Environmental Management Plan

University Experimental Mine

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University Experimental Mine Introduction

1. Introduction

The University of Queensland currently operates an experimental (non producing) mine to provide educational support to the Division of Mining and Metallurgical Engineering, School of Engineering located at the St Lucia campus. The mine is located in Brisbane's western suburb of Indooroopilly, between Kate Street, Isles Road, Goldieslie Road and Witton Creek as shown in Figure 1.0. Witton Creek is a minor waterway which discharges into the Brisbane River.

The Julius Kruttschnitt Mineral Research Centre (JKMRC) also operates at the site. It is a world-renowned leader in mineral processing, science and technology. The JKMRC's activities include research, training of postgraduate students and delivery of specialised undergraduate courses. It also contributes specialist expertise to the consulting and professional development of the JKTech Pty Ltd.

An Environmental Management System (EMS) has been developed by the University of Queensland and is available on the Property & Facilities website at **www.pf.uq.edu.au/ems.html** It is driven by the University's Policy shown in Section 1.0 of the EMS which aims to ensure that the relevant environmental laws and regulations are complied with and that the protection of the environment is enhanced by keeping impacts to a minimum in a sustainable, financially rewarding and technically feasible manner. The University of Queensland has prepared this Environmental Management Plan (EMP) to be consistent with the University's EMS to identify potential impacts and to put in place appropriate specific plans to investigate these impacts.

1.1 *Background*

The underground mine historically was a small silver/lead mine which records show was worked from 1919 to 1929. The University of Queensland later purchased the mine through the Department of Mining and Metallurgical Engineering (DMME) in 1951. The Julius Kruttschnitt Mineral Research Centre (JKMRC) is the main educational facility located at the site. The underground mine and associated facilities essentially serve to provide students with practical experience to supplement classroom teaching. An aerial view of the site is shown in Figure 2.0.

The university's EMS and the Mine's EMP addresses all activities undertaken at the mine and associated facilities that may impact on the environment including air quality, noise, energy management and water management. The Property and Facilities Division manages the EMS and the EMP. In some instances where environmental and health and safety issues overlap, the University's Occupational Health and Safety Unit works collaboratively with the Property and Facilities Division on such matters.

1.2 *Purpose of the EMP*

The purpose of this EMP is to:

- Ensure that the University of Queensland is exercising due diligence with respect to managing the mine and the JKMRC;
- Ensure that environmental considerations are incorporated into all phases of development and operation of the site;
- Provide a framework for managing the environmental impacts of day to day operational activities of the mine in areas that might potentially cause environmental harm;
- Provide the community with evidence of management of the site in an environmentally friendly manner; and
- Provide statutory authorities with a framework to confirm compliance with policies, relevant Acts and Regulations and other requirements.

Figure 1.0 Indooroopilly Mine Location Mine

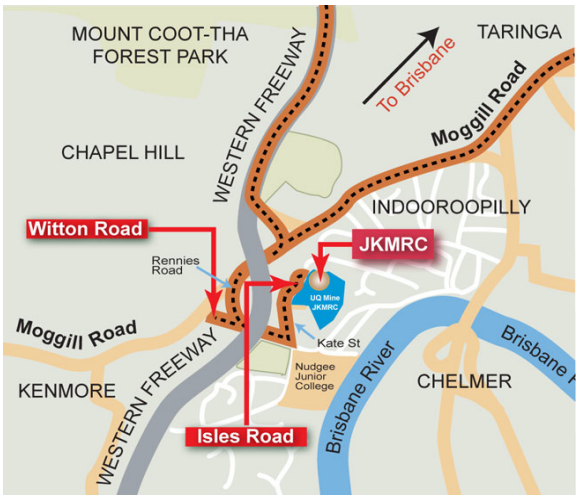


Figure 2.0 Ariel View Indooroopilly

2. Description of Activities

The site's current operations are described in Sections 2.1 to 2.4 below. The aim of reviewing these activities is to determine potential impacts from these activities and ensure that management strategies and corresponding action plans are put in place to manage them.

2.1 *On Site Offices*

There are three main offices on site which are used to administer the site – the JKMRC, the Mine Manager's office and CRC Mining as shown in Figure 3.0 (building 631). These offices have a low impact effect producing office waste such as paper cardboard and aluminium cans, and consuming energy for air conditioning systems, general lighting and power. There is a cooling tower on the roof which generates some noise. Clean stormwater collected from the office roofs area is captured in a rainwater tank and the overflow is piped to a run-off ditch which eventually drains into Witton Creek. The collected rainwater is used for irrigation on site.

2.2 *The Mine*

2.2.1 Blasting

Limited blasting is conducted in the open-cut mine (refer Figure 3.0 area 645) on a very low scale. Blasting is used to break small quantities of rock for experimental purposes only. Due to the very low quantities of explosives used, noise is just audible at the surface of the mine. No vibration is transmitted to surrounding areas.

2.2.2 Storage of Explosives

Minor quantities of explosives are stored underground. The storage facility is locked when not in use. A licence for storage is not required under the Explosives Regulation 2003 due to the small quantities involved. The explosives however, must be stored by a person who is licensed to use the explosives.

2.2.3 Mine Hoist (Winder)

A winder is used to move material and equipment in and out of the mine. Low level noise is generated from the winch motor, and warning bell system.

2.2.4 Mine Dewatering

The mine experiences large influxes of water during periods of heavy rain. A dewatering pump pumps mine water to the surface to dewater the mine during wet periods. The mine water is pumped to the storm water system, as the seepage water from the mine has been tested and been found to be comparable with the local groundwater quality. Plans are in place to use the mine water for wash down in the pilot plant reducing the need for the use of potable water.

2.2.5 Mining Laboratory (including CRC Drilling Facility)

Small quantities of rock waste such as Helidon sandstone, marble and granite are generated from laboratory activities. Piped water from town supply is used for dust suppression and clean-up, which is disposed of to trade waste.

The CRC drilling rig is housed inside the laboratory building to minimise noise. Its use is generally minimal.

The facility operates from 7am to approximately 7pm during the week and from 8am to 7pm on weekends.

2.2.6 Mining Open Day – One weekend per year

During the Labour Day weekend each year, a Mine Open Day is held on site, and various mining activities are demonstrated, including the use of hand-held rotary percussion drills. The open day is advertised in the local paper prior to the event.

2.3 *Minerals Processing Area*

2.3.1 Pilot Plant

The Pilot Plant consists of two buildings (buildings 638 and 639) and an external work area. They house a number of items of laboratory and pilot scale equipment such as rock crushers, grinding mills, flotation equipment and testing devices. Most of the equipment is housed within the buildings, is sound insulated and connected to a dust extraction/collection system. The dust extraction system is on the outside of the building and does generate some noise. This is a source of noise pollution on the site. The externally located 1 metre grinding mill employs wet grinding and accordingly dust extraction/collection systems are unnecessary. Minor quantities of flammable and corrosive materials are kept in the Pilot Plant in appropriate storage cupboards.

Rock samples are received, processed and tested, and discarded when test work is completed. Overseas samples are brought in with a declaration or permit stating that they have had the necessary treatment before arriving. Rocks can be segregated generally into four groups:

1. General rock waste which goes into a skip and is collected by a waste contractor,
2. Small quantities of rock waste which contain high concentrations of heavy metals are retained until sufficient quantity is collected for removal from site by a waste contractor and disposed to a segregated land fill. – need to determine it this is still necessary.
3. Rock waste containing asbestos is usually sent back to the client, but may also be disposed via a licensed asbestos removalist. Fines generated and collected by the dust collection system are also disposed by these methods.
4. Radioactive waste is returned to its place of origin, under the terms of the site licence from Queensland Health.

The facility is run from 7am to approximately 7pm during the week and from 8am to 7pm on Saturday, Sunday and Public Holidays.

2.3.2 Site Workshops

Two small workshops are located on site – the Mine workshop and the Pilot Plant workshop. These facilities are used to support and maintain the above facilities. Typical wastes generated include hydrocarbons such as oils and grease, detergents, batteries, scrap metal, obsolete plant and equipment, timber off cuts, and building materials. Liquid waste is collected as required by the University Chemical Store for approved disposal. Solid waste is placed in a skip and collected by a waste management company, or periodically sold to a metal recycler. Minor quantities of flammable materials are kept in the workshops in a flammables storage cupboard.

Noise levels generated by the workshops are generally low. The workshops operate from 7am to approximately 7pm during the week and occasionally on weekends.

2.3.3 Stormwater Collection from Pilot Plant Facility

Stormwater that falls on building roofs is piped directly to a reed bed filtration system, located on University land, which eventually drains into Witton Creek. Stormwater that is collected from the external concrete pads is collected by the grated drainage system, or a spoon drain system. Water collected by the spoon drain system bypasses the settling tank (refer Section 2.3.4) and flows directly to the reed bed. Water collected by the grated drainage system is treated as per Section 2.3.4. The reed bed serves as a final settling pond and filtration zone by allowing solids to settle, and the overflow drains to the creek. Plans are in place to divert the water from the concrete pad to sewer via a filtration system. This will minimise the risk of pollutants entering Witton Creek.

2.3.4 Process and Clean-up Water

The process and clean-up water generated from Pilot Plant 2 (Building 639) is collected (refer Figure 3.0) for treatment. The solids are settled out in a trap, and the water is disposed of to trade waste as per the trade waste licence.

Water generated from Building 638 (Pilot Plant 1) and the external pad is collected, pumped to a settling tank, and the clear effluent disposed of to the storm water system. There however exists the potential for contaminated water (from fine suspended metalliferous rock particles) to enter the stormwater system. This will be addressed when the drainage system is upgraded.

2.3.5 Drum Storage

Rock samples are stored in 200 litre drums kept on storage racks on the concrete pad in the vicinity of the Pilot Plants. Any flammable materials are stored in flammable cupboards as previously discussed. The drum storage area is visible to some local residents raising a visual amenity issue.

2.3.6 Other activities

Within some of the above areas, equipment such as stirrers or pumps may be left running for experimental purposes overnight. The noise level is low. There is also a freezer unit on site between the buildings in the Pilot Plat.

2.4 *Site – General*

Flood Lighting

Plans are in place to secure the site at night via fencing and swipe card access. Key areas are floodlit at night to minimise the risk of unauthorised persons entering the site, and for personal security of site personnel. There have been no known complaints regarding the current floodlighting arrangements to date.

Site Flora and Fauna

Fauna and flora management on site is directed by the current Landscape Management Plan (LMP) for the Indooroopilly mine. The site contains a high level of vegetation, especially in the northern extremities of the property. There is a major weed infestation on site which is both a potential fire hazard and a threat to remnant vegetation. The weed infestation is currently being brought under management through the LMP, and weed species will gradually be replaced by native revegetation plantings.

Potential fire risk on site is being mitigated by the establishment of fire retardant native vegetation plantings, the establishment of fire breaks, and the removal of dense weed infestation. The major native vegetation communities remaining on site are comprised of a large number of mature dry sclerophyll species and a diverse population of regenerating rainforest species.

The site is a key ecological corridor linking Witton Creek to the Brisbane River, and surrounding bushland parks, and is registered as a Land for Wildlife property. Fauna observations on site include Common Ringtail, Brushtail, and 'Bobuck' possums, Squirrel Gliders, Swamp Wallabies, Echidnas, Water Dragons and over 40 bird species.

Green waste generated by the revegetation is either removed via skip, or is trucked to the St. Lucia green waste facility.

Roadways

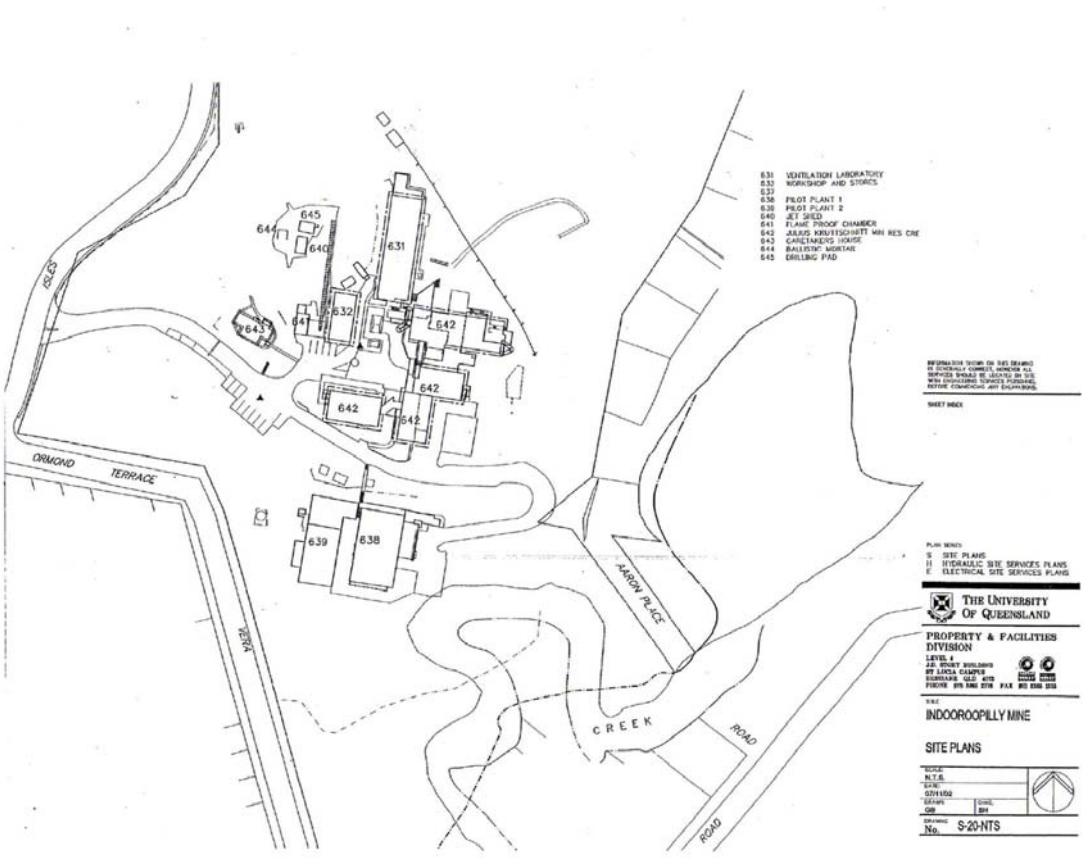
A roadway exists on site and in some cases minor portions of the road and parking areas are unsealed. These generate low levels of dust and potential for limited sediment loss during rain events. As vehicular speeds are very low due to the nature of the roadways, damage to local fauna is considered to be low risk.

2.5 *Description of the Surrounding Environment*

The site is generally surrounded by low-density residential housing. To the southeast is Witton Creek which drains into the Brisbane River further to the east as shown in Figure 3.0. Areas infested with weed exist along the creek and will continue to disburse if not controlled. Some nearby vegetation cover helps to minimise sediment movement into the creek during rain events.

A roadway exists servicing a small residential area to the southeast of the site. The unsealed cutting into the hill generated for this development is a source of sediment supply to Witton Creek. To the west lies Isles Road and Kate Street also an area of low-density development and further to the west lies the Western Freeway. To the north along Goldieslie Road lies low-density residential properties. To the south is Nudgee Junior College.

Figure 3.0 University Experimental Mine Site Plan



University Experimental Mine Environmental Review

3. Environmental Review

3.1 *Overview Process*

An Environmental review of the University of Queensland Experimental Mine at Indooroopilly was carried out in 2002 and a review of the EMS and EMP in 2005 and again in 2008. The initial review involved a site inspection and a group discussion with relevant Indooroopilly Mine and Property and Facilities Division personnel. The EMS & EMP reviews involved a group discussion with relevant Indooroopilly Mine and Property and Facilities Division personnel.

The purpose of reviewing the EMP is to identify any new aspects of the site's activities likely to cause or which would have potential to cause environmental harm as well as aspects that may no longer be relevant due to cessation or change of activities. Activities within each operational process that could result in an environmental impact are reported in the format shown in Table 1 to determine the necessary EMP's.

Table 1 Environmental Aspects, Potential Impacts and Assessment

Activity	Aspects	Potential Impact	Assessment
Particular activity that could result in an on-site or off-site environmental impact	A listing of the elements of the site's activities which could have an adverse impact on the environment.	Impacts refer to the potential change that could take place in the environment as a result of the aspects.	The determination of any actual or likely environmental impact as identified from monitoring or complaints received by the site.

3.2 *Environmental Aspects & Potential Impacts and Assessment*

Based upon the above process an impact assessment has been carried out on those activities listed in Section 2. The outcome is shown in Table 2 below.

Table 2 Environmental Aspects and Impacts Assessments

Activity/Description	Aspects	Potential Impact	Assessment
Office Area	Air conditioning	Use of natural resources	Energy Management employed. Regular maintenance conducted. Cooling Tower water consumption reported to BCC quarterly.
		Noise	Air conditioning can generate noise which is of particular concern at night.
		Light Spill	Light spill from the current buildings has not been an issue. Controls will need to be put into place for the new building whose offices will directly face residents.
	Paper/cardboard/cans/polystyrene generation	Use of natural resources	Recycling employed

Activity/Description	Aspects	Potential Impact	Assessment
	Computer use	Use of natural resources	Energy Management employed and E-Waste recycling available through Cleaning Services
Mine	Blasting	Noise	Minimal noise nuisance
		Air	Minimal air pollution
		Biodiversity	Minimal disturbance
	Explosives storage	Theft	Risk of misuse by unauthorised persons
	Mine hoist (Winder)	Noise	Minimal noise nuisance during hours of operation
	Mine dewatering	Surface water contamination	No significant difference to surface water values
		Noise (pump operation)	minimal operation
	Mining laboratory	Dust	Dust extraction & collection system in place
		Water Contamination	Sent to trade waste
		Noise	Housed in building with minimal nuisance
	Drill Rig	Noise	The drill rig is used during operational hours.
		Air Pollution	There are three small baghouses to capture dust.
	Mine open day	Noise	Advertised in local community paper (one day per year)
Minerals Processing Area	Pilot plant	Noise	Necessary equipment housed in buildings. The dust extraction systems are external and can generate noise
		Dust	Dust extraction & collection system. Some fines sent to landfill or returned to place of origin
		Waste rock	Placed in skips & sent to appropriate landfill sites or returned to place of origin
		Stormwater contamination (solids)	Solids settle out in run-off ditch & external collection pads before discharge to creek
		Fire – flammables store	Flammables are stored in a flammables cabinet in accordance with legislation
		Water	Water from the roof of the pilot plant goes to Witton creek.
	Site Workshops	Waste	Liquid/solid waste collected by licensed waste collectors or recyclers
		Fire	Minor flammables stored in flammables storage cupboard
		Noise	Minimal nuisance level
	Pilot Plant 1	Process water used in Workshop can contain waste liquids and solids	Solids settle out in settling trap and disposed of to trade waste under licence
	Pilot Plant 2	Process water used in Pilot Plant can contain metal fines	Water pumped to settling tank and clear effluent sent to stormwater system. Opportunity for metals to be sent to stormwater system There are plans in place to divert this water to sewer due to

Activity/Description	Aspects	Potential Impact	Assessment
			the possibility of contaminants being collected and deposited in Witton Ck.
	Drum storage	Visual amenity	Amenity affected by drum stacking
		Spills	Minimal effect. Drums mostly contain rock. No dangerous goods stored here. Spills can be contained and cleaned
General Site	Flood lighting	Amenity of neighbouring sites	Minimal effect on local community
Chemical Management	Decanting chemicals	Air, Biodiversity, Community	Chemical Procedures available in EMS and training is conducted through TEDI
	Chemical Spills	Air, Water, Biodiversity, Natural Resources, Community	Spill procedures in place. Staff working with chemicals must be trained in use and disposal + spills
	Disposal of chemicals	Air, Water, Biodiversity, Natural Resources, Community	Chemicals are disposed of via the University's Central Chemical Store as per the EMS procedure.
Site grounds	Vegetation	Weeds	Some areas of identified weeds. Landscape Management Plan is being implemented. Specialist gardener on-site
		Fire	Medium risk in dry conditions to site personnel, assets, community, flora & fauna
	Fauna	Fire, clearing of vegetation	Removal of weeds and replanting with native vegetation is occurring to encourage native fauna. Mine has a Land for Wildlife Agreement with council as of 2008
Witton Creek	Vegetation	Weeds	Identified weed area developing. Landscape Management Plan is being implemented. Mine is part of the Land for Wildlife program.
	Rain events	Water quality	Potential sediment inflow during significant rain events from unsealed areas
General Activities	On site vehicle movements on unsealed areas	Dust	Minimal dust nuisance

The table above lists the aspects that are specific to the Indooroopilly Mine site. A register of environmental aspects for the University is kept and managed by the Environmental Engineer. The register is updated annually.

University Experimental Mine Environmental Management Plans

4. Environmental Management Plans

The EMP's in the following sections have been developed specifically for use at the University's Experimental Mine located at Indooroopilly. The EMP's are designed to address potential impacts based upon discussions with site personnel, previous complaints, and from a site visit. The EMP's are additional to and compliment the University of Queensland EMS which can be accessed at **http://www.pf.uq.edu.au/ems.html**

The following environmental issues that require environmental management plans based upon the potential impacts of the activities outlined in Section 3 are as follows:

- Air Quality;
- Energy Management;
- Noise & Vibration;
- Waste Management;
- Water Quality;
- Environmental Contingency Plan;
- Feral Weed and Native Vegetation Management; and
- Explosives Management.

To ensure the purpose of this EMP will be achieved, the environmental management plans will be established as follows based upon the identification of potential impacts established in Section 3.2:

- Objective(s) to be achieved;
- Management strategies;
- Tasks;
- Responsibilities;
- Performance indicators;
- Frequency;
- Monitoring and reporting; and
- Corrective actions.

4.1 *Air Quality Management Plan*

The main source of air pollution to be managed is dust produced from operating laboratory equipment and to a lesser extent from unsealed road and parking areas. The plan excludes vehicle emissions and indoor air quality.

Performance Objective(s)	▪ To minimise the impact to air quality from site operations. ▪ Ensure the relevant provisions of the *Environmental Protection (Air) Policy 2008* are met.
Management Strategies	The performance objectives above will be achieved by the following management strategies: ▪ Use of improved technology where economically feasible to replace less efficient equipment eg gas usage in place of other fuels. ▪ Ensure that all relevant licences are in place and being met through confirmation by measurement. ▪ Evaluate the effect of air emissions where appropriate. ▪ Employment of dust extraction equipment on equipment. ▪ Burn-offs to only take place with a permit from the fire Services department and during appropriate weather conditions and with provision of Metropolitan Fire Brigade services on site. ▪ Roads and parking areas to be sealed where possible. ▪ Future site development to consider dust management planning.
Tasks	**The following actions will be undertaken to implement the above management strategies.** ▪ EMS/EMP awareness training to be included as part of inductions. ▪ Dust extraction and collection equipment is to be maintained and repaired as required.
Responsibilities	▪ This EMP is the responsibility of the Property and Facilities Division. ▪ The actions outlined in this plan are the responsibility of Mine Management and Property & Facilities staff where applicable.
Performance Indicators	▪ Conformance with relevant provisions of the *Environmental Protection (Air) Policy 2008.* ▪ Nil Complaints relating to air quality management. ▪ Extraction equipment appropriately maintained as per site maintenance schedule.
Frequency	▪ Dust extraction and collection equipment repaired as required. ▪ Pilot plant Dust Extraction and Fume Hood equipment inspected annually.
Monitoring & Reporting	▪ Any complaints as to the management of on-site air quality will be directed to Property and Facilities Division for immediate action. Complaints and any actions arising from a complaint will be recorded in a complaints register to be maintained by site management.
Corrective Actions	▪ Maintain dust collection system following reduced performance.

University Experimental Mine Energy Management Plan

4.2 *Energy Management Plan*

The energy management EMP is aimed at minimising electricity use. The main sources of use are

- air conditioners;
- site equipment; and
- lighting

Performance Objective(s)	▪ To minimise electrical energy usage on site in accordance with the Property & Facilities Energy Policy http://www.pf.uq.edu.au/ems.html
Management Strategies	The performance objective above will be achieved by the following management strategies. ▪ Monitor energy usage to determine high-use areas. ▪ Establishing areas of wastage. ▪ Install energy management systems/devices to minimise energy usage (e.g. timers for lighting) where economically viable. ▪ Take energy rating into account for new equipment when being purchased. Refer to the University of Queensland Green Purchasing Guide for guidance on purchasing office equipment http://www.pf.uq.edu.au/ems.html
Tasks	The following actions will be undertaken to implement the above management strategies. ▪ Undertake EMS/EMP awareness training as part of inductions. ▪ Maintain equipment energy control systems.
Responsibilities	▪ Energy Monitoring is the responsibility of the Property and Facilities Division. ▪ The installation of energy management systems and purchasing is the responsibility of Mine management. ▪ The EMP is the responsibility of the Property and Facilities Division
Performance Indicators	▪ Energy usage not increasing against established benchmarks. (UQ 5 year average 2002-2006) ▪ KPI: Maintain consumption at or below 0.65GJ/ m^2 /year (2007= 0.58 GJ/m2)
Frequency	▪ Energy usage reviews conducted randomly by Property & Facilities.
Monitoring & Reporting	▪ Engineering Services is responsible for reporting energy usage to the Utilities Management Committee at least annually
Corrective Actions	▪ Undertake energy monitoring and establish where and why increased usage in electrical energy has occurred.

University Experimental Mine Noise and Vibration Management Plan

4.3 *Noise and Vibration Management Plan*

The potential sources of noise identified were from operational plant such as drilling rigs, workshop facilities and grounds maintenance. This EMP excludes emergency warning systems, off-site traffic or special activity authorized by an administering authority.

Performance Objective(s)	▪ To meet requirements of the *Environmental Protection (Noise) Policy 2008* (EPP Noise) and the *Environment Protection Regulation 2008.* ▪ To avoid noise nuisance to nearby residents and fauna habitats. ▪ To avoid vibration nuisance to nearby residents and fauna habitats.
Management Strategies	The performance objectives above will be achieved by the following management strategies: ▪ Activities that generate excessive noise will be restricted to hours permitted by the regulations of the EPA and Brisbane City Council. ▪ Minimal explosives quantities will be used for blasting experiments. ▪ Maintain on-site equipment including noise reduction equipment. ▪ Enclose excessively noisy equipment likely to generate community complaints where economically feasible.
Tasks	The following actions will be undertaken to implement the above management strategies: Construction can be undertaken from 6.30am to 6.30 pm Monday to Saturday. ▪ Grounds maintenance involving regulated devices will be undertaken between the hours of 7am to 7pm Monday to Saturday. ▪ Public address systems for authorised activities will be undertaken from 7am to 10pm Monday to Friday and 8am to 6pm Saturday, Sunday and public holidays. The maximum level is background plus 10dBA. ▪ Undertake EMS/EMP awareness training as part of inductions.
Responsibilities	▪ This EMP is the responsibility of the Property and Facilities Division. ▪ The actions outlined in this plan are the responsibility of Mine Management and Property & Facilities staff where applicable.
Performance Indicators	▪ Nil Complaints relating to noise or vibration nuisance. ▪ Conformance to the provisions of the EPP Noise and *Environment Protection Regulation 2008* (Part 2A Nuisance) ▪ Operating equipment and noise reduction equipment correctly maintained.
Frequency	▪ Ongoing
Monitoring & Reporting	▪ Any complaints as to the management of noise on-site will be directed to Security for immediate action. Complaints and any actions arising from a complaint will be recorded in a complaints register to be maintained by site management.
Corrective Actions	▪ Immediate shutdown of noisy activity by on-site staff or security if unattended.

	▪ Investigate complaint immediately. ▪ Maintain poorly performing equipment and noise reduction equipment.

University Experimental Mine Waste Management Plan

4.4 *Waste Management Plan*

The main wastes likely to be produced from the Indooroopilly Mine site are:

- rock waste including metal ore fines; and
- workshop wastes including hydrocarbons, scrap metal, timber and building materials.

Performance Objective(s)	▪ To meet requirements of the *Environmental Protection (Waste Management) Policy 2000, Environmental Protection (Waste Management) Regulations 2000.* ▪ To minimise waste generation by developing strategies for the management and disposal of all wastes produced in accordance with the principles of avoidance, reuse, and recycling and disposal of waste. ▪ To manage wastes in a manner that is sustainable and sensitive to the environment.
Management Strategies	The performance objectives above will be achieved by the following management strategies: ▪ Components of waste streams will be separated at source where possible to minimise contamination and maximise potential for reuse and recycling of materials. ▪ Waste will not be stored in areas where it could contribute to the generation of contaminated runoff. ▪ Suitably sized containers will be provided to separate and store recyclable components from the general waste stream. Appropriate transport of stored components will be organised. ▪ Recyclable materials will be collected and stored on-site and sent for recycling when viable quantities are accumulated. For further information on what can be recycled at UQ see the recycling guide available at www.pf.uq.edu.au/ems.html ▪ Waste storage will be away from ignition sources to minimise risk of fire. ▪ The off site movement of regulated wastes will be recorded and kept for five years. Records to be kept by Indooroopilly Mine will include: 1. the date, quantity and type of waste removed; 2. name of the waste transporter and/or disposal operator that removed the waste; and 3. the intended treatment and/or disposal destination of the wastes. ▪ Licensed waste contractors will be used for the transportation /disposal of regulated wastes. ▪ No waste will be burnt on site.
Tasks	The following actions will be undertaken to implement the above

	management strategies: ▪ Organise regular waste collections to avoid excessive on-site storage. ▪ Audit the locations of waste storage to ensure that the above strategies are being met. ▪ Undertake EMS/EMP awareness training as part of inductions.
Responsibilities	▪ This EMP will be the responsibility of the Property and Facilities Division. ▪ The actions outlined in this plan are the responsibility of Mine Management and Property & Facilities staff where applicable.
Performance Indicators	▪ Nil complaints relating to waste management. ▪ No non-compliances identified in waste storage checks and/or audit. ▪ Conformance with *Environmental Protection* (*Waste Management*) *Policy 2000.*
Frequency	▪ Periodic waste storage checks. ▪ Waste audit as necessary. ▪ Waste collections conducted as required.
Monitoring & Reporting	▪ The Mine management will advise Property and Facilities Management if it becomes aware that waste has been incorrectly disposed of from site. ▪ Any complaints as to the management of waste on-site will be directed to the Environmental Engineer for immediate action. The Underground Mine Manager and Senior Site Executive should also be notified. Complaints and actions arising from a complaint will be recorded in a complaints register to be maintained by mine site management.
Corrective Actions	▪ The Property and Facilities Division will recommend corrective actions in the event that waste is disposed of incorrectly or in an unsatisfactory manner.

University Experimental Mine Water Management Plan

4.5 *Water Management Plan*

The Water Management program is designed to manage:

- stormwater;
- waste water from wash down of process areas;
- sediment; and
- process water usage and disposal.

In addition to this water management plan a Water Efficiency Management Plan (WEMP) has been developed for Cooling Towers and Evaporative Coolers at the mine in accordance with the Queensland Water Commission Guidelines. The plan has been authorised by a Water Efficiency Assessor and approved by Brisbane City Council. Property & Facilities staff will be responsible for undertaking the actions outlined in the plan.

Performance Objective(s)	▪ To comply with the *Environmental Protection Act 1994* and the *Environmental Protection (Water) Policy 2008*. ▪ To comply with the *Water Act, 2002* ▪ To comply with South East Queensland Water Restriction Guidelines and Brisbane City Council regulations ▪ All sediment and erosion control work undertaken on site will be consistent with sound environmental management of storm water. A suitable reference for future site development is *Soil Erosion and Sediment Control* – Engineering Guidelines for Queensland – Construction Sites, 1996, published by the Institution of Engineers, Queensland. ▪ To minimise potable water usage on site.
Management Strategy	The performance objectives above will be achieved by the following management strategies: ▪ Divert clean storm water runoff from site to prevent it entering the operations areas. ▪ Collect runoff from process areas and divert to a sediment control facility where appropriate and then to trade waste/stormwater as appropriate. ▪ Maintain site drains and reed bed. ▪ Restrict vehicle movements where practical to defined site roads/tracks. ▪ Routinely clean bitumen roadways to control potential contaminant transport. ▪ Ensure waste is located in areas which will not contaminate surface water run-off. ▪ Ensure discharge of process water meets trade waste licence requirements.

	▪ Use of rainwater for irrigation of grounds ▪ To raise awareness of the importance of conserving water at the Mine.
Tasks	The following actions will be undertaken to implement the above management strategies: ▪ Rehabilitation should be maintained as required to control erosion. ▪ Undertake EMS/EMP awareness training as part of inductions. ▪ Monitor discharge water to ensure that trade waste licence conditions are being met and that no contaminated runoff enters Witton Creek. ▪ Maintain site drains and reed bed as required to maintain water flow and quality entering Witton Creek. . ▪ Distribute awareness materials to the mine for distribution throughout the buildings and workshops.
Responsibility	▪ This EMP is the responsibility of the Property and Facilities Division. ▪ The actions outlined in this plan are the responsibility of Mine Management and Property & Facilities staff where applicable.
Performance Indicators	▪ No contaminated runoff is to enter Witton Creek. ▪ No discharge of out of specification wastewater off site.
Frequency	▪ Drains to be inspected prior to each wet season and after each significant rainfall event. ▪ Reed bed to be inspected periodically to ensure that effective filtration is maintained. ▪ Water quality testing annually or as per licence requirements/operating procedures.
Monitoring & Reporting	▪ The Mine management will advise Property and Facilities Management if it becomes aware that water has been incorrectly discharged from site. ▪ Any complaints as to the management of water on-site will be directed to the Environmental Engineer for immediate action. Complaints and any actions arising from a complaint will be recorded in a complaints register to be maintained by site management.
Corrective Actions	▪ Investigate any non-complying off-site discharges.
Related Documents	▪ WEMP Indooroopilly Mine, March 2008 at http://www.pf.uq.edu.au/Ems/WtrMgt.html

University Experimental Mine Environmental Contingency Plan

4.6 *Environmental Contingency Plan*

The potential emergency risk on this site is a fire event given the level of site vegetation that exists on this site.

Performance Objective(s)	▪ To meet the requirements of the Forestry Act 1959, the Fire and Rescue Service Act 1990, the Fire & Rescue Service Amendment Act 2006 and at Commonwealth level, the Environmental Protection and Biodiversity Conservation Act 1999. ▪ Minimise the impact to the community and local environment.
Management Strategy	The performance objectives above will be achieved by the following management strategies: ▪ Minimise fire risk through risk evaluation processes and management of those risks i.e. fire prevention. ▪ Restrict high-risk activities in accordance with local fire bans or times of high fire danger. ▪ Maintain a plan for rapid and coordinated response to the outbreak of fire through an established fire response plan in conjunction with the local metropolitan fire brigade.
Tasks	▪ Implement and maintain building fire alarm systems, emergency lighting, fire hydrants, fire hose reels, and service checks to relevant locations as per relevant Australian Standard. ▪ Undertake Fire Safety awareness training as part of site inductions. ▪ Conduct regular fire drills and record exercises and actions generated. ▪ Conduct periodic fire equipment audits.
Responsibilities	▪ This EMP is the responsibility of the Property and Facilities Division. ▪ The actions outlined in this plan are the responsibility of Mine Management and Property & Facilities staff where applicable.
Performance Indicators	▪ No damage or loss or injury to personnel, equipment or infrastructure due to fire (including neighbouring properties). ▪ Building fire systems maintained by a suitably qualified contractor. ▪ Fire events recorded and corrective actions implemented.
Frequency	▪ Fire equipment inspections to be carried out as advised by University of Queensland's fire management system contractor. ▪ Fire drills conducted at least annually.
Monitoring & Reporting	▪ Report all fire events to the Environmental Engineer.
Corrective Actions	▪ Extinguish fire if safe to do so. ▪ Notify fire brigade and University security on 53333 immediately and implement evacuation procedure if appropriate.

Related Documents	▪ Environmental Contingency Program, The University of Queensland EMS http://www.pf.uq.edu.au/Ems (Section 7)

Emergency Contacts

Fire Safety Issues	Fire Safety Officer, Property & Facilities Division, Security Section	52329
Environmental	Environmental Engineer, Property and Facilities Division, Operations	51587
Contingency Issues Operation Coordination	Operations Manager, Property and Facilities Division, Operations	52233
Hazards, Risks and emergency Issues Risk Management committee	Associate Director Occupational Health and Safety Unit	52563
Advisory Coordinator Emergency	Security Shift Supervisor Property and Facilities Division, Security Section	53333

University Experimental Mine Feral Weed and Native Vegetation Management Plan

4.7 *Feral Weed and Native Vegetation Management Plan*

The major issues on site are the management of declared and environmental weed species, and the enhancement of the current flora and fauna species present. Weeds are categorised (declared) under the *Land Protection (*Pest and Stock Route Management) *Act 2002* as pest plant species which have, or could have, serious economic environmental or social impact. Weeds of National Significance (WONS) are recognised under the Commonwealth's National Weeds Program (ANZECC 1997). Local Council may also declare species as weeds. In Brisbane the *Natural Assets Local Law 2003* lists species which are declared species by council. There are a number of declared and environmental weeds at the Mine.

Native vegetation is protected under the *Vegetation Management Act 1999* and in Brisbane the *Natural Assets Local Law 2003.*

A Landscape Management Plan for the Mine Site has been developed and is being implemented in stages. The plan includes strategies for removing and reducing weed species and replanting native species. The plan is kept with the Senior Supervisor Grounds.

Performance Objective(s)	▪ To meet the obligations under the *Land Protection (*Pest and Stock Route Management) *Act 2002*, the *Natural Assets Local Law 2003,* and the *Vegetation Management Act 1999.* ▪ Ensure weeds are not introduced into the site area. ▪ To control environmental and declared weeds. ▪ To preserve where feasible the conservation values remaining on the site and maintain habitat of native species also present on site.
Management Strategy	The performance objectives above will be achieved by the following management strategies: ▪ Minimise vegetation clearing and promote natural flora through revegetation as a natural control to weed infestation. ▪ Coordinate weed eradication programs as outlined in the Landscape Management Plan. ▪ Implement weed identification programs, including chemical and physical controls. ▪ Control the dumping of soil and green waste within weed free areas where possible. ▪ Identify and encourage native flora and fauna present on site and plant appropriate species to support. ▪ Implement strategies to reduce fire hazards, erosion and overland flow.
Tasks	▪ Maintain register of weed types and infested areas. ▪ Reduce and/or eradicate existing weed species identified in areas.
Responsibilities	▪ The EMP is the responsibility of the Property & Facilities Division. ▪ The actions outlined in this plan are the responsibility of Mine Management and Property & Facilities staff where applicable.
Performance Indicators	▪ Reduction of targeted weed species.

	▪ No additional weed species to be introduced.
Frequency	▪ Rehabilitated areas to be monitored and inspected regularly as required.
Monitoring & Reporting	▪ The distribution of known declared weeds shall be monitored and such weeds eradicated in accordance with the *Land Protection (*Pest and Stock Route Management) *Act 2002* and the *Natural Assets Local Law 2003* ▪ The identification of declared weeds should be reported to the Senior Supervisor Grounds Section of Property and Facilities.
Corrective Actions	▪ Continue with weed control management strategies. ▪ Contact the Brisbane City Council for guidance/assistance if required.
Related Documents	Indooroopilly Experimental Mine Landscape Management Plan. Issued March 2006

University Experimental Mine Explosives Management Plan

4.8 *Explosives Management Plan*

The Explosive Management Plan has been prepared to minimise the impact on the environment. This is largely controlled by using low quantities of explosives during experiments. Accordingly, impacts from dust, noise and vibration on the local community and fauna are minimal.

Performance Objective(s)	▪ To comply with the *Explosives Regulation 2003.* ▪ To minimise nuisance to the local community. ▪ To minimise the effects on local wildlife.
Management Strategy	The performance objectives above will be achieved by the following management strategies: ▪ Restrict access to explosives to authorised persons. ▪ Use explosives quantities that do not generate excessive noise, dust and vibration impacts to site personnel or the local community.
Tasks	▪ Observe experimental area to determine extent of noise, dust and vibration and adjust quantities accordingly if required.
Responsibilities	▪ The EMP is the responsibility of the Property and Facilities Division.
Performance Indicators	▪ No complaints from local residents.
Frequency	▪ Keep Shot firer(s) Licence current.
Monitoring & Reporting	▪ Report any environmental incidents involving explosives to the Mine Manager and to the Environmental Engineer at Property and Facilities.
Corrective Actions	▪ Investigate any complaint(s) received.

5. Community Management

5.1 Scope

The Community Management Program is applicable to all staff, students and visitors to the Indooroopilly Mine Site.

5.2 Objectives

- To ensure The University of Queensland acts as a responsible member of the greater Brisbane Community;
- To minimise disturbance to neighbours and the community through day to day operations, services and social activities run at and from the Mine site;
- To maintain the aesthetic values of the area and minimise the effects on neighbouring properties.
- To encourage staff to engage with the local community though education and learning activities such as the annual Mine Open Day.

5.3 Community Management Issues

5.3.1 Noise

Indooroopilly Mine site is required to comply with all relevant noise legislation, namely the requirements under the Environmental Protection Act (1994). Details on acceptable noise levels for specific activities are outline in the Noise Program (Section 8).

Not excluding any of the detail in Section 8, no noise generated at the Mine shall impact on its neighbours after 10.00pm and before 6.00am.

Police will respond to all noise complaints.

5.3.2 Lighting

To minimise the impact of spill lighting (light shining from the mine into neighbouring properties), all activities are to stop and lights out (excepting security lighting) by 10.00pm.

5.3.3 Aesthetics

Indooroopilly Mine is to be kept clean and tidy at all times. All equipment shall be stored in appropriate areas. No equipment is to be left on or near the fence lines or against the buildings (unless otherwise directed).

5.3.4 Major Projects

From time to time The Indooroopilly Mine will undertake major projects which have the potential to impact on local residents. To ensure that community concerns are addressed the mine uses one or more of the following methods of communication prior to project implementation.

- Email
- Letter drops
- Meetings

The community are then able to raise concerns about the project which can then be addressed by Mine staff or referred to the appropriate University staff.

5.4 Feedback on Community Issues

Community representatives are able to contact the Mine to register a complaint. The complaints are followed up by the Mine Manager (UQEM), Technical Services Manager (JKMRC) or the Occupational Health and Safety Officer (JKMRC) and referred to the appropriate University staff where applicable.

5.5 Responsibilities

Responsibilities for management of community issues lie with everyone at Indooroopilly Mine. Table 1 outlines these specific responsibilities.

Table 1. Community Management Responsibilities

Responsible Person	Duties
Users (Students, researchers, staff, etc)	Ensure awareness and understanding of the community issues associated with their activities. To act responsibly and adhere to the procedures outlined in this procedure.
Manager, Mine (UQEM) Executive Dean Faculty of Engineering (UQEM) Technical Services Manager (JKMRC) Director (JKMRC)	Ensure facilities and materials are available to limit the impact on the community and to allow compliance with this procedure. Identification and review of new and existing community issues and updating the program on an annual basis.

5.6 Records

The Property and Facilities Division or the Manager at the Indooroopilly Mine hold all documents issued and kept in respect to the Community Management Program. The term documents for the purpose of this program includes the following:

- Operational Procedures;
- Checklists;
- Notes;
- Letters;
- Reports and Registers.

5.7 Enquiries

For further information regarding community management contact the Technical Services Manager, Indooroopilly Mine.

University Experimental Mine EMP Management

6. EMP Management

6.1 Audit and Review

One of the tools to proactively assess the performance of this EMP is to conduct internal audits of the respective EMPs. These audits will be organised by Property and Facilities Division and conducted on a time scale dependent upon incident or complaint reports and associated environmental risk.

6.2 Training Requirements

The activities involved in the University of Queensland experimental mine operation at Indooroopilly have the potential to impact on the environment in certain circumstances and hence all personnel involved in the operation of the mine facility will be briefed on the issues discussed in this document and made aware of the EMP's. The EMP's will only be successful if all those responsible for their implementation and review are conversant with its contents, interpretation and performance measures. They will be instructed in the requirements of relevant legislation and regulations and relevant personnel will be instructed in the basic tenets of the *Environmental Protection Act 1994* including matters relating to the prevention of environmental harm and the general environmental duty.

Similarly the University of Queensland will be responsible for ensuring that personnel working on the site have sufficient knowledge and awareness to identify potential environmental issues. Personnel should be trained in appropriate corrective action in the event that they become aware of an environmental issue.

6.3 Review and Update of the EMP

The EMP's will be reviewed as required to ensure that they address issues and changes in legislation, policies, guidelines and other requirements. This will be the responsibility of the Property and Facilities Division.

The EMP has been developed as a document that will undergo continual change in response to changes in the site operation, environmental legislation and/or environmental management procedures and policies of the University of Queensland.

Awareness of these changes and the requirement to update superseded legislation and policy is the responsibility of the Property and Facilities Division. The current legislation is listed as part of the individual EMP's.

6.4 Emergency Situations

The environmental contingency procedure listed on pages 22-23 of this document addresses the risk of fire at the Indooroopilly Mine site as this has been identified as a high risk. A comprehensive environmental contingency program for the University is available in the University's EMS. It can be accessed at ***http://www.pf.uq.edu.au/ems.html*** (Section 7)

6.5 Reporting

It is important that all personnel are familiar with the procedures for the reporting of issues that may result in environmental degradation whether the incident has occurred or may occur in the future. An environmental incident and feedback form is available on the EMS

website **www.pf.uq.edu.au/ems.html** for the recording of such events. The issue is to be investigated with corrective actions assigned and implemented.
Note: Matters affecting the mine and associated facilities must also be reported to the Underground Mine Manager (UGM) and the Senior Site Executive.

6.6 Complaints

An external complaint can be registered on the incident form discussed in Section 6.5. The complaint is then to be treated as an incident and investigated with corrective actions provided and implemented.

University Experimental Mine References

1. Environmental Management System, University of Queensland, August 2008. at www.pf.uq.edu.au/ems.html
2. Environmental Protection Act 2004. at http://www.legislation.qld.gov.au/Acts_SLs/Acts_SL_E.htm
3. Environmental Protection (Noise) Policy 2008.
4. Environmental Protection (Air) Policy 2008.
5. Environmental Protection (Waste Management) Policy 2000.
6. Environmental Protection Regulation 2008.
7. Environmental Protection Waste Management Regulation 2000.
8. Water Act, 2000. at http://www.legislation.qld.gov.au/Acts_SLs/Acts_SL_W.htm
9. Queensland Water Commission Guidelines, Dec 2007 at http://www.qwc.qld.gov.au/WEMP+Guidelines
10. Land Protection (Pest & Stock Route Management) Act 2002. at http://www.legislation.qld.gov.au/Acts_SLs/Acts_SL_L.htm
11. Natural Assets Local Law 2003. at http://www.legislation.qld.gov.au/Acts_SLs/Acts_SL_N.htm
12. Forestry Act 1959. at http://www.legislation.qld.gov.au/Acts_SLs/Acts_SL_F.htm
13. Fire and Rescue Service Act 1990 and the Fire & Rescue Service Amendment Act 2006. at http://www.legislation.qld.gov.au/Acts_SLs/Acts_SL_F.htm
14. Environmental Protection and Biodiversity Conservation Act 1999. http://www.environment.gov.au/epbc/about/index.html
15. Explosives Regulation 2003. http://www.legislation.qld.gov.au/Acts_SLs/Acts_SL_E.htm
16. University of Queensland Green Purchasing Guide 2005 at http://www.pf.uq.edu.au/Ems/Purcshasing.html
17. Soil Erosion and Sediment Control- Engineering Guidelines for Queensland-Construction Sites 1996. Institute of Engineers Queensland.
18. Indooroopilly Experimental Mine Landscape Management Plan. Issued March 2006
19. Water Efficiency Management Plan- University Experimental mine Site March 2008 at http://www.pf.uq.edu.au/Ems/WtrMgt.html