Sowing will follow closely behind the preparation of an area.

In the detail design of the area, the following variables will need to be considered.

- directional aspect slopes
- substrate materials, particularly dispersive, sodic spoil
- techniques to manage water flow
- different topsoils and application of various depths of topsoil
- combinations of species used and variations in rate of application of fertiliser
- potential seed available from natural vegetation particularly adjacent to remnant natural vegetation

Revegetated areas will be monitored annually until the nominated standards have been met for 3 years. Maintenance will be performed to promote acceptable cover or to repair failed areas. Regular monitoring and surveillance will be undertaken. Actions considered appropriate to rectify any causes of revegetation failure will be commenced immediately after identification of the problem.

3.6.4 DRAFT EA CONDITIONS

Schedule F - Land Management

Rehabilitation landform criteria

(F1-1) All areas significantly disturbed by mining activities must be rehabilitated to a stable landform with a self-sustaining vegetation cover in accordance with Schedule F – Table 1 and 2.

Schedule F Table 1 - Final land use and rehabilitation approval schedule

Tenure ID	Disturbance type	Projective surface area (ha)	Post-mine land description	Post mine land capability classification	Slope range (%)
ML 50074	Infrastructure		Light Grazing	3	<10%
	Haul Roads		Light Grazing	4	<7%
	Topsoil Stripped		Fauna Habitat	3	<10%
	Active Pit (final void)		Fauna Habitat	5	Competent rock <70% Incompetent material <45%
	Spoil Area		Fauna Habitat	4	<18%

“land capability” as defined in the DME 1995 Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland.

- (F1-2) Progressive rehabilitation must commence as areas become available within the operational land.
- (F1-3) Complete an investigation into rehabilitation of disturbed areas and submit a report to the administering authority proposing acceptance criteria to meet the outcomes in Schedule F - Table 1 and landform design criteria in Schedule F - Table 2 within 3 years of mining commencing.

Residual void outcome

- (F2-1) Residual voids must not cause any serious environmental harm to land, surface waters or any recognised groundwater aquifer, other than the environmental harm constituted by the existence of the residual void itself and subject to any other condition within this environmental authority; and
- (F2-2) A geotechnical assessment and associated report by a qualified professional who is a member of a credible external accreditation body, must be undertaken for all voids:
once they have been classified as a final void; and

prior to lease relinquishment

The assessment and associated report must investigate final void geotechnical stability and make recommendations for management where signs of instability are evident. The report must also include recommendations for constructing safety barriers on highwalls prior to lease relinquishment to restrict human and animal access. The geotechnical assessment report must be made available to the administering authority upon request. The geotechnical assessment and management actions to rectify final void instability must be detailed in the POOP.

Infrastructure

- (F3-1) All infrastructure, constructed by or for the environmental authority holder during the mining activities including water storage structures, must be removed from the site prior to mining lease surrender, except where agreed in writing by the post mining land owner / holder.

END OF CONDITIONS FOR SCHEDULE F

3.7 NATURE CONSERVATION

3.7.1 ENVIRONMENTAL VALUE OF NATURE CONSERVATION

Nature conservation includes the integrity of ecological processes and associated ecosystems (including rare and threatened ecosystems); biological diversity at genetic, species and ecosystem levels and conservation values for flora and fauna that may be affected by operations at Kogan mine.

A description of the lease's environmental characteristics is presented in the various reports (Ison Environmental Planners 1992b and Ison Environmental Planners 1993a).

The vegetation of the proposed mining area is predominantly open eucalypt forest and woodland. All are widespread in the region, with no rare or threatened flora having been identified within the ML or its immediate surrounds.

The wide regional destruction of vegetation and the landform types encountered on the Kogan site, coupled with extensive clearing of the more fertile areas of the site has undoubtedly long since adversely impacted upon the diversity and abundance of fauna in the district. Only limited wildlife corridors remain on the site. Kogan Creek connects the Condamine River with the Braemar State Forest to the south of the ML. Clearing of the river flats for cultivation and the sporadic retention of narrow bands of vegetation on the creek line preclude its use by all but those animals least dependent on such movement corridors for survival.

3.7.2 IMPACTS ON NATURE CONSERVATION

The major area of disturbance will be the area disturbed during the coal extraction, construction of infrastructure, coal stockpiles and water management structures.

Surveys of the site have been undertaken to establish the existing flora and fauna of the site, especially the potential presence of rare and threatened flora and fauna species. The majority of the site is almost completely cleared and has a long history of disturbance from grazing.

There are no known species of plants or animals that are considered rare or threatened.

Areas of land adjacent to the lease have no history of recreational or educational uses other than the Condamine River itself and a C.W. and Recreation reserve approximately 4 km downstream of Brigalow Bridge.

3.7.3 COMMITMENTS TO NATURE CONSERVATION

3.7.3.1 Objective for Nature Conservation

Aberdare will ensure that proposed mining activities minimise the impacts upon the biological values on the mine site consistent with safe and efficient operations and will minimise the risk of impacts on flora and fauna outside the immediate mine site area.

3.7.3.2 Indicators of Nature Conservation

- Knowledge of conservation status of local flora and fauna with respect to Queensland's Regional Ecosystems (*Environment Protection and Biodiversity Conservation Act 1999, Vegetation Management Act 1999, Nature Conservation Act 1992 and the Nature Conservation (Wildlife) Regulation 1994*).
- Percentage of the mining lease area providing natural habitat taking into account the proposed final land use.
- Recorded occurrences of outbreaks of, and area affected by, declared plant or environmental weed species.

3.7.3.3 Standards of Nature Conservation

On the Kogan Mine site, the extent of disturbance to flora and fauna will be the minimum required for safe and efficient operations. Aberdare will prevent the unnecessary destruction of other vegetation, especially areas holding conservation values or significant ecosystems.

All declared plant or environmental weed species will be controlled in accordance with the requirements of the *Land Protection (Pest and Stock Route Management) Act 2002* and any pest management plans prepared by the Chinchilla Shire Council.

3.7.3.4 Control Strategies for Nature Conservation

The revegetation aim is to select tree species native to the area and incorporate their planting into the mine rehabilitation program. The target is to establish 250 trees/ha of mined area except in areas where pasture improvement for grazing can be successfully demonstrated. These trees will be established adjacent to habitat outside of the lease and along drainage lines where feasible to create wildlife corridors.

As much of the land to be disturbed within the mining lease has been cleared or disturbed by previous grazing and agricultural use, there should be no significant issues associated with clearing fauna habitat. Prior to disturbance, areas to be cleared are to be checked for the presence of obvious fauna. If significant fauna is noted, Aberdare may use one of a number of sources, including use of Queensland Parks and Wildlife Service's expertise, to assist in the relocation of the identified fauna species to a suitable new location of similar habitat.

Aberdare will comply with the *Land Protection (Pest and Stock Route Management) Act 2002* and remove declared plants from the land under its control as required under the Act. No declared flora and fauna are to be brought to the Site. All vehicles and machinery leaving infected areas shall be thoroughly cleaned and must be free of soil and plant material.

3.8 CULTURAL HERITAGE (HISTORIC AND INDIGENOUS)

3.8.1 ENVIRONMENTAL VALUE OF CULTURAL HERITAGE

Cultural heritage includes places and objects of cultural and heritage significance within and near Kogan Mine.

3.8.2 IMPACTS ON CULTURAL HERITAGE

An initial archaeological survey of EPC 464 (now held under MDL 335) and surrounding areas was conducted in 1992 under a permit issued by the then Department of Environment and Heritage (Turnix 1992). Two further archaeological surveys were conducted in 1999 as part of a consultation process with the relevant Aborigine communities and individuals (Ann Wallin and Associates 1999 and Bonhomme, Craib and Associates 1999). Copies of these reports has been lodged with the Division of Cultural Heritage together with detailed site descriptions.

The surveys found that the area has significant archaeological record with a density of artefacts that implies a considerable association of Aboriginal people with the area and that a Cultural Heritage Management Plan (CHMP) was required to adequately ensure these sites are appropriately protected. A CHMP was jointly prepared by Wallin, Craib and Bonhomme and it included comments from traditional owner groups. This was submitted to the EPA in March 2000 and in April 2000 they issued a excavation/collection permit. Due to the suspension of the project, this work was not commenced at that time.

A new consultation process with the Traditional Custodian Groups was commenced in March 2003 and a Cultural Heritage Investigation Management Agreement and revised CHMP have been prepared. An intensive collection investigation of the area of impact for the power station and the twenty year mine plan was conducted in the period 11 August 2003 to 18 September 2003. The work was conducted under EPA Permit number CHCC00036903 pursuant to section 28 of the *Cultural Record (Landscapes Queensland and Queensland Estate) Act 1987*. Bonhomme Craib and Associates reported the details of this work in *Kogan Power Project Cultural Heritage Study*, January 2004.

The investigation collected over 22,000 stone items and two "well" complexes and shelters were located, mapped and excavated. The report makes specific recommendations for further monitoring on the site during some works, identifies the well and cave area for exclusion from site activity and that a buffer and exclusion area to be established in the area of the knapping floor adjacent to the conveyor easement.

The report states that “An adequate sample of artefacts has been collected for scientific purposes from all locations in the study area”. The report is currently being considered by the Cultural Heritage Management Committee and further recommendations may arise from this review process

3.8.3 COMMITMENTS TO CULTURAL HERITAGE

3.8.3.1 Objective for Cultural Heritage

Aberdare will ensure that Aboriginal cultural heritage on the areas of the mining lease that are to be disturbed by mining activities will be identified, recorded, preserved, conserved, protected and managed in accordance with the CHMP to the extent reasonably practical, taking into account the nature of the mining activities, the connections under Aboriginal tradition of the Traditional Owner Groups to the land and the laws of Queensland.

3.8.3.2 Indicators for Cultural Heritage

- The presence of sites of potential heritage value and appropriate management of those sites.
- The number of legitimate complaints received in relation to cultural heritage issues.

3.8.3.3 Standards for Cultural Heritage

Kogan Mine will comply with any statutory requirements of the EPA as covered by the terms of the *Cultural Record (Landscapes Queensland and Queensland Estate) Act 1987* or the soon to be enacted *Aboriginal and Cultural Heritage Act 2003*.

3.8.3.4 Control Strategies for Cultural Heritage

The CHMP contains provisions to:

- recognise and protect the cultural value, meaning and significance of places and objects within the Kogan Creek Project boundaries;
- detail the actions and procedures to be carried out during the pre-construction, construction and post-construction phases of the project, to ensure all culturally important cultural heritage places are identified and managed appropriately;
- set protocols in place to ensure that this work is undertaken.

These provisions seek to mitigate possible potential impacts on Cultural Heritage by ensuring that:

- All reasonable precautions are to be taken to protect cultural places from damage caused by construction and associated activities.
- Traditional Custodian's beliefs and cultural knowledge remain their property.
- Monitoring of Aboriginal sites and Aboriginal cultural heritage management will involve Traditional Custodians.
- A suitable induction program will be included for all personnel associated with and involved in the construction to facilitate an awareness of Aboriginal cultural heritage.

- When it is culturally appropriate, professional expertise will be engaged to advise on archaeological matters.

The following fieldwork tasks will be undertaken as part of a phased approach to collect or mitigate known cultural material, to further assess the impact areas and to identify further mitigation that may be required based on the results of the field work.

- Mapping of artefact areas - Data will be generated from a detailed recording and mapping of features (e.g. quarries and adjacent artefact clusters) in the study areas. These maps will also include the locations of collection areas, e.g. grids and excavation units (if any).
- Systematic surface collection - In order to document inter and intra-site variation in the presence and relative frequencies of cultural artefacts, it is necessary to document the horizontal stratigraphy of cultural artefacts within the project area. Surface collections are to be conducted across those areas directly affected by the proposed works and in adjacent areas which will be subject to development activity.
- Test excavations - Controlled test excavation will be made in selected areas to investigate those areas to be directly impacted by mining activities to determine the potential for sub surface material to be present and obtaining sufficient samples of such cultural artefacts in order to adequately describe the cultural record.
- Analysis and data generation - Analysis of the artefacts collected and excavated will be undertaken.
- Recording - Details of the artefacts will be recorded and catalogued.
- Reporting - A report detailing all activities and making recommendations regarding the on going management of the project area will be produced, at the end of the work programme.

Artefacts are deemed to be items of the “Queensland Estate” and in accordance with the *Cultural Record (Landscapes Queensland and Queensland Estate) Act 1987* are to be given to the Queensland Museum unless the Traditional Custodians enter in a negotiation with the Museum to provide alternative storage. This requirement will change with the enactment of the *Aboriginal and Cultural Heritage Act 2003*.

At the completion of the cataloguing process the collection of artefacts will be either lodged, in appropriate form, with the Queensland Museum, or placed in an appropriate location for safe keeping.

The documentation required in accordance with the Act will be presented to the NRM.

3.9 COMMUNITY

3.9.1 ENVIRONMENTAL VALUE OF COMMUNITY

Environmental value of community is community self-awareness, social and community amenity, liveability, harmony and well being, sense of community, access to recreation, and access to social and community services and infrastructure in the region surrounding Kogan Mine, including economic conditions and benefits within the affected community.

3.9.2 IMPACT ON COMMUNITY

There are few facilities in the area. The nearest store and public telephone is at Brigalow, approximately 10 km by road to the north. The nearest hotel is in Kogan, approximately 15 km by road to the south and the nearest service station is at Chinchilla, approximately 30 km by road to the west.

Ongoing consultation is being conducted with those landholders' in the area who are potentially affected by the proposed mine and with the Chinchilla Shire Council. There is no other relevant "community" in the area.

The mine should have minimal impact on the social life of the local area. Being on private land, the mine site is now not available for public use. The mine itself will be self contained and will not place any undue demand on local facilities. The company will not be providing accommodation and therefore staff will live in existing houses and accommodation. Families of employees will either live in the local area or in nearby towns. Hostel type accommodation will be provided in Chinchilla during construction.

There will not be any excessive demands on schools or other infrastructure.

The provision of employment in the area should positively impact upon the small businesses in the community that are generally supportive of the mine. In addition to the flow on of employment increasing disposable income in the region, various levels of government also obtain considerable revenue from direct and indirect taxation, royalties, stamp duty and other Government charges.

The site is remote from houses and especially residential concentrations and hence there is little impact on the visual amenity or other community issues.

3.9.3 COMMITMENTS TO COMMUNITY

3.9.3.1 Objective for Community

Aberdare will manage operations at Kogan mine to minimise negative impacts on the local farming community and as far as practicable improve amenities and well-being in the community through participation in the Chinchilla Community Benefits Trust via CEPA (Kogan Creek) Holding Pty Ltd.

3.9.3.2 Indicators of Community

- The level of public consultation conducted by Aberdare.
- The development and implementation of procedures to manage risks to the public from mining operations.
- The number of community projects involving formal participation by Aberdare or its related companies.
- The number of complaints lodged annually by the public in relation to operations at Kogan mine.

3.9.3.3 Standards of Community

Aberdare will maintain ongoing consultation mechanisms with the community and relevant agencies and monitor and address any further social issues if they arise after consultation with the Chinchilla Shire Council or relevant State Government departments.

All complaints received will be responded to within 1 week using Aberdare's complaints handling procedure with the intention of resolving legitimate concerns as quickly as possible.

3.9.3.4 Control Strategies for Community

There are no other social issues identified further to those discussed in the above sections.

AS 4269 Complaints Handling will be used for guidance in establishing a complaint handling process.

Mining will be small scale using contractors who will employ the required staff. On present production schedules, approximately 70 people will be employed directly. No site has been selected as an accommodation site for the project workforce but discussions have been held with the Chinchilla Shire Council. It is hoped that the majority of employees will be recruited locally and will have their own accommodation. Except for the construction phase, accommodation will not be provided by the Company to encourage local employment.

The only local community that may be affected is the township of Chinchilla. The influx of people through the area should positively impact upon the small businesses in the community, which are generally supportive of the Project.

During the operational phase people will be employed directly at the site with additional indirect employment in the region. In selecting job applicants, provided they have the necessary skills and considering all factors, preference will be given to employing local people. This will create local job opportunities in an area where traditionally opportunities are rare and school leavers must move to the larger cities to seek jobs.

If any further social issues arise, the company will address them after consultation with the relevant Government departments. Aberdare will respond to any legal written directive from the relevant Government department or authority to any issue that may arise in the future.

Control strategies to be adopted by Aberdare to address social issues include:

- restrictions on public access to the mine site (including suitable signage and fencing where necessary);
- development of stable post mining landforms through appropriate rehabilitation methods as described in the current POOP;
- regular consultation with neighbours to provide project information and address any concerns raised;
- participation in suitable community projects through the Chinchilla Community Benefits Trust via CEPA (Kogan Creek) Holding Pty Ltd. ;
- preferential use of suitable qualified local personnel for employment or work contracts;

- continued support for the local community through donations, purchases and employment;
- maintenance of good relations with nearby neighbours;
- investigations into alternate beneficial post mining land uses; and
- consultation with relevant Government departments.

3.9.4 DRAFT EA CONDITIONS

Schedule G – Community

Complaint response

(G1-1) All complaints received must be recorded including details of complainant, reasons for the complaint, investigations undertaken, conclusions formed and actions taken. This information must be made available for inspection by the administering authority on request.

END OF CONDITIONS FOR SCHEDULE G

3.10 MISCELLANEOUS

3.10.1 ENVIRONMENTAL AUDITING

Periodic internal and external environmental audits are conducted of the Kogan Creek Coal Mine in accordance with corporate environmental requirements. The audit reports are used internally to improve environmental performance and monitor regulatory compliance.

Issues and recommendations arising from the audits are prioritised and included in the action plan which is addressed over the following 12 months.

Review results are distributed within the Company including senior personnel. While the reviews address performance, compliance and systems, the situation provides a point of discussion concerning current or planned activities, problems or issues.

The environmental audit program is in accordance with the requirements of the Kogan Creek Coal corporate environmental policy, including:

- External verification of environmental performance data
- Continual improvement
- Internal and external auditing of environmental compliance.

4. ENVIRONMENTAL MONITORING

Monitoring is conducted to demonstrate that the Mine is operated in accordance with all of the conditions in the current EA.

Where monitoring is a requirement of the environmental authority a competent person(s) will conduct all monitoring.

Refer to measurable indicators and standards listed in sections on:

- Air Quality,
- Water Management,
- Land Management,
- Noise,
- Waste Management,
- Nature Conservation,
- Cultural Heritage,
- Community.

Laboratory analysis will be undertaken by a registered laboratory NATA accredited for the analysis

Monitoring programs have been developed to measure variables relevant to licence conditions, and to measure the environmental performance of any operational system or activity which may have an impact upon compliance with the EA conditions.

Details of the monitoring programs will be incorporated into the POOP.

All monitoring and research data, collected for the purposes of demonstrating compliance with the environmental authority, will be maintained and catalogued in a central location such that it is accessible on request by the administering authority.

Recognised codes, standards and guidelines where appropriate are used for the selection of sample locations, sampling protocols, parameters measured, sample analysis and quality assurance.

All monitoring and research data collected in accordance with the EA will be maintained and catalogued to allow ready access by company staff and the EPA.

4.1 REVEGETATION AND REHABILITATION MONITORING

The following will be monitored annually for three years after initial revegetation and rehabilitation programmes:

- Species diversity
- Vegetation cover

- Weed presence/ absence
- Evidence of soil erosion

4.2 SITE WATER QUALITY MONITORING

Parameters measured will be:

- pH
- Total Dissolved Solids
- Electrical Conductivity
- Total Suspended Solids
- Sulphate.

4.3 AIR QUALITY MONITORING

As requested by the Administering Authority.

4.4 NOISE AND VIBRATION

As requested by the Administering Authority.

4.5 WASTE MONITORING

All wastes disposed off-site will be quantified and tracked where required by the Waste Tracking Guidelines.

5. ENVIRONMENTAL REPORTING

The objective is to provide timely, relevant and appropriately presented information to the mine manager on the environmental performance of the Mine (and to other parties where appropriate).

It is not intended to report on a regular basis to the Administering Authority however all monitoring data and reports will be available if required.

The strategy for reporting is as follows:

- An internal environmental monitoring report will be prepared quarterly for the company General Manager. The report of monitoring data will allow an evaluation of trends and a feedback to operations of any corrective actions that may be required after the review.
- An annual external audit of the environmental management program will be undertaken. An audit report will indicate deficiencies, non-compliance issues and corrective actions necessary in the program.

Measurable indicators will include:

- Completion of Annual Return
- Completion of National Pollutant Inventory report.
- EPA requirements for Annual Return.
- Environmental Protection Act provisions relating to reporting and notification.

All monitoring, research and planning data collected in accordance with the EA will be maintained and catalogued to allow ready preparation of statutory and corporate reports.

The POOP will describe how the company will meet the commitments outlined in this EMOS, and the annual return to the EPA lists compliance with Environment Authority conditions.

External avenues of reporting include financial reports to shareholders which sets future environmental targets for continuous improvement. Internal reporting is also required that details monitoring results, achievement of targets, budgets and compliance issues.

6. CONTINUOUS IMPROVEMENT

A policy of continual improvement will be implemented. Continual improvement will be achieved by:

- Review of environmental monitoring results and developing a feedback mechanism to mining operations so that improvements can be identified resulting in observable beneficial trends in monitoring data
- Research into revegetation techniques. The aim will be to measure progress towards the successful achievement of the post-mining agreed land use.
- Staff training and awareness programs will result in the continuous improvement in environmental management outcomes
- Environmental auditing reports will include recommendations for corrective action which upon implementation will contribute to continuous improvement.

Research, monitoring and trials aimed at improving rehabilitation techniques will be ongoing. Site environmental management practices will be refined in the light of company, industry and operational experience in order to improve performance.

6.1 RESEARCH

Strategies proposed in this EMOS for managing environmental impact are based on the use or adaptation of proven techniques from previous research programs or current industry practice. Monitoring programs will determine the level of success of these strategies. Where deficiencies in environmental controls are determined which can not be satisfactorily resolved, alternative controls will be selected and or research will be conducted or sponsored.

Financial support for environmental research issues through the industry's Australian Coal Association Research Program (ACARP) will continue. A levy on coal production funds industry agreed areas of research priority which in the past have included mine spoil erosion, ecosystem success indicators, void hydrology and revegetation species. The Company will continue to assess potential ACARP research projects that may be of benefit to the operation.

Any research programs to be conducted or sponsored will be detailed and undated within the Plan of Operations including a statement of applicability for the project.

7. STAFF TRAINING

Inductions for employees and contractors working on the Kogan Creek Coal Mine will include an environmental component setting out their individual environmental responsibilities and the key Mine environmental protection requirements. Additional training will be given to those engaged in activities where specific environmental capabilities may be required to ensure compliance with the Environmental Authority.

All staff and contractors will be provided with induction training prior to the start of their duties. The induction programme will include the following environmental topics:

- Environmental impacts
- Rehabilitation and revegetation issues
- Water management/monitoring
- Waste management/waste tracking
- Compliance with legislation and other statutory obligations
- Air and noise issues in relation to sensitive receptors
- Weed control
- Incident reporting

In addition to induction training, a series of "environmental topics" will be prepared for presentation at routine talks to work groups by Supervisors.

ATTACHMENT I

Definitions

“acceptance criteria” means the measures by which the actions implemented to rehabilitate the land are deemed to be complete. The acceptance criteria indicate the success of the rehabilitation outcome or remediation of areas which have been significantly been disturbed by the mining activities. Acceptance criteria may include information regarding:

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

“airblast overpressure” means energy transmitted from the blast site within the atmosphere in the form of pressure waves. The maximum excess pressure in this wave, above ambient pressure is the peak airblast overpressure measured in decibels linear (dB).

“ambient (or total) noise” at a place, means the level of noise at the place from all sources (near and far), measured as the Leq for an appropriate time interval.

“competent person” means a person with the demonstrated skill and knowledge required to carry out the task to a standard necessary for the reliance upon collected data or protection of the environment.

“authority” means environmental authority (mining activities) under the Environmental Protection Act 1994.

“blasting” means the use of explosive materials to fracture-rock, coal and other minerals for later recovery; or structural components or other items to facilitate removal from a site or for reuse.

“commercial place” means a work place **other than the Kogan Creek Power Station** used as an office or for business or commercial purposes, which is not part of the mining activity and does not include employees accommodation or public roads.

“dam” means a containment or proposed containment whether permanent or temporary, which is designed to contain, divert or control flowable substances. However this does not include a fabricated or manufactured tank or container designed to a recognised standard.

“environmental authority holder” means the holder of this environmental authority.

“hazardous waste” means any substance, whether liquid, solid or gaseous, derived by or resulting from, the processing of minerals that tends to destroy life or impair or endanger health.

“Kogan Creek Power Station” means the coal fired power station including all associated infrastructure located both on and adjacent to the Mining Lease 50074.

“ $L_{A\ 10, \text{adj}, 10 \text{ mins}}$ ” means the A-weighted sound pressure level, (adjusted for tonal character and impulsiveness of the sound) exceeded for 10% of any 10-minute measurement period, using Fast response.

“ $L_{A\ 1, \text{adj}, 10 \text{ mins}}$ ” means the A-weighted sound pressure level, (adjusted for tonal character and impulsiveness of the sound) exceeded for 1% of any 10-minute measurement period, using Fast response

“ $L_{A, \text{max adj}, T}$ ” means the average maximum A-weighted sound pressure level, adjusted for noise character and measured over any 10 minute period, using Fast response.

“land” in the “land schedule” of this document means land excluding waters and the atmosphere.

“land capability” as defined in the DME 1995 Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland.

“land suitability” as defined in the DME 1995 Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland.

“land use” term to describe the selected post mining use of the land, which is planned to occur after the cessation of mining operations.

“mandatory reporting level” means the volume below the spillway crest, equivalent to the lower of the AEP, 72 hour storm or the AEP wave allowance (AEP is the annual exceedence probability).

“mineral” means a substance which normally occurs naturally as part of the earth’s crust or is dissolved or suspended in water within or upon the earth’s crust and includes a substance which may be extracted from such a substance, and includes—

clay if mined for use for its ceramic properties, kaolin and bentonite;

foundry sand;

hydrocarbons and other substances or matter occurring in association with shale or coal and necessarily mined, extracted, produced or released by or in connection with mining for shale or coal or for the purpose of enhancing the safety of current or future mining operations for coal or the extraction or production of mineral oil therefrom;

limestone if mined for use for its chemical properties;

marble;

mineral oil or gas extracted or produced from shale or coal by in situ processes;

peat;

salt including brine;

shale from which mineral oil may be extracted or produced;

silica, including silica sand, if mined for use for its chemical properties;

rock mined in block or slab form for building or monumental purposes;

but does not include—

living matter;

petroleum within the meaning of the Petroleum Act 1923;

soil, sand, gravel or rock (other than rock mined in block or slab form for building or monumental purposes) to be used or to be supplied for use as such, whether intact or in broken form;

water.

“noxious” means harmful or injurious to health or physical well being, other than trivial harm.

“non-standard” means a mining operation that if in the opinion of the administering authority does not have a low risk of serious environmental harm and the activities can not comply with the criteria for standard mining activities prescribed in schedule 1A of the Environmental Protection Regulation 1998. The standard mining activity trigger criteria are as follows;

the mining activities do not or will not cause more than 10 ha of land to be significantly disturbed at any one time;

the mining activities do not or will not cause more than 5 ha of land to be significantly disturbed at any one time;

(a) in a riverine area;

(b) because of mine workings;

the mining activities are not or will not be carried out in, or within 2 km of a category A Environmentally Sensitive Area;

the mining activities are not or will not be carried out in, or within 1 km of a category B environmentally sensitive area;

the mining activities do not include a level 1 environmentally relevant activity

no more than 20 persons are carrying out or will, at any one time, carry out the mining activities;

“offensive” means causing reasonable offence or displeasure; is disagreeable to the sense; disgusting, nauseous or repulsive, other than trivial harm.

“peak particle velocity (ppv)” means a measure of ground vibration magnitude which is the maximum rate of change of ground displacement with time, usually measured in millimetres/second (mms^{-1}).

“protected area” means - a protected area under the Nature Conservation Act 1992; or

- a marine park under the Marine Parks Act 1992; or

- a World Heritage Area.

“progressive rehabilitation” means rehabilitation (defined below) undertaken progressively or a staged approach to rehabilitation as mining operations are ongoing.

“reference site” (or analogue site) may reflect the original location, adjacent area or another area where rehabilitation success has been completed for a similar biodiversity. Details of the reference site may be as photographs, computer generated images and vegetation models etc.

“rehabilitation” the process of reshaping and revegetating land to restore it to a stable landform and in accordance with the acceptance criteria set out in this environmental authority and, where relevant, includes remediation of contaminated land.

“representative” means a sample set which covers the variance in monitoring or other data either due to natural changes or operational phases of the mining activities.

“residual void” means an open pit resulting from the removal of ore and/or waste rock which will remain following the cessation of all mining activities and completion of rehabilitation processes.

“self sustaining” means an area of land which has been rehabilitated and has maintained the required acceptance criteria without human intervention for a period nominated by the administering authority.

“sensitive place” means;

- a dwelling, residential allotment, mobile home or caravan park, residential marina or other residential premises; or
- a motel, hotel or hostel; or
- an educational institution; or
- a medical center or hospital; or
- a protected area under the Nature Conservation Act 1992, the Marine Parks Act 1992 or a World Heritage Area; or
- a public park or gardens.

“significant disturbance” – includes land

if it is contaminated land; or

it has been disturbed and human intervention is needed to rehabilitate it.

to a state required under the relevant environmental authority; or

if the environmental authority does not require the land to be rehabilitated to a particular state – to its state immediately before the disturbance.

Some examples of disturbed land include:

areas where soil has been compacted, removed, covered, exposed or stockpiled;

areas where vegetation has been removed or destroyed to an extent where the land has been made susceptible to erosion; (vegetation & topsoil)

areas where land use suitability or capability has been diminished;

areas within a watercourse, waterway, wetland or lake where mining activities occur;

areas submerged by tailings or hazardous contaminant storage and dam walls in all cases;

areas under temporary infrastructure. Temporary infrastructure includes any infrastructure (roads, tracks, bridges, culverts, dams, bores, buildings, fixed machinery, hardstand areas, airstrips, helipads etc) which is to be removed after mining activities have ceased; or

areas where land has been contaminated and a suitability statement has not been issued.

However, the following areas are not included:

- areas off lease (e.g. roads or tracks which provide access to the mining lease);

- areas previously significantly disturbed which have achieved the rehabilitation outcomes;

- by agreement with the EPA, areas previously significantly disturbed which have not achieved the rehabilitation objective(s) due to circumstances beyond the control of the mine operator (such as climatic conditions);

- areas under permanent infrastructure. Permanent infrastructure includes any infrastructure (roads, tracks, bridges, culverts, dams, bores, buildings, fixed machinery, hardstand areas, airstrips, helipads etc) which is to be left by agreement with the landowner. The agreement to leave permanent infrastructure must be recorded in the Landowner Agreement and lodged with the EPA;

- disturbances that pre-existed the grant of the tenure unless those areas are disturbed during the term of the tenure.

“spillway” means passage or outlet from the dam through which surplus water flows.

“stable” means geotechnical stability of the rehabilitated landform where instability related to the excessive settlement and subsidence caused by consolidation / settlement of the wastes deposited, and sliding / slumping instability has ceased.

“trivial harm” means environmental harm which is not material or serious environmental harm and will not cause actual or potential loss or damage to property of an amount of, or amounts totalling more than \$5,000.

“watercourse” - Means a river, creek or stream in which water flows permanently or intermittently in a visibly defined channel (natural, artificial or artificially improved) with:

- continuous bed and banks;

- an extended period of flow for some months after rain ceases, and

- an adequacy of flow that sustains basic ecological processes and maintains biodiversity.

“waters” includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea) or any part thereof.

8. REFERENCES

- AGEC (Australasian Groundwater and Environmental Consultants Pty Ltd) (1999), *Proposed Kogan Creek Power Station, Impact Assessment of Ash Disposal on the Groundwater Regime*, October 1999.
- Ann Wallin and Associates (1999), *A Cultural Heritage Assessment on a Proposed Coal Mine, Power Station and Water Supply Pipeline at Kogan Creek, Near Brigalow*, September 1999.
- Australian and New Zealand Environment & Conservation Council (2000), *Australian Water Quality Guidelines for Fresh and Marine Waters*, (October 2000).
- Bonhomme, Craib and Associates (1999), *A Study of the Impact on Cultural Heritage Resources of the Proposed Kogan Mine*, December 1999.
- Bonhomme, Craib and Associates (2004), *Kogan Power Project Cultural Heritage Study*, January 2004.
- David Moore and Associates Pty Ltd (1993), *Sound Level Impact Assessment of Kogan Creek Coal Project (Brigalow, Queensland) Upon Local Residents*, July 1993.
- Gill, J.Y. (1998), *Intrepretation of Stock Water Analysis*, DPI File P98135, Queensland Department of Primary Industries, June 1998.
- Gutteridge Haskins & Davey Pty Ltd (1993a), *Kogan Creek Coal, Off River Storage & Flood Harvesting Study*, July 1993.
- Gutteridge Haskins & Davey Pty Ltd (1993b), *Kogan Creek Coal Project, Mine Site Water Management Investigations*, October 1993.
- Gutteridge Haskins & Davey Pty Ltd (1993c), *Kogan Creek Coal Project, Condamine River Flood Study, Existing and 0.56Mtpa Mine Operations*, October 1993.
- Ison Environmental Planners (1992) *Analysis and Assessment of Overburden, Brigalow Coal Project*, October 1992.
- Ison Environmental Planners (1993), *Biological and Physical Assessment - Soils, Land Capability, Flora, Fauna and Farm Management, Kogan Creek Coal Project Area*, July 1993.
- Katestone Scientific Pty Ltd (1993), *Assessment of Potential Air Pollution from the Kogan Creek Project*, July 1993.
- MWH Australia Pty Ltd (2003), *CS Energy, Eastern Branch Creek Diversion and Condamine River Flood Modelling*, September 2003.
- Rosser, J., Swartz, G.L., Condamine, N.M. and Briggs, H.S. (1974), *A Land Capability Classification for Agricultural Purposes*, Division of Land Utilisation, Technical Bulletin No. 14, Queensland Department of Primary Industries.
- Runge Pty Ltd (2002), *Kogan Creek Power Project, Conceptual Mine Dump Design Incorporating Ash Disposal Reservoirs*, for CS Energy Ltd, Report No.: 4712 / December, 2002.
- Runge Pty Ltd Reports (2000), *Kogan Creek 20 Year Mine Plan*, for Allied Queensland Coalfields Pty Ltd & Golding Contractors Pty Ltd, Report No.: 3624a / March, 2000.
- Turnix Pty Ltd (1992), *Archeological Survey of Brigalow EPC 464*.