# ASSESSMENT REPORT

for the application of a mineral lease, an extractive mineral lease and two miscellaneous purposes licences from **Rex Minerals (SA) Pty Ltd for the Hillside copper mine**

SOUTH AUSTRALIA

Government of South Australia

Department of State Development

Prepared by
Mining Regulation Branch
Department of State Development
SOUTH AUSTRALIA

16 July 2014

Government of South Australia
Department of State Development

**Resources and Energy Group**
Department of State Development
Level 7, 101 Grenfell Street, Adelaide
GPO Box 320, Adelaide SA 5001

Phone +61 8 8463 3000
Email Resources.CustomerServices@sa.gov.au
www.minerals.statedevelopment.sa.gov.au
South Australia Resources Information Geoserver (SARIG)
www.statedevelopment.sa.gov.au/sarig

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# EXECUTIVE SUMMARY

## Executive Summary

**Introduction**

This report describes the South Australian Government assessment of the Rex Minerals (SA) Pty Ltd (Rex) Hillside Mine Proposal, including the consideration of environmental, social and economic risk posed by the operation, the potential for treatment through mitigation or management of that risk, and whether or not any residual risk posed by the project is, on balance, acceptable.

The report has been prepared in accordance with the requirements of the *Mining Act 1971* (the Act), and the Government's framework for best practice regulation outlined in *Regulating mineral exploration and mining in South Australia*, August 2012[1].

**The Hillside Mining Tenement Applications**

In August 2013 Rex lodged tenement applications and an accompanying Mining Lease Proposal and Management Plan (the Proposal) for their Hillside Copper, Gold, and Iron Ore mine with the South Australian Government.

The Hillside deposit is located 12 km south of Ardrossan and within close proximity to Pine Point, Rogues Point, James Well and Black Point on the eastern side of Yorke Peninsula.

Rex's applications include:

- A Mineral Lease (ML) for an open pit and underground mine, a processing plant for producing a copper/gold concentrate, an iron ore concentrate and waste storage landforms.
- An Extractive Minerals Lease (EML) to enable the sale of any excess extractive minerals from the highway realignment cut and fill operations.
- Two Miscellaneous Purposes Licenses (MPLs):

[1] https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/BROCH005.pdf.

- a first Miscellaneous Purpose Licenses (MPL) for a power line and pipelines between the proposed mine and Ardrossan (**Power line and Pipelines MPL**)
- a second MPL for mineral concentrate dewatering, storage and handling infrastructure at the Port of Ardrossan (**Port MPL**).

Rex has reported a Ore Reserve in accordance with the JORC Code totalling (at June 2013) 180Mt @ 0.52% copper, 0.13g/t gold and 14.4% iron for contained metal of 936,000 tonnes of copper, 752,300 ounces of gold and 25,700,000 tonnes of iron ore. The metal grades equate to a copper equivalent (CuEq) grade of 0.8%.

Rex proposes an open cut and underground operation based on the current reserve of 180Mt, producing 75,000tpa of copper, 60,000ozpa gold and 1.2Mtpa of iron ore contained within two export concentrates. The project would employ between 550 and 750 full time people over a proposed mine life of 15+ years.

The open pit proposed at Hillside would be amongst Australia's largest at approximately 500m deep, 2.4km long and 1.2km wide, situated within 1km from the east coast of Gulf St Vincent. Waste rock dumps and an integrated waste landform incorporating the tailings storage facility will surround the pit, and vary in height to a maximum of approximately 115m above the existing ground surface.

The proposed operation would also include a mineral processing plant (crushing, grinding and flotation and magnetic separation processes to make copper/gold and iron ore concentrates), supporting mining infrastructure (ore stockpile areas, workshops, fuel storage and sheds, sewerage treatment systems, water supply dams, administration offices and a small accommodation camp).

The proposed Extractive Minerals Lease (EML) operation is for the recovery of extractive minerals from stockpiles of excess overburden from the construction of the realignment of the Yorke and St Vincent Highways (within the proposed Mining Lease area).

The proposed Power line and Pipeline MPL would provide an infrastructure corridor between Ardrossan and mine site for the construction and operation of a high voltage power transmission line, and buried water and concentrate slurry pipelines.

The proposed Port MPL would include infrastructure for concentrate dewatering, storage and transfer to the existing port conveyor loading system. It would also include a sea water intake attached to the port jetty for a water supply for the mine.

The land within the proposed ML and EML is primarily utilised for cropping and grazing, with some areas of remnant native vegetation. There are a number of third party-owned dwellings located within and in the vicinity of

the proposed ML. The MPL application areas contain cultivated land, roads and the Ardrossan port facility.

Subsequent to submitting these applications, Rex requested deferral of the assessment of the Port MPL application on the grounds that they were evaluating alternative options for what has been proposed in the Port MPL. DSD has agreed to defer the assessment of the Port MPL for a period of up to 12 months, pending further information which would be provided by Rex, and to complete the assessment of the ML, EML and Power and Pipelines MPL applications.

**Legislative Requirements**

The Hillside Mining Lease Proposal is subject to consideration under a significant number of State and Commonwealth statutes. Primary assessment of the activities proposed at Hillside has been undertaken in relation to applications made by Rex under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, the South Australian *Mining Act 1971*, and the South Australian *Development Act 1993*.

*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth):

Rex submitted a Referral for the Hillside project under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* in relation to threatened species in the project area. Following a period of statutory consultation and formal assessment by the Commonwealth Government, the outcome of this Referral was that the proposed activity was declared 'Not a Controlled Action if undertaken in a Particular Manner' under Section 77A of that Act.

South Australian *Mining Act 1971*:

The proposed mining and ancillary activities at Hillside have been considered in accordance with the provisions of the *Mining Act 1971* (the Act) and *Mining Regulations 2011* (the Regulations).

South Australian *Development Act 1993*:

Proposed diversions of the Yorke and St Vincent Highways as a result of the location of the proposed open pit, and upgrades required to the existing dolomite loading facility at Port Ardrossan have been considered public infrastructure under Section 49 of the *Development Act 1993*. Approvals for these activities were granted in February 2014.

The South Australian Government has also considered the proposal in the context of the requirements of other Acts, including the *Environment Protection Act 1993, Radiation Protection and Control Act 1982, Aboriginal Heritage Act 1988,* and *Native Vegetation Act 1991.*

**Statutory Consultation under the Mining Act**

As detailed in Section 7 of the Proposal, Rex implemented a program of community and stakeholder engagement in the development of the

application for an ML, EML and MPLs for the Hillside Project. Initial consultation with local communities, indigenous traditional land owners, the Yorke Peninsula Council, the South Australian Government and other regional agencies started in 2008 with the commencement of exploration activities. More targeted consultation commenced in mid-2010 in relation to the Hillside Mining Lease Proposal.

In accordance with legislative requirements specified in section 35A of the Act, DSD initiated a period of statutory public circulation in September 2013 to enable the public and Government agencies to make written submissions in relation to the application for an ML, EML and 2 MPLs for the Hillside Project. A total of 266 public submissions were received over a total of 8 weeks, 10 were originally marked as confidential and not supplied to Rex. 17 others subsequently asked that their submissions not be published.

Following the collation of public and government agency submissions, in December 2013 DSD provided Rex with a request to respond to those submissions, including a consolidated list of technical issues raised by the public and government. Rex formally responded to this request in February 2014, with the Response Document made publicly available on the Rex website.

**Mining Act Assessment Process**

The submission of the Response Document initiated a comprehensive technical assessment of Rex's Proposal, submissions to statutory circulation and Response Document in accordance with the requirements of the Act by the South Australian Government. The assessment has utilised technical specialists from South Australian Government agencies, including the Department of State Development, the Environment Protection Authority and the Department of Environment, Water and Natural Resources, as well as independent expert consultants engaged by the South Australian Government in relation to Air Quality, Geotechnical Engineering, Tailings Storage and Geochemistry.

The assessment has considered potential impacts resulting from the proposed Hillside Mine during construction, operation and post mine completion, and in particular:

1. Whether Rex has provided adequate information about the existing receiving environment.
2. Whether Rex has identified all of the sensitive receptors and environmental values that may potentially be impacted by the proposal. The assessment also considers additional sensitive receptors and environmental values identified by DSD, other government agencies or the public.
3. Whether Rex has identified, and correctly assessed, the consequence of all credible impact events. The assessment also considers additional potential impact events identified by DSD, other government agencies or the public.

4. DSD has had regard for all issues and concerns which were raised during statutory consultation. DSD has made an assessment as to which issues are within the scope of the Mining Lease Proposal. Issues raised which were outside the scope of the Mining Lease Proposal have not been specifically mentioned in this report, however, they have been considered in the assessment process.
5. For each impact event, whether or not an 'outcome' is required. An outcome is a statement of the level of impact subsequent to control strategies. DSD requires outcomes when it considers a potential impact to the receiving environment requires management during construction, operation and/or post completion. An outcome is required for the purpose of determining the acceptability and achievability of the level of the impact described by the outcome. All impact events require an outcome unless the primary consequence of the event has been demonstrated to be trivial in nature. For the purpose of assessment, trivial is defined as an insignificant consequence.
6. The acceptability of the Rex proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable. If the Rex proposed outcome is not acceptable, DSD recommends a new outcome.
7. The achievability of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed would achieve the proposed outcome. For closure events this would consider whether the proposed strategies would be self-sustaining in the long term. The assessment also considers any assumptions and uncertainty in control strategies.

**Primary Environmental, Social and Economic Project Impacts**

The environmental aspects and values considered in the assessment were:

- Air Quality
- Soil/Land Disturbance
- Visual Amenity
- Public Safety
- Socio-economic Impacts
- Adjacent Land Use and Protection of Third Party Property
- Noise and Vibration
- Native Vegetation
- Heritage
- Traffic
- Land Access
- Weeds, Pests and Plant Pathogens
- Blasting
- Native Fauna
- Surface Water
- Radiation
- Groundwater
- Coastal and Marine Environment

Sections 5 and 7 of this report highlight noise, air quality, visual amenity, impacts associated with management of mine waste, impacts to third party property, surface water impacts, public safety and socio-economic impacts as material considerations for the Minister for Mineral Resources and

Energy in considering whether or not to grant mining tenements for the Hillside Project.

The direct and indirect benefits from the Hillside project include economic stimulus and industry sector diversification for Yorke Peninsula and the broader State economy through job creation and increased demand for skills and services, as well as improved infrastructure and services to the community.

**Conclusion**

Detailed assessments of the environmental impacts and socio-economic benefits have been provided in Section 7 and Section 5.5 of this report. The benefits from the Hillside project would include economic growth, job creation both for the mine and service industry, as well as improved regional and local infrastructure and services to the community.

Primary impacts associated with the project have been identified by Rex and stakeholders including community members and groups. DSD and other relevant South Australian Government agencies have separately identified the key impacts of the proposed mining project. These impact events have been assessed in detail in Section 7 of this report.

Impacts considered by DSD to be of significance due to the nature, scale and location of the operations include noise, air quality, visual amenity, impacts associated with management of mine waste, impacts to third party property, surface water impacts, public safety and socio-economic impacts. Based on the information provided in the Proposal and subsequent Response Document, DSD considers that the potential impacts of the proposed operations can be managed to an acceptable level, and would be balanced by potential socio-economic benefits created by the project.

The detailed assessment undertaken by the South Australian Government has concluded that the Hillside project can be undertaken in an environmentally responsible manner, with effective mitigation and management strategies available for controlling impacts and ensuring that the project can be undertaken in a manner that is acceptable to, and provides a benefit for, the local, regional and broader South Australian community.

**Recommendations**

The South Australian Government assessment recommends:

1) That in accordance with the requirements of the Act, the Minister for Resources and Energy (or his delegate) considers, on the basis of the Proposal, the results of statutory consultation, the Response Document and the attached assessment, whether or not to grant mining tenements for the proposed Hillside mine.

2) That if a decision is made to grant the mining tenements for which Rex has applied, the body of recommended conditions, terms and clauses identified in the attached Assessment Report and provided in consolidated schedules in Appendix 2, 3 and 4, become legal requirements of those tenements.

3) That in accordance with the requirements of Part 10A of the Act, if mining tenements are granted, Rex are clearly advised that:

   a. no operations may be undertaken until such time as Rex has provided a detailed Program for Environment Protection and Rehabilitation (PEPR) which meets the legal requirements of the Act, Regulations, Ministerial Determinations and addresses all terms, conditions and clauses of the tenements to the satisfaction of, and is formally approved by, the Minister for Mineral Resources and Energy, and

   b. that in preparing the PEPR, Rex will be required to demonstrate ongoing consultation between the company, the local community and government agencies, and that the results of that consultation has informed the proposed approach to mine construction, operation and rehabilitation; and

   c. the Minister for Mineral Resources and Energy will not approve a PEPR for mining operations on exempt land prior to the registration in the Mining Register of the required waivers of exemption.

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# 1 Introduction

## *1.1 General*

This Assessment Report addresses the social, environmental and economic impacts of the proposal by Rex Minerals (SA) Pty Ltd (Rex) for the Hillside Copper Mine near Ardrossan on the Yorke Peninsula.

Rex has submitted a Mining Lease Proposal and Management Plan (the Proposal) under the *Mining Act 1971* (the Act) to support the applications for:

- a Mineral Lease (**ML**) to mine and produce copper, gold and iron concentrate
- an Extractive Mineral Lease (**EML**) to enable the sale of any excess extractive minerals from the highway realignment cut and fill operations
- a first Miscellaneous Purpose Licenses (MPL) for a power line and pipelines between the proposed mine and the Port of Ardrossan (**Power line and Pipelines MPL**)
- a second MPL for mineral concentrate dewatering, storage and handling infrastructure at the Port of Ardrossan (**Port MPL**).

While this Assessment Report is intended to be a stand-alone document, the detailed information on which it is based is contained in:

- Rex's Hillside Copper Mine Mining Lease Proposal and Management Plan, including supporting appendices sections 5 to 8 inclusive (received 26 August 2013) (referred to as the **Proposal**)
- Public submissions received during the statutory consultation period from 12 September to 8 November 2013 (referred to as **Public Submissions**)
- Rex's response document to the technical issues raised during the formal consultation process (referred to as the **Response Document**)

This Assessment Report has been compiled utilising information, comments and specialist technical advice provided by appropriate South Australian Government agencies including the Department of State Development (DSD), the Environment Protection Authority (EPA) and Department of the Environment, Water and Natural Resources (DEWNR).

In addition, the State Government engaged several independent technical experts to review the following aspects of the Proposal:

- Geochemistry - O'Kane Consultants Pty Ltd (referred to as O'Kane)
- Mining and Mining Geotechnical Engineering - Kevin Rosengren & Associates Pty Ltd (referred to as Rosengren)
- Tailings Storage Facility Design - SLR Consulting Australia Pty Ltd (referred to as SLR Consulting)
- Air Quality - JBS&G (VIC & SA) Pty Ltd (referred to as JBS&G)

The technical reports listed above are provided as **Appendices** to this assessment report with the exception of the Rosengren technical report on Mining and Mining Geotechnical Engineering. This report has not been included in the DSD public assessment report as it contains information that has yet to be released to the Australian Stock Exchange (ASX). The Rosengren technical report includes information relating to the Rex Bankable Feasibility Study (BFS) which has not yet been completed or disclosed to the public by Rex.

### *1.2 Assessment Process*

The following is a summary of the process that has been undertaken for the assessment under the Act of the applications for a Mineral Lease (ML), Extractive Mineral Lease (EML) and two Miscellaneous Purposes Licences (MPL) (the applications).

The applications and supporting Proposal have been developed in accordance with:

- *Mining Act 1971* (SA)
- *Mining Regulations 2011* (SA)
- Ministerial Determination 006 – Minimum information required to be provided in a mining proposal or management plan for ML and any associated MPL applications for metallic and industrial minerals (excluding extractive minerals, coal and uranium) (DSD 2012).

The Proposal was developed to also meet the requirements of section 53(1) of the Act, submitting a Management Plan to support the two MPL applications.

The following is a summary of the process that has been undertaken for the lodgment of the Proposal and subsequent documentation by Rex which has formed the basis of this assessment.

1. Rex submitted applications to DSD on 26 August 2013.
2. In accordance with section 35A(1a), 35A(2) and 53(4) of the Act DSD provided the owners of land within the application areas and the District Council of the Yorke Peninsula with copies of the application within 14 days of their lodgment.
3. The Act requires the Minister to undertake a minimum two week statutory consultation process on all mining production tenement applications. Due to the volume and complexity of the Proposal, the potential impacts on landowners and surrounding communities, and broader stakeholder interest, the Minister commenced a six week public consultation period on 12 September 2013 with a closing date of 24 October 2013. This involved public notices in the Advertiser and Yorke Peninsula Country Times, Government Gazette and DSD website, providing copies of the Proposal to all immediate and adjacent landowners, the Council and other relevant stakeholders, making the Proposal document available for viewing on the DSD website, and providing hard copies of the Proposal to the Council for public viewing. Additional hard copies of the Proposal were subsequently issued on request to individual parties in the community.
4. During the statutory consultation period, differences were identified between the printed and electronic versions of two technical appendices (Operational Noise Assessment and Dust and Odour Impact Assessment) to the Proposal. These differences were rectified by Rex and released by DSD, and the closing date to the statutory consultation was extended by two weeks to 8 November 2013.
5. Submissions received during the statutory consultation were progressively provided to Rex unless confidentiality was requested by the submitter.
6. At the conclusion of the statutory consultation, DSD produced a consolidated technical summary of comments received from the public and government agencies. This summary was provided to Rex, along with complete copies of all public submissions received during the statutory consultation period (apart from those submissions where confidentiality was requested) and made publicly available on the DSD website. On 3 December 2013 DSD formally requested that Rex respond to submissions received during statutory consultation. Rex submitted their response to DSD on 21 February 2014. The Response Document was made publicly available on Rex's website.
7. Receipt of the Response Document by DSD initiated the comprehensive technical assessment of the complete Proposal (being the original Proposal, submissions received during statutory consultation and the Response Document).
8. In addition to engaging technical specialists from South Australian Government agencies to participate in that comprehensive assessment (particularly the Department of State Development, the Environment Protection Authority and the Department of Environment, Water and Natural Resources), DSD also engaged

independent expert consultants in relation to Air Quality, Geotechnical Engineering, Tailings Storage and Geochemistry.

9. On 26 June 2014, Rex wrote to DSD requesting deferral of the assessment of the Port MPL application on the grounds that Rex was evaluating alternative options for what has been proposed in the Port MPL.
10. On 3 July 2014, DSD advised Rex that it had considered the request for deferral and determined that the assessment of the Port MPL would be deferred for a period of up to 12 months, pending further information which would be provided by Rex in regards to any proposed changes in relation to the Port MPL application. DSD consequently continued the assessment of the ML, EML and Power and Pipelines MPL applications on the grounds of a reasonable prospect that the applicant could secure future access to a supplementary water supply and a concentrate dewatering and export facility to complement the previously approved ship-loading infrastructure.
11. On 8 July 2014, DSD exercised section 79 of the Act to ensure that all coordinates specifying the eastern boundary of registered Mineral Claims 4346 and 4354 clearly fall outside the adjacent proclaimed Coastal Reserve area, including allowing for variations between different cartographic representations of the Reserved area and potential future change in the High Water Mark (upon which the definition of the Coastal Reserve is based). The coordinates defining the ML and EML applications share the boundaries of the Mineral Claims, and consequently also do not encroach on the Coastal Reserve area.

The following is a summary of the processes that are to be undertaken subsequent to the completion of the Report on the assessment of the Rex applications for the ML, EML and Power line and Pipelines MPL.

1. The DSD Tenement Review Committee (TRC) reviews the Assessment Report to ensure the correct statutory processes have been undertaken in making the assessment and it reviews the conditions proposed to be imposed on the tenement holder should the mining tenements be offered. TRC endorses the report or requests changes to be made.
2. TRC will then make a recommendation to the Director of Mines (as delegate of the Minister) in relation to the applications.
3. The Director of Mines is provided with all documents supporting the assessment report and recommended conditions to be imposed on the mining tenements should the mining tenements be granted.
4. The Director of Mines then makes a decision to either offer to grant the mining tenements with specific conditions or refuse the applications.
5. Should the Director of Mines make a decision to refuse the applications, the Director of Mines will notify Rex of the decision and the process ends.

6. If the Director of Mines determines he is willing to grant to Rex the mining tenements he must advise Rex in writing of the terms and conditions under which he is prepared to do so.
7. Rex must within 21 days (or such longer period as the Mining Registrar may allow) notify the Minister in writing as to whether Rex is willing to accept the terms and conditions.
8. If Rex accepts the terms and conditions and pays the appropriate fees under the Act, the Minister will grant the mining tenements.
9. The Minister will then move to publicly release the Assessment Report and details of the terms and conditions of grant or refusal.
10. The grant of the mining tenements would not give Rex the right to commence mining operations. Should the mining tenements be granted, Rex would be required to prepare a comprehensive and detailed Program for Environment Protection and Rehabilitation (PEPR) for submission to DSD.
11. No operations may be undertaken until such time as Rex has provided a detailed Program for Environment Protection and Rehabilitation (PEPR) which meets the legal requirements of the Act, Regulations, Ministerial Determinations and addresses all terms, conditions and clauses of the tenements to the satisfaction of, and is formally approved by, the South Australian Government.
12. In preparing the PEPR, Rex will be required to demonstrate ongoing consultation between the company, the local community and government agencies, and that the results of that consultation has informed the proposed approach to mine construction, operation and rehabilitation. The PEPR would be required to be submitted to DSD within 12 months of the grant of the mining tenements.
13. DSD would assess the PEPR and the Minister would, in accordance with section 70B(5) of the Act, either approve the PEPR or request further information.
14. In assessing the PEPR, DSD would undertake a calculation of the maximum mine rehabilitation liability to be met by the lodgment of a bond as required under the Act.
15. If a PEPR is approved, the Minister would issue a notice in accordance with section 62 of the Act requesting the lodgement of the bond.
16. The Minister would then move to publicly release the PEPR.
17. Mining operations cannot commence until the PEPR is approved and the bond is registered in the Mining Register.
18. In addition, mining operations cannot commence on exempt land until Rex has obtained registered waivers of exemption in accordance with section 9AA of the Act. These waivers would then need to be registered in the Mining Register.
19. Rex may require approvals under other legislation including various EPA licences. These would also be required to be sought prior to commencing mining operations.

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# 2 Background

## *2.1 Description of Applications*

Rex has made applications pursuant to the Act for a proposed open cut and underground mine producing a copper/gold concentrate and a magnetite (iron ore) concentrate. The applications have been made for the following commodities only:

- Copper
- Gold
- Iron ore (hematite and magnetite)
- Extractive minerals - Calcrete (for road base)

There are some aspects of the Hillside project that have been assessed and approved under the Development Act 1993, including highway and road realignments/modifications and upgrades to facilities at the Port of Ardrossan. In addition, Rex made a Referral to the Commonwealth Department of Sustainability Environment, Water, Population and Communities (now the Department of Environment) with regards to potential impacts on matters of National Environmental Significance from the proposed mine under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). Following a period of statutory consultation and formal assessment, the outcome of this Referral was that the proposed activity was declared 'not a Controlled Action if undertaken in a Particular Manner' under the EPBC Act.

For the purpose of clarity, Table 2.1 outlines the purpose of relevant applications that have been assessed under the Act and the Development Act in relation to the Rex Hillside Project.

**Table 2.1 – Description of Applications**

| Purpose of Application | Applicable Legislation | Reference Number | Status |
|---|---|---|---|
| *Development Application*<br>Modifications to wharf infrastructure at the Port of Ardrossan | Develop-ment Act | Development Number 544/V003/13 | Approved by the Minister for Planning on 28 February 2014 |
| *Development Application*<br>Boundary re-alignment and construction of a new road to enable mining activities to be conducted at the Rex Hillside Copper Mine | Develop-ment Act | Development Number 544/G017/13 | Approved by the Minister for Planning on 28 February 2014 |
| *Development Application*<br>Boundary re-alignment and construction of a new road to enable mining activities to be conducted at the Rex Hillside Copper Mine | Develop-ment Act | Development Number 544/G018/13 | Approved by the Minister for Planning on 28 February 2014 |
| *Mineral Lease Application*<br>Proposed mining operations for the Rex Hillside Mine for the recovery of copper, gold, hematite and magnetite. | Mining Act | Mineral Claim 4346 | Mineral Lease Application for this activity is the subject of this assessment report. |
| *Extractive Minerals Lease Application*<br>Proposed operations for the stockpiling and sale of clay, gravel, limestone and sand resulting from the construction of the Yorke Highway diversion. Note: the activity of construction of the Yorke Highway diversion and extraction of material associated with this activity is the subject of Development Act approvals 544/G017/13 and 544/G018/13 | Mining Act | Mineral Claim 4354 | Extractive Mineral Lease Application for this activity is the subject of this assessment report. |
| *Miscellaneous Purposes Licence Application*<br>Purpose is to provide an infrastructure corridor containing three pipelines and a high voltage power line | Mining Act | T02964 | Miscellaneous Purposes License Application for this activity is the subject of this assessment report. |
| *Miscellaneous Purposes Licence Application*<br>Purpose is to provide concentrate dewatering, storage and handling infrastructure at and around the Port of Ardrossan | Mining Act | T02943 | The assessment of a Miscellaneous Purposes License Application for this activity has been deferred. |
| *Referral under the Commonwealth EPBC Act*<br>Purpose to construct and operate an open cut mine 12 km south of Ardrossan | Common-wealth EPBC Act | EPBC2012/6434 | Not a controlled action (conditions for the protection of remnant native vegetation were attached to the decision) |

## 2.2 Location

The ML and EML applications are located 12 km south of Ardrossan on the Yorke Peninsula. The Power line and Pipelines MPL application is located between the proposed mine and the Port of Ardrossan. The Port MPL application was also proposed for infrastructure within and adjoining the existing Ardrossan port precinct. For completeness, the Port MPL is referenced in Chapters 1 to 6, however as described in Section 1.2 of this report, the assessment of that application has been deferred at the

request of Rex in order for them to evaluate alternative options. The application areas for the ML, EML and MPLs are located as detailed in **Table 2.2**.

**Table 2.2 – Application Areas**

| Application | Area | Location | Purpose |
|---|---|---|---|
| Mineral Lease Application over mineral claim 4346 | 2997.84 hectares | Allotments 1 and 2 Deposited Plan 12321<br>Allotments 1 and 2 Filed Plan 18703<br>Allotment 155 Filed Plan 196716<br>Allotment 159 Filed Plan 196720<br>Allotment 106 Filed Plan 216753<br>Allotment 107 Filed Plan 216754<br>Allotment 156 Filed Plan 196717<br>Sections 1, 2, 39, 44, 45, 46, 47, 48, 49, 50, 51, 74, 75, 81, 184, 188 and 189 Hundred of Muloowurtie, Pine Point | Recovery of copper, gold, hematite and magnetite |
| Extractive Minerals Lease Application over mineral claim 4354 | 224.53 hectares | Sections 1, 2, 188 and 189 Hundred of Muloowurtie, Pine Point | To enable the sale of any excess extractive minerals from the highway realignment cut and fill operations |
| Miscellaneous Purposes Licence Application for an infrastructure corridor for a Power line and Pipelines | 94.34 hectares | Allotment 3 Filed Plan 10759<br>Allotment 176 Filed Plan 196737<br>Allotment 177 Filed Plan 196738<br>Allotment 96 Filed Plan 215377<br>Allotment 10 Deposited Plan 30870<br>Allotments 501 and 502 Deposited Plan 52783<br>Allotment 50 Deposited Plan 59518<br>Allotment 21 Deposited Plan 77995<br>Allotment 100 and Allotment Pieces 101 and 102 Deposited Plan 89702<br>Sections 45 and 376 Hundred of Cunningham, Ardrossan | Provide an infrastructure corridor that will contain three pipelines and a high voltage power line |
| Miscellaneous Purposes Licence Application for infrastructure at the Port of Ardrossan | 57.35 hectares | Allotment 96 Filed Plan 215377<br>Allotment 100 Filed Plan 215381<br>Allotment Pieces 5 and 6 Filed Plan 34313<br>Allotments 50 and 100 and Allotment Piece 101 Deposited Plan 58918, Ardrossan | Purpose is to provide concentrate dewatering, storage and handling infrastructure at and around the Port of Ardrossan |

As described in Section 1.2 of this Report, the coordinates which specify the eastern boundary of registered Mineral Claims 4346 and 4354 were redefined to ensure that the eastern boundary of those Mineral Claims and the ML and EML applications fall outside the adjacent proclaimed Coastal Reserve area. The effect of this redefinition, which makes allowance for variations between different cartographic representations of the Reserved area and potential future change in the High Water Mark (upon which the definition of the Coastal Reserve is based), is a reduction in the total areas described in Rex's proposal of 1.1% or 31.84 Ha from 3029.68Ha to 2997.84Ha for the ML application, and 10.4% or 25.98Ha from 250.51Ha to 224.53Ha for the EML application.

The specific coordinates that define the eastern boundaries of the ML and EML applications, based on the GDA 94 MGA Zone 53 Datum, are as follows:

| Co-ordinate No. | Easting | Northing |
|---|---|---|
| 1 | 764934.03 | 6177455.40 |
| 2 | 764832.34 | 6177256.91 |
| 3 | 764761 | 6177099 |
| 4 | 764756 | 6177019 |
| 5 | 764772 | 6176940 |
| 6 | 764723 | 6176779 |
| 7 | 764725 | 6176690 |
| 8 | 764755 | 6176569 |
| 9 | 764769 | 6176260 |
| 10 | 764746 | 6176184 |
| 11 | 764773 | 6176110 |
| 12 | 764714.19 | 6175955.49 |
| 13 | 764676 | 6175822 |
| 14 | 764734 | 6175557 |
| 15 | 764740 | 6175388 |
| 16 | 764787 | 6175079 |
| 17 | 764738 | 6174742 |
| 18 | 764728 | 6174493 |
| 19 | 764744 | 6174431 |
| 20 | 764734 | 6174268 |
| 21 | 764741 | 6174222 |
| 22 | 764698 | 6173991 |
| 23 | 764731 | 6173788 |
| 24 | 764668 | 6173574 |
| 25 | 764535 | 6173173 |
| 26 | 764562 | 6172985 |
| 27 | 764408 | 6172722 |
| 28 | 764427 | 6172249 |
| 29 | 764402 | 6171936 |
| 30 | 764397 | 6171790 |
| 31 | 764337.21 | 6171274.62 |

The 1.1% reduction in the area described in the Proposal for the ML application has no impact on any proposed activities and is not material to the application. The 10.4% reduction in the area described in the proposal for the EML application has no material impact on the activities proposed in the application, given there is adequate room for managing the

stockpiling and subsequent transport of 60,000m$^3$ of excess extractive materials.

The approval provided under the Development Act (for the use of material generated as part of the approved highway diversion for activities related to that diversion) is not impacted by the proposed EML. If the EML is granted, Rex would need to account for any sales of material from the proposed EML to demonstrate that they relate only to material generated from within the scope of the DA and within the proposed EML footprint.
The general location of the proposed applications is shown in Figure 2.1.

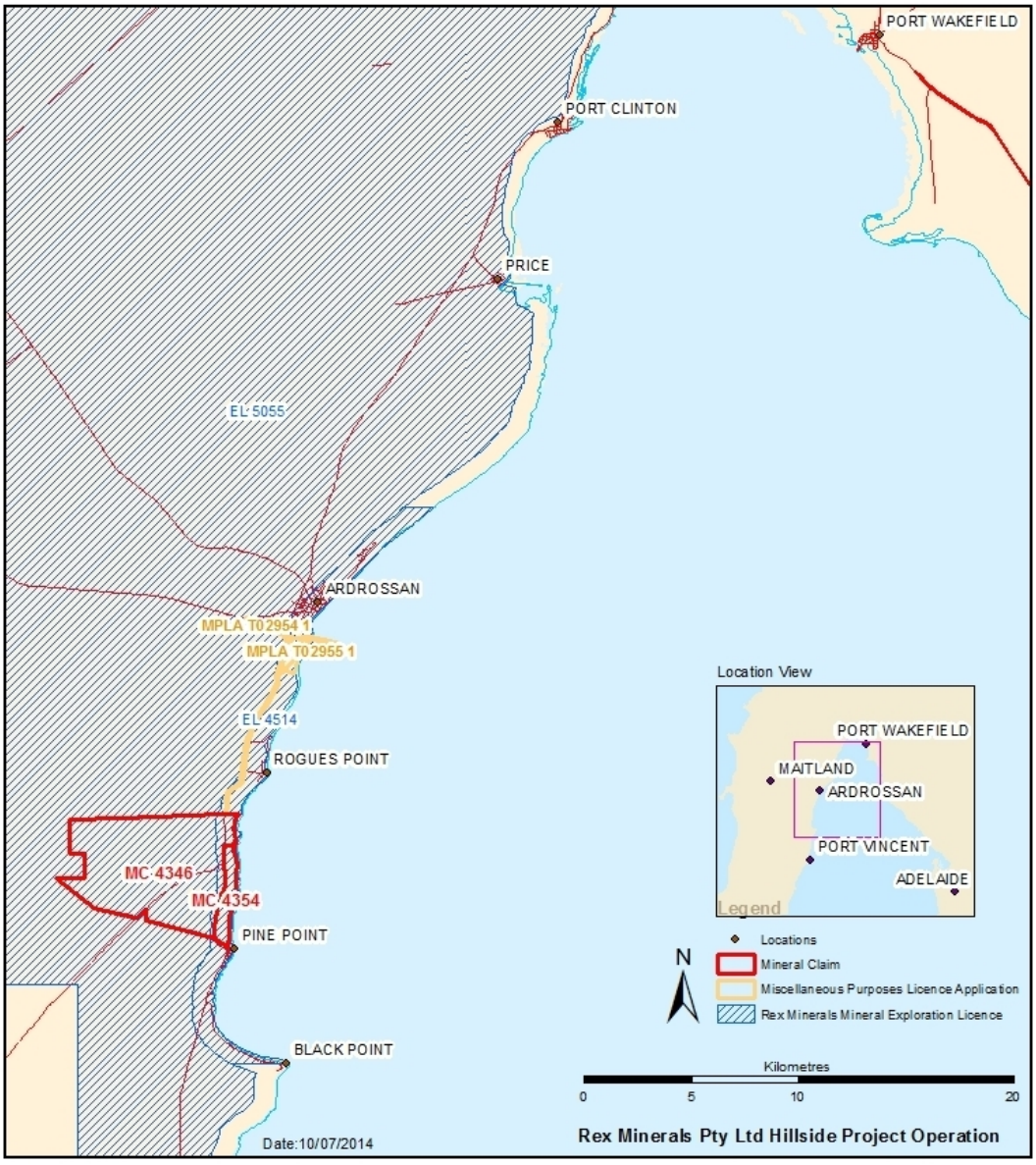


**Figure 2.1 – The location of the Hillside Copper Project and applications**

### 2.3 Land Tenure

Underlying tenure of the proposed ML, EML and MPL's is freehold. At the time of the applications, 12 out of the 25 land titles (13 out of 26 land parcels) were held by Rex Hillside (Property) Pty Ltd, as detailed in the Proposal. Land Tenure is described in Section 2.3 of the Proposal. Waivers of exemption are described on page iv of the Proposal. Exempt land can broadly be described as cultivated land, land being within 400m of a residence, land within 150m of infrastructure and land within 150m of industrial buildings. Rex's obligations in regards to exempt land are set out in Sections 9 and 9AA of the Act.

### 2.4 Supporting documents

The Rex **Proposal** is supported by a number of studies on specific aspects of the project (identified in the **Proposal** as Appendices), including:

Section 5 – Description of the Existing Environment
- 5.1-A Socio-Economic Baseline Report
- 5.3-A Traffic and Transport Impact Assessment
- 5.5-A Visual Amenity Plan
- 5.6-A Hillside Mine Pre-construction Noise Monitoring
- 5.6-B Hillside Mine Road Diversion – Road Traffic Noise Assessment
- 5.6-C Dust and Odour Impact Assessment Report
- 5.8-A Waste Rock Sampling
- 5.8-B Waste Rock Characterisation Report
- 5.9-A Surface Hydrology Report
- 5.10-A Hydrogeology Report
- 5.11-A Marine Baseline Report
- 5.11-B Marine Potential Contaminants Report
- 5.12-A Flora Baseline Report
- 5.12-B Flora Supplementary Report
- 5.13-A Fauna Baseline Report
- 5.13-B Fauna Supplementary Report
- 5.13-C Quarterly Bird Surveys Report
- 5.14-A Land Capability Report
- 5.14-B Mine Rehabilitation (Characterisation of Overburden)
- 5.15-A Preliminary Aboriginal Cultural Heritage Investigation
- 5.15-B Aboriginal Cultural Heritage Investigation – Stage 2
- 5.15-C Aboriginal Cultural Heritage Investigation – Supplementary Stage2
- 5.15-D Aboriginal Heritage Collaboration Agreement

Section 6 – Description of the Proposed Operations
- 6.2-A Reserve Statement Hillside Project
- 6.5-A Groundwater Investigations Report
- 6.5-B Groundwater Injection Disposal Modelling Report
- 6.6-A Operational Noise Assessment
- 6.7-A Integrated Waste Management Tailings Storage Facility Design Report

Section 7 – Stakeholder Consultation
- 7.4-A Community Consultative Group Terms of Reference
- 7.4-B Hillside Project Government Consultation Minutes
- 7.4-C Community Perceptions Survey Report

Section 8 – Environment and Social Impact Assessment
- 8.1-A Socio-economic Impact Assessment
- 8.3-A Construction Noise and Vibration Management Plan
- 8.3-B Hillside Mine Blasting Impact Assessment
- 8.3-C Hillside Mine Mobile Plant Headlight Line of Sight Assessment

The Rex Response Document is supported by a number of studies on specific aspects of the project (identified in the Response Document as Appendices), including:

- Appendix 2 - Caterpillar Haul Road Design and Management
- Appendix 4 - Dispersion Modelling Update
- Appendix 5A - Design of Haul Roads – Kaufman Ault
- Appendix 5B - Design of Haul Roads – Thompson Visser
- Appendix 5C - Waste Rock Characterisation Test Work Phase 1
- Appendix 5D - QLD Rainwater Sampling Procedure
- Appendix 5E - Eurofins Accreditation
- Appendix 7 - Hydrogeological Summary Report
- Appendix 18A - Hillside Mineral Resource Statement (*)
- Appendix 18B - AMD Testwork Phase 2
- Appendix 18C - Summary of Ore Characterisation Study (*)
- Appendix 21 - Mineral Identification Report
- Appendix 22 - Figure 5.16-1 of the Proposal
- Appendix 23A - ASX and Media Release: 28 June 2013
- Appendix 23B - 12 Year Reserve Pit: Resource Underground (*)
- Appendix 24 - Geology Database: 6 June 2013 (*)
- Appendix 33 - Noise Memo: Annoying noise character penalty
- Appendix 36 - Hillside Production schedule (*)
- Appendix 37 - Uranium in Block Model at 80ppm and 200ppm (*)
- Appendix 38 - Radiation Dose Assessment Jan 2014
- Appendix 39 - Baseline Radiological Assessment
- Appendix 43A - Antamina's Copper and Zinc Concentrate Pipeline
- Appendix 43B - Ramu NiCo Long Distance Pipeline Operation
- Appendix 43C - Slurry Pipeline System: Simulation and Validation
- Appendix 49 - PFS TSF Design: Independent Review Report
- Appendix 68 - Exploration Water Management Plan
- Appendix 137 - Fibrous Materials: HSE Cert of Analysis
- Appendix 145 - Acacia Rhetinocarpa: EPBC Referral
- Appendix 150 - Noise Memo: Noise Emissions from WRDs

(*) Rex has identified these supporting appendices as confidential as they contain commercial information that Rex has not yet reported to the ASX. This information was provided to State Government for consideration in the assessment, but is not available for public viewing or disclosure to any third party without Rex's prior written consent.

## *2.5 The Proponent*

The proponent of the proposed Hillside Copper-Gold Project is Rex Minerals (SA) Pty Ltd. A description of the proponent is provided in Section 2 of the Proposal.

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# 3 Summary description of Environment

The proposed Hillside Copper Mine (Hillside Mine) is located on agricultural land in the Yorke Peninsula, between the townships of Ardrossan and Pine Point, to the west of the Gulf St Vincent.

The existing environment has been described in the Proposal document in accordance with Ministerial Determination MD006. The following section summarises the detailed description of the existing environment provided by Rex in order to give context for this report. A detailed review of the description of the environment is discussed under the relevant impact assessment sections of this report.

Figures 3.1, 3.2 and 3.3 show the location of the tenement applications in relation to the receiving environment.

## *3.1 Local Community*

The closest towns to the proposed mine are Ardrossan, Black Point, James Well, Pine Point, Port Julia, Rogues Point, Sheoak Flat and Tiddy Widdy Beach, as shown in Figure 5.1-1 of the Proposal (the Primary Study Area, or PSA). The PSA has a total population of 1580, with an estimated population of 30,800 in the broader region. The region attracts approximately 8500 day visitors and a similar amount of overnight stays annually. The primary service center in the PSA is Ardrossan. The local economy is based on agriculture (both cropping and livestock), mining of extractive and industrial minerals, and tourism.

## *3.2 Land use*

The land within the proposed ML and EML is primarily utilised for cropping and grazing, and contains some areas of remnant vegetation. There is also a small quarry used by the Yorke Peninsula Council (YPC) to provide road base for use in the local district. Planning zones over the ML/EML include primary production and coastal conservation.

The MPL application areas contain cultivated land, roads and a loading area at the Ardrossan port facility. The surrounding land use is dominated by broad acre cropping and grazing with small conservation areas and a dolomite mine adjacent to the proposed MPLs. Existing planning zones over the proposed MPLs include primary production, bulk handling and coastal conservation zones.

The proposed EML is over freehold land held by Rex Hillside (Property) Pty Ltd, subsidiary company of Rex, and existing road reserves.

The land titles held by Rex within the proposed ML include two easements and public roads. Rex has been granted a Permit to Use Public Road by the YPC. The proposed land was at the time of the application covered by a Petroleum Exploration Licence and the holder of PEL 423 has been notified of the application. The proposed ML and MPL areas include land designated Mining Production Tenement Regulation Areas (MPTRAs). This triggers Schedule 20 of the Development Regulations and the applications and Proposal have has been referred for advice to the Minister for Planning, pursuant to Section 75, *Development Act, 1993*. The Minister for Planning has responded to the referral and endorsed the DSD assessment process and highlighted matters for DSD to consider in its assessment (see Section 8 of this Report for additional information).

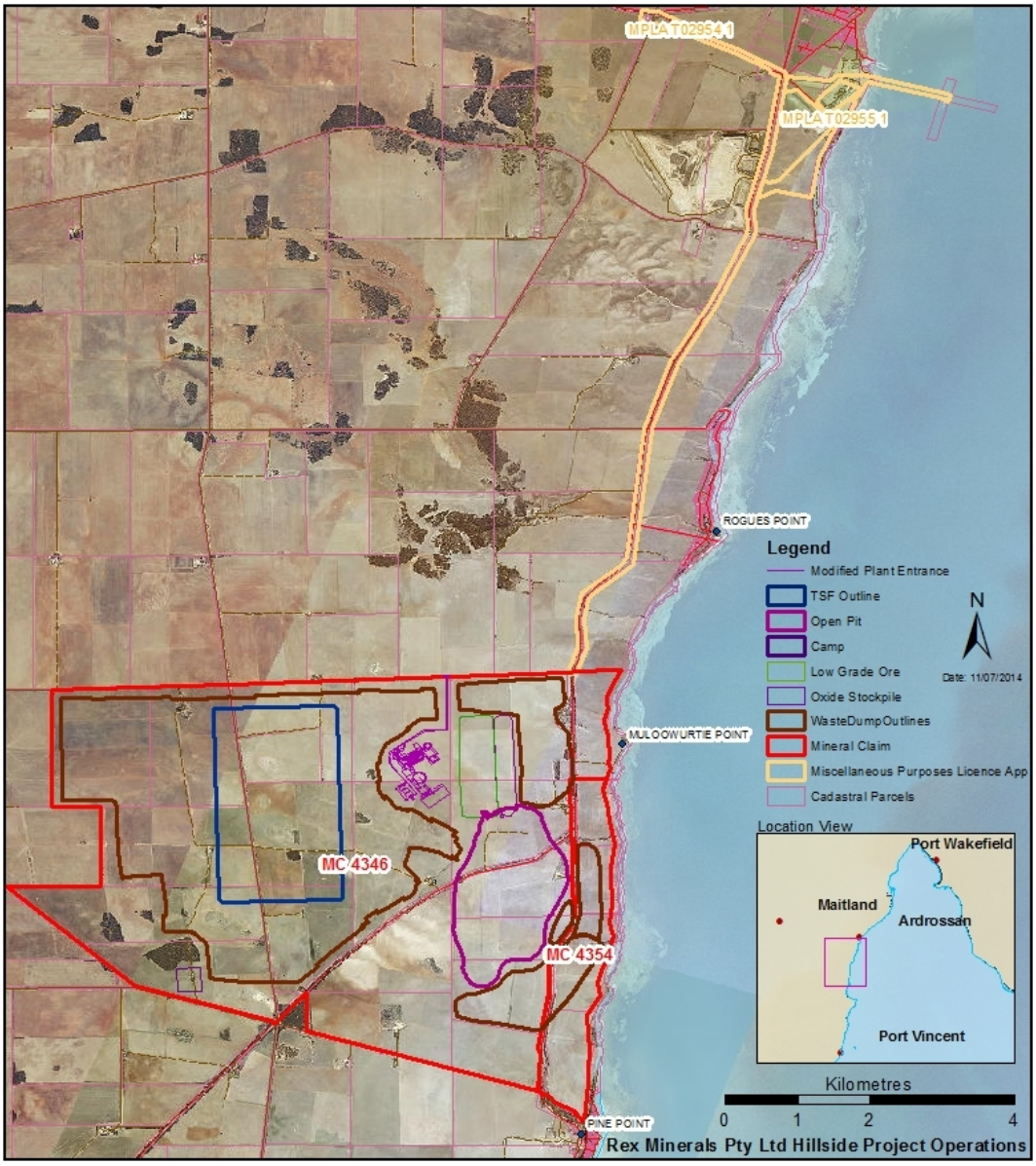


**Figure 3.1 – Overview of the tenement applications**

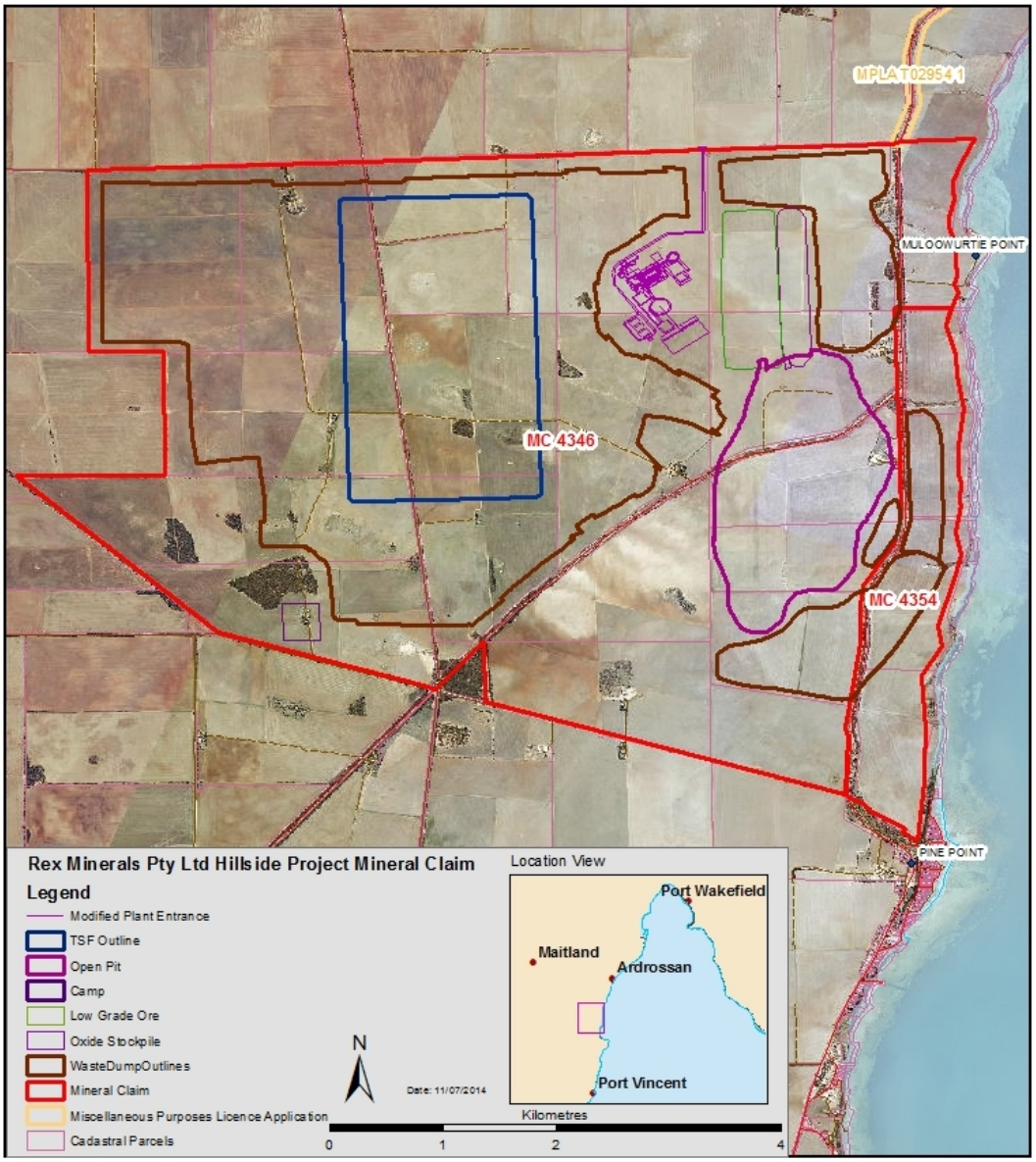


**Figure 3.2 – Overview of the Mineral Lease and Extractive Mineral Lease applications over MC 4346 and MC 4354 respectively**


**Figure 3.3 – Overview of the Miscellaneous Purposes Licence applications**

### 3.3 Proximity to infrastructure and housing

The closest community to the mining lease site is Pine Point. There are three houses and associated farm sheds within land owned by Rex Hillside (Property) Pty Ltd and a further five dwellings that are located within the proposed ML.

The application areas are located close to existing mains electricity, water supply, telecommunication, roads and other infrastructure, including bores and dams (refer to Table 5.3-1 of the Proposal). SA Water is proposing to increase water supply capacity of its infrastructure to cope with the requirements of the Hillside copper project. . Parts of the Yorke and St Vincent Highways, and a number of rural roads are either within or bordering the proposed ML, including Redding Road (West), Sandy Church Road (North) and Pine Point Road (South).

### 3.4 Amenity

The application areas are located in an agricultural area with some areas of remnant native vegetation, coastal cliffs, views of the Gulf of St Vincent to the east and undulating low hills to the west. The proposed Port MPL is located in the largely industrial landscape at the Port of Ardrossan. Night time light sources include surrounding townships and vehicle traffic along the Yorke and St Vincent Highway. A “Viewshed” analysis was undertaken by Rex, supported by 3D modelling visualisation to show the visibility of mine infrastructure at various mine development stages from vantage points including township and road locations where greatest visibility was identified.

### 3.5 Noise, dust and air quality

Existing noise and dust near the mine site and along the infrastructure corridor are typical of a cultivated rural setting in a Mediterranean-type climate. Dust sources are mainly due to agricultural equipment and practices, and traffic on unsealed roads. Dust levels in summer, sourced from tilled land and during crop harvest, can be notable. Dust and noise at the proposed MPL at the Port is more typical of industry and includes sources from mining and processing activities, grain storage and vehicle haulage/traffic.

Background noise monitoring was conducted to characterise and quantify existing noise around the ML and port area, for both day and night. Background dust monitoring was also undertaken to assess ambient PM10 and ambient total suspended particulate matter (incl. base metal analysis) concentrations and dust deposition rates.

Meteorological conditions which would concentrate odour, such as calm and early morning temperature inversions, are uncommon in the project area.

### 3.6 Topography

The proposal is located on a mainly undulating limestone plain of generally low relief with an extensive coastline of cliffs, beaches and rocky shores and mixed grassland and parkland inland areas widely used for agricultural purposes. Topography of the proposed ML is gently undulating with low ridges (elevation between 45m and 85m) and broad shallow gullies which run from north-west to the sea. Due to underlying geology, the potential for karst features exists however no caves or karst features have been observed or recorded within the proposed ML and MPL areas.

### 3.7 Climate

In the Proposal, meteorological data was reviewed for five locations to represent climatic variation of the proposed sites including Ardrossan, Price, Port Vincent, Maitland and Pine Point. The data sets considered ranged for each location from 1880 – 2011 for Ardrossan to 2005 -2011 for Pine Point. Based on data, temperatures generally vary between 15 and 25º due to the marine influence of the location however can exceed 30 and 40º in summer months. Average rainfall for Ardrossan is 345.1mm with 67% of rainfall occurring in the 6 coolest months of the year and October to April being the driest months. The dominant wind directions are southerly, south-westerly and northerly with distinct speed and direction changes occurring throughout the day. These are presented in the Proposal for key localities.

### 3.8 Geohazards

The Hillside deposit is located along the north-south oriented Pine Point fault. The Proposal states that no landslides have been recorded within or immediately adjacent to the proposed ML or MPL areas and despite coastal cliffs gradually being eroded by natural processes, land slips are rare and not commonly recorded. In submissions received during consultation it was noted that there have been cliff slippages in several areas including one in Ardrossan in early 2013. Discussion of historic earthquakes is provided in the Proposal. In Australian terms the area is relatively seismically active and there is a moderate risk of a low order earthquake.

No karst features were observed within the ML and MPL areas.

Hillside is classified as an iron-oxide copper-gold deposit with an inherent likelihood of association with uranium mineralisation. Uranium concentrations have been recorded as low, however there are discrete zones of elevated uranium concentration as detailed in the Proposal and appendices. The ore body is not homogenous and narrow zones of uranium mineral concentrations were intersected during drilling with the highest assay recorded at 10,100 ppm over an interval of less than 2m. Less than 100 of the 197,000 drill samples assayed returned results exceeding 1000 ppm uranium and the average grade for the combined ore zone is 57 ppm uranium.

Laboratory analysis for asbestiform materials yielded no samples that could generate respirable fibres as per the relevant criteria.

A waste-rock characterisation study undertaken (as per Proposal and Appendix 5.8-B) to evaluate the potential for formation of acid determined that less than 1% of samples tested showed potential for acid formation. Leachate test work was also conducted on samples, indicating that leachate samples are relatively benign. Further geochemical information has been provided by Rex in relation to waste characterisation in the Response Document. Oxide ore stockpiles are discussed in the Proposal and contain a variety of environmentally stable copper minerals. An exception is Atacamite, which is easily soluble and hence more bioavailable to the environment. Atacamite occurs in low quantities (estimated at 0.5%) in the ore body.

### *3.9 Hydrology*

The land surrounding the proposed ML is relatively flat with gradients ranging from 1.5% to approximately 3% to the east around existing drainage lines. The proposed ML is located close to the coast and surface water ultimately drains into the Gulf St Vincent. The drainage of the proposed MPLs is described only for the Port, where topography has been altered for the purposes of the current port facilities. A surface hydrology report (Appendix 5.9-A) is included in the Proposal and discusses the existing surface water regime for Hillside, including drainage and pre-development sub-catchment areas. Consideration of a 100 year Average Recurrence Interval (ARI) for rainfall events is included in the Proposal. The 100 year ARI demonstrates design storm durations and intensity and the amount and extent of flooding for existing catchments. The Proposal states there are no users of surface water or any water dependent ecosystems in the area due to the low rainfall and high infiltration. There is considered to be no significant interaction between surface and groundwater around the project area.

### *3.10 Groundwater*

The Hillside deposit occurs beneath Tertiary age (Cainozoic) sediments ranging in thickness to over 30m, including sediments of the Rogue Formation and the Muloowurtie Formation. Proterozoic age basement rocks occur beneath the Cainozoic sequence with units forming a single confined to unconfined aquifer which have been variably weathered, with weathered rock formed in the uppermost part of the basement profile (saprolitic layer ranges in thickness from 20m to over 200m). A description of initial groundwater investigations were provided in the Proposal.

Subsequent to initial groundwater studies a deep drilling and pump testing program was completed to a depth of 470m. This program, as documented in Response Document Appendix 7, found:

- Basement rock aquifer is of general low hydraulic conductivity;
- Groundwater on site and in the vicinity of the Hillside Deposit is of high to very high salinity, neutral pH and that metals concentrations are generally low; and
- Salinity is significantly greater at depth with some wells providing salinities of in excess of 100,000 mg/L

An assessment of existing wells and users in the vicinity of the proposed ML and MPL areas was conducted using the 'Waterconnect' database. Results indicate existing well depths are generally shallow and salinities high to very high. The Ardrossan Dolomite Quarry has been identified as the only significant user of groundwater in the vicinity of the Hillside deposit. One groundwater dependent ecosystem was identified in the area that could potentially be affected by the proposed mine. This vegetation community has been identified as requiring clearance for the highway diversion.

### *3.11 Native Vegetation*

Historically areas within and surrounding the proposed ML and MPLs were cleared for agriculture, development and industry with only 4% of native vegetation now remaining on the Yorke Peninsula. Native vegetation exists mainly in the form of remnant isolated stands surrounded by agricultural land, along cliffs, road reserves and small privately managed reserves. Despite historical clearance, the area supports a broad diversity of vegetation groups including Mallee communities, low woodlands, coastal shrublands and sedges. Floristic groups are described in Table 5.12-1 and mapped in Figure 5.12-1 of the Proposal.

While the remaining vegetation stands in the direct impact zone of the proposed ML MPL corridor contain some small areas of moderate to good condition vegetation, vegetation is generally in poor to very poor condition.

Two threatened species were identified within the proposed ML area, including the Resin Wattle (*Acacia rhetinocarpa*) and the Mallee Bitter-pea (*Daviesia benthammii spp. humilis*). The large-club spider orchid (*Caladenia macroclavia*) was identified adjacent to the proposed ML area. Irongrass natural temperate grassland (*Lomandra effuse – L. multiflora* spp. *dura*), an EPBC listed community, was identified within the MPL corridor. Further information regarding endangered species in the region is in Table 5.12-2 of the Proposal (including names, status, survey observations and likelihood of occurrence).

### 3.12 Weeds and Plant Pathogens

Surveys conducted by Rex identified a number of weeds in the area of the proposed ML and MPLs:

- A number of common introduced species, and;
- Nine declared weed species (listed under the NRM Act)

All weeds are specified in section 5.12.2 of the Proposal. There were no sightings of Broomrape (*Orobanche*) species. The site is within a nil or very low risk area for *Phytophthora* (no evidence of pathogen recorded onsite).

### 3.13 Fauna

Faunal surveys were conducted in representative available habits situated along coastal cliff lines and in remnant vegetation patches. Fauna surveys indicate very low diversity of mammals, reptiles and amphibians comparative to the region due to historical land use and management practices.

Surveys identified the presence of:

- 2 amphibian species
- 51 native bird species
- 7 native mammal species
- 8 reptile species
- Six introduced mammal species and six introduced bird species

Regarding conservation significance, surveys identified:

- No nationally threatened species (under the EPBC Act)
- One state-listed rare species present in the proposed ML - The Peregrine Falcon (*Falco peregrinus*)
- Twelve regionally-listed threatened species (as rare, vulnerable or endangered) including the Peregrine Falcon, Southern Hairy-nosed Wombat (*Lasiorhinus* latifrons), Barn Owl (*Tyto alba*), Blue Bonnett (*Northellia haematogaster*), Brown Thornbill (*Acanthiza pusilla),* Dusky Woodswallow (*Artamus cyanopterus*), Grey Currawong (*Strepera versicolour),* Inland Thornbill (*Acanthiza apicalis*), Tawny Frogmouth (*Podargus strigoides*), Yellow-plumed Honeyeater (*Lichenostomus ornatus*), Varied Sittella (*Daphoenositta chrysoptera*) and the endangered Whistling Kite (*Haliastur sphernurus)*

Ongoing fauna surveys timed to capture further temporal variation may reveal more native species utilising the area, however, it is expected that the proposed ML and MPL areas would support low to moderate fauna diversity, even under good seasonal conditions.

### 3.14 Topsoil and subsoil

The soils within the proposed ML are formed into ridges west north west of the site over aeolian sands with reworked aeolian sediments in alluvial drainage depressions. The proposed MPL corridor comprises soft/rubbly calcareous sediments and soils formed on unconsolidated sediments/deeply weathered rock and basement rock, and the proposed MPL at the port comprises soils formed on unconsolidated sediments/deeply weathered rock and soils formed on soft/rubbly calcareous sediments. The soil profile on the proposed ML is identified as:

- topsoil (the organic or A horizon) to an average of 0.5 m within the ML, mainly sand to sandy clay loams, but can be non-existent around rocky outcrops
- subsoil (B and C horizons) ranging to 2m deep, comprising light to medium clays in west, medium to heavy clays in the valleys and clay loams on the ridges
- deep regolith (D horizon or R), for the layers deeper than 2 m, mostly sandy clay becoming finer to loam clay to the east of the proposed ML and rocky regolith in or near gullies

Rex identified soils as being generally alkaline, mildly saline with low boron and some available calcium and potassium. Soils were identified as being more saline-sodic with depth below the surface and acidic at depths below 5m. With application of appropriate fertilisers, the soils are generally suitable for cereal cropping.

### 3.15 Heritage (Aboriginal, European, geological)

The proposed ML and MPLs lie within the traditional territory of the Narungga people. Numerous registered and reported heritage sites have been identified within the vicinity of the proposed ML and MPL areas along coastal margins (listed in Table 5.15-1 of the Proposal), including some archaeological sites and a registered quarry site near or within the proposed ML area. The Proposal states that no burial sites exist within the proposed ML or MPLs, although, remains have been found in the general area. Surveys conducted within the proposed ML have identified 1000 artefacts to date (not representing intact sites).

Rex assessed European heritage via desktop research. No significant sites were identified within the proposed ML and MPLs. A State Heritage Place is located approximately 2km from the proposed ML. Three historic mines exist, the Hillside Mine (within the proposed ML) and Harts and Phillips Mine (outside the proposed ML and MPLs).

### 3.16 Proximity to conservation areas

The Hillside project is located in close proximity to a number of conservation areas (depicted in figure 5.16-1 of the Proposal), including:

- Muloowurtie Conservation Reserve (located outside ML between Yorke Highway and Pine Point Road); a small remnant patch of native vegetation containing nationally endangered flora

- Two Native Vegetation Heritage Agreements (between Ardrossan and Black Point), approximately 460 ha in total for conservation purposes
- Roadside Significant Sites including six natural sites and one built/cultural site (along Yorke highway within the proposed ML and MPL)
- Four Geological Monuments, including Horse Gully, Muloowurtie Formation, Harts Mine and Pines Point (Horse Gully is the only site located in the proposed MPL corridor, other three along coast)
- Marine Park 14 (located within the Port of Ardrossan)

## *3.17 Pre-existing site contamination or disturbance*

Potential contamination and disturbances at Hillside have resulted from historical land use activities:

- The historic copper Hillside Mine is located within the proposed ML consists of a single, partially collapsed, vertical shaft and costean with mullock heaps of low grade copper oxide and sulphide mineralisation. There are no tailings on site and the potential for downslope contamination from the historic heaps was assessed by Rex as unlikely
- Agricultural activities have left the proposed ML and MPL areas extensively cleared and disturbance has also occurred in the form of a quarry utilised by the council.

## *3.18 Marine Environment*

### 3.18.1 *Hydrology*

As stated previously Hillside is located adjacent the west shore of the upper Gulf St Vincent. The majority of the coastline is sheltered, has a low wave energy, weak currents and extensive areas of quiet water shallows which are typically turbid from northward flows. The Proposal states that the Gulf is referred to as a reverse (or inverse) estuary given that the water circulation in the Gulf is opposite to that of a classical estuary, taking water 'in' at the surface, and 'out' along the bottom. Rex commissioned a series of marine environment surveys to provide baseline data for the status of ecosystems adjacent to the proposed ML and MPLs. This study included surveying intertidal and coastal habitats and species, subtidal habitats, seagrass health, and subtidal sediment characteristics.

### 3.18.2 *Marine flora*

Coastal and intertidal areas along the stretch of coast adjoining the proposed ML and MPL areas comprise cliffs, sand dunes, soft sediment and rocky shore habitats. Surveys were conducted by Rex covering approximately 10km of coastline adjacent to the proposed ML and port filtration facility Surveys of coastal areas identified 47 coastal flora species from the sand dunes and cliff habitats with nine species identified as weeds or naturalised. Table 5.11-1 of the Proposal provides a list of species. A number of species were identified as 'near threatened' or 'least concern' on a regional level and one species, Bush minuria (*Minuria cunninghamii),* was identified as 'rare' Habitats of the intertidal zone were described in the Proposal as containing sparse wrack (detached seagrass)

cover in the upper intertidal zone and varied flora in the low intertidal zone including seagrass and foliose brown and green algae. Soft-sediment areas are dominated by the seagrass *Heterozostera sp.*.

An ecological assessment of the subtidal areas adjacent to the proposed ML and MPL areas (provided in Appendix 5.11-A of the Proposal). Subtidal habitats broadly include seagrass meadows, unvegetated soft bottom habitat and small amounts of reef habitat. Most of the subtidal zone off Ardrossan, to a depth of about 10 m, supports relatively dense seagrass communities.

### 3.18.3 *Marine fauna*

Surveys of intertidal zones adjacent to the proposed ML and MPL areas identified numerous coastal and marine faunal species including fifteen Mollusca, three Arthropda and three Cnidaria species. A Rex commissioned survey of shorebirds between high water mark and approximately 200m off-shore and including the cliff line and dune system identified 17 bird species (listed in table 5.11-3 of the Proposal), including:

- Silver Gull (*Larus novaehollandiae)*, Chestnut Teal (*Anas castanea*) and Little Pied Cormorant (*Phalacrocorax melanoleucos*), which were the primary species observed
- Sanderling (*Calidris alba*) and Caspian Tern (*Sterna caspia*), listed under the EPBC Act as migratory
- Red-capped Plover (*Charadrius ruficapillus*) and Hooded Plover (*Thinornis rubricollis*), both listed as Marine under the EPBC Act (as stated in the Proposal)
- No nationally threatened birds (despite potentially occurring in the area)

Rex conducted a search of Protected Matters under the EPBC Act for the area and identified listing of nine threatened species, seven of which are migratory species including:

- Six albatross and petrel species, and the Australian Painted Snipe (*Rostratula australis*).
- The (eastern) Western Whipbird (*Psophodes nigrogularis leucogaster*), and;
- The nationally threatened Fairy Tern (*Sternula nereis nereis*).

Subtidal marine faunal species were identified during surveys of the habitats (as described in 5.11.3.3 of the Proposal). Fisheries taxa specific to the study area which utilised the different habitats were also presented in Table 5.11-4 of the Proposal.

## *3.19 DSD assessment of description*

DSD is satisfied that the description of the environment in the Proposal is accurate and provides sufficient detail to identify risks posed by the mining operation.

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# 4 Description of the Proposed Mining Operations

## *4.1 General description and maps/plans of operation*

The proposed operation is an open cut mine with an underground extension. The products would be copper, gold concentrate and magnetite concentrate which would be transported to a loading facility at Port Ardrossan via an underground slurry pipeline and shipped offshore for further refinement. There would also be a small extractive operation (associated with excess material from the highway diversion).

Processing would be via a conventional flotation circuit with magnetic separators to separate the ores. This concentrate would be washed in fresh water and transported to the port. The waste would be stored in an integrated waste facility – a TSF positioned within a larger waste rock dump. The justification for selection of these options is included in Section 6.1 of the Proposal.

Extractive Operations would involve the movement and removal of stockpiles generated from the diversion of the highway. The excavation of the material and rehabilitation of excavated areas is considered in the relevant Development Application and is not part of this assessment.

## *4.2 Reserves Products and Market*

The Hillside deposit is an iron oxide copper–gold deposit. The deposit is located within the Pine Point Structural Corridor and is surrounded by gabbro, granite, carbonates, calc-silicates, meta-psammites and mafir meta-volcanics. The copper mineralisations occur close to garnet, magnetite and pyrite assemblages. A strip ratio of waste to ore for the life of mine is 6.2:1.

The Hillside ore reserve is 180Mt at 0.52% copper, 0.13 g/t gold and 14.4% iron, this is consistent with the ASX release on 24 February 2014. The products from the proposed ML would be copper/gold and magnetite

concentrates. It is expected to produce 75 kt of copper, 60 koz of gold and 1.2 Mt of iron ore per year on average. Technical Issue number 23 in the Response Document provides additional information about the resource and reserve in relation to the proposed open pit and underground mine. The information provided by Rex indicates that the resource potentially contains a substantially larger volume of recoverable ore than has been proposed to be mined in this application.

Section 6.4.3.1 and Figure 6.4-15 of the Proposal states that the total open pit ore proposed to be mined is 184Mt. Figure 6.4-16 of the Proposal indicates that approximately 32Mt of ore is proposed to be mined from underground. The proposed ore to be mined from the combined open pit and underground is calculated by DSD to be approximately 216Mt.

The proposed EML associated with the construction of the Yorke Highway diversion is calculated to produce 60 000$m^3$ of rubble excess to requirements which could be sold to third parties. It has an expected life of mine of 3 years.

## *4.3 Exploration Activities*

The Proposal explains that ongoing exploration drilling would be conducted using diamond core drills to depths from 50m to 1000m. Reverse Circulation drilling would also be conducted. Where there is a thin cover over the ore body, aircore, rotary air blast and auger drilling would be used.

Rex has proposed the following geophysical survey methods to be undertaken in accordance with guidelines for low impact mineral exploration in South Australia;

- Magnetic surveys (ground and airborne)
- Gravity surveys (ground based)
- Electromagnetic surveys (ground and airborne)
- Induced polarisation surveys
- Down hole surveys

Rex has stated that drilling pads would not require earthworks for construction and would be constructed by laying down a sheet of plastic covered by a mat of coconut fibres for a non-slip surface.

Rehabilitation of drill sites would involve removal of all equipment from site, removal of matting and any contaminated soil which would be disposed of in accordance with appropriate legislation. Drill holes would be capped at a depth of 50 cm and topsoil filling the hole.

## 4.4 Mining Plan

### 4.4.1 Type or types of mining operation to be carried out

Operations would consist of 3 small open pits that would be linked to form the final pit and an underground extension. The ore would be treated by a processing plant before being transported offsite.

### 4.4.2 Sequence of mining and rehabilitation operations

Operations would be conducted in the following stages:

- Stripping and stockpiling of top and subsoil from the open pit and hardstand areas to a depth of 4 m (TSF and processing plant footprint);
- Surplus topsoil from the highway diversion would be stored on the proposed EML;
- Earthworks to construct the processing plant base and port facility;
- 3 Starter pits would be created as shown in Figure 6.4-2 of the Proposal along with the construction of the processing plant and supporting infrastructure;
- At this point the construction of the port facility and supporting infrastructure would commence;
- Mining would be conducted from 10 m high benches with 60 m width. Ramps would be 24-35 m width depending on whether it allows one or two way traffic;
- Mining would progress outwards to form the final pit outline;
- Overburden would create the embankments of the TSF before creating the Northern and South Eastern WRD;
- Underground operations commence, these would be mined in 4 zones as shown in Figure 6.4-9 of the Proposal. Underground mining would utilise both longitudinal and transverse sub-level caving methods.

Rehabilitation would be conducted in the following stages:

- Once full capacity has been reached, the Northern and South Eastern WRD would firstly be rehabilitated, with the Western WRD being completed last;
    - This would involve re-contouring, spreading with sub- and topsoil and revegetation with agricultural and native species dependent on the slope.
    - TSF would be dried out then capped with a cover system consisting of overburden, sub and topsoil and rehabilitated as per section 6.9.4.2 of the Proposal.
    - No backfilling of the underground operations or open pit has been proposed.

- After all operations have finished the process plant would be removed and processing area and access tracks rehabilitated. Process ponds would be cleaned and either retained for future use or are rehabilitated;
- All extractive stockpiles on the EML would be removed within 3 years of the commencement of operations.

The open pit operations would last for approximately 10 years, with recovered ore initially stockpiled until construction of the processing plant in the second year of operation. The proposed underground operations would begin after 6 years and continue for 11 years. During initial construction, the TSF foundations would be constructed, following this the Northern, Southern and Western WRD would be formed at approximately the same time. Further information regarding timing of stages and production schedules has been included in Section 6.4 of the Proposal.

## *4.5 Mining Operations*

### 4.5.1 *Modes and hours of operation*

The mine would operate continuously 365 days per year. The processing plant and underground operations would be operated continuously whilst open pit mining would occur during the day shift. Support services would primarily operate during the day including weekends.

### 4.5.2 *Workforce*

The project is proposing to employ a maximum of 725 people and an average of 532 people over the life of the mine. There is a sharp reduction in the average employment levels in years 10 and 11 (217 positions) when mining is competed and closure commences. The management of this workforce is detailed in Table 6.10-1 of the Proposal.

### 4.5.3 *Use of explosives*

The following explosives would be used;

- Ammonium Nitrate emulsion
- Detonating chord
- Detonating relays
- Electric and Non-electric Detonators

Blasting would be conducted every second day in open pit and twice daily for underground operations at the change of shift. Explosives (up to 250,000 kg) and accessories would be stored in re-locatable magazines in accordance with Australian Standard 2187.1.

### 4.5.4 *Type of equipment*

Section 6.5.3 of the Proposal lists all equipment by type of operation (open cut, underground, extractive) and number of units required for each year. It also details the approximate noise and carbon emissions for each machine with vibration and ignition sources covered for all machines together.

### 4.5.5 *Mine dewatering*

Estimated inflow of water, as described in Appendix 7 of the Response Document (Hydrogeological Summary Report), is predicted to reach a maximum of 117 L/s following the establishment of underground mining. Water from dewatering would be used in processing. Further information regarding groundwater and groundwater inflow can be found in the impact assessment Section 7.12 of this report.

### 4.5.6 *Stockpiles*

Proposed stockpiles on site include;

- Topsoil stockpiles – height 26 m, volume 0.7 $Mm^3$
- Subsoil stockpiles – height 26 m, volume 5.0 $Mm^3$
- Mineral Oxide stockpiles - height 33 m, volume 5.6 $Mm^3$
- Low Grade Ore stockpile - height 32 m, volume 19.0 $Mm^3$
- Run of Mine (ROM) stockpile

Stockpiles would be bulldozed into position and paddock dumped. During operation drains would be constructed on top of stockpiles to distribute water and reduce erosion. Topsoil and subsoil stockpiles would be seeded. Ore and oxide stockpiles would be placed on clay pads and runoff captured in drains/ponds to prevent soil contamination.

Overburden stockpiles for the proposed EML would be stockpiled near proposed infrastructure (inside road corridor and MPL) and treated as described above.

## *4.6 Mine Completion*

### 4.6.1 *Description of mine site at completion*

The final pit outline would be 2400 m long and 1000 m wide with steep slopes to a depth of -370m AHD. Rex has proposed earth bunds around the pit (vegetated with native species), fencing and signage to ensure that the pit is safe upon closure. Two haul roads would remain at closure to direct runoff into the pit lake. The pit would slowly fill with water from runoff and inflow from groundwater. The pit lake is expected to reach equilibrium at 680 years after mine completion with a depth to water of -38.5 m AHD.

The area to the east of the highway realignment would be included as part of the Native Vegetation Management Plan. This is proposed to be planted with native vegetation and management taken over by DPTI or the Yorke Peninsula Council.

Should any low grade ore stockpiles remain upon mine closure they would be capped and rehabilitated.

## *4.7 Underground Workings*

### 4.7.1 *Description*

Underground operations would be conducted in 4 stages (A to D), as shown in figures 6.4-10 & 1 of the Proposal, shown below. Underground workings would consist of both longitudinal and transverse sub-level caving. Transverse sub-level caving would be used to mine section D with longitudinal sub-level caving used to extract ore in sections A-C. Rex has stated no surface disturbance would occur outside the pit boundary. For further discussion regarding potential impacts caused by pit subsidence see the impact assessment for Third Party Property, Section 7.15 of this report.

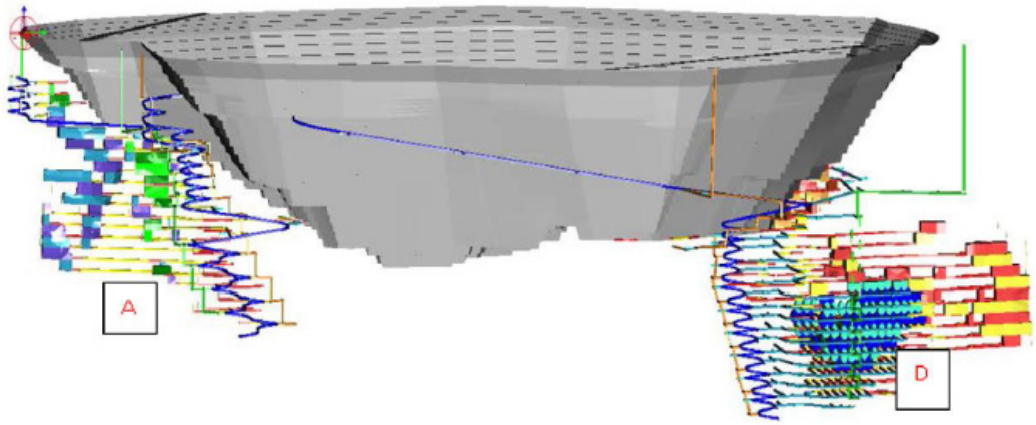



**Figure 6.4-10: Base case underground mine phase 1 (figure is to scale)**

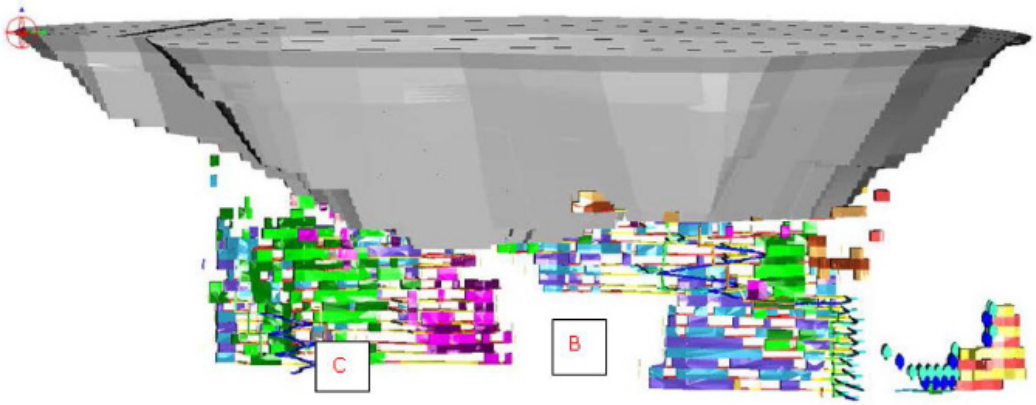



**Figure 6.4-11: Base case underground phase 2 (figure is to scale)**

*Source: the Proposal*

Decline access would have level accesses on 25 m vertical intervals. Stockpiles are proposed on each level and halfway between levels with sumps below each level. Footwall drives advance north off the decline 2 system to access the fresh air intake and egress systems.

A return air rise is proposed on the decline between sub-levels, connecting with every second level. Ventilation fans are located up gradient to provide a fresh air source.

### 4.7.2 *Underground fill*

No underground back filling has been proposed.

### 4.7.3 *Rehabilitation strategies and timing*

Upon mine closure the pump and ventilation systems would be removed. Structural supports put in place during operations would remain post mine completion. The portals to the underground mine would be sealed with concrete.

## *4.8 Crushing, Processing and Product Transport*

Processing would involve:

- Comminution circuit consisting of primary crushing and two stage grinding circuit to achieve 80% product size (P80) of 106 µm
- Conventional copper rougher flotation
- Regrind of copper rougher concentrate to P80 of 10 µm
- A four stage copper flotation cleaning circuit (cleaner, cleaner scavenger, re-cleaner 1 and re-cleaner 2)
- Copper concentrate thickening, filtration and storage
- Rougher magnetic separation of rougher flotation tail
- Regrind of magnetite rougher concentrate to P80 of 40 µm
- A single stage magnetite cleaning circuit
- Magnetite concentrate thickening, filtration and storage
- Tailings thickening and disposal

The concentrate would be transported via a slurry pipeline to Port Ardrossan where it would be filtrated (separation of solids from water) and washed before being loaded onto the ship.

No processing is involved in the operation of the proposed EML.

### 4.8.1 *Crushing plant*

The proposed crushing plant is a gyratory primary crusher working at an open side setting of 190 mm. A rock breaker may be used for oversize material. The material would then pass through an open circuit SAG mill (with size of 11.6 mm diameter) and 2 ball mills. This would then be screened to remove oversized material. Final size of ore once through this circuit would be 106 µm.

### 4.8.2 *Processing plant*

The ore would then be passed through a flotation system at a solids density of 35%. The fines would be extracted and passed through the cyclone cluster. The ore would then pass through another grinding mill with a target grain size of 10 µm. The ore would be pumped through a number of cleaner tanks, thickened and pumped to the port for transport. The tailings from the cleaning process would pass through a magnetic separation with the magnetic portion reground to 40 µm, cleaned, thickened and pumped to the port for export. The non-magnetic tails would be thickened and pumped to the TSF.

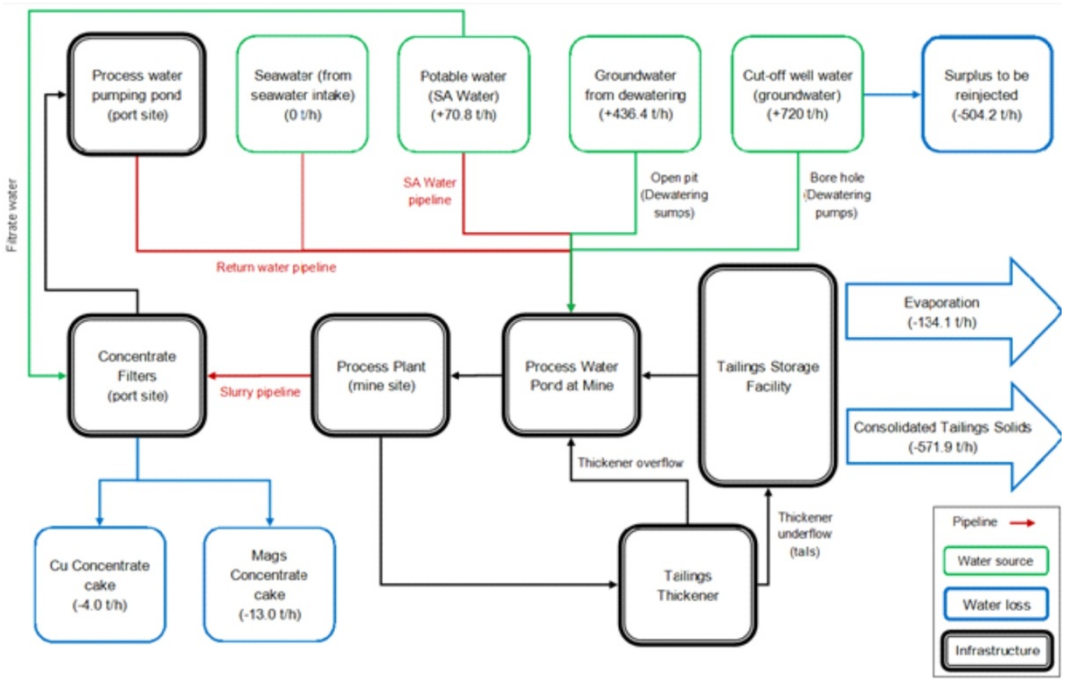
The input water for the processing plant would be stored in high density polyethylene (HDPE) lined ponds. The water is to be recovered from processing plant, tailings dam and water from the port facility and mine dewatering.

Processing chemicals proposed to be used include:

- Quicklime
- Flocculant – Magnafloc 800HP flocculant
- Collector – Potassium Amyl Xanthate and Orica DSP-052 (this has the potential for combustion if stored incorrectly)
- Frother – Methyl isobutyl carbinol (non-toxic, readily biodegradable and not bioaccumulative)
- Antiscalant – Nalco Scale Guardian 84614

### 4.8.3 *Process water balance*

The process water balance was included in Figure 6.6-4 of the Proposal, shown below.




*Source: the Proposal Figure 6.6-4*

### 4.8.4 *Hours of operation*

Both the mine site and port processing plants would operate continuously, 24 hours a day.

### 4.8.5 *Type of mobile equipment*

Processing equipment has been included in the mobile equipment listed above.

### 4.8.6 *Rehabilitation strategies and timing*

The processing plant is proposed to be removed following the end of production. All above ground infrastructure and buildings would be removed from site and disposed of in accordance with relevant legislation. Compacted areas would be ripped up and topsoil reinstated. Dams not required post completion would have any remaining water pumped into the Tailings Storage Facility (TSF) or pit (depending on quality) and would be

filled in. If a suitable agreement for ongoing management is reached with a new owner, there is potential for infrastructure to remain on site for future use, otherwise it would need to be removed and the site rehabilitated. Any soil contaminated through mining operations would be remediated or removed and disposed of in accordance with appropriate legislation. Ground would be ripped to 30 cm, covered with topsoil and returned to either agricultural production or native vegetation. Drainage from rehabilitated surfaces would drain into the pit.

## *4.9 Wastes*

### 4.9.1 *Overburden and tailings*

There are 3 proposed Waste Rock Dumps (WRDs). The Western WRD is proposed to store 430,871,990 $m^3$ of material and would incorporate the integrated TSF. The Northern WRD is proposed to store 28,048,697 $m^3$ of material and would help screen the plant from road users. The South Eastern WRD is proposed to store 30,992,941 $m^3$ of material and would assist in shielding the pit from the road and local Pine Point residents. Further information regarding location, size, shape and height can be found in section 6.7.1.1 of the Proposal.

The slopes of the waste rock dump would include lifts of 10-20 m in height on a 37° angle. These would be rehabilitated to slopes of 20° for the upper lifts down to 10° for the lower lifts. A slope stability assessment has been conducted and provided in Section 6.7.2.4 of the Proposal.

Further information regarding the TSF design is in Appendix 6.7-A of the Proposal – ATC Williams – Integrated Waste Management Tailings Storage Facility Pre-Feasibility Design Report.

Samples of waste rock have shown no asbestiform minerals and low potential for forming acid. Temporary drains would be installed to channel water falling on the WRD and limit erosion.

The TSF capacity has been calculated at 125.83 million $m^3$ of material over the life of mine. The holding capacity of the TSF was tested against a 1 in 100 year recurrence interval storm event. It was identified there was potential for the TSF to deform during a seismic event, further studies show the integrity of the TSF, WRDs and stockpiles should not be compromised under a seismic event.

The TSF is proposed to be constructed in rises of approximately 4 m/year. The TSF embankments would be constructed using a starter embankment and subsequent **downstream** embankment raised (page 23 of ATC Williams Report). Anticipated beach design has a slope ranging from 1.5% for the top third of the beach to 0.7% for the bottom third of the beach. A 20 m blanket drain is proposed down the centre of the TSF to drain excess water into the Decant Seepage Collection Pond (DSCP).

The ATC Williams Report indicates that the estimated total ore production would be in the order of 198Mt (page 5 of the report) and that the tailings

dam is designed for total production of 188.75Mt of tailings (page 7 of the report). Having said this, the Proposal and the ATC Williams report does not explicitly state that the amount of ore for which the TSF capacity (i.e.: footprint and height) has been designed.

### 4.9.2 *Processing wastes*

Rex has estimated 13.25 Mt/a of tailings would be pumped to the TSF at 58% solids. Test work has indicated a low potential for acid generation.

### 4.9.3 *Industrial and Domestic Waste*

Putrescible waste and recyclables would be deposited in separate bins on site and disposed of in accordance with appropriate legislation. Waste oil, oil filters, tyres, petrochemicals and chemical containers would be disposed of in accordance with appropriate legislation, recycling would be used where possible. A septic and irrigation system has been proposed for both the mine site and port facility. This would be constructed in accordance with the relevant legislation, standards and guidelines.

### 4.9.4 *Rehabilitation and closure strategies*

Once production has ceased the TSF would be capped, contoured and covered with topsoil and revegetated. Drains would be incorporated into the final structure to drain water away from the TSF and limit erosion. The capping layer would consist of coarse, non-acid forming rock, low permeability compacted earthfill, non-acid forming rock fill and topsoil cover. All the materials for the cap would be sourced onsite. The water quality of the TSF would be tested and, if suitable, excess water would be pumped into the pit to facilitate drying of the TSF ahead of capping. Water runoff from the TSF would drain to the Decant Storage Collection Pond (DSCP), and this would be tested to ensure it meets background levels or requires treatment. Once the water quality is suitable the DSCP would be filled in and water redirected into the open pit.

The WRDs would be progressively rehabilitated during mining operations. Rex have indicated the south-eastern and north-eastern WRDs would be finished in years 3-4 and would be rehabilitated shortly afterwards, to be completed by year 5. WRDs would be rehabilitated by batter to 10-20° slope angle, covering with sub- and topsoil and planting with vegetation. The steeper slopes (20°) would also be covered by rocks to reduce erosion. The south-eastern and north-eastern WRDs are proposed to be planted with native vegetation to re-establish corridors disrupted by their construction. The western WRD would be planted with native vegetation on the upper portions in line with the TSF design and pasture species on all other slopes.

All waste would be removed from site and disposed of at licensed facilities in line with operational waste management practices. The sewage plant would be removed upon removal of the camp.

## *4.10 Supporting surface infrastructure*

### 4.10.1 *Access*

The proposed ML would be accessed from Sandy Church Road. This would require upgrading of the junction with Yorke Highway. A mine access road would be built off Sandy Church Road. The section of Sandy Church Road between the Yorke Highway and the mine entrance would be sealed.

Access to the proposed EML would be via Yorke Highway and St Vincent Highway.

There are 3 options for access to Ardrossan Port Facility. These are via Yorke Highway and then a third party privately owned haul road, using the existing entrance or via a newly constructed road. Any changes to existing road infrastructure would be undertaken to meet SA road standards.

### 4.10.2 *Accommodation and offices*

No accommodation for workers is proposed to be onsite other than a construction camp which would be retained for emergency accommodation during operations. Accommodation for staff would be sourced within the local region. The location of the emergency bed accommodation camp which would be available onsite is shown in Figure 6.1-2 of the Proposal. The location of the proposed 12 buildings on the Hillside site and 8 buildings on Ardrossan Port site are located on Figure 6.6-2 and 6.6-3 of the Proposal respectively. All offices are temporary and would be removed during rehabilitation.

### 4.10.3 *Public roads, services and utilities used by the operation*

A Proposed underpass, under the Yorke Highway is planned to be built to allow access between offices and the mine site itself. The open pit extends over the existing Yorke Highway, and as such the Yorke Highway would be realigned to go around the mine. Details of this realignment are included in section 6.8.3.1 of the Proposal. The underpass and highway realignment have been assessed separately to the Mining Lease Application through provisions of the Development Act.

Electricity would be supplied from existing power supply infrastructure. Necessary relocation of power and telephone lines which may be impacted by the mine is being negotiated by Rex with the utility owners.

Water would be sourced from SA water mains. Water from mine dewatering and seawater would be utilised for various processing requirements and dust suppression. For more information please refer to Resource Inputs, water supply below.

Communication would involve installation of a fibre optic backbone interlinking the mine pits and port facility sites. 3G mobile phone coverage already exists over both sites.

Transport would involve a combination of buses and light vehicles to transport workers to and from the site. Rex is also considering providing a ferry service from Adelaide to provide a larger worker base.

### 4.10.4 *MPL corridor infrastructure*

An 11 km long underground pipeline corridor would connect the processing plant with the port facility. This would include 3 pipes: one for slurry, one for return water and one for potable water. The slurry pipeline would transport both ore types with 1 hour of water washing the pipe between batches. The pipelines would be fitted with a leak detection system designed to detect leaks within 2 to 10 minutes of occurring. The slurry pipe would be lined with a HDPE liner for an additional measure of protection.

### 4.10.5 *Port processing facility*

This facility would include concentrate filtration and storage, seawater intake and potable water storage and distribution. Concentrate delivery to bulk carriers, and upgrades to the jetty ship loader at the port have been assessed separately through an application under the Development Act.

The concentrate is proposed to be stored in separate tanks and passed through a filter system in batches with pipe washing undertaken in between to avoid cross contamination. The concentrate would then be stored in a negative pressure storage shed. The concentrate would be transferred by a covered conveyer to the loading point.

There are three options for arrangement of infrastructure at the port facility. These have been presented in figure 6.6-7 of the Proposal.

A seawater intake, as described in Section 6.6.6.5 of the Proposal, is proposed on the jetty. The recovery rate is approximately 526$m^3$/h. The pumps would be located on a platform underneath the jetty 1 m above the high tide mark. The intake valve itself would be 1.5 m above the sea floor.

### 4.10.6 *Visual screening*

The Northern and Southern Waste rock dumps have been sited and designed to screen the processing plant and pit from the public road. They would be the first WRDs to be rehabilitated and re-established with native vegetation.

### 4.10.7 *Fuel and chemical storage*

Diesel would be stored in self-bunded tanks and managed by an independent contractor. Liquid chemicals would be bunded and stored in accordance with EPA guidelines.

### 4.10.8 *Site security*

The site would be fenced with boom gates at the main entrance. Security personnel would be onsite throughout operations.

### 4.10.9 *Silt Control and drainage*

Surface water would be directed around infrastructure where practical. Runoff from disturbed areas would be directed into retention ponds to settle suspended solids before water is discharged or reused. Sediment control structures have not been finalised yet.

### 4.10.10 *Supporting surface infrastructure closure strategies and closure timing*

The accommodation camp would be removed and sold. The land would be returned to agricultural land. Concrete footings would be removed from 0.75 m of the surface and rehabilitated with topsoil. All waste would be disposed of in accordance with relevant legislation.

Underground pipelines would be rinsed with freshwater, filled with potable water and sealed at both ends. The SA Water pipeline would remain under the management of SA Water. If an agreement could be reached the powerline would remain post completion. If this is not the case powerline poles and wires would be removed and disposed of at a licensed facility.

Port facilities that are not required for other operators would be removed and disposed of. Concrete pads and roads that are no longer needed would be removed and rehabilitated. Any contaminated soil would be treated or removed from site to a licensed facility. Should a beneficial use be found for any of the site infrastructure it would remain under the care of the new owner.

Undisturbed farmland on the lease would be managed for weeds and pests in anticipation of returning to agricultural production.

## *4.11 Resource Inputs*

### 4.11.1 *Workforce*

Resources required included 605 full time employees, sourced from local districts where possible. A list of positions and required numbers has been included in the Proposal.

### 4.11.2 *Energy sources*

The project would require energy in the form of diesel and electricity. It is estimated to require 2098 terajoules per year (TJ/yr). Diesel usage would vary from 235 TJ/yr to 2550 TJ/yr with an additional 22.3TJ/yr for personnel transport. Diesel fuel would be transported to site in B-double tanker trucks. Electricity would be supplied to the mine site by ElectraNet from the Yorke Peninsula power network. Electricity for the Port site would be supplied by existing SA Power Networks. The combined power would generate the equivalent of 8,251,165 tonnes of Carbon Dioxide.

### 4.11.3 *Water sources*

The project would use water from 3 sources; mine water (from dewatering of operations), seawater and potable water (SA Water). Expected annual water usage from each source is as follows;

- Mine water 3.26 GL/a
- Seawater 1.35 GL/a
- Potable water 0.42 GL/a

Modelled mine dewatering, as described in Appendix 7 of the Response Document, predicts there would be a water deficit throughout the life of the project, and that a water supply would be needed to support mineral processing. This would be provided through the installation of the seawater intake.

## *4.12 DSD assessment of description*

The description of proposed operations provided by Rex in the Proposal and the Response Document is considered to be adequate and comply with the requirements set out in Ministerial Determination 006.

In its review of the Proposal, DSD considers that the following are key factors which define the scope of the operation:

1. The total tonnage of ore to be produced from the mine, and the resultant volume of waste produced; and
2. The capacity of the integrated Tailings Storage Facility and Waste Rock Dump.

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# 5 Review of socio-economic impact assessment and potential benefits

A socio-economic baseline characterisation study was conducted by Rex as part of the Proposal development, investigating the existing demography and population, land use, social services, infrastructure (both physical and social) and the economic base for the localised project area, as well as for the region as a whole. The study was separated into the local (primary) study area and the regional (secondary) study area. A description of potential benefits was provided in the Proposal, accompanied by a socio-economic impact assessment commissioned by Rex.

To date, $126M has been spent on exploration at Hillside, with ongoing forecast regional expenditure of $1.5M. Total capital investment (both project expenditure and additional infrastructure) is estimated to be $900M. It is expected that the Hillside project would generate approximately $800M in annual revenue, leading to royalties to the SA Government of up to $30M. A substantial portion of the expected ongoing $400M annual operating costs would be expended in the Yorke Peninsula and within South Australia more broadly. The projected average wage of employees and contractors on the Hillside Project would be $40,000 more per annum above the state average, at approximately $100,000 gross. A full breakdown of operating expenditures has not been provided in the Proposal.

The Proposal contends that development of the proposed Hillside project would contribute to the South Australia's Strategic Plan objective 'Growing Prosperity', which includes targets such as economic growth, business investment, minerals exploration, production and processing, and jobs. The Proposal further suggests that the indicated benefits would have flow on effects leading to the achievement of other key Strategic Plan objectives. Table 3.2-1 in the Proposal outlines the specific Hillside Copper project contributions to these objectives.

In accordance with Ministerial Determination (006), a description of the potential benefits of the proposed project was provided in relation to social, economic and environmental aspects.

The assessment of environmental impacts directly attributed to the proposed mining operations can be found in Section 7 of this Assessment Report. The scope of the environmental components assessed in Section 7 is defined by Section 6(4) of the Act listed below, and is inclusive of ecological and socio-economic aspects of the environment:

(a) Land, air, water (including both surface and underground water and seawater), organisms, ecosystems, native fauna and other features or elements of the natural environment;
(b) Buildings, structures and other forms of infrastructure, and cultural artefacts;
(c) Existing or permissible land use;
(d) Public health, safety or amenity;
(e) The geological heritage values of an area; and
(f) The aesthetic or cultural values of an area.

An assessment of the socio-economic potential impacts and benefits from the proposal not specifically related to the environmental components discussed above is in the following Sections 5.1 – 5.6. This includes a review of Rex's assessment of direct and flow-on benefits and impacts on:

- Employment and training;
- Housing and accommodation;
- Community services and infrastructure; and
- Property values;

In the Proposal, Rex has proposed a Social Management Plan which would consist of the following sub plans:

- Communication Management Plan
- Local Employment Management Plan
- Local Business Development Plan
- Community Relations Management Plan

## *5.1 Employment and Training*

**Summary of proposal**

The most common industries for employment in the primary study area are sheep, beef cattle and grain farming. Other industries include food product manufacturing, hospitals, education and supermarkets. At the time of release of 2006 ABS Census data, unemployment within the primary study area was 7.8%, however it is acknowledged that updated Census data from 2011 (which was not available at the time development of the Proposal) indicates lower unemployment rates.

The Proposal outlines that an average of 605 full time jobs would be provided over the life of mine with a maximum of 725 jobs at one time. The

actual number of employees on site at any one time would be dependent on the mines rostering arrangements.1437 full time jobs are estimated for supporting services based on an indirect multiplier of 2.7. The project is not proposed to be a fly-in fly-out operation, with the Proposal indicating a focus on encouraging local employment opportunities. The Proposal suggests that 60-80% of the workforce would live in or are already living within 50km of the mine site, with a portion of the workforce to commute from Adelaide daily, utilising a proposed ferry service.

Rex acknowledged the potential of the Hillside project to reduce the workforce available to the local communities and existing industries within the region. A commitment to a variety of training opportunities for local workers and students has been made, along with commitments through an Aboriginal Heritage Collaboration Agreement with the Narungga people, to improve and provide employment opportunities for the Aboriginal communities.

**Issues raised through consultation**

The key issue raised in relation to employment was the impacts on the current workforce for local employers, and how the proponent would manage their workforce without having a significant effect on local business, farming and local government agencies through competition for limited employee pool.

**Rex Response to concerns and Commitments**

Rex, through its Response Document, acknowledges the potential the project has to deplete other industries of skilled workers. One of the key strategies Rex outlined to minimise the potential impact from competition of skilled labour is the provision of opportunities for training and education programs to increase the skilled labour pool in the region. Additionally, Rex committed to providing opportunities through work experience and placements linked to local school, TAFE and tertiary education programs.

Section 8.2 of the Proposal outlines the formal commitments from Rex, which stated that an overarching Social Management Plan would be formulated in consultation with the relevant stakeholders (CCG). This would include a Local Employment Plan as outlined in Table 8.2.1 of the Proposal containing the following key aspects;

- Set targets for employment of people with the relevant skills or experience from the primary study area and Goyder State Electoral Division (SED) region that is considerate of both the desire to maximise the economic benefits of the Project without depleting the region of skilled workers in other industries/businesses.
- Provide opportunities to non-mine employees to participate in training and education programs in order to increase the ‘pool’ of skilled labour available to other businesses/ industries.
- Set strategies to minimise the potential impact of workforce reductions on local communities (as discussed directly above).

- Include a policy of consistency with other regional employers in the setting of wages and conditions, such as flexible rosters to allow for agriculture seasonal peak times, for mine workers.

**Assessment**
Whilst Rex did not provide detailed recruitment strategies, or approximate timelines for creation of positions in the Proposal or Response Document, commitments have been specified that outline how the issues would be addressed prior to commencement of the project. If the mine is approved, these commitments would be required within a Social Management Plan, including Local Employment Management Plan, prior to construction and commencement of operations. DSD supports Rex's initiatives and commitments in relation to employment and training, including commitments to improve and provide employment opportunities for the Aboriginal communities. However, consultation on the Social Management Plan should not be limited to the CCG. Relevant stakeholders should be engaged more broadly to ensure an appropriate range of views and concerns are addressed.

During the life of the project there are likely to be, regional competition for skilled labour. DSD considers the Social Management Plan to be an appropriate mechanism to identify benchmarks and targets in relation to the ongoing recruitment for Hillside and training needs for the broader community.

**DSD Recommendations and Requirements**
If approved:

It is recommended that there be ongoing discussions between Rex, CCG, the wider community and relevant SA Government agencies in relation to workforce planning, training infrastructure and training delivery prior to the development of the Social Management Plan (including all sub plans defined in the Proposal).

The Social Management Plan and associated Local Employment Management Plan should provide a clear commitment for the creation of specific training/education opportunities, and how this would benefit other businesses and industries.

### *5.2 Housing and Accommodation*

**Summary of proposal**
The Proposal states that 317 individual permanent accommodation facilities would be required to house the increased population from the project. The estimated 325 employees, both direct and indirect, who choose not to relocate for the project would also require temporary accommodation in the region for the duration of each roster or contract. The Proposal states in Section 6.8.2 that Yorke Peninsula has ample accommodation facilities and, coupled with the proposed ferry service from Adelaide for daily commuting employees, no requirement for site-based accommodation is foreseen.

In order to manage any potential accommodation availability risks, Rex has committed to relocate the current drilling camp and upgrade the accommodation facilities to a 120 bed emergency accommodation facility. The Proposal acknowledges, however, that even with these measures, increased demand for accommodation would place significant pressure on current housing and land availability, with likely results of a reduction in availability and affordability of housing in the region.

**Issues raised as a result of statutory consultation**
Further explanation was sought regarding potential for competition for rental and purchase of properties leading to a decrease in the affordability of properties in the area due to competition for property sales or rentals.

**Rex Response to concerns and Commitments**
The Response Document highlights and reiterates excerpts from the Proposal in relation to potential impacts on housing and accommodation, both locally and regionally. The Response reiterates the proposed control and management strategies outlined in the Proposal, including the commitment to:

- Develop and implement Local Employment Management Plan;
- Develop and implement the Communication Management Plan; and
- Temporary camp accommodation provided for employees and contractors during operation and construction.

**Assessment**
DSD concurs with Rex's determination that there would be a significant impact in relation to availability of accommodation in the region and on affordability, particularly for lower-income earners. It is noted there is contradicting information provided in the Proposal in relation to accommodation availability. The identified potential impacts would not only have a social impact, but a potential economic impact for the medium to long-term. The proposed control strategies for these impacts are identified in the Proposal and Response Document as management plans and the provision of temporary 'emergency' camp accommodation for employees and contractors for the period of mine life. If the mine is approved, prior to commencement of the project, the need for additional camp facilities must be investigated to ensure sufficient accommodation is provided within the ML (or permission sought by the relevant authority external to the ML) for employees of the mine, and to reduce the potential impact on local accommodation availability. In developing the Local Employment Management Plan and Communication Management Plan, it is critical for Rex in its Accommodation Strategy to not only consider future residents (including potential employees), but ensure that all impacts to existing residents are considered and managed appropriately.

**DSD Recommendations**
If approved:

It is recommended that the Social Management Plan includes monitoring of rental rates, rental availability and housing stress within the regional area defined in the socio-economic baseline characterisation study.

It is recommended that the Social Management Plan includes an investigation into the need for the proposed 'emergency' accommodation camp facilities to be changed to a permanent camp to suitably house employees and contractors choosing not to permanently relocate to the region for the life of mine.

### *5.3 Community Services and Infrastructure*

**Summary of proposal**

The Proposal outlines a number of potential impacts in relation to community services and facilities. The increased population would place additional pressure on current health, education, childcare, waste and emergency services and facilities. The increased population may result in greater transience through the region, likely requiring more emergency services being available, along with a requirement for greater police presence in multiple regional towns. The increase in population from outside the region could also impact on cohesion within the community.

Potential effects from the project on infrastructure such as increased traffic (see Section 7.14 (Traffic) of the Assessment Report) and power and water usage are discussed in the Proposal. Rex has stated that the additional population would further add to the demand of the project on domestic power and water supplies. Broad statements were made in the document regarding the potential for the mine to act as a stimulus to upgrade power supply to Yorke Peninsula before 2018. The Proposal indicates discussions would take place between Rex and state power agencies to this effect.

Positive impacts from an increase in population may be experienced within the retail and commercial sector with an increased demand for goods and services. In order to ensure a positive impact, Rex has committed to procuring where practical goods and services for the purpose of the project from within the region. There would likely be greater numbers of people wanting to access leisure facilities and to participate in events and sporting teams locally. There is also potential for the introduction of mine related tourism opportunities such as mine tours, to complement the existing mining heritage tourist attractions of Yorke Peninsula (i.e. Moonta Mines Museum).

**Issues raised through consultation**

An independent assessment was requested on the proposed mine in relation to impacts on the economy of the local Yorke Peninsula region and the state in both the long and short term, including all aspects of the region's current economy.

**Rex Response to concerns and Commitments**
To address the main concerns raised, the Response Document (No. 162, p194) highlighted the commitment to develop a Social Management Plan (in consultation with relevant stakeholders), which would include a Local Business Development Plan requiring the following elements:

- Engage with state agencies such as Regional Development Authority, local government and other employers to plan, on a regional scale, to maximise the regional business opportunities.
- Identify goods and services provision capacity in the region and develop and implement a policy of regional procurement including identifying and promoting opportunities for indigenous businesses.
- Conduct training and awareness sessions for small businesses in the region to assist them to understand the potential supply opportunities to the Project and the Project's procurement requirements.
- Engage with agencies, local government, industry associations and other businesses to develop strategies to mutually benefit industries in the region.
- Consultation with the Regional Development Authority and CCG on the development of the Local Business Development Plan.

Additionally, Rex has also made a commitment to the District Council of Yorke Peninsula to support the 'Walk the Yorke' program along the stretch of coastline owned by Rex. The 'Walk the Yorke' concept is a 500 km continuous coastal trail around Yorke Peninsula. Rex has highlighted the opportunity to link the existing trails to form one continuous leisure trail that circumnavigates the peninsula.

**Assessment**
The development of the Hillside project would likely result in an increase in population, namely workers and their families, wanting to live locally to the mine site, as well as regionally.

The increase in population would put pressure on health, education, emergency services, water and power, and other services.

There is potential for positive impacts related to leisure facilities, both from increased participation from incoming population, and the contributions made by Rex as part of their social commitments to the region.

The Proposal and Response Document do not provide management strategies or commitments regarding a number of the impacts on the key infrastructure and availability of services in the region. It is proposed by Rex that these issues be addressed through the Community Relations Management Plan (CRMP) which would be developed in consultation with the CCG. If the mine is approved, DSD would require wider consultation with relevant stakeholders in the development of the relevant plans. It would be critical for the relevant State and local government departments

to review this Plan, and to monitor and respond according to these needs based on community growth.

**DSD Recommendations**
If approved:

Prior to construction, DSD recommends that Rex engage with relevant SA government agencies, the Regional Development Authority and the Local Council to develop the appropriate strategies (within the CRMP) for managing the impacts on infrastructure and services within the region.

### *5.4 Property Values*

**Summary of proposal**
The agricultural industry dominates the land use of the area. There are 13 separate agricultural landholdings abutting the proposed ML. The Proposal notes that the effect of mining on values of adjoining agricultural properties has not been conclusively demonstrated to be either negative or positive, but rather seems to depend on the nature of the mining operation and its management practices. Nevertheless, property value impacts have been identified by Rex, and Section 2.1.3 of the Proposal states that land values are likely to change as a result of the Hillside Project. This statement is based on precedence across Australia suggesting that towns and cities near to major mining and resources regions experience a general increase in land values, as demand meets or outstrips supply. Rex does however acknowledge that adjoining landholders may perceive that their property value is decreased as a result of the Project. The effects of this potential impact would extend across the region and the effects are likely to be medium to long term.

**Issues raised through consultation**
An explanation was sought regarding potential decrease in property values due to the proximity of the mine and long-term price inertia on its completion.

**Rex Response to concerns and Commitments**
The Response Document reiterates the content of the Proposal and outlines a number of management strategies for the potential impacts, including:

- Implement a Communication Management Plan to establish clear communication with nearby landowners of activities that may impact on adjacent land use.
- Minimise areas excluded from agriculture during operation by maintaining agricultural land use on all areas not required for direct mining activity.
- Land access and compensation agreement and waiver of exempt land status in place.

**Assessment**
Whist DSD does not regulate matters of property value under the Act, DSD has assessed the potential impacts of the proposed mine on 3rd party property including agricultural land in the assessment of environmental impacts (Section 7. of this Assessment Report).

**DSD Recommendations and Requirements**
N/A

### *5.5 Summary of socio-economic conditions of approval*

DSD recommends that the following lease conditions applicable to community engagement and communications protocols be included should a lease be granted:

**Social Management Plan**
The tenement holder must prepare, implement and maintain a Social Management Plan (SMP) within 12 months from the date of the grant of the tenement (in consultation with relevant State Government agencies and key community stakeholders) that addresses:

- the matters described in Table 8.2-1 of the mining lease proposal; and
- anything further that the Director of Mines directs in writing.

The tenement holder must make the SMP publically available.

**Community Engagement**
The tenement holder must prepare, implement and maintain (to the satisfaction of the Director of Mines) a Community Engagement Plan (**"CEP"**) that:

- Sets out the purpose, objectives and parameters of engagement with the Community;
- Identifies all community stakeholders likely to be affected by mining operations;
- Sets out the tools and techniques that the tenement holder intends to use for;
    - identifying community attitudes and expectations;
    - providing information to the community;
    - receiving feedback from the community;
    - analysing community feedback and considering community concerns or expectations; and
    - registering, documenting and responding to communications from members of the community;
- Outlines an action plan to commence the proposed engagement activities; and
- Addresses any further matters that the Director of Mines advises in writing.

The CEP must be submitted to the Director of Mines for approval within three months of the grant of the Lease.

**Communication protocols**

The Tenement Holder must develop (to the satisfaction of the Director of Mines) a communication and operating protocol between itself and owners of land adjacent to and on the Lease (subject to the agreement of the owners of land) prior to the commencement of mining operations that includes the following matters:

- Interaction with landholder operations;
- Emergency procedures;
- Communications and issue management processes;
- Land management;
- Dispute resolution;
- Ongoing communication about the Tenement Holder's operations;
- Receiving and considering feedback;
- Safety procedures;
- Access protocols; and
- Any matters identified by the Director of Mines in writing.

The Tenement Holder must maintain and adhere to the protocol to the satisfaction of the Director of Mines for the term of the Lease.

### *5.6 DSD Assessment*

DSD considers that Rex has provided an adequate assessment of the likely benefits of the Hillside project. In addition, DSD considers that Rex has provided an adequate assessment of the socio-economic impacts associated with the project.

Should a lease be granted, Rex would need to continue to engage with the local and regional community as well as service providers to ensure the most effective implementation of commitments discussed in the Proposal.

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# 6 Results of consultation

## *6.1 Overview*

The process for application of a mining lease allows for both formal and informal stakeholder consultation.

DSD expects that a mining proponent engages relevant stakeholders throughout the development of the Proposal, to enable the identification of stakeholder concerns. Evidence of this engagement should be presented in the Proposal, detailing how concerns raised during the engagement process have been addressed.

Statutory consultation processes are established under Section 35A of the Act*, 1971*, which requires that the mining lease application and supporting Proposal document be publically circulated for a minimum 2 week period, and provides the opportunity for the public to make written submissions in relation to the application. The applicant is provided with an opportunity to respond to issues raised. DSD then considers all submissions and the response to issues raised when undertaking its assessment of the application

## *6.2 Summary of Rex consultation*

Rex implemented a program of community and stakeholder engagement in the development of the application for an ML, EML and MPLs for the Hillside Copper Project. This is detailed in Section 7 of the Proposal.

For the purposes of developing their stakeholder engagement strategy, as per Section 7.3 of the Proposal, stakeholders were identified using stakeholder mapping as a tool to define groups and the associated type and level of impact. This included primary stakeholders with the potential to be impacted by the project, and secondary stakeholders which were identified as having an interest in the project. A table showing the key stakeholders and Rex Mineral's assessment of their degree of impact or interest is summarised in Table 7.3-1 of the Proposal. Broadly, the stakeholder groups identified included landowners, communities,

government (local and state), indigenous groups, regional development groups and other interest groups. Rex identified a number of engagement opportunities using this information. A summary is provided in sections 6.2.1 to 6.2.3 of this report.

### 6.2.1 *Rex Consultation with landowners*

A number of properties exist within the proposed ML, EML and MPL areas. Rex Hillside Property Ltd has purchased some of the land within the proposed ML area and is in the process of negotiating with the remaining landowners regarding options such as purchase, relocation and reducing the impact of the proposed mine on landowners who intend to stay. The landowners were identified in the Proposal as one of the primary stakeholders who may experience a high level of impact and were therefore consulted with using the processes identified below.

The Proposal describes that during exploration Rex carried out consultation with the landholders within the vicinity of planned exploration activities through one-on-one consultation and by letter, through farmer group meetings and information sessions, site visits and the provision of information sheets. It is also noted in the Proposal that consultation with affected landowners within the proposed ML and MPL areas has continued to occur and has included discussion on potential impacts, land ownership and compensation options.

### 6.2.2 *Steps conducted by Rex to consult with other relevant stakeholders (public and Government)*

Initial consultation with local communities, indigenous traditional land owners, the council and other regional agencies started in 2008 with the commencement of exploration activities. As specified in section 7.4.1 of the Proposal this involved community and interest group presentations, open office information sessions and regular articles published in the Yorke Peninsula Times.

More targeted consultation has occurred since mid-2010 specific to the Hillside project as documented in Table 7.3-1 of the Proposal. Four consultation strategies were identified by Rex as a means to facilitate stakeholder consultation in the development of the Hillside Project. As described in Section 7.4.2 of the Proposal this included:

1. Consultation with the community stakeholders through a Community Consultative Group (CCG)
2. Where possible, consultation with those landowners directly impacted by the Project
3. Consultation strategies adopted to consult with those who temporarily visit the area for holidays or own property (holiday homes) that are not their primary residence
4. Consultation with key government agencies and regulators.

The following consultation strategies were used by Rex in its engagement with the local community and relevant stakeholders:

- Establishment of Hillside Project Community Consultative Group (CCG)
    - Representative of stakeholder groups (as shown in Table 7.3-1 of Proposal), and;
    - Each CCG member is provided with information and minutes from meetings to distribute to the wider community
- Open-office sessions
- Presentations
- Meetings and forums
- Workshop sessions
- Public and interest group site tours
- Information sessions and distribution of information through the:
    - REXPRESS Community Newsletter, and;
    - Progress Association newsletters and notice boards
- Surveys

Rex has indicated that consultation would be ongoing, and a consultation database would be used to record consultation with groups and individuals which would be maintained throughout the life of the Hillside Project.

Rex consulted with State Government throughout the mine development and Proposal preparation process on a host of topics and issues as detailed in Table 7.4-2 of the Proposal. Government agencies consulted included DSD, EPA, DPTI, SA Water, SA Power Networks, DPC and PIRSA. Consultation occurred through meetings and workshops with Government agencies, as detailed in Appendix 7.4-B of the Proposal.

### 6.2.3 *Issues raised during consultation and the response addressing those issues*

During the consultation process, in order to track issues raised by the local community, Rex maintained an issues register. The register was compiled through the Hillside Project CCG, documenting the concerns raised by the community which were raised in, for example, forums such as meetings held with affected and neighbouring landowners or through surveys during site tours. The issues register was updated after any new issue was raised by the public and reviewed at CCG meetings, and it noted in the Proposal that the register continues to remain a live document with new issues being added as they are raised.

The register was used by Rex to devise a social issues register and community expectations table (see Table 7.5-1 and Table 7.5-2 of the Proposal). This table identifies each issue and the level of concern associated with that issue. It also outlines the community's expectation,

the outcome proposed by the community and the response proposed by Rex. Table 7.5-1 outlines the social/infrastructure issues and Table 7.5-2 identifies the environmental issues. The concerns raised are classified as extreme, very high, high, medium, low and 'benefit'.

Outlined below are broad topics covering the issues raised during Rex's consultation process:

- Social/Infrastructure issues
    - Employment
    - Accommodation
    - Social services
    - Economic
    - Heritage
    - Infrastructure and communications
- Environmental issues
    - Air quality
    - Flora and fauna
    - Water
    - Marine
    - Erosion
    - Noise
    - Vibration
    - Light
    - Land use (during operation)
    - Visual amenity
    - End use and mine closure
    - Waste
    - Chemicals
    - Fire
    - Communications

Points noted to be of extreme concern during Rex's consultation were;

- Depletion of workforce for small businesses/farming and skills shortage
- Rent increases as a result of increased demand on rental properties
- Lack of family services and increased pressure on existing limited services
- Negative impacts on existing services and allied health services
- Pressure of emergency services and volunteers
- Impact on nearby residences
- Mine having a negative impact on tourism accommodation
- Traffic management and safety to minimise impact on other users

- Pine Point road upgrade to highway including Redding road/Sandy Church road intersections: protection of endangered vegetation, safety intersection
- Landowners impacted by road changes

As detailed in Tables 7.5-1 and 7.5-2 Rex has provided a response to issues outlined during their consultation by identifying where it is addressed in the Proposal or where the concern would be addressed in the Program for Environment Protection and Rehabilitation (PEPR) or supporting management plans, should the lease be granted. Rex has also, where possible, modified the plans for the Project to accommodate community and stakeholder concerns. By way of example, Rex cites the decision not to have a large camp facility, but rather work with the community to maximise opportunities for integration of the workforce into the community in response to community expectations.

Topics and issues raised by Government agencies during the mine development and preparation of the Proposal are specified in Table 7.4-2 of the Proposal. The topics included, but were not limited to, flora and fauna including referral under the Environment Protection and Biodiversity Conservation (EPBC) Act, radiation, the coastal reserve, marine and port studies, vibration and blasting, groundwater and surface water hydrology, odour and noise, air quality, the tailings storage facility, water and power supply, roads and heritage.

Issues raised on the aforementioned topics were raised during meetings and workshops held between Rex and the relevant Government stakeholders, and response is provided in Appendix 7.4-B of the Proposal. As detailed in Appendix 7.4-B development of issues involved presenting on proposed activities and potential impacts, seeking feedback from the relevant agency, provision of a response to the feedback (by Rex) and identification of outcomes and further actions required.

## *6.3 Statutory Circulation*

### 6.3.1 *Circulation details*

In accordance with legislative requirements specified in Section 35A of the *Mining Act 1971* consultation with relevant stakeholders was undertaken to enable the public to make written submissions in relation to the application for an ML, EML and 2 MPLs for the Hillside Copper Project.

Rex submitted their application for the ML, EML and MPLs required for the Hillside Copper Mine Project, together with the supporting Mining Lease Proposal and Appendices on 26 August 2013. Owners of the land contained within the ML, EML and MPL application areas and the Yorke Peninsula Council were notified on 3 September 2013, within 14 days of receiving the application in alignment with the requirements of the Act, Sections 35A(1a) and 35A(2).

DSD developed a comprehensive circulation plan, to ensure all potentially impacted stakeholders (including the Yorke Peninsula Council,

landholders, community groups and relevant government agencies) were adequately informed of the opportunity to provide comment on the proposal.

Circulation commenced on the 12 September 2013 with the call for public submissions concluding on 24 October 2013. A statutory circulation period of six weeks was determined to be suitable in line with previous major mine proposal circulation periods and based on the complexity of the proposal and high level of stakeholder interest.

Notice was given under Section 35A(4) of the Act and advertised accordingly in the following:

- Yorke Peninsula Country Times
- The Advertiser
- Government Gazette
- DSD website

A copy of the Proposal was also circulated to all adjacent landowners and the following stakeholders;

- Pine Point Progress Association
- James Well and Rogues Point Progress Association
- Black Point Progress Association
- Ardrossan Progress Association
- Friends of Gulf St Vincent
- Primary Producers SA
- Yorke Regional Development Board
- SA Power Networks
- District Council of Yorke Peninsula
- State Government (DSD, DEWNR, EPA, DPC, DPTI, PIRSA, Safework SA, SA Health and SA Water)

During the circulation period, the Proposal document was available for viewing electronically through the DSD website. DSD also sent 3 hard copies of the Proposal document to the Yorke Peninsula Council to provide a central location for the public and other interested stakeholders to view the document. In addition a number of hard copies of the Proposal were subsequently sent on request to individual parties in the local community.

On 3 October 2013 Rex confirmed that there were differences between the submitted printed and electronic versions of two technical Proposal appendices (Operational Noise Assessment and Dust and Odour Impact Assessment) that were released for public viewing. The differences were rectified, and a two week extension was granted to extend the closing date to 8 November 2013.

Public submissions were made and can be accessed on DSD's website, with the exception of those marked confidential, at the following link.

http://www.minerals.dmitre.sa.gov.au/mines__and__developing_projects/developing_projects/rex_minerals_hillside_copper_mine_submissions

The Proposal prepared by Rex reflects a significant investigation into the potential impacts of the proposed mining development, however both the government and the public identified a range of issues for further consideration; points of clarification and/or additional information which was required to enable a comprehensive assessment of the Hillside Copper project.

### 6.3.2 *Summary of Public Submissions and issues raised*

During the statutory circulation period a total of 266 public submissions were received. Of the public submissions 10 were originally marked as confidential and not supplied to Rex. 17 others subsequently asked that their submissions not be published. The authors of the public submissions were from a wide variety of locations across the state and interstate.

The public submissions were reviewed by DSD and assessed against information contained within the Proposal document or against questions or issues raised by other government agencies. Where there were specific technical issues raised that were not adequately identified within the Proposal document or which were not highlighted in Government submissions, further information was sought. This formed part of the request for a response to consultation issued to Rex on 3rd December 2013 (discussed in greater detail in Section 6.3.3 below and provided in the link specified in Section 6.3.1).

In total 196 points of clarification and/or additional information was specified; divided into two categories including issues raised by the State Government (from 1-99_ and issues raised from members of the public (from 100-196). The broad technical aspects raised from members of the public included the following:

- 3rd Party interests
- Air quality
- Closure
- Copper Contamination
- Editorial
- Emissions
- Fauna
- Geochemistry
- Geology
- Light
- Marine
- Meteorological
- Native vegetation
- Noise
- Radiation
- Seismicity

- Slurry Pipe
- Socio-economic
- Soil
- Tailings storage facility
- Water

The link provided in Section 6.3.1 details the technical issues relating to each aspect from the public submissions.

### 6.3.3 *Summary of Government Submission and issues raised*

As highlighted in Section 6.3.1 of this report, the Proposal and associated Appendices were provided for assessment to a number of State Government agencies including DSD, DEWNR (inclusive of the NRM board), EPA, DPC, DPTI, PIRSA, Safework SA, SA Health and SA Water.

The Outcomes of Statutory Consultation document was provided to Rex on the 3rd December 2013. The letter and Appendix 1 attachment can be accessed from the link provided in section 6.3.1. As specified in section 1.2.2 a total of 196 points required clarification and/or additional information with State Government issues identified from 1-99.

The State Government response component was setup to show the topic (aspect), the relevant section reference of the Proposal, the description of the issue raised by the State Government and the requirement.

The State Government issues were identified under the following technical aspects;

- Air quality
- Closure
- Concentrate
- Editorial
- Geochemistry
- Geology
- Geotechnical
- Marine
- Native Vegetation
- Noise
- Processing
- Radiation
- Soil
- Toxicological
- Tailings Storage Facility
- Water

The link provided in Section 6.3.1 details the specific issues relating to each aspect.

### 6.3.4 *Summary of Rex Mineral's response to Public and Government submissions*

Rex were afforded the opportunity to formally respond to the issues raised in the submissions as specified in the DSD request for a response to consultation of 3rd December 2013. As highlighted in the letter, Rex was expected to review in detail each of the public submissions and the government submission, and to prepare a thorough Response Document accordingly.

The formal response provided by Rex titled 'Hillside Copper Mine Response to Statutory Consultation (the Response Document) was received on the 21 February 2014 and is accessible on the link provided in 6.3.1.

### 6.3.5 *Assessment of Response document*

Upon receipt of Rex Response Document DSD and the relevant government agencies reviewed the response document to confirm that the issues raised as a result of the statutory consultation were adequately addressed.

Following a thorough assessment, DSD deemed on 25th February 2014 that the Response Document was suitable for the purpose of assessing the Hillside project.

The Response Document was subsequently published on the DSD website.

## *6.4 Conclusion*

DSD considers that Rex has undertaken an engagement process to identify concerns raised by relevant stakeholders and address those concerns in the development of the Proposal.

DSD also considers that statutory consultation requirements established under Section 35A of the Act have been satisfied through the circulation of the Mining Lease application and supporting Proposal calling for public submission, together with the development and subsequent release of the Response Document by Rex.

The number and content of submissions received during the public consultation period highlights the level of concern of both the local and wider community in relation to the introduction of large scale mining operations into a farming/tourism community, and the consequent expectations of a thorough and expert assessment of the potential impacts from the project.

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# 7 Assessment of Impacts and Project Risks

The Act and Mining Regulations have adopted a risk/performance-based approach. A risk-based approach is focussed on identifying the key environmental risks relevant to a specific proposal, and to develop community acceptable Outcomes that treat those risks and the applicant is committed to deliver. A performance-based regulatory approach focuses on 'what should be achieved' (i.e.: Outcomes), 'not how it should be achieved'. The scope of environmental components considered is defined by the definition of the Environment in Section 6 of the Act.

In accordance with regulation 30(2) and 49(2) the Mining Proposal or Management Plan must:

- be balanced, objective and concise
- state any limitations that apply, or should apply, to the use of the information in the Mining Proposal
- identify any matter in relation to which there is a significant lack of relevant information or a significant degree of uncertainty
- where relevant, identify the sensitivity to any assumption that has been made and the potential consequences if this assumption later proves to be incorrect.

**Rex's risk assessment process**

Rex's environmental and social impact assessment for the proposed Mining Lease (ML), Miscellaneous Purpose Licenses (MPLs) and Extractive Mineral Lease (EML) is provided in Section 8 of the Mine Lease Proposal and Management Plan (Proposal). Potential environmental impact events, primary and residual risk ratings, proposed outcomes and measurements are also summarised in Tables in Section 8.

For the purpose of definition, where the word 'primary' is used to describe a risk, impact, likelihood or consequence, this refers to the impact event prior to control strategies being applied. Where the word residual is used

to describe a risk, impact, likelihood or consequence, this refers to the impact event post control strategies being applied.

The impact assessment approach adopted by Rex is explained in Section 8.1.3 of the Proposal. Rex identifies sensitive receptors which have the potential to be impacted by the project and establishes an environmental baseline for all environmental values of the receptors. Rex provides an assessment of the potential environmental impact events from the Hillside Project and then undertakes a primary risk assessment for each impact event occurring using a likelihood and consequence estimation method. The risk ratings from the primary risk assessment are used to determine which impact events require a formal Environmental Outcome (Outcome). Impact events that receive a risk rating greater than Low have been assessed by Rex to require an Outcome. Rex has identified some impact events which require an Outcome as a requirement of legislation even if they have been assessed to have a 'Low' risk. An Outcome is defined as a statement of the level of acceptable impact to the receiving environment.

The Proposal then outlines control strategies and operational management measures which Rex proposes to implement to reduce the primary risks. The residual risk is that remaining after these measures have been taken into account, and assumes that all proposed design and control measures are effectively implemented throughout the life of the mine. Rex performs a residual risk assessment for each impact event that requires an outcome and taking into consideration the control strategies using a likelihood and consequence estimation method.

Rex explains in Section 7 of the Proposal how their program of stakeholder consultation activities assisted in the identification of potential impact events of concern to the community, and the identification of community expectations pertaining to the management of risks.

**DSD process for assessing management of environmental impacts**

In the assessment of the Rex Mining Lease Application, DSD in conjunction with other government agencies has performed an assessment of the Rex Proposal and Response, assessing potential impact to the environment as a result of the proposed Hillside Copper Mine during construction, operation and post-completion. Closure impacts have been assessed within each relevant environmental aspect chapter.

The assessment considers the following matters in accordance with Ministerial Determination MD 006:

1. Whether Rex have provided adequate information about the existing receiving environment.
2. Whether Rex has identified all of the sensitive receptors and environmental values that may potentially be impacted by the proposal. The assessment also considers additional sensitive receptors and environmental values identified by DSD, other government agencies or the public.

3. Whether Rex has identified, and correctly assessed, the consequence of all credible impact events. The assessment also considers additional potential impact events identified by DSD, other government agencies or the public.
4. DSD has had regard for **all** issues and concerns which were raised during statutory consultation. DSD has made an assessment as to which issues are within the scope of the Mining Lease Proposal. Issues raised which were outside the scope of the Mining Lease Proposal have not been specifically mentioned in this report, however, they have been considered in the assessment process.
5. For each impact event, whether or not an outcome is required. DSD requires outcomes when it considers a potential impact to the receiving environment requires management during construction, operation and/or post completion. An outcome is required for the purpose of determining the acceptability and achievability of the level of the impact described by the outcome. All impact events require an outcome unless the primary consequence of the event has been demonstrated to be trivial in nature. For the purpose of assessment, trivial is defined as an insignificant consequence.
6. The acceptability of the Rex proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable. If the Rex proposed outcome is not acceptable, DSD recommends a new outcome.
7. The achievability of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed would achieve the proposed outcome. For closure events this would consider whether the proposed strategies would be self-sustaining in the long term. The assessment also considers any assumptions and uncertainty in control strategies.

Should a lease be granted, environmental outcomes are ultimately made a condition or requirement of a lease or licence. Compliance with these environmental outcomes is determined by demonstrating achievement of the outcomes using explicit measurement criteria as required by Regulation 65 of the Mining Regulations.

To define how successful achievement of outcomes would be demonstrated by the proponent in operation, conceptual (draft) outcome measurement criteria have been developed by Rex for each of the environmental outcomes including mine closure and rehabilitation outcomes. DSD has undertaken an assessment of the draft measurement criteria to determine whether they are an appropriate method for demonstrating achievement of the outcome proposed by Rex. Where DSD has recommended modified outcomes to those identified by Rex the assessment would determine if the measurement criteria are still applicable or would require modification. In the situation where DSD has recommended a new outcome where none has previously been proposed by Rex, DSD has provided recommendations for the future development of criteria as part of the operational approval (PEPR) should a lease be granted. These recommendations can be reflected by DSD in the

recommendation of additional lease conditions, and/or DSD would state if these recommendations are to be addressed as criteria in the PEPR.

The assessment of criteria considers in particular whether relevant recognised industry, legislative or regulatory standards have been applied to the proposed criteria. If appropriate standards have not been applied, where applicable, DSD has recommended consideration for these in the development of criteria.

Where there is a high level of reliance on control strategies to reduce risk to the environment and to achieve approved environmental outcomes, leading indicator criteria are required. DSD has assessed the requirement for leading indicator criteria, should a lease be granted. Refinement of these criteria would occur in the PEPR.

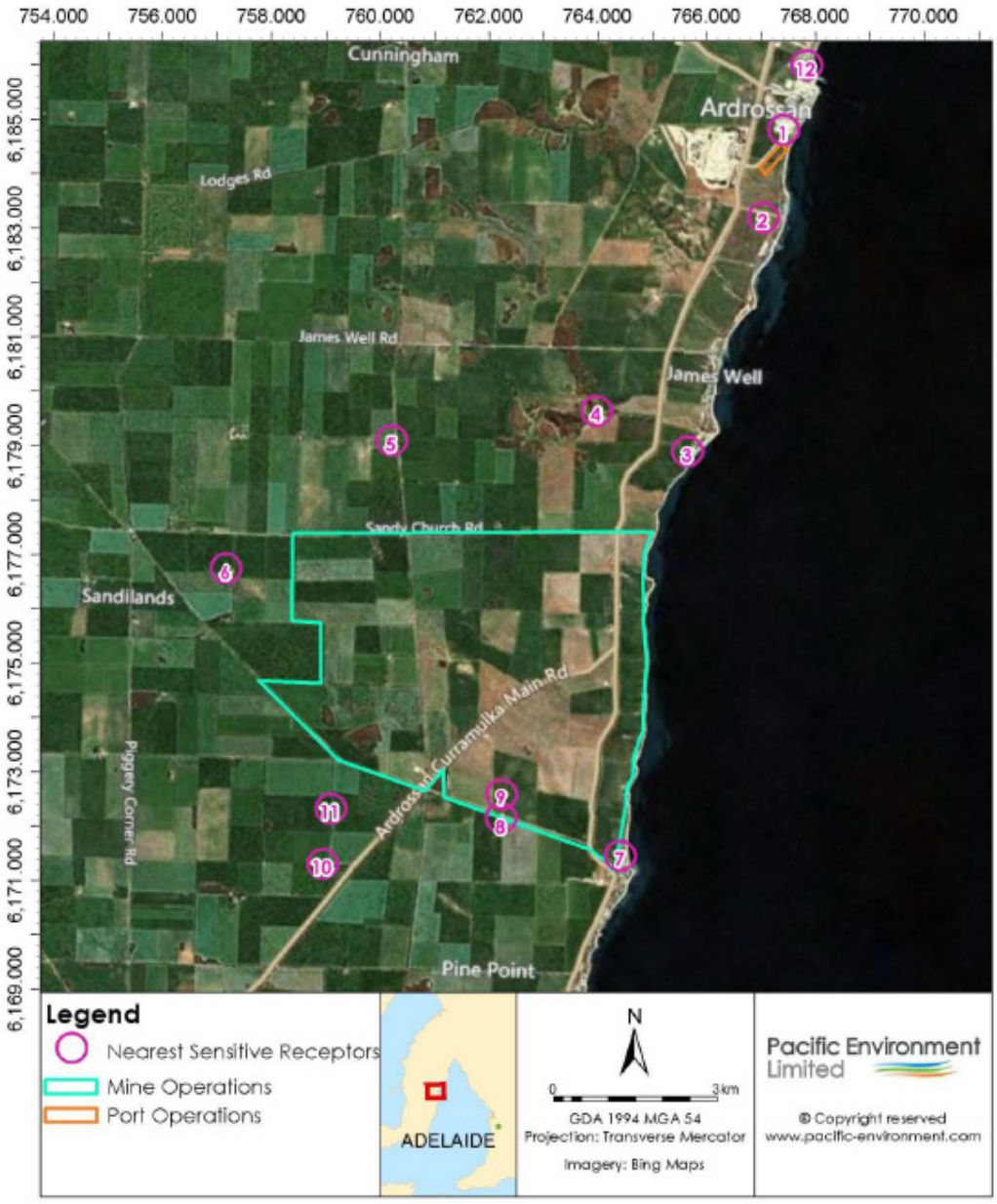
The Act requires measurement criteria to be finalised in accordance with the Mining Regulations 2011 in the provision of a PEPR, should a lease be granted.

## *7.1 Air Quality (including dust and odour)*

### 7.1.1 *Description of Relevant Aspects of Environment*

The Hillside Project site is located adjacent to the Gulf of St Vincent in an area that is primarily used for cereal cropping and grazing and in close proximity to a number of coastal communities. The ML and EML are located 12km SW of Ardrossan, 4km N of Pine Point, 5km SW of Rogues Point, 7km South West of James Well and 7km North of Black Point. The closest community to the mining lease site is therefore Pine Point. Figure 8.3-1 of the Proposal (shown below) shows the closest sensitive receptors in relation to the ML, EML and MPLs. There are eight dwellings within the proposed ML of which three houses and farm sheds within land owned by Rex and a further five dwellings located within the proposed ML. Of these five dwellings, Rex has stated in their Proposal that one is unoccupied, one has a negotiated relocation agreement in place and negotiations are underway for the remaining dwellings. Rex has developed their proposal with the understanding only one dwelling would remain as a sensitive receptor for the life of mine as the others would be unoccupied subject to agreements being put in place. Rex made the following statement in the response document in Issue No. 132.

“As per Section 5.3.1 (Proposal) within the Proposal, there are five dwellings located within the proposed ML that are not owned by Rex. Negotiations are underway for Rex to purchase or relocate the two dwellings (one previously believed to be unoccupied) on Redding land (see Section 2.3 of the Proposal). The proposed footprint of the mine infrastructure (TSF and WRDs), as set out in the Proposal, would not be possible without owning this land. Therefore, for the purposes of assessing potential social and environmental impacts, the two dwellings on Redding’s land have not been considered as sensitive residential dwellings.”




**From Proposal by Rex - Figure 8.3-1: Air quality sensitive receptors during construction and operation for the proposed ML, EML and MPLs**

In developing the Proposal meteorological data was collected and reviewed for five locations to generate an understanding of the climatic variation across the proposed sites. Based on the data Rex has used, average temperatures generally vary between 15º to 25º due to the marine influence of the location; however, always exceed 30º and often even 40º in summer months. Average rainfall for Ardrossan is 345.1mm with 67% of rainfall occurring in the 6 coolest months of the year and October to April being the driest months. An annual rainfall deficit of more than 1000mm is common in the ML, EML and MPL areas as evaporation exceeds mean monthly rainfall for all months of the year. Dominant wind direction for sites is southerly, south-westerly and northerly with distinct speed and direction changes occurring throughout the day. These are shown in the Proposal in relation to key localities.

Rex had identified the existing air quality near the ML and EML is typical of a cultivated rural setting with sources mainly from agricultural equipment and practices, and traffic. Air quality at the MPL at the Port is more typical of industry and includes sources from existing mining and processing activities, grain storage, agriculture and vehicle haulage/traffic. Dust levels during summer months when vegetation is reduced and during crop harvest can be notable within the region. In order to establish background data a dust monitoring program was undertaken by Rex at a number of locations surrounding the proposed lease and licence areas. The program was designed in conjunction with consultants Pacific Environment Ltd (PEL) to assess the following elements:

- Ambient $PM_{10}$,
- Ambient Total Suspended Particulate (TSP) matter including a base metal analysis,
- Dust deposition rates (including metal analysis),
- Weather station data.

Results from the baseline studies have been summarised in Section 5.6 of the Proposal. The monitoring program, including background monitoring results data, is provided as Appendix 5.6-C (Dust and Odour Impact Assessment Report). Site baseline $PM_{10}$ data was not considered sufficient for evaluation due to low data availability therefore Whyalla Schulz Reserve $PM_{10}$ data was used as a basis for Rex's Impact Assessment. Results from the Rex baseline TSP monitoring indicated an average concentration of 26µg/m3, with TSP generally lower in winter. Base metal concentrations were also assessed from the dust collected and indicated very low levels (the highest copper showing average concentrations of 0.001µg/m3). Results from dust deposition data indicated dust levels remaining below 4g/m2 per month averaged over a 12 month sampling period. Rex identified this as likely the result of short-lived dust produced by local agricultural and traffic activities.

DSD sought an assessment of the suitability of baseline data from JBS&G. The review by JBS&G concludes that the meteorology is representative of the existing meteorology of the Project location and that existing air quality (regarding dust deposition, TSP and PM10 are generally consistent with concentrations in other similar areas (JBS&G, 2014).

Based on the rural setting of the Hillside Project there are no main existing sources of odour in the vicinity of the proposed ML, EML and MPLs. In the Proposal it states that meteorological conditions associated with high odour potential conditions such as calm and early morning temperature inversions are not commonly experienced in the proposed ML area. Evidence to support this claim was provided in section 144 of the Response Document.

DSD considers the sensitive receptors and associated environmental values for this environmental aspect to be;

- Nearby coastal communities and residential dwellings (public health and amenity)

    - Residents within or surrounding the ML, EML and MPL for the pipeline corridor (receptors 4, 5, 6, 8, 9, 10 and 11 as per Figure 3.3 Appendix 5.6-C); Receptor 9 is the closest receptor, located within the ML
    - Coastal communities near the ML, EML and MPL including Pine Point and Rogues Point (receptors 3 and 7 as per Figure 3.3 Appendix 5.6-C)
    - Primarily Ardrossan community for the MPL for the port facility (receptors 1, 2 and 12 as per Figure 3.3 Appendix 5.6-C)

- Native Vegetation (vegetation health and diversity)
- Marine Environment (vegetation and faunal health and diversity)
- Surrounding primary industry receptors (including crops, livestock and grain storage, economic productivity)

DSD considers that the description of the existing environment in the Proposal is a suitable characterisation of the receiving environment which may be affected by mining operations.

### 7.1.2 *Views of affected parties*

In the Proposal Rex notes that the CCG have expressed a high level of concern regarding the negative impact from mine-related dust on air quality for both the community and the environment. This includes dust impacts on nearby settlements, rainwater tanks and also remnant vegetation. Rex identified that the CCG had low concern for odour from mining.

The concerns expressed by the CCG in the Proposal are reflective of the issues identified in public submissions during statutory consultation. This includes concern for health impacts resulting from dust exposure (inhaled and via rainwater tanks), and impacts to native vegetation.

The primary issues raised during statutory consultation are summarised below in **Table 7.1** and are cross-referenced with the relevant impact events discussed below:

**Table 7.1 – Impact events relating to issues raised during statutory consultation**

| Issues raised during statutory consultation | Addressed |
|---|---|
| Impacts to public health due to dust | **ML-A1, DSD MLA1, DSD ML-A2** and **MPL-A1 and DSD ML-A10** |
| Contamination from dust in rainwater tanks | **ML-A2** |
| Impacts to amenity from dust | **ML-A3, EML-A1, MPL-A4** and **MPL-A5** |
| Dust effects on native vegetation | **ML-A5** and **MPL-A3** |
| Potential for dust to cause impacts on agriculture regarding crops (including plant growth and seed germination) and livestock | Impacts on crops<br>**ML-A6** and **MPL-A7**<br>Impacts on livestock<br>**DSD ML-A4** |
| Impacts on the efficiency of solar panels | **DSD ML-A5** |
| Potential for dust to impact power infrastructure | **DSD ML-A6** |
| Public health impacts from sulphides, uranium and asbestos fibres in dust | Asbestos<br>**DSD ML-A8**<br>Sulphides and uranium<br>the presence of sulphides and uranium is discussed in Sections 7.16 (Groundwater and Surface Water) and Section 7.11 and 7.12 (Radiation) of this report |
| Effect of dust on grain | **DSD ML-A3** and **MPL-A2** |
| Dust and emissions from underground operations | **DSD ML-A7** |
| Emissions, including diesel fumes and radon gas | **DSD ML-A9** |
| Impacts on marine environment | **ML-A7** and **MPL-A6** |
| Confidence in the proposed dust monitoring and control measures | **Discussed in Section 7.1 (based on JBS&G 2014)** |
| Quality of background data used and consideration for meteorological conditions (such as temperature inversion) | ***Discussed in 7.1.1 (Description of Relevant Aspects of Environment) based on JBS&G report (2014)*** |
| Concern that the EPA and NEPM air quality criteria cannot be demonstrated | **ML-A1** |
| Lack of consideration for PM2.5 as a measurement in the dust modelling | **DSD ML-A2** |
| Modelling not reflecting the new mine design (in regards to the TSF design) | **DSD ML-A1** |
| Lack of control measures from odour | **ML-A4** |

The statutory consultation did identify additional receptors or impact events to those identified by Rex.

The additional impact events identified are; dust from the TSF, impacts on health from PM2.5, impacts to livestock from dust, impacts to solar panels and infrastructure from dust, dust from underground mining operations, impacts from asbestos dust and impacts from diesel emissions. These have been addressed in the impact assessment and identified as **DSD ML-A1** to **DSD ML-A8.**

DSD has had regard for all concerns which were raised during statutory consultation, however not all concerns have been included as part of this assessment report as they are either not within the scope of the assessment or are too general in nature to consider.

### 7.1.3 *Impact assessment (ML)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0.

Baseline studies, in conjunction with emissions estimations for the proposed operations, were used to undertake air quality modelling to characterise dust and odour emissions from the mine site and assess potential dispersion. This is provided in Appendix 5.6-C as specified in the Proposal. Estimations of emissions are provided as Appendix A (Appendix 5.6-C). Emissions consider loading and unloading operations, wheel generated dust, drilling, blasting, wind erosion, crushing, miscellaneous transfer points associated with conveying and stockpiles, bulldozing and Port Operations. Modelling was however based on an original Tailing Storage Facility design (high aspect ratio TSF) which was subsequently amended to a low aspect ratio TSF design and proposed in the Proposal. In the original model Rex identified in Section 7 of Appendix 5.6-C that $PM_{10}$ and TSP dust emissions from the mine are predominantly generated from traffic on haul roads within and outside of the pit (85% of total annual TSP and 77% of total annual $PM_{10}$), with blasting and materials handling also making significant contributions. In the modelling it was also noted that predicted odour concentrations were not anticipated to be an issue of significance.

Since the submission of the Proposal DSD requested revised dust dispersion modelling to reflect the updated TSF designs. The updated dispersion model has been provided as Appendix 4 of the Rex Response Document. The revised model indicates the main contributors of mine TSP and $PM_{10}$ emissions are from the same sources, as previously identified. Given the increased waste rock handling rates and increased dump truck activity however, emissions from these sources near doubled the estimated total dust emissions.

Further technical issues regarding modelling and criteria were raised by State Government as a result of a technical review of the Proposal and applicable appendices. Issues presented by State Government and subsequent responses provided by Rex can be viewed in the Response Document.

The compliance criteria applied by Rex in their Proposal regarding $PM_{10}$ is consistent with the Ambient Air Quality NEPM (representing the current state of particulate health science in an Australian context). As there is currently no South Australian recognised limit for nuisance dust, the methods for modelling and assessment of air pollutants by the EPA in NSW (DEC 2005) has been used by Rex as a criteria to measure nuisance dust.

JBS&G conducted a technical review of the air quality modelling and air quality criteria, including any subsequent responses provided by Rex. It was concluded in section 3.3 of the JBS&G report that overall the modelling presented was considered to appropriately reflect the project as presented in the Proposal and where applicable, emissions estimates were considered reasonable and appropriate. Regarding the use of the nominated criteria JBS&G concluded that it was reasonable and appropriate to utilise a national standard given the lack of any South Australian-specific health and amenity dust criteria (section 3.2, JBS&G 2014).

Rex has assessed the potential air quality impacts associated with uranium separately in Section 8.3.19 of the Proposal.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7.0.

As a significant portion of operations would be conducted above ground DSD considers that the identified sensitive receptors may be affected by dust emissions from the site during the life of mine if not managed suitably by Rex. Only low level odour is predicted for peak impacts. Uranium has been assessed in Section 7.16 (Radiation) of this report. Sulphides are addressed in Section 7.12 (Groundwater) of the Proposal and Section 7.13 (Surface Water) of this report. Dust from blasting has been considered in the modelling for air quality and therefore, would not be considered in the Blasting Impact Assessment section of this report.

A review of Rex's impact assessment is shown in Table 7.1.1 and impacts identified by state government identified post submission of Proposal identified in Table 7.1.2.

## Table 7.1.1 – Impact events identified by Rex in the Proposal

*Impact events identified by Rex in the Proposal*

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **ML-A1** | Health impacts on neighbouring sensitive receptors from increased $PM_{10}$ emissions | Rex has stated that the consequence of this impact occurring without controls implemented is moderate.<br><br>Given the close proximity to sensitive receptors, DSD considers health impacts from increased $PM_{10}$ emissions from mining operations as a significant potential impact. Dust would be emitted from the site if not appropriately managed by Rex. The sensitive receptors that have the potential to be impacted are within the immediate vicinity of the proposed operation, including one existing dwelling within the ML area (as shown in Figure 8.3-1 of the Proposal, and provided earlier in this Section). Public health impacts due to the risk of the potential for radiation in dust are discussed further under impact event **ML-R1** in Section 7.16 of this report.<br><br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES<br><br>Rex has provided an outcome |
| **ML-A2** | Health impacts from contamination of water tanks via increased dust deposition | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br><br>As per **ML-A1** given the mine location DSD considers sensitive receptors have the potential to be impacted by dust deposited in rain water tanks as a result of unmitigated dust from mining operations.<br><br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES<br><br>Rex has provided an outcome |
| **ML-A3** | Public nuisance arising from increased dust deposition at surrounding properties | Rex has stated that the consequence of this impact occurring without controls implemented is Moderate.<br><br>As per **ML-A1** and **ML-A2** due to the proximity to sensitive receptors and based on the rural setting of the ML, as well as close proximity to a coastal location, DSD accepts that nuisance impacts could occur from mine dust without controls in place.<br><br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES<br><br>Rex has provided an outcome |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-A4** | Public nuisance caused by odour emissions from the site | Rex has stated that the consequence of this impact occurring without controls implemented is negligible.<br><br>An odour impact assessment was provided by Rex in the Proposal document (based on Appendix 5.6C) which identified that emissions from the processing plant were negligible. Odour emissions from the TSF were estimated using data from a comparative copper mine in Australia which uses similar flotation reagents, and showed that predicted peak impacts for the nearest receptor would be below SA EPA Odour Guidelines (2006). In addition Rex would be obligated to manage air pollutants to ensure WH&S standards for onsite personnel.<br><br>The EPA in its review of the air quality aspects of the Proposal concluded that it was satisfied with the Proposal risk assessment findings that odour emissions would meet the odour criteria established by the EPA guideline, *'Odour assessment using odour source modelling (2007)'*.<br><br>DSD assesses that the primary consequence of this occurring is trivial and hence no outcome is required. | NO<br><br>Rex has not provided an outcome |
| **ML-A5** | Reduced native plant growth or abundance resulting from increased dust deposition resulting from mining operations | Rex has stated that the consequence of this impact occurring without controls implemented is Moderate.<br><br>Despite the ML area being predominately used for agricultural pursuits some remnant patches of native vegetation and roadside vegetation exist within and surrounding the ML. DSD considers there could be impacts on native plant growth resulting from unmanaged mine dust.<br><br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES<br><br>Rex has provided an outcome |

*Impact events identified by Rex in the Proposal*

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **ML-A6** | Reduced agricultural crop growth rates/yield resulting from increased dust deposition on leaves | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br><br>This impact could relate to photosynthesis as well as toxicological effects. Rex discusses plant growth impacts from dust deposited on leaves in the context of photosynthesis however Rex did not discuss effects to yield from the effects of copper and other metals on crops in sufficient detail in the Proposal. This was a concern raised during statutory consultation and State Government requested Rex provide a further response (Issue No. 2). Rex subsequently provided response which indicated there would not be significant risk to crops resulting from dust deposition. This was primarily discussed in terms of likelihood and consequence of the impact post implementation of controls, not consequence of impact pre-controls. Rex's original conclusion in the Proposal was that it was possible there could be impacts without controls in place. DSD accepts Rex's original conclusion that it is possible that if control strategies are not implemented there could be impacts to crops from mine related dust given the surrounding land use is primarily agriculture and research exists which indicates the possibility that both dust volume and metalliferous content may impact plant growth and yield.<br><br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES<br><br>Rex has provided an outcome |
| **ML-A7** | Impacts on marine flora and fauna from increased sedimentation rates | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br><br>DSD does not accept the adequacy of Rex's primary assessment of this impact. Part of Rex's assessment refers to predicted dust deposition post implementation of controls (Figure 8.3-3 Proposal), not pre implementation of controls. Considering the locality of the ML to the Gulf, potential unmitigated mine dust quantities and also existing land based activities, DSD considers that it is possible that impacts to the marine environment could occur as a result of mine dust if it is not suitably controlled. Rex has also not indicated the deposition rates at which impacts may manifest.<br><br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES<br><br>Rex has provided an outcome |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML(C)-A1** | Elevated dust continues post mine closure | Rex has stated that the consequence of this impact occurring without controls implemented is moderate.<br><br>DSD considers there is potential for dust emissions as a result of mining operations to remain elevated post mine closure if surfaces remain exposed for periods of time. Rex would have to demonstrate that rehabilitation would be self-sustaining long term prior to enabling lease relinquishment, if a lease is granted.<br><br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES<br><br>Rex has provided an outcome |

The State Government, through the assessment process, has identified additional impacts to air quality associated with the proposed mining activities subsequent to the submission of the Proposal. An assessment of these additional impact events is provided in Table 7.1.2.

## Table 7.1.2 – Impact events identified subsequent to the Proposal

*Impact events identified subsequent to the Proposal*

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **DSD ML-A1** | Post cessation of mineral processing, dust generated from the tailings surface causing increased dust emissions to sensitive receptors | State Government raised this impact in Technical Issue No. 5(r) of the DSD's request for a response to statutory consultation and an assessment of this impact was subsequently undertaken by Rex in the Response Document. The impact event is discussed in DSD's technical expert reports authored by SLR Consulting Australia Pty Ltd (Appendix 5) and JBS&G (VIC & SA) Pty Ltd (Appendix 7). DSD considers that the TSF could be a source of dust emissions during any protracted period of inactive deposition if appropriate controls are not implemented. Long term controls include the placement of tailings at densities to achieve consolidation rates that would permit timely installation of a cover system upon the cessation of mineral processing. Prior to capping, if the reliance on salt crusting is not effective, other dust suppression methods may need to be applied to control dust emissions, particularly at times of high wind speeds.<br><br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES |
| **DSD ML-A2** | Health impacts on sensitive receptors from increased $PM_{2.5}$ emissions | Health impacts from $PM_{2.5}$ emissions were not identified by Rex due to limitation on available $PM_{2.5}$ background concentration data and lack of appropriate emission factors. State Government raised this as an issue and Rex provided a response (Response Document Issues No.5 & No. 114). The current health science described in the 2011 Ambient Quality NEPM Review Report suggests that there may be distinct health impacts associated with exposure to $PM_{2.5}$ sized and foreshadows the current advisory reporting standards for $PM_{2.5}$ be replaced with compliance criteria. Given the Proposal doesn't assess the risk relating to $PM_{2.5}$ emissions, DSD considers that further investigations and monitoring would be required.to assess the potential for $PM_{2.5}$ emissions and to ensure achievement of the current standards.<br><br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES |

*Impact events identified subsequent to the Proposal*

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **DSD ML-A3** | Reduced grain quality resulting from increased dust emissions | Impacts to the quality of grain as a result of increased dust emissions from proposed mining operations on the ML were not discussed by Rex. This impact was identified by stakeholders during the statutory consultation process. Rex's assessment included in **ML-A6** primarily addresses the impact of dust deposition on crop plant growth. Concern regarding grain impacts relating to the MPL is discussed in **MPL-A2.**<br><br>Based on the agricultural activities occurring within and surrounding the ML DSD considers that there could be an impact to grain production if dust is not suitably managed.<br><br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES |
| **DSD ML-A4** | Impacts to livestock resulting from increased dust deposition | Impacts to livestock from dust deposition were not identified by Rex in section 8.3.1 of the Proposal. This issue was raised in the Public Submissions and State Government requested further information from Rex. As per the Response Document Issues No. 44 and No. 116 Rex's discussion is based on mitigated dust and despite providing compositional information on the dust did not provide threshold limits at which dust could become an impact. DSD therefore considers that there could be impacts to livestock as a result of unmitigated mine dust.<br><br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES |
| **DSD ML-A5** | Impacts on the efficiency of solar panels from increased dust deposition | Impacts to solar panels from dust were not identified in the Proposal. These impacts were raised by the public during statutory circulation and by the State Government. Further response has since been provided by Rex (as Response Document Issues No. 105).<br>In the Response Document Rex assessed the impacts on power output and performance on solar panels as unlikely. This conclusion is supported by the information provided by Rex including recommendations regarding cleaning requirements for solar panels, panel layout and climatic considerations. Rex also discussed the predicted dust deposition rates comparative to background levels. Although this reflects mitigated mine dust the other supporting information suitably supports the assessment by Rex that impacts would be unlikely. In addition, given that Rex would be obligated to manage dust to achieve other air quality outcomes it would be expected that the residual risk would be low. This is supported in the JBS&G review (2014).<br><br>DSD assesses that the primary consequence of this occurring is trivial and hence no outcome is required. | NO |

| *Impact events identified subsequent to the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **DSD ML-A6** | Impacts on the efficiency of power infrastructure from increased dust deposition | Impact on power infrastructure was raised during statutory circulation and by the State Government. Further response has since been provided by Rex (as Response Document Issues No. 104).<br>Rex assessed that impacts on nearby electrical lines would be unlikely. This is similarly based background levels which infrastructure is already exposed to and anticipated mine emissions. In addition it is noted by Rex that the SWER lines identified would be either relocated or removed. Based on the information provided and as dust would be controlled to achieve other air quality outcomes DSD considers that power lines would not be impacted from dust.<br>DSD assesses that the primary consequence of this occurring is trivial and hence no outcome is required. | NO |
| **DSD ML-A7** | Impacts to receptors from dust and emissions from underground operations | Potential impacts to receptors from dust and emissions from underground operations were not specified in the Proposal. This was an issue which State Government raised (Issue No. 5) and sought further information on. In the response provided by Rex it is confirmed that an evase` would be installed to direct all potential dust and emissions into the open pit. To reduce to the consequence of this impact, there is therefore a reliance on the primary control measure.<br>DSD assesses that the primary consequence of this occurring is greater than trivial and hence an outcome would be required. DSD considers the outcome for ML-A1 to adequately address the potential impact from DSD ML-A7. | YES<br>Refer to outcome for **ML-A1** |

| *Impact events identified subsequent to the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **DSD ML-A8** | Impacts to public health resulting from exposure to asbestos | Asbestiform minerals were discussed in section 5.8 of the Proposal. The fibrous characteristics of the material at Hillside were raised by the Public and subsequently further information was sought by State Government. Rex provided response in Issue No. 137 (Response Document).<br><br>As discussed in both the Proposal and the response Rex has commissioned research and investigations to determine the potential for asbestiform minerals and phases. In both submissions by Rex discusses what mineral assemblages are likely to cause potentially asbestiform minerals, including specific amphibole minerals or the serpentine mineral chrysotile. In the deposit Rex notes that there are either no known occurrences or minimal amounts (i.e. less than 2% of any sample) of the relevant amphibole minerals present, and that the serpentine observed at Hillside is not fibrous and overall is rare in the deposit. Rex also highlights findings from investigations of asbestiform phases and concludes that there are not any observed asbestiform phases at Hillside. Rex therefore concludes that mineralogical analysis show no presence of asbestos or asbestiform minerals with reference specifically to as per Appendix 5.8-B (Proposal). Technical detail on the investigations and mineral formations at Hillside refer to the Proposal (including Appendix 5.8-B) and Response document.<br><br>DSD commissioned a technical expert to review the geochemical aspects of the project. Based on the review it was noted that 'No asbestiform minerals were identified in the testing undertaken by Rex.' (O'Kane Consultants Pty Ltd, 2014). The Geological Survey of South Australia has reviewed and indicated that no asbestiform minerals have been reported in the vicinity of the proposed mine.<br><br>DSD assesses that the primary consequence of this occurring is trivial and hence no outcome is required. | NO |

| *Impact events identified subsequent to the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **DSD ML-A9** | Impacts to public health resulting from exposure to diesel fumes and radon gas | In response to concerns raised on emissions, such as diesel emissions and radon gas, further information was sought from Rex as per Issues No.111, No. 112 and No. 113. In the responses Rex highlight that radon decay and diesel emissions would present a risk only in enclosed areas and when humans are isolated in that enclosed area for long periods of time. In relation to open pit activities this would not be the case as diesel emissions would be dispersed by the atmosphere. The risk would be primarily relating to worker safety. Workplace safety is regulated under separate legislation and is hence outside the scope of this assessment. Rex would be obligated to manage air pollutants due to Workplace Health and Safety controls for onsite personnel under the applicable legislation. The management of impacts to worker safety would ensure any risks to the public are also effectively managed. Public health impacts due to radiation, including radon gas, are discussed further under impact event **ML-R1** in Section 7.16 of this report.<br><br>DSD assesses that the primary consequence of this occurring is trivial and hence no outcome is required. | NO |
| **DSD ML-A10** | Impacts to public health resulting from toxicological characteristics of dust. | In response to concerns raised regarding the toxicological effects of dust further information was sought from Rex under technical issue 5d. In the response Rex provided further information regarding the composition of the ore and waste rock. If heavy metals are present in dust emissions there is the potential for an effect on human health, without the effective implementation of control strategies.<br><br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes |

| *Impact events identified subsequent to the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **DSD ML-A11** | Contamination of dams due to increased dust deposition | Contamination of dams, and subsequent impact on the health of livestock from consuming contaminated water was raised as a concern during the statutory consultation period.<br><br>As discussed under previous impact events, Rex has predicted the expected dust deposition rates as a result of mining activities following the implementation of control strategies. This shows that there is potential for an increase in dust deposition in the immediate vicinity of the mine, including onto nearby dams used for stock watering or other purposes. The predicted monthly average dust deposition at the nearest 3rd party dam is 0.2g/m$^2$. Given the low copper concentration within ore of approximately 0.5%, the total amount of copper in dust deposited at the nearest dams is expected to be insignificant, particularly as the major source of dust would be off haul roads constructed of non-mineralised waste rock (not ore).<br><br>In addition, given that Rex would be obligated to manage dust to achieve other air quality outcomes it would be expected that the residual risk of dust deposition causing an exceedance of the recommended water quality trigger value of 1mg/L copper for cattle drinking water (ANZECC Table 4.3.2) at the nearest dams to be low.<br><br>DSD assesses the primary consequence of this occurring is trivial and hence no outcome is required. | No |

### 7.1.4 *Outcomes (ML)*

Table 7.1.3 is the DSD assessment of outcomes proposed by Rex in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable.

The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed would achieve the proposed outcome. For closure events this would consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment would also consider any assumptions and uncertainty in control strategies.

Table 7.1.4 provides outcomes for impact events identified by DSD that were determined in Section 7.1.3 to require an outcome.

**Table 7.1.3 – DSD assessment of outcomes**

| *DSD assessment of outcomes* | | | |
|---|---|---|---|
| **ID / Impact Event / Rex Proposed Outcome** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-A1**<br><br>**Impact event:** Health impacts on neighbouring sensitive residential receptors from increased $PM_{10}$ emissions<br><br>**Rex proposed outcome:**<br><br>No public health impacts to local residents from air emissions and dust generated on site as a result of mining operations | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies.<br><br>It is however recommended that the outcome be all inclusive of public health and nuisance impacts during construction, operation and post completion. | Rex considers control strategies would reduce this risk of this impact to a level of low.<br><br>The assessment process identified that there were a number of factors used in the development of the air dispersion model which did not accurately reflect the proposed mining operation. Specifically, the model:<br><br>• Was based on an operational footprint different from that proposed in the Proposal<br>• Was based on significantly lower mining rate (60 Mtpa waste rock handling rate compared to 125 Mtpa)<br>The dispersion model was subsequently revised to more accurately reflect proposed operations, and the updated model attached as Appendix 4 to the Proposal Response Document.<br><br>The results of the initial dust dispersion modelling (presented by Rex in the Proposal) predicted that during full operation and with worst case weather conditions compliance with proposed $PM_{10}$ dust criteria would not be achievable for the two nearest receptors immediately south of the proposed mining operations (receptors 8 & 9 in Figure 3.3 of Appendix 5.6-C) up to three days over the modelled year without active management.<br><br>The results of Rex's updated dispersion modelling (presented in Appendix 4 of the Response Document) predicted that without the implementation of operational controls, exceedances of the nominated $PM_{10}$ criteria would occur at six nearby receptors. The four additional receptors are predicted to receive between 1 and 3 days in exceedance of the $PM_{10}$ criteria, while Receptors 8 and 9 would have experienced 9 and 10 days in exceedance respectively. There is also the potential for around three additional days per year exceedance as a result of high background (non-operational) dust sources. The sensitive receptors are presented in Figure 8.3-1 of the Proposal. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction, operation and post completion, ensure that there are no public health and/or public nuisance impacts from air emissions and/or dust generated by mining operations.<br><br>*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event **ML-A1**;*<br><br>Undertake continuous dust and meteorological monitoring to inform decisions for operational response and contingency |

| *DSD assessment of outcomes* | | | |
|---|---|---|---|
| **ID / Impact Event / Rex Proposed Outcome** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | In operation, potential exceedances at these receptors is proposed to be managed through the implementation of a plan for real-time monitoring and operational response to ensure that dust levels at nearby receivers are maintained below nominated criteria.<br><br>The EPA advised in its assessment of the Proposal that it had a particular interest in the potential for dust, especially fine particulate matter known as $PM_{10}$, to have an impact on the amenity and/or health of sensitive receivers. Following its review of the odour and dust impact assessment report (Appendix 5.6-C) , the EPA indicated that it was satisfied with the methodology and findings of the dust dispersion model, and the recommendation that real time monitoring be undertaken to demonstrate that mining operations would be carried out to ensure compliance with NEPM criteria.<br><br>The EPA made it clear that the management of $PM_{10}$ is the main health related air quality risk for which appropriate management is required.<br><br>The EPA has stated that its expectation for air quality monitoring include the following elements:<br><br>• Monitoring locations based on the siting requirements of the NEPM<br>• Monitoring locations to be spatially located so as to determine regional and mine contributions<br>• Real time trigger levels for $PM_{10}$ and TSP that immediately inform the operator<br>• Assessment and mitigation strategies to be implemented in the event of dust emissions reaching the trigger levels for $PM_{10}$ and TSP<br>• Regular reporting of the performance of the system<br>To support the technical assessment of the Proposal, DSD engaged an independent air quality expert (JBS&G Pty Ltd) to review the dust impact assessment and air quality model. The review is provided as Appendix 7 to this report. The review found that the dust dispersion model followed accepted air quality modelling practices, and with the revisions made to the model subsequent to the submission of the Proposal, was considered to 'reasonably represent the proposed mining activity in terms of layout, mining rate, topography and meteorology. The emissions factors and control factors used for the prediction of dust generation are considered appropriate, and predictions | measures to be implemented to prevent exceedance of compliance criteria. |

| *DSD assessment of outcomes* | | | |
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| **ID / Impact Event / Rex Proposed Outcome** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | are considered to reasonably represent the likely dust emissions as a result of proposed operations' (Page 26, JBS&G 2014).<br><br>JBS&G also provided review on the modelling assumptions stated in the Proposal. Namely the use of baseline $PM_{10}$ data from Whyalla Schultz Reserve (WSR) due to limited availability of site $PM_{10}$ data, control efficiencies for the main dust contributor (wheel generated dust) which was initially referenced as being 93% to 97% but later revised to a control efficiency of 83.5%, and the change in the TSF design not incorporated into the original model. Regarding these assumptions the DSD air quality expert considered the use of the WSR data as appropriate, and the revised efficiency as being 'consistent with the control efficiency assumed in other, similar air quality assessments in South Australia' (Page 16, JBS&G 2014). As previously indicated the revised model also incorporated the updated TSF design.<br><br>The JBS&G review of the impact assessment concludes that the proposed operational controls using real-time dust monitoring and reactive and predictive operational response is considered reasonable and appropriate. Further strategies detailing how these would be implemented would be required in the PEPR if the project was approved.<br><br>The strategies would include continuous real time weather and dust monitoring program to indicate requirements for mitigation activities and operational controls, restrictions and shut down procedures to proactively manage dust generation to ensure thresholds would not be exceeded.<br><br>Given the range of control and management strategies proposed are considered to be effective and have the ability to pro-actively mitigate potential air quality impacts before they are realised, DSD determines that the recommended outcome (as it relates to health impacts) is achievable.<br><br>In the JBS&G review it was noted that to achieve the proposed outcome the following should be considered in the development of the dust monitoring system: | |

| *DSD assessment of outcomes* | | | |
|---|---|---|---|
| **ID / Impact Event / Rex Proposed Outcome** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | • Sufficient monitors should be installed to allow ground-level concentrations of $PM_{10}$ dust to be measured that are representative of concentrations at the nearby sensitive receptors, with consideration of the spatial distribution and locations of these receptors.<br>• The PM10 monitor(s) should be of a type appropriate to the task (BAM, TEOM, E-BAM etc), with consideration given to the relative advantages and disadvantages of each technology. They should be capable of accurately measuring ground-level dust concentrations at intervals of not more than 10-minutes between consecutive readings.<br>• The system should have the capability to determine the contribution of operationally-generated $PM_{10}$ dust to total dust, i.e. the system should be able to differentiate between operationally contributed and background PM10 dust. It is likely that this would necessitate the installation of a meteorological monitoring station capable of the real-time monitoring of at least wind speed and direction<br>• Data from the installed dust and meteorological monitors should download to an appropriate central location in real-time to allow operational response and/or other contingency measures to be implemented in adequate time<br>• Compliance with the 24-hour average $PM_{10}$ criterion should be measured as an average of hourly average PM10 data, measured from midnight-to-midnight<br>• Each monitoring station should be designed, sited and operated in accordance with relevant Australian Standards or, where no Australian Standard exists, appropriate and equivalent international standards.<br>• Each monitoring station should be operated and maintained in accordance with the manufacturer and/or supplier's recommendations in order to achieve a data availability of not less than 75% per annum. | |

| *DSD assessment of outcomes* | | | |
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| **ID / Impact Event / Rex Proposed Outcome** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | • Contingency measures should be developed for instances where the real-time monitoring system is unavailable, to ensure that ground-level $PM_{10}$ concentrations do not exceed the criterion at nearby receptors.' (Section 4.2.2.1, JBS&G 2014)<br><br>On the basis of the information provided, it is concluded that the air quality public health outcome is appropriate, and would be achievable provided the proposed dust control and management strategies are effectively implemented.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | |
| **ML-A2**<br><br>**Impact event:** Health impacts from contamination of water tanks via increased dust deposition<br><br>**Rex proposed outcome:** No public health impacts to local residents from dust generated on site as a result of mining operations<br><br>(as per **ML-A1)** | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies.<br><br>However as per **ML-A1** it is recommended that the outcome be all inclusive of public health and nuisance impacts during construction, operation and post completion. | Rex considers control strategies would reduce this impact to a level of low.<br><br>Contamination of rainwater tanks from mine related dust at nearby receptors has been identified by Rex as a potential impact. The residual risk of this impact event has been assessed as low, based on predicted low dust deposition rates at nearest sensitive receptors, and the mine generated dust being characterised as containing a low concentration of minerals potentially hazardous to human health (as discussed in Question 2 and 5(q) of the Response Document).<br><br>The technical review of air quality impacts undertaken by JBS&G Pty Ltd found that the low residual risk of mine dust impacting on drinking water as a result of entering rainwater tanks was reasonable.<br><br>In addition to the dust control and management strategies proposed in the Proposal, which Rex propose to further refine in an Air Quality Management Plan, Rex in the Proposal has committed to implementing remedial measures such as the installation of first flush equipment in the event that ongoing monitoring of rainwater tanks shows contamination as a result of mining activities.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction, operation and post completion, ensure that there are no public health and/or public nuisance impacts from air emissions and/or dust generated by mining operations. |

| *DSD assessment of outcomes* | | | |
|---|---|---|---|
| **ID / Impact Event / Rex Proposed Outcome** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-A3**<br><br>**Impact event:** Public nuisance arising from increased dust deposition at surrounding properties<br><br>**Rex proposed outcome:** All public nuisance from dust emanating from the Lease during operation and rehabilitation activities are recognised and addressed appropriately by the Tenement Holder | The proposed outcome does not accurately describe the level of impact.<br><br>The proposed outcome is not considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies.<br><br>The proposed outcome is considered unacceptable. It does not make a commitment to achieve a level of impact to the public that is considered by DSD to be acceptable. DSD recommends that an outcome be used to address nuisance impacts from mine generated dust during all phases of the mine life (ie: construction, operation and post completion). | Rex considers control strategies would reduce this impact to a level of moderate.<br><br>Potential public nuisance impacts arising from dust deposition were assessed by Rex based on the air quality dispersion model undertaken as part of the Proposal, and the subsequent updated dispersion modelling included in the Response Document. The results of the initial and revised model predicted that total annual average TSP ground level concentrations and operationally contributed annual average dust deposition rates are well within current industry accepted criteria.<br><br>The dust dispersion model provided in the Proposal used to predict TSP concentrations at both the mine site and port operations without control and management strategies in place demonstrated that the annual average concentration of TSP was compliant with the NSW criterion for the annual average concentration of 90 µg/$m^3$ at all receptors. . The model also predicted very limited impacts for dust deposition at the nearest receptors. The results of dust deposition were well below the NSW criterion of a maximum increase of 2 g/$m^2$/month at the nearest receptors.<br><br>The updated dispersion model provided with the Hillside Response Document (based on a revised waste rock handling rate) predicted an increase in the annual average TSP concentrations, as well as annual average dust deposition. The increased concentrations were however still below the proposed criterion. Highest annual average TSP concentrations were predicted to be 39µg/m3 at the nearest receptor, while annual average dust deposition was predicted to be 1.3 g/$m^2$/month at the same nearest receptor.<br><br>The EPA concluded in its review of the Proposal dust and odour impact assessment that it was satisfied with the conclusions of the report that TSP deposition is likely to be low at the nearest sensitive receptor. The EPA has advised that TSP as a measure of nuisance dust relies on good environmental management and, as such, should be detailed in the strategies and monitoring required in a PEPR should the project be approved. Recommendations for these strategies and monitoring requirements are presented in **ML-A1.** | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction, operation and post completion, ensure that there are no public health and/or public nuisance impacts from air emissions and/or dust generated by mining operations.<br><br>*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event **ML-A3**;*<br><br>Progressive rehabilitation and stabilisation of disturbed areas undertaken throughout the life of mine to control dust emissions generated by wind erosion. |

| *DSD assessment of outcomes* | | | |
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| **ID / Impact Event / Rex Proposed Outcome** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | The JBS&G Pty Ltd review of the air quality impact assessment and dispersion model found that 'The assessment of nuisance dust impacts is limited by restriction in the ability of the model to predict short-term fluctuations in dust deposition and by the nature of people's perception of dust. As a result, the impact assessment presented in the MLA should be used only as a guide to the potential for nuisance impacts, in which case the finding of a moderate potential impact appears reasonable.' (Page 26, JBS&G 2014). In the JBS&G Pty Ltd review it specifies that in order to manage the potential for negative perceptions of dust associated with public nuisance, a combination of the following measures be implemented:<br>• The establishment of real-time and/or HiVol TSP monitors at locations adjacent to the proposed real-time $PM_{10}$ monitoring sites for a period of time sufficient to establish a convincing relationship between concentrations of $PM_{10}$ and TSP dust at nearby sensitive receivers.<br>• The use of the proposed real-time PM10 dust monitoring system, the associated meteorological monitor(s), the TSP/$PM_{10}$ relationship developed in the above-mentioned dot point and the dust deposition monitors to differentiate between operationally-contributed and background dusts, and to demonstrate compliance with the human health and public nuisance criteria presented within the Proposal. Including the provision of this information to stakeholders though the internet in real-time as done at sites such as Port Hedland.<br>• A robust complaint management system with targets for the time taken to respond to/action complaints<br>• The establishment of a relationship (or otherwise), over time and given enough data, between community complaints and TSP and/or PM10 dust concentrations and meteorology, such that operational and meteorological conditions likely to result in public nuisance impacts can be predicted and mitigated appropriately | |

| *DSD assessment of outcomes* | | | |
|---|---|---|---|
| **ID / Impact Event / Rex Proposed Outcome** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | • Education programs and routine forums with stakeholders to discuss air quality issues.<br>• A social benefits program that compensates for potential reductions in amenity through the provision of additional services or commitments within the region' (Section 4.2.3, JBS&G 2014).<br><br>As previously discussed, Rex proposes operational controls using real-time dust monitoring and reactive and predictive operational response to manage potential dust impacts. Further detail around how these would be implemented would be included in a PEPR should the project be approved.<br><br>On the basis of the information provided, it is concluded that an air quality outcome be recommended by DSD that is appropriate for the management of public nuisance impacts from dust, and would be achievable provided the proposed dust control and management strategies are effectively implemented.<br><br>As previously discussed, it is recommended that a specific lease condition be included which prescribes the requirements for the PEPR to ensure appropriate mechanisms are in place during mining operations to manage potential public nuisance impacts from dust. This should include requirements for carrying out progressive rehabilitation to ensure long term sustainable dust suppression treatments are put in place.<br><br>DSD considers that the outcome recommended by DSD would be achievable. | |
| **ML-A5**<br><br>**Impact event:** Reduced native plant growth or abundance resulting from increased dust and<br><br>particulate deposition<br><br>**Rex proposed outcome:** | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to | Rex considers control strategies would reduce this impact to a level of low.<br><br>Impacts on native vegetation growth caused by mine related dust deposition has been identified by Government and community stakeholders as a potential impact of concern, particularly due to the proximity of proposed mining operations to remnant vegetation and revegetation areas. This impact event has been discussed in section 8.3.1.4 of the Proposal. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or |

| *DSD assessment of outcomes* | | | |
|---|---|---|---|
| **ID / Impact Event / Rex Proposed Outcome** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| No overall loss of abundance or diversity of native vegetation on or off the proposed ML through dust deposition | implementation of control strategies.<br><br>Although the general intent of the outcome proposed by Rex is acceptable DSD recommends the use of an outcome that is all-inclusive for native flora impacts, and for the whole of mine life (construction, operation and post completion) | The initial Proposal dust deposition modelling has predicted that some roadside vegetation would receive an increase in dust deposition of up to 2g/$m^2$/month. With the implementation of the proposed control and management strategies in place to proactively manage dust generated on site, the risk of long term impacts to native vegetation communities surrounding the ML is rated as being unlikely and the residual risk is low.<br><br>In Section 2 of the Response Document Rex has provided further assessment on the impacts to native flora from dust. This is discussed in the context of a standard for $PM_{10}$ dust established by the United States EPA which includes potential damage to crops and vegetation as being 150µg/m3 which is not to be exceeded more than once per year on average over three years. Rex has indicated based on modelling predictions and the requirement to adhere to NEPM standards ($PM_{10}$ < 50µg/m3 for a 24 hour average) that there would be no impacts on native vegetation based on this standard. JBS&G Pty Ltd in its review of this information have concluded that 'on the basis of this information and in the context of the low metals content of the dust and low predicted dust deposition rates, the assessment of the residual risk as low appears reasonable.' (Pg. 24 JBS&G 2014). It is noted that an impact on native vegetation is possible if approval to do so is granted under the provisions of the Native Vegetation Regulations.<br><br>On the basis of the information provided, it is concluded that the air quality native vegetation outcome is appropriate, and would be achievable provided the proposed dust control and management strategies are effectively implemented.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | diversity of native vegetation on or off the Lease through:<br>• clearance;<br>• dust/contaminant deposition;<br>• fire;<br>• reduction in water supply; or<br>• other damage<br>unless prior approval under the relevant legislation is obtained. |
| **ML-A6**<br><br>**Impact event:** Reduced agricultural crop growth rates resulting from increased dust deposition on leaves | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable | Rex considers control strategies would reduce this impact to a level of low.<br><br>Community stakeholders have expressed concern of potential impacts of mine generated dust on nearby cropping yields. This includes concern relating to dust coating slowing the rate of photosynthesis and plant growth, as well as toxicological impacts of deposited dust (from copper or other metals). Impacts from contamination of grain are considered in impact event DSD ML-A3. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction, operation |

| *DSD assessment of outcomes* | | | |
|---|---|---|---|
| **ID / Impact Event / Rex Proposed Outcome** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **Rex proposed outcome:** No overall loss of agricultural productivity on or off the ML through dust deposition | level of impact on the environment subsequent to implementation of control strategies.<br><br>It is recommended however that the outcome be modified to include impacts for the whole of mine life (construction, operation and post completion) | Section 8.3.1.4 of the Proposal indicates in the air quality impact assessment that there is some evidence that dust can inhibit plant photosynthesis and consequently impact plant growth however there was no information provided to support the statement (i.e. explaining threshold dust deposition rates which may cause an impact to cropping yields). In this section of the Proposal Rex also do not directly discuss the potential for toxicological impacts resulting from dust deposited on crops.<br><br>Consequentially SA Government identified this as a potential impact needing further assessment by Rex (Issue No. 2 of the Technical Issues document). The response provided by Rex discussed dust deposition on crops relating to monitored and modelled dust, dust impacts on crops from $PM_{10}$, compositional characteristics of the dust, and dust relating to grain storage (see Impact Assessment relating to the MPL applications for information regarding dust and grains). Rex concluded:<br><br>• based on a comparison of monitored dust deposition comparative to modelled dust deposition by Rex in the Response Document (Appendix 4), the modelled indicates that the amount of dust would increase by approximately 1.3 g/m2/month on average at Receptor 9, comparative to an existing background level of 2.2g/$m^2$/month. If the Rex model is indicating an increase in dust deposition of 1.3g/m2/month at Receptor 9, it can be reasonably inferred that the cropping land located closer to the mine could receive a dust deposition increase higher than this.<br>• that based on modelling predictions and the requirement to adhere to NEPM standards (50µg/m3) there would be no impacts on crops from $PM_{10}$ dust. In relation to $PM_{10}$ impacts on crops Rex also identified a standard for $PM_{10}$ dust established by the United States EPA which includes potential damage to crops and vegetation as being 150µg/m3 which is not to be exceeded more than once per year on average over three years.<br>• that wheel dust would be the main source of emissions and the material used to construct haul roads would not contain copper or metals in significant quantities. | and post completion, ensure no impacts to agricultural productivity for third party land users on or off the Lease as a result of mining operations, including:<br>• reduction in crop yield;<br>• reduction in grain quality; or<br>• adverse health impacts to livestock |

| *DSD assessment of outcomes* | | | |
|---|---|---|---|
| **ID / Impact Event / Rex Proposed Outcome** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | The response provided by Rex is reasonable and the data provided by Rex is an accurate reflection of the conclusions made (indicating mitigated dust levels would be low).<br><br>Comments received from The South Australian Research and Development Institute (SARDI) indicates that dust impacts on crop production are not anticipated to produce significant production losses. SARDI have also indicated that "intuitively the growing season is during winter and rain events would wash accumulated dust off of plants. Further while ground is wet, dust movement would be limited".<br><br>DSD considers it is reasonable that any impacts to agricultural crops would be unlikely and minor in consequence. This finding is supported by the JBS&G review (Pg. 27, JBS&G 2014).<br><br>On the basis of the information provided, it is concluded that the air quality agricultural activity outcome is appropriate for dust impacts off the ML, and would be achievable provided the proposed dust control and management strategies (as described in **ML-A1**) are effectively implemented. However this would need to be demonstrated through monitoring against measurement criteria relating to crop yield.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | |
| **ML-A7**<br><br>**Impact event:** Impacts on marine flora and fauna from increased sedimentation rates<br><br>**Rex proposed outcome:** No loss of coastal or marine habitats, flora and fauna through mine related activities | The proposed outcome accurately describes the level of impact.<br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex considers control strategies would reduce this impact to a level of low.<br><br>Community stakeholders have raised concerns regarding potential impacts to marine flora and fauna caused by mine related dust deposition.<br><br>This potential impact event has been discussed by Rex to a limited extent in Section 8.3.1.4 in the Proposal, and further in the Response Document. The potential impacts discussed relate to increased turbidity reducing light penetration, and smothering of benthic flora and fauna. The impact assessment has a residual risk rating of low following control and management strategies, based on low predicted deposition rates and low level of potentially hazardous minerals within the ore. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must ensure no loss of abundance and diversity of marine flora and fauna from contaminants and dust deposition resulting from mining operations, during |

| *DSD assessment of outcomes* | | | |
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| **ID / Impact Event / Rex Proposed Outcome** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | It is recommended that the outcome be modified to focus only on marine flora and fauna as terrestrial (including coastal) flora and fauna are addressed in by the relevant outcomes in those sections.<br><br>It is also recommended that the outcome be modified to consider impacts for the whole of mine life (construction, operation and post completion) | No data is presented to indicate what constitutes a dust deposition rate which may cause marine impacts. Nor is there any discussion within the Proposal and Response Document on the toxicological components of dust deposition on the marine environment.<br><br>The ecosystem protection criteria for the marine environment of 0.0013 mg/L for copper (ANZECC, 2000) has been used by DSD as the reference for assessing potential impacts to the marine environment. DSD has used the Rex Response Document modelled dust deposition data to estimate the potential copper that could be deposited in the marine environment and concluded that the likelihood of the ANZECC guideline water quality value being exceeded is insignificant. The EPA have agreed that the estimation of copper deposition in the marine environment is well below the ANZECC trigger limit based on the modelled dust deposition rates and the estimated concentration of metals in the dust.<br><br>On the basis of the information provided, it is concluded that the marine outcome is appropriate for potential dust and other mine related impacts, and would be achievable provided the proposed dust control and management strategies are effectively implemented. However this would need to be demonstrated through monitoring against measurement criteria relating to impacts on the marine environment.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | operations and post completion. |

| *DSD assessment of outcomes* | | | |
|---|---|---|---|
| **ID / Impact Event / Rex Proposed Outcome** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML(C)- A1**<br><br>**Impact event:** Elevated dust continues post mine closure<br><br>**Rex proposed outcome:** No public health and nuisance impacts to local residents from dust generated on site, post-closure | The proposed outcome does not accurately describe the level of impact.<br><br>The proposed outcome is not considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies.<br><br>The outcome accurately reflects the potential impact on the public from dust post completion however only suggests the public as a receptor and fails to highlight other receptors which could be impacted by dust post completion. Consideration of post completion impacts and management of the impacts should occur throughout the early stages of the mine life. It is therefore recommended that outcomes for all non-closure impacts consider closure. | Rex considers control strategies would reduce this impact to a level of low.<br><br>Rex has identified elevated dust post mine closure as a potential impact however in the outcome proposed Rex have only highlighted the public as a receptor. As with dust during operations DSD considers there is the potential for other receptors to be impacted such as native flora, crops, livestock and the marine environment.<br><br>Management of this potential impact would be through the successful rehabilitation of the site, which would return disturbed and cleared areas to native vegetation and agricultural pursuits (other than the pit void). The residual risk following successful rehabilitation is classified as low. This residual risk rating was considered reasonable by JBS&G in its review of the project air quality impacts (Pg. 25 JBS&G 2014).<br><br>On the basis of the information provided, it is concluded that the air quality closure would be achievable in the long term provided the proposed rehabilitation activities are effectively implemented. Modification to other outcomes would however be required to reduce risks to all receptors.<br><br>DSD considers that the outcome recommended by DSD would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction, operation and post completion, ensure that there are no public health and/or public nuisance impacts from air emissions and/or dust generated by mining operations. |

## Table 7.1.4 – Outcomes for impact events identified by DSD

| *Outcomes for impact events identified by DSD* | | | |
|---|---|---|---|
| **ID** | **Acceptability of outcome** | **Achievability of outcome** | **Recommended regulatory response** |
| **DSD ML-A1**<br><br>**Impact event:** Post cessation of mineral processing, dust generated from the tailings surface causing increased dust emissions to sensitive receptors<br><br>**Proposed Outcome:** Outcomes based on the DSD Regulatory Response for impacts **ML-A1** to **ML-A7** | The outcomes accurately describe the level of impact.<br><br>The outcomes are considered suitable statements on the acceptable level of impact on the environment. | The discussion on achievability of outcomes for impacts **ML-A1** to **ML-A7** is relevant to the assessment of impact **DSD ML-A1** because dust emissions from the TSF were not explicitly discussed in the Proposal. SA Government raised this impact (under Response Document Issue No. 5) primarily due to concern that, if the tailings were not deposited at a suitable solids density, the rate of consolidation of tailings may not permit the timely installation of the cover system after cessation of mineral processing.<br><br>Rex subsequently provided a risk assessment in their Response document including provision of further control strategies specifically relating to management of dust from the TSF. Considering the controls proposed Rex has identified a residual risk level of low.<br><br>DSD sought advice from two technical experts on the response provided by Rex. Both technical experts agree that during operation there is a low likelihood that the surface of the TSF would be a dust source. This issue was commented on by JBS&G who highlighted that TSF emissions during operations are rarely included in air quality assessments due to the assumption that tailings material would remain sufficiently moist to prevent wind generation of dust. In the JBS&G report it also notes that the anticipated design solids concentration are unlikely to result in areas that would 'dry sufficiently to dust during the operational stage of the Project' (Pg. 20, JBS&G 2014).<br><br>In the report provided by SLR Consulting it indicates that the inability to achieve the required timely consolidation and hence the ability to establish timely capping of the TSF may elevate the potential for dust generation subsequent to cessation of mineral processing. The rate of consolidation is largely dependent upon achieving a tailings solids content of 55% (refer to Pg. 2, SLR Consulting 2014).<br><br>SLR Consulting has noted that based on their industry experience there is the potential for tailings densities to be lower than expected due to a lack of consistency of the tailings deposited in the TSF throughout the operation of the plant. It was further noted within the same report that 'the ability of operations to | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>DSD considers the regulatory responses for impacts **ML-A1** to **ML-A7** are acceptable. |

| *Outcomes for impact events identified by DSD* | | | |
|---|---|---|---|
| **ID** | **Acceptability of outcome** | **Achievability of outcome** | **Recommended regulatory response** |
| | | achieve high and consistent underflow densities relies heavily upon the quality of management applied…' (Pg. 3, SLR Consulting 2013). In addition SLR Consulting go on to describe in greater detail what would be required to successfully operate the TSF over the life of the mine (see page 9, SLR Consulting 2013).<br>Rex has identified a host of other strategies to reduce dust off the TSF during operations and closure as described in the Response document including formation of a salt crust, dust suppression methods and meteorological monitoring. Both reviewers agree that the formation of a salt crust would reduce potential for dusting however they also highlight the length of time dry tailings surfaces are exposed to the weather would influence the effectiveness of these control strategies. SLR Consulting have also noted that pre-planning would be required to ensure the effective management of the TSF.<br>It is concluded that the air quality closure outcomes for ML-A1 to ML-A7 are appropriate, would be achievable and would reduce the residual risk to low provided that Rex adequately plan for the management of the TSF for the operational life of the TSF and post completion. DSD would therefore recommend that conditions would accompany the outcomes to ensure suitable planning and management of the TSF is undertaken.<br>DSD considers that the outcomes recommended by DSD would be achievable. | |
| **DSD ML-A2**<br>**Impact event:** Health impacts on neighbouring sensitive receptors from increased $PM_{2.5}$ emissions<br>**Proposed Outcome:** Outcomes based on the DSD Regulatory Response for impacts **ML-A1** | The outcome accurately describes the level of impact.<br>The outcome is considered a suitable statement on the acceptable level of impact on the environment. | $PM_{2.5}$ was not assessed by Rex in the Proposal. This was raised by SA Government as a potential impact requiring further information which Rex provided response to (refer to Issue No. 5, Rex Response Document).<br>The request for further response by government reflects current health science (as described in the 2011 Ambient Air Quality NEPM Review Report) which suggests there may be health impacts associated with exposure to $PM_{2.5}$. Currently there is a NEPM advisory standard for $PM_{2.5}$ (being a 24-hour average of 25 µg/$m^3$ and an annual average of 8µg/$m^3$). The EPA advises that although $PM_{2.5}$ is only a reporting standard in the Ambient Air NEPM and, as such, | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br>DSD considers the regulatory responses for impact ML-A1 are acceptable. |

| *Outcomes for impact events identified by DSD* | | | |
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| **ID** | **Acceptability of outcome** | **Achievability of outcome** | **Recommended regulatory response** |
| | | currently has no mandatory compliance requirement, Rex should have regard for $PM_{2.5}$ as a potential health risk.<br>JBS&G were engaged to conduct a review on the response regarding $PM_{2.5}$ and all other applicable air quality information provided by Rex. The reviewer concluded that the active measures proposed by Rex (as described in **ML-A1**) to ensure compliance with the $PM_{10}$ 24-hour criterion would be likely to also provide an adequate level of protection against the health effects of $PM_{2.5}$ emissions. Based on the JBS&G review it was recommended that '$PM_{2.5}$ dust be monitored concurrently with the $PM_{10}$ monitoring until such time as either the potential health impacts of $PM_{2.5}$ are confirmed through continued demonstrated compliance with the NEPM $PM_{2.5}$ advisory standards (i.e. not less than one year), or until such time as a reliable relationship between measured $PM_{10}$ and $PM_{2.5}$ ground-level concentrations is established sufficient to enable the $PM_{10}$ monitoring data to be used as a proxy for $PM_{2.5}$ concentrations' (section 4.2.2.1, JBS&G 2014). This recommendation has been addressed in Table 7.1.5.<br>DSD considers that the outcomes recommended by DSD would be achievable. | |
| **DSD ML-A3**<br>**Impact event:**<br>Reduced grain quality resulting from increased dust emissions<br>**Proposed Outcome:**<br>DSD proposes the following outcome:<br>The Tenement Holder must, in construction, operation and post completion, ensure no impacts to agricultural productivity for third party | The outcome accurately describes the level of impact.<br>The outcome is considered a suitable statement on the acceptable level of impact on the environment. | Impact on the quality of grain produced from crops within and surrounding the ML was not assessed by Rex in the Proposal.<br>Grain contamination due to copper contamination was an issue raised during statutory consultation. Copper contamination was identified as an issue by State Government requiring further response from Rex (Response Document Technical Issues No.2 and No.5).<br>While deposition rates are anticipated to be minor, there is no information presented by Rex on the permissible concentrations of elements in grain. This observation was reflected in the JBS&G report. Based on further technical advice sought, DSD has been advised by SARDI that the defined Maximum Residue Limits (MRL) for copper in grain is 10mg/kg. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br>The Tenement Holder must, in construction, operation and post completion, ensure no impacts to agricultural productivity for third party land users on or off the Lease as a result of mining operations, including:<br>• reduction in crop yield;<br>• reduction in grain |

| *Outcomes for impact events identified by DSD* | | | |
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| **ID** | **Acceptability of outcome** | **Achievability of outcome** | **Recommended regulatory response** |
| land users on or off the Lease as a result of mining operations, including:<br>• reduction in crop yield;<br>• reduction in grain quality; or<br>• adverse health impacts to livestock | | DSD has used the modelled dust deposition data to estimate the potential copper that could be deposited on grain crops near the mine and concluded that the likelihood of the MRL value being exceeded is highly unlikely.<br>Considering this information and the control measures proposed DSD considers that the outcome would be achievable however the measurement criterion which would be defined in the PEPR would have to consider management of dust deposition to ensure activities from the ML operations are not affecting the quality of the grain in accordance with MRLs for copper.<br>On the basis of the information provided, it is concluded that the recommended outcome is appropriate for dust impacts to grain and would be achievable provided the proposed dust control and management strategies (as described in **ML-A1**) are effectively implemented.<br>DSD considers that the outcomes recommended by DSD would be achievable. | quality; or<br>• adverse health impacts to livestock |
| **DSD ML-A4**<br>**Impact event:** Impacts to livestock resulting from increased dust deposition<br>**Proposed Outcome:** DSD proposes the following outcome:<br>The Tenement Holder must, in construction, operation and post completion, ensure no impacts to agricultural productivity for third party land users on or off the Lease as a result of mining operations, including:<br>• reduction in crop yield; | The outcome accurately describes the level of impact.<br>The outcome is considered a suitable statement on the acceptable level of impact on the environment. | This was an issue SA Government sought further information on particularly in relation to livestock ingesting plant matter which had been affected by dust. The discussion provided by Rex, as with impacts on crops, was focused around discussion on anticipated dust deposition rates post implementation of controls, controlling the primary dust pathway to the receptor and mineralogical composition of the main dust sources. There was however no discussion on threshold limits of copper and heavy metals relevant to livestock.<br>The control strategies Rex propose to adopt are specified in **ML-A1** and Rex propose to provide further detail on these in an Air Quality Management Plan which would be submitted as part of the PEPR. The focus of these strategies is to control the sources of dust emissions. Regarding livestock, the main pathways by which an impact could occur is the ingestion of metals through the uptake of vegetation, water or soil (including uptake by the plant through soil).<br>The JBS&G review of the impact assessment concludes that the proposed operational controls for dust management are considered reasonable and appropriate. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br>The Tenement Holder must, in construction, operation and post completion, ensure no impacts to agricultural productivity for third party land users on or off the Lease as a result of mining operations, including:<br>• reduction in crop yield;<br>• reduction in grain quality; or<br>• adverse health impacts to livestock |

| *Outcomes for impact events identified by DSD* | | | |
|---|---|---|---|
| **ID** | **Acceptability of outcome** | **Achievability of outcome** | **Recommended regulatory response** |
| • reduction in grain quality; or<br>• adverse health impacts to livestock | | Based on the discussion in impact event **DSD-ML-A3** (grain quality), and the ability to pro-actively mitigate potential air quality impacts before they are realised, DSD determines that the recommended outcome is appropriate, and would be achievable provided the proposed dust control and management strategies are effectively implemented.<br>DSD considers that the outcomes recommended by DSD would be achievable. | |
| **DSD ML-A10**<br>**Impact event:** Impacts to public health resulting from toxicological characteristics of dust.<br>**Proposed Outcome:** DSD proposes the following outcome:<br>The Tenement Holder must, in construction, operation and post completion, ensure that there are no public health and/or public nuisance impacts from air emissions and/or dust generated by mining operations. | The outcome accurately describes the level of impact.<br>The outcome is considered a suitable statement on the acceptable level of impact on the environment. | Rex did not identify this as an impact in the Proposal. This was an issue SA Government sought further information on. The discussion provided by Rex was focused around discussion on anticipated dust deposition rates post implementation of controls, controlling the primary dust pathway to the receptor and measuring mineralogical composition of the main dust sources. There was however no discussion on threshold limits of copper and heavy metals.<br>The main pathway for dust to have an impact on health is via the air. DSD considers that the dust deposition and any toxicological effects would be managed through controlling dust levels in the air. Expert review of the dust section by JBS&G concluded that the proposed operational controls are considered reasonable and appropriate. Further discussion on these controls is provided under **ML-A1**.<br>On the basis of the information provided, and the ability to pro-actively mitigate potential air quality impacts before they are realised, DSD determines that the recommended outcome would be achievable provided the proposed dust control and management strategies are effectively implemented.<br>DSD considers that the outcomes recommended by DSD would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*<br>The Tenement Holder must, in construction, operation and post completion, ensure that there are no public health and/or public nuisance impacts from air emissions and/or dust generated by mining operations. |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex or identified by DSD.

### 7.1.5 *Measurement Criteria (ML)*

Table 7.1.5 is DSD's assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

**Table 7.1.5 – DSD's assessment of the measurement criteria**

| *DSD's assessment of the measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **ML-A1**<br><br>**Impact event:** Health impacts on neighbouring sensitive residential receptors from increased $PM_{10}$ emissions<br><br>**Recommended outcome:** The Tenement Holder must, in construction, operation and post completion, ensure that there are no public health and/or public nuisance impacts from air emissions and/or dust generated by mining operations. | $PM_{10}$ dust levels collected from sampling equipment at locations specified in the Air Quality Management Plan would be sampled over a 24 hour period every six days as per Australian standards and results would demonstrate compliance with NEPM 1998 criteria of 50 $\mu g/m^3$ (daily average) [when background levels are below 50 $\mu g/m^3$] with <5 days of exceedances per year at the neighbouring sensitive residential receptors or, if background levels exceed 50 $\mu g/m^3$ results show no additional | The EPA advised that this draft outcome measurement criterion is not appropriate as a sampling regime for managing dust and fine particulates based on the information provided in the Proposal and Response document. The 1 in 6 day sampling protocol is considered an insufficient frequency for this proposal, and final measurement criteria must align with the Air NEPM standards for PM10 which provides results against the 24-hour PM10 goal on a daily basis, and measurement be undertaken on the basis of continuous real-time monitoring and supported by meteorological monitoring for determining the emissions resulting from mining operations.<br><br>In the Hillside Response Document, Rex has committed to real-time monitoring with daily averaging in line with the NEPM requirements, with outcome measurement criteria for PM10 aligning with the air NEPM Standards (Environment Australia May, 2001) which states that an ambient PM10 standard of 50 micrograms per cubic metre (µg/m3) as a 24-hour average. Rex has also suggested this criteria include, 'with 5 exceedances permitted per year'. | DSD considers that there is a strong reliance on control strategies required to reduce risk to the environment (predominantly the use of real-time monitoring and actions) and thus Leading Indicator Criteria are required.<br><br>Rex has proposed Leading Indicator Criteria.<br><br>As indicated in the JBS&G report (2014) 'Rex has committed to the implementation of an active operational monitoring and response plan…designed to monitor dust concentrations in real-time and apply further mitigation and/or reduce or suspend mining operations to ensure that the PM10 24-hour average dust | *DSD recommends the following lease condition(s) applicable to the measurement criteria:*<br><br>**PM10**<br><br>The Tenement Holder must ensure that:<br><br>1.the total PM 10 dust concentration (including both ambient and mine related dust) leaving the site is less than 50µg/$m^3$ as a 24 hour (midnight to midnight) average of measurements taken at intervals of not more than 10 minutes; or<br><br>2. where the total PM 10 dust concentration entering the site exceeds 50µg/$m^3$ as a 24 hour (midnight to midnight) average of measurements taken at intervals of not more than 10 minutes, the total |

| *DSD's assessment of the measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| | contribution of $PM_{10}$ at the neighbouring sensitive residential receptors above background concentrations. | This criteria is considered consistent with Ambient Air Quality NEPM (representing the current state of particulate health science in an Australian context), and appropriate for use in this situation except the allowance of 5 exceedances per year. The Ambient Air Quality NEPM also establishes a goal for PM10 of no more than 5 allowable exceedances per year to allow for the impacts of prescribed burning, dust storms and bushfires on regional air quality and should not be interpreted as allowing individual industries to contribute to such exceedances. (Reference: Protocol for Environmental Management State Environment Protection Policy (Air Quality Publication 1191 December 2007, EPA Victoria.)<br><br>It is recommended that in order to ensure Rex commit to NEPM standards that a condition be imposed to accompany the outcome, which specifies the applicable criteria.<br><br>DSD considers there are appropriate measurement methodologies and standards to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | concentration does not exceed the criterion, including both operational and background sources of dust.'<br><br>To this effect Rex has proposed LIC stating 'Continuous real time weather and dust monitoring at locations specified in the Air Quality Management Plan, would provide a hierarchy of controls for work mitigation measures triggered by specified climatic conditions for PM10 dust levels.'<br><br>Should a lease be granted, the leading indicator criteria which would include dust emission trigger levels would be finalised in the PEPR submission. | PM10 dust leaving the site does not exceed the measured level entering the site during that period.<br><br>In the event that monitoring shows that Conditions <associated with **ID ML-A1** measurement criteria> have been breached, the tenement holder must immediately cease the activity which resulted in the breach.<br><br>The Tenement Holder must ensure that PM2.5 and PM10 dust concentration data and meteorological monitoring data acquired by the Tenement Holder is reported in real time to the public on an unrestricted internet site. The monitoring data must be retained and remain accessible on the unrestricted internet site for the life of the mine.<br><br>The Tenement Holder must undertake meteorological monitoring in accordance with relevant Australian standards to measure and record (but not limited to) wind speed and direction, temperature, humidity, atmospheric pressure, solar radiation, rainfall and evaporation. |

| *DSD's assessment of the measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| | | | | *DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(d) of the Regulations in relation to the outcome for impact event **ML-A1**;*<br><br>Measure PM 10 dust concentration using monitoring methodology, equipment and instruments that are recognised by a relevant International or Australian Standard. |
| **ML-A2**<br><br>**Impact event:** Health impacts from contamination of water tanks via increased dust deposition<br><br>**Recommended outcome:** The Tenement Holder must, in construction, operation and post completion, ensure that there are no public health and/or public nuisance impacts from air emissions and/or dust generated by mining operations. | Annual testing of representative water tanks to ensure ongoing compliance with baseline water quality results from test work. | Baseline water quality from rainwater tanks at James Well and Rogues Point demonstrates existing water quality is within Australian drinking water standards. The results of this sampling were provided in the Rex Response Document. Additional subsequent baseline testing has been undertaken at rainwater tanks located at James Well, Rogues Point, Pine Point and surrounding landowners totalling 18 testing sites. Rex has indicated that results of this baseline sampling would be provided in the PEPR and that an ongoing monitoring plan would be developed.<br><br>This criteria is considered to appropriately demonstrate there is no impact to public health from mine generated dust contaminating rain water tanks.<br><br>It is recommended that a condition be imposed to reflect Rex's commitment to ongoing monitoring as proposed by Rex in the Proposal and Response Document. | DSD considers that there is a strong reliance on control strategies required to reduce risk to the environment (predominantly the use of real-time monitoring and actions) and thus Leading Indicator Criteria are required.<br><br>Rex has proposed Leading Indicator Criteria.<br><br>The criterion proposed by Rex is based on sampling of airborne dust and toxicological characterisation to demonstrate no significant levels of heavy metal of heavy metals in the dust | *DSD recommends the following lease condition(s) applicable to the measurement criteria:*<br><br>The Tenement Holder must undertake (subject to the consent of the owners of land) water quality testing of all rainwater tanks owned by third parties within the Lease and within 4 kilometres of the Lease boundary at least annually. Test results must be reported against the most recent *Australian Drinking Water Guidelines (Australian Government)*, and be provided to the respective owners of the tanks tested within one month of the sampling. |

*DSD's assessment of the measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| | | DSD considers the proposed methodology is an appropriate mechanism to demonstrate achievement of the outcome.<br>DSD considers that achievement of the recommended outcome would be measurable.<br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | composition. This is considered acceptable however 'significant levels' would need to be defined in the PEPR with consideration for human health standards.<br>In addition, given the high reliance on controls to reduce dust a link to the LIC stated for **ML-A1** and **ML-A3** should be identified in the PEPR to pre-empt dust deposition which could exceed defined criteria.<br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | |
| **ML-A3**<br>**Impact event:** Public nuisance arising from increased dust deposition at surrounding properties<br>**Recommended outcome:** The Tenement Holder must, in construction, | Dust deposition gauges at locations specified in the Air Quality Management Plan would be monitored monthly for total insoluble solids to demonstrate that the increase in deposited dust level remains below 2 g/m2/month. | The criteria is based on Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (2005) impact assessment criteria as there are no South Australian standards for TSP concentration and dust deposition rates. The EPA stated that although it does not generally use the NSW criteria as it is not able to provide information on short term episodes, it does not object to the use of this methodology if it is integrated with a comprehensive dust management plan. | DSD considers that there is a strong reliance on control strategies required to reduce risk to the environment (predominantly the use of real-time monitoring and actions) and thus Leading Indicator Criteria are required. | DSD recommends the following lease condition(s) applicable to the measurement criteria;<br>**Public Nuisance**<br>The Tenement Holder must ensure that the Total Dust Deposition (including both ambient and mine related dust) (**"TDD"**) leaving the site does not exceed 4g/$m^2$/month and the mine contribution of TDD |

*DSD's assessment of the measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| operation and post completion, ensure that there are no public health and/or public nuisance impacts from air emissions and/or dust generated by mining operations. | All complaints would be logged in a register and records would show that all complaints received have been investigated, and the complaint addressed within an agreed timeframe. The Air Quality Management Plan would be reviewed if required. | The Rex Response Document explains limitations in the model's ability to predict short-term dust deposition rates with an appropriate level of accuracy.<br><br>Given these limitations and the absence of South Australian specific amenity dust criteria, the use of the NSW proposed monthly and annual average dust deposition rates as a measure of the potential of the operation to influence amenity is appropriate.<br><br>In relation to the measurement of TSP concentration DSD has used the World Health Organisation (WHO) standards as follows; TSP < 120 µg/$m^3$ for a 24 hour average and TSP < 90 µg/$m^3$ for an annual average.<br><br>A complaint resolution measurement criterion for this outcome has also been provided by Rex. DSD consider this is not appropriate for a measurement criterion to show achievement of the outcome. However, DSD consider complaints could be used as a management strategy as a trigger for further control measures. DSD considers registers of complaints and actions to resolve should be included in compliance reporting requirements should the project be approved.<br><br>DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable. Should a lease be granted, these criteria would be finalised in the PEPR submission. | Rex has proposed Leading Indicator Criteria.<br><br>The criterion proposed by Rex is based on real time weather and dust monitoring and triggers as per **ML-A1**.<br><br>DSD considers the draft LIC as suitable for this stage of the assessment. During the development of the Air Quality Management Plan this criteria would need to be refined to define triggers and mitigation measures.<br><br>It is however suggested that an additional LIC be provided in the PEPR relating to monitoring of complaints received. This may allow trends to be identified that could lead to a development of a trigger level.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | does not exceed the baseline TDD data by greater than 2g/$m^2$/month.<br><br>*Note: Baseline TDD data includes any data submitted with the Mining Lease Proposal and any additional baseline data acquired subsequent to the Lease being granted.*.<br><br>The Tenement Holder must ensure that Total Suspended Particulate matter (**"TSP"**) leaving the site does not exceed an average of 120 µg/$m^3$ for a 24 hour period (midnight to midnight) and an average of 90 µg/$m^3$ for any 12 month period.<br><br>In the event that monitoring shows that Conditions <associated with **ID ML-A3** measurement criteria> have been breached, the tenement holder must immediately cease the activity which resulted in the breach.<br><br>*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(d) of the Regulations in relation to the outcome for impact event **ML-A3**;* |

*DSD's assessment of the measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
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| | | | | Measure PM 10 dust concentration using monitoring methodology, equipment and instruments that adhere to Australian Standard AS/NZS 3580.9.11, and any future updates or variants to that Standard.<br><br>Measure TDD using monitoring methodology, equipment and instruments that are recognised by a relevant International or Australian Standard.<br><br>Measure TSP using monitoring equipment and instruments that are recognised by a relevant International or Australian Standard.<br><br>Directional Dust Deposition (including both ambient and mine related dust) (**"DDD"**) is to be measured using monitoring equipment and instruments that are recognised by a relevant International or Australian Standard. |

*DSD's assessment of the measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **ML-A5**<br><br>**Impact event:** Reduced native plant growth or abundance resulting from increased dust and particulate deposition<br>**Recommended outcome:** The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the Lease through:<br>• clearance;<br>• dust/contaminant deposition;<br>• fire;<br>• reduction in water supply; or<br>• other damage<br>unless prior approval under the relevant legislation is obtained. | An annual survey of the native vegetation would show that all clearance of native vegetation is authorised under the Native Vegetation Act when compared with baseline survey presented in the approved NVMP. | This criteria proposed by Rex is considered appropriate at this stage for demonstrating no impacts or clearance on native vegetation from dust deposition that is not accounted for in SEB arrangements. In this context clearance includes physical disturbance as well as inhibiting plant growth. This criterion would have to be refined during the development of the PEPR.<br><br>DSD considers the proposed methodology is an appropriate mechanism to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers that Leading Indicator Criteria specific to this impact event are not required. | DSD considers no lease conditions applicable to the measurement criteria are required. |

*DSD's assessment of the measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **ML-A6**<br><br>**Impact event:** Reduced agricultural crop growth rates resulting from increased dust deposition on leaves<br><br>**Recommended outcome:** The Tenement Holder must, in construction, operation and post completion, ensure no impacts to agricultural productivity for third party land users on or off the Lease as a result of mining operations, including:<br>• reduction in crop yield;<br>• reduction in grain quality; or<br>• adverse health impacts to livestock | Dust deposition gauges would be monitored monthly for total insoluble solids to demonstrate total insoluble solids remain below investigation limit of 4g/m2/month annual average for monitoring applications. | In the JBS&G review it was suggested that 'a network of dust deposition monitors should be established in locations considered to be appropriate to the impact being assessed (crops, rainwater tanks, grain storages etc). These should comply with the relevant Australian Standards for monitor siting, design and operation, and should allow comparison against the 4 g/m2/month total dust deposition criterion.' (Pg. 30, JBS&G 2014).<br><br>To this effect the criterion proposed would be suitable in part, however the technical expert has further highlighted that additional (non-dust) monitoring would be required to provide context to the deposited dust results.<br><br>Rex have not provided any threshold limits which may cause an impact to cropping yields (regarding dust coating slowing plant growth or toxicological thresholds for copper and metals) however, the criteria proposed for monitoring public nuisance should constitute adequate measurement for the achievement of this outcome.<br><br>DSD considers there are methodologies that are an appropriate mechanism to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | Rex has not proposed Leading Indicator Criteria.<br><br>DSD considers that there is a strong reliance on control strategies required to reduce risk to the environment including all applicable strategies relating to dust mitigation on haul roads (as per 8.3.1.3 of the Proposal) and it is recommended that Leading Indicator Criteria be considered for inclusion in the PEPR.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease conditions applicable to the measurement criteria are required. |

*DSD's assessment of the measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **ML-A7**<br><br>**Impact event:** Impacts on marine flora and fauna from increased sedimentation rates<br><br>**Recommended outcome:**<br>The Tenement Holder must ensure no loss of abundance and diversity of marine flora and fauna from contaminants and dust deposition resulting from mining operations, during operations and post completion. | Once mining has commenced, at a time agreed with the regulators, samples of airborne dust would be collected and toxicological characterisation of the dust would be carried out to demonstrate that there are not significant levels of heavy metals in the dust composition. | As per **ML-A6** the criterion provided is only partly acceptable in that Rex have not provided data which indicates at what level impacts to the marine environment may manifest. In addition as highlighted in the JBS&G review, 'The potential impact of the toxicological components of cumulative dust deposition on the marine environment over the life of the operation (e.g. relative to appropriate marine water quality standards) is also not presented' (Pg. 25, JBS&G 2014). DSD therefore considers that the criteria proposed for impact event **DSD ML-A3** would be appropriate for demonstrating achievement of this outcome.<br><br>DSD considers there are appropriate measurement methodologies and standards to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers that should a lease be granted, leading indicator criteria should be considered in the PEPR submission. | DSD considers no lease conditions applicable to the measurement criteria are required. |

*DSD's assessment of the measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **ML(C)-A1**<br><br>**Impact event:** Elevated dust continues post mine closure<br><br>**Recommended outcome:** Outcomes applicable to **ML-A1** to **A10.** | Dust levels collected from sampling equipment at locations specified in the Air Quality Management Plan would be reported annually post completion until results show no increase from background levels. | DSD considers that the criterion proposed by Rex is considered appropriate at this stage. This is reflected in the comments provided in the JBS&G technical review (report page 26). DSD considers this measurement criteria would also be suitable to demonstrate achievement of the DSD proposed outcome.<br><br>DSD considers the proposed methodology is an appropriate mechanism to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers that a leading indicator criterion is not required. | DSD considers no lease conditions applicable to the measurement criteria are required. |

*DSD's assessment of the measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **DSD ML-A1**<br><br>**Impact event:** Post cessation of mineral processing, dust generated from the tailings surface causing increased dust emissions to sensitive receptors<br><br>**Recommended outcome:** In the Response Document Rex refers to existing air quality outcomes. DSD recommends outcomes in the Regulatory Response for impacts **ML-A1** to **ML(C)-A1**<br><br>(including any additional conditions applicable to **ML-A1** to **ML(C)-A1,** and **DSD ML-A1** as per the recommended regulatory response) | Rex has not proposed criteria for this outcome.<br><br>In the Response Document Rex refers to existing air quality measurement criteria. DSD recommends the criteria for impacts **ML-A1** to **ML(C)-A1**<br><br>(including any additional conditions applicable to **ML-A1** to **ML(C)-A1** as per the recommended regulatory response) | The criteria and additional conditions relating to the criteria for impacts **ML-A1** to **ML(C)-A1** are acceptable to measure outcomes relating to **DSD ML-A1**.<br>DSD considers the proposed methodology are an appropriate mechanism to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | Comments on leading indicator criteria for impact **ML-A1** to **ML(C)-A1** are applicable to **DSD ML-A1** also. | DSD considers no lease conditions applicable to the measurement criteria are required. |
| **DSD ML-A2**<br><br>**Impact event:** Health impacts on neighbouring sensitive receptors from | Rex has not proposed criteria for this outcome.<br><br>There is no criterion | There is no draft criteria proposed by Rex which can be assessed.<br><br>DSDs recommendation for Rex's criteria is based on a technical review by JBS&G. The review of $PM_{2.5}$ by JBS&G specified that '$PM_{2.5}$ dust be monitored | Comments on leading indicator criteria for impact **ML-A1** are applicable to **ML-A9** also. The proposed LIC is at this stage is suitable. | *DSD recommends the following lease condition(s) applicable to the measurement criteria:* |

*DSD's assessment of the measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| increased $PM_{2.5}$ emissions<br><br>**Recommended outcome:** The Tenement Holder must, in construction, operation and post completion, ensure that there are no public health and/or public nuisance impacts from air emissions and/or dust generated by mining operations. | proposed by Rex to monitor $PM_{2.5}$. DSD recommends that Rex in the development of the PEPR provide a criterion which would enable $PM_{2.5}$ to be monitored in accordance with the NEPM advisory standard. | concurrently with the $PM_{10}$ monitoring until such time as either the potential health impacts of $PM_{2.5}$ are confirmed through continued demonstrated compliance with the NEPM $PM_{2.5}$ advisory standards (i.e. not less than one year), or until such time as a reliable relationship between measured $PM_{10}$ and $PM_{2.5}$ ground-level concentrations is established sufficient to enable the $PM_{10}$ monitoring data to be used as a proxy for $PM_{2.5}$ concentrations' (Pg. 31, JBS&W 2014).<br><br>To ensure that monitoring is consistent with NEPM advisory standards, and that monitoring requirements are incorporated into the Air Quality Management Plan, conditions relating to $PM_{2.5}$ would be recommended.<br><br>DSD considers there are appropriate measurement methodologies and standards to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | | **PM 2.5**<br><br>1. Subject to **Condition 2** the Tenement Holder must ensure that:<br><br>1.1. the total PM 2.5 dust concentration (including both ambient and mine related dust) leaving the site is less than 25µg/$m^3$ as a 24 hour (midnight to midnight) average of measurements taken at intervals of not more than 10 minutes; or<br><br>1.2. where the total PM 2.5 dust concentration entering the site exceeds 25µg/$m^3$ as a 24 hour (midnight to midnight) average of measurements taken at intervals of not more than 10 minutes, the total PM2.5 dust leaving the site does not exceed the measured level entering the site during that period.<br><br>2. **Condition 1** is applicable unless and until the Director of Mines has notified the Tenement Holder in writing that he is satisfied that the |

*DSD's assessment of the measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| | | | | Tenement Holder has:<br>2.1. demonstrated compliance with Condition 2 for a period of no less than one consecutive year after the commencement of mineral processing; and<br>2.2. established that PM10 measurements can be used as a proxy for PM 2.5 measurements.<br>In the event that monitoring shows that Conditions <associated with **ID DSD ML-2** measurement criteria> have been breached, the tenement holder must immediately cease the activity which resulted in the breach.<br>The Tenement Holder must ensure that PM2.5 and PM10 dust concentration data and meteorological monitoring data acquired by the Tenement Holder is reported in real time to the public on an unrestricted internet site. The monitoring data must be retained and remain accessible on the unrestricted internet site for the life of the mine. |

*DSD's assessment of the measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| | | | | The Tenement Holder must undertake meteorological monitoring in accordance with relevant Australian standards to measure and record meteorological data including (but not limited to) wind speed and direction, temperature, humidity, atmospheric pressure, solar radiation, rainfall and evaporation.<br><br>*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(d) of the Regulations in relation to the outcome for impact event **DSD ML-A2**;*<br>Measure PM 2.5 dust concentration using monitoring methodology, equipment and instruments that are recognised by a relevant International or Australian Standard. |

*DSD's assessment of the measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **DSD ML-A3**<br><br>**Impact event:**<br><br>Reduced grain quality resulting from increased dust emissions<br><br>**Proposed Outcome:**<br>The Tenement Holder must, in construction, operation and post completion, ensure no impacts to agricultural productivity for third party land users on or off the Lease as a result of mining operations, including:<br>• reduction in crop yield;<br>• reduction in grain quality; or<br>• adverse health impacts to livestock | There is no criterion proposed by Rex to monitor impacts to grain quality. DSD recommends that Rex in the development of the PEPR provide a criterion which would enable impacts to grain to be monitored. | In relation to the criteria proposed for **ML-A6** in the JBS&G review it was suggested that 'a network of dust deposition monitors should be established in locations considered to be appropriate to the impact being assessed. These should comply with the relevant Australian Standards for monitor siting, design and operation.<br><br>As Rex has not provided any threshold limits which may cause an impact to grain from copper. DSD considers that additional measurement criteria would be required to demonstrate achievement of the outcome. It is recommended that during the development of the PEPR threshold limits be considered to enable suitable criteria to be developed. This may relate to the use of MRLs as discussed previously in the **DSD ML-A3** sections.<br><br>DSD considers there are appropriate measurement methodologies and standards to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers that there is a strong reliance on control strategies required to reduce risk to the environment including all applicable strategies relating to dust mitigation on haul roads (as per 8.3.1.3 of the Proposal) and thus Leading Indicator Criteria are required.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission.<br><br>DSD recommends that that Leading Indicator Criteria should include trigger values for metals concentration in dust deposited in dust deposition gauges located in line with the pathway between the dust source and the receptors. | *DSD recommends the following lease condition(s) applicable to the measurement criteria:*<br><br>The Tenement Holder must measure chemical and toxicological composition of dust emissions generated by mining operations through an ongoing air monitoring program. |

*DSD's assessment of the measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **DSD ML-A4**<br><br>**Impact event:** Impacts to livestock resulting from increased dust deposition<br><br>**Recommended outcome:** The Tenement Holder must, in construction, operation and post completion, ensure no impacts to agricultural productivity for third party land users on or off the Lease as a result of mining operations, including:<br>• reduction in crop yield;<br>• reduction in grain quality; or<br>• adverse health impacts to livestock | DSD recommends that Rex provide a criterion in the development of the PEPR which is similar to **DSD ML-A3**, which requires toxicological characterisation of the dust | As discussed in relation to the criterion for **DSD ML-A3** Rex has not provided data which indicates at what level impacts to livestock may manifest. DSD therefore considers that if a criterion were to be proposed similar to **DSD ML-A3** that the criterion would need to define what is considered to be 'significant levels' based on threshold limits at which toxicological impacts to livestock can occur from copper. It would also need to consider the potential for cumulative impacts (as identified by dust deposition from the model, over the mine life).<br><br>DSD considers there are methodologies that are appropriate mechanisms to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers that there is a strong reliance on control strategies required to reduce risk to the environment including dust mitigation on haul roads (as per 8.3.1.3 of the Proposal) and thus Leading Indicator Criteria are required.<br><br>DSD recommends that that Leading Indicator Criteria should include trigger values for metals concentration in dust deposited in dust deposition gauges located in line with the pathway between the dust source and the receptors.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | *DSD recommends the following lease condition(s) applicable to the measurement criteria:*<br><br>The Tenement Holder must measure chemical and toxicological composition of dust emissions generated by mining operations through an ongoing air monitoring program |

*DSD's assessment of the measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **DSD ML-A10**<br><br>**Impact Event:** Impacts to public health resulting from toxicological characteristics of dust.<br><br>**Recommended Outcome:**<br><br>The Tenement Holder must, in construction, operation and post completion, ensure that there are no public health and/or public nuisance impacts from air emissions and/or dust generated by mining operations. | Rex has not proposed criteria for this outcome.<br><br>There is no criterion proposed by Rex as this is an impact identified by DSD. DSD recommends that Rex provide a criterion in the development of the PEPR. | As discussed in relation to the criterion for **ML-A7** Rex has not provided data which indicates at what level impacts to humans. DSD therefore considers that if a criterion were to be proposed similar to **ML-A7** that the criterion would need to define what is considered to be on threshold limits at which toxicological impacts to humans can occur from copper. It would also need to consider the potential for cumulative impacts (as identified by dust deposition from the model, over the mine life).<br><br>Safework Australia has a standard for safe workplace exposure for airborne contaminants. This standard only takes into consideration safe contaminant levels based on a working week period of exposure (8 hour days, 5 days per week). These standards can be adjusted if the exposure time is likely to be longer than the average working week. DSD considers these standards can be adjusted to provide a standard level of airborne contaminants that compliance can be assessed against.<br><br>DSD considers there are appropriate measurement methodologies to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers that there is a strong reliance on control strategies required to reduce risk to the environment including dust mitigation on haul roads (as per 8.3.1.3 of the Proposal) and thus Leading Indicator Criteria are required.<br><br>Rex has not proposed Leading Indicator Criteria.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | *DSD recommends the following lease condition(s) applicable to the measurement criteria:*<br><br>The Tenement Holder must measure chemical and toxicological composition of dust emissions generated by mining operations through an ongoing air monitoring program |

### 7.1.6 *Summary of the recommended regulatory response (ML)*

DSD has assessed that all potential impacts to air quality during construction, operations and post completion have been identified through this assessment and acceptable outcomes have been recommended for all primary impact events where the severity of primary consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for sensitive receptors and receiving environment during construction, operation and post completion. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

*DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*

1. The Tenement Holder must, in construction, operation and post completion, ensure that there are no public health and/or public nuisance impacts from air emissions and/or dust generated by mining operations.

2. The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the Lease through:

- clearance;
- dust/contaminant deposition;
- fire;
- reduction in water supply; or
- other damage

unless prior approval under the relevant legislation is obtained.

3. The Tenement Holder must, in construction, operation and post completion, ensure no impacts to agricultural productivity for third party land users on or off the Lease as a result of mining operations, including:

- reduction in crop yield;
- reduction in grain quality; or
- adverse health impacts to livestock

4. The Tenement Holder must ensure no loss of abundance and diversity of marine flora and fauna from contaminants and dust deposition resulting from mining operations, during operations and post completion.

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event **ML-A1**:*

Undertake continuous dust and meteorological monitoring to inform decisions for operational response and contingency measures to be implemented to prevent exceedance of compliance criteria.

Progressive rehabilitation and stabilisation of disturbed areas undertaken throughout the life of mine to control dust emissions generated by wind erosion.

*DSD recommends the following lease condition(s) applicable to the measurement criteria:*

1. The Tenement Holder must ensure that:
   1.1. the total PM 10 dust concentration (including both ambient and mine related dust) leaving the site is less than 50µg/$m^3$ as a 24 hour (midnight to midnight) average of measurements taken at intervals of not more than 10 minutes; or
   1.2. where the total PM 10 dust concentration entering the site exceeds 50µg/$m^3$ as a 24 hour (midnight to midnight) average of measurements taken at intervals of not more than 10 minutes, the total PM10 dust leaving the site does not exceed the measured level entering the site during that period.
2. Subject to **Condition 3** the Tenement Holder must ensure that:
   2.1. the total PM 2.5 dust concentration (including both ambient and mine related dust) leaving the site is less than 25µg/$m^3$ as a 24 hour (midnight to midnight) average of measurements taken at intervals of not more than 10 minutes; or
   2.2. where the total PM 2.5 dust concentration entering the site exceeds 25µg/$m^3$ as a 24 hour (midnight to midnight) average of measurements taken at intervals of not more than 10 minutes, the total PM2.5 dust leaving the site does not exceed the measured level entering the site during that period.
3. **Condition 2** is applicable unless and until the Director of Mines has notified the Tenement Holder in writing that he is satisfied that the Tenement Holder has:
   3.1. demonstrated compliance with Condition 2 for a period of no less than one consecutive year after the commencement of mineral processing; and
   3.2. established that PM10 measurements can be used as a proxy for PM 2.5 measurements.
4. The Tenement Holder must ensure that the Total Dust Deposition (including both ambient and mine related dust) (**"TDD"**) leaving the

site does not exceed 4g/$m^2$/month and the mine contribution of TDD does not exceed the baseline TDD data by greater than 2g/$m^2$/month.

*Note: Baseline TDD data includes any data submitted with the Mining Lease Proposal and any additional baseline data acquired subsequent to the Lease being granted.*

5. The Tenement Holder must ensure that Total Suspended Particulate matter (**"TSP"**) leaving the site does not exceed an average of 120 µg/$m^3$ for a 24 hour period (midnight to midnight) and an average of 90 µg/$m^3$ for any 12 month period.
6. In the event that monitoring shows that Conditions 1, 2, 4 or 5 have been breached, the tenement holder must immediately cease the activity which resulted in the breach.
7. The Tenement Holder must measure chemical and toxicological composition of dust emissions generated by mining operations through an ongoing air monitoring program.
8. The Tenement Holder must undertake (subject to the consent of the owners of land) water quality testing of all rainwater tanks owned by third parties within the Lease and within 4 kilometres of the Lease boundary at least annually. Test results must be reported against the most recent *Australian Drinking Water Guidelines (Australian Government)*, and be provided to the respective owners of the tanks tested within one month of the sampling.
9. The Tenement Holder must ensure that PM2.5 and PM10 dust concentration data and meteorological monitoring data acquired by the Tenement Holder is reported in real time to the public on an unrestricted internet site. The monitoring data must be retained and remain accessible on the unrestricted internet site for the life of the mine.

**Meteorological Monitoring**

The Tenement Holder must undertake meteorological monitoring in accordance with relevant Australian standards to measure and record meteorological data including (but not limited to) wind speed and direction, temperature, humidity, atmospheric pressure, solar radiation, rainfall and evaporation.

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(d) of the Regulations in relation to the outcome for impact event* ***ML-A1, ML-A3 and DSD ML-A2****:*

Measure PM 10 dust concentration using monitoring methodology, equipment and instruments that are recognised by a relevant International or Australian Standard.

Measure TDD using monitoring methodology, equipment and instruments that are recognised by a relevant International or Australian Standard.

Measure TSP using monitoring equipment and instruments that are recognised by a relevant International or Australian Standard.

Directional Dust Deposition (including both ambient and mine related dust) (**"DDD"**) is to be measured using monitoring equipment and instruments that are recognised by a relevant International or Australian Standard.

Measure PM 2.5 dust concentration using monitoring methodology, equipment and instruments that are recognised by a relevant International or Australian Standard.

### 7.1.7 *Impact assessment (EML)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0. Rex provided a description of potential air quality impacts associated with dust and odour emissions for the ML and EML in Table 8.3.3 (Construction and Operation) and Table 8.3.4 (Closure). The anticipated amounts of dust resulting from the proposed EML activities (removal of stockpiles) is considered to be minimal and would be controlled and managed as a part of the wider air quality for the proposed ML. DSD considers that due to the limited and temporary nature of activities within the proposed EML associated with stockpile movement and the placement of waste rock dumps that the risk of air quality impacts on sensitive receptors would be minimal.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7.0. A review of Rex's impact assessment is shown in Table 7.1.6.

**Table 7.1.6 – Impact events identified by Rex in the Proposal**

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **EML-A1** | Public nuisance arising from increased dust deposition at surrounding properties | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>There is a potential for dust to be generated off stockpiles associated with the EML activities without control strategies.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has not provided an outcome. |

DSD considers that Rex has identified all potential impacts to air quality associated with the proposed mining activities.

Based on the information provided, and as dust would be managed under the ML, DSD considers that there are no additional potential impacts to air quality from the EML which have not been identified by Rex.

### 7.1.8 *Outcomes (EML)*

Table 7.1.7 is the DSD assessment of outcomes proposed by Rex in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable.

The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed would achieve the proposed outcome. For closure events this would consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment would also consider any assumptions and uncertainty in control strategies.

**Table 7.1.7 – DSD assessment of outcomes proposed by Rex in the Proposal**

| ID | Assessment of acceptability of outcome | Assessment of achievability of outcome | Recommended regulatory response |
|---|---|---|---|
| **EML-A1**<br><br>**Impact event:** Public nuisance arising from increased dust deposition at surrounding properties<br><br>**Rex Proposed Outcome:** Rex has not provided an outcome. | The recommended outcome accurately describes the level of impact.<br><br>The recommended outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex considers control strategies would reduce this impact to a level of low.<br><br>Proposed control strategies applicable to this outcome include stabilisation of stockpiles with physical or chemical binders, shielding stockpiles from prevailing winds and use of water spray trucks.<br><br>Progressive rehabilitation is also an applicable strategy that would be required.<br><br>These stockpiles would be in operation for a short duration (3 years) compared to the stockpiles on the proposed ML. It is considered the discussion on impact **ML-A3** is applicable to this impact.<br><br>DSD considers that the outcome recommended by DSD would be achievable. | DSD recommends that should a lease be granted the following outcome be a requirement of the lease;<br><br>The Tenement Holder must, in construction, operation and post completion, ensure that there are no public health and/or public nuisance impacts from air emissions and/or dust generated by mining operations. |

### 7.1.9 *Measurement Criteria (EML)*

Table 7.1.8 is DSD's assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

**Table 7.1.8 – DSD's assessment of the measurement criteria**

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **EML-A1**<br><br>**Potential Impact:** Public nuisance arising from increased dust deposition at surrounding properties<br><br>**Recommended Outcome:** The Tenement Holder must, in construction, operation and post completion, ensure that there are no public health and/or public nuisance impacts from air emissions and/or dust generated by mining operations. | Rex has not proposed criteria for this outcome. | Although Rex has not proposed criteria for the EML the measurement criteria relating to impacts **ML-A1-3** are applicable to this outcome. Given the proposed EML overlaps the proposed ML the monitoring undertaken would measure dust from both proposed leases.<br><br>DSD considers there are appropriate measurement methodologies and standards to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable. Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |

### 7.1.10 *Summary of the recommended regulatory response (EML)*

DSD has assessed that all potential impacts to air quality during construction, operations and post completion have been identified through this assessment and acceptable outcomes have been recommended for all primary impact events where the severity of primary consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for sensitive receptors during construction, operation and post completion. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

*DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*

The Tenement Holder must, in construction, operation and post completion, ensure that there are no public health and/or public nuisance impacts from air emissions and/or dust generated by mining operations.

### 7.1.11 *Impact assessment (MPL)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0.

Air quality impacts associated with the MPLs are documented in Table 8.4.2.

Rex have conducted modelling to support their impact assessment for the air in the Dust and Odour Impact Assessment (Appendix 5.6-C) as discussed in the assessment of Air quality for the ML (discussed in Section 7.1.3 of this report).

Amendments to the modelling subsequent to the submission of the Proposal and an assessments or technical reviews applicable to assessing the appropriateness and reliability of the modelling are also discussed in the Air Quality assessment for the ML in this report.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7.0. A review of Rex's impact assessment is shown in Table 7.1.9.

The Port MPL application has been deferred at the request of Rex and has not been assessed in this report.

**Table 7.1.9 – Impact events identified by Rex in the Proposal**

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **MPL-A4** | Decrease in ambient air quality resulting in public nuisance at neighbouring sensitive receptors from dust and particulates generated by pipeline installation | Rex has stated that the consequence of this impact occurring without controls implemented is negligible.<br>DSD accepts the assessment by Rex that although it is possible impacts could occur from pipeline construction the consequence of impacts would be negligible due to the short duration and localised effects.<br>DSD assesses that the primary consequence of this occurring is trivial and hence **no** outcome is required. | No<br>Rex has not provided an outcome |

### 7.1.12 *Summary of the recommended regulatory response (MPL)*

DSD has assessed that all potential impacts to air quality during construction, operations and post completion have been identified through this assessment and no outcomes are required for the Power line and Pipelines MPL.

**Power line and Pipelines MPL**

*DSD recommends no licence conditions applicable to air quality in relation to the Power line and Pipelines MPL.*

## *7.2 Noise and Vibration*

### 7.2.1 *Description of Relevant Aspects of Environment*

Existing noise and vibration within and surrounding the mine site, and along the infrastructure corridor, is typical of a cultivated rural setting. Noise sources are mainly from agricultural equipment and practices, and traffic. Noise at the MPL at the Port is more typical of industry and includes sources from mining and processing activities (from existing mining), grain storage and vehicle haulage/traffic.

Rex has identified that the primary receptors for noise and vibration from the proposed ML (including EML) site and the MPL corridor would be surrounding residences and local communities such as Pine Point and Rogues Point. Sensitive receptors at the Port would similarly be the closest residences around the Port vicinity, including Ardrossan locals.

Background noise monitoring was conducted to characterise and quantify existing noise levels for day and night, at various locations around the mine and port sites. Rex engaged AECOM to conduct monitoring and report on the findings in 2012; the results are provided in Appendix.6-A of the Proposal which is titled *Hillside Mine Pre-Construction Noise Monitoring*. Monitoring included the use of both attended and unattended methods.

Unattended monitoring was undertaken at 6 locations surrounding the mine site, including sites at both Pine and Rogues Points, along the MPL corridor and within the ML. An unattended monitoring site was also established in Ardrossan. These sites are shown in Figures 5.6-2 and 5.6-3 of the Proposal.

The results of unattended monitoring near the ML are provided in Table 5.6-1 of the Proposal. The lowest daytime noise level ranges were recorded at location 4 (within the ML) as $L_{Aeq,15h}$, 30 to 52dB(A). The **highest day time** noise ranges were recorded at location 3 (Rogues Point), as $L_{Aeq,15h}$, 44 to 62dB(A). The **lowest night time** noise level ranges were recorded at location 4, as $L_{Aeq,9h}$, 29 to 54dB(A), and the **highest night time** noise ranges were recorded at location 3 as $L_{Aeq,9h}$, 36 to 56dB(A). Unattended noise monitoring in Ardrossan measured median daytime noise levels of $L_{Aeq,15h}$, 51 dB(A) and median night time noise

levels of $L_{Aeq,9h}$ 42 dB(A). Please note, a definition of the term $L_{Aeq}$ is provided in the glossary.

Attended noise measurements were undertaken at 7 locations around the Port area as shown in Figure 5.6.1 of the Proposal. Results of attended monitoring are provided in Table 5.6-2 of the Proposal. Attended baseline noise levels measured as $L_{A90}$ were recorded at the Port ranging from 24 to 50 dB(A). The attended monitoring method was not used for the ML as it was considered that noise levels would be similar to locations south of the Port area due to similarities in land use and proximity to roads.

DSD considers the potential sensitive receptors and associated environmental values for noise and vibration to be;

- Nearby coastal communities (public amenity)
- Surrounding residential dwellings (public amenity and structural integrity of buildings and contents)
    - Receptors (also referred to as Receivers) have been identified by Rex and are presented in Section 8 of the Proposal (from page 8-57) and in Figure 4 of Appendix 6.6-A of the Proposal.
    - Receptor 29 is the closest to the proposed open pit
- Livestock and native fauna (health)
- Marine fauna (health)

DSD considers that the description of environment is a suitable characterisation of the receiving environment which may be affected by mining operations.

### 7.2.2 *Views of affected parties*

In the Proposal Rex notes that the CCG have expressed a high level of concern regarding the impact to nearby residents and communities from noise generated by mining activities (refer to section 7 of the Proposal). Vibration was similarly identified as an area of concern but this predominantly related to blasting activities which would be addressed in Section 7.3 of this report. The expectations identified in Section 7 of the Proposal relate to noise impacts on human receptors as well as animals. These concerns were reflected during statutory consultation. The main issues raised during statutory consultation relating to noise were:

- Effect on health and amenity
- Traffic noise
- Health and wellbeing of livestock

Other concerns were raised regarding the noise modelling undertaken by Rex including:

- Modelled noise contours (justification for selected noise contours and also changes in contours over mine life)
- Modelling reflecting the changes in the tailings dam design

- Considerations of inputs used by Rex in predictive noise modelling
- Rezoning of land to 'mining' and the implications to farmers in the area considered for rezoning.
- Concerns that Rex would not meet EPA noise standards or planning guidelines

The details of Rex's commitments regarding the provision of noise mitigation treatments for home owners such as double glazing were also sought. In regard to vibration similar concerns were raised during the statutory consultation process, including:

- Loss of amenity
- Damage to adjacent houses
- Effect on health and wellbeing of livestock

These comments primarily related to vibration as a result of blasting activities which is specifically assessed under Section 7.3 of this report.

Whilst the statutory consultation did not identify additional receptors to those identified by Rex, additional impact events involving impacts of noise and vibration on livestock were identified and have been addressed in the impact assessment under ID **ML-N8.**

Concerns with modelling are addressed by Rex in Issue Numbers 147 - 150 of the Response Document.

Impacts on health and amenity from noise (including traffic) were identified and assessed by Rex in the Proposal and have been addressed in impacts event IDs **ML-N1** to **ML-N6**.

Commitment by Rex to double glaze impacted residences is provided in Issue No. 146 of the Response Document.

DSD has had regard for all concerns which were raised during statutory consultation, however not all concerns have been included as part of this assessment report as they are either not within the scope of the assessment or are too general in nature to consider (including re-zoning of land as this falls under separate legislation).

### 7.2.3 *Impact assessment (ML)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0.

The environmental impact assessment for Noise and Vibration relating to the ML is assessed by Rex in section 8.3.2 of the Proposal. A description of potential noise impacts associated with the ML is provided in Table 8.3-11. The impact assessment for noise and vibration by Rex was conducted for the construction phase, operation and rehabilitation phases and also the road diversion works. It is important to note that the road diversions

works and associated impacts were included in the detailed assessment of those activities under Section 49 of the Development Act and are accordingly not revisited in this assessment under the Act. Noise monitoring was carried out to establish baseline noise levels currently experienced at represented sensitive receivers. (Appendix 5.6-A of the **Proposal**).

Predictive noise modelling was undertaken using noise modelling software to estimate the noise levels from the proposed mining and port operations.

Predicted noise levels in the modelling by Rex have assumed worst case meteorological conditions for noise propagation. Rex has suggested that the modelling is conservative for this reason.

Modelled scenarios were developed for three stages over the mine life from mine construction and through operations. Specifically these were represented by Year 1, Year 5 and Year 12 starting from the mine opening. This is provided in Appendix 6.6-A Operational Noise Assessment. Year 5 of the noise modelling was based on an original 'high aspect ratio' Tailing Storage Facility (TSF) design which was subsequently amended to the low aspect ratio TSF design proposed in the Proposal. This change was re-assessed by AECOM and considered to be representative of the operational footprint in year 5, regardless of the change to the height of the TSF and was therefore included in Appendix 6.6-A of the Proposal. 'Year 12' was modelled using the 'low aspect ratio TSF'. These qualifications were subsequently considered and agreed to by DSD and the EPA, and as a consequence no further changes to the modelling information were required.

For the purposes of Rex's assessment on noise and their ability to comply with the South Australia regulatory standards for noise, AECOM presented an assessment of the EPA Noise Environment Protection (Noise) Policy 2007 (the Noise Policy) in the Proposal and associated Appendix 6.6-A (Operational Noise Assessment). AECOM derived the applicable noise limits by identifying the current planning zones within the Yorke Peninsula Council Development Plan and the applicable noise criteria prescribed by the Environment Protection (Noise) Policy 2007. The criteria derived by AECOM for the proposed mining operations are presented in Table 8.3-7 of the Proposal and are as follows:

- Primary Production Zone, LAeq 57dB(A) 7am – 10pm, and LAeq 50dB(A) 10pm – 7am; and
- Settlement Zone, LAeq 55dB(A) 7am – 10pm, and LAeq 48dB(A) and LAmax 60dB(A) 10pm – 7am
- Deferred Urban Zone, LAeq 55dB(A) 7am – 10pm, and LAeq 48dB(A) and LAmax 60dB(A) 10pm – 7am

The criteria derived by AECOM for the proposed port operations are presented in the Noise Assessment Report in Appendix 6.6-A of the Proposal.

The criteria derived for the mine by AECOM do not consider the application of an additional penalty for 'annoying noise character' which would result in each noise criteria being lowered by 5dBA. Figure 4 in Appendix 6.6-A of the Proposal also provides further information in relation to receiver/receptor location and associated Council Development Plan Zones. The derivation of the noise criteria is fully explained in the Appendix A of the Operational Noise Assessment Report and a memo on the annoying character penalty is provided in Appendix 33 accompanying the Response Document.

Since the submission of the Proposal, Appendix A of Appendix 6.6-A has been updated to include an assessment of the Noise Policy in relation to the Yorke Peninsula Development Plan (a discussion of the Noise Criteria Derivation). Appendix A also includes the discussion of the EPA noise planning penalty.

The EPA conducted a detailed review of the Proposal and provided commentary on noise criteria under the Noise Policy, which is considered within this assessment.

In the EPA review, it was identified that the noise criteria to be achieved at noise affected premises derived by AECOM differs to those determined by the EPA due to both zoning land use category differences and annoying character penalty application. The EPA indicated in their comment on the Proposal that the noise criteria to be achieved at noise affected premises, as derived from the provisions of the Noise Policy to be:

- Primary Production Zone, 51dB(A) 7am – 10pm and 44dB(A) 10pm – 7am; and
- Settlement Zone, 51dB(A) 7am – 10pm and 42dB(A) 10pm – 7am

These noise criteria incorporate a 5dBA adjustment for the presence of an annoying noise character.

In assessing the noise aspect of the proposal, the EPA initiated visits by their noise advisors to mines in the Hunter Valley, NSW. After listening to mining noise at these mines, the EPA formed the opinion that at least one penalty for noise character should be applied to the noise limits in accordance with the relevant provisions of the Noise Policy. The application of one penalty results in lowering the noise limits required to be met by 5dBA.

The review provided by EPA has been considered in DSDs assessment of noise.

The criteria for construction noise levels have been derived in accordance with Part 6 of the Noise Policy -*Special noise control provisions, Division 1 - Construction noise* and are presented in the Construction Noise and

Vibration Management Plan (CNVMP) in Appendix 8.3-A. This is consistent with EPA requirements.

As there are no statutory limits for acceptable levels of vibration Rex have specified vibration standards applicable to this assessment including Australian Standard AS 2670.2–1990, *Evaluation of human exposure to whole-body vibration, Part 2: Continuous and shock induced vibration in buildings* provides vibration criteria for buildings, primarily with respect to annoyance of humans subjected to the building vibration. These are summarised in Table 8.3-8 of the Proposal, and German Standard DIN 4150-1999 – Part 3, *Structural vibration in buildings – Effects on structures (DIN 4150)* (widely used in Australia) provides recommended maximum levels of vibration that reduce the likelihood of building damage caused by vibration summarised in Table 8.3-9 of the Proposal. DSD considers the use of the above standards reasonable.

At closure, operations would have ceased and there would be no remaining source of noise or vibration, hence noise and vibration from the mine site would no longer be an issue and this has not been included as an impact by Rex and is not shown in Table 7.2.1. DSD considers there are no post mine completion impacts associated with noise and vibration for the ML.

**DSD review of Rex Impact assessment (ML)**
A description of DSD's assessment of the impact assessment process is described in Section 7.0.

A review of Rex's impact assessment is shown in Table 7.2.1 and impacts identified by state government identified post submission of Proposal identified in Table 7.2.2.

## Table 7.2.1 – Impact events identified by Rex in the Proposal

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** *As documented in Table 8.3-12 of the Proposal* | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-N1** | Public nuisance impacts from noise during mine construction | Rex has stated that the consequence of this impact occurring without controls implemented is *minor.*<br><br>Given the close proximity to surrounding residences and communities DSD considers that nuisance impacts would occur as a result of noise from mining operations if noise is not managed during construction. As noted in the Proposal construction impacts would be short term in nature (18 months).<br><br>DSD assesses the primary consequence of this occurring is greater than *trivial* and hence an outcome is required. | Yes<br><br>Rex has provided an outcome |
| **ML-N2** | Public nuisance impacts from noise and vibration due to altered road traffic routes | Rex has stated that the consequence of this impact occurring without controls implemented is *minor.*<br><br>In the Proposal the description of this impact relates to the road diversion works. The construction of the Yorke Highway realignment has been assessed separately under the Development Application.<br><br>Public nuisance impacts from mine related traffic during operations requires consideration, namely impacts associated with the realignment of Yorke Highway. It is stated that there would be increased mine traffic (non-cartage related) including light, medium and heavy vehicles.<br><br>The realignment of the Yorke Highway will increase traffic and associated traffic noise at two residential receptors (R1 and R2 in Figure 8.3-5 of the Proposal). The increase in noise is predicted In the Traffic Impact Assessment (Proposal Appendix 5.3-A) conducted by AECOM, to be up to 10dB(A). In the Proposal it also states the road traffic noise levels are predicted to remain at least 5dB(A) below the target range of outside noise levels for these receptors as set out in DPTI's Road Traffic Noise Guidelines (RTNG). These target levels are $L_{eq\ nighttime}$ 50dB and $L_{eq\ daytime}$ 55dB (the DPTI guidelines state that the $L_{eq}$ noise level is equivalent to the $L_{Aeq}$ noise level). | No<br><br>Rex has not provided an outcome |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** *As documented in Table 8.3-12 of the Proposal* | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| | | DSD accepts the Rex discussion that the smooth surfaces of the new roads are unlikely to generate perceptible levels of ground vibration at the nearest receptors.<br><br>The road realignment has been assessed in the Rex Development Application under Section 49 and 49A of the Development Act 1993 Application Nos 544/G018/13 and 544/G017/13).<br><br>No outcome for this impact is proposed as traffic on public roads is regulated under the jurisdiction of the *Road Traffic Act 1961* and associated legislation. | |
| **ML-N3** | Public nuisance from noise from fixed plant during operation | Rex has stated that the consequence of this impact occurring without controls implemented is *minor*.<br><br>In the Proposal Table 8.3-12 in the assessment of the primary risk level Rex has indicated the likelihood is unlikely and the consequence is *minor.* Given the close proximity to surrounding residences and communities DSD considers that nuisance impacts could occur as a result of noise from fixed plant during mining operations. Although noise modelling identifies haul trucks as the main source of noise, suggesting that noise emissions from mobile plant will mask noise from fixed plant, a *moderate* impact could occur at receptors closest to the plant area without controls being implemented.<br><br>DSD assesses the primary consequence of this occurring is greater than *trivial* and hence an outcome is required. | Yes<br><br>Rex has provided an outcome |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** *As documented in Table 8.3-12 of the Proposal* | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-N4** | Public nuisance from noise from mobile plant during operation | Rex has stated that the consequence of this impact occurring without controls implemented is *moderate.*<br><br>Noise modelling has shown that haul trucks will be the main source of noise at receptor locations. Given the close proximity to surrounding residences and communities DSD considers the nuisance impacts from mobile plant will therefore occur without mitigation measures in place.<br><br>DSD assesses the primary consequence of this occurring is greater than *trivial* and hence an outcome is required. | Yes<br><br>Rex has provided an outcome |
| **ML-N5** | Public nuisance impacts from vibration during construction | Rex has stated that the consequence of this impact occurring without controls implemented is *negligible*.<br><br>Rex's assessment is primarily based on the setback distance to the nearest receivers/receptors with the closest being 100m from the construction works of the Yorke Peninsula Highway realignment. As identified by Rex, in Appendix 8.3-A of the Proposal, plant and equipment on site used for highway construction may cause perceptible vibration from time to time, but the vibration levels would be expected to be no higher than that caused by heavy vehicle traffic. Predicted vibration levels are provided in 5.2.2 of Appendix 8.3-A of the Proposal. These can be compared against vibration criteria proposed by Rex in Tables 9, 10 and 11 of Appendix 8.3-A.<br><br>Given that mine construction impacts will be completed in 18 months, and given that few receptors are located near the areas proposed for mine construction it is unlikely that there would be impacts caused from vibration resulting from mine construction works.<br><br>DSD assesses that the primary consequence of this occurring is *trivial* and hence no outcome is required. | No<br><br>Rex has not provided an outcome |
| **ML-N6** | Public nuisance impacts from vibration during | Rex has stated that the consequence of this impact occurring without controls implemented is *minor*.<br><br>As per **ML-N5** Rex's assessment is based on the large setback distances between the mine and the nearest sensitive receptors. Given that there are no receptors located within 1km of the primary source of operational vibration ie the crushing, grinding and | No<br><br>Rex has not |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** *As documented in Table 8.3-12 of the Proposal* | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| | operation (not including blasting) | processing plant, it is unlikely that there would be nuisance impacts caused by vibration resulting from general operations. It is likely that any nuisance from vibration would be a result of blasting; specifically assessed under Section 7.3 of this report.<br>DSD assesses that the primary consequence of this occurring (not including blasting) is *trivial* and hence no outcome is required. | provided an outcome |
| **ML-N7** | Displacement of terrestrial native fauna and marine fauna from noise and vibration | Rex has stated that the consequence of this impact occurring without controls implemented is *minor*.<br>Based on the information provided within the Proposal including baseline fauna surveys there is very low diversity and abundance of native fauna within and surrounding the ML. In addition the few habitats within and surrounding the site are well represented and preserved in the broader region.<br>There are also few species of conservation significance. Rex has provided discussion on the threatened Peregrine Falcon which is the only State listed terrestrial species recorded in proximity to the ML. Considering nesting habits, the buffer zones suggested and the quarterly bird surveys conducted on behalf of Rex indicating there are no nesting sites in the cliff areas, DSD considers the impact on the Peregrine Falcon from noise would be minimal.<br>With regards to marine impacts Rex has provided a discussion around the listed shorebirds. Research presented in the Proposal indicates that shorebirds habituate to repetitive noise disturbance. In addition, noise exposure levels at which effects on birds may occur are provided (greater than 85dB(A)). Based on predicted noise emissions and the fact that Rex will have to comply with the EPA Noise Policy to meet human tolerance levels which will be a maximum of 51dB(A) the information provided suggests there will be limited impact on shorebirds.<br>DSD considers that the primary impacts from vibration would result from blasting. This has been assessed in section 7.3 of this report.<br>DSD assesses that the primary consequence of this occurring is *trivial* and hence no outcome is required. | No<br>Rex has not provided an outcome |

The State Government, through the assessment process, has identified additional impacts to noise and vibration associated with the proposed mining activities subsequent to the submission of the Proposal. An assessment of these additional impact events is provided in Table 7.2.2.

**Table 7.2.2 – Impact events identified subsequent to the Proposal**

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **DSD**<br>**ML-N8** | Impacts to livestock from noise and vibration from mining operations | Impacts to livestock from noise and vibration were a concern raised during statutory consultation. Disturbance to livestock resulting from blasting operations was assessed by Rex in the Proposal (under Blasting) however general noise and vibration impacts were not discussed.<br>DSD sought further information from Rex post submission of the Proposal, as per Issue No.109 (Response Document) to determine the potential consequence of this impact pre-mitigation. This includes discussion around livestock currently co-existing with other land uses that emit noise and vibration and also references the EPA noise policy which Rex will adhere to, to ensure noise impacts to human receptors are adequately managed. As indicated in **ML-A6** Rex will also be managing and monitoring blast vibration in accordance with Australian Standards.<br>DSD supports the conclusion that based on existing practices that livestock can co-exist with other land uses which emit noise and vibration. Also, as there are regulatory levels for noise and vibration impacts on livestock DSD considers that by managing impacts to human receptors (as per **ML-N1, ML-N3** and **ML-N4**) the consequence to livestock would likely be trivial.<br>DSD considers the consequence without controls implemented to be *trivial.* | No<br>Rex has not provided an outcome |

### 7.2.4 *Outcomes (ML)*

Table 7.2.3 is the DSD assessment of outcomes proposed by Rex in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable. The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies.

**Table 7.2.3 – DSD assessment of outcomes proposed by Rex**

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-N1**<br><br>**Impact Event:** Public nuisance impacts from noise during mine construction<br><br>**Rex Proposed Outcome:** All public nuisance from noise emanating from the Lease during mine construction activities are recognised and addressed appropriately by the Tenement Holder | The proposed outcome does not accurately describe the level of impact.<br><br>The proposed outcome is not considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies.<br><br>The proposed outcome is considered unacceptable as it does not make a commitment to at least maintaining the current amenity permitted under the Noise Policy for the current council zones from noise due to mine construction activities and will not achieve a | Rex considers control strategies will reduce the risk to a level of *low*.<br><br>The assessment by Rex is based on comparison between the indicative noise levels for significant noise generating items of plant required during the construction of the mine site, with the pre-construction night-time noise levels (ie the lowest background noise levels) and the Noise EPP construction noise criteria (derived in accordance with Part 6 of the Noise EPP - *Special noise control provisions, Division 1 - Construction noise*).<br><br>This is presented in the Construction Noise and Vibration Management Plan (CNVMP) in Appendix 8.3-A of the Proposal.<br><br>The major sources of construction noise are anticipated to be plant defined in the Proposal and the construction phase is anticipated to be approximately 18 months.<br><br>The requirement to meet EPA construction noise limits only apply to projects approved under the *Development Act 1993*, in this case the road diversion. During all stages of the operations (including construction, operation and closure) Rex will be required to meet the noise limits for the relevant zoning. These limits are lower than the construction noise limits.<br><br>Rex has proposed numerous strategies including off-site or alternative processes to reduce impact as specified in 8.3.2.3 of the Proposal. These broadly include: | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction and operation, ensure noise emanating from mining operations is in accordance with the current amenity as defined by the Yorke Peninsula Council Development Plan at the time of lease grant.<br><br>*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event **ML-N1**;* |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | level of impact that is considered by DSD to be acceptable.<br><br>This assessment has considered the noise levels predicted for the proposed mining construction (and operations) in the context of the noise levels permitted under the Noise Policy for the current council zones.<br><br>DSD recommends that a noise outcome applicable to construction (and operation) be prescribed to limit the noise levels to those currently permitted under the Noise Policy for the current council zones. Post completion is not applicable in this instance as there will be no noise sources. | • Strategic scheduling of activities and equipment<br>• Use of noise reduction devices<br>• Equipment maintenance, and adopting operating and materials handling practices to reduce noise<br>EPA noise limits are for external noise levels. Rex has further assessed potential noise levels in sleeping areas resulting from construction levels (referencing AS 2107 recommendations for satisfactory recommended internal noise levels).<br><br>DSD considers that the use of a real-time noise and weather monitoring system to determine when construction noise will exceed the Noise Policy and to enable Rex to take proactive remedial action to reduce noise levels to ensure compliance would position the operation for continuous compliance.<br><br>The assumptions provided are acceptable and the conclusion indicates that Rex will be able to remain within the recommended noise levels at all receptors.<br><br>DSD considers that the outcome recommended by DSD would be achievable. | Undertake continuous noise and meteorological monitoring to inform decisions for operational response and contingency measures to be implemented to prevent exceedance of compliance criteria. |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-N3**<br><br>**Impact Event:** Public nuisance from noise from fixed plant during operation<br><br>**Rex Proposed Outcome:**<br>All public nuisance from noise emanating from the Lease during operation and rehabilitation activities are recognised and addressed appropriately by the Tenement Holder | The proposed outcome does accurately describe the level of impact however as described in **ML-N1** the proposed outcome is not considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies.<br><br>Refer to **ML-N1** for discussion on why the outcome is considered unacceptable and the recommendations by DSD for an acceptable outcome. | Rex considers control strategies will reduce the risk to a level of *low*.<br><br>This assessment is based on mobile plant being the primary noise contributor and it is assumed that noise from mobile plant will mask noise from the fixed plant. If nuisance noise is being experienced it will be difficult for a receiver to distinguish between noise being created as a result of fixed versus mobile plant. Rex has provided strategies to manage both. For fixed plant this includes location of plant away from sensitive receptors and maintenance of fixed plant to ensure noise emissions do not increase above specified levels over the lifespan of the plant. The remaining strategies proposed by Rex are focused around the primary noise source (Mobile plant).<br><br>EPA did not provide specific comment on the fixed plant but provided comment on noise emissions from the mine site as a whole. This is discussed in impact **ML-N4**.<br><br>As the overall contribution of noise from the mine site (including both fixed and mobile plant) will have to be managed to meet EPA noise requirements and it is likely nuisance noise will primarily be from mobile plant, DSD considers that the residual risk of nuisance to the public specifically from fixed plant would be *low.*<br><br>DSD considers that the outcome recommended by DSD would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction and operation, ensure noise emanating from mining operations is in accordance with the current amenity as defined by the Yorke Peninsula Council Development Plan at the time of lease grant. |
| **ML-N4**<br><br>**Impact Event:** Public nuisance from noise from mobile plant during operation<br><br>**Rex Proposed Outcome:**<br>All public nuisance from noise emanating from the Lease during operation and rehabilitation activities | As discussed in **ML-N3** the proposed outcome does accurately describe the level of impact however the proposed outcome is not considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies.<br><br>Refer to **ML-N3** for discussion on why the outcome is considered unacceptable and | Rex considers control strategies will reduce the risk to a level of *medium*.<br><br>The residual risk will however be managed through the strategies informed by the real-time monitoring system proposed by Rex. The assessment of the residual risk by Rex was based on Appendix 6.6-A of the Proposal entitled Operational Noise Assessment prepared by AECOM. This modelled predicted noise emissions pre and post mitigation and compared the mitigated emissions at sensitive receptors against noise criteria presented by AECOM. The criteria applied by AECOM is discussed in section 7.2.3 of this report (refer to Rex assessment process above).<br><br>Noise models were developed to predict noise levels for three time periods during the proposed operations corresponding to years 1, 5 and 12 after the commencement of open | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction and operation, ensure noise emanating from mining operations is in accordance with the current amenity as defined by the Yorke Peninsula Council Development Plan at the time of lease grant. |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| are recognised and addressed appropriately by the Tenement Holder | the recommendations by DSD for an acceptable outcome. | cut mining (ie Periods 1, 5, and 12). The main operational noise emissions were identified to be from the mobile plant (haul trucks, excavators etc). Control strategies have therefore been mainly focused around this source. Controls proposed by Rex are specified in section 8.3.2.3 of the Proposal. These broadly include:<br>• Selection and operation of mobile plant (including haul trucks) with appropriate noise attenuation fitted; and<br>• Use of the WRDs and stockpiles to assist in shielding noise<br>• Proactive management of mobile plant operations by real-time noise and audio monitoring with forecast and real-time metrological conditions, including regular liaison with the community to obtain feedback on the operational noise<br>• Modify operations to minimise noise impacts where practical e.g. limit use of higher gears in dozers during the night (less track slap), use an alternative waste rock dumping location or minimise mobile plant traffic.<br>• Applying noise treatment at houses to minimise long term annoyance.<br>AECOM indicated, based on their noise criteria, that post implementation of control strategies exceedance of 3dB(A) would be experienced at only one receptor (R29) for approximately 18 nights during Period 1 with no exceedances anticipated for Period 5 or 12. Rex indicated these exceedances would be managed by modifications of operations using real-time monitoring to remain below the AECOM derived criteria.<br>The EPA reviewed the Proposal and associated modelling for noise and did not focus specifically on impacts from fixed or mobile plant but on the ability to meet the Noise Policy. In the review by the EPA the noise criteria derived by AECOM was not supported. The EPA calculated a different noise criteria due to both zoning land use category differences and the application of an annoying character penalty. The criteria applied by EPA is discussed in section 7.2.3 of this report (refer to Rex assessment process above). The limits specified by the Noise Policy are to be achieved outside of noise affected premises. The EPA indicated that in application of their criteria with noise mitigation applied to the haul trucks that the following exceedances could occur during the periods of operation modelled by Rex: | |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | • Period 1 - exceedance of 9dB(A) at R29, and 2 - 6dB(A) at 8 other premises<br>• Period 5 - exceedance of 6dB(A) at R29, and 2 or 4dB(A) at 2 other premises; and<br>• Period 12 – compliance at all noise-affected premises<br><br>To put these estimated exceedances into context, the EPA have identified that, based on human perception, changes in noise levels would be clearly noticeable from 6dB(A) upwards. Most exceedances would therefore be below this level with the most notable impact only on the closest receptor (R29).<br><br>Rex provided a justification in Appendix 6.6-A of the Proposal for allowing exceedance of the noise criteria AECOM derived through the provisions in the Noise Policy on the basis of exceedances predicted by AECOM's noise modelling and on the basis of Clause 20(6) of the Noise Policy).<br><br>Clause 20(6) only applies for applications for development authorisation referred under the Development Act 1993 and hence does not apply to this application.<br><br>Rex indicated the following strategies would be used to control noise emissions; elimination or reduction of noise sources where possible, engineering and design controls, the combination of real time noise and prevailing weather conditions monitoring, modifying operations, such as using alternative waste rock dumping locations.<br><br>The EPA indicated that the use of a real-time noise and weather monitoring system to determine when operating noise will exceed the Noise Policy and to enable Rex to take proactive remedial action to reduce noise levels to ensure compliance would position the operation for continuous compliance.<br><br>Rex has indicated that they believe strict compliance with the planning criteria (ie including the 5dB(A) adjustment for one annoying character penalty), under worst case conditions, is neither reasonable nor practicable to achieve. However Rex noted that for the majority of the time under the typical prevailing weather conditions, it is likely that Rex will comply with the planning criteria in any case. | |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | Following detailed review of the proposal and noise modelling, DSD considers that it is technically feasible for Rex to suitably manage noise in a manner that will meet the EPA Noise Policy criteria by using the proposed monitoring and active management strategies, and further through the implementation of potential additional design and engineering measures. The strategies described in the proposal will enable Rex to identify the source of noise and if necessary, or if weather conditions indicate the potential for an exceedance, move, re-schedule or shut down selected areas of operation to mitigate the impact before noise limits are breached.<br><br>To satisfy the requirements of both the EPA and DSD, if a lease is granted, as part of the PEPR DSD would require control strategies outlining the proposed noise mitigation and management measures to be incorporated into the project. As indicated by the EPA, and reflective of DSDs position, if a lease is to be granted, the details of how the real-time monitoring system would be implemented to achieve the outcome would need to be included in the PEPR and agreed by both regulating parties prior to approval of the PEPR.<br><br>DSD considers that the outcome recommended by DSD would be achievable. | |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex.

### 7.2.5 *Measurement Criteria (ML)*

Table 7.2.4 is DSDs assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

## Table 7.2.4 – DSD assessment on measurement criteria

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **ML-N1**<br><br>**Potential Impact:** Public nuisance impacts from noise during mine construction<br><br>**Recommended Outcome:** The Tenement Holder must, in construction and operation, ensure noise emanating from mining operations is in accordance with the current amenity as defined by the Yorke Peninsula Council Development Plan at the time of lease grant. | All noise complaints will be investigated and a response provided to the complainant within two working days. All complaints will be resolved and associated actions will be recorded in a data base.<br>Monitoring of construction related noise levels shall be undertaken in response to a complaint where this is considered an appropriate response | Rex has provided justification for not needing routine monitoring based on noise predictions against AS 2107. This is not based on EPA noise policy criterion. The EPA expects that Rex comply with the Noise policy criterion during construction works. It is recommended that the criteria be modified to include regular monitoring which demonstrates compliance with the Noise Policy criterion and all reasonable and practicable measures are taken to comply with Section 25 of the Environment Protection Act 1993 including (but not limited to) the measures specified in Cl.23(1)(c) of the Environment Protection (Noise) Policy 2007.<br><br>DSD does not consider that it is suitable to conduct monitoring based on when it is considered 'an appropriate response' as this is not sufficiently definitive as to when monitoring will occur. A monitoring system should be established at the outset of construction activities to demonstrate compliance with the Noise Policy. If complaints are received Rex will be able to use the monitoring data to demonstrate their construction activities are being conducted in accordance with the EPA noise policy requirements.<br><br>DSD considers that achievement of the recommended outcome would be measurable. | Rex has not proposed Leading Indicator Criteria.<br><br>DSD considers that there is the possibility that a strong reliance on control strategies may be required to reduce risk to the environment and thus Leading Indicator Criteria may be required for this outcome.<br><br>Should a lease be granted, DSD recommend that Leading Indicator Criteria be reconsidered and finalised in the PEPR submission. | *DSD recommends the following lease condition applicable to the measurement criteria;*<br>1 Subject to **Condition 2**, the Tenement Holder must ensure that noise generated from the lease:<br>1.1. is measured, for or at, all sensitive receivers in accordance with the *Environment Protection (Noise) Policy 2007;* and<br>1.2. does not exceed the following noise limits†, at those sensitive receivers:<br>1.2.1. 51 dB(A) between the hours of 7am and 10pm and 44dB(A) between the hours of 10pm and 7am within a Primary Production Zone (as delineated in the Yorke Peninsula Council Development Plan at the time of Lease grant, set out in the Seventh Schedule of this Lease); or<br>1.2.2. 51 dB(A) between the hours of 7am and 10pm and 42dB(A) between the hours of 10pm and 7am within a Settlement Zone (as delineated in the Yorke Peninsula Council Development Plan at the time of Lease grant, set out in the Seventh Schedule of this Lease).<br>† *The noise limits are adjusted in accordance with the relevant environment protection noise policy by the inclusion of a penalty for a* |

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| | | Should a lease be granted, these criteria would be finalised in the PEPR submission. | | *characteristic where tonal/modulating/impulsive/low frequency characteristics are present at the sensitive receiver.*<br>2. The Tenement Holder can only exceed the noise levels stipulated in **Condition 10** if the Director of Mines:<br>2.1. is satisfied, on the basis of information provided to him by an acoustic engineer, that the noise from the mining operation will not cause an adverse impact at the sensitive receiver due to the existing influence of ambient noise, or the limited duration and/or frequency of occurrence of the activity; and<br>2.2. provides prior approval for the exceedance<br>3. The Tenement Holder must monitor noise levels on the Lease on a continuous basis and report that data and meteorological monitoring data acquired by the Tenement Holder in real time to the public on an unrestricted internet site. The monitoring data must be retained and remain accessible on the unrestricted internet site for the life of the mine.<br>4. In the event that monitoring shows that **Condition 1**, subject to **Condition 2**, has been breached, the tenement holder must immediately cease the activity that resulted in the breach. |

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| | | | | **Meteorological Monitoring**<br>The Tenement Holder must undertake meteorological monitoring in accordance with relevant Australian standards to measure and record meteorological data including (but not limited to) wind speed and direction, temperature, humidity, atmospheric pressure, solar radiation, rainfall and evaporation. |
| **ML-N3**<br>**Potential Impact:** Public nuisance from noise from fixed plant during operation<br>**Recommended Outcome:** The Tenement Holder must, in construction and operation, ensure noise emanating from mining operations is in accordance with the current amenity as defined by the Yorke Peninsula Council Development Plan at the time of lease grant. | All noise complaints will be investigated and a response provided to the complainant within two working days. All noise complaints will be resolved and associated actions will be recorded in a data base.<br>Noise levels dB(A) simultaneous with audio will be measured quarterly for seven consecutive days (24 hours a day), at selected sensitive receptors to the project components (to be determined in the Noise and Vibration Management Plan) which will demonstrate compliance with EPA noise goals as defined in the Environment | DSD considers that the draft criteria proposed by Rex is not considered suitable for measuring achievement of the outcome for **ML-N3.** The reasons for the criteria being unsuitable are provided:<br>• The criteria references Table 8.3-7 of the Proposal which is based on the criteria proposed by AECOM. The EPA has applied a criteria (as specified in section 7.2.3– refer to section 'Rex assessment process') which specifies compliance noise levels which are lower than the levels defined by AECOM. If the lease is granted, the noise criteria that would be required in the PEPR must be consistent with the EPA defined criteria and not the criteria defined by AECOM<br>• The criterion is based on noise and audio monitoring only for a defined period on a quarterly basis. Real time monitoring is suggested in the Proposal to be a mechanism to inform operations to suitably manage noise at the source to | Rex has not proposed Leading Indicator Criteria.<br>DSD considers that there is a strong reliance on control strategies required to prevent a high consequence event (primarily mitigation measures prompted by real time monitoring) and thus Leading Indicator Criteria are required.<br>DSD recommends that Rex identify 'trigger levels' as Leading Indicator Criteria to determine when it is likely there will be a non-compliance with the EPA noise criteria. It is recommended that these levels be defined for noise as well as weather/forecast conditions and be directly | *DSD recommends the following lease condition applicable to the measurement criteria;*<br>The recommended regulatory response to Impact **ID ML-N1** applies for this impact |

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| | Protection (noise) Policy 2007' at the receptors as stated in noise criteria Table 8.3-7 based on land use zoning. | ensure noise remains compliant with the defined criteria. This however is not proposed to form part of the criterion proposed by Rex. Both the EPA and DSD consider that real time monitoring (noise, audio and weather and forecast) would have to be undertaken on a continual basis to demonstrate compliance. This requirement will need to be included in the criteria is a lease is granted<br><br>DSD considers that the relevant standards (i.e. the EPA Noise Policy 2007) are an appropriate mechanism to demonstrate achievement of the outcome. DSD considers that achievement of the recommended outcome would be measurable. Should a lease be granted, these criteria would be finalised in the PEPR submission. | linked to the EPA noise criteria.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | |
| **ML-N4**<br><br>**Potential Impact:** Public nuisance from noise from mobile plant during operation<br><br>**Recommended Outcome:** The Tenement Holder must, in construction and | All noise complaints will be investigated and a response provided to the complainant within two working days. All noise complaints will be resolved and associated actions will be recorded in a data base.<br>Noise levels dB(A) simultaneous with audio will be measured quarterly for seven | As discussed in **ML-N3,** DSD considers that the draft criteria proposed by Rex is not considered suitable for measuring achieve-ment of the outcome for **ML-N3** or **ML-N4.**<br><br>Based on the discussion in **ML-N3** DSD considers that there are standards (i.e. the EPA Noise Policy 2007) that are an appropriate mechanism to demonstrate achievement of the outcome for **ML-N4**.<br><br>DSD considers that achievement of the recommended outcome would be measurable. | Rex has not proposed Leading Indicator Criteria.<br><br>As discussed in **ML-N3** DSD considers that there is a strong reliance on control strategies required to prevent a high consequence event (primarily mitigation measures prompted by real time monitoring) and thus | *DSD recommends the following lease condition applicable to the measurement criteria;*<br><br>The recommended regulatory response to Impact **ID ML-N1** applies for this impact. |

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| operation, ensure noise emanating from mining operations is in accordance with the current amenity as defined by the Yorke Peninsula Council Development Plan at the time of lease grant. | consecutive days (24 hours a day), at selected sensitive receptors to the project components (to be determined in the Noise and Vibration Management Plan) which will demonstrate compliance with EPA noise goals as defined in the Environment Protection (noise) Policy 2007' at the receptors as stated in noise criteria Table 8.3-7 based on land use zoning. | Should a lease be granted, the necessary criteria would be finalised in the PEPR submission. | Leading Indicator Criteria are required.<br><br>DSD recommends the use of 'trigger levels' as specified in the discussion in **ML-N3.**<br>As indicated in **ML-N3** should a lease be granted, these criteria would be finalised in the PEPR submission. | |

### 7.2.6 *Summary of the recommended regulatory response (ML)*

DSD considers that all potential impacts from noise and vibration during construction and operations (including rehabilitation) have been identified through this assessment and outcomes have been recommended for all impact events where the severity of consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for humans from mining activities. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

*DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*

The Tenement Holder must, in construction and operation, ensure noise emanating from mining operations is in accordance with the current amenity as defined by the Yorke Peninsula Council Development Plan at the time of lease grant.

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event **ML-N1**;*

Undertake continuous noise and meteorological monitoring to inform decisions for operational response and contingency measures to be implemented to prevent exceedance of compliance criteria.

*DSD recommends the following lease condition applicable to the measurement criteria;*

1. Subject to **Condition 2**, the Tenement Holder must ensure that noise generated from the lease:
   1.1. is measured, for or at, all sensitive receivers in accordance with the *Environment Protection (Noise) Policy 2007;* and
   1.2. does not exceed the following noise limits†, at those sensitive receivers:
      1.2.1. 51 dB(A) between the hours of 7am and 10pm and 44dB(A) between the hours of 10pm and 7am within a Primary Production Zone (as delineated in the Yorke Peninsula Council Development Plan at the time of Lease grant, set out in the Seventh Schedule of this Lease); or
      1.2.2. 51 dB(A) between the hours of 7am and 10pm and 42dB(A) between the hours of 10pm and 7am within a Settlement Zone (as delineated in the Yorke Peninsula Council Development Plan at the time of Lease grant, set out in the Seventh Schedule of this Lease).

† *The noise limits are adjusted in accordance with the relevant environment protection noise policy by the inclusion of a penalty for a characteristic where tonal/modulating/impulsive/low frequency characteristics are present at the sensitive receiver.*

2. The Tenement Holder can only exceed the noise levels stipulated in **Condition 1** if the Director of Mines:
   2.1. is satisfied, on the basis of information provided to him by an acoustic engineer, that the noise from the mining operation will not cause an adverse impact at the sensitive receiver due to the existing influence of ambient noise, or the limited duration and/or frequency of occurrence of the activity; and
   2.2. provides prior approval for the exceedance.
3. The Tenement Holder must monitor noise levels on the Lease on a continuous basis and report that data and meteorological monitoring data acquired by the Tenement Holder in real time to the public on an unrestricted internet site. The monitoring data must be retained and remain accessible on the unrestricted internet site for the life of the mine.
4. In the event that monitoring shows that **Condition 1**, subject to **Condition 2**, has been breached, the tenement holder must immediately cease the activity that resulted in the breach.

**Meteorological Monitoring**

The Tenement Holder must undertake meteorological monitoring in accordance with relevant Australian standards to measure and record meteorological data including (but not limited to) wind speed and direction, temperature, humidity, atmospheric pressure, solar radiation, rainfall and evaporation.

### 7.2.7 *Impact assessment (EML)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0.

The environmental impact assessment for Noise relating to the EML is assessed by Rex in section 8.3.2 of the Proposal. A description of potential noise impacts associated for the EML is provided in Table 8.3-11. As discussed in section 7.2.3 (refer to 'Impact Assessment (ML) Rex approach) Rex has prepared modelling to assess potential noise emissions from mining activities. The modelling provided only discussed emissions from ML and MPL activities. Noise emissions from the proposed EML activities are expected to be minimal and short term.

It is anticipated that there will be no closure impacts associated with the EML as the purpose of the EML is for the highway realignment. Therefore no works under the EML will be required post completion and noise and vibration will not be applicable. Closure is hence not identified in Table

7.2.5. DSD considers there are no closure impacts associated with noise and vibration for the EML.

**DSD review of Rex impact assessment (EML)**
A description of DSD's assessment of the impact assessment process is described in Section 7.0.

DSD considers that due to the limited duration and nature of operations within the EML, modelling for EML activities was not required as the expected noise impacts on sensitive receptors would be minimal.

A review of Rex's impact assessment is shown in Table 7.2.5. There were no impacts identified by State Government post submission of Proposal identified.

It is anticipated that there will be no closure impacts associated with the EML as the purpose of the EML is for the highway realignment. Therefore no works under the EML will be required post completion and noise and vibration will not be applicable. Closure is therefore not identified in Table 7.2.5 and has not been identified as an impact by State Government.

**Table 7.2.5 – Impact events identified by Rex in the Proposal**

| ID | Potential impact event<br>As documented in Table 8.3-12 of the Proposal | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **DSD EML-N1** | Public nuisance impacts on surrounding residential receptors from noise emanating from the removal and transport of extractive stockpiles | Rex has stated that the consequence of this impact occurring without controls implemented is *minor.*<br><br>The proposed EML will produce excess materials from the construction of the Yorke Highway diversion which will predominately be used as fill material for the Pine Point Road diversion southwest of the proposed EML. The stockpiling and transport of 60,000 $m^3$ excess extractive material is required for an approximate period of three years. Whilst no crushing or processing is required for the extractive material prior to being removed from the proposed EML, the location of stockpiled excess extractive material is uncertain. Hence, the impact from the materials handling of stockpiles cannot be assessed.<br><br>DSD assesses that the primary consequence of this occurring is uncertain and hence an outcome is required. | YES<br><br>Rex has not provided an outcome |

DSD considers that Rex has identified all potential impacts to noise associated with the proposed mining activities (relating to the EML).

### 7.2.8 *Outcomes (EML)*

Table 7.2.6 provides outcomes for impact events identified by DSD that were determined in section 7.2.7 to require an outcome.

**Table 7.2.6 – Discussion of outcomes for impacts identified by DSD**

| ID | Acceptability of outcome | Achievability of outcome | Recommended regulatory response |
|---|---|---|---|
| **DSD EML-N1**<br><br>**Impact event:** Public nuisance impacts on surrounding residential receptors from noise emanating from the removal and transport of extractive stockpiles<br><br>**Proposed Outcome:**<br><br>The Tenement Holder must, in construction and operation, ensure noise emanating from the Lease is in accordance with the current amenity determined by the council zones in place at the time of the grant of the lease. | The outcome accurately describes the level of impact.<br><br>The outcome is considered a suitable statement on the acceptable level of impact on the environment. | The outcome is achievable provided that stockpiles are located away from sensitive receptors.<br><br>**DSD considers that the outcome would be achievable.** | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction and operation, ensure noise emanating from mining operations is in accordance with the current amenity as defined by the Yorke Peninsula Council Development Plan at the time of lease grant.<br><br>*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event **DSD EML-N1**;*<br><br>The Tenement Holder must ensure that separation distances between any extractive stockpiles and Pine Point ensure the achievement of the outcome <for impact event **DSD EML-N1**>. |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex or identified by DSD.

### 7.2.9 *Measurement Criteria (EML)*

There is no noise criteria proposed for the EML.

### 7.2.10 *Summary of the recommended regulatory response (EML)*

DSD considers that all potential impacts from noise and vibration during construction and operations (including rehabilitation) have been identified through this assessment and outcomes have been recommended for all impact events where the severity of consequence is higher than trivial. DSD has recommended the outcome and determined that it sets an acceptable level of impact for humans from mining activities. DSD considers that this outcome would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

*DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*

The Tenement Holder must, in construction and operation, ensure noise emanating from mining operations is in accordance with the current amenity as defined by the Yorke Peninsula Council Development Plan at the time of lease grant.

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event **DSD EML-N1**:*

The Tenement Holder must ensure that separation distances between any extractive stockpiles and Pine Point ensure the achievement of the outcome <for impact event **DSD EML-N1**>.

### 7.2.11 *Impact assessment (MPL)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0.

The environmental impact assessment for Noise relating to the MPLs is assessed by Rex in section 8.4.2 of the Proposal. Noise and vibration impacts are documented in Table 8.4-5. As discussed in section 7.2.3 (refer to 'Impact Assessment (ML) Rex approach) Rex has prepared modelling to assess potential noise emissions from mining activities including MPL activities.

For the purposes of Rex's assessment on noise and the ability to achieve noise criterion AECOM presented an assessment of the Noise EPP in the Proposal and associated Appendix. AECOM assessed the criterion by for the operation of the port facility in accordance with the Noise EPP and presented this in Table 8.4-4 of the Proposal (see table for criterion). Although Rex have indicated that the criteria in the Proposal reflects Appendix 6.6-A DSD notes that the criteria provided in the Proposal differs

from the criteria in the stated Appendix. The criteria in Appendix 6.6-A is as follows:

- Light Industry Zone, LAeq 56dB(A) 7am – 10pm, and LAeq 48dB(A) 10pm – 7am
- Mineral Extraction, LAeq 60dB(A) 7am – 10pm, and LAeq 50dB(A) 10pm – 7am
- Residential Zone, LAeq 52dB(A) 7am – 10pm, and LAeq 45dB(A), LAmax 60dB(A) 10pm – 7am
- Coastal Conservation Zone, LAeq 56dB(A) 7am – 10pm, and LAeq 48dB(A) 10pm – 7am

The derivation of the noise criteria provided in the Operational Noise Assessment Report is fully explained in Appendix A (Appendix 6.6-A). The criteria for construction noise levels have been derived by AECOM in accordance with Part 6 of the Noise EPP - Special noise control provisions, Division 1 - Construction noise and are presented in the Construction Noise and Vibration Management Plan (CNVMP) in Appendix 8.3-A.

DSD considers there are no closure impacts associated with noise and vibration for the MPLs.

DSD considers that the approach adopted by Rex in the Proposal is suitable.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7.0. Rex has not identified any impact events associated with the Power line and Pipelines MPL. Table 7.2.7 details impacts identified by the State Government post submission of Proposal.

The Port MPL application has been deferred at the request of Rex and has not been assessed in this report.

**Table 7.2.7 – Impact events identified subsequent to the Proposal**

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **DSD**<br>**MPL- N1** | Public nuisance impacts from noise and vibration during construction of the pipeline | Impacts **MPL-N1** to **MPL-N4** discuss impacts primarily in relation to the port upgrades and subsequent operation. Minimal discussion is provided for noise and vibration impacts for the construction (laying) of the pipeline in the MPL corridor.<br>The construction of the underground slurry pipeline will be short term and localised (based on the width of the MPL corridor and the length of each working strip) as it will involve trenching and laying of pipeline along the corridor which sits along the Yorke Peninsula Highway. There are no occupied residences identified within close proximity to this corridor. During operations the pipeline is buried therefore there will be no operational noise or vibration impacts for receptors.<br>DSD considers the consequence without controls implemented to be *trivial*. | No |

### 7.2.12 *Summary of the recommended regulatory response (MPL)*

DSD has assessed that all potential impacts from Noise and Vibration during construction, operations and post completion have been identified through this assessment and no outcomes are required for the Power line and Pipelines MPL.

**Power line and Pipelines MPL**

*DSD recommends no licence conditions applicable to noise and vibration in relation to the Power line and Pipelines MPL.*

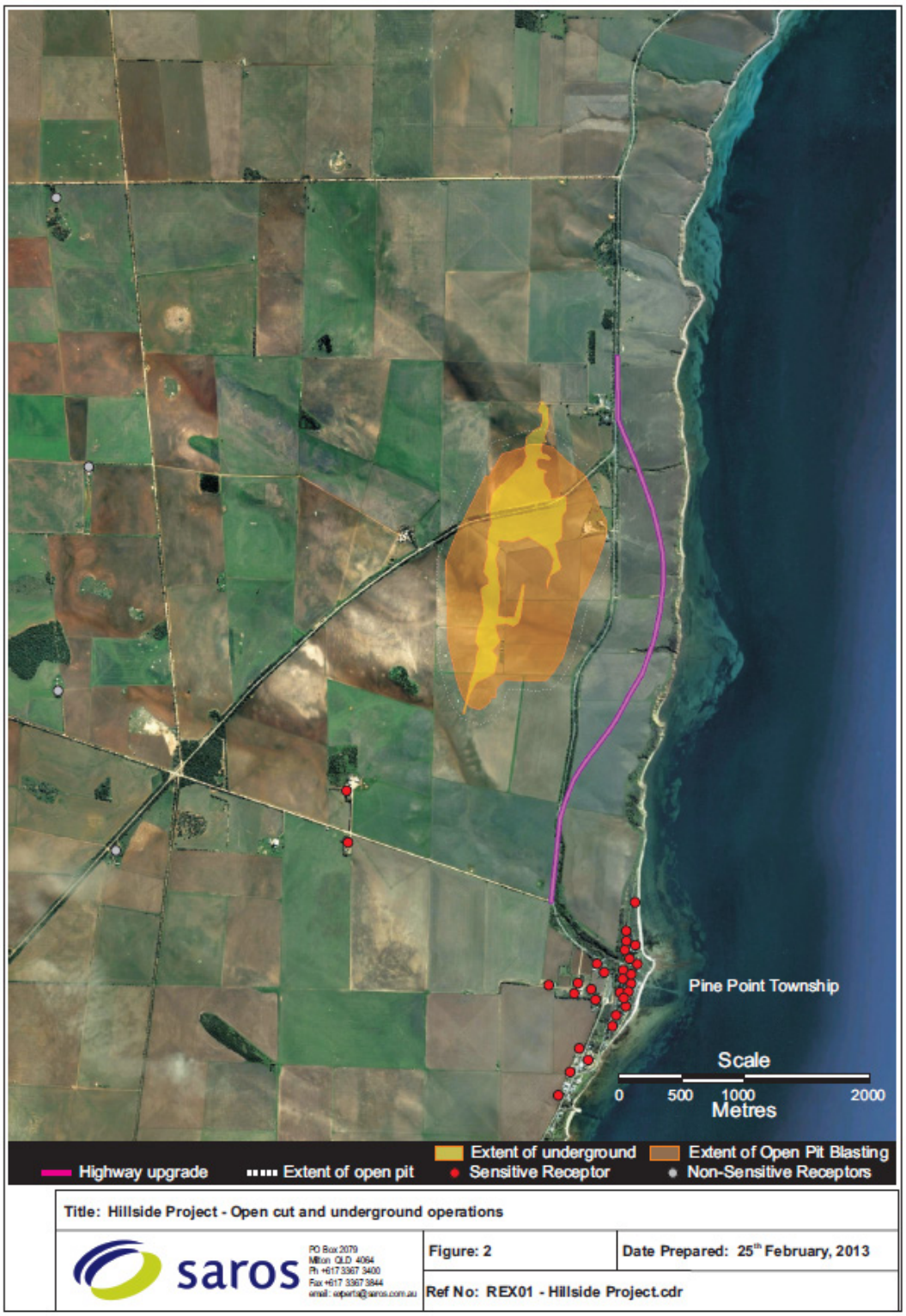
## *7.3 Blasting*

### 7.3.1 *Description of Relevant Aspects of Environment*

As described in Section 7.1 (refer to air quality and odour section) the ML is located in a rural setting surrounded primarily by agricultural activities (crop and pasture). The ML is located over the Yorke and St Vincent Highways, and a number of rural roads are within and bordering the ML including Redding Road to the west, Sandy Church Road to the North and Pine Point Road to the south. Roads in the vicinity of the proposed ML are shown in Figure 5.3-3 of the Proposal. Existing noise and vibration sources are from surrounding land practices, including agricultural activities and road traffic, blasting at existing mines and the Port Wakefield Proof and Experimental Establishment (located across the Gulf).

The coastline for the St Vincent Gulf is located to the east of the ML. Three geological monuments are located in the coastal waters or coastal cliffs (including Harts Mine) adjacent to the proposed ML, illustrated in Figure 5.16-1 of the Proposal.

The proposed open pit for the ML is located within close proximity to a number of rural residences. The closest sensitive receptor is the rural residence located 1.1 kilometres to the southwest of the pit. Pine Point is the closest township to the proposed open pit located approximately 2.4 kilometres to the south southeast of the pit. The locations of the open pit and underground workings in relation to sensitive receptors are presented in Figure 2 of Appendix 8.3-B (Blasting Impact Assessment), provided below.




**From Appendix 8.3-B by SAROS - Figure 2: Sensitive receptors during blasting on the ML**

A small percentage of remnant vegetation exists within the ML. Rex has indicated that the mine site and surrounds has a very low diversity and abundance of native fauna due to historical and current land management practices (see Section 5.13 of the Proposal).

DSD considers the sensitive receptors and associated environmental values for this blasting to be;

- The closest occupied residential dwellings within 1200 m of the blast zone (public health, safety, amenity and structural integrity of property)
    - Closest south-western receptor as per Figure 2 above (referred to as Receptor 9 in the Air Quality Impact Assessment)
- Coastal community of Pine Point (public health, safety, amenity and structural integrity of property)
- Surrounding primary industry receptors including adjacent land users and livestock (livestock health and economic productivity)
- Marine Environment (faunal health)
- Native terrestrial fauna (faunal health)
- Coastal Cliffs and Geological Monuments (structural integrity and geological heritage)
- The Yorke Highway and road network including diversion 426 m from the blast zone.

DSD considers that the description of environment is a suitable characterisation of the receiving environment which may be affected by mining operations.

### 7.3.2 *Views of affected parties*

In the Proposal, Rex notes that the CCG have expressed concern regarding the negative impacts from mine blasting for nearby neighbours and roads users, adjacent land users (such as impacts on aerial spraying activities for agricultural practices and impacts to livestock), fauna and also the possibility or blasting induced seismic activity.

The issues expressed by the CCG in the Proposal are reflective of the issues identified in public submissions during statutory consultation. This includes concerns for the following:

**Table 7.3 – Impact events relating to issues raised during statutory consultation**

| Issues raised during statutory consultation | Addressed |
|---|---|
| Impact from blasting on seismic activity and coastline (i.e. potential to cause an earthquake or cause damage to cliffs) | **DSD ML-BV1** |
| Impact form blasting on infrastructure and property | **ML-BV3** |
| Disturbance to stock and native fauna from blasting | **ML-BV3, ML-BV5** and **ML-BV6** |
| Public health and safety from blasting impacts | **ML-BV3** |
| Fly rock damage (health, stock and property) | **ML-BV3** |
| Impacts on surrounding land use (i.e. the blast exclusion zone impeding on agricultural activities such as aerial application of fertilisers and pesticides) | **ML-BV7** |
| Communication of blasting activities with affected parties | **ML-BV7**<br>Strategies discussed in section 8.3.3 of the MLP and Issue No. 103 Response Document |
| Safe storage of explosives | Discussed in section 6.5.6.3 of the MLP (storage in accordance with the Australian Standard 2187.1 Explosives) |
| Damage from underground blasting | **ML-BV1, MLBV2** and **MLBV-4** |
| Agreements with affected parties to blast within blasting exclusion zone | **ML-BV8**<br>Issue No. 110 Response Document |

The statutory consultation did not identify any additional receptors to those identified by Rex but did identify additional impact events.

The additional impact events were blasting induced seismic activity and impacts to the coastline, and have been addressed in the impact assessment under id. **DSD ML-BV1** and **DSD ML-BV2**

DSD has had regard for all concerns which were raised during statutory consultation, however not all concerns have been included as part of this assessment report as they are either not within the scope of the assessment or are too general in nature to consider.

### 7.3.3 *Impact assessment (ML)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0.

The environmental impact assessment for blasting relating to the ML is assessed by Rex in section 8.3.3 of the Proposal. A description of the potential impacts from blasting activities on the ML is provided in Table 8.3-15.

SAROS (Australia) Pty Ltd (SAROS) was commissioned by Rex to assess the effects of both the open and underground blasting activities and detail mitigation measures to achieve outcomes and standards. This is detailed in the Proposals Appendix 8.3-B Blasting Impact Assessment. The focus of the study by SAROS was ground vibration and air overpressure from blasting activities, and safety measures relating to flyrock. SAROS used data obtained from mining and blasting operations with comparable geological and topographic conditions, and which utilise similar scale blasting practices, to model impacts of blasting at Hillside.

The modelling indicates that blasting from underground activities will induce lower vibration levels than the surface blasting (open pit). As indicated in the report by SAROS, blasting will be minimal, during the initial phase of the mining operations. The initial geotechnical investigations conducted on the project indicate that around the top 80 metres of the material can be won through mechanical methods. Below this level it is anticipated the use of drill and blast practices will be required. Impacts from blasting activities will therefore have the potential to occur from this time onwards. Rex have indicated when blasting is at full production, exposure to blasting impacts will equate to a few seconds each day. As mining is proposed to progress to underground operations in Year 7 of the project, disturbance from blasting activities would reduce even further.

As specified in the Proposal and Appendix 8.3-B, the compliance criteria for ground vibration and air overpressure impacts have been based on guidelines detailed in Australian Standard 2187.2 - 2006 *Storage and use – use of explosives.* This is presented in Table 8.3-14 of the Proposal (provided below). The statement included by Rex regarding reaching a higher limit if agreement is reached with third party operators is not considered by the Australian Standard.

**Taken from MLP –**

**Table 8.3-14: Summary of ground vibration and air overpressure limits to minimise human discomfort from long term blasting activities at a sensitive site (adapted from Tables J4.5(A) and J5.4(A) – AS2187.2 -2006)**

| Category | Type of blasting operations | Parameter | Peaks Level |
|---|---|---|---|
| **Sensitive site*** | Operation lasting longer that 12 months or more than 20 blasts | Ground vibration | 5mm/s for 95% blasts per year, 10mm/s maximum unless agreement is reached with the occupier that a higher limit may apply |
| **Sensitive Site*** | Operations lasting longer than 12 months or more than 20 blasts | Air Overpressure | 115dBL for 95% blasts per year, 120dBL maximum unless agreement is reached with the occupier that a higher limit may apply |
| *A sensitive site includes houses and low residential buildings, hospitals, theatres, schools etc, occupied by people | | | |

The assessment by Rex has not identified any post completion impacts associated with blasting as all blasting activities would have ceased.

Dust associated with blasting activities was considered by Rex in Section 8.3.1 of the MLP and has been assessed in Section 7.1 of this report under the air quality impact assessment.

Exclusion zones during blast times may impact on adjacent land uses as a result of restriction to land. Rex has identified this in Section 8.3.17 Adjacent Land Uses. Noise impacts associated with blasting have been assessed under Section 7.2 of this report under the noise impact assessment.

No blasting activities are proposed on the EML or MPLs.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7.0.

Dust associated with blasting activities has been considered in Section 7.1 (Air Quality). The dust dispersion modelling provided in Attachment 5.6-C of the Proposal includes dust from blasting as a source and considers the associated emissions produced from blasting. Impacts to adjacent land use from restricted land access from blasting activities have been addressed in Section 7.15 of this report in the Adjacent Land Use and Protection of 3rd Party Property impact assessment.

A review of Rex's impact assessment is shown in Table 7.3.1 and impacts identified by State Government identified post submission of MLP identified in Table 7.3.2.

## Table 7.3.1 – Impact events identified by Rex in the Proposal

*Impact events identified by Rex in the Proposal*

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **ML-BV1** | Reduced public amenity as a result of ground vibration associated with blast activities | Rex has stated that the consequence of this impact occurring without controls implemented is *minor*.<br><br>Given the proximity to the nearest receptors and communities DSD considers that without implementation of blast control measures public amenity would be impacted as a result of ground vibration and air overpressure from open pit and underground blasting activities at Hillside Mine.<br><br>DSD assesses the primary consequence of this occurring is greater than *trivial* and hence an outcome is required | Yes<br><br>Rex has provided an outcome |
| **ML-BV2** | Reduced public amenity as a result of air over pressure associated with blast activities | Rex has stated that the consequence of this impact occurring without controls implemented is *minor*.<br><br>Given the proximity to the nearest receptors and communities, DSD considers that without implementation of blast control measures public amenity could be impacted as a result of air overpressure from open pit and underground blasting activities at Hillside Mine. Impacts from over pressure from blasting activities for underground operations will however be restricted to only the initial stages of the decline development. Following this time, air overpressure generated from underground blasts is contained within the underground portion of the mine. This is discussed in section 4.2 of Appendix 8.3-B.<br><br>DSD assesses the primary consequence of this occurring is greater than *trivial* and hence an outcome is required | Yes<br><br>Rex has provided an outcome |
| **ML-BV3** | Reduced public safety and damage to third party property (including stock) from fly rock caused by blasting | Rex has stated that the consequence of this impact occurring without controls implemented is *major*.<br><br>Given the proximity of the road network, including Yorke Highway, and the nearest receptors to the blast clearance zones DSD considers that without implementation of control measures public safety and public property would be impacted as a result of fly rock from open pit activities at Hillside Mine.<br><br>DSD assesses the primary consequence of this occurring is greater than *trivial* and hence an outcome is required | Yes<br><br>Rex has provided an outcome |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-BV4** | Structural damage to roads and houses caused by blast activities | Rex has stated that the consequence of this impact occurring without controls implemented is *minor.*<br><br>The discussion provided by Rex in relation to this impact seems to be around modelling of vibration and air over pressure post implementation of control measures not pre-control measures. Given the proximity to the nearest receptors DSD considers that without implementation of blast control measures structural damage could occur from open pit and/or underground blasting activities at Hillside Mine.<br><br>DSD assesses the primary consequence of this occurring is greater than *trivial* and hence an outcome is required | Yes<br><br>Rex has not provided an outcome |
| **ML-BV5** | Disturbance to native fauna due to blasting activities | Rex has stated that the consequence of this impact occurring without controls implemented is *minor*<br><br>In the MLP it is noted that there is little information available on the direct impacts of short term transient vibration levels and blasting overpressure on animals and there is currently no prescriptive limits in Australia. SAROS (in Appendix 8.3-B) have provided a discussion around the potential impacts to terrestrial and marine fauna based on a case study of blasting impacts from open pit mining in NSW adjacent to a wetland and work conducted on impacts to marine life. With regards to impacts on marine life, guidelines for the use of explosives in or adjacent to fish habitats were used to estimate a recommended 93m set back distance from the fish habitat based on proposed blasting activities. The eastern side of the Hillside proposed pit is located 600m from the coastline and is hence significantly further than the suggested buffer zone.<br><br>In the Proposal it is noted that it is likely that native terrestrial fauna interacting with the mining operation will consist predominately of bird species and those birds will have the ability to relocate to other locations if disturbed. Fauna surveys, which recorded a much higher presence of birds to any other faunal species, support this assertion, and are consistent with the agricultural setting of the ML, and the expected low diversity and abundance on native fauna within and surrounding the ML.<br><br>Given that the ML and surrounding area is predominantly used for agricultural practices and current infrastructure exists in the area such as highways which emit vibration it is reasonable to assume that fauna existing within the area would have some tolerance to disturbance from vibration. A program of blast monitoring would be required to ensure compliance with the AS2187.2 guidelines for vibration and air over pressure. In addition ongoing monitoring would be required to ensure | No<br><br>Rex has not provided an outcome |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| | | noise and dust associated with mine activities (including blasting) remain within applicable standards for humans (as discussed in the Air Quality and Noise Impact Assessment Sections of this Report). DSD considers that impacts to native fauna (marine and terrestrial) would be *trivial*.<br><br>DSD assesses that the primary consequence of this occurring is *trivial* and hence no outcome is required. | |
| **ML-BV6** | Disturbance to livestock on neighbouring properties from blasting activities | Rex has stated that the consequence of this impact occurring without controls implemented is *minor.*<br><br>Concerns relating to impacts on livestock were expressed during statutory consultation. As discussed in ML-BV5 there is limited information about the direct impacts of short term transient vibration levels and blasting overpressure on animals (including livestock). Rex provided minimal discussion on this assessment in the Proposal. DSD sought further information from Rex to support the consequence rating of *minor.* This information was subsequently provided in Issues No. 100 and 109 of the Response Document.<br><br>The discussion provided by Rex considers the co-existence of livestock near mining operations. A number of examples were provided where grazing activities successfully occur close to large scale mining operations in Australia. Other examples of livestock coexisting with sources of vibration and air-overpressure (including planes, trains and highways) were also raised for comparison to emissions anticipated from Hillside blasting activities.<br><br>Blasting will also not be a continuous activity and will last for only a few seconds per day at full mine production. In line with the conclusions provided in **ML-BV5** it is also reasonable to assume that animals would be accustomed to a certain level of vibration and overpressure disturbance due to existing land use.<br><br>As per **ML-BV5,** blasting will also be managed in accordance with Australian Standards to ensure vibration and air over pressure is managed within limits for ensuring public amenity.<br><br>DSD assesses that the primary consequence of this occurring is *trivial* and hence no outcome is required.<br><br>DSD has assessed impacts on stock from blast flyrock separately under **ML-BV3** (relating to third party property damage). | No<br><br>Rex has not provided an outcome |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-BV7** | Impact on agricultural aircrafts flying over the clearance zone during a blast | Rex has stated that the consequence of this impact occurring without controls implemented is *major.*<br><br>As discussed by Rex in the Proposal, when mining the open cut between depths of 50-100m, aircraft could conceivably enter a Rex implemented flyrock exclusion zone directly over the pit when flying at the minimum height of 1000 feet (as required under the *Civil Aviation Regulations, 1998* over populous areas). Given the primary land use within and surrounding the ML is agriculture, which requires the use of light aircraft at required times throughout the year, DSD considers that there could be an impact on aerial agricultural activities as a result of blasting activities, without implementation of control measures.<br><br>DSD assesses the primary consequence of this occurring is greater than *trivial* and hence an outcome is required | Yes<br><br>Rex has provided an outcome |
| **ML-BV8** | Disturbance to geological monuments from construction and operation of the Hillside operation | Rex has stated that the consequence of this impact occurring without controls implemented is *minor.*<br><br>The discussion provided by Rex is focused around modelled blasting impacts, post implementation of controls. Justification for the low rating is therefore not adequately provided by Rex. Based on advice provided by the Geological Survey SA with regards to impacts on the coastal geological monuments identified in the Proposal, it has been assessed that there would be no adverse impact on geological monuments which would be expected due to the Hillside Mine.<br><br>Furthermore, as blasting activities will be managed through impacts **ML-BV1, ML-BV2, ML-BV3** and **ML-BV4** potential for any damage to sensitive sites, which includes structural damage to, for example, buildings and houses it is likely there would be no adverse impact.<br><br>DSD assesses that the primary consequence of this occurring is *trivial* and hence no outcome is required. | No<br><br>Rex has not provided an outcome |

The State Government, through the assessment process, has identified additional impacts to Blasting associated with the proposed mining activities subsequent to the submission of the MLP. An assessment of these additional impact events is provided in Table 7.3.2.

## Table 7.3.2 – Impact events identified subsequent to the MLP

| *Impact events identified subsequent to the MLP* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **DSD ML-BV1** | Damage to coastal cliffs caused by blasting activities | The potential impact to coastal cliffs from blasting was identified by members of the public during statutory consultation.<br><br>Rex provided further discussion in Issue No.159 of the Response Document. The discussion provided by Rex reflected the discussion in relation to **ML-BV8** (coastal geological monuments).<br><br>The modelled blast vibration is between the 5 mm/s and 10 mm/s at the nearest cliff to the open pit blast zone. This is well below the vibration limits established in guidelines relating to damage to residential and commercial structures.<br><br>DSD assesses that the primary consequence of this occurring is *trivial* and hence no outcome is required. | No |
| **DSD ML-BV2** | Impacts on public and infrastructure caused by mine induced seismic activity | A potential impact to public and infrastructure caused by mine induced seismic activity was identified during statutory consultation.<br><br>Rex provided further discussion in Issue No.'s 19, 30 and158 of the Response Document. The discussion provided was around mining induced seismicity from the redistribution of natural pre-existing stress fields following the creation of mine voids, rather than specifically seismicity induced by blasting.<br><br>The discussion noted that the creation of a large open pit and underground working is expected to result in some low magnitude mining induced seismicity, however it would be unlikely that these events would be noticed by the public, or result in damage to offsite infrastructure. Rex goes on to state that as the development of the pit and UG mine would be staged, any seismic events would be dissipated as small incremental events matched to the gradual changes in mine development.<br><br>DSD considers that, in view of the relative shallow depth of the mine, mine induced seismicity at levels that could cause impacts to third parties is unlikely. DSD assesses that the primary consequence of this occurring is *trivial* and hence no outcome is required. | No |

| *Impact events identified subsequent to the MLP* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| | | Rex has made provision of the establishment of seismic monitoring system to further help Rex understand the source, location and drivers of seismicity within the rock mass. GSSA makes recommendation that surface continuous vibration monitoring should have suitable frequency coverage (1 – 100 Hz) and dynamic range in case of a large seismic event. In addition, stress field modelling and reporting is proposed by Rex, should this be necessary. DSD accepts these provisions proposed by Rex. | |

### 7.3.4 *Outcomes (ML)*

Table 7.3.3 is the DSD assessment of outcomes proposed by Rex in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable.

The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies. Table 7.3.4 provides outcomes for impact events identified by DSD that were determined in section 7.3.3 to require an outcome.

**Table 7.3.3 – DSD assessment of outcomes proposed by Rex**

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-BV1**<br><br>**Impact event:** Reduced public amenity as a result of ground vibration associated with blast activities<br><br>**Rex Proposed Outcome:** No public safety impacts or damage to third party property from airblast, vibration or flyrock caused by blasting and all public nuisance | The proposed outcome does accurately describe the majority of potential impact events, however does not describe the level of nuisance from blasting vibration.<br><br>The proposed outcome is not considered a suitable statement on the acceptable level of nuisance impact from blasting subsequent to implementation of control strategies.<br><br>DSD recommends that the outcome be reworded which | Rex considers control strategies will reduce this impact to a level of *low.*<br>Strategies to reduce impacts from blasting (including vibration) are specified in Section 8.3.3.3 of the MLP. The strategies Rex are proposing for vibration broadly include:<br>• Maintaining blast clearance distances<br>• Realignment of the St Vincent and Yorke Highways<br>• Implementation of a Drill and Blast Management Plan<br>• Application of ground vibration limits as per the Australian Standard AS2187.2-2006<br>• Modification of blasting design and charging practices as required<br>• Notification of blasting activities for sensitive receptors<br>• Consistency in blasting firing times and potential for blasting during day for open pit<br>• Reduction in effective blast weights | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction and operation, ensure that there are no adverse impacts to:<br>• Public safety;<br>• Human Comfort;<br>• Third party property (including stock);<br>• Adjacent land use;<br>• Aircraft; or<br>• Other receptors<br>from airblast, flyrock and vibration caused by blasting. |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| activities are recognised and addressed appropriately by the Tenement Holder | sets 'no adverse impacts to human comfort' as the acceptable level of impact. | • Establishment of a blast monitoring program to measure ground vibration and air overpressure<br>The modelling provided by SAROS predicted vibration levels from open pit blasting would not exceed 3mm/s at the closest sensitive receptor to the southwest as per Figure 2 (section 7.3.1 Description of Relevant Aspects of Environment), post implementation of controls. The maximum levels would occur when blasting in the south of the pit. Vibration levels at the closest receptor would reduce significantly for blasts occurring in the north region. Modelling indicates vibration levels from underground mining would be less than 2mm/s (Refer to Figures 3 and 5 of Appendix 8.3-B). The modelled vibration levels at the nearest residential receptors are below compliance criteria detailed in AS2187.2-2006 relating to human discomfort (peaks level of 5mm/s for 95% blasts per year and no blasts over 10 mm/s).<br>In Section 8.3.3.1 of the Proposal Rex details assumptions used in the blast model. This includes the use of monitoring data obtained from mining and blasting operations which possess comparable geological and or topographic conditions and utilise similar blasting practices. Rex also indicate that the model is based on 10m bench heights for open pit mining to a depth of approximately 80m with specifications of blast design parameters for both open pit and underground blasting. Impacts from operations are also based on blasting at the extremities of the open pit and hence are considered 'worst case'. The assumptions adopted which relate to design parameters are based on the current understanding of rock conditions. As specified in the control strategies blasting design and charging practices can and will be modified over the life of the operation. DSD considers that these modelling assumptions are acceptable.<br>DSD considers that the residual risk of *low* for this impact occurring following implementation of control measures is appropriate.<br>DSD considers that the outcome recommended by DSD would be achievable. | |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-BV2**<br><br>**Impact event:**<br>Reduced public amenity as a result of air over pressure associated with blast activities<br>**Rex Proposed Outcome:**<br>No public safety impacts or damage to third party property from airblast, vibration or flyrock caused by blasting and all public nuisance activities are recognised and addressed appropriately by the Tenement Holder | The proposed outcome does not accurately describe the level of impact in the context of nuisance from blasting air over pressure.<br><br>The proposed outcome is not considered a suitable statement on the acceptable level of public amenity from blasting subsequent to implementation of control strategies.<br><br>DSD recommends that the outcome be reworded which sets 'no adverse impacts to human comfort' as the acceptable level of impact for public amenity as a result of blast activities. | Rex considers control strategies will reduce this impact to a level of *low.*<br><br>As per **ML-BV1** Rex have proposed strategies to reduce impacts from blasting in Section 8.3.3.3 of the MLP. The strategies relating to vibration (detailed in **ML-BV1**) would also reduce air over pressure.<br><br>Modelling of air over pressure from blasting, based on the design parameters proposed by SAROS, indicates that using appropriate blast design will ensure all open pit blasting achieves compliance with Australian Standards. Overpressure contours presented in Figure 4 of Appendix 8.3-B shows compliance with the limit of 95% of blasts at 115dBL with no blasts over 120dBL at the nearest sensitive receptor.<br><br>Sensitive receptors will have no impact from air blast during underground mining as overpressure will be contained within the underground portion of the mine (Figure 6, Appendix 8.3-B)<br><br>DSD therefore considers that the residual risk of *low* is appropriate.<br><br>DSD considers that the outcome recommended by DSD would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction and operation, ensure that there are no adverse impacts to:<br>• Public safety;<br>• Human Comfort;<br>• Third party property (including stock);<br>• Adjacent land use;<br>• Aircraft; or<br>• Other receptors<br>from airblast, flyrock and vibration caused by blasting. |
| **ML-BV3**<br><br>**Impact event:**<br>Reduced public safety and damage to third party property (including stock) from fly rock caused by blasting<br><br>**Rex Proposed Outcome:** | The proposed outcome accurately describes the level of impact in the context of damage to property in terms of flyrock.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the | Rex considers control strategies will reduce this risk to a level of *high.*<br><br>This is the only blasting impact assessed by Rex has having a residual risk of high. The assessment by Rex is based on the proximity of the Yorke Highway and adjoining third party property to the blast clearance zones. (refer to Figure 8.3-13 of the Proposal).<br><br>The following minimum blasting safety clearance distances with controls implemented were presented in the Rex Mineral Limited *Drill and Blast Management Plan*, which was provided on request to DSD: | *DSD recommends that should a lease be granted the following outcome be a condition of the lease;*<br><br>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.<br><br>*DSD recommends that should a lease be* |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| No public safety impacts or damage to third party property from airblast, vibration or flyrock caused by blasting and all public nuisance activities are recognised and addressed appropriately by the Tenement Holder | environment subsequent to implementation of control strategies. | • Personnel – 426m<br>• Equipment – 213m<br><br>Although Rex has identified the likelihood is *rare*, given there could be significant consequences (i.e. injury to a member of the public), DSD considers the consequence post-implementation of controls is still *major.*<br><br>The primary strategy to reduce this impact, and ensure the clearance zone will be maintained, is the realignment of the St Vincent and Yorke Highways. SAROS also proposes a number of other modifications to blasting practices which can be applied to maintain the clearance zone (section 4.3, Appendix 8.3-B), particularly applicable to the blasting in the eastern edge of the pit due to the proximity to the Highway.<br><br>The closest residence is approximately 1.1km from the open pit and is outside the blast exclusion zone identified by Mining Plus. Based on the application of the exclusion zone and other measures, DSD considers that the likelihood of safety impacts and property damage to this receptor, from flyrock, is *rare*. A portion of the property which belongs to the closest residence is however within the blast exclusion zone, and may on occasion contain grazing livestock and/or people conducting land management activities that could be exposed to flyrock if not adequately controlled. Rex in their response to Issue No. 103 acknowledges that 'the blast exclusion zone is almost certain to impinge on a small area of adjacent agricultural land use'. Rex has also indicated in the Proposal that due to the flyrock exclusion zone people and stock would not be able to remain within the closest paddocks during blasting times. Rex has identified strategies, including blast scheduling to reflect the needs of neighbouring land uses, notifying neighbours of blasting activities and consistency in blasting to manage this impact.<br><br>Through modification of blasting activities throughout the mine life DSD considers that the implementation of controls could reduce this impact to low.<br><br>DSD considers that the outcome recommended by DSD would be achievable. | *granted the following outcomes be a requirement of the lease;*<br><br>The Tenement Holder must, in construction and operation, ensure that there are no adverse impacts to:<br>• Public safety;<br>• Human Comfort;<br>• Third party property (including stock);<br>• Adjacent land use;<br>• Aircraft; or<br>• Other receptors<br>from airblast, flyrock and vibration caused by blasting.<br><br>*DSD recommends the following lease condition(s) applicable to be adopted for achievement of the outcome:*<br><br>The Tenement Holder must notify property owners adjacent to and within the area of the Lease, subject to their consent, of all blasts no less than forty eight hours in advance of those blasts.<br><br>DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to outcomes for impact events **ML-BV1, ML-BV2 and ML-BV-3**;<br><br>1 Develop strategies for the management of impacts from blasting, including the |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | To ensure that there will be no impact to third party property at the nearest receptors land as a result of blasting activities, the Tenement Holder must obtain a registered waiver of exemption or agreement to undertake mining operations (inclusive of maintaining a flyrock exclusion zone) on CT 5707/273. prior to the commencement of mining activities. | determination of blast exclusion zones, in accordance with relevant standards including the Australian Standard AS2187.2.<br><br>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;<br><br>3 Develop 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;<br><br>4 A blasting protocol and blasting schedule will be developed in consultation with residents of land within and adjoining the Lease to reflect the needs of the neighbouring land use practices (including aerial crop dusting);<br><br>A further regulatory recommendation is provided in Section 7.17 of this report requiring the provision of 3rd party independent review of the effectiveness of proposed strategies in achieving this outcome (for impact event **ML-BV3**). |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-BV4**<br><br>**Impact event:** Structural damage to roads and houses caused by blast activities<br>**Rex Proposed Outcome:** Rex did not propose an outcome for this impact.<br><br>DSD recommends the outcome based on DSD regulatory Response for **ML-BV3** relating to third party property damage | The outcome accurately describes the level of impact.<br><br>The outcome is considered a suitable statement on the acceptable level of impact on the environment. | Rex has not discussed the residual risk level for this impact as no outcome was proposed by Rex.<br><br>Damage to third party property from flyrock is addressed in **ML-BV3.** DSD therefore considers this impact relates to damage from vibration and air overpressure. As discussed in **ML-BV1** and **ML-BV2** Rex are proposing a number of control strategies to manage vibration and air overpressure. As per **ML-BV1** modelling predicted vibration levels for open pit blasting as less than 3mm/s at the closest sensitive receptor and less than 2mm/s for underground mining, post implementation of controls. The modelled vibration levels are below compliance criteria detailed in AS2187.2-2006 relating to human discomfort (peaks level of 5mm/s for 95% blasts per year and no blasts over 10 mm/s). Vibration levels as discussed in Appendix 8.3-B of the Proposal which can cause structural damage are much higher than that of personal amenity therefore it is unlikely there will be any infrastructure damage from blast vibration, provided appropriate control measures are implemented.<br><br>As discussed in **ML-BV2**, modelling of air over pressure from blasting, based on the design parameters proposed by SAROS indicate overpressure from open pit blasting will be less than the compliance limit of 95% of blasts at 115dBL and no blasts over 120 dBL at the nearest sensitive receptor. As highlighted by Rex the level of overpressure required to cause damage to buildings has been well researched. Extremely high levels are required to cause minor damage such as broken windows (i.e. greater than 150dBL). Based on modelled predicted it is therefore unlikely any structural damage would occur as a result of overpressure from blasting operations at Hillside. As per **ML-BV2** there is no expected impact to property from overpressure during underground blasting as overpressure will be contained within the underground portion of the mine.<br><br>DSD considers that the outcome recommended by DSD would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction and operation, ensure that there are no adverse impacts to:<br>• Public safety;<br>• Human Comfort;<br>• Third party property (including stock);<br>• Adjacent land use;<br>• Aircraft; or<br>• Other receptors<br>from airblast, flyrock and vibration caused by blasting. |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-BV7**<br><br>**Impact event:** Impact on agricultural aircrafts flying over the clearance zone during a blast<br>**Rex Proposed Outcome:** No public safety impacts or damage to third party property from airblast, vibration or flyrock caused by blasting and all public nuisance activities are recognised and addressed appropriately by the Tenement Holder | The proposed outcome does accurately describe the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex considers control strategies will reduce this impact to a level of *low.*<br><br>During statutory consultation the impact on agricultural aircrafts were identified by the Public. Rex provided further response on this impact in Issue No. 103. (Response Document). In the response Rex indicated that they are obligated to provide a Notice to Airmen (NOTAM) over the proposed open pit to a certain height. This however does not restrict entry by aircrafts within these areas. Rex has indicated they will maintain contact with local airstrips to notify of upcoming blasts. Consultation with affected parties including landowners and any local airports will allow aircraft to operate when safe to do so.<br><br>Rex have indicated that they will develop the blast schedule in consultation with nearest residents to reflect the requirements of neighbouring land uses and that an agreed notification protocol will be adopted to notify landowners in advance of blast activities. DSD considers that this consultation process involves the input of relevant land managers for all adjacent farming properties. In addition Rex has proposed that alternative arrangement for crop dusting (such as the use of helicopters instead of fixed wing aircrafts) may be agreed upon with the impacted landowner, where applicable.<br><br>DSD considers that the residual risk will be reduced to *low* and that the outcome will be achievable. DSD considers that based on the strategies proposed the residual risk will be reduced to *moderate*, and the outcome would still be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction and operation, ensure that there are no adverse impacts to:<br>• Public safety;<br>• Human Comfort;<br>• Third party property (including stock);<br>• Adjacent land use;<br>• Aircraft; or<br>• Other receptors<br>from airblast, flyrock and vibration caused by blasting. |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex or identified by DSD.

### 7.3.5 *Measurement Criteria (ML)*

Table 7.3.5 is DSDs assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

**Table 7.3.5 – DSD assessment on measurement criteria**

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **ML-BV1**<br><br>**Potential Impact:** Reduced public amenity as a result of ground vibration associated with blast activities<br><br>**Recommended Outcome:** The Tenement Holder must, in construction and operation, ensure that there are no adverse impacts to:<br>• Public safety;<br>• Human Comfort;<br>• Third party property (including stock);<br>• Adjacent land use;<br>• Aircraft; or<br>• Other receptors<br>from airblast, flyrock and vibration caused by blasting. | Blast records will demonstrate that vibration for all blasts have been measured at locations specified in the Drill and Blast Management Plan and are within the Australian Standard 2187.2 – 2006.<br><br>All complaints related to blasting will be investigated, a response provided to the complainant within two working days and all complaints will be resolved and associated actions will be recorded in a data base. | DSD considers the proposed draft criteria to be suitable, however will require further refinement in the PEPR should a lease be granted, including details of the blast monitoring methodology and location.<br><br>The first part of the criterion will demonstrate compliance with recognised compliance criteria for ground vibration detailed in Australian Standard 2187.2 – 2006, which has been designed to limit human discomfort at a sensitive site (including residential buildings occupied by people).<br><br>A second criterion is proposed for responding to complaints to ensure blasting related impacts are managed and resolved with the complainant.<br><br>DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. Rex has not proposed Leading Indicator Criteria. | *DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(d) of the Regulations in relation to the outcome for impact event **ML-BV1, ML-BV2 and ML-BV-3**;*<br><br>1 Blasting criteria is set in accordance with the Australian Standard AS2187.2<br><br>2 Measurements taken to demonstrate achievement of the outcome in **<Impact ID ML-BV1>** must be taken in accordance with Australian Standard AS2187.2. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **ML-BV2**<br><br>**Potential Impact:** Reduced public amenity as a result of air over pressure associated with blast activities<br>**Recommended Outcome:** The Tenement Holder must, in construction and operation, ensure that there are no adverse impacts to:<br>• Public safety;<br>• Human Comfort;<br>• Third party property (including stock);<br>• Adjacent land use;<br>• Aircraft; or<br>• Other receptors<br>from airblast, flyrock and vibration caused by blasting. | Blast records will demonstrate that air overpressure for all surface blasts have been measured at locations specified in the Drill and Blast Management Plan and are within the Australian Standard 2187.2 – 2006.<br><br>All blasting complaints will be recorded, investigated and resolved within the agreed timeframe. Records demonstrate that landholders within the blast exclusion zone have been notified of blasting activities. | As discussed in **ML-BV1** DSD considers the proposed draft criteria to be suitable' however will require further refinement in the PEPR should a lease be granted, including details of the blast monitoring methods.<br><br>The first part of the criterion will demonstrate compliance with recognised compliance criteria for air over pressure detailed in Australian Standard 2187.2 – 2006, which has been designed to limit human discomfort at a sensitive site (including residential buildings occupied by people).<br><br>A second criterion is proposed for responding to complaints to ensure blasting related impacts are managed and resolved with the complainant.<br><br>**ML-BV1** provides more specific detail around management of complaints (i.e. resolve within two days and recoding in a data base). DSD recommends further detail around this to be provided when refining the criteria for **ML-BV2**.<br><br>DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. Rex has not proposed Leading Indicator Criteria. | See response to **ML-BV1** |
| **ML-BV3**<br><br>**Potential Impact:** Reduced public safety and damage to third party property | Annual audit of blasting records (for each blast) demonstrate that blasts have been undertaken in | As indicated in Appendix 8.3-B the processes which control air overpressure levels and flyrock are the same therefore blasting to meet the defined compliance criteria should in turn act as a safety mechanism to restrict the extent of rock | DSD considers that there is a strong reliance on control strategies required to reduce risk to the environment, including the | See response to **ML-BV3** |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| (including stock) from fly rock caused by blasting<br>**Recommended Outcomes:**<br>The Tenement Holder must, in construction and operation, ensure that there are no adverse impacts to:<br>• Public safety;<br>• Human Comfort;<br>• Third party property (including stock);<br>• Adjacent land use;<br>• Aircraft; or<br>• Other receptors<br>from airblast, flyrock and vibration caused by blasting.<br><br>And<br><br>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. | accordance with Australian Standards 2187.2 –2006. All exceedances are reviewed and the cause recorded and rectified. | displacement. With regards to exceedances DSD would require further definition of how this would be reported to the regulator, should they occur.<br><br>It is also considered that additional criteria would need to be included to demonstrate that a defined blast exclusion zone is managed and to ensure no flyrock impacts on 3rd party property and public roads.<br><br>As per the additional condition proposed for **ML-BV3** regarding the blast exclusion zone, this distance must be established between blasting activities and any third party or their property (including stock).<br><br>DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | blast design parameters and loading methods (and any modifications during operation), notification of blasting activities and maintaining the blast clearance zone and thus Leading Indicator Criteria are required.<br><br>Rex has not proposed Leading Indicator Criteria.<br><br>Based on the close proximity to the nearest sensitive receptor and the Yorke Highway DSD considers that a leading indicator criterion is required.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **ML-BV4**<br><br>**Potential Impact:**<br>Structural damage to roads and houses caused by blast activities<br>**Recommended Outcome:**<br>The Tenement Holder must, in construction and operation, ensure that there are no adverse impacts to:<br>• Public safety;<br>• Human Comfort;<br>• Third party property (including stock);<br>• Adjacent land use;<br>• Aircraft; or<br>• Other receptors<br>from airblast, flyrock and vibration caused by blasting. | Rex has not proposed an outcome for this impact. | There is no draft criteria proposed by Rex which can be assessed. DSD however considers that Rex would be able to prepare criteria that will suitably measure achievement of the outcome, as per the recommendations on the criteria relating to impacts to human comfort as per **ML-BV1, ML-BV2** and flyrock impacts on property as per **ML-BV3.**<br><br>As indicated in the discussion on the outcomes proposed for the above mentioned impacts structural damage as a result of vibration and overpressure are higher than compliance limits as per Australian Standards. Therefore compliance within these limits this would be a suitable measure of the outcome. Similarly adherence to the blast exclusion zone would reduce any potential for damage from flyrock as there are no houses or roads within the exclusion zone.<br><br>DSD considers there are appropriate measurement methodologies and standards to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | See response to **ML-BV1** |

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **ML-BV7**<br><br>**Potential Impact:** Impact on agricultural aircrafts flying over the clearance zone during a blast<br>**Recommended Outcome:** The Tenement Holder must, in construction and operation, ensure that there are no adverse impacts to:<br>• Public safety;<br>• Human Comfort;<br>• Third party property (including stock);<br>• Adjacent land use;<br>• Aircraft; or<br>• Other receptors<br>from airblast, flyrock and vibration caused by blasting. | Documentation will provide evidence that there is an aviation exclusion zone directly over the open pit and that local agricultural aircraft pilots have been notified of all blasts prior to occurrence. | DSD considers the proposed draft criteria to be suitable, however will require further refinement in the PEPR should a lease be granted, including arrangements of recording and reporting.<br><br>Implementation of this criteria will ensure pilots are aware of the mines upcoming blasting program. Agricultural activities will however have the potential to be impacted so an exclusion zone alone would not be suitable unless a mutual agreement is reached with the surrounding landholders around blasting and agricultural activity scheduling.<br><br>If approval for an exclusion zone is not gained DSD considers that a different suitable criterion would need to be developed. This could consider the development of a mutual agreement with affected landholders.<br><br>DSD considers these criteria are an appropriate mechanism to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | See response to **ML-BV7** |

### 7.3.6 *Summary of the recommended regulatory response (ML)*

DSD has assessed that all potential impacts from Blasting during construction, operations and post completion have been identified through this assessment and acceptable outcomes have been recommended for all primary impact events where the severity of primary consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for sensitive receptors during construction, operation and post completion. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

*DSD recommends that should a lease be granted the following outcome(s) be a condition(s) of the lease;*

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.

*DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*

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

- Public safety;
- Human Comfort;
- Third party property (including stock);
- Adjacent land use;
- Aircraft; or
- Other receptors

from airblast, flyrock and vibration caused by blasting.

*DSD recommends the following lease condition(s) applicable to be adopted for achievement of the outcome:*

The Tenement Holder must notify property owners adjacent to and within the area of the Lease, subject to their consent, of all blasts no less than forty eight hours in advance of those blasts.

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcomes for impact events **ML-BV1**, **ML-BV2** and **ML-BV-3**:*

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 AS2187.2.

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;

3 Develop 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;

4 A blasting protocol and blasting schedule will be developed in consultation with residents of land within and adjoining the Lease to reflect the needs of the neighbouring land use practices (including aerial crop dusting);

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(d) of the Regulations in relation to the outcomes for impact events **ML-BV1**, **ML-BV2** and **ML-BV-3**:*

1 Blasting criteria is set in accordance with the Australian Standard AS2187.2

2 Measurements taken to demonstrate achievement of the outcome in **<Impact ID ML-BV1>** must be taken in accordance with Australian Standard AS2187.2.

#### 7.3.7 *Summary of recommended regulatory response (EML and MPL)*

Not applicable as no blasting will occur on the EML or MPL.

The Port MPL application has been deferred at the request of Rex and has not been assessed in this report.

### *7.4 Visual Amenity*

#### 7.4.1 *Description of Relevant Aspects of Environment*

The existing visual amenity is discussed by Rex in Section 5.5 of the Proposal.

The ML, EML and MPL for the pipeline corridor are located in an area dominated by agricultural landscapes, minimal areas of native vegetation and coastal cliffs, with views of the Gulf of St Vincent to the east and mildly undulating hills to the west. The Port MPL is located in the largely industrial landscape at Port Ardrossan.

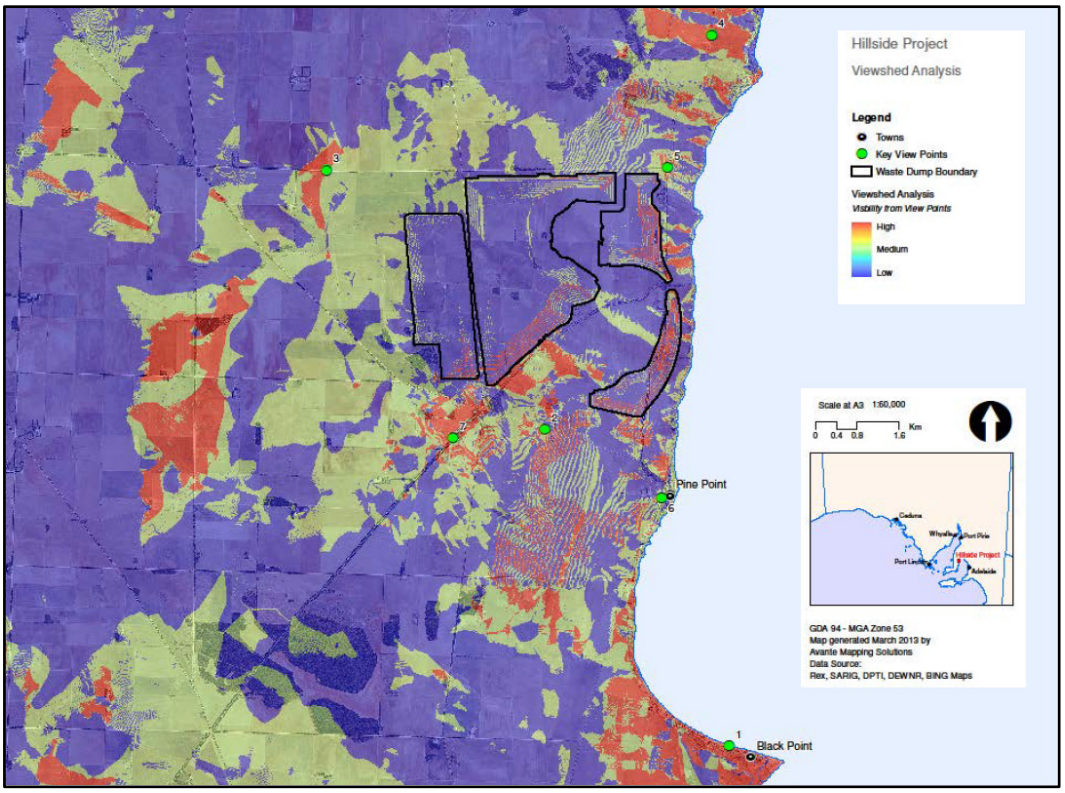
Light sources currently emanate from surrounding townships and vehicle traffic along the Yorke and St Vincent Highways. During times of peak agricultural activity, farm machinery lights are visible across the cultivated land.

Rex commissioned COOE to undertake a Viewshed analysis to assess visual amenity impacts. As part of this assessment a photographic survey of each of the selected sites (as shown in Figure 5.5-1 of the Proposal and

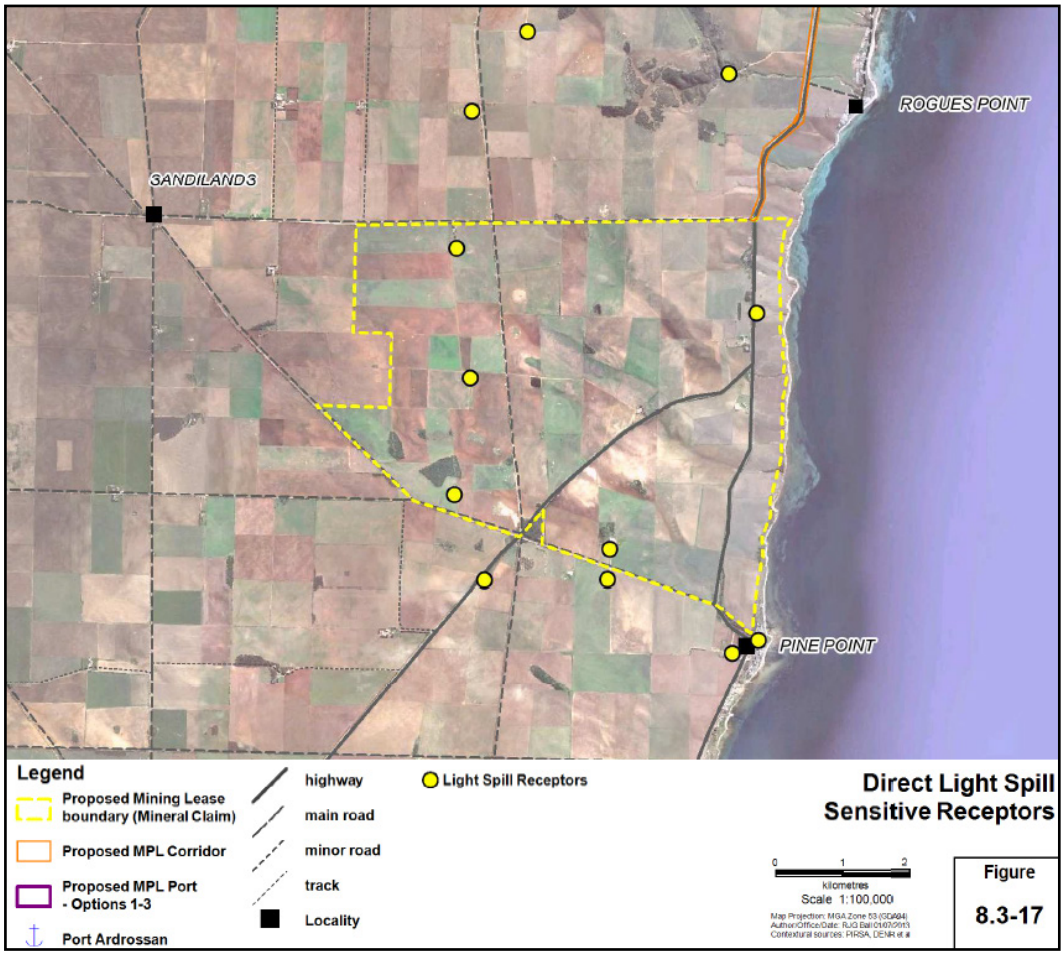
shown below) was undertaken to determine the visual landscape character pre-mining. The pre-mining viewpoints are shown in 5.5.2.2 to 5.5.27 of the Proposal. The sites were selected by Rex and COOE in consultation with the Community Consultative Group (CCG) and included locations in/along:

- Site No. 1 Black Point
- Site No. 3 Sandy Church Rd
- Site No. 4 Yorke Hwy
- Site No. 5 Corner (Yorke Hwy – Sandy Church Rd)
- Site No. 6 Pine Point
- Site No. 7 Yorke Hwy (south of the Hillside project site)

Rex also commissioned AECOM to conduct modelling on mobile light sources. Sensitive receptors for fixed and mobile light sources are shown in Figure 8.3-17 of the Proposal.




**Viewshed analysis survey sites (Figure 5.5-1 of the Proposal)**




**Sensitive Receptors (Figure 8.3-17 of the Proposal)**

Features of the existing landscape are described in Section 5.5.3 of the Proposal.

DSD considers the sensitive receptors and associated environmental values for this environmental aspect to be:

- Residential dwellings, including but not limited to, those located on Sandy Church Road, Pine Point Road, Redding Road, the Yorke Highway and St Vincents Highway (visual amenity)
- Nearby Coastal communities including Pine Point, James Well, Rogues Point and Black Point (visual amenity)
- People travelling along the Yorke and St Vincent Highways (visual amenity)

DSD considers that the description of environment is a suitable characterisation of the receiving environment which may be affected by mining operations.

### 7.4.2 *Views of affected parties*

In the Proposal Rex notes that the CCG have expressed a high level of concern regarding the potential for the visual impact of the mining

operation to detract from the landscape, and for deliberately selected visual buffers to detract from the landscape and post mine landscape.
In the Proposal Rex state that *'While the landscape and landform change is notable there was general acceptance or tolerance of the changes. One viewpoint (site 5) at the intersection of Sandy Church Road and Yorke Highway several hundred meters from the a south eastern WRD was identified as unacceptable by some CCG members if no vegetation screening was put in place. Sites one to four were all deemed as acceptable by the majority, with a small percentage classifying the view as tolerable. Classifications of acceptable, tolerable and unacceptable were used by the CCG in assessing their perceived level of comfort with the resultant land form changes from the various viewpoints.'* The visual impact at Site 5 is shown in Figure 8.3.2. Rex has proposed vegetative screening measures as discussed in impact **ML-VA2.**

The CCG also discussed preferences on visual amenity with the wider community, particularly as it relates to landforms at closure, (discussed in Section 6.9.3 of the Proposal). Rex indicated that there was preference for a rural vista landscape with areas of native vegetation primarily near the coast and on the earthen bunds.

Rex indicated in the Proposal that visual amenity issues specifically associated with the corridor and port were not raised during consultation through the CCG prior to submission of the Proposal. Rex did highlight however that there were general visual amenity issues raised during consultation with the CCG including the potential for infrastructure (pipeline and power lines) within the corridor to obscure the view to the ocean.

Other issues specified by Rex in 8.3.4 of the Proposal include light spill from the operation and the location and space taken up by the overburden (WRDs size and scale).

Other issues raised during statutory consultation included:

**Table 7.4 – Impact events relating to issues raised during statutory consultation**

| Issues raised during statutory consultation | Addressed |
|---|---|
| Lack of Viewshed analysis from the east (i.e. from the water) | Discussed in Section 7.4.3 (Rex's approach to impact assessment) |
| Changes in project design since Viewshed analysis conducted (regarding footprint and design) | Discussed in Section 7.4.3 (Rex's approach to impact assessment) |
| Loss of amenity from increased solid waste | **ML-VA4** |
| Light spill from mining operations (health impacts and impacts on livestock) | Section 7.15 (Adjacent Land Use) |
| Visual impact of proposed power line along coast road | Strategy proposed to manage this concern in Section 8.3.4.3 of the Proposal (No. 4). **ML-VA2** |

The statutory consultation did not identify any additional receptors or impact events to those identified by Rex.

DSD has had regard for all concerns which were raised during statutory consultation, however not all concerns have been included as part of this assessment report as they are either not within the scope of the assessment or are too general in nature to consider.

### 7.4.3 *Impact assessment (ML)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0.

The approach used by Rex to assess likely impacts, due to the subjective nature of perceived visual amenity, was to identify sensitive viewpoints and receptors, assess prominent visual features of the project and assess potential night light impacts from the project.

As indicated in Section 7.4.1 (Description of relevant aspects of the environment) COOE undertook a Viewshed analysis to assess visual amenity impacts from the mining operation, as per Appendix 5.5-A (Visual Amenity Assessment Report) provided as an attachment to the Proposal. A number of sites were selected for analysis, which considered the location of the surrounding residential receptors, visible locations along main transport routes for the general public, and potential viewpoints for the wider community. The resulting locations are along major, secondary and minor roads within the area surrounding the proposed mining lease area. These sites were selected in consultation with the CCG.

This assessment was supported by 3D modelling visualisation showing visibility of mine infrastructure at various mine development stages and from various vantage points discussed above. The visual landscape views as they currently stand at all sites were also shown (pre-mine development) to allow for comparison against landscape views during and post mining. The assessment included the use of elevation contour data to develop a Digital Elevation Model (DEM) of the study area. DEM was analysed in relation to the heights of the proposed mine site waste rock dumps (WRD) and topsoil and ore stockpiles across 5, 10 and 15- year periods and the final rehabilitated landform.

Since the Viewshed analysis was conducted an update to the TSF design occurred. The change in the TSF design was discussed in the Proposal in regards to how this affected the Viewshed analysis and it was concluded by Rex that given the TSF re-design resulted in a decrease in the overall height of the TSF, the visual amenity assessment represented the worst case scenario and was therefore valid for the assessment. Rex also highlighted that there will be a notable change to viewpoint 3 as the WRD will be approximately 1200m closer however the WRD height will be the same as originally presented.

Rex also commissioned an assessment of the impact of mobile light sources on sensitive receptors, as per Appendix 8.3-C AECOM Hillside Mine Mobile Plant Headlight Line of Sight Assessment. Where multiple receptors were in close proximity, the worst case line of sight was chosen to represent that cluster of receptors (see Figure 8.3-17 of the Proposal, shown in section 7.4 of this report). Modelling predicted line of site for mobile plant at various stages in the projects development (with WRD changes) at years 1, 5 and 12.

Impacts associated with the Yorke and St Vincent Highways diversion construction works were considered under the Development Act applications for these activities and will be regulated under the Development Act.

DSD considers the approach to assessment of visual impact to be suitable.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7.0. A review of Rex's impact assessment is shown in Table 7.4.1.

## Table 7.4.1 – Impact events identified by Rex in the Proposal

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** As documented in Table 8.3-21 of the Proposal | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **MLVA 1** | Reduction in visual amenity during construction | Rex has stated that the consequence of this impact occurring without controls implemented is *minor.*<br><br>This is discussed by Rex in the context of clearance of vegetation, excavation and plant works during construction. Given the proximity to sensitive receptors DSD considers that without implementation of control measures there may be visual impacts from selected receptors as a result of construction activities at Hillside Mine.<br><br>DSD assesses the primary consequence of this occurring is greater than *trivial* and hence an outcome is required. | YES<br><br>Rex has provided an outcome |
| **MLVA 2** | Reduction in visual amenity during operation | Rex has stated that the consequence of this impact occurring without controls implemented is *moderate.*<br><br>This assessment by Rex is based on temporary and permanent changes in the landform as a result of the mine operation. Given the size and location of the WRDs and the proximity to sensitive receptors DSD considers that without implementation of control measures visual amenity could be impacted as a result of mining operations at Hillside Mine.<br><br>DSD assesses the primary consequence of this occurring is greater than *trivial* and hence an outcome is required. | YES<br><br>Rex has provided an outcome |
| **ML-VA3** | Nuisance from light spill | Rex has stated that the consequence of this impact occurring without controls implemented is *minor.*<br><br>Given the rural setting of the Hillside Mine site and the proximity to sensitive receptors DSD considers that without implementation of control measures sensitive receptors will experience amenity impacts from light spill occurring during construction and operation activities. Rex has discussed this mainly in the context of headlights from mobile plant and the provision of night lighting.<br><br>DSD assesses the primary consequence of this occurring is greater than *trivial* and hence an outcome is required. | YES<br><br>Rex has provided an outcome |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** As documented in Table 8.3-21 of the Proposal | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-VA4** | Reduction in visual amenity from increase in general solid waste and litter at mine site. | Rex has stated that the consequence of this impact occurring without controls implemented is *minor.*<br><br>Rex has indicated that there will be considerable solid waste generated from mining activities and have discussed the risk of this impacting receptors in the context of waste management. In Table 8.3-21 there is an error as Rex have assessed the impact as *low* however has indicated that an outcome is required without providing an outcome and criteria in Table 8.3-22.<br><br>The discussion by Rex is based on control measures. DSD considers that potential visual impact to receptors could occur at selected stages of the mine life (particularly prior to the formation of the WRDs) as a result of solid waste generated onsite, if controls are not implemented.<br><br>DSD assesses the primary consequence of this occurring is greater than *trivial* and hence an outcome is required. | YES<br><br>Rex has not provided an outcome |
| **ML(C)-VA1** | Post completion landforms not integrated with surrounding landscape | Rex has stated that the consequence of this impact occurring without controls implemented is *minor.*<br><br>As indicated in the Proposal post mine closure there will be notable and permanent landscape change from the residual project elements (WRD). If control measures are not implemented to blend the permanent structures as much as possible to conform to similar landforms on the Yorke Peninsula this is likely to result impact to visual amenity for sensitive receptors.<br><br>DSD assesses the primary consequence of this occurring is greater than *trivial* and hence an outcome is required. | YES<br><br>Rex has provided an outcome |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** As documented in Table 8.3-21 of the Proposal | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML(C)-VA2** | Post completion visual amenity unacceptable to relevant stakeholders | Rex has stated that the consequence of this impact occurring without controls implemented is *moderate.*<br><br>Given the proximity to sensitive receptors and the permanent landforms which will remain post completion, if Rex has not implemented control strategies to adequately represent the views on final landform of affected parties, DSD considers there could be an impact to the visual amenity of relevant stakeholders.<br><br>DSD assesses the primary consequence of this occurring is greater than *trivial* and hence an outcome is required. | YES<br><br>Rex has provided an outcome |

DSD considers that Rex has identified all potential impacts to Visual Amenity associated with the proposed mining activities.

### 7.4.4 *Outcomes (ML)*

Table 7.4.2 is the DSD assessment of outcomes proposed by Rex in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable. The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies.

**Table 7.4.2 – DSD assessment of outcomes proposed by Rex**

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-VA1**<br><br>**Impact event:** Reduction in visual amenity during construction<br><br>**Rex Proposed Outcome:** During construction the site is maintained in a manner such that visual impacts are minimised | The proposed outcome does not accurately describe the level of impact.<br><br>The proposed outcome is not considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies.<br><br>The outcome provided does not make a commitment to an acceptable level of impact | Rex considers control strategies will reduce this impact to a level of *moderate.*<br><br>There would be an unavoidable impact from construction activities. These activities are short term in nature and the construction of screening measures during this stage will mitigate the impact during operations. The assessment by Rex is based on the temporary nature of the construction activities.<br><br>The strategies Rex are proposing to reduce impact from construction including constructing prominent built structures in accordance with local planning requirements and principles, screening with feature plantings of native vegetation and using non-reflective, natural coloured materials. Rex has also indicated that the WRDs will be used to screen activities and onsite infrastructure from public roads and residences.<br><br>The control strategies proposed by Rex are designed to reduce visual impact, and are listed below:<br><br>• Prominent built structures (office or accommodation infrastructure required for the Hillside Project) designed to meet planning requirements and principles; screened with feature plantings of native vegetation where possible; structures and buildings use non-reflective, natural coloured materials to reduce their visual impact. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction and operating the lease and post completion ensure that the form, contrasting aspects and reflective aspects of mining operations are visually softened to blend in with the surrounding landscape.<br><br>*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event **ML-VA1**;* |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | • Position and design WRDs to screen, where possible, activities and on-site infrastructure (process plant, offices and other buildings) from public roads and residences (sensitive receptors).<br><br>As indicated in Section 6.4.2 of the Proposal the construction phase is planned to take approximately a year and a half, until the operations phase commences. During the construction phase Rex indicate that the main areas of visual impact will be process plant and construction infrastructure, and the internal mine road construction. A number of sheds and mine plant structures will also be established during this phase. As described in the Proposal construction onsite will also involve pre-stripping and stockpiling (topsoil and subsoil).<br><br>Rex has indicated that the natural topography will limit the visual impact of the process plant construction from receptors.<br><br>Rex have provided justification for the residual risk indicating that amenity cannot be reduced further during construction as the primary control to reduce visual impacts (WRDs) will not be established at this time.<br><br>DSD considers that the recommended outcome would be achievable.<br><br>DSD considers that an additional condition be imposed should a lease be granted requiring a program for the development and implementation of strategies for the management of visual amenity, developed in consultation with affected parties. The program is to be reflective of all stages of mining including construction, operation, rehabilitation and post completion. | Develop and implement strategies in consultation with affected parties for the management of visual amenity which should include (but not limited to):<br>• Screening of prominent built structures and use of non-reflective, natural coloured materials<br>• Establishing vegetation and mature trees to screen built infrastructure and minimise views into the mine site<br>• Positioning and design of permanent mine landforms or other earthen bunds to screen activities<br>• Sculpture permanent mine landforms to soften the visual impact and reflect surrounding landscape<br>• Prompt rehabilitation of disturbed areas once no longer required for mining operations, utilising every available opportunity provided by the mine plan<br>• Rehabilitation of the final batters immediately following the completion of each WRD lift<br>• Vegetate external faces of permanent mine landforms to |

| *DSD assessment of outcomes proposed by Rex* | | | |
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| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | | reduce the impact of changes in landscape colour. |
| **ML-VA2**<br><br>**Impact event:** Reduction in visual amenity during operation **Rex Proposed Outcome:** During operation the site is maintained in a manner such that visual impacts are minimised | The proposed outcome does not accurately describe the level of impact.<br><br>The proposed outcome is not considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies.<br><br>The outcome provided does not make a commitment to a level of impact and does reflect the level of impact and also considers closure | Rex considers control strategies will reduce this impact to a level of *moderate*.<br><br>Mine operational stages are shown in Figures 6.4-3 to 6.4-6 in the Proposal. The WRDs will be the most prominent features of the mine which are visible during mining operations. They will act to reduce visual impact of mine activities through their positioning around the mine site (as discussed in Appendix 5.5-A) once they have reached sufficient heights to screen mining operations. The visibility of these structures cannot be prevented however the impact of these structures, which will become permanent in the landscape, can be reduced through progressive rehabilitation mechanisms to meet the expectations of sensitive receptors.<br><br>Rex is proposing a number of control strategies to reduce visual amenity impacts during operations as per Section 8.3.4.3. Broadly these include:<br>• screening of plant and use of natural coloured materials<br>• positioning of the WRDs to screen onsite operations from public roads and sensitive receptors<br>• design of the Yorke Highway with consideration for reduced visual impact for passing traffic (i.e. below line of sight, and establishing vegetation corridors where possible)<br>• designed fixed night lighting to minimise light spillage<br>• minimise vegetation clearance to maximise screening of construction and operations<br>• progressive rehabilitation (including shaping and planting to blend with landscape)<br>• Construction and rehabilitation of south-east and north-east WRDs by Year 5 (most visible from passing traffic and Rogues and Pine Point) | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction and operating the lease and post completion ensure that the form, contrasting aspects and reflective aspects of mining operations are visually softened to blend in with the surrounding landscape.<br><br>*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event **ML-VA1**;*<br><br>Develop and implement strategies in consultation with affected parties for the management of visual amenity which should include (but not limited to):<br>• Screening of prominent built structures and use of non-reflective, natural coloured materials<br>• Establishing vegetation and mature trees to screen built |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | • Construction of vegetative bunds and visual screens along roads surrounding site (vegetation to reflect landscape)<br>• Sculpturing WRDs to reflect similar landforms on Yorke Peninsula<br>• Vegetating slopes of WRD strategically to suit grades of slope (crops and/or native vegetation)<br>• Maintenance program for visual screens<br>• Provision of window blinds if required to the most impacted receptors<br>Rex has provided justification for the residual risk indicating that amenity cannot be reduced further and WRDs must be constructed to operate the mine. DSD considers this justification to be reasonable.<br>Rex has included a control strategy in **ML(C)-VA2** relating to ongoing community consultation regarding closure. DSD considers this strategy to also be applicable to operations as this forms the basis for closure. Key to ensuring that the outcome would be achieved is via Rex engaging with stakeholders throughout the life of the operation and progressively operating and rehabilitating (and gaining feedback on their rehabilitation), to ensure the landforms created during mining will be as a result of engagement with stakeholders.<br>DSD considers that the outcome recommended by DSD would be achievable. | infrastructure and minimise views into the mine site<br>• Positioning and design of permanent mine landforms or other earthen bunds to screen activities<br>• Sculpture permanent mine landforms to soften the visual impact and reflect surrounding landscape<br>• Prompt rehabilitation of disturbed areas once no longer required for mining operations, utilising every available opportunity provided by the mine plan<br>• Rehabilitation of the final batters immediately following the completion of each WRD lift<br>• Vegetate external faces of permanent mine landforms to reduce the impact of changes in landscape colour. |
| **ML-VA3**<br>**Impact event:** Nuisance from light spill<br>**Rex Proposed Outcome:** No permanent disruption in visual amenity due to direct light spill | The proposed outcome accurately describes the level of impact.<br>The proposed outcome is not considered a suitable statement on the acceptable level of impact on the environment | Rex considers control strategies will reduce this impact to a level of *low.*<br>Rex has indicated that the primary source of light spill likely to create an impact is from mobile plant (haul trucks) as the site will be operational on a 24 hour basis. Rex proposes a number of control measures, some of which are specified in **ML-VA2.** Others include:<br>• Shaping of the WRDs to reduce direct light spill<br>• Use of earthen bunds and strategic positioning of haul roads to reduce light spill<br>• Provision of light reduction mechanisms (such as window blinds) at most impact receptors | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br>The Tenement Holder must in construction and operation ensure that there are no public nuisance |

| *DSD assessment of outcomes proposed by Rex* | | | |
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| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | subsequent to implementation of control strategies.<br><br>This is because it implies that as long as the impact is not permanent it is acceptable however this is not deemed to be an appropriate level of impact. Light spill impacts also need to be considered for all applicable stages of operation (light spill will not be an applicable post completion) | • Limit night lighting in non-active work and accommodation areas and use on an 'as needs' basis where it can be safely applied<br>• Reduce reflective properties of surfaces around process plant and night illuminated work areas; and<br>• Staff training on light reduction<br><br>The level of impact would be primarily dependent upon the affected individuals' perception or experience of the impact. To this effect treatment measures at the receptor where appropriate is a strategy that would contribute to the achievement of the outcome recommended by DSD.<br><br>DSD considers that the outcome recommended by DSD would be achievable. | impacts from light spill generated by mining operations. |
| **ML-VA4**<br><br>**Impact event:** Reduction in visual amenity from increase in general solid waste and litter at mine site. **Rex Proposed Outcome:** Rex has not proposed an outcome for this impact.<br><br>DSD recommends the following outcome: | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Industrial and commercial waste is discussed in 6.7.4 of the Proposal. Rex has not provided a residual risk rating as they have indicated that all industrial and commercial waste will be removed in accordance with EPA requirements.<br><br>Disposal of waste is addressed under the *Environment Protection Act 1993.*<br><br>The primary visual impact to sensitive receptors is likely to be via temporary onsite storage, prior to removal in accordance with EPA legislation.<br><br>There are industry standard practices which can be used to effectively hide temporary onsite storage facilities.<br><br>DSD considers control strategies would reduce this impact to a level of *low.*<br><br>DSD considers that the recommended outcome would be achievable. | *DSD recommends that should a lease be granted the following outcome(s) be a condition(s) of the lease;*<br><br>The Tenement Holder must ensure that any waste temporarily stored on the lease is not visible by any third party from any land based view point. |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| The Tenement Holder must ensure that any waste temporarily stored on the lease is not visible by any third party from any land based view point. | | | |
| **ML(C)-VA1**<br><br>**Impact event:** Post completion landforms not integrated with surrounding landscape **Rex Proposed Outcome:** Integrate and harmonise final landforms and vegetation with the surrounding landscape | The proposed outcome does not accurately describe the level of impact.<br><br>The proposed outcome is not considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies.<br><br>DSD considers that the outcome should include all applicable mine life stages including operation and post-completion together | Rex considers control strategies will reduce this impact to a level of *low*.<br><br>Proposed control strategies include tree planting and screening of prominent built structures, and ongoing maintenance of this screening.<br><br>As discussed in **ML-VA2** DSD considers that the majority of the operational strategies proposed are applicable to closure as the operational activities forms the basis for closure, including but not limited to strategies based on shaping and vegetating waste rock dumps, and designing mine waste landforms to soften visual impact<br><br>As indicated in **ML-VA2**, key to ensuring that the outcome would be achieved is via Rex engaging with stakeholders throughout the life of the operation and progressively operating and rehabilitating (and gaining feedback on their rehabilitation), to ensure the landforms created during mining will be as a result of engagement with stakeholders.<br><br>DSD considers that the outcome recommended by DSD would be achievable. | DSD recommends the regulatory response applicable to impact **ML-VA1** will be applicable to this impact. |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML(C)-VA2**<br><br>**Impact event:** Post completion visual amenity unacceptable to relevant stakeholders<br><br>**Rex Proposed Outcome:**<br>The external visual amenity of the site is acceptable as determined by consultation with relevant interested parties | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies.<br><br>DSD however considers this outcome should reflect all applicable stages of the mine life (including operation and closure) | Rex considers control strategies will reduce this impact to a level of *moderate.*<br><br>Rex has indicated that they will conduct ongoing community consultation in the development of strategies to minimise impacts to visual amenity.<br><br>DSD considers that both strategies are applicable to operations as per the discussion provided in **ML-VA2** and **ML(C)-VA2.** As discussed, given that operation activities (including progressive rehabilitation) will ultimately form the final landscape DSD considers that it is crucial for Rex to be ensuring stakeholder expectations are being met throughout the life of the operations.<br><br>DSD considers that the proposed strategies by Rex for operation and closure will be able to reduce this impact to a residual level of *moderate.* DSD considers the justification for the residual risk rating, as provided by Rex in the Proposal is reasonable.<br><br>The reduction of the residual risk to as low as reasonably practical will be highly dependent upon the consultation Rex undertake with the community pre and post all stages of operation.<br><br>DSD considers that the outcome recommended by DSD would be achievable. | *DSD recommends that should a lease be granted the following outcome(s) be a condition(s) of the lease;*<br><br>Unless the Director of Mines has approved (in writing) an alternative agreement between the Tenement Holder and a land owner relating to the removal of infrastructure, the Tenement Holder must ensure that all infrastructure is decommissioned and removed from the lease at mine completion.<br><br>*DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction and operating the lease and post completion ensure that the form, contrasting aspects and reflective aspects of mining operations are visually softened to blend in with the surrounding landscape. |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex and, where applicable, identified by DSD.

### 7.4.5 *Measurement Criteria (ML)*

Table 7.4.3 is DSDs assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

**Table 7.4.3 – DSD assessment on measurement criteria**

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **ML-VA1**<br><br>**Potential Impact:** Reduction in visual amenity during construction<br><br>**Recommended Outcome:** The Tenement Holder must, in construction and operating the lease and post completion ensure that the form, contrasting aspects and reflective aspects of mining operations are visually softened to blend in with the surrounding landscape. | During construction photo monitor visibility of site construction activity from sensitive receptor locations to show visual screens (vegetation and bunds) and operating procedures reduce visibility of activity. Frequency of monitoring will be dependent on the activity and its location. | DSD considers that additional criteria be developed, which demonstrates that Rex would be operating in accordance with the visual amenity strategies developed as part of the PEPR.<br><br>DSD considers that photo monitoring as proposed by Rex in the draft criteria to be one suitable method for demonstrating visual amenity strategies are being implemented.<br><br>DSD considers that Rex should investigate additional methodologies as part of the development of the PEPR to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |
| **ML-VA2**<br><br>**Potential Impact:** Reduction in visual amenity during operation **Recommended Outcome:** The Tenement Holder | Annual photo monitoring of visible landscape from identified baseline photo viewpoint locations and sensitive receptors to demonstrate that | Similar to ML-VA1, DSD considers that additional criteria be developed, which demonstrates that Rex would be operating in accordance with the visual amenity strategies developed as part of the PEPR. This would include demonstration of progressive rehabilitation of mine landforms (including waste rock dumps). | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| must, in construction and operating the lease and post completion ensure that the form, contrasting aspects and reflective aspects of mining operations are visually softened to blend in with the surrounding landscape. | sequencing of WRDs is in accordance with the progressive rehabilitation plan | DSD considers that photo monitoring as proposed by Rex in the draft criteria to be one suitable method for demonstrating visual amenity strategies are being implemented.<br><br>DSD considers there is methodology that is an appropriate mechanism to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | | |
| **ML-VA3**<br><br>**Potential Impact:**<br>Nuisance from light spill<br><br>**Recommended Outcome:**<br>The Tenement Holder must in construction and operation ensure that there are no public nuisance impacts from light spill generated by mining operations | Results of regular site inspections show that fixed lighting meets the requirements of AS 4282-1997 control of the obtrusive effects of outdoor lighting | The criterion proposed by Rex is demonstrating control measures have been achieved. The Australian Standards (AS 4282-1997), proposed by Rex, specifies design parameters for outdoor lighting to control the obtrusive effects. Compliance with this standard may be applicable to measurement achievement of the outcome.<br>An additional way of measuring this outcome could include measurement of public complaints and actions to remediate impacts. Nuisance impacts are based on the perception of the person experiencing the impact. The criteria could be focused around measuring how this impact is being managed and resolved with the sensitive receptor.<br>DSD considers there are appropriate measurement methodologies and standards to demonstrate achievement of the outcome.<br>DSD considers that achievement of the recommended outcome would be measurable.<br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers that there is a strong reliance on control strategies required to reduce risk to the environment, including operational measures to reduce light spill as well as mitigation at the location of the sensitive receptor and thus Leading Indicator Criteria are required.<br><br>Rex has proposed the following Leading Indicator Criteria:<br><br>*Record community complaints and respond in accordance with the Communications Management Plan.*<br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **ML-VA4**<br><br>**Potential Impact:** Reduction in visual amenity from increase in general solid waste and litter at mine site.<br>**Recommended Outcome:** The Tenement Holder must ensure that any waste temporarily stored on the lease is not visible by any third party from any land based view point | Rex has not proposed criteria for this outcome. | DSD recommends that a criterion could be developed to measure this outcome via such methods as photo monitoring from the sensitive receptor/vantage point locations on a defined basis to demonstrate waste is appropriately managed.<br><br>DSD considers there are appropriate measurement methodologies and standards to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |
| **ML(C)-VA1**<br><br>**Potential Impact:** Post completion landforms not integrated with surrounding landscape<br>**Recommended Outcome:** The Tenement Holder must, in construction and operating the lease and post completion ensure that the form, contrasting aspects and reflective aspects of mining operations are visually | Photo monitoring from identified baseline photo viewpoints and sensitive receptors showing a mixed landscape of native vegetation and agricultural land within 2 years after operations cease. | Similar to ML-VA1, DSD considers that additional criteria be developed, which demonstrates that Rex has rehabilitated the mine in accordance with the visual amenity strategies developed as part of the PEPR.<br><br>DSD considers that photo monitoring as proposed by Rex in the draft criteria to be one suitable method for demonstrating completion visual amenity strategies and outcomes are being implemented and achieved.<br><br>DSD considers there are appropriate measurement methodologies and standards to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable. | DSD considers that there is a strong reliance on control strategies required to reduce risk to the environment, including all operational measures which will ultimately lead to the final landform, and thus Leading Indicator Criteria are required.<br><br>Rex has proposed the following Leading Indicator Criteria:<br><br>*Post completion community perceptions survey to assess acceptance of integration into surrounding landscape.* | DSD considers no lease conditions applicable to the measurement criteria are required. |

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| softened to blend in with the surrounding landscape. | | Should a lease be granted, these criteria would be finalised in the PEPR submission. | The proposed LIC is appropriate as it reflects stakeholder perceptions after all rehabilitation has been carried out. The survey should be based on gauging stakeholder perception progressively over the course of the mine life to determine whether it is likely the outcome will not be achieved and to allow rectification accordingly.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | |
| **ML(C)-VA2**<br><br>**Potential Impact:** Post completion visual amenity unacceptable to relevant stakeholders<br><br>**Recommended Outcome:** Unless the Director of Mines has approved (in writing) an alternative agreement between the Tenement Holder and a land owner relating to the removal of infrastructure, the Tenement Holder must ensure that all | Results of post completion community perceptions survey to assess acceptance final landscape demonstrates that the post completion visual amenity is accepted by the relevant stakeholders | Suitable criteria must be developed which are a demonstration (through inspections, audits or similar) to show all infrastructure and waste is removed or an alternative agreement is in place with the landowner.<br><br>DSD considers there are methodologies that are an appropriate mechanism to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers that there is a strong reliance on control strategies required to reduce risk to the environment, such as ongoing community consultation to determine community expectations, and thus Leading Indicator Criteria are required.<br><br>Rex has proposed the following Leading Indicator Criteria:<br><br>*Community acceptance assessed by visitation numbers to viewing points post completion.*<br>The LIC proposed requires modification as visitation numbers to viewing points will not indicate that | DSD considers no lease conditions applicable to the measurement criteria are required. |

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| infrastructure is decommissioned and removed from the lease at mine completion. | | | there is potential that stakeholder expectations may not be met. The results of a survey would be more suitable to determine whether the outcome is not going to be achieved.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | |

### 7.4.6 *Summary of the recommended regulatory response (ML)*

DSD has assessed that all potential impacts to Visual Amenity during construction, operations and post completion have been identified through this assessment and acceptable outcomes have been recommended for all primary impact events where the severity of primary consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for sensitive receptors during construction, operation and post completion. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

*DSD recommends that should a lease be granted the following outcome(s) be a condition(s) of the lease;*

The Tenement Holder must ensure that any waste temporarily stored on the lease is not visible by any third party from any land based view point. Unless the Director of Mines has approved (in writing) an alternative agreement between the Tenement Holder and a land owner relating to the removal of infrastructure, the Tenement Holder must ensure that all infrastructure is decommissioned and removed from the lease at mine completion.

*DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*

1. The Tenement Holder must, in construction and operating the lease and post completion ensure that the form, contrasting aspects and reflective aspects of mining operations are visually softened to blend in with the surrounding landscape.

2. The Tenement Holder must in construction and operation ensure that there are no public nuisance impacts from light spill generated by mining operations.

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event **ML-VA1**:*

Develop and implement strategies in consultation with affected parties for the management of visual amenity which should include (but not limited to):

- Screening of prominent built structures and use of non-reflective, natural coloured materials
- Establishing vegetation and mature trees to screen built infrastructure and minimise views into the mine site
- Positioning and design of permanent mine landforms or other earthen bunds to screen activities

- Sculpture permanent mine landforms to soften the visual impact and reflect surrounding landscape
- Prompt rehabilitation of disturbed areas once no longer required for mining operations, utilising every available opportunity provided by the mine plan
- Rehabilitation of the final batters immediately following the completion of each WRD lift
- Vegetate external faces of permanent mine landforms to reduce the impact of changes in landscape colour

### 7.4.7 *Impact assessment (EML)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0.

Rex has indicated in Section 8.3.4.1 of the Proposal that the removal of stockpiles from the proposed EML is not considered to have any visual amenity impact.

DSD considers that any stockpiling or movement of stockpiles on the EML has the potential to create a visual impact for sensitive receptors.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7.0.

Rex did not identify any impacts for the EML relating to visual amenity. Impacts identified by state government identified post submission of Proposal identified in Table 7.4.4.

**Table 7.4.4 – Impact events identified subsequent to the Proposal**

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **DSD EML-VA1** | Reduction in visual amenity due to stockpile activities within the EML. | Rex did not provide an assessment for this impact. Given the close proximity of the EML to sensitive receptors DSD considers that there is a potential for visual impact as a result of stockpiling and movement of stockpiles on the EML.<br>DSD considers the consequence without controls implemented to be greater than trivial. | YES |

### 7.4.8 *Outcomes (EML)*

Table 7.4.5 provides outcomes for impact events identified by DSD that were determined in section 7.4.3 to require an outcome.

The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable.

The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies.

**Table 7.4.5 – Discussion of outcomes for impacts identified by DSD**

| ID | Acceptability of outcome | Achievability of outcome | Recommended regulatory response |
|---|---|---|---|
| **DSD EML-VA1**<br><br>**Impact event:** Reduction in visual amenity due to stockpile activities within the EML<br><br>**Outcome:** DSD proposes the following outcome;<br><br>The Tenement Holder must, in construction and operating the lease and post completion ensure that the form, contrasting aspects and reflective aspects of mining operations are visually softened to blend in with the surrounding landscape. | The outcome accurately describes the level of impact.<br><br>The outcome is considered a suitable statement on the acceptable level of impact on the environment. | Industry standard control strategies can be implemented to ensure any stockpile activities and extractive materials (which do not relate to the DA application for the highway diversion) are screened or outside the view of the public.<br><br>DSD considers that the outcome would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction and operating the lease and post completion ensure that the form, contrasting aspects and reflective aspects of mining operations are visually softened to blend in with the surrounding landscape.<br><br>*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event **DSD EML-VA1**;*<br><br>Develop and implement strategies in consultation with affected parties for the management of visual amenity which should include (but not limited to):<br>• Screening of prominent built structures and use of non-reflective, natural coloured materials<br>• Prompt rehabilitation of disturbed areas once no longer required for mining operations, utilising every available opportunity provided by the mine plan |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies or identified by DSD.

### 7.4.9 *Measurement Criteria (EML)*

Table 7.4.6 is DSDs assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

**Table 7.4.6 – DSD assessment on measurement criteria**

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **DSD EML-VA1**<br><br>**Potential Impact:**<br>Reduction in visual amenity due to stockpile activities within the EML (not related to Highway works)<br><br>**Recommended Outcome:**<br>The Tenement Holder must, in construction and operating the lease and post completion ensure that the form, contrasting aspects and reflective aspects of mining operations are visually softened to blend in with the surrounding landscape. | Rex has not proposed criteria for this outcome. | As per the discussion on ML-VA1, DSD considers that criteria be included which validates the implementation of control strategies for the management of visual amenity.<br>DSD considers there are methodologies that are an appropriate mechanism to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | Should a lease be granted, DSD recommend that Leading Indicator Criteria be considered in the PEPR submission. | DSD considers no lease conditions applicable to the measurement criteria are required. |

### 7.4.10 *Summary of the recommended regulatory response (EML)*

DSD has assessed that all potential impacts to Visual Amenity during construction, operations and post completion have been identified through this assessment and acceptable outcomes have been recommended for all primary impact events where the severity of primary consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for sensitive receptors during construction, operation and post completion. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

*DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*

The Tenement Holder must, in construction and operating the lease and post completion ensure that the form, contrasting aspects and reflective aspects of mining operations are visually softened to blend in with the surrounding landscape.

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event* ***DSD EML-VA1****:*

Develop and implement strategies in consultation with affected parties for the management of visual amenity which should include (but not limited to):

- Screening of prominent built structures and use of non-reflective, natural coloured materials
- Prompt rehabilitation of disturbed areas once no longer required for mining operations, utilising every available opportunity provided by the mine plan

### 7.4.11 *Impact assessment (MPL)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0.

Rex have indicated in their assessment of visual impacts from the MPLs (in the Proposal) that 'sensitive viewpoints and receptors affected by the proposed corridor and port MPL's are limited to passing traffic, and those working at and using the port and grain storage facility'. Rex has therefore not identified any specific receptors as relevant to the impacts. Nuisance impacts from dust relating to the MPLs have been assessed by Rex in the Air Quality section of the Proposal (Section 8.4.1).

## DSD review of Rex impact assessment

A description of DSD's assessment of the impact assessment process is described in Section 7.0. A review of Rex's impact assessment is shown in Table 7.4.7 and impacts identified by the State Government post submission of the Proposal are provided in Table 7.4.8.

The Port MPL application has been deferred at the request of Rex and has not been assessed in this report.

### Table 7.4.7 – Impact events identified by Rex in the Proposal

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** As documented in Table 8.4-10 of the Proposal | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **MPL-VA1** | Reduction in visual amenity from clearance of vegetation and excavations during construction. | Rex has stated that the consequence of this impact occurring without controls implemented is *minor.*<br>The Rex proposal states that minimal native vegetation exists along the MPL corridor. Given the rural and industrial settings that the Power line and Pipelines MPL falls within, DSD expects visual amenity impacts from removal of native vegetation will be trivial for receptors along the corridor. In addition, the 11km long pipeline trench is proposed by Rex to be progressively backfilled and rehabilitated following the laying of pipework.<br>DSD assesses that the primary consequence of this occurring is *trivial* and hence no outcome is required. | NO<br>Rex has not provided an outcome |
| **MPL-VA2** | Built infrastructure reducing visual amenity | Rex has stated that the consequence of this impact occurring without controls implemented is *minor.*<br>The construction of the underground slurry pipeline will be short term and localised (based on the width of the MPL corridor and the length of each working strip) as it will involve trenching and laying of pipeline through a regular working strip. Built structures will therefore not be required for the slurry pipeline. New power lines will be required along the corridor however these will be constructed on the western side of the Yorke Highway road easement and along Silo Road (will not be on the ocean view side of the Highway) within farm land and road easements.<br>DSD assesses that the primary consequence of this occurring is *trivial* and hence no outcome is required. | NO<br>Rex has not provided an outcome |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** As documented in Table 8.4-10 of the Proposal | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **MPL-VA3** | Nuisance to the public from light spill during construction and operation. | Rex has stated that the consequence of this impact occurring without controls implemented is *minor.*<br>DSD considers that given the short term staged construction (via working strips) of the pipeline, impacts from light spill during this time will be limited. During operations the slurry pipeline is buried therefore there will be no impact from light spill.<br>DSD assesses that the primary consequence of this occurring *is trivial* and hence no outcome is required. | NO<br>Rex has not provided an outcome |
| **MPL (C)-VA1** | Post completion visual amenity unacceptable to relevant stakeholders | Rex has stated that the consequence of this impact occurring without controls implemented is *minor.*<br>Rex has indicated that this impact relates primarily to infrastructure remaining post completion. DSD considers that if Rex does not consult with relevant stakeholders in regards to visual amenity strategies, there is a potential for stakeholders not to accept these strategies.<br>DSD assesses the primary consequence of this occurring is greater than *trivial* and hence an outcome is required. | YES<br>Rex has not provided an outcome |

The State Government, through the assessment process, has identified additional impacts to Visual Amenity associated with the proposed mine related activities subsequent to the submission of the Proposal. An assessment of these additional impact events is provided in Table 7.4.8.

**Table 7.4.8 – Impact events identified subsequent to the Proposal**

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **DSD MPL-VA1** | Reduction in visual amenity from increase in general solid waste and litter along the MPL corridor during construction | Rex discussed the impact of waste and litter in the context of the Port operations but not along the pipeline corridor during construction.<br>Rex has discussed this in the context of there being minimal amounts of waste generated in the pipeline corridor.<br>DSD assesses the primary consequence of this occurring is t*rivial* and hence an outcome is not required. | NO |

### 7.4.12 *Outcomes (MPL)*

Table 7.4.9 is the DSD assessment of outcomes proposed by Rex in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable. The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies.

**Table 7.4.9 – DSD assessment of outcomes proposed by Rex**

| ID | Assessment of acceptability of outcome | Assessment of achievability of outcome | Recommended regulatory response |
|---|---|---|---|
| **MPL (C)-VA1**<br><br>**Impact event:** Post completion visual amenity unacceptable to relevant stakeholders<br>**Rex Proposed Outcome:** Rex has not proposed an outcome.<br><br>DSD proposes the following outcome;<br><br>Unless the Director of Mines has approved an alternative agreement between the Tenement Holder and a land owner relating to the removal of equipment and waste, the Tenement Holder must ensure that all infrastructure is decommissioned and removed and that there is no industrial or commercial waste left onsite at completion. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex had not assessed this impact as requiring an outcome however provided control strategies which reflect the outcomes that have been recommended by DSD. These include:<br><br>• Decommission and remove all infrastructure that has no further beneficial use and reinstate the landscape to original condition.<br><br>In regards to waste industrial and commercial waste is discussed in 6.7.4 of the Proposal. Rex has indicated that all industrial and commercial waste will be removed in accordance with EPA requirements.<br><br>Key to ensuring that the outcome would be achieved is via Rex engaging with stakeholders throughout the life of the operation and rehabilitation (and gaining feedback on their rehabilitation); to ensure the built structures created during mining will be as a result of engagement with stakeholders.<br><br>DSD considers that the outcome recommended by DSD would be achievable. | *DSD recommends that should a license be granted the following outcome be a condition of the licence;*<br><br>Unless the Director of Mines has approved (in writing) an alternative agreement between the Tenement Holder and a land owner relating to the removal of infrastructure, the Tenement Holder must ensure that all infrastructure is decommissioned and removed from the licence at mine completion.<br>*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event **MPL (C)-VA1**;*<br><br>Develop and implement strategies in consultation with affected parties for the management of visual amenity which should include (but not limited to):<br>• Prompt rehabilitation of disturbed areas once no longer required for mine related activities |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex or identified by DSD.

### 7.4.13 *Measurement Criteria (MPL)*

Table 7.4.10 is DSDs assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

**Table 7.4.10 – DSD assessment on measurement criteria**

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **MPL (C)- VA1**<br><br>**Potential Impact:** Post completion visual amenity unacceptable to relevant stakeholders<br>**Recommended Outcome:** Unless the Director of Mines has approved an alternative agreement between the Tenement Holder and a land owner relating to the removal of equipment and waste, the Tenement Holder must ensure that all infrastructure is decommissioned and removed and that there is no industrial or commercial waste left onsite at completion. | Rex has not proposed criteria for this outcome. | Similar to **ML-VA1**, DSD considers that additional criteria be developed, which demonstrates that Rex has rehabilitated the mine in accordance with the visual amenity strategies developed as part of the PEPR.<br><br>DSD considers that photo monitoring as proposed by Rex in the draft criteria to be one suitable method for demonstrating completion visual amenity strategies and outcomes are being implemented and achieved.<br><br>DSD considers there are methodologies that are an appropriate mechanism to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no licence requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no licence conditions applicable to the measurement criteria are required. |

### 7.4.14 *Summary of the recommended regulatory response (MPL)*

DSD has assessed that all potential impacts to Visual Amenity during construction, operations and post completion have been identified through this assessment and acceptable outcomes have been recommended for all primary impact events where the severity of primary consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for sensitive receptors during construction, operation and post completion. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

**Power line and Pipelines MPL**

*DSD recommends that should a license be granted the following outcome be a condition of the licence;*

Unless the Director of Mines has approved (in writing) an alternative agreement between the Tenement Holder and a land owner relating to the removal of infrastructure, the Tenement Holder must ensure that all infrastructure is decommissioned and removed from the licence at mine completion.

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event **MPL-(C)-VA1**;*

Develop and implement strategies in consultation with affected parties for the management of visual amenity which should include (but not limited to):

- Prompt rehabilitation of disturbed areas once no longer required for mine related activities

## *7.5 Soil/Land Disturbance*

### 7.5.1 *Description of Relevant Aspects of Environment*

Rex has provided a detailed description of the existing soils (topsoil and subsoil) in Section 5.14 of the Proposal. A detailed description of the underlying geology is provided in Section 6.2.1 of the Proposal.

The information on soils has been obtained by Rex from the Australian Soil Resource Information System (ASRIS), as well as from site observations of excavations, road cuttings, soil pits and drilling programs conducted by Rex Geologists. In addition, studies were undertaken in 2012 on land capability and mine rehabilitation which included overburden characterisation. The information collected was included as Appendices 5.14-A and 5.14-B of the Proposal.

Rex has stated that the ML is primarily freehold agricultural cropping and livestock farming land. The soil cover (topsoil) within the proposed ML is characterised as being sands to sandy clay loams up to 0.5m thick that have been disturbed by land clearing, grazing and cultivation for over a hundred years. Subsoils range to 2m deep and have a similar texture but with increased clay content. Deep regolith is present below the subsoil down to basement rock. This is characterised as mostly sandy clay becoming finer to loam clay towards the east. Rocky outcrops are also present on the land surface within and surrounding the proposed ML.

Soil properties based on salinity, exchangeable sodium and pH were generally classified as suitable for agricultural purposes, with the soil becoming more saline-sodic with depth. The Overburden Characterisation Study (Appendix 5.14-B of the Proposal) classified most samples tested below 2m as being strongly sodic attributed to high levels of exchangeable sodium. This study found that the upper 4m of the cover sequence is suitable for mine rehabilitation purposes (return to agriculture pursuits), provided amelioration of the soil with gypsum and fertiliser is undertaken prior to use. Below this, salinity and sodicity increases and pH reduces, which can inhibit vegetation establishment. Some lower lying highly sodic soils with high clay content may also tend to be dispersive, and are proposed to be removed and used in construction of the TSF.

The proposed MPL corridor comprises soft/rubbly calcareous sediments and soils formed on unconsolidated sediment/deeply weathered rock. The infrastructure corridor is primarily freehold agricultural cropping and livestock farming land.

DSD considers the sensitive receptors and associated environmental values for soil and land disturbance impacts to be Native flora, adjoining agricultural productivity, and the soil itself (particularly for rehabilitation purposes and post completion soil productivity). Potential air quality impacts associated with soil erosion and dust generation are detailed in Chapter 7.1 of this assessment report.

DSD considers that the description of environment is a suitable characterisation of the receiving environment which may be affected by mining operations.

### 7.5.2 *Views of affected parties*

In the Proposal Rex notes that the CCG expressed a moderate level of concern regarding the risk of water and wind erosion from exposed soil.

During statutory consultation the following issues regarding soils and land disturbance were noted:

**Table 7.5 – Impact events relating to issues raised during statutory consultation**

| Issues raised during statutory consultation | Addressed |
|---|---|
| Loss of topsoil and productivity | Impact events ML-S1, ML-S2, ML-S3, ML-S6 |
| Increased salinization from use of salt water for a range of activities | ML-S5 |
| Length of time topsoil stored for sterilising the soil biology and making unviable | ML(C)-S1 |
| Return of land to agriculture would be unviable | Response Document Issues 123, 124, 125, 126,127.<br>Proposal Section 6.9. |
| Sustainability of rehabilitation practices in the long term (eg. ability to grow vegetation on dumps with original topsoil) | ML(C)-S1 |

The statutory consultation did not identify any additional receptors or impact events to those identified by Rex.

DSD has had regard for all concerns which were raised during statutory consultation, however, not all concerns have been included as part of this assessment report as they are either not within the scope of the assessment or are too general in nature to consider.

### 7.5.3 *Impact assessment (ML)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0. Rex's evaluation of the potential impact events caused by proposed construction, operation and rehabilitation activities mostly relate to soil stripping, topsoil management and the potential for soil contamination. Rex indicates that these potential impact events were either raised as concerns by stakeholders, or are based on industry experience from other open cut metalliferous mining operations.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7.0.

A review of Rex's impact assessment is shown in Table 7.5.1 and impacts identified by the State Government post submission of the Proposal are provided in Table 7.5.2.

**Table 7.5.1 – Impact events identified by Rex in the Proposal**

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event**<br>As documented in Section 8.3.5.2 of the Proposal | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-S1** | Decreased soil quantity available for rehabilitation from erosion of soil stockpiles and exposed land | Rex has stated that there is a potential for loss of topsoil from stockpiles due to wind and water erosion processes, which could lead to insufficient soil being available for rehabilitation purposes.<br>Rex has assessed the consequence of this impact occurring without controls as minor, and soil can always be brought onto site for remediation purposes.<br>DSD considers that the potential loss of topsoil through erosion over extended periods would negatively impact the ability to successfully rehabilitate disturbed areas to agreed post mining land uses.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event**<br>As documented in Section 8.3.5.2 of the Proposal | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-S2** | Decreased soil quality from compaction during mining activities | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>Mine construction and operation activities including the use of heavy plant and machinery will compact existing soils, particularly on areas where topsoil has not been pre-stripped. This has the potential to reduce soil quality and the ability to successfully use soil for rehabilitation purposes.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |
| **ML-S3** | Decreased soil quality through the degradation of viable native seed due to long term stockpiling | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>The bulk of topsoil to be stripped and stockpiled will come from land used over an extended period for agricultural purposes, and so will have a very limited native vegetation seed bank. Some small areas of native vegetation will require clearing for mine construction purposes, and Rex intends to stockpile topsoil from these areas for early rehabilitation purposes. Should soil removed from areas of native vegetation be stockpiled for an extended period, the viability of the seed stock could be compromised without implementation of control and amelioration strategies.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |
| **ML-S4** | Decreased soil quality due to build-up of weed seed in the topsoil stockpile from long term storage | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>Rex has assessed that there is likely to be a significant weed seed bank in stockpiled topsoil due to the existing prevalence of weeds which are attributed to historic agricultural activities.<br>DSD considers that the presence of a significant seed bank in topsoil may negatively impact on rehabilitation activities, particularly where disturbed land is intended to be returned to stands of native vegetation.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event**<br>As documented in Section 8.3.5.2 of the Proposal | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-S5** | Decreased soil quality due to build-up of salt from dust suppression activities and/or from mixing with saline subsoils | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>There is potential for increasing the salt content of soils through dust suppression using highly saline groundwater, a through mixing or leaching of existing saline subsoils that are exposed during mining activities. Increasing the salinity of saline soils has a detrimental impact on plant growth and soil dispersion. Higher salinity affects the establishment of plants and reduces vigour and yield. Increasing the salinity will ultimately stop plant growth and reduce agricultural productivity.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |
| **ML-S6** | Decreased soil quality due to contamination from spills of fuel, oil or a hazardous chemical | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>It is likely that significant quantity of fuel, oils and process chemicals will be stored and used on site, which if released to the receiving environment may impact on the ability for that soil to be successfully rehabilitated, or to be used for rehabilitation purposes.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |
| **ML-S7** | Decreased soil quality due to potentially contaminated airborne dust emanating from the mining operation. | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>Rex has provided a dust dispersion model in Appendix 5.6-C of the Proposal, which is based on estimations of the likely sources and quantities of dust generated from mining activities. The model estimates that less than 10% of total dust generated from the mine will be from ore crushing, and that the main sources of dust are likely to be due to blasting, loading and haulage to WRDs or the ROM stockpile, which will have low metal concentrations.<br>Without controls, however, DSD assesses the primary consequence of this occurring is greater than trivial and an outcome is required. | Yes<br>Rex has provided an outcome |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event**<br>As documented in Section 8.3.5.2 of the Proposal | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-T1 to T7**<br>**and ML(C)-TSF1** | Decreased soil quality due to contamination from discharge of tailings (*The impact relates to the TSF and was addressed in Section 8.3.13 of the Proposal)* | Table 8.3-50 lists potential causes for impacts to soils associated with the discharge of solids from the TSF. These include:<br>1. Discharge of solids from the tailings due to tailings delivery pipeline failure.<br>2. Discharge of solids from failure or excess deformation of the embankment (embankment instability and settlement).<br>3. Discharge of solids from overfilling or overtopping of the storage.<br>4. Discharge of solids due to flooding.<br>5. Discharge of solids after closure as possible as a result of failure or excess deformation of the embankment.<br>6. Discharge of solids after closure as a result of a breach of the capping layer (which may include erosion damage at the spillway).<br>Rex has assessed the primary risk for these impacts occurring as moderate, based on a risk assessment of the TSF and DSCP prepared using the ANCOLD guidelines (Appendix 6.7-A of the Proposal).<br>Due to the significant size and nature of the TSF, and its location in close proximity to adjoining agricultural land, DSD considers that the primary consequence of impacts to soil quality occurring as a result of discharge of tailings solids is greater than trivial and hence an outcome is required.<br>The discharge of contaminated water from tailings has been assessed under the surface water aspect, Section 7.11 of this report. | Yes<br>Rex has provided an outcome (Table 8.3-52 of Proposal) |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** As documented in Section 8.3.5.2 of the Proposal | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-W1** | Soil or water contamination due to incorrect waste disposal *(The impact relates to waste disposal and was addressed in Section 8.3.16 of the Proposal).* | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>Mining operations will generate industrial and commercial waste which will include putrescibles, hazardous waste, waste oil, tyres, petrochemicals, chemical containers, sewage and recyclables (note that waste rock and tailings are assessed separately).<br>Without appropriate storage and handling controls, there is a potential for leakages and spills from stored wastes which could impact on soil quality. In addition sewage effluent can contain pollutants such as metals and toxicants which can also impact on soil quality if not appropriately managed.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | *Yes*<br>*Rex has provided an outcome (Table 8.3-64 of Proposal)* |
| **ML-SW1** | Increased sediment loads in downstream surface water flows causing contamination to the surrounding environment (*This impact relates to Surface Water and is was addressed in Section 8.3.11 of the Proposal)* | This impact relates to Surface Water and is has been assessed in Section 7.11 of this report | N/A |
| **ML-SW4** | Acid mine drainage transported by surface water run-off resulting in contamination to surrounding environment. *(The impact relates to Surface Water and is was addressed in Section 8.3.11 of the Proposal)* | This impact relates to Surface Water and is has been assessed in Section 7.11 of this report | N/A |

*Impact events identified by Rex in the Proposal*

| ID | Potential impact event<br>As documented in Section 8.3.5.2 of the Proposal | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **ML(C)-S1** | Insufficient topsoil quantity and poor topsoil quality resulting in low establishment of native vegetation and agricultural pasture at closure | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>There is the potential for loss of topsoil available for rehabilitation purposes through erosion of soil stockpiles which may impact on the ability for vegetation and crops to establish post completion.<br>There are also a range of mining related activities which could potentially lead to a reduction in topsoil quality, which again could impact on vegetation and crop establishment post completion. As discussed under previous soil impact events, this includes compaction of soils, weed seed build-up, increases in soil salinity and contamination via fuel and chemical spills.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | *Yes*<br>*Rex has provided an outcome* |
| **ML(C)-S2** | Instability of final landforms post completion leading to the erosion of soil. | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>The long term stability of final landforms will be highly dependent on the construction methodologies employed and materials used. Due to the large scale of the proposed mine waste landforms, there is a potential for erosion to occur which could result in sediment laden runoff, as well as the exposure of mine waste which is intended to remain encapsulated such as PAF material. In addition, the Mine Rehabilitation – Overburden Characterisation Report (Appendix 5.14-B of the Proposal) concluded that virtually all soil core material tested was classified as sodic and without soil amelioration would likely cause soil erosion problems.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | *Yes*<br>*Rex has provided an outcome* |
| **ML(C)-W1** | Waste remaining onsite at closure resulting in loss of land capability to future user. *(The impact relates to Waste and was addressed in Section 8.3.16 of the Proposal)* | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>There is a potential for waste to remain onsite at closure without appropriate waste management controls in place. In addition, there is a potential that improper disposal of waste may impact on land capability post completion.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | *Yes*<br>*Rex has provided an outcome* |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event**<br>As documented in Section 8.3.5.2 of the Proposal | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML(C)-AL1** | Reduced land available to agriculture post completion. *(The impact relates to adjacent land use and was addressed in Section 8.3.17 of the Proposal)* | Rex has stated that the consequence of this impact occurring without controls implemented is moderate. Through proposed mining activities, a significant area of agricultural land will be either permanently or temporarily lost. The area of land suitable for a return to agriculture post mining will be dependent on final mine closure planning, and the successful implementation of rehabilitation activities.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | *Yes*<br>*Rex has provided an outcome* |

The State Government, through the assessment process, has identified additional impacts to soils associated with the proposed mining activities subsequent to the submission of the MLP. An assessment of these additional impact events is provided in Table 7.5.2.

## Table 7.5.2 – Impact events identified subsequent to the Proposal

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **DSD ML-S1** | Mounding of seepage under the TSF impacting on adjoining land uses (including cropping) during operations and post completion | This potential impact event was identified by the State Government, and an impact assessment was subsequently provided by Rex in Item #48 of the Proposal Response Document.<br>In this assessment, Rex has stated that the consequence of this impact occurring without controls implemented is minor. Rex explained that an underdrainage system will be installed as part of the TSF design to capture and remove seepage below the decant pond. Seepage which is not captured by the under drainage system will seep through to the underlying confining saprolite layer. The interpreted surface of this saprolite layer over the MLA area has been provided in Figure 88 of the Hydrogeological Summary Report (Appendix 7 of the Proposal Response Document). This shows that seepage to the east of the TSF will report to the pit, whilst to the west the saprolite layer slopes away from the pit. DSD considers that TSF seepage has the potential to flow westward from the TSF and mound on the saprolite layer. Should TSF seepage be greater than design parameters, the mounding has the potential to rise to within the root zone of agricultural land and patches of native vegetation, with consequent impacts on plant and crop growth.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes |
| **DSD ML-S2** | Leaching of metals or other contaminants through waste rock dumps, oxide and ore stockpiles impacting on adjoining land uses (including cropping) during operations and post completion | This impact event has been identified by the State Government, and an assessment of leaching of metals through oxide and low grade ore stockpiles was provided in Issue 16 of the Response Document<br>As per the previous discussion on mounding under the TSF (ID DSD (ML)-S1), any uncaptured leaching or mobilisation of metals and other contaminants through WRDs and stockpiles will seep through to the underlying confining saprolite layer. As indicated by the elevation contour plan of the saprolite layer provided in Figure 88 of the Hydrogeological Summary Report (Appendix 7 of the Proposal Response Document), seepage under the western part of the Western WRD will flow to the west towards agricultural land, while seepage under the eastern WRDs has the potential to flow east towards the coast in the direction where the saprolite layer slopes away. This seepage has a potential to mound and contaminate soil, or discharge to the marine environment (potential marine impact will be discussed in Section 7.9 of this report under the marine impact assessment).<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes |

### 7.5.4 *Outcomes (ML)*

Table 7.5.3 is the DSD assessment of outcomes proposed by Rex in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable.

The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies.

Table 7.5.4 provides outcomes for impact events identified by DSD that were determined in section 7.5.3 to require an outcome.

## Table 7.5.3 – DSD assessment of outcomes proposed by Rex

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-S1**<br><br>**Impact event:** Decreased soil quantity available for rehabilitation from erosion of soil stockpiles and exposed land<br><br>**Rex Proposed Outcome:** All soil disturbed or impacted by mining operations will have pre-mining quality and quantity maintained. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex proposes to strip and preserve topsoil and suitable subsoil in stockpiles for later use in mine rehabilitation. Topsoil and subsoil will be stored in separate stockpiles where it will be protected from wind erosion by a cover of vegetation.<br><br>In addition, Rex proposes to put in place erosion and sediment control systems to contain soil erosion as near to the source as practical, and to divert clean surface water runoff around the mine site. Control measures include seeding exposed land where possible, establishing contour banks, engineered drains, silt retention basins and sumps to trap sediment.<br><br>Rex considers control strategies will reduce this impact to a level of low.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*<br><br>The Tenement Holder must, in constructing and operating the Lease and post-completion ensure that the existing (pre-mining) soil quality and quantity is maintained.<br><br>*DSD recommends the following requirement applicable to achievement of the outcome:*<br><br>A further regulatory recommendation is provided in Section 7.17 of this report requiring the provision of a 3rd party independent review of the effectiveness of proposed strategies in achieving this outcome (for impact event **ML-S1**).<br><br>*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event **ML-S1**;*<br><br>Strategies to achieve recovery of topsoil and subsoil from areas to be disturbed by mining operations.<br><br>Strategies for maintaining the quality and quantity of stockpiled soils until such time that it is used for rehabilitation purposes.<br><br>Strategies for reinstatement of these soils so as to maximise the likelihood of achieving the outcome <relating to impact event **ML-S1>**. |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | | An auditable record of soil movement including recovery, stockpiling and reinstatement.<br>Strategies for the establishment of post completion land uses and areas, including the re-establishment of land for agriculture, must be consistent with Section 6.9.3 and 6.9.4 of the Proposal.<br>A plan for establishing appropriate legal mechanisms to ensure effective transfer of responsibility for any maintenance of the site and control of any future development post completion. |
| **ML-S2**<br>**Impact event:** Decreased soil quality from compaction during mining activities<br>**Rex Proposed Outcome:** All soil disturbed or impacted by mining operations will have pre-mining quality and quantity maintained. | The proposed outcome accurately describes the level of impact.<br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies | Rex has assessed the primary risk level of this impact occurring as high.<br>Rex proposes to minimise compaction of soils during mining through controlled land clearance, traffic management and ripping compacted soil as part of rehabilitation activities.<br>Rex considers these control strategies will reduce this impact to a level of low.<br>DSD considers that soil compaction would be an inevitable consequence of mining operations, particularly around hardstand areas, haul roads and under stockpiles. As Rex intends ripping compacted areas during rehabilitation, the long term impacts from compaction should be minimised.<br>DSD considers that the outcome proposed by Rex would be achievable. | DSD recommends the regulatory response applicable to impact **ML-S1** will be applicable to this impact. |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-S3**<br><br>**Impact event:** Decreased soil quality through the degradation of viable native seed due to long term stockpiling<br><br>**Rex Proposed Outcome:** All soil disturbed or impacted by mining operations will have pre-mining quality and quantity maintained. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex has assessed the primary risk level of this impact occurring as moderate.<br><br>The majority of topsoil stripped will come from land used for agriculture, hence will have limited natural native seed stock. There will be some areas of native vegetation cleared during construction, and Rex proposes to collect topsoil from these areas and stockpile for rehabilitation purposes. Rex intends storing these stockpiles for minimal time prior to reuse, to protect the native seed bank and beneficial organisms.<br><br>Rex considers these control strategies will reduce this impact to a level of low.<br><br>DSD considers that provided topsoil stripped from areas of native vegetation is used for early rehabilitation purposes, the outcome proposed by Rex would be achievable. | DSD recommends the regulatory response applicable to impact **ML-S1** will be applicable to this impact. |
| **ML-S4**<br><br>**Impact event:** Decreased soil quality due to build-up of weed seed in the topsoil stockpile from long term storage<br><br>**Rex Proposed Outcome:** No introduction of new pest plant and animal species and plant pathogens, or sustained increase in abundance of existing pest plant and animal species in the proposed ML caused by mining operations. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex has assessed the primary risk level of this impact occurring as moderate.<br><br>Rex states that topsoil stripped and stockpiled for rehabilitation purposes is likely to have a significant weed seed bank due to historic agricultural activities. Rex proposes to manage the control of weeds through a weed management plan to prevent weed infestations in topsoil stockpiles. This will reduce weed introduction or the spread of weeds during subsequent spreading of topsoil.<br><br>Rex considers these control strategies will reduce this impact to a level of low.<br><br>DSD considers that should adequate weed control on topsoil stockpiles be undertaken, the outcome proposed by Rex would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*<br><br>The Tenement Holder must, in construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Lease area compared to adjoining land.<br><br>Note: Weeds are defined in this condition as any invasive plant that threatens native vegetation in the local area or any species recognised as invasive in South Australia. |

| *DSD assessment of outcomes proposed by Rex* | | | |
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| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-S5**<br><br>**Impact event:** Decreased soil quality due to build-up of salt from dust suppression activities and/or from mixing with saline subsoils<br><br>**Rex Proposed Outcome:** All soil disturbed or impacted by mining operations will have pre-mining quality and quantity maintained. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex has assessed the primary risk level of this impact occurring as moderate.<br><br>Rex states that the potential impact of salt contamination of soil stockpiles through mixing or leaching of saline soils, or from dust suppression using saline water will be limited to specific areas of the mine which will not affect neighbouring soils.<br><br>Rex proposes to use non-saline water, from sewerage treatment plants and the SA Water mains water supply as dust suppression of subsoil and topsoil stockpiles. Rex also proposes that soil sprayed with saline water during construction and operations will be removed or separated during the closure stage so that salt contaminated soil does not impact on rehabilitation activities.<br><br>Rex proposes to develop a soil management plan which will ensure that during the stripping process, subsoil and topsoil will be stored apart from saline soils, and the drainage from saline soils will be directed away from topsoil and subsoil stockpiles to avoid contamination.<br><br>Rex considers these control strategies will reduce this impact to a level of low.<br><br>DSD considers that the outcome proposed by Rex would be achievable, provided the control strategies are effectively carried out.<br><br>Additional detail on soil management will be required in a subsequent PEPR should a lease be granted. | DSD recommends the regulatory response applicable to impact **ML-S1** will be applicable to this impact. |

| *DSD assessment of outcomes proposed by Rex* | | | |
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| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-S6**<br><br>**Impact event:** Decreased soil quality due to contamination from spills of fuel, oil or a hazardous chemical<br><br>**Rex Proposed Outcome:** All soil disturbed or impacted by mining operations will have pre-mining quality and quantity maintained. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex has assessed the primary risk level of this impact occurring as moderate.<br><br>Rex contends that the impact of any spill will be localised and not directly affect topsoil stockpiles.<br><br>Chemical and fuel storage and bunding is proposed to contain possible spills.<br><br>Rex considers this will reduce this impact to a level of low.<br><br>DSD considers that the outcome proposed by Rex would be achievable.<br><br>Additional detail on fuel and chemical storage and bunding will be required in the PEPR should a lease be granted. | DSD recommends the regulatory response applicable to impact **ML-S1** will be applicable to this impact. |
| **ML-S7**<br><br>**Impact event:** Decreased soil quality due to potentially contaminated airborne dust emanating from the mining operation.<br><br>Rex Proposed Outcome: All soil disturbed or impacted by mining operations will have pre-mining quality and quantity maintained. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex has assessed the primary risk level of this impact occurring as moderate.<br><br>Dust dispersion modelling provided by Rex in Appendix 5.6-C of the Proposal predicted that the majority of dust generated by mining activities would be attributed to blasting, loading and haulage of ore and waste rock. This dust has been determined to contain low concentrations of metals. Dust emanating from the pit and ROM stockpile would also contain very low metal concentrations.<br><br>The model of dust deposition rates associated with the project indicates that with the implementation of control measures, the additional dust deposition due to operational activities (above background levels), will be minor in nature relative to existing baseline dust deposition monitoring undertaken (JBS&G pg. 23). | DSD recommends the regulatory response applicable to impact **ML-S1** will be applicable to this impact. |

| *DSD assessment of outcomes proposed by Rex* | | | |
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| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | A minimal proportion of total dust generated was predicted to come from ore crushing, which could contain higher metal concentrations.<br><br>Rex proposes to implement dust control strategies including water trucks and sprinklers during the construction and operation phases. Crushing facilities would have a dedicated dust extraction filter system installed.<br><br>Rex considers these control strategies will reduce this impact to a level of low.<br><br>DSD considers that the outcome proposed by Rex would be achievable.<br><br>Further detail on dust management strategies would be provided in an Air Quality Management Plan in the PEPR should a lease be granted This should include detailing strategies to prevent the increase in metal concentrations in soils. | |
| **ML-T1 to T7**<br><br>**and ML(C)-TSF1**<br><br>**Impact event:** Decreased soil quality due to contamination from discharge of tailings (*The impact relates to the TSF and was addressed in Section 8.3.13 of the Proposal)*<br><br>**Rex Proposed Outcome:** No contamination and/or pollution of natural water drainage systems, groundwater, land and soils by waste products | The proposed outcome accurately describes the level of impact to soils subsequent to control strategies being implemented.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Impacts relating to the discharge of contaminated water from the TSF have been assessed under the assessment of surface water impacts (Section 7.11 of this report).<br><br>Rex has assessed the primary risk level of the soil impacts associated with discharge of tailings as moderate.<br><br>Rex has proposed a range of design and control management strategies for the effective management of tailings to ensure no loss of containment. These are described in Appendix 6.7-A of the Proposal and include:<br><br>• Construction of the TSF wall using the “downstream” construction method (Refer to the Proposal, Section 6.7.2.6).<br>• Instrumentation along the tailings pipeline to detect leaks/rupture<br>• Bunding of the tailings pipeline to contain spills | *DSD recommends that should a lease be granted the following outcome(s) be a condition of the lease:*<br><br>The Tenement Holder must ensure that:<br><br>1. there is no contamination of land and soils either on or off site as a result of mining operations; and<br><br>2. no contamination of land and soils either on or off site after mine completion occurs as a result of mining operations. |

| *DSD assessment of outcomes proposed by Rex* | | | |
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| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| and hazardous material used in the mine operations. | | • TSF design to ANCOLD standards and peer reviewed<br>• Maintaining tailings densities in accordance with design<br>• Maintaining tailings deposition beach slope<br>• Ongoing inspections<br>• Maintaining minimum freeboard<br>• TSF design to withstand a 1 in 100 year ARI storm event<br><br>Rex considers these control strategies will reduce the residual risk of this impact occurring to a level of low.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | *DSD recommends the following lease condition(s) applicable to strategies be adopted for achievement of the outcome:*<br><br>The Tenement Holder must ensure that all commercial or industrial waste (which does not include tailings and waste rock) is disposed of in an EPA licensed facility.<br><br>The Tailings Storage Facility (**"TSF"**) embankment must be designed and constructed using the downstream construction method.<br><br>The TSF construction and operation must be verified by a suitably qualified independent expert approved by the Director of Mines, against the design and plans that have been adopted for the TSF construction and operation;<br><br>• for the initial stage of TSF construction; and<br><br>• for each subsequent stage of TSF construction including the cover system; and<br><br>• on an annual basis for operations or at a frequency as the Director of Mines may specify by notice in writing.<br><br>The expert must prepare reports of the findings of the verifications. The initial expert report for construction verification must be provided to the Director of Mines prior to the initial placement of tailings in the TSF and subsequent reports must be provided to the Director of Mines within 1 month of |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | | completion of the verification and all reports will be made publically available.<br><br>*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event **ML-S1 and ML-T1 to T7**;*<br><br>The design, construction, operation and closure of the Tailings Storage Facility must be prepared in accordance with, but not limited to, the most recent ANCOLD guidelines relating to Tailings Dams.<br><br>Specify the minimum freeboard height and maximum supernatant pond dimensions for the Tailings Storage Facility. The maximum dimensions of the supernatant pond must be consistent with the method of sub-aerial deposition of tailings.<br><br>The Tenement Holder must cease deposition of tailings to the TSF if the limits for freeboard height or supernatant pond dimensions specified as a result of <the previous clause> are exceeded and report this exceedance to the Director of Mines within 24 hours.<br><br>*Note: Freeboard is defined as the difference in height between the level of the supernatant pond and the lowest point of the tailings dam embankment.*<br><br>Strategies for the control of seepage through the TSF base and walls. |

| *DSD assessment of outcomes proposed by Rex* | | | |
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| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | | Strategies for achieving and maintaining design tailings discharge densities and tailings consolidation rates to ensure timely construction of the cover system post cessation of tailings deposition.<br><br>Tailings discharge density trigger limits and remedial actions to ensure design densities are achieved.<br><br>Quality control arrangements for all stages of construction of the TSF including supervision by appropriately qualified and experienced persons, documented procedures, quality control testing and record keeping.<br><br>A leak detection program for monitoring seepage through the base of the TSF.<br><br>The design construction and maintenance of mine waste cover systems including, but not limited to, a detailed cover system design, construction methodology, cover system modelling and provision of a program of works for field trials and collection of site specific data to validate/calibrate the model(s).<br><br>A further regulatory recommendation is provided in Section 7.17 of this report requiring the provision of a 3rd party independent review of the effectiveness of proposed strategies in achieving this outcome (for impact events **ML-T1 to T7**). |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-W1**<br><br>**Impact event:** Soil or water contamination due to incorrect waste disposal *(The impact relates to waste disposal and was addressed in Section 8.3.16 of the Proposal).*<br><br>**Rex Proposed Outcome:** No contamination and pollution is caused by waste products and their disposal | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex has assessed the primary risk level of this impact occurring as moderate.<br><br>Rex proposes to minimise the consumption of materials and generation of waste as far as reasonably practical. Recycling will be undertaken wherever possible, and all waste generated will be disposed off-site at recycling facilities or waste depots authorised by the EPA. Waste will be removed by contractors regularly to minimise the risk of soil contamination.<br><br>Rex states that effluent will be disposed of at an approved sewage facility constructed on the lease.<br><br>Hazardous wastes such as waste oils and car batteries will be stored in accordance with EPA bunding guidelines.<br><br>Rex proposes to develop and implement a waste management plan, and incorporate waste management into its Environmental Management System (EMS). Regular inspections are proposed to ensure correct storage of waste awaiting disposal.<br><br>Rex considers these control strategies will reduce the residual risk of this impact occurring to a level of low.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | *DSD recommends that should a lease be granted the following outcome(s) be a condition of the lease:*<br><br>The Tenement Holder must, ensure that:<br><br>1. there is no contamination of land and soils either on or off site as a result of mining operations; and<br><br>2. no contamination of land and soils either on or off site after mine completion occurs as a result of mining operations.<br><br>*DSD recommends the following lease condition(s) applicable to strategies be adopted for achievement of the outcome:*<br><br>The Tenement Holder must ensure that all commercial or industrial waste (which does not include tailings and waste rock) is disposed of in an EPA licensed facility. |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML(C)-S1**<br><br>**Impact event:** Insufficient topsoil quantity and poor topsoil quality resulting in low establishment of native vegetation and agricultural pasture at closure<br><br>**Rex Proposed Outcome:** All soil disturbed or impacted by mining operations will have pre-mining quality and quantity maintained. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex has assessed the primary risk level of this impact occurring as moderate.<br><br>This impact has been similarly assessed under previous impacts (IDs ML-S1 to S7) where topsoil is going to be stripped, stockpiled and subsequently used for rehabilitation purposes<br><br>As discussed, provided the control and management strategies are effectively implemented, potential impacts to soils post completion will be minimised.<br><br>Rex considers these control strategies will reduce the closure impact to a level of low.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*<br><br>The Tenement Holder must, in constructing and operating the Lease and post-completion ensure that the existing (pre-mining) soil quality and quantity is maintained. |
| **ML(C)-S2**<br><br>**Impact event:** Instability of final landforms post completion leading to the erosion of soil.<br><br>**Rex Proposed Outcome:** At closure the site will be physically stable. | The proposed outcome accurately describes the level of impact at closure, however must be amended to include the period post mine completion.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex has assessed the primary risk level of this impact occurring as moderate.<br><br>Conceptual mine landforms including waste rock dumps have been designed and assessed by Rex to ensure long term stability. The steeper slopes of rehabilitated waste rock dumps will be covered with a mix of topsoil and rock to minimise erosion<br><br>Rex proposes that site drainage at closure, including contoured banks, engineered drains and sumps will control flow and ensure that water runoff will not result in the erosion of soils<br><br>Rex considers these control strategies will reduce the closure impact to a level of low.<br><br>DSD's technical expert (Rosengren) has stated that the major geotechnical issue with waste rock dumps is the weak near-surface weathered materials, and further geotechnical investigations are required on: | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*<br><br>The Tenement Holder must ensure that the WRD and TSF final landforms will be physically stable post mine completion.<br><br>*DSD recommends the following requirement applicable to achievement of the outcome:*<br><br>A further regulatory recommendation is provided in Section 7.17 of this report for the provision of 3rd party review of strategies proposed for this outcome.<br><br>A further regulatory recommendation is provided in Section 7.17 of this report requiring the provision of a 3rd party independent review of the effectiveness |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | • Foundation conditions for the dumps and the need for foundation treatment; and<br>• Requirements for selective placement of the weathered materials, particularly for clay rich saprolite.<br>DSD considers that the outcome proposed by Rex would be achievable provided the recommendations for further work are completed and demonstrated within the PEPR, should a lease be granted.<br>Final closure strategies including further detail on erosion control measures will be required in a subsequent PEPR should a lease be granted. | of proposed strategies in achieving this outcome (for impact event **ML(C)-S2**). |
| **ML(C)-W1**<br>**Impact event:** Waste remaining onsite at closure resulting in loss of land capability to future user. *(The impact relates to Waste and was addressed in Section 8.3.16 of the Proposal)*<br>**Rex Proposed Outcome:** No contamination and pollution is caused by waste products and their disposal | The proposed outcome accurately describes the level of impact.<br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | An assessment of impacts to land and soils caused by mine generated waste is provided under ID ML-W1 above.<br>As all waste will be removed from site during operations for appropriate disposal, it is considered that the residual risk of this impact occurring post mine completion will be low.<br>Based on the discussion above DSD considers that the outcome proposed by Rex would be achievable. | *DSD recommends that should a lease be granted the following outcome(s) be a condition of the lease:*<br>The Tenement Holder must, ensure that:<br>**1.** there is no contamination of land and soils either on or off site as a result of mining operations; and<br>**2.** no contamination of land and soils either on or off site after mine completion occurs as a result of mining operations<br>*DSD recommends the following lease condition(s) applicable to strategies be adopted for achievement of the outcome:*<br>The Tenement Holder must ensure that all commercial or industrial waste (which does not include tailings and waste rock) is disposed of in an EPA licensed facility. |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML(C)-AL1**<br><br>**Impact event:** Reduced land available to agriculture post completion.<br><br>**Rex Proposed Outcome:** Maximise area of suitable land returned to productive agriculture pursuits post closure | The proposed outcome accurately describes the level of impact.<br><br>The word “maximise” is not appropriate when describing an outcome as it makes the outcome difficult to measure.<br><br>The proposed outcome is not considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex considers control strategies will reduce this impact to a level of Low.<br><br>Rex have proposed the following control strategy; ‘Maximise area available to agricultural pursuits post mining by rehabilitating the land to a level of productivity similar to surrounding agricultural land’.<br><br>Additional strategies proposed to enhance the success of returning land to agriculture include:<br><br>Designing the shape, slope and height of WRDs to optimise the cropping area and to minimise hours of shading of agricultural land;<br>Progressive rehabilitation to include returning land to agricultural use as soon as possible; and<br>Conducting crop trials to monitor productivity from rehabilitation methods.<br>DSD considers that the outcome recommended by DSD would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*<br><br>Before completion, the Tenement Holder must satisfy the Director of Mines that where practicable, the pre mining land use can be recommenced after mine completion. |

## Table 7.5.4 – Discussion of outcomes for impacts identified by DSD

| *Discussion of outcomes for impacts identified by DSD* | | | |
|---|---|---|---|
| **ID** | **Acceptability of outcome** | **Achievability of outcome** | **Recommended regulatory response** |
| **DSD ML-S1**<br><br>**Impact event:** Mounding of seepage under the TSF impacting on adjoining land uses (including cropping) during operations and post completion<br><br>**Outcome:**<br><br>Rex proposed the following outcome in the Proposal Response Document:<br><br>All soil disturbed or impacted by mining operations will have pre-mining quality and quantity maintained. | DSD considers that the outcome accurately describes the level of impact.<br><br>The outcome is considered a suitable statement on the acceptable level of impact on the environment. | As discussed in the assessment of this potential impact, significant seepage beyond design parameters through the base of the TSF could lead to mounding on the underlying saprolite layer which could impact on soils on adjoining land and subsequent crop growth. This impact event was assessed by Rex in the Proposal Response Document (Issue #48).<br><br>Rex has proposed a range of design and control management strategies for the effective management of tailings to minimise seepage through the base layer. These include:<br><br>• Constructing a low permeability clay liner under the TSF and on embankment slopes<br>• Installing a TSF underdrainage system (blanket drain and finger drains below the decant pond) to remove seepage from below the decant pond<br>• Installing monitoring bores to record seepage and any mounding for westward flowing seepage<br>• Removal of any water detected in cover sediments surrounding the TSF<br>Once tailings deposition has ceased, the TSF will dry out due to evaporation and drainage to the underdrainage system. The TSF underdrainage will continue to report any seepage to the decant pond until tailings produce no more water. At mine closure, the TSF will be capped to minimise ongoing infiltration of rainfall, and hence seepage risk will reduce over time until it is negligible.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction, operation and post completion, ensure that water seepage from the TSF, WRD's or ore stockpiles does not result in adverse impacts on adjacent land uses including, but not limited to, growth of native vegetation and cropping land. |

| *Discussion of outcomes for impacts identified by DSD* | | | |
|---|---|---|---|
| **ID** | **Acceptability of outcome** | **Achievability of outcome** | **Recommended regulatory response** |
| **DSD ML-S2**<br><br>**Impact event:** Leaching of metals or other contaminants through waste rock dumps, oxide and ore stockpiles impacting on adjoining land uses (including cropping) during operations and post completion<br>**Outcome:** DSD proposes the following outcome:<br><br>The Tenement Holder must, in construction, operation and post completion, ensure that water seepage from the TSF, WRD's or ore stockpiles does not result in adverse impacts on adjacent land uses including, but not limited to, growth of native vegetation and cropping land. | DSD considers that the outcome accurately describes the level of impact.<br><br>The outcome is considered a suitable statement on the acceptable level of impact on the environment. | As discussed in the assessment of this potential impact, leaching of metals or other contaminants through waste rock dumps and oxide stockpiles without controls could lead to seepage and mounding on the underlying saprolite layer which could impact on soils on adjoining land. Control strategies for the management of WRD's are also discussed in Section 7.11 – Surface Water.<br><br>Rex in the Proposal and Response Document (Issue #16) explains that oxide and ore stockpiles would be placed on constructed domed clay low-permeability pads. As the pad would be domed, it would shed any water which percolates through the stockpiles and there would be no head on the clay layer at any time. The clay base would divert water to perimeter drains, preventing infiltration into the underlying soil. All water collected in the perimeter drains would be considered 'dirty water' and reused as process water. As there would be no head on the clay layer, it is unlikely that water would mound under the oxide stockpile.<br><br>The stockpile of oxide material would be treated at the end of the mine life, or if uneconomic to treat at this time, be capped in a similar manner to the TSF.<br><br>DSD considers that the recommended outcome would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction, operation and post completion, ensure that water seepage from the TSF, WRD's or ore stockpiles does not result in adverse impacts on adjacent land uses including, but not limited to, growth of native vegetation and cropping land. |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex or identified by DSD.

### 7.5.5 *Measurement Criteria (ML)*

Table 7.5.5 is DSDs assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

## Table 7.5.5 – DSD assessment on measurement criteria

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **ML-S1**<br>**Potential Impact**: Decreased soil quantity available for rehabilitation from erosion of soil stockpiles and exposed land<br>**Recommended Outcome:**<br>The Tenement Holder must, ensure that:<br>1. there is no contamination of land and soils either on or off site as a result of mining operations; and<br>2. no contamination of land and soils either on or off site after mine completion occurs as a result of mining operations | Annual photo monitoring of all soil stockpiles and cleared areas will show progressive establishment of vegetation and landform stability. | DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome, however the timing of photo monitoring should include after significant rainfall events. DSD also considers that criteria be included to demonstrate there is no evidence of erosion occurring (ie: no rills or gullies forming on stockpiles).<br>Demonstration should also be provided that progressive rehabilitation of stockpiles is occurring.<br>DSD recommends that an auditable record of soil movements including recovery, stockpiling and reinstatement must be maintained and reported.<br>Should a lease be granted, these criteria must be revised and finalised in the PEPR submission. | Rex has proposed the following Leading Indicator Criteria:<br>After high rainfall events which generate runoff, visual inspections of all topsoil stockpiles will occur to ensure no evidence of sediment loss through erosion (formation of rills and gullies).<br>Should a lease be granted, DSD recommend that Leading Indicator Criteria be reconsidered and finalised in the PEPR submission. | DSD considers no lease conditions applicable to the measurement criteria are required. |
| **ML-S2**<br>**Potential Impact:** Decreased soil quality from compaction during mining activities<br>**Recommended Outcome:**<br>The Tenement Holder must, in constructing and operating the Lease and post-completion ensure that the existing (pre-mining) soil quality and quantity is maintained. | Annual photo monitoring of all soil stockpiles and cleared areas will show progressive establishment of vegetation and landform stability. | DSD considers that annual photo monitoring of cleared areas is not sufficient in itself to demonstrate impacts due to compaction. It is suggested that additional criteria be developed that demonstrates land clearing is being controlled and minimised.<br>Should a lease be granted, these criteria must be revised and finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary.<br>Rex has not proposed Leading Indicator Criteria. | DSD considers no lease conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **ML-S3**<br><br>**Potential Impact**: Decreased soil quality through the degradation of viable native seed due to long term stockpiling<br><br>**Recommended Outcome:**<br><br>The Tenement Holder must, in constructing and operating the Lease and post-completion ensure that the existing (pre-mining) soil quality and quantity is maintained. | Topsoil collected from patches of native vegetation is used in accordance with a soil management plan. | DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome, however the criteria needs rewording to include how the demonstration will be undertaken, such as an annual audit of the implementation of management strategies. ).<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | Rex has not proposed Leading Indicator Criteria.<br><br>DSD considers that there is the possibility that a strong reliance on control strategies may be required to reduce risk to the environment and thus Leading Indicator Criteria may be required for this outcome.<br><br>Should a lease be granted, DSD recommend that Rex further consider the need for Leading Indicator Criteria for inclusion in the PEPR. | DSD considers no lease conditions applicable to the measurement criteria are required. |
| **ML-S4**<br><br>**Potential Impact:** Decreased soil quality due to build-up of weed seed in the topsoil stockpile from long term storage<br><br>**Recommended Outcome:**<br><br>The Tenement Holder must, in construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Lease area compared to adjoining land. | Annual pest plant survey shows at transects located on the topsoil stockpiles on the ML no new pest plant species, or sustained increase in abundance of existing pest plant in the proposed ML when compared to baseline data. | DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome.<br><br>The criteria will need to provide greater definition around the meaning of 'sustained increase'.<br><br>DSD considers that to support this criteria, sufficient baseline data on pest plants must be gathered within the ML area prior to the commencement of mining.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary.<br><br>Rex has not proposed Leading Indicator Criteria. | *DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(d) of the Regulations in relation to the outcome for impact event* ***ML-S4****;*<br>Representative baseline data on the presence and abundance of weeds, pests and plant pathogens within the ML area prior to commencement of mine operations. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **ML-S5**<br><br>**Potential Impact:** Decreased soil quality due to build-up of salt from dust suppression activities and/or from mixing with saline subsoils.<br><br>**Recommended Outcome:**<br><br>The Tenement Holder must, in constructing and operating the Lease and post-completion ensure that the existing (pre-mining) soil quality and quantity is maintained. | Annual soil salinity (EC) monitoring to be undertaken on soil stockpiles to ensure pre-mining quality has been maintained | DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome.<br><br>DSD considers that to support this criteria, sufficient baseline data on pre-mining topsoil salinity must be gathered within the ML area prior to the commencement of mining.<br><br>Should a lease be granted, these criteria would be revised and finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary.<br><br>Rex has not proposed Leading Indicator Criteria. | *DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(d) of the Regulations in relation to the outcome for impact event* ***ML-S5****;*<br>Baseline data to characterise the pre-mining condition of all soils within the ML area. |
| **ML-S6**<br><br>**Potential Impact**: Decreased soil quality due to contamination from spills of fuel, oil or a hazardous chemical<br><br>**Recommended Outcome:**<br><br>The Tenement Holder must, in constructing and operating the Lease and post-completion ensure that the existing (pre-mining) soil quality and quantity is maintained. | An annual internal audit of the Hillside spills register demonstrates that all spills of fuels, lubricant or other contaminate have been remediated in accordance with EPA requirements and that all spills greater than 20L reported to appropriate regulator. | DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome.<br><br>Should a lease be granted, these criteria would be revised and finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary.<br><br>Rex has not proposed Leading Indicator Criteria. | *DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(d) of the Regulations in relation to the outcome for impact event* ***ML-S6****;*<br>Baseline data to characterise the pre-mining condition of all soils within the ML area. |
| **ML-S7**<br><br>**Potential Impact:** Decreased soil quality due to potentially contaminated airborne dust emanating from the mining operation.<br><br>Recommended Outcome: The Tenement | Annual soil stockpile quality monitoring (pH and metals) to ensure pre mining quality has been maintained | DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome, however DSD considers that soil testing locations be included for adjoining agricultural land. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | *DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(d) of the Regulations in relation to the outcome for impact event* |

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| Holder must, in constructing and operating the Lease and post-completion ensure that the existing (pre-mining) soil quality and quantity is maintained. | | Should a lease be granted, these criteria would be revised and finalised in the PEPR submission. | Rex has not proposed Leading Indicator Criteria. | ***ML-S7****;*<br>Baseline data to characterise the pre-mining condition of all soils within the ML area. |
| **ML-T1 to T7**<br>**Potential Impact:** Decreased soil quality due to contamination from discharge of tailings<br>**Recommended Outcome:**<br>The Tenement Holder must ensure that:<br>1. there is no contamination of land and soils either on or off site as a result of mining operations; and<br>2. no contamination of land and soils either on or off site after mine completion occurs as a result of mining operations. | Separate criteria are provided for each of the 7 impact events – relevant criteria are provided below:<br>An annual internal audit (intermediate and comprehensive) of the records from daily and weekly inspections of the:<br>1. tailings pipelines;<br>2. main embankment condition and all appurtenant structures;<br>3. spillway condition, tailings beach development and decant pond level; and<br>4. freeboard<br>Demonstrates that the TSF and associated infrastructure are operated in accordance | DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome, however the criteria needs finalising to include TSF operating parameters including the level of freeboard to be measured and reported against.<br>Should a lease be granted, these criteria would be finalised in the PEPR submission | Rex has proposed Leading Indicator Criteria in Table 8.3-53 of the Proposal<br>DSD considers that there is the possibility that a strong reliance on control strategies may be required to reduce risk to the environment and thus Leading Indicator Criteria may be required for this outcome.<br>Should a lease be granted, DSD recommend that Leading Indicator Criteria be reconsidered and finalised in the PEPR submission. | DSD considers no lease conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| | with the TSF 'Operation and Maintenance Manual' and any resultant action carried out in accordance with the TSF 'Operation and Maintenance Manual'. | | | |
| **ML-W1**<br><br>**Potential Impact:** Soil or water contamination due to incorrect waste disposal<br>**Recommended Outcome:**<br>The Tenement Holder must ensure that all commercial or industrial waste (which does not include tailings and waste rock) is disposed of in an EPA licensed facility. | An annual audit of the waste disposal records of the volumes of putrescible and hazardous waste taken off-site demonstrate that the disposal of all potentially polluting waste has been taken to an approved EPA site and in accordance with the Waste Management Plan. | DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome, however criteria should also be provided to demonstrate through regular inspections that waste storage facilities and sewage treatment plants are not causing impacts to soils.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |
| **ML(C)-S1**<br><br>**Potential Impact:** Insufficient topsoil quantity and poor topsoil quality resulting in low establishment of native vegetation and agricultural pasture at closure<br>**Recommended Outcome:**<br>The Tenement Holder must, in constructing and operating the Lease and post-completion ensure that the existing (pre- | An independent suitably qualified and experienced expert certifies that representative test sites on rehabilitated areas have achieved or by trends may be confidently predicted to reach and pass sustainability thresholds as defined by | DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome. DSD recommends that the establishment of sustainability thresholds should be undertaken as early as possible during the life of the mine, and that EFA be undertaken on progressively rehabilitated sites rather than at mine closure. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| mining) soil quality and quantity is maintained. | Ecosystem Function Analysis.*<br>* Soil parameters of EFA. | Should a lease be granted, these criteria would be finalised in the PEPR submission, including methodology for undertaking the EFA monitoring and analysis. | | |
| **ML(C)-S2**<br>**Potential Impact:** Instability of final landforms post completion leading to the erosion of soil.<br>**Recommended Outcome:**<br>The Tenement Holder must ensure that the WRD and TSF final landforms will be physically stable post mine completion | Results from the inspection of final landforms by a suitably qualified expert demonstrate that the final landforms have been rehabilitated in accordance with the approved closure plan. | In addition to the proposed criteria, DSD considers that additional closure criteria must be provided to establish over a period of time that rehabilitated landforms are and will remain stable post mine-completion.<br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |
| **ML(C)-W1**<br>**Potential Impact:** Waste remaining onsite at closure resulting in loss of land capability to future user.<br>**Recommended Outcome:**<br>The Tenement Holder must, ensure that:<br>1. there is no contamination of land and soils either on or off site as a result of mining operations; and<br>2. no contamination of land and soils either on or off site after mine completion occurs as a result of mining operations | Results from an inspection at closure demonstrate that all waste materials have been disposed of in accordance with EPA standards. | DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome.<br>Should a lease be granted, these criteria would be revised and finalised in the PEPR submission. | DSD considers that Leading Indicator Criteria be established to ensure ongoing demonstration that all waste has been disposed in accordance with EPA standards. | DSD considers no lease conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **DSD ML-S1**<br><br>**Potential Impact:** Mounding of seepage under the TSF impacting on adjoining land uses (including cropping) during operations and post completion<br>**Recommended Outcome:**<br>The Tenement Holder must, in construction, operation and post completion, ensure that water seepage from the TSF, WRD's or ore stockpiles does not result in adverse impacts on adjacent land uses including, but not limited to, growth of native vegetation and cropping land. | Rex has proposed the following criteria in the Proposal Response Document:<br><br>Quarterly water level monitoring using observation wells around the TSF will demonstrate that no mounding occurs which could salinize third party agricultural land | DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome. Further clarification will be required on maximum water level limits of mounding under the TSF which would indicate salinisation or other contamination of 3rd party agricultural land.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | Rex has not proposed specific leading indicator criteria for this impact event, but has proposed the following leading indicator for the impact event *Leakage through the embankment and base* (ML-TSF7):<br><br>Data of the groundwater conditions and phreatic surface of the TSF is analysed and any resultant action carried out in accordance with the TSF 'Operation and Maintenance Manual' within specified timeframe.<br><br>DSD considers that Leading Indicator Criteria are required.<br><br>Should a lease be granted, DSD recommend that Leading Indicator Criteria be reconsidered and finalised in the PEPR submission. | DSD considers no lease conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **DSD ML-S2**<br><br>**Potential Impact:** Leaching of metals or other contaminants through waste rock dumps, oxide and ore stockpiles impacting on adjoining land uses (including cropping) during operations and post completion<br>**Recommended Outcome:**<br>The Tenement Holder must, in construction, operation and post completion, ensure that water seepage from the TSF, WRD's or ore stockpiles does not result in adverse impacts on adjacent land uses including, but not limited to, growth of native vegetation and cropping land. | Rex has not proposed criteria for this outcome. | DSD considers that similar criteria to the previous TSF impact event (**DSD ML-S1**) could be applied for monitoring groundwater levels around waste rock dumps and ore stockpiles to demonstrate that no mounding occurs which could salinize or contaminate third party agricultural land<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |
| **ML(C)-AL1**<br><br>**Potential Impact:** Reduced land available to agriculture post completion.<br>**Recommended Outcome:**<br>Before completion, the Tenement Holder must satisfy the Director of Mines that where practicable, the pre mining land use can be recommenced after mine completion. | Annual monitoring of progressive rehabilitation through comparison with production schedule to demonstrate compliance with approved rehabilitation plan. | DSD considers that further explanation is required on the type of monitoring to be undertaken annually. For example will this be through photo monitoring or inspections by a 3rd party, or a combination of methods.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers that Leading Indicator Criteria are required.<br><br>The leading indicator criteria should be demonstration that progressive rehabilitation is being carried out. | DSD considers no lease conditions applicable to the measurement criteria are required. |

### 7.5.6 *Summary of the recommended regulatory response (ML)*

DSD has assessed that all potential impacts to soils during construction, operations and post completion have been identified through this assessment and acceptable outcomes have been recommended for all primary impact events where the severity of primary consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for the receiving environment during construction, operation and post completion. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

*DSD recommends that should a lease be granted the following outcome(s) be a condition of the lease:*

The Tenement Holder must ensure that:

1. there is no contamination of land and soils either on or off site as a result of mining operations; and
2. no contamination of land and soils either on or off site after mine completion occurs as a result of mining operations.

*DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*

The Tenement Holder must, in constructing and operating the Lease and post-completion ensure that the existing (pre-mining) soil quality and quantity is maintained.

The Tenement Holder must, in construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Lease area compared to adjoining land.

> *Note: Weeds are defined in this condition as any invasive plant that threatens native vegetation in the local area or any species recognised as invasive in South Australia.*

The Tenement Holder must ensure that the WRD and TSF final landforms will be physically stable post mine completion.

Before completion, the Tenement Holder must satisfy the Director of Mines that where practicable, the pre mining land use can be recommenced after mine completion.

The Tenement Holder must, in construction, operation and post completion, ensure that water seepage from the TSF, WRD's or ore

stockpiles does not result in adverse impacts on adjacent land uses including, but not limited to, growth of native vegetation and cropping land.

*DSD recommends the following lease condition(s) applicable to strategies be adopted for achievement of the outcome:*

The Tenement Holder must ensure that all commercial or industrial waste (which does not include tailings and waste rock) is disposed of in an EPA licensed facility.

The Tailings Storage Facility (**"TSF"**) embankment must be designed and constructed using the downstream construction method.

The TSF construction and operation must be verified by a suitably qualified independent expert approved by the Director of Mines, against the design and plans that have been adopted for the TSF construction and operation;

- for the initial stage of TSF construction; and
- for each subsequent stage of TSF construction including the cover system; and
- on an annual basis for operations or at a frequency as the Director of Mines may specify by notice in writing.

The expert must prepare reports of the findings of the verifications. The initial expert report for construction verification must be provided to the Director of Mines prior to the initial placement of tailings in the TSF and subsequent reports must be provided to the Director of Mines within 1 month of completion of the verification and all reports will be made publically available.

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event **ML-S1**;*

Strategies to achieve recovery of topsoil and subsoil from areas to be disturbed by mining operations.

Strategies for maintaining the quality and quantity of stockpiled soils until such time that it is used for rehabilitation purposes.

Strategies for reinstatement of these soils so as to maximise the likelihood of achieving the outcome <relating to impact event **ML-S1>**.

An auditable record of soil movement including recovery, stockpiling and reinstatement.

*Strategies for the establishment of post completion land uses and areas, including the re-establishment of land for agriculture, must be consistent with Section 6.9.3 and 6.9.4 of the Proposal.*

*A plan for establishing appropriate legal mechanisms to ensure effective transfer of responsibility for any maintenance of the site and control of any future development post completion.*

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event* ***ML-S1 and ML-T1 to T7****;*

The design, construction, operation and closure of the Tailings Storage Facility must be prepared in accordance with, but not limited to, the most recent ANCOLD guidelines relating to Tailings Dams.

Specify the minimum freeboard height and maximum supernatant pond dimensions for the Tailings Storage Facility. The maximum dimensions of the supernatant pond must be consistent with the method of sub-aerial deposition of tailings.

The Tenement Holder must cease deposition of tailings to the TSF if the limits for freeboard height or supernatant pond dimensions specified as a result of <previous clause> are exceeded and report this exceedance to the Director of Mines within 24 hours.

> *Note: Freeboard is defined as the difference in height between the level of the supernatant pond and the lowest point of the tailings dam embankment.*

Strategies for the control of seepage through the TSF base and walls.

Strategies for achieving and maintaining design tailings discharge densities and tailings consolidation rates to ensure timely construction of the cover system post cessation of tailings deposition.

Tailings discharge density trigger limits and remedial actions to ensure design densities are achieved.

Quality control arrangements for all stages of construction of the TSF including supervision by appropriately qualified and experienced persons, documented procedures, quality control testing and record keeping.
A leak detection program for monitoring seepage through the base of the TSF.

The design construction and maintenance of mine waste cover systems including, but not limited to, a detailed cover system design, construction methodology, cover system modelling and provision of a program of works for field trials and collection of site specific data to validate/calibrate the model(s).

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(d) of the Regulations in relation to the outcome for impact event **ML-S4-S7**;*

Representative baseline data on the presence and abundance of weeds, pests and plant pathogens within the ML area prior to commencement of mine.

Baseline data to characterise the pre-mining condition of all soils within the ML area.

### 7.5.7 *Impact assessment (EML)*

**Rex's approach to impact assessment**

Rex has not provided a soils impact assessment for the EML

Impacts to soils associated with EML activities that have been identified by State Government after submission of the Proposal are discussed in Table 7.5.6.

**Table 7.5.6 – Impact events identified subsequent to the Proposal**

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **DSD EML-S1** | Decreased soil quantity and quality available for rehabilitation from erosion of soil stockpiles, compaction and fuel spills. | Activities on the EML will include the stockpiling and movement of overburden stockpiles, extracted through road diversion activities.<br><br>DSD considers that these activities, if not appropriately managed, could impact on pre-mining soil quality and quantity such that soil is unfit for rehabilitation. Potential impacts are considered to be compaction through use of heavy machinery, erosion of soil stockpiles, and spills of fuel and other hydrocarbons through use of machinery.<br><br>Based on the discussion above DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES<br><br>Rex has not provided an outcome. |

### 7.5.8 *Outcomes (EML)*

Table 7.5.7 provides outcomes for impact events identified by DSD that were determined in Section 7.5.1 to require an outcome.
The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable.

The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies.

**Table 7.5.7 – Discussion of outcomes for impacts identified by DSD**

| ID | Acceptability of outcome | Achievability of outcome | Recommended regulatory response |
|---|---|---|---|
| **DSD EML-S1**<br>**Impact event:** Decreased soil quantity and quality available for rehabilitation from erosion of soil stockpiles, compaction and fuel spills.<br>**Outcome:** DSD proposes the following outcome:<br>The Tenement Holder must, in constructing and operating the Lease and post completion ensure that the existing (pre-mining) soil quality and quantity is maintained. | DSD considers that the outcome accurately describes the level of impact.<br>The outcome is considered a suitable statement on the acceptable level of impact on the environment. | Although Rex has not proposed control strategies for this impact on the EML the proposed control strategies for managing soil stockpiles on the ML (as described in Table 7.5.1 above) are considered appropriate to manage this risk.<br>Based on the discussion above DSD considers that the outcome would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*<br>The Tenement Holder must, in constructing and operating the Lease and post-completion ensure that the existing (pre-mining) soil quality and quantity is maintained. |

DSD considers that the recommended outcome defines an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex.

### 7.5.9 *Measurement Criteria (EML)*

Table 7.5.8 is DSDs assessment of the measurement criteria as a suitable demonstration of achievement of the outcome recommended by DSD.

**Table 7.5.8 – DSD assessment on measurement criteria**

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **DSD EML-S1**<br><br>**Potential Impact:** Decreased soil quantity and quality available for rehabilitation from erosion of soil stockpiles, compaction and fuel spills.<br>**Recommended Outcome:** The Tenement Holder must, in constructing and operating the Lease and post-completion ensure that the existing (pre-mining) soil quality and quantity is maintained. | The criterion proposed by Rex for **ML-S1 – S7** could be applicable for the EML outcome. | The criterion proposed by Rex for **ML-S1-S7** could be appropriate.<br>These criteria are around demonstration that soil quality and quantity is being maintained.<br><br>Further information will be required regarding exact monitoring and auditing methods.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, this criterion would be refined and finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criterion are required. |

### 7.5.10 *Summary of the recommended regulatory response (EML)*

DSD considers that all potential impacts to soils during construction, operations and post completion have been identified through this assessment and a suitable outcome has been recommended for impact events where the severity of consequence is higher than negligible. DSD has considered the outcome and determined that it sets an acceptable level of impact for receiving environment from mining activities. DSD considers that the outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of the outcome.

*DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*

The Tenement Holder must, in constructing and operating the Lease and post-completion ensure that the existing (pre-mining) soil quality and quantity is maintained.

### 7.5.11 *Impact assessment (MPL)*

A description of DSD's assessment of the impact assessment process is described in Section 7.0. A review of Rex's MPL impact assessment is shown in Table 7.5.9. The Port MPL application has been deferred at the request of Rex and has not been assessed in this report.

**Table 7.5.9 Impact events identified by Rex in the Proposal**

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** As documented in Section 8.4.4.2 of the Proposal | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **MPL-S1** | Soil loss and land disturbance from the construction of the slurry pipeline | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>An 11km trench would be excavated and soil stockpiled during the progressive construction and installation of a raw water and slurry pipeline. While this soil material is temporarily stockpiled there is a potential for soil loss through water and wind erosion. There is also potential for soil compaction to occur through the use of heavy machinery during construction of the corridor.<br>Based on the discussion above DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES<br>Rex has provided an outcome |
| **MPL-S2** | Reduced soil quality due to soil contamination from leakage of the slurry and salt water pipeline | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>DSD considers that without controls, a saline water spill from the seawater intake pipe, or a concentrate spill from the slurry pipeline could have significant localised impacts.<br>Based on the discussion above DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES<br>Rex has provided an outcome |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** As documented in Section 8.4.4.2 of the Proposal | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **MPL(C)-S1** | Land surface not properly stabilised post completion | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>DSD considers that without implementing appropriate controls, including effective rehabilitation of disturbed and compacted areas at the port facility, there is a potential for long term loss of land capability.<br>Based on the discussion above DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES<br>Rex has provided an outcome |

DSD considers that Rex has identified all potential impacts to soils associated with the proposed MPL mine related activities.

### 7.5.12 *Outcomes (MPL)*

Table 7.5.10 is the DSD assessment of outcomes proposed by Rex in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable. The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies.

## Table 7.5.10 – DSD assessment of outcomes proposed by Rex

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **MPL-S1 Impact event:** Soil loss and land disturbance from the construction of the slurry pipeline<br><br>**Rex Proposed Outcome:** All soil disturbed or impacted by the port facility or pipeline will have pre-disturbance quality and quantity maintained. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex has assessed the primary risk level of this impact occurring as high.<br><br>Rex proposes to remove soil from the pipeline corridor in a systematic way such that the existing soil profile is reinstated. Topsoil and subsoil will be stockpiled separately with stockpiles at a low height to limit wind and water erosion.<br><br>Topsoil will be re-spread as soon as possible during pipeline construction, and the corridor returned to the landowners agricultural rotation as soon as practicable.<br><br>Erosion of gullies will be minimised through the use of directional drilling under these features.<br><br>Rex considers control strategies will reduce this impact to a level of low.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | *DSD recommends that should a license be granted the following outcome be a requirement of the license:*<br><br>The Tenement Holder must, in constructing and operating the Licence and post-completion ensure that the existing (pre-mining) soil quality and quantity is maintained. |
| **MPL-S2**<br><br>**Impact event:** Reduced soil quality due to soil contamination from leakage of the slurry and salt water pipeline<br><br>**Rex Proposed Outcome:** All soil disturbed or impacted by the port facility or pipeline will have pre-disturbance quality and quantity maintained. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex has assessed the primary risk level of this impact occurring as moderate.<br><br>Rex proposes to introduce design and management strategies that minimise potential for leaks from the slurry and return water pipelines. These include:<br><br>• Pipelines will be constructed using hard wearing materials<br>• Internally lining the pipelines with HDPE liner<br>• Installing a leak detection system to immediately detect leaks and triggering immediate shutdown of the pipeline<br>Rex considers control strategies will reduce this impact to a level of low.<br><br>DSD considers that the following additional control strategies be considered for achievement of the outcome:<br><br>• Installing buried pipework at sufficient depth to prevent mechanical disturbance post installation; and | *DSD recommends that should a license be granted the following outcome be a requirement of the license:*<br><br>The Tenement Holder must, in constructing and operating the Licence and post-completion ensure that the existing (pre-mining) soil quality and quantity is maintained.<br><br>*DSD recommends the following matters be addressed for the purposes of* |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | • On surface markers identifying the location of buried pipework.<br>Given the potential environmental risk posed by a failure of these pipes, the design, construction and operation should be subject to independent verification.<br>DSD considers that the outcome proposed by Rex would be achievable. | *Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event **MPL-S2**;*<br>The location and depth below the natural surface of the concentrate and water pipelines must prevent any foreseeable damage due to accidental excavation or surface disturbance. |
| **MPL(C)-S1**<br>**Impact event:** Land surface not properly stabilised post completion<br>**Rex Proposed Outcome:** All soil disturbed or impacted by mining operations will have pre-mining quality and quantity maintained. | The proposed outcome accurately describes the level of impact.<br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex has assessed the primary risk level of this impact occurring as moderate.<br>As per previous discussions, topsoil and subsoil would be stripped prior to construction of both the pipeline corridor, and soil stockpiles would be managed appropriately to avoid loss of soil through erosion, and soil degradation.<br>Stockpiled soils would be reinstated as part of rehabilitation activities as soon as practicable. Following rehabilitation of disturbed areas, the pipeline corridor would be reintroduced into the agricultural rotation as soon as practicable or as per the landowners requirements. Rex has proposed to leave pipelines filled with potable water in the ground post-completion.<br>Rex considers control strategies would reduce this impact to a level of low.<br>DSD considers that the outcome proposed by Rex would be achievable and self-sustaining in the long-term. | *DSD recommends that should a license be granted the following outcome be a requirement of the license:*<br>The Tenement Holder must, in constructing and operating the Licence and post-completion ensure that the existing (pre-mining) soil quality and quantity is maintained. |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex.

### 7.5.13 *Measurement Criteria (MPL)*

Table 7.5.11 is DSDs assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

**Table 7.5.11 – DSD assessment on measurement criteria**

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **MPL-S1**<br>**Potential Impact:** Soil loss and land disturbance from the construction of the slurry pipeline<br>**Recommended Outcome:** The Tenement Holder must, in constructing and operating the Licence and post-completion ensure that the existing (pre-mining) soil quality and quantity is maintained. | Records from an inspection of the pipeline corridor once construction is completed show that all topsoil has been reinstated as per design and land suitable to be reinstated to agricultural land. | DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome.<br>Arrangements for verifying the effectiveness of rehabilitation and that agricultural productivity of rehabilitated areas has been restored is likely to be addressed in land access agreement. If not, verification arrangements would be included in the criteria.<br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no licence requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no Licence conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **MPL-S2**<br><br>**Potential Impact:** Reduced soil quality due to soil contamination from leakage of the slurry and salt water pipeline<br><br>**Recommended Outcome:** The Tenement Holder must, in constructing and operating the Licence and post-completion ensure that the existing (pre-mining) soil quality and quantity is maintained. | An annual internal audit of the leak detection system register demonstrates that the system is operated and maintained in accordance with the design. | In addition to the Rex proposed criteria, DSD considers that criteria must be included to demonstrate that any spills from the slurry or water pipeline have appropriately remediated to a standard suitable for return to agricultural land use.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers that Leading Indicator Criteria is required. | DSD considers no Licence conditions applicable to the measurement criteria are required. |
| **MPL(C)-S1**<br><br>**Potential Impact:** Land surface not properly stabilised post completion<br><br>**Recommended Outcome:** The Tenement Holder must, in constructing and operating the Licence and post-completion ensure that the existing (pre-mining) soil quality and quantity is maintained. | An independent suitably qualified and experienced expert certifies that representative test sites on rehabilitated areas have achieved or by trends may be confidently predicted to reach and pass sustainability thresholds as defined by an Ecosystem Function Analysis. | DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome.<br><br>DSD recommends that the establishment of sustainability thresholds should be undertaken as early as possible during the life of the mine, and that EFA be undertaken on progressively rehabilitated sites rather than at mine closure.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission, including the details of methodology for undertaking the EFA. | DSD considers no licence requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no Licence conditions applicable to the measurement criteria are required. |

### 7.5.14 *Summary of the recommended regulatory response (MPL)*

DSD has assessed that all potential impacts to soils during construction, operations and post completion have been identified through this assessment and acceptable outcomes have been recommended for all primary impact events where the severity of primary consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for the receiving environment during construction, operation and post completion. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

**Power line and Pipelines MPL**

*DSD recommends that should a Licence be granted the following outcomes be prescribed as conditions of the licence;*

The Tenement Holder must, in constructing and operating the Licence and post-completion ensure that the existing (pre-mining) soil quality and quantity is maintained.

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event **MPL-S2**;*

The location and depth below the natural surface of the concentrate and water pipelines must prevent any foreseeable damage due to accidental excavation or surface disturbance.

## *7.6 Native Vegetation*

### 7.6.1 *Description of Relevant Aspects of Environment*

Much of the area surrounding the Hillside Project site was cleared for agriculture, development and industry in the late 19$^{th}$ century. Rex states in the Proposal that regionally it was estimated 26% of the native vegetation remained following clearance, and within the application area it is estimated only 4% of native vegetation remains (source: page 5-93 of the Proposal and Appendix 5.1-A). Native vegetation in the application area remains mainly in the form of roadside vegetation, isolated stands surrounded by agricultural land, along cliffs and small privately-managed reserves. The broader clearance of native vegetation and grazing activities adjacent to these areas has resulted in a generally poor condition of native vegetation with little native understory and many weed species present.

Rex has conducted desktop research and field studies to determine the characterisation, composition, structure and diversity of flora, including;

- Rex Minerals Ltd Hillside Copper Project Environmental Desktop Study – Flora and Fauna Listed under EPBC Act 1999 (COOE 2011)

- Rex Minerals Ltd Botanical Survey of the Hillside Project Site and Adjacent Reserves and Roadsides (Baste 2011)
- Rex Minerals Ltd Supplementary Flora Report – Patches and Roadsides Vegetation Survey (COOE 2012a, 2013)
- Rex Minerals Ltd Significant Environmental Benefit Survey and Calculations (COOE in prep.)
- Invasive and declared weed species surveys – ongoing surveys conducted by Rex environmental personnel.
- Background research of vegetation within the ML and MPLs using literature reviews and searching a host of flora databases

This research identified 13 broad vegetation groups including coastal and inland plant species containing Mallee communities, low woodlands, coastal shrub lands and sedges. The groups are described in Table 5.12-1 and the application area was mapped into these areas, as shown in Figure 5.12-1 and 5.12-2.

The Irongrass Sedgeland (vegetation group 8) was identified as critically endangered under the EPBC Act. This vegetation group was identified within the proposed MPL corridor within a DPTI roadside significant site. This site was classed as Condition Class B in accordance with EPBC policy, indicating a habitat being moderately degraded but still of significance. Desktop studies identified additional threatened species in the region but were not considered to occur in the application area with the exception of Resin Wattle (*Acacia rhetinocarpa,* nationally vulnerable) and Mallee Bitter-pea (*Daviesia benthammii sppl humuilis*, rare under the NPW Act). A full list of threatened species potentially in the area is included in Table 5.12-2. Rex lodged an EPBC referral assessing the impact of mining operations on the Resin Wattle and the Mallee Bitter-pea. The Commonwealth DoE made the determination that this was not a controlled action if undertaken in a particular manner. The decision prescribes measures to prevent impacts to the Resin Wattle (*Acacia rhetinocarpa*) and the Large-club Spider-orchid (*Caladenia macroclava*).

Approximately 40 hectares of native vegetation is anticipated to be cleared for project activities including the proposed road diversion (mainly patches, isolated stand of native vegetation, and roadside vegetation). The determination of a Significant Environmental Benefit (SEB) is currently in preparation under the *Native Vegetation Act 1991*. The SEB also includes assessment of clearance of scattered trees in accordance with the relevant guidelines; these details would be included in a Native Vegetation Management Plan along with details regarding protection of threatened species. No clearance is proposed for EML activities.

DSD concurs with Section 8.3.6.2 of the MPL that the sensitive receptors and associated environmental values for this environmental aspect to be: abundance, diversity and condition of native vegetation on and surrounding the lease area. Rex has stated that the requirement for land clearance within the corridor MPL areas is minimal as the sites for locating

infrastructure generally comprise degraded land, agricultural land and land that is already developed.

DSD considers that the Proposal description of the existing environment in relation to native vegetation is an adequate characterisation of the receiving environment which could potentially be affected by mining operations.

### 7.6.2 *Views of affected parties*

In the Proposal Rex notes that the CCG expressed a high level of concern regarding the negative impact from native vegetation clearance particularly in relation to endangered species (both plants and animals including habitat). In addition the CCG raised issues regarding maximising the benefits from revegetation in coastal areas and vegetation corridors. During statutory consultation public submissions raised the following issues:

**Table 7.6 - Impact events relating to issues raised during statutory consultation**

| Issues raised during statutory consultation | Addressed |
|---|---|
| Presence of rare Spider-orchids | **ML-NV2** |
| Impact of dust on native vegetation | Section 7.1 |
| Using saline water for dust suppression on soils | **ML-S5** in Section 7.5 |
| Long term storage of soils decreasing future viability and the ensuing impact on native vegetation | **ML-S5** in Section 7.5 |

The statutory consultation did not identify any additional receptors or impact events to those identified by Rex.

### 7.6.3 *Impact assessment (ML)*

**Rex's approach to impact assessment**

The proposed footprint of the project would involve clearance of 40 ha of land; DSD considers that clearance of native vegetation is a certain impact in regards to Rex's proposed clearance footprint. Impacts of dust on Native Vegetation have been assessed separately in Section 8.3.1 of the Proposal and Section 7.1 of this report. Subsequent impacts on Native Fauna from clearance of habitat have been assessed separately in Section 8.3.7 of the Proposal and Section 7.7 of this report.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7. A review of Rex's impact assessment is shown in Table 7.6.1 and impacts identified by state government identified post submission of Proposal identified in Table 7.6.2.

### Table 7.6.1 – Impact events identified by Rex in the Proposal

*Impact events identified by Rex in the Proposal*

| Impact ID | Potential impact event on Native Vegetation | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **ML-NV1** | Required land clearance due to placement of mine infrastructure, causing loss of density and/or diversity of native vegetation | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>Clearance of native vegetation would impact the density or diversity of native vegetation. DSD would require this impact to be managed to an acceptable level.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |
| **ML-NV2** | Required land clearance due to placement of mine infrastructure, causing significant impact on threatened species. | Rex has stated that the consequence of this impact occurring without controls implemented is moderate.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |
| **ML-NV3** | Unauthorised land clearance from saline over spray from dust suppression, causing loss of density and/or diversity of native vegetation | Rex has stated that the consequence of this impact occurring without controls implemented is moderate.<br>DSD accepts the conclusion that use of saline over spray from dust suppression could cause loss of density or diversity of native vegetation without controls in place.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |

*Impact events identified by Rex in the Proposal*

| Impact ID | Potential impact event on Native Vegetation | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **ML-NV4** | Unauthorised land clearance from manual clearance, causing loss of density and/or diversity of native vegetation | Rex has stated that the consequence of this impact occurring without controls implemented is moderate.<br>Manual clearance of native vegetation could cause loss of density or diversity of native vegetation without controls in place.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |
| **ML-NV5** | Unauthorised land clearance from uncontrolled fires emanating from the Hillside Project area of activity, causing loss of density and/or diversity of native vegetation | Rex has stated that the consequence of this impact occurring without controls implemented is major.<br>It is possible uncontrolled fires caused by mining operations would cause loss of density or diversity of native vegetation. Impacts on cropland and other third party property have been assessed in Section 7.15 of this report.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |
| **ML-A5** | Reduced native plant growth or abundance resulting from increased dust deposition resulting from mining operations | This impact has been addressed in the Air Quality impact assessment in Section 8.3.1 of the Proposal and Section 7.1 of this report. | |
| **ML-PPA1** | Introduction of new pest plant and animal species and plant pathogens in the proposed ML area | This impact has been addressed in the Weeds, Pest Plant and Animal impact assessment in Section 8.3.8 of the Proposal and Section 7.8 of this report. | |

*Impact events identified by Rex in the Proposal*

| Impact ID | Potential impact event on Native Vegetation | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **ML-PPA2** | Introduction of new pest plant and animal species and plant pathogens in the proposed ML area | This impact has been addressed in the Weeds, Pest Plant and Animal impact assessment in Section 8.3.8 of the Proposal and Section 7.8 of this report. | |
| **ML-SW1** | Increased sediment loads in downstream surface water flows causing contamination to the surrounding environment | This impact has been addressed in the Surface Water impact assessment in Section 8.3.10 of the Proposal and Section 7.11 of this report. | |
| **ML-SW2-7** | Contamination of surface water run-off | This impact has been addressed in the Surface Water impact assessment in Section 8.3.10 of the Proposal and Section 7.11 of this report. | |
| **ML-SW8** | Inundation of areas of remnant vegetation due to changes in the natural water flow resulting in a reduction in abundance of native flora | This impact has been addressed in the Surface Water impact assessment in Section 8.3.10 of the Proposal and Section 7.11 of this report. | |
| **ML-SW9** | Disruption of downstream water flows resulting in loss of abundance of native flora | This impact has been addressed in the Surface Water impact assessment in Section 8.3.10 of the Proposal and Section 7.11 of this report. | |
| **ML-GW5** | Reduced groundwater quantity available for native vegetation as a result of mine dewatering | This impact has been addressed in the Groundwater impact assessment in Section 8.3.10 of the Proposal and Section 7.12 of this report. | |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **Impact ID** | **Potential impact event on Native Vegetation** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML(C)-NV1** | Ecosystem and landscape function not reinstated to pre-mining conditions. | Rex has stated that the consequence of this impact occurring without controls implemented is moderate.<br>DSD accepts the potential for inadequate rehabilitation to lead to the land not being adequately restored to pre-mining conditions. Rex would have to demonstrate that rehabilitation would be self-sustaining in the long term prior to enabling lease relinquishment, if a lease is granted.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |
| **ML(C)-S1** | Insufficient topsoil quantity and poor topsoil quality resulting in low establishment of native vegetation and agricultural pasture on rehabilitated sites | This impact has been addressed in the Soil impact assessment in Section 8.3.5 of the Proposal and Section 7.5 of this report. | |

The State Government, through the assessment process, has identified additional impacts to native vegetation associated with the proposed mining activities subsequent to the submission of the Proposal. An assessment of these additional impact events is provided in Table 7.6.2.

### Table 7.6.2 – Impact events identified subsequent to the Proposal

| Impact ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **DSD ML-NV1** | Clearance of native vegetation for the waste rock dump causing a break in the roadside corridor native vegetation | This impact relates to both Native Vegetation and Native Fauna with implications for quality of native vegetation remnants and distribution of native flora and fauna along corridors. Given the sparse nature of native vegetation in the region these corridors are important for linking biodiversity patches and distribution of flora and fauna along the peninsula. Proposed clearance would interrupt these corridors in the area of the proposed mine. This impact would need to be managed to an acceptable level.<br><br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes |
| **DSD ML-NV2** | Degradation of remnant location caused by proximity of the mining camp | SA Government submissions raised the proximity of the mine camp to a patch of remnant vegetation. Further information was requested from Rex about the interaction between them as per Issue No. 32. Rex provided further control strategies to protect the condition of the remnant vegetation.<br><br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes |

### 7.6.4 *Outcomes (ML)*

Table 7.6.3 is the DSD assessment of outcomes proposed by Rex in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable. The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed would achieve the proposed outcome. For closure events this would consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment would also consider any assumptions and uncertainty in control strategies.

Table 7.6.4 provides outcomes for impact events identified by DSD that were determined in section 7.6.3 to require an outcome.

**Table 7.6.3 – DSD assessment of outcomes proposed by Rex**

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **Impact ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-NV1**<br><br>**Impact event:** Required land clearance due to placement of mine infrastructure, causing loss of density and/or diversity of native vegetation<br><br>**Rex Proposed Outcome:** No loss of density and/or diversity of native vegetation on or off the lease through clearance, dust suppression, fire, or | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Clearance of native vegetation would be required as part of the proposed operations. This cannot be avoided as the footprint of the operations is dependent upon the location of the ore body. The residual risk was assessed as high as the impact would be certain to occur for the proposed clearance footprint. The control and management strategies proposed including progressive rehabilitation have reduced the consequence of the impact to negligible.<br><br>DSD accepts the residual risk as high due to the certainty of the impacts, however, the provision of a Significant Environmental Benefit (SEB) will provide an offset for this which is considered to be acceptable. Consequence has been deemed to be negligible as areas of high habitat significance will be retained or are well represented in the region and progressive rehabilitation will result in the reintroduction of native vegetation habitat.<br><br>The SA government review of the proposed strategies identified that some of the activities listed as contributing to the SEB offset are not included in this offset, for example rehabilitation is not considered a suitable offset, however, rehabilitation with native vegetation can allow a reduction in the SEB ratio required. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the lease through;<br>• Clearance;<br>• Dust/contaminant deposition;<br>• Fire; |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **Impact ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| other damage unless prior approval under the relevant legislation is obtained. | | Control and management strategies were proposed in the Proposal to minimise clearance and prevent unauthorised clearance. This includes; staged clearance, marking areas for removal, induction of staff, progressive clearance and rehabilitation.<br>Further information would be included in the Native Vegetation Management Plan, to be submitted with the PEPR.<br>On the basis of the information provided, it is concluded that the outcome relating to loss of density or diversity of native vegetation is appropriate for the ML with the addition of specifying the additional pathway of loss of vegetation through dust deposition, and would be achievable provided the proposed control and management strategies are effectively implemented and the preparation of a suitable NVMP.<br>DSD considers that the outcome proposed by Rex would be achievable. | • Reduction in water supply; or<br>• Other damage<br>unless prior approval under the relevant legislation is obtained. |
| **ML-NV2**<br>**Impact event:** Required land clearance due to placement of mine infrastructure, causing significant impact on threatened species.<br>**Rex Proposed Outcome:** No loss of density and/or diversity of native vegetation on or off the lease through clearance, dust suppression, fire, or other damage unless prior approval under the relevant legislation is obtained. | The proposed outcome accurately describes the level of impact.<br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex discussed the significant impact on threatened species and communities in the Proposal including those that are nationally listed. An application was submitted to Department of Environment for EPBC assessment outlining these species, communities and the proposed operations. The application was determined not to be a 'Controlled Action' under the EPBC Act provided certain control measures were in place to protect the Resin Wattle (*Acacia rhetinocarpa*) and the large-club spider orchid (*Caladenia macroslavia*). The residual risk was rated as being unlikely with a moderate consequence resulting in a moderate risk. This was the same as the primary risk suggesting the control strategies do not significantly alter the likelihood or consequence of the impact.<br>DSD accepts the residual risk as moderate due to the moderate consequence. While the control and management strategies do not affect the likelihood or consequence of the impact they provide an offset under the *Native Vegetation Act 1991*, which would take into consideration the endangered status of any species impacted. This residual risk is considered acceptable.<br>Further information was sought regarding the control strategies to prevent harm to the Spider Club Orchid (technical issue 145). The response document outlined the requirements of the EPBC referral with regards to preventing harm to the Large-Club Spider Orchid (*Caladenia macroclavia)* and the Neat Wattle (*Acacia rhetinocarpa*). Rex has made a | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br>The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the lease through;<br>• Clearance;<br>• Dust/contaminant deposition;<br>• Fire;<br>• Reduction in water supply; or |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **Impact ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | commitment to avoid clearance of areas with threatened species present where possible. Should a lease be granted further detail regarding the location of threatened species and clearance, control measures to protect them would be included in the NVMP which would be included in the PEPR.<br>On the basis of the information provided, it is concluded that the outcome relating to loss of density or diversity of native vegetation is appropriate for the ML with the addition of specifying the additional pathway of loss of vegetation through dust deposition. The outcome is considered an appropriate condition for capturing all native vegetation loss, including the specific impact of clearance on threatened species with control measures to be included in the NVMP.<br>DSD considers that the outcome proposed by Rex would be achievable. | • Other damage<br>unless prior approval under the relevant legislation is obtained. |
| **ML-NV3**<br>**Impact event:** Unauthorised land clearance from saline over spray from dust suppression, causing loss of density and/or diversity of native vegetation<br>**Rex Proposed Outcome:** No loss of density and/or diversity of native vegetation on or off the lease through clearance, dust suppression, fire, or other damage unless prior approval under the relevant legislation is obtained. | The proposed outcome accurately describes the level of impact.<br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex identified the impact of saline water used in dust suppression both in relation to effects on soil and effects on vegetation. This section considers the impacts on native vegetation, the impacts on Soil are discussed in Section 8.3.5 of the Proposal and Section 7.5 of this report. The residual risk was assessed as being rare and of minor consequence resulting in a risk of low.<br>Further information was sought in relation to this under technical issue 167. Rex's response included details on how contaminated soil would be dealt with (either by in situ remediation or disposal in the TSF or open pit). Control and management strategies are designed to protect topsoil as the sensitive receptor. Remediation or disposal of contaminated subsoil would allow vegetation to re-establish.<br>On the basis of the information provided, it is concluded that outcome relating to loss of density or diversity of native vegetation is appropriate for the ML, and would be achievable provided the proposed control and management strategies are effectively implemented.<br>DSD considers that the outcome proposed by Rex would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br>The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the lease through;<br>• Clearance;<br>• Dust/contaminant deposition;<br>• Fire;<br>• Reduction in water supply; or<br>• Other damage |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **Impact ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | | unless prior approval under the relevant legislation is obtained. |
| **ML-NV4**<br><br>**Impact event:** Unauthorised land clearance from manual clearance, causing loss of density and/or diversity of native vegetation.<br>**Rex Proposed Outcome:** No loss of density and/or diversity of native vegetation on or off the lease through clearance, dust suppression, fire, or other damage unless prior approval under the relevant legislation is obtained. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex identified the potential for vegetation to be cleared without authorisation with special regard for the potential for clearance to impact threatened species present in the ML area. Rex has assessed the residual risk to be low with a minor consequence that is unlikely to occur. DSD consider that the worst case scenario, unauthorised clearance of a nationally threatened species, to be moderate, however the likelihood associated with this particular impact is rare, resulting in a moderate risk. Clearance of non-threatened native species is likely to have a minor consequence and be unlikely, this increase in likelihood is due to the non-threatened species being less well identified and considered in the NVMP.<br><br>DSD accepts the residual risk as moderate due to the moderate consequence. While the control and management strategies do not affect the likelihood or consequence of the impact they provide an offset which would take into consideration the endangered status of any species impacted which is considered acceptable.<br><br>The control and management strategies include clear delineation of areas to be cleared and supporting strategies to ensure all workers are aware of their obligations regarding native vegetation.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the lease through;<br>• Clearance;<br>• Dust/contaminant deposition;<br>• Fire;<br>• Reduction in water supply; or<br>• Other damage<br><br>unless prior approval under the relevant legislation is obtained. |
| **ML-NV5**<br><br>**Impact event:** Unauthorised land clearance from uncontrolled fires emanating from the Hillside Project area of activity, causing loss of density and/or diversity of | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement | Rex identified the impact of loss of vegetation through uncontrolled fire on native vegetation. Impacts from uncontrolled fire on other receptors have been included in other sections with the control and management strategies included in Section 8.3.18 of the Proposal. The residual risk was assessed to be low as the control strategies would reduce the likelihood of the fire and implement strategies to ensure any fires are controlled on site thus reducing the consequence to minor.<br><br>The control and management strategies proposed would adequately manage fires on | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br>The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **Impact ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| native vegetation.<br>**Rex Proposed Outcome:**<br>No loss of density and/or diversity of native vegetation on or off the lease through clearance, dust suppression, fire, or other damage unless prior approval under the relevant legislation is obtained. | on the acceptable level of impact on the environment subsequent to implementation of control strategies. | the tenement to limit the spread and reduce the risk of ignition.<br>DSD considers that the outcome proposed by Rex would be achievable. | vegetation on or off the lease through;<br>• Clearance;<br>• Dust/contaminant deposition;<br>• Fire;<br>• Reduction in water supply; or<br>• Other damage<br>unless prior approval under the relevant legislation is obtained. |
| **ML(C)-NV1**<br>**Impact event:** Ecosystem and landscape function not reinstated to pre-mining conditions.<br>**Rex Proposed Outcome:**<br>Where practical, re-establishment of the pre-mining ecosystem and landscape function. | The proposed outcome accurately describes the level of impact.<br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex identified the potential for unsuccessful rehabilitation to impact on native vegetation and associated communities. Rex has assessed the residual risk to be low attributing it an unlikely impact of minor consequence. This residual risk is based upon the Native Vegetation Management Plan (NVMP), which has yet to be provided to DSD and which would be a requirement of a PEPR should a Mining Lease be granted. The NVMP would be assessed by DSD (in conjunction with DEWNR) as part of the PEPR. The re-establishment of native vegetation upon mine closure is dependent upon many factors including the nature, qualities of growth mediums such as waste rock.<br>Best practice techniques allow this impact to be managed to an acceptable level. Ecosystem and landscape function is used to monitor in preference of vegetation growth as it is able to demonstrate the recovery of the entire community and landscape function. Further information would be required in the PEPR to define when it is practical to achieve outcomes and provide evidence the impact would be managed to a low risk.<br>The outcome provided is considered to be acceptable and achievable given best practice techniques. Further information regarding the control strategies would be required to be provided in the PEPR to evidence that this impact would have a low risk.<br>DSD considers that the outcome proposed by Rex would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br>Before mine completion, the Tenement Holder must satisfy the Director of Mines that where practicable, the pre mining land use can be recommenced after mine completion. |

## Table 7.6.4 – Discussion of outcomes for impacts identified by DSD

| *Discussion of outcomes for impacts identified by DSD* | | | |
|---|---|---|---|
| **ID** | **Acceptability of outcome** | **Achievability of outcome** | **Recommended regulatory response** |
| **DSD ML-NV1**<br><br>**Impact event:** Clearance of native vegetation for the waste rock dump causing a break in the roadside corridor native vegetation<br><br>**Outcome:** The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the lease through;<br>• Clearance;<br>• Dust/contaminant deposition;<br>• Fire;<br>• Reduction in water supply; or<br>• Other damage<br>unless prior approval under the relevant legislation is obtained.. | The outcome accurately describes the level of impact.<br><br>The outcome is considered a suitable statement on the acceptable level of impact on the environment. | Clearance of native vegetation that constitutes part of a patch or corridor has flow on effects for the spread of native vegetation and animals in the area. This is of special relevance in landscapes where the native vegetation comprises of a small part of the landscape in disconnected patches, such as agricultural landscapes. DSD would require that additional information in regards to this be provided in the Native Vegetation and Management Plan (NVMP) which would be submitted as part of the PEPR. The revegetation plan provided as part of the Proposal shows revegetation occurring surrounding the pit and waste rock dumps re-establishing the corridors that were disturbed by mining. Exact timing of this revegetation would be provided in the PEPR.<br><br>The NVMP must have consideration for the Principles of Clearance of Native Vegetation as outlined in Schedule 1 of the *Native Vegetation Act 1991*.<br>DSD considers that the outcome would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the lease through;<br>• Clearance;<br>• Dust/contaminant deposition;<br>• Fire;<br>• Reduction in water supply; or<br>• Other damage<br>unless prior approval under the relevant legislation is obtained. |
| **DSD ML-NV2**<br><br>**Impact event:** Degradation of remnant location caused by proximity of the mining camp<br><br>**Outcome:** Outcomes based on the DSD Regulatory Response for impacts **ML-NV1** to **ML-NV5** | The outcome accurately describes the level of impact.<br><br>The outcome is considered a suitable statement on the acceptable level of impact on the environment. | The proximity of the mining camp to a remnant of vegetation was not assessed by Rex in the Proposal. This was raised by SA Government as a potential impact requiring further information which Rex provided response to (refer to Issue No. 32, Rex Response Document). This impact focused both on unauthorised clearance of the native vegetation and introduction of weeds and pests that could outcompete the native vegetation and cause loss of diversity.<br><br>The information provided stated the location of the camp was diagrammatic only and would not be located so close to the native vegetation, in addition they provided further impact strategies to restrict | DSD considers the regulatory responses for impacts **ML-NV4, ML-PPA1** and **ML-PPA2** are acceptable. |

| *Discussion of outcomes for impacts identified by DSD* | | | |
|---|---|---|---|
| **ID** | **Acceptability of outcome** | **Achievability of outcome** | **Recommended regulatory response** |
| | | access and manage the potential for weeds and pests to invade the area.<br><br>This impact, while not being specifically mentioned in the Proposal is covered under the impact of **ML-NV4** and **ML-PPA1** to **ML-PPA2** and the associated outcomes would be applicable.<br>On the basis of the information provided, it is concluded that an outcome relating to loss of density or diversity of native vegetation is appropriate for the ML, and would be achievable provided the proposed control and management strategies are effectively implemented.<br>DSD considers that the outcome would be achievable. | |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex or identified by DSD.

### 7.6.5 *Measurement Criteria (ML)*

Table 7.6.5 is DSDs assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

## Table 7.6.5 – DSD assessment on measurement criteria

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **ML-NV1**<br><br>**Potential Impact:** Required land clearance due to placement of mine infrastructure, causing loss of density and/or diversity of native vegetation<br><br>**Recommended Outcome:**<br><br>The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the lease through;<br>• Clearance;<br>• Dust/contaminant deposition;<br>• Fire;<br>• Reduction in water supply; or<br>• Other damage<br><br>unless prior approval under the relevant legislation is obtained. | An annual survey of the native vegetation would show that all clearance of native vegetation is authorised under the Native Vegetation Act when compared with baseline survey presented in the approved NVMP. | This criterion proposed by Rex is considered to be appropriate at this stage for demonstrating no impacts or clearance on native vegetation that is not accounted for in SEB arrangements. In this context clearance includes physical disturbance as well as inhibiting plant growth. This criterion would have to be refined during the development of the PEPR.<br><br>DSD considers the proposed methodology is an appropriate mechanism to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, the criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |
| **ML-NV2**<br><br>**Potential Impact:** Required land clearance due to placement of mine infrastructure, causing significant impact on threatened species.<br><br>**Recommended Outcome:** The Tenement Holder must, in construction, | An annual survey of the native vegetation would show that all clearance of native vegetation is authorised under the Native Vegetation Act when compared | This criteria proposed by Rex is considered appropriate at this stage for demonstrating no impacts or clearance on native vegetation that is not accounted for in SEB arrangements. In this context clearance includes physical disturbance as well as inhibiting plant growth. The criteria would have to be refined during the development of the PEPR. Further information would be required in the PEPR including the exact positioning of | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the lease through;<br>• Clearance;<br>• Dust/contaminant deposition;<br>• Fire;<br>• Reduction in water supply; or<br>• Other damage<br>unless prior approval under the relevant legislation is obtained. | with baseline survey presented in the approved NVMP. | endangered species in relation to areas of clearance and assessment of the significance of the vegetation to be cleared.<br>DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome.<br>DSD considers that achievement of the recommended outcome would be measurable.<br>Should a lease be granted, the criteria would be finalised in the PEPR submission. | | |
| **ML-NV3**<br>**Potential Impact:** Unauthorised land clearance from saline over spray from dust suppression, causing loss of density and/or diversity of native vegetation<br>**Recommended Outcome:** The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the lease through;<br>• Clearance;<br>• Dust/contaminant deposition;<br>• Fire;<br>• Reduction in water supply; or<br>• Other damage | An annual survey of the native vegetation would show that all clearance of native vegetation is authorised under the Native Vegetation Act when compared with baseline survey presented in the approved NVMP. | This criteria proposed by Rex is considered appropriate at this stage for demonstrating no impacts or clearance on native vegetation that is not accounted for in SEB arrangements. In this context clearance includes physical disturbance as well as inhibiting plant growth. Under the *Native Vegetation Act 1991* clearance includes 'any other substantial damage to native vegetation'. The criteria would have to be refined during the development of the PEPR.<br>Additional information on what the survey would look for would be required in the PEPR. The results of the survey would need to provide information on condition, abundance and diversity of native vegetation that maybe impacted by mining operations.<br>Further information provided by Rex indicated that testing of soil prior to rehabilitation would be conducted to test for potential contaminants. This issue is addressed in Section 7.5 of this report (Soil impact assessment). | DSD considers that Leading Indicator Criteria is not required. | DSD considers no lease conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| unless prior approval under the relevant legislation is obtained. | | DSD considers the proposed methodology and standards are appropriate to demonstrate achievement of the outcome.<br>DSD considers that achievement of the recommended outcome would be measurable.<br>Should a lease be granted, the criteria would be finalised in the PEPR submission. | | |
| **ML-NV4**<br>**Potential Impact:** Unauthorised land clearance from manual clearance, causing loss of density and/or diversity of native vegetation<br>**Recommended Outcome:** The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the lease through;<br>• Clearance;<br>• Dust/contaminant deposition;<br>• Fire;<br>• Reduction in water supply; or<br>• Other damage<br>unless prior approval under the relevant legislation is obtained. | An annual survey of the native vegetation would show that all clearance of native vegetation is authorised under the Native Vegetation Act when compared with baseline survey presented in the approved NVMP. | This criteria proposed by Rex is considered to be appropriate at this stage for demonstrating no impacts or clearance on native vegetation that is not accounted for in SEB arrangements. In this context clearance includes physical disturbance as well as inhibiting plant growth. Under the *Native Vegetation Act 1991* clearance includes 'any other substantial damage to native vegetation'. This criterion would have to be refined during the development of the PEPR.<br>DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome.<br>DSD considers that achievement of the recommended outcome would be measurable.<br>Should a lease be granted, this criterion would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criterion are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **ML-NV5**<br><br>**Potential Impact:** The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the lease through;<br>• Clearance;<br>• Dust/contaminant deposition;<br>• Fire;<br>• Reduction in water supply; or<br>• Other damage<br>unless prior approval under the relevant legislation is obtained. | An annual survey of the native vegetation would show that all clearance of native vegetation is authorised under the Native Vegetation Act when compared with baseline survey presented in the approved NVMP. | This criterion proposed by Rex is considered appropriate at this stage for demonstrating no impacts or clearance on native vegetation that is not accounted for in SEB arrangements. In this context clearance includes physical disturbance as well as inhibiting plant growth. Under the *Native Vegetation Act 1991* clearance includes 'any other substantial damage to native vegetation'. This criterion would have to be refined during the development of the PEPR. This measurement criteria would cover the risk to native vegetation from uncontrolled fires, other impacts from uncontrolled fires is covered in Section 7.13 and 7.7 of this document relating to public safety and native fauna.<br><br>DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, this criterion would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criterion are required. |
| **ML(C)- NV1**<br><br>**Potential Impact:** Ecosystem and landscape function not reinstated to pre-mining conditions.<br><br>**Recommended Outcome:**<br>Before mine completion, the Tenement Holder must satisfy the Director of Mines that where practicable, the pre mining | An independent suitably qualified and experienced expert certifies that representative test sites on rehabilitated areas have achieved or by trends may be confidently predicted to reach and pass | The proposed criterion directly measures the outcome and discusses sustainability of rehabilitation practices in the long term. DSD notes there are other methodologies available to demonstrate re-establishment of pre-mining ecosystems and landscape function which should be reviewed and considered during the development of the PEPR.<br><br>This criterion would have to be refined during the development of the PEPR. Information required would include (but not limited to); location of control sites and proposed location of | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criterion are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| land use can be recommenced after mine completion. | sustainability thresholds as defined by Ecosystem Function Analysis. | rehabilitated transects. Sustainability thresholds are not incorporated in the EFA framework, although discussion of how sustainability would be determined is included. Further discussion regarding the length and confidence of trends that would be considered to constitute sustainability would need to be addressed in the PEPR.<br>DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome.<br>DSD considers that achievement of the recommended outcome would be measurable.<br>Should a lease be granted, this criterion would be finalised in the PEPR submission. | | |
| **DSD ML-NV1**<br>**Potential Impact:** Clearance of native vegetation for the waste rock dump causing a break in the roadside corridor native vegetation<br>**Recommended Outcome:** The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the lease through;<br>• Clearance;<br>• Dust/contaminant deposition;<br>• Fire; | Rex has not proposed criteria for this outcome. | Acceptable criteria could include; surveys of the mine site during operations and post completion would show re-establishment of the corridors of native vegetation which were disturbed during mining. Further information would be provided in the PEPR regarding the timing of this vegetation and how the quality of the re-established vegetation would be determined.<br>DSD considers there are methodology and standards that are an appropriate mechanism to demonstrate achievement of the outcome.<br>DSD considers that achievement of the recommended outcome would be measurable.<br>Should a lease be granted, this criterion would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criterion are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| • Reduction in water supply; or<br>• Other damage<br>unless prior approval under the relevant legislation is obtained. | | | | |
| **DSD ML-NV2**<br>**Potential Impact:** Degradation of remnant location caused by proximity of the mining camp<br>**Recommended Outcome:** DSD recommends outcomes in the Regulatory Response for impacts **ML-NV4** and **ML-PPA1** and **ML-PPA2.**<br>Please note **ML-PPA1** and **ML-PPA2** is discussed under Section 7.8 of this report (weeds and pests). | DSD recommends the criteria for impacts **ML-NV1** to **ML-NV5**. | The criteria and additional conditions relating to the criteria for impacts **ML-NV1** to **ML-NV5** are acceptable to measure outcomes relating to **ML-NV7**.<br>DSD considers there are appropriate measurement methodologies and standards to demonstrate achievement of the outcome.<br>DSD considers that achievement of the recommended outcome would be measurable.<br>Should a lease be granted, this criterion would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |

### 7.6.6 *Summary of the recommended regulatory response (ML)*

DSD has assessed that all potential impacts to native vegetation during construction, operations and post completion have been identified through this assessment and acceptable outcomes have been recommended for all primary impact events where the severity of primary consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for receiving environment during construction, operation and post completion. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

*DSD recommends that should a lease be granted the following outcomes be a requirement of the lease;*

The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the lease through;

- Clearance;
- Dust/contaminant deposition;
- Fire;
- Reduction in water supply; or
- Other damage

unless prior approval under the relevant legislation is obtained.

Before mine completion, the Tenement Holder must satisfy the Director of Mines that where practicable, the pre mining land use can be recommenced after mine completion.

### 7.6.7 *Impact assessment (EML)*

**Rex's approach to impact assessment**

Rex has stated that no removal of native vegetation is required for the proposed EML activities.

### 7.6.8 *Summary of recommended regulatory response (EML)*

*DSD recommends that should a lease be granted the following be prescribed as a condition of the lease;*

The Tenement Holder must not clear any native vegetation on the Lease other than in accordance with the realignment of the St Vincent Highway and the realignment of the Yorke Highway.

### 7.6.9 *Impact assessment (MPL)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0.

Rex provided a description of potential impacts on native vegetation associated with the MPLs in Section 8.4.5. Rex states that a contractor would be used to install, supply and decommission the power lines along the MPL corridor and as such would be responsible for all native vegetation management which was not included. As the tenement holder, Rex is responsible for all native vegetation management upon their tenements in relation to the mining operations, regardless of whether the work is undertaken by Rex or a contractor. Further information regarding management of this native vegetation would be included in the PEPR as part of the NVMP. Rex has stated in the Proposal that the anticipated impact on native vegetation from construction of the MPL for the pipeline is considered minimal. DSD agrees with this conclusion and no submissions were received regarding vegetation relating to the MPL corridors.

**DSD review of Rex impact assessment (MPL)**
A description of DSD's assessment of the impact assessment process is described in Section 7.0.

A review of Rex's impact assessment is shown in Table 7.6.6.

The Port MPL application has been deferred at the request of Rex and has not been assessed in this report.

## Table 7.6.6 – Impact events identified by Rex in the Proposal

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **MPL- NV1** | Required land clearance due to placement of infrastructure, causing loss of density and/or diversity of native vegetation. | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>This impact is certain, clearance of native vegetation would be required for infrastructure and an outcome is required to ensure this impact is managed to an acceptable level.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |
| **MPL-NV2** | Unauthorised land clearance from manual clearance, causing loss of density and/or diversity of native vegetation. | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>DSD accepts that there is potential for manual clearance of native vegetation to cause loss of density or diversity of native vegetation without controls in place.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |
| **MPL-NV3** | Unauthorised land clearance from uncontrolled fires emanating from the areas of activity, causing loss of density and/or diversity of native vegetation. | Rex has stated that the consequence of this impact occurring without controls implemented is major.<br>DSD accepts that there is potential for uncontrolled fires caused by mining operations to cause loss of density or diversity of native vegetation.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **MPL-PPA1-4** | Introduction of new and sustained increase in pest plants and animal species (*The impact relates to pest plant and animals and is therefore addressed in Section 8.4.7 of the Proposal)* | This impact has been addressed in the Weeds, Pest Plant and Animal impact assessment in Section 8.3.8 of the Proposal and Section 7.8 of this report. | |

### 7.6.10 *Outcomes (MPL)*

Table 7.6.7 is the DSD assessment of outcomes proposed by Rex in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable. The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed would achieve the proposed outcome. For closure events this would consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment would also consider any assumptions and uncertainty in control strategies.

**Table 7.6.7 – DSD assessment of outcomes proposed by Rex**

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **MPL-NV1**<br><br>**Impact event:** Required land clearance due to placement of mine infrastructure, causing loss of density and/or diversity of native vegetation<br><br>**Rex Proposed Outcome:** No loss of density and/or diversity of native vegetation on or off the ML *[MPL]* through clearance, fire, or other damage unless prior approval under the relevant legislation is obtained. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies.<br><br>Note error I the tenement type mentioned in the Proposal. | Rex considers control strategies would reduce this impact to a level of high.<br><br>Clearance of native vegetation would be required as part of the proposed operations. This cannot be avoided as the footprint of the operations is dependent upon the location of the ore body. The residual risk was assessed as high as the impact is almost certain to occur. The control and management strategies proposed including progressive rehabilitation have reduced the consequence to negligible.<br><br>DSD accepts the residual risk as high due to the certainty of the impacts; however, the provision of a Significant Environmental Benefit (SEB) would provide an offset for this which is considered acceptable.<br><br>DSD notes that Rex has not covered impacts for native vegetation in the proposed MPL corridor relating to power line construction or decommissioning. DSD considers this potential for disturbance is the responsibility of Rex and notes the associated lease condition that would apply in accordance with all activities undertaken on the lease by Rex or any contractors. Further information regarding the potential disturbance of native vegetation and the control and management strategies would be included in the PEPR in the NVMP. | *DSD recommends that should a licence be granted the following outcome be a requirement of the licence;*<br><br>The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the Licence through;<br>• Clearance;<br>• Dust/contaminant deposition;<br>• Fire;<br>• Reduction in water supply, or<br>• Other damage<br>unless prior approval under the relevant legislation is obtained. |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | On the basis of the information provided, it is concluded that outcome relating to loss of density or diversity of native vegetation is appropriate for the ML with the addition of specifying the additional pathway of loss of vegetation through dust deposition, and would be achievable provided the proposed control and management strategies are effectively implemented and the preparation of a suitable NVMP.<br>DSD considers that the outcome proposed by Rex would be achievable. | |
| **MPL-NV2**<br>**Impact event:** Unauthorised land clearance from manual clearance, causing loss of density and/or diversity of native vegetation.<br>**Rex Proposed Outcome:** No loss of density and/or diversity of native vegetation on or off the MPL through clearance, dust suppression, fire, or other damage unless prior approval under the relevant legislation is obtained. | The proposed outcome accurately describes the level of impact.<br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex considers control strategies would reduce this impact to a level of low.<br>Rex identified the potential for vegetation to be cleared without authorisation. Rex has assessed the residual risk to be low with a minor consequence that is unlikely to occur. Baseline surveys undertaken by Rex show no threatened species within the MPL areas.<br>No further information has been sought in regards to this impact. The control and management strategies would clearly mark out what needs to be cleared and educate all employees on the obligations regarding native vegetation.<br>On the basis of the information provided, it is concluded that outcome relating to loss of density or diversity of native vegetation is appropriate for the MPL, and would be achievable provided the proposed control and management strategies are effectively implemented.<br>DSD considers that the outcome proposed by Rex would be achievable. | *DSD recommends that should a licence be granted the following outcome be a requirement of the licence;*<br>The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the Licence through;<br>• Clearance;<br>• Dust/contaminant deposition;<br>• Fire;<br>• Reduction in water supply, or<br>• Other damage<br>unless prior approval under the relevant legislation is obtained. |
| **MPL-NV3**<br>**Impact event:** Unauthorised land clearance from uncontrolled fires emanating from the Hillside Project area of activity, causing loss of | The proposed outcome accurately describes the level of impact.<br>The proposed outcome is considered | Rex considers control strategies would reduce this impact to a level of low.<br>Rex identified the impact of loss of vegetation through uncontrolled fire. The control and management strategies for fire control have been included in Section 8.4.16 of the Proposal. The residual risk was assessed to be low as the control strategies would reduce the likelihood of the fire, thus reducing the consequence to minor. | *DSD recommends that should a licence be granted the following outcome be a requirement of the licence;*<br>The Tenement Holder must, in construction, operation and post completion, ensure no loss of |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| density and/or diversity of native vegetation.<br>**Rex Proposed Outcome:**<br>No loss of density and/or diversity of native vegetation on or off the MPL through clearance, dust suppression, fire, or other damage unless prior approval under the relevant legislation is obtained. | a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | A potential fire started from a power line is unlikely to be controlled early as there is no direct observation over the large area of wires. Given the risk of fire starting from a power line constructed to required standards would be equal to that already experienced on the Yorke Peninsula this is an acceptable risk.<br>DSD considers that the control and management strategies proposed would adequately manage fires on the tenement to limit the spread and reduce the risk of ignition.<br>On the basis of the information provided, it is concluded that outcome relating to loss of density or diversity of native vegetation is appropriate for the MPL, and would be achievable provided the proposed control and management strategies are effectively implemented.<br>DSD considers that the outcome proposed by Rex would be achievable. | abundance or diversity of native vegetation on or off the Licence through;<br>• Clearance;<br>• Dust/contaminant deposition;<br>• Fire;<br>• Reduction in water supply, or<br>• Other damage<br>unless prior approval under the relevant legislation is obtained. |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex.

### 7.6.11 *Measurement Criteria (MPL)*

Table 7.6.8 is DSDs assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

**Table 7.6.8 – DSD assessment on measurement criteria**

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **MPL-NV1**<br>**Potential Impact:** Required land clearance due to placement of mine infrastructure, causing loss of density and/or diversity of native vegetation<br>**Recommended Outcome:** The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the Licence through;<br>• Clearance;<br>• Dust/contaminant deposition;<br>• Fire;<br>• Reduction in water supply, or<br>• Other damage<br>unless prior approval under the relevant legislation is obtained. | An annual survey of the native vegetation would show that all clearance of native vegetation is authorised under the Native Vegetation Act when compared with baseline survey presented in the approved NVMP. | The criteria proposed by Rex is considered appropriate at this stage for demonstrating no impacts or clearance of native vegetation that is not accounted for in SEB arrangements. In this context clearance includes physical disturbance as well as inhibiting plant growth. Under the *Native Vegetation Act 1991* clearance includes 'any other substantial damage to native vegetation'. The criteria would have to be refined during the development of the PEPR.<br>DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome.<br>DSD considers that achievement of the recommended outcome would be measurable.<br>Should a lease be granted, this criterion would be finalised in the PEPR submission. | DSD considers no licence requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no licence conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **MPL-NV2**<br><br>**Potential Impact:** Unauthorised land clearance from manual clearance, causing loss of density and/or diversity of native vegetation<br><br>**Recommended Outcome:** The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the Licence through;<br>• Clearance;<br>• Dust/contaminant deposition;<br>• Fire;<br>• Reduction in water supply, or<br>• Other damage<br>unless prior approval under the relevant legislation is obtained. | An annual survey of the native vegetation would show that all clearance of native vegetation is authorised under the Native Vegetation Act when compared with baseline survey presented in the approved NVMP. | The criteria proposed by Rex is considered appropriate at this stage for demonstrating no impacts or clearance on native vegetation that is not accounted for in SEB arrangements. In this context clearance includes physical disturbance as well as inhibiting plant growth. Under the *Native Vegetation Act 1991* clearance includes 'any other substantial damage to native vegetation'. The criteria would have to be refined during the development of the PEPR.<br><br>DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, this criterion would be finalised in the PEPR submission. | DSD considers no licence requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no licence conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **MPL-NV3**<br><br>**Potential Impact:** Unauthorised land clearance from uncontrolled fires emanating from the Hillside Project area of activity, causing loss of density and/or diversity of native vegetation.<br>**Recommended Outcome:**<br>The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the Licence through;<br>• Clearance;<br>• Dust/contaminant deposition;<br>• Fire;<br>• Reduction in water supply, or<br>• Other damage<br>unless prior approval under the relevant legislation is obtained. | An annual survey of the native vegetation would show that all clearance of native vegetation is authorised under the Native Vegetation Act when compared with baseline survey presented in the approved NVMP. | The criteria proposed by Rex is considered appropriate at this stage for demonstrating no impacts or clearance on native vegetation that is not accounted for in SEB arrangements. In this context clearance includes physical disturbance as well as inhibiting plant growth. Under the *Native Vegetation Act 1991* clearance includes 'any other substantial damage to native vegetation'. The criteria would have to be refined during the development of the PEPR. This measurement criteria would cover the risk to native vegetation from uncontrolled fires, other impacts from uncontrolled fires is covered in Section 7.13 and 7.7 of this document relating to public safety and native fauna.<br><br>DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, this criterion would be finalised in the PEPR submission. | DSD considers no licence requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no licence conditions applicable to the measurement criteria are required. |

### 7.6.12 *Summary of the recommended regulatory response (MPL)*

DSD has assessed that all potential impacts to native vegetation during construction, operations and post completion have been identified through this assessment and acceptable outcomes have been recommended for all primary impact events where the severity of primary consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for the receiving environment during construction, operation and post completion. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

**Power line and Pipelines MPL**

*DSD recommends that should a licence be granted the following outcome be a requirement of the licence;*

The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the Licence through;

- Clearance;
- Dust/contaminant deposition;
- Fire;
- Reduction in water supply, or
- Other damage

unless prior approval under the relevant legislation is obtained.

## *7.7 Native Fauna*

### 7.7.1 *Description of Relevant Aspects of Environment*

The Hillside Project is located within a highly cleared and fragmented landscape dominated by mixed cropping, thus the habitat for native fauna is sparse.

Rex undertook a variety of desktop and field studies to establish baseline native fauna data including;

- Rex Minerals Ltd Hillside Copper Project Environmental Desktop Study – Flora and Fauna listed under the Environment Protection and Biodiversity Conservation Act 1999 (C'wealth) (COOE 2011)
- Rex Minerals Ltd Fauna Survey of the Hillside Property and Adjacent Reserves and Roadsides (COOE, 2011, 2012, 2013)
- Rex Minerals Ltd Bird Survey of the Hillside Property and Adjacent Reserves and Roadsides (COOE 2013)
- Vertebrate pest species surveys, conducted on an ongoing basis by Rex environmental personnel.

Through these surveys, a low diversity of native fauna was identified for the project area, with no EPBC listed species recorded. One state-listed threatened species, the Peregrine Falcon (*Falco peregrinus*) and a number of regionally listed threatened species were observed. The Proposal states that no nationally threatened fauna species are likely to occur within the ML footprint.

The low biodiversity is likely due to existing and historical land management practices, vegetation clearance and introduced pests impacting on native fauna populations. No native vegetation/habitat clearance is associated with the EML activities. A small amount of clearance of roadside native vegetation will be required along the pipeline corridor MPL as described in Section 8.4.5 of the Proposal.

Rex has identified terrestrial and marine fauna as receptors to potential impacts associated with proposed mining operations.

DSD considers the sensitive receptors and associated environmental values for this environmental aspect to be native fauna diversity and threatened species.

DSD considers that the description of environment provided by Rex is a suitable characterisation of the receiving environment which may be affected by mining operations.

### 7.7.2 *Views of affected parties*

In the Proposal Rex notes that the CCG indicated the following issues:

- The impact of the mine on endangered species in the vicinity. Rex has addressed this concern under **ML-NV2**.
- The impact of noise and vibration on native fauna and livestock, Rex has assessed this risk under the noise and vibration impact assessments in the Proposal.
- The impact of light spill on nocturnal fauna, Rex has addressed this under **ML-NV4**.
- The negative impact from native vegetation clearance particularly with consideration for endangered species (both plants and animals including habitat). Rex has addressed this under **ML-NF1.**
- Maximising the benefits from revegetation in coastal areas and vegetation corridors.

During Statutory consultation the following issues regarding Native fauna were noted:

**Table 7.7 – Impact events relating to issues raised during statutory consultation**

| Issues | Addressed |
|---|---|
| Disturbance from blasting | **ML-BV5** See Section 7.3 |
| Potential for copper and uranium toxicity | Potential for metal toxicity is considered in the air quality and surface water impact assessments in Section 7.1 and 7.11 of this report. |
| Attraction of fauna to contaminated water sources | **DSD ML-NF2** |
| The effects on the Peregrine Falcons in the cliffs near Pine Point | **ML-NF2** |
| Lack of baseline data for marine flora and fauna | Potential impacts to marine fauna are assessed separately in Section 7.9 of this report. |
| Impacts on marine fauna | As above, potential impacts to marine fauna are assessed separately in Section 7.9 of this report. |

The statutory consultation identified an additional impact event to those identified by Rex being the attraction of fauna to contaminated water sources. This has been addressed in the impact assessment under impact event number **DSD ML-NF2.**

DSD has had regard for all concerns which were raised during statutory consultation, however not all concerns have been included as part of this assessment report as they are either not within the scope of the assessment or are too general in nature to consider.

### 7.7.3 *Impact assessment (ML)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7.0. DSD has addressed the potential impacts to fauna from the tailings storage facility below. A review of Rex's impact assessment is shown in Table 7.7.1 and impacts identified by state government post submission of the Proposal in Table 7.7.2.

**Table 7.7.1 – Impact events identified by Rex in the Proposal**

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-NF1** | Loss of fauna from land clearance. | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>As described in detail in the Native Vegetation chapter, operation of the ML will involve clearance of native vegetation that is potential habitat for native species. Loss of vegetation will lead to increased competition for available food and habitat, and thus potential for loss of abundance and diversity of native fauna using that habitat.<br>DSD assesses the primary consequence of this event occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome. |
| **ML-NF2** | Significant impacts to species of conservation significance. | Rex has stated that the consequence of this impact occurring without controls implemented is moderate.<br>The species of conservation significance identified in the area or potentially using this area are Peregrine Falcon, Intermediate Egret, Pied Oystercatcher, Hooded Plover, Sanderling and Caspian Tern. There is potential for mining activities to impact these species through excessive noise, blasting, increased traffic movements and introduction of pests. It should also be noted that many of the threatened species in the area are birds and as such are highly mobile and have the potential to traverse the site.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome. |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-NF3** | Fauna injuries and/or deaths from collisions with infrastructure and vehicles. | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>Increased vehicle traffic associated with mining activities which will increase the chance of collisions with native fauna. The construction of a significant amount of large scale infrastructure including fixed plant raises the potential for collisions to occur between native fauna, particularly birds, and mine infrastructure.<br>DSD assesses the primary consequence of collisions occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome. |
| **ML-NF4** | Population isolation due to presence of the mine acting as a barrier to movement. | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>Corridors of suitable habitat are important for native fauna. Habitat corridors allow fauna to safely move between areas of habitat to extend their range, increase the area they can forage and allow fauna to move away from areas presenting danger or pressure. Historical clearance of the Yorke Peninsula has resulted in very little remaining native vegetation and habitat for fauna and what habitat remains is highly fragmented. Thus corridors are of high importance to connect these fragmented populations. However, the historical land management practices have also resulted in low diversity of native fauna with high levels of invasive species present. The proposed ML operations would result in the clearance of two corridors of native vegetation in the footprint of the pit and waste rock dump. Ground dwelling fauna will be more affected by clearance than birds and bats that can fly between areas of habitat and can easily get over fences.<br>Long term impacts including reduction or disruption of habitat corridors would be expected to exacerbate fragmentation of fauna populations potentially reducing genetic diversity, increasing edge effects (degraded habitat surrounding edges), and decrease species diversity and richness.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome. |
| **ML-NF5** | Displacement of native fauna from light spill. | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>There were several nocturnal species noted around the mine area in baseline studies including a number of bat species and a barn owl (*Tyto alba*). Current conditions involve night lighting for harvest activities which is a temporary recurrence, and a lesser impact than expected from mining activities. It is noted that prey for bats includes insects | No<br>Rex has provided an outcome. |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| | | which would likely be attracted by artificial light sources. The Proposal states that there is a low abundance of bats in the vicinity of the mine site. This, together with the mobile nature of bats and the lack of quality habitat in the immediate area of the mine indicates that impacts to bats from light spill will be negligible.<br>DSD assesses that the primary consequence of this occurring is trivial and hence **no** outcome is required. | |
| **ML-TSF8** | Fauna injuries and/or deaths from interactions within the TSF (including fauna entrapment and bird death associated with the Hillside Project) | Rex has stated that the consequence of this impact occurring without controls implemented is moderate.<br>The tailings dam presents two potential impacts to fauna; access to potentially contaminated water and potential for entrapment in the tailings surface. It is proposed to erect fences around the site for public safety which will also be effective in preventing ground dwelling animals gaining access to the tailings dam. The proposed tailings dam will have ponded water which could attract native fauna. Given the lack of native vegetation, the noise from pumping and the frequent presence of vehicles, Rex have concluded that it is unlikely that birds will wish to drink from this water when there are plenty of stock watering points and dams in the area with more suitable surrounding habitat.<br>Should fauna gain access to the tailings dam, information provided by Rex indicates the water produced on the tailings will not be acutely toxic, and reagents used in the floatation of the concentrate (PAX) are not considered to be hazardous at the concentrations likely to occur within water contained on the TSF. The Proposal does conclude that fauna fatalities are not expected at the TTSF, but could occur without controls.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome. |
| **ML-N7** | Displacement of terrestrial native fauna and marine fauna due to noise and vibration from mine construction and operation. | This impact has been assessed under Section 8.3.2 of the Proposal and Section 7.2 of this report. | |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-BV5** | Disturbance to native fauna (terrestrial and marine) due to blasting activities. | This impact has been assessed under Section 8.3.3 of the Proposal and Section 7.3 of this report. | |
| **ML-PPA1-2** | Increase in and/or introduction of pest plants and animals from activities associated with the Hillside Project resulting in reduction in flora and fauna species. | This impact has been assessed under Section 8.3.8 of the Proposal and Section 7.8 of this report. | |
| **ML(C)-NF1** | Final landforms at closure unsafe for fauna. | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>The post completion landform has the potential for many impacts on fauna, including entrapment from unsatisfactory rehabilitation and landslides from inappropriate slope angles. Control strategies implemented for long term public and environmental safety would be managing risk of entrapment for native fauna. Birds will not be impacted by pitfall traps as they will be able to fly. The final pit lake was identified by Rex in the closure plan to be potential habitat for fauna. Although not identified by Rex this impact event also covers the potential for fauna to drink contaminated water in the pit lake post completion. This water is modelled to be slightly more saline than seawater and will not be potable. Models indicate that the water would contain low levels of metals that are unlikely to be available to ecological receptors. This was verified in the independent geochemical review undertaken for DSD (O'Kane 2014).<br>DSD assesses that the primary consequence of this occurring is trivial and hence **no** outcome is required. | No<br>Rex has provided an outcome. |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML(C)-NV1** | Ecosystem and landscape function not reinstated to pre-mining conditions. | This impact has been assessed under Section 8.3.6 of the Proposal and Section 7.6 of this report. | |
| **ML(C)-TSF4** | Discharge of water after closure from leakage through the capping layer, embankment and base (affecting fauna). | This impact has been covered under Section 7.5 (Soils) of this report. | |

The State Government, through the assessment process, has identified additional impacts to native fauna associated with the proposed mining activities subsequent to the submission of the Proposal. An assessment of these additional impact events is provided in Table 7.7.2.

**Table 7.7.2 – Impact events identified subsequent to the Proposal**

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **DSD ML-NF1** | Impact of dust toxicology on native fauna | Section 7.1 of this report discusses the effect of dust deposition on livestock both with respect to the dust levels and toxicity (reference impact event **DSD ML-A4**). Given livestock are expected to be the closest receptors it is assumed that managing the risk of dust to livestock will adequately manage the risk to native fauna.<br>DSD assesses that the primary consequence of this occurring is trivial and hence **no** outcome is required. | No |
| **DSD ML-NF2** | Impact on fauna from contaminated water sources. | The Proposal only addresses the potential impact to birds from the tailings dam. Further consideration should be given to contaminated water in ponds that may be attractive to native avifauna. Ponds contained on the lease include water storage ponds, retention ponds and decant seepage collection ponds (DSCP).<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes |

### 7.7.4 *Outcomes (ML)*

Table 7.7.3 is the DSD assessment of outcomes proposed by Rex in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable.

The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies.

Table 7.7.4 provides outcomes for impact events identified by DSD that were determined in section 7.7.3 to require an outcome.

## Table 7.7.3 – DSD assessment of outcomes proposed by Rex

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-NF1**<br><br>**Impact event:** Loss of fauna from land clearance.<br><br>**Rex Proposed Outcome:** No native fauna injury or death due to mine related activities that could have been reasonably prevented. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is not considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies.<br><br>The outcome does not clearly reflect the identified impact event. | Rex considers control strategies will reduce this impact to a level of low.<br><br>The control strategies proposed by Rex include minimising habitat cleared and conducting surveys to identify and relocate any native fauna prior to clearance. This would result in loss of fauna on the mine site but would not result in injury or death of the fauna.<br><br>DSD considers that the outcome recommended by DSD would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the lease through;<br>• Clearance;<br>• Dust/contaminant deposition;<br>• Fire;<br>• Reduction in water supply; or<br>• Other damage<br><br>unless prior approval under the relevant legislation is obtained. |
| **ML-NF2**<br><br>**Impact event:** Significant impacts to species of conservation significance.<br><br>**Rex Proposed Outcome:**<br><br>No native fauna injury or death due to mine related activities that could have | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex considers control strategies will not reduce the residual risk for this impact from a level of moderate. Control strategies are unable to reduce the consequence and as the likelihood is as low as possible this is considered to be acceptable.<br><br>There are a number of pathways by which endangered species can be harmed. Perimeter fencing will deter the southern hairy-nosed wombat from entering the site and thus providing protection from a number of onsite impacts, off site impacts are discussed in the relevant sections (Noise, Air | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mining operations that could |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| been reasonably prevented. | | Quality, **ML-NF5**). However, this will not be an effective exclusion strategy for birds (which comprise the remainder of the regional threatened species).<br><br>Control strategies related to onsite impacts on birds include; monitoring of birds and bats and artificial wet areas, employee awareness and low speed limit. This is considered to reduce the likelihood of collision with vehicles but will not identify and manage other impacts to fauna.<br><br>Further information relating to bird deterrent strategies was discussed in the Response document under technical issue 135 related to the tailings storage facility. These strategies are considered to be appropriate for other potentially contaminated water sources, should monitoring indicate a problem. Further control strategies, including those relating to treatment of any animals injured or trapped by the TSF can be readily applied in this situation.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | have been reasonably prevented. |
| **ML-NF3**<br><br>**Impact event:** Fauna injuries and/or deaths from collisions with infrastructure and vehicles.<br><br>**Rex Proposed Outcome:** No native fauna injury or death due to mine related activities that could have been reasonably prevented. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex considers control strategies will reduce this impact to a level of moderate.<br><br>The discussion regarding the achievability of outcome **ML-NF2** is applicable to this impact.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mining operations that could have been reasonably prevented. |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-NF4**<br>**Impact event:** Population isolation due to presence of the mine acting as a barrier to movement.<br>**Rex Proposed Outcome:** Areas of retained native vegetation within the ML area are maintained. | The proposed outcome does not accurately describe the level of impact.<br>The proposed outcome is not considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies.<br>This impact does not reflect the disruption of native vegetation already proposed. Nor does the maintenance of remaining vegetation mitigate the impact. The outcome proposed by DSD identifies an impact will be caused during mining operations but that it will be remedied. | This relates to clearance of corridors, discussed in Section 7.6 of this report. The recommended outcome for impact **DSD ML-NV1** is considered acceptable for this impact.<br>While remnant vegetation will be interrupted by mining operations, proposed revegetation will re-establish these corridors. The reestablishment of habitat corridor should be planned and planted within the earliest possible timeframe.<br>Information provided in the Proposal does not show how this would be undertaken to provide a standard similar to current roadside vegetation given best practice techniques this outcome is considered achievable. Further information regarding revegetation and closure plans would be provided in the PEPR.<br>DSD considers that the outcome recommended by DSD would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br>The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mining operations that could have been reasonably prevented. |
| **ML-TSF8**<br>**Impact event:** Fauna injuries and/or deaths from interactions within the TSF (including fauna entrapment and bird death associated with the Hillside Project)<br>**Rex Proposed Outcome:**<br>No fauna injuries and/or deaths from interactions with the TSF that could have been reasonably prevented. | The proposed outcome does not accurately describe the level of impact.<br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies.<br>DSD recommends that the outcome be amended to be cover all mine related activities, rather than only those relating to TSF interactions. | Rex considers control strategies will reduce this impact to a level of *moderate*.<br>Proposed control strategies include increasing the pH of the water such that heavy metals are not bioavailable, designing the separation process to not incorporate toxic reagents and reducing the free water which could attract birds.<br>Further to the earlier discussion about the relative attractiveness of the TSF to birdlife, these measures would further reduce the likelihood birds will be attracted to the tailings and the consequence if they should drink from it. Other fauna would be prevented access to the TSF by fencing.<br>During operations fauna will be further deterred from the TSF and broader mine site by the amount of human and mechanical activity associated with operations. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br>The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mining operations that could have been reasonably prevented. |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | Bird deterrent strategies, as discussed in the response document under technical issue 135 could be applied to this situation to prevent native fauna injury or death should this prove to be a problem. Further control strategies are available defining how to treat any animals injured or trapped by the TSF and can be readily applied in this situation.<br><br>DSD considers that the outcome recommended by DSD would be achievable. | |

**Table 7.7.4 – Discussion of outcomes for impacts identified by DSD**

| ID | Acceptability of outcome | Achievability of outcome | Recommended regulatory response |
|---|---|---|---|
| **DSD ML-NF2**<br><br>**Impact event:**<br><br>Impact on fauna from contaminated water sources.<br><br>**Outcome:** DSD proposes the following outcome;<br><br>The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mining operations that could have been reasonably prevented. | The outcome accurately describes the level of impact.<br><br>The outcome is considered a suitable statement on the acceptable level of impact on the environment. | Land-dwelling fauna will be deterred from any potentially contaminated water source by fencing. Birds and bats will have the potential to access these water sources. Rex has proposed monitoring of birds, bats and artificially wet areas but no proposed contingencies in the event that these control strategies are not effective. Further information would need to be included in the PEPR regarding what techniques will be used should these artificially wet areas attract birds and result in impacts to native fauna. Further control strategies, including those relating to treatment of any animals injured or trapped by the TSF can be readily applied in this situation.<br><br>DSD considers that the outcome would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mining operations that could have been reasonably prevented. |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex or identified by DSD.

### 7.7.5 *Measurement Criteria (ML)*

Table 7.7.5 is DSDs assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

**Table 7.7.5 – DSD assessment on measurement criteria**

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **ML-NF1**<br>**Potential Impact:** Loss of fauna from land clearance.<br>**Recommended Outcome:** The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the lease through;<br>• Clearance;<br>• Dust/contaminant deposition;<br>• Fire;<br>• Reduction in water supply; or<br>• Other damage<br>unless prior approval under the relevant legislation is obtained. | An annual survey of the native vegetation will show that all clearance of native vegetation is authorised under the Native Vegetation Act when compared with baseline survey presented in the approved NVMP. | DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome.<br>DSD considers that achievement of the recommended outcome would be measurable.<br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | Rex has proposed the following lead indicator criteria:<br>All native fauna deaths or injuries on-site will be reported and an investigation will be undertaken to demonstrate it could not have been reasonably prevented.'<br>DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |
| **ML-NF2**<br>**Potential Impact:** Significant impacts to species of conservation significance. | An annual survey of the native vegetation will show that all clearance of native vegetation is | DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **Recommended Outcome:**<br>The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mining operations that could have been reasonably prevented. | authorised under the Native Vegetation Act when compared with baseline survey presented in the approved NVMP.<br>All native fauna deaths or injuries on-site will be reported and an investigation will be undertaken to demonstrate it could not have been reasonably prevented. Review of NVMP if required. | A monitoring program such as an annual survey which demonstrates that the there are no adverse impacts on native fauna abundance or diversity must be included in the PEPR.<br>DSD considers that achievement of the recommended outcome would be measurable.<br>Should a lease be granted, these criteria would be revised and finalised in the PEPR submission. | | |
| **ML-NF3**<br>**Potential Impact:** Fauna injuries and/or deaths from collisions with infrastructure and vehicles.<br>**Recommended Outcome:** The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mining operations that could have been reasonably prevented. | All native fauna deaths or injuries on-site will be reported and an investigation will be undertaken to demonstrate it could not have been reasonably prevented. Review of NVMP if required. | The criteria will need to be amended to reflect the recommended outcome.<br>A monitoring program such as an annual survey which demonstrates that the there are no adverse impacts on native fauna abundance or diversity must be included in the PEPR.<br>DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome.<br>DSD considers that achievement of the recommended outcome would be measurable.<br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **ML-NF4**<br><br>**Potential Impact:** Population isolation due to presence of the mine acting as a barrier to movement.<br><br>**Recommended Outcome:**<br><br>The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mining operations that could have been reasonably prevented | An annual survey of the native vegetation will show that all clearance of native vegetation is authorised under the Native Vegetation Act when compared with baseline survey presented in the approved NVMP. | This measurement criteria is not appropriate to measure the DSD recommended outcome. Criteria are required to demonstrate the re-establishment of the corridors of native vegetation which were disturbed as a result of mining. Further information would be required in a PEPR, should a lease be granted on the vegetation survey methods used to measure the establishment of habitat corridors.<br><br>A monitoring program such as an annual survey which demonstrates that the there are no adverse impacts on native fauna abundance or diversity must be included in the PEPR.<br><br>DSD considers there are appropriate measurement methodologies and standards to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |
| **ML-TSF8**<br><br>**Potential Impact:** Fauna injuries and/or deaths from interactions within the TSF (including fauna entrapment and bird death associated with the Hillside Project) | All native fauna deaths or injuries on-site will be reported and an investigation will be undertaken to demonstrate it could not have reasonably been prevented. | The criteria will need to be amended to reflect the recommended outcome.<br><br>A monitoring program such as an annual survey which demonstrates that the there are no adverse impacts on native fauna abundance or diversity must be included in the PEPR.<br><br>DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **Recommended Outcome:** The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mining operations that could have been reasonably prevented | | DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission, including a detailed fauna monitoring plan for the TSF. | | |
| **DSD ML-NF1**<br><br>**Potential Impact:** Impact on fauna from contaminated water sources.<br><br>**Recommended Outcome:** The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mining operations that could have been reasonably prevented. | Rex has not proposed criteria for this outcome. | Please see above discussion (under **ML-NF2)** for further discussion regarding the measurement criteria applicable to this outcome. This discussion is applicable for this impact event.<br><br>A monitoring program such as an annual survey which demonstrates that the there are no adverse impacts on native fauna abundance or diversity must be included in the PEPR.<br><br>DSD considers there are appropriate measurement methodologies and standards to demonstrate achievement of the outcome.<br>DSD considers that achievement of the recommended outcome would be measurable.<br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |

### 7.7.6 *Summary of the recommended regulatory response (ML)*

DSD considers that all potential impacts to native fauna during construction, operations and post completion have been identified through this assessment and acceptable outcomes have been recommended for all primary impact events where the severity of primary consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for sensitive receptors during construction, operation and post completion. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

*DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*

The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the lease through:

- Clearance;
- Dust/contaminant deposition;
- Fire;
- Reduction in water supply; or
- Other damage

unless prior approval under the relevant legislation is obtained.

The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mining operations that could have been reasonably prevented.

### 7.7.7 *Impact assessment (EML)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0. Rex has not provided an impact assessment of the proposed EML activities on native fauna.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7.0. Impacts identified by State Government identified post submission of the Proposal are presented in Table 7.7.6.

**Table 7.7.6 – Impact events identified subsequent to the Proposal**

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **DSD**<br>**EML NF-1** | Fauna injuries and/or deaths from collisions with infrastructure and vehicles. | Vehicle movement associated with EML activities has the potential to increase traffic and thus increase the chance of a collision with native fauna. The proposed activities will not result in an increase in traffic significantly greater than the levels experienced on surrounding farms. Any EML activities occurring in this area will be operated and regulated in accordance with requirements established under conditions of the ML lease.<br>DSD assesses that the primary consequence of this occurring is trivial and hence **no** outcome is required. | NO |

No impact events have been identified for the EML and hence no outcome is required.

### 7.7.8 *Impact assessment (MPL)*

***Rex's approach to impact assessment***

A description of Rex's approach to the impact assessment process is described in Section 7.0. Rex has assessed the impacts to marine fauna separately to the rest of native fauna. DSDs assessment of marine fauna can be found in Section 7.9 of this report.

***DSD review of Rex impact assessment***

A description of DSD's assessment of the impact assessment process is described in Section 7.0. A review of Rex's impact assessment is shown in Table 7.7.7. The Port MPL application has been deferred at the request of Rex and has not been assessed in this report.

**Table 7.7.7 – Impact events identified by Rex in the Proposal**

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **Impact ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **MPL-NF1** | Loss of fauna from land clearances during construction. | Rex has stated that the consequence of this impact occurring without controls implemented is negligible.<br>Clearance of native vegetation is required for placement of infrastructure. Specifically the clearance involved with the upgrade of the Yorke Highway and Sandy Church Road intersection and any clearance required for the installation of the powerline in the MPL corridor. Although the roadside vegetation is of poor quality and unlikely to be the habitat for any animals, there is the potential for any native fauna residing in the road side vegetation to be harmed.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has not provided an outcome |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **Impact ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **MPL-NF2** | Significant impacts to species of conservation significance. | Rex has stated that the consequence of this impact occurring without controls implemented is moderate.<br>The species of conservation significance identified in the area or potentially using this area are Peregrine Falcon, Intermediate Egret, Pied Oystercatcher, Hooded Plover, Sanderling and Caspian Tern. All of these species are located within the region, but were not recorded within the proposed MPL corridor. These species may suffer impacts as described in the other impact events discussed below.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |
| **MPL-NF4** | Isolation of fauna populations due to presence of the infrastructure acting as a barrier to fauna movement. | Rex has stated that the consequence of this impact occurring without controls implemented is negligible.<br>The infrastructure proposed in the MPL will not pose a barrier to fauna greater than that currently experienced; the pipeline will be underground, the powerlines will be similar to the current impacts.<br>DSD assesses that the primary consequence of this occurring is trivial and hence **no** outcome is required. | No<br>Rex has not provided an outcome |
| **MPL-PPA1-2** | Increase in and/or introduction of weeds, plant pathogens and/or pests causing land degradation and competition for resources, resulting in reduction in flora and fauna species from activities associated with the corridor and port facility. | This has been discussed in Section 7.8 (weeds, pests and pathogens) of this report. | |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **Impact ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **MPL(C)-NF1** | Final landforms at closure unsafe for fauna and could cause entrapment of fauna. | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>At closure no surface infrastructure will remain on the corridor MPL, unless agreement is reached for a handover of the powerline to power utilities.<br>DSD assesses that the primary consequence of this occurring is trivial and hence **no** outcome is required. | No<br>Rex has provided an outcome |

DSD considers that Rex has identified all potential impacts to native fauna associated with the proposed mine related activities.

### 7.7.9 *Outcomes (MPL)*

Table 7.7.8 is the DSD assessment of outcomes proposed by Rex in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable. The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies.

## Table 7.7.8 – DSD assessment of outcomes proposed by Rex

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **MPL-NF1**<br><br>**Impact event:** Loss of fauna from land clearances during construction.<br><br>**Rex Proposed Outcome:** No native fauna injury or death due to mine related activities that could have been reasonably prevented. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is not considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies.<br><br>The outcome does not sufficiently define 'reasonably prevented' It is recommended a clearer outcome is required.<br><br>DSD considers that a more appropriate outcome would be ensuring native vegetation is limited to agreed clearance areas. | Rex considers control strategies will reduce this impact to a level of low.<br><br>Rex has proposed control strategies to minimise land clearance and identify and relocate native fauna prior to clearance. In addition they have proposed provision of alternative habitat for what may be cleared.<br><br>DSD considers that the outcome recommended by DSD would be achievable. | *DSD recommends that should a licence be granted the following outcome be a requirement of the licence;*<br><br>The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the Licence through:<br>• Clearance;<br>• Dust/contaminant deposition;<br>• Fire;<br>• Reduction in water supply; or<br>• Other damage<br>unless prior approval under the relevant legislation is obtained. |
| **MPL-NF2**<br><br>**Impact event:** Significant impacts to species of conservation significance.<br><br>**Rex Proposed Outcome:**<br><br>No native fauna injury or death due to mine related activities that could have been reasonably prevented. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex considers control strategies will reduce this impact to a level of moderate.<br><br>This has been included as a separate impact as the consequence is higher due to the significance of the receptor. However, the control strategies discussed in **MPL-NF1** and **MPL-NF3** would adequately manage all risks to species of significance.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | *DSD recommends that should a licence be granted the following outcome be a requirement of the licence;*<br><br>The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mine related activities that could have been reasonably prevented. |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex.

### 7.7.10 *Measurement Criteria (MPL)*

Table 7.7.9 is DSDs assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

**Table 7.7.9 – DSD assessment on measurement criteria**

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **MPL-NF1**<br>**Potential Impact:** Loss of fauna from land clearances during construction.<br>**Recommended Outcome:** The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the Licence through:<br>• Clearance;<br>• Dust/contaminant deposition;<br>• Fire;<br>• Reduction in water supply; or<br>• Other damage<br>unless prior approval under the relevant legislation is obtained. | All native fauna deaths or injuries on-site will be reported and an investigation will be undertaken to demonstrate it could not have reasonably been prevented. | The criteria will need to be amended to reflect the recommended outcome.<br>A monitoring program such as an annual survey which demonstrates that the there are no adverse impacts on native fauna abundance or diversity must be included in the PEPR.<br>DSD considers there is an appropriate mechanism to demonstrate achievement of the outcome.<br>DSD considers that achievement of the recommended outcome would be measurable.<br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **MPL-NF2**<br><br>**Potential Impact:** Significant impacts to species of conservation significance.<br><br>**Recommended Outcome**: The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mine related activities that could have been reasonably prevented. | All native fauna deaths or injuries on-site will be reported and an investigation will be undertaken to demonstrate it could not have reasonably been prevented. | The criteria will need to be amended to reflect the recommended outcome.<br><br>A monitoring program such as an annual survey which demonstrates that the there are no adverse impacts on native fauna abundance or diversity must be included in the PEPR.<br><br>DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |

### 7.7.11 *Summary of the recommended regulatory response (MPL)*

DSD has assessed that all potential impacts to native fauna during construction, operations and post completion have been identified through this assessment and acceptable outcomes have been recommended for all primary impact events where the severity of primary consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for sensitive receptors during construction, operation and post completion. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

**Power line and Pipelines MPL**

*DSD recommends that should a licence be granted the following outcomes be a requirement of the licence;*

The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the Licence through:

- Clearance;
- Dust/contaminant deposition;
- Fire;
- Reduction in water supply; or
- Other damage

unless prior approval under the relevant legislation is obtained.

The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mine related activities that could have been reasonably prevented.

## *7.8 Weeds, Pests and Plant Pathogens*

### 7.8.1 *Description of Relevant Aspects of Environment*

Agriculture, development and industry surrounding the Hillside Project site has resulted in the introduction of weeds to both the agricultural land and remnant native vegetation. The proposed mining operations could potentially exacerbate the impact of weeds, pests and pathogens in a number of ways. Imported material and vehicles associated with the proposed mining operations could potentially introduce or spread weeds and pathogens. Alteration of conditions, such as cleared or artificially wet areas, could potentially favour weed, pest or pathogen species which could potentially cause adverse impacts on the receiving environment. Further incursion of weeds, pests and pathogens would have a negative impact on remnant vegetation, native vegetation and surrounding primary production.

Rex undertook a number of surveys to establish baseline data for weeds, pests and plant pathogens in the area.

Baseline surveys identified nine declared weed species in the area of the proposed ML, EML and MPLs. A full list of the weeds is provided in Table 5.12-3. The site is considered to be in a low risk area for *Phytophthora* (dieback), which requires acidic soils and rainfall greater than 400mm. No evidence of *Phytophthora* or broomrape (*Orobanche)* was found on site.

Baseline studies showed six introduced mammal species and six introduced bird species. The most dominant mammal species in the proposed lease area was the house mouse, (*Mus musculus*). The most abundance bird species in all surveys was the Common Starling (*Sturnus vulgaris)*. A complete overview of the pest animal species is provided in Section 5.13.3 of the Proposal.

DSD concurs with Section 8.4.7.2 of the Proposal that the sensitive receptors and associated environmental values for this environmental aspect to be;

- Remnant Native Vegetation (abundance and diversity)
- Native Fauna (abundance and diversity)
- Surrounding primary industry receptors (including crops and livestock and grain storage facility).

DSD considers that the Proposal description of the existing environment in relation to weed, pests and plant pathogens is an adequate characterisation of the receiving environment which could potentially be affected by mining operations.

### 7.8.2 *Views of affected parties*

In the Proposal Rex notes that the CCG have expressed concern regarding weed introduction via vehicles associated with Rex proposed mining operations. The community has proposed a number of control and management strategies including; establish a weed management plan,

wash down procedures for vehicles, monitoring of weed species and distribution and control strategies be conducted in line with regional management plans and establish trapping programs for cats and baiting programs. Rex has addressed these issues in their impact assessment under impact events **ML-PPA1, ML-PPA2, ML(C)-PPA1** and **MPL-PPA1.** The CCG were also concerned regarding the potential for marine pest species through shipping activities, this was also mentioned during statutory consultation. Biosecurity is regulated under the federal *Quarantine Act 1908.*

During public statutory consultation the only concern raised with regards to weeds and pests was regarding the potential for pest marine species to be transported in ballast water emptied at the port. This concern is managed under the federal *Quarantine Act 1908.*

Technical Issue 32 of the Response document discusses the impact of the proximity of the mining camp to remnant native vegetation including the impact from weeds and pests. This specific impact is covered by impact event **ML-PPA1-2** below.

The statutory consultation did not identify any additional receptors or impact events to those identified by Rex.

DSD has had regard for all concerns which were raised during statutory consultation, however not all concerns have been included as part of this assessment report as they are either not within the scope of the assessment or are too general in nature to consider.

### 7.8.3 *Impact assessment (ML)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0. Rex has assessed the impact of incorrect storage of waste increasing pest species under the aspect of waste.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is provided in Section 7.0. DSD has assessed the impact of incorrect storage of waste increasing pest species in this section.

A review of Rex's impact assessment is shown in Table 7.8.1.

### Table 7.8.1 – Impact events identified by Rex in the Proposal

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **ML-PPA1** | Introduction of new pest plant and animal species and plant pathogens in the proposed ML area. | Rex have stated that the consequence of this impact occurring without controls implemented is Minor.<br>Without control strategies introduced weeds and pests could be spread offsite resulting in an impact to adjacent or regional areas.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |
| **ML-PPA2** | Sustained increase in abundance of existing pest plant and animal species in the proposed ML area. | Rex have stated that the consequence of this impact occurring without controls implemented is Minor.<br>Weeds and pests already exist in the area and there is a potential for mining operations to change the environment making it more preferable for weeds and pests to increase in numbers.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |
| **ML-W5** | Attraction of pest animals to waste stored onsite | Rex have stated that the consequence of this impact occurring without controls implemented is Minor.<br>There is a potential for pests to be attracted to rubbish onsite, specifically food scraps. This will be a localised impact on site.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |
| **ML(C)-PPA1** | Competition or predation by pest plants and animals with native vegetation, revegetated native species and agricultural pursuits. | Rex have stated that the consequence of this impact occurring without controls implemented is Minor.<br>There is a potential for weeds, pests and pathogens present on site to create difficulty for rehabilitation of areas due to competition and predation.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |

DSD considers that Rex has identified all potential impacts to weeds, pests and plant pathogens associated with the proposed mining activities.

### 7.8.4 *Outcomes (ML)*

Table 7.8.2 is the DSD assessment of outcomes proposed by Rex in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable. The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies.

**Table 7.8.2 – DSD assessment of outcomes proposed by Rex**

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-PPA1**<br>**Impact event:** Introduction of new pest plant and animal species and plant pathogens in the proposed ML area.<br>**Rex Proposed Outcome:** No introduction of new pest plant and animal species and plant pathogens, or sustained increase in abundance of existing pest plant and animal species in the proposed ML caused by mining operations. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex considers control strategies will reduce this impact to a level of *low*.<br><br>The control strategies proposed by Rex are widely used, simple and effective. They work both on prevention of introductions and early identification and rectification of any observed impact. Prevention activities will make it unlikely that new pest species would be introduced. Early identification will result in a localised impact, with *minor* severity of consequence. It is considered the Rex's residual risk of low is appropriate.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Lease area compared to adjoining land.<br><br>Note: Weeds are defined in this condition as any invasive plant that threatens native vegetation in the local area or any species recognised as invasive in South Australia. |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-PPA2**<br>**Impact event:** Sustained increase in abundance of existing pest plant and animal species in the proposed ML area.<br>**Rex Proposed Outcome:** No introduction of new pest plant and animal species and plant pathogens, or sustained increase in abundance of existing pest plant and animal species in the proposed ML caused by mining operations. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex considers control strategies will reduce this impact to a level of low.<br><br>The control strategies proposed by Rex are widely used, simple and effective. There is a potential for the mining operations to create a favourable environment for pests to establish or increase abundance. The control strategies proposed by Rex minimise or restrict favourable habitat in addition to identifying increases early the problem can be rectified easily and before a large area is impacted. It is considered the Rex's residual risk of low is appropriate.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Lease area compared to adjoining land.<br><br>Note: Weeds are defined in this condition as any invasive plant that threatens native vegetation in the local area or any species recognised as invasive in South Australia. |
| **ML-W5**<br>**Impact event:** Attraction of pest animals to waste stored onsite<br>**Rex Proposed Outcome:** No introduction of new pest animal species or sustained increase in abundance of existing pest animal species in the proposed ML caused by mining operations. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex considers control strategies will reduce this impact to a level of low.<br><br>The control strategies proposed by Rex are widely used, simple and effective. By limiting access to waste the attraction of pests to a food source on site is reduced. By identifying increases, early pest control programs can be implemented and the problem can be rectified easily and before a large area is impacted. It is considered the Rex's residual risk of low is appropriate.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Lease area compared to adjoining land.<br><br>Note: Weeds are defined in this condition as any invasive plant that threatens native vegetation in the local area or any species recognised as invasive in South Australia. |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML(C)-PPA1**<br>**Impact event:** Competition or predation by pest plants and animals with native vegetation, revegetated native species and agricultural pursuits.<br>**Rex Proposed Outcome:** Where practical, re-establishment of the pre-mining ecosystem and landscape function. | Pest levels are considered a component of the ecosystem and landscape function. The proposed outcome defines the acceptable level of impact as being no increase in weeds, pests or pathogen species compared to pre-mining levels, this will ensure no potential for impacts from these species post completion.<br><br>The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex considers control strategies will reduce this impact to a level of low.<br><br>The control strategies proposed by Rex are widely used, simple and effective. By controlling weed and pest levels throughout operations and rehabilitation the risk of establishment of revegetation being affected by competition or predation is controlled. Per discussion in the Soils Section 7.5 control strategies have been proposed to prevent weed infestation into topsoil stockpiles and any external material imported on site. It is considered the Rex's residual risk of low is appropriate.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Lease area compared to adjoining land.<br><br>Note: Weeds are defined in this condition as any invasive plant that threatens native vegetation in the local area or any species recognised as invasive in South Australia. |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex.

### 7.8.5 *Measurement Criteria (ML)*

Table 7.8.3 is DSDs assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

**Table 7.8.3 – DSD assessment on measurement criteria**

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **ML-PPA1**<br><br>**Potential Impact:** Introduction of new pest plant and animal species and plant pathogens in the proposed ML area.<br><br>**Recommended Outcome:** The Tenement Holder must, in construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Lease area compared to adjoining land | Annual pest plant and animal survey shows at permanent transects located throughout the ML no new pest plant and animal species and plant pathogens in the proposed ML when compared to control sites or baseline data. | The draft measurement criterion is suitable for this stage of the assessment. Further information would be required regarding exact survey methods used to determine weed, pest and pathogen levels.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, this criterion would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | *DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(d) of the Regulations in relation to the outcome for impact event **ML- PPA1**;*<br>Representative baseline data on the presence and abundance of weeds, pests and plant pathogens within the ML area prior to commencement of mine operations. |
| **ML-PPA2**<br><br>**Potential Impact:** Sustained increase in abundance of existing pest plant and animal species in the proposed ML area.<br><br>**Recommended Outcome:** The Tenement Holder must, in construction, | Annual pest plant and animal survey shows at permanent transects located throughout the ML no sustained increase in abundance of existing pest plant and animal species in the proposed ML when | The draft measurement criterion is suitable for this stage of the assessment. Further information would be required regarding exact survey methods used to determine weed, pest and pathogen levels.<br><br>DSD considers that achievement of the recommended outcome would be measurable. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD recommends that the regulatory response for **ML-PPA1** also applies to this impact event. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Lease area compared to adjoining land | compared to control sites or baseline data. | Should a lease be granted, this criterion would be finalised in the PEPR submission. | | |
| **ML-W5**<br><br>**Potential Impact:** Attraction of pest animals to waste stored onsite<br><br>**Recommended Outcome:** The Tenement Holder must, in construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Lease area compared to adjoining land. | An annual audit of the records from monthly inspections of the waste/recycling storage locations show all waste is stored correctly and processing of waste items is in accordance with the approved Waste Management Plan | The proposed criterion measures the control strategies to achieve the outcome, not the outcome itself. It is recommended that the criteria is amended to measure the outcome, and thus the effectiveness of the control strategies rather than just measuring whether they are in place. The outcome used for **ML-PPA1-2** would be appropriate.<br><br>Should a lease be granted, this criterion would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD recommends that the regulatory response for **ML-PPA1** also applies to this impact event. |
| **ML(C)-PPA1**<br><br>**Potential Impact:** Competition or predation by pest plants and animals with native vegetation, revegetated native species and agricultural pursuits.<br><br>**Recommended Outcome:** The Tenement Holder must, in construction, operation and post completion, ensure no introduction of new species of | Post completion pest plant and animal monitoring at EFA transects located on rehabilitated sites throughout the ML will show no increase in pest plant and animal species when compared to analogue sites or baseline data. | The draft measurement criterion is suitable for this stage of the assessment. Further information would be required regarding exact monitoring methods used to determine weed and pest levels and location of analogue sites when required.<br><br>Baseline studies have not identified any pathogens on site and previous outcomes defined that no pathogens will be introduced to site. There has previously been stated a low risk of pathogens being introduced to the | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD recommends that the regulatory response for **ML-PPA1** also applies to this impact event. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Lease area compared to adjoining land. | | area. Phytophthora is common in areas with annual rainfall above 400mm and acidic soils. The Upper Yorke Peninsula is noted to be a low risk area. Broomrape is also noted as a declared weed and will also be covered under monitoring for pest plants. DSD accepts the omission of pathogens from mine closure monitoring.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | | |

### 7.8.6 *Summary of the recommended regulatory response (ML)*

DSD considers that all potential impacts to weeds, pests and plant pathogens during construction, operations and post completion have been identified through this assessment and suitable outcomes have been recommended for all impact events where the severity of consequence is greater than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for receiving environment from mining activities. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

*DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*

The Tenement Holder must, in construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Lease area compared to adjoining land.

> *Note: Weeds are defined in this condition as any invasive plant that threatens native vegetation in the local area or any species recognised as invasive in South Australia.*

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(d) of the Regulations in relation to the outcome for impact event* ***ML- PPA1****:*

Representative baseline data on the presence and abundance of weeds, pests and plant pathogens within the ML area prior to commencement of mine operations.

### 7.8.7 *Impact assessment (EML)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0. Rex has not provided an impact assessment for the EML.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7.0.

Rex is responsible for all activities undertaken on the EML relating to mining operations, irrespective of whether the activities are undertaken by Rex or by a contractor. The assessment considers all impacts from EML operations and any rehabilitation undertaken on the EML.

The state government, through the assessment process, has identified additional potential impacts relating to weeds, pests and pathogens associated with the proposed mining activities. An assessment of these additional impact events is provided in Table 7.8.4.

**Table 7.8.4 – Impact events identified subsequent to the Proposal**

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **DSD EML-PPA1** | Introduction or sustained increase of new pest plant and animal species and plant pathogens in the proposed ML area. | Activities on the EML will include earthworks, specifically the movement of overburden stockpiles. There is a potential for earthmoving machinery to introduce weeds or pathogens via mechanisms including tyres, tracks, underbodies and floor mats. There is also potential for any weeds present on site, as identified in baseline studies, to be spread around the site by the same mechanism. DSD considers that there is a potential for changes in landscape and rubbish left onsite to attract pests without control strategies. Any introduced weeds, pests or pathogens have the potential to spread offsite without implementation of control strategies.<br><br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES<br><br>Rex has not provided an outcome. |
| **DSD EML(C)-PPA1** | Competition or predation by pest plants and animals with native vegetation, revegetated native species and agricultural pursuits. | Rex has not assessed this impact as they have referred the management of impacts associated with the EML to the highway diversion activities as assessed under the Development Act.<br><br>There is a potential for weeds, pests and pathogens present on site to create difficulty for revegetation of areas due to competition and predation.<br><br>DSD accepts that the consequence of this occurring is Minor.<br><br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES<br><br>Rex has not provided an outcome. |

### 7.8.8 *Outcomes (EML)*

Table 7.8.5 provides outcomes for impact events identified by DSD that were determined in section 7.8.7 to require an outcome. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable. The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies.

**Table 7.8.5 – Discussion of outcomes for impacts identified by DSD**

*Discussion of outcomes for impacts identified by DSD*

| ID | Acceptability of outcome | Achievability of outcome | Recommended regulatory response |
|---|---|---|---|
| **DSD EML-PPA1**<br>**Impact event:** Introduction or sustained increase of new pest plant and animal species and plant pathogens in the proposed ML area.<br>**Outcome:** The Tenement Holder must, in construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Lease area compared to adjoining land. | This impact is the same as the impacts for **ML-PPA1-2** and thus the same outcome is appropriate.<br><br>The outcome accurately describes the level of impact.<br><br>The outcome is considered a suitable statement on the acceptable level of impact on the environment. | Although Rex has not proposed control strategies for this impact on the EML the proposed control strategies for the ML are considered appropriate to manage this risk.<br><br>Please see **ML-PPA1-2** for discussion regarding the effectiveness of control strategies and achievability of the outcome.<br><br>DSD considers that the outcome would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Lease area compared to adjoining land.<br><br>Note: Weeds are defined in this condition as any invasive plant that threatens native vegetation in the local area or any species recognised as invasive in South Australia. |
| **DSD EML(C)-PPA1**<br>**Impact event:** Competition or predation by pest plants and animals with native vegetation, revegetated native species and agricultural pursuits.<br>**Outcome** The Tenement Holder must, | This impact is the same as the impacts for **ML(C)-PPA1** and thus the same outcome is appropriate. | Rex considers control strategies will reduce this impact to a level of low.<br><br>The control strategies proposed by Rex are widely used, simple and effective. By controlling weed and pest levels throughout operations and rehabilitation the risk of | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in construction, operation and post completion, ensure no |

| | | | |
|---|---|---|---|
| in construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Lease area compared to adjoining land. | The outcome accurately describes the level of impact.<br><br>The outcome is considered a suitable statement on the acceptable level of impact on the environment. | establishment of revegetation being effected by competition or predation is controlled. Control strategies have been proposed to prevent weed infestation into topsoil stockpiles and any external material imported on site. It is considered the Rex's residual risk of low is appropriate.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Lease area compared to adjoining land.<br><br>Note: Weeds are defined in this condition as any invasive plant that threatens native vegetation in the local area or any species recognised as invasive in South Australia |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex.

### 7.8.9 *Measurement Criteria (EML)*

Table 7.8.6 is DSDs assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

**Table 7.8.6 – DSD assessment on measurement criteria**

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **DSD EML-PPA1**<br><br>**Potential Impact:** Introduction or sustained increase of new pest plant and animal species and plant pathogens in the proposed ML area.<br><br>**Recommended Outcome:** The Tenement Holder must, in construction, operation | The criterion proposed by Rex for **ML-PPA1 – ML-PPA2** would be appropriate. | The criterion proposed by Rex for **ML-PPA1 – ML-PPA2** would be appropriate for this impact.<br><br>This criterion measures introductions of and increases in weed, pest and pathogen species in the lease. This measurement criterion is considered appropriate for this outcome at this stage. Further information will be required regarding exact survey methods used to determine weed, pest and pathogen levels. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criterion are required. |

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Lease area compared to adjoining land. | | DSD considers that achievement of the recommended outcome would be measurable. Should a lease be granted, this criterion would be finalised in the PEPR submission. | | |
| **DSD EML(C)-PPA1**<br><br>**Potential Impact:** Competition or predation by pest plants and animals with native vegetation, revegetated native species and agricultural pursuits.<br>**Recommended Outcome:** The Tenement Holder must, in construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Lease area compared to adjoining land. | The criterion proposed by Rex for **ML(C)-PPA1** could be appropriate. | The criterion proposed by Rex for **ML(C)-PPA1** could be appropriate. Further information will be required regarding exact monitoring methods used to determine weed and pest levels and location of analogue sites when required. Baseline studies have not identified any pathogens on site and previous outcomes defined that no pathogens will be introduced to site. There has previously been stated a low risk of pathogens being introduced to the area. Phytophthora is common in areas with annual rainfall above 400mm and acidic soils. The Upper Yorke Peninsula is noted to be a low risk area. Broomrape is also noted as a declared weed and will also be covered under monitoring for pest plants. DSD accepts the omission of pathogens from mine closure monitoring.<br><br>DSD considers that achievement of the recommended outcome would be measurable. Should a lease be granted, this criterion would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criterion are required. |

### 7.8.10 *Summary of the recommended regulatory response (EML)*

DSD considers that all potential impacts to weeds, pests and pathogens during construction, operations and post completion have been identified through this assessment and suitable outcomes have been recommended for all impact events where the severity of consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for receiving environment from mining activities. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

*DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*

The Tenement Holder must, in construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Lease area compared to adjoining land.

> *Note: Weeds are defined in this condition as any invasive plant that threatens native vegetation in the local area or any species recognised as invasive in South Australia.*

### 7.8.11 *Impact assessment (MPL)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0. With respect to the activities proposed on MPLs, Rex has not assessed any impacts related to the installation, supply and decommissioning of the electricity transmission line as Rex have stated in the Proposal that this will be undertaken by a third party. Rex has only assessed the impacts relating to the installation of the pipelines. As rehabilitation along the pipeline will not involve land disturbance (ie: it is proposed that the pipeline will remain buried), the impacts associated with rehabilitation of the pipeline has not been assessed by Rex.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7.0. Rex is responsible for all activities undertaken on the MPL relating to mining operations, irrespective of whether the activities are undertaken by Rex or by a third party contractor.

A review of Rex's impact assessment is shown in Table 7.8.7.

The Port MPL application has been deferred at the request of Rex and has not been assessed in this report.

**Table 7.8.7 – Impact events identified by Rex in the Proposal**

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **MPL-PPA1** | Introduction of new pest plant and animal species and plant pathogens within the pipeline system. | Rex has stated that the consequence of this impact occurring without controls implemented is moderate.<br>Without control strategies introduced weeds and pests could be spread offsite resulting in an impact to adjacent or regional areas. As stated above DSD considers Rex responsible for all activities occurring on their tenement. The impact does not include all areas, however, it correctly identifies the impact event and as such is suitable at this stage.<br>DSD accepts that the consequence of this occurring is moderate. | YES<br>Rex has provided an outcome |
| **MPL-PPA2** | Sustained increase in abundance of existing pest plant and animal species within the pipeline system. | Rex has stated that the consequence of this impact occurring without controls implemented is moderate.<br>Given the weeds and pests already exist in the area increase in numbers may not result in significant changes to the environment. As stated above DSD considers Rex responsible for all activities occurring on their tenement. The impact does not include all areas, however, it correctly identifies the impact event and as such is suitable at this stage.<br>DSD accepts that the consequence of this occurring is moderate. | YES<br>Rex has provided an outcome |
| **MPL(C)-PPA1** | Competition or predation by pest plants and animals with agricultural pursuits | Rex has stated that the consequence of this impact occurring without controls implemented is negligible.<br>The area to be re-sown with crops is a small area. As current agricultural pursuits would be affected by weed, pest and pathogen levels the impact on re-sowing would not have a noticeable consequence.<br>DSD accepts that the consequence of this occurring is negligible. | NO |

DSD considers that Rex has identified all potential impacts to weeds, pests and pathogens associated with the proposed mine related activities.

### 7.8.12 *Outcomes (MPL)*

Table 7.8.8 is the DSD assessment of outcomes proposed by Rex in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable.

The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies.

**Table 7.8.8 – DSD assessment of outcomes proposed by Rex**

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **MPL-PPA1**<br><br>**Impact event:** Introduction of new pest plant and animal species and plant pathogens within the pipeline system and port facility area.<br><br>**Rex Proposed Outcome:** No introduction of new pest plant and animal species, or sustained increase in abundance of existing pest plant and animal species at the port facility caused by mine related activity. | The proposed outcome does not accurately describe the level of impact.<br><br>The proposed outcome is not considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies.<br><br>The proposed outcome does not take into account the potential for weeds, pests and pathogens to be introduced or impacted by the construction activities involving the pipeline or electricity transmission lines. DSD proposes an outcome to | Rex considers both the primary and residual risk as moderate (page 8-305 of the Proposal), implying the controls strategies have little effect on the outcomes. This is in conflict with the statement on page 8-306 of the Proposal which states the primary risk is low.<br><br>The control strategies proposed by Rex focus solely on the Port Facility. DSD considers the initial construction of the pipeline and transmission lines present the potential to introduce or spread weeds, pests or pathogens. It is recommended the outcome cover all activities on the Power line and Pipelines MPL.<br><br>The primary activities on the Power line and Pipelines MPL consist of earthworks associated with the construction/installation of the pipeline and electricity transmission lines. Control strategies designed to minimise introduction and spread of weeds and pathogens during earthworks are included in the control strategies for the MPL. These control strategies could be implemented in this situation to adequately control the risk. In addition to prevention | *DSD recommends that should a licence be granted the following outcome be a requirement of the licence:*<br>The Tenement Holder must, in construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Licence area compared to adjoining land.<br>Weeds are defined in this condition as any invasive plant that threatens native vegetation in the local area or any species recognised as invasive in South Australia. |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | cover this impact event should state no introduction or sustained increase in weed, pest and pathogen levels relevant to all activities undertaken on the lease. | strategies the inspections and control strategies designed to identify and remedy issues early have been included. These should be included on the pipeline and electricity transmission line areas, however, as the only activities that would introduce and spread weeds occur on these during construction and maintenance. Weed, pest and pathogen surveys would only need to be conducted during this time.<br>DSD considers that the outcome recommended by DSD would be achievable. | *The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(d) of the Regulations in relation to impact event **MPL-PPA1**;*<br>Representative baseline data on the presence and abundance of weeds, pests and plant pathogens within the MPL area prior to commencement of site operations. |
| **MPL-PPA2**<br>**Impact event:** Sustained increase in abundance of existing pest plant and animal species within the pipeline system and port facility area.<br>**Rex Proposed Outcome:** No introduction of new pest plant and animal species, or sustained increase in abundance of existing pest plant and animal species at the port facility caused by mine related activity. | This outcome is the same as **MPL-PPA1** and the discussion regarding this has been included in this section. | This outcome is the same as **MPL-PPA1** and the discussion regarding this has been included in this section. | *DSD recommends that should a licence be granted the following outcome be a requirement of the licence:*<br>The Tenement Holder must, in construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Licence area compared to adjoining land.<br>Weeds are defined in this condition as any invasive plant that threatens native vegetation in the local area or any species recognised as invasive in South Australia. |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex or identified by DSD.

### 7.8.13 *Measurement Criteria (MPL)*

Table 7.8.9 is DSDs assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

**Table 7.8.9 – DSD assessment on measurement criteria**

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **MPL-PPA1**<br>**Potential Impact:** Introduction of new pest plant and animal species and plant pathogens within the pipeline system and port facility area.<br>**Recommended Outcome:** The Tenement Holder must, in construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Licence area compared to adjoining land. | Quarterly site inspection of the port will ensure no introduction of new pest plant and animal species and plant pathogens. | The criteria proposed by Rex does not cover the main impact for Power line and Pipelines MPL. As discussed above it is considered that surveys of the pipeline and power line areas should be conducted during construction and maintenance activities.<br>DSD considers that achievement of the recommended outcome would be measurable.<br>Should a licence be granted, these criteria would be finalised in the PEPR submission. | DSD considers no licence requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no licence conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **MPL-PPA2**<br><br>**Potential Impact:** Sustained increase in abundance of existing pest plant and animal species within the pipeline system and port facility area.<br>**Recommended Outcome:** The Tenement Holder must, in construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Licence area compared to adjoining land. | Site inspection of the port will ensure no increase in abundance of existing pest plant and animal species at the port facility. | The criteria proposed by Rex does not cover the main impact for Power line and Pipelines MPL. As discussed above it is considered that surveys of the pipeline and power line areas should be conducted during construction and maintenance activities.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a licence be granted, these criteria would be finalised in the PEPR submission. | DSD considers no licence requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no licence conditions applicable to the measurement criteria are required. |

### 7.8.14 *Summary of the recommended regulatory response (MPL)*

DSD considers that all potential impacts to weed, pest and pathogen during construction, operations and post completion have been identified through this assessment and suitable outcomes have been recommended for all impact events where the severity of consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for receiving environment from mine related activities. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

**Power line and Pipelines MPL**

*DSD recommends that should a licence be granted the following outcomes be prescribed as conditions of the licence:*

The Tenement Holder must, in construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Licence area compared to adjoining land.

Note: Weeds are defined in this condition as any invasive plant that threatens native vegetation in the local area or any species recognised as invasive in South Australia.

*The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(d) of the Regulations in relation to impact event* ***MPL-PPA1****:*

Representative baseline data on the presence and abundance of weeds, pests and plant pathogens within the MPL area prior to commencement of site operations.

## *7.9 Coastal and Marine Environment*

### 7.9.1 *Description of Relevant Aspects of Environment*

The Hillside Project site (including the ML and EML) is located approximately one kilometre from the western shore of the Gulf St Vincent. The MPL is similarly located adjacent to the western shore of the Gulf St Vincent, south of Ardrossan, at the existing port.

The coastal and intertidal areas along the stretch of coast adjoining the ML, EML and MPL areas comprise cliffs, sand dunes, soft sediment and rocky shore habitats. This coastal environment adjacent to the ML, EML and MPLs is influenced by existing land activities of coastal settlements, agricultural practices and operations at the Port.

A detailed description of the marine environment (including oceanographic conditions, coastal and intertidal areas and subtidal areas) is in provided in section 5.11 of the Proposal. This includes discussion on flora and fauna within these areas.

Rex commissioned a series of marine environment surveys to provide baseline data for status of ecosystems along the coast from Ardrossan to Pine Point including surveying intertidal and coastal habitats and species, subtidal habitats, seagrass health, and subtidal sediment characteristics (as per Appendix 5.11-A B of the Proposal).

Surveys were conducted by Rex covering approximately 10km of coastline adjacent to the ML and the filtration facility (MPL area, immediately south of Ardrossan). The surveys of coastal areas identified 47 coastal flora species from the sand dunes and cliff habitats consisting of a majority of natives with only nine species identified as weeds or naturalised (Table 5.11-1 of the Proposal provides a list of species). A number of species were identified as 'near threatened' or 'least concern' on a regional level and one species was identified as 'rare', Bush minuria (*Minuria cunninghamii).* Habitats of the intertidal zone were described in the Proposal as containing sparse wrack (detached seagrass) cover in the upper intertidal zone and varied flora in the low intertidal zone including seagrass and foliose brown and green algae; soft-sediment areas dominated by the seagrass *Heterozostera sp.*

Surveys of intertidal zones adjacent to the ML and MPL areas identified numerous coastal and marine faunal species including fifteen Mollusca, three Arthropda and three Cnidaria species. To identify intertidal shorebirds Rex commissioned a survey to identify and count birds present between high water mark and approximately 200m off-shore (this also included along the cliff line and dune system). The survey identified 17 bird species (listed in table 5.11-3 of the Proposal).

Rex also conducted a search of the Protected Matters database under the EPBC Act for the area and identified nine threatened species, seven of which are also migratory species (see Section 5.11.2.3 of the Proposal).

An ecological assessment of the subtidal areas adjacent to the proposed ML and MPL areas was commissioned by Rex, which included subtidal habitat mapping, investigating seagrass condition, and subtidal sediment characteristics (full details are provided in Appendix 5.11-A). Subtidal habitats broadly includes seagrass meadows, unvegetated soft bottom habitat and very little reef habitat. Most of the subtidal zone off Ardrossan, to a depth of about 10 m, supports relatively dense seagrass communities. Subtidal marine faunal species were identified during surveys of the habitats aforementioned (as described in 5.11.3.3 of the Proposal). Fisheries taxa specific to the study area which utilised the different habitats were also presented in the Proposal (as per Table 5.11-4)

Seagrass condition was used as an indicator to determine the health of the marine ecosystem. Rex assessed differences at seven sites between Pine Point and Ardrossan with regards to seagrass cover, biomass and leaf length. Leaf length measured at study sites adjacent to the northern extent of the proposed ML to Ardrossan indicated seagrasses are healthy and not presently stressed. Shorter leaf length at the two southernmost sites adjacent to the ML indicate some degree of naturally occurring stress. Assessment of seagrass density and biomass indicate greater cover and biomass between the ML and Port Ardrossan (indicating communities are healthier). Seagrasses at sites adjacent to the ML and Port Ardrossan are however patchier and less leaf density was observed.

Rex commissioned baseline studies of the current state of pollutants (hydrocarbons and heavy metal concentrations) near the port facility and along the coast. Results from sampling sites close to the port area had higher metal burdens than sites further South, which is reflective of the types of activities (primarily industrial) undertaken around the port facility.

As noted in the Proposal, to support seagrass conservation, Rex have established permanent sedimentation sampling points to assist in managing the potential for coastal nutrient and sediment inputs (Appendix 5.11-A).

Structures which surround the port facility including seawalls and breakwaters could provide habitat adjacent to the MPL (port upgrade) for marine species.

A detailed description of the geological and hydrogeological setting has been provided in Section 5.10 of the Proposal and surface water in Section 5.9 of the Proposal.

Rex considers flora and fauna contained within the marine environment as sensitive receptors. (Proposal Section 8.3.9)

DSD considers the sensitive receptors and associated environmental values for this environmental aspect to be;

- Marine Ecosystems (health and diversity)
- Marine Fauna and Flora (faunal and flora health and diversity)

DSD considers that the description of environment is a suitable characterisation of the receiving environment which may be affected by mining operations.

### 7.9.2 *Views of affected parties*

In the Proposal Rex notes that the CCG expressed concern regarding the introduction of marine pests as a result of shipping activities at the Port. This concern is addressed by Australia's *Quarantine Act 1908* and the requirements of the International Convention for the Prevention of Pollution from Ships (MARPOL) and this matter is regulated under these legislations. It is, however, discussed further in Section 8.4.8 of the Proposal.

Other concerns expressed by the CCG relate to the interaction between the sea and groundwater, particularly leakage of contaminated groundwater into the sea. These concerns are addressed in Groundwater and Surface Water (Sections 7.11 and 7.12) of this report, including specific impacts **ML-GW4, ML(C)-GW2, MPL-GW1 a**nd **MPL-SW4.**

In Section 7.0 of the Proposal public access to the coast is also mentioned as a concern by the CCG. Rex has indicated that there will be no impact to access.

The following table summarises the issues raised during statutory consultation:

**Table 7.9 – Impact events relating to issues raised during statutory consultation**

| Issues raised during statutory consultation | Addressed |
|---|---|
| Potential for spillage from pipeline and marine impact | **MPL-S2** |
| Concern for marine fauna, marine species (including fish and other species) | Various impacts as per Sections 7.1, 7.2, 7.11 of this report |
| Concerns for coastal fauna, including shorebirds (such as Peregrine Falcons) and migratory birds | Assessed under Section 7.6 (Native Flora) and Section 7.7 (Native Fauna) of this report |
| Return of mining water to marine environment | Discussed in Issue No. 84 (Response Document) |
| Potential for contamination from mining | Various impacts as per Sections 7.5, 7.11 of this report |
| Copper and Uranium toxicity to the marine environment, and sedimentation of marine environment | **ML-A7** (Air Quality)<br>**ML-R4** and **DSD MPL-R2** (Radiation)<br>Discussed in Issue No. 129 (Response Document) |
| Lack of marine dispersal studies and concern regarding dispersal of effluents in marine environment | **ML-A7** (Air Quality)<br>Discussed in Issue No. 142 (Response Document) |
| Impact of dust deposition on the Gulf and marine flora | **ML-A7** (Air Quality) |
| Ability to meet Water Quality Policy | Further response provided by Rex in Issue No. 84 (Response Document) |
| Marine impacts from blasting, vibration and noise | **ML-N7** (Noise and Vibration)<br>**ML-BV5** (Blasting) |
| Increased turbidity due to dust and runoff | **ML-A7** (Air Quality)<br>**ML-SW1** (Surface Water) |
| Lack of baseline data for marine flora and fauna | Baseline data discussed in Section 7.9.1 (Description of Relevant Aspects of Environment) |
| Monitoring of impacts to marine environment | Discussed in sections relating to measurement criteria for various impacts (as per Sections 7.1, 7.11 of this report) |

The statutory consultation identified an additional potential impact event to those identified by Rex; uranium impacts on the marine environment (in the context of the MPLs). This has been addressed in the impact assessment under **DSD MPL-R2** (Radiation).

DSD has had regard for all concerns raised that addressed matters within the scope of the project during statutory consultation, however not all concerns have been addressed in this assessment report because they

were either not within the scope of the assessment or were too general in nature to consider.

### 7.9.3 *Impact assessment (ML)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0. Rex has discussed impacts to the coastal and marine environment in the context of the 'pathways' which impacts could occur to the marine environment as discussed in Section 8.3.9 of the Proposal. Rex has detailed impacts to terrestrial native flora and terrestrial fauna in Section 8.3.6 and Section 8.3.7 of the Proposal (including impacts, where applicable, to shorebirds and migratory species and coastal flora). Impacts to the marine environment (marine flora and fauna) have been the focus of assessment in Section 8.3.9 of the Proposal.

Primary 'pathways' which could result in a potential impact on the coastal and marine environment from mining activities on the ML have been identified in the Proposal via air, noise and vibration, blasting activities, surface water, groundwater and radiation. The impacts have therefore been discussed by Rex in the aforementioned sections of the Proposal in air quality (Section 8.3.1), noise and vibration (Section 8.3.2), blasting activities (Section 8.3.3), surface water (Section 8.3.10), groundwater (Section 8.3.11) and radiation (Section 8.3.18).

Rex has conducted modelling to support their impact assessment for the relevant sources and pathways relating to coastal and marine impacts, including:

- Air quality (discussed in section 7.1 of this report)
- Noise and vibration (discussed in section 7.2 of this report)
- Blasting activities (discussed in section 7.3 of this report)
- Surface water (discussed in section 7.11 of this report)
- Groundwater (discussed in section 7.12 of this report)
- Radiation (discussed in section 7.16 of this report).

Amendments to the modelling subsequent to the submission of the Proposal and an assessment or technical reviews applicable to assessing the appropriateness and reliability of the modelling are also discussed in the relevant sections of this report.

DSD considers that the approach adopted by Rex in the Proposal is suitable as the relevant sources and pathways are discussed in relation to all potential receptors which could be impacted.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7.0.

DSD has conducted the impact assessment for the ML relating to the coastal and marine as per the relevant sources and pathways, in line with the assessment structure provided in the Proposal by Rex. Hence impacts

to the coastal and marine environment are discussed in the applicable sections (relating to the pathway and/or source) of this assessment report, including:

- Air quality (section 7.1 of this report)
- Noise and vibration (section 7.2 of this report)
- Blasting activities (section 7.3 of this report)
- Surface water (section 7.11 of this report)
- Groundwater (section 7.12 of this report)
- Radiation (section 7.16 of this report).

A consolidated overview of the impact events relating to the coastal and marine environment, which have been identified by Rex and the corresponding section where they have been assessed in this report, is shown in Table 7.9.1 and impacts identified by the State Government post submission of the Proposal are presented in Table 7.9.2.

## Table 7.9.1 – Impact events identified by Rex in the Proposal

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** As documented in the applicable sections of the Proposal | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-A7** | Impacts on marine flora and fauna from increased sedimentation rates | This impact has been considered in Section 7.1 (Air Quality) of this report | See Section 7.1 |
| **DSD ML-A1** | Dust generated from the tailings surface causing increased dust emissions to sensitive receptors | This impact has been considered in Section 7.1 (Air Quality) of this report | See Section 7.1 |
| **ML(C)-A1** | Elevated dust continues post mine closure | This impact has been considered in Section 7.1 (Air Quality) of this report | See Section 7.1 |
| **MPL-A6** | Degradation of marine environment and negative impact on marine flora and fauna from concentrate dust and particulates generated from the port operations entering the ocean. | This impact has been considered in Section 7.1 (Air Quality) of this report | See Section 7.1 |
| **DSD MPL-A2** | Elevated dust continues post mine closure | This impact has been considered in Section 7.1 (Air Quality) of this report | See Section 7.1 |
| **ML-N7** | Displacement of terrestrial native fauna and marine fauna from noise and vibration | This impact has been considered in Section 7.2 (Noise and Vibration) of this report | See Section 7.2 |
| **MPL- N5** | Displacement of terrestrial native fauna and disturbance to marine fauna from noise and vibration at the port facility | This impact has been considered in Section 7.2 (Noise and Vibration) of this report | See Section 7.2 |
| **ML-BV5** | Disturbance to native fauna (terrestrial and marine) due to blasting activities | This impact has been considered in Section 7.3 (Blasting) of this report | See Section 7.3 |
| **ML-NF2** | Significant impacts to species of conservation significance | This impact has been considered in Section 7.7 (Native Fauna) of this report | See Section 7.7 |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** As documented in the applicable sections of the Proposal | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-NF5** | Displacement of native fauna from light spill from Hillside mining and associated infrastructure | This impact has been considered in Section 7.7 (Native Fauna) of this report | See Section 7.7 |
| **ML-SW1** | Increased sediment loads in downstream surface water flows causing contamination to the surrounding environment | This impact has been considered in Section 7.11 (Surface Water) of this report | See Section 7.11 |
| **ML-SW2** | Contamination of surface water run-off with mine hydrocarbons and process chemicals causing contamination to the surrounding environment. | This impact has been considered in Section 7.11 (Surface Water) of this report | See Section 7.11 |
| **ML-SW4** | Acid mine drainage transported by surface water run-off resulting in contamination to surrounding environment. | This impact has been considered in Section 7.11 (Surface Water) of this report | See Section 7.11 |
| **ML-SW5** | Dissolved copper ions transported by surface water run-off causing contamination to surrounding environment. | This impact has been considered in Section 7.11 (Surface Water) of this report | See Section 7.11 |
| **ML(C)-SW1** | Increased sediment loads in downstream water flows | This impact has been considered in Section 7.11 (Surface Water) of this report | See Section 7.11 |
| **ML(C)-SW2** | Leachates (AMD & dissolved copper ions) chemically unstable at closure causing contamination to the surrounding environment. | This impact has been considered in Section 7.11 (Surface Water) of this report | See Section 7.11 |
| **MLGW1** | Inappropriate abandonment of drill holes and wells leading to the contamination of groundwater | This impact has been considered in Section 7.12 (Groundwater) of this report | See Section 7.12 |
| **MLGW2** | Contamination of groundwater due to open pit and underground mining activities. | This impact has been considered in Section 7.12 (Groundwater) of this report | See Section 7.12 |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** As documented in the applicable sections of the Proposal | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **MLGW3** | Contamination of groundwater by the injection of water from dewatering. | This impact has been considered in Section 7.12 (Groundwater) of this report | See Section 7.12 |
| **MLGW4** | Seawater ingress impacting groundwater quality. | This impact has been considered in Section 7.12 (Groundwater) of this report | See Section 7.12 |
| **ML(C)-GW1** | Offsite movement of contaminated groundwater from the mine at closure. | This impact has been considered in Section 7.12 (Groundwater) of this report | See Section 7.12 |
| **ML(C)-GW2** | Inflow of sea water into the pit post mine closure. | This impact has been considered in Section 7.12 (Groundwater) of this report | See Section 7.12 |
| **ML-TSF1** | Loss of solids from pipeline failure | This impact has been considered in Section 7.5 (Soil/Land Disturbance) of this report | See Section 7.5 |
| **ML-TSF2** | Loss of solids from embankment failure | This impact has been considered in Section 7.5 (Soil/Land Disturbance) of this report | See Section 7.5 |
| **ML-TSF3** | Loss of solids from overfilling of storage | This impact has been considered in Section 7.5 (Soil/Land Disturbance) of this report | See Section 7.5 |
| **ML-TSF4** | Loss of solids from flood | This impact has been considered in Section 7.11 (Surface Water) of this report | See Section 7.11 |
| **ML-TSF5** | Discharge of contaminated water from pipeline failure | This impact has been considered in Section 7.11 (Surface Water) of this report | See Section 7.11 |
| **ML-TSF6** | Discharge of contaminated water through the spillway | This impact has been considered in Section 7.11 (Surface Water) of this report | See Section 7.11 |
| **ML-TSF7** | Leakage through the embankment or base | This impact has been considered in Section 7.5 (Soil/Land Disturbance) of this report | See Section 7.5 |
| **ML(C)-TSF1** | Discharge of solids at closure from failure or excess deformation of the embankment | This impact has been considered in Section 7.5 (Soil/Land Disturbance) of this report | See Section 7.5 |
| **ML(C)-TSF2** | Discharge of solids at closure from flooding | This impact has been considered in Section 7.11 (Surface Water) of this report | See Section 7.11 |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** As documented in the applicable sections of the Proposal | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML(C)-TSF4** | Discharge of contaminated water through the capping layer, embankment and base | This impact has been considered in Section 7.12 (Groundwater) of this report | See Section 7.12 |
| **ML-W1** | Soil or water contamination due to incorrect waste disposal | This impact has been considered in Section 7.11 (Surface Water) of this report | See Section 7.11 |
| **ML(C)-W1** | Waste remaining onsite at closure | This impact has been considered in Section 7.5 (Soil/Land Disturbance) of this report | See Section 7.5 |
| **ML-R4** | Damage to marine flora and fauna as a result of increased deposition of radionuclide dusts | This impact has been considered in Section 7.16 (Radiation) of this report | See Section 7.16 |

The State Government, through the assessment process, has identified additional impacts to the coastal and marine environment associated with the proposed mining activities subsequent to the submission of the Proposal. An assessment of these additional impact events is provided in Table 7.9.2.

**Table 7.9.2 – Impact events identified subsequent to the Proposal**

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **DSD-ML-M1** | Leaching of metals or other contaminants through waste rock dumps, oxide and ore stockpiles impacting on the marine environment during operations and post completion | This impact event has been identified by the State Government. No assessment of the impact has been undertaken by Rex.<br><br>As per the discussion on mounding under the TSF (ID DSD (ML)-S1), any uncaptured leaching or mobilisation of metals and other contaminants through WRDs and stockpiles will seep through to the underlying confining saprolite layer. As indicated by the elevation contour plan of the saprolite layer provided in Figure 88 of the Hydrogeological Summary Report (Appendix 7 of the Proposal Response Document), seepage under the western part of the Western WRD will flow to the west towards agricultural land, while seepage under the eastern WRDs has the potential to flow east towards the coast in the direction where the saprolite layer slopes away. This seepage has a potential to mound and contaminate soil, or discharge to the marine environment.<br><br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes |

### 7.9.4 *Outcomes (ML)*

DSD assessment of outcomes relating to impacts proposed by Rex in the Proposal is included in the sections of this report identified in Table 7.9.2. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable.

The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies.

Table 7.9.3 provide an outcome for the impact event identified by DSD that were determined in section 7.9 to require an outcome.

## Table 7.9.3 – Discussion of outcomes for impacts identified by DSD

| *Discussion of outcomes for impacts identified by DSD* | | | |
|---|---|---|---|
| **ID** | **Acceptability of outcome** | **Achievability of outcome** | **Recommended regulatory response** |
| **DSD**<br>**ML-M1**<br>**Impact event:** Leaching of metals or other contaminants through waste rock dumps, oxide and ore stockpiles impacting on the marine environment during operations and post completion<br>**Outcome:** DSD proposes the following outcome:<br>The Tenement Holder must ensure no loss of marine habitats, flora and fauna from contaminants resulting from mining operations, during operations and post completion. | DSD considers that the outcome accurately describes the level of impact.<br>The outcome is considered a suitable statement on the acceptable level of impact on the environment. | As discussed in **DSD ML-S2** State Government sought further response form Rex in relation to this potential impact.<br>Rex in the Proposal and Response Document (Issue No. 16) explains that oxide and ore stockpiles would be placed on constructed domed clay low-permeability pads. As the pad would be domed, it would shed any water which percolates through the stockpiles and there would be no head on the clay layer at any time. The clay base would divert water to perimeter drains, preventing infiltration into the underlying soil. All water collected in the perimeter drains would be considered 'dirty water' and reused as process water. As there would be no head on the clay layer, it is unlikely that water would mound under the oxide stockpile.<br>The stockpile of oxide material would be treated at the end of the mine life, or if uneconomic to treat at this time, would be capped in a similar manner to the TSF.<br>Waste material to be contained in waste rock dumps has been characterised by Rex as being benign with low metal concentrations which could impact on the receiving environment. In addition, water falling directly onto WRDs will be collected in drains and channelled to water storage dams located on site. This will minimise infiltration and any leaching of minerals.<br>In Issue No.16 (Response Document) Rex also discuss the risk of copper seeping from the oxide stockpile and leaching into the marine environment post completion. Rex proposes to manage this impact primarily through the design and implementation of capping of the oxide stockpile. Rex considered the likelihood of copper ions leaching through the constructed clay base layer of the oxide storage pad in their response as unlikely and provides suitable justification. Furthermore Rex indicates should the unlikely event of copper ions leaching the underlying Cainozoic layer result, this layer would act as natural buffer due to its calcareous nature. Rex has therefore assessed the residual risk as *low*.<br>In the Proposal, Rex state that they have established permanent sedimentation sampling points to assist in managing the potential for coastal nutrient and sediment inputs (Appendix 5.11-A of the Proposal). DSD recommends that this monitoring program continue as a strategy to ensure achievability of the outcome.<br>DSD considers that the outcome would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*<br>The Tenement Holder must ensure no loss of abundance and diversity of marine flora and fauna from contaminants and dust deposition resulting from mining operations, during operations and post completion.<br>*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event **DSD ML- M1**;*<br>Strategies for this outcome must be consistent with the recommendations for monitoring programs in Appendix 5.11-A of the Mining Lease Proposal. |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex.

### 7.9.5 *Measurement Criteria (ML)*

Table 7.9.4 is DSD's assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

**Table 7.9.4 – DSD assessment on measurement criteria**

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **DSD ML-M1**<br><br>**Potential Impact:** Leaching of metals or other contaminants through waste rock dumps, oxide and ore stockpiles impacting on the marine environment during operations and post completion<br><br>**Recommended Outcome:** The Tenement Holder must ensure no loss of abundance and diversity of marine flora and fauna from contaminants and dust deposition resulting from mining operations, during operations and post completion. | Rex has not proposed criteria for this outcome. | As discussed in **DSD ML-S2** DSD considers that similar criteria to the impact relating to **DSD ML-S1** could be applied for monitoring of water around waste rock dumps and ore stockpiles.<br><br>In the Proposal, Rex state that they have established a seagrass monitoring program (Appendix 5.11-A of the Proposal). Measurement criteria for determining achievement of the outcome must include a continuation of the seagrass monitoring program to:<br><br>• determine the species composition and density of the seagrass communities<br><br>• assess the condition of seagrass communities<br><br>DSD considers there are appropriate measurement methodologies and standards to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | *DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(d) of the Regulations in relation to the outcome for impact event **DSD ML- M1**;*<br><br>Measurement Criteria for this outcome must be consistent with the recommendations for monitoring programs in Appendix 5.11-A of the Mining Lease Proposal. |

### 7.9.6 *Summary of the recommended regulatory response (ML)*

DSD has assessed that all potential impacts to the Coastal and Marine Environment during construction, operations and post completion have been identified through this assessment and acceptable outcomes have been recommended for all primary impact events where the severity of primary consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for the receiving environment during construction, operation and post completion. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

*DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*

The Tenement Holder must ensure no loss of abundance and diversity of marine flora and fauna from contaminants and dust deposition resulting from mining operations, during operations and post completion.

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event **DSD ML- M1**:*

Strategies for this outcome must be consistent with the recommendations for monitoring programs in Appendix 5.11-A of the Mining Lease Proposal.

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(d) of the Regulations in relation to the outcome for impact event **DSD ML- M1**:*

Measurement Criteria for this outcome must be consistent with the recommendations for monitoring programs in Appendix 5.11-A of the Mining Lease Proposal.

### 7.9.7 *Impact assessment (EML)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0.

Rex has discussed impacts to the coastal and marine environment in the context of the 'pathways and sources' which could lead to impacts to the marine environment as discussed in Section 8.3.9 of the Proposal. There has however been no discussion on the potential impacts to the coastal and marine environment as a result of the EML operations, within section 8.3.9 of the Proposal.

Rex has detailed impacts to terrestrial native flora and terrestrial fauna in Section 8.3.6 and Section 8.3.7 of the Proposal (including impacts, where applicable, to shorebirds and migratory species and coastal flora). Impacts

to the marine environment (marine flora and fauna) have been the focus of assessment in Section 8.3.9 of the Proposal.

**DSD review of Rex impact assessment**
A description of DSD's assessment of the impact assessment process is described in Section 7.0.

DSD has conducted the impact assessment for the EML relating to the coastal and marine as per the relevant sources and pathways, in line with the assessment structure provided in Section 8.3.9 of Proposal by Rex. Hence impacts to the coastal and marine environment are discussed in the applicable sections (relating to the pathway and/or source) of this assessment report. For the EML, the main source and pathway by which the coastal and marine environment may be impacted is via increased sediment loads in downstream water flows as a result of runoff from extractive mineral stockpiles. This impact is discussed in Surface Water (section 7.11 of this report) as per **DSD EML-SW1.** The potential for impacts to the coastal and marine environment from mining dust carried by wind is also a pathway. As discussed in section 7.1.11 Impact Assessment (EML) relating to Air Quality, The anticipated amounts of dust resulting from the proposed EML activities (removal of stockpiles) is considered to be minimal. DSD considers that due to the limited nature of activities within the proposed EML associated with stockpile movement and the placement of waste rock dumps that the risk of air quality impacts on sensitive receptors will be minimal.

Potential impacts from noise will primarily result from mining operations conducted on the ML and hence have not been considered in the context of the marine and coastal environment for EML activities. Noise emissions from the proposed EML activities are expected to be minimal and short term.

Blasting will similarly be restricted to ML operations and hence has not been assessed for the marine and coastal environment in relation to EML activities.

No further impacts are therefore identified as being applicable to the operation of the EML.

### 7.9.8 *Outcomes (EML)*
DSD assessment of outcomes relating to impacts proposed by Rex in the Proposal is included in the relevant section of this report; Surface Water (section 7.11 of this report) as per **DSD EML-SW1**.

### 7.9.9 *Measurement Criteria (EML)*
An assessment of the measurement criteria proposed by Rex for impacts identified by Rex are described in the relevant section of this report; Surface Water (section 7.11 of this report) as per **DSD EML-SW1**.

### 7.9.10 *Summary of the recommended regulatory response (EML)*

DSD has assessed that all potential impacts to the coastal and marine environment during construction, operations and post completion have been identified through this assessment and acceptable outcomes have been recommended in Section 7.11 of this report for all primary impact events where the severity of primary consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for receiving environment during construction, operation and post completion. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

Should a lease be granted DSD recommends the outcomes and requirements specified in the relevant sections of the report which relate to the Coastal and Marine Environment as detailed in Surface Water (section 7.11 of this report).

### 7.9.11 *Impact assessment (MPL)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0.

Rex has discussed impacts to the coastal and marine environment in the context of the 'pathways' which impacts could create an impact to the marine environment as discussed in Section 8.3.9 of the Proposal. Rex has detailed impacts to terrestrial native flora and terrestrial fauna in Section 8.4.5 and Section 8.4.6 of the Proposal (including impacts, where applicable to shorebirds and migratory species and coastal flora). Impacts to the marine environment (marine flora and fauna) have been the focus of assessment in Section 8.4.8 of the Proposal.

Primary 'pathways' which could result in a potential impact on the coastal and marine environment from mine related activities on the MPLs have been identified in the Proposal via air, noise, surface water and groundwater. The impacts have therefore been discussed by Rex in the aforementioned sections of the Proposal in air quality (Section 8.4.1), noise and vibration (Section 8.4.2), surface water (Section 8.4.10) and groundwater (Section 8.4.11). Impacts which could result from soil contamination at the port have been considered in the surface water section.

Rex has incorrectly referenced the impact events associated with the aforementioned pathways in Section 8.3.9 of the Proposal, including:

- **MPL-A5** on page 8-311 of the Proposal, which should read **MPL-A6**
- **MPL-SW1** on page 8-324 of the Proposal, which should read **MPL-SW3**
- **MPL-SW2** on page 8-324 of the Proposal, which should read **MPL-SW4**
- **MPL-SW3** on page 8-324 of the Proposal, which should read **MPL-SW5**

Rex have also not referenced the potential impact to the marine environment which relates to groundwater (**MPL-GW1)** and noise **(MPL-N5)** in Table 8.4-27 of the Proposal, although Rex have discussed this impact in the groundwater and noise sections. Rex has also not discussed closure impacts relating to surface water in Table 8.4-27 of the Proposal however have identified this impact in the surface water section of the Proposal.

Rex has conducted modelling to support their impact assessment for the relevant sources and pathways relating to coastal and marine impacts, including:

- Air quality (discussed in section 7.1 of this report)
- Noise and vibration (discussed in section 7.2 of this report)

Any amendments to the modelling subsequent to the submission of the Proposal and any assessments or technical reviews applicable to assessing the appropriateness and reliability of the modelling are discussed in the relevant sections of this report.

DSD considers that the approach adopted by Rex in the Proposal is suitable as the relevant sources and pathways are discussed in relation to all potential receptors which could be impacted.

In the Proposal Rex has not addressed impacts relating to shipping activities, such as collisions between marine wildlife and vessels, introduction of marine pests present in ballast water or attached to vessel hulls. Nor has Rex addressed impacts to marine biota from anchorage of service vessels (barges) around the jetty for construction and maintenance. In addition damage to the marine environment from direct deposition of concentrate from conveyor and loader spillages has not been assessed in the Proposal. This is because these activities are regulated by other relevant legislation, both Federal and State. As discussed in the Proposal these activities are currently managed by the Australian Maritime Safety Authority and through SA EPA licensing held by the companies using the existing port facilities will be addressed as part of the responsibilities of operating Port Ardrossan. Rex has made an application to DAC under Section 49 and 49A of the Development Act which includes the proposed upgrades to the existing conveyor infrastructure and all of the ship-loading facilities on the jetty at Port Ardrossan. This Development application has been approved under the Development Act. Rex has included the proposed works in the Proposal for information only as this does not fall within the scope of the Act.

Impact from construction activities which are specifically addressed in Rex's Development Application have not been included in this assessment as they are regulated under the Development Act.

**DSD review of Rex impact assessment**
A description of DSD's assessment of the impact assessment process is described in Section 7.0.

DSD has conducted the impact assessment for the MPL relating to the coastal and marine as per the relevant sources and pathways, in line with the assessment structure provided in the Proposal by Rex. Hence impacts to the coastal and marine environment are discussed in the applicable sections (relating to the pathway and/or source) of this assessment report, including:

- Air quality (section 7.1 of this report)
- Noise and vibration (section 7.2 of this report)
- Surface water (section 7.11 of this report)
- Groundwater (section 7.12 of this report); and
- Radiation (section 7.16 of this report)

The DSD assessment references the correct impact identification numbers as they correspond to the applicable sections of the Proposal. A consolidated overview of the impact events relating to the coastal and marine environment, which have been identified by Rex, and the corresponding section where they have been is assessed in this report is shown in Table 7.9.5 and impacts identified by state government identified post submission of Proposal identified in Table 7.9.6.

The Port MPL application has been deferred at the request of Rex and has not been assessed in this report.

**Table 7.9.5 – Impact events identified by Rex in the Proposal**

| ID | Potential impact event<br>As documented in the applicable sections of the Proposal | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **MPL-SW5** | Increased sediment loads in downstream surface water flows causing smothering of marine flora and fauna impacting the marine environment | This impact has been considered in Section 7.11 (Surface Water) of this report | See Section 7.11 |
| **MPL(C)-SW1** | Increased sediment loads in downstream water flows from not properly stabilised land surfaces and/or flooding of adjacent areas from poorly maintained or insufficient drainage. | This impact has been considered in Section 7.11 (Surface Water) of this report | See Section 7.11 |

The State Government, through the assessment process, has identified additional impacts to the coastal and marine environment associated with the proposed mine related activities subsequent to the submission of the Proposal. An assessment of these additional impact events is provided in Table 7.9.6.

**Table 7.9.6 – Impact events identified subsequent to the Proposal**

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **DSD MPL(C)-A1** | Elevated dust continues post mine closure | This impact has been considered in Section 7.1 (Air Quality) of this report | See Section 7.1 |

There are no impact events identified above that require an Outcome to be addressed in this section.

### 7.9.12 *Summary of the recommended regulatory response (MPL)*

DSD has assessed that all potential impacts to the Coastal and Marine environment during construction, operations and post completion have been identified through this assessment and no outcomes are required for the Power line and Pipelines MPL.

**Power line and Pipelines MPL**

*DSD recommends no licence conditions applicable to marine in relation to the Power line and Pipelines MPL.*

## *7.10 Heritage*

### 7.10.1 *Description of Relevant Aspects of Environment*

Mining proposals must consider both indigenous and non-Indigenous heritage (cultural and geological) in their proposed areas of operation.

Rex used the following methods to identify sites of significance in the proposed footprint of the mine and surrounding areas;

- Search of the Aboriginal Sites and Objects (Register) maintained by the Department of Premier and Cabinet, Aboriginal Affairs and Reconciliation branch
- Previous surveys conducted, focusing on the coastal sand dunes (SA Museum) and high elevation areas (developers of proposed wind farm)
- Indigenous archaeological surveys conducted by Dr K Walshe (Archaeologist) and Mr Q Agius within the ML area (2010, 2012)
- Desktop study of historic maps, literature, reports and database searches of sites of non-Indigenous cultural heritage and geological heritage

The Yorke Peninsula is the traditional territory of the Narungga People. The Narungga Nation is composed of four clans; the Kaunara, the Windera, the Wair and the Dilpa. The area surrounding the mine site shows a long period of habitation, mainly around the coastal areas.

A number of Aboriginal Heritage sites were identified in the area surrounding the proposed operations. A complete list and map of approximate locations is provided in Table 5.15-1 and Figure 5.15-1 of the Proposal. One reported site is overlapping with the proposed operations within the proposed MPL corridor. Additional sites have been located on the boundary of the proposed ML and EML leases. No burial remains were found in the footprint of the proposed operations, however three registered sites were identified in the areas of the leases. Surveys conducted during exploration uncovered many Aboriginal objects which were salvaged, in accordance with the *Aboriginal Heritage Act 2006,*at the time and are currently being held by SA Museum, however, no intact sites were identified. These objects consisted of stone, glass and ceramic implements in addition to remains of reef shell.

No sites of non-Indigenous cultural heritage significance were identified within the proposed ML and MPL areas. Three sites were identified

outside of the proposed ML and MPL areas; the Ardrossan Institute, First School, the former Pine Point Grain Shed with associated yard and stone wall. The Harts and Phillips mines are registered geological monuments in the area, both located outside the footprint of the proposed operations. Further geological monuments were identified by DSD and additional information was provided by Rex regarding their location and characteristics in the response document (Appendix 22, Figure 5.16-1).

DSD considers the sensitive receptors within the area of potential impact from the proposed operations for this environmental aspect to be;

- Aboriginal Heritage sites (inclusive of all sites including those not registered or reported yet)
- Geological monuments
- Non-Indigenous cultural heritage sites

DSD considers that the description of environment is a suitable characterisation of the receiving environment which may be affected by mining operations. DSD considers that should a lease be granted Rex undertakes additional studies to support the information provided in the Proposal on Heritage. Details regarding further investigations must be provided in the PEPR.

### 7.10.2 *Views of affected parties*

The CCG identified protection of Aboriginal heritage and the need to ensure relevant staff and contractors receive cultural heritage training as concerns. Rex sought to addressed these concerns in impact event **ML-H1, MPL-H1** and **MPL-H2** and made a commitment to implement a Heritage Management Plan including procedures for identification, protection and/or salvage of heritage items. To ensure all relevant matters have been addressed in relation to Aboriginal heritage, Rex has also consulted with the Department for Premier and Cabinet, Aboriginal Affairs and Reconciliation Branch.

The State Government identified several archaeological sites within the project area. These sites were identified by Rex in the Proposal. Statutory consultation undertaken by DSD identified issues relating to the preservation of sites and the absence of a comprehensive heritage study. Several heritage studies were undertaken by Rex in parts of the proposed ML area during exploration. Heritage studies of the MPL corridor were not conducted. Rex has made a commitment to conduct heritage surveys prior to construction and land disturbance. Should a lease be granted, DSD recommends that this commitment be formalised in a lease condition, consistent with the recommended regulatory response below.

**Table 7.10 – Impact events relating to issues raised during statutory consultation**

| Issues raised during statutory consultation | Addressed |
|---|---|
| Preservation of the Pine Point Porcelain Mine. | **ML-BV8,** see Section 7.3 of this report |
| Preservation of Aboriginal sacred grounds adjacent to, or included in the proposed ML area. | **ML-H1** |
| No heritage study has been undertaken for the mine site despite being in a designated significant Aboriginal Heritage Area. | Discussed above |

The statutory consultation did not identify any additional receptors or impact events to those identified by Rex.

DSD has had regard for all concerns which were raised during statutory consultation, however not all concerns have been included as part of this assessment report as they are either not within the scope of the assessment or are too general in nature to consider.

### 7.10.3 *Impact assessment (ML)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7.

A review of Rex's impact assessment is shown in Table 7.10.1 and impacts identified by state government identified post submission of Proposal identified in Table 7.10.2.

**Table 7.10.1 – Impact events identified by Rex in the Proposal**

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **ML-H1** | Disturbance or damage of Aboriginal objects, sites or remains from mining activity. | Rex has stated that the consequence of this impact occurring without controls implemented is moderate.<br>DSD accepts the conclusion that without controls Aboriginal objects or sites could be disturbed by mining operations.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |
| **ML-BV8** | Disturbance to geological monuments from blasting activities. | This impact has been addressed in Section 8.3.3 of the Proposal and Section 7.3 of this report. DSD acknowledges that no sites of European heritage have been identified. | |

The State Government, through the assessment process, has identified additional impacts to heritage associated with the proposed mining activities subsequent to the submission of the Proposal. An assessment of these additional impact events is provided in Table 7.10.2.

**Table 7.10.2 – Impact events identified subsequent to the Proposal**

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **DSD ML-H1** | Disturbance or damage of non-Indigenous or heritage sites from mining activity. | There is potential for additional non-Indigenous heritage sites to be discovered on site and be disturbed or damaged by mining operations.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes |
| **DSD ML-H2** | Disturbance or damage of caves. | Mining operations can potentially discover caves in limestone features that were otherwise unknown.<br>Rex has stated the area does not show Karst or cave features and DSD, based on its own geological assessment of the area, accepts the low risk of this outcome.<br>DSD assesses the primary consequence of this occurring is trivial and hence **no** outcome is required. | No |

### 7.10.4 *Outcomes (ML)*

Table 7.10.3 is the DSD assessment of outcomes proposed by Rex in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable.

The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed

strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies.

Table 7.10.4 provides outcomes for impact events identified by DSD that were determined in Section 7.10.3 to require an outcome.

**Table 7.10.3 – DSD assessment of outcomes proposed by Rex**

| ID | Assessment of acceptability of outcome | Assessment of achievability of outcome | Recommended regulatory response |
|---|---|---|---|
| **ML-H1**<br><br>**Impact event:** Disturbance or damage of Aboriginal objects, sites or remains from mining activity.<br><br>**Rex Proposed Outcome:** No disturbance to Aboriginal sites, objects or remains from mining operations unless prior approval under the relevant legislation is obtained. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex considers control strategies will reduce this impact to a level of low.<br><br>Proposed strategies include heritage surveys to record and identify any objects or sites and ensure heritage objects are avoided, salvaged and/or protected. Further details would need to be provided demonstrating how this will be achieved. Exploration activities undertaken by Rex included the engagement of a recognised cultural heritage representative on site when land disturbance was undertaken to identify and if necessary salvage any objects found.<br><br>There was a registered archaeological site identified on the proposed ML/EML boundary. Further control strategies will need to be provided in the PEPR regarding how this will be protected. Given that no mining operations are proposed close to this site protection is considered achievable.<br><br>DSD has determined that there is potential for impacts to non-indigenous objects, sites and remains, as identified in impact event **DSD ML-H1.** It is recommended that an outcome relating to all heritage sites (both Aboriginal and European), objects or remains be included.<br><br>DSD considers that the outcome proposed by Rex did not encompass all potential impacts, and therefore should be replaced by the proposed DSD outcome. This outcome is considered achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*<br><br>The Tenement Holder must, in constructing and operating the Lease, ensure that there is no disturbance to Aboriginal or European heritage sites, objects or remains unless prior approval under the relevant legislation is obtained.<br><br>*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event **ML – H1**:*<br>An Aboriginal heritage survey to be carried out with the representatives of the Traditional Owners prior to the disturbance of land, to identify and document Aboriginal sites and objects for all land to be disturbed. |

**Table 7.10.4 – Discussion of outcomes for impacts identified by DSD**

| ID | Acceptability of outcome | Achievability of outcome | Recommended regulatory response |
|---|---|---|---|
| **DSD ML-H1**<br><br>**Impact event:** Disturbance or damage of non-Indigenous or geological heritage sites from mining activity.<br><br>**Outcome:** Outcomes based on DSD regulatory Response for **ML-H1**. | The outcome accurately describes the level of impact.<br><br>The outcome is considered a suitable statement on the acceptable level of impact on the environment. | Should non–indigenous heritage sites be identified, DSD considers that the outcome would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*<br><br>The Tenement Holder must, in constructing and operating the Lease, ensure that there is no disturbance to Aboriginal or European heritage sites, objects or remains unless prior approval under the relevant legislation is obtained. |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex.

### 7.10.5 *Measurement Criteria (ML)*

Table 7.10.5 is DSDs assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

## Table 7.10.5 – DSD assessment on measurement criteria

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **ML-H1**<br>**Potential Impact:** Disturbance or damage of Aboriginal objects, sites or remains from mining activity.<br>**Recommended Outcome:** The Tenement Holder must, in constructing and operating the Lease, ensure that there is no disturbance to Aboriginal or European heritage sites, objects or remains unless prior approval under the relevant legislation is obtained. | Evidence that appropriate authorisation will be obtained under the relevant legislation prior to the commencement of construction to disturb Aboriginal objects and sites. | This measurement criteria would indicate authorisation to disturb Aboriginal heritage sites currently identified within the proposed ML area it does not take into consideration the potential for discovery of new sites, objects or remains.<br>Measurement criteria would need to include recording/evidence that upon discovery of a potential site, object or remain work ceased until authorisation from the appropriate authority was given. In addition to including records/evidence, the wording of the proposed Measurement Criteria must be changed from 'will be obtained' to 'has been obtained, to suitably reflect this.<br>DSD considers there are appropriate methodologies available which would allow the demonstration of achievement of the outcome. DSD considers that achievement of the recommended outcome would be measurable. Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |
| **DSD ML-H1**<br>**Potential Impact:** Disturbance or damage of non-Indigenous or geological heritage sites from mining activity.<br>**Recommended Outcome:** The Tenement Holder must, in constructing and operating the Lease, ensure that there is no disturbance to Aboriginal or European heritage sites, objects or remains unless prior approval under the relevant legislation is obtained. | Rex has not proposed criteria for this outcome. | Measurement criteria will need to include (but not limited to) recording/evidence that upon discovery of a potential site, object or remain, work had ceased until authorisation from the appropriate authority was given. DSD considers there is methodology appropriate to demonstrate achievement of the outcome.<br>DSD considers that achievement of the recommended outcome would be measurable.<br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |

### 7.10.6 *Summary of the recommended regulatory response (ML)*

DSD has assessed that all potential impacts to heritage, both Indigenous and non-Indigenous, during construction, operations and post completion have been identified through this assessment. Acceptable outcomes have been recommended for all primary impact events where the severity of primary consequence has been assessed by DSD to be greater than 'trivial'. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for sensitive receptors during construction, operation and post completion. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

*DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*

The Tenement Holder must, in constructing and operating the Lease, ensure that there is no disturbance to Aboriginal or European heritage sites, objects or remains unless prior approval under the relevant legislation is obtained.

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event **ML – H1**:*

An Aboriginal heritage survey to be carried out with the representatives of the Traditional Owners prior to the disturbance of land, to identify and document Aboriginal sites and objects for all land to be disturbed.

### 7.10.7 *Impact assessment (EML)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0. Rex have stated that EML activities involving the subsequent removal of overburden stockpiles created through road diversion works undertaken under a Development authorisation is not considered land disturbance and thus has not been assessed.

**DSD review of Rex impact assessment**

DSD concurs with Rex that land disturbance associated with EML activities that poses risk to Indigenous heritage is part of the road diversion and as such has been assessed under the Development Act. It is noted that archaeological sites were identified within the boundaries of the EML, however, operations are not proposed nearby the area. This impact is similar to **ML-H1** and thus the above assessment is applicable to this tenement. The lease requirements for impact event **ML-H1** are also recommended for the proposed EML.

### 7.10.8 *Summary of the recommended regulatory response (EML)*

Further to the discussion in Section 7.10.3 relating to the ML, DSD has assessed that all potential impacts to heritage during construction, operations and post completion have been identified through this assessment and acceptable outcomes have been recommended for all primary impact events where the severity of the primary consequence is greater than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for sensitive receptors during construction, operation and post completion. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

*DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*

The Tenement Holder must, in constructing and operating the Lease, ensure that there is no disturbance to Aboriginal or European heritage sites, objects or remains unless prior approval under the relevant legislation is obtained.

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the Heritage outcome for the **EML**:*

An Aboriginal heritage survey to be carried out with the representatives of the Traditional Owners prior to the disturbance of land, to identify and document Aboriginal sites and objects for all land to be disturbed.

### 7.10.9 *Impact assessment (MPL)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0. Rex states that a contractor would be used to install, commission, supply and decommission the power lines along the MPL corridor and as such would be responsible for all heritage management which was not included in the impact assessment.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7.0. DSD have assessed that as the tenement holder Rex is responsible for all heritage management upon their tenements in relation to the mine related activities, regardless of whether the work is undertaken by Rex or a third party. Potential impacts from installation of the power line have been included in this assessment and further information would be included in the PEPR.

A review of Rex's impact assessment is shown in Table 7.10.6 and impacts identified by state government identified post submission of Proposal identified in Table 7.10.7.

The Port MPL application has been deferred at the request of Rex and has not been assessed in this report.

**Table 7.10.6 – Impact events identified by Rex in the Proposal**

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **MPL-H2** | Disturbance and damage of Aboriginal objects, sites and remains during construction of the corridor. | Rex has stated that the consequence of this impact occurring without controls implemented is high. Based on DSD's assessment, this increase in risk rating from the ML assessment is due to the MPL traversing a larger number of drainage lines, as well as being located closer to the coastline.<br>There is potential for land disturbance associated with the construction of the corridor to uncover and disturb Aboriginal objects, sites or remains.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |

The State Government, through the assessment process, has identified additional impacts to heritage associated with the proposed mine related activities subsequent to the submission of the Proposal. An assessment of these additional impact events is provided in Table 7.10.7.

**Table 7.10.7 – Impact events identified subsequent to the Proposal**

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **DSD MPL-H1** | Disturbance or damage of non-Indigenous or heritage sites from mining activity. | There is a potential for additional non-Indigenous heritage sites to be discovered on site and potential disturbed or damaged from mining operations.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes |
| **DSD MPL-H2** | Damage to geological monument Horse Gully. | Horse Gully is within the proposed MPL corridor and the proposed power line will intersect this gully. Rex have stated that there may be damage from installation of the power line but that it hadn't been assessed as it would be undertaken by a third party. DSD considers that Rex is responsible for the work of third party contractors on any mining Tenement. Horse Gully was declared a geological monument due to the presence of fossils from the Cambrian Period. Sinking of power poles, vehicle movements and other activities associated with power line construction have the potential to impact this site.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes |
| **DSD MPL-H3** | Access to geological monuments. | An assessment by DSD of the information provided in the Proposal, has determined that the activities occurring on the MPL will not restrict access to Horse Gully.<br>DSD assesses that the primary consequence of this occurring is trivial and hence **no** outcome is required. | No |

### 7.10.10 *Outcomes (MPL)*

Table 7.10.8 is the DSD assessment of outcomes proposed by Rex in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable.

The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies.

Table 7.10.9 provides outcomes for impact events identified by DSD that were determined in section 7.10.9 to require an outcome.

**Table 7.10.8 – DSD assessment of outcomes proposed by Rex**

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **MPL-H2**<br><br>**Impact event:** Disturbance and damage of Aboriginal objects, sites and remains during construction of the corridor.<br><br>**Rex Proposed Outcome:** No disturbance to Aboriginal sites, objects or remains from mining operations unless prior approval under the relevant legislation is obtained. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex considers control strategies will reduce this impact to a level of low.<br><br>Proposed strategies include heritage surveys to record and identify any objects or sites and ensure heritage objects are avoided, salvaged and/or protected. Further details would need to be provided demonstrating how this would be achieved. Exploration activities undertaken by Rex included the engagement of a recognised cultural heritage representative on site when land disturbance was undertaken to identify and if necessary salvage any objects found. No heritage surveys were conducted on the proposed MPL area.<br><br>As identified in impact event **DSD MPL-H1** impacts relating to other types of heritage are possible and it is recommended that an outcome relating to all heritage sites, objects or remains be included.<br><br>An archaeological site was identified on the boundary of the proposed MPL during statutory consultation. Further details regarding how this will be managed would need to be included in the PEPR.<br><br>DSD considers that the outcome recommended by Rex would be achievable. | *DSD recommends that should a licence be granted the following outcome be a requirement of the licence:*<br><br>The Tenement Holder must, in constructing and operating the Licence, ensure that there is no disturbance to Aboriginal or European heritage sites, objects or remains unless prior approval under the relevant legislation is obtained.<br><br>*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event **MPL – H2**:*<br><br>An Aboriginal heritage survey to be carried out with the representatives of the Traditional Owners prior to the disturbance of land, to identify and document Aboriginal sites and objects for all land to be disturbed. |

**Table 7.10.9 – Discussion of outcomes for impacts identified by DSD**

| *Discussion of outcomes for impacts identified by DSD* | | | |
|---|---|---|---|
| **ID** | **Acceptability of outcome** | **Achievability of outcome** | **Recommended regulatory response** |
| **DSD MPL-H1**<br><br>**Impact event:** Disturbance or damage of non-Indigenous or heritage sites from mining activity.<br><br>**Outcome:** Outcomes based on DSD regulatory Response for **MPL-H2**. | The outcome accurately describes the level of impact.<br><br>The outcome is considered a suitable statement on the acceptable level of impact on the environment. | The proposed strategies discussed under impact **MPL-H2** relating to identification and protection of Aboriginal heritage sites would be readily applicable to non-Indigenous sites.<br><br>DSD considers that the outcome would be achievable. | *DSD recommends that should a licence be granted the following outcome be a requirement of the licence:*<br><br>The Tenement Holder must, in constructing and operating the Licence, ensure that there is no disturbance to Aboriginal or European heritage sites, objects or remains unless prior approval under the relevant legislation is obtained. |
| **DSD MPL-H2**<br><br>**Impact event:** Damage to geological monument Horse Gully.<br><br>**Outcome:** DSD proposes the following outcome;<br><br>No disturbance to Geological monuments in constructing and operating the Licence unless prior approval under the relevant legislation is obtained. | The outcome accurately describes the level of impact.<br><br>The outcome is considered a suitable statement on the acceptable level of impact on the environment. | DSD has determined the most appropriate option to ensure achievement of the outcome would be avoidance of the site and thus no compromise to the values of that site. As the proposed powerline intersects this site it is possible that avoidance is not practicable. In this case surveys will need to be conducted around the location of disturbance to ensure that there are no fossils in the proposed disturbance footprint.<br><br>DSD considers that the outcome would be achievable. | *DSD recommends that should a licence be granted the following outcome be a requirement of the licence:*<br><br>The Tenement Holder must, in constructing and operating the Licence, ensure that there is no disturbance to Geological monuments unless prior approval under the relevant legislation is obtained. |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex or identified by DSD.

### 7.10.11 *Measurement Criteria (MPL)*

Table 7.10.10 is DSDs assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

**Table 7.10.10 – DSD assessment on measurement criteria**

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **MPL-H2**<br><br>**Potential Impact:** Disturbance and damage of Aboriginal objects, sites and remains during construction of the corridor.<br><br>**Recommended Outcome:** The Tenement Holder must, in constructing and operating the Licence, ensure that there is no disturbance to Aboriginal or European heritage sites, objects or remains unless prior approval under the relevant legislation is obtained. | Evidence that appropriate authorisation will be obtained under the relevant legislation prior to the commencement of construction to disturb Aboriginal objects and sites. | This measurement criteria would indicate authorisation to disturb Aboriginal heritage sites currently identified within the proposed MPL area, it does not take into consideration the potential for discovery of new sites, objects or remains. Measurement criteria would need to include (but not limited to) recording/evidence that upon discovery of a potential site, object or remain, work had ceased until authorisation from the appropriate authority was given. In addition to including records/evidence, the wording of the proposed Measurement Criteria must be changed from 'will be obtained' to 'has been obtained', to suitably reflect this.<br><br>DSD considers there are appropriate methodologies available which would allow appropriate the demonstration of achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no licence requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no licence conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **DSD MPL-H1**<br><br>**Potential Impact:** Disturbance or damage of non-Indigenous or heritage sites from mining activity.<br><br>**Recommended Outcome:** The Tenement Holder must, in constructing and operating the Licence, ensure that there is no disturbance to Aboriginal or European heritage sites, objects or remains unless prior approval under the relevant legislation is obtained. | Rex has not proposed criteria for this outcome. | Measurement criteria would need to include (but not limited to) recording/evidence that upon discovery of a potential site, object or remain, work had ceased until authorisation from the appropriate authority was given.<br><br>DSD considers there are appropriate methodologies available which would allow appropriate the demonstration of achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no licence requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no licence conditions applicable to the measurement criteria are required. |
| **DSD MPL-H2**<br><br>**Potential Impact:** Damage to geological monument Horse Gully.<br><br>**Recommended Outcome:** The Tenement Holder must, in constructing and operating the Licence, ensure that there is no disturbance to Geological monuments unless prior approval under the relevant legislation is obtained. | Rex has not proposed criteria for this outcome. | Measurement criterion would need to include records showing that the geological monument was avoided or surveys were undertaken to ensure that activities did not disturb areas of fossils. This would include pre-disturbance surveys and records of any discovering made during activities and how the discoveries were managed.<br><br>DSD considers there are appropriate methodologies available which would allow appropriate the demonstration of achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no licence requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no licence conditions applicable to the measurement criteria are required. |

### 7.10.12 *Summary of the recommended regulatory response (MPL)*

DSD has assessed that all potential impacts to heritage during construction, operations and post completion have been identified through this assessment and acceptable outcomes have been recommended for all primary impact events where the severity of primary consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for sensitive receptors during construction, operation and post completion. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

**Power line and Pipelines MPL**

*DSD recommends that should a licence be granted the following outcome be a requirement of the licence:*

The Tenement Holder must, in constructing and operating the Licence, ensure that there is no disturbance to Aboriginal or European heritage sites, objects or remains unless prior approval under the relevant legislation is obtained.

The Tenement Holder must, in constructing and operating the Licence, ensure that there is no disturbance to Geological monuments unless prior approval under the relevant legislation is obtained.

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event* ***MPL – H1:***

An Aboriginal heritage survey to be carried out with the representatives of the Traditional Owners prior to the disturbance of land, to identify and document Aboriginal sites and objects for all land to be disturbed.

## *7.11 Surface Water*

### 7.11.1 *Description of Relevant Aspects of Environment*

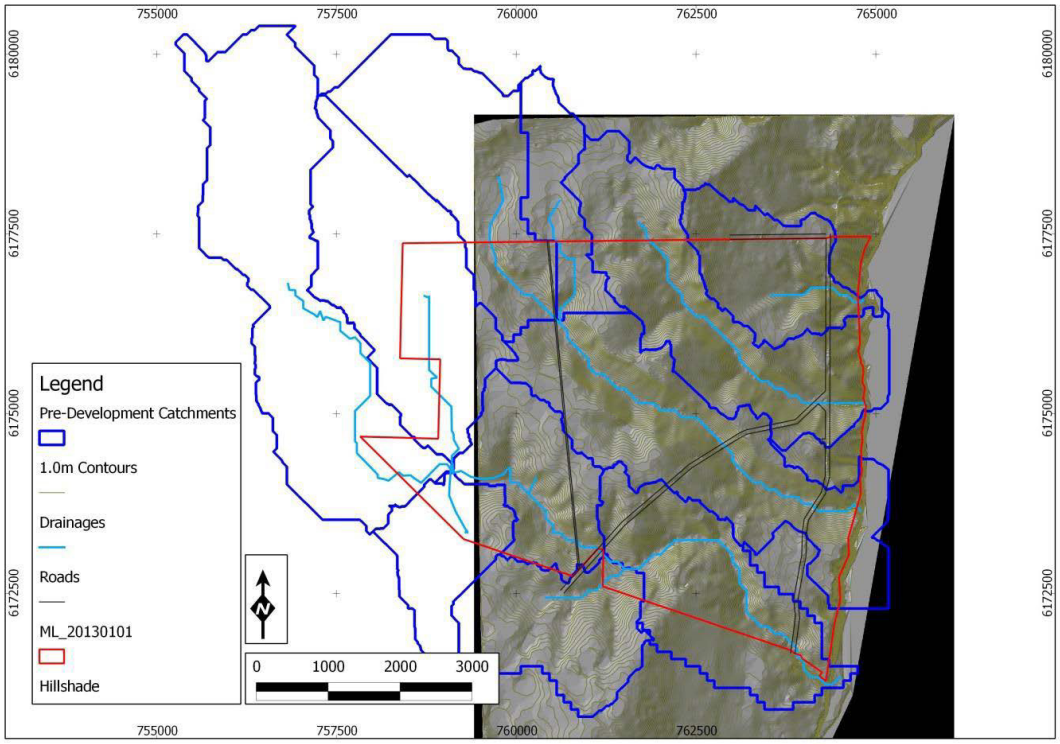
Rex has provided a detailed description of surface topography and existing catchments in Section 5.9 of the Proposal. Further detail is provided in Appendix 5.9-A Surface Hydrology Report which provides a study of the existing surface water regime including runoff and flood extent estimations for the Hillside project, and initial advice regarding the need for drainage control infrastructure.

Yorke Peninsula has little catchment drainage definition due to its underlying geology and consequent geomorphology; surface water catchments have also been altered by land clearance and subsequent land management practices. The Proposal describes land surrounding the proposed ML area as being relatively flat. Slopes in the western section of the proposed ML are generally less than 1.5%, and increase to approximately 3% toward the east around existing drainage channels.

Sheet flow is described as the dominant catchment drainage regime, particularly in the upper reaches of the catchments. In the lower reaches, channel flow crosses Yorke Highway and St Vincent Highway via culverts. On occasions where high rainfall generates runoff, flow ultimately drains through existing channels to Gulf St Vincent. The Proposal states that there are no existing upstream dams or drains.

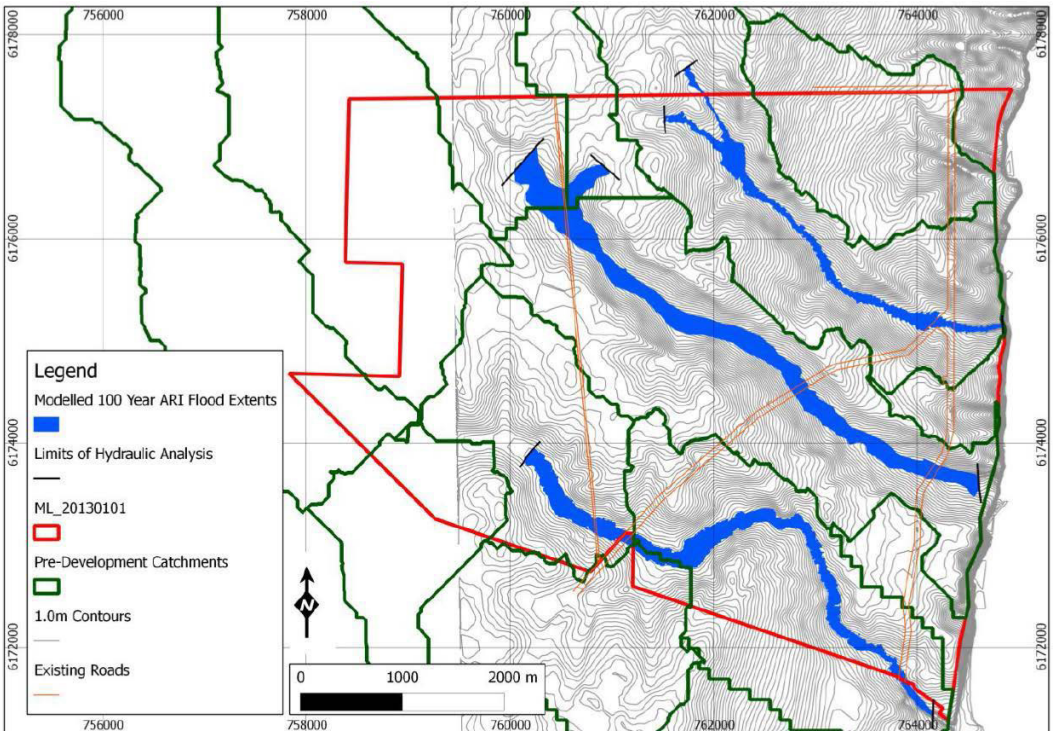
The topography at Port Ardrossan has been altered by installation of hardstand areas and established drainage control infrastructure.

Catchment areas and drainage lines based on existing terrain data for the proposed ML were calculated in Appendix 5.9-A using GIS tools. The existing sub-catchments and drainage paths are shown in the following figure, taken from the Response Document.




Due to the low average annual precipitation (explained in Section 5.7.1 of the Proposal), the flat terrain, and relatively high infiltration capacity of the soil (explained in Section 5.14 of the Proposal), significant runoff is unlikely to be generated at the site under normal conditions.

There is however potential for the generation of significant runoff during storm events. The extent of the 100 year Average Recurrence Interval (ARI) was modelled as part of the studies detailed in the Hydrology Report (Appendix 5.9-A). The extent of the 100 year ARI peak flood for existing catchments is shown in the following figure taken from Appendix 5.9-A.




Rex has identified that there are no known users of surface water or any water dependent ecosystems in the area, as there are no significant inputs of surface water at the site. Dams are not a feature of the region, as piped water is the primary water source for irrigation and livestock.

The project area is not within a South Australian Water Protection Area.

The proposed infrastructure corridor MPL traverses numerous natural ephemeral drainage channels that flow in a general easterly direction, exiting into Gulf St Vincent. No specific investigations or detail is provided in the MPL application on these catchments.

DSD considers the sensitive receptors for surface water to be native vegetation within downstream drainage channels, the receiving marine environment, agricultural land on and immediately adjoining the ML and public roads.

DSD considers that the description of environment is a suitable characterisation of the receiving environment which may be affected by mining operations.

### 7.11.2 *Views of affected parties*

Rex explains that prior to the submission of the Proposal, the CCG expressed level of concern regarding impacts on surface water quality, water dependant ecosystems, and impacts on flow regimes and surface/ground water interactions.

During the statutory consultation, specific concerns were raised pertaining to:

- Water pollution (including Copper and AMD)
- Ability to deal with large amounts of runoff or excess water
- Interaction of seawater, freshwater and groundwater
- Contamination of rainwater tanks and dams from mine generated dust

Additional concerns were raised pertaining to water usage, including:

- Use of River Murray (source) water for mining activities
- Amount of water needed
- Drought provisions (how will the water consumption by the mine be affected by drought and water restrictions)

The statutory consultation did not identify any additional receptors or impact events to those identified by Rex.

DSD has had regard for all concerns which were raised during statutory consultation, however not all concerns have been included as part of this assessment report as they are either not within the scope of the assessment or are too general in nature to consider.

### 7.11.3 *Impact assessment (ML and EML)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0. The environmental impact assessment for surface water is provided in Section 8.3.11 of the Proposal for the ML, and Section 8.4.10 for the MPLs. No impacts have been identified or assessed for the proposed EML.

The ML surface water impact assessment utilises information provided in the Pre-feasibility Hydrology Report (Appendix 5.9-A of the Proposal). This report defined existing catchments that contribute runoff to the proposed mining area, undertook a detailed hydrological study investigating potential impacts of flooding on the proposed operation at the Hillside project and provided runoff and flood extent estimations for the 100 year ARI storm event.

Rex found that in a normal rainfall year, impacts arising from the interaction of surface water and mine infrastructure were expected to be minimal. Hydrological modelling and analysis using the runoff and stream flow routing software RORB indicated that the project will alter the natural drainage regime, and that impacts arising from these changes may be significant under severe rainfall events. Assumptions and limitations of the analysis are detailed in Section 2.3 of Appendix 5.9-A. One key limitation was that no stream flow data was available for the site to calibrate the model against, and so adopted parameters contain uncertainty. DSD recommends that the model be calibrated once site specific data becomes available for ephemeral drainage systems.

**DSD review of Rex impact assessment**
A description of DSD's assessment of the impact assessment process is described in Section 7.0.

A review of Rex's impact assessment is shown in Table 7.12.1 and impacts identified by State Government post submission of the Proposal are included in Table 7.11.2.'

**Table 7.11.1 – Impact events identified by Rex in the Proposal**

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD determination if an outcome is required** |
| **ML-SW1** | Disruption of downstream water flows resulting on loss of abundance of native flora | Rex has stated that the consequence of this impact occurring without controls implemented is minor<br>Surface flow modelling undertaken by Rex predicts that the development of the mine will result in a decrease in surface water quantity in three of the existing four drainage lines which contain native vegetation. The reduction in water available for the vegetation will result in some level of loss of abundance of the native vegetation located downstream of the three drainage lines.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required.<br>Rex, in the Proposal, has not included a residual risk assessment for this impact event as it has for all other impact events under surface water. | Yes<br>Rex has provided an outcome |
| **ML-SW2** | Increased sediment loads in downstream surface water flows | Rex has stated that the consequence of this impact occurring without controls implemented is minor<br>Mine related land disturbance has the potential to create an increase in sediment loads in runoff during rainfall events. This sediment would ultimately deposit onto neighbouring agricultural land, or where it enters drainage channels sediment may discharge into the marine environment approximately 1km away.<br>Runoff from the WRD's and TSF has the potential to contain high sediment loads that could enter the receiving environment.<br>Although the volumes of sediment released are expected by Rex to be low compared to regional agricultural releases, DSD considers that the consequence of release of additional sediment without appropriate controls to be greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |

*Impact events identified by Rex in the Proposal*

| ID | Potential impact event | DSD assessment of impact event | DSD determination if an outcome is required |
|---|---|---|---|
| **ML-SW3** | Contamination of surface water run-off with mine hydrocarbons and process chemicals | Rex has stated that the consequence of this impact occurring without controls implemented is minor<br>There is a potential for mining related activities to cause contamination of surface water runoff which during high rainfall events may impact on native flora, agricultural land downstream and also the marine environment where the existing drainage channels discharge. Sources of the contamination are considered to include hydrocarbons, mine process chemicals, acid mine drainage from off the WRD/TSF and oxide stockpiles, and leaching of copper minerals through oxide ore stockpiles.<br>Contaminated surface runoff may also lead to contamination of soils on and off the mine site. This impact is assessed under the Section 7.5 (Soils) of this report.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |
| **ML-SW4** | Increased salinity of surface water run-off resulting in salt scald or salt deposition downstream of the mine site | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>The use of either seawater or extracted high salinity groundwater for dust suppression has the potential to cause an increase in salt loading of soils, and increase in salinity of surface water runoff which could deposit on adjoining farmland or areas of native vegetation,<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |
| **ML-SW5** | Acid mine drainage transported by surface water run-off resulting in contamination to surrounding environment | Rex has stated that the consequence of this impact occurring without controls implemented is moderate.<br>The geological information provided by Rex in the Proposal and Response Document has identified the existence of Potentially Acid Forming minerals. Without suitable management the excavation of these materials and incorrect storage could lead to the generation of AMD and subsequent impacts on the surrounding environment through transportation in surface water.<br>DSD assesses the primary consequence of this impact occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |

*Impact events identified by Rex in the Proposal*

| ID | Potential impact event | DSD assessment of impact event | DSD determination if an outcome is required |
|---|---|---|---|
| **ML-SW6** | Dissolved copper ions transported by surface water run-off causing contamination to surrounding environment. | Rex has stated that the consequence of this impact occurring without the implementation of controls is minor.<br>Contamination of surface water by leaching of copper minerals through oxide ore stockpiles has been included in the impact assessment under **ML-SW-3.**<br>DSD assesses that the primary consequence of this impact occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |
| **ML-SW7** | Inundation of public roads due to changes in the natural surface water flow | Rex has stated that the consequence of this impact occurring without controls implemented is moderate.<br>Rex has undertaken modelling of the extent of flooding from a 100 year ARI storm event following mine development. This has shown that where runoff from a catchment is obstructed by mining infrastructure and is unable to flow to the natural outlet there is a potential for flooding to occur. This may impact on adjoining receptors including public roads.<br>DSD has assessed that the primary consequence of this impact occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |
| **ML-SW8** | Inundation of agricultural land due to changes in the natural surface water flow resulting in loss of crop | Rex has stated that the consequence of this impact occurring without controls implemented is moderate.<br>As discussed above in ML-SW7, mine development has the potential to cause flooding on adjoining land, which includes cropping land.<br>DSD has assessed that the primary consequence of this impact occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |

*Impact events identified by Rex in the Proposal*

| ID | Potential impact event | DSD assessment of impact event | DSD determination if an outcome is required |
|---|---|---|---|
| **ML-SW9** | Inundation of areas of remnant vegetation due to changes in the natural water flow resulting in a reduction in abundance of native flora | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>As discussed above in ML-SW7, mine development has the potential to cause flooding on adjoining land. This includes some areas of existing native vegetation. Rex has identified that native vegetation within the potential flood zone is limited to a small patch and roadside vegetation which is of generally poor condition. Temporary inundation is not expected to cause significant impact to this vegetation.<br>DSD has assessed that the primary consequence of this impact occurring is trivial and hence no outcome is required. | No |
| **ML-TSF5** | Discharge of contaminated water from tailings or return water pipeline failure. | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>There is a potential of failure of the proposed tailings and return water pipeline, which would lead to a discharge of contaminated water. If this occurs coincident with high rainfall events this could lead to contaminated surface runoff discharging to agricultural land or to the marine environment.<br>DSD has assessed that the primary consequence of this impact occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |
| **ML-TSF6** | Discharge of contaminated water by discharge through the spillway. | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>There is a potential of discharge of contaminated water through the Decant Storage Collection Pond (DSCP) spillway during major storm events, particularly with a high initial pond level, and high stored tailing level. The contaminated water could impact on neighbouring agricultural land.<br>DSD has assessed that the primary consequence of this impact occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |

*Impact events identified by Rex in the Proposal*

| ID | Potential impact event | DSD assessment of impact event | DSD determination if an outcome is required |
|---|---|---|---|
| **ML- W1** | Soil or water contamination due to incorrect waste disposal | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>Rex has proposed that all waste and recyclables will be disposed of at off-site facilities. The assessment of impacts associated with the impacts of industrial waste is dealt with in the Soils Impact Assessment (Section 7.5)<br>Given waste will not be disposed on the site, DSD assesses the primary consequence of this impact occurring is trivial and hence no outcome is required. | No |
| **ML(C)-SW1** | Increased sediment loads in downstream water flows | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>Following mine closure and the rehabilitation of disturbed land and mine waste landforms, DSD considers that there is still potential of increased sediment loads in drainage channels during heavy rainfall events, and that this may either discharge to the marine environment or settle on agricultural land.<br>DSD has assessed that the primary consequence of this impact occurring is greater than trivial and hence an outcome is required. | Yes |
| **ML(C)-SW2** | Leachates (AMD & dissolved copper ions) chemically unstable at closure causing contamination to the surrounding environment. | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>Following mine closure and the rehabilitation of disturbed land and mine waste landforms, DSD considers that there remains a potential for contamination of surface water runoff through a range of sources. These include PAF material that is treated and managed to design specifications, AMD from the TSF and mine waste landforms which may be exposed post completion and dissolved copper ions from remnant oxide ore.<br>Runoff which comes into contact with contaminants has the potential to flow offsite and impact on either land or the marine environment.<br>DSD has assessed that the primary consequence of this impact occurring is greater than trivial and hence an outcome is required. | Yes |

The State Government, through the assessment process, has identified an additional surface water impact associated with the proposed mining activities subsequent to the submission of the Proposal. An assessment of these additional impact events is provided in Table 7.11.2.

**Table 7.11.2 – Impact events identified subsequent to the Proposal**

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **DSD ML (c) - SW1** | Inundation of public roads or agricultural land *post completion* due to changes in the natural surface water flow | As discussed under impact ID ML- SW7, Rex has undertaken modelling of the extent of flooding from a 100 year ARI storm event following mine development. The results of this is provided in the Surface Hydrology Report (Proposal Appendix 5.9-A). The report predicts that where runoff from a catchment is obstructed by mining infrastructure (such as behind waste rock dump landforms), and is unable to flow to the natural outlet, there is a potential for flooding or inundation to occur.<br>As waste rock dumps will remain following closure, the potential for this impact event will remain.<br>DSD considers the consequence without controls implemented to be greater than trivial and hence an outcome is required. | Yes |
| **DSD EML – SW1** | Increased sediment loads in downstream water flows as a result of runoff from extractive mineral stockpiles | Rex has indicated in Section 6.5.8.1of the Proposal that EML material (temporary topsoil and overburden stockpiles from the highway realignment) will be located within the road corridor and MPL pipeline corridor.<br>DSD considers that there is a potential of runoff transporting sediment off these stockpiles, leading to an increased sediment load in drainage channels during heavy rainfall events, and that this may either discharge to the marine environment or settle on agricultural land.<br>DSD considers the consequence without controls implemented to be greater than trivial and hence an outcome is required. | Yes |

### 7.11.4 *Outcomes (ML and EML)*

Table 7.11.3 is the DSD assessment of outcomes proposed by Rex in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable. The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies. Table 7.11.4 provides outcomes for impact events identified by DSD that were determined in section 7.12.3 to require an outcome.

## Table 7.11.3 – DSD assessment of outcomes proposed by Rex

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-SW1**<br>**Impact event:**<br>Disruption of downstream water flows resulting on loss of abundance of native flora<br><br>**Rex Proposed Outcome:**<br>None provided | No outcome provided | Rex in the Proposal has not provided a discussion on control and management strategies, or a residual risk assessment for potential impacts on native vegetation caused by reductions in downstream surface water flows.<br><br>Although no specific strategies are proposed to minimise impacts (clearance) to native vegetation from this particular impact event, Rex has in the native vegetation impact assessment (Section 8.3.6 of the Proposal) stated that clearance of some areas of native vegetation will be unavoidable and required as part of the proposed operations. The control and management strategies proposed including progressive rehabilitation and provision of a Significant Environmental Benefit (SEB). Further information on the SEB will be included in the Native Vegetation Management Plan (NVMP), to be submitted with the PEPR. This should include an assessment of the likely nature of disturbance to native vegetation through disruption of downstream water flows.<br><br>Rex has proposed the following outcome as part of the native vegetation impact assessment:<br>*'No loss of density and/or diversity of native vegetation on or off the lease through clearance, dust suppression, fire, or other damage unless prior approval under the relevant legislation is obtained.'*<br>DSD considers that the outcome be amended to include 'reduction in water supply' as a further potential impact event for native vegetation.<br>DSD considers that with the provision of a suitable SEB as part of an approved NVMP, this outcome would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*<br><br>The Tenement Holder must, in constructing and operating the lease ensure no loss of abundance or diversity of native vegetation on or off the lease through;<br>• Clearance;<br>• Dust/contaminant deposition;<br>• Fire;<br>• Reduction in water supply, or<br>• Other damage<br><br>unless prior approval under the relevant legislation is obtained. |

| *DSD assessment of outcomes proposed by Rex* | | | |
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| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-SW2**<br>**Impact event:** Increased sediment loads in downstream surface water flows<br>**Rex Proposed Outcome:** No water contaminated as a result of mining operations leaves the lease area or results in contamination of soil on or off the lease | The proposed outcome does accurately describe the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex proposes to separate runoff from disturbed areas including stockpiles, the TSF and WRDs from natural drainage system. Drainage control was interpreted from the Pre-feasibility Hydrology Report (Appendix 5.9-A of the Proposal), which assessed the likely interactions of extreme storm events within the project are, and provided an assessment of the requirement for engineered drainage controls such as diversions, drains, bunds and retention ponds.<br>Runoff from the disturbed areas will be either retained in ponds to allow suspended sediment loads and other contaminants to be reduced acceptable levels prior to discharge, or directed to water reclaim infrastructure for re-use in the process. Drains and ponds will be designed to contain runoff and be suitably constructed and lined as is required for the storm event ARI. Silt traps will be constructed where necessary and managed to reduce the probability of sediment bearing run-off. Significant features such as WRDs will be designed to manage runoff and erosion. Progressive rehabilitation is proposed of disturbed areas to minimise sediment removal during operations. Further detail on erosion and silt control and drainage is contained in Section 6.8.8, and Appendix 5.9-A of the Proposal. The exact locations and design of sediment management structures will be provided as part of a final design should a lease be granted.<br><br>Rex considers control and management strategies will reduce this impact to a level of low.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | *DSD recommends that should a lease be granted the following outcome be a condition of the lease:*<br><br>The Tenement Holder must:<br>1. ensure no surface water contaminated as a result of mining operations leaves the Lease area; and<br>2. ensure that, apart from water contained in the pit void:<br>2.1 no surface water contaminated prior to mine completion remains within the Lease area after mine completion; and<br>2.2 no contamination of surface water occurs after mine completion as a result of mining operations within the Lease area.<br>*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event <**ML-SW2**>;*<br><br>Progressive landform stabilisation methods and utilisation of energy dissipation where necessary to minimise sediment loads in run-off from disturbed areas and landforms. |

| *DSD assessment of outcomes proposed by Rex* | | | |
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| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-SW3**<br>**Impact event:** Contamination of surface water run-off with mine hydrocarbons and process chemicals<br>**Rex Proposed Outcome:** No contamination and /or pollution of natural water drainage systems, streams, and rivers, groundwater, land and soils occurs either on or off the mining lease is caused by waste products and hazardous material used in the mine operations | The proposed outcome does accurately describe the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex proposes to install perimeter bunding and diversion drains to divert upstream clean run-off around mine infrastructure for flow on to the downstream receiving environment. Rex also proposes to store hydrocarbons and process chemicals in accordance with EPA bunding and spill management guidelines, and applicable Australian Standards. Workshop and plant areas will have concrete lined sumps and oily water separators where necessary.<br><br>Rex considers that implementation of these control and management strategies will reduce this impact to a level of low.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | *DSD recommends that should a lease be granted the following outcome be a condition of the lease:*<br><br>The Tenement Holder must:<br>1. ensure no surface water contaminated as a result of mining operations leaves the Lease area; and<br>2. ensure that, apart from water contained in the pit void:<br>2.1 no surface water contaminated prior to mine completion remains within the Lease area after mine completion; and<br>2.2 no contamination of surface water occurs after mine completion as a result of mining operations within the Lease area. |

| *DSD assessment of outcomes proposed by Rex* | | | |
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| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-SW4**<br>**Impact event:** Increased salinity of surface water run-off resulting in salt scald or salt deposition downstream of the mine site<br>**Rex Proposed Outcome:** No water contaminated as a result of mining operations leaves the lease area or results in contamination of soil on or off the lease | The proposed outcome does accurately describe the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Salt water will be used for dust suppression, and saline soils will be present within the WRDs.<br><br>Rex proposes to only use saline water for dust suppression within the internally draining 'dirty area'.<br>Rex proposes to install a system of collection drains and sediment ponds to contain runoff from WRDs, to ensure that it is contained within the 'dirty area'.<br>Rex considers that implementation of these control and management strategies will reduce this impact to a level of low.<br><br>DSD considers that provided the control strategies are adhered to, the outcome proposed by Rex would be achievable. | *DSD recommends that should a lease be granted the following outcome be a condition of the lease:*<br><br>The Tenement Holder must:<br><br>1. ensure no surface water contaminated as a result of mining operations leaves the Lease area; and<br>2. ensure that, apart from water contained in the pit void:<br>2.1 no surface water contaminated prior to mine completion remains within the Lease area after mine completion; and<br>2.2 no contamination of surface water occurs after mine completion as a result of mining operations within the Lease area. |
| **ML-SW5**<br>**Impact event:** Acid mine drainage transported by surface water run-off resulting in contamination to surrounding environment<br>**Rex Proposed** | The proposed outcome does accurately describe the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to | The Proposal documentation assessed that the potential for mine wastes to form AMD is very low. Their testing resulted in less than 1% of samples tested being classified as Potential Acid Forming material (PAF), and that this would be effectively controlled by the high abundance of carbonate minerals within the Hillside system. The Proposal also found that leachate test work on samples from Hillside indicated that leachate from samples is relatively benign, and that waste rock leachate in unlikely to present a risk to the environment.<br><br>Rex considers that due to the abundant highly neutralising rock, the limited PAF can be easily managed through the placement and encapsulation of PAF rock | *DSD recommends that should a lease be granted the following outcome be a condition of the lease:*<br>The Tenement Holder must:<br><br>1. ensure no surface water contaminated as a result of mining operations leaves the Lease area; and<br>2. ensure that, apart from water contained in the pit void:<br>2.1 no surface water contaminated prior to mine completion remains within the Lease area after mine completion; and |

| *DSD assessment of outcomes proposed by Rex* | | | |
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| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **Outcome:** No contamination and /or pollution of natural water drainage systems, streams, and rivers, groundwater, land and soils occurs either on or off the mining lease is caused by permanent disposal or temporary storage of mine waste material. | implementation of control strategies. | with acid consuming material in the WRDs. With this control in place, Rex considers that the residual risk of this impact occurring to be moderate.<br><br>As part of its assessment of the Proposal, DSD commissioned a technical review of the geochemical aspects of the Hillside project, which included an assessment of risks to the receiving environment associated with AMD.<br><br>The findings of this review undertaken by O'Kane Consultants Pty Ltd are attached as Appendix 6 – Hillside Copper Project Proposal – Review of Geochemical Risks.<br><br>The review analysed significantly greater geochemical data than initially provided in the Proposal, and found that approximately 24% of mine waste could be classed as PAF based on a sulphur concentration >0.1%. Although the volume of PAF was much higher than initially predicted in the Proposal, the review concluded that there is a sufficient volume of non-acid forming waste available for encapsulating and managing the PAF waste to minimise acid drainage.<br><br>The report recommends that should the mine proceed, it will be important to have a life of mine waste (materials movement) schedule that separates waste rock with sulphur concentration >0.1%S to facilitate selective mining and placement of this material. Using the sulphur model was considered a simple approach to define NAF and PAF domains and to mark out waste areas on each bench prior to blasting. The final waste landform design will need to consider management of the potentially larger PAF waste volume determined by the sulphur block model.<br><br>DSD requires that current best practice for the management of PAF during the construction of the Waste Rock Dump (WRD) be employed. | 2.2 no contamination of surface water occurs after mine completion as a result of mining operations within the Lease area.<br>*DSD recommends the following lease condition(s) applicable to strategies be adopted for achievement of the outcome:*<br><br>The separate extraction of NAF and PAF from the mine, and separate placement of NAF and PAF in waste rock dumps must be verified by a suitably qualified independent expert approved by the Director of Mines on a 3 monthly basis, or at a frequency as the Director of Mines may specify by notice in writing. The expert must prepare a report of the findings of the verification and this report must be provided to the Director of Mines within 1 month of completion of the verification.<br><br>A further regulatory recommendation is provided in Section 7.17 of this report requiring the provision of 3rd party independent review of the effectiveness of proposed strategies in achieving this outcome (for impact event **ML-SW5**).<br><br>DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event <**ML-SW5**>;<br><br>1 Locate the TSF emergency spillway to ensure any overflow reports to the open pit.<br><br>2. Determine a sulphur cut-off grade for PAF material through further testing for each waste rock unit. |

| *DSD assessment of outcomes proposed by Rex* | | | |
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| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | Implementing best practice methodology for the management Potential Acid Forming Material (PAF), is vital. DSD does not consider it appropriate to construct a WRD, designed to manage PAF, using high lifts and end dumping. The long term management solutions for PAF material relies on developing a design that limits the ingress of water and oxygen.<br><br>The Global Acid Rock Drainage (GARD) Guide International Network for Acid Prevention (INAP) explains that end dumping construction of a WRD results in particle distribution, which is the separation and sorting of the larger and smaller particles of the waste rock. This distribution of particle sizes is conducive to the ingress of oxygen and moisture at the base of the dump. Pathways are generated through the sorting of the particles causing a chimney effect. This subsequent chimney effect funnels the oxygen and moisture into the material, increasing the risk of AMD generation.<br><br>WRDs with lifts higher than 5m have been shown to further assist in developing a chimney effect within the WRD, increasing the likelihood of a preferential pathway for the gases to reach the encapsulated PAF material.<br><br>The current best practice methodology for WRD construction for PAF management is paddock dumping, with lifts no higher than 5m, and compaction between each lift. This methodology reduces the potential for the chimney effect to occur and additionally assists in limiting downward infiltration.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | 3 Block modelling the sulphur distribution of all waste and ore to be mined for the purpose of determining the distribution and estimating the volume of NAF and PAF using the sulphur cut-off grade.<br><br>4 Integration of the sulphur model with the geological model to provide confidence in the definition of PAF boundaries, potential zones of high neutralising capacity and potential geological controls on mineralisation.<br><br>5 Procedures for regularly updating the models with new geological and sulphur assay data collected in the course of mine production operations.<br><br>6 Procedures for ensuring PAF and NAF boundaries derived from the sulphur cut-off and the sulphur block model are included in open pit bench plans.<br><br>7 Procedures for assaying the sulphur content of drill cuttings, produced during the course of blast hole drilling, for verifying PAF and NAF information plotted on open pit bench plans to provide a final check that all PAF and NAF materials have been correctly identified.<br><br>8 Procedures and recording systems for selective mining of the identified PAF and NAF materials and separate placement in accordance with the waste rock dump design.<br><br>9 Construction of waste rock dumps in small lifts using placement methods that prevent the separation and sorting of the larger and smaller particles of the waste rock, with each lift compacted by waste haul trucks,<br><br>10 Waste rock dumps designed and constructed for the selective placement of the total volume of PAF material with it effectively encapsulated by NAF. |

| *DSD assessment of outcomes proposed by Rex* | | | |
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| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | | 11 A program for determining the erodibility of waste rock to ensure that no erodible waste rock is placed immediately underneath subsoil on external batters.<br>12 Waste rock dumps designed to ensure PAF material is not exposed as a result open pit wall failure post completion<br>13 Strategies included in any guidelines provided by the Director of Mines. |
| **ML-SW6**<br>**Impact event:** Dissolved copper ions transported by surface water run-off causing contamination to surrounding environment.<br>**Rex Proposed Outcome:** No water contaminated as a result of mining operations leaves the lease area or results in contamination of soil on or off the lease. | The proposed outcome does accurately describe the level of impact.<br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control | Rex explains in the Proposal that all copper minerals identified are environmentally stable with the exception of atacamite, which may be found in small quantities in oxide and low grade ore.<br>Rex proposes to stockpile oxide and low grade ore material over low permeability prepared clay pads which would act as a barrier to prevent percolation of water through stockpiles entering the underlying soil. In addition a perimeter drain is proposed around the base of stockpiles to collect any drainage through, or runoff from these stockpiles, which would then be treated as 'dirty' water. These controls will capture any of the copper bearing runoff into the process water stream.<br><br>Rex considers that these control strategies will reduce this impact to a low residual risk.<br><br>Rex provides additional information on this impact event in Issue No. 16 of the Proposal Response Document. In this, Rex explains that the clay base will be domed to prevent a head of water on the clay liner. Any standing water on the stockpile pads will be pumped to holding dams designed and located to manage dirty water.<br><br>Rex states there will be no atacamite in the WRDs (as it is stored in ore and oxide stockpiles), and therefore not present in the material used to construct haul roads. | *DSD recommends that should a lease be granted the following outcome be a condition of the lease:*<br><br>The Tenement Holder must:<br>1. ensure no surface water contaminated as a result of mining operations leaves the Lease area; and<br>2. ensure that, apart from water contained in the pit void:<br>2.1 no surface water contaminated prior to mine completion remains within the Lease area after mine completion; and<br>2.2 no contamination of surface water occurs after mine completion as a result of mining operations within the Lease area. |

| *DSD assessment of outcomes proposed by Rex* | | | |
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| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | The storage of oxide material will commence in the 1st year of open pit mining operation, and the majority of material will be stockpiled by year four of the open pit operation. This stockpile will either be treated at the end of the mine life, or capped in a similar manner to the TSF.<br><br>Further detailed closure control and design strategies for these stockpiles will be required in the PEPR should a lease be granted, including drainage systems to direct water percolation and runoff to the pit, and base and capping designs which ensure the long term achievement of the outcome<br><br>DSD considers that the outcome proposed by Rex would be achievable. | |
| **ML-SW7**<br>**Impact event:** Inundation of public roads due to changes in the natural surface water flow<br>**Rex Proposed Outcome:** No water run-off as a result of mining infrastructure results in flooding of adjacent areas, to an extent greater than that that could reasonably be expected to occur prior to mining | The proposed outcome does accurately describe the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | The extent of flooding following mine development was modelled by Rex in the Pre-feasibility Hydrology Report (Appendix 5.9-A of the Proposal).<br>This predicted that runoff impacts were most significant at the northern and southern wall of the western WRD. Temporary severe flooding was predicted to occur in those areas only for major 1 in 100 year rainfall events.<br>The Proposal assesses the primary risk of flooding of public roads to be moderate.<br>The Proposal discusses the installation of flood mitigation measures (including diversion channels) in areas of potential flood water build up, to allow water to be transported around mine infrastructure and alleviate flooding in areas which would not have experienced flooding pre-mining.<br>Rex considers that these control strategies will reduce this impact to a low residual risk.<br><br>DSD considers the concept of the proposed clean channel diversions described in Section 6.8.8.2 of the Proposal, would be an effective measure to prevent the impact event occurring on land surrounding the proposed lease boundary.<br>An assessment of the surface contours of the land where the 'clean water' channel diversion is proposed suggests that the proposed diversions may need to be excavated to a depth in the order of 10-15 meters to create a gradient that | *DSD recommends that should a lease be granted the following outcome be a condition of the lease:*<br><br>The Tenement Holder must ensure that:<br><br>1. mining operations do not cause inundation of third party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing); and<br><br>2. inundation of third party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing) after completion of the lease is not caused by mining operations;<br><br>unless the Tenement Holder obtains a registered Waiver of Exemption under the Act to undertake mining activities (inclusive of inundation). |

| *DSD assessment of outcomes proposed by Rex* | | | |
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| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| operations being established. | | allows storm water to flow naturally into existing drainage lines and on to the receiving environment. Buffers between the proposed lease boundary/remnant vegetation and the toe of the IWL and WRD's would need to provide sufficient space for accommodating these diversions, dirty water drains and sediment traps.<br>Rex states that it will continue to investigate and develop this aspect of water management, which will include the refinement of the exact location and design of structures and drains. Should a lease be granted, detail would be required for inclusion in the PEPR.<br>DSD considers that the outcome proposed by Rex would be achievable. | A further regulatory recommendation is provided in Section 7.17 of this report requiring the provision of 3rd party independent review of the effectiveness of proposed strategies in achieving this outcome (for impact event **ML-SW7**). |
| **ML-SW8**<br>**Impact event:** Inundation of agricultural land due to changes in the natural surface water flow resulting in loss of crop<br>**Rex Proposed Outcome:** No adverse impact to adjacent land use from mine operations<br>No water run-off as a result of mining infrastructure results in flooding of adjacent areas, | The proposed outcome does accurately describe the level of impact.<br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex has assessed this impact in the same discussion as the previous impact event (**ID ML-SW7**).<br><br>Rex considers residual risk for this impact event to be low.<br><br>DSD considers the concept of the proposed clean channel diversions described in Section 6.8.8.2 of the Proposal, would be an effective measure to prevent the impact event occurring on land surrounding the proposed lease boundary.<br>As previously discussed under **ID ML-SW7** assessment of the surface contours suggests that the proposed clean channel diversions may need to be excavated up to a depth in the order of 15 meters to create a gradient that allows storm water to flow naturally into existing drainage lines and on to the receiving environment. Buffers between the proposed lease boundary/remnant vegetation and the toe of the IWL and WRD's would need to provide sufficient space for accommodating these diversions, dirty water drains and sediment traps. Further detail on the design of the channel diversions would need to be included in the PEPR, should a lease be granted.<br><br>The system of clean channel diversions designed to collect storm water from the north west, west and south west and catchments appear to direct all flow through a natural drainage line running across private land located between the | *DSD recommends that should a lease be granted the following outcome be a condition of the lease:*<br><br>The Tenement Holder must ensure that:<br>1. mining operations do not cause inundation of third party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing); and<br>2. inundation of third party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing) after completion of the lease is not caused by mining operations;<br><br>unless the Tenement Holder obtains a registered Waiver of Exemption under the Act to undertake mining activities (inclusive of inundation).<br>*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the* |

| *DSD assessment of outcomes proposed by Rex* | | | |
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| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| to an extent greater than that that could reasonably be expected to occur prior to mining operations being established. | | IWL and the open pit. Further analysis on the impact of the altered surface drainage due to the proposed channel diversions would need to be included in the PEPR, should a lease be granted.<br><br>Based on the previous discussion (**ID ML-SW7**) DSD considers that the outcome proposed by Rex would be achievable. | *Regulations in relation to the outcome for impact event <**ML-SW8**>;*<br>No change in surface water flow across third party property that could prevent achievement of the outcome <recommended for impact **ML-SW8**> unless otherwise agreed by the affected third party**.**<br><br>A plan for establishing appropriate legal mechanisms to ensure effective transfer of responsibility for any maintenance of the site and control of any future development post completion.<br><br>A further regulatory recommendation is provided in Section 7.17 of this report requiring the provision of 3rd party independent review of the effectiveness of proposed strategies in achieving this outcome (for impact event **ML-SW8**). |
| **ML-TSF5**<br>**Impact event:** Discharge of contaminated water from tailings or return water pipeline failure.<br>**Rex Proposed Outcome:** No contamination and/or pollution of natural water drainage systems, groundwater, land | The proposed outcome does accurately describe the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | The primary risk for this impact event was assessed by Rex to be moderate.<br><br>Rex proposes control and management strategies including bunding, leak detection instrumentation and regular inspections to identify and contain leaks from the TSF pipelines.<br><br>Rex considers that the control strategies will reduce this impact to a level of low.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | *DSD recommends that should a lease be granted the following outcome be a condition of the lease:*<br>The Tenement Holder must:<br>1. ensure no surface water contaminated as a result of mining operations leaves the Lease area; and<br>2. ensure that, apart from water contained in the pit void:<br>2.1 no surface water contaminated prior to mine completion remains within the Lease area after mine completion; and<br>2.2 no contamination of surface water occurs after mine completion as a result of mining operations within the Lease area. |

| *DSD assessment of outcomes proposed by Rex* | | | |
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| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| and soils by waste products and hazardous material used in the mine operations. | | | |
| **ML-TSF6**<br>**Impact event:** Discharge of contaminated water by discharge through the spillway.<br>**Rex Proposed Outcome:** No contamination and/or pollution of natural water drainage systems, groundwater, land and soils by waste products and hazardous material used in the mine operations. | The proposed outcome does accurately describe the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex has designed the TSF emergency spillway based on water balance calculations such that under the combined conditions of high rainfall, high initial pond level, and high stored tailings level, the primary risk of discharge has been conservatively assessed by Rex as being moderate.<br><br>Rex intends to implement treatment strategies including the provision of catchment diversion drains, and ongoing monitoring and surveillance of the water balance and pond level during operations.<br><br>Rex states that if the spillway does flow, it will report to the DSCP. The DSCP spillway has the same design capacity as the spillway (designed for a 1 in 100 year recurrence interval rainfall storm event). Overflow from the DSCP emergency spillway is designed to report to the pit (as shown in Figure 6.7-7 of the Proposal).<br>Figure 6.7-7 of the Proposal indicates that the spillway is located adjacent to the North West corner of the TSF. It is unclear how overflow from the TSF emergency spillway would report to the DSCP.<br><br>Rex considers that the control strategies will reduce this impact to a level of low.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | *DSD recommends that should a lease be granted the following outcome be a condition of the lease:*<br><br>The Tenement Holder must:<br>1. ensure no surface water contaminated as a result of mining operations leaves the Lease area; and<br>2. ensure that, apart from water contained in the pit void:<br>2.1 no surface water contaminated prior to mine completion remains within the Lease area after mine completion; and<br>2.2 no contamination of surface water occurs after mine completion as a result of mining operations within the Lease area.<br><br>*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to **ML-TSF6**;*<br><br>The Tenement Holder must locate the TSF emergency spillway to ensure any overflow reports to the open pit. |
| **ML(C)-SW1**<br>**Impact event:** Increased | The proposed outcome does not accurately describe | The description in the Proposal of the mine site at mine closure proposed to reinstate all disturbed ML areas, other than the open pit, to either agricultural pursuits or native vegetation. | *DSD recommends that should a lease be granted the following outcome be a condition of the lease:* |

| *DSD assessment of outcomes proposed by Rex* | | | |
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| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| sediment loads in downstream water flows<br>**Rex Proposed Outcome:** Surface water quality and quantity is maintained | the level of impact – there is no explanation provided on what precisely is meant by the phrase 'maintaining surface water quality and quantity', particularly how this relates to the long term post completion.<br><br>The proposed outcome is not considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies.<br><br>DSD require the outcome be reworded to describe an acceptable level of impact to the receiving environment post completion | Rex has assessed that as rehabilitation progresses; the generation of sediment loads would stabilise and reach equilibrium with natural processes. Run-off from the final waste rock dumps is proposed to be directed to self-draining catch dams and/or silt traps to contain sediment during operations.<br><br>Following rehabilitation, Rex intends on monitoring surface runoff until it is demonstrated that the quality of runoff meets the standards of naturally occurring drainage. At this stage, the diversion system separating the mine runoff from the natural drainage will be removed.<br><br>Should runoff not meet these standards, then drainage diversions will be retained and divert runoff to the open pit.<br><br>Rex considers that with these closure strategies in place, the residual risk of the closure impact occurring will be low.<br><br>DSD considers that the WRD's and TSF and other aspects of the mine must be managed in a manner to ensure dirty water management is not required forever post completion. This will require appropriate design and progressive rehabilitation of WRD slopes to control erosion, appropriate design of the final WRD and TSF cover systems and surface water drainage management and discharge points and vigilant PAF management.<br><br>Final surface water drainage from the TSF cover system post completion should be directed to the pit as a contingency should the final TSF cover system be breached.<br><br>DSD considers that the outcome recommended by DSD would be achievable and self-sustaining in the long term. | The Tenement Holder must:<br>1. ensure no surface water contaminated as a result of mining operations leaves the Lease area; and<br>2. ensure that, apart from water contained in the pit void:<br>2.1 no surface water contaminated prior to mine completion remains within the Lease area after mine completion; and<br>2.2 no contamination of surface water occurs after mine completion as a result of mining operations within the Lease area. |
| **ML(C)-SW2**<br>**Impact event:** Leachates (AMD & dissolved copper | DSD recommends an outcome which describes an acceptable level of impact to the | During operations, Rex proposed to encapsulate excavated PAF material within the waste rock dumps, where there is sufficient acid consuming material to act in a neutralising capacity in the long term post-mining.<br><br>The final waste landforms will be designed to reduce the potential for erosion, | *DSD recommends that should a lease be granted the following outcome be a condition of the lease:* |

| *DSD assessment of outcomes proposed by Rex* | | | |
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| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| ions) chemically unstable at closure causing contamination to the surrounding environment.<br>**Rex Proposed Outcome:** None provided | receiving environment post completion | including the selection of appropriate batter angles and placement of benches. The final design will be based on the characteristics of the cover material, and the results of testing and monitoring during the operational phase.<br>Runoff from final waste rock dumps will be directed to self-draining catch dams and/or silt traps to contain sediment. As previously mentioned, discharged surface water will be monitored until is shown to meet the quality expected from an undisturbed environment.<br>Rex proposes that the north eastern WRD would form a bund around the pads used for ore and oxide stockpiles, thus ensuring runoff from these stockpiles is diverted towards the open pit.<br>Rex in the Proposal Response Document (Issue #16) state that following the cessation of processing operations, if the oxide stockpile has not been treated the oxide stockpile landform will be capped. The oxide stockpile will be covered with competent non-acid generating rock and capped to prevent the ingress of water.<br>Additional detail on the conceptual closure strategies for the TSF, WRDs and open pit are provided in Section 6.9.4 of the Proposal. Closure plans and strategies will be further refined during the course of mining operations, should a lease be granted.<br>A geotechnical review of the Proposal undertaken by Rosengren concluded that as the proposed open pit is situated in close proximity to proposed waste dumps on the West, East and Northern boundaries of the pit, there would be a potential impact from a pit failure on the waste dumps post-completion resulting in exposure of encapsulated waste materials.<br>DSD considers that to manage this potential impact event from occurring, the disposal and encapsulation of PAF material in waste rock dumps must take into consideration the predicted open pit final landform post-completion, taking into consideration reasonable factors of safety and uncertainty.<br>DSD considers that the outcome recommended by DSD would be achievable and self-sustaining in the long term. | The Tenement Holder must:<br>1. ensure no surface water contaminated as a result of mining operations leaves the Lease area; and<br>2. ensure that, apart from water contained in the pit void:<br>2.1 no surface water contaminated prior to mine completion remains within the Lease area after mine completion; and<br>2.2 no contamination of surface water occurs after mine completion as a result of mining operations within the Lease area. |

## Table 7.11.4 – Discussion of outcomes for impacts identified by DSD

| *Discussion of outcomes for impacts identified by DSD* | | | |
|---|---|---|---|
| **ID** | **Acceptability of outcome** | **Achievability of outcome** | **Recommended regulatory response** |
| **DSD ML (C) - SW1**<br>**Impact event:** Inundation of public roads or agricultural land post completion due to changes in the natural surface water flow<br>**Outcome:** DSD proposes the following outcome:<br><br>The Tenement Holder must ensure that:<br><br>1. mining operations do not cause inundation of third party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing); and<br><br>2. inundation of third party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing) after completion of the lease is not caused by mining operations;<br><br>unless the Tenement Holder obtains a registered Waiver of Exemption under the Act to undertake mining activities (inclusive of inundation). | DSD considers that this outcome accurately describes the level of impact.<br><br>The outcome is considered a suitable statement on the acceptable level of impact on the environment. | Inundation of public roads and agricultural land during operations is discussed under ID SW-7 and SW-8.<br><br>Section 6.9.6.3 of the Proposal describes site drainage at closure. After rehabilitation, once the surface runoff is shown to meet the agreed upon water standards for the naturally occurring drainage, then the diversion system separating the mine runoff from the natural drainage will be removed. Should the runoff not meet these standards then the drainage diversions will be retained and the runoff water diverted to the pit.<br><br>Connecting the diversion system to either natural drainage or the pit will reduce potential for inundation post mine completion.<br><br>DSD considers that the outcome recommended by DSD would be achievable and self-sustaining in the long term. | *DSD recommends that should a lease be granted the following outcome be a condition of the lease:*<br><br>The Tenement Holder must ensure that:<br><br>1. mining operations do not cause inundation of third party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing); and<br><br>2. inundation of third party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing) after completion of the lease is not caused by mining operations;<br><br>unless the Tenement Holder obtains a registered Waiver of Exemption under the Act to undertake mining activities (inclusive of inundation). |

| *Discussion of outcomes for impacts identified by DSD* | | | |
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| **ID** | **Acceptability of outcome** | **Achievability of outcome** | **Recommended regulatory response** |
| **DSD EML – SW1**<br>**Impact event:** Increased sediment loads in downstream water flows as a result of runoff from extractive mineral stockpiles<br>**Outcome:** DSD proposes the following outcome:<br><br>The Tenement Holder must:<br>1. ensure no surface water contaminated as a result of mining operations leaves the Lease area; and<br>2. ensure that, apart from water contained in the pit void:<br>2.1 no surface water contaminated prior to mine completion remains within the Lease area after mine completion; and<br>2.2 no contamination of surface water occurs after mine completion as a result of mining operations within the Lease area | DSD considers that this outcome accurately describes the level of impact.<br><br>The outcome is considered a suitable statement on the acceptable level of impact on the environment. | Rex in Section 6.5.8.4 the Proposal propose stabilisation and erosion control strategies for topsoil and subsoil stockpiles to minimise potential soil loss through wind and water erosion. Methods include installing rock lined stormwater collection drains on stockpiles where needed, sloping berms towards stockpiles to slow the flow of water, and seeding of stockpiles.<br><br>It is proposed that all extractive material stockpiles will be removed during the course of operations, further reducing the likelihood of sediment entering into watercourses.<br><br>DSD considers that the outcome would be achievable. | *DSD recommends that should a lease be granted the following outcome be a condition of the lease:*<br><br>The Tenement Holder must:<br>1. ensure no surface water contaminated as a result of mining operations leaves the Lease area; and<br>2. ensure that, apart from water contained in the pit void:<br>2.1 no surface water contaminated prior to mine completion remains within the Lease area after mine completion; and<br>2.2 no contamination of surface water occurs after mine completion as a result of mining operations within the Lease area. |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex.

### 7.11.5 *Measurement Criteria (ML and EML)*

Table 7.11.5 is DSDs assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

**Table 7.11.5 – DSD assessment on measurement criteria**

| *DSD assessment on measurement criteria* | | | | |
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| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **ML-SW1**<br>**Potential Impact:** Disruption of downstream water flows resulting on loss of abundance of native flora<br>**Recommended Outcome:** The Tenement Holder must, in constructing and operating the lease ensure no loss of abundance or diversity of native vegetation on or off the lease through;<br>• Clearance;<br>• Dust/contaminant deposition;<br>• Fire;<br>• Reduction in water supply, or<br>• Other damage<br>unless prior approval under the relevant legislation is obtained. | Rex has not proposed criteria for this outcome. | Although Rex has not proposed criteria against this specific impact event, it has drafted measurement criteria for other mine related impacts on native vegetation in Table 8.3-30 of the Proposal.<br>These criteria relate to annual surveys of native vegetation to demonstrate all clearance has been undertaken in accordance with the approved NVMP.<br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>The PEPR is to include a detailed native vegetation clearance monitoring program<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |
| **ML-SW2**<br>**Potential Impact:** Increased sediment loads in downstream surface water flows<br>**Recommended Outcome:** The Tenement The Tenement Holder must:<br>1. ensure no surface water contaminated as a result of mining | An internal annual or quarterly audit of the records of visual inspections conducted after rainfall events which generate run-off of all silt traps, sediments dams, 'clean' and 'dirty' separation measures | The timing period or inspection trigger (quarterly or annually or otherwise) of the audits proposed by Rex is unclear. The criteria must more clearly explain how inspections after rainfall events will be undertaken to show that potentially contaminated surface water is being maintained on site. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |

| *DSD assessment on measurement criteria* | | | | |
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| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| operations leaves the Lease area; and<br>2. ensure that, apart from water contained in the pit void:<br>2.1 no surface water contaminated prior to mine completion remains within the Lease area after mine completion; and<br>2.2 no contamination of surface water occurs after mine completion as a result of mining operations within the Lease area. | and flood mitigation structures. The audit must stipulate that all infrastructure is in place and maintained as per the surface water management plan. Records state that any damaged infrastructure is reinstated in a timeframe as soon as reasonably practical as per design in the surface water management plan. | DSD accepts that the auditing of regular inspections of sediment and silt control measures is a useful measurement criterion, however additional detail must be included on the specific scope of the audits (such as treatments on the WRD and IWL for managing erosion) and the surface water strategies in a PEPR should a lease be granted.<br>DSD considers that additional measurement criteria will be required in the PEPR, which are a direct measure of sediment loads in surface waters exiting the lease area. Maximum sediment levels and metal concentrations should be set in accordance with appropriate standards such as the *Environment Protection (Water Quality) Policy 2001*. The criteria for marine water quality would be relevant as it is the key sensitive receiving ecosystem.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>The PEPR is to include additional measurement criteria for the measurement of sediment loads in surface water runoff exiting the lease area.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | | |

| *DSD assessment on measurement criteria* | | | | |
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| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **ML-SW3**<br>**Potential Impact:** Contamination of surface water run-off with mine hydrocarbons and process chemicals<br>**Recommended Outcome:**<br>The Tenement Holder must:<br>1. ensure no surface water contaminated as a result of mining operations leaves the Lease area; and<br>2. ensure that, apart from water contained in the pit void:<br>2.1 no surface water contaminated prior to mine completion remains within the Lease area after mine completion; and<br>2.2 no contamination of surface water occurs after mine completion as a result of mining operations within the Lease area. | An annual audit of the records from monthly inspections of the all waste and hazardous substances, shows all waste, hydrocarbons and process chemicals are stored correctly and processing of waste items is in accordance with the approved waste management plan. | DSD considers that measurement criteria will be required to specifically demonstrate that there has been appropriate response to spills of hydrocarbons and process chemicals and that contaminants have been adequately remediated to meet NEPM standard criteria.<br><br>Should a lease be granted, criteria are to be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |
| **ML-SW4**<br>**Potential Impact:** Increased salinity of surface water run-off resulting in salt scald or salt deposition downstream of the mine site.<br>**Recommended Outcome:**<br>The Tenement Holder must:<br>1. ensure no surface water contaminated as a result of mining operations leaves the Lease area; and | An internal annual or quarterly (whichever is less) audit of the records of visual inspections conducted after rainfall events which generate run-off of all silt traps, sediments dams, 'clean' and 'dirty' separation measures and flood mitigation structures. The audit must stipulate that all infrastructure is in place and maintained as | DSD accepts that the auditing of regular inspections of sediment and silt control measures is a useful measurement criterion. DSD considers that additional measurement criteria will be required in the PEPR, which are a direct measure of salinity loads in surface waters exiting the lease area, to demonstrate that mining activities are not leading to an unacceptable release of salt to the receiving environment. Maximum salinity of discharged water should be set in accordance with | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |

| *DSD assessment on measurement criteria* | | | | |
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| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| 2. ensure that, apart from water contained in the pit void:<br>2.1 no surface water contaminated prior to mine completion remains within the Lease area after mine completion; and<br>2.2 no contamination of surface water occurs after mine completion as a result of mining operations within the Lease area. | per the surface water management plan.<br>Records state that any damaged infrastructure is reinstated in a timeframe as soon as reasonably practical as per design in the surface water management plan. | appropriate standards such as the *Environment Protection (Water Quality) Policy 2001*.<br>DSD considers that achievement of the recommended outcome would be measurable.<br>The PEPR is to include additional measurement criteria for the measurement of salinity in surface water runoff discharging from the lease area during runoff events.<br>Should a lease be granted, these criteria would be finalised in the PEPR submission | | |
| **ML-SW5**<br>**Potential Impact:** Acid mine drainage transported by surface water run-off resulting in contamination to surrounding environment<br>**Recommended Outcome:**<br>The Tenement Holder must:<br>1. ensure no surface water contaminated as a result of mining operations leaves the Lease area; and<br>2. ensure that, apart from water contained in the pit void:<br>2.1 no surface water contaminated prior to mine completion remains within the Lease area after mine completion; and<br>2.2 no contamination of surface water occurs after mine | An annual audit of the material movement records show that all encountered PAF material is sequestered in accordance with the PAF management plan/protocol. | DSD considers that compliance measurement criteria for AMD management must address regular (at least quarterly) ongoing accounting of the material movement records, in addition to the proposed annual audit of the material movement records to ensure PAF material is appropriately identified and managed.<br>DSD considers that additional measurement criteria are required which are a direct measurement of the water quality of surface water runoff which has been in contact with the waste rock material.<br>DSD considers that achievement of the recommended outcome would be measurable.<br>Should a lease be granted, these criteria would be finalised in the PEPR submission | Rex has not proposed Leading Indicator Criteria.<br>DSD considers that there is a strong reliance on control strategies, in particular adherence to material movement procedures, to reduce risk to the environment associated with AMD, and thus Leading Indicator Criteria are required.<br>Should a lease be granted, this leading indicator criterion must be finalised in the PEPR submission to include (but not limited to) in-situ measurement of PAF material within the WRD dumps to provide early | DSD considers no lease conditions applicable to the measurement criteria are required. |

| *DSD assessment on measurement criteria* | | | | |
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| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| completion as a result of mining operations within the Lease area. | | | detection of pyrite / sulfide oxidation (such as with the use of $O_2$ sensor & Temperature probe to detect reduction in $O_2$) & increase in Temp from sulfide oxidation processes). This provides a much earlier indicator of AMD risk that analysis of run-off which only occurs after pyrites have been oxidised and the resultant acidity has been mobilised. | |
| **ML-SW6**<br>**Potential Impact:** Dissolved copper ions transported by surface water run-off causing contamination to surrounding environment.<br>**Recommended Outcome:**<br>The Tenement Holder must:<br>1. ensure no surface water contaminated as a result of mining operations leaves the Lease area; and<br>2. ensure that, apart from water contained in the pit void:<br>2.1 no surface water contaminated prior to mine completion remains within the Lease area after mine completion; and<br>2.2 no contamination of surface | An internal annual or quarterly audit of the records of visual inspections conducted after rainfall events which generate run-off of all silt traps, sediments dams, 'clean' and 'dirty' separation measures and flood mitigation structures. The audit must stipulate that all infrastructure is in place and maintained as per the surface water management plan. Records state that any damaged infrastructure is reinstated in a timeframe as soon as reasonably practical as per design in the surface water management plan. | The timing period or inspection trigger (quarterly or annually or otherwise) of the audits proposed by Rex is unclear. The criteria must more clearly explain how inspections after rainfall events will be undertaken to show that potentially contaminated surface water is being maintained on site. Performance thresholds must also be provided to define what constitutes achievement of the outcome.<br>Compliance criteria must demonstrate that any release of surface runoff from disturbed areas to the receiving environment, complies with the *Environment Protection (Water Quality) Policy 2001*.<br>DSD considers that achievement of the recommended outcome would be measurable.<br>Should a lease be granted, these criterion would be finalised in the PEPR submission | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |

| *DSD assessment on measurement criteria* | | | | |
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| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| water occurs after mine completion as a result of mining operations within the Lease area. | | | | |
| **ML-SW7**<br>**Potential Impact:** Inundation of public roads due to changes in the natural surface water flow<br>**Recommended Outcome:**<br>The Tenement Holder must ensure that:<br>1. mining operations do not cause inundation of third party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing); and<br>2. inundation of third party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing) after completion of the lease is not caused by mining operations;<br>unless the Tenement Holder obtains a registered Waiver of Exemption under the Act to undertake mining activities (inclusive of inundation). | An internal annual or quarterly (whichever is less) audit of the records of visual inspections conducted after rainfall events which generate run-off of all silt traps, sediments dams, 'clean' and 'dirty' separation measures and flood mitigation structures. The audit must stipulate that all infrastructure is in place and maintained as per the surface water management plan.<br>Records state that any damaged infrastructure is reinstated in a timeframe as soon as reasonably practical as per design in the surface water management plan. | The proposed measurement criterion is not considered acceptable as it is not a clear demonstration of achievement of the recommended outcome.<br>DSD considers that criteria would need to be developed for monitoring areas adjacent to those predicted to be subject to inundation following high rainfall events demonstrating that there is no flooding as a result of mining activities. Criteria must include performance thresholds that define what constitutes achievement of the outcome.<br>As there is a high reliance on management strategies to achieve the outcome, leading indicator criteria would be required. This should include a review of the surface water management design and certification the works by an appropriately qualified independent expert DSD considers that achievement of the recommended outcome would be measurable.<br>Should a lease be granted, these criteria would be finalised in the PEPR submission | DSD considers that the following Leading Indicator Criteria are required:<br>The tenement holder must cause a review of the proposed surface water management drainage system by a suitably independent qualified independent expert to verify that the outcome relating to impact **ML-SW7** will be achieved.<br>The tenement holder must cause an audit of the development of the surface water management drainage system by a suitably independent qualified independent expert to verify that the system has been developed in accordance with the design. | DSD considers no lease conditions applicable to the measurement criteria are required. |

| *DSD assessment on measurement criteria* | | | | |
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| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **ML-SW8**<br>**Potential Impact:** Inundation of agricultural land due to changes in the natural surface water flow resulting in loss of crop<br>**Recommended Outcome:**<br>The Tenement Holder must ensure that:<br>1. mining operations do not cause inundation of third party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing); and<br>2. inundation of third party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing) after completion of the lease is not caused by mining operations;<br>unless the Tenement Holder obtains a registered Waiver of Exemption under the Act to undertake mining activities (inclusive of inundation). | An internal annual or quarterly (whichever is less) audit of the records of visual inspections conducted after rainfall events which generate run-off of all silt traps, sediments dams, 'clean' and 'dirty' separation measures and flood mitigation structures. The audit must stipulate that all infrastructure is in place and maintained as per the surface water management plan.<br>Records state that any damaged infrastructure is reinstated in a timeframe as soon as reasonably practical as per design in the surface water management plan. | As per the previous discussion on ID ML-SW7, The proposed measurement criteria is not considered acceptable as it is not a clear demonstration of achievement of the recommended outcome.<br>DSD considers that criteria be developed for monitoring of adjacent areas predicted to be subject to inundation following high rainfall events, to demonstrate that there is no flooding as a result of mining activities.<br>As there is a high reliance on management strategies to achieve the outcome, leading indicator criteria would be required. This should include a review of the surface water management design and certification the works by an appropriately qualified independent expert DSD considers that achievement of the recommended outcome would be measurable.<br>Should a lease be granted, these criteria would be finalised in the PEPR submission | DSD considers that similar Leading Indicator Criteria be included in the PEPR as were recommended under impact **ML-SW7** | DSD considers no lease conditions applicable to the measurement criteria are required. |

| *DSD assessment on measurement criteria* | | | | |
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| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **ML-TSF5**<br>**Potential Impact:** Discharge of contaminated water from tailings or return water pipeline failure.<br>**Recommended Outcome:**<br>The Tenement Holder must:<br>1. ensure no surface water contaminated as a result of mining operations leaves the Lease area; and<br>2. ensure that, apart from water contained in the pit void:<br>2.1 no surface water contaminated prior to mine completion remains within the Lease area after mine completion; and<br>2.2 no contamination of surface water occurs after mine completion as a result of mining operations within the Lease area. | An annual internal audit (intermediate and comprehensive)* of the records from daily and weekly inspections of the tailings pipelines demonstrate that the TSF and associated infrastructure are operated in accordance with the TSF 'Operation and Maintenance Manual' and any resultant action carried out in accordance with the TSF 'Operation and Maintenance Manual'.<br>* See table 8.3-53 of the Proposal for additional detail. | DSD considers that due to potential consequences from uncontrolled discharges, measurement criteria must be developed to demonstrate that any discharges from tailings or return water pipeline failures are contained within the mining lease.<br>It is also expected that detailed information would be required as part of the TSF ''Operation and Maintenance Manual', in relation to pipeline leak detection and spill containment.<br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission | Rex has proposed the following leading indicator criteria:<br>Control room logs of on line monitoring of pipeline instrumentation demonstrate that all alerts are investigated and any resultant action carried out in accordance with the TSF 'Operation and Maintenance Manual'.<br><br>Should a lease be granted, leading indicator criteria are to be finalised in the PEPR submission. | DSD considers no lease conditions applicable to the measurement criteria are required. |

| *DSD assessment on measurement criteria* | | | | |
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| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **ML-TSF6**<br>**Potential Impact:** Discharge of contaminated water by discharge through the spillway.<br>**Recommended Outcome:**<br>The Tenement Holder must:<br>1. ensure no surface water contaminated as a result of mining operations leaves the Lease area; and<br>2. ensure that, apart from water contained in the pit void:<br>2.1 no surface water contaminated prior to mine completion remains within the Lease area after mine completion; and<br>2.2 no contamination of surface water occurs after mine completion as a result of mining operations within the Lease area. | An annual internal audit (intermediate and comprehensive)* of the records from daily and weekly inspections of the TSF demonstrate that the freeboard as specified in the TSF 'Operation and Maintenance Manual' is maintained and any resultant action carried out in accordance with the TSF 'Operation and Maintenance Manual'. | DSD considers that due to potential consequences from uncontrolled discharges, specific measurement criteria must be developed specifying the freeboard to be monitored and maintained on the TSF to prevent 'overtopping' the spillway.<br>It is expected that this detailed information must be provided in the TSF 'Operation and Maintenance Manual'.<br>DSD considers that achievement of the recommended outcome would be measurable.<br>Should a lease be granted, these criteria would be finalised in the PEPR submission | Rex has proposed the following leading indicator criterion:<br>Records from daily inspections of the demonstrate that if the pond water level/pond surface area are greater than the criterion for operation of the decant pond specified in the TSF 'Operation and Maintenance Manual' that resultant action carried out in accordance with the TSF 'Operation and Maintenance Manual' to reduce to level of water to below the specified criterion within specified timeframe.<br>Should a lease be granted, this leading indicator criterion must be finalised in the PEPR submission to define maximum pond water levels and surface area. | DSD considers no lease conditions applicable to the measurement criteria are required. |

| *DSD assessment on measurement criteria* | | | | |
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| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **ML(C)-SW1**<br>**Potential Impact:** Increased sediment loads in downstream water flows post completion<br>**Recommended Outcome:**<br>The Tenement Holder must:<br>1. ensure no surface water contaminated as a result of mining operations leaves the Lease area; and<br>2. ensure that, apart from water contained in the pit void:<br>2.1 no surface water contaminated prior to mine completion remains within the Lease area after mine completion; and<br>2.2 no contamination of surface water occurs after mine completion as a result of mining operations within the Lease area. | An independent suitably qualified and experienced expert certifies that representative test sites on rehabilitated areas have achieved or by trends may be confidently predicted to reach and pass sustainability thresholds as defined by Ecosystem Function Analysis. | The proposed criterion must be further developed to nominate test sites that are predicted to be potential sources of sediment load during runoff events following mine closure. The Ecosystem Function Analysis thresholds must include vegetation.<br>DSD considers that achievement of the recommended outcome would be measurable.<br>Should a lease be granted, this criterion would be finalised in the PEPR submission | Rex has not proposed Leading Indicator Criteria. | DSD considers no lease conditions applicable to the measurement criteria are required. |

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **ML(C)-SW2**<br>**Potential Impact:** Leachates (AMD & dissolved copper ions) chemically unstable at closure causing contamination to the surrounding environment.<br>**Recommended Outcome:**<br>The Tenement Holder must:<br>1. ensure no surface water contaminated as a result of mining operations leaves the Lease area; and<br>2. ensure that, apart from water contained in the pit void:<br>2.1 no surface water contaminated prior to mine completion remains within the Lease area after mine completion; and<br>2.2 no contamination of surface water occurs after mine completion as a result of mining operations within the Lease area. | Rex has not proposed criteria for this outcome. | DSD considers that the most appropriate method of demonstrating achievement of this outcome would be through 3rd party verification of the WRD, ore and oxide stockpile designs (including closure methods).This is in addition to verification that these structures have been effectively rehabilitated at mine closure, via appropriate encapsulation and cover systems or by removal.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission | Rex has not proposed Leading Indicator Criteria. DSD considers that there is a strong reliance on control strategies, in particular adherence to material movement procedures, to reduce risk to the environment associated with AMD, and thus Leading Indicator Criteria are required.<br>Should a lease be granted, this leading indicator criterion must be finalised in the PEPR submission to include (but not limited to) in-situ measurement of PAF material within the WRD dumps to provide early detection of pyrite / sulfide oxidation (such as with the use of $O_2$ sensor & Temperature probe to detect reduction in $O_2$) & increase in Temp from sulfide oxidation processes). This provides a much earlier indicator of AMD risk that analysis of run-off which only occurs after pyrites have been oxidised and the resultant acidity has been mobilised. | DSD considers no lease conditions applicable to the measurement criteria are required. |

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **DSD ML (C) - SW1**<br>**Potential Impact:** Inundation of public roads or agricultural land post completion due to changes in the natural surface water flow<br>**Recommended Outcome:**<br>The Tenement Holder must ensure that:<br>1. mining operations do not cause inundation of third party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing); and<br>2. inundation of third party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing) after completion of the lease is not caused by mining operations;<br>unless the Tenement Holder obtains a registered Waiver of Exemption under the Act to undertake mining activities (inclusive of inundation). | Rex has not proposed criteria for this outcome. | DSD considers that an acceptable way to demonstrate probable achievement of this post completion outcome is through the provision of predictive post completion flood extent modelling of the rehabilitated mine site. It is intended that this will demonstrate that agricultural land and public roads will not be subject to inundation following high rainfall events.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission | Rex has not proposed Leading Indicator Criteria. | DSD considers no lease conditions applicable to the measurement criteria are required. |

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **DSD EML – SW1**<br>**Potential Impact:** Increased sediment loads in downstream water flows as a result of runoff from extractive mineral stockpiles<br>**Recommended Outcome:**<br>The Tenement Holder must:<br>1. ensure no surface water contaminated as a result of mining operations leaves the Lease area; and<br>2. ensure that, apart from water contained in the pit void:<br>2.1 no surface water contaminated prior to mine completion remains within the Lease area after mine completion; and<br>2.2 no contamination of surface water occurs after mine completion as a result of mining operations within the Lease area. | Rex has not proposed criteria for this outcome. | DSD considers that auditing of regular inspections of sediment and silt control measures is a suitable method for measuring achievement of the recommended outcome. DSD considers that additional measurement criteria may be necessary in the PEPR should a lease be granted, which are a direct measure of sediment loads in surface waters exiting the lease area.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, criteria are to be finalised in the PEPR submission. | Rex has not proposed Leading Indicator Criteria. | DSD considers no lease conditions applicable to the measurement criteria are required. |

### 7.11.6 *Summary of the recommended regulatory response (ML and EML)*

DSD considers that all potential impacts to surface water during construction, operations and post completion have been identified through this assessment and suitable outcomes have been recommended for all impact events where the severity of consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for the receiving environment from mining activities. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

*DSD recommends that should a lease be granted the following outcome be a condition of the lease:*

The Tenement Holder must:

1. ensure no surface water contaminated as a result of mining operations leaves the Lease area; and
2. ensure that, apart from water contained in the pit void:
   - 2.1 no surface water contaminated prior to mine completion remains within the Lease area after mine completion; and
   - 2.2 no contamination of surface water occurs after mine completion as a result of mining operations within the Lease area.

The Tenement Holder must ensure that:

1. mining operations do not cause inundation of third party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing); and
2. inundation of third party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing) after completion of the lease is not caused by mining operations;

unless the Tenement Holder obtains a registered Waiver of Exemption under the Act to undertake mining activities (inclusive of inundation).

*DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*

The Tenement Holder must, in constructing and operating the lease ensure no loss of abundance or diversity of native vegetation on or off the lease through;

- Clearance;
- Dust/contaminant deposition;
- Fire;

- Reduction in water supply, or
- Other damage

unless prior approval under the relevant legislation is obtained.

*DSD recommends the following lease condition(s) applicable to strategies be adopted for achievement of the outcome:*

The separate extraction of NAF and PAF from the mine, and separate placement of NAF and PAF in waste rock dumps must be verified by a suitably qualified independent expert approved by the Director of Mines on a 3 monthly basis, or at a frequency as the Director of Mines may specify by notice in writing. The expert must prepare a report of the findings of the verification and this report must be provided to the Director of Mines within 1 month of completion of the verification.

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event <**ML-SW2**>:*

Progressive landform stabilisation methods and utilisation of energy dissipation where necessary to minimise sediment loads in run-off from disturbed areas and landforms.

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event <**ML-SW5**>:*

1. Locate the TSF emergency spillway to ensure any overflow reports to the open pit.

2. Determine a sulphur cut-off grade for PAF material through further testing for each waste rock unit.

3. Block modelling the sulphur distribution of all waste and ore to be mined for the purpose of determining the distribution and estimating the volume of NAF and PAF using the sulphur cut-off grade.

4. Integration of the sulphur model with the geological model to provide confidence in the definition of PAF boundaries, potential zones of high neutralising capacity and potential geological controls on mineralisation.

5. Procedures for regularly updating the models with new geological and sulphur assay data collected in the course of mine production operations.

6. Procedures for ensuring PAF and NAF boundaries derived from the sulphur cut-off and the sulphur block model are included in open pit bench plans.

7. Procedures for assaying the sulphur content of drill cuttings, produced during the course of blast hole drilling, for verifying PAF and NAF information plotted on open pit bench plans to provide a final check that all PAF and NAF materials have been correctly identified.

8. Procedures and recording systems for selective mining of the identified PAF and NAF materials and separate placement in accordance with the waste rock dump design.

9. Construction of waste rock dumps in small lifts using placement methods that prevent the separation and sorting of the larger and smaller particles of the waste rock, with each lift compacted by waste haul trucks,

10. Waste rock dumps designed and constructed for the selective placement of the total volume of PAF material with it effectively encapsulated by NAF.

11. A program for determining the erodibility of waste rock to ensure that no erodible waste rock is placed immediately underneath subsoil on external batters.

12 Waste rock dumps designed to ensure PAF material is not exposed as a result open pit wall failure post completion

13 Strategies included in any guidelines provided by the Director of Mines.

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event <**ML-SW8**>:*

No change in surface water flow across third party property that could prevent achievement of the outcome <recommended for impact **ML-SW8**> unless otherwise agreed by the affected third party**.**

A plan for establishing appropriate legal mechanisms to ensure effective transfer of responsibility for any maintenance of the site and control of any future development post completion.

Should a lease be granted DSD recommends the following be prescribed as conditions of the **Extractive Mineral Lease (EML)**:

*DSD recommends that should a lease be granted the following outcome be a condition of the lease:*

The Tenement Holder must:

1. ensure no surface water contaminated as a result of mining operations leaves the Lease area; and
2. ensure that, apart from water contained in the pit void:

2.1 no surface water contaminated prior to mine completion remains within the Lease area after mine completion; and

2.2 no contamination of surface water occurs after mine completion as a result of mining operations within the Lease area.

### 7.11.7 *Impact assessment (MPL)*

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7.0. A review of Rex's impact assessment is shown in Table 7.11.6. The Port MPL application has been deferred at the request of Rex and has not been assessed in this report.

**Table 7.11.6 – Impact events identified by Rex in the Proposal**

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD determination if an outcome is required** |
| **MPL-SW1** | Increased sediment loads during construction of the corridor causing impact on adjacent agricultural land | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>The construction of the pipeline corridor will generate short term land disturbance, including stockpiling of topsoil and subsoil. Although stockpiles may be temporary and small in volume, they will be formed across a number of natural drainage channels, with limited information has provided for the surface water hydrology along the pipeline corridor.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes |
| **MPL-SW2** | Contamination of surface run-off during construction of the corridor causing impact on adjacent agricultural land | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>The only source for contamination of surface water runoff is from spills from machinery during construction of infrastructure along the corridor.<br>Given that spills from machinery have localised impacts, DSD assesses that the primary consequence of this occurring is trivial and hence **no** outcome is required. | No |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD determination if an outcome is required** |
| **MPL-S2** | Reduced soil quality due to soil contamination and leakage of the slurry and salt water pipeline | This section relates to soils and is therefore addressed in Section 7.5 | N/A |
| **MPL-W1** | Soil or water contamination due to incorrect waste disposal (This section relates to waste disposal and is addressed in Section 8.3.15 of the Proposal) | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>No hazardous waste will be generated or stored within the corridor MPL.<br>DSD assesses that the primary consequence of this occurring is trivial and hence **no** outcome is required. | No |
| **MPL (C) - SW1** | Increased sediment loads in downstream water flows from not properly stabilised land surfaces and/or flooding of adjacent areas from poorly maintained or insufficient drainage. | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>DSD considers that in the long term post completion, there is potential for poorly rehabilitated areas to generate sediment laden runoff which could impact on the receiving environment, particularly the coast or adjoining agricultural land.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes |

The State Government, through the assessment process, has identified no new or additional impact events.

### 7.11.8 *Outcomes (MPL)*

Table 7.11.7 is the DSD assessment of outcomes proposed by Rex in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable. The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies.

**Table 7.11.7 – DSD assessment of outcomes proposed by Rex**

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **MPL-SW1**<br>**Impact event:** Increased sediment loads during construction of the corridor causing impact on adjacent agricultural land<br>**Rex Proposed Outcome:** None proposed | No outcome provided.<br><br>DSD recommends an outcome which describes an acceptable level of impact to agricultural land caused by discharge of sediment laden runoff | Rex states that land disturbance and the stockpiling of topsoil and subsoil generated through construction of the pipeline corridor will be temporary in nature. It also assesses the likelihood of sediment bearing runoff being deposited at a volume which could impact on agricultural land as unlikely due to the low frequency and volume of rainfall events.<br><br>As the primary risk has been assessed by Rex to be low, no residual risk assessment has been carried out.<br><br>DSD considers that provided stockpiles and disturbed areas are rehabilitated progressively, the outcome recommended by DSD would be achievable. | *DSD recommends that should a licence be granted the following outcome be a condition of the licence:*<br>1. The Tenement Holder must:<br>1.1. ensure no surface water contaminated as a result of site operations leaves the Licence area; and<br>1.2. ensure that:<br>1.2.1. no surface water contaminated prior to mine completion remains within the Licence area after mine completion; and<br>1.2.2. no contamination of surface water occurs after mine completion as a result of site operations within the Licence area. |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **MPL (C) – SW1**<br>**Impact event:** Increased sediment loads in downstream water flows from not properly stabilised land surfaces and/or flooding of adjacent areas from poorly maintained or insufficient drainage.<br>**Rex Proposed Outcome:** Surface water quality and quantity is maintained | The proposed outcome does not accurately describe the level of impact – there is no explanation provided on what is meant by the phrase 'maintaining surface water quality and quantity', particularly how this relates to the long term post completion. The proposed outcome is not considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies.<br>DSD require the outcome be reworded to describe an acceptable level of impact to the receiving environment post completion | Rex states that post completion, maintenance of Power line and Pipeline MPL infrastructure including drainage will be the responsibility of the custodian.<br>Should the land surface not be appropriately design, managed and rehabilitated, there is potential for ongoing runoff of sediment laden water onto adjoining land.<br>Rex classifies the residual risk of this impact occurring as low on the basis that drainage and landforms will be designed appropriately.<br>DSD considers that provided stockpiles and disturbed areas are rehabilitated progressively, the outcome recommended by DSD would be achievable. | *DSD recommends that should a licence be granted the following outcome be a condition of the licence:*<br>1. The Tenement Holder must:<br>1.1. ensure no surface water contaminated as a result of site operations leaves the Licence area; and<br>1.2. ensure that:<br>1.2.1. no surface water contaminated prior to mine completion remains within the Licence area after mine completion; and<br>1.2.2. no contamination of surface water occurs after mine completion as a result of site operations within the Licence area. |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex.

### 7.11.9 *Measurement Criteria (MPL)*

Table 7.11.8 is DSDs assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

## Table 7.11.8 – DSD assessment on measurement criteria

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **MPL-SW1**<br>**Potential Impact:** Increased sediment loads during construction of the corridor causing impact on adjacent agricultural land<br>**Recommended Outcome:**<br>1. The Tenement Holder must:<br>1.1. ensure no surface water contaminated as a result of site operations leaves the Licence area; and<br>1.2. ensure that:<br>1.2.1. no surface water contaminated prior to mine completion remains within the Licence area after mine completion; and<br>1.2.2. no contamination of surface water occurs after mine completion as a result of site operations within the Licence area. | Rex has not proposed criteria for this outcome. | DSD considers that appropriate measurement criteria would involve inspections of soil stockpiles and disturbed areas following significant rainfall events to ensure erosion is minimised and sediment bearing runoff is captured.<br><br>Measurement criteria should also be provided that demonstrates rehabilitation of disturbed areas (including backfilling of the pipeline excavation) is undertaken as soon as is practicable after completion of activities.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no licence requirements applicable to Leading Indicator Criteria are necessary. | Measurement criteria are to be finalised in the PEPR. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **MPL (C) – SW1**<br>**Potential Impact:** Increased sediment loads in downstream water flows from not properly stabilised land surfaces and/or flooding of adjacent areas from poorly maintained or insufficient drainage.<br>**Recommended Outcome:**<br>1. The Tenement Holder must:<br>1.1. ensure no surface water contaminated as a result of site operations leaves the Licence area; and<br>1.2. ensure that:<br>1.2.1. no surface water contaminated prior to mine completion remains within the Licence area after mine completion; and<br>1.2.2. no contamination of surface water occurs after mine completion as a result of site operations within the Licence area. | Results from an inspection at closure demonstrate that all drainage and final landforms are in accordance with the closure plan. | Rex proposes measurement criteria that demonstrate all drainage and final landforms are in accordance with the closure plan.<br><br>DSD considers that further detail must be provided in the PEPR on the 'closure strategies', should a licence be granted. This would include detailed description of the surface water drainage and erosion controls for all rehabilitated areas, not just drainage and landforms. It is also expected that the closure strategies would include detailed flood extent modelling for the site as it will apply post completion.<br><br>DSD considers the proposed criterion would provide an appropriate mechanism to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission | DSD considers no licence requirements applicable to Leading Indicator Criteria are necessary. | Measurement criteria are to be finalised in the PEPR.<br><br>The closure plan must be further detailed in the PEPR, including post completion flood extent modelling for the Power line and Pipelines MPL. |

### 7.11.10 *Summary of the recommended regulatory response (MPL)*

DSD considers that all potential impacts to surface water during construction, operations and post completion have been identified through this assessment and suitable outcomes have been recommended for all impact events where the severity of consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for the receiving environment from mine related activities. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

**Power line and Pipelines MPL**

*DSD recommends that should a licence be granted the following outcome be a condition of the licence:*

1. The Tenement Holder must:

1.1. ensure no surface water contaminated as a result of site operations leaves the Licence area; and

1.2. ensure that:

1.2.1. no surface water contaminated prior to mine completion remains within the Licence area after mine completion; and

1.2.2. no contamination of surface water occurs after mine completion as a result of site operations within the Licence area.

## *7.12 Groundwater*

### 7.12.1 *Description of Relevant Aspects of Environment*

A detailed description of the geological and hydrogeological setting has been provided in Section 5.10 of the Proposal. This information was based on a review of available geological and hydrogeological data together with a field testing program (aquifer testing together with groundwater monitoring) to assess groundwater conditions and define hydrogeological parameters for the Hillside site.

This information was used in the development of:

- a conceptual hydrogeological model around the mine site
- a numerical groundwater model to assess likely dewatering requirements
- the construction of a pit water level recovery model following mine closure
- site water balances.

At Hillside, groundwater occurs in a single fractured rock aquifer overlain by saprolitic rocks which act as a vertical confining layer. The saprolite is overlain by Cainozoic age sediments for which historical reports indicate there are local areas where these sediments are known to be saturated. Extensive drilling undertaken by Rex has demonstrated Cainozoic sediments are unsaturated at the proposed mine site and immediate surroundings. A search undertaken by Rex of the 'Water Connect'

database has identified that groundwater can occur at shallow depths in the vicinity of the pipeline corridor, particularly near the coast with recorded salinity (TDS) values in the order of 6,370 – 16,177mg/L (Table 1 of the Proposal Response Document - Appendix 7).

Rex undertook a groundwater user survey in December 2013 within the local area surrounding the mine site. Rex contacted all landholders of property on which the Water Connect database indicated a water supply well was located. Rex indicates that only one operational well was located during this survey. This well was situated 8km south of the mine site.

The 4 staged aquifer pumping tests indicated that the basement rock aquifer is of variable transmissivity, due in part to the presence and nature of fractures, deep weathering and lithology changes. Water quality in the fractured rock aquifer has been characterised as being saline to highly saline (TDS up 110,000 mg/L) making it unsuitable for any use other than industrial without treatment. pH is neutral, and metal concentrations are generally low. Salinity was found to increase significantly with depth. No known users of this groundwater, or groundwater dependent ecosystems, have been identified by Rex in the vicinity of the proposed mine and further afield including Pine Pont, Rogues Point, Rogues Gully and James Well. One groundwater well used for stock watering was identified near Black Point, 8km to the south of the proposed mine.

Additional aquifer pump tests undertaken subsequent to the Proposal in May and June 2013 provided updated information on hydrogeological characteristics of the fractured rock aquifer based on wells constructed to a depth of 400m (the anticipated depth of the proposed pit). A full summary of all groundwater investigations has been documented in *the Hydrogeological Summary Report*, Appendix 7 to the Proposal Response Document. The key finding of the additional pump tests was that the fractured rock aquifer has lower transmissivity at depth than initially predicted in the Proposal.

The Hydrogeological Summary Report provides details of updates to the original groundwater flow model provided in the Proposal based on the Stage 4 pump tests. A sensitivity analysis was also run on the model using different hydraulic conductivity (K) values. The revised model predicted a significant reduction in water inflows into the mine pit and underground workings as compared to that predicted in the Proposal, resulting in a reduction in dewatering volumes. Consequently, the mine water balance was updated such that there would no longer be a need to reinject excess mine water into the fractured rock aquifer.

The long term pit water level recovery model was also updated taking into account the revised hydraulic conductivity values from the later drilling program. This predicted that water levels in the pit would stabilise at -38.5 m AHD after approximately 680 years. This compares to the original model contained in the Proposal which predicted water levels stabilising at -27.1m AHD after approximately 550 years. The model also indicates that

groundwater will flow toward the pit from all directions following water level recovery, meaning the pit lake will become a permanent groundwater sink.

DSD considers the current sensitive receptors and associated environmental values for groundwater to be:

1. Potential environmental values of the basement fractured rock aquifer; and
2. Potential environmental values of groundwater within Cainozoic age sediments, should this be present (MPLs only).

DSD considers that the description of the environment is a suitable characterisation of the receiving environment which may be affected by mining operations.

DSD considers that should a lease be granted, Rex provides on-going supporting data to validate the information provided in the Proposal on groundwater, particularly on the potential presence and nature of groundwater within shallow Cainozoic age sediments along the pipeline corridor. Details regarding further investigations must be provided in the PEPR.

### 7.12.2 *Views of affected parties*

Rex explains that prior to submission of the Proposal, the CCG had expressed a high level of concern of water seepage from the mine into surrounding groundwater resources, and that the mining activities may impact negatively on groundwater quality.

During the statutory consultation, mining related impacts on groundwater quality and quantity were common issues of concern raised by individuals and community groups. Concerns were also raised on the validity of the hydrogeological investigations undertaken by Rex in its development of the Proposal, including the suitability of the pump testing. Specific issues raised during Statutory Consultation are listed in the following table.
A number of technical issues were raised by Government Agencies during this consultation period. Responses to these issues were provided in the Response Document.

To support its review of the Proposal during Statutory Consultation, the Yorke Peninsula Land Owners Group (YPLOG) engaged groundwater consultants Gilbert and Sutherland to undertake a review of hydrogeology information contained in the Proposal and supporting Hydrogeology Report. Additional impact events identified by Gilbert and Sutherland are included in the table below.

The following issues were raised during Statutory Consultation:

**Table 7.12 – Impact events relating to issues raised during statutory consultation**

| Issue | Addressed |
|---|---|
| Potential contamination of groundwater and effects on adjacent users (incl. from TSF seepage) | **ML-GW2, ML-GW-3, ML(C) - GW3, ML-TSF7 Response Document Issue #75** |
| Inadequacies of Proposal<br>• No calculations regarding the amount of salt that will be pumped onto land or into aquifers<br>• Has the high rate of water seepage on the Yorke Peninsula been considered especially as mining below sea level (potential for it to seep in through fractured rock)<br>• Potential for groundwater dependent ecosystems in the zone of influence<br>• Test pumping method used is unreliable<br>• Potential for linear extensions of less steep but more extensive groundwater drawdown along lines of enhanced permeability due to fracturing sympathetic with regional geological faulting was not discussed.<br>• Groundwater drill holes were to insufficient depth to assess impact, did not target seasonal perched aquifer and insufficient samples were used to generate model<br>• Insufficient discussion regarding groundwater long-term pump test results, pumping tests were not conducted for adequate period of time | **ML-GW4** and **ML(C)-GW2**<br>**ML-GW5**<br><br>**Response Document Issues 55-90, 93, 97-98, 170 – 196 and Appendix 7** |
| Quality of water remaining in pit (and potential for this to contaminate groundwater) | **ML(C)-GW1 to GW3** |
| Groundwater drawdown affecting other users | **DSD ML(C)-GW1** and **DSD ML-GW5** |
| Fate of excess groundwater from dewatering | **Response Document Appendix 7** |
| Interactions between surface and groundwater | **Response Document Issue #170** |
| Fate of groundwater leaving the site in the final two years where not all groundwater can be intercepted. | **Response Document Appendix 7** |
| Geological constraints on groundwater flows | **ML(C)-GW2** |
| Interaction of seawater and freshwater and groundwater | **ML-GW4** and **ML(C)-GW2** |

The statutory consultation did not identify any additional receptors or impact events to those identified by Rex.

DSD has had regard for all concerns which were raised during statutory consultation, however not all concerns have been included as part of this

assessment report as they are either not within the scope of the assessment or are too general in nature to consider.

### 7.12.3 *Impact assessment (ML)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0.

The impact assessment provided in the Proposal is informed by a conceptual hydrogeological model, numerical groundwater flow model and pit water level recovery model. These models were based on 3 stages of drilling and pump testing, to a depth of ~200m.

The Hydrogeological Summary Report provided in the Response Document Appendix 7 included a revised groundwater flow model developed using the data collected during the Stage 4 deep drilling (400m) pump tests.

Rex has provided a separate assessment of groundwater impacts associated with TSF activities in Section 8.3.13 of the Proposal. DSD has assessed these impacts within this groundwater impact assessment.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7.0.

A review of Rex's impact assessment is shown in Table 7.12.1. A review of the groundwater impacts associated with the TSF has been incorporated into this assessment. Impacts identified by State Government post submission of Proposal are included in Table 7.12.2.

DSD sought the advice of senior hydrogeologists within DEWNR in its review of potential groundwater impacts associated with proposed mining operations, and the appropriateness of methodologies and modelling adopted by Rex in their impact assessment. DEWNR was satisfied that all issues raised following the statutory consultation stage have been adequately addressed by Rex and its consultants for the purpose of completing an assessment of mining risks.

DEWNR considers that the model used by Rex is a 'Class 1' model according to criteria established in the Australian Model Guidelines, as Rex has limited data sets to advance to a more complex Class 2 or 3 model. DSD recommends that Rex acquire additional data during mining operations which would allow ongoing calibration of the groundwater flow model and removal of modelling assumptions.

## Table 7.12.1 – Impact events identified by Rex in the Proposal

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-GW1** | Inappropriate abandonment of drill holes and wells leading to the contamination of groundwater. | Cross contamination of aquifers cannot occur as there is only one aquifer present at the Hillside site.<br>Based on the discussion above DSD considers the consequence without controls implemented to be trivial and as such no outcome is required.<br>An outcome is proposed in the Proposal due to '*legislative requirements*'. DSD does not consider this is necessary, as abandonment of drill holes and decommissioning of wells is adequately managed through other legislative processes under the NRM Act. | No<br>Rex has provided an outcome |
| **ML-GW2** | Contamination of groundwater due to open pit and underground mining activities. | DSD accepts that the consequence of contamination of groundwater due to the open pit and underground mining activities is minor as there is no environmental value or current users associated with the fractured rock aquifer in the vicinity of proposed mining operations. In addition, as predicted by the groundwater model, dewatering required to undertake operations would cause groundwater within the drawdown zone of influence to migrate towards the pit.<br>The water quality and environmental values of the fractured rock aquifer outside of the project area are less well defined, and as such there is a potential to impact on groundwater resources outside of the immediate project area.<br>Based on the discussion above DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-GW3** | Contamination of groundwater by the injection of water from dewatering. | The updated groundwater flow model undertaken following the May-June 2013 deep well pump tests has changed the conceptual mine water balance such that reinjection of excess water will no longer be required, and has only been retained as a contingency measure in the Proposal Response Document.<br>Based on the discussion above DSD considers the consequence without controls implemented to be trivial and as such no outcome is required.<br>Should reinjection be proposed at a subsequent time, an additional impact assessment will be required.<br>Although no outcome is required, DSD recommends that a condition be placed on the lease to prevent this activity unless approved by the Director of Mines (see Section 7.12.6 for Regulatory Response). | No<br>Rex has provided an outcome |
| **ML-GW4** | Seawater ingress impacting groundwater quality. | The revised groundwater model provided in the response document demonstrates that mine dewatering will be significantly reduced throughout the proposed mining operation (compared to information in the Proposal) due to the lower measured transmissivity of the fresh basement.<br>DSD accepts the Rex conclusion that should the risk of connectivity be realised, seawater ingress to the mine would lead to negligible impacts on groundwater quality due to similarities in salinity levels in the fractured rock aquifer and seawater. Therefore, if there was any seawater ingress this would not result in a significant reduction of water quality. In addition, the pit will act as a groundwater sink mitigating any risk of broader ingress of seawater into the fractured rock aquifer.<br>Based on the discussion above DSD considers the consequence without controls implemented to be trivial and as such no outcome is required. | No<br>Rex has not provided an outcome |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-GW5** | Reduced groundwater quantity available for native vegetation as a result of mine dewatering. | The investigative drilling undertaken by Rex has demonstrated that there is not an unconfined watertable aquifer in the Cainozoic sediments located in vicinity of the mine. DSD accepts the Rex finding that vegetation does not access groundwater in the basement aquifer as it is confined below the saprolite layer. Field surveys undertaken within and surrounding the application area have not identified any groundwater dependent ecosystems that could be impacted by a drawdown in the basement aquifer water levels. On the basis that there are no groundwater dependent ecosystems in the vicinity of the mine, DSD accepts that the consequence of this impact event is trivial.<br>Based on the discussion above DSD considers the consequence without controls implemented to be trivial and as such no outcome is required. | No<br>Rex has not provided an outcome |
| **ML-TSF7** | Discharge of contaminated water by excessive leakage through the embankment or base of the TSF. | This impact was discussed in the TSF impact assessment of the Proposal (Appendix 6.7-A) and summarised in Section 8.3.13). Rex has classified the unmitigated consequence of major leaks through the base or embankment as severe, and minor leaks as medium.<br>An additional impact assessment was provided in the Proposal Response Document in response to a Government request (Government Issue No. 48). This is discussed under the ID DSD 1 below.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |
| **ML(C)-GW1** | Offsite movement of contaminated groundwater from the mine at closure. | The Proposal and subsequent information provided in the Response Document explains that at mine closure, groundwater modelling undertaken by Rex predicts that the pit will act as a local groundwater sink, and that any groundwater potentially contaminated by mining activities would, in the long term, transmit to the pit void.<br>DSD accepts this conclusion, however considers further calibration of the groundwater flow model will be required in operation, to demonstrate groundwater movement will be towards the pit void.<br>Based on the discussion above DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has not provided an outcome |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML(C)-GW2** | Inflow of sea water into the pit post mine closure. | The information provided by Rex in the Proposal and subsequent Response Document (Government Issue No. 26) indicates that the coastal granites to the east of the proposed pit are generally of low hydraulic conductivity, minimising ingress of sea water to the pit post-mining. DSD accepts that, just as in operation, there is a low likelihood of seawater ingress to the pit post completion, and that in any event pit water chemistry post completion would not be unduly impacted should seawater transmit to the pit.<br>Based on the discussion above DSD assesses that the primary consequence of this occurring is trivial and hence no outcome is required. | No<br>Rex has not provided an outcome |
| **ML(C)-GW3** | Reduction in groundwater quality for potential future users | The Proposal explains that the consequence of impacts to potential groundwater users will be minor as existing groundwater is classified as suitable only for industrial use, and the potential use of the groundwater is limited without treatment due to natural salinity concentrations. In addition, the pit will act as a permanent groundwater sink post completion which will prevent groundwater migration away from the site.<br>DSD accepts this conclusion, however considers further calibration of the groundwater flow model will be required in operation, to demonstrate groundwater movement will be towards the pit void.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has not provided an outcome |
| **ML(C)-TSF4** | Discharge of contaminated water through the TSF capping layer, embankment and base | This impact has been covered under Section 7.5 (Soils) of this report. | Yes<br>Rex has provided an outcome |

The State Government, through the assessment process, has identified additional impacts to groundwater associated with the proposed mining activities subsequent to the submission of the Proposal. An assessment of these additional impact events is provided in Table 7.12.2.

**Table 7.12.2 – Impact events identified subsequent to the Proposal**

| *Impact events identified subsequent to the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **DSD ML-GW1** | Impacts caused by the transport of leached copper bearing minerals through WRDs and oxide stockpiles | This impact event was identified by the State Government and has been addressed in Section 7.5 (Soils) and Section 7.9 (Marine) of this report. | See Section 7.5 |
| **DSD ML-GW2** | Mounding of seepage under the TSF impacting on adjoining land uses (including cropping) during operations and post completion | This impact event was identified by the State Government and has been addressed in Section 7.5 (Soils) of this report. | See Section 7.5 |
| **DSD ML-GW3** | Reduction in groundwater quantity for existing users | There is the potential for a reduction in groundwater pressure, generated from dewatering or the residual open pit void, to cause a reduction in groundwater quantity for existing users.<br>Rex in the Proposal and Response Document has provided an assessment of nearest groundwater users to the proposed mine site. The Rex groundwater users survey, conducted in December 2013 found that the nearest operational well is situated 8km to the south of the Hillside deposit. This is considered well outside the area of influence of groundwater reduction that could be expected from proposed mining operations. Other local groundwater wells identified in the 'WaterConnect' Database could either not be located or had been abandoned or decommissioned.<br>DSD assesses that the primary consequence of this occurring is trivial and hence no outcome is required. | No |

| *Impact events identified subsequent to the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **DSD ML(C)-GW1** | Reduction in groundwater quantity post completion | Pit water level recovery modelling has predicted that the pit will act as a perpetual groundwater sink (cone of depression) post completion, with a localised drawdown in the groundwater level post completion due to evaporative losses exceeding pit water recharge rates.<br><br>The extent of the drawdown around the pit is predicted to be contained to an area immediately surrounding the pit (as shown in Figure 173 of Response Document Appendix 7) which baseline studies have shown to be of a low quality and suitable only for industrial use.<br><br>Based on the discussion above DSD assesses that the primary consequence of this occurring is trivial and hence no outcome is required. | No |

### 7.12.4 *Outcomes (ML)*

Table 7.12.3 contains the DSD assessment of outcomes proposed by Rex in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable. The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies.

## Table 7.12.3 – DSD assessment of outcomes proposed by Rex

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-GW2**<br><br>**Impact event:** Contamination of groundwater from open pit and underground mining activities.<br><br>**Rex Proposed Outcome:** No adverse impact to groundwater quality caused by mining operations. | The statement '*no adverse impact to groundwater quality'* does not accurately describe the level of impact, as there would be some interaction of the open pit and underground activities with groundwater, and consequently some degree of change in water quality.<br><br>The proposed outcome is not considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies.<br><br>A recommended acceptable level of impact is suggested to be no change to the existing environmental value of the groundwater resource. | Rex has proposed a number of control and management strategies in Section 8.3.12.3 of the Proposal. The principal control would be the maintenance of a net hydraulic gradient toward the pit, which will ensure any possible reduction in water quality of the fractured rock aquifer would be maintained to a localised area within and immediately adjacent to the pit. This would be achieved through ongoing dewatering activities which are necessary for mine operation, and at mine closure would be maintained by the process of evaporation removing more water from the pit than will naturally inflow.<br><br>The updated groundwater flow model provided in the Hydrogeological Summary Report attached to the Proposal Response Document has been technically reviewed and determined to be a reasonable prediction of groundwater response following pit and underground mine development and associated dewatering activities.<br><br>The modelled groundwater elevations predicted in this report indicate that mining activities will induce groundwater flow towards the pit from all directions once dewatering commences during mining operation and indefinitely post completion.<br><br>A sensitivity analysis has been provided by observing the change to model outputs brought about by varying hydraulic conductivity (K values) and specific storage (Ss) to reflect both 'worst case' and most likely water inflow scenarios. The model was found to be very sensitive to changes in both hydraulic conductivity and specific storage.<br><br>The Hydrogeological Summary Report explains that transient model calibration could not be undertaken, as this requires a time series data set of aquifer response to stresses such as pumping or seasonal recharge /discharge, and that no such datasets are available for the project area. Calibration was however able to be carried out by comparing varied model runs against pump test observations.<br><br>As documented in Section 14.3 of the Report. Should mining proceed, DSD recommends that the groundwater model be recalibrated on a progressive basis using ongoing groundwater level monitoring | *DSD recommends that should a lease be granted the following outcomes be a condition of the lease:*<br><br>1. The Tenement Holder must ensure there is no adverse change to the environmental values of the basement fractured rock aquifer outside of the area of the Lease during constructions and operation.<br><br>2. The Tenement Holder must ensure there is no adverse change to the environmental values of the basement fractured rock aquifer within or outside of the area of the Lease after mine completion.<br><br>*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event <**ML-GW2**>;* |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | Other control and management measures proposed to mitigate the potential for contamination of groundwater from mining activities are based on preventative measures, ensuring that contaminants are managed in such a way that they will not enter the groundwater system. This includes management of wastes, spill control and management, and purpose built and operated waste rock, tailings storage and chemical storage with leak detection and under-drainage collection facilities.<br><br>DSD is satisfied that the contaminant prevention and control strategies proposed will minimise potential transport of contaminants to the underlying groundwater system. DSD is also satisfied that Proposal and subsequent Response Document sufficiently demonstrates that the proposed mine dewatering activities will result in a net hydraulic gradient toward the pit throughout the mine life. As a consequence of this, it is considered that in the unlikely event mine activities lead to groundwater contamination, this will be maintained within the pit area due to this acting as a groundwater sink.<br><br>There is no risk of compromising the environmental values of the fractured rock aquifer, which are classified as 'industrial' due to high natural salinities preventing stock or other beneficial uses.<br><br>Based on the discussion above DSD considers that the outcome recommended by DSD would be achievable. | The Tenement Holder must provide a calibrated ground water model in the proposed PEPR.<br><br>The Tenement Holder must establish a program for the establishment and ongoing calibration of the transient ground water model using data obtained from groundwater monitoring within the PEPR.<br><br>The Tenement Holder must provide a calibrated transient groundwater model within 1 year from the approval of the PEPR.<br><br>The Tenement Holder must establish a program for the ongoing calibration of the pit lake geochemistry and hydrogeological models using data obtained from operational monitoring to address any assumptions and uncertainty within the model.<br><br>A further regulatory recommendation is provided in Section 7.17 of this report requiring the provision of a 3rd party independent review of |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | | the effectiveness of proposed strategies in achieving this outcome (for impact event **ML-GW2**). |
| **ML-TSF7**<br><br>**Impact event:** Leakage through the (TSF) embankment or base.<br><br>**Rex Proposed Outcome:** No contamination and/or pollution of natural water drainage systems, groundwater, land and soils by waste products and hazardous material used in the mine operations. | The proposed outcome accurately describes the level of impact to surface and groundwater systems subsequent to control strategies being implemented.<br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies.<br><br>It is recommended that the outcome be modified from 'no contamination' to 'no compromise of environmental values' which allows for the protection of any beneficial uses or environmental users of the groundwater resource. It is also recommended that the outcome also cover any mine related impacts on groundwater resources. | The detailed construction and operation plans for the TSF are contained in the Proposal Appendix 6.7-A Integrated Waste Management Tailings Storage Facility Design Report. This includes control and management systems for tailings leak prevention, detection and collection which are designed to minimise the leakage of tailings to the receiving environment. The TSF Report then assesses the risk associated with leakage through the embankment or base in terms of the effect of major and minor defects caused by improper construction methods.<br><br>The leakage minimisation design principles for the TSF include a proposed reworked in-situ low-permeability base layer, low permeability compacted waste rock embankments keyed into the base, and an underdrainage system to remove seepage water from the TSF area which discharges to an engineered Decant and Seepage Collection Pond (DSCP). Monitoring bores and piezometers are also proposed to detect any seepage. Further details of the leak collection and monitoring systems are explained in the Proposal Response Document. Response No. 45 also explains that strategies are available for the remediation of any leak-failures in the TSF should they occur.<br>In addition to the design strategies, results from tests conducted on the tailings the Proposal summarises, have shown that the tailings are non-acid generating. Leachate analysis using the toxicity characteristic leaching procedure (TCLP) test was also conducted on the waste material. This information together with additional drillhole geochemistry data was provided to DSD to inform a technical review of geochemical risks (acid and metalliferous drainage) associated with the mine (including TSF). The findings of this review were that the geochemical risks of the mining waste, including tailings, would be manageable through the implementation of appropriate control and management strategies.<br><br>An expert geotechnical review of the Proposal and supporting documentation conducted by DSD found that base or lateral seepage from the TSF should not be of concern provided that the low permeability zone of the embankment is constructed as designed, and also that the stability of a clay faced rock embankment is as proposed (see Appendix 5, SLR Consulting 2014). | *DSD recommends that should a lease be granted the following outcomes be a condition of the lease:*<br><br>1. The Tenement Holder must ensure there is no adverse change to the environmental values of the basement fractured rock aquifer outside of the area of the Lease during constructions and operation.<br><br>2. The Tenement Holder must ensure there is no adverse change to the environmental values of the basement fractured rock aquifer within or outside of the area of the Lease after mine completion. |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | From the information provided, it is considered that the risk of excessive leakage from the TSF would be low following the implementation of control and management strategies. Any leakage that does occur would be monitored to confirm volume and chemical composition, which would directly inform any remedial strategies.<br><br>In the unlikely event that water could pass through the confining saprolite layer and reach the fractured rock aquifer below, the existing groundwater quality is saline and meets no environmental values other than industrial in the potential zone of influence around the TSF. In addition, as previously discussed all groundwater within the locality of the pit, including under the TSF, will report to the pit.<br><br>This impact event is also addressed under the Soils impact assessment under Impact ID **DSD ML S-1.**<br><br>Based on the discussion above DSD considers that the outcome recommended by DSD would be achievable. | |
| **ML(C)-GW1**<br><br>**Impact event:** Offsite movement of contaminated groundwater from the mine at closure.<br><br>**Rex Proposed Outcome:** None | N/A | As per the discussion pertaining to impact ID ML GW-2, the principal control for ensuring no contamination of groundwater will be maintaining a net hydraulic gradient toward the pit, which will ensure any possible impact on water quality of the fractured rock aquifer will be maintained to a localised area within and immediately adjacent to the pit. During mining operations, dewatering activities lower groundwater levels around the open pit and underground workings resulting in a 'groundwater sink'. At mine closure, dewatering ceases and the pit will refill with groundwater inflow, precipitation and some surface water flow. The revised groundwater model provided in the Proposal Response Document Appendix 7 'Hydrogeological Summary Report' predicts that following mine closure, water levels in the pit will stabilise after approximately 680 years at a level of approximately -38.5m AHD (compared to a pre-mining potentiometric surface of 5 - 30m AHD in the area of the proposed pit as shown in Figure 19 of Response Document Appendix 7).<br>The updated model indicates that evaporation would exceed pit inflows from groundwater and rainfall recharge, resulting in the pit lake water level remaining lower than the surrounding groundwater levels indefinitely post completion. This means that groundwater will always move toward the pit, and so there will be no offsite movement of groundwater that may have been impacted by mining activities. | *DSD recommends that should a lease be granted the following outcomes be a condition of the lease:*<br><br>1. The Tenement Holder must ensure there is no adverse change to the environmental values of the basement fractured rock aquifer outside of the area of the Lease during constructions and operation.<br><br>2. The Tenement Holder must ensure there is no |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | DSD, in consultation with South Australian Government hydrogeologists, considers that this is a credible post completion prediction of groundwater movement at the mine site, and given that the existing groundwater resource is highly saline, consider that the proposed outcome is achievable indefinitely post completion.<br><br>Based on the discussion above DSD considers that the outcome recommended by DSD would be achievable | adverse change to the environmental values of the basement fractured rock aquifer within or outside of the area of the Lease after mine completion. |
| **ML(C)-TSF4**<br><br>**Impact event:** Discharge of contaminated water through the capping layer, embankment and base<br><br>**Rex Proposed Outcome:** All mine waste materials left onsite are chemically and physically stable. | The proposed outcome does not accurately describe the level of impact.<br><br>The proposed outcome is not considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies.<br><br>The outcome needs to be reworded such that it describes an acceptable level of impact to groundwater subsequent to control strategies being implemented | The main control and management strategies to prevent the long-term risk of leakage from the TSF and WRDs impacting groundwater quality are an appropriately designed and constructed TSF base and embankment, as well as a capping system which prevents infiltration of rainwater. Failure of either the base or capping system may lead to major leaks which if not remedied could lead to mounding on the underlying confining saprolite layer (discussed in Section 7.5 of this assessment - Soils), or infiltration through to the basement fractured rock aquifer.<br><br>A low permeability base layer and embankment have been proposed as discussed under ID ML-TSF7 to effectively minimise infiltration of any leakage through the TSF base. This will be monitored and managed during the life of the mine which will address the potential for long term major defects and leaks.<br><br>At mine closure, a cover design has been proposed by Rex which includes a low permeability layer, protective layer and topsoil typical of a store and release cover.<br><br>The top of the TSF will be covered with a water shedding, low water flux cover system (ATC Williams, December 2012) and will be sourced from overburden onsite. The cover will comprise of a:<br>• capillary break layer of coarse, non-acid forming waste rock (0.3 m depth)<br>• sealing layer of non-acid forming, low permeability compacted earthfill (0.5m depth)<br>• mine spoil cover of non-acid forming rockfill (1.0m depth)<br>• topsoil cover (0.1 – 0.3m depth).<br>The geochemical technical review of the Proposal and Response Document conducted by DSD found that it will be necessary for the cover system to be modelled and regularly reviewed during the life of the mine to confirm final design parameters. The cover would be necessary to reduce net | *DSD recommends that should a lease be granted the following outcomes be a condition of the lease:*<br><br>1. The Tenement Holder must ensure there is no adverse change to the environmental values of the basement fractured rock aquifer outside of the area of the Lease during constructions and operation.<br><br>2. The Tenement Holder must ensure there is no adverse change to the environmental values of the basement fractured rock aquifer within or outside of the area of the Lease after mine completion. |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | percolation and reduce long-term contaminant discharge to the receiving environment post completion. The cover system would also need to be structurally stable and able to withstand long term erosion processes.<br><br>Rex has also proposed to put in place a legal encumbrance on the land which ensures that land management practices are enshrined post completion for the area of the TSF.<br>In addition to these measures, the pit would act as a groundwater sink following mine completion in perpetuity. This will ensure that any impacts to groundwater quality will be retained within the area of the pit post completion.<br><br>On account of the proposed control and management strategies, DSD considers that the recommended closure outcome is achievable in the long term.<br><br>DSD considers that the outcome recommended by DSD would be achievable | |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex.

### 7.12.5 *Measurement Criteria (ML)*

Table 7.12.4 is DSDs assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

## Table 7.12.4 – DSD assessment on measurement criteria

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **ML-GW2**<br>**Potential Impact:** Contamination of groundwater from open pit and underground mining activities.<br>**Recommended Outcome:**<br>1. The Tenement Holder must ensure there is no adverse change to the environmental values of the basement fractured rock aquifer outside of the area of the Lease during constructions and operation.<br>2. The Tenement Holder must ensure there is no adverse change to the environmental values of the basement fractured rock aquifer within or outside of the area of the Lease after mine completion. | An annual internal audit of the Hillside spills register demonstrates that all spills of fuels, lubricant or other contaminate have been remediated in accordance with EPA requirements and that all spills greater than 20 L reported to appropriate regulator. | An additional assessment criterion will be required in the PEPR for an ongoing groundwater monitoring program which adequately demonstrates that groundwater is not being impacted off the mining lease as a result of mining activities.<br>Should a lease be granted, these criteria would be finalised in the PEPR submission | None are proposed<br>DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | *DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(d) of the Regulations in relation to the outcome for impact event* ***ML-GW2****;*<br>Establish representative baseline water quality data for the basement fractured rock aquifer underlying the Lease.<br>Establish compliance groundwater monitoring bores adjacent to the lease boundaries that are of sufficient density and depth to detect movement of groundwater off the lease. |
| **ML-TSF7**<br>**Potential Impact:** Leakage through the (TSF) embankment or base.<br>**Recommended Outcome:**<br>1. The Tenement Holder must ensure there is no adverse change to the environmental values of the basement fractured rock aquifer outside of the area of the Lease | An annual internal audit (intermediate and comprehensive) of the records of the groundwater conditions and the phreatic surface of the TSF from monitoring logs of the boreholes and piezometers installed at locations specified in the TSF 'Operation and Maintenance | Additional criteria will be required in the PEPR detailing the leakage monitoring proposed surrounding the TSF (as indicated in Response No. 45 in the Proposal Response Document) This criteria must satisfy the requirements of Mining Regulation 65(2)(d).<br>Measurement criteria are also to be provided in the PEPR, should a lease be granted, detailing the leak detection | The following leading indicator criteria is proposed*: 'Data of the groundwater conditions and phreatic surface of the TSF is analysed and any resultant action carried out in accordance with the TSF 'Operation and Maintenance Manual' within specified timeframe.'* | DSD considers no lease conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| during constructions and operation.<br>2. The Tenement Holder must ensure there is no adverse change to the environmental values of the basement fractured rock aquifer within or outside of the area of the Lease after mine completion. | Manual' demonstrate through annual analysis of the data that no leakage from the TSF into the surrounding aquifer or Cainozoic sediments has been detected. | monitoring program around the TSF and DSCP.<br>Should a lease be granted, these criteria would be finalised in the PEPR submission | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | |
| **ML(C)-GW1**<br>**Potential Impact:** Offsite movement of contaminated groundwater from the mine at closure.<br>**Recommended Outcome:**<br>1. The Tenement Holder must ensure there is no adverse change to the environmental values of the basement fractured rock aquifer outside of the area of the Lease during constructions and operation.<br>2. The Tenement Holder must ensure there is no adverse change to the environmental values of the basement fractured rock aquifer within or outside of the area of the Lease after mine completion. | No outcome or draft criteria have been proposed for this impact event. | Criteria will be required in the PEPR to measure the achievement of this outcome. It is suggested that the criteria include a groundwater monitoring program which collects data to calibrate the groundwater flow model.<br>Should a lease be granted, these criteria would be finalised in the PEPR submission | None proposed<br>DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **ML(C)-TSF4**<br>**Potential Impact:** Discharge of contaminated water through the integrated TSF/WRD capping layer, embankment and base<br>**Recommended Outcome:**<br>1. The Tenement Holder must ensure there is no adverse change to the environmental values of the basement fractured rock aquifer outside of the area of the Lease during constructions and operation.<br>2. The Tenement Holder must ensure there is no adverse change to the environmental values of the basement fractured rock aquifer within or outside of the area of the Lease after mine completion. | A TSF closure audit by an independent chartered professional will be undertaken post completion to demonstrate that the TSF and associated infrastructure has been rehabilitated as per the approved TSF closure design. | DSD considers the proposed criteria to be a suitable demonstration of the achievement of the proposed outcome. Comprehensive TSF closure strategies and design will be required in the PEPR should a lease be granted.<br>The PEPR must include measurement criteria that demonstrate achievement of the outcome.<br>DSD considers verification of the TSF control strategies and verification that construction of the TSF is to design to be appropriate measurement criteria. Verification is to be provided by a suitably qualified 3rd party expert.<br>Should a lease be granted, these criteria would be finalised in the PEPR submission | None proposed<br>DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |

### 7.12.6 *Summary of the recommended regulatory response (ML)*

DSD considers that all potential impacts to groundwater during construction, operations and post completion have been identified through this assessment and acceptable outcomes have been recommended for all primary impact events where the severity of primary consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for the receiving environment during construction, operation and post completion. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

*DSD recommends that should a lease be granted the following outcomes be a condition of the lease:*

1. The Tenement Holder must ensure there is no adverse impact to the quantity, and no adverse change to the environmental values of the basement fractured rock aquifer outside of the area of the Lease during constructions and operation.
2. The Tenement Holder must ensure there is no adverse change to the environmental values of the basement fractured rock aquifer within or outside of the area of the Lease after mine completion.

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome for impact event <**ML-GW2**>:*

The Tenement Holder must provide a calibrated ground water model in the proposed PEPR.

The Tenement Holder must establish a program for the establishment and ongoing calibration of the transient ground water model using data obtained from groundwater monitoring within the PEPR.

The Tenement Holder must provide a calibrated transient groundwater model within 1 year from the approval of the PEPR.

The Tenement Holder must establish a program for the ongoing calibration of the pit lake geochemistry and hydrogeological models using data obtained from operational monitoring to address any assumptions and uncertainty within the model.

*DSD recommends the following additional matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations:*

The Tenement Holder must obtain approval from the Director of Mines in writing before developing any:

1. groundwater cut-off wellfield; or
2. managed aquifer recharge (MAR) program.

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(d) of the Regulations in relation to the outcome for impact event **ML-GW2**:*

Establish representative baseline water quality data for the basement fractured rock aquifer underlying the Lease.

Establish compliance groundwater monitoring bores adjacent to the lease boundaries that are of sufficient density and depth to detect movement of groundwater off the lease.

### 7.12.7 *Summary of the recommended regulatory response (EML)*

The proposed EML activities will include movement of stockpiles of extractive materials taken from near the surface that do not contain radionuclide bearing minerals. DSD considers there are no credible impacts to groundwater associated with the EML, and that no regulatory response is required.

### 7.12.8 *Impact assessment (MPL)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0.

Rex has provided an assessment of potential groundwater impacts associated with the MPL activities in Section 8.4.11 of the Proposal.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7.0.

A review of Rex's impact assessment is shown in Table 7.12.5. Impacts identified by State Government post submission of the Proposal are included in Table 7.12.6.

The Port MPL application has been deferred at the request of Rex and has not been assessed in this report.

**Table 7.12.5 MPL – Impact events identified by Rex in the Proposal**

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **MPL – S2** | Reduced soil quality due to soil contamination from leakage of the slurry and salt water pipeline | Rex states that this impact relates to soil contamination (primary pathway) and is therefore addressed under Soils in Section 8.4.4. | N/A |

The State Government, through the assessment process, has identified an additional impact to groundwater associated with the proposed MPL infrastructure corridor activities subsequent to the submission of the Proposal. An assessment of this additional impact event is provided in Table 7.12.6.

**Table 7.12.6 MPL – Impact events identified subsequent to the Proposal**

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **DSD MPL-GW1** | Impacts to groundwater quality caused by rupture and leakage of the concentrate or water intake pipeline | Rex has identified that groundwater in parts of the proposed infrastructure corridor occurs at shallow depths. DSD is of the opinion that a major leak of the buried concentrate or water supply pipeline may result in impacts on water quality of shallow aquifers where these exist along the corridor.<br><br>Based on the discussion above DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes |

### 7.12.9 *Outcomes (MPL)*

Table 7.12.7 is the DSD assessment of outcomes. The assessment initially determines the **acceptability** of the outcome. That is, whether the expected level of impact to the environment subsequent to control strategies. The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies.

**Table 7.12.7 – Discussion of outcomes for impacts identified by DSD**

| *Discussion of outcomes for impacts identified by DSD* | | | |
|---|---|---|---|
| **ID** | **Acceptability of outcome** | **Achievability of outcome** | **Recommended regulatory response** |
| **DSD MPL-GW1**<br><br>**Impact event:** Impacts to groundwater quality caused by rupture and leakage of the concentrate or water intake pipeline<br><br>*DSD proposes the following outcome:*<br><br>The Tenement Holder must ensure there is no compromise to the environmental values of any unconfined aquifer present within the Licence during construction, operation and post completion. | DSD considers that the recommended outcome accurately describes the level of impact, and is a suitable statement on the acceptable level of impact on the environment. | Although Rex has not specifically identified this impact event, it has identified impacts to soils due to pipeline leaks, and has documented control and management strategies including automatic leak detection and control, to minimise impacts to the receiving environment as a result of concentrate pipeline failure. These control and management strategies are detailed under Section 7.5 Soils.<br><br>As DSD considers that the impacts to soils during mining and post completion can be appropriately detected and managed, impacts to potential underlying groundwater will also be managed through the implementation of these same strategies.<br><br>DSD considers that the outcome would be achievable during mining and post-completion. | *DSD recommends that should a licence be granted the following outcomes be a condition of the licence:*<br><br>The Tenement Holder must ensure there is no adverse change to the environmental values of the groundwater within the shallow Cainozoic age sediments outside of the area of the Licence as a result of site operations.<br><br>The Tenement Holder must ensure there is no adverse change to the environmental values of the groundwater within the shallow Cainozoic age sediments within or outside of the area of the Licence after mine completion.<br><br>*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to impact event **DSD MPL - GW1**;*<br><br>Design and management strategies are to be provided for pipeline leak detection which includes automation of operational controls for the monitoring and control of all pipelines on the Lease and Licence. This should include (but not limited to):<br><br>• Continuous and automatic monitoring of pressures, flow rates and any other parameters for the prompt detection and resolution of abnormal operating conditions in any pipeline or processing plant equipment. |

| *Discussion of outcomes for impacts identified by DSD* | | | |
|---|---|---|---|
| **ID** | **Acceptability of outcome** | **Achievability of outcome** | **Recommended regulatory response** |
| | | | • Continuous and automatic monitoring of process plant functions, including tank levels, flow rates, pressures and fluid quantities;<br>• The integration of data through a central computer-based control and monitoring system. |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex.

### 7.12.10 *Measurement Criteria (MPL)*

Table 7.12.8 is DSD's assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

**Table 7.12.8 – DSD assessment on measurement criteria**

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **MPL-GW1**<br>**Potential Impact:** Contamination of groundwater as a result of seepage from the raw water and process water pumping pond at the port facility and eventual discharge into the marine environment<br>**Recommended Outcome:** The Tenement Holder must ensure there is no adverse change to the environmental values of the groundwater within the shallow Cainozoic age | Internal annual audit of fortnightly inspections of the port process water ponds demonstrate that the ponds are maintained in accordance with the engineering design | DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome. Further detail will be required in the PEPR to specify specific pond operating parameters which must be achieved as part of the fortnightly inspections. | DSD considers no licence requirements applicable to Leading Indicator Criteria are necessary.<br>No leading indicator is proposed in the Proposal. | DSD considers no licence conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| sediments outside of the area of the Licence as a result of site operations.<br><br>The Tenement Holder must ensure there is no adverse change to the environmental values of the groundwater within the shallow Cainozoic age sediments within or outside of the area of the Licence after mine completion. | | DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a Licence be granted, these criteria would be finalised in the PEPR submission. | | |
| **DSD MPL-GW1**<br><br>**Potential Impact:** Impacts to groundwater quality caused by rupture and leakage of the concentrate or water intake pipeline<br><br>**Recommended Outcome:** The Tenement Holder must ensure there is no adverse change to the environmental values of the groundwater within the shallow Cainozoic age sediments outside of the area of the Licence as a result of site operations.<br><br>The Tenement Holder must ensure there is no adverse change to the environmental values of the groundwater within the shallow Cainozoic age sediments within or outside of the area of the Licence after mine completion. | None provided | DSD considers that a similar measurement criteria be applied as that proposed by Rex for the MPL Soils impact event (Proposal Table 8.4-15, ID MPL-S2) : *An annual internal audit of the leak detection system register demonstrates that the system is operated and maintained in accordance with the design.*<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a Licence be granted, these criteria would be finalised in the PEPR submission. | DSD considers no licence requirements applicable to Leading Indicator Criteria are necessary.<br><br>No leading indicator is provided in the Proposal. | DSD considers no licence conditions applicable to the measurement criteria are required. |

### 7.12.11 *Summary of the recommended regulatory response (MPL)*

DSD considers that all potential impacts to groundwater during construction, operations and post completion for the port and infrastructure corridor MPLs have been identified through this assessment and acceptable outcomes have been recommended for all primary impact events where the severity of primary consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for the receiving environment during construction, operation and post completion. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

**Power line and Pipelines MPL**

*DSD recommends that should a licence be granted the following outcomes be a condition of the licence:*

The Tenement Holder must ensure there is no adverse change to the environmental values of the groundwater within the shallow Cainozoic age sediments outside of the area of the Licence as a result of site operations.

The Tenement Holder must ensure there is no adverse change to the environmental values of the groundwater within the shallow Cainozoic age sediments within or outside of the area of the Licence after mine completion.

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to impact event* ***DSD MPL - GW1****:*

Design and management strategies are to be provided for pipeline leak detection which includes automation of operational controls for the monitoring and control of all pipelines on the Lease and Licence. This should include (but not limited to):

- Continuous and automatic monitoring of pressures, flow rates and any other parameters for the prompt detection and resolution of abnormal operating conditions in any pipeline or processing plant equipment.
- Continuous and automatic monitoring of process plant functions, including tank levels, flow rates, pressures and fluid quantities;
- The integration of data through a central computer-based control and monitoring system.

## *7.13 Public Safety*

### 7.13.1 *Description of Relevant Aspects of Environment*

A description of the environment relevant to public safety is provided in Section 5.1, 5.2, 5.3 and Section8.3.14 of the Mining Lease Proposal. Rex has identified the following as potential public safety receptors:

- People located in nearby residences and vehicles

DSD considers the sensitive receptors and associated environmental values for public safety to be:

- People in nearby residences, businesses (including farming and fishing) and vehicles surrounding the leases and licences
- People in aircraft
- People who access the leases and licences without authorisation

DSD considers that the description of environment is a suitable characterisation of the receiving environment which may be affected by mining operations.

### 7.13.2 *Views of affected parties*

Rex noted that the following issues were raised as a result of stakeholder engagement prior to the submission of the Proposal:

- The CCG had not expressed concern regarding public safety.
- The CCG had not expressed any concern regarding public safety during construction of the power line, pipeline track or at the port location.

Issues raised during statutory consultation are summarised below:

**Table 7.13 – Impact events relating to issues raised during statutory consultation**

| Issues raised during statutory consultation | Addressed |
|---|---|
| Concern that safety of residents and visitors to local communities will be impacted | Addressed by all impacts events discussed in this Section. |
| Difficulty breathing due to dust and increased humidity from mining (particularly worsening of individuals with existing conditions) | See Section 7.1 – Air Quality |
| Ongoing health issues from mining (chemicals, dust and unspecified) | See Section 7.1 – Air Quality |
| Blasting fly rock | See Section 7.3 - Blasting |
| Lack of information regarding what contaminants will be present | See Section 7.1 – Air Quality |
| Concern regarding asbestos | See Section 7.1 – Air Quality |
| Concern regarding uranium/radioactivity | See Section 7.16 - Radiation |

The statutory consultation did not identify additional receptors or impact events to those identified by Rex.

DSD has had regard for all concerns which were raised during statutory consultation, however not all concerns have been included as part of this assessment report as they are either not within the scope of the assessment or are too general in nature to consider.

### 7.13.3 *Impact assessment (ML)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Sections 8.3.14 of the Proposal.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7.0.

A review of Rex's impact assessment is shown in Table 7.13.1.

## Table 7.13.1 – Impact events identified by Rex in the Proposal

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-P1** | Injury and/or death to members of the public through unauthorised access to the mine site. | Rex has stated that the consequence of this impact occurring without controls implemented is Catastrophic.<br>Rex has stated the following in the Proposal; "Unauthorised access to the mine operation by a member of the public, who is neither trained nor inducted, can potentially lead to injury or death. Potential hazards include, falls into the open pit, collision with heavy vehicles and access to the explosives stored on-site." The potential consequences that can arise from unauthorised access to the leases or licences include injury and/or death to the public and hence control strategies would be required to manage this impact.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES<br>Rex has provided an outcome |
| **ML-P2** | Reduced public safety from fire originating from the mine site resulting in injury and/or death. | Rex has stated that the consequence of this impact occurring without controls implemented is Major.<br>The potential consequences that can arise from interactions of mining operations with the public may include injury and/or death to the public and hence control strategies would be required to manage this impact.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES<br>Rex has provided an outcome |
| **ML-T3** | Increased vehicle accidents as a result of dragout carried from mine entrances onto public roads. *(The impact relates to the Traffic and is therefore addressed in Section 8.3.15)* | This impact event has been assessed in Section 7.14 - Traffic | This impact event has been assessed in Section 7.14 - Traffic |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-T4** | Increased traffic incidents at the mine entry and exit point from the Hillside Project. | This impact event has been assessed in Section 7.14 - Traffic | This impact event has been assessed in Section 7.14 - Traffic |
| **ML-BV3** | Reduced public safety and damage to third party property (including stock) from fly rock | This impact event has been assessed in Section 7.3 - Blasting | This impact event has been assessed in Section 7.3 - Blasting |
| **ML-TSF2** | Discharge of solids from failure or excess deformation of the embankment (embankment instability and settlement) causing damage to third party property, reduced public safety and flooding of surrounding low lying areas. | This impact event has been assessed in Section 7.5 Soils and land disturbance | This impact event has been assessed in Section 7.5 of this report |
| **ML(C)-P1** | Injury and/or death to members of the public due to access vertical openings and unsafe final landforms. | Rex has stated that the consequence of this impact occurring without controls implemented is Catastrophic.<br>Rex has stated the following in the Proposal; "Underground mining poses the potential risk of surface subsidence causing a collapse of a portion of land and in turn instabilities caused to surface infrastructure. The proposed underground mine is located with the open cut pit, hence no potential surface disturbance has been identified to occur as a result of the underground operations external to the pit shell boundary. Subsequently, public safety will | YES<br>Rex has provided an outcome |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| | | not be affected by surface subsidence caused by the Hillside project." "As part of the closure process, the final pit void will remain as a permanent feature in the landscape which will be a potential risk to public safety. The portals and vent shafts to the underground mine will be located within the mine pit domain therefore these surface components will become a part of the open pit domain on closure."<br>The Rex Proposal identifies land within the proposed mining lease which is not owned by Rex, but rather owned by third parties. Post mine completion, DSD must consider that this land will still remain as third party property and hence the public safety risks on this land must be considered.<br>During operations, potential impacts to public safety resulting from open pit instability, underground mining subsidence or unsafe landforms are addressed by the previous impact event ML-P1 and ML-P2.<br>DSD agrees with Rex's position that the final pit void will be a potential risk to public safety post mine completion. See Section 7.15 – Adjacent Land Use and Third Party Property for further discussion in regards DSD's assessment of the stability of the open pit and its impact on third party property (Rosengren). The potential post completion risks to third party property are the same risks which would apply to public safety post completion.<br>DSD does not agree with Rex's position that public safety will not be affected by surface subsidence caused by underground mining post completion. DSD's technical expert has reviewed the mining and geotechnical data for the open pit mine design and underground mine design. The findings of this technical review are summarized as follows (Rosengren):<br>There is potential for surface disturbance to extend beyond the limits of the open pit through the following mechanisms:<br>• wall failure during open pit mining and post completion<br>• wall cut-back following wall failure<br>• subsidence from underground mining<br>• wall failure induced by underground mining. | |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| | | DSD believes that there is a potential impact to public safety due to the fact that a pit wall failure induced by underground mining would have the potential to impact third party property to the west of the open pit, and hence would have the potential to impact on public safety on this third party property.<br>The potential consequences that can arise post completion from open pit failure or underground subsidence on third party property, and hence to public safety include injury and/or death to the public and hence control strategies would be required to manage this impact.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | |

The State Government, through the assessment process, has not identified any additional impacts to Public Safety associated with the proposed mining activities subsequent to the submission of the Proposal.

### 7.13.4 *Outcomes (ML)*

Table 7.13.2 is the DSD assessment of outcomes proposed by Rex in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable. The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies.

## Table 7.13.2 – DSD assessment of outcomes proposed by Rex

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-P1**<br><br>**Impact event:** Injury and/or death to members of the public through unauthorised access to the mine site.<br><br>**Rex Proposed Outcome:** No public injuries and or deaths from unauthorised entry to the mine site that could have been reasonably prevented by the Tenement Holder. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex considers control strategies will reduce this impact to a level of Major.<br><br>Rex has proposed the following control strategies:<br><br>• The mine site will be enclosed by a security fence which complies with AS1725-2003 standards.<br>• Boom gates to be installed at the main entrance whilst all other perimeter gates within the security fence will be locked<br>• Installation of adequate warning signs.<br>• The surface explosives magazine will be fenced in a separate security compound and restricted to authorised persons holding SafeWork SA Blasting permits or permits to handle explosives.<br>• Maintain adequate on-site site security including cameras and fence controls.<br>• Regular inspections and maintenance of the site fence and signage.<br>• Regular auditing of the magazine records and non-cuttable keys are used to ensure all explosives, detonators and magazine keys are accounted for.<br>• Regular monitoring of areas or infrastructure /structures posing safety risks and the provision of timely notification of mining progress to the community and any other relevant stakeholders where management of public safety is required.<br>• Maintain good community relations to assist in reporting of trespassers.<br><br>DSD considers that the outcome recommended by DSD would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*<br><br>The Tenement Holder must, in constructing and operating the Lease, ensure that unauthorised entry to the site does not result in public injuries and or deaths that could have been reasonably prevented.<br><br>*The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to Schedule 6 Clause 35:*<br><br>Develop strategies to ensure final landform design for the open pit void meets the outcome for protection of public safety post completion and in the long term to address the following potential hazards (but not limited to): |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | | 1. The risk of falling;<br>2. The risk of drowning;<br>3. The risk of vehicle incidents/accidents; and<br>4. Ground instability.<br><br>A plan for establishing appropriate legal mechanisms to ensure effective transfer of responsibility for any maintenance of the site and control of any future development post completion. |
| **ML-P2**<br><br>**Impact event:** Reduced public safety from fire originating from the mine site resulting in injury and/or death.<br><br>**Rex Proposed Outcome:** No unplanned fires onsite, and ensure control measures are in place to manage potential off site Impacts | The proposed outcome does not accurately describe the level of impact.<br><br>The proposed outcome is not considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex considers control strategies will reduce this impact to a level of Moderate.<br><br>Rex has proposed the control strategies applicable to ML-AL6 are also applicable to ML-P2.<br><br>DSD considers that the outcome recommended by DSD for ML-AL6, Section 7.1 would be applicable to ML-PL2 and would be achievable. | DSD recommends that should a lease be granted the recommended outcome for **ML-AL6** relating to Adjacent Land Use be applied. |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML(C)-P1**<br><br>**Impact event:** Injury and/or death to members of the public due to access vertical openings and unsafe final landforms.<br><br>**Rex Proposed Outcome:** The risks to the health and safety of the public are as low as reasonably practical. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex considers control strategies will reduce this impact to a level of Major.<br><br>Rex has proposed the following Closure control and management strategies:<br><br>• On mine closure access to the open cut will be minimised by construction of a man-proof fence around the entire pit with relevant signage.<br>• Earth bunds will be constructed around the pit within the fenced area to prevent access by light vehicles, post completion. The bunds will be 1 m high and 2 m wide, with the exact location to be determined by a geotechnical engineer before mine closure, to ensure the bunds remain in perpetuity.<br>• The bunds will be vegetated with native species.<br>• Rex will institute the provision of a caveat on the land title stating that all fencing and bunding around the open void is maintained by the custodian.<br>• Final land uses for the open pit void are still being considered in consultation with stakeholders and will form part of the final PEPR's closure and completion.<br>• Results from an inspection of final landforms at closure will show that final landforms are safe and stable and reducing the risks to the health and safety of the public are as low as reasonably practical.<br><br>The control and management strategies described by Rex above to reduce the post mine completion risks to third party property and public safety resulting from unsafe final landforms require further work in the PEPR. The construction of fences and bunds which will require ongoing maintenance post completion may not be suitable long term solutions for preventing public access to potentially dangerous and unstable landforms. The certainty that these physical controls can be maintained in the long term is not guaranteed and further work will be required to determine an appropriate strategy for post completion in the PEPR.<br><br>DSD considers that the outcome recommended by DSD would be achievable. Further work will be required for the development of the PEPR. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*<br><br>The Tenement Holder must demonstrate that post completion, the risks to the health and safety of the public so far as it may be affected by mining operations are as low as reasonably practicable. |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex (or identified by DSD).

### 7.13.5 *Measurement Criteria (ML)*

Table 7.13.3 is DSD's assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

**Table 7.13.3 – DSD assessment on measurement criteria**

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **ML-P1**<br><br>**Potential Impact:** Injury and/or death to members of the public through unauthorised access to the mine site.<br><br>**Recommended Outcome:** The Tenement Holder must, in constructing and operating the Lease, ensure that unauthorised entry to the site does not result in public injuries and or deaths that could have been reasonably prevented. | All unauthorised entries to the mine site are investigated and investigations demonstrate all reasonable and practical measures were in place to prevent entry (and injury, if applicable). | DSD considers the proposed draft criterion is not demonstrating measurement of the outcome and is strategy focused only. Further work to develop the criteria will be required prior to submission of the PEPR.<br><br>DSD considers that measurable criteria could be developed and should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers that there is the possibility that a strong reliance on control strategies may be required to reduce risk to the environment and thus Leading Indicator Criteria may be required for this outcome.<br><br>Rex has proposed Leading Indicator Criteria as follows:<br><br>"Records of monthly visual inspections of the perimeter fence demonstrate they are maintained as designed".<br>Should a lease be granted, DSD recommend that Leading Indicator Criteria be reconsidered and finalised in the PEPR submission. | DSD considers no lease conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **ML-P2**<br><br>**Potential Impact:** Reduced public safety from fire originating from the mine site resulting in injury and/or death.<br><br>**Recommended Outcome:** The Tenement Holder must in constructing and operating the Lease, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mining operations. | All uncontrolled on-site fires are investigated and this demonstrates they were appropriately managed and controlled | DSD considers the proposed draft criterion is not demonstrating measurement of the outcome and is strategy focused only. Further work to develop the criteria will be required prior to submission of the PEPR.<br><br>DSD considers that measurable criteria could be developed and should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to LIC are necessary.<br><br>DSD assesses that Leading Indicator Criteria for this outcome may be required pursuant to Regulation 65(2)(e), and recommends that this be reviewed in the preparation of the PEPR, should a lease be granted. | DSD considers no lease conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **ML(C)-P1**<br><br>**Potential Impact:** Injury and/or death to members of the public due to access vertical openings and unsafe final landforms.<br><br>**Recommended Outcome:** The Tenement Holder must demonstrate that post completion, the risks to the health and safety of the public so far as it may be affected by mining operations are as low as reasonably practicable. | Rex will institute the provision of a caveat on the land title stating that all fencing and bunding around the open void is maintained for the custodian.<br><br>Results from an inspection of final landforms at closure will show that final landforms are safe and stable and reducing the risks to the health and safety of the public are as low as reasonably practical. | DSD considers the proposed draft criterion is not demonstrating measurement of the outcome and is strategy focused only. DSD, as discussed previously (ML(C)-P1), also requires Rex to complete further works to develop strategies suitable to reducing the post mine completion risks to third party property and public safety resulting from unsafe final landforms.<br><br>A third party independent verification (undertaken by an expert as approved by the Director of Mines) of the physical and chemical stability of the final landforms prior to mine completion is one aspect of an appropriate measurement criteria to determine achievement of this outcome.<br><br>DSD considers that measurable criteria could be developed and should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers that there is the possibility that a strong reliance on control strategies may be required to reduce risk to the environment and thus Leading Indicator Criteria may be required for this outcome.<br><br>Rex did not propose Leading Indicator Criteria.<br><br>DSD considers no lease requirements applicable to LIC are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |

### 7.13.6 *Summary of the recommended regulatory response (ML)*

DSD has assessed that all potential impacts to Public Safety during construction, operations and post completion have been identified through this assessment and acceptable outcomes have been recommended for all primary impact events where the severity of primary consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for sensitive receptors/receiving environment during construction, operation and post completion. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

*DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*

The Tenement Holder must, in constructing and operating the Lease, ensure that unauthorised entry to the site does not result in public injuries and or deaths that could have been reasonably prevented.

The Tenement Holder must in constructing and operating the Lease, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mining operations.

The Tenement Holder must demonstrate that post completion, the risks to the health and safety of the public so far as it may be affected by mining operations are as low as reasonably practicable.

*The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to Schedule 6 Clause 35:*

Develop strategies to ensure final landform design for the open pit void meets the outcome for protection of public safety post completion and in the long term to address the following potential hazards (but not limited to):

1. The risk of falling;
2. The risk of drowning;
3. The risk of vehicle incidents/accidents; and
4. Ground instability.

A plan for establishing appropriate legal mechanisms to ensure effective transfer of responsibility for any maintenance of the site and control of any future development post completion.

### 7.13.7 *Impact assessment (EML)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0. Rex has not identified any impacts associated with proposed activities on the EML and have made the following statements:

"The removal of stockpiles from the proposed EML is not considered to have any public safety impacts. Potential impact events from the traffic associated with the removal of extractive material is assessed in Section 8.3.15."

**DSD review of Rex impact assessment (EML)**

DSD does not agree with Rex's assessment that there are no potential impacts to Public Safety associated with the proposed mining activities (relating to the EML). DSD considers unauthorised access to the site as a potential risk whilst activity occurs on the EML.

### 7.13.8 *Summary of the recommended regulatory response (EML)*

*DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*

The Tenement Holder must, in constructing and operating the Lease, ensure that unauthorised entry to the site does not result in public injuries and or deaths that could have been reasonably prevented.

The Tenement Holder must in constructing and operating the Lease, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mining operations.

### 7.13.9 *Impact assessment (MPL)*

***Rex's approach to impact assessment***

A description of Rex's approach to the impact assessment process is described in Section 7.0 of the Proposal.

Section 8.3.14.1 of the Proposal provides details in regards to the location of the port and corridor MPL's in relation to public roads and residential properties.

DSD considers that the approach adopted by Rex in the Proposal is suitable.

***DSD review of Rex impact assessment***

A description of DSD's assessment of the impact assessment process is described in Section 7.0. A review of Rex's impact assessment is shown in Table 7.13.4.

The Port MPL application has been deferred at the request of Rex and has not been assessed in this report.

## Table 7.13.4 – Impact events identified by Rex in the Proposal

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **MPL-P1** | Reduced public safety during construction of the slurry pipeline due to fall hazards into the open trench | Rex has stated that the consequence of this impact occurring without controls implemented is Minor.<br>DSD considers this potential construction impact to public safety could result in injury or death and that these potential impacts would need to be managed in order to protect public safety.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES<br>Rex has not provided an outcome |
| **MPL-P2** | Reduced public safety from fire originating from the site resulting in injury and/or death. | Rex has stated that the consequence of this impact occurring without controls implemented is Moderate.<br>The potential consequence to public safety as a result of fire which may be caused from the either construction or operations on the MPL will need to be managed.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES<br>Rex has provided an outcome |
| **MPL-T1** | Increased traffic accidents while entering and leaving the Yorke Highway during pipeline and infrastructure construction. (The impact relates to the Traffic and is therefore addressed in Section 8.4.13 of the Proposal). | This impact is assessed in Section 7.14 – Traffic. | This impact is assessed in Section 7.14 – Traffic. |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **MPL-T5** | Reduced public safety and increased vehicle accidents as a result of dragout onto public roads. (The impact relates to the Traffic and is therefore addressed in Section 8.4.13 of the Proposal). | This impact is assessed in Section 7.14 – Traffic. | This impact is assessed in Section 7.14 – Traffic. |
| **MPL(C)-P1** | Unsafe final landforms resulting in reduced public safety | Rex has stated that the consequence of this impact occurring without controls implemented is Minor. Rex has also stated the following, "At closure there are minimal public safety risks from the corridor and Port Ardrossan sites as there are no deep trenches/excavations causing hazards and there is restricted public access to Port Ardrossan." Having said this, Rex is required to produce final land forms that are chemically and physically stable prior to mine completion in order to protect Public Safety.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES<br>Rex has provided an outcome |

The State Government, through the assessment process, has not identified additional impacts to Public Safety associated with the proposed activities on the MPL's subsequent to the submission of the Proposal.

### 7.13.10 *Outcomes (MPL)*

Table 7.13.5 is the DSD assessment of outcomes proposed by Rex in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable. The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also

consider any assumptions and uncertainty in control strategies. As there are no outcomes required for impact events identified by DSD a table is only provided for impacts identified by Rex.

**Table 7.13.5 – DSD assessment of outcomes proposed by Rex**

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **MPL-P1**<br>**Impact event:** Reduced public safety during construction of the slurry pipeline due to fall hazards into the open trench<br>**Rex Proposed Outcome:** None Proposed | The outcome proposed by DSD in the last column of this table accurately describes the level of impact.<br>The outcome is considered a suitable statement on the acceptable level of impact on the environment. | DSD considers that the recommended outcome would be achievable. | *DSD recommends that should a licence be granted the following outcome be a requirement of the licence:*<br>The Tenement Holder must, in constructing and operating the Licence, ensure that unauthorised entry to the site does not result in public injuries and or deaths that could have been reasonably prevented. |
| **MPL-P2**<br>**Impact event:** Reduced public safety from fire originating from the site resulting in injury and/or death.<br>**Rex Proposed Outcome:** No unplanned fires onsite, and ensure control measures are In place to manage potential off site Impacts | The proposed outcome does not accurately describe the level of impact and is not considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies | Rex considers control strategies will reduce this impact to a level of Moderate.<br>Rex has proposed the control strategies applicable to ML-TTP1 are also applicable to MPL-P2.<br>DSD considers that the outcome recommended by DSD for ML-AL6 would be applicable to ML-PL2 and would be achievable. | DSD recommends that should a licence be granted the recommended outcome for **ML-AL6** relating to Adjacent Land Use and Third Party Property be applied to this impact event:<br>The Tenement Holder must in constructing and operating the Licence, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by site operations. |
| **MPL(C)-P1**<br>**Impact event:** Unsafe final landforms resulting in reduced public safety | The proposed outcome accurately describes the level of impact.<br>The proposed outcome is considered a suitable statement on the acceptable level of impact on | Rex has proposed the following Closure control and management strategies:<br>• Rehabilitation of open trench for pipelines | *DSD recommends that should a licence be granted the following outcome be a requirement of the licence:* |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **Rex Proposed Outcome:** The risks to the health and safety of the public are as low as reasonably practical | the environment subsequent to implementation of control strategies. | DSD considers that the recommended outcome would be achievable. | The Tenement Holder must demonstrate that post completion, the risks to the health and safety of the public so far as it may be affected by site operations are as low as reasonably practicable. |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex.

### 7.13.11 *Measurement Criteria (MPL)*

Table 7.13.6 is DSDs assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

**Table 7.13.6 – DSD assessment on measurement criteria**

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **MPL-P1**<br><br>**Potential Impact:** Reduced public safety during construction of the slurry pipeline due to fall hazards into the open trench<br>**Recommended Outcome:**<br>The Tenement Holder must, in constructing and operating the Licence, ensure that unauthorised entry to the site does not result in public injuries and or deaths that could have been reasonably prevented. | No Measurement Criteria have been proposed by Rex. | DSD considers that achievement of the recommended outcome would be measurable and should a lease be granted, these criteria would be reviewed and finalised in the PEPR submission. | DSD considers no licence requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no licence conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **MPL-P2**<br><br>**Potential Impact:** Reduced public safety from fire originating from the site resulting in injury and/or death.<br>**Recommended Outcome**<br>The Tenement Holder must in constructing and operating the Licence, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by site operations. | All uncontrolled on-site fires are investigated and this demonstrates they were appropriately managed and controlled | DSD considers the proposed draft criterion is not demonstrating measurement of the outcome and is strategy focused only.<br><br>Further work to develop the criteria will be required prior to submission of the PEPR. DSD considers that measurable criteria could be developed and should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no licence requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no licence conditions applicable to the measurement criteria are required. |
| **MPL(C)-P1**<br><br>**Potential Impact:** Unsafe final landforms resulting in reduced public safety<br>**Recommended Outcome:**<br>The Tenement Holder must demonstrate that post completion, the risks to the health and safety of the public so far as it may be affected by site operations are as low as reasonably practicable. | Results from an inspection of final landforms at closure will show that final landforms are safe and stable and the risks to the health and safety of the public are as low as reasonably practical. | DSD considers that achievement of the recommended outcome would be measurable and should a lease be granted, these criteria would be reviewed and finalised in the PEPR submission. | DSD considers no licence requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no licence conditions applicable to the measurement criteria are required. |

### 7.13.12 *Summary of the recommended regulatory response (MPL)*

DSD has assessed that all potential impacts to Public Safety on the MPLs during construction and operations have been identified through this assessment and acceptable outcomes have been recommended for all primary impact events where the severity of primary consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for nearby residents and communities during construction and operation. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

**Power line and Pipelines MPL**

*DSD recommends that should a licence be granted the following outcomes be a requirement of the licence:*

The Tenement Holder must, in constructing and operating the Licence, ensure that unauthorised entry to the site does not result in public injuries and or deaths that could have been reasonably prevented.

The Tenement Holder must in constructing and operating the Licence, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by site operations.

The Tenement Holder must demonstrate that post completion, the risks to the health and safety of the public so far as it may be affected by site operations are as low as reasonably practicable.

## *7.14 Traffic*

### 7.14.1 *Description of Relevant Aspects of Environment*

The Hillside Proposal is located within an agricultural setting with a number of nearby coastal communities with fluctuating tourism-driven populations. The different types of traffic existing in the area would consist of farming/commercial traffic, residential traffic and significantly increased periods of traffic during long weekends and holiday periods.

A map of roads in the area is included in Figure 5.3-3 of the Proposal, included below. Rex has undertaken a baseline traffic survey during the holiday periods on the highways of the area and compared it to DPTI averages.

Annual averages gained from DPTI showed between 9 and 24% of traffic on the main highways was commercial with an average of 460 to 1700 vehicles per day travelling on the highways intersecting the lease. Surveys undertaken by Rex showed during peak holiday periods the proportion of commercial vehicles decreased to 2-3% and average vehicles travelling daily increased to between 889 and 2722.

Rex also undertook traffic surveys on relevant minor roads bordering the proposed lease over the May to October period. This would not have included the Easter or Christmas holiday periods nor the harvest period when those roads would be most busy. Those surveys showed a high percentage of light vehicles (68-75%) using these roads, with a recorded daily average number of vehicles between 21 and 35.

Operations are expected to increase traffic numbers and potential risks associated with traffic from the following activities:

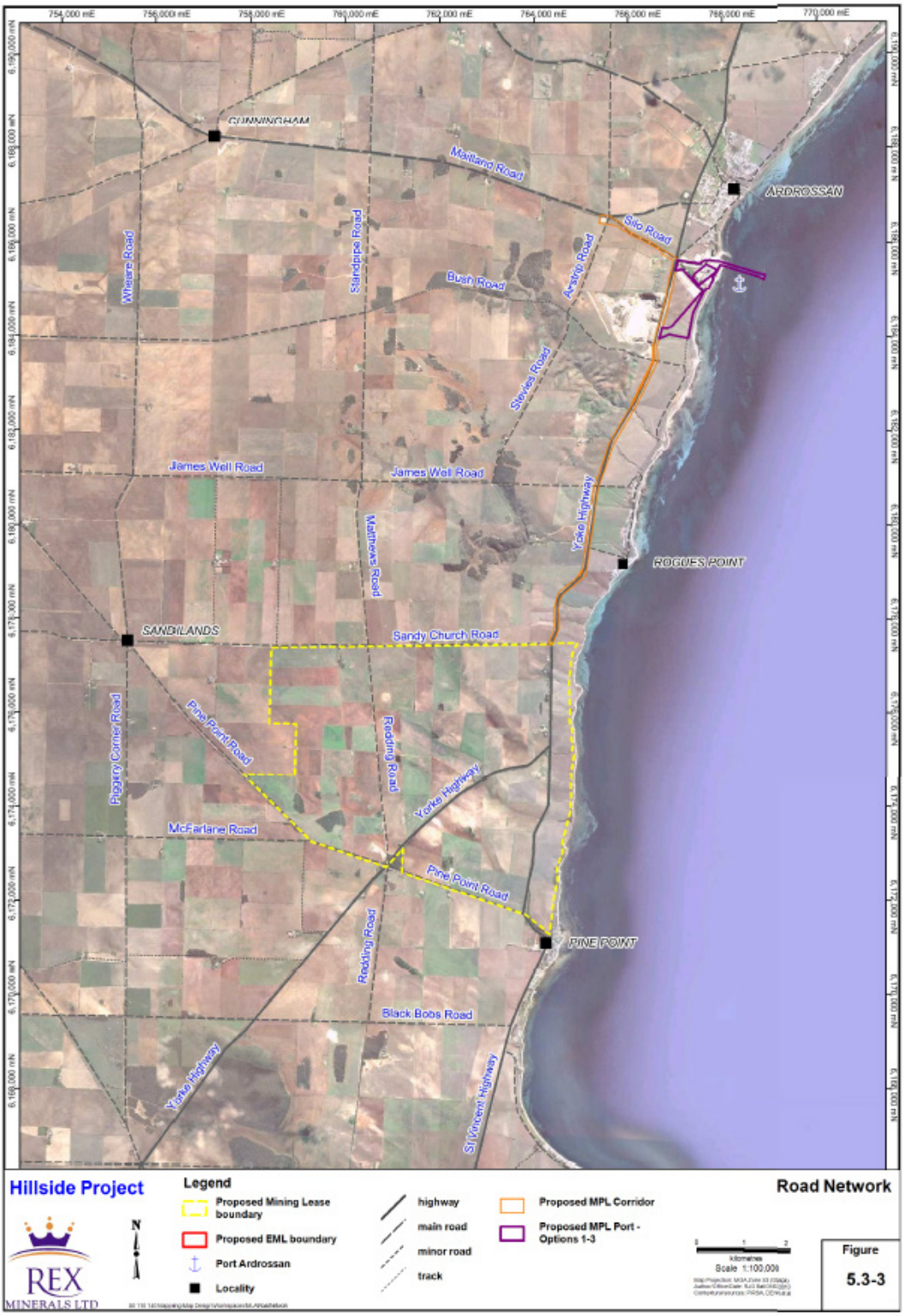
- Employees and contractors accessing the site for work
- Trucks transporting equipment/material (for construction, operation and closure)
- Trucks tracking dust from unsealed roads onto the highway (drag out)
- Road closures and diversions (assessed under the Development Act)

    - Figure 6.8-4 shows the proposed road closures and diversions. It should be noted this map does not show the closure of Redding Road which will be required for the placement of the Integrated Waste Facility.

DSD considers the sensitive receptors for this environmental aspect to be:

- Residents (including school bus routes)
- Tourists
- Local business operators (including impacts associated with harvest)

DSD considers that the description of environment is a suitable characterisation of the receiving environment which may be affected by mining operations.




### 7.14.2 *Views of affected parties*

In the Proposal Rex identified that the CCG raised concerns regarding traffic management and safety impacts, upgrading intersections for safety and the impact on landowners from the road changes. The CCG also raised concerns about increased traffic due to increased populations and the ability of the road network and parking facilities to accommodate these changes, the relocation of St Vincent Highway and the degradation of

roads including responsibility for maintenance. Rex has taken these into consideration in the preparation of their Proposal and has stated they will be further addressed in a Traffic Management Plan and Community Relations Management Plan.

**Table 7.14 – Impact events relating to issues raised during statutory consultation**

| Issues raised during statutory consultation | Addressed |
|---|---|
| Traffic surveys were taken during non-peak season (both tourism and harvest peak seasons) and does not accurately reflect traffic volumes | This has been taken into consideration below. |
| Traffic information does not consider how a ferry service (proposed) impacts on traffic numbers. | This is regulated under the South Australian Road Traffic Act 1961 |
| Noise from increased traffic | Noise from all construction and operation activities has been addressed in Section 7.2 of this report (noise) |
| Road diversion concerns | Outside the scope of this assessment (this was assessed as part of the development application). |
| Increased travel times resulting from closure of Redding Road affecting both movement of agricultural machinery and emergency services response time. | **ML-T5** |
| Increased traffic resulting in increased accidents. | **ML-T2** |
| Degradation of road due to mine traffic. | **ML-TTP2** |
| Mine traffic travelling at lower speeds causing safety risks due to disparity is speed limits. | **ML-T1** and **ML-T4** |
| Mine traffic causing safety risk for children on side of road on school bus route. | **ML-T2** |
| Fate of haul roads following mining. | Haul roads will be retained for the purposes of firebreaks or rehabilitated as per Section 6.9.3 of the Proposal. |
| All road upgrades are in accordance with requirements. | Prior consultation was undertaken with DPTI with regards to the requirements of road upgrades. |
| Extent of movement of over-sized loads. | This information was included in Appendix 5.3-A under Anticipated traffic increase for each stage. |

The statutory consultation did not identify any additional receptors or impact events to those identified by Rex.

Other concerns which were raised during statutory consultation have not been included as part of this assessment as they are either not within the scope of the assessment or too general to consider.

### 7.14.3 *Impact assessment (ML)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0. Rex has assessed the impact of mine related traffic. This has not covered impacts on traffic from road diversions which is regulated under the Development Act.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7.0. A review of Rex's impact assessment is shown in Table 7.14.1 and impacts identified by the State Government post submission of Proposal are provided in Table 7.14.2.

**Table 7.14.1 – Impact events identified by Rex in the Proposal**

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-T1** | Increased public nuisance resulting from oversize vehicles using Highways during construction. | Rex has stated that the consequence of this impact occurring without controls implemented is Moderate.<br>This impact event has been assessed in the Rex Development Application under Section 49 and 49A of the Development Act 1993. Conditions of approval for Development Number 544/G018/13 and 544/G017/13 have been imposed which include:<br>• The applicant shall formulate a Construction and Traffic Management Plan that shows, to the Department's satisfaction, the timing and staging of works for the realignment of the Yorke Highway and St Vincent Highway and how the transition from the current road network to the new network will be managed.<br>This impact would be regulated under the jurisdiction of the *Road Traffic Act 1961* and associated legislation. | No<br>Rex has provided an outcome |
| **ML-T2 &** | Increased traffic incidents as a result of increased | Rex has stated that the consequence of this impact occurring without controls implemented is moderate.<br>Rex proposes a number of strategies to reduce the risk of traffic incidents. These include: | Yes |

*Impact events identified by Rex in the Proposal*

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **SEI-11** | vehicles on roads (including on school bus routes near the site for the proposed ML). | • Scheduling deliveries to minimise heavy vehicle operation during peak traffic periods and at night;<br>• Transporting staff to and from the site via bus;<br>• Transporting concentrate to the port using a slurry pipeline rather than road haulage;<br>• Sealing minor roads that will experience significant increases in vehicle numbers in consultation with YPC;<br>• Regular road safety training and briefings for all staff and contractors;<br>• Development and implementation of a traffic management plan, as explained in Section 8.2.3.2 of the Proposal<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Rex has provided an outcome |
| **ML-T3** | Increased vehicles accidents as a result of dragout carried from mine entrances onto public roads. | Rex has stated that the consequence of this impact occurring without controls implemented is moderate.<br>Rex has stated there is potential for drag out to be carried onto Sandy Church Road and this can reduce visibility for road users and increase the potential for accidents. Without control strategies there is a potential for drag out to occur at the Yorke Highway intersection (1km away from the Sandy Church Road site entrance). This is a larger road with higher speeds, and higher traffic movements.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |
| **ML-T4** | Increased traffic incidents at the mine entry and exit point from the Hillside Project. | Rex has stated that the consequence of this impact occurring without controls implemented is Major.<br>There is potential for mine traffic turning off Yorke Highway and Sandy Church Road to cause an accident.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |

*Impact events identified by Rex in the Proposal*

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **ML-T5** | Public nuisance due to changes in road network resulting from road diversions and closures. | Rex has stated that the consequence of this impact occurring without controls implemented is Minor.<br>Impacts associated with the road diversions and closures of the Yorke and St Vincent Highways were assessed under the Development Act Applications 544/G017/13 & 544/G018/13 and will be managed and regulated under the conditions of approval for those applications.<br>The closure of Redding road has the potential to cause public nuisance, including disruption of traffic, increased travel time, increased fuel usage, increased response time of emergency services and difficulty in accessing paddocks previously accessed via this route. Assessment on the impact of access to paddocks has been included in Adjacent land use (Section 7.15 of this report) under impact **ML-AL3.**<br>Control strategies proposed by Rex relating to this impact event include signage, publication of road changes and detours and sealing of minor roads that will experience significant increases in traffic. Sealing of these roads would improve road conditions and thus allow an increase in safe speeds that can be driven on these roads. This would offset some of the extra time associated with the alternative routes for light vehicles (farm machinery using Redding road for transport would be limited by the speed of the machinery itself).<br>Should a lease be granted, DSD expects that Rex would engage with owners and managers of land adjacent to the lease who would be affected by the closure of Redding Road to discuss arrangements for offsetting the identified potential impacts.<br>DSD assesses that an outcome is not required. | No |
| **SEI-19** | Effect of increased traffic volumes on existing and new road infrastructure associated with the mine on amenity tourism. | This impact event has been assessed in the Rex Development Application under Section 49 and 49A of the Development Act 1993. Conditions of approval for Development Number 544/G018/13 and 544/G017/13 have been imposed which include:<br>• The applicant shall formulate a Construction and Traffic Management Plan that shows, to the Department's satisfaction, the timing and staging of works for the realignment of the Yorke Highway and St Vincent Highway and how the transition from the current road network to the new network will be managed.<br>This impact would be regulated under the jurisdiction of the *Road Traffic Act 1961* and associated legislation. | No<br>Rex has not provided an outcome |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-N2** | Public nuisance impacts on surrounding residential receptors from noise emanating from increase in road traffic from road diversions required from the Hillside Project. | This has been assessed in Section 8.3.2 of the Proposal and Section 7.2 of this report. | |
| **ML-TTP1** | Public road damage due to the increase of traffic to and from the mining operations. | This has been assessed in Section 8.3.18 of the Proposal and Section 7.15 of this report. | |
| **ML-NF2** | Increased native animal mortality as a result of more collisions with vehicles. | This has been assessed in Section 8.3.6 of the Proposal and Section 7.7of this report. | |

The State Government, through the assessment process, has identified additional impacts to traffic associated with the proposed mining activities subsequent to the submission of the Proposal. An assessment of these additional impact events is provided in Table 7.14.2.

**Table 7.14.2 – Impact events identified subsequent to the Proposal**

| *Impact events identified subsequent to the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **DSD ML-T1** | Long commute times for mine workers leading to fatigue related road accidents. | There is potential for this impact event to occur where employees and contractors are required to travel long distance to the workplace, or through other work and non-work related causes of fatigue.<br>The company and its employees are required under their duty of care to ensure that fatigue does not create a risk to their own or others health and wellbeing.<br>Workplace impacts relating to fatigue would be regulated under the jurisdiction of the Safework SA under the *Work Health and Safety Act 2012* and any associated legislation. | N/A |

### 7.14.4 *Outcomes (ML)*

Table 7.14.3 is the DSD assessment of outcomes proposed by Rex in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable. The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies.

## Table 7.14.3 – DSD assessment of outcomes proposed by Rex

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-T3**<br><br>**Impact event:** Increased vehicles accidents as a result of dragout carried from mine entrances onto public roads.<br><br>**Rex Proposed Outcome:** No dragout or noise impacts to offsite areas associated with mine related traffic. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex has proposed rumble grids to drop the dust prior to exiting site, and sealing internal roads to decrease the amount of dust picked up. They have also proposed street sweepers to clean the road if required. Further information would need to be included in the PEPR regarding how the need for street sweepers would be identified, such as daily inspections of the intersection with Sandy Church road and the intersection with Yorke Highway to identify dragout. In addition DSD recommends wheel washes be installed at unsealed entrance/exit points to further decrease risk of dragout (in addition to decreasing the transport of seed/weed offsite).<br><br>Noise impacts from Traffic are assessed in Section 7.2 of this Assessment Report.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*<br><br>The Tenement Holder must, in constructing and operating the Lease, ensure that no public impacts offsite are caused by noise, dust and/or dragout to and from the mine site associated with mine related traffic. |
| **ML-T4**<br><br>**Impact event:** Increased traffic incidents at the mine entry and exit point from the Hillside Project.<br><br>**Rex Proposed Outcome:** No traffic accidents involving the public associated with mine related traffic that could have been reasonably prevented. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex considers control strategies will reduce this impact to a level of low.<br><br>Rex has proposed signs and boom gates at the mine access point, improvement of intersections and road safety training. In addition DSD recommends truck entering and exiting signs at the intersection to Sandy Church Road and Yorke Highway.<br><br>DSD recommends an outcome for mine traffic at the entry and exit points.<br><br>DSD considers that the outcome proposed by DSD would be achievable.<br><br>The Act does not provide for the regulation of mine impacts that are caused off lease. All mine related traffic is subject to the Australian | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*<br><br>The Tenement Holder must, in constructing and operating the Lease, ensure that there are no traffic accidents involving the public at mine access points that could have been reasonably prevented by the Tenement Holder.<br><br>*DSD recommends the following lease condition(s) applicable to strategies to be adopted for achievement of the outcome:* |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | Road Rules (under the *Road Traffic Act 1961*) and would be regulated by the SA Police. | The Tenement Holder must ensure all road and intersection upgrades are conducted in accordance with technical standards provided in writing by the Department for Planning Transport and Infrastructure. |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex or identified by DSD.

### 7.14.5 *Measurement Criteria (ML)*

Table 7.14.4 is DSDs assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

**Table 7.14.4 – DSD assessment on measurement criteria**

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **ML-T3**<br>**Potential Impact:** Increased vehicles accidents as a result of dragout carried from mine entrances onto public roads. | Daily inspection of site road entry and exit points to ensure no build-up of drag out material.<br>Record details of all road users | This measurement criterion describes an appropriate framework, however further information would need to be provided in the PEPR. The criterion would need to provide for inspections on a larger area should drag out be identified, including the intersection of Sandy Church Road and Yorke Highway. In addition there should be a 'trigger level' of drag out above which the use of a street sweeper would be required to clean the roads. Further information would also need to be included in the PEPR regarding complaint management including, but not limited to, distribution of a | DSD considers no lease requirements applicable to LIC are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **Recommended Outcome:** The Tenement Holder must, in constructing and operating the Lease, ensure that no public impacts offsite are caused by noise, dust and/or dragout to and from the mine site associated with mine related traffic. | complaints and respond according to the communication management plan. | number for complainants to contact, timeframes for responding to and closing out a complaint, recording and reporting of complaints.<br>Additional control strategies to prevent dragout to be included in the PEPR would include but not be limited to, installation of wheel wash facilities.<br>DSD considers there are methodologies and standards that are an appropriate mechanism to demonstrate achievement of the outcome.<br>DSD considers that achievement of the recommended outcome would be measurable.<br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | | |
| **ML-T4**<br>**Potential Impact:** Increased traffic incidents at the mine entry and exit point from the Hillside Project.<br>**Recommended Outcome:** The Tenement Holder must, in constructing and operating the Lease, ensure that there are no traffic accidents involving the public at mine access points that could have been reasonably prevented by the Tenement Holder. | Independent investigation of all recorded accidents resulting from mine traffic entry and exit demonstrates that the Tenement Holder could not have reasonably prevented the accident. | This measurement criterion accurately measures the impact. Further information would be required in the PEPR regarding the recording and reporting of this information. In addition it is recommended that the control strategies relating to traffic are reviewed for effectiveness should any accident occur.<br>DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome.<br>DSD considers that achievement of the recommended outcome would be measurable.<br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to LIC are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |

### 7.14.6 *Summary of the recommended regulatory response (ML)*

DSD has assessed that all potential impacts to traffic during construction, operations and post completion have been identified through this assessment and acceptable outcomes have been recommended for all primary impact events where the severity of primary consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for sensitive receptors during construction, operation and post completion. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

*DSD recommends that should a lease be granted the following outcomes be a requirement of the lease:*

The Tenement Holder must, in constructing and operating the Lease, ensure that no public impacts offsite are caused by noise, dust and/or dragout to and from the mine site associated with mine related traffic.

The Tenement Holder must, in constructing and operating the Lease, ensure that there are no traffic accidents involving the public at mine access points that could have been reasonably prevented by the Tenement Holder.

*DSD recommends the following lease condition(s) applicable to strategies to be adopted for achievement of the outcome:*

The Tenement Holder must ensure all road and intersection upgrades are conducted in accordance with technical standards provided in writing by the Department for Planning Transport and Infrastructure.

### 7.14.7 *Impact assessment (EML)*

#### *Rex's approach to impact assessment*

A description of Rex's approach to the impact assessment process is described in Section 7.0.

#### *DSD review of Rex impact assessment*

A description of DSD's assessment of the impact assessment process is described in Section 7.0. A review of Rex's impact assessment is shown in Table 7.14.5 and impacts identified by state government identified post submission of Proposal identified in Table 7.14.6.

**Table 7.14.5 – Impact events identified by Rex in the Proposal**

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **EML-T1** | Increased traffic incidents at the highway entry and exit point for the transport of extractive material. | Rex has stated that the consequence of this impact occurring without controls implemented is Major.<br>Earthmoving trucks will need to turn directly onto the Yorke or St Vincent Highway. Without control strategies the slow acceleration and turning lanes could pose a danger to both the driver and general public.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |

The State Government, through the assessment process, has identified additional impacts to traffic associated with the proposed mining activities subsequent to the submission of the Proposal. An assessment of these additional impact events is provided in Table 7.14.6.

**Table 7.14.6 – Impact events identified subsequent to the Proposal**

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **DSD EML-T1** | Increased vehicles accidents as a result of dragout carried from mine entrances onto public roads. | Trucks coming from the extractive lease and turning onto Yorke Highway could cause dragout. As discussed for the ML dragout on the main highway could have a significant impact as it can reduce visibility on a high speed road and not all drivers will be familiar with the conditions. Additional control strategies to prevent dragout to be included in the PEPR would include but not be limited to, installation of wheel wash facilities.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes |

### 7.14.8 *Outcomes (EML)*

Table 7.14.7 is the DSD assessment of outcomes proposed by Rex in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable. The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies. Table 7.14.8 provides outcomes for impact events identified by DSD.

**Table 7.14.7 – DSD assessment of outcomes proposed by Rex**

| ID | Assessment of acceptability of outcome | Assessment of achievability of outcome | Recommended regulatory response |
|---|---|---|---|
| **EML-T1**<br><br>**Impact event:** Increased traffic incidents at the highway entry and exit point for the transport of extractive material.<br><br>**Rex Proposed Outcome:** No traffic accidents involving the public associated with mine related traffic that could have been reasonably prevented. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex considers control strategies will reduce this impact to a level of Major.<br><br>The Proposal does not clearly differentiate between what control strategies are proposed for EML and ML activities.<br><br>The control strategies for the ML (discussed under **ML-T4**) were also listed in the description of the EML impact and thus it is assumed these control strategies would be applied to both the separate ML and EML access points. In addition Rex mentions in the Proposal that vehicle entry signs will be used. Although this was not included in the control strategies for EML-T1, DSD considers vehicle entry signs must be included for the EML entrance.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in constructing and operating the Lease, ensure that there are no traffic accidents involving the public at mine access points that could have been reasonably prevented by the Tenement Holder. |

**Table 7.14.8 – Discussion of outcomes for impacts identified by DSD**

| ID | Acceptability of outcome | Achievability of outcome | Recommended regulatory response |
|---|---|---|---|
| **DSD EML-T1**<br><br>**Impact event:** Increased vehicles accidents as a result of dragout carried from mine entrances onto public roads.<br><br>**Outcome:** Outcomes based on DSD regulatory Response for **ML-T3**.<br><br>The Tenement Holder must, in constructing and operating the Lease, ensure that no public impacts offsite are caused by noise, dust and/or dragout to and from the mine site associated with mine related traffic. | The outcome accurately describes the level of impact.<br><br>The outcome is considered a suitable statement on the acceptable level of impact on the environment. | The discussion regarding **ML-T3** is applicable for this impact.<br><br>DSD considers that the outcome would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease;*<br><br>The Tenement Holder must, in constructing and operating the Lease, ensure that no public impacts offsite are caused by noise, dust and/or dragout to and from the mine site associated with mine related traffic. |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex or identified by DSD.

### 7.14.9 *Measurement Criteria (EML)*

Table 7.14.9 is DSD's assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

## Table 7.14.9 – DSD assessment on measurement criteria

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **EML-T1**<br><br>**Potential Impact:** Increased traffic incidents at the highway entry and exit point for the transport of extractive material.<br><br>**Recommended Outcome:** The Tenement Holder must, in constructing and operating the Lease, ensure that there are no traffic accidents involving the public at mine access points that could have been reasonably prevented by the Tenement Holder. | Independent investigation of all recorded accidents resulting from mine traffic entry and exit demonstrates that he Tenement Holder could not have reasonably prevented the accident. | The assessment of the measurement criterion for **ML-T4** is applicable for this impact.<br><br>DSD considers there are appropriate measurement methodologies and standards to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to LIC are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |
| **DSD EML-T1**<br><br>**Potential Impact:** Increased vehicles accidents as a result of dragout carried from mine entrances onto public roads.<br><br>**Recommended Outcome:** The Tenement Holder must, in constructing and operating the Lease, ensure that no public impacts offsite are caused by noise, dust and/or dragout to and from the mine site associated with mine related traffic. | Rex has not proposed criteria for this outcome. | The measurement criterion and assessment for **ML-T3** is applicable for this impact.<br><br>DSD considers there are appropriate measurement methodologies and standards to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to LIC are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |

### 7.14.10 *Summary of the recommended regulatory response (EML)*

DSD has assessed that all potential impacts to traffic during construction, operations and post completion have been identified through this assessment and acceptable outcomes have been recommended for all primary impact events where the severity of primary consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for sensitive receptors during construction, operation and post completion. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

*DSD recommends that should a lease be granted the following outcomes be a requirement of the lease;*

The Tenement Holder must, in constructing and operating the Lease, ensure that there are no traffic accidents involving the public at mine access points that could have been reasonably prevented by the Tenement Holder.

The Tenement Holder must, in constructing and operating the Lease, ensure that no public impacts offsite are caused by noise, dust and/or dragout to and from the mine site associated with mine related traffic.

### 7.14.11 *Impact assessment (MPL)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7.0. A review of Rex's impact assessment is shown in Table 7.14.10

**Table 7.14.10 – Impact events identified by Rex in the Proposal**

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **MPL-T1** | Increased traffic accidents while entering and leaving the Yorke Highway during pipeline and infrastructure construction. | Rex has stated that the consequence of this impact occurring without controls implemented is Minor.<br>Vehicles will need to turn directly onto the Yorke or St Vincents Highway. Without control strategies the slow acceleration of vehicles and absence of turning lanes could pose a danger to both the driver and general public.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | Yes<br>Rex has provided an outcome |
| **MPL-T5** | Reduced public safety and increased vehicle accidents as a result of dragout onto public roads. | Rex has stated that the consequence of this impact occurring without controls implemented is Minor.<br>There is a potential for dust or dirt from construction of the pipeline to dragout onto public roads. In the case of pipeline construction the impacts will be of short duration. This impact is likely to be trivial in consequence and will not require an outcome.<br>DSD assesses the primary consequence of this occurring is trivial and hence an outcome is not required. | No |

DSD considers that Rex has identified all potential impacts to traffic associated with the proposed mine related activities.

### 7.14.12 *Outcomes (MPL)*

Table 7.14.11 is the DSD assessment of outcomes proposed by Rex in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable. The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies.

**Table 7.14.11 – DSD assessment of outcomes proposed by Rex**

| ID | Assessment of acceptability of outcome | Assessment of achievability of outcome | Recommended regulatory response |
|---|---|---|---|
| **MPL-T1**<br><br>**Impact event:** Increased traffic accidents while entering and leaving the Yorke Highway during pipeline and infrastructure construction.<br><br>**Rex Proposed Outcome:** No traffic accidents involving the public associated with mine related traffic that could have been reasonably prevented by the Tenement Holder. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex considers control strategies will reduce this impact to a level of low.<br><br>Rex has stated that designated entry and exit points for construction of pipeline to meet with DPTI and YPC safety requirements. Induction of staff regarding traffic issues, requiring vehicles to stop prior to joining the highway and adequate line of sight are expected to reduce the likelihood to rare.<br><br>DSD considers that the outcome proposed by Rex would be achievable. | *DSD recommends that should a licence be granted the following outcome be a requirement of the licence:*<br><br>The Tenement Holder must, in constructing and operating the Licence, ensure that there are no traffic accidents involving the public as a result of mine related activities within the Licence area that could have been reasonably prevented by the Tenement Holder. |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex or identified by DSD.

### 7.14.13 *Measurement Criteria (MPL)*

Table 7.14.12 is DSDs assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

**Table 7.14.12 – DSD assessment on measurement criteria**

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **MPL-T1**<br><br>**Potential Impact:** Increased traffic accidents while entering and leaving the Yorke Highway during pipeline and infrastructure construction.<br><br>**Recommended Outcome:** The Tenement Holder must, in constructing and operating the Licence, ensure that there are no traffic accidents involving the public as a result of mine related activities within the Licence area that could have been reasonably prevented by the Tenement Holder. | Independent investigation of all recorded accidents resulting from mine traffic entry and exit demonstrates that the accident could not have reasonably prevented.<br><br>Record details of all road users complaints and respond according to the Communication Management Plan. | This measurement criterion accurately measures the impact. Further information would be required in the PEPR regarding the recording and reporting of this information. In addition it is recommended that the control strategies relating to traffic are reviewed for effectiveness should any accident occur.<br><br>Further information would need to be included in the PEPR regarding the communication management plan.<br><br>DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no licence requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no licence conditions applicable to the measurement criteria are required. |

### 7.14.14 *Summary of the recommended regulatory response (MPL)*

DSD has assessed that all potential impacts to traffic during construction, operations and post completion have been identified through this assessment and acceptable outcomes have been recommended for all primary impact events where the severity of primary consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for sensitive receptors during construction, operation and post completion. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

**MPL – Corridor**

*DSD recommends that should a licence be granted the following outcome be a requirement of the licence:*

The Tenement Holder must, in constructing and operating the Licence, ensure that there are no traffic accidents involving the public as a result of mine related activities within the Licence area that could have been reasonably prevented by the Tenement Holder.

## *7.15 Adjacent Land Use and Protection of Third Party Property*

### 7.15.1 *Description of Relevant Aspects of Environment*

A description of existing adjacent land use and 3rd party property is provided in Section 5.2, 5.3, 8.3.17 and 8.3.18 of the Mining Lease Proposal. Rex has identified the following as potential 3rd party property receptors:

- Property owned by third parties within the proposed Mining Lease and adjacent to the proposed Mining Lease, including (but not limited to) houses, farms, sheds, bores, dams etc.
- Commercial and Industrial land and businesses, i.e.: Agricultural land, fisheries etc.
- Conservation areas
- Public utilities, i.e.: power, gas, communication lines, sewerage and water infrastructure etc.
- Public and private roads
- Airstrips
- Public facilities (schools, health services etc)
- Ports and shipping
- Overlapping mineral and petroleum tenements.

Figure 5.3-1 of the Proposal (included on the following page) shows the location of housing and other infrastructure.

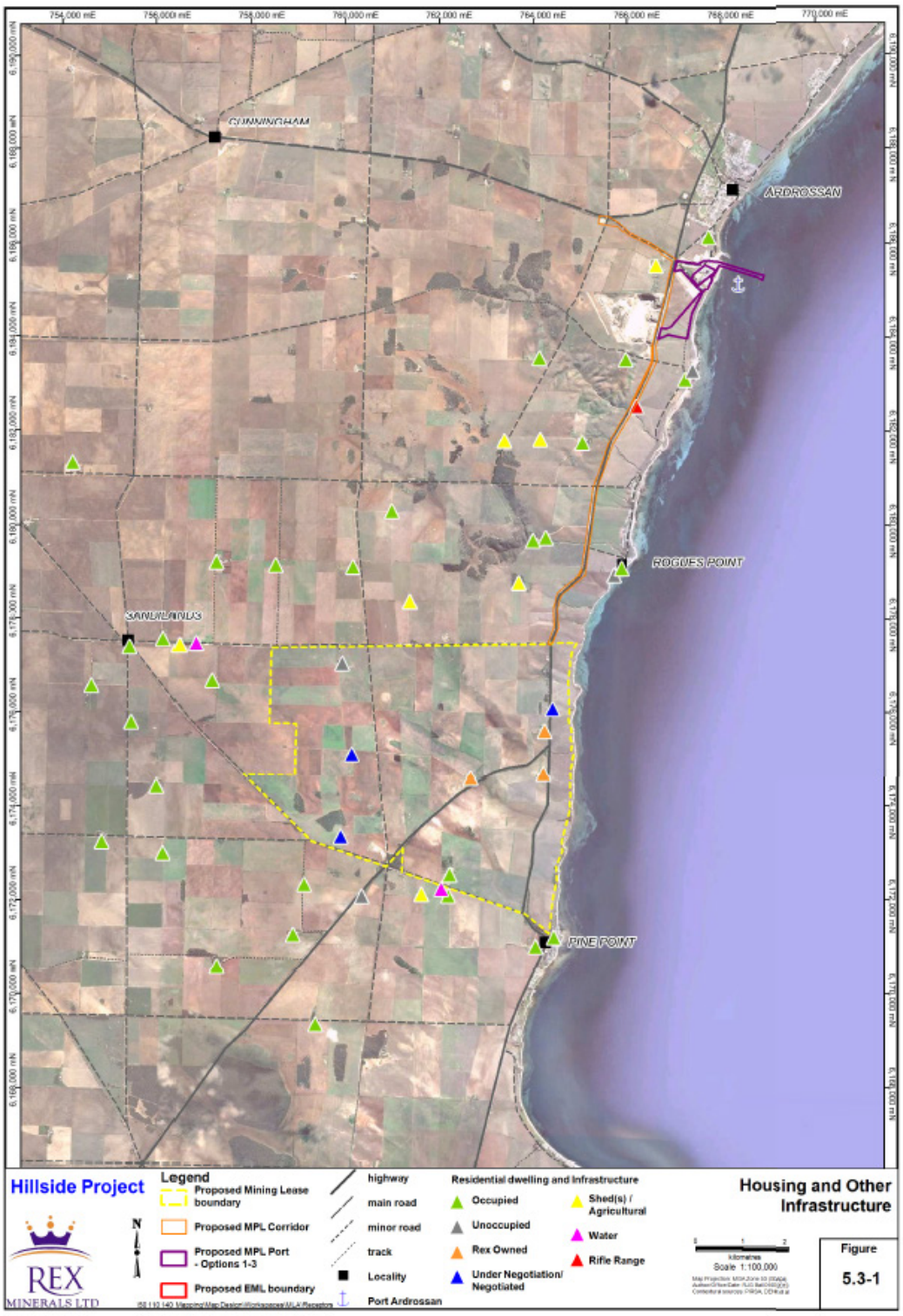
DSD considers the key sensitive receptors and associated environmental values for 3rd party property to be;

- Property owned by third parties within the proposed Mining Lease and adjacent to the proposed Mining Lease.
- Residential dwellings owned by third parties located within the proposed Mining Lease and adjacent to the proposed Mining Lease.
- Commercial and Industrial land and businesses.
- Agricultural land and infrastructure owned by third parties within the proposed Mining Lease and adjacent to the proposed Mining Lease.
- Conservation areas.
- Highways and roads owned by third parties including (but not limited to): the Yorke Highway, St Vincent Highway, Redding Road, Sandy Church Road, Pine Point road, McFarlane Road, Matthews Road.

DSD considers that the description of environment is a suitable characterisation of the receiving environment which may be affected by mining operations.

### 7.15.2 *Views of affected parties*

- Rex's assessment of views of affected parties
    - Consultation between Rex and DPTI have covered the following matters;
        - Coastal reserve
        - Vibration modelling
        - Blast impact zone
        - Road change options




Rex has identified key concerns expressed by the CCG as follows:

- the risk of fire during periods of high fire danger
- impacts on aerial spraying
- farm productivity
- impact on grain transport and machinery movement

- potential for increased vehicle movements (in particular heavy trucks) to cause damage to public roads.
- Potential for flyrock from blasting activities and flooding of the TSF embankment to damage third party property.

The following impact events were identified during the statutory consultation period:

**Table 7.15 – Impact events relating to issues raised during statutory consultation**

| Issues raised during statutory consultation | Addressed |
|---|---|
| Permanent loss of farm land and associated industries | ML-AL4 |
| Loss of farmland making economics of scale impossible and thus farm land unviable | ML-AL4 |
| Proximity to residential area and effect on this property | ML-AL1 |
| Contamination of grain silos and bunkers | Addressed in Air Quality Section 7.1 of this report |
| Increase risk of fire due to mining | ML-NV5 / ML-TTP1 |
| Preservation of Aboriginal sacred grounds adjacent and possibly within the mining area | Addressed in Heritage Section 7.10 of this report |
| The impact to third party property during operation and post completion in relation to the long term stability of the pit wall (and pit wall surface expression), and the risk of subsidence of the underground mine in the long term on the following:<br>a) Third Party Property<br>b) Public Roads<br>c) Waste Rock Dumps (WRD) post completion<br>d) Tailings Storage Facility (TSF)post completion | DSD-ML-TTP1 and DSD-ML(C)-TTP1 |
| Aviation Exclusion Zone impacting on crop dusting and other aerial agricultural activities | DSD ML-AL1 |

The additional impact events identified by Government have been addressed in the impact assessment under ID **DSD-ML-TTP1** and **DSD ML-AL1**.

DSD has had regard for all concerns which were raised during statutory consultation, however not all concerns have been included as part of this assessment report as they are either not within the scope of the assessment or are too general in nature to consider.

### 7.15.3 *Impact Assessment (ML)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Sections 8.3.17 and 8.3.18.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7.0.

A review of Rex's impact assessment is shown in Table 7.15.1 and impacts identified by State Government post submission of the Proposal are shown in Table 7.15.2.

## Table 7.15.1 – Impact events identified by Rex in the Proposal

*Impact events identified by Rex in the Proposal*

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **ML-AL1** | Blasting exclusion zone restricts access to adjacent land user for normal faming activities and aerial spraying | Rex has stated that the consequence of this impact occurring without controls implemented is Minor.<br>The proposed blast exclusion zone resulting from the open pit would impact adjacent land use and third party property as it will restrict access to land within the blast exclusion zone during times of blasting.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES<br>Rex has provided an outcome |
| **ML-AL2** | Interference with grain transport and machinery movements on adjacent roads. | Rex has stated that the consequence of this impact occurring without controls implemented is Minor.<br>Impacts on grain transport could come from a number of sources, namely; road closures and diversions, blasting exclusion zone, road degradation and increased traffic volumes. DSD has assessed this impact under the relevant sections. Impacts from road closures and diversions have been assessed under impact **ML-T5,** Section 7.14 of this report. Impacts from blasting are covered in **ML-AL1** above. Impacts from road degradation are discussed in **ML-TTP2** below, and impacts from increased volumes of traffic are outside the scope of this assessment. | See relevant sections. |
| **ML-AL3** | Reduced access to land parcels as a consequence of blast exclusion zone and road changes. | Rex has stated that the consequence of this impact occurring without controls implemented is Minor.<br>Clarification regarding this issue was sought by DSD under technical issue 101. The proposed blast exclusion zone resulting from the open pit would impact adjacent land use and third party property as it will restrict access to land within the blast exclusion zone during times of blasting. The proposed closure of Redding Road and the consequent impact on traffic is also considered under technical issue 101.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES<br>Rex has provided an outcome |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-AL4** | Decrease in land available for agriculture during operation. | Rex has stated that the consequence of this impact occurring without controls implemented is Moderate.<br><br>Further information regarding this impact was sought by DSD under technical issue 102 of the Response Document. For the purposes of assessing the impacts of proposed mining on agricultural pursuits, DSD has divided the agricultural land into 3 groups; agricultural land off the lease, agricultural land on the lease owned by a third party and agricultural land on the lease owned by Rex. The assessment of environmental impacts on agricultural land off the lease and on land owned by a third party is included in the relevant impact assessment section of this report - Refer to Section 7.1, 7.5, 7.11 (soil, air quality, soil, surface water etc.).<br><br>The proposed mine will result in loss of agricultural land on the lease during operation. Control strategies include maximisation of land rehabilitated for re-establishing agriculture. DSD has assessed this impact as the closure impact **ML(C)-AL1**. The loss of agricultural land during operation, and the permanent loss of agricultural land on areas that cannot be rehabilitated to agricultural purposes (such as the pit void), represents a loss of agricultural production. Offsetting this, however, is the opportunity to realise the value of the mineral deposit for the benefit of the State and wider community. The economic benefit from mining is discussed in Section 6.<br><br>Agricultural land owned by third parties is considered to be within the scope of the Exempt Land provisions of section 9 of the Act. A waiver of the Exempt Land status, by way of an agreement with the affected land owner(s), will be required before mining operations can occur on exempt land. Given the Exempt Land and Waiver provisions of the Act provide for the affected parties to negotiate, or authorise the ERD Court to determine, the level of impact, DSD considers that an outcome is not required for this impact event.<br><br>DSD assesses the primary consequence of this impact event occurring is greater than trivial and requires waivers be obtained prior to mining on exempt land. | No |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-AL5** | Reduced productivity resulting from shading of farm land by changed landscape (waste rock dumps). | Rex has stated that the consequence of this impact occurring without controls implemented is Minor.<br>This impact would relate to a reduction in light resulting in a reduction in photosynthesis. There is insufficient evidence surrounding the potential of shading crops from landform to assess this impact. In the absence of information DSD recommends an outcome for this impact be imposed.<br>DSD assesses that the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES<br>Rex has not provided an outcome. |
| **ML-AL6** | Fires damaging to agricultural crops and native vegetation | Rex has stated that the consequence of this impact occurring without controls implemented is Major.<br>If a fire was caused by the proposed operations, the damage to adjacent agricultural crops and native vegetation could potentially be major.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES<br>Rex has provided an outcome |
| **ML(C)-AL1** | Reduced land available to agriculture post completion. | Rex has stated that the consequence of this impact occurring without controls implemented is Moderate.<br>DSD has assessed that this impact does not apply to adjacent land use, but rather this relates to land within the proposed lease area. DSD has assessed this impact as the closure impact **ML(C)-AL1** which has been included in Section 7.5 of this report (soil and land disturbance). | See Section 7.5 – Soil/Land Disturbance |
| **ML-TTP1** | Unplanned fires from mining operation results in damage to third party property | Rex has stated that the consequence of this impact occurring without controls implemented is Major.<br>If a fire was caused by the proposed operations, the damage to adjacent land use and third party property could potentially be major.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES<br>Rex has provided an outcome |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-TTP2** | Public road damage due to increased traffic to and from the mining operations | Rex has stated that the consequence of this impact occurring without controls implemented is Minor.<br><br>Rex has discussed this impact in Section 8 of the Proposal (page 8-234). As the proposed operation includes a slurry pipeline for the transport of concentrate from the mining lease to the port, there is no need to use trucks for the transportation of concentrate. As a result, there is only a small increase to existing baseline traffic due to the proposed operations, as has been described in Appendix 5.3-A of the Proposal.<br><br>DSD assesses that the primary consequence of this occurring is trivial and hence **no** outcome is required.<br><br>Rex will be required to comply with the requirements of the Department for Planning Transport and Infrastructure. | NO<br><br>Rex has not provided an outcome<br><br>**DSD recommends that should a lease be granted the following be a condition of the Lease**:<br><br>The Tenement Holder must ensure any activities undertaken on the road or road reserve are conducted in accordance with any written requirements of the Department for Planning Transport and Infrastructure. |
| **ML-W3** | Incorrect tyre storage which can cause fires and present a fire hazard | Rex has stated that the consequence of this impact occurring without controls implemented is Moderate.<br><br>If a fire was caused by incorrect tyre storage, the damage to adjacent land use and third party property could potentially be major.<br><br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES<br><br>Rex has provided an outcome |

The State Government, through the assessment process, has identified additional impacts to Adjacent Land Use and Third Party Property associated with the proposed mining activities subsequent to the submission of the Proposal. An assessment of these additional impact events is provided in Table 7.15.2.

## Table 7.15.2 – Impact events identified subsequent to the Proposal

*Impact events identified subsequent to the Proposal*

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **DSD-ML-TTP1 / DSD-ML(c)-TTP1** | Disturbance to adjacent third party property and infrastructure as a result of the following mechanisms:<br>• open pit wall failure during operations and post completion<br>• open pit wall cut-back following wall failure during operations<br>• surface subsidence from underground mining operations<br>• open pit wall failure induced by underground mining operations. | Adjacent land use and third party property and public roads within the proposed lease could be impacted during operation and post completion by the potential instability of the proposed open pit wall and/or by subsidence associated with the proposed underground mine. The proposed Waste Rock Dumps and Tailings Storage Facility could also be disturbed by these mining induced mechanisms.<br>Rex did not identify this impact event in the Proposal. In considering the significant dimensions of the proposed open pit, the caving method proposed for underground ore extraction and the close proximity to third party property, DSD requested that Rex in their Response Document provide a detailed assessment addressing the outlined potential post completion impacts associated with geotechnical stability. The assessment should discuss any uncertainties around the residual risk for the predicted post completion impacts.<br>DSD also engaged an independent technical expert (Kevin Rosengren and Associates Pty Ltd) to assess this geotechnical risk.<br><br>The proposed open pit is situated in close proximity to privately owned cropping land to the West and South of the pit. The proposed St Vincent Highway road realignment is located to the east of the pit. The privately owned land to the West and South is located within the proposed Mining Lease boundary. Rex's Response Document (page 51) states that the proposed final pit wall is ">30m from the nearest third party property boundary (western wall)". Rex also states that they "expect the designed final pit outlines depicted in Figures6.9-6 to 6.9-10 of the Proposal to reflect the designed long term geotechnical stable pit crest. Rex does not expect the pit crest to fail post completion."<br><br>The proposed open pit is situated in close proximity to proposed waste dumps on the West, East and Northern boundaries of the pit. The proposed processing plant is also situated in close proximity to the North West of the proposed pit. The potential impact of a pit failure on the waste dumps post completion must be considered in the context of the materials that may be encapsulated within the waste dumps. As the waste dumps are not considered third party property during operation or post completion, this impact is dealt with in the Soils and Land Disturbance section of this report (Section 7.5).<br><br>In relation to the impacts due to underground mining, Rex states "No underground mining is planned under third party property (including land inside the proposed ML owned by third parties), thus the risk of mining related subsidence to third party property is realistically nil". | YES |

*Impact events identified subsequent to the Proposal*

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| | | It is for these reasons that Rex does not believe there will be an impact to third party property as a result of geotechnical instability resulting from either the open pit or the underground mine.<br><br>DSD's technical expert has reviewed the mining and geotechnical data for the open pit mine design and underground mine design. The findings of this technical review are summarized as follows (source: Rosengren)<br><br>There is a significant potential for surface disturbance to extend beyond the limits of the open pit through the following mechanisms:<br>• wall failure during open pit mining and post completion<br>• wall cut-back following wall failure<br>• subsidence from underground mining<br>• wall failure induced by underground mining.<br>The recommended limit for location of major infrastructure and preventing impact to private land around the open pit is defined by angles subtended from the base of the pit, of 35 degrees and 30 degrees on the western and eastern sides, respectively. The flatter angle on the eastern side makes allowance for seepage from the sea on long term stability of the east wall, post completion. These limits encroach on the waste dumps and private land to the west of the open pit. However, the plant site, the tailings storage facility and the proposed St Vincent Highway deviation are outside of its influence. It is noted that the extent of potential surface disturbance would change if the pit were to be deepened beyond the current proposal or if the strike extent and depth of the SLC were increased, The extent of potential surface disturbance caused by instability of the open pit walls would expand if the pit was deepened.<br><br>In relation to proposed underground stoping by sublevel caving (SLC) of the Dart and Zanoni lodes, the stoping would generate a 300m deep slot along the toe of the west wall of the open pit which would certainly cause failure of the wall. The slot would be progressively filled with caved material but this would be compressible, allowing the wall to deform. Because of the length of the wall, a 60 degree break line should be assumed for determining the zone of potential subsidence induced by the SLC. The open pit wall would not collapse beyond the 38degree rill angle but surface cracking due to SLC induced subsidence should be assumed back to the 60 degree break line. This would result in surface subsidence on land owned by a 3rd party.<br>On present knowledge, SLC of the Parsee or Songvaar Lodes is not likely to occur. If it should occur, any direct subsidence would be confined within the open pit. Significant subsidence would occur if the Omero Lode is extracted by SLC because of its greater transverse dimensions. A caving break line of 80 degrees is considered | |

| *Impact events identified subsequent to the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| | | appropriate for predicting the land disturbed by subsidence. Using this angle, direct subsidence would be confined by the north pit wall. There would also be a zone of cracking and disturbance around the direct subsidence zone. Assuming a draw limit of 70 degrees, this peripheral zone is also largely confined within the north pit wall, with a small part extending beyond the crest of the wall. It is anticipated that the north wall would collapse but the crest should not retreat significantly because of the additional void volume available in the subsidence crater.<br>DSD's technical expert stressed that the above predictions on subsidence are preliminary only. More detailed studies, including numerical modelling, would be required to assess the impacts of underground mining.<br>DSD does not agree with Rex's position that there will be no potential impact to adjacent land use or third party property as a result of a potential open pit wall failure or a subsidence event caused by underground mining.<br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | |
| **DSD-ML-TTP2** | Effect of light spill on livestock. | The potential for light spill to impact on livestock was raised during statutory consultation. Further information was sought from Rex under technical issue 141. Rex have assessed that the impacts to livestock from light spill will not be greater than that suffered by humans and thus the same control strategies will apply with an outcome for public amenity covering the potential impact on livestock.<br><br>The information provided for light spill in the Proposal shows light spill occurring within the Proposal to the West of the Western waste rock dumps and South of the pit area. The area to the South of the pit and South West of the Western waste rock dump would currently experience light spill from traffic along Yorke Highway. The impacts of light spill will mainly occur during construction prior to the construction of WRDs which will act as barriers. The modelling provided by Rex shows the extent of light spill to be the highest in the first year of operations, with it decreasing by year 5 and minimal by year 12. Further discussion on the nuisance impacts from light spill has been assessed under the Visual Amenity section of this report.<br><br>DSD has insufficient information to assess the primary consequence of this occurring and hence an outcome is required. | Yes |
| **ML-BV3, ML-BV5 and ML-BV6** | Impacts to livestock from noise and vibration as a result of blasting. | This has been assessed in Section 7.3 of this report. | N/A |

| *Impact events identified subsequent to the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **DSD ML-AL1** | Aviation exclusion zone impacting on agricultural management practices. | Assessment of the safety of aircraft is provided in the Blasting impact assessment section of this report under impact **ML-BV7**, see Section 7.3. | N/A |

### 7.15.4 *Outcomes (ML)*

Table 7.15.3 is the DSD assessment of outcomes proposed by Rex in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable. The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies. Table 7.15.4 provides outcomes for impact events identified by DSD that were determined in section 7.15.3 to require an outcome.

## Table 7.15.3 – DSD assessment of outcomes proposed by Rex

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-AL1**<br><br>**Impact event:** Blasting exclusion zone restricts access to adjacent land users for normal farming activities and aerial spraying<br><br>**Rex Proposed Outcome:** No adverse impacts to adjacent land use from mining operations | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex considers control strategies will reduce this impact to a level of Moderate.<br><br>Rex has proposed a Drill and Blast Management Plan and Communication Management Plan which will contain the control strategies to manage the impacts of blasting. Implementation of this plan will be critical to achieving the outcome, in particular, through ensuring the blast schedule takes account of the needs to adjoining landowners. For this reason, DSD has recommended conditions to impose these requirements.<br><br>The achievability of outcome of blasting on third party property is discussed under impact ML-BV1, ML-BV2, ML-BV3 and ML-BV7 (Blasting Section 7.3).<br><br>DSD considers that the outcome recommended by DSD would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*<br><br>The Tenement Holder must during construction, operation and post completion ensure that there are no adverse impacts to third party land use on property adjacent to and on the Lease as a result of mining operations, other than those agreed between the Tenement Holder and the affected user.<br><br>*DSD recommends the following lease condition(s) applicable to strategies to be adopted for achievement of the outcome:*<br><br>The Tenement Holder must notify property owners adjacent to and within the area of the Lease, subject to their consent, of all blasts no less than forty eight hours in advance of those blasts.<br><br>*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to **ML-AL1**;*<br><br>A blasting protocol and blasting schedule will be developed in consultation with residents of land within and adjoining the Lease to reflect the needs of the neighbouring land use practices (including aerial crop dusting). |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| **ML-AL3**<br><br>**Impact event:** Reduced access to land parcels as a consequence of blast exclusion zone and road changes.<br><br>**Rex Proposed Outcome:** No adverse impacts to adjacent land use from mining operations | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex considers control strategies will reduce this impact to a level of Low.<br><br>Rex has proposed a Drill and Blast Management Plan and Communication Management Plan which would contain the control strategies to manage the impacts of blasting.<br><br>The achievability of the outcome of blasting on third party property is discussed under impact ML-BV1, ML-BV2, ML-BV3 and ML-BV7 (Blasting Section 7.3).<br><br>The proposed closure of Redding Road has the potential impact on adjacent land use and the access to paddocks for some land users. Rex proposes to provide alternative access to land parcels which have been cut off from the Redding Road closure.<br><br>DSD considers that the outcome recommended by DSD would be achievable. | DSD recommends that should a lease be granted the recommended outcome for **ML-A1**relating to adjacent land use be applied. |
| **ML-AL5**<br><br>**Impact Event:** Reduced productivity resulting from shading of farm land by changed landscape (waste rock dumps).<br><br>**Rex Proposed Outcome:** Rex has not proposed an outcome for this impact event. See Recommended Regulatory Response for DSD recommended outcome. | N/A | Rex considers control strategies will reduce this impact to a level of Low.<br><br>Rex has proposed to design the shape, slope and height of WRDs to minimise hours of shading where practical. DSD recommends that the effects of shading should be taken into consideration when determining a WRD design and buffer zone within which impacts from mining are unavoidable. Further work will be required by Rex, to be included in the PEPR, justifying the area of land affected by shading and thus the WRD design and buffer zone applicable.<br><br>DSD considers that the outcome recommended by DSD would be achievable. | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*<br><br>The Tenement Holder must, in construction, operation and post completion, ensure no impacts to agricultural productivity for third party land users on or off the Lease as a result of mining operations, including:<br>• reduction in crop yield;<br>• reduction in grain quality; or<br>• adverse health impacts to livestock.<br>*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to impact events **ML-AL5**;* |

| *DSD assessment of outcomes proposed by Rex* | | | |
|---|---|---|---|
| **ID** | **Assessment of acceptability of outcome** | **Assessment of achievability of outcome** | **Recommended regulatory response** |
| | | | Develop strategies for the design of waste rock dumps to ensure no impact from shading to agricultural productivity for third party land users on or off the Lease. |
| **ML-AL6**<br><br>**Impact event:** Fires damaging to agricultural crops and native vegetation<br><br>**Rex Proposed Outcome:** No unauthorised damage to adjacent public or private property and infrastructure caused by mining operation, or mine personnel (including that caused by fire) | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex considers control strategies will reduce this impact to a level of Low.<br><br>Rex has proposed to install firebreaks around the site and implement a fire management plan. Additional control strategies that can be included in the fire management plan include management of fuel loads, induction of employees and installing fire extinguisher or other relevant equipment on all mobile machinery and fixed plant.<br><br>DSD considers that the recommended outcome would be achievable**.** | *DSD recommends that should a lease be granted the following outcome be a requirement of the lease:*<br><br>The Tenement Holder must in constructing and operating the Lease, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mining operations. |
| **ML-TTP1**<br><br>**Impact event:** Unplanned fires from mining operation results in damage to third party property<br><br>**Rex Proposed Outcome:** No unauthorised damage to adjacent public or private property and infrastructure caused by mining operation, or mine personnel (including that caused by fire) | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | Rex considers control strategies will reduce this impact to a level of Low.<br><br>See discussion under impact **ML-AL6.**<br><br>DSD considers that the outcome recommended by DSD would be achievable**.** | DSD recommends that should a lease be granted the recommended outcome for **ML-A6** relating to adjacent land use and third party property be applied as a requirement of the Lease. |

## Table 7.15.4 – Discussion of outcomes for impacts identified by DSD

| *Discussion of outcomes for impacts identified by DSD* | | | |
|---|---|---|---|
| **ID / Impact Event** | **Acceptability of outcome** | **Achievability of outcome** | **Recommended regulatory response** |
| **DSD-ML-TTP1 / DSD-ML(c)-TTP1**<br><br>Disturbance to adjacent third party property and infrastructure as a result of the following mechanisms:<br><br>• open pit wall failure during operations and post completion<br><br>• open pit wall cut-back following wall failure during operations<br><br>• surface subsidence from underground mining operations<br><br>• open pit wall failure induced by underground mining operations.<br><br>**Outcome:**<br><br>DSD proposes the following outcome;<br><br>The Tenement Holder must during construction, operation and post completion, ensure that as a result of a geotechnical failure caused by mining: | The outcome accurately describes the level of impact, that is, no impact to third party property as a result of a geotechnical failure caused by mining is acceptable.<br><br>The outcome is considered a suitable statement on the acceptable level of impact on the environment. | Rex did not identify this impact event in the Proposal and indicated in their response to Issue 26 and 29 in the Response Document that there is a very low probability of failure.<br><br>The risk to third party property arising from the potential geotechnical failure of the open pit is described by Rosengren with the application of the following principles that address the potential for mine instability to disturb third party property and infrastructure over the long term:<br><br>1) At any stage during operation or post completion, the western pit wall has the potential to fail to a minimum slope of 35 degrees, which is the approximate angle of repose for broken rock. The use of 35 degrees as a failure limit means that there is no likelihood of a pit wall failure occurring beyond the 35 degrees. DSD recommends the use of this principle as it would ensure no impact to third party property.<br><br>To ensure that the likelihood that there will be no impact to third party property as a result of a geotechnical failure of the open pit during operation or post completion, it is recommended that open pit mining cannot extend west of a plane dipping down at 35 degrees to the east from the property boundary of CT 5707/273 – Section 39 and 44, Hundred Plan 131200 , south of latitude 6174600N, south of latitude 6174600N unless the Tenement Holder obtains:<br>(i) ownership of CT 5707/273 or;<br>(ii) a registered waiver or agreement to undertake mining activities (inclusive of future geotechnical subsidence) on CT 5707/273<br><br>The risk to third party property arising from the potential geotechnical failure of the proposed underground mine is described in the discussion on the potential impact above.<br><br>To ensure that there would be no likelihood of impacts to third party property as a result of a geotechnical failure of the underground mine during operation or post completion, it is recommended “A caving method of mining cannot be used below | *DSD recommends that should a lease be granted the following outcomes be prescribed as a requirement of the Lease:*<br><br>The Tenement Holder must during construction, operation and post completion, ensure that as a result of a geotechnical failure caused by mining:<br><br>(i) there are no adverse impacts to land use adjacent to the mineral lease, and<br><br>(ii) there is no unauthorised damage to public or private property and infrastructure.<br><br>*DSD recommends the following lease condition(s) applicable to strategies to be adopted for achievement of the outcome:*<br>4. The Tenement Holder must ensure that the open pit mining does not extend west of a plane dipping down at 35 degrees to the east from the property boundary of CT 5707/273 – Section 39 and 44, Hundred Plan 131200, south of latitude 6174600N unless the Tenement Holder obtains:<br><br>4.1. ownership of CT 5707/273 or; |

| *Discussion of outcomes for impacts identified by DSD* | | | |
|---|---|---|---|
| **ID / Impact Event** | **Acceptability of outcome** | **Achievability of outcome** | **Recommended regulatory response** |
| (i) there are no adverse impacts to land use adjacent to the mineral lease, and<br><br>(ii) there is no unauthorised damage to public or private property and infrastructure. | | a plane dipping down at 60 degrees to the east from the private land boundary, south of 6174600N. This restriction would not allow SLC mining to proceed below RL-570m in Dart Lode or below RL-800m in Zanoni Lode in this zone".<br><br>The geotechnical risks to third party property and infrastructure have been assessed within the scope of the open pit and underground design presented by Rex in the Proposal which is based on the current ore reserve. In Issue 27 of the Response Document, Rex indicated that further exploration of Inferred Resources should upgrade to higher classifications and be capable of conversion to Ore Reserves later in the mining schedule. Potential extensions to the Ore Reserves along the line of strike or at depth could result in increasing the area that could be influenced by open pit instability or underground mining induced subsidence.<br><br>This impact event should be reassessed if mine design changes in extent from that described in the Proposal and assessed by DSD's technical expert.<br><br>The Rex Proposal identifies land within the proposed mining lease which is not owned by Rex, but rather owned by third parties. Post mine completion, DSD must consider that this land will still remain as third party property and hence the risk to third party property post completion on this land must be considered (i.e.: subsequent to lease surrender and the termination of any waivers that may be in place). This scenario relates specifically to the post completion component of this outcome and achievability must be demonstrated by ensuring that geotechnical information gathered during the early phases of operations would be used to update the open pit closure strategies on an ongoing basis during operations (as recommended by Rosengren).<br><br>DSD considers that the outcome would be achievable if the limits to mining proposed by DSD are imposed. | 4.2. a registered Waiver of Exemption under the Act to undertake mining activities (inclusive of future geotechnical subsidence) on CT 5707/273.<br><br>5. The Tenement Holder must ensure that a caving method of mining is not used below a plane dipping down at 60 degrees to the east from the property boundary of CT 5707/273 – Section 39 and 44, Hundred Plan 131200, south of latitude 6174600N unless the Tenement Holder obtains:<br><br>5.1. ownership of CT 5707/273 or;<br><br>5.2. a registered Waiver of Exemption under the Act or agreement to undertake mining activities (inclusive of future geotechnical subsidence) on CT 5707/273.<br><br>Refer to Section 7.13 (Public Safety) Impact Event **ML(C)-P1** for the public safety closure outcome and lease requirement which is also applicable to this impact event. |

| *Discussion of outcomes for impacts identified by DSD* | | | |
|---|---|---|---|
| **ID / Impact Event** | **Acceptability of outcome** | **Achievability of outcome** | **Recommended regulatory response** |
| **DSD-ML-TTP2 Impact:** Effect of light spill on livestock.<br>**Outcome:**<br>DSD proposes the following outcome;<br>The Tenement Holder must in constructing and operating the Lease, ensure that there are no adverse impacts to adjacent land use as a result of light spill caused by mining operations. | The outcome accurately describes the level of impact, that is, no impact to third party property as a result of a light spill caused by mining is acceptable.<br>The outcome is considered a suitable statement on the acceptable level of impact on the environment. | The control strategies for light spill on human, as discussed in Section 7.4, visual amenity, and native fauna receptors would be applicable to this impact. Namely; design night lighting to achieve minimal light spillage in accordance with Australian Standards, limit night works where possible, use non-reflective materials around areas involving night work to reduce light reflection, use low powered lighting where possible and shields to direct light below the horizon.<br>DSD considers that the outcome would be achievable. | *DSD recommends that should a lease be granted the following outcome be prescribed as a requirement of the Lease:*<br>The Tenement Holder must in constructing and operating the Lease, ensure that there are no adverse impacts to adjacent land use as a result of light spill caused by mining operations. |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex or identified by DSD.

### 7.15.5 *Measurement Criteria (ML)*

Table 7.15.5 is DSDs assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by DSD.

## Table 7.15.5 – DSD assessment on measurement criteria

| *DSD assessment on measurement criteria* | | | | |
|---|---|---|---|---|
| **ID** | **Proposed Measurement Criteria** | **DSD assessment on measurement criteria** | **DSD assessment of leading indicator criteria** | **Recommended regulatory response** |
| **ML-AL1**<br><br>**Potential Impact:** Blasting exclusion zone restricts access to adjacent land user for normal farming activities and aerial spraying<br><br>**Recommended Outcome:**<br><br>The Tenement Holder must during construction, operation and post completion ensure that there are no adverse impacts to third party land use on property adjacent to and on the Lease as a result of mining operations, other than those agreed between the Tenement Holder and the affected user. | All neighboring landowners affected by blast exclusion zones to be notified of blasts as per the agreed notification protocol to facilitate planning and planning of agricultural activities.<br><br>Record details of all landowner complaints and respond according to the Communication Management Plan. | To reduce the impact on adjacent landowners DSD recommends the blast schedule be developed in consultation with affected parties. This is recommended as a condition applicable to achievement of the outcome above. By ensuring two way communications, a schedule can be developed that meets the needs of all parties. Evidence of consultation in the development and implementation of the blast schedule could be used as measurement criteria for this outcome.<br><br>Table 7.3.5 of the assessment report provides further discussion on the measurement criteria Rex intends to adopt for blasting impacts, including vibration, flyrock and noise, and the maintenance of a blasting exclusion zone.<br><br>Should a lease be granted, the criteria for this outcome would be finalised in the PEPR submission. | Refer to Section 7.3 – Blasting for an assessment of measurement criteria related to notifications and communications with landowners in relation to blasting. | Refer to Section 7.3 – Blasting for an assessment of measurement criteria related to notifications and communications with landowners in relation to blasting. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **ML-AL3**<br><br>**Potential Impact:** Reduced access to land parcels as a consequence of blast exclusion zone and road changes.<br><br>**Recommended Outcome:** The Tenement Holder must during construction, operation and post completion ensure that there are no adverse impacts to third party land use on property adjacent to and on the Lease as a result of mining operations, other than those agreed between the Tenement Holder and the affected user. | Evidence of a practical, implemented alternative access to land parcels from road changes and during blasting will be provided to regulators. | The proposed measurement criterion accurately measures the impact and the outcome.<br><br>DSD considers the proposed methodology and standards are an appropriate mechanism to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |
| **ML-AL5**<br><br>**Impact Event:** Reduced productivity resulting from shading of farm land by changed landscape (waste rock dumps).<br><br>**Recommended Outcome:** The Tenement Holder must, in construction, operation and post completion, ensure no impacts to agricultural productivity for third party land users on or off the Lease as a result of mining | Rex has not proposed criteria for this outcome. | Measurement criteria for this outcome could demonstration that the WRDs have been built to a design that prevents shading of adjacent paddocks.<br><br>Other options for measurement criteria include measurement of crop yields from paddocks where shading may occur against analogous sites. Other possible criteria could be measurement of solar radiation to determine whether shading does occur and to what extent. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | DSD considers no lease conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| operations, including:<br>• reduction in crop yield;<br>• reduction in grain quality; or<br>• adverse health impacts to livestock. | | DSD considers there are methodology that is an appropriate mechanism to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | | |
| **ML-AL6**<br><br>**Potential Impact:** Fires damaging to agricultural crops and native vegetation<br><br>**Recommended Outcome:**<br><br>The Tenement Holder must in constructing and operating the Lease, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mining operations. | All uncontrolled on-site fires are investigated and this demonstrates they were appropriately managed and controlled. | The proposed measurement criterion measures some aspects of the outcome but requires further information. Records showing all uncontrolled fires were managed is part of the criteria, however, further records will need to be included showing the rectification of any damage to adjacent land use, third party property or native vegetation to show achievement of the outcome.<br><br>DSD considers there are appropriate methodologies and standards to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers that there is a strong reliance on control strategies required to reduce risk to the environment, management strategies to prevent the spread of fire, and thus Leading Indicator Criteria are required.<br><br>Rex has proposed the following Leading Indicator Criteria;<br><br>Monthly fire hazard inspections to ensure compliance with the fire management plan and that all control measures are in place to manage potential off-site impacts to third party property. Regular (annual) audit of operational Fire Management Plan.<br>The proposed leading indicator criterion will show compliance with the fire management plan, | DSD considers no lease conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| | | | this would provide early warning if strategies to reduce the spread of fire were not in place. Further information regarding what strategies will be inspected for will need to be included in the PEPR.<br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | |
| **ML-TTP1**<br><br>**Potential Impact:** Unplanned fires from mining operation results in damage to third party property<br><br>**Recommended Outcome:**<br><br>The Tenement Holder must in constructing and operating the Lease, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mining operations. | All uncontrolled on-site fires are investigated and this demonstrates they were appropriately managed and controlled. | The assessment of the measurement criterion for **ML-AL6** is applicable for this impact.<br><br>DSD considers there are appropriate methodologies and standards to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | The assessment of the leading indicator criterion for **ML-AL6** is applicable for this impact.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease conditions applicable to the measurement criteria are required. |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **DSD-ML-TTP1 / DSD-ML(c)-TTP1**<br><br>Disturbance to adjacent third party property and infrastructure as a result of the following mechanisms:<br><br>• open pit wall failure during operations and post completion<br><br>• open pit wall cut-back following wall failure during operations<br><br>• surface subsidence from underground mining operations<br><br>• open pit wall failure induced by underground mining operations.<br><br>**Recommended Outcome:**<br><br>The Tenement Holder must during construction, operation and post completion, ensure that as a result of a geotechnical failure caused by mining:<br><br>(i) there are no adverse impacts to land use adjacent to the mineral lease, and<br><br>(ii) there is no unauthorised damage to public or private property and infrastructure. | Rex has not proposed criteria for this outcome. | To demonstrate no adverse impacts to adjacent land use or damage to third party property, DSD recommends that if mining is allowed to proceed, the Tenement Holder must undertake ongoing verification of their mining and geotechnical engineering plan to demonstrate the final pit shell will remain stable and subsidence from underground mining will not impact 3rd party property and infrastructure during operations or post completion, unless agreement is reached with that 3rd party.<br><br>The measurement criteria for the post completion outcome must include the provision of a 3rd party independent expert undertaking a geotechnical assessment on whether the final pit shell will remain stable and subsidence from underground mining will not impact 3rd party property and infrastructure post completion, unless agreement is reached with that 3rd party<br><br>DSD considers there are appropriate measurement methodologies and standards to demonstrate achievement of the outcome.<br><br>DSD considers that achievement of the recommended outcome would be measurable.<br><br>Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers that there is the possibility that a strong reliance on control strategies may be required to reduce risk to the environment and thus Leading Indicator Criteria will be required for this outcome.<br><br>DSD considers no lease requirements applicable to LIC are necessary, however LIC for this outcome will be required for inclusion in the PEPR. | <u>DSD recommends the following lease condition(s) applicable to measurement criteria:</u><br>1. The Tenement Holder must ensure that the open pit mining does not extend west of a plane dipping down at 35 degrees to the east from the property boundary of CT 5707/273 – Section 39 and 44, Hundred Plan 131200, south of latitude 6174600N unless the Tenement Holder obtains:<br><br>1.1. ownership of CT 5707/273 or;<br><br>1.2. a registered Waiver of Exemption under the Act to undertake mining activities (inclusive of future geotechnical subsidence) on CT 5707/273.<br><br>2. The Tenement Holder must ensure that a caving method of mining is not used below a plane dipping down at 60 degrees to the east from the property boundary of CT 5707/273 – Section 39 and 44, Hundred Plan 131200, south of latitude 6174600N unless the Tenement Holder obtains:<br><br>2.1. ownership of CT 5707/273 or; |

*DSD assessment on measurement criteria*

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| | | | | 2.2. a registered Waiver of Exemption under the Act or agreement to undertake mining activities (inclusive of future geotechnical subsidence) on CT 5707/273. |
| **DSD-ML-TTP2**<br>**Potential Impact:** Effect of light spill on livestock.<br>**Recommended Outcome:** DSD proposes the following outcome;<br>The Tenement Holder must in constructing and operating the Lease, ensure that there are no adverse impacts to adjacent land use as a result of light spill caused by mining operations. | Rex has not proposed criteria for this outcome. | The potential for light spill to cause stress in cattle will be most readily identified by farmers who are familiar with their livestock and the potential pathways for stress.<br>DSD suggests that a complaints based criteria should be considered in preparation of the PEPR, where upon suspected livestock impacts could be reported to Rex who can then investigate and where necessary implement remedial actions.<br>It may also be appropriate to use standards for the effect of light spill on humans as referenced in Section 7.4 – Visual Amenity.<br>DSD considers there are appropriate measurement methodologies and standards to demonstrate achievement of the outcome.<br>DSD considers that achievement of the recommended outcome would be measurable. Should a lease be granted, these criteria would be finalised in the PEPR submission. | DSD considers no lease requirements applicable to Leading Indicator Criteria are necessary. | *DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to impact events **DSD-ML-TTP2**;*<br>Develop strategies for the design of waste rock dumps to ensure no impact from shading to agricultural productivity for third party land users on or off the Lease. |

### 7.15.6 *Summary of the recommended regulatory response (ML)*

DSD has assessed that all potential impacts to Adjacent Land Use and Third Party Property during construction, operations and post completion have been identified through this assessment and acceptable outcomes have been recommended for all primary impact events where the severity of primary consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for sensitive receptors or receiving environment during construction, operation and post completion. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

*DSD recommends that should a lease be granted the following outcomes be a requirement of the lease:*

The Tenement Holder must ensure any activities undertaken on the road or road reserve are conducted in accordance with any written requirements of the Department for Planning Transport and Infrastructure.

The Tenement Holder must during construction, operation and post completion ensure that there are no adverse impacts to third party land use on property adjacent to and on the Lease as a result of mining operations, other than those agreed between the Tenement Holder and the affected user.

The Tenement Holder must, in construction, operation and post completion, ensure no impacts to agricultural productivity for third party land users on or off the Lease as a result of mining operations, including:

- reduction in crop yield;
- reduction in grain quality; or
- adverse health impacts to livestock.

The Tenement Holder must in constructing and operating the Lease, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mining operations.

The Tenement Holder must during construction, operation and post completion, ensure that as a result of a geotechnical failure caused by mining:

(i) there are no adverse impacts to land use adjacent to the mineral lease, and

(ii) there is no unauthorised damage to public or private property and infrastructure.

The Tenement Holder must in constructing and operating the Lease, ensure that there are no adverse impacts to adjacent land use as a result of light spill caused by mining operations.

*DSD recommends the following lease condition(s) applicable to strategies to be adopted for achievement of the outcome:*

1. The Tenement Holder must ensure that the open pit mining does not extend west of a plane dipping down at 35 degrees to the east from the property boundary of CT 5707/273 – Section 39 and 44, Hundred Plan 131200, south of latitude 6174600N unless the Tenement Holder obtains:
    1.1. ownership of CT 5707/273 or;
    1.2. a registered Waiver of Exemption under the Act to undertake mining activities (inclusive of future geotechnical subsidence) on CT 5707/273.
2. The Tenement Holder must ensure that a caving method of mining is not used below a plane dipping down at 60 degrees to the east from the property boundary of CT 5707/273 – Section 39 and 44, Hundred Plan 131200, south of latitude 6174600N unless the Tenement Holder obtains:
    2.1. ownership of CT 5707/273 or;
    2.2. a registered Waiver of Exemption under the Act or agreement to undertake mining activities (inclusive of future geotechnical subsidence) on CT 5707/273.

*DSD recommends the following lease condition(s) applicable to strategies to be adopted for achievement of the outcome:*

The Tenement Holder must notify property owners adjacent to and within the area of the Lease, subject to their consent, of all blasts no less than forty eight hours in advance of those blasts.

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to **ML-AL1**:*

A blasting protocol and blasting schedule will be developed in consultation with residents of land within and adjoining the Lease to reflect the needs of the neighbouring land use practices (including aerial crop dusting).

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to impact events **ML-AL5**:*

Develop strategies for the design of waste rock dumps to ensure no impact from shading to agricultural productivity for third party land users on or off the Lease.

*DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to impact events* ***DSD-ML-TTP2****:*

Develop strategies for the design of waste rock dumps to ensure no impact from shading to agricultural productivity for third party land users on or off the Lease.

### 7.15.7 *Impact assessment (EML)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0. Rex has not identified any impacts associated with EML activities.

**DSD review of Rex impact assessment (EML)**

A description of DSD's assessment of the impact assessment process is described in Section 7.0. Rex own all land within the proposed EML, thus no third party property is present. Activities associated with the proposed EML are not expected to have off site impacts, any potential for introduction and spread of weeds and pests from site is covered in Section 7.8 of this report (weeds and pests). DSD accepts Rex's conclusion that there are no impacts on adjacent land use or third party property associated with EML activities.

### 7.15.8 *Summary of the recommended regulatory response (EML)*

Not applicable

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### 7.15.9 *Impact assessment (MPL)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0.

DSD considers that the approach adopted by Rex in the Proposal is suitable.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7.0. A review of Rex's impact assessment is shown in Table 7.15.6 of this assessment report and impacts identified by the State Government post submission of the Proposal are shown in Table 7.15.7. The Port MPL application has been deferred at the request of Rex and has not been assessed in this report.

**Table 7.15.6 – Impact events identified by Rex in the Proposal**

*Impact events identified by Rex in the Proposal*

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **MPL-AL1** | Agricultural land disturbed by the installation of the pipeline. | Rex has stated that the consequence of this impact occurring without controls implemented is Minor.<br>Agricultural land owned by third parties is considered to be within the scope of the Exempt Land provisions of section 9 of the Act. A waiver of the Exempt Land status, by way of an agreement with the affected land owner(s), will be required before mining operations can occur on exempt land. Given the Exempt Land and Waiver provisions of the Act provide for the affected parties to negotiate, or authorise the ERD Court to determine, the level of impact, DSD considers that an outcome is not required for this impact event. | No |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **MPL-AL2** | Reduced access to agricultural land resulting from power lines on farm land. | Rex has stated that the consequence of this impact occurring without controls implemented is Minor.<br>Agricultural land owned by third parties is considered to be within the scope of the Exempt Land provisions of section 9 of the Act. A waiver of the Exempt Land status, by way of an agreement with the affected land owner(s), will be required before mining operations can occur on exempt land. Given the Exempt Land and Waiver provisions of the *Mining Act 1971* provide for the affected parties to negotiate, or authorise the ERD Court to determine, the level of impact, DSD considers that an outcome is not required for this impact event. | No |
| **MPL-AL3** | Reduced land available for agriculture during operation | Rex has stated that the consequence of this impact occurring without controls implemented is Negligible.<br>Agricultural land owned by third parties is considered to be within the scope of the Exempt Land provisions of section 9 of the Act. A waiver of the Exempt Land status, by way of an agreement with the affected land owner(s), will be required before mining operations can occur on exempt land. Given the Exempt Land and Waiver provisions of the Act provide for the affected parties to negotiate, or authorise the ERD Court to determine, the level of impact, DSD considers that an outcome is not required for this impact event. | No |
| **ML-PPA14** | Introduction and/or increase in existing weeds during construction and operations. | This potential impact relates to Weeds and Pests and has been addressed in Section 8.4.7 of the Proposal and is assessed under Section 7.8 of this report. | N/A |

**Table 7.15.7 – Impact events identified subsequent to the Proposal**

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **DSD-MPL-TTP1** | Fire caused during construction and operation due to mine related activities related to the pipelines and powerline. | DSD considers that the activity of construction of the pipelines and powerline pose a risk of fire which can potentially impact adjacent land use or third party property. The construction of the pipeline will require welding and other hot work which is a potential source of fire. As the pipeline is being constructed either within a road reserve, or on third party property the source and the receptor are co-located. During operations, maintenance on the pipeline could also be a source of fire. The construction and operational maintenance of the powerline will also be potential source of fire.<br><br>DSD assesses the primary consequence of this occurring is greater than trivial and hence an outcome is required. | YES |

### 7.15.10 *Outcomes (MPL)*

Table 7.15.8 is the DSD assessment of outcomes proposed by Rex and DSD in the Proposal. The assessment initially determines the **acceptability** of the proposed outcome. That is, whether the expected level of impact to the environment subsequent to control strategies as described by Rex is acceptable. The assessment then determines the **achievability** of the proposed outcome. This is an assessment on the likelihood that the control and management strategies proposed will achieve the proposed outcome. For closure events this will consider whether the proposed strategies are going to be self-sustaining in the long term. The assessment will also consider any assumptions and uncertainty in control strategies.

**Table 7.15.8 – DSD assessment of outcomes proposed by Rex and DSD**

| ID | Assessment of acceptability of outcome | Assessment of achievability of outcome | Recommended regulatory response |
|---|---|---|---|
| **DSD-MPL-TTP1**<br><br>**Potential Impact:** Fire caused during construction and operation due to mine related activities related to the pipelines and powerline.<br>**Recommended Outcome:** DSD proposes the following outcome;<br><br>The Tenement Holder must in constructing and operating the Licence, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mine related activities. | The proposed outcome accurately describes the level of impact.<br><br>The proposed outcome is considered a suitable statement on the acceptable level of impact on the environment subsequent to implementation of control strategies. | DSD considers that the outcome would be achievable. | *DSD recommends that should a licence be granted the following outcome be a requirement of the licence:*<br><br>The Tenement Holder must in constructing and operating the Licence, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mine related activities.<br><br>*DSD recommends that should a Licence be granted the following be prescribed as a condition of the Licence:*<br><br>The Tenement Holder must ensure any activities undertaken on the road or road reserve are conducted in accordance with any written requirements of the Department for Planning Transport and Infrastructure. |

DSD considers that all recommended outcomes define an acceptable level of impact to the receiving environment and would be achievable following the implementation of the control strategies proposed by Rex.

### 7.15.11 *Measurement Criteria (MPL)*

Table 7.15.9 is DSDs assessment of the measurement criteria as a suitable demonstration of achievement of all outcomes recommended by Rex and DSD.

### Table 7.15.9 – DSD assessment on measurement criteria

| ID | Proposed Measurement Criteria | DSD assessment on measurement criteria | DSD assessment of leading indicator criteria | Recommended regulatory response |
|---|---|---|---|---|
| **DSD-MPL-TTP1**<br><br>**Potential Impact:** Fire caused during construction and operation due to mine related activities related to the pipelines and powerline.<br>**Recommended Outcome:** The Tenement Holder must in constructing and operating the Licence, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mine related activities. | All uncontrolled on-site fires are investigated and this demonstrates they were appropriately managed and controlled. | The assessment of the measurement criteria for **ML-AL6** is applicable to this impact. | The assessment of the leading indicator criterion for **ML-AL6** is applicable to this impact. | DSD considers no licence conditions applicable to the measurement criteria are required. |

### 7.15.12 *Summary of the recommended regulatory response (MPL)*

DSD has assessed that all potential impacts to adjacent land use and third party property on the MPLs during construction and operations have been identified through this assessment and acceptable outcomes have been recommended for all primary impact events where the severity of primary consequence is higher than trivial. DSD has considered each of these outcomes and determined that they set an acceptable level of impact for nearby residents and communities during construction and operation. DSD considers that these outcomes would be achievable following the successful implementation of control strategies. DSD also considers there are suitable methods available for measuring achievement of these outcomes.

**Power line and Pipelines MPL**

*DSD recommends that should a Licence be granted the following outcome be prescribed as a requirement of the Licence:*

The Tenement Holder must in constructing and operating the Licence, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mine related activities.

*DSD recommends that should a Licence be granted the following be prescribed as a condition of the Licence:*

The Tenement Holder must ensure any activities undertaken on the road or road reserve are conducted in accordance with any written requirements of the Department for Planning Transport and Infrastructure.

## *7.16 Radiation*

### 7.16.1 *Description of Relevant Aspects of Environment*

The Hillside deposit is an Iron-oxide copper-gold deposit which frequently is associated with uranium mineralisation in South Australia.

Uranium like all radioisotopes contributes to the natural background radiation which all humans are exposed to every day of their lives. Background radiation consists of cosmic rays from space and radiation present in the earth from when it was formed. The terrestrial radiation comes from naturally occurring radioisotopes of potassium and rubidium and from decay products of uranium and thorium. On average two thirds of the dose people receive comes from terrestrial sources. Much of this dose can come from the gas, radon, which is a decay product of uranium and thorium. In Australia people are exposed to approximately 1.5 mSv of background radiation, further as shown in the table below.

**Human Exposure To Background Radiation**

| Source Of Exposure | Exposure |
|---|---|
| Natural Radiation (terrestrial and airborne) | 1.2 mSv per year |
| Natural Radiation (cosmic radiation at sea level) | 0.3 mSv per year |
| **Total Background Radiation** | **1.5 mSv per year** |
| Seven hour aeroplane flight | 0.05 mSv |
| Chest X-ray | 0.04 mSv |
| Nuclear Fallout (from atmospheric tests in 50's & 60's) | 0.02 mSv per year |
| Cosmic Radiation Exposure of Domestic Airline Pilot | 2 mSv per year |

Source:
http://www.arpansa.gov.au/radiationprotection/Factsheets/is_rad.cfm

Testing of samples has revealed uranium concentrations across the ore body to be relatively low. The uranium-bearing minerals present within the Hillside deposit are; coffinite, uraninite and pitchblende. These minerals occur within and adjacent to the target areas of copper mineralisation. Table 5.8-1 in the Proposal, shown below, shows average concentrations of measured and expected uranium for ore, waste and products of the mine.

| Zone or product | Average Uranium concentration (ppm) |
|---|---|
| Orezones (combined) | 57 |
| Orezone (highest average – Songvaar domain) | 81 |
| Mined waste (overburden) | 16 |
| Copper concentrate | 30 |
| Magnetite concentrate | 11 |
| Tailings | 25* |

* DSD notes there is an inconsistency in the average concentration of uranium in Tailings as described in the Proposal (and Item #155 of the Response Document) and Appendix 38 of the Response Document (Hillside Project Radiation Impact Assessment Technical Note, revised January 2014). Appendix 38 states an average tailings uranium grade of 57ppm in its dose assessments which differs from the Proposal. DSD acknowledges that the assessment of potential radiological doses to workers and members of the public has been based on the higher uranium concentration of 57ppm in tailings.

The ore body is not homogenous and narrow zones of uranium mineral concentrations were intersected during drilling with the highest assay recorded at 10,100 ppm over an interval of less than 2m. Less than 100 of the 197,000 drill samples assayed returned results exceeding 1000 ppm uranium.

The South Australian EPA assesses the requirement for a licence to mine radioactive substances under the *Radiation Protection and Control Act 1982* and where uranium levels exceed 200 ppm currently require a radiation management plan. Approximately 4.1Mt of material from the mine is expected to exceed this value. Rex proposes to manage the uranium contained within product and waste material on site through a traditional blending program, such that the average uranium concentration of any material does not exceed 200 ppm.

Uranium and radionuclides at very high concentrations have the potential to cause radiological impacts on human and fauna health. The closest receptors identified include mine workers, adjacent residences, and fauna.

Rex has also undertaken a background radiation monitoring program, based on a ground gamma survey conducted in 2012, airborne radon concentration and radon emanation measurements, and dust radionuclide activity concentration measurements. This information was provided in Appendix 39 of the Proposal Response Document '*Baseline Radiological Assessment of Hillside'*.

In recent years, in response to community concern regarding uranium mineralisation at the Hillside project, technical specialists in both DSD and the EPA have, as part of the ongoing regulation of exploration activities on the site, further reviewed and confirmed that there is and has been no material risk to public health and safety as a result of uranium mineralisation identified within the Hillside orebody. In 2012 the EPA performed independent radiological measurements at both the Hillside site and an adjacent property. The EPA concluded that the radiation levels were typical of background levels.

Given the low level of uranium mineralisation across the deposit, Rex has indicated that it does not propose to produce radioactive mineral products as part of the Mining Lease Proposal. The following assessment does however provide specific consideration of all relevant risks associated with radioactive minerals, and potential impacts to health and safety from any radioactive materials present in the Hillside deposit.

DSD considers that the description of environment is a suitable characterisation of the receiving environment which may be affected by mining operations.

### 7.16.2 *Views of affected parties*

The CCG expressed a very high concern regarding the radiation levels and management in ore, concentrate waste material and tailings. Rex has addressed this in the impact assessment.

The following issues regarding uranium and radiation were raised during consultation.

**Table 7.16 – Impact events relating to issues raised during statutory consultation**

| Issues raised during statutory consultation | Addressed |
|---|---|
| Uranium levels provided were averages and did not display maximum and minimum and thresholds vary widely throughout the Proposal | DSD sought further clarification regarding this under technical issues 37-41 and 152. This has been considered in the assessment of **ML-R1 to R4**. |
| Information regarding uranium and heavy metal chemistry of the TSF and pathways of contamination was not provided. Including pathway to the food chain and exports. | DSD sought further information under technical issue 157 and 168. This has been considered in the assessment of **ML-R1 to R4**. |
| Radiation contamination of nearby residents and surrounding environment | **ML-R1 to R4**. |
| Levels of uranium in waste rock dump, tailings storage facility and final concentrate/slurry | **ML(C)-R1** and **DSD MPL-R1** |
| Initial exposure of uranium and radon gas prior to blending | DSD sought further information regarding blending of materials under technical issue 151 and 152 and 156. This has been considered in the assessment of **ML-R1**. |
| Safety of mine workers from radiation | Safety of Mine workers is outside the scope of this assessment. Safety of workers is subject to the *Radiation Protection and Control Act 1982* and associated legislation. |
| The Proposal did not contain a radiation plan nor did the EPBC referral mention uranium). | A radiation management plan is not required as a component of the Proposal. If the operation is licenced under the *Radiation Protection and Control Act 1982* Rex will be required to develop a radiation management plan in accordance with the requirements of the EPA.<br>With regards to the EPBC Act, Rex's referral did not include any mining of uranium and the decision made by DoE has not considered this. The presence of uranium is not in itself a trigger for referral under the EPBC Act. |
| Leaching of uranium into the Gulf St Vincent | DSD sought further information regarding this under technical issue 153. This has been considered in impact id **DSD MPL-R2** |
| The scope of the project may change to include uranium. | The Proposal has not sought approval to mine uranium. Should a mining lease be granted it would not include uranium as a commodity to be mined.<br>DSD sought further information regarding Rex's intentions to mine uranium under technical issue 155. Rex has indicated that uranium is not present at Hillside in economic quantities that would justify recovery.<br>Should this position change in the future State and Commonwealth approval processes would be required including undertaking statutory public consultation. |

The statutory consultation identified additional impact events to those identified by Rex.

An additional impact event was identified by DSD: the potential health impacts from airborne radionuclides from concentrate handling at the port. This has been addressed in the impact assessment **DSD MPL-R1.**

DSD has had regard for all concerns which were raised during statutory consultation, however not all concerns have been included as part of this assessment report as they are either not within the scope of the assessment or are too general in nature to consider.

### 7.16.3 *Impact assessment (ML)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0. In addition to this, Rex in the Proposal Response Document provided an estimate of occupational radiation doses, as well as public doses following mine development. The summary of the estimated public doses is provided in the following table (taken from Issue #38 of the Response Document), and shows that predicted public doses would be well below the public dose limit of 1mSv/year.

**A summary of the estimated public doses as supplied by Rex (Table 17 Response Document)**

| Sensitive Receptor | Dose From Pathway (mSv/y) | | | | |
|---|---|---|---|---|---|
| | Inhalation of RnDP | Inhalation of Dust | Gamma Radiation | Total Dose | Maximum Allowable |
| Southern Project Boundary | 0.056 | 0.011 | 0 | 0.067 | 1.0 |
| Port | 0.004 | 0.008 | 0 | 0.012 | 1.0 |

Rex proposes to manage the small quantities of uranium bearing ore through dilution of this ore and waste rock with other material not containing any uranium. This will be undertaken by scheduling of pit and processing activities to minimise the concentrations carried through to concentrate and waste streams including the TSF.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7. A review of Rex's impact assessment is shown in Table 7.16.1.

## Table 7.16.1 – Impact events identified by Rex in the Proposal

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-R1** | Human health impacts resulting from inhalation of increased levels of radionuclide dusts. | Rex has stated that the consequence of this impact occurring without controls implemented is negligible.<br>Proposed mining activities will involve the recovery of varying volumes and concentrations of uranium bearing minerals. Rex has provided, within the Response Document:<br>• Detailed estimations of the volumes of uranium bearing ore present<br>• Maximum mining rates and schedules for radioactive ores<br>• Uranium Block Models of the proposed pit developed using uranium grade cut-off of 80ppm and 200ppm<br>• Estimated radiation doses for periods when workers will be handling radioactive ores<br>• Quantitative predictions of radionuclide releases to the environment based on dust deposition modelling<br>• Quantitative predictions of radionuclide doses to the public at the nearest sensitive receptors.<br>The radionuclide dose assessment to the public includes predictions of doses from gamma radiation, radon and dust.<br>This information has undergone assessment by the EPA Radiation Protection Branch and no concerns were highlighted regarding the information presented.<br>Based on this information DSD have assessed that there are no credible risks to public health from radiation exposures due to mining operations.<br>DSD assesses the primary consequence of this occurring is trivial and hence **no** outcome is required.<br>Rex will be required to comply with the obligations within the *Radiation Protection and Control Act 1982*. | No<br>Rex has not provided an outcome |
| **ML-R2** | Adverse health impacts on grazing animals from ingestions of radionuclide dusts. | Rex has stated that the consequence of this impact occurring without controls implemented is negligible.<br>Although some dust bearing uranium and radionuclides may be removed from the mine through wind erosion, Based on advice provided by the EPA, DSD considers that the potential volumes and uranium concentrations within this dust would be insufficient to cause health impacts on grazing animals in the vicinity of the mine.<br>DSD assesses the primary consequence of this occurring is trivial and hence **no** outcome is required. | No<br>Rex has not provided an outcome |

| *Impact events identified by Rex in the Proposal* | | | |
|---|---|---|---|
| **ID** | **Potential impact event** | **DSD assessment of impact event** | **DSD assessment if an outcome is required** |
| **ML-R3** | Negative health impacts on native fauna resulting from increased inhalation/ingestions of radionuclide dusts. | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>Although some dust bearing uranium and radionuclides may be removed from the mine through wind erosion, based on advice provided by the EPA, DSD considers that the potential volumes and uranium concentrations within this dust would be insufficient to cause health impacts on grazing animals in the vicinity of the mine.<br>DSD assesses that the primary consequence of this occurring is trivial and hence **no** outcome is required. | No<br>Rex has not provided an outcome |
| **ML-R4** | Damage to marine flora and fauna as a result of increased deposition of radionuclide dusts. | Rex has stated that the consequence of this impact occurring without controls implemented is negligible.<br>Although some dust bearing uranium and radionuclides may be removed from the mine through wind erosion, based on advice provided by the EPA, DSD considers that the volume and concentrations of any dust deposited on the sea would pose no credible risk to marine flora and fauna.<br>DSD assesses that the primary consequence of this occurring is trivial and hence **no** outcome is required. | No<br>Rex has not provided an outcome |
| **ML(C)-R1** | Human health risks post completion if residual radioactive material is not suitably mixed and encapsulate within the waste stockpiles and TSF. | Rex has stated that the consequence of this impact occurring without controls implemented is minor.<br>As discussed under ML – R1, Rex has provided information in the Response Document for the management of radionuclides. This information has undergone assessment by the EPA Radiation Protection Branch and no concerns were highlighted regarding the information presented.<br>Based on this information DSD has assessed that there are no credible risks to public health from radiation exposures following mine completion, including from the potential risk of exposure of waste rock through erosion or other failures of the waste rock encapsulation.<br>DSD assesses the primary consequence of this occurring is trivial and hence no outcome is required. | No<br>Rex has not provided an outcome |

DSD considers that Rex has identified all potential impacts to radiation associated with the proposed mining activities and no outcomes are required.

### 7.16.4 *Summary of the recommended regulatory response (ML)*

DSD has assessed that all potential impacts to radiation during construction, operations and post completion have been identified through this assessment and no outcomes have been recommended for all primary impact events as the severity of primary consequence is determined to be trivial.

*Should a lease be granted DSD recommends the following be prescribed as conditions of the lease:*

The Tenement Holder must at all times comply with the requirements of the *Radiation Protection and Control Act 1982. (See Section 7.17 for the recommended lease condition in relation to complying with other legislation).*

### 7.16.5 *Impact assessment (EML)*

### 7.16.6 *Summary of the recommended regulatory response (EML)*

The proposed EML activities will include movement of stockpiles of extractive materials taken from near the surface that do not contain radionuclide bearing minerals. DSD considers there is no credible source of radiation on the EML, and that no regulatory response is needed.

### 7.16.7 *Impact assessment (MPL)*

**Rex's approach to impact assessment**

A description of Rex's approach to the impact assessment process is described in Section 7.0. Rex has not provided an impact assessment for radiation impacts associated with the MPLs.

**DSD review of Rex impact assessment**

A description of DSD's assessment of the impact assessment process is described in Section 7.0.

The Port MPL application has been deferred at the request of Rex and has not been assessed in this report.

The State Government, through the assessment process, has identified an additional radiation impact associated with the proposed mine related activities subsequent to the submission of the Proposal. An assessment of these additional impact events is provided in Table 7.16.4.

**Table 7.16.4 – Impact events identified subsequent to the Proposal**

| ID | Potential impact event | DSD assessment of impact event | DSD assessment if an outcome is required |
|---|---|---|---|
| **DSD MPL-R1** | Human health impacts resulting from inhalation of increased levels of radionuclide dusts emanating from a pipeline spill. | Rex intends blending ore of variable uranium content through the processing plant to ensure that the concentration within their product remains low, and below exemption levels in the Radiation Protection and Control (Transport of Radioactive Substances) Regulations 2003 which details requirements for the transport of radioactive substances. Rex intends on blending as close as possible to the expected average mill feed grade of 57ppm Uranium.<br><br>Based on low predicted concentration of uranium within the Copper and Magnetite concentrate DSD has determined there is no credible risk of radiological exposures to the public or any other sensitive receptors at the port operations.<br><br>DSD assesses that the primary consequence of this occurring is trivial and hence **no** outcome is required.<br><br>Rex will be required to comply with the obligations within the *Radiation Protection and Control Act 1982.* | No |

### 7.16.8 *Summary of the recommended regulatory response (MPL)*

DSD has assessed that all potential impacts to radiation during construction, operations and post completion have been identified through this assessment and no outcomes have been recommended for all primary impact events as the severity of primary consequence is determined to be trivial.

**Power line and Pipelines MPL**

*Should a licence be granted DSD recommends the following be prescribed as conditions of the licence:*

The Tenement Holder must at all times comply with the requirements of the *Radiation Protection and Control Act 1982. (See Section 7.17 for the recommended lease condition in relation to complying with other legislation).*

## *7.17 Other Regulatory Terms and Conditions*

DSD has identified all potential impacts to the environment during construction, operations and post completion through this assessment and acceptable outcomes have been recommended for all primary impact events where the severity of the primary consequence is higher than trivial. DSD has determined each of these outcomes to be both achievable and measurable.

DSD considers that additional terms and conditions are necessary for inclusion on the leases and licenses which prescribe conditions for achievement of the environmental outcomes.

### 7.17.1 *Mineral Lease*

*DSD recommends that should a lease be granted the following be prescribed as terms and conditions of the* ***Mineral Lease (ML):***

**FIRST SCHEDULE (ADDITIONAL TERMS) (ML)**

**Authorised Mining Operations**

1. Mining operations authorised by this lease must only be for the recovery of copper, gold and iron ore (magnetite and hematite) and must be consistent with the mining operations described in the mining lease proposal document dated August 2013 and subsequent response document dated 21 February 2014.

**Ore from other tenements**

2. Mining operations authorised by this lease must only be for the recovery of ore from this lease.

**SECOND SCHEDULE (ADDITIONAL CONDITIONS) (ML)**

*{Note: Numbering begins at (33) to align with Appendix 2 numbering}*

**Additional Information in the Program**

33. In accordance with section 70B(2)(d) of the Act it is a condition of this lease 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 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:

        a. an Independent Mining and Blasting Expert (ie: for Blasting operations)
        b. an Independent Environmental Geochemist Expert (ie: for PAF material and metalliferous drainage management)
        c. an Independent Geotechnical Engineering Expert (ie: for WRD and TSF design and construction methodology)
        d. an Independent Mine Waste Cover System Expert (ie: for mine waste cover systems design)
        e. an Independent Geomorphology Expert (ie: for Landform design, soil and erosion management)

f. an Independent Hydrology Expert (ie: for Surface water management)
g. an Independent Hydrogeology Expert (ie: for verification of predictive ground water models, ground water management and the extent of ground water mounding underneath the TSF)
h. an Independent Mining Geotechnical Engineering Expert (ie: for stability of final open pit and underground stope voids)
i. an Independent Chemical, Process or Metallurgical Engineering Expert (ie: for tailings densities necessary for timely construction of the TSF cover system upon cessation of tailings deposition)

These reports must include identification of any risks, assumptions and uncertainties associated with the relevant strategies.

33.2. 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.

**Transparency**

34. The Tenement Holder agrees to the approved PEPR and any compliance reports and reportable incident reports, submitted in accordance with the Regulations, being made available for public inspection.

**Notification of cessation of operations**

35. Within 30 days of becoming aware of any event or decision which is likely to give rise to the cessation of mining operations for a period of more than 7 days and prior to the cessation of mining operations, the tenement holder must notify the Director of Mines in writing of the event or decision. The notice must specify the date upon which the mining operations are expected to cease, or have ceased and an estimate of the period of cessation.

**Decommissioning and Rehabilitation Plan**

36. Unless the Director of Mines otherwise directs, a Decommissioning and Rehabilitation Plan ("**DRP**") must be submitted to the Director of Mines for approval within 30 days of any decision or event that is likely to give rise to the permanent cessation of mining operations, and that DRP must:

    a. set out the activities and scheduling required for the carrying out of the rehabilitation works specified in the approved PEPR;

    b. be prepared in accordance with any guidelines provided by the Director of Mines.

37. The Tenement Holder must comply with a DRP approved in accordance with **Condition 36** or **38** when decommissioning or rehabilitating the tenement.

38. If, in the opinion of the Director of Mines, mining operations on the tenement have substantially ceased for 2 years or more, the Director of Mines may:

    38.1. require that the Tenement Holder submits a DRP for approval dealing with the requirements set out in **Condition 36**; and/or

    38.2. direct the Tenement Holder to rehabilitate the tenement in accordance with the approved PEPR and/or any DRP.

**Social Management Plan**

39. The tenement holder must prepare, implement and maintain a Social Management Plan (SMP) within 12 months from the date of the grant of the tenement (in consultation with relevant State Government agencies and key community stakeholders) that addresses:

    39.1. the matters described in Table 8.2-1 of the mining lease proposal; and

    39.2. anything further that the Director of Mines directs in writing.

    The tenement holder must make the SMP publically available.

**Community Engagement**

40. The tenement holder must prepare, implement and maintain (to the satisfaction of the Director of Mines) a Community Engagement Plan (**"CEP"**) that:

    40.1. Sets out the purpose, objectives and parameters of engagement with the Community;

    40.2. Identifies all community stakeholders likely to be affected by mining operations;

    40.3. Sets out the tools and techniques that the tenement holder intends to use for;

        40.3.1. identifying community attitudes and expectations;

        40.3.2. providing information to the community;

        40.3.3. receiving feedback from the community;

        40.3.4. analysing community feedback and considering community concerns or expectations; and

        40.3.5. registering, documenting and responding to communications from members of the community;

    40.4. Outlines an action plan to commence the proposed engagement activities; and

    40.5. Addresses any further matters that the Director of Mines advises in writing.

41. The CEP must be submitted to the Director of Mines for approval within three months of the grant of the Lease.

**Communications Protocol**

42. The Tenement Holder must develop (to the satisfaction of the Director of Mines) a communication and operating protocol between itself and owners of land adjacent to and on the Lease (subject to the agreement of the owners of land) prior to the commencement of mining operations that includes the following matters:

    42.1. Interaction with landholder operations;

    42.2. Emergency procedures;

    42.3. Communications and issue management processes;

    42.4. Land management;

    42.5. Dispute resolution;

    42.6. Ongoing communication about the Tenement Holder's operations;

    42.7. Receiving and considering feedback;

    42.8. Safety procedures;

    42.9. Access protocols; and

    42.10. Any matters identified by the Director of Mines in writing.

43. The Tenement Holder must maintain and adhere to the protocol to the satisfaction of the Director of Mines for the term of the Lease.

**Complaints Register**

44. 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.

45. 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.

46. 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:

    46.1. the time at which the complaint was received;

    46.2. all personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;

    46.3. the subject-matter of the complaint;

    46.4. the action taken by the tenement holder in relation to the complaint, including any follow-up contact with the complainant; and

    46.5. if no action was taken by the tenement holder, the reasons why no action was taken.

47. All records in respect of the public complaints must be maintained for a period of at least 7 years.

48. The tenement holder must make the public complaints register publically available except for the name and contact details of each complainant.

**Notification of Insolvency Events**

49. The Tenement Holder shall notify the Minister immediately after becoming aware of the Tenement Holder being placed into Administration.

**Other Legislation**

50. The Tenement Holder must comply with all State and Commonwealth legislation and regulations applicable to the activities undertaken pursuant to this lease including (but not limited to) the:

*50.1. Environment Protection and Biodiversity Conservation Act 1999;*

*50.2. Development Act 1993;*

*50.3. Dangerous Substances Act 1979;*

*50.4. National Parks and Wildlife Act 1972;*

*50.5. Marine Parks Act 2007;*

*50.6. Natural Resources Management Act 2004;*

*50.7. Public and Environmental Health Act 1987;*

*50.8. Radiation Protection and Control Act 1982;*

*50.9. Aboriginal Heritage Act 1988;*

*50.10. Heritage Places Act 1993*

*50.11. Work Health and Safety Act 2012;*

*50.12. Environment Protection Act 1993;*

*50.13. Native Vegetation Act 1991;*

*50.14. Mines and Works Inspection Act 1920;*

*50.15. Harbors and Navigation Act 1993; and*

*50.16. Road Traffic Act 1961.*

### 7.17.2 *Extractive Mineral Lease*

*DSD recommends that should a lease be granted the following be prescribed as terms and conditions of the Extractive Mineral Lease (EML):*

**FIRST SCHEDULE (ADDITIONAL TERMS) (EML)**

**Authorised Mining Operations**

1. Mining operations authorised by this lease must:

1.1 only be for the recovery of extractive minerals from stockpiles of excess overburden from the operations associated with the

realignment of the Yorke Highway and St Vincent Highway within the Lease; and

1.2 be consistent with the mining operations described in the mining lease proposal document dated August 2013 and subsequent response document dated 21 February 2014.

## SECOND SCHEDULE (ADDITIONAL CONDITIONS) (EML)

*{Note: Numbering begins at (3) to align with Appendix 3 numbering}*

**Transparency**

3. The Tenement Holder agrees to the approved PEPR and any compliance reports and reportable incident reports, submitted in accordance with the Regulations, being made available for public inspection.

**Notification of cessation of operations**

4. Within 30 days of becoming aware of any event or decision which is likely to give rise to the cessation of mining operations for a period of more than 7 days and prior to the cessation of mining operations, the tenement holder must notify the Director of Mines in writing of the event or decision. The notice must specify the date upon which the mining operations are expected to cease, or have ceased and an estimate of the period of cessation.

**Decommissioning and Rehabilitation Plan**

5. Unless the Director of Mines otherwise directs, a Decommissioning and Rehabilitation Plan ("**DRP**") must be submitted to the Director of Mines for approval within 30 days of any decision or event that is likely to give rise to the permanent cessation of mining operations, and that DRP must:

    c. set out the activities and scheduling required for the carrying out of the rehabilitation works specified in the approved PEPR;

    d. be prepared in accordance with any guidelines provided by the Director of Mines.

6. The Tenement Holder must comply with a DRP approved in accordance with **Condition 5** or **7** when decommissioning or rehabilitating the tenement.

7. If, in the opinion of the Director of Mines, mining operations on the tenement have substantially ceased for 2 years or more, the Director of Mines may:

    7.1. require that the Tenement Holder submits a DRP for approval dealing with the requirements set out in **Condition 5**; and/or

    7.2. direct the Tenement Holder to rehabilitate the tenement in accordance with the approved PEPR and/or any DRP.

**Communications Protocol**

8. The Tenement Holder must develop (to the satisfaction of the Director of Mines) a communication and operating protocol between itself and owners of land adjacent to and on the Lease (subject to the agreement of the owners of land) prior to the commencement of mining operations that includes the following matters:

   8.1. Interaction with landholder operations;

   8.2. Emergency procedures;

   8.3. Communications and issue management processes;

   8.4. Land management;

   8.5. Dispute resolution;

   8.6. Ongoing communication about the Tenement Holder's operations;

   8.7. Receiving and considering feedback;

   8.8. Safety procedures;

   8.9. Access protocols; and

   8.10. Any matters identified by the Director of Mines in writing.

9. The Tenement Holder must maintain and adhere to the protocol to the satisfaction of the Director of Mines for the term of the Lease.

**Complaints Register**

10. 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.

11. 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.

12. 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:

    12.1. the time at which the complaint was received;

    12.2. all personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;

    12.3. the subject-matter of the complaint;

    12.4. the action taken by the tenement holder in relation to the complaint, including any follow-up contact with the complainant; and

    12.5. if no action was taken by the tenement holder, the reasons why no action was taken.

13. All records in respect of the public complaints must be maintained for a period of at least 7 years.

14. The tenement holder must make the public complaints register publically available except for the name and contact details of each complainant.

**Notification of Insolvency Events**

15. The Tenement Holder shall notify the Minister immediately after becoming aware of the Tenement Holder being placed into Administration.

**Other Legislation**

16. The Tenement Holder must comply with all State and Commonwealth legislation and regulations applicable to the activities undertaken pursuant to this lease including (but not limited to) the:

*16.1. Environment Protection and Biodiversity Conservation Act 1999;*

*16.2. Development Act 1993;*

*16.3. Dangerous Substances Act 1979;*

*16.4. National Parks and Wildlife Act 1972;*

*16.5. Marine Parks Act 2007;*

*16.6. Natural Resources Management Act 2004;*

*16.7. Public and Environmental Health Act 1987;*

*16.8. Radiation Protection and Control Act 1982;*

*16.9. Aboriginal Heritage Act 1988;*

*16.10. Heritage Places Act 1993*

*16.11. Work Health and Safety Act 2012;*

*16.12. Environment Protection Act 1993;*

*16.13. Native Vegetation Act 1991;*

*16.14. Mines and Works Inspection Act 1920;*

*16.15. Harbors and Navigation Act 1993; and*

*16.16. Road Traffic Act 1961.*

### 7.17.3 *Miscellaneous Purpose Licence – Power line and Pipelines*

*DSD recommends that should a Licence be granted the following be prescribed as terms and conditions of the Miscellaneous Purpose Licence (MPL):*

**FIRST SCHEDULE (ADDITIONAL TERMS) (MPL)**

**Authorised Mining Operations**

1. The Miscellaneous Purposes Licence (MPL) is granted for the purpose of constructing, operating and maintaining water and concentrate pipelines and a high voltage power line directly related to the conduct of mining

operations authorised under mining tenement MLXXXX[1] and must be consistent with the activities described in the miscellaneous purposes licence management plan dated August 2013 and subsequent response document dated 21 February 2014.

*Note 1: The ML number to be inserted here will be for the proposed mineral lease.*

## SECOND SCHEDULE (ADDITIONAL CONDITIONS) (MPL)

*{Note: Numbering begins at (8) to align with Appendix 4 numbering}*

**Additional Information in the Program**

8. In accordance with section 70B(2)(d) of the Act it is a condition of this lease 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:

   8.1. 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:

      a. an Independent Slurry Pipeline Engineering Expert (ie: for verification of the design of the concentrate slurry pipeline)

      These reports must include identification of any risks, assumptions and uncertainties associated with the relevant strategies.

   8.2. 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.

**Transparency**

9. The Tenement Holder agrees to the approved PEPR and any compliance reports and reportable incident reports, submitted in accordance with the Regulations, being made available for public inspection.

**Notification of cessation of operations**

10. Within 30 days of becoming aware of any event or decision which is likely to give rise to the cessation of mining operations for a period of more than 7 days and prior to the cessation of mining operations, the tenement holder must notify the Director of Mines in writing of the event or decision. The notice must specify the date upon which the mining operations are expected to cease, or have ceased and an estimate of the period of cessation.

**Decommissioning and Rehabilitation Plan**

11. Unless the Director of Mines otherwise directs, a Decommissioning and Rehabilitation Plan ("**DRP**") must be submitted to the Director of Mines for approval within 30 days of any decision or event that is likely to give rise to the permanent cessation of mining operations, and that DRP must:

a. set out the activities and scheduling required for the carrying out of the rehabilitation works specified in the approved PEPR;

b. be prepared in accordance with any guidelines provided by the Director of Mines.

12. The Tenement Holder must comply with a DRP approved in accordance with **Condition 11** or **13** when decommissioning or rehabilitating the tenement.

13. If, in the opinion of the Director of Mines, mining operations on the tenement have substantially ceased for 2 years or more, the Director of Mines may:

13.1. require that the Tenement Holder submits a DRP for approval dealing with the requirements set out in **Condition 11**; and/or

13.2. direct the Tenement Holder to rehabilitate the tenement in accordance with the approved PEPR and/or any DRP.

**Community Engagement**

14. The tenement holder must prepare, implement and maintain (to the satisfaction of the Director of Mines) a Community Engagement Plan (**"CEP"**) that:

14.1. Sets out the purpose, objectives and parameters of engagement with the Community;

14.2. Identifies all community stakeholders likely to be affected by mining operations;

14.3. Sets out the tools and techniques that the tenement holder intends to use for;

14.3.1. identifying community attitudes and expectations;

14.3.2. providing information to the community;

14.3.3. receiving feedback from the community;

14.3.4. analysing community feedback and considering community concerns or expectations; and

14.3.5. registering, documenting and responding to communications from members of the community;

14.4. Outlines an action plan to commence the proposed engagement activities; and

14.5. Addresses any further matters that the Director of Mines advises in writing.

15. The CEP must be submitted to the Director of Mines for approval within three months of the grant of the Lease.

**Communications Protocol**

16. The Tenement Holder must develop (to the satisfaction of the Director of Mines) a communication and operating protocol between itself and owners of land adjacent to and on the Lease (subject to the agreement of the owners of land) prior to the commencement of mining operations that includes the following matters:

    16.1. Interaction with landholder operations;

    16.2. Emergency procedures;

    16.3. Communications and issue management processes;

    16.4. Land management;

    16.5. Dispute resolution;

    16.6. Ongoing communication about the Tenement Holder's operations;

    16.7. Receiving and considering feedback;

    16.8. Safety procedures;

    16.9. Access protocols; and

    16.10. Any matters identified by the Director of Mines in writing.

17. The Tenement Holder must maintain and adhere to the protocol to the satisfaction of the Director of Mines for the term of the Lease.

**Complaints Register**

18. 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.

19. 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.

20. 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:

    20.1. the time at which the complaint was received;

    20.2. all personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;

    20.3. the subject-matter of the complaint;

    20.4. the action taken by the tenement holder in relation to the complaint, including any follow-up contact with the complainant; and

    20.5. if no action was taken by the tenement holder, the reasons why no action was taken.

21. All records in respect of the public complaints must be maintained for a period of at least 7 years.

22. The tenement holder must make the public complaints register publically available except for the name and contact details of each complainant.

**Notification of Insolvency Events**

23. The Tenement Holder shall notify the Minister immediately after becoming aware of the Tenement Holder being placed into Administration.

**Other Legislation**

24. The Tenement Holder must comply with all State and Commonwealth legislation and regulations applicable to the activities undertaken pursuant to this lease including (but not limited to) the:

*24.1. Environment Protection and Biodiversity Conservation Act 1999;*

*24.2. Development Act 1993;*

*24.3. Dangerous Substances Act 1979;*

*24.4. National Parks and Wildlife Act 1972;*

*24.5. Marine Parks Act 2007;*

*24.6. Natural Resources Management Act 2004;*

*24.7. Public and Environmental Health Act 1987;*

*24.8. Radiation Protection and Control Act 1982;*

*24.9. Aboriginal Heritage Act 1988;*

*24.10. Heritage Places Act 1993*

*24.11. Work Health and Safety Act 2012;*

*24.12. Environment Protection Act 1993;*

24.13. *Native Vegetation Act 1991;*

*24.14. Mines and Works Inspection Act 1920;*

*24.15. Harbors and Navigation Act 1993; and*

*24.16. Road Traffic Act 1961.*

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# 8 Other Endorsements Required

***The following South Australian endorsements are required for the purpose of considering whether or not to grant a mining lease and miscellaneous purposes licenses:***

## *8.1 Development Act*

This application is made pursuant to the *Mining Act 1971* and is excluded from the definition of 'development' pursuant to the *Development Act 1993*. The appropriate authority is the Minister administering the *Mining Act 1971*.

The highway diversion, Pine Point road diversion and upgrades to Port facilities have been applied for and assessed separately under the *Development Act 1993*.

The new lease application is located within two Schedule 20, 'Mineral Production Tenement Regulations Area - Yorke Peninsula Plan' and 'The Coast', hence this application has been referred for advice to the Minister for Planning, pursuant to section 75, *Development Act 1993*.

The Minister for Planning has responded to the referral and endorsed the DSD assessment process and indicated that he is confident that the process under the *Mining Act 1971* can accommodate the assessment and management of the following significant matters:

- It is noted that Waste Rock Dumps (WRDs) have been located to shield views of the mine and processing facility from the Yorke Highway. The WRDs will form tiered hill landforms, and are proposed to be sculptured in a way that softens visual impact. A vegetation corridor is also proposed to be established on the western side of the highway (i.e. between the road and the WRDs) to further reduce views to the project site. This will be an important factor in managing impacts.

- Ocean views from the proposed realigned Yorke Highway are expected to be enhanced, with the highway being moved closer to the coast. Views into the mine site from properties and local roads to the north, south and west will be minimised by vegetation along road reserves where space exists and should be appropriately managed. The placement of the western WRD shields much of the view into the mine site from the west.

- Built infrastructure on the site is proposed to be constructed of non-reflective materials and screened with earthen bunds, fencing and advanced trees where possible. This will be an important factor in mitigating impacts.

- Environmental issues (such as dust, noise, odour, stormwater, waste generation, vegetation loss etc) are proposed to be addressed either through licensing or other management arrangements by relevant state agencies. This will be an important factor in mitigating impacts.

The significant matters identified by the Minister for Planning have been addressed in Section 7 of this assessment report and are addressed in the recommendations for the terms, conditions and requirements for tenements, should they be granted.

### *8.2 Native Title (South Australia) Act*

The application submitted by Rex is over freehold land only and thus the Native Title has been extinguished over this land. The *Native Title (South Australia) Act 1994* does not apply in this instance.

***The following subsequent endorsements are required where relevant, should a lease and licenses be granted:***

### *8.3 Radiation Protection and Control Act*

The proposed Mining Lease will involve extraction and management of some zones of ore containing radioactive substances above the prescribed concentration of 35 kBq/kg (200 ppm uranium). Therefore licensing or registration under the *Radiation Protection and Control Act 1982* may be required and would be administered by the Environment Protection Authority (EPA).

### *8.4 Environment Protection Act*

The *Environment Protection Act 1993* provides for the protection of the environment and is administered by the Environment Protection Authority (EPA). Rex is required to meet all obligations of the *Environment Protection Act, 1993* and associated Regulations and Policies.

Rex will require the following Authorisations for the project:

- Works Approval (Section 35) for the construction of a building or structure or the installation of any plant or equipment for use for a prescribed activity of environmental significance

- License for Prescribed activities of environmental significance (Section 36) for relevant activities listed under Schedule 1 of the *Environment Protection Act 1993*.

### 8.5 Natural Resources Management Act

The *Natural Resources Management Act 2004* promotes sustainable and integrated management of the state's natural resources and provides for their protection. The regulating agency for this act is the Department of Environment, Water and Natural Resources (DEWNR).

Where necessary, Rex may require permits and licences for the project, as determined by the local Natural Resources Management (NRM) board of the Northern and Yorke NRM board.

### 8.6 National Parks and Wildlife Act

This State Act was designed to allow for the establishment and maintenance of a system of reserves, as well as the protection of threatened species of flora and fauna. The Act identifies and protects certain species located within conservation parks and reserves, as well as any species listed under Schedules 7, 8 and 9 of the Act. Species protected under this act identified in the vicinity of the mine site include the large-club spider-orchid (*Caladenia macroclavia*), mallee bitter-pea (*Daviesia benthamii* spp. *Humilis*) and the Peregrine Falcon (*Falco peregrinus*).

### 8.7 Native Vegetation Act

The *Native Vegetation Act 1991* promotes the conservation, protection and enhancement of native vegetation in the state with specific focus on remnant native vegetation. This act is regulated by the DEWNR. To allow clearance of native vegetation for the proposed project Rex must submit an application and plan to provide a Significant Environmental Benefit (SEB) in accordance with the *Native Vegetation Regulations 2003* and 'Guidelines for a native vegetation Significant Environmental Benefit policy for the clearance of native vegetation associated with the minerals and petroleum industry 2005'. This plan will be submitted as part of the PEPR and approved by DSD under delegation from the Native Vegetation Council. Preparation and assessment of this plan will be undertaken in consultation with DEWNR.

### 8.8 Aboriginal Heritage Act and Heritage Places Act

The *Aboriginal Heritage Act 1988* and the *Heritage Places Act 1993* promote the conservation and protection of heritage objects, artefacts and sites. Rex must operate in accordance with these acts at all times. Authorisation to move heritage objects and artefacts to ensure protection must be obtained where required.

***The following Commonwealth legislative requirement was applicable to the Hillside Project:***

### *8.9 Environment Protection and Biodiversity Conservation Act*

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) enables the Australian Government to join with the states and territories to provide a national scheme of environment protection and biodiversity conservation. Under the EPBC Act, actions that are likely to have a significant impact on a matter of national significance are assessed. The Australian Government's Department for Environment (DoE) is responsible for administering the act.

An application was referred to DoE for the proposed Mining Lease and was assessed under the Commonwealth EPBC Act. A decision was made by DoE on 11th September 2012 that the referral was not a controlled action if undertaken in a particular manner.

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# 9 Conclusion

Detailed assessments of the environmental impacts and socio-economic benefits have been provided in Section 7 and Section 5.5 of this report. The benefits from the Hillside project would include economic growth, job creation both for the mine and service industry, as well as improved regional and local infrastructure and services to the community.

Primary impacts associated with the project have been identified by Rex and stakeholders including community members and groups. DSD and other relevant South Australian Government agencies have separately identified the key impacts of the proposed mining project. These impact events have been assessed in detail in Section 7 of this report.

Impacts considered by DSD to be of significance due to the nature, scale and location of the operations include noise, air quality, visual amenity, impacts associated with management of mine waste, impacts to third party property, surface water impacts, public safety and socio-economic impacts. Based on the information provided in the Proposal and subsequent Response Document, DSD considers that the potential impacts of the proposed operations can be managed to an acceptable level, and would be balanced by potential socio-economic benefits created by the project.

The detailed assessment undertaken by the South Australian Government has concluded that the Hillside project can be undertaken in an environmentally responsible manner, with effective mitigation and management strategies available for controlling impacts and ensuring that the project can be undertaken in a manner that is acceptable to, and provides a benefit for, the local, regional and broader South Australian community.

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# 10 Recommendations

The South Australian Government assessment recommends:

1) That in accordance with the requirements of the Act, the Minister for Resources and Energy (or his delegate) considers, on the basis of the Proposal, the results of statutory consultation, the Response Document and the attached assessment, whether or not to grant mining tenements for the proposed Hillside mine.
2) That if a decision is made to grant the mining tenements for which Rex has applied, the body of recommended conditions, terms and clauses identified in the attached Assessment Report and provided in consolidated schedules in Appendix 2, 3 and 4, become legal requirements of those tenements.
3) That in accordance with the requirements of Part 10A of the Act, if mining tenements are granted, Rex are clearly advised that:
    a. no operations may be undertaken until such time as Rex has provided a detailed Program for Environment Protection and Rehabilitation (PEPR) which meets the legal requirements of the Act, Regulations, Ministerial Determinations and addresses all terms, conditions and clauses of the tenements to the satisfaction of, and is formally approved by, the Minister for Mineral Resources and Energy, and
    b. that in preparing the PEPR, Rex will be required to demonstrate ongoing consultation between the company, the local community and government agencies, and that the results of that consultation has informed the proposed approach to mine construction, operation and rehabilitation; and
    c. the Minister for Mineral Resources and Energy will not approve a PEPR for mining operations on exempt land prior to the registration in the Mining Register of the required waivers of exemption.

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# 11 References


Australian and New Zealand Environment and Conservation Council (ANZECC), 2000, Australian and New Zealand Guidelines for Fresh and Marine Water Quality

Australian National Committee on Large Dams (ANCOLD), 2012, Guidelines on Tailings Dams – Planning, Design, Construction, Operation and Closure

Australian Pesticides and Veterinary Medicines Authority, 2012, Australian and Veterinary Chemicals Code Instrument No. 4 (MRL Standard) 2012

Australian Radiation Protection and Nuclear Safety Agency, 2005, Code of practice for radiation protection and radioactive waste management in mining and mineral processing

Department of Environment and Conservation (NSW), 2005, Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales

Department of Manufacture, Innovation, Trade, Resources and Energy, 2012, Ministerial Determination 006 – Minimum information required to be provided in a mining proposal or management plan for a mineral lease (ML) and any associated miscellaneous purposes licence (MPL) applications for metallic and industrial minerals (excluding extractive minerals, coal and uranium)

Department of Planning Transport and Infrastructure (DPTI), 2007, Road Traffic Noise Guidelines, version 3.0

Department of the Premier and Cabinet, 2011, SA Strategic Plan

Deutsches Institut fűr Normung (Germany Standards organisation), 1999, DIN 4150-3:1999 Structural vibration – Effects of vibration on structures

Environment Protection Agency (United States), 2006, National Ambient Air Quality Standards (NAAQS)

Environment Protection Authority (SA), 1994, Environment Protection (Air Quality) Policy

Environment Protection Authority (SA), 2003, Environment Protection (Water Quality) Policy

Environment Protection Authority (SA), 2007, Odour assessment using odour source modelling

Environment Protection Authority (SA), 2012, Bunding and Spill Management Guidelines

Environment Protection Authority (Victoria), 2007, Protocol for Environment Management State Environment Protection Policy (Air Quality Management) Mining and Extractive Industries, publication 1191

Global Acid Rock Drainage (GARD) Guide Version 1 2012, International Network for Acid Prevention (INAP)

JBS&G (VIC & SA) Pty Ltd, 2014, Rex Minerals Ltd Hillside Project Dust Impact Assessment Review

Kevin Rosengren & Associates Pty Ltd, 2014, Hillside Copper-Gold Deposit Geotechnical/Mining Aspects Independent Peer Review

National Environment Protection Council (Environment Australia), 2003, National Environment Protection (Ambient Air Quality) Measure

National Environment Protection Council, 2011, National Environment Protection (Ambient Air Quality) Measure Review Report

National Health and Medical Research Council, 2013, Australian Drinking Water Guidelines 6, version 2.0

O'Kane Consultants Pty Ltd, 2014, Hillside Copper Project - Geochemical Expert Review

Rex Minerals, 2014, 20140224 Investor Presentation February 2014, ASX Release, accessed from http://www.rexminerals.com.au/investor-relations/asx-releases/

Safework Australia, 2013, Workplace exposure standards for airborne contaminants

SLR Consulting Australia Pty Ltd, 2014, Hillside Copper Mine TSF Design Review

# GLOSSARY

## Glossary

| Word/Acronym | Definition |
|---|---|
| 24 – hour average | The average of all values collected (eg. Dust deposition) for each hour of a 24 hour period. |
| ABS | Australian Bureau of Statistics |
| AECOM | Consulting company engaged by Rex. |
| AHD | Australian Height Datum |
| AMD | Acid Mine Drainage |
| ANCOLD | Australian National Committee on Large Dams |
| ANFO | Ammonium nitrate/fuel oil (type of explosive) |
| Annoying noise character | Noises that are impulsive, low frequency, modulating or tonal can be considered to have an annoying character. |
| ANZECC | Australian and New Zealand Environment and Conservation Council. |
| ARI | Average Recurrence Interval – the average or expected value of the period between exceedance of a given rainfall total accumulated over a given duration. |
| ASRIS | Australian Soil Resource Information System – a GIS database of soil information. |
| ATC Williams | Consulting company engaged by Rex. |
| Australian Standards | Publications from Standards Australia, a non-government body that produces and promotes a standardised set of methods, levels and other activities. |
| BAM | Beta Attenuation Monitoring – an air monitoring technique employing the absorption of beta radiation by solid particles extracted from air flow |
| Base metal | A metal which oxidises when heated in air. |

| Word/Acronym | Definition |
|---|---|
| Blast exclusion zone | An area surrounding blasting activities in which impacts to receptors are expected and should be managed for safety reasons. DSD considers the blast exclusion zone to constitute mining activities under the definition in the *Mining Act 1971*. |
| Bq/kg | Becquerel per kilogram – this is a unit of radioactivity expressed as a concentration. |
| Buffer zone | An area surrounding an activity in which impacts are expected. Buffer zones are usually applied by ensuring an adequate area is left between activities and receptors. |
| Caveat | A notice, usually in the form of an entry in a register, to the effect that no action of a certain kind may be taken without first informing the person who gave the notice. |
| CCG | Community Consultative Group |
| Clearance (of native vegetation) | Clearance of native vegetation is defined under the *Native Vegetation Act 1991* as including all of the following:<br>• The killing or destruction of native vegetation<br>• The removal of native vegetation<br>• The severing of branches, limbs, stems or trunks of native vegetation<br>• The burning of native vegetation<br>• Any other substantial damage to native vegetation |
| Closure | A whole of mine life process, (which involves the reduction of assumptions in the closure design/management strategies providing confidence in design) including progressive implementation, which typically culminates in the achievement of agreed environmental outcomes and tenement surrender. The process includes decommissioning and rehabilitation. |
| CNVMP | Construction Noise and Vibration Management Plan – a management plan proposed by Rex. |
| Completion | The goal of mine closure. A completed mine has been rehabilitated to an extent that mining lease ownership can be surrendered and responsibility accepted by the next land user.<br>(Note: The definitions above have been derived from DSD's draft PEPR Guideline). |
| Controlled action | This is a determination made under the EBPC Act on whether a proposed action is likely to have a significant impact on a matter of national environmental significance or the environment of Commonwealth land. |
| COOE | Care of our Environment - Consulting company engaged by Rex |

| Word/Acronym | Definition |
|---|---|
| Council Development Plan Zones | These are zones described in the local council's development plan which describe the main and intended land use of the zone and what activity should occur within the zone. |
| CRMP | Community Relations Management Plan – a management plan proposed by Rex. |
| DA | Development Application |
| DAC | Development Assistance Commission – the committee that assesses development applications |
| dB(A) | A-weighted decibels – This is a unit of sound that is 'weighted' or calibrated to what the human ear can perceive. |
| DEM | Digital Elevation Model – a digital model or 3D representation of a terrain's surface |
| DEWNR | Department of Environment, Water and Natural Resources |
| Director of Mines | The Director of Mines is a statutory position, authorised under the *Mining Act 1971*. |
| DSD | Department of State Development (formerly DMITRE - Department for Manufacturing, Innovation, Trade, Resources and Energy) |
| DoE | The Commonwealth Department of the Environment (formerly known as SEWPaC). |
| DPC | Department of Premier and Cabinet – which includes the function of Aboriginal Affairs and Reconciliation Division. |
| DPTI | Department for Planning, Transport and Infrastructure |
| DSCP | Decant Seepage Collection Pond |
| E-BAM | Environmental Beta Attenuation Monitor - a device which measures and records airborne particulate concentration levels using the principle of beta ray attenuation |
| EC | Electrical Conductivity (measure of salinity) |
| EFA | Ecosystem Function Analysis – a monitoring tool commonly used to demonstrate the effectiveness of mine rehabilitation. |
| EML | Extractive Minerals Lease – a lease authorising the extraction and sale of extractive minerals in accordance with the *Mining Act 1971* and associated legislation. |
| EMS | Environmental Management System |
| EPA | Environment Protection Authority |
| EPBC Act | Environment Protection and Biodiversity Conservation Act ,2000 |
| Exempt Land | Exempt land is defined under the *Mining Act 1971* and includes cultivated fields, land within 400 m of a residence or within 150 m of a building or structure with a value of greater than $200 and used for a commercial purpose. |

| Word/Acronym | Definition |
|---|---|
| Flyrock exclusion zone | See blasting exclusion zone |
| Geological monument | Exposures or outcrops of rocks that provide significant scientific data. |
| GIS | Geographical Information System |
| GL/a | Gigalitres per annum |
| HDPE | High Density Polyethylene |
| Heavy metals | Term used for any metal or metalloid that can cause environmental concern. |
| HiVol TSP monitors | High Volume air quality sampler used to measure total suspended particulates. |
| IWL | Integrated Waste Facility, this refers to an integrated waste rock dump and tailings storage facility. |
| $L_{A90}$ | A-weighted noise level exceeded 90% of the 10 minute measurement period. This descriptor is used to represent background noise level. |
| $L_{Aeq}$ | The equivalent (continuous) noise level is defined as the equivalent steady noise level which, in a given period of time, would contain the same noise energy as the time varying noise during the same time period. |
| LIC | Leading Indicator Criteria – 'early warning' measurement criteria for outcomes where there is a high level of reliance on control strategies to reduce risk to the environment. |
| Measurement Criteria | The manner in which the achievement of the outcome is to be demonstrated. |
| Mining Operations | Mining operations are defined under the *Mining Act 1971* and include construction, operation and rehabilitation of land. |
| Mining Plus | Consulting company engaged by Rex |
| Ministerial Determination MD006 | A legislative requirement outlining the minimum requirements to be included in a mining lease proposal or management plan. |
| ML | Mineral Lease - a lease authorising the extraction and sale of minerals in accordance with the *Mining Act 1971* and associated legislation. This does not include extractive minerals. |
| MLA | Mining Lease Application |
| MLP | Mining Lease Proposal –a documented submitted to support the mining lease application and contains the information outlined in Ministerial Determination 006. |
| MP | Management Plan – a document submitted to support an application for a Miscellaneous Purposes Licence (MPL). |
| MPL | Miscellaneous Purpose Licenses – a licence authorising activities associated with a mining operation authorised under the *Mining Act 1971*. |

| Word/Acronym | Definition |
|---|---|
| MPTRA | Mining Protection Tenement Regulation Area – the area covered by Schedule 20 of the *Development Regulations 2008.* |
| MRL | Maximum Residue Limits – a standard produced by the Commonwealth government detailing the maximum levels of contaminants that can be included in food both for humans and livestock. |
| Mtpa | Mega-tonnes (1,000,000 tonnes) per annum |
| Narungga People | The registered Native Title claimant for the area |
| NEPM | National Environment Protection Measures – a series of standards created by that National Environment Protection Council authorised under the Commonwealth government. |
| Noise EPP | Environment Protection (Noise) Policy 2007 |
| NAF | Non-acid forming waste rock |
| NOTAM | Notice to Airmen – a publication required by Commonwealth law to publish aeronautical information required under legislation or relating to safety that is of temporary relevance. |
| NRM | Natural Resource Management |
| NVMP | Native Vegetation Management Plan – This is a legislative requirement if clearance is required which provides for the provision of a SEB. The NVMP is to be developed in accordance with Guidelines For a Native Vegetation Significant Environmental Benefit Policy For the clearance of native vegetation associated with the minerals and petroleum industry (DWLBC 2005). |
| Outcome | A statement on the likely level of environmental impact from proposed mining operations on a receptor subsequent to control strategies. |
| PAF | Potentially acid forming waste rock |
| Pathway | This is how an impact travels or is transferred from the source of the impact to the receptor. |
| PEL | Pacific Environment Limited – Consulting company engaged by Rex |
| PEPR | Program for Environment Protection and Rehabilitation – the operational approval document required under Part 10A of the *Mining Act* 1971, to be submitted within 12 months of lease grant and prior to commencement of operations. |
| PFS | Pre-Feasibility Study |
| PIRSA | Primary Industries and Resources South Australia |
| PL | Petroleum Licence |
| PM10 | the fraction of particulates in air 10 micrometres or less in aerodynamic diameter |
| PM2.5 | the fraction of particulates in air 2.5 micrometres or less in aerodynamic diameter |

| Word/Acronym | Definition |
|---|---|
| Ppm | Parts per million – measurement of concentration |
| Primary Risk | This refers to the risk of an impact event occurring prior to implementation of control strategies |
| PSA | Primary Study Area – an area used by Rex for the purposes of assessing baseline environmental and socio-economic conditions |
| Real time monitoring | Monitoring where results are received and analysed at the same time as being collected allowing changes to operations to be made quickly to rectify any non-compliance. |
| Receptor | The receptor is the aspect of the environment that will be impacted. Environment is defined under the *Mining Act 1971* and includes public health, safety amenity, built, natural and cultural environment. |
| Regional Development Authority | An initiative of the commonwealth and state governments and local councils with the aim of enhancing regional development. |
| Residual Risk | This refers to the risk of an impact event occurring post implementation of control strategies. |
| Response Document | The Rex document submitted on 3 December 2013 (at the request of DSD) which provides a response to the issues raised during Statutory Consultation. |
| REXPRESS | A community newsletter used by Rex as part of their consultation. |
| ROM | Run of Mine |
| RTNG | Road Traffic Noise Guidelines (produced by DPTI). |
| SAG mill | Semi-autogenous grinding mill – a type of crushing machinery. |
| SAROS | SAROS (Australia) Pty Ltd – consultant commissioned by Rex to assess blasting impacts. |
| Scattered trees | Single native tress with little or no native understory. |
| Schedule 20 | A schedule of the *Development Regulations 2008* which outline areas of significance for the State. The application and submissions made under that application for any proposed mine under the *Mining Act 1971* that falls within this area must be referred to the Minister for Planning. |
| SEB | Significant Environmental Benefit – In order to compensate for the clearance of native vegetation the person clearing the land must replace the immediate environmental value lost and achieve a net gain that improves the condition of the regional environment or biodiversity. Details of how an SEB will be provided are outlined in the NVMP. |
| SED | State Electoral Division |

| Word/Acronym | Definition |
|---|---|
| SEWPaC | The former Federal Government Department of Sustainability, Environment, Water, Population and Communities now known as the Department of Environment. |
| SLC | Sub-Level Caving – a method of underground mining. |
| South Australia's Strategic Plan | This is a publically available document which identifies the overarching principles of the state of South Australia. The seven strategic priorities focus and drive the work of government. |
| Ss | Specific storage – a physical property that characterises the capacity of an aquifer to release groundwater |
| Statutory Consultation | In accordance with Section 35A of the *Mining Act 1971* a lease application must be available for public comment for a period of at least 14 days. The Minister must have regard to any submissions received from this consultation in determining whether to grant or refuse an application and any conditions that apply. |
| Sv/year | Sievert per year - Unit measurement of dose of radiation |
| SWER | Single-Wire Earth Return |
| TCLP | Toxicity Characteristic Leaching Procedure - a soil sample extraction method for chemical analysis employed as an analytical method to simulate leaching through a landfill |
| TDS | Total Dissolved Solids - a measure of the combined content of all inorganic and organic substances contained in water |
| Tenement Review Committee | An internal committee of DSD established to, amongst other things, consider applications for the grant of a tenement and make recommendations on whether a tenement should be granted and (where applicable) what conditions should be incorporated in a tenement offer. |
| TEOM | A type of air quality monitor that measures properties of particulates in the ambient air |
| The Code | Code of Practice and Safety Guide for Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (2005) |
| The Noise Policy | Environment Protection (Noise) Policy 2007 |
| TJ/yr | Terajoules per year – units of electricity use. |
| Trivial | For the purpose of this assessment trivial is defined as an insignificant consequence. |
| TSF | Tailings Storage Facility |
| TSP | Total Suspended Particulates |
| Viewshed analysis | An analysis of what will be visible from a particular location, taking into consideration topography. |

| Word/Acronym | Definition |
|---|---|
| Waiver of Exemption | A document signed by the owner of exempt land allowing a company to mine on exempt land, conditions may be attached to this Waiver. The waiver is submitted to the Mining Registrar and registered. |
| WH&S | Work Health and Safety |
| WRD | Waste Rock Dump |
| WSR | Whyalla Shultz Reserve |
| YPC | Yorke Peninsula Council |
| YPLOG | Yorke Peninsula Land Owners Group |

# APPENDIXES

# Appendixes

## *Appendix 1 Lease Schedules Information Sheet*

### EXPLANATION OF THE TENEMENT DOCUMENT SCHEDULES

**Purpose of a Tenement Document**

Tenement documents are generated when, following a formal application process and detailed assessment by the Department of State Development in accordance with the *Mining Act 1971*, the Minister decides to grant a mining tenement.

Should the Minister choose to grant mining tenements for Rex Minerals (SA) Pty Ltd's proposed Hillside project, tenement documents will be created to inform the tenement holder and the general public, about the specific details of the Hillside tenements.

A tenement document does not set out all of the things that a tenement holder must do; the *Mining Act 1971* (the Act) and the *Mining Regulations 2011* (the Regulations) – along with other relevant legislation – set out the requirements with which tenement holders must comply. A tenement document does, however, provide the specific terms, conditions and clauses for ensuring the acceptable conduct of mining operations on any given mining tenement.

Tenement documents are different for each type of mining tenement (e.g. Mineral Lease, Extractive Minerals Lease, and Miscellaneous Purposes Licence), but share the same components and approach.

**Content and Format of Tenement Documents**

Appendices 2-4 of this document detail the recommended terms, conditions and clauses that have been identified through the assessment of the Hillside projects mining lease proposal and management plan. If a decision is made to grant mining tenements, the content of these appendices will become formal 'Schedules'.

To ensure clarity of the requirements of the Mining Act, the Schedules separate conditions that have historically been provided in two Schedules in tenement documents, into three Schedules.

The First Schedule of terms describe the tenement holder's specific rights, the Second Schedule of conditions imposes specific restrictions, and the Sixth Schedule of clauses sets out the required content to be provided in the Program for Environment Protection and Rehabilitation (PEPR).

If granted, each mining tenement that forms part of the Hillside Project will have a tenement document. The tenement document will be provided in the form of a small booklet, which must be read in entirety, and in the context of the Act and Regulations, in order to understand the complete regulatory obligations imposed by the Minister on the tenement holder.

**Mining Operations and Environment Protection and Rehabilitation**
Amendments to the Act in 2011 introduced in Part 10A, an environment protection and rehabilitation regime that is centred on PEPRs.

Tenement documents reflect this environmental focus in two significant ways. First, the body of a tenement document contains extensive restatements about the PEPR and the process for its approval. Secondly, the types of environmental outcomes, criteria and strategies that need to be addressed in a PEPR are included in the tenement document, particularly in the Sixth Schedule.

The grant of a mining tenement does not authorise the conduct of mining operations. Mining operations cannot commence until the tenement holder has submitted a 'Proposed PEPR' for approval and, following assessment, the Minister has approved the PEPR.

The Minister can only and will only approve a 'Proposed PEPR' if:

- It is consistent with the mining lease proposal;
- It contains all of the information that the Act or Regulations say it must;
- All additional conditions about the PEPR are complied with;
- It addresses strategies and criteria to be adopted to measure environmental outcomes listed in the Sixth Schedule; and
- Access has been authorised to all land relevant for the operations described in the PEPR, in accordance with the Act.

## *Appendix 2 Recommended Lease Schedules – Mineral Lease (ML)*

**FIRST SCHEDULE (ADDITIONAL TERMS) (ML)**
**Authorised Mining Operations**

1. Mining operations authorised by this lease must only be for the recovery of copper, gold and iron ore (magnetite and hematite) and must be consistent with the mining operations described in the mining lease proposal document dated August 2013 and subsequent response document dated 21 February 2014.

**Ore from other tenements**

2. Mining operations authorised by this lease must only be for the recovery of ore from this lease.

**SECOND SCHEDULE (ADDITIONAL CONDITIONS) (ML)**
**Air Quality**

1. The Tenement Holder must ensure that:

   1.1. the total PM 10 dust concentration (including both ambient and mine related dust) leaving the site is less than 50µg/$m^3$ as a 24 hour (midnight to midnight) average of measurements taken at intervals of not more than 10 minutes; or

   1.2. where the total PM 10 dust concentration entering the site exceeds 50µg/$m^3$ as a 24 hour (midnight to midnight) average of measurements taken at intervals of not more than 10 minutes, the total PM10 dust leaving the site does not exceed the measured level entering the site during that period.

2. Subject to **Condition 3** the Tenement Holder must ensure that:

   2.1. the total PM 2.5 dust concentration (including both ambient and mine related dust) leaving the site is less than 25µg/$m^3$ as a 24 hour (midnight to midnight) average of measurements taken at intervals of not more than 10 minutes; or

   2.2. where the total PM 2.5 dust concentration entering the site exceeds 25µg/$m^3$ as a 24 hour (midnight to midnight) average of measurements taken at intervals of not more than 10 minutes, the total PM2.5 dust leaving the site does not exceed the measured level entering the site during that period.

3. **Condition 2** is applicable unless and until the Director of Mines has notified the Tenement Holder in writing that he is satisfied that the Tenement Holder has:

   3.1. demonstrated compliance with Condition 2 for a period of no less than one consecutive year after the commencement of mineral processing; and

   3.2. established that PM10 measurements can be used as a proxy for PM 2.5 measurements.

4. The Tenement Holder must ensure that the Total Dust Deposition (including both ambient and mine related dust) (**"TDD"**) leaving the

site does not exceed 4g/$m^2$/month and the mine contribution of TDD does not exceed the baseline TDD data by greater than 2g/$m^2$/month.

*Note: Baseline TDD data includes any data submitted with the Mining Lease Proposal and any additional baseline data acquired subsequent to the Lease being granted.*

5. The Tenement Holder must ensure that Total Suspended Particulate matter (**"TSP"**) leaving the site does not exceed an average of 120 µg/$m^3$ for a 24 hour period (midnight to midnight) and an average of 90 µg/$m^3$ for any 12 month period.
6. In the event that monitoring shows that Conditions 1, 2, 4 or 5 have been breached, the tenement holder must immediately cease the activity which resulted in the breach.
7. The Tenement Holder must measure chemical and toxicological composition of dust emissions generated by mining operations through an ongoing air monitoring program.
8. The Tenement Holder must undertake (subject to the consent of the owners of land) water quality testing of all rainwater tanks owned by third parties within the Lease and within 4 kilometres of the Lease boundary at least annually. Test results must be reported against the most recent *Australian Drinking Water Guidelines (Australian Government)*, and be provided to the respective owners of the tanks tested within one month of the sampling.
9. The Tenement Holder must ensure that PM2.5 and PM10 dust concentration data and meteorological monitoring data acquired by the Tenement Holder is reported in real time to the public on an unrestricted internet site. The monitoring data must be retained and remain accessible on the unrestricted internet site for the life of the mine.

**Noise**

10. Subject to **Condition 11**, the Tenement Holder must ensure that noise generated from the lease:

    10.1. is measured, for or at, all sensitive receivers in accordance with the *Environment Protection (Noise) Policy 2007;* and

    10.2. does not exceed the following noise limits†, at those sensitive receivers:

        10.2.1. 51 dB(A) between the hours of 7am and 10pm and 44dB(A) between the hours of 10pm and 7am within a Primary Production Zone (as delineated in the Yorke Peninsula Council Development Plan at the time of Lease grant, set out in the Seventh Schedule of this Lease); or

        10.2.2. 51 dB(A) between the hours of 7am and 10pm and 42dB(A) between the hours of 10pm and 7am within a Settlement Zone (as delineated in the Yorke Peninsula Council Development Plan at the time of Lease grant, set out in the Seventh Schedule of this Lease).

† *The noise limits are adjusted in accordance with the relevant environment protection noise policy by the inclusion of a penalty for a characteristic where tonal/modulating/impulsive/low frequency characteristics are present at the sensitive receiver.*

11. The Tenement Holder can only exceed the noise levels stipulated in **Condition 10** if the Director of Mines:

    11.1. is satisfied, on the basis of information provided to him by an acoustic engineer, that the noise from the mining operation will not cause an adverse impact at the sensitive receiver due to the existing influence of ambient noise, or the limited duration and/or frequency of occurrence of the activity; and

    11.2. provides prior approval for the exceedance.

12. The Tenement Holder must monitor noise levels on the Lease on a continuous basis and report that data and meteorological monitoring data acquired by the Tenement Holder in real time to the public on an unrestricted internet site. The monitoring data must be retained and remain accessible on the unrestricted internet site for the life of the mine

13. In the event that monitoring shows that **Condition 10**, subject to **Condition 11**, has been breached, the tenement holder must immediately cease the activity that resulted in the breach.

**Meteorological Monitoring**

14. The Tenement Holder must undertake meteorological monitoring in accordance with relevant Australian standards to measure and record meteorological data including (but not limited to) wind speed and direction, temperature, humidity, atmospheric pressure, solar radiation, rainfall and evaporation.

**Blasting**

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.

16. The Tenement Holder must notify property owners adjacent to and within the area of the Lease, subject to their consent, of all blasts no less than forty eight hours in advance of those blasts.

**Visual Amenity**

17. The Tenement Holder must ensure that any waste temporarily stored on the lease is not visible by any third party from any land based view point.

18. Unless the Director of Mines has approved (in writing) an alternative agreement between the Tenement Holder and a land owner relating to the removal of infrastructure, the Tenement Holder must ensure that all infrastructure is decommissioned and removed from the lease at mine completion.

**Soil and Land Disturbance**

19. The Tenement Holder must, ensure that:

    19.1. there is no contamination of land and soils either on or off site as a result of mining operations; and

    19.2. no contamination of land and soils either on or off site after mine completion occurs as a result of mining operations.

20. The Tenement Holder must ensure that all commercial or industrial waste (which does not include tailings and waste rock) is disposed of in an EPA licensed facility.

21. The Tailings Storage Facility (**"TSF"**) embankment must be designed and constructed using the downstream construction method.

22. The TSF construction and operation must be verified by a suitably qualified independent expert approved by the Director of Mines, against the design and plans that have been adopted for the TSF construction and operation;

    22.1. for the initial stage of TSF construction; and

    22.2. for each subsequent stage of TSF construction including the cover system; and

    22.3. on an annual basis for operations or at a frequency as the Director of Mines may specify by notice in writing.

    22.4. The expert must prepare reports of the findings of the verifications. The initial expert report for construction verification must be provided to the Director of Mines prior to the initial placement of tailings in the TSF and subsequent reports must be provided to the Director of Mines within 1 month of completion of the verification and all reports will be made publically available.

**Surface Water**

23. The separate extraction of NAF and PAF from the mine, and separate placement of NAF and PAF in waste rock dumps must be verified by a suitably qualified independent expert approved by the Director of Mines on a 3 monthly basis, or at a frequency as the Director of Mines may specify by notice in writing. The expert must prepare a report of the findings of the verification and this report must be provided to the Director of Mines within 1 month of completion of the verification.

24. The Tenement Holder must ensure that:

    24.1. mining operations do not cause inundation of third party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing); and

    24.2. inundation of third party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing) after completion of the lease is not caused by mining operations;

unless the Tenement Holder obtains a registered Waiver of Exemption under the Act to undertake mining activities (inclusive of inundation).

25. The Tenement Holder must:

    25.1. ensure no surface water contaminated as a result of mining operations leaves the Lease area; and

    25.2. ensure that, apart from water contained in the pit void:

        25.2.1. no surface water contaminated prior to mine completion remains within the Lease area after mine completion; and

        25.2.2. no contamination of surface water occurs after mine completion as a result of mining operations within the Lease area.

**Groundwater**

26. The Tenement Holder must ensure there is no adverse change to the environmental values of water within the basement fractured rock aquifer outside of the area of the Lease as a result of mining operations.

27. The Tenement Holder must ensure there is no adverse change to the environmental values of the basement fractured rock aquifer within or outside of the area of the Lease as a result of mining operations after mine completion.

28. The Tenement Holder must obtain approval from the Director of Mines in writing before developing any:

    28.1. groundwater cut-off wellfield; or

    28.2. managed aquifer recharge (MAR) program.

**Traffic**

29. The Tenement Holder must ensure all road and intersection upgrades are conducted in accordance with technical standards provided in writing by the Department for Planning Transport and Infrastructure.

**Adjacent Land Use and Third Party Property**

30. The Tenement Holder must ensure that the open pit mining does not extend west of a plane dipping down at 35 degrees to the east from the property boundary of CT 5707/273 – Section 39 and 44, Hundred Plan 131200, south of latitude 6174600N unless the Tenement Holder obtains:

    30.1. ownership of CT 5707/273 or;

    30.2. a registered Waiver of Exemption under the Act to undertake mining activities (inclusive of future geotechnical subsidence) on CT 5707/273.

31. The Tenement Holder must ensure that a caving method of mining is not used below a plane dipping down at 60 degrees to the east from the property boundary of CT 5707/273 – Section 39 and 44, Hundred Plan 131200, south of latitude 6174600N unless the Tenement Holder obtains:

31.1. ownership of CT 5707/273 or;

31.2. a registered Waiver of Exemption under the Act or agreement to undertake mining activities (inclusive of future geotechnical subsidence) on CT 5707/273.

32. The Tenement Holder must ensure any activities undertaken on the road or road reserve are conducted in accordance with any written requirements of the Department for Planning Transport and Infrastructure.

**Additional Information in the Program**

33. In accordance with section 70B(2)(d) of the Act it is a condition of this lease 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 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:

a. an Independent Mining and Blasting Expert (ie: for Blasting operations)
b. an Independent Environmental Geochemist Expert (ie: for PAF material and metalliferous drainage management)
c. an Independent Geotechnical Engineering Expert (ie: for WRD and TSF design and construction methodology)
d. an Independent Mine Waste Cover System Expert (ie: for mine waste cover systems design)
e. an Independent Geomorphology Expert (ie: for Landform design, soil and erosion management)
f. an Independent Hydrology Expert (ie: for Surface water management)
g. an Independent Hydrogeology Expert (ie: for verification of predictive ground water models, ground water management and the extent of ground water mounding underneath the TSF)
h. an Independent Mining Geotechnical Engineering Expert (ie: for stability of final open pit and underground stope voids)
i. an Independent Chemical, Process or Metallurgical Engineering Expert (ie: for tailings densities necessary for timely construction of the TSF cover system upon cessation of tailings deposition)

These reports must include identification of any risks, assumptions and uncertainties associated with the relevant strategies.

33.2. 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.

**Transparency**

34. The Tenement Holder agrees to the approved PEPR and any compliance reports and reportable incident reports, submitted in accordance with the Regulations, being made available for public inspection.

**Notification of cessation of operations**

35. Within 30 days of becoming aware of any event or decision which is likely to give rise to the cessation of mining operations for a period of more than 7 days and prior to the cessation of mining operations, the tenement holder must notify the Director of Mines in writing of the event or decision. The notice must specify the date upon which the mining operations are expected to cease, or have ceased and an estimate of the period of cessation.

**Decommissioning and Rehabilitation Plan**

36. Unless the Director of Mines otherwise directs, a Decommissioning and Rehabilitation Plan ("**DRP**") must be submitted to the Director of Mines for approval within 30 days of any decision or event that is likely to give rise to the permanent cessation of mining operations, and that DRP must:

    a. set out the activities and scheduling required for the carrying out of the rehabilitation works specified in the approved PEPR;

    b. be prepared in accordance with any guidelines provided by the Director of Mines.

37. The Tenement Holder must comply with a DRP approved in accordance with **Condition 36** or **38** when decommissioning or rehabilitating the tenement.

38. If, in the opinion of the Director of Mines, mining operations on the tenement have substantially ceased for 2 years or more, the Director of Mines may:

    38.1. require that the Tenement Holder submits a DRP for approval dealing with the requirements set out in **Condition 36**; and/or

    38.2. direct the Tenement Holder to rehabilitate the tenement in accordance with the approved PEPR and/or any DRP.

**Social Management Plan**

39. The tenement holder must prepare, implement and maintain a Social Management Plan (SMP) within 12 months from the date of the grant of the tenement (in consultation with relevant State Government agencies and key community stakeholders) that addresses:

    39.1. the matters described in Table 8.2-1 of the mining lease proposal; and

    39.2. anything further that the Director of Mines directs in writing.

    The tenement holder must make the SMP publically available.

**Community Engagement**

40. The tenement holder must prepare, implement and maintain (to the satisfaction of the Director of Mines) a Community Engagement Plan (**"CEP"**) that:

    40.1. Sets out the purpose, objectives and parameters of engagement with the Community;

    40.2. Identifies all community stakeholders likely to be affected by mining operations;

    40.3. Sets out the tools and techniques that the tenement holder intends to use for;

        40.3.1. identifying community attitudes and expectations;

        40.3.2. providing information to the community;

        40.3.3. receiving feedback from the community;

        40.3.4. analysing community feedback and considering community concerns or expectations; and

        40.3.5. registering, documenting and responding to communications from members of the community;

    40.4. Outlines an action plan to commence the proposed engagement activities; and

    40.5. Addresses any further matters that the Director of Mines advises in writing.

41. The CEP must be submitted to the Director of Mines for approval within three months of the grant of the Lease.

**Communications Protocol**

42. The Tenement Holder must develop (to the satisfaction of the Director of Mines) a communication and operating protocol between itself and owners of land adjacent to and on the Lease (subject to the agreement of the owners of land) prior to the commencement of mining operations that includes the following matters:

    42.1. Interaction with landholder operations;

    42.2. Emergency procedures;

    42.3. Communications and issue management processes;

    42.4. Land management;

    42.5. Dispute resolution;

    42.6. Ongoing communication about the Tenement Holder's operations;

    42.7. Receiving and considering feedback;

    42.8. Safety procedures;

    42.9. Access protocols; and

    42.10. Any matters identified by the Director of Mines in writing.

43. The Tenement Holder must maintain and adhere to the protocol to the satisfaction of the Director of Mines for the term of the Lease.

**Complaints Register**

44. 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.

45. 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.

46. 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:

    46.1. the time at which the complaint was received;

    46.2. all personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;

    46.3. the subject-matter of the complaint;

    46.4. the action taken by the tenement holder in relation to the complaint, including any follow-up contact with the complainant; and

    46.5. if no action was taken by the tenement holder, the reasons why no action was taken.

47. All records in respect of the public complaints must be maintained for a period of at least 7 years.

48. The tenement holder must make the public complaints register publically available except for the name and contact details of each complainant.

**Notification of Insolvency Events**

49. The Tenement Holder shall notify the Minister immediately after becoming aware of the Tenement Holder being placed into Administration.

**Other Legislation**

50. The Tenement Holder must comply with all State and Commonwealth legislation and regulations applicable to the activities undertaken pursuant to this lease including (but not limited to) the:

    *50.1. Environment Protection and Biodiversity Conservation Act 1999;*

    *50.2. Development Act 1993;*

    *50.3. Dangerous Substances Act 1979;*

    *50.4. National Parks and Wildlife Act 1972;*

*50.5. Marine Parks Act 2007;*

*50.6. Natural Resources Management Act 2004;*

*50.7. Public and Environmental Health Act 1987;*

*50.8. Radiation Protection and Control Act 1982;*

*50.9. Aboriginal Heritage Act 1988;*

*50.10. Heritage Places Act 1993*

*50.11. Work Health and Safety Act 2012;*

*50.12. Environment Protection Act 1993;*

*50.13. Native Vegetation Act 1991;*

*50.14. Mines and Works Inspection Act 1920;*

*50.15. Harbors and Navigation Act 1993; and*

*50.16. Road Traffic Act 1961.*

**SIXTH SCHEDULE (ML)**
**Environmental outcomes and associated criteria and strategies specified in this lease pursuant to Regulation 65 of the *Mining Regulations 2011* (SA),**

**Air Quality Outcomes**
1. The Tenement Holder must, in construction, operation and post completion, ensure that there are no public health and/or public nuisance impacts from air emissions and/or dust generated by mining operations.

2. The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the Lease through:

- clearance;
- dust/contaminant deposition;
- fire;
- reduction in water supply; or
- other damage

unless prior approval under the relevant legislation is obtained.

3. The Tenement Holder must, in construction, operation and post completion, ensure no impacts to agricultural productivity for third party land users on or off the Lease as a result of mining operations, including:

- reduction in crop yield;
- reduction in grain quality; or
- adverse health impacts to livestock

**Air Quality Strategies**
4 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 **Schedule 6 Clause 1**;

4.1 Undertake continuous dust and meteorological monitoring to inform decisions for operational response and contingency measures to be implemented to prevent exceedance of compliance criteria.

4.2 Progressive rehabilitation and stabilisation of disturbed areas undertaken throughout the life of mine to control dust emissions generated by wind erosion.

**Air Quality Criteria**

5. 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 **Schedule 6 Clause 1**;

5.1 Measure PM 10 dust concentration using monitoring methodology that adheres to Australian Standard AS/NZS 3580.9.11, and any future updates or variants to that Standard, and monitoring equipment and instruments that are recognised by a relevant International or Australian Standard.

5.2 Measure TDD using monitoring methodology, equipment and instruments that are recognised by a relevant International or Australian Standard.

5.3 Measure TSP using monitoring equipment and instruments that are recognised by a relevant International or Australian Standard.

5.4 Directional Dust Deposition (including both ambient and mine related dust) (**"DDD"**) is to be measured using monitoring equipment and instruments that are recognised by a relevant International or Australian Standard.

5.5 Measure PM 2.5 dust concentration using monitoring methodology, equipment and instruments that are recognised by a relevant International or Australian Standard.

**Noise Outcome**

6. The Tenement Holder must, in construction and operation, ensure noise emanating from mining operations is in accordance with the current amenity as defined by the Yorke Peninsula Council Development Plan at the time of lease grant.

**Noise Strategies**

7. 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 **Schedule 6 Clause 6**;

7.1 Undertake continuous noise and meteorological monitoring to inform decisions for operational response and contingency measures to be implemented to prevent exceedance of compliance criteria.

**Blasting Outcome**

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

- Public safety;
- Human Comfort;

- Third party property (including stock);
- Adjacent land use;
- Aircraft; or
- Other receptors

from airblast, flyrock and vibration caused by blasting.

**Blasting Strategies**

9. 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 **Schedule 6 Clause 8**;

9.1 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 AS2187.2.

9.2 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;

9.3 Develop 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;

9.4 A blasting protocol and blasting schedule will be developed in consultation with residents of land within and adjoining the Lease to reflect the needs of the neighbouring land use practices (including aerial crop dusting);

10. 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 **Schedule 6 Clause 8**;

10.1 Blasting criteria is set in accordance with the Australian Standard AS2187.2

10.2 Measurements taken to demonstrate achievement of the outcome in **Schedule 6 Clause 8** must be taken in accordance with Australian Standard AS2187.2.

**Visual Amenity Outcomes**

11. The Tenement Holder must, in construction and operating the lease and post completion ensure that the form, contrasting aspects and reflective aspects of mining operations are visually softened to blend in with the surrounding landscape.

12. The Tenement Holder must in construction and operation ensure that there are no public nuisance impacts from light spill generated by mining operations.

**Visual Amenity Strategies**

13. 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 **Schedule 6 Clause 11**;

13.1 Develop and implement strategies in consultation with affected parties for the management of visual amenity which should include (but not limited to):

- Screening of prominent built structures and use of non-reflective, natural coloured materials
- Establishing vegetation and mature trees to screen built infrastructure and minimise views into the mine site
- Positioning and design of permanent mine landforms or other earthen bunds to screen activities
- Sculpture permanent mine landforms to soften the visual impact and reflect surrounding landscape
- Prompt rehabilitation of disturbed areas once no longer required for mining operations, utilising every available opportunity provided by the mine plan
- Rehabilitation of the final batters immediately following the completion of each WRD lift
- Vegetate external faces of permanent mine landforms to reduce the impact of changes in landscape colour.

**Soil and Land Disturbance Outcomes**

14. The Tenement Holder must, in constructing and operating the Lease and post-completion ensure that the existing (pre-mining) soil quality and quantity is maintained.

15. Before completion, the Tenement Holder must satisfy the Director of Mines that where practicable, the pre mining land use can be recommenced after mine completion.

**Soil and Land Disturbance Strategies**

16. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to **Schedule 6 Clauses 14 and 15**;

16.1 Strategies to achieve recovery of topsoil and subsoil from areas to be disturbed by mining operations.

16.2 Strategies for maintaining the quality and quantity of stockpiled soils until such time that it is used for rehabilitation purposes.

16.3 Strategies for reinstatement of these soils so as to maximise the likelihood of achieving the outcomes in **Schedule 6 Clauses 14 and 15**.

16.4 An auditable record of soil movement including recovery, stockpiling and reinstatement.

16.5 Strategies for the establishment of post completion land uses and areas, including the re-establishment of land for agriculture, must be consistent with Section 6.9.3 and 6.9.4 of the Proposal.

16.6 A plan for establishing appropriate legal mechanisms to ensure effective transfer of responsibility for any maintenance of the site and control of any future development post completion.

**Soil and Land Disturbance Criteria**

17. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(d) of the Regulations in relation to impact event **Schedule 6 Clauses 14 and 15**:

17.1 Baseline data to characterise the pre-mining condition of all soils within the ML area.

**Soil and Land Disturbance Outcomes - TSF and WRD**

18. The Tenement Holder must ensure that the WRD and TSF final landforms will be physically stable post mine completion.

19. The Tenement Holder must, in construction, operation and post completion, ensure that water seepage from the TSF, WRD's or ore stockpiles does not result in adverse impacts on adjacent land uses including, but not limited to, growth of native vegetation and cropping land.

**Soil and Land Disturbance Strategies - TSF and WRD**

20. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to **Schedule 2 Conditions 19 (soil) and 25 (surface water),** and **Schedule 6 Clauses 18 and 19;**

20.1 The design, construction, operation and closure of the Tailings Storage Facility must be prepared in accordance with, but not limited to, the most recent ANCOLD guidelines relating to Tailings Dams;

20.2 Specify the minimum freeboard height and maximum supernatant pond dimensions for the Tailings Storage Facility. The maximum dimensions of the supernatant pond must be consistent with the method of sub-aerial deposition of tailings.

20.3 The Tenement Holder must cease deposition of tailings to the TSF if the limits for freeboard height or supernatant pond dimensions specified as a result of **Clause 20.2** are exceeded and report this exceedance to the Director of Mines within 24 hours.

*Note: Freeboard is defined as the difference in height between the level of the supernatant pond and the lowest point of the tailings dam embankment.*

20.4 Strategies for the control of seepage through the TSF base and walls.

20.5 Strategies for achieving and maintaining design tailings discharge densities and tailings consolidation rates to ensure timely construction of the cover system post cessation of tailings deposition.

20.6 Tailings discharge density trigger limits and remedial actions to ensure design densities are achieved.

20.7 Quality control arrangements for all stages of construction of the TSF including supervision by appropriately qualified and experienced persons, documented procedures, quality control testing and record keeping.

20.8 A leak detection program for monitoring seepage through the base of the TSF.

20.9 The design construction and maintenance of mine waste cover systems including, but not limited to, a detailed cover system design, construction methodology, cover system modelling and provision of a program of works for field trials and collection of site specific data to validate/calibrate the model(s).

**Native Vegetation Outcome**

21. The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the lease through;

- Clearance;
- Dust/contaminant deposition;
- Fire;
- Reduction in water supply; or
- Other damage

unless prior approval under the relevant legislation is obtained.

**Native Fauna Outcomes**

22. The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mining operations that could have been reasonably prevented.

**Weeds, Pest and Pathogens Outcome**

23. The Tenement Holder must, in construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Lease area compared to adjoining land.

**Weeds, Pest and Pathogens Criteria**
24. The Tenement Holder is required to address the following matters be addressed for the purposes of Regulation 65(2)(d) of the Regulations in relation to **Schedule 6 Clause 23**;

24.1 Representative baseline data on the presence and abundance of weeds, pests and plant pathogens within the ML area prior to commencement of mine operations.

**Coastal and Marine Outcome**
25. The Tenement Holder must ensure no loss of abundance and diversity of marine flora and fauna from contaminants and dust deposition resulting from mining operations, during operations and post completion.

**Coastal and Marine Strategies**
26. DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome in **Schedule 6 Clause 25**;

26.1 Strategies for this outcome must be consistent with the recommendations for monitoring programs in Appendix 5.11-A of the Mining Lease Proposal.

**Coastal and Marine Measurement Criteria**
27. DSD recommends the following matters be addressed for the purposes of Regulation 65(2)(d) of the Regulations in relation to the outcome in **Schedule 6 Clause 25**;

27.1 Measurement Criteria for this outcome must be consistent with the recommendations for monitoring programs in Appendix 5.11-A of the Mining Lease Proposal.

**Heritage Outcomes**
28. The Tenement Holder must, in constructing and operating the Lease, ensure that there is no disturbance to Aboriginal or European heritage sites, objects or remains unless prior approval under the relevant legislation is obtained.

**Heritage strategies**
29. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to **Schedule 6 Clause 28**:

29.1 An Aboriginal heritage survey to be carried out with the representatives of the Traditional Owners prior to the disturbance of land, to identify and document Aboriginal sites and objects for all land to be disturbed.

**Surface Water Strategies**
30. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to **Schedule 2 Condition 25:**

30.1 Locate the TSF emergency spillway to ensure any overflow reports to the open pit.

30.2 Determine a sulphur cut-off grade for PAF material through further testing for each waste rock unit.

30.3 Block modelling the sulphur distribution of all waste and ore to be mined for the purpose of determining the distribution and estimating the volume of NAF and PAF using the sulphur cut-off grade.

30.4 Integration of the sulphur model with the geological model to provide confidence in the definition of PAF boundaries, potential zones of high neutralising capacity and potential geological controls on mineralisation.

30.5 Procedures for regularly updating the models with new geological and sulphur assay data collected in the course of mine production operations.

30.6 Procedures for ensuring PAF and NAF boundaries derived from the sulphur cut-off and the sulphur block model are included in open pit bench plans.

30.7 Procedures for assaying the sulphur content of drill cuttings, produced during the course of blast hole drilling, for verifying PAF and NAF information plotted on open pit bench plans to provide a final check that all PAF and NAF materials have been correctly identified.

30.8 Procedures and recording systems for selective mining of the identified PAF and NAF materials and separate placement in accordance with the waste rock dump design.

30.9 Construction of waste rock dumps in small lifts using placement methods that prevent the separation and sorting of the larger and smaller particles of the waste rock, with each lift compacted by waste haul trucks,

30.10 Waste rock dumps designed and constructed for the selective placement of the total volume of PAF material with it effectively encapsulated by NAF.

30.11 A program for determining the erodibility of waste rock to ensure that no erodible waste rock is placed immediately underneath subsoil on external batters.

30.12 Waste rock dumps designed to ensure PAF material is not exposed as a result open pit wall failure post completion

30.13 Strategies included in any guidelines provided by the Director of Mines.

31. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to **Schedule 6 Clause 43**:

31.1 No change in surface water flow across third party property that could prevent achievement of the outcome in **Schedule 6 Clause 43** unless otherwise agreed by the affected third party**.**

31.2 A plan for establishing appropriate legal mechanisms to ensure effective transfer of responsibility for any maintenance of the site and control of any future development post completion.

31.3 Progressive landform stabilisation methods and utilisation of energy dissipation where necessary to minimise sediment loads in run-off from disturbed areas and landforms.

**Groundwater strategies**

32. The Tenement Holder must provide a calibrated ground water model in the proposed PEPR.

33. The Tenement Holder must establish a program for the establishment and ongoing calibration of the transient ground water model using data obtained from groundwater monitoring within the PEPR.

34. The Tenement Holder must provide a calibrated transient groundwater model within 1 year from the approval of the PEPR.

35. The Tenement Holder must establish a program for the ongoing calibration of the pit lake geochemistry and hydrogeological models using data obtained from operational monitoring to address any assumptions and uncertainty within the model.

**Groundwater criteria**

36. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(d) of the Regulations in relation to **Schedule 2 Conditions 26 and 27**:

36.1 Establish representative baseline water quality data for the basement fractured rock aquifer underlying the Lease.

36.2 Establish compliance groundwater monitoring bores adjacent to the lease boundaries that are of sufficient density and depth to detect movement of groundwater off the lease.

**Public Safety Outcomes**

37. The Tenement Holder must, in constructing and operating the Lease, ensure that unauthorised entry to the site does not result in public injuries and or deaths that could have been reasonably prevented.

38. The Tenement Holder must in constructing and operating the Lease, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mining operations.

39. The Tenement Holder must demonstrate that post completion, the risks to the health and safety of the public so far as it may be affected by mining operations are as low as reasonably practicable.

**Public Safety Strategies**

40. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to **Schedule 6 Clause 39**:

40.1 Develop strategies to ensure final landform design for the open pit void meets the outcome for protection of public safety post completion and in the long term to address the following potential hazards (but not limited to):

40.1.1 The risk of falling;
40.1.2 The risk of drowning;
40.1.3 The risk of vehicle incidents/accidents; and
40.1.4 Ground instability.

40.2 A plan for establishing appropriate legal mechanisms to ensure effective transfer of responsibility for any maintenance of the site and control of any future development post completion.

**Traffic Outcomes**

41. The Tenement Holder must, in constructing and operating the Lease, ensure that no public impacts offsite are caused by, noise, dust and/or dragout to and from the mine site associated with mine related traffic.

42. The Tenement Holder must, in constructing and operating the Lease, ensure that there are no traffic accidents involving the public at mine access points that could have been reasonably prevented by the Tenement Holder.

**Adjacent Land Use and Third Party Property Outcomes**

43. The Tenement Holder must during construction, operation and post completion ensure that there are no adverse impacts to third party land use on property adjacent to and on the Lease as a result of mining operations, other than those agreed between the Tenement Holder and the affected user.

44. The Tenement Holder must, in construction, operation and post completion, ensure no impacts to agricultural productivity for third party land users on or off the Lease as a result of mining operations, including:

- reduction in crop yield;
- reduction in grain quality; or
- adverse health impacts to livestock.

45. The Tenement Holder must in constructing and operating the Lease, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mining operations.

46. The Tenement Holder must during construction, operation and post completion, ensure that as a result of a geotechnical failure caused by mining:

(i) there are no adverse impacts to land use adjacent to the mineral lease, and

(ii) there is no unauthorised damage to public or private property and infrastructure.

47. The Tenement Holder must in constructing and operating the Lease, ensure that there are no adverse impacts to adjacent land use as a result of light spill caused by mining operations.

**Adjacent Land Use and Third Party Property Strategies**

48. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to **Schedule 6 Clause 47**:

48.1 Develop strategies for the design of waste rock dumps to ensure no impact from shading to agricultural productivity for third party land users on or off the Lease.

49. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to **Schedule 6 Clause 47:**

49.1 Adhere to Standards Australia, 1997, AS 4282-1997 Control of the obtrusive effects of outdoor lighting.

## *Appendix 3 Recommended Lease Schedules – Extractive Mineral Lease*

**FIRST SCHEDULE (ADDITIONAL TERMS) (EML)**
**Authorised Mining Operations**

1. Mining operations authorised by this lease must:
    1.1 only be for the recovery of extractive minerals from stockpiles of excess overburden from the operations associated with the realignment of the Yorke Highway and St Vincent Highway within the Lease; and
    1.2 be consistent with the mining operations described in the mining lease proposal document dated August 2013 and subsequent response document dated 21 February 2014.

**SECOND SCHEDULE (ADDITIONAL CONDITIONS) (EML)**
**Surface Water**

1. The Tenement Holder must ensure that:

    1.1. mining operations do not cause inundation of third party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing); and

    1.2. inundation of third party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing) after completion of the lease is not caused by mining operations;

    unless the Tenement Holder obtains a registered Waiver of Exemption under the Act to undertake mining activities (inclusive of inundation).

2. The Tenement Holder must:

    2.1. ensure no surface water contaminated as a result of mining operations leaves the Lease area; and

    2.2. ensure that, apart from water contained in the pit void:

        2.2.1. no surface water contaminated prior to mine completion remains within the Lease area after mine completion; and

        2.2.2. no contamination of surface water occurs after mine completion as a result of mining operations within the Lease area.

**Transparency**

3. The Tenement Holder agrees to the approved PEPR and any compliance reports and reportable incident reports, submitted in accordance with the Regulations, being made available for public inspection.

**Notification of cessation of operations**

4. Within 30 days of becoming aware of any event or decision which is likely to give rise to the cessation of mining operations for a period of more than 7 days and prior to the cessation of mining operations, the tenement holder must notify the Director of Mines in writing of the event or decision. The notice must specify the date upon which the

mining operations are expected to cease, or have ceased and an estimate of the period of cessation.

**Decommissioning and Rehabilitation Plan**

5. Unless the Director of Mines otherwise directs, a Decommissioning and Rehabilitation Plan ("**DRP**") must be submitted to the Director of Mines for approval within 30 days of any decision or event that is likely to give rise to the permanent cessation of mining operations, and that DRP must:
    a. set out the activities and scheduling required for the carrying out of the rehabilitation works specified in the approved PEPR;
    b. be prepared in accordance with any guidelines provided by the Director of Mines.
6. The Tenement Holder must comply with a DRP approved in accordance with **Condition 5** or **7** when decommissioning or rehabilitating the tenement.
7. If, in the opinion of the Director of Mines, mining operations on the tenement have substantially ceased for 2 years or more, the Director of Mines may:
    7.1. require that the Tenement Holder submits a DRP for approval dealing with the requirements set out in **Condition 5**; and/or
    7.2. direct the Tenement Holder to rehabilitate the tenement in accordance with the approved PEPR and/or any DRP.

**Communications Protocol**

8. The Tenement Holder must develop (to the satisfaction of the Director of Mines) a communication and operating protocol between itself and owners of land adjacent to and on the Lease (subject to the agreement of the owners of land) prior to the commencement of mining operations that includes the following matters:
    8.1. Interaction with landholder operations;
    8.2. Emergency procedures;
    8.3. Communications and issue management processes;
    8.4. Land management;
    8.5. Dispute resolution;
    8.6. Ongoing communication about the Tenement Holder's operations;
    8.7. Receiving and considering feedback;
    8.8. Safety procedures;
    8.9. Access protocols; and
    8.10. Any matters identified by the Director of Mines in writing.
9. The Tenement Holder must maintain and adhere to the protocol to the satisfaction of the Director of Mines for the term of the Lease.

**Complaints Register**

10. 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.
11. 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.
12. 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:
    - 12.1. the time at which the complaint was received;
    - 12.2. all personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
    - 12.3. the subject-matter of the complaint;
    - 12.4. the action taken by the tenement holder in relation to the complaint, including any follow-up contact with the complainant; and
    - 12.5. if no action was taken by the tenement holder, the reasons why no action was taken.
13. All records in respect of the public complaints must be maintained for a period of at least 7 years.
14. The tenement holder must make the public complaints register publically available except for the name and contact details of each complainant.

**Notification of Insolvency Events**

15. The Tenement Holder shall notify the Minister immediately after becoming aware of the Tenement Holder being placed into Administration.

**Other Legislation**

16. The Tenement Holder must comply with all State and Commonwealth legislation and regulations applicable to the activities undertaken pursuant to this lease including (but not limited to) the:
    - *16.1. Environment Protection and Biodiversity Conservation Act 1999;*
    - *16.2. Development Act 1993;*
    - *16.3. Dangerous Substances Act 1979;*
    - *16.4. National Parks and Wildlife Act 1972;*
    - *16.5. Marine Parks Act 2007;*
    - *16.6. Natural Resources Management Act 2004;*

*16.7. Public and Environmental Health Act 1987;*

*16.8. Radiation Protection and Control Act 1982;*

*16.9. Aboriginal Heritage Act 1988;*

*16.10. Heritage Places Act 1993*

*16.11. Work Health and Safety Act 2012;*

*16.12. Environment Protection Act 1993;*

*16.13. Native Vegetation Act 1991*

*16.14. Mines and Works Inspection Act 1920;*

*16.15. Harbors and Navigation Act 1993; and*

*16.16. Road Traffic Act 1961.*

**SIXTH SCHEDULE (EML)**
**Environmental outcomes and associated criteria and strategies specified in this lease pursuant to Regulation 65 of the *Mining Regulations 2011* (SA),**

**Air Quality Outcomes**
1. The Tenement Holder must, in construction, operation and post completion, ensure that there are no public health and/or public nuisance impacts from air emissions and/or dust generated by mining operations.

**Noise Outcome**
2. The Tenement Holder must, in construction and operation, ensure noise emanating from mining operations is in accordance with the current amenity as defined by the Yorke Peninsula Council Development Plan at the time of lease grant.

**Noise Strategies**
3. 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 **Schedule 6 Clause 2**;

3.1 The Tenement Holder must ensure that separation distances between any extractive stockpiles and Pine Point ensure the achievement of the outcome in **Schedule 6 Clause 2**.

**Visual Amenity Outcomes**
4. The Tenement Holder must, in construction and operating the lease and post completion ensure that the form, contrasting aspects and reflective aspects of mining operations are visually softened to blend in with the surrounding landscape.

**Visual Amenity Strategies**
5. 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 **Schedule 6 Clause 4**;

5.1 Develop and implement strategies in consultation with affected parties for the management of visual amenity which should include (but not limited to):

- Screening of prominent built structures and use of non-reflective, natural coloured materials
- Prompt rehabilitation of disturbed areas once no longer required for mining operations, utilising every available opportunity provided by the mine plan

**Soil and Land Disturbance Outcomes**

6. The Tenement Holder must, in constructing and operating the Lease and post-completion ensure that the existing (pre-mining) soil quality and quantity is maintained.

**Native Vegetation Outcome**

7. The Tenement Holder must not clear any native vegetation on the Lease other than in accordance with the realignment of the St Vincent Highway and the realignment of the Yorke Highway.

**Weeds, Pest and Pathogens Outcome**

8. The Tenement Holder must, in construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Lease area compared to adjoining land.

**Heritage Outcomes**

9. The Tenement Holder must, in constructing and operating the Lease, ensure that there is no disturbance to Aboriginal or European heritage sites, objects or remains unless prior approval under the relevant legislation is obtained.

**Heritage strategies**

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 **Schedule 6 Clause 9**:

10.1 An Aboriginal heritage survey to be carried out with the representatives of the Traditional Owners prior to the disturbance of land, to identify and document Aboriginal sites and objects for all land to be disturbed.

**Surface water strategies**

11. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to **Schedule 2 Conditions 1 and 2**:

11.1 No change in surface water flow across third party property that could prevent achievement of the outcome in **Schedule 2 Condition 1** unless otherwise agreed by the affected third party**.**

11.2 Progressive landform stabilisation methods and utilisation of energy dissipation where necessary to minimise sediment loads in run-off from disturbed areas and landforms.

**Public Safety Outcomes**

12. The Tenement Holder must, in constructing and operating the Lease, ensure that unauthorised entry to the site does not result in public injuries and or deaths that could have been reasonably prevented.

13. The Tenement Holder must in constructing and operating the Lease, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mining operations.

**Traffic Outcomes**

14. The Tenement Holder must, in constructing and operating the Lease, ensure that no public impacts offsite are caused by noise, dust and/or dragout to and from the mine site associated with mine related traffic.

15. The Tenement Holder must, in constructing and operating the Lease, ensure that there are no traffic accidents involving the public at mine access points that could have been reasonably prevented by the Tenement Holder.

## *Appendix 4 Recommended Licence Schedules – Power line and Pipelines Miscellaneous Purposes Licence*

**FIRST SCHEDULE (ADDITIONAL TERMS) (MPL)**
**Authorised Mining Operations**

1. The Miscellaneous Purposes Licence (MPL) is granted for the purpose of constructing, operating and maintaining water and concentrate pipelines and a high voltage power line directly related to the conduct of mining operations authorised under mining tenement MLXXXX[1] and must be consistent with the activities described in the miscellaneous purposes licence management plan dated August 2013 and subsequent response document dated 21 February 2014.

Note 1: The ML number to be inserted here will be for the proposed mineral lease.

**SECOND SCHEDULE (ADDITIONAL CONDITIONS) (MPL)**
**Visual Amenity**

1. Unless the Director of Mines has approved (in writing) an alternative agreement between the Tenement Holder and a land owner relating to the removal of infrastructure, the Tenement Holder must ensure that all infrastructure is decommissioned and removed from the licence at mine completion.

**Soil and Land Disturbance**

2. The Tenement Holder must, in constructing and operating the Licence and post-completion ensure that the existing (pre-mining) soil quality and quantity is maintained.

**Weeds**

3. The Tenement Holder must, in construction, operation and post completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Licence area compared to adjoining land.

   Note: Weeds are defined in this condition as any invasive plant that threatens native vegetation in the local area or any species recognised as invasive in South Australia.

**Surface Water**

4. The Tenement Holder must:
   - 4.1. ensure no surface water contaminated as a result of site operations leaves the Licence area; and
   - 4.2. ensure that:
     - 4.2.1. no surface water contaminated prior to mine completion remains within the Licence area after mine completion; and

4.2.2. no contamination of surface water occurs after mine completion as a result of site operations within the Licence area.

**Groundwater**

5. The Tenement Holder must ensure there is no adverse change to the environmental values of the groundwater within the shallow Cainozoic age sediments outside of the area of the Licence as a result of site operations.

6. The Tenement Holder must ensure there is no adverse change to the environmental values of the groundwater within the shallow Cainozoic age sediments within or outside of the area of the Licence after mine completion.

**Adjacent Land Use and Third Party Property**

7. The Tenement Holder must ensure any activities undertaken on the road or road reserve are conducted in accordance with any written requirements of the Department for Planning Transport and Infrastructure.

**Additional Information in the Program**

8. In accordance with section 70B(2)(d) of the Act it is a condition of this lease 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:

   8.1. 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:

      a. an Independent Slurry Pipeline Engineering Expert (ie: for verification of the design of the concentrate slurry pipeline)

      These reports must include identification of any risks, assumptions and uncertainties associated with the relevant strategies.

   8.2. 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.

**Transparency**

9. The Tenement Holder agrees to the approved PEPR and any compliance reports and reportable incident reports, submitted in accordance with the Regulations, being made available for public inspection.

**Notification of cessation of operations**

10. Within 30 days of becoming aware of any event or decision which is likely to give rise to the cessation of mining operations for a period of more than 7 days and prior to the cessation of mining operations, the

tenement holder must notify the Director of Mines in writing of the event or decision. The notice must specify the date upon which the mining operations are expected to cease, or have ceased and an estimate of the period of cessation.

**Decommissioning and Rehabilitation Plan**

11. Unless the Director of Mines otherwise directs, a Decommissioning and Rehabilitation Plan ("**DRP**") must be submitted to the Director of Mines for approval within 30 days of any decision or event that is likely to give rise to the permanent cessation of mining operations, and that DRP must:

    c. set out the activities and scheduling required for the carrying out of the rehabilitation works specified in the approved PEPR;

    d. be prepared in accordance with any guidelines provided by the Director of Mines.

12. The Tenement Holder must comply with a DRP approved in accordance with **Condition 11** or **13** when decommissioning or rehabilitating the tenement.

13. If, in the opinion of the Director of Mines, mining operations on the tenement have substantially ceased for 2 years or more, the Director of Mines may:

    13.1. require that the Tenement Holder submits a DRP for approval dealing with the requirements set out in **Condition 11**; and/or

    13.2. direct the Tenement Holder to rehabilitate the tenement in accordance with the approved PEPR and/or any DRP.

**Community Engagement**

14. The tenement holder must prepare, implement and maintain (to the satisfaction of the Director of Mines) a Community Engagement Plan (**"CEP"**) that:

    14.1. Sets out the purpose, objectives and parameters of engagement with the Community;

    14.2. Identifies all community stakeholders likely to be affected by mining operations;

    14.3. Sets out the tools and techniques that the tenement holder intends to use for;

        14.3.1. identifying community attitudes and expectations;

        14.3.2. providing information to the community;

        14.3.3. receiving feedback from the community;

        14.3.4. analysing community feedback and considering community concerns or expectations; and

        14.3.5. registering, documenting and responding to communications from members of the community;

14.4. Outlines an action plan to commence the proposed engagement activities; and

14.5. Addresses any further matters that the Director of Mines advises in writing.

15. The CEP must be submitted to the Director of Mines for approval within three months of the grant of the Lease.

**Communications Protocol**

16. The Tenement Holder must develop (to the satisfaction of the Director of Mines) a communication and operating protocol between itself and owners of land adjacent to and on the Lease (subject to the agreement of the owners of land) prior to the commencement of mining operations that includes the following matters:

16.1. Interaction with landholder operations;

16.2. Emergency procedures;

16.3. Communications and issue management processes;

16.4. Land management;

16.5. Dispute resolution;

16.6. Ongoing communication about the Tenement Holder's operations;

16.7. Receiving and considering feedback;

16.8. Safety procedures;

16.9. Access protocols; and

16.10. Any matters identified by the Director of Mines in writing.

17. The Tenement Holder must maintain and adhere to the protocol to the satisfaction of the Director of Mines for the term of the Lease.

**Complaints Register**

18. 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.

19. 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.

20. 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:

20.1. the time at which the complaint was received;

20.2. all personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;

20.3. the subject-matter of the complaint;

20.4. the action taken by the tenement holder in relation to the complaint, including any follow-up contact with the complainant; and

20.5. if no action was taken by the tenement holder, the reasons why no action was taken.

21. All records in respect of the public complaints must be maintained for a period of at least 7 years.

22. The tenement holder must make the public complaints register publically available except for the name and contact details of each complainant.

**Notification of Insolvency Events**

23. The Tenement Holder shall notify the Minister immediately after becoming aware of the Tenement Holder being placed into Administration.

**Other Legislation**

24. The Tenement Holder must comply with all State and Commonwealth legislation and regulations applicable to the activities undertaken pursuant to this lease including (but not limited to) the:

*24.1. Environment Protection and Biodiversity Conservation Act 1999;*

*24.2. Development Act 1993;*

*24.3. Dangerous Substances Act 1979;*

*24.4. National Parks and Wildlife Act 1972;*

*24.5. Marine Parks Act 2007;*

*24.6. Natural Resources Management Act 2004;*

*24.7. Public and Environmental Health Act 1987;*

*24.8. Radiation Protection and Control Act 1982;*

*24.9. Aboriginal Heritage Act 1988;*

*24.10. Heritage Places Act 1993*

*24.11. Work Health and Safety Act 2012;*

*24.12. Environment Protection Act 1993;*

24.13. *Native Vegetation Act 1991*

*24.14. Mines and Works Inspection Act 1920;*

*24.15. Harbors and Navigation Act 1993; and*

24.16. *Road Traffic Act 1961.*

**SIXTH SCHEDULE (Power line and Pipelines MPL)**
**Environmental outcomes and associated criteria and strategies specified in this lease pursuant to Regulation 65 of the *Mining Regulations 2011* (SA),**

**Visual Amenity Strategies**
1. 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 Visual Amenity Outcome **Schedule 2 - Condition 1**;

1.1 Develop and implement strategies in consultation with affected parties for the management of visual amenity which should include (but not limited to):

- Prompt rehabilitation of disturbed areas once no longer required for mine related activities

**Soil and Land Disturbance Strategies**
2. 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 Soils Outcome **Schedule 2 - Condition 2**;

2.1 The location and depth below the natural surface of the concentrate and water pipelines must prevent any foreseeable damage due to accidental excavation or surface disturbance.

**Native Vegetation Outcome**

3. The Tenement Holder must, in construction, operation and post completion, ensure no loss of abundance or diversity of native vegetation on or off the Licence through;

- Clearance;
- Dust/contaminant deposition;
- Fire;
- Reduction in water supply, or
- Other damage

unless prior approval under the relevant legislation is obtained.

**Native Fauna Outcomes**
4. The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mine related activities that could have been reasonably prevented.

**Weeds Strategies**
5. 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 Weeds Outcome **Schedule 2 - Condition 3**;

5.1 Representative baseline data on the presence and abundance of weeds, pests and plant pathogens within the MPL area prior to commencement of site operations.

**Heritage Outcomes**

6. The Tenement Holder must, in constructing and operating the Licence, ensure that there is no disturbance to Aboriginal or European heritage sites, objects or remains unless prior approval under the relevant legislation is obtained.

7. The Tenement Holder must, in constructing and operating the Licence, ensure that there is no disturbance to Geological monuments unless prior approval under the relevant legislation is obtained.

**Heritage Strategies**

8. 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 **Schedule 6 Clause 6:**

8.1 An Aboriginal heritage survey to be carried out with the representatives of the Traditional Owners prior to the disturbance of land, to identify and document Aboriginal sites and objects for all land to be disturbed.

**Groundwater Strategies**

9. 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 Groundwater Outcome **Schedule 2 - Condition 5**;

9.1 Design and management strategies are to be provided for pipeline leak detection which includes automation of operational controls for the monitoring and control of all pipelines on the Lease and Licence. This should include (but not limited to):

- Continuous and automatic monitoring of pressures, flow rates and any other parameters for the prompt detection and resolution of abnormal operating conditions in any pipeline or processing plant equipment.
- Continuous and automatic monitoring of process plant functions, including tank levels, flow rates, pressures and fluid quantities;
- The integration of data through a central computer-based control and monitoring system.

**Public Safety Outcomes**

10. The Tenement Holder must, in constructing and operating the Licence, ensure that unauthorised entry to the site does not result in public injuries and or deaths that could have been reasonably prevented.

11. The Tenement Holder must in constructing and operating the Licence, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by site operations.

12. The Tenement Holder must demonstrate that post completion, the risks to the health and safety of the public so far as it may be affected by site operations are as low as reasonably practicable.

**Traffic Outcome**

13. The Tenement Holder must, in constructing and operating the Licence, ensure that there are no traffic accidents involving the public as a result of mine related activities within the Licence area that could have been reasonably prevented by the Tenement Holder.

**Adjacent Land Use and Third Party Property Outcome**

14. The Tenement Holder must in constructing and operating the Licence, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mine related activities.

## *Appendix 5 Technical Report – SLR Consulting Australia Pty Ltd – Tailings storage facility*

26 November 2013
Document: 675.10534.00500-L1

Director Mining Regulation
Mineral Resources Division
Department of Manufacturing, Innovation, Trade, Resources & Energy
GPO Box 1671
Adelaide SA 5001

**ATTENTION : Mr Greg Marshall**

Dear Greg,

**REX MINERALS LTD, HILLSIDE COPPER MINE,**
**YORKE PENINSULA, SOUTH AUSTRALIA**

## 1 Introduction

Following an approach by Nathan Zeman, a Principal Mining Assessments Officer with DMITRE we have been contracted to undertake an independent expert review of geotechnical aspects of the Hillside Copper Project Mining Lease Proposal (MLP). The brief for the review advised that:

Specifically, DMITRE were seeking a review of the integrated waste rock dump (WRD) and TSF design and management plans within the proposal document, and the provision of advice as to:

- The environmental risks associated with proposed construction and operation of the WRD/TSF including post-closure risks.
- Whether the WRD/TSF designs and management strategies are able to achieve proposed environmental outcomes (including closure outcomes).
- If proposed mining designs and management strategies are unlikely to achieve the proposed environmental outcomes, or better outcomes are technically feasible, advise DMITRE on best practice mining strategies and control measures for managing the environmental risks.

We have been provided with a copy of the Rex Minerals Mining Lease Proposal and Management Plan and of the ATC Williams report on the Integrated Waste Management Tailings Storage Facility Pre-Feasibility Design Report which forms Appendix 6.7 – A to the MLP. Section 6.7.2 of the MLP entitled "Tailings Storage Facility" advises that all modelling and design work in regards to the TSF was undertaken by ATC Williams (ATCW) and that the detail included in the MLP had been summarised from their report. Accordingly, our review has concentrated on the ATCW report and this letter offers our comments arising from that review.

During the review we were also alerted to the presence of an independent review of the pre-feasibility design for the TSF for the project undertaken for Rex Minerals by Dr Gary Bentel. A copy was obtained by DMITRE and has also been considered during our review.

# 2 Overview of report

The documentation describes a pre-feasibility phase of design for construction and operation of the TSF which can be reviewed conceptually but which will almost certainly be subject to changes as further data relating to the site are derived during the next phase of investigation and testing leading to a final design.

In a positive sense, the Integrated Waste Disposal (IWL) concept proposed in which the TSF is nested (at least on three sides) into a waste rock dump provides a sound structure which should minimise the possibility of an embankment failure. The downstream construction technique and the use of waste rock from the mine pit involved in the development of the confining embankment will facilitate the building of a structure that should be stable over the long term and provide resistance to overtopping and seepage provided the construction keeps ahead of the rising level of tailings being deposited and the low permeability upstream face is competently constructed. Furthermore, the topography of the site and location of the mine pit downstream of the IWL suggests that any potential discharge of water or tailings (except possibly from the southern embankment) would ultimately flow into the pit which could be very damaging for the mine but is likely to have little impact beyond the lease boundaries. In addition, the geochemical test data included in the current report indicates that the potential for acid generation should be low which also reduces the environmental impact of any discharge or seepage from the TSF and WRD.

As will be discussed further below, the IWL concept as outlined by ATCW appears to be well suited to the site and the project and we see no reason why the project should not proceed to the final design phase. We have concern about the possibility of cracking of the low permeability face of the embankment as a result of settlement of the underlying waste rock and suggest that for the final design the designers should be conservative in ensuring that the width/thickness of the liner is sufficient to accommodate such settlement and incorporate appropriate analyses to validate the design. In addition, we suggest that a drain should be incorporated along the inside toe of the liner to draw down the phreatic surface and hence the potential for seepage in the event of cracking.

Our experience suggests however that the most critical aspect related to the long term success of the operation will be the ability and willingness of the management of the operation to commit the resources required to develop the IWL/TSF as planned ahead of production on a continual basis. The volume of waste rock required for such an embankment increases with time as the height increases as do the related demands for personnel and equipment. Fundamental to the successful performance of the TSF will be a requirement for the mine management to set up a sequence of targets and schedules for construction of the TSF that are to be met by the operators that can be monitored and regulated.

## 2.1 Inconsistencies in the report

There are a number of inconsistencies within the report which suggest that the report is an interim document hastily prepared as the concept has been changing. For example:

- There are inaccurate references to sections on a number of figures including Figures 8.1; 11.1; 11.2; 11.3; 11.4; 11.6 and 11.7.
- In the executive summary (Page i) the final elevation of the TSF embankments is estimated to be RL130 m which is interpreted as equating to an overall average height of 55 m and a maximum height of 65 m. These numbers are replicated in Section 7.2 on Page 21. Then in Section 4.5.1 on Page 11 it is reported that the proposed TSF embankment has a maximum height of 110 m which appears to us to possibly relate to a previous concept.
- In Section 8.1 (Page 24) the authors advise that the height of the WRD is envisaged to be at RL130 m around the TSF. On the other hand, the cross section of the facility on Figure 17.2 indicates that the height of the WRD will be around RL130 m east of the TSF and RL160 m west of the TSF.
- In Section 19.5 (Page 50) the authors refer to the ability to monitor internal water levels within the TSF in the post closure period in **the decant well**. As the decant facility is now shown to consist of a floating decant pump (which would appear to be a more flexible design) we can only surmise that this is a reference to a now superseded design concept for the decant.

- Table 8.1 (P 24) indicates that the TSF embankment slopes are 1:2.7 upstream and 1:3.2 (v:h) downstream whereas the batter slopes are shown on Figure 8.1 as 1:2 upstream and 1:2.5 downstream. It would appear that the data in Table 8.1 might be for the overall slopes including batters and berms and if so would be better labelled as such.

# 3 Design concepts

As outlined in the following sections, there are a number of elements of the design that we believe need to be clarified. Some of these lead to suggestions for modifications to the final design while others pose questions about the fall back options in the event that operational parameters are not met or are changed during operations. These include:

## 3.1 Tailings density

The ATCW report includes an estimate that some 198 million tonnes of ore are to be processed during the life of mine and around 189 Mt of tailings will be produced. The tailings from the plant are to be thickened in High Rate Thickeners to an estimated consistency of 58% solids which after discharge into the TSF will settle to an average density of 1.5 $t/m^3$. At that density these tailings will require a storage volume of 126 $Mm^3$ within the TSF.

Experience suggests that the consistency being achieved in the thickener underflow will very likely be lower than the design value for significant periods. In the circumstances in which virtually the only mechanism for removing excess bound water from the deposited tailings will be by evaporation we believe that the designers could and should address the consequences of not consistently achieving the design density in the TSF.

Being contained within a waste rock dump will minimize the potential for an embankment failure which could threaten the environment and we believe that the major issues related to not achieving the design density within the TSF on discharge will be the scheduling challenges in ensuring that the embankment materials are produced on time and the costs involved in building the TSF and surrounding waste rock dump to higher levels than planned. The cause of lower than planned tailings density will almost certainly arise from the consistency of the tailings produced as underflow from the thickeners which in turn depends primarily upon the ability of the thickeners to achieve the design underflow density with the feed ore derived from the mine and the ability of the plant operators to manage the operations to produce a consistently high density.

Experience has shown that there will be an initial period of up to 18 months for the operation to build up to producing a consistent product and that during that time the thickener underflow pumped to the TSF is unlikely to be consistent and will most likely be at less than the design density. The ability of operations to achieve high and consistent underflow densities relies heavily upon the quality of management applied and is needed throughout the life of mine rather than only during this initial period. This issue is beyond the design process and can only be raised with the mine management and monitored through provisions applied to the mine approval process.

The disadvantages of not achieving the design density in the TSF will include the following:

- Lower density tailings will require an increased storage volume for the same mass of tailings and hence the TSF embankments will need to be built higher than predicted to contain the tailings produced.
- This will require additional volumes of material to construct the TSF embankments and for these materials to be available earlier than currently scheduled as well as adding to the cost of constructing the facility

- The waste rock dump (on three sides of the TSF) will need to be constructed to a higher level consistent with the height of the TSF embankments which will change the scheduling for hauling and dumping the waste rock which could also add to the cost of the operations
- Tailings densities lower than expected will result in longer consolidation times and potentially longer waiting times before work can commence on any planned rehabilitation strategies that involve capping the TSF.
- Even should some of the additional water transported into the TSF with lower density tailings report rapidly to the decant pond (from which it can be pumped), the volume of water bound up in the tailings will be greater and this will take a longer time to consolidate to the ultimate state envisaged by the designers.

Regardless of the density initially achieved in the tailings, any increase in density with time will be slow and this will be exacerbated with lower density tailings in that:

- There will be virtually no base seepage from the TSF and excess water bound up in the tailings will primarily migrate to the surface through desiccation or consolidation.
- The final depth of tailings will be greater than 50 m.
- The rate of rise of tailings discharged into the TSF will be higher than normal (6 m in the first year and averaging 4 m per year over the life of mine (Section 7.2, Page 21)
- Salt water is to be used in the process which will reduce the evaporation rate.

We suggest that at the time of presenting the final design, the owners will need to detail their remedial options and the criteria for initiating them should it become evident that the design densities are not being achieved in a timely manner during operations. The list of remedial options available is large and depending upon the consistency being achieved could range from ceasing operations altogether through to taking no action and accepting the consequences. A normal first step would be to try to improve the thickener underflow densities by modifying the flocculant dosage and/or retaining the tailings longer in the thickener to increase the density. The key to addressing these problems in a timely fashion is to be aware of the remedial options available and to undertake planning prior to commencement of operations so that the means to address the issue and implement the remedy are detailed and available once the extent of the problem is identified.

### 3.2 Integrity of the low permeability embankment facing

The placement of the waste rock forming the TSF embankment is to be carried out by mine personnel and equipment and the compaction applied will be from the traversing by mine trucks bringing in the rock. Settlements must be expected in rock placed in this manner and will continue as the height of the layer continues to increase. Our experience suggests that the reliability of compaction applied by mine truck movements cannot be guaranteed so that the designers will need to be conservative as this will almost certainly lead to long term on going settlement of the rock mass which in turn is likely to result in cracking in the low permeability face liner.

We suggest that the designers will need to ensure that the low permeability facing will be sufficiently thick to accommodate settlement (and differential settlement) as the waste rock settles and the upstream face of the embankment is loaded by rising tailings. Detailed design will need to incorporate appropriate analyses to demonstrate the extent of such settlement. In addition, we suggest that a toe drain should be constructed along the inside of the clay liner with the objective of drawing the phreatic surface down and hence reducing the potential for seepage through any cracking that might develop. The toe drain can be connected to the central blanket drain to conduct any seepage to the Decant and Seepage Collection Pond (DSCP).

### 3.3 Seepage and blanket drains

The base and upstream faces of the TSF have been designed to have low permeability and hence low seepage potential. The embankment profile presented in Figures 8.1 and 11.2 show blanket drains at the downstream toe of each lift which are intended to collect water draining through the waste rock forming the embankment behind the low permeability face. Construction of these drains as illustrated on these figures may be possible on the northern embankment where there is no contiguous WRD and the embankment may be built up in layers, but as ATCW have noted on Figure 8.1, integration of the embankment with the waste rock dump will almost certainly result in no identifiable layers in the profile elsewhere.

We have assumed that these drains are intended to intercept rainwater seeping down through the waste rock to limit any potential for a head of water developing behind the low permeability face lining and to direct the water collected toward the central blanket drain and from there toward the DSCP. Even when the sequence of construction and placement of the waste rock precludes the construction of toe drains as illustrated we suggest that similar drains should be installed under the base of the WRD prior to depositing rock around the area. Directing the seepage thus intercepted to the DSCP will add to the water supply for the process plant and minimise the possibility of building water pressures on to the rear of the embankment lining.

None of the figures illustrating the extent of the different stages of the TSF show the toe drains in evidence on the northern or southern sections of the embankments other than as a brief return around from the eastern embankment (see Figure 11.1). We suggest that the designers should adequately illustrate and justify the extent and purpose of these drains.

The purpose of the central blanket drain across the TSF does not appear to be indicated in the ATCW report. The potential for this drain to provide base drainage for the TSF would be very limited in that the tailings deposited into the TSF would quickly blind the drain and/or cover it with a low permeability cap. As a result, even though the details on Figures 7.1 to 7.4 do not show the blanket drain extending under the western embankment we have concluded that the primary purpose of the drain is to convey water collected in the base/toe drains west of the TSF under the facility and towards the DSCP. One suggestion we would have for this drain would be for it to be sunk into and to finish roughly flush with the surface of the base layer (rather than built proud of the surface of the lining as shown of Figure11.2) in order not to interfere with the flow of tailings discharged into the TSF and to avoid any possible scouring from this initial flow of tailings.

### 3.4 Spillways

The TSF has been fitted with a spillway at the western end of the northern embankment (Figure 7.1) to satisfy regulatory conditions. In the final paragraph of Section 11.4 (Page 34) the authors advise that *"if the spillway does flow, the flood water will report to the DSCP in a relatively short period due to its proximity to the TSF*…". The topographical contours on Figure 7.1 suggest that any discharge from the spillway would most probably flow through the process plant on the way to the DSCP or the open pit unless some form of discharge channel is constructed directing the water to the desired location. We acknowledge that the design is still conceptual, but irrespective of the low likelihood of a discharge through the spillway believe that this would be an essential component of the design. Any such discharge appears likely to be rare but could be violent. As such we suggest that it would be more important to protect the discharge channel against erosion than to line it to prevent seepage.

### 3.5 Decant and seepage collection pond (DSCP)

The ATCW report indicates that the DSCP is intended to be the holding pond for supernatant water pumped from the decant pond on the TSF (to maintain the decant pond to the minimum practical level); intercepted base seepage and rainfall runoff and for any overflow from the TSF spillway. The report on the preliminary water balance analyses suggest that the capacity of the DSCP will be designed to be sufficient to allow for any eventuality. ATCW suggest that the worst case scenario would involve an overflow through the TSF spillway and a spillway with those same dimensions is to be incorporated into the DSCP embankment as a safeguard against any possible overtopping.

The spillway as illustrated on Figure 11.6 exits below the embankment such that any discharge will be almost directly into the open pit. ATCW have evaluated the hazard category of the DSCP as "significant" but the severity of damage and loss from a flood event as "minor". Despite that, a sequence of high rainfall events coupled with a slowdown in production at the concentrator (for example) could result in the spillway flooding and we suggest that even with the remediation costs estimated to be less than $10M (per event?), the disruption to the mine would be unfortunate. Such an event would however be unlikely to have consequences beyond the limits of the open pit and there should be sufficient notice to remove workers to safety before any inflow into the pit. Nevertheless, we suggest that this issue should be very rigorously evaluated during the water balance modelling to be carried out during the next design phase.

ATCW believe that the low permeability of the base and face of the embankment of the DSCP will effectively limit seepage from the facility. We suggest however that any evaluation of the pit wall stability should take into consideration the possibility of water infiltrating into the material downstream of the DSCP embankment (not necessarily from the DSCP) and hence reducing the shear strength of the materials in the pit wall.

# 4 Construction issues

## 4.1 Volume of embankment liner material available

The investigation to date has been of limited extent and as is stated a number of times in the report, a more comprehensive program of investigation and testing will be undertaken to obtain data for the final design. The test pits in the TSF footprint have to date been restricted to the south east quadrant of the facility. The logs indicate that in that area there is a topsoil layer of some 300 mm thickness over an intermittent layer of calcrete varying from some 300 to 800 mm thickness and/or the clayey material that is to be reconditioned to form the low permeability base for the TSF. The authors indicate that the topsoil is to be removed and stockpiled for use in covers for the TSF and/or waste rock dumps during closure, while the calcrete is to be removed and utilised for roadwork or used for acid neutralisation in the rock dumps should that be necessary.

What appears yet to be determined is how this profile may vary across the site of the TSF and the open pit. The presence of and thicknesses of the topsoil and calcrete under the TSF should not be of major concern, but ultimately the thickness of the underlying clayey material over the area of the pit will be very important. This layer will be the source of the material from which the low permeability upstream face lining on both the TSF and DSCP embankments will be constructed. The perimeter of the TSF as shown on the figures in the report is of the order of 7.5 to 8 km long and the volume of material to line the 6 m wide (2.7 m thick) upstream face of a 55 m high TSF (inclined at a slope of 1 vertical to 2 horizontal) will be of the order of 330 $m^3$ per m of perimeter. This would amount to a volume of around 2,500,000 $m^3$ for the TSF liner.

An interpretation of the information provided on Page 5-114 of the MLP indicates that the orebody at Hillside lies beneath soil of thickness varying in depth from zero to >30 m but which average around 10 m thick. The report suggests that the upper 4 m is suitable for rehabilitation and that the material below that will be removed and used in the construction of the TSF. If the layer of pit overburden suitable for constructing the TSF lining averages 6 m as this suggests, an area of around 0.5 $km^2$ will need to be stripped to provide the face lining for the TSF alone (excluding the DSCP embankment). This is a smaller area than will be covered by the final open pit but a considerable volume of this low permeability material will be required prior to the excavation of mineralised ore for the construction of the TSF embankment to a level sufficient to contain the tailings that will be generated once the process plant commences operations. Similarly a significant volume of crushed waste rock will be required for embankment construction before the process plant commences operations. Accordingly, we suggest that scheduling the operations to ensure that the material required to construct both the TSF and DSCP embankments prior to and during operations will be a very important aspect of the final design for the project (MARP?).

The width of the low permeability upstream face layer (liner) is likely to have been set as a practical issue, as properly working this material to meet the desired low permeability requires sufficient width to enable earthmoving equipment to safely place and work the material. However, as indicated earlier, we believe that settlement of the underlying rock may be an important factor in designing the width/thickness of this face layer and suggest that the designers will need to incorporate appropriate analyses to validate the final design.

### 4.2 Construction scheduling

ATCW has acknowledged (Section 13 on Page 36) that the TSF development will be particularly complex and we agree. The construction of the inner low permeability embankment liner – particularly at the rate of rise envisioned in the report will almost certainly require the engagement of a specialist contractor with appropriate earthwork construction experience and suitably sized construction equipment. As the transport and placement of the waste rock for the balance of the embankments and associated waste rock dumps will be carried out by heavy mining equipment, the interaction between these two fleets of equipment and separate workforces operating to different schedules will create complex safety issues. This will be exacerbated by the rate of construction of the embankment during initial operations when the rate of filling of the TSF with tailings is much higher than is usual.

If the rate of production through the concentrator is not to be held up once operations commence it will be of paramount importance to ensure that the level of the TSF embankment is maintained to a level no lower (at any point around the perimeter) than that required to contain the tailings being produced plus the proscribed freeboard heights. In the event that the height of the TSF embankment at any time is not sufficient to receive the tailings being produced, the discharge of tailings into the TSF will need to stop or be reduced to a rate that does not exceed the allowable height of the embankment. As there is no alternative storage facility for the tailings, either of these options would have very significant consequences for the operation.

The volume of material required for an IWL facility is often considerably greater than for a conventional earthen construction and the demands on the mine personnel responsible for producing, transporting and placing the waste rock as well as supplying the low permeability for the contractor constructing the upstream face are significant and continuous. Experience suggests that in many instances the priorities of mining personnel assigned to construction of the TSF are altered to address other needs or crises that arise and that work on the TSF then falls behind schedule. This is a situation that is very difficult to recover from and almost inevitably results in an insufficient storage being available for the tailings being produced by the operation.

The lead time associated with the exercise of ensuring that the large volume of materials needed for construction of an IWL/TSF facility of this size are sourced, transported and where stipulated placed or stored is generally quite long and requires meticulous planning. We therefore suggest that the owners/operators of the mine should pay great attention to setting up and implementing the mine planning and undertaking the associated risk analyses to minimise the inherent risks in “getting it wrong”.

It would be our recommendation that the mine management should be required to set up a sequence of targets and schedules for construction of the TSF that are to be met by the operators and can easily be monitored to determine how the project is progressing in respect to the planned schedule. These may for example consist of a series of drawings showing the stages of construction around the facility needed to store tailings matched against production at regular intervals (say six monthly). Any involved party such as the designers; face liner contractors; TSF operators; review consultants; mine management or regulators will then be able to assess how the construction of the facility is tracking against the planned schedule and/or lease conditions and regulations.

We trust that the designers will be recommending the use of independent third party specialists for supervision and testing of the construction of the IWL/TSF to ensure the integrity of the structure.

## 5 Tailings management

In their Section 7.4, ATCW have estimated that tailings discharged at a solids content of 58% should beach at an average slope of around 1% with 3 spigots operating at any one time and that 12 spigots evenly spaced at approximately 500 m apart could be utilised. The report also suggests that a ring main and spigot system would most likely be required to move periodically to assist in the formation of a uniform beach profile. We trust that this is to be interpreted such that spigots will be spaced considerably closer than 500 m apart and opened and closed as required to simplify the operations and achieve the desired result. With a 1% beach slope, spigots spaced at 500 m would leave a 2 + m difference in tailings level between each spigot and the midpoint between spigots and although we leave such a recommendation to the designers we would prefer to see spigot spacings at more like 100 m intervals to produce a beach with a relatively uniform slope both down and across the beach. The tailings are to be discharged from the south, east and northern embankments in order to drive the decant pond to the western side of the TSF. This will enhance the ability to access the decant pond but will result in water being impounded directly against the western embankment and require that the face is protected against scour due to wave action.

## 6 Closure considerations

ATCW propose (Section 17) that closure of the facility would incorporate a conventional low flux cover system consisting of a waste rock layer covered with top soil and revegetated. We however tend to believe that due to the extended consolidation time likely to be involved and the low shear strength we would expect to be developed at the surface this solution would likely be impractical in any realistic timeframe. As a result, the surface may well have to remain uncapped for some years before vehicular access would be possible. In this situation the deposit may well by necessity be left uncapped and susceptible to wind erosion and dusting into the future unless a cap is installed when it becomes feasible at some later stage. This is an issue that will need to be given a great deal of attention in the final design phase in order to satisfy the regulatory authorities even though advances in closure technology might result in the implementation of a different concept when the operation is to be closed.

## 7 Summation

On the basis of the information available to date we are satisfied that the conceptual IWL TSF design we have reviewed should be appropriate for the Hillside project. Further comprehensive stages of investigation leading to a final design should result in a safe and stable facility with minimal potential for detrimental environmental impact to the site or surroundings.

However, our experience suggests that the most critical aspect related to the long term success of the operation will be the ability and willingness of the management of the operation to commit on a continual basis the resources required to develop the IWL/TSF as planned ahead of production. The volume of waste rock required for such an embankment increases with time as the height increases as do the related demands for personnel and equipment. A key feature of lease conditions for licencing this mine should require the mine management to set up a sequence of targets and schedules for construction of the TSF that are to be met by the operators that can be monitored and regulated.

In respect to the specific brief provided for this review:

- The environmental risks associated with the construction and operation of the TSF would appear to arise mainly in the event that the rate of filling gets ahead of construction and tailings are released into the surroundings. In this situation, the extent of risk posed to the environmental depends upon the point of release and if on the southern side of the facility tailings before the confining waste rock dump is established could flow off the lease with significant consequences. The potential for such an event will depend entirely on the rigour of the owners/operators in developing a risk management system and ensuring that the plans, schedules and procedures are strictly adhered to. During operation, the surface of the tailings will very likely be susceptible to drying out and generating dust which will need to be controlled with (for example) a sprinkler system if one can be deployed.

- The IWL design concept is inherently safe and stable and provided sufficient freeboard is left on the structure at closure to avoid any potential release of water, there should be little environmental concern other than the long term issue from dusting in the event that it proves to be impractical to cap the facility.
- The question as to whether the design and management strategies are able to achieve the proposed environmental outcomes can only be answered once the design is finalised. While we believe that the concepts outlined to date will result in a safe and stable facility we suggest that the designers will need to justify the thickness of the upstream face layer and incorporate an additional drain at the toe of the upstream toe to minimise the possibility of and extent of seepage that could occur in the event of cracking in the face layer due to settlement in the underlying rock dump. We would then expect that the final design should minimise any possible detrimental environmental impact from this operation, but suggest that this will need to be addressed fully when the design is being finalised.

While the IWL concept is not overly complex, the relatively high rates of filling and ultimate height of the facility means that the construction process will be very much more complex than usual. The long term success of the operation will be very dependent upon:

- the owners/operators paying due attention to the design concepts involved and; maintaining high quality on-going management to the whole operation throughout the life of the mine.
- the owners undertaking rigorous planning and scheduling to ensure that the construction operations can be conducted safely and efficiently, and ensuring that the materials required for construction of the TSF are available in a timely manner;

These will best be addressed through the development of a life of mine plan and a detailed risk assessment system during the final design phase.

There are a number of aspects of the design that we suggest should be addressed or clarified during the final design phase. For example, we suggest that:

- the designers should adequately describe the full extent of and justify the mechanism of operation of the toe drains, and in particular how they are to be constructed ahead of or in conjunction with the placement of the surrounding waste rock.
- the purpose of the blanket drain across the TSF should be defined and that if constructed it should be sunk into and to finish roughly flush with the surface of the base layer in order not to interfere with the flow of tailings discharged into the TSF and to avoid any possible scouring from this initial flow of tailings.
- We believe that the designers will need to justify the thickness of the upstream face layer and incorporate an additional drain at the toe of the upstream toe to minimise the possibility of and extent of seepage that could occur in the event of cracking in the face layer due to settlement in the underlying rock dump.
- the means by which any overflow though the TSF spillway is to be conducted to the DSCP needs to be detailed.

The risks associated with constructing and operating the waste facility and the mine will need to be thoroughly re-examined during the final design phase and addressed in the final documentation. In particular:

- the proponents will need to detail their remedial options and the criteria for initiating them should it become evident that the design densities for the tailings in the TSF are not being achieved in a timely manner during operations.
- the designers should undertake a rigorous and detailed risk assessment of the storage capacity of the DSCP and the consequences to the mine in the event of an overflow through the spillway.
- the risk of locating the TSF and particularly the DSCP immediately upstream of the open pit mine, including from overflow through the spillway and from an increase in the in situ moisture content in the pit wall material.

We trust you will find the above in line with your present requirements.

Yours faithfully

**Richard Jewell** FIEAust CPEng

**Dr Gordon McPhail** MIEAust CPEng

For and on behalf of:

SLR Consulting Australia Pty Ltd

18 January 2014
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Director Mining Regulation
Mineral Resources Division
Department of Manufacturing, Innovation, Trade, Resources & Energy
GPO Box 1671
Adelaide SA 5001

**ATTENTION : Mr. Greg Marshall**

Dear Greg,

**REX MINERALS LTD, HILLSIDE COPPER MINE,**
**YORKE PENINSULA, SOUTH AUSTRALIA**

## 1 Introduction

Following on from our reporting (Document: 675.10534.00500-L1) of an independent expert review of geotechnical aspects of the Hillside Copper Project Mining Lease Proposal (MLP) we have been requested to provide an opinion on what are the key design parameters for the Hillside TSF decant pond that should be maintained in order to ensure effective operation and closure of the TSF.

The brief from Nathan Zeman advises that DMITRE is seeking advice in relation to the parameters which should be applied for determining the maximum size of the TSF supernatant / decant pond to ensure that the operation of the TSF is in accordance with the design intent of the proposed sub-aerial deposition method and to ensure base and lateral seepage does not impact on environmental values.

## 2 Overview of the issues

### 2.1 The objective

As outlined in the executive summary of the ATC Williams May 2013 report on the Waste Management Tailings Storage Facility Pre-Feasibility Design Report which forms Appendix 6.7 – A to the MLP, the tailings management within the TSF must be effectively controlled throughout the life of the facility if the design objectives for the volume/mass of tailings storage in the TSF are to be achieved. We understand that DMITRE is seeking to establish criteria that will signal when the decant pond on the TSF is exceeding target areas/volumes in order to be able to condition the Hillside project such that water will be appropriately managed on the TSF and to ensure excess water is not stored on the TSF.

The rate of rise of the tailings deposited into the TSF is faster than normal for the environment at this location. To provide sufficient consolidation and desiccation of the body of tailings to help achieve the desired density in the stored tailings, the design requires that the surface area of the decant pond is kept to a minimum to maximise the area of exposed beaches and hence potential for evaporation.

The TSF design incorporates a floating decant pump designed to draw down the volume of supernatant water reporting to the decant pond from the tailings discharged from the plant and from rainfall collecting on the TSF. This water is to be transferred to the DSCP pond as rapidly as possible. The challenge will be to establish means by which the maximum area/volume of water stored on the TSF can be easily identified such that the appropriate action may be taken by the operators or regulatory authorities to ensure that the extent of the decant pond remains within or is returned to the design limits.

### 2.2 The existing design criteria

Section 15.9 (Page 42) of the ATC Williams report is entitled Decant Pond Water and Sub Section 15.9.1 is headed Expected Maximum Volume. In this section ATC Williams write:

> *It is proposed that the maximum allowable volume of water contained within the TSF be limited by the following:*
>
> - *The pond should (be) no less than 500 m from the upstream (i.e. discharge side) embankment crest (measured perpendicularly at any point along the crest line); and*
> - *An overall pond depth limitation of 5 m above the general profile at the toe (but excluding possible local deeper areas directly beneath the decant location).*
>
> *These limitations have been implemented to maintain overall embankment stability by limiting the proximity of the pond to the embankment crest and to limit the hydraulic head exerted on the Zone 1 low permeability liner.*

These criteria are shown schematically on their Figure 15.1 in terms of two potential beach slopes developing from the discharged tailings (beach slopes estimated for two discharge spigots (average 0.5%) or multiple spigot discharge (average 1.0%)). If these beach slope assumptions are correct, the limiting pond depth criteria will restrict the pond to coming within approximately 660 m from the embankment crest for an average beach slope of 1.0% and will provide a freeboard of some 8.5 m between the decant pond and the crest of the tailings beach (and more to the crest of the TSF embankment). For an average beach slope of 0.5%, the minimum distance of 500 m will become the limiting criteria and will result in a freeboard of some 2.5 m between the decant pond and the crest of the tailings beach (and more to the crest of the TSF embankment).

### 2.3 Observations

Directly monitoring the depth of the decant pond will not be feasible. However considering the thickness of the Zone 1 layer (including the increased thickness of this layer along the western embankment along which the decant pond abuts) we do not believe that the potential for seepage through this layer is high providing that this zone is competently constructed. Additionally, as illustrated on Figure 15.1 permitting the decant pond to come to within 500 m with a 1% average beach slope will only increase the depth of the decant pond by an additional 1.5 m.

Nevertheless, we suggest that both of the criteria listed by ATC Williams should be adopted for the process of monitoring the performance of the operation of the TSF, along with measurements of the beach slope. In the event that the beach slope developing in the field is not reaching an average 0.5% we suggest that another criterion should be introduced to ensure that a nominal minimum freeboard should be maintained at all times. ATC Williams have introduced a minimum freeboard of 2.5 m and we suggest that this would be an appropriate value to adopt.

We now have three criteria to consider; a) distance from embankment to decant pond; b) depth of decant pond and c) minimum freeboard.

- Maintaining a minimum distance from embankment to decant pond is intended to maximise the area of exposed beach in order to assist achieving the design density in the deposited tailings and ultimately expedite closure operations. However, allowing the

decant pond closer to the embankment is unlikely to be detrimental to the environment in the short term.

- Providing the Zone 1 low permeability liner is constructed to specification, a decant pond deeper than 5 m should not lead to seepage through the liner in the short term. In any event, should any seepage penetrate the liner it would be intercepted by the external toe drains and be directed towards the DSCP. Hence seepage is unlikely to be of major concern to the environment in the short term and in any event the depth of the decant pond cannot be monitored directly.
- The prime threat to the environment in the short term would be if the embankment was to be breached by overtopping. To minimise that possibility, we have suggested that at no point around the TSF embankments should the freeboard above the level of the decant pond be less than 2.5 m during operations. This measurement should be to the crest of the Zone 1 (low permeability) material forming the face of the embankments which will carry the ring main delivering tailings to the spigots and which we suggest will almost always be lower than the supporting rock zones.

  This freeboard is intended to contain any wave action and with a fetch along the length of the TSF of upwards of 2 km, the northern and southern embankments would be most at risk under adverse conditions.

From this assessment, we believe that maintaining the decant pond a minimum distance of 500 m from the embankment and maintaining a minimum freeboard of 2.5 m provides parameters which are easy to monitor and simple to regulate. Together, these should ensure that the design criteria can be met and that any threat to the environment is minimised.

A spillway has been included in the design of the TSF to direct any excess water accumulating on the TSF towards the DSCP. However, we do not believe that it will be practical to maintain a spillway during construction and suggest that the spillway will only be built into the embankment at its final height and operate after closure. As a result it will be important to maintain sufficient freeboard at all times during operations to store any excess water on the TSF until the decant pump can draw the volume down by transferring the water to the DSCP.

The ATC Williams report indicates that the water balance calculations are to be updated once the final design parameters have been obtained and additional more sophisticated modelling undertaken. We suggest that the actual numbers relating to minimum freeboard and the minimum distance of the decant pond to the embankment walls should be reviewed at that time, but that the parameters used to monitor the operations will remain the same.

## 3 Decant and seepage collection pond (DSCP)

The DSCP has been designed on the basis of the parameters obtained from the water balance modelling. ATC Williams Figure 11.5 indicates that minimum extreme storm storage level in the DSCP (RL 53.2 m) has been based upon a 1 in 100 year, 72 hour storm with which we agree. Nevertheless, from our experience the size of the facility appears to be small and as drawing down the volume on the TSF decant pond will depend upon volume being available in the DSCP, we believe it desirable to introduce a comment in this letter.

In the event that the DSCP has insufficient volume to accept all of the excess water from the TSF, the excess water (up to a given capacity) will need to be stored on the TSF OR the DSCP will be allowed overflow into the mine. At some stage it could be necessary to either stop production from the plant to avoid depositing additional water into the TSF with the tailings and/or accept shutting down the mine due to flooding.

We believe that in order to deal with this, the criteria relating to the distance from the decant pond to the embankment should be treated as a warning that the pond is getting too large such that action needs to be taken to limit the stored water. However, the minimum freeboard of 2.5 m should be taken as a "not to be exceeded" criteria and that some larger freeboard should be introduced as the point at which a first warning should be issued. This limit would best be determined after observing operations, but a value of say 3.0 m could well be introduced at the beginning.

## 4 Summation

In our opinion, the key design parameter for the effective operation and closure of the TSF is the density achieved in the deposited tailings throughout operations. If lower densities develop due for example to lower density slurries in the underflow from the plant discharged into the TSF or lower evaporation from exposed tailings beaches, then the mass of tailings to be stored will require a greater capacity in the TSF and closure operations will very likely be delayed.

We then suggest that assuming that the tailings discharged into the TSF achieve the density assumed by the designers then there are three criteria that can be applied to assess whether the tailings in the TSF decant pond are likely to achieve the design density. These are: a) distance from embankment to decant pond; b) depth of decant pond and c) minimum freeboard. The first two of these have been taken directly from the report by ATC Williams and the third directly from their data.

Of these, we believe that the horizontal distance between the decant pond and the embankment and the freeboard between the decant pond and the crest of the low permeability embankment are the most important and furthermore can readily be measured and monitored.

We believe that maintaining the decant pond a minimum distance of 500 m from the embankment is highly desirable and should be treated as a parameter which cannot be encroached upon without incurring a warning that the decant pond needs to be drawn down. On the other hand, a minimum freeboard of 2.5 m should be taken as a "not to be exceeded" criteria while some larger freeboard (say 3.0 m) could be introduced as the point at which a first warning should be issued.

In essence, we believe that base or lateral seepage from the TSF should not be of concern provided that the low permeability zone of the embankment is constructed as designed and also that the stability of a clay faced rock embankment should not be an issue. However, overtopping of the embankment would be highly undesirable and the minimum freeboard criterion has been introduced to minimise that possibility.

Importantly, it should be noted that attaining the objectives for this operation will be very dependent upon the plant being operated to produce tailings for discharge into the TSF at the density assumed by the designers and the TSF embankments being constructed as designed. The parameters utilised for this design are to be updated following further investigations and the design revisited before being finalised and we recommend that this work also be revisited at the appropriate time.

Yours faithfully

**Richard Jewell** FIEAust CPEng

**Dr Gordon McPhail** MIEAust CPEng

For and on behalf of:

SLR Consulting Australia Pty Ltd

9 March 2014
Document: 675.10534.00500-L3

Director Mining Regulation
Mineral Resources Division
Department of Manufacturing, Innovation, Trade, Resources & Energy
GPO Box 1671
Adelaide SA 5001

**ATTENTION : Mr. Greg Marshall**

Dear Greg,

**REX MINERALS LTD, HILLSIDE COPPER MINE,**
**YORKE PENINSULA, SOUTH AUSTRALIA**

## 1 Introduction

Following on from our reporting (Document: 675.10534.00500-L1) of an independent expert review of geotechnical aspects of the Hillside Copper Project Mining Lease Proposal (MLP) we have been requested to respond to a question regarding the risk associated with dust being generated from the TSF. The possibility of dust generation was raised in our report as a possibility both in the short term during operations as well as after operation ceased and before capping of the facility.

The email from Carla Barbaro initiating the request indicated that your technical consultant was of the opinion that "*given the high salinities within the tailings storage facilities that the tailings would likely form a crust which will then reduce the chance of dust being propagated form (sic) the surface*". I was provided with the relevant section of the risk assessment provided by Rex and asked to "*confirm whether I considered the conclusion that the anticipated crusting of the TSF surface is likely and an adequate representation of how tailings (based upon a similar composition to that which is anticipated at Hillside) react based upon your (my) experience with other tailings facilities*".

## 2 Overview of the issues

We acknowledge that the salt water used in the process will under normal circumstances bring salt to the surface along with pore water under suction generated by evaporation process and that this will inhibit the extent of evaporation from both wet and dry beaches and in addition form a salt crust when the surface is "dry". In Section 15.3 (Page 38) of their design report ATC Williams have assumed that the area of wet beach will remain constant at approximately 8% of the total exposed beach throughout operations. The wet beach was defined as the portion of the newly deposited tailings beach that is wet immediately after deposition has taken place and dusting will not develop from this surface.

From our experience there is some potential for dusting to occur from these dry beaches under adverse weather conditions such as strong hot winds. Rex appear to agree, and in the 4$^{th}$ dot point under "During Operations" under the main heading entitled "Dust generation from Tailings Surface Risk Assessment", of their response they outline a strategy of installing wind breaks on the embankment crest or installing and operating dust suppression irrigation systems during unfavourable times when excessive dust is likely to be generated. This of course could be exacerbated at any time if operations are interrupted and the surface dries out for any extended period as will occur once the TSF is full.

Once operations cease and there will no longer be wetting of the surface from deposited tailings, the surface will dry out and will be susceptible to dusting under unfavourable conditions. This is also addressed in the Rex response under “Closure Controls and Management” in which they outline the same strategy to control the dust generated as during operations.

A major factor in the potential for dusting to occur is therefore the length of time that dry tailings surfaces are exposed to the weather before being either covered by the next layer of tailings during operations or capped after closure. After closure, the surface will be left open to the elements until capping and rehabilitation is effected which will be after vehicular access to the surface becomes feasible. A salt crust will form, but will be broken down and swept away by rainfall and with an average rainfall of 345 mm/year this will be considerably more likely than in the more arid interior of Australia with which we have more experience for salty tailings.

With a north – south fetch of more than two kilometres, a strong hot wind is very likely to generate dust even from a salt encrusted surface and this will be enhanced if the crust has been diminished by rain. We are not suggesting that this is certain to occur but merely indicating that from our experience dusting can develop and if so it would have an environmental impact and this has to be taken into consideration by the mine operators.

The designers indicate that they expect the tailings to consolidate rapidly after closure and for capping to be possible quite quickly after closure. This does however depend upon the consistency of the tailings deposited in the TSF reaching or exceeding a solids content of 55% (thickener underflow solids) throughout the operation of the plant. In our report, we indicated that there are a number of reasons as to why lower than planned tailings densities could develop and that this is more likely to occur during the initial 18 months of operation with the result that lower than design densities will develop in the lower levels of the deposit which will affect the rate of consolidation through the full depth of the deposit and ultimately extend the delay before capping can commence after closure.

Our concerns in this regard have been reinforced by recent experiences with mining operations in South Australia and we would urge DMITRE to question the likelihood that the plant will consistently produce the designed underflow thickener solids contents throughout operations and to develop means by which they can monitor deposition into the TSF and ensure that remedial actions can be initiated in a timely manner should they become necessary. Neither of the amelioration techniques proposed (installing wind breaks on the embankment crest or installing and operating dust suppression irrigation systems on the surface of the exposed tailings) can be implemented quickly without pre-planning should dusting become an issue at any time.

## 3 Conclusion

Ultimately, we believe that dusting could become an issue from this TSF, particularly during any protracted period of inactive deposition and if the time between closure and capping is extended. The potential for dusting will be reduced but not eliminated due to the salt water being used by the process and included in the deposited tailings.

Yours faithfully

**Richard Jewell** FIEAust CPEng

**Dr Gordon McPhail** MIEAust CPEng

For and on behalf of:

SLR Consulting Australia Pty Ltd

# *Appendix 6 Technical Report – O'Kane Consultants Pty Ltd – Geochemistry*

# Hillside Copper project

# Mining Lease proposal –

# Review of Geochemical Risks

*Report No. 912-1-01*

**Prepared for:**

SOUTH AUSTRALIA

Government of South Australia
Department for Manufacturing, Innovation, Trade, Resources and Energy

**Prepared by:**

O'Kane Consultants Pty Ltd
*Integrated Geotechnical Engineering Services*
*Specialists in Unsaturated Zone Hydrology*

**April 2014**

## EXECUTIVE SUMMARY

The Hillside copper-gold deposit is a sulfide deposit is proposed to be mined by open cut and underground operation and processed generating a large waste rock storage facility to contain 900Mt of waste rock and large tailings storage facility to accommodate 300Mt of process tailings. The geology of the deposit has been thoroughly studied by Rex Geologists and geological consultants working on the project. They have identified 14 major waste rock lithologies that formed the focus of sampling and testing for acid forming capacity and metal ion concentrations that may mobilise through leaching. The geology is complex due to faulting and folding and intrusion. This is likely to make it difficult to distinguish specific waste rock types during mining for distinguishing and selective handling of PAF material. It will be important to separate out specific waste types for construction materials such as non-erosive material for erosion protection, drainage design and foundation; compactable clayey material for construction of low permeable material.

The geochemical risks associated with proposed construction and operation of the Hillside Copper Project including post-closure risks are largely associated with the exposure of reactive mine waste materials i.e. waste rock and tailings containing sulfide minerals principally pyrite and chalcopyrite plus other metal sulfides and actual and potential release of metals, sulfate and acidity or acid, sulfate salinity and metalliferous drainage (AMD).

Two sets of mine waste characterisation data were reviewed for both waste rock and tailings:

Waste Rock

- Mining Plus on behalf of Rex collected 182 representative samples of different waste rock lithologies and analysed for acid forming capacity.
- Rex (at the request of DMITRE) generated a sulfur model of the proposed waste based on 187,390 samples.

Tailings

- AMEC on behalf of Rex constructed and tested 1 Pilot Test sample derived from samples from 13 drill holes representative of the ore
- Rex (at the request of DMITRE) generated a sulfur model of the proposed ore based on 13,405 samples.

The 14 major waste rock lithologies identified by Rex formed the focus of sampling and testing for acid forming capacity and metal ion concentrations that may mobilise through leaching. A limited number of waste rock samples (182) and Pilot Testing of representative tailings material was undertaken. The acid base accounting (ABA) testwork indicated that there is a significant concentration of acid neutralisation in the material tested.

A comprehensive sampling program for drill holes has been undertaken by Rex that has generated a drillhole database comprising 202,106 samples tested for total sulfur and metals, made up of 175,792 waste rock samples with Cu <0.2% and 26,314 samples of ore (tailings) with Cu >0.2%. Rule of thumb suggests that material with a sulfur concentration <0.1%S is unlikely to generate acid drainage and is likely to be suitable for encapsulating waste material classed from the sulfur block modelling as PAF (ie S concentration >0.1%). Block modelling of the waste rock sulfur concentration undertaken by Rex indicates that 76% of the waste rock has a sulfur concentration <0.1% and is can be classed as non-acid forming waste and 24% of waste mass has a sulfur concentration >0.1% and is classed PAF waste. Table ES-1 summarises the output from the block modelling. It shows in this instance that the ratio of non-acid forming waste (NAF) to PAF is high for 0.1%S cutoff as well as 0.2%S cutoff.

For distinguishing PAF material it is recommended that a sulfur model (similar to that provided by Rex for this review) for the deposit is constructed for life of mine and used for identifying PAF material. The sulfur % cutoff must be validated by further testing of the range of sulfur concentrations defined by the drillhole database using sulfide sulfur analysis (CRS) versus NAG to pH 4.5, 7 and 10 to define PAF, NAF and mineralised NAF.

Using the block model the waste mining schedule can then be generated for the life of mine to allow a waste rock dump to be designed and constructed to contain and encapsulate the PAF waste.

Table ES-1: tonnages and volumes of PAF and NAF waste based on Rex Sulfur model

| Description | Volume | Tonnage | % of total waste |
|---|---|---|---|
| NAF waste < 0.1%S | 368,112,196 | 933,173,168 | 76% |
| PAF waste >0.1%S | 107,648,855 | 300,179,214 | 24% |
| NAF waste < 0.2%S | 416,125,914 | 1,066,027,244 | 86% |
| PAF waste >0.2%S | 59,635,136 | 167,325,138 | 14% |

No waste rock dump design and final cover conceptual design was provided for review. This will need to be done prior to mine commencement and regularly updated during mining to ensure correct placement of waste materials.

It is recommended that the waste rock dump design and the final dump landform is re-examined in respect to the sulfur block modelling and increase in PAF volumes.

The sulfur block modelling suggests that the final landform design provided by Rex needs to be reviewed and modified to consider management of the larger PAF waste volume

determined by the Sulfur block modelling. OKC recommend that the following key actions need to be implemented for effective waste rock management.

- Re-examine the waste rock dump design in respect to the substantial sulfur database, and construct the sulfur waste block modelling and increase in PAF volumes and a life of mine waste mining schedule is constructed.
- Integrate the substantial sulfur dataset compiled in the drillhole database for the waste and ore with the ABA data for individual waste rock types, alteration mineralogy and the geological model for the ore and host rocks to characterise the sulfur distribution across the proposed pit area and hence the potential mining waste (waste rock and tailings).
- Undertake further testing to justify a sulfur cut-off grade including comparative analysis of NAG for pH 4.5, 7 and 10 versus sulfide sulfur analysis (CRS), for each waste rock unit for the range of sulfur concentrations identified in the drillhole database.
- Integrate the substantial sulfur dataset compiled for the waste into the mine planning and ore and waste scheduling.
- Undertake the waste block modelling using sulfur to determine the distribution and volume/tonnage of NAF and PAF waste using a sulfur cut-off for waste is used using the defined sulfur cut-of e.g. >0.1%S for PAF and <0.1%S for NAF (or as defined by dot point 2 and 3 above).
- Integrate the sulfur model with the geological model to identify potential for acid neutralising capacity, as calculated by the lithology ABA work (Part 1), and where possible lithology/sulfur concentration relationships.
- Compile a dump design based on sulfur concentration is generated using the schedule and waste volumes generated from the sulfur block model requiring selective placement of PAF waste, and correct construction of NAF encapsulation to minimise net percolation through life of mine and post closure.
- Selectively mine and encapsulate PAF waste by NAF with no PAF placed beneath batter slopes and intermediate truck compacted surfaces constructed for every lift of the waste dump.
- During mining Rex will construct the daily bench plans with the PAF and NAF waste layout marked for field mapping/checking/sampling to ensure correct identification of PAF and NAF waste for selective mining.
- Reconcile the geological model and the waste rock block model regularly through the life of mine to ensure correct placement of PAF and NAF waste.

Detailed metallurgical testing has been undertaken on Pilot testing of ore and associated tailings. The information supplied by Rex consultants AMEC to DMITRE indicate that the sample tested was derived from 13 drill holes selected to generate a representative sample material of ore and associated tailings for the Pilot testing program. In addition to the Pilot study sample a large dataset including exists comprising 26,314 samples of ore was reviewed. These data provide a comprehensive assessment of ore composition variability and need to be analysed by Rex to understand the variability of tailings composition over time.

Based on the information supplied and summarised above the mining waste geochemistry (tailings, waste rock and final void pit lake) will be manageable.

A cover design has been proposed for the tailings storage facility which includes a low permeability layer, protective layer and topsoil typical of a generalized store and release cover. It will be necessary for the cover system to be modelled and regularly reviewed through the life of the mine to ensure that will be effective during and post mine closure. A similar process for covering the waste rock storages to that proposed for the tailings storage facility is recommended.

The water quality of the final void pit lake post mining was modelled by Rex using Geochimica, Inc as their consultant. It is Geochimica's opinion that in this environment and with this degree of evaporative concentration, the pit lake will be well-mixed. The modelled water quality for time slots of Years' 80, 320, 450 and 1200 is summarised in Table ES-2.

Because trace metals are generally low in the native, pre-mining groundwater, the principal source of such potential solutes in the final pit will be oxidation and reaction in the pit walls, subsequently dissolved and delivered to the pit lake by flow across the pit walls.

The area of pit wall available for reaction and contributing mass to the lake declines with time, as the pit walls are inundated during filling. By Stage 4 of the pit filling, there is only a small rind of pit-wall rock remaining. Consequently, the contribution of mass form the pit walls must be small and that is what the modeling shows.

There are two possible physical states for the pit lake:

- It may become a well-mixed reservoir, due to (a) the passive effects of high- density water (the result of evapo-concentraton) sinking through earlier, lower- density water; (b) energetic mixing due to the effects of solar radiation and wind moving across the lake surface.
- The waters could remain stratified, effectively by the stages of filling.

If the pit behaves in a stratified manner, then the time series expected for pit-lake chemistry is that shown in Table ES-2. It is Geochimica's opinion that in this environment and with this degree of evaporative concentration, the pit lake will be well-mixed.

The pit-lake water reaches the chlorinity typical of Sea Water sometime between 80 and 320 years, but remains in the vicinity of Sea-Water chlorinity for several hundred years, rising to the stead-state system value only after about 500 years. Such water would not be potable, to animals or birds, and so even the low predicted levels of metals are unlikely to be available to ecological receptors.

Table ES-2: Step-Wise Geochemical Models for a Well-Mixed Reservoir, with Evaporation and Equilibration

| Mixed by Stress Stage | | | | | | |
|---|---|---|---|---|---|---|
| **Analyte** | **Unit** | **Year 80** | **Year 320** | **Year 450** | **Year 1200** | **Sea Water** |
| **Cations** | | | | | | |
| Na + | mg/L | 8,080 | 12,012 | 12,615 | 16,929 | 11,000 |
| K + | mg/L | 146 | 218 | 229 | 306 | 560 |
| Ca 2+ | mg/L | 547 | 802 | 841 | 1121 | 600 |
| Mg 2+ | mg/L | 1,120 | 1,666 | 1,751 | 2,342 | 1,300 |
| Fe 2+ | mg/L | 0.004 | 0.004 | 0.0043 | 0.0042 | 1.4 |
| Mn 2+ | mg/L | 0.001 | 0.001 | 0.001 | 0.001 | <0.025 |
| Cu 2+ | mg/L | 0.032 | 0.046 | 0.044 | 0.05 | <0.005 |
| Zn 2+ | mg/L | 0.1 | 0.077 | 0.063 | 0.054 | 0.018 |
| Ni 2+ | mg/L | 0.015 | 0.02 | 0.02 | 0.025 | <0.006 |
| Ba 2+ | mg/L | 0.039 | 0.046 | 0.047 | 0.056 | <0.1 |
| Cd 2+ | mg/L | 0.0013 | 0.0012 | 0.001 | 0.001 | <0.001 |
| Co 2+ | mg/L | 0.011 | 0.015 | 0.015 | 0.02 | <0.005 |
| Pb 2+ | mg/L | 0.038 | 0.03 | 0.025 | 0.023 | <0.005 |
| Be 2+ | mg/L | 0.0018 | 0.003 | 0.003 | 0.004 | <0.005 |
| U | mg/L | 0.095 | 0.141 | 0.148 | 0.199 | <0.025 |
| **Anions** | | | | | | |
| HCO3 - | mg/L | 40 | 41 | 41 | 42 | 120 |
| CO3 2- | mg/L | 210 | 180 | 178 | 169 | |
| Cl - | mg/L | 16,200 | 24,100 | 25,282 | 33,849 | 22,000 |
| SO4 2- | mg/L | 880 | 1296 | 1358 | 1811 | 1,100 |
| HPO4 2- | mg/L | 0.08 | 0.117 | 0.123 | 0.164 | <0.05 |
| As(OH)4 - | mg/L | 0.008 | 0.01 | 0.011 | 0.013 | 0.021 |
| B | mg/L | 3.62 | 5.49 | 5.77 | 7.88 | |
| TDS-calc | mg/L | 27,223 | 40,318 | 42,295 | 56,570 | 40,000 |
| pH | | 7.84 | 7.81 | 7.8 | 7.78 | 8.3 |

There are no data available on the erodibility of the waste rock. It is recommended that further testing of waste rock is undertaken to understand the erodibility of the placed waste rock. The testing should include abrasive tests such as slake durability testing (ASTM D4644-08), or the more indirect way using such simple tests such as Emerson crumb, Particle Size Distributions (PSDs), geochemical tests to determine Exchangeable Sodium Percentage (ESP), Sodium Adsorption Ratio (SAR), soil salinity, clay analysis and numerical modelling.

Atacamite a copper chloride mineral has been identified in the ore. It is uncertain what the concentration and volume of this mineral is in the ore and how it will behave over time, ie will it leach from the ore stockpiles. In the absence of further data it is assumed that there is a potential risk and that any runoff from the stockpiles needs to be captured and discharged to the process water dam.

It is recommended that Rex undertake an assessment to identify the volume and distribution of the atacamite within the ore and waste rock. Further, it is recommended that Rex undertake simple leach tests using simulated rainfall conditions to determine its leachability under ambient rainfall conditions to identify the potential risk of copper discharge from the waste and ore stockpiles.

No Asbestiform minerals were identified in the testing undertaken by Rex.

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# 1 INTRODUCTION

O'Kane Consultants Pty Ltd (OKC) was commissioned by the South Australian Department of Manufacturing, Innovation, Trade, Resource and Energy (DMITRE) to provide a review of the geochemical aspects of the Rex Minerals Ltd (Rex) Hillside Copper Project Mining Lease Proposal (MLP). The following is a summary of this review. There were two phases to the review comprising Phase 1 an initial review of the geochemical risks of the Hillside MLP; the follow-up Phase 2 comprising specific geochemical issues identified through the Phase 1 review. These are summarised as follows:

**Phase 1 initial review of the geochemistry aspects of Hillside MLP**

Phase 1 comprised undertaking an independent expert review of the geochemical aspects of the design and management plans contained within the Hillside Copper Project MLP (~820pp) and associated geochemical appendices. Specifically, advice was provided in regards to:

- The geochemical risks associated with proposed construction and operation of the Hillside Copper Project including post-closure risks;
- Whether designs and management strategies proposed for the Hillside Copper Project can achieve the proposed environmental outcomes (including closure outcomes) from a geochemical perspective; and
- Whether the proposed mining designs and management strategies are unlikely to achieve the proposed environmental outcomes, or better outcomes are technically feasible, advise DMITRE on best practice mining strategies and control measures for managing the geochemical environmental risks.

**Phase 2 supplementary review of specific geochemistry aspects of the Hillside Project**

Phase 2 comprised supplementary questions relating to geochemistry following initial assessment in November 2013 included:

- What information would be needed to assess the risk of the potential impact from other contaminants beyond salinity in the proposed pit lake? Would a statement of the chemical composition of the exposed pit walls assist? This relates to item # 7 – pit lake chemistry in the Response document
- In relation to additional information needed to assess the erodibility of Waste Rock used in the construction of WRD's, what info would be needed to cover off on this request? Would a discussion of the erodibility different rock types and how these rock types are used in the WRD and management of the WRD be appropriate? Can unconfined compressive strength (UCS) (or other testwork parameters) be used as a proxy for erodibility? This is in addition to the response provided by Rex.
- Review and provide comment on additional information provided by Rex and in particular, can you please review and provide comment on the adequacy of Rex's response to the following items:
    - # 7 – pit lake chemistry
    - # 18 – waste characterisation
    - # 21 – mobilisation of copper through stockpiles
    - additional geochemical risk information

### *1.1 Deliverable*

The following is a summary of deliverables

- The independent expert review will be a final detailed written report. The initial report was provided in October 2013. This was extended due to further data clarification requirements.
- OKC will provide regular updates to DMITRE in regards to the progressive findings of the review prior to submission of the final report. A delivery schedule for these updates will be provided one week after we have received the Hillside Copper Project MLP.
- If required OKC will review any subsequent changes to the Hillside Copper Project MLP, or additional information which may result from our initial review.

## 2 SUMMARY OF FINDINGS

### *2.1 Source Material*

OKC reviewed the following documents supplied by DMITRE:

- Hillside Copper Project Mining Lease Proposal (MLP) & Management Plan (MP)
    - Hillside Copper Mine Section 5 – Description of the Existing Environment
    - Hillside Copper Mine Section 6 – Description of the Proposed Operations
- Hillside Copper Project Waste Rock Characterisation Review
- COOE – Rex Minerals Cereal Land Capability Study
- Rex Minerals Hillside Project Rehabilitation Planning Phase One Subsoil Characterisation
- Appendix 5 Hillside Pre-Feasibility Study Waste Rock Sampling
- Appendix 5 Rex Minerals Hillside Project Waste Rock Characterisation Report
- Aldam Geoscience, 2014: Hillside Project – Hydrogeological Summary Report, February 2014.

Additional data were received from Rex including:

- Sulfur Block model
- Geochemical data set of the Drillhole database
- Drillhole summaries
- Major element geochemistry for major rock types
- Rare Earth Element Data
- Asbestiform Mineral memo
- Rare Earth Element Data
- Geology of Hillside deposits:
    - Technical Note 3 Dart Geology

- Technical Note 5 Parsee Geology
- Technical Note 6 Zanoni Geology
- Technical Note 8 Songvaar Geology

- Pit Lake modelling by Mark Logsdon (Geochmica, Inc)

The data initially reviewed indicated that there was a significant lack of information supplied in the reports lodged by Rex Minerals (Rex) to DMITRE and supplied to OKC for review. This required further information from Rex to determine what the potential risk from the geochemistry of the exposure of mining waste – waste rock, tailings and pit walls. This meant that the delivery date of 23 October 2013 was not achievable.

## *2.2 Summary of Phase 1 Review*

The following is a summary of the review of DMITRE supplied documents.

The Hillside Copper Mine (Hillside Mine) with an existing resource of 337 Mt @ 0.6% copper and 0.14 g/t gold and 15.7% iron is proposed to be an open cut and underground mine producing a copper/gold concentrate and a magnetite (iron ore) concentrate. The concentrates will be transported via a 12km underground pipeline system to Port Ardrossan for filtration and shipping using the upgraded existing loading facility. Hillside Copper Mine Include:

- Open pit and underground operation
- Mineral processing plant and supporting mining infrastructure
- Mine waste rock and tailings storage facility
- Open pit and underground mine

The final open pit is planned to be approximately 2.4 km long from north to south, 1 km wide and 450 m deep. The underground operation will be in two areas; to the north and south of the open pit.

### *2.2.1 Mineral processing plant*

The processing plant includes crushing, grinding and flotation and magnetic separation processes to make copper/gold and iron ore concentrates.

### *2.2.2 Waste rock and tailings storage facility*

It appears, based on the information supplied, that mine and plant will produce an estimated total waste rock tonnage is in excess of 900M tonnes, and in excess of 300M tonnes of tailings assuming a resource of 330Mt.

Waste rock from the open pit will be disposed of in three waste rock dumps (WRD) to the north, south and west of the open pit. The largest will be the Western WRD which will be

constructed to contain a purpose built dam (tailings storage facility) to permanently store the material (tailings) left once the copper, gold and iron ore have been removed in the process plant. The proposed final heights of the WRDs above the existing land surface range from approximately 20-45 m (North-eastern), 50-85 m (South-eastern) and 70-115 m (Western).

The TSF will be integrated with the waste rock dumps and have a footprint. In Section 6.1.3.4 Integrated Waste Management – Low Aspect Ratio TSF the footprint was estimated to be approximately 378 ha. The TSF will have a compacted clay liner using re-compaction of existing in situ clayey material. The interface between the WRD and TSF embankment will be protected by lower permeability material to reduce egress of tailings.

### *2.2.3 Geology*

The structural style of the Hillside mineralising system, like those at the Moonta-Wallaroo mines, comprises mineralisation hosted within discrete, but apparently laterally and vertically continuous, structures. This structural style is in contrast to the Olympic Dam and Carrapateena-style IOCG(U) deposits that are characterised by large polygonal to circular hematite-dominant breccia bodies.

The Hillside deposit is hosted by highly deformed and folded metasediments of the Wallaroo Group, intruded by Mesoproterozoic igneous rocks which comprise numerous phases of granite, micro-gabbro, porphyritic gabbro and gabbro-diorite, presumed to be related to the Hiltaba Suite. The metasediments are invariably intensely altered within the Pine Point structural corridor, but have also commonly undergone late retrogression. All intrusions, including numerous pegmatites that have been emplaced along minor structures, have been intensely altered, including both endoskarns and exoskarns.

The copper-gold-(uranium) mineralisation is hosted within metasediments and meta-mafic rocks and can develop within and adjacent to gabbros and A-type felsic intrusives. The metasediments are folded by pre-intrusion open to tight, south-plunging folds, including both upright folds (local F2), and a series of recumbent to strongly inclined folds (local F1). The local F1 folds are also associated with possible early thrusts in some sections. Folds have a north to NE trend, with some evidence for later NW cross-folding in some areas. The folding varies from parallel-coincident, to acutely discordant to the north-south trending skarn and breccia bodies.

Significant mineralisation is focussed in numerous, north-trending, sub-vertical to steeply west dipping bodies intimately associated with prograde and retrograde skarn assemblages and associated steeply west-dipping 'breccia' structures. Mineralisation and associated skarn development is variable both laterally and vertically. The overall depth extent of the individual high-grade mineralised zones suggests mineralisation was emplaced over a vertical interval of >700 m. Stratabound replacement of metasediments occurs adjacent to the skarns, e.g., in the immediate footwall of the western branch of the Pine Point Fault structure.

Three major separate anastomosing, ~1.5 km long copper-mineralised structures have been defined, the Zanoni, 'Songvaar' and 'Parsee' structures. These structures are broadly defined by a magnetic anomaly that exists over an area that is 2 km long and 500 m wide. Together they have a combined strike length in excess of 4 km, although copper mineralisation remains open both along strike and at depth, and has been observed from as shallow as 5 m below surface to 700 m in depth.

Numerous high to low temperature skarns are developed within the Hillside deposit. The earliest, higher temperature phases are dominated by magnetite ± quartz ± pyrite ± garnet and almost monomineralic garnet skarn. The earlier skarns are replaced by clinopyroxene, K feldspar, epidote, actinolite, allanite and biotite-rich assemblages with, for example, clinopyroxene-bearing skarn often developed on the margins of and replacing garnet skarn. Primary copper mineralisation developed within and adjacent to skarn lithotypes, comprises high grade, parallel, steeply-dipping domains which may be flanked by lower grade vein, blebby and lace-like chalcopyrite accumulations.

The Hillside copper deposit is a sulfide deposit that will be mined and processed generating a large waste rock storage facility and large tailings storage facility. The geochemical risks associated with proposed construction and operation of the Hillside Copper Project including post-closure risks are largely associated with the exposure of reactive materials ie sulfide minerals principally pyrite and chalcopyrite plus other metal sulfides and the potential release of metals, sulfate and acidity or acid and metalliferous drainage (AMD).

### *2.2.4 Waste assessment*

The potential geochemical risks that will be associated with the Hillside Copper Project are associated with disposal and storage of waste rock and tailings, and the open pit and underground workings and will relate to potential for seepage impacts on soil, surface water and groundwater. The geochemical risks are associated with proposed construction and operation of the Hillside Copper Project including post-closure risks are largely associated with the exposure of reactive mine waste materials i.e. waste rock and tailings containing sulfide minerals principally pyrite and chalcopyrite plus other metal sulfides and actual and potential release of metals, sulfate and acidity or acid, sulfate salinity and metalliferous drainage (AMD).

The mine waste characterisation data that were reviewed for both waste rock and tailings comprised:

Waste Rock

- Mining Plus on behalf of Rex collected 182 representative samples of different waste rock lithologies and analysed for acid forming capacity.

Tailings

- AMEC on behalf of Rex constructed and tested 1 Pilot Test sample derived from samples from 13 drill holes representative of the ore

Waste rock data review

The initial data set supplied by Rex for review contained information compiled by Mining Plus on 182 waste rock samples. Sample locations were selected based on drilling offsets during the pre-feasibility study. Samples were collected to best represent lithological domains and to obtain a sampling spread within the proposed pit to most effectively target lithologies to best represent geology and structural conditions.

Fourteen major rock lithologies were identified and sampled for standard acid base accounting and metals total concentration and leachability. These are listed Table 1.

Table 1 Waste Rock Lithology Types selected for Sampling by Mining Plus

| Waste Rock Lithology | Domain ID |
|---|---|
| Granite | 1 |
| Gabbro | 2 |
| Impure Limestone | 3 |
| Unmineralised Metasediments | 4 |
| Skarn (red rock altered) | 5 |
| Skarn (pyritic) | 6 |
| Skarn (sulphide absent) | 7 |
| Pegmatite | 8 |
| Breccia (sulphide absent) | 9 |
| Breccia (pyritic) | 10 |
| Skarn (mineralised) | 11 |
| Metasediments (mineralised) | 12 |
| Other (mineralised) | 13 |
| Gritstone | 14 |

The acid base accounting identified limited acid generating or PAF waste material. Significant acid neutralising capacity was recorded for many of the samples tested up to 584kg H2SO4/t equivalent. Of the 57 samples tested only two samples returned sulfur concentration >0.3%S (0.37 and 1.66%S), most returned S% <0.1%. The data presented in the report has a few minor errors but in general the calculations presented for NAPP are acceptable.

The report indicates that in general, the waste rock from the Hillside project exhibits very limited potential to generate acid. However, the report does state that given the large volume of waste rock associated with the project, further sampling may be required including testing the following:

- Oxidised and transitional granite;
- Pyritic skarn; and

- Mineralised rock types and gritstones.

Further sampling was undertaken and the NAPP test-work concluded that of the 125 samples tested, 3 samples were classified as PAF and these showed obvious mineralisation, these lithologies would probably be included within the ore envelope and therefore would be processed. Fourteen samples were classified as ACM again indicating the considerable neutralising potential of parts of the waste should PAF be encountered in the pit. This agreed with findings from the earlier PFS study of 57 samples discussed above.

The samples were selected based on the geology and their distribution throughout the proposed pit area.

The Waste Rock Characterisation Review by Mining Plus presented an estimation of waste types based on the ABA classification and block modelling of the waste, as summarised in Table 2.

Table 2 Summary of waste volumes based on initial Mining Plus assessment

| Primary Geochemical Waste Type Class | NAPP limit $kgH_2SO_4/t$ | NAPP Domain - Mine Model | Volume in Tonnes | % Volume |
|---|---|---|---|---|
| Potentially Acid Forming (PAF) | ≥ 10 | 1 | 11,342,118 | 1 |
| Potentially Acid Forming - Low capacity (PAF-LC) | 5 to 10 | 2 | 0 | |
| Uncertain, probably NAF | 0 to 5 | 5 | 94,443,067 | 8.33 |
| Non Acid Forming (NAF) | -100 to 0 | 3 | 909,376,216 | 80.18 |
| Acid Consuming Materials (ACM) | < -100 | 4 | 63,984,601 | 5.64 |
| Unclassified | Cover | 0 | 53,997,301 | 4.76 |

This summary of waste types suggests that at the worst the PAF + Uncertain waste volume comprised 105,785,185 or <10% of the total estimated waste volume.

Acid base accounting (ABA) is a test design to characterise mining waste (waste rock/overburden and tailings) in respect to that material's ability to generate acidity. It is the net balance between maximum potential acidity based on sulfur % converted to kgH2SO4/t using the stoichiometric constant of 30.59, and acid neutralising capacity determined by titration.

The report used the classification for samples tested for ABA summarised in Table 3.

Table 3 Geochemical Waste type Classes used in Mining Plus waste assessment

| Waste Rock Class | NAPP limit $kgH_2SO_4/t$ |
|---|---|
| Potentially Acid Forming (PAF) | ≥ 10 |
| Potentially Acid Forming - Low capacity (PAF-LC) | 5 to 10 |
| Uncertain , probably NAF | 0 to 5 |
| Non Acid Forming (NAF) | minus 100 to 0 |
| Acid Consuming Materials (ACM) | < minus 100 |

While this classification is widely used it can be misleading particularly if it is based on a small data set. This classification does not consider neutral saline and metalliferous drainage resulting from high sulfide bearing waste with high ANC that could have near zero NAPP. No justification for using the classification provided by Mining Plus. The report also noted that samples with sulfur <0.3% are unlikely to generate acidity. Testing reported in published literature suggests the limit is more likely to be 0.1%S (*Miller et al, 2010: Methods for estimation of long-term non-carbonate neutralisation of acid rock drainage, Science of the Total Environment 408 (2010) 2129–2135*). The recommended sulfur cutoff for PAF is 0.1%S subject to validation using sulfide sulfur versus NAG for pH 4.5, 7 and 10 to justify the stated sulfur cut-off.

Tailings data review

Detailed metallurgical testing has been undertaken on Pilot testing of ore and associated tailings. However only one set of acid base accounting and metals analysis was undertaken on a single sample of tailings generated from the Pilot testing. The information supplied by Rex consultants AMEC to DMITRE indicate that the sample tested was derived from 13 drill holes selected to generate a representative sample material of ore and associated tailings for the Pilot testing program. The single Pilot test tailings sample was assessed for acid base accounting and metals concentration.

### *2.2.5 Asbestiform minerals*

Various amphibole minerals have been observed at Hillside however no chrysotile asbestos has been noted.

### *2.2.6 General comment of geology and waste characterisation*

The geological complexity of the deposit is complex. It was difficult to follow the methodology in sample selection for waste characterisation despite the good geological understanding of the deposit geology by Rex geological staff and consultants. An alternative approach to waste characterisation and delineation within the pit during mining is required as discussed below in the Phase 2 review section "*Waste Classification based on Sulfur model".*

### *2.2.7 Leachate Analysis*

59 samples were subjected to a toxicity characteristic leaching procedure (TCLP) test.

The leachate from the TCLP test for each sample tested was analysed for the following analytes: Al, As, Ba, Be, Cd, Co, Cr, Cr(3), Cr(6), Fe, K, Mg, Mn, Ni, P, Pb, Sn, Sr, Te, Th, Ti, U, V, Y Zn, Zr, and TDS.

The testwork did not analyse for calcium, sodium, chloride or sulfate.

The method used a solid to solvent ratio of 1:20 which is too low and likely to underestimate metal concentrations in leachate.

It is recommended that further short term leaching tests are undertaken on a range of waste rock samples and sulfur and metal concentrations using the Shake Flask Solubility Test that has been adapted modified from the Australian Standard Leaching Procedure (ASLP) (Australian Standards AS4439.2 and 44396.3), using a solids to solvent ratio of 200g solid:400g solvent; the solvent is Deionised (DI) water. A modification is to acidify the DI water to rainwater acidity of 5.5pH. The analytes should include the metals tested for on the TCLP leachate as well as calcium, sodium, chloride and sulfate. When selecting samples the larger geochemistry dataset should be used as a guide to the range of metals and sulfur concentrations that should be included.

### *2.2.8 Erosion*

From discussions with REX personnel it is understood that some of the waste rock is likely to be erodible. While erodibility and dispersivity testing was undertaken for the Tertiary/Quaternary overburden, similar testing was not available for review. It is recommended that this is undertaken prior to commencement of mining. This aspect of rock properties can be easily assessed by a review of core to see how readily certain rock types will breakdown when exposed to weathering. This could be undertaken by the review subject to time and budget.

## *2.3 Review Phase 2*

Given the mass of waste rock expected to be mined of >900M tonnes and >300M tonnes of tailings the initial data set supplied for review contained information on 182 waste rock samples and 1 tailings which is considered by the reviewer as inadequate, despite an excellent attempt to characterise different waste.

The reviewer contacted Rex Minerals directly with permission from DMITRE to see whether any further data were available. Contact was made with James Nagel the mine manager for the Hillside Project who directed OKC to REX resource geologist Craig Went and consultant petrologist/geologist Graham Teale. From this contact OKC were supplied with information on:

- Block modelling of S% of the waste ("sulfur model") was reviewed;
- Geochemistry data from the drillhole database including 175,792 waste rock samples analysed for total sulfur from a total database of 202,106 samples tested derived from 598 diamond holes and 245 RC holes for a total of 234,000m.
- Drillhole sulfur geochemistry database included 26,314 samples of ore with Cu >0.2% and these data can also be used to provide an indication of tailings geochemistry;
- Geological summaries of the four mineralised zones that will be mined by open pit 'Dart', 'Zanoni', 'Songvaar' and 'Parsee';
- General discussion on the geology and mineralisation as it pertains to the tailings and the waste rock.

A summary of the findings of the review of the dataset supplied by REX to DMITRE for Part 2 is provided below

### *2.3.1 Waste Classification based on Sulfur model*

#### 2.3.1.1 Waste Rock

The geology is complex due to faulting and folding and intrusion as illustrated in the figures below. This likely to make it difficult to distinguish specific waste rock types during mining for distinguishing and selective handling of PAF material. It will be important to separate out specific waste types for construction materials such as non-erosive material for erosion protection, drainage design and foundation; compactable clayey material for construction of low permeable material.

For distinguishing PAF material it is recommended that a sulfur model for the deposit is constructed and used for identifying PAF material.

A Sulfur block model was developed for this review by REX for different % sulfur concentrations as a starting point to potentially define PAF and NAF material. The sulfur model was based on sulfur % data from the drillhole database from 175,792 waste rock samples.

By the way of illustration, using the available large data set, Table 5 summarises the output from the block modelling using in this instance a sulfur % cut-off that shows that the ratio of NAF to PAF is high for 0.1%S cutoff as well as 0.2%S cutoff. It must be noted that if a sulfur % is used as a cutoff it must be validated by testing the full range of sulfur concentration as defined by the drillhole database for total sulfur, sulfide sulfur using CRS analysis and NAG to pH 4.5, 7 and 10. As discussed earlier in the report that material with a sulfur concentration of say <0.1%S is unlikely to generate acid drainage and is likely to be suitable for encapsulating waste material classed from the sulfur block modelling as PAF (eg S concentration >0.1%) subject to validation and integration with the geological model for the

deposit. The modelling and definition of the distribution and volume for the proposed pit shells will need to be undertaken to design the waste rock dump.

The mine scheduling needs to be redone for sulfur model only and not to rely on ANC. The NAPP testwork while potentially correct in theory is unlikely to be able to be implemented due to complexity of the geology. The simpler approach using the sulfur model is strongly recommended. While the sulfur model increases the volume of PAF material it is easier to define NAF and PAF domains and simpler for marking out waste areas on each bench prior to blasting. Make the model complex and it will not be followed by mining.

Table 4: tonnages and volumes of PAF and NAF waste based on sulfur model

| Description | Volume | Tonnage | % of total waste |
|---|---|---|---|
| NAF waste < 0.1%S | 368,112,196 | 933,173,168 | 76% |
| PAF waste >0.1%S | 107,648,855 | 300,179,214 | 24% |
| NAF waste < 0.2%S | 416,125,914 | 1,066,027,244 | 86% |
| PAF waste >0.2%S | 59,635,136 | 167,325,138 | 14% |

No waste rock dump design and final cover conceptual design was provided for review. This will need to be done prior to mine commencement and regularly updated during mining to ensure correct placement of waste materials.

Rehabilitation of WRDs will consist of pushing back the batters to three slope angles of 20°, 15° and 10° each with a 5 m back-sloping berm at each change of slope. The WRDs will be covered with subsoil to 0.5m and topsoil to a depth of 0.1m to 0.3m on all surfaces with a slope of 15° or less. The design is based on the initial assumption that PAF waste represents <1% of the total waste mass.

The sulfur block modelling suggests that the final landform design provided by Rex needs to be reviewed and modified to consider management of the larger PAF waste volume determined by the Sulfur block modelling. OKC recommend that the following key actions need to be implemented by Rex for effective waste rock management.

- Re-examine the waste rock dump design in respect to the substantial sulfur database, and construct the sulfur waste block modelling and increase in PAF volumes and a life of mine waste mining schedule is constructed.
- Integrate the substantial sulfur dataset compiled in the drillhole database for the waste and ore with the ABA data for individual waste rock types, alteration mineralogy and the geological model for the ore and host rocks to characterise the sulfur distribution

across the proposed pit area and hence the potential mining waste (waste rock and tailings).

- Undertake further testing to justify a sulfur cut-off grade including comparative analysis of NAG for pH 4.5, 7 and 10 versus sulfide sulfur analysis (CRS), for each waste rock unit for the range of sulfur concentrations identified in the drillhole database.
- Integrate the substantial sulfur dataset compiled for the waste into the mine planning and ore and waste scheduling.
- Undertake the waste block modelling using sulfur to determine the distribution and volume/tonnage of NAF and PAF waste using a sulfur cut-off for waste is used using the defined sulfur cut-of e.g. >0.1%S for PAF and <0.1%S for NAF (or as defined by dot point 2 and 3 above).
- Integrate the sulfur model with the geological model to identify potential for acid neutralising capacity, as calculated by the lithology ABA work (Part 1), and where possible lithology/sulfur concentration relationships.
- Compile a dump design based on sulfur concentration is generated using the schedule and waste volumes generated from the sulfur block model requiring selective placement of PAF waste, and correct construction of NAF encapsulation to minimise net percolation through life of mine and post closure.
- Selectively mine and encapsulate PAF waste by NAF with no PAF placed beneath batter slopes and intermediate truck compacted surfaces constructed for every lift of the waste dump.
- During mining Rex will construct the daily bench plans with the PAF and NAF waste layout marked for field mapping/checking/sampling to ensure correct identification of PAF and NAF waste for selective mining.
- Reconcile the geological model and the waste rock block model regularly through the life of mine to ensure correct placement of PAF and NAF waste.

The lithology ABA testwork (Part 1 of this review) indicated that there is a significant concentration of carbonate in the material tested which will be an additional safeguard for managing acid generation.

### *2.3.2 Tailings*

The drillhole database does suggest that there is significant sulfur present in the ore as it is a sulfide ore body and that will at times exceed 0.9% S. Some of this will be pyrite. Likewise the carbonate content and hence the acid neutralising capacity of the ore will vary spatially and temporarily and this also needs to be considered. It should be noted that sulfide tailings are very difficult to rehabilitate if incorrectly manage. On the positive side if there is excess carbonate minerals this will definitely contribute to managing impacts with respect to acid drainage, but may result in elevated sulfate and metals in leachate over time, if the tailings are sub-aerially deposited. The amount of carbonate minerals present has not been provided by Rex,

In addition to the single Pilot study sample a large dataset including exists comprising 26,314 samples of ore was reviewed. In addition each drillhole tested for geochemistry of the ore has also a detailed geological log identifying ore mineralogy, including alteration minerals and lithology. These data provide a comprehensive assessment of ore composition variability both spatially and temporally.

It is recommended that this larger ore dataset together with the geology and mineralogy data from the drillhole database and the Pilot testing work is analysed by Rex to understand the variability of tailings composition over time and incorporated into the mine plan.

Final cover design for TSF cover design has been proposed which includes a low permeability layer, protective layer and topsoil typical of a generalized store and release cover. It will be necessary for the cover system to be modelled and regularly reviewed through the life of the mine.

The top of the TSF will be covered with a low water flux cover system (ATC Williams, December 2012) and will be sourced from overburden onsite. The cover will comprise of a:

- capillary break layer of coarse, non-acid forming waste rock (0.3 m depth)
- sealing layer of non-acid forming, low permeability compacted earthfill (0.5m depth)
- mine spoil cover of non-acid forming rockfill (1.0m depth)
- topsoil cover (0.1 – 0.3m depth).

The cover will be necessary to reduce net percolation and reduce long-term contaminant discharge to groundwater post closure.

As a minor detail there is some conflicting reference to different cover designs in the Management Plan. It is assumed the ATC Williams Dec 2012 design is the current recommended cover. It is also noted that *Hillside Copper Mine Mining Lease Proposal & Management Plan* assumes the tailings will not generate acid drainage. The design needs to be reassessed based on the outcome of the review of the larger sulfur dataset discussed above.

### *2.3.3 Summary Statement of waste Management*

Based on the information supplied and summarised above the mining waste geochemistry (tailings, waste rock and final void pit lake) will be manageable.

OKC is satisfied that Rex has the means to model, schedule, mark-out, validate, reconcile and correctly place the NAF and PAF waste, provided they keep it simple. The data supplied supports this conclusion.

### *2.3.4 Final Void*

Limited information on the final void pit lake was provided. A request to Rex as part of Part 2 geochemical risk assessment of the Hillside Copper Project was made by DMITRE for a geochemical model of the long-term pit lake chemistry. This is discussed below.

#### 2.3.4.1 Pit Lake Modelling

Further investigation of the final pit lake water quality was undertaken by Rex Minerals and their consultants at the request of DMITRE. Mark Logsdon of Geochimica, Inc. (Geochimica) was commissioned by Rex Minerals to develop a long term geochemical model of the final pit lake to predict long term impacts post closure. The following is a summary of the findings of modelling work completed by Geochimica.

Geochimica evaluated the post- closure water chemistry of the Hillside pit lake at four time intervals derived from the hydraulic analysis of the pit refilling (Aldam Geoscience, 2014):

- 80 Years
- 320 Years
- 450 Years
- 1200 Years, at which point the pit in is hydraulic steady state

At each stage, Geochimica calculated the water chemistry (including the effects of evaporation, water-atmospheric gas interactions, and mineral saturation on the water moving to the pit) for that stress period. In addition Geochimica calculated a cumulative pit-water chemistry assuming that the pit water is well mixed as the pit fills.

For the Hillside Mine, once active water control ceases, flow will report to the mine void. Because the mine void is at all times a hydraulic sink, the mass conveyed in water flows to the pit will accumulate there – the system is closed with respect to mass of solutes. However, the system is open to the solvent, $H_2O$, via evaporation. As evaporation greatly exceeds precipitation, there will be a process of evapo-concentration that occurs in the pit lake, with observed concentrations of solutes increasing monotonically over time as evaporation occurs, unless or until the solubility of some component is controlled by thermodynamic equilibrium.

There are two possible physical states for the pit lake:

- It may become a well-mixed reservoir, due to
    a) the passive effects of high- density water (the result of evapo-concentraton) sinking through earlier, lower- density water;
    b) energetic mixing due to the effects of solar radiation and wind moving across the lake surface.
- The waters could remain stratified, effectively by the stages of filling.

The overall chemistry of the pit-lake water in the Hillside mine void is controlled by three factors:

- The very high concentrations of the native groundwater that will flow to the pit;
- Evapo-concentration over time;
- The exsolution of $CO_2$ from the lake. If $CO_2$ is retained (as it is in groundwater), then the pH will be about 7.1 – 7.2 (instead of 7.7-7.8), but the $HCO_3$ alkalinity will remain elevated. If, or rather, as $CO_2$ exsolves (it must, at least as a result of diffusion), the pH will rise, and the dissolved $HCO^-$ value near 40-50 mg/L as $HCO^-$ will decline to a long-term

#### 2.3.4.2 Pit Lake modelling summary

Because trace metals are generally low in the native, pre-mining groundwater, the principal source of such potential solutes in the final pit will be oxidation and reaction in the pit walls, subsequently dissolved and delivered to the pit lake by flow across the pit walls.

The area of pit wall available for reaction and contributing mass to the lake declines with time, as the pit walls are inundated during filling. By Stage 4 of the pit filling, there is only a small rind of pit-wall rock remaining. Consequently, the contribution of mass form the pit walls must be small and that is what the modeling shows.

If the pit behaves in a stratified manner, then the time series expected for pit-lake chemistry is that shown in Table 5. If the pit becomes a well-mixed reservoir, then Table 6 is the better approximation for the observed pit-lake water over time. It is Geochimica's opinion that in this environment and with this degree of evaporative concentration, the pit lake will be well-mixed.

The best-estimate chemistry for the pit lake over time is itemised as Table 6.

Table 5 Individual Stress-Stage Geochemical Models, with Evaporation and Equilibration

| By Stress Stage | | | | | |
|---|---|---|---|---|---|
| **Analyte** | **Unit** | **Year 80*** | **Year 320*** | **Year 450*** | **Year 1200*** |
| **Cations** | | | | | |
| Na + | mg/L | 8080 | 14700 | 13900 | 23400 |
| K + | mg/L | 146 | 268 | 252 | 422 |
| Ca 2+ | mg/L | 547 | 977 | 923 | 1540 |
| Mg 2+ | mg/L | 1120 | 2040 | 1930 | 3230 |
| Fe 2+ | mg/L | 0.004 | 0.004 | 0.005 | 0.004 |
| Mn 2+ | mg/L | 0.001 | 0.001 | 0.001 | 0.001 |
| Cu 2+ | mg/L | 0.032 | 0.056 | 0.038 | 0.06 |
| Zn 2+ | mg/L | 0.1 | 0.062 | 0.031 | 0.04 |
| Ni 2+ | mg/L | 0.015 | 0.023 | 0.02 | 0.034 |
| Ba 2+ | mg/L | 0.039 | 0.05 | 0.05 | 0.07 |

| By Stress Stage | | | | | |
|---|---|---|---|---|---|
| **Analyte** | **Unit** | **Year 80*** | **Year 320*** | **Year 450*** | **Year 1200*** |
| Cd 2+ | mg/L | 0.0013 | 0.0011 | 0.0006 | 0.0011 |
| Co 2+ | mg/L | 0.011 | 0.017 | 0.015 | 0.027 |
| Pb 2+ | mg/L | 0.038 | 0.025 | 0.015 | 0.02 |
| Be 2+ | mg/L | 0.0018 | 0.0044 | 0.0038 | 0.0036 |
| U | mg/L | 0.095 | 0.172 | 0.163 | 0.275 |
| **Anions** | | | | | |
| HCO3 - | mg/L | 40 | 41.9 | 41.8 | 43.6 |
| CO3 2- | mg/L | 210 | 160 | 172 | 157 |
| Cl - | mg/L | 16200 | 29500 | 27800 | 46700 |
| SO4 2- | mg/L | 880 | 1580 | 1490 | 2490 |
| HPO4 2- | mg/L | 0.08 | 0.143 | 0.136 | 0.226 |
| As(OH)4 - | mg/L | 0.008 | 0.012 | 0.011 | 0.017 |
| B | mg/L | 3.62 | 6.76 | 6.373 | 11.047 |
| TDS-calc | mg/L | 27223 | 49267 | 46509 | 77983 |
| pH | | 7.84 | 7.782 | 7.788 | 7.738 |

Table 6 Step-Wise Geochemical Models for a Well-Mixed Reservoir, with Evaporation and Equilibration

| Mixed by Stress Stage | | | | | | |
|---|---|---|---|---|---|---|
| **Analyte** | **Unit** | **Year 80** | **Year 320** | **Year 450** | **Year 1200** | **Sea Water** |
| **Cations** | | | | | | |
| Na + | mg/L | 8,080 | 12,012 | 12,615 | 16,929 | 11,000 |
| K + | mg/L | 146 | 218 | 229 | 306 | 560 |
| Ca 2+ | mg/L | 547 | 802 | 841 | 1121 | 600 |
| Mg 2+ | mg/L | 1,120 | 1,666 | 1,751 | 2,342 | 1,300 |
| Fe 2+ | mg/L | 0.004 | 0.004 | 0.0043 | 0.0042 | 1.4 |
| Mn 2+ | mg/L | 0.001 | 0.001 | 0.001 | 0.001 | <0.025 |
| Cu 2+ | mg/L | 0.032 | 0.046 | 0.044 | 0.05 | <0.005 |
| Zn 2+ | mg/L | 0.1 | 0.077 | 0.063 | 0.054 | 0.018 |
| Ni 2+ | mg/L | 0.015 | 0.02 | 0.02 | 0.025 | <0.006 |
| Ba 2+ | mg/L | 0.039 | 0.046 | 0.047 | 0.056 | <0.1 |
| Cd 2+ | mg/L | 0.0013 | 0.0012 | 0.001 | 0.001 | <0.001 |
| Co 2+ | mg/L | 0.011 | 0.015 | 0.015 | 0.02 | <0.005 |
| Pb 2+ | mg/L | 0.038 | 0.03 | 0.025 | 0.023 | <0.005 |
| Be 2+ | mg/L | 0.0018 | 0.003 | 0.003 | 0.004 | <0.005 |
| U | mg/L | 0.095 | 0.141 | 0.148 | 0.199 | <0.025 |
| **Anions** | | | | | | |
| HCO3 - | mg/L | 40 | 41 | 41 | 42 | 120 |
| CO3 2- | mg/L | 210 | 180 | 178 | 169 | |
| Cl - | mg/L | 16,200 | 24,100 | 25,282 | 33,849 | 22,000 |
| SO4 2- | mg/L | 880 | 1296 | 1358 | 1811 | 1,100 |
| HPO4 2- | mg/L | 0.08 | 0.117 | 0.123 | 0.164 | <0.05 |
| As(OH)4 - | mg/L | 0.008 | 0.01 | 0.011 | 0.013 | 0.021 |
| B | mg/L | 3.62 | 5.49 | 5.77 | 7.88 | |
| TDS-calc | mg/L | 27,223 | 40,318 | 42,295 | 56,570 | 40,000 |
| pH | | 7.84 | 7.81 | 7.8 | 7.78 | 8.3 |

The modelling undertaken for the final void by Geochimica suggests that the geochemical risks to the environment (groundwater, fauna etc.) as a result of the pit lake are likely to be minimal. The pit-lake water reaches the chlorinity typical of Sea Water sometime between 80 and 320 years, but remains in the vicinity of Sea-Water chlorinity for several hundred years, rising to the stead-state system value only after about 500 years. Such water would not be potable, to animals or birds, and so even the low predicted levels of metals are unlikely to be available to ecological receptors

It is uncertain whether Geochimica were supplied with the sulfur block modelling data for the final pit shell.

It is recommended that the model is rerun or at least reviewed by Geochimica with the initial data supplied by Rex as well as the sulfur block modelling data including cross sections and modelling information of sulfide mineral presence in the pit walls based on the sulfur block modelling.

Notwithstanding OKC recommendation for Geochimica to complete this final part of their review OKC believe there is enough information for DMITRE to be satisfied that the long term risks to the environment due to the geochemistry of the water in the pit lake is low, based on the Geochimica Hillside Pit Water Chemistry assessment.

### *2.3.5 Atacamite presence*

# 19 – Mobilisation of copper through stockpiles

*DMITRE Question:*
*The risk associated with atacamite's solubility in rainwater is not described? How will the oxide stockpile be managed to contain this risk? Section 5.8.3 (5th paragraph)*

The XRD work showed 48 of the 106 samples tested contained Atacamite. It is uncertain from the information supplied how much there is, but certainly 45% of the samples tested were identified as Atacamite. Atacamite is normally derived from leaching copper deposits in the oxide zone under hyperaridity conditions. Sea breeze is a potential source of the chloride ions for the formation of Atacamite, as well as saline groundwaters. Atacamite is soluble under freshwater conditions and may leach when exposed to rainwater. The risk relates to the quantity and protection of the stockpile area. Rex has identified its presence and the potential to leach, but it is uncertain to the reviewer how much there is and what volume the 46 samples tested represent. It is recommended that Rex undertake an assessment of the presence of atacamite and determine the volume, distribution and leachability under freshwater (rainfall) conditions that may prevail during operational life of the stockpiles (ore and waste rock) that may contain the atacamite. It is also recommended that all runoff from the ore stockpiles is captured, by cut-off drains and bunding, and directed to a sump for pumping to the mine water dam for treatment and/or incorporation in the process water circuit.

### *2.3.6 Erodibility of waste rock*

*DMITRE question: In relation to additional information needed to assess the erodibility of Waste Rock used in the construction of WRD's, what info would be needed to cover off on this request? Would a discussion of the erodibility (of) different rock types and how these rock*

*types are used in the WRD and management of the WRD be appropriate? Can unconfined compressive strength (UCS) (or other testwork parameters) be used as a proxy for erodibility?*

Unconfined compressive strength (UCS) cannot be used to measure erodibility. To estimate erodibility of waste rock requires undertaking abrasive tests such as slake durability testing (ASTM D4644-08), or the more indirect way using such simple tests such as Emerson crumb, Particle Size Distributions (PSDs), geochemical tests to determine Exchangeable Sodium Percentage (ESP), Sodium Adsorption Ratio (SAR), soil salinity, clay analysis and numerical modelling. The core could be tested for clay content particularly in the oxide zone, as well as the partially oxide zone, and any hydrothermally altered host rocks. The REX team includes experienced geologists capable of answering this question. This work should be undertaken early in the mine operations either at feasibility or construction phase and regularly reviewed.

# 3 SUMMARY AND RECOMMENDATIONS

The following conclusion and recommendations are provided below.

The Hillside copper-gold deposit is a sulfide ore body that is proposed to be mined by open cut and underground operation. It will generate an estimated waste rock tonnage in excess of 900Mt and tailings mass in excess of 300Mt. The geology of the deposit has been thoroughly studied by Rex Geologists and geological consultants working on the project. The geology is complex due to faulting and folding and intrusion as illustrated in the figures below. This likely to make it difficult to distinguish specific waste rock types during mining for distinguishing and selective handling of PAF material. It will be important to separate out specific waste types for construction materials such as non-erosive material for erosion protection, drainage design and foundation; compactable clayey material for construction of low permeable material.

Rex have identified 14 major waste rock lithologies that formed the focus of sampling and testing for acid forming capacity and metal ion concentrations that may mobilise through leaching. A limited number of waste rock samples (182) and Pilot Testing of representative tailings material was undertaken. The acid base accounting (ABA) testwork indicated that there is a significant concentration of acid neutralisation in the material tested.

A comprehensive sampling program for drill holes has been undertaken by Rex that has generated a drillhole database 175,792 samples analysed for total sulfur from a total database of 202,106 samples tested; and a drillhole geochemistry database comprising 26,314 samples of ore (tailings) with Cu >0.2% analysed for sulfur and metals. Block modelling of the waste rock sulfur concentration undertaken by Rex indicates that 76% of the waste rock has a sulfur concentration <0.1% and is can be classed as non-acid forming waste and 24% of waste mass is PAF. This suggests that while the volume of waste is higher than that predicted by the limited waste sampling based on geology there is a significant volume

of waste available for encapsulating and management the PAF waste to minimise acid drainage. The NAPP testwork while potentially correct in theory is unlikely to be able to be implemented due to complexity of the geology. The simpler approach using the sulfur model is strongly recommended. While the sulfur model increases the volume of PAF material it is easier to define NAF and PAF domains and simpler for marking out waste areas on each bench prior to blasting. Make the model complex and it will not be followed by mining.

It is recommended that further work is undertaken for the range of sulfur concentrations present in the waste rock and ore as identified from the drillhole database to justify the sulfur % cut-off defining PAF waste using CRS versus NAG for pH 4.5, 7 and 10.

It is recommended for distinguishing PAF material that a sulfur model for the deposit is constructed and used for identifying PAF material.

It is recommended that the modelling and definition of the distribution and volume for the proposed pit shells will need to be undertaken to design the waste rock dump.

It is recommended that the mine scheduling needs to be redone for sulfur model only and not to rely on ANC.

It is recommended that the existing acid base accounting test data based on the 182 samples are integrated with the substantial sulfur database, in particular the detailed geological, mineralogical and alteration data as specifically the acid neutralising capacity, and the mine scheduling and waste dump design reviewed.

There are sufficient data to suggest that a small volume, ~24% of the waste rock that will be generated will have a sulfur concentration >0.1%S and in the absence of sufficient acid neutralising capacity can be classed as PAF. It is strongly recommend that a life of mine waste schedule is generated that separates waste rock with sulfur concentration >0.1%S to facilitate selective mining and placement of this material. At this stage there is insufficient acid neutralising data compared to sulfur data to assume that the potential to generate acid drainage from the out of pit waste rock storage is negligible based on the ABA assessment modelling that suggests PAF volume represents 1% of the total waste volume.

The sulfur block modelling suggests that the final landform design provided by Rex needs to be reviewed and modified to consider management of the potentially larger PAF waste volume determined by the Sulfur block modelling. OKC recommend that the following key actions need to be implemented for effective waste rock management.

- Re-examine the waste rock dump design in respect to the substantial sulfur database, and construct the sulfur waste block modelling and increase in PAF volumes and a life of mine waste mining schedule is constructed.
- Integrate the substantial sulfur dataset compiled in the drillhole database for the waste and ore with the ABA data for individual waste rock types, alteration mineralogy and the geological model for the ore and host rocks to characterise the sulfur distribution

across the proposed pit area and hence the potential mining waste (waste rock and tailings).

- Undertake further testing to justify a sulfur cut-off grade including comparative analysis of NAG for pH 4.5, 7 and 10 versus sulfide sulfur analysis (CRS), for each waste rock unit for the range of sulfur concentrations identified in the drillhole database.
- Integrate the substantial sulfur dataset compiled for the waste into the mine planning and ore and waste scheduling.
- Undertake the waste block modelling using sulfur to determine the distribution and volume/tonnage of NAF and PAF waste using a sulfur cut-off for waste is used using the defined sulfur cut-of e.g. >0.1%S for PAF and <0.1%S for NAF (or as defined by dot point 2 and 3 above).
- Integrate the sulfur model with the geological model to identify potential for acid neutralising capacity, as calculated by the lithology ABA work (Part 1), and where possible lithology/sulfur concentration relationships.
- Compile a dump design based on sulfur concentration is generated using the schedule and waste volumes generated from the sulfur block model requiring selective placement of PAF waste, and correct construction of NAF encapsulation to minimise net percolation through life of mine and post closure.
- Selectively mine and encapsulate PAF waste by NAF with no PAF placed beneath batter slopes and intermediate truck compacted surfaces constructed for every lift of the waste dump.
- During mining Rex will construct the daily bench plans with the PAF and NAF waste layout marked for field mapping/checking/sampling to ensure correct identification of PAF and NAF waste for selective mining.
- Reconcile the geological model and the waste rock block model regularly through the life of mine to ensure correct placement of PAF and NAF waste.

In addition to the single Pilot study sample a large dataset including exists comprising 26,314 samples of ore was reviewed. In addition each drillhole tested for geochemistry of the ore has also a detailed geological log identifying ore mineralogy, including alteration minerals and lithology. These data provide a comprehensive assessment of ore composition variability both spatially and temporally.

It is recommended that this larger ore dataset together with the geology and mineralogy data from the drillhole database and the Pilot testing work is analysed by Rex to understand the variability of tailings composition over time and incorporated into the mine plan.

OKC is satisfied that Rex has the means to model, schedule, mark-out, validate, reconcile and correctly place the NAF and PAF waste, provided they keep it simple. The data supplied supports this conclusion.

There is further work required to assess the erodibility of waste rock that will be used to construct the waste rock dumps as no data were available for review.

It is recommended that further testing of waste rock is undertaken to understand the erodibility of the placed waste rock. The testing should include abrasive tests such as slake durability testing (ASTM D4644-08), or the more indirect way using such simple tests such as Emerson crumb, PSDs, geochemical tests to determine ESP, SAR, soil salinity, clay analysis and numerical modelling.

The numerical modelling of the final void pit lake suggests that the pit becomes a well-mixed reservoir post closure. The pit-lake water reaches the chlorinity typical of Sea Water sometime between 80 and 320 years, but remains in the vicinity of Sea-Water chlorinity for several hundred years, rising to the stead-state system value only after about 500 years. Such water would not be potable, to animals or birds, and so even the low predicted levels of metals are unlikely to be available to ecological receptors.

It is recommended for completeness that Geochimica review the sulfur block model data including cross-sections of the final pit and data generated by Rex that indicates the area of zones of the pit wall containing sulfur and update their model with this information if deemed necessary after review of the data.

Notwithstanding, OKC believe there is enough information for DMITRE to be satisfied that the long term risks to the environment due to the geochemistry of the water in the pit lake is low, based on the Geochimica Hillside Pit Water Chemistry assessment.

Atacamite a copper chloride mineral has been identified in the ore. It is uncertain what the concentration and volume of this mineral is in the ore and how it will behave over time, ie will it leach from the ore stockpiles. In the absence of further data it is assumed that there is a potential risk and that any runoff from the stockpiles need to be captured and discharged to the process water dam.

It is recommended that Rex undertake an assessment to identify the volume and distribution of the atacamite within the ore and waste rock. Further, it is recommended that Rex undertake simple leach tests using simulated rainfall conditions to determine its leachability under ambient rainfall conditions to identify the potential risk of copper discharge from the waste and ore stockpiles.

# 4 CLOSURE

We trust this report meets your requirements. Please contact the undersigned (Peter Scott) at 07 3367 8063 or pscott@okc-sk.com should you have any questions or require clarification on any matter discussed in this proposal.

## *Appendix 7 Technical Report – JBS&G (VIC & SA) Pty Ltd (JBS&G) – Air quality*

Department for Manufacturing, Innovation, Trade, Resources and Energy (Mining Regulation Branch)

# Rex Minerals Ltd Hillside Project
# Dust Impact Assessment Review

## Final Report

08 May 2014
SGE131017_RP01
JBS&G

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**Department for Manufacturing, Innovation, Trade, Resources and Energy (Mining Regulation Branch)**

# Rex Minerals Ltd Hillside Project
# Dust Impact Assessment Review

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**JBS&G**

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# Tables

# List of Abbreviations

| | |
|---|---|
| ADWG | Australian Drinking Water Guidelines (2011) |
| AGL | Above Ground Level |
| BoM | Bureau of Meteorology |
| E-BAM | Beta-Attenuation Monitor |
| EET | Emission Estimation Technique |
| EPA | Environment Protection Authority, South Australia |
| DA | Development Application |
| DMITRE | Department for Manufacturing, Innovation, Trade, Resources and Energy |
| HiVol | High-volume air sampler |
| ML | Mining Lease |
| MLA | Mining Lease Application |
| MPL | Miscellaneous Purposes Licence |
| NEPM | National Environment Protection (Ambient Air Quality) Measure |
| NPI | National Pollutant Inventory |
| $PM_{2.5}$ | Particulate with an aerodynamic mean diameter of less than 2.5 micron |
| $PM_{10}$ | Particulate with an aerodynamic mean diameter of less than 10 micron |
| Rex | Rex Minerals Ltd |
| ROM | Run-of-Mine |
| TSF | Tailings Storage Facility |
| TSP | Total Suspended Particulate |
| US EPA | United States Environmental Protection Agency |
| WRD | Waste Rock Dump |
| WRF | Weather Research and Forecasting |

# 1 Scope

JBS&G (VIC & SA) Pty Ltd (JBS&G) have been commissioned by the Mining Regulation Branch of the Government of South Australia, Department for Manufacturing, Innovation, Trade, Resources and Energy (DMITRE) to undertake a peer review of the Rex Minerals Ltd (Rex) Hillside copper-gold-iron project (the Project) Dust Impact Assessment, as presented in their Mining Lease Application (MLA).

The scope is to review and comment on the dust impact and risk components of the MLA, including:

- The adequacy of the documented baseline air quality information for the Project location, including:
    - Existing ambient air quality
    - Meteorology
    - Topography
- The air quality criteria developed for the Project, in the context of:
    - State and Federal guidelines, standards and legislation
    - Current health science
    - Criteria developed/approved for other, similar projects
- The prevention/minimisation of other impacts outside of human health, including:
    - Amenity (including potential impacts to drinking water quality and solar PV efficiencies)
    - Flora and fauna (including the marine environment)
    - Agriculture
- The development of the air quality model for the Project, including:
    - The representativeness of the modelled scenarios
    - The appropriateness and completeness of the nominated dust-generating activities
    - The assumptions and data used to derive emission source terms for the chosen scenarios and activities, including:
        - The choice of emissions equations used to estimate emission rates from activities
        - The assumptions and/or data presented in the MLA and how this has been reflected in the emission estimates
        - The appropriateness of assumptions that have been made that are not otherwise contained within the MLA (if any)
- The outcomes of the air quality model for the Project, including:
    - Verification of the predicted dust concentrations against both the nominated Project air quality criteria and other criteria as identified during the peer review (if applicable)
    - The adequacy of the sensitivity analysis
- The proposed dust control strategies, including:
    - The appropriateness/suitability of the identified dust control measures for the management of predicted air quality impacts
    - The likely effectiveness of these control strategies based on experience at other, similar operations, and a review of how this effectiveness has been reflected in the developed air quality model

- The appropriateness/suitability of the identified dust control contingency for the management of risks associated with potential air quality impacts
- The appropriateness/suitability of the proposed monitoring program to adequately inform the Project as to the effectiveness of applied dust control strategies
- Any dust control measures applied to other, similar operations (or otherwise available) that have not been identified in within the MLA that may be as, or more, effective at reducing impacts/risks

- The conclusions presented within the MLA air quality assessment with respect to dust, specifically:
  - Whether the conclusions regarding the likely environmental outcomes and potential environmental risks are valid
  - Whether the conclusions are reasonable based on the information presented in the MLA

This report presents the outcomes of the review of the dust impact assessment components of the Rex Hillside MLA and subsequent correspondence provided by Rex in response to requests for additional information made by DMITRE. This additional information/correspondence is available at http://www.rexminerals.com.au/wp-content/uploads/2013/10/Statutory-Consultation-Response_PUBLIC-VERSION.pdf, with supplementary air quality dispersion modelling results available at http://www.rexminerals.com.au/wp-content/uploads/2013/10/Appendix-4_Air_Quality-Dispersion_Modelling_Update.pdf. These documents are subsequently referenced within this Report as the "Rex Response Document".

# 2 Context and project overview

Rex proposes to develop the Hillside copper-gold-iron deposit, located on the Yorke Peninsula, approximately 12 km south of Ardrossan and 165 km by road from Adelaide. The Project is proposed to consist of:

- an open pit and underground mining operation and associated infrastructure;
- a minerals processing plant and associated infrastructure;
- three mine waste rock dumps (WRDs);
- a tailings storage facility (TSF);
- modification of the existing Port Ardrossan ship-loading infrastructure, and construction of new concentrate filtration and storage infrastructure; and
- supporting infrastructure, including:
    - new concentrate and water transfer pipelines between the operation and the port;
    - a new electricity supply transmission line and upgrades; and
    - realignment of nearby roadways.

Figures 1.1-1 and 1.1-2 of the MLA provide an overview of the location of the proposed operation in a regional and local context, respectively. Figures 6.1-2 and 6.6-7 of the MLA provide an overview of the mine site and port operation infrastructure layouts, respectively.

# 3 Dust Impact Assessment review

## 3.1 Supporting information

A review of the baseline information relevant to and/or contributing to the Dust Impact Assessment provided within the MLA was undertaken, and is summarised in the following sections.

### 3.1.1 Sensitive receptors

Figure 8.3-1 of the MLA and Figure 3.3 of Appendix 5.6-C (the Dust Impact Assessment Report) of the MLA illustrates the locations of the nominated sensitive receptors in the context of the proposed Mining Lease (ML) and Miscellaneous Purposes Licence (MPL) areas.

These are consistent with the nearest stakeholders identified within Section 5.3.1 of the MLA and are representative of those residences and communities most likely to be impacted by the proposed operations.

### 3.1.2 Surrounding land use

Figure 4.3 of Appendix 5.6-C of the MLA presents the surround land use information as incorporated into the Calmet model for the development of the site-specific meteorological files.

This is consistent with the description of the surrounding land use provided in Section 5.2 of the MLA.

### 3.1.3 Topography

The topography within and surrounding the proposed ML and MPL areas is discussed in Section 5.4 of the MLA, and illustrated in Figure 5.4-1. Section 4.2 of Appendix 5.6-C of the MLA. These sections discuss the development of the site-specific meteorological model including the consideration and incorporation of existing terrain and topographic information for both the Calmet outer and inner domain modelling. The meteorological model is discussed further in Section 3.1.4 of this report.

It was not evident within the MLA that project-related topographical features (specifically the WRDs and TSF) were incorporated into the development of the meteorological model used in the dispersion modelling. Also, no discussion of the significance in the local context is provided for these features, which are up to around 990 ha in area and up to around 65 m above ground level (AGL) in height. Section 5(a) of the Rex Response Document confirms that the heights of these topographic features were incorporated into the model with respect to the generation of emissions, and that the TSF and WRDs are sufficiently small relative to the modelled meteorological domain as to have little effect on regional meteorology and pollutant dispersion.

### 3.1.4 Meteorology

Section 5.7 of the MLA presents the meteorological data for the Project location. This data comes from a mix of sources, including Ardrossan (rainfall) and Price (temperature, wind speed and direction and evaporation). A weather station was also established within the ML, however data from this station are not presented within the MLA. For the purposes of the Dust Impact Assessment, a site-specific meteorological model was developed using the Weather Research and Forecasting (WRF) weather prediction model. The WRF Model produced mesoscale data based on surface observations obtained from Bureau of Meteorology (BoM) weather stations located at Edinburgh RAAF, Clare, Snowtown, Adelaide Airport, Roseworthy, Noarlunga, Port Augusta and Whyalla. This was then refined with Calmet, incorporating land use and topographic data to produce three-dimensional meteorological data suitable for use in dispersion modelling.

Section 6.2 of Appendix 5.6-C of the MLA presents the frequency distributions of stability classes for the generated meteorology, stating that 'the data shows a high frequency of occurrence of D-class stability which is typical for coastal and windy locations'. No reference is provided to support this statement.

Section 6.3 of Appendix 5.6-C of the MLA presents the diurnal variation of mixing height for the Project location, stating that 'the Calmet estimated mixing height behaviour is consistent with expectations for near-coastal locations'. No reference is provided to support this statement.

Comparison of the Calmet-generated wind speed and direction data with the observations obtained from the site weather station are presented in Section 6.1 of Appendix 5.6-C of the MLA and suggest a good correlation. The results showed the generated data having a slightly greater percentage of calm days (0.65% vs. 0.15%), a slightly lower average wind speed (4.53 m/s vs. 5.16 m/s), a higher frequency of northerly and north-westerly winds (around 17% vs. 11%) and a lower frequency of south-westerly winds (6% vs. around 10%). A comparison of the generated wind roses with those presented in Figure 5.7-5 of the MLA show a strong likeness to both the 9am and 3pm wind roses obtained from the Price BoM data. This indicates that the generated meteorology is representative of the existing meteorology of the Project location and is acceptable for use as the basis of the dust dispersion modelling.

### 3.1.5 Existing air quality

A summary of existing ambient air quality is presented in Section 5.6.2 of the MLA and discussed in greater detail in Section 8 of Appendix 5.6-C of the MLA. A baseline dust monitoring system was established in and around the ML and MPL areas, consisting of:

- 15 dust deposition gauges;
- a high-volume air sampler (HiVol) for the monitoring of Total Suspended Particulate (TSP) concentrations; and
- a Beta-Attenuation Monitor (E-BAM) for the monitoring of concentrations of particulate with an aerodynamic mean diameter of less than 10 micron ($PM_{10}$).

$PM_{10}$ and TSP monitoring was undertaken from January and February 2012 to November 2012, respectively. Dust deposition monitoring was undertaken from December 2011 to November 2012. The results of the monitoring are discussed in the following sections.

#### 3.1.5.1 Dust deposition

Dust deposition results are summarised in Table 5.6-4 of the MLA, and presented in detail in Table 8.3 of Appendix 5.6-C of the MLA. The individual monitoring location averages range from 0.38 $g/m^2$/month to 3.66 $g/m^2$/month, and the overall average is around 1.5 $g/m^2$/month, consistent with other monitoring undertaken in similar environments.

#### 3.1.5.2 Total Suspended Particulate

TSP monitoring results are discussed in Section 5.6.2.3 of the MLA, and presented in Tables 8.2 and 8.3 of Appendix 5.6-C of the MLA. The baseline average TSP concentration of 26 $\mu g/m^3$ is consistent with observed TSP concentrations in other, similar areas. The maximum observed 24-hour average TSP concentration was 178 $\mu g/m^3$.

The concentration of copper in existing TSP is provided as 0.001 $\mu g/m^3$, and it is stated that 'base metal concentrations in dust were assessed and these indicate very low levels…' however no data was provided within the MLA or Appendix 5.6-C of the MLA to support this statement. Data subsequently provided in Section 5(f) of the Rex Response Document indicates copper-in-TSP concentrations of between 0.0017 and 0.0085 $\mu g/m^3$.

#### 3.1.5.3 Fine particles

On-site $PM_{10}$ monitoring results are summarised in Section 5.6.2.2 of the MLA, and presented in detail in Section 8.2 of Appendix 5.6-C of the MLA. This data indicates that the baseline average $PM_{10}$ concentration is around 12.8 $\mu g/m^3$ with a maximum 24-hour average concentration of around 198 $\mu g/m^3$. The average concentration is consistent with observed $PM_{10}$ concentrations at other, similar areas.

Significant issues associated with the capture of data from the $PM_{10}$ monitor resulted in only 67% data availability during the monitoring campaign, however during this time, six exceedences of the National Environment Protection (Ambient Air Quality) Measure (NEPM) 24-hour average criterion were recorded. These exceedences occurred on days with relatively high northerly wind speeds, and analysis of air quality monitoring data at other monitoring stations in South Australia suggests that these events coincided with higher regional dust concentrations. A polar plot of hourly average $PM_{10}$ concentrations against wind speed and direction provides further evidence that strong winds from the north, north-west result in greater observed dust concentrations at the Project site.

## 3.2 Air quality criteria

Table 8.3-1 of the MLA and Section 5.1 of Appendix 5.6-C of the MLA present the dust impact assessment criteria for the Project, repeated in Table 1.

**Table 3.1: Proposed dust impact assessment criteria**

| Parameter | Criterion | Reference |
|---|---|---|
| $PM_{10}$ | 50 µg/$m^3$ 24-hour average (including background $PM_{10}$) | Ambient Air Quality NEPM |
| TSP | 90 µg/$m^3$ annual average (including background TSP) | Queensland Environment Protection (Air) Policy 2008 |
| Dust deposition | 2 g/$m^2$/month annual average (operational contribution) | Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (2005) |
| | 4 g/$m^2$/month annual average (including background deposition) | |

The nominated criteria were agreed in discussions between Rex and DMITRE and the SA EPA and, where presented, are consistent with the Ambient Air Quality NEPM (representing the current state of particulate health science in an Australian context) and are commonly used by industry. In view of the lack of any South Australian-specific health and amenity dust criteria, the use of these criteria is reasonable and appropriate.

Section 5(o) of the Rex Response Document provides a justification for the omission of $PM_{2.5}$-related criteria (related to the lack of available regional $PM_{2.5}$ data and the immaturity of the $PM_{2.5}$ emission factors for the prediction of $PM_{2.5}$ emissions) which are considered reasonable with regards to the likely representativeness of any $PM_{2.5}$ dispersion modelling. The current health science described in the 2011 Ambient Air Quality NEPM Review Report does, however, suggest that there may be distinct health impacts associated with exposure to $PM_{2.5}$-sized particles, and does recommend that the current NEPM advisory reporting standards for $PM_{2.5}$ (being a 24-hour average of 25 µg/$m^3$ and an annual average of 8 µg/$m^3$) be replaced with compliance criteria. For this reason it is considered appropriate that the real-time dust monitoring to be installed in and around the Rex operations be capable of monitoring $PM_{2.5}$ in order to assess on-going compliance with these standards.

Section 4.4.1 of Appendix 5.6-C of the MLP specifies the annual average TSP criterion as a measure of nuisance dust impacts (i.e. amenity impacts). Community and/or individual perceptions of dust have been shown to not correlate to measured dust concentrations, rather are based on visual cues associated with dust such as dust deposition onto roofs or cars, general haze etc (Dean et al., 1987; ACARP, 1999). Studies undertaken in the Hunter Valley in New South Wales indicate that the perception of dust is more closely related to the receivers previous exposure to dusty environments, the nature of their relationship to the generator of the dust and the rate of increase or decrease in dust concentrations over time, with a greater perception of dust with increasing magnitude of dust concentration fluctuations. In Section 5(p) of the Rex Response Document, limitations in the model's ability to predict short-term dust deposition rates with an appropriate level of accuracy are detailed. Given these limitations, the use of monthly and annual average dust deposition rates as a measure of the *potential* of the operation to influence amenity is appropriate.

A comparison of the nominated air quality criteria against that monitored at other, similar operations is provided in Section 4.

## 3.3 Air quality model

The developed air quality model was reviewed in the context of the information presented in the MLA, the assumptions and variables used, the appropriateness of the emission estimation techniques applied and the suitability of the modelling scenarios. Where uncertainties were noted or additional context required, information was requested of Rex, with their responses provided in the Rex Response Document. In additional, revised dispersion modelling was undertaken subsequent to the submission of the MLA, with the results presented in the Rex Dispersion Modelling Update, presented as Appendix 4 to the Rex Response Document. The findings are presented in the following sections.

### 3.3.1 Background concentrations

Background concentrations of $PM_{10}$ and TSP were added to the model outcomes in order to assess against the nominated criteria.

Due to the low data availability from the on-site $PM_{10}$ monitoring station, background $PM_{10}$ data from the Environment Protection Authority South Australia (EPA)-operated $PM_{10}$ monitoring station at Schulz Reserve, Whyalla. Given the significant deficiencies associated with the on-site data, this is considered appropriate. A comparison of the limited on-site data with that observed at Schulz Reserve indicates that the data are representative, with the $70^{th}$ percentile $PM_{10}$ concentration from the EPA data (18.1 µg/$m^3$, being the background concentration calculated using the methodology specified within the Victorian State Environment Protection (Air Quality Management) Policy 2011) calculated to be equivalent to the $79^{th}$ percentile concentration measured on-site. Table B.4.1 of Appendix 5.6-C of the MLA indicates that, in 2012, the Schulz Reserve site recorded no exceedences of the 24-hour average criteria, whereas Section 8.2 of the same Appendix observed six exceedences over roughly the same time period (limited data availability notwithstanding). This suggests that although the average $PM_{10}$ dust concentration on-site appears lower than the equivalent concentration at Whyalla, the Project site may be subject to more peak dust events. Reasons for this are not discussed within the MLA. A statistical analysis of the Schulz Reserve $PM_{10}$ data was undertaken in order to determine the appropriateness of the use of the $70^{th}$ percentile value as indicative of background $PM_{10}$ dust concentrations (see Section B.5.2 of Appendix 5.6-C of the MLA). The results of this analysis indicated only minor differences in the maximum ground-level $PM_{10}$ concentrations at the nearest sensitive receptors, suggesting the use of the $70^{th}$ percentile background concentration is appropriate.

The annual average background TSP concentration was derived from the average of the data observed from the on-site HiVol (being 26 µg/$m^3$, see Section 3.1.5.2 of this report). Background concentrations of dust deposition were not added to the modelling results, rather results were compared against only the 2 g/$m^2$/month 'permissible increase' criterion. It is recommended that during operations, compliance against 4 g/$m^2$/month total dust deposition criterion nominated in Table 8.3-1 of the MLA be assessed in addition to the 'permissible increase' criterion.

### 3.3.2 Modelled scenarios

Section 3 of Appendix 5.6-C of the MLA outlines the modelled scenario, which is proposed to be a representation of Year 5 of operations. Aspects associated with the modelled scenario are discussed in further detail in the following sections.

#### 3.3.2.1 Site layout

The modelled site layout is presented in Figures 3.1 and 3.2 of Appendix 5.6-C of the MLA, representing Year 5 of the proposed mining operations and Option 1 of the Port Ardrossan components of the Project.

The layout of the proposed mining operations presented in Figure 3.1 of Appendix 5.6-C of the MLA differ significantly from that proposed in the MLA, specifically:

1. The footprint of the Western WRD is smaller than that proposed in Figure 6.1-2 of the MLA as a result of modelling the 'high aspect ratio' TSF/WRD option, rather than the 'low aspect ratio' TSF/WRD option proposed in the MLA. This results in the modelling having been undertaken with a Western WRD footprint of around 684 ha (and a TSF final height of around 105 m AGL) versus that proposal within the MLA which presents a Western WRD footprint of around 830 ha (at a TSF final height of around 65 m AGL). As discussed in Section 3.1.3 of this report, it's not clear what, if any, topography associated with the WRDs/TSF was included in the model. Section 8.3.1.1 of the MLA presents a discussion of the likely significance of the use of the high aspect ratio operational footprint; however without undertaking the requisite modelling of the correct operational footprint, the accuracy of this justification cannot be verified.
2. The Eastern WRD footprint location as presented in Figure 3.1 of Appendix 5.6-C of the MLA is broken down into the Northern and Southern WRDs in Figure 6.1-2 of the MLA, and the low-grade, oxide, subsoil and topsoil stockpiles are further differentiated. Whilst the total area of these stockpiles equates approximately to the modelled Eastern WRD, the nature (location, height and material properties) of these stockpiles, in particular the topsoil and subsoil stockpiles, are likely to differ from that of the bulk waste rock which may influence their propensity to generate dust as a result of wind erosion.
3. Figure 6.5-12 of the MLA presents the location of soil stockpiles surrounding the WRDs. These locations are not presented in Figure 3.1 of Appendix 5.6-C of the MLA nor do the wind erosion emission factors discussed later indicate that they've been assessed. This may be the result of an assumption that these stockpiles are revegetated at Year 5, however this assumption is not stated.
4. Section 6.5.8.1 of the MLA suggests the Run-of-Mine (ROM) stockpile will be sufficient for 1.5 days of processing. Although no size is presented within the MLA, this equates to around 0.5 ha, significantly less area than presented within the dust impact assessment, which assumed 5.5 ha plus 1.9 ha associated with a 'Main Copper Stockpile' which is also not discussed within the MLA.

The haul roads presented in Figure 3.1 of Appendix 5.6-C of the MLA have a total length of 6.6 km (see Table 11.12 of Appendix 5.6-C of the MLA) and are modelled to occur at ground level on the

southern boundary of the Western WRD, and around northern and western sides of the open pit. Whilst this may represent a worst case in terms of the proximity of the dust emissions to the nearest sensitive receptor (located on the ML to the south of the Western WRD), it did not consider that waste rock hauling and dumping operations will occur at all points of the WRDs in order to provide sufficient material for the construction of the TSF embankments. As a result, the total length and the locations of the haul roads modelled within the MLA may not be representative of how and where haulage and dumping operations would actually be undertaken.

Subsequent to the submission of the MLA, revised dust dispersion modelling was undertaken by Rex (presented as Appendix 4 to the Rex Response Document), addressing the above-mentioned issues associated with the representativeness of the site layout. The revised modelling is considered to appropriately reflect the Project as presented within the MLA.

Option 1 of the proposed Port Ardrossan upgrade was modelled in preference to Options 2 and 3. As Option 1 is the only alternative that requires land clearing, and given the low emission rates predicted as a result of port operations, this is considered appropriate.

#### 3.3.2.2 Mining rates

The mining rates modelled within Appendix 5.6-C of the MLA for Year 5 were 15 Mtpa of ore movement and 60 Mtpa of waste rock movement (see Table 11.7 of Appendix 5.6-C of the MLA). These were significantly less than the peak material movement rates proposed within the MLA, which are up to 26 Mtpa of ore movement, of which 15 Mtpa would proceed through the crusher and minerals processing plant, the rest stockpiled (see Figure 6.4-15 and Section 6.4.3.1 of the MLA). Waste rock movement peaks at 105 Mtpa and averages around 100 Mtpa (see Sections 6.2.3 and 6.4.3 of the MLA).

The dispersion modelling undertaken by Rex subsequent to the submission of the MLA revised the waste rock handling rate to 125 Mtpa, for a total material handling rate of 140 Mtpa versus the 131 Mtpa peak rate described in the MLA. This is significantly greater than the 75 Mtpa assumed in the modelling presented within Appendix 5.6-C of the MLA, and is considered representative of the Project as described in the MLA.

#### 3.3.2.3 Other variables

The moisture content of the ore is assumed in the estimation of emissions from various mining and materials handling activities. Throughout the development of these emission estimates, the moisture content of the ore and waste rock is variously referenced as ‘greater than 4%’ (Section A.1.1.1 of Appendix 5.6-C of the MLA), 4.8% (Tables 11.5 and 11.32 of Appendix 5.6-C of the MLA) and 10% (Table 11.36 of Appendix 5.6-C of the MLA). Section 5(c) of the Rex Response Document provides further justification for the use of these factors, and is considered reasonable and appropriate.

The silt content of the haul roads has been assumed to be 4.3% (Section B.2.2.2 of Appendix 5.6-C of the MLA) which is less than the most conservative assumption for haul road silt content (being 8.4%, see Table 11.10 of Appendix 5.6-C of the MLA) but greater than the silt contents measured

at three coal mining operations in New South Wales (see Section B.2.2.2 of Appendix 5.6-C of the MLA) which averaged 2.7%, and results in an overall wheel-generated dust emission rate more conservative than that used in other, similar assessments undertaken within South Australia. Section 5(b) of the Rex Response Document notes the lack of available silt content data for Australian operations, provides clarification of the uncertainties around this assumption, and commits the Project to the development of high quality haul roads designed specifically for the nominated haul truck weights. In this context, the use of 4.3% silt content is considered reasonable and appropriate.

### 3.3.3 Emission factors

The development of emission estimations for the Project is documented in Appendix A of Appendix 5.6-C of the MLA. These were reviewed for appropriateness and, where possible, recalculated to ensure they had been applied correctly. Where uncertainties were noted or additional context required, information was requested of Rex, with their responses provided in the Rex Response Document. The findings are presented in the following sections.

#### 3.3.3.1 Primary crusher loading operations

Section A.1.1.1 of Appendix 5.6-C of the MLA details the development of emissions estimates associated with the unloading of ore from the ROM stockpile to the primary crusher (referred to as 'loading operations' in Section A.1.1.1 of the MLA). Assuming the ore is considered 'high moisture' (see Section 3.3.2.3 of this report), the use of the chosen emission factors is appropriate, and the modelled material movement rate (15 Mtpa) is consistent with the maximum throughput of the primary crusher. The assumed control efficiency of 85% is calculated as a result of a 70% reduction in dust associated with the general enclosure of the primary crusher (details of which are not provided in the MLA or Appendix 5.6-C of the MLA) and a further 50% for the use of water sprays.

Section 5(l) of the Rex Response Document notes that the emission factors used are many times greater than those for 'normal' vehicle unloading operations and are thus considered conservative. In this context, the emission and control factors used are considered appropriate.

#### 3.3.3.2 Unloading operations

Section A.1.1.2 of Appendix 5.6-C of the MLA details the development of emissions estimates associated with the unloading of ore and waste rock materials to stockpiles. The emission factors used are presented in US EPA AP-42 Chapter 13.2.4 (Aggregate Handling and Storage Piles), and were 0.000890 kg of dust per tonne of material movement for TSP and 0.000421 kg/t for $PM_{10}$. These are an order of magnitude less than the more commonly used emission factors for the unloading of overburden from haul trucks presented in Table 2 of the Australian National Pollutant Inventory (NPI) Emission Estimation Technique (EET) Manual for Mining (v3.1) of 0.012 kg/t for TSP and 0.0043 kg/t for $PM_{10}$.

Section 5(g) of the Rex Response Document states that due to the nature of the NPI emission factor development, the use of the NPI emission factor is likely to result in an over-estimation of

dust emissions because it's been developed for coal overburden which is generally more weathered and likely to contain a greater proportion of fine material. In order to reduce the level of conservatism in the dispersion model, the lower AP-42 emission factors have been applied. Whilst the Rex response is noted and confirmed to some extent by the NPI documentation (i.e. Section 1.2.2 of the NPI for Mining presents the USEPA factor for use) this same documentation notes that, as per coal overburden loading and unloading, the equation 'gives estimates that are unrealistically low for Australian conditions' and further that 'the equation provides estimates that are significantly less (a factor of 5 to 10 less) than appears reasonable based on NERDDC measurements'. In the context of the Project, the contribution of loading and unloading operations to overall dust generation is relatively small in comparison to the contribution of wheel-generated dusts, and is therefore unlikely to significantly influence overall ground-level dust concentrations regardless of the exact emission factor implemented. In this context, the use of the chosen AP-42 emission factor is reasonable.

The assumed control factor of 70% associated with the use of water sprays during truck unloading is referenced and appropriate.

#### 3.3.3.3 Wheel-generated dust

The emissions estimates for wheel-generated dusts were presented in Section A.1.2 of Appendix 5.6-C of the MLA, and subsequently revised and remodelled in Revision 3 of the Appendix (dated 31 July 2013) and attached as Section B.2 to Appendix 5.6-C of the MLA.

Both the initial and revised wheel-generated dust emission estimation used the 2006 US EPA emission equation for unpaved roads (Section 13.2.2). This is considered appropriate and consistent with other similar air quality assessments; the primary difference being the referenced efficiency following the application of dust control measures and the assumed silt content of the haul road surface. Discussion regarding uncertainty associated with the silt content of haul roads within the dust impact assessment was provided in Section 3.3.2.3 of this report.

The dust control efficiency was initially referenced as being 93% to 97%, depending on the location of the haul road, with haul roads located within the pit achieving a higher control efficiency as a result of generated dust settling out prior to exiting the pit. This control efficiency was based on the use of chemical (salt-based) dust suppressants, however is inconsistent with the control efficiencies provided within the NPI Mining EET, which suggest a 75% control efficiency when around 2 L/$m^2$/hour of water is applied to an unpaved surface. The NPI value is based on the use of default (or standard) values for average daily evaporation rate, average hourly traffic movements, water application intensity and the time between water applications in an equation developed by Cowherd, Muleski and Kinsey (1988). The revised emission estimate presented in Section B.2.2.1 of Appendix 5.6-C of the MLA substitutes Project site-specific data into this equation to produce a revised control efficiency of 83.5%, which is consistent with the control efficiency assumed in other, similar air quality assessments in South Australia. The revised assessment states that 'The salinity of the available water will also in all likelihood produce better dust suppression performance than an equal amount of fresh water', although no reference is provided to support this statement.

The revised assessment also updated the nature of the haul trucks proposed to be used in the Project to ones of a greater payload (216 t vs. 177 t) meaning fewer truck movements (i.e. fewer kilometres travelled and hence less dust generation) for a given amount of material movement. This is consistent with the type of haul trucks proposed within Table 6.5-1 of the MLA.

Issues associated with the nature (length and location) of the modelled haul roads themselves was discussed in Section 3.3.2.1. Section 5(j) of the Rex Response Document confirms that emissions of wheel-generated dust include the return trips and were calculated for the average haul truck weights (loaded and unloaded). This is considered reasonable and appropriate.

#### 3.3.3.4 Drilling and blasting

Drilling and blasting emissions are estimated in Section A.1.3 and A.1.4 of Appendix 5.6-C. of the MLA The emission factors are equivalent to those presented in the NPI Mining EET, and are appropriate for the nature of the operation. Assumptions regarding the drill and blast area are based on discussions with Rex and are not discussed within the MLA. The modelling has assumed one blast per day, however Section 6.5.6.2 of the MLA indicates that blasting will occur every second day. Section 4(c) of the Rex Response Document suggests that the dispersion model conservatively assumed that the size of the blast (500,000 t) blasted every two days was blasted every day. This ensured that the effects of blasting were considered in all daily dispersion conditions. This is considered reasonable and conservative.

A control efficiency of 99% has been applied to the drilling operations as a result of a commitment to use fabric dust filters on the drilling rigs, with additional mitigation assumed as a result of a pit retention factor, assuming that all drilling and blasting occurs within the pit. The information provided within the MLA or Appendix 5.6-C of the MLA does not indicate at what pit depth drilling and blasting operations would commence, however the application, or otherwise, of the pit retention factor to drilling and blasting operations is unlikely to significantly influence resultant ground-level dust concentrations and is therefore considered reasonable.

#### 3.3.3.5 Wind erosion

Section A.1.5 of Appendix 5.6-C of the MLA discussed the derivation of emissions estimates as a result of the wind erosion of stockpile surfaces. As discussed in Section 3.3.2.1, there were potentially significant discrepancies between the modelled site layout and that presented within the MLA, however these have been addressed in the revised dispersion modelling undertaken subsequent to the submission of the MLA (as presented in Appendix 4 to the Rex Response Document). Beyond this, the emission factors applied are consistent with those used in other, similar air quality assessments and are considered appropriate.

Rainfall data used in the development of the emissions estimates was obtained from the BoM meteorological station at Pine Point, located about 3 km from the boundary of the ML (see Section 5.3.1 of the MLA) and is considered representative of conditions at the Project location.

The control efficiencies associated with the mitigation of wind erosion from the stockpiles is limited to water sprays and wind breaks on the ROM and copper stockpiles (65% efficient), with

no control assumed for the WRDs. These efficiencies are consistent with those presented in the NPI Mining EET.

#### 3.3.3.6 Crushing

Crushing emissions are calculated in Section A.1.6 of Appendix 5.6-C of the MLA, using AP-42 emission factors that are also contained within the NPI Mining EET and consistent with those used for other, similar air quality assessments. Similarly, the control efficiencies are consistent with the factors presented in the NPI Mining EET. The crusher throughput (15 Mtpa) corresponds to the maximum throughput nominated in Section 6.2.2.2 of the MLA.

#### 3.3.3.7 Miscellaneous conveyor transfer points

Emissions from materials handling via conveyors are calculated in Section A.1.7 of Appendix 5.6-C of the MLA, using the high-moisture emission factors consistent with those provided in Table 3 of the NPI Mining EET and considered appropriate for operations of this nature. The use of water sprays and wind breaks (the conveyors will act as wind breaks located between the Western and Northern WRDs) as controls are appropriate, and the proposed material throughput (15 Mtpa) corresponds to the maximum throughput nominated in Section 6.2.2.2 of the MLA.

#### 3.3.3.8 Miscellaneous stockpile transfer points

Section A.1.8 of Appendix 5.6-C of the MLA estimates the emissions associated with the loading of waste rock and ore within the open pit operations and the loading of ore from the ROM pad into haul trucks bound for the primary crusher. The emission factors used are the same as those presented for the unloading of materials at stockpiles (Section A.1.2 of Appendix 5.6-C of the MLA) and the comments provided in Section 3.3.3.2 of this report are also applicable to the emission factors utilised here.

The control efficiencies used (being water sprays and pit retention) are referenced and appropriate.

#### 3.3.3.9 Bulldozing operations

Section A.1.9 of Appendix 5.6-C of the MLA provides the estimation of emissions associated with the bulldozing of material within the open pit and on the associated stockpiles. The emission factor is obtained from the NPI Mining EET and is consistent with that used in other, similar air quality assessments; as are the control efficiencies.

#### 3.3.3.10 Port operations

The emission factors, presented in Section A.1.10 of Appendix 5.6-C of the MLA, covering the transfer and handling of concentrates via conveyors and subsequent ship loading activities are referenced and appropriate to the nature of the proposed operations; as are the proposed control efficiencies. The total material throughput is consistent with the rate of concentrate production detailed in Section 6.6.5.1 of the MLA. The rate of ship-loading is stated as 2,000 kg/h

(confirmed as a typographical error, and actually representing 2,000 t/h) in Table 11.41 of Appendix 5.6-C of the MLA, which is consistent with the standard operating capacity of the ship-loading infrastructure (see Section 4(d) of the Rex Response Document). It is understood that the (17% greater) 2,400 t/h capacity nominated in Table 6.6-3 of the MLA refers to the maximum conveyor system handling rate, and not its standard capacity.

### 3.3.4 Omissions

During the review, it was noted that some potential emissions sources have not been included in the emissions inventory. These are discussed in the following sections.

#### 3.3.4.1 Wind erosion of cleared areas

The wind erosion emission estimate provided in Section A.1.5 of the MLA covers the following areas:

- ROM stockpile;
- Copper Ore Main Stockpile;
- Eastern WRD (referenced as the Northern and Southern WRDs in the MLA); and
- Western WRD.

Wind erosion from other cleared areas have not been estimated; specifically from the surface of haul roads, the area of which totals around 23 ha. Section 5(m) of the Rex Response Document states that research undertaken on various sites indicates that on haul roads with a high traffic frequency (as proposed by the Project), surface dusts are suspended by the action of the haul trucks rather than through wind erosion, and are therefore excluded to avoid 'double counting' of the dust contribution. Based on the Rex response, this is considered appropriate.

#### 3.3.4.2 Underground mining emissions

At Year 6, it is proposed that underground mining operations would commence concurrently with open pit mining operations at rate of around 4 Mtpa, with both operations continuing until the cessation of open pit mining operations in Year 10 (see Section 6.2.4.3 of the MLA). Section 3.3 of Appendix 5.6-C of the MLA states that the modelling is based on the operation at Year 5 prior to the commencement of underground operations. Justification for the choice of this year is relates to discussion of the closure and rehabilitation of the Eastern WRD (Northern and Southern WRDs in the MLA) at the end of Year 5.

Emissions of dust and saline aerosol from the underground operations would be directed to an evase located within the open pit, limiting the concentration and dispersion of any entrained materials (Section 5(n) of the Rex Response Document).

#### 3.3.4.3 Tailings Storage Facility dust emissions

Post-closure dust emissions from the TSF were not explicitly assessed within the MLP or supporting Appendices. This is consistent with other air quality modelling studies undertaken,

most of which model one or two scenarios during operations only. Emissions from the TSF during operations are rarely included in air quality assessments as it is assumed that the tailings material (typically delivered via a ring of spigots at a solids concentration between 45-60% solids) will remain sufficiently moist to prevent the wind-generation of dust. The proposed Project TSF has a design rate of rise of around 3 m/year, and a design solids concentration of 58% solids and as a result it is unlikely that any of the beach areas of the TSF will dry sufficiently to dust during the operational stage of the Project (refer to Section 8.2 of Appendix 49 of the Rex Response Document).

Comments provided to DMITRE by Rex subsequent to the submission of the MLP suggest that post-closure (but prior to capping/rehabilitation) dust emissions from the TSF are unlikely because the saline nature of the tailings is likely to form a salt "crust" which effectively limits the potential for wind erosion. This is considered to be generally true provided that the tailings mass is adequately consolidated, although no specific reference is provided to support this statement. On this, the Independent Technical Review of the proposed TSF design and operation (see Section 3.2 of Appendix 49 of the Rex Response Document) suggests that "…this reduces the rate of rise to a level (less than 3 m/year) at which full consolidation should be achieved".

Conservatively, post closure emissions from all cleared areas associated with the operation, including the TSF, may have been estimated using guidance from the NPI and US EPA AP-42 Emission Estimation Techniques manuals for wind erosion (these methodologies assume that wind-generated dust from cleared areas is only generated above a wind speed threshold of around 5.4 m/s. Data provided in Figure 5.7-5 of the MLP indicates the percentage of time with wind speeds greater than this is around 14% at 9am, and 31% at 3pm). It is considered, however, that these emissions, in total, would be considerably less than the emissions predicted to be generated during operations, and hence represent a lesser potential for health and amenity impact. This is especially true of the TSF emissions themselves, which would likely be reduced as a result of the high salt content of the tailings as per Rex's response. Furthermore, mitigation could be applied (e.g. water sprays, sprinklers, surface coatings (e.g. mulch or chemical stabilisers)) at times when high wind speed events are forecast to assist in the mitigation of emissions from cleared areas prior to capping and/or revegetation.

### 3.3.5 Model outcomes

The outcomes of the initial dust modelling were presented in concentration isopleths (contours) as Figures 8.3-2 and 8.3-3 within the MLA and discussed in detail in Section 9.2 of Appendix 5.6-C of the MLA. Results of revised modelling, taking into account changes to the emission estimates associated with wheel-generated dust (see Section 3.3.3.3 of this report) were presented in Section B.5 of Appendix 5.6-C of the MLA. The latest dispersion modelling results (Appendix 4 of the Rex Response Document) incorporating changes to the site layout and mining rates are discussed in the following sections.

#### 3.3.5.1 $PM_{10}$ ground level concentrations

The results of the initial $PM_{10}$ modelling suggest that 24-hour average $PM_{10}$ concentrations (including the contribution of background dust) would comply with the nominated $PM_{10}$ criteria at

all receptors, including those receptors adjacent to the proposed port operations, with the exception of the two residences located immediately south of the proposed mining operations. These would experience up to three exceedences of the criterion over the modelled year. The results of the initial revised modelling presented within the MLA, incorporating changes to the wheel-generated dust emission estimates, indicated that overall ground-level concentrations would increase slightly at all receptors but remain compliant for all but the two residences immediately south of the proposed mining operations. The number of exceedences would increase slightly from three days to four days at the nearest receptor. The results of the dispersion modelling update undertaken subsequent to the submission of the MLA (Appendix 4 of the Rex Response Document) indicate that, with the Project configuration and at the rates outlined in the MLA and without the implementation of operational control, exceedences of the nominated criterion are predicted for one day at Receptor 4, two days for each of Receptors 10 and 11, nine days at Receptor 8 and ten days at Receptor 9.

The addition of a statistically-generated background $PM_{10}$ concentration in preference to the use of the $70^{th}$ percentile background concentration was discussed in Section B.5.2 of Appendix 5.6-C of the MLA, with the results of the statistical analysis presented in Table B.5.2. These suggest that the nominated criteria would be exceeded at all receptors as a result of non-operational background $PM_{10}$ concentrations on three days per year, in addition to the exceedences summarised above.

Further measures for the control of dust are discussed in Section 3.4.

#### 3.3.5.2 TSP ground level concentrations and dust depositions

Section B.5.3 of Appendix 5.6-C of the MLA provides tabulated TSP and dust deposition results for the revised modelling with the results of the initial modelling provided for comparison, both sets of results being essentially identical. The updated dispersion modelling results generated subsequent to the submission of the MLA are presented in Table 3 of Appendix 4 of the Rex Response Document, and are only slightly (between around 2% and 20%) greater than those presented in the MLA. The TSP results include the measured annual average background TSP concentration, however, the dust deposition results do not include a background component, and comparison of total dust deposition to the 4 $g/m^2$/month criterion is not provided. The results indicate that total annual average TSP concentrations and operationally-contributed annual average dust deposition rates are well within the nominated criteria.

## 3.4 Dust control

### 3.4.1 Dust mitigation commitments

Dust mitigation measures are incorporated into developed emission estimates, and are summarised in Table 7.4 of Appendix 5.6-C of the MLA. Comments regarding the suitability or otherwise of these control measures was provided in Section 3.3.3 of this report.

To ensure that the impact assessments (and associated risk mitigation measures) outside of the air quality works presented in the MLA were reflected in the dust impact assessment, a review of

the commitments to dust mitigation discussed within the MLA was undertaken. The results are presented in Table 2 for mining operations within the ML area and Table 3 for port operations within the MPL area.

**Table 3.2: Committed dust mitigation measures within the MLA (mining operations)**

| Impact assessment | Potential dust-related impacts | Mitigation commitment | Reflected in the dust impact assessment? |
|---|---|---|---|
| Native flora | Land clearance as a result of the use of saline dust suppression water | Minimise the over-spraying of areas with saline water | Not applicable |
| | | Use of fresh water for dust suppression on topsoil and subsoil stockpiles | Yes - Emissions from topsoil and subsoil stockpiles not modelled (see Section 3.3.2.1 of this Report) |
| Surface water, soil salinity and land disturbance | Contamination of surface water and soils with salt from the use of saline dust suppression water | Trafficable and working areas will be sealed with compacted material or road base | Yes |
| | | All exposed soils will be protected from erosion and revegetated as soon as practicable | Yes - Emissions from cleared areas other than stockpiles not modelled (see Section 3.3.4.1 of this Report). |
| | | Soil stockpiles will be vegetated, and cover will be maintained until the soil is required for rehabilitation | Yes - Emissions from topsoil and subsoil stockpiles not modelled (see Section 3.3.2.1 of this Report) |
| | | Soil stockpiles will be stabilised with physical and/or chemical binders until rehabilitation can be conducted | Yes - Emissions from topsoil and subsoil stockpiles not modelled (see Section 3.3.2.1 of this Report) |
| | | Windbreaks will be incorporated into the mine plan, consisting of vegetation barriers and vegetated embankments | Yes |
| | | Dust suppression with saline water will not occur on revegetated areas | Yes - revised modelling has assumed fresh water for dust suppression |
| Traffic | Dust generation as a result of increased traffic on minor roads | Unpaved minor roads that will see an increase in traffic will be sealed (Section 8.3.15.3 of MLA) | Yes - emissions from unpaved roads outside of the ML not modelled |
| Adjacent land use | Reduction in crop yields and a reduction in soil quality as a result of dust deposition | Refers to dust control measures committed to within the dust impact assessment | Yes |

**Table 3.3: Committed dust mitigation measures within the MLA (port operations)**

| Impact assessment | Potential dust-related impacts | Mitigation commitment | Reflected in the dust impact assessment? |
|---|---|---|---|
| Visual amenity | Nuisance dust | Refers to dust control measures committed to within the dust impact assessment | Yes |
| Native flora | Land clearance as a result of the use of saline dust suppression water | Use of fresh water for dust suppression on topsoil stockpiles | Yes - Emissions from topsoil and subsoil stockpiles not modelled (see Section 3.3.2.1 of this Report) |
| Surface water, soil salinity and land disturbance | Contamination of surface water and soils with wind-blown topsoil from stockpiles | Limiting the height of stockpiles to less than 3 m | Yes – wind erosion of topsoil stockpiles at the port not modelled |
| | | Soil stockpiles will be vegetated, and cover will be maintained until the soil is required for rehabilitation | Yes - Emissions from topsoil and subsoil stockpiles not modelled (see Section 3.3.2.1 of this Report) |
| | Spillage and subsequent wind-erosion of concentrates leading to soil contamination | Conveyor belt washers | Not applicable |
| | | Concrete bunding | Not applicable |
| | | Enclosure of conveyors, sheds and transfer points and the installation of dust extraction systems | Yes |
| Coastal and marine environment | Spillage of concentrate | Not assessed (refers to assessments to be undertaken as a component of the Port Upgrade Development Applications | Not applicable |
| Adjacent land use | Contamination of grain storages | Refers to dust control measures committed to within the dust impact assessment | Yes |

The dust mitigation measures committed to within the MLA for the reduction of impact severity are adequately represented by the dust impact assessment presented in Sections 8.3.1 and 8.4.1 of the MLA, Appendix 5.6-C of the MLA and in the updated dispersion modelling presented in Appendix 4 of the Rex Response Document.

### 3.4.2 Dust management

Further to the commitments described in Section 3.4.1 of this report, Sections 8.3.1.3 and 8.4.1.3 of the MLA and the discussion of the updated dispersion modelling results presented in Appendix 4 of the Rex Response Document describe the operational management controls that would be implemented to further manage the potential for dust emissions. The use of an active dust management system (comprising real-time dust monitoring systems and reactive (and predictive) operational control to manage dust-generating operations to ensure that ground-level dust concentration criteria at nearby receptors are complied with) is a measure used in other, similar operations and is considered reasonable and appropriate. The detail around how these would be implemented is deferred to an Air Quality Management Plan, the contents of which are not known. The suitability of the systems, particularly in relation to the real-time monitoring components, should be assessed prior to the commencement of operations.

## 3.5 Impact assessment and conclusions

An evaluation of the risk associated with the potential impacts of dust emissions within and surrounding the ML and within and surrounding the MPL are described in Section 8.3.1.4 and 8.4.1.4 of the MLA, respectively, and further detailed in Sections 9.2.3 and 10 of Appendix 5.6-C of the MLA. These were reviewed to determine whether they accurately reflected the outcomes of the dust impact assessment, notwithstanding the comments regarding the development of the air quality model outlined in Section 3.3 of this report, and whether they were supported by the information presented within the MLA. The results of this review are presented in the following sections.

### 3.5.1 Human health impacts

The modelling results presented within Appendix 4 of the Rex Response Document indicate that some exceedences of the $PM_{10}$ 24-hour average criterion are expected at up to six of the nearest sensitive receptors to the mining operations. The number of exceedences per year is predicted to be up to around ten at one residence, less at the other residences. The results of the modelling using a statistically-generated background dust concentration, i.e. excluding any operational contribution, indicated that natural background dust could exceed the criterion at all receptors around three times per annum.

In order to manage the risks these exceedences may present to human health, Rex has committed to the implementation of an active operational monitoring and response plan. The plan is designed to monitor dust concentrations in real-time and apply further mitigation and/or reduce or suspend mining operations to ensure that the $PM_{10}$ 24-hour average dust concentration does not exceed the criterion, including both operational and background sources of dust. Also, if the background concentration alone exceeds the criterion, the operation presents no additional dust contribution at nearby sensitive receptors.

The measures outlined above, if implemented as stated, will adequately manage the generation of $PM_{10}$ dusts to levels within the nominated 24-hour criterion, and thus are considered to provide adequate protection against the health impacts associated with inhalation of $PM_{10}$ dusts. The health risks presented by exposure to long-term (annual average) $PM_{10}$ concentrations and both short-term and long-term exposures to $PM_{2.5}$ dusts have not been assessed, however the active measures required to ensure compliance with the $PM_{10}$ 24-hour criterion are likely to also provide an adequate level of protection against the health effects of these exposures. The conclusion that the potential for human health impacts is unlikely and the consequence minor, resulting in a low residual risk, is therefore supported by the data presented within the MLA.

### 3.5.2 Contamination of rainwater tanks

Modelling of dust deposition rates associated with the Project has been undertaken, suggesting that the additional, operationally-contributed dust deposition is minor in nature relative to existing baseline dust deposition monitoring undertaken.

Section 8.3.1.4 of the MLA suggests that water quality sampling of two rainwater tanks at James Well and Rouges Point was undertaken, the results indicating compliance with the Australian Drinking Water Quality Guidelines (ADWG) and that metals and minerals concentrations were very low. Section 5(e) of the Rex Response Document presents the results of this sampling and confirms that the rainwater is currently compliant with the ADWG standards. The impacts assessment presented within the MLA is based on the low predicted dust deposition rate, the predicted low levels of minerals potentially hazardous to human health within ore dust based on core samples (confirmed in Section 5(d) of the Rex Response Document and the low baseline metals and minerals concentrations in existing rainwater tanks. Based on this information, the conclusion that the potential for this dust deposition to impact drinking water as a result of entering rainwater tanks represents a low residual risk is reasonable.

### 3.5.3 Contamination of grain storages

The existing grain storages (bunkers) at the port will be located adjacent to the proposed concentrate handling port operations, and consequently, any release of dust from the concentrate handling operations may negatively impact the grain quality. The thoroughness of the dust controls to be implemented at the port have been predicted to result in only minor concentrations of dust being generated and low rates of dust deposition. There is, however, no information presented within the MLA to place these concentrations and rates into context, specifically no discussion about the turnover/throughput of the grain storages or reference to standards or guidelines that describe the permissible concentrations of elements in grain. As a result, the assessment of the potential of generated concentrate dust to impact the grain as representing a low risk is not demonstrated by the information presented in the MLA or within the Rex Response Document.

### 3.5.4 Public nuisance dust

The residual risk predicted as a result of nuisance dust is assessed as moderate, based on the likelihood of an exceedance of the operationally-contributed dust deposition criterion of unlikely, and a consequence of moderate. It is not clear from the description provided within the MLA what impacts are considered a public nuisance, for example, dust deposition onto washing, cars and/or roofs, visual amenity (i.e. the presence of dust haze), etc.

The factors influencing community perceptions of dust were discussed in Section 3.2 of this report, with studies undertaken in the Hunter Valley (NSW) indicating that such perceptions did not correlate with measured dust concentrations, rather were the result of a variety of community, individual and dust-related factors. The use of long-term (annual average) criteria for assessment of the scale of nuisance dust impacts is not consistent with studies that indicate that short-term fluctuations in relative dust concentrations are more likely to result in a negative perception, however, as noted in Section 5(p) of the Rex Response Document, the modelling of shorter time periods is limited by the restrictions of the model itself, leaving annual average TSP and dust deposition concentrations as the best available indicator of the potential for nuisance dust impacts. During operation, the implementation of community-based education and/or information presentation initiatives, beyond the current commitment to develop and maintain a

complaints register may contribute to a further reduction in the severity of impacts associated with nuisance dusts.

### 3.5.5 Native flora

Two significant areas of nearby native vegetation have been identified, containing one nationally-listed endangered species and one nationally-listed vulnerable species. These areas are predicted to see an increase in dust deposition of 12% to 25%, and as a result of this low rate of dust deposition, the residual risk has been assessed as low.

Section 2 of the Rex Response Document provides reference to the primary and secondary National Ambient Air Quality Standards (1990), the primary designed for the protection of human health and the secondary providing public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation and buildings. The criterion for the secondary $PM_{10}$ standard is stated as 150 µg/$m^3$ as a 24-hour average, the Rex Response Document stating that no exceedance of 150 µg/$m^3$ is predicted to occur at any point (the greatest concentration being 98.5 µg/$m^3$ at Receptor 9 without the implementation of the active dust management system). On the basis of this information, and in the context of the low metals content of the dust and low predicted dust deposition rates, the assessment of the residual risk as low appears reasonable.

### 3.5.6 Agricultural impacts

Section 8.3.1.4 of the MLA states that there is some evidence that dust can inhibit light transferral to leaves, therefore slow the rate of photosynthesis and negatively impact plant growth. No reference is provided to support this statement, and data related to the threshold dust deposition rates at which this impact may present is not provided within the MLA.

The same rationale provided in Section 3.5.5 regarding native flora equally applies to crops, and further, it would appear reasonable to assume that if the build-up of dusts in rainwater tanks results in water that continues to comply with the ADWG standards at the nearest receptors over the life of the Project (see Section 3.5.2), similar deposition of dusts on crops is unlikely to result in significant impacts. Thus the finding that the Project is unlikely to result in any impacts to agricultural crops, and that said impacts, if they did occur, would be minor in nature appears reasonable.

### 3.5.7 Marine environment

Section 8.3.1.4 of the MLA identifies two potential impacts to the benthic marine environment that may occur as a result of dust deposition: being increased turbidity reducing light penetration and influencing marine plant growth, and the smothering of benthic flora and fauna. No data is referenced to indicate the dust deposition rates at which these impacts may manifest, thus the appropriateness of the assessment of the residual risk associated with dust deposition to the marine environment as low cannot be verified.

The potential impact of the toxicological components of cumulative dust deposition on the marine environment over the life of the operation (e.g. relative to appropriate marine water quality standards) is also not presented, although if dust deposition to rainwater tanks results in water that continues to comply with the ADWG standards, it is reasonable to assume that the same dust deposition will also meet marine water quality standards.

### 3.5.8 Post-closure dust generation

The residual risk rating of low based on the successful closure and rehabilitation of the Project is reasonable, and commitment to continue monitoring dust concentrations until such time as the influence of the operation on local dust levels is indistinguishable from background dust concentrations should ensure the outcome is achieved.

# 4 Monitoring system

DMITRE have sought advice regarding current monitoring practices at other, similar operations, specifically with respect to the air quality criteria applied and the methods of dust monitoring. These are addressed in the following sections.

## 4.1 Air quality criteria

Air quality criteria are broadly divided into two categories, those related to the protection of human health values, and those related to amenity (or nuisance). Typically, criteria for short-term and long-term $PM_{10}$ and $PM_{2.5}$ exposures are designated for the protection of human health values, and criteria for TSP and dust deposition used as a measure of potential impacts to amenity.

Guidelines and/or legislation related to ambient (ground-level) dust concentrations varies from state to state, with the current criteria in each jurisdiction described in Table 4.1.

**Table 4.1: Australian dust guidelines/legislation by jurisdiction**

| Jurisdiction | Dust type | Criteria | Reference |
|---|---|---|---|
| Federal | TSP | Annual average of 90 µg/m$^3$ | NHMRC, Ambient Air Quality Goals Recommended by the National Health and Medical Research Council (1996) |
| | $PM_{10}$ | 24-hour average of 50 µg/m$^3$ | National Environment Protection (Ambient Air Quality) Measure 2005 |
| | $PM_{2.5}$[1] | 24-hour average of 25 µg/m$^3$ | |
| | | Annual average of 8 µg/m$^3$ | |
| New South Wales | TSP | Annual average of 90 µg/m$^3$ | NSW EPA Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (2005) |
| | $PM_{10}$ | 24-hour average of 50 µg/m$^3$ | |
| | | Annual average of 30 µg/m$^3$ | |
| | Deposited dust (additional) | 2 g/m$^2$/month | |
| | Deposited dust (total) | 4 g/m$^2$/month | |
| Queensland | TSP | Annual average of 90 µg/m$^3$ | Department of Environment and Heritage Protection Environment Protection (Air) Policy 2008 |
| | $PM_{10}$ | 24-hour average of 50 µg/m$^3$ | |
| | $PM_{2.5}$ | 24-hour average of 25 µg/m$^3$ | |
| | Deposited dust | 133 mg/m$^2$/day | NZ Ministry for the Environment (adopted by the DEHP) |
| South Australia | None specified | None specified | SA EPA Guideline 386/06 (Air Quality Impact Assessment Using Design Ground Level Pollutant Concentrations) |
| Victoria | $PM_{10}$ | 24-hour average of 50 µg/m$^3$ (5 permissible exceedences per year) | State Environment Protection Policy (Ambient Air Quality) 1999[2] |
| | Visibility Reducing Particles | 1-hour average minimum visual distance of 20 km. | |
| | TSP (design criteria)[2] | 3-minute average of 330 µg/m$^3$ (as an indicator of amenity/nuisance impacts) | State Environment Protection Policy (Air Quality Management) 2001 |
| | $PM_{10}$ (design criteria)[3] | 1-hour average of 80 µg/m$^3$ | |
| | $PM_{10}$ (intervention level)[3] | 24-hour average of 60 µg/m$^3$ | |
| | $PM_{2.5}$ (design criteria)[3] | 1-hour average of 50 µg/m$^3$ | |
| | $PM_{2.5}$ (intervention level)[3] | 24-hour average of 36 µg/m$^3$ | |
| Western Australia | Western Australia EPA and Department of Environmental Protection have adopted the NEPM criteria for dust, including advisory | | WA DEP Ambient Air Quality Guidelines, 2004 |

| Jurisdiction | Dust type | Criteria | Reference |
|---|---|---|---|
| | standards, and where such criteria do not exist, adopt the World Health Organisation Guidelines for Air Quality, 2000. | | |

[1] The NEPM $PM_{2.5}$ criteria is currently an advisory standard, although the 2011 NEPM Ambient Air Quality Review Report has recommended making these compliance criteria, and also adding a long-term (annual average) $PM_{10}$ criterion also.

[2] Note that compliance with this Policy is the responsibility of the Victorian EPA, and these criteria are not necessarily those adopted by industry.

[3] Design criteria is required to be met by individual industrial sources, the intervention level is designed to be applied to a regional airsheds, however Table 2of the Victorian EPA document 'Protocol for Environmental Management – Mining and Extractive Industries, 2007' nominates the $PM_{10}$ and $PM_{2.5}$ intervention levels as the compliance criteria for mining operations. In the event these cannot be met, compliance with the NEPM criteria must be demonstrated when measured at the centre of the nearest population centre (i.e. not the nearest residence, rather a location representative of the average exposure of the population).

The information summarised in Table 4.1 indicates that, where presented (see Section 3.2), the nominated air quality criteria for the Project represent the most stringent existing limits, however there are other criteria not represented in the Project criteria that have not been assessed within the MLA and supporting information, specifically:

- annual and 24-hour average $PM_{2.5}$ criteria as a measure of the potential for health impacts;
- annual average $PM_{10}$ criterion as a measure of the potential for health impacts; and
- 3-minute TSP average criterion as a measure of the potential for amenity impacts.

## 4.2 Dust monitoring

The MLA and supporting information commit Rex to establishing an Air Quality Management System, indicating that the detail regarding the nature of the monitoring systems and operational response plans will be detailed in an Air Quality Management Plan. This Plan was not submitted with the MLA documentation, and as a result the appropriateness of the Plan in achieving the desired health and environmental outcomes has not been reviewed. DMITRE has requested additional information/advice regarding what such a plan may consider in order to achieve the desired outcome. This is detailed in the following sections.

### 4.2.1 Monitoring purpose

The purpose of undertaking dust monitoring is to both validate the results of the impact assessment presented within the MLA and/or any further approvals documentation, and to ensure that impacts beyond those approved within these documents do not occur. Should impacts exceed those predicted within the approvals documentation, the Air Quality Management Plan should contain contingency measures (triggered, in part or whole by the results obtained from the dust monitoring system) sufficient to mitigate the impact back to that approved for the Project. The Dust Monitoring System must have sufficient capability to measure the performance of these contingency measures if implemented.

Table 4.2 summarises the residual risk rating of the impacts identified within the MLA (see Section 3.5), and the dust basis for these ratings.

**Table 4.2: Impact assessment residual risk ratings**

| Environmental aspect | Residual risk | Basis |
|---|---|---|
| Human health | Low | 24-hour average ground-level $PM_{10}$ concentrations |
| Contamination of drinking water | Low | Dust deposition |
| Contamination of grain storages | Low | Dust deposition |
| Public nuisance dust | Moderate | Dust deposition and annual average ground-level TSP concentrations |
| Native flora | Low | Dust deposition |
| Impacts to agriculture | Low | Dust deposition |
| Impacts to marine environment | Low | Dust deposition |
| Post-closure dust generation | Low | Dust deposition |

### 4.2.2 Monitoring system

#### 4.2.2.1 Human health

The residual risk rating was based on the outcomes of the $PM_{10}$ dispersion modelling, which indicated up to ten exceedences of the nominated air quality criteria, and potentially an additional three exceedences as a result of existing background dust concentrations. To mitigate these, Rex has committed to implementing an Operational Response Plan which will use real-time $PM_{10}$ monitors to inform operational personnel on the current status of local air quality, and thus the requirement (or otherwise) to implement any contingency measures. This would assist to ensure that the $PM_{10}$ 24-hour average dust concentration criterion is not exceeded at nearby receptors, including both operational and background dust sources and that, should background dust alone exceed the criterion, the operation presents no additional contribution. In order to achieve this outcome, the following should be considered in the development of the dust monitoring system:

- Sufficient monitors should be installed to allow ground-level concentrations of $PM_{10}$ dust to be measured that are representative of concentrations at the nearby sensitive receptors, with consideration of the spatial distribution and locations of these receptors.
- The $PM_{10}$ monitor(s) should be of a type appropriate to the task (BAM, TEOM, E-BAM etc), with consideration given to the relative advantages and disadvantages of each technology. They should be capable of accurately measuring ground-level dust concentrations at intervals of not more than 10-minutes between consecutive readings.
- The system should have the capability to determine the contribution of operationally-generated $PM_{10}$ dust to total dust, i.e. the system should be able to differentiate between operationally-contributed and background $PM_{10}$ dust. It is likely that this would necessitate the installation of a meteorological monitoring station capable of the real-time monitoring of at least wind speed and direction.
- Data from the installed dust and meteorological monitors should download to an appropriate central location in real-time to allow operational response and/or other contingency measures to be implemented in adequate time.
- Compliance with the 24-hour average $PM_{10}$ criterion should be measured as an average of hourly average $PM_{10}$ data, measured from midnight-to-midnight.
- Each monitoring station should be designed, sited and operated in accordance with relevant Australian Standards or, where no Australian Standard exists, appropriate and equivalent international standards.

- Each monitoring station should be operated and maintained in accordance with the manufacturer and/or supplier's recommendations in order to achieve a data availability of not less than 75% per annum.
- Contingency measures should be developed for instances where the real-time monitoring system is unavailable, to ensure that ground-level $PM_{10}$ concentrations do not exceed the criterion at nearby receptors.

There was a lack of assessment of the potential impacts of $PM_{2.5}$ dust on human health values presented within the MLA and supporting documentation due to limitations on available $PM_{2.5}$ background concentration data and the lack of appropriate $PM_{2.5}$ emission factors in order to present an accurate estimation of $PM_{2.5}$ impact. However, it is recommended that $PM_{2.5}$ dust be monitored concurrently with the $PM_{10}$ monitoring until such time as either the potential health impacts of $PM_{2.5}$ are confirmed through continued demonstrated compliance with the NEPM $PM_{2.5}$ advisory standards (i.e. not less than one year), or until such time as a reliable relationship between measured $PM_{10}$ and $PM_{2.5}$ ground-level concentrations is established sufficient to enable the $PM_{10}$ monitoring data to be used as a proxy for $PM_{2.5}$ concentrations. Monitoring of annual average and 24-hour average $PM_{2.5}$ dust was conditioned as a component of the approval of the recent Olympic Dam Expansion EIS.

#### 4.2.2.2 Contamination-related impacts

In order to verify the accuracy of the contamination-related impacts, a network of dust deposition monitors should be established in locations considered to be appropriate to the impact being assessed (crops, rainwater tanks, grain storages etc). These should comply with the relevant Australian Standards for monitor siting, design and operation, and should allow comparison against the 4 $g/m^2$/month total dust deposition criterion. Additional (non-dust) monitoring will be required to provide context to the deposited dust results, including monitoring of native flora health/abundance, rainwater tank water quality, grain storage contaminant monitoring etc.

### 4.2.3 Public nuisance dust

The residual risk rating was based on the predicted low dust deposition rate and compliance with the annual average TSP criterion nominated for the Project. As discussed within Section 3.5.4, studies have indicated little correlation between long-term dust concentrations, so it is considered unlikely that monitoring TSP concentrations (either in real-time via a continuous monitor nor via 'batch'-type monitoring using High Volume Air Samplers (HiVols)) would provide information that would necessarily be indicative of public nuisance. However, in order to assess compliance against the impact assessment presented within the MLP, and to manage the potential for negative perceptions of dust associated with public nuisance, it is considered that a combination of the following measures be implemented:

- The establishment of real-time and/or Hivol TSP monitors at locations adjacent to the proposed real-time $PM_{10}$ monitoring sites for a period of time sufficient to develop a robust relationship between concentrations of $PM_{10}$ and TSP dust at nearby sensitive receivers.
- The use of the proposed real-time $PM_{10}$ dust monitoring system, the associated meteorological monitor(s), the TSP/$PM_{10}$ relationship developed in the above-mentioned dot point and the dust

deposition monitors to differentiate between operationally-contributed and background dusts, and to demonstrate compliance with the human health and public nuisance criteria presented within the MLP. Including the provision of this information to stakeholders in real-time as done at locations such as Port Hedland.

- A robust complaint management system with targets for the time taken to respond to/action complaints
- The establishment of a relationship (or otherwise), over time and given enough data, between community complaints and TSP and/or $PM_{10}$ dust concentrations and meteorology, such that operational and meteorological conditions likely to result in public nuisance impacts can be predicted and mitigated appropriately.
- Education programs and routine forums with stakeholders to discuss air quality issues.
- A social benefits program that compensates for potential reductions in amenity through the provision of additional services or commitments within the region.

# 5 Summary of findings

The findings associated with this review can be categorised as either relating to the development of the air quality model or those related to the impact assessment. These are summarised in the following sections.

## 5.1 Air quality model findings

The development of the dust dispersion model follows standard air quality modelling practices, and, with the revisions made to the model subsequent to the submission of the MLA (Appendix 4 of the Rex Response Document), is considered to reasonably represent the Project as proposed within the MLA in terms of site layout, mining rate, topography and meteorology. The emissions factors and control factors used for the prediction of dust generation are adequately justified and are generally appropriate and relevant, and are considered to reasonably represent the likely dust emissions as a result of Project operations.

## 5.2 Impact assessment findings

The dust concentrations and dust deposition rates, calculated as a result of the combination of existing background concentrations and operationally-contributed dusts, are predicted to exceed the nominated air quality criteria at six nearby receptors between one and ten days per annum, with the potential for around an additional three days per year exceedance as a result of high background (non-operational) dust sources. In operation, concentrations at these receptors would be managed through the implementation of a real-time monitoring and operational response plan. Rex have proposed a system of real-time monitoring and operational response (to be documented in an Air Quality Management Plan) to ensure that the over-riding commitment to maintain dust levels at nearby receivers to dust concentrations less than the criteria including the contribution of background dust, or, where concentrations of background dust alone are in excess of the limit, to present no additional operational contribution to overall dust levels, is achieved. This style of dust management is used successfully at other, similar operations.

The information provided in the Rex Response Document has provided additional information and context for the impact assessments presented in the MLA. Human health impacts are assessed solely against the 24-hour average $PM_{10}$ Ambient Air Quality NEPM criterion as a result of a lack of baseline and emissions estimation information for the adequate assessment of $PM_{2.5}$. The results of the human health impact assessment appear reasonable and are supported by the information presented within the MLA and supporting documentation. The assessment of nuisance dust impacts is limited by restrictions in the ability of the model to predict short-term fluctuations in dust deposition, and by the nature of people's perceptions of dust. As a result, the impact assessment presented in the MLA should be used only as a guide to the potential for nuisance impacts, in which case the finding of a moderate potential impact appears reasonable.

The assessment of potential impacts to rainwater tank water quality, marine water quality, native flora and agricultural impacts are supported by additional information provided in the Rex Response Document which provide a reasonable indication that the low dust deposition rates and low metals content of the dusts are unlikely to result in any greater than low residual impacts.

This is likely to be true of any potential for a reduction in solar PV efficiencies also, although this is not directly assessed within the MLA.

The stated residual risks associated with potential impacts of dust deposition on marine turbidity and on portside grain storages are not supported by the information presented within the MLA nor the Rex Response Document, and require further contextual information in the form of comparison of predicted dust deposition against relevant accepted standards before an assessment of the appropriateness of the risk ranking can be undertaken.

# 6 References

Australian Coal Association Research Program 1999, *Dust in the Hunter Valley: An evaluation of the concentration distributions, meteorological associations and community response*, ACARP, Sydney.

Cowherd, C., Muleski, G.E., Kinsey, J.S., *Control of open fugitive dust sources*, Midwest Research Institute, September 1988,

Kansas City, United States of America.Dean, M, Holmes, N, & Mitchell, P 1987, *Air Pollution from Surface Coal Mining: Community Perception, Measurement and Modelling*, Sydney.

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# ASSESSMENT REPORT
## 2014

**Resources and Energy Group**
Department of State Development
Level 7,
101 Grenfell Street,
Adelaide
GPO Box 320,
Adelaide SA 5001

SOUTH AUSTRALIA

Government of South Australia
Department of State Development

**Assessment report** for the application of a mineral lease, an extractive mineral lease and two miscellaneous purposes licences from **Rex Minerals (SA) Pty Ltd for the Hillside copper mine**