



## BLAST MANAGEMENT PLAN

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## Definition of Terms

ACR	Annual Compliance Report.
Air overpressure	<p>The pressure caused by a blast-generated shock wave over and above normal atmospheric pressure. It is measured in decibels using the linear weighting scale dB(Lin). Air overpressure is often below the range of human hearing. There are generally five sources of blast-generated air overpressure:</p> <p><u>Air Pressure Pulse</u> – Low frequency pressure caused by rock displacement at the face (piston-like movement or bulking of the rock mass).</p> <p><u>Gas Release Pulse</u> – High frequency pressure caused by gases venting through the face.</p> <p><u>Stemming Release Pulse</u> – High frequency pressure caused by gases venting through the stemming.</p> <p><u>Rock Pressure Pulse</u> – Typically insignificant air pressure generated by the ground vibration.</p> <p><u>Noise</u> – High frequency energy from detonating cord or surface delays.</p>
BMP	Blast Management Plan
BOM	Australian Government - Bureau of Meteorology.
Burden and spacing	<p>The distance from a blast hole to the rock free face – ie. the linear width of rock to be blasted by that blast hole.</p> <p>Spacing is the lateral distance between blast holes.</p>
dB	Decibel - a unit of measurement used to express noise (or sound) level. It is based on a logarithmic scale.
dB(Lin) or dBL	Flat or Linear frequency response i.e. unweighted decibel level.
DSD	Department of State Development, South Australia.
EMS	Environmental Management System.
EPA	Environment Protection Agency, South Australia.
Hz	Frequency is the number of times a vibrating object oscillates (moves back and forth) in one second. Fast movements produce high frequency sound (high pitch/tone), but slow movements mean the frequency (pitch/tone) is low. 1 Hz is equal to 1 cycle per second.
HMCV	Hillside Mine Community Voice.
MIC	Maximum Instantaneous Charge (MIC), that is the explosive charge mass detonated per delay.
ML	Mineral Lease 6438.
mm/s	Millimetres per second, unit of vibration velocity.
SOP	Standard Operating Procedure.
PPV	Peak particle velocity is the maximum vector sum of the three velocity components in vibrations, ie. longitudinal, transverse and vertical (measured in mm/s).
PVS	Peak vector sum, measured in mm/s.
BMP	Blast Management Plan.
IS14001:2004	Environmental management systems – Requirements with guidance for use.

## 1. INTRODUCTION

Rex Minerals Limited plans to develop and operate the Hillside Mine, situated 12 kilometres south of the township of Ardrossan on the Yorke Peninsula, South Australia. Conventional open cut mining techniques will be employed using trucks and excavators to deliver ore to a processing plant that will produce a copper concentrate.

Blasting of ore and overburden can have impacts on the surrounding community. These impacts mainly include fly-rock, vibration through the air (overpressure) and earth (ground vibration) and the generation of dust and fumes. Impacts associated with fume, dust and odour from blasting activities are covered under the Air Quality Management Plan.

### 1.1 ENVIRONMENTAL MANAGEMENT SYSTEM

Rex Minerals is committed to minimising the impact of its operations on the local environment and community, and is developing a comprehensive EMS based on the International Standard 14001:2004. This BMP will be a component of the Hillside Mine EMS.

### 1.2 OBJECTIVES

The objectives of this BMP are to provide a framework for:

- ensuring compliance with all relevant statutory requirements;
- Rex Minerals Policies and Standards;
- implementing tools and practices to manage and minimise the impact of blasting from mining operations on the environment and nearby residences;
- providing details on blast management responsibilities; and
- maintaining an effective response mechanism to deal with issues and complaints.

## 2. BLASTING CONDITIONS

The following Hillside Mine ML conditions (Second Schedule) relate to blasting.

15. The Tenement Holder must ensure that no fly-rock encroaches on third party property unless the Tenement Holder obtains a registered Waiver of Exemption under the Act to undertake mining activities that would include such an encroachment.
16. The Tenement Holder must notify property owners adjacent to and within the Land, subject to their consent, of all blasts no less than forty eight hours in advance of those blasts.

*Explanatory Note: The consent required is for the notification of blasting, and not the blasting itself.*

33. In accordance with section 70B(2)(d) of the Act it is a condition of the grant of the Mining Tenement that a proposed PEPR submitted in accordance with Part 10A of the Act must include reports from suitably qualified independent experts on the following matters:
  - 33.1. The capacity of the Tenement Holder to achieve compliance with the Act and the Program in light of its management systems, personnel, policies, procedures, practices and resources.
  - 33.2. The effectiveness of the proposed strategies in the proposed PEPR achieving the environmental outcomes identified in the proposed PEPR, including but not limited to reports from:
    - 33.2.1. an Independent Mining and Blasting Expert (ie. for Blasting operations)

### 3. BLASTING OUTCOMES

In accordance with the ML Sixth Schedule clause 9, the blasting conditions applicable to the Hillside Mine are given below.

The Tenement Holder must, in construction and operation, ensure that there are no adverse impacts to:

- 9.1 public safety,
- 9.2 human comfort,
- 9.3 third party property (including stock),
- 9.4 adjacent land use,
- 9.5 aircraft, or
- 9.6 other receptors.

from airblast, fly-rock and vibration caused by blasting.

When assessing at sensitive receptors (ie. nearest residences), guidance is obtained from AS 2187.2 – 2006, Australian Standard “Explosives-Storage, transport and use Part 2: Use of explosives” (AS 2187.2). Table 1, Table 2 and Table 3 below outline the criteria based on AS2187.2.

**Table 1: Human comfort criteria at residential premises**

Parameter	Limits
Ground Vibration	5mm/s PPV for 95% of blasts per year, 10mm/s PPV maximum unless agreement is reached with the occupier that a higher limit may apply.
Air Overpressure	115 dB(Lin) for 95% of blasts per year, 120 dB(Lin) maximum unless agreement is reached with the occupier that a higher limit may apply.

**Table 2: Vibration criteria for commercial and industrial buildings or structures**

Parameter	Limits
Ground Vibration	25mm/s PPV maximum.

**Table 3 Vibration criteria for public or private buried utilities**

Parameter	Limits
Ground Vibration	100mm/s PPV maximum.

### 4. BASELINE MEASUREMENTS AND MODELLING

Baseline measurements of the air overpressure were carried out to demonstrate the influence of environmental factors on air overpressure levels (Saros 2013). Saros undertook a study over a one month period by correlating wind speed measurements with peak air overpressure levels recorded at an adjacent location.

Over the one month monitoring duration, in excess of 370,000 air overpressure measurements were obtained. The baseline study shows that even without blasting the background air overpressure can exceed the ML limits of 115dBL level, with a maximum level in excess of 135dBL for more than 4,500 (>1%) non-blast related events (such as wind, lightening, trucks, trains and fireworks).

Saros modelled the air overpressure and vibration levels from proposed blasting for the Hillside Mine. The modelled levels of air overpressure and vibration at the receptor locations is shown in Appendix 1 Location Maps. The exclusion zone for fly-rock for the open pit perimeter was modelled to be 426 metres and is also shown in Appendix 1 Location Maps.

## 5. UNCERTAINTY ASSESSMENT

The variability in the geology and rock strengths will be an important factor in the planning and design of blasting practices. The modelling of blasting impacts including ground vibration and air overpressure, were based on the proposed open pit designs for the Hillside Mine and are described in Table 4.

**Table 4: Proposed open pit blast design parameters for the Hillside Mine**

Parameter	Type/Value
Bench Height	10 metres
Burden	6.0 – 7.0 metres*
Spacing	5.0 – 6.0 metres*
Blast Hole Diameter	229 millimetres
Stemming	3.5 metres
Subdrill	1.0 – 1.5 metres*
Explosive Type	ANFO/Bulk Emulsion*
Powder Factor	0.6 – 0.9 kg/m <sup>3</sup>
Charge per Blast Hole	Up to 350 kilograms
Initiation	Pyrotechnic

\*Variability dependent on the rock strength and ground conditions

Key assumptions made by the Company's blasting and vibration consultants (SAROS), in predicting the blast vibration and air overpressure impacts caused by the Hillside Mine operations, and in recommending mitigation and management controls, include the following:

- initial geotechnical investigations indicating mechanical excavation can be achieved to a depth of between 25 to 168 metres with an average depth of 40 metres;
- good controls over the movement of free faces and initiation timing is part of modern blasting practice and assumed to ensure blasting activities maintain compliance with air overpressure limits;
- modified practices relating to both blast design and implementation of loading practices will be used around the edges of the pit including presplitting and buffering blasting where applicable;
- blast vibration modelling was carried out in the absence of site-specific data (due to the operation having not commenced); and
- blast air overpressure modelling was carried out under the assumption of "favourable" meteorological conditions with tight controls over practices.

The following actions will be taken during the early operational phase to ensure these assumptions are satisfactory:

- blasting outcomes related to geology;
- blasting outcomes related to hole wetness;
- blasting outcomes related to maximum charge weight; and
- blasting outcomes related to initiation timing and sequence.

## 6. KEY RISKS

The potential blast impacts associated with the Hillside Mine are outlined below:

- public nuisance from air overpressure;
- public nuisance from ground vibration;
- public safety and/or infrastructure damage from fly-rock;
- damage to underground utilities; and
- dust and fumes.

Fume and dust from blasting activities are covered under the Air Quality Management Plan.

The modelling shows that the air overpressure and vibration levels will be well under the ML conditions using standard drill and blast practices. Blasting at the Hillside Mine pit perimeters requires modified drill and blast practices including presplitting and buffer blasting to ensure fly-rock stays within the exclusion zone.

The modelling shows a low risk of exceedance of the conditions for air overpressure and vibration for sensitive receptors 34 and 35. Additional monitoring will be in place when blasting is undertaken at the open pit perimeter. After year five, the fly-rock exclusion zone will extend into some small areas used for agriculture within the ML.

## 7. BLASTING CONTROL MEASURES

To mitigate potential air overpressure, vibration and fly-rock impacts from the Hillside Mine, a number of management controls will be implemented throughout the life of the mine. These controls are detailed in the following sub-sections.

The Australia Standard AS 2187.2 states the variables within and outside the control of blasting operators and these are listed below in Table 5 for vibration and air overpressure.

The Hillside Mine will plan to minimise the impact of variables listed outside the control of the blasting operators (eg. weather conditions).

**Table 5: AS 2187.2: Summary of blast design variables affecting vibration and air overpressure**

Variables	Ground vibration			Airblast		
	Influence on ground vibration			Influence on overpressure		
	Significant	Moderately significant	Insignificant	Significant	Moderately significant	Insignificant
<b>1 Within the control of blasting operators</b>						
Maximum instantaneous charge (effective charge mass per delay)	✓				✓	
Delay interval	✓			✓		
Burden and spacing		✓		✓		
Stemming: Amount			✓	✓		
Type			✓	✓		
Charge length and diameter			✓		✓	
Angle of blasthole			✓			✓
Direction of initiation	✓			✓		
Charge mass per blast		✓				✓
Charge depth			✓	✓		
Covering of detonating cord			✓	✓		
Charge confinement	✓			✓		
Blasthole deviation	✓			✓		
<b>2 Not within the control of blasting operators</b>						
General surface			✓		✓	
Geological conditions	✓			✓		
Wind and weather conditions			✓	✓		
Water saturated ground	✓					✓

## 7.1 AIR OVERPRESSURE AND VIBRATION CONTROL MEASURES

Table 6 describes the control measures to mitigate air overpressure and vibration associated with blasting activities at the Hillside Mine and summarises the responsibilities that have been documented within this Plan. If blasting activity results in an adverse impact on amenity, all reasonable and practicable measures will be taken to minimise further impacts from the activity. This includes (but is not limited to) the following measures to the extent practicable:

**Table 6: Blasting control measures and responsibilities**

Blast control measures	Responsibility	Timing
<b>Pre-blast planning</b>		
Complying with the relevant internal Hillside Mine blasting SOPs prior to the initiation of any blast including blast exclusion zones by referring to the Hillside Mine safety management system or equivalent.	Mining Manager	Ongoing

Conducting a pre-blast environmental assessment with consideration given to wind speed, direction, and meteorological conditions prior to each blast. Meteorological conditions will then be compared with internal Hillside Mine blasting SOPs. These SOPs will be further refined over time based on specific site conditions.	Mining Manager	Ongoing
Use of an initiation sequence that minimises vibration as detailed in the Hillside Mine SOPs.	Mining Manager	Ongoing
Use of adequate stemming lengths to ensure maximum confinement of explosive charges, whilst minimising fly-rock and air overpressure.	Mining Manager	Ongoing
Use of suitable quality stemming material - being either crushed rock sourced from site or imported gravel when necessary.	Mining Manager	Ongoing
Ensuring adequate burden is present on all faces and blast holes.	Mining Manager	Ongoing
Adherence to blast loading and initiation designs unless risks are determined by the shot-firer at the time of loading that may be mitigated through changes to design.	Mining Manager	Ongoing
<b>Operational response processes and post blast learning</b>		
Operate in accordance with this BMP and implement procedures contained within this management plan.	All employees	Ongoing
Ensure the blast and meteorological monitoring network is maintained and results are routinely analysed, assessed and reported.	Sustainability Manager	In accordance with Section 10
Receiving, reporting and responding to any complaints in relation to blasting through the 24-hour community response line.	Sustainability Manager	Ongoing
In the event of exceedance of the blast limits, the situation should be reported to the Operations Manager.	Operations Manager	Ongoing
Report the results of any blast monitoring in accordance with the ML conditions.	Sustainability Manager	As required
Ensure that all employees and contractors are given adequate training in environmental awareness, legal responsibilities, and blast control methods.	Sustainability Manager	Ongoing
Any corrective action as an operational response will be recorded and reported to the Senior Environment Advisor who is to keep a record of all significant proactive and reactive actions. The Community Relations Advisor must be informed of any complaint and details must be recorded in the complaints register in addition to response and actions taken.	Sustainability Manager	Ongoing
Use of monitoring data and techniques to establish and refine predictive tools to estimate likely air overpressure and vibration levels during the design process of subsequent blasts.	Mining Manager	Ongoing

## 7.2 FLY-ROCK CONTROL MEASURES

The generation of fly-rock is managed by incorporating appropriate controls in blast designs, as briefly described in Section 7.1 and is outlined in the Hillside Mine blasting SOPs. These controls include design of stemming lengths and quality stemming materials to minimise the potential for generating fly-rock, ensuring adequate burden is maintained to minimise the risk of generating fly-rock due to face bursting. These measures, along with an appropriate exclusion zone with relevant mine safety regulations, are used to ensure there is no damage or injury to personnel, livestock, property, equipment, or power lines from fly-rock.

The Hillside Mine will use crushed rock stemming to improve stemming confinement and hence reduce the chance of fly-rock and elevated blast air overpressure.

The blast exclusion zone for each blast will vary depending on the size and location of the blast (lateral and vertical). An overall maximum exclusion zone of 426 metres (Appendix 1 Location Maps) was

reviewed by independent consultants (Saros 2013). The road re-alignment of the Yorke Highway will take this road outside the maximum exclusion zone. The Hillside Mine design means this maximum exclusion zone will provide the desired protection from fly-rock.

The blast exclusion zone will, on occasion, impinge on a small area of adjacent agricultural land use and may restrict access for short durations. Rex Minerals will work with the landowner to develop an agreed notification protocol (Appendix 2 Landholder Communication Protocol). This protocol will include a clear plan indicating the blast location, proposed time and exact extent of blast clearance area to facilitate planning and timing of agricultural activities including aerial crop dusting.

All blasts will be internally reviewed by Rex Minerals for their performance. This information will be used to continually reassess the adequacy of blast design controls in reducing the generation of fly-rock. The information will also be used to reassess the size of the safety exclusion zone established for people and livestock in the vicinity of a blast.

### **7.3 ADVERSE METEOROLOGICAL CONDITIONS**

The monitoring of current and forecast meteorological conditions will be used to assist in blast planning. Occasionally, there will be meteorological conditions at the Hillside Mine site, or surrounding region, which may give rise to situations that are unsuitable for blasting. Such conditions may include temperature inversions which may have the effect of focusing the sound waves from the blast site at significant distances. Understanding the local meteorological conditions that cause temperature inversions will be the subject of further study over the early stages of mine operation, eg. sea breeze inversion or surface inversions (summer).

Data from the Hillside Mine weather station and particularly forecast data from the BOM, will be utilised to identify the potential for temperature inversions.

### **7.4 PROTECTION OF UNDERGROUND UTILITIES**

Given the significant distance between the Hillside Mine blasting locations and adjacent private land, it is unlikely that any damage to underground or public utilities will occur given the level of ground vibration required to cause this type of damage must be greater than 100mm/s PPV (see Table 3). In addition, checks are undertaken where required to determine the location of any public utilities throughout the ML area so that blasts can be designed to minimise the risk of damage.

### **7.5 MITIGATION MEASURES**

The details of the day to day operational control measures and responsibilities for the management and monitoring of blasts are stated in the Hillside Mine blasting SOPs.

### **7.6 TRAINING**

To ensure the effective implementation of this BMP, all Hillside Mine personnel and contractors will be advised of blast management requirements as part of the Hillside Mine general induction. Additional blast management training, including regular toolbox meetings as necessary, will be provided to personnel and contractors who require specific skills or knowledge relating to blast impacts and mitigation.

## 8. CONSULTATION

### 8.1 CONSULTATION WITH NEIGHBOURING RESIDENTS AND COMMUNITY

Rex Minerals will maintain a weekly schedule of planned blasts which will be posted on the Hillside Mine website, and on a noticeboard at the entrance to the mine. It should be noted that the weekly schedule is subject to variation depending on daily factors, including variable weather, which may ultimately delay a blast until conditions improve.

Rex Minerals will notify property owners adjacent to, and landowners within, the ML area of all blasts no less than forty-eight hours in advance of those blasts subject to their consent (the consent required is for the notification of blasting, and not the blasting itself), and at a closer time just prior to the blasts using communication methods to be agreed with the community, likely to be via an SMS messaging system (see Appendix 2 Landholder Communication Protocol).

Further to this, Rex Minerals will send out a group SMS message to those residents who have requested to be on a blast notification list prior to blasting in order to avoid surprise and maintain good working relationships. Residents will be able to request to be added to this blast notification list through the Hillside Mine website or through direct contact with Rex Minerals.

### 8.2 CONSULTATION WITH GOVERNMENT AGENCIES

This BMP is being prepared in consultation with the DSD, the EPA and Safework SA.

## 9. RESPONSE PROCEDURES

### 9.1 OPERATIONAL RESPONSE PROCESS

Operational response procedures are detailed in the Hillside Mine blasting SOPs.

### 9.2 EXCEEDANCE PROTOCOL

In situations where the blast results potentially adversely impact the limits identified in the blasting outcomes (refer Section 3), an investigation will be initiated to determine what actions need to be taken to ensure further exceedances do not occur. Blasting consultants may be engaged to provide expert analysis and interpretation of blasting results as part of an investigation into an exceedance of criteria.

### 9.3 COMMUNITY RESPONSE PROCESS

All complaints received regarding operational blast activities will be responded to in accordance with the established Hillside Mine procedure for complaints. This procedure details the obligations of the Hillside Mine in regard to receiving, handling, responding to, and recording details of all community complaints. Upon receipt of a complaint from the community, preliminary investigations will commence as soon as practicable to determine the likely causes of the complaint using information such as the prevailing meteorological conditions, the nature of activities taking place and recent monitoring results. A response will be provided as soon as practicable, which may include the provision of relevant monitoring data.

Where specific complaints are received in relation to blast air overpressure, vibration and fly-rock at a particular residence, portable attended monitoring units may be deployed in consultation with the complainant to monitor future blast impacts at the relevant location.

Every effort will be made to ensure that concerns are addressed in a manner that facilitates a mutually acceptable outcome for both the complainant and Rex Minerals.

Rex Minerals will record all community complaints into the site event management database in accordance with the Hillside Mine procedure for complaints. The database will include reporting, incident/event notification, close out action tracking, inspections, and audits.

#### **9.4 LANDOWNER NOTIFICATION**

Condition 43 of the Second Schedule of the ML conditions requires the development of a Communication and Operating Protocol with owners of adjacent land. This protocol will include communications and issues management relating to blasting as specified in the Social Management Plan.

### **10. MONITORING PROGRAM**

The monitoring program has been designed to ensure that adequate monitoring is undertaken to confirm compliance with Condition 11.1 of the Rex Minerals Hillside Mine, ML conditions Sixth Schedule, requiring blasting criteria is set in accordance with the Australian Standard AS 2187.2 (refer Section 3). The program specifies monitoring requirements, and provides guidelines on data analysis and reporting. Additional information relating to maintenance and calibration of the monitoring system is also specified.

#### **10.1 MONITORING METHODOLOGY**

The blast monitoring program will monitor peak air overpressure in dB(Lin) and vibration PPV in mm/s associated with blasting activities. All aspects of blast monitoring will be conducted in accordance with Australian Standard AS 2187.2.

#### **10.2 MEASUREMENT EQUIPMENT**

Ground vibration will be measured with a tri-axial geophone with a flat frequency response to within 5% over the frequency range 5 Hz to 250 Hz. For permanent monitoring stations, the geophone will be attached to a mass of at least 30kg to ensure good coupling with the ground. The mass will be buried so that its uppermost surface will be level with the ground surface.

Air overpressure will be measured with a microphone having a lower limiting frequency of 2 Hz (- 3 dB response point of the measurement system) and a detector onset time of not greater than 100 microseconds as assessed in accordance with Australian Standard AS 1259.1 – 1990 *Acoustics - Sound level meters Non-integrating*. The microphone will be located 1.2 to 1.5 metres above the ground.

#### **10.3 PERMANENT MONITORING LOCATIONS**

The Hillside Mine will install two permanent blast-monitoring systems for the life of the mine. These systems will be automated and connected to the mine network to provide real-time vibration and air overpressure data. The proposed monitoring locations are presented in Appendix 1 Location Maps.

The blast monitors will be calibrated in accordance with Australian Standard AS 2187.2. Copies of calibration certificates will be filed and the date of last calibration recorded on each monitor.

#### **10.4 AD HOC MONITORING LOCATIONS**

In accordance with this Plan, ad hoc monitoring will be undertaken with portable units to assist in measuring air overpressure and ground vibration at relevant locations surrounding the operation. The intent of these measurements will be to confirm compliance at the nearest sensitive premises as well as

to enable learning on the propagation characteristics under the various meteorological conditions that occur during blasting.

It is expected that these measurements will continue until sufficient data has been obtained to adequately understand the propagation of air-blast overpressure under the typical range of prevailing meteorological conditions encountered during blasting. This data will also be correlated with the permanent monitoring locations to enable a typical propagation correction to be determined for the nearest sensitive premises.

The proposed monitoring locations are presented in Appendix 1 Location Maps.

In response to complaints, ad hoc monitoring may be undertaken (in consultation with the complainant) where it is considered an appropriate response.

## 10.5 MONITORING RECORDS

The Hillside Mine will collect and record the following for each blast:

- MIC in kilograms (kg);
- location of the blast within the mine (including which bench level);
- air overpressure level, dB(Lin) peak;
- PVS in mm/s;
- location, date and time of recording the MIC;
- meteorological conditions from the Hillside Mine weather station (including temperature, relative humidity, wind speed and direction), as well as the BOM forecast for the period of blasting; and
- information that can be used by a Geographic Information System to produce a map showing blast location with respect to sensitive premises and measurement results at each monitoring location.

Permanent measurement equipment will be connected to the mine communications network and an automatic notification sent to key mine personnel if an exceedance is registered to allow follow up actions to occur quickly.

## 10.6 MONITORING LOCATIONS TYPE AND PURPOSE

The blast monitoring requirements for the Hillside Mine will cover two key areas, namely permanent and ad hoc monitoring locations. The monitoring equipment's purpose is provided in Table 6, with the locations also identified in Appendix 1 Location Maps. The initial proposed monitoring locations may change over the life of the mine after consultation with the DSD due to operational requirements.

**Table 7: Monitoring equipment purpose and location**

Site No.	Monitoring Equipment	Monitoring Type / Frequency	Location MGA Zone 53 (GDA94)	Purpose
W1	Weather Station	Continuous	762,004E 6,177,076N	Record of meteorological conditions relating to all blasts
P1	Permanent vibration and air overpressure monitoring station	Continuous	763,263E 6,179,149N	Record of all blast events for life of mine Residential compliance

P2	Permanent vibration and air overpressure monitoring station	Continuous	762,371E 6,172,675N	Record of all blast events for life of mine Residential compliance
B1	Portable vibration and air overpressure monitoring unit	Ad hoc	765,667 E 6,178,851N	Residential compliance
B2	Portable vibration and air overpressure monitoring unit	Ad hoc	760,175E 6,175,171N	Residential compliance
B3	Portable vibration and air overpressure monitoring unit	Ad hoc	764,161E 6,171,238N	Residential compliance
B4	Portable vibration and air overpressure monitoring unit	Ad hoc	764,379E 6,176,042N	Industrial compliance

## 10.7 DATA ANALYSIS

Following the completion of blasting, the blast results for each monitoring location (see Section 10.6) are reviewed for compliance with blasting criteria for ground vibration and air overpressure (see Section 3).

The percentage of blasts within each of the criteria (as defined by Australian Standard AS 2187.2) will be calculated at each monitoring location against the total number of blasts on a rolling 12 month basis.

## 11. REPORTING

The reporting and notification of blast results that exceed the blast criteria will be undertaken in accordance with the Hillside Mine procedure for complaints.

In the event that the monitoring results from a blast identify an exceedance of the ground vibration or air overpressure criteria at any of the blast monitoring locations, Rex Minerals will conduct investigations to ascertain the cause of the exceedance.

Rex Minerals will prepare a detailed report outlining the results of the investigation and may provide the relevant agencies with the report. The detailed report will:

- identify the date, time and scale of the exceedance;
- identify the cause or likely cause of the exceedance;
- describe the actions taken in relation to the exceedance; and
- identify any measures being undertaken to minimise the risk of future exceedance of blasting criteria.

Rex Minerals will implement any recommendations as a result of the investigation, in order to minimise or prevent any future blast exceedances.

The Hillside Mine will report on the performance of the BMP in the ACR and provide regular updates to members of the HMCV consultation group. The ACR will be provided to the HMCV and made available for public information on the Rex Minerals website.

## 12. PERFORMANCE INDICATORS

The following performance indicators will be measured against the Hillside Mine ML conditions:

- compliance with relevant blasting criteria at monitoring locations, in particular those representative of sensitive receptor locations;
- minimisation of blasting complaints as evidenced by trends in the frequency and extent of complaints; and
- compliance with this Plan, as indicated by internal and statutory reporting.

## 13. CONTINUAL IMPROVEMENT

The Hillside Mine will strive to continually improve on the mine's environmental and operational performance by applying the principles of best practice to mining operations, including where cost-effective and practicable, the adoption of new best practice technologies and improved blast control measures. Progress will be monitored using the performance indicators in Section 12.

## 14. REVIEW

This Plan will be reviewed, and if necessary revised, to the satisfaction of the DSD (in consultation with relevant government agencies):

- following changes to the project approval or licence conditions relating to blast management or monitoring;
- following significant incidents at the Hillside Mine relating to blasting;
- following the conduct of an independent environmental audit which requires changes to the BMP or to the blast monitoring practices;
- if there is a relevant change in technology or legislation; or
- annually.

## 15. REFERENCES

Australian Standard AS 2187.2-2006 *'Explosives - Storage, transport and use Part 2: Use of explosives'*

EPA - Environmental Protection Licence (application to be submitted for approval prior to project commencement)

Rex Minerals Ltd, Hillside Mine Mineral Lease Application

Government of South Australia, Mineral Lease 6438, 16 September 2014

Saros, Hillside Mine Blasting Impact Assessment, 8 March 2013

Hillside Mine blasting standard operating procedures

Hillside Mine – Description of the Mining Operations

Australian Standard AS 1259.1 – 1990 *Acoustics - Sound level meters Non-integrating*

16. APPENDICES

Appendix 1: Location Maps

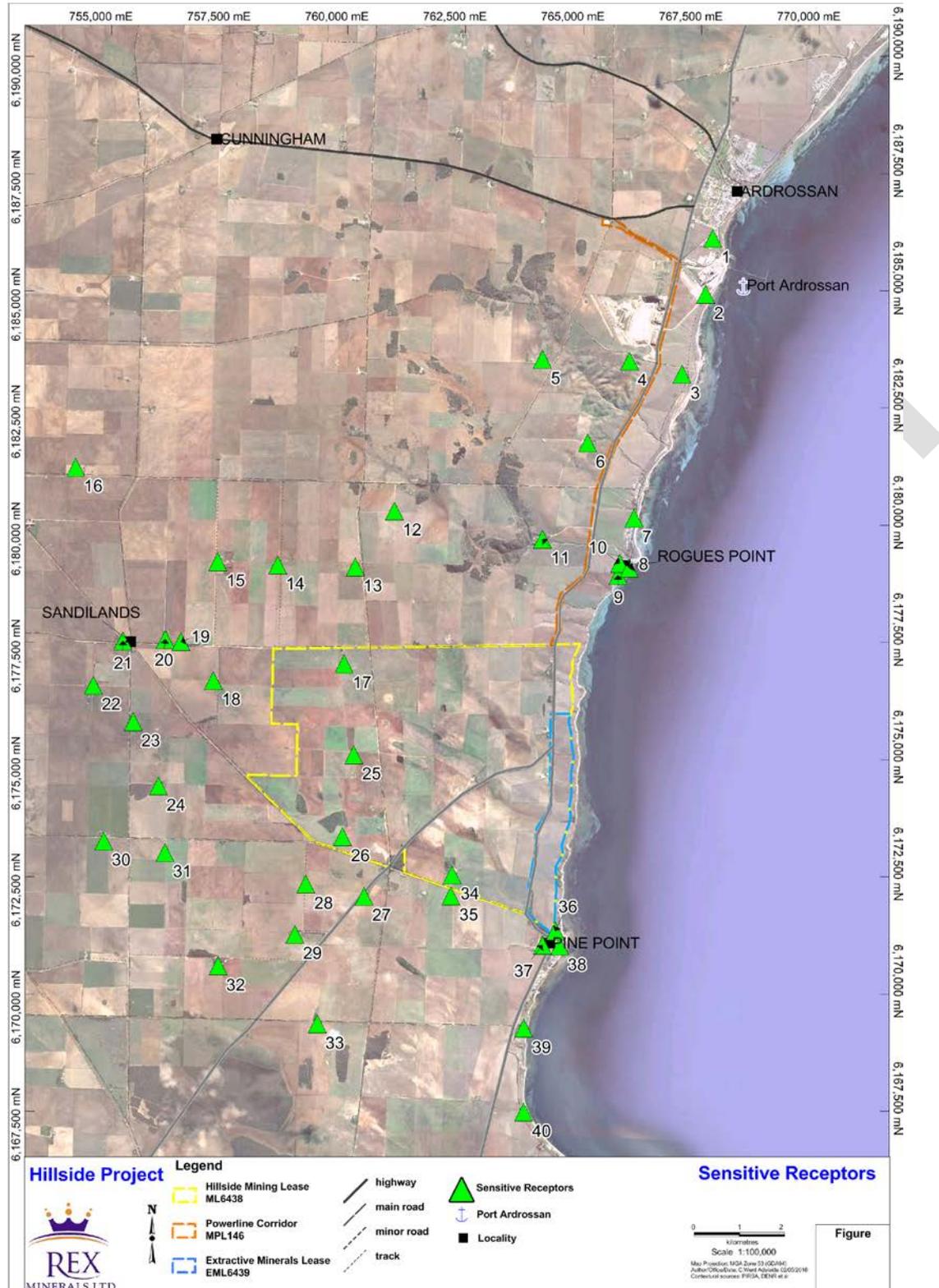


Figure 1: Sensitive receptor locations

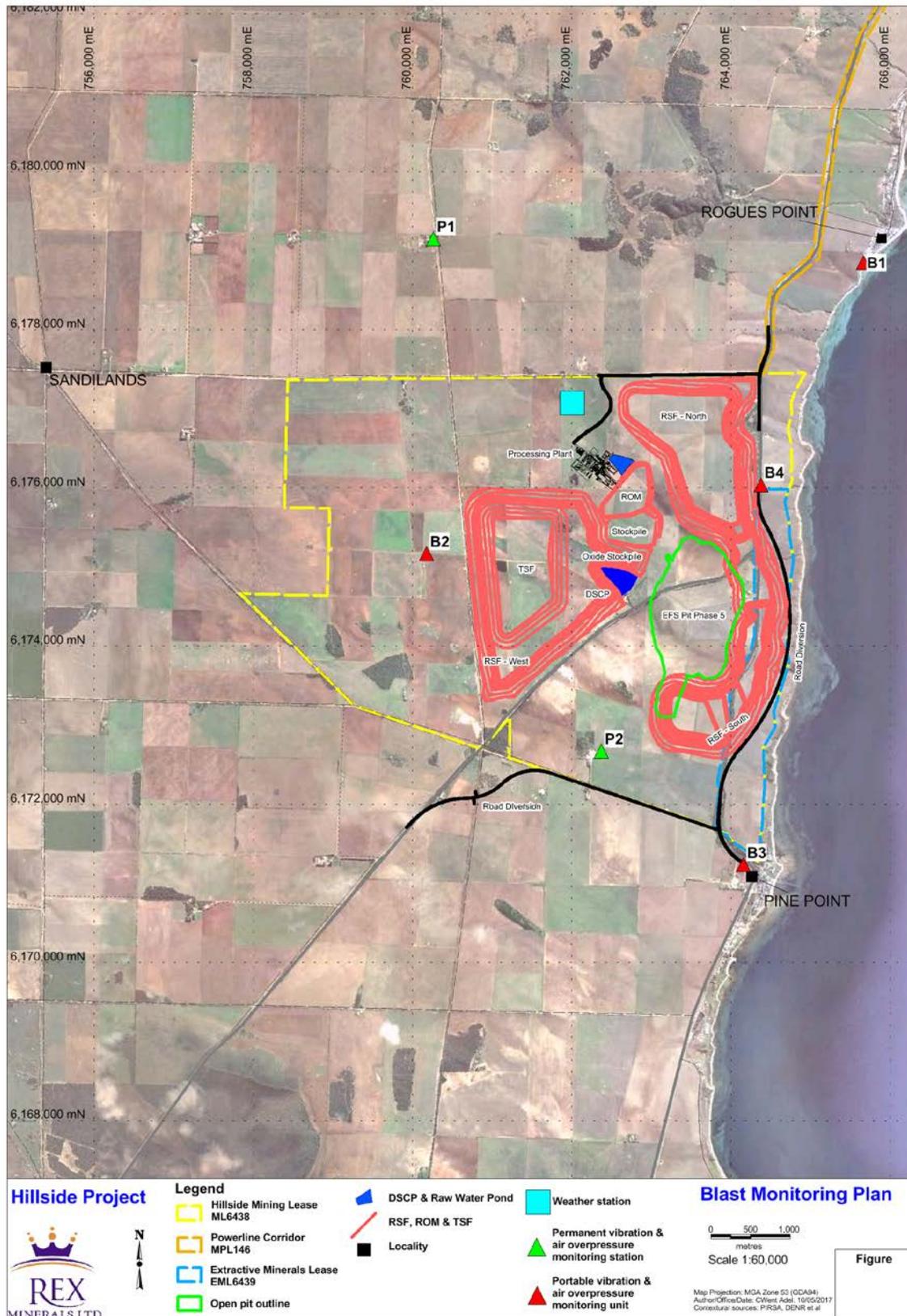


Figure 2: Hillside Mine blast monitoring plan



Figure 3: Hillside Mine extent of vibration impacts from open pit blasting



Figure 4: Hillside Mine extent of air overpressure impacts from open pit blasting

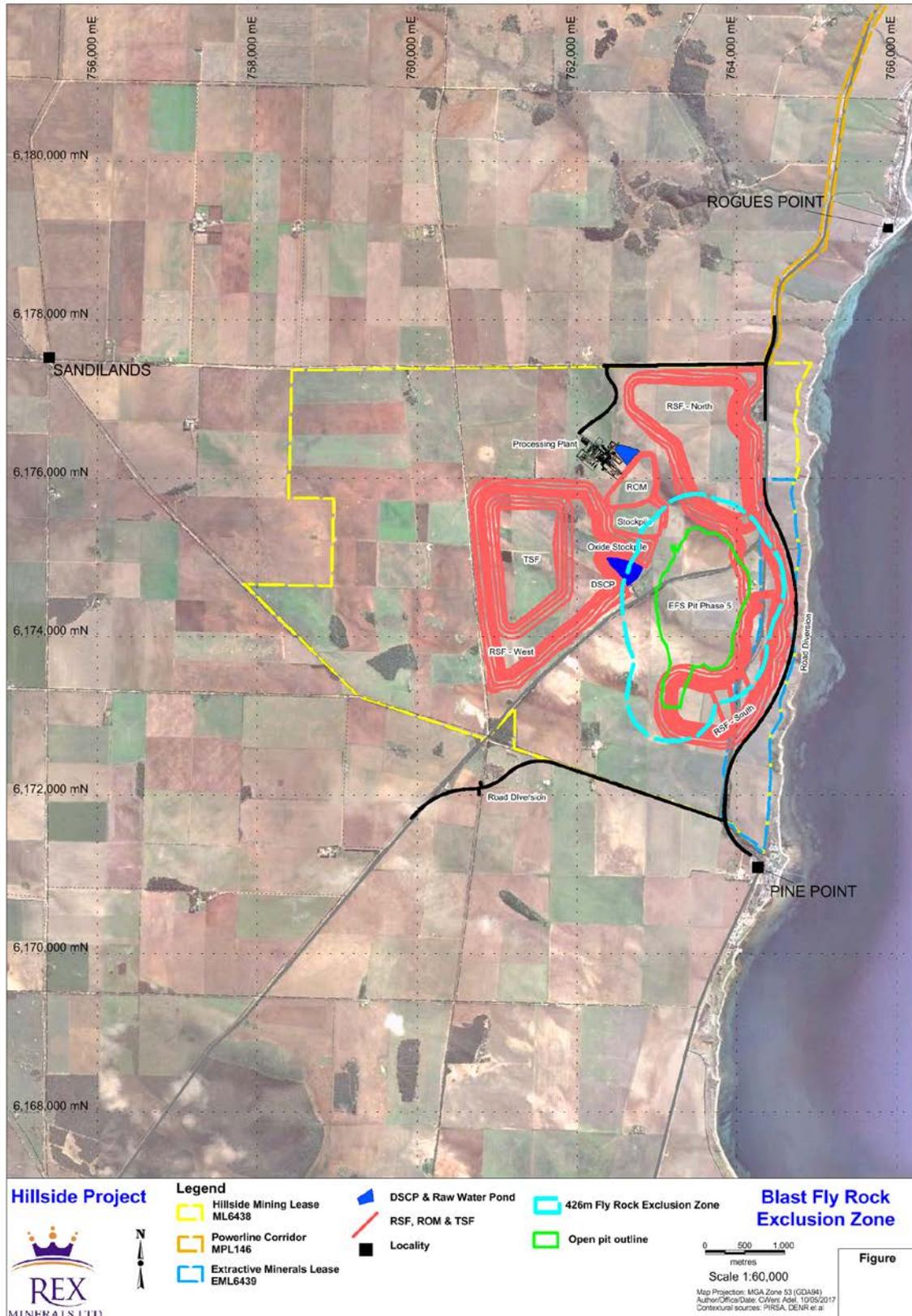


Figure 5: Hillside Mine blast exclusion fly-rock exclusion zone

## Appendix 2: Landholder Communication Protocol

Communications Protocol to be updated on finalisation of blasting SOPs. This protocol will be used with landowners from approximately year 5 onwards when open pit permit extends South and West.

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### Appendix 3: Correspondence Records

Key relevant communications with DSD, Safework SA, EPA and the community relating to this management plan are detailed below.

Date	Communication with:	Action or Outcomes
23 March 2017	DSD	Outline of proposed management plan and monitoring program structure.
3 April 2017	HMCV	Outline presented by Rex Minerals of content of proposed Blasting Management Plan and Blasting Monitoring Program.
13 April 2017	DSD	Updated on status of plan development.

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#### Appendix 4: Blast Complaints Form Details Example

Complaint received by.	
Date and time of complaint.	
The method by which the complaint was made (ie. verbal, telephone, written).	
Any personal details of the complainant which were provided by the complainant, or if no such details were provided, a note to that effect.	
The location of the nuisance observation.	
Wind speed and direction prior to, and at the time the complaint was received.	
Blast vibration and air overpressure measurement data relating to the time of the complaint.	
The action taken by Rex Minerals in relation to the complaint, including any follow up contact with the complainant.  Or  If no action was taken, the reason(s) why no action was taken.	
Complaint and follow up correspondence reported as relevant.	

**Note:** a single complaints form will be designed for all complaints relating to dust, odour, noise and blasting. This form is included as an example.

## Appendix 5: Blast Management Plan Requirements Checklist

Condition	Requirement	Section
<b>Rex Minerals Hillside Mine Mineral Lease Conditions (ML 6438) Second Schedule</b>		
<b>Blasting</b>		
15.	The Tenement Holder must ensure that no flyrock encroaches on third party property unless the Tenement Holder obtains a registered Waiver of Exemption under the Act to undertake mining activities that would include such an encroachment.	2 6 7.2 8.1 Appendix 1
16.	The Tenement Holder must notify property owners adjacent to and within the Land, subject to their consent, of all blasts no less than forty eight hours in advance of those blasts.  <i>Explanatory Note: The consent required is for the notification of blasting, and not the blasting itself.</i>	2 8 Appendix 2
<b>Additional Information in the Program</b>		
33.	In accordance with section 70B(2)(d) of the Act it is a condition of the grant of the Mining Tenement that a proposed PEPR submitted in accordance with Part 10A of the Act must include reports from suitably qualified independent experts on the following matters:	
33.2	The effectiveness of the proposed strategies in the proposed PEPR achieving the environmental outcomes identified in the proposed PEPR, including but not limited to reports from:	
33.2.1	An Independent Mining and Blasting Expert (i.e.: for Blasting operations)	4 5 6 Appendix 4
<b>Communication Protocol</b>		
43.	The Tenement Holder must develop (in consultation with the owners of land and to the satisfaction of the Director of Mines) a communication and operating protocol between itself and owners of land adjacent to and on the Land prior to the commencement of mining operations that includes the following matters:	
43.1	Interaction with landholder operations;	2 3
43.2	emergency procedures;	7.2 8 9
43.3	communications and issue management processes;	Appendix 2
43.4	land management;	
43.5	dispute resolution;	
43.6	ongoing communication about the Tenement Holder's operations;	

43.7	receiving and considering feedback;	
43.8	safety procedures;	
43.9	access protocols; and	
43.10	any matters identified by the Director of Mines in writing.	
44.	The Tenement Holder must maintain and adhere to the protocol to the satisfaction of the Director of Mines for the term of the Mining Tenement.	2 3 7.2 8 9.3 9.4 11 Appendix 2
<b>Complaints Register</b>		
45	The Tenement Holder must operate a 24 hour per day, 7 day per week, free-call telephone complaints line for the purpose of receiving complaints from members of the public in relation to mining operations.	9.3 9.4 11 Appendix 2
46.	The Tenement Holder must take reasonable measures to notify the public of the complaints line telephone number and the fact that it is a complaints line.	9.3 9.4 11 Appendix 2
47.	The Tenement Holder must establish and maintain a public complaints register. The public complaints register must, as a minimum, record the following detail in relation to each complaint received in which it is alleged that environmental harm (including an environmental nuisance) has been caused by the mining operations:	
47.1	the time at which the complaint was received;	
47.2	all personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;	9.3 11 Appendix 2 Appendix 5
47.3	the subject-matter of the complaint;	
47.4	the action taken by the tenement holder in relation to the complaint, including any follow-up contact with the complainant; and	
47.5	if no action was taken by the tenement holder, the reasons why no action was taken.	
48.	All records in respect of the public complaints must be maintained for a period of at least 7 years.	Appendix 2
49.	The Tenement Holder must make the public complaints register publicly available except for the name and contact details of each complainant.	11 Appendix 2
<b>Rex Minerals Hillside Mine Mineral Lease Conditions (ML 6438) Sixth Schedule</b>		
<b>Blasting Outcome</b>		
9.	The Tenement Holder must, in construction and operation, ensure that there are no adverse impacts to:	2 3 4

9.1	Public safety.	6 7 10
9.2	Human comfort,	
9.3	Third party property including stock),	
9.4	Adjacent land use,	
9.5	Aircraft, or	
9.6	Other receptors,	
	from airblast, flyrock and vibration caused by blasting	
<b>Blasting Strategies</b>		
10.	The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome in Sixth Schedule Clause 8;	
10.1	Develop strategies for the management of impacts from blasting, including the determination of blast exclusion zones, in accordance with relevant standards including the Australian Standard AS 2187.2;	2 4 7 7.2
10.2	Develop strategies for establishing and implementing a blast exclusion zone between any third party property, and the designated blast area, for all blasting events during mining operations;	2 4 7.2
10.3	Development strategies to ensure that the blast exclusion zone is maintained between the public and the designated blast area, for all blasting events during mining operations.	2 4 7.2
10.4	A blasting protocol and blasting schedule will be developed in consultation with residents of land within and adjoining the Land to reflect the needs of the neighbouring land use practices (including aerial crop dusting).	8.1 Appendix 2
11.	The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(d) of the Regulations in relation to the outcome in Sixth Schedule Clause 8;	
11.1	Blasting criteria is set in accordance with the Australian Standard AS 2187.2.	3 7
11.2	Measurements taken to demonstrate achievement of the outcome in Sixth Schedule Clause 8 must be taken in accordance with Australian Standard AS 2187.2.	10 10.1 10.2 10.3 10.7