ARDLETHAN HARD ROCK TIN MINE

Preliminary Mine Closure Plan

Amendment 1

Prepared by:

R.W. CORKERY & CO. PTY. LIMITED
EOE (No. 75) Pty Limited
ABN: 95 006 829 787

Preliminary Mine Closure Plan
Amendment 1
for the
Ardlethan Hard Rock Tin Mine

Prepared for:
EOE (No. 75) Pty Limited
ABN: 95 006 829 787
Level 2, 53 Berry Street
NORTH SYDNEY NSW 2060

Prepared by:
R.W. Corkery & Co. Pty. Limited
Geological & Environmental Consultants
ABN: 31 002 033 712

Brooklyn Office:
1st Floor, 12 Dangar Road
PO Box 239
BROOKLYN NSW 2083
Telephone: (02) 9985 8511
Facsimile: (02) 6361 3622
Email: brooklyn@rw corkery.com

Orange Office:
62 Hill Street
ORANGE NSW 2800
Telephone: (02) 6362 5411
Facsimile: (02) 6361 3622
Email: orange@rw corkery.com

Brisbane Office:
Suite 5, Building 5
Pine Rivers Office Park
205 Leitchs Road
BRISBANE QLD 4000
Telephone: (07) 3360 0217
Facsimile: (02) 6361 3622
Email: brisbane@rw corkery.com

Ref No. 754/07
June 2016
CONTENTS

1 INTRODUCTION .............................................................................................................. 1
  1.1 Background ............................................................................................................. 1
  1.2 Scope, Purpose, Approach and Limitations ......................................................... 2
    1.2.1 Scope ............................................................................................................... 3
    1.2.2 Purpose ........................................................................................................... 3
    1.2.3 Approach ........................................................................................................ 3
    1.2.4 Limitations ...................................................................................................... 4
  1.3 Previous and Current operations ............................................................................ 4
  1.4 Mineral Authorities, Consents, Licences and Land Tenure ..................................... 7
    1.4.1 Mineral Authorities ....................................................................................... 7
    1.4.2 Consents ......................................................................................................... 7
    1.4.3 Licences .......................................................................................................... 8
    1.4.4 Land Tenure .................................................................................................... 9
  1.5 Document Preparation ........................................................................................... 9

2 CLOSURE REQUIREMENTS ......................................................................................... 9
  2.1 Introduction ............................................................................................................ 9
  2.2 Company Standards .............................................................................................. 10
  2.3 Consultation .......................................................................................................... 10
    2.3.1 Government Agency Consultation .................................................................... 10
    2.3.2 Community Consultation ................................................................................ 10
  2.4 Legislative Requirements ..................................................................................... 11
  2.5 Conditional Requirements ................................................................................... 12
  2.6 Other Standards and Guidelines .......................................................................... 13

3 CLOSURE VISION, OBJECTIVES AND CRITERIA .................................................. 13
  3.1 Closure Vision ...................................................................................................... 13
  3.2 Closure Objectives .............................................................................................. 13
  3.3 Closure Criteria ................................................................................................... 14

4 EXISTING ENVIRONMENT ....................................................................................... 14
  4.1 Introduction .......................................................................................................... 14
  4.2 Existing Environment Surrounding the Mine Site .................................................. 16
    4.2.1 Topography and Drainage .............................................................................. 16
      4.2.1.1 Regional and Local Topography & Drainage ............................................ 16
    4.2.2 Climate ......................................................................................................... 16
      4.2.2.1 Source of Data ...................................................................................... 16
      4.2.2.2 Temperature .......................................................................................... 16
      4.2.2.3 Rainfall .................................................................................................. 16
      4.2.2.4 Relative Humidity .................................................................................. 17
      4.2.2.5 Evaporation .......................................................................................... 17
   4.2.3 Air Quality ...................................................................................................... 17
    4.2.4 Noise ............................................................................................................. 18
    4.2.5 Flora and Fauna ............................................................................................ 18
  4.3 Existing Environment Within the Mine Site .......................................................... 18
    4.3.1 Mine Site Topography ................................................................................... 18
    4.3.2 Groundwater ................................................................................................. 22
CONTENTS

4.3.3 Heritage ........................................................................................................... 22
4.3.4 Soils ................................................................................................................... 22
4.3.5 Contaminated Land ............................................................................................ 22

5 CLOSURE RISKS AND ASSUMPTIONS .................................................................. 22
5.1 Closure Risks ....................................................................................................... 22
5.2 Closure Assumptions ............................................................................................ 25

6 CLOSURE DOMAINS ............................................................................................. 25

7 CLOSURE ACTIONS AND MONITORING .............................................................. 25

8 CLOSURE COSTS .................................................................................................... 38

9 ONGOING MAINTENANCE, MONITORING AND RECORD KEEPING .................. 38
9.1 Ongoing Maintenance .......................................................................................... 38
9.2 Monitoring ........................................................................................................... 39
9.3 Record Keeping ..................................................................................................... 39

10 MINERAL AUTHORITY RELINQUISHMENT ............................................................. 40

APPENDICES

Appendix 1 Review of Environmental Factors ................................................................. 43
Appendix 2 Letter of Change ........................................................................................ 85

FIGURES

Figure 1 Locality Plan .................................................................................................... 2
Figure 2 Mine Site Layout ............................................................................................. 5
Figure 3 Mineral Authorities and Land Tenure ............................................................... 8
Figure 4 Surrounding Land Uses and Vegetation ......................................................... 19
Figure 5 Mine Site Topography and Catchments ......................................................... 20
Figure 6 Closure Domains ............................................................................................ 26

TABLES

Table 1 Mineral Authorities .......................................................................................... 7
Table 2 Indicative Closure Criteria ............................................................................... 15
Table 3 Average Monthly Climate Statistics ............................................................... 17
Table 4 Closure Risks .................................................................................................. 23
Table 5 Closure Actions and Monitoring ..................................................................... 27
1 INTRODUCTION

1.1 BACKGROUND

This Preliminary Closure Plan for the Ardlethan Hard Rock Tin Mine has been prepared by R.W. Corkery & Co. Pty. Limited on behalf of EOE (No.75) Pty Limited (EOE). The Ardlethan Hard Rock Tin Mine is located approximately 4km to the northwest of the town of Ardlethan in the Coolamon Local Government Area (Figure 1).

It is noted that the Ardlethan Hard Rock Tin Mine is located adjacent to the Ardlethan Alluvial Tin Mine operated by Telminex NL, a wholly owned subsidiary of Marlborough Resources NL. That mine ceased operation in 2003 and has been extensively rehabilitated by the former Department of Primary Industries – Mineral Resources. This Preliminary Closure Plan applies only to those areas covered by the mineral authorities identified in Section 1.3.1. For clarity, those areas are referred to hereafter as the Mine Site (see Figure 1).

In 2008, EOE prepared a Review of Environmental Factors (REF) to support an application for approval for Category 3 exploration activities, namely extraction and reprocessing of a 20 000t sample of tailings. That application was approved by Division of Resources and Energy and EOE were subsequently advised by Division of Resources and Energy (DRE) in May 2016 that that approval remains valid.

This Preliminary Closure Plan has been prepared (in 2010) at the request of Industry and Investment NSW (I&I NSW). It is noted that Australian Tin Resources Pty Ltd (ATR), a related company to EOE, is currently (in 2010) investigating options for the retreatment (re-processing) of tin tailings within the Mine Site (see Section 1.3).

In 2016, ATR commissioned Mineral Technologies to further review and investigate the design and operation of a new Tailings Re-processing Pilot Plant. That review has resulted in a number of minor adjustments to the proposed areas to be disturbed for the bulk sample, exploration activity including the location of the proposed pilot plant and extraction areas.

As a result of changes to the approval pathway for exploration on mining leases, EOE have been advised that the approved Mining Operations Plan (MOP) must be amended to include a description of the

- Approved exploration activities; and
- The proposed amendments to the approved exploration activities.

As a result, the 2010 REF and a letter describing proposed amendments to those activities have been attached as Appendices 1 and 2.

While rehabilitation activities across the entire area of the Mine Site are addressed in this document, priority will be placed on rehabilitation of those sections of the Mine Site that would not be disturbed by the Project.

Finally, it is noted that this is the first amendment of this Closure Plan. Amended text is presented in red throughout this document.
REFERENCE
Ardlethan Hard Rock Mine Site Boundary

Figure 1
LOCALITY PLAN

SCALE 1:50 000

R. W. CORKERY & CO. PTY. LIMITED
1.2 SCOPE, PURPOSE, APPROACH AND LIMITATIONS

1.2.1 Scope

The scope of this Preliminary Closure Plan is to:

- identify the closure requirements for the Mine Site, with respect to legislation, government authority expectations and EOE liability;
- identify a suitable timeframe for the closure that allows EOE flexibility with respect to potential future uses of the Mine Site and its infrastructure;
- determine an appropriate rehabilitation provision/security deposit for the closure of the Ardlethan Hard Rock Tin Mine; and
- document the intended closure of the Mine Site, including all assumptions made during the preparation of this document.

This Preliminary Closure Plan represents an update of and presents more detail than, the original draft rehabilitation plan for the Mine Site presented in the Mining Operation Plan prepared for Marlborough Resources NL in September 2000 (“2000 MOP”).

1.2.2 Purpose

This Preliminary Closure Plan has been prepared following an extended period of inactivity within the Mine Site following the placement of the mine operator, Telminex NL, into administration in 2003 (see Section 1.3). Since the purchase of EOE by ATR, I&I NSW and its predecessor organisation have had a number of discussions with ATR in relation to rehabilitation of the Mine Site. The purpose of this document is to document the outcomes of those discussions and formalise the agreements reached in relation to rehabilitation of the Mine Site pending commencement of tailings retreatment operations. This document is not intended to be a detailed Mine Closure Plan, rather it is intended to identify the framework within which mine closure and rehabilitation will occur.

1.2.3 Approach

The preparation of this Preliminary Closure Plan was undertaken in a number of steps, described below.

1. Document review – all documents relevant to the closure of the Ardlethan Hard Rock Tin Mine were reviewed, including the 2000 MOP and internal I&I NSW documents.
2. Site Domains – identification of closure domains and closure areas within these domains (refer to Section 6).
3. Closure options – closure options were identified for each domain area and discussed during a site inspection on 29 July 2009 with representatives of EOE and Mr Michael Young of I&I NSW.
4. Closure costs – closure costs were determined based on the I&I NSW Draft Security Deposit Tool for NSW Mining Operations.
1.2.4 Limitations

The contents of this Preliminary Closure Plan are limited primarily by the availability of accurate rehabilitation cost information. It is noted that hard rock mining operations within the Mine Site ceased in 1986. As a result, recent progressive rehabilitation has been limited. In addition, the style of rehabilitation undertaken by I&I NSW within the alluvial mining area (see Section 1.3) was different from that required to be undertaken within the Mine Site. As a result, reliance has been placed on assumed rehabilitation costs, based primarily on costs included in the I&I NSW Security Calculation Tool. It is acknowledged that these costs may not reflect actual costs for rehabilitation activities as they are based on rehabilitation costs in the Hunter Valley. Rehabilitation required in the Hunter Valley and the costs for undertaking that rehabilitation are not necessarily appropriate in the area surrounding the Mine Site.

Additional uncertainty relates to identification of an acceptable rehabilitation completion criteria. It is noted that I&I NSW have indicated verbally prior to EOE’s purchase of the mineral authorities that given the age of the Ardlethan Hard Rock Tin Mine and the fact that the current operator took control of the site approximately 20 years after hard rock mining operations ceased, that rehabilitation completion criteria may not necessarily reflect those criteria that would be expected today.

In recognition of this uncertainty in relation to acceptable rehabilitation completion criteria, negotiation criteria have been agreed to and are incorporated into this document.

Finally, as limited rehabilitation operations have been undertaken recently, it is uncertain whether the proposed rehabilitation activities and completion criteria will be achievable. Detailed monitoring of rehabilitation success and re-evaluation of the completion criteria may be required during rehabilitation of the Mine Site.

1.3 PREVIOUS AND CURRENT OPERATIONS

Tin mining first commenced at Ardlethan in 1922. Initial mining operations were comparatively small scale and utilised both open cut and underground mining methods. However, during the period 1965 to 1986, Aberfoyle Resources Ltd mined and processed approximately 9 million tonnes of primary, hard-rock, tin-bearing ore averaging 0.46% tin, primarily by open cut mining methods from three open cuts, namely the Ardwest/Wild Cherry, White Crystal and Stackpool Open Cuts, with limited underground mining (Figure 2). In addition, during processing operations, a number of tailings dams were constructed. These operations ceased in 1986 due to the reduced tin prices and the depletion of economically viable resources. There has been no further hard rock mining activity within the Mine Site since 1986.

Further recovery of alluvial tin (in the form of cassiterite – \( \text{SnO}_2 \)) was undertaken by Telminex NL (a subsidiary of Marlborough Resources NL) between 2000 and 2003 from alluvial and deep lead tin deposits down slope from the primary hard-rock deposits. Following a further drop in tin prices, Telminex NL was placed into administration and ceased operations in 2003. I&I NSW has since undertaken a comprehensive rehabilitation program to re-instate the areas of alluvial mining left unrehabilitated by Telminex NL. The areas of hard rock mining, together with the processing areas and tailings dams, have yet to be rehabilitated or have only been partially rehabilitated.

EOE, the holder of the mineral authorities identified in Section 1.4, was purchased from the Telminex NL administrator by ATR in July 2007. ATR was formed in early 2007 and is currently investigating the economic viability of extracting and reprocessing the tin tailings.
This page has intentionally been left blank
within the Mine Site, with the retreated tailings to be placed into previously mined voids within the Mine Site, including the tailings dams, processing plant area and facilities area. As noted in Section 1.1, Mineral Technologies was engaged by ATR in 2016 to investigate the design and operation of a new Tailings Re-processing Pilot Plant. Approval to operate a Pilot Plant on the Mine Site was previously granted 13 January 2009. The 2016 Pilot Plant program would require some minor adjustments to the proposed activities, including the location of the proposed pilot plant and extraction areas. All of the changes proposed are located within areas of previous disturbance. Details regarding the previously approved Pilot Plant program are presented in Appendix 1, (Review of Environmental Factors (R.W Corkery & Co, 2008)). As previously noted, based on the review conducted by Mineral Technologies, minor adjustments to the Pilot Program are envisaged to suit the operation of the Pilot Plant, these adjustments are presented in Appendix 2.

1.4 MINERAL AUTHORITIES, CONSENTS, LICENCES AND LAND TENURE

1.4.1 Mineral Authorities

Figure 3 presents a plan showing the mineral authorities held by EOE and Table 1 presents a list of those authorities and the Mining Act they were granted under.

<table>
<thead>
<tr>
<th>Title Code</th>
<th>Title No.</th>
<th>Mining Act Year</th>
<th>Title Code</th>
<th>Title No.</th>
<th>Mining Act Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLL</td>
<td>3403</td>
<td>1906</td>
<td>PL(MP)L</td>
<td>3486</td>
<td>1906</td>
</tr>
<tr>
<td>ML</td>
<td>6213</td>
<td>1906</td>
<td>PLL</td>
<td>970</td>
<td>1924</td>
</tr>
<tr>
<td>ML</td>
<td>6218</td>
<td>1906</td>
<td>MPL</td>
<td>1298</td>
<td>1906</td>
</tr>
<tr>
<td>ML</td>
<td>6157</td>
<td>1906</td>
<td>PLL</td>
<td>3387</td>
<td>1906</td>
</tr>
<tr>
<td>ML</td>
<td>6135</td>
<td>1906</td>
<td>ML</td>
<td>5698</td>
<td>1906</td>
</tr>
<tr>
<td>PLL</td>
<td>3223</td>
<td>1906</td>
<td>PLL</td>
<td>1310</td>
<td>1906</td>
</tr>
<tr>
<td>PL(MP)L</td>
<td>1043</td>
<td>1906</td>
<td>ML</td>
<td>467</td>
<td>1973</td>
</tr>
<tr>
<td>S(C&amp;PL)L</td>
<td>5</td>
<td>1969</td>
<td>PLL</td>
<td>3310</td>
<td>1906</td>
</tr>
<tr>
<td>PL(MP)L</td>
<td>3239</td>
<td>1906</td>
<td>MPL</td>
<td>1300</td>
<td>1906</td>
</tr>
<tr>
<td>PLL</td>
<td>3561</td>
<td>1906</td>
<td>ML</td>
<td>509</td>
<td>1973</td>
</tr>
<tr>
<td>ML</td>
<td>505</td>
<td>1973</td>
<td>ML</td>
<td>6088</td>
<td>1906</td>
</tr>
<tr>
<td>ML</td>
<td>6084</td>
<td>1906</td>
<td>PL(MP)L</td>
<td>3240</td>
<td>1906</td>
</tr>
<tr>
<td>MPL</td>
<td>112</td>
<td>1973</td>
<td>ML</td>
<td>504</td>
<td>1973</td>
</tr>
<tr>
<td>PLL</td>
<td>794</td>
<td>1924</td>
<td>ML</td>
<td>6140</td>
<td>1906</td>
</tr>
<tr>
<td>ML</td>
<td>508</td>
<td>1973</td>
<td>ML</td>
<td>6098</td>
<td>1906</td>
</tr>
<tr>
<td>ML</td>
<td>619</td>
<td>1973</td>
<td>ML</td>
<td>555</td>
<td>1973</td>
</tr>
<tr>
<td>ML</td>
<td>510</td>
<td>1973</td>
<td>PLL</td>
<td>790</td>
<td>1924</td>
</tr>
<tr>
<td>PL(MP)L</td>
<td>3210</td>
<td>1906</td>
<td>ML</td>
<td>6089</td>
<td>1906</td>
</tr>
<tr>
<td>MPL</td>
<td>1297</td>
<td>1906</td>
<td>ML</td>
<td>460</td>
<td>1973</td>
</tr>
<tr>
<td>ML</td>
<td>507</td>
<td>1973</td>
<td>ML</td>
<td>506</td>
<td>1973</td>
</tr>
<tr>
<td>PLL</td>
<td>3339</td>
<td>1906</td>
<td>PLL</td>
<td>3487</td>
<td>1906</td>
</tr>
<tr>
<td>PLL</td>
<td>3224</td>
<td>1906</td>
<td>PLL</td>
<td>3414</td>
<td>1906</td>
</tr>
<tr>
<td>ML</td>
<td>5140</td>
<td>1906</td>
<td>PLL</td>
<td>3772</td>
<td>1906</td>
</tr>
<tr>
<td>PLL</td>
<td>3602</td>
<td>1906</td>
<td>PLL</td>
<td>1290</td>
<td>1924</td>
</tr>
<tr>
<td>ML</td>
<td>6085</td>
<td>1906</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: I&I NSW – 2/4/07
Figure 3
MINERAL AUTHORITIES
AND LAND TENURE

REFERENCE
- Ardlethan Hard Rock Mine Site Boundary
- Mineral Authority Boundary
- Cadastral Boundary
- Limit of EOE Land Ownership (offset for clarity)

SCALE 1:20 000
1.4.2 Consents

The Ardlethan Hard Rock Tin Mine operated under Continuing Use Rights prior to ceasing production in 1986. On 18 September 1995, Coolamon Shire Council granted development consent (DA 20/95) under SEEP 37 - Continued Mines and Extractive Industries for the continued use of the Ardlethan Tin Mine. Subsequently, Coolamon Shire Council granted development consent for the Ardlethan Alluvial Tin Mine. Clause 1.2 of that consent required that DA 20/95 be surrendered in respect to any land covered by the subsequent consent. As a result, DA 20/95 has ceased to apply to the Ardlethan Alluvial Tin Mine Site but may still apply to all or part of the Ardlethan Hard Rock Tin Mine Site.

1.4.3 Licences

No Licences are currently held in relation to the Mine Site.

1.4.4 Land Tenure

Surrounding land is either private freehold land or road reserves. Figure 3 presents the land owned by EOE.

1.5 DOCUMENT PREPARATION

This document has been prepared by Mitchell Bland (BSc (hons), MEconGeol, LLB) of R.W. Corkery & Co. Pty. Limited. Technical advice and assistance has been provided by the following, all of ATR.

- Mr Peter Francis.
- Mr Glen Cunningham.
- Mr Bill Lannon.

2 CLOSURE REQUIREMENTS

2.1 INTRODUCTION

This section outlines the closure requirements for the Ardlethan Hard Rock Tin Mine. These requirements have been determined based on internal Company standards, consultation with government agencies and a review of the conditional requirements of the relevant mineral authorities.
2.2 COMPANY STANDARDS

It is noted that ATR, through EOE, intends to progressively rehabilitate the Mine Site through retreatment and processing of tin tailings, including progressive removal of the existing tailings dams and remediation of any contaminated land issues associated with previous mining and processing operations. The company intends to construct a final landform that would be:

- safe for people and animals in the short- and long-term;
- geotechnically stable and not likely to result in subsidence or collapse of the ground surface;
- sustainable in the short and the long term for the proposed final land of agriculture or nature conservation, where practicable; and
- non-polluting

2.3 CONSULTATION

2.3.1 Government Agency Consultation

Extensive consultation has been undertaken with I&I NSW in relation to rehabilitation and closure of the Mine Site. This has included the following.

- Ongoing consultation in relation to the proposed tin tailings retreatment Project and removal of the existing tailings dams. This has included meetings prior to acquisition of EOE by ATR, a Conceptual Project Development Plan Meeting and a Planning Focus Meeting, including site inspection.

- Targeted consultation in relation to the Preliminary Closure Plan, including circulation of draft of the rehabilitation domains identified in Figure 6 prior to a site visit on 29 July 2009. During the site visit, rehabilitation options were discussed and the activities identified in Section 7 were agreed to.

- Provision by I&I NSW of internal documentation relating to the Mine Site.

- Provision of a draft of this document to I&I NSW for comment prior to finalisation.

2.3.2 Community Consultation

It was agreed between EOE and I&I NSW that consultation in relation to preparation of a Preliminary Closure Plan would create confusion in relation to the interaction between the Preliminary Closure Plan and the proposal to reprocess the tin tailings. As a result, no community consultation was undertaken. However, community consultation would be undertaken during preparation of a final Closure Plan, if required.
2.4 Legislative Requirements

The following presents a list of legislation that may apply to closure of the Mine Site. It is noted that this list is not definitive and does not represent professional legal advice.

*Mining Act 1992*

- **s239** Rehabilitation, etc. of area damaged by mining
  
  (1) The conditions subject to which an authority or mineral claim is granted or renewed may include such conditions relating to:

  (a) the rehabilitation, levelling, regrassing, reforesting or contouring of such part of the land over which the authority or claim has effect as may have been damaged or adversely affected by prospecting operations or mining operations, and

  (b) the filling in, sealing or fencing off of excavations, shafts and tunnels, as may be prescribed by the regulations or as the Minister or mining registrar may, in any particular case, determine.

  (1A) The Minister or mining registrar may, in any particular case, determine that an authority or mineral claim be granted or renewed subject to conditions relating to the afforestation (including for carbon sequestration within the meaning of section 87A of the Conveyancing Act 1919 and related environmental purposes) of such part of the land over which the authority or claim has effect as may have been damaged or adversely affected by prospecting operations or mining operations.

  (1B) However, a condition referred to in subsection (1A) may only be imposed at the request of the applicant for, or holder of, the authority or claim.

- **s240 - s242** – directions to rehabilitate land

  Under these sections the Minister can direct a company to rehabilitate their land, or, should the company not comply with this direction, direct the rehabilitation of the land at the Minister’s expense and later recovery the cost from the company.

- **s245** – clearing away of mining plant

  (1) The holder of an authority or mineral claim over land that ceases to be subject to the authority or claim:

  (a) may, within the prescribed period, and
(b) must, if directed to do so by the Minister by notice in writing, within the period specified in the notice, cause to be removed from the land any mining plant brought onto, or erected on, that land in the course of mining operations carried out under the authority or claim.

(2) The Minister may give a direction under this section even though the prescribed period has not expired.

Additionally, the Act also includes sections on compensation for land owners should the mining activity result in compensable loss on their land (s281 and s270).

**Protection of Environment Operations Act 1997**

- Chapter 3 – provision of Environment Protection Licences
- Chapter 4 – application of Environment Protection Notices
- Chapter 5 – environmental offences including water, air, noise and land pollution

**Heritage Act 1977**

- s24-30 – interim orders for items of State or local heritage significance
- Part 6 – other measures for the conservation of environmental heritage
- Division 8 – controlling and restricting harm to buildings, works, relics and places not subject to interim heritage orders or State Heritage Register listings

**Contaminated Land Management Act 1997**

- Part 2 (s6-10) – the main functions of the DECCW under the Act, specifically important is s9 which relates to the assessment of the risk of harm.
- Part 3(s11-48) – investigations and remediation of contaminated lands

**Additional acts that may apply**

The following acts may apply to the closure of the operations, specifically with respect to the divestment of the Mining Leases and the land tenure that exists beneath each Mining Lease.

- Crown Lands Act 1989
- Native Title (NSW) Act 1994

Additionally, there is potential for the following Commonwealth Acts to be applied to the heritage items in the area.

- National Heritage Trust of Australia Act 1997

### 2.5 CONDITIONAL REQUIREMENTS

There are no relevant conditional closure requirements.
2.6 OTHER STANDARDS AND GUIDELINES

A number of mine closure plan guidelines have been reviewed during the preparation of this document and are listed below.

- Environment Australia (2002) *Mine Decommissioning, Commonwealth of Australia (Best Practice Environmental Management in Mining Series)* - this document provides an overview of best practice mine decommissioning principles and closure criteria. This document also provides indicative costs for a typical gold mining operation in the arid zone in 2002 and identifies specific issues that should be considered during the compilation of a closure plan.


3 CLOSURE VISION, OBJECTIVES AND CRITERIA

3.1 CLOSURE VISION

EOE’s ultimate closure vision is to rehabilitate the Ardlethan Hard Rock Tin Mine in a manner which minimises ongoing safety and environmental liability whilst meeting potentially conflicting requirements from individual government authorities and the needs of the community as far as is practicable.

3.2 CLOSURE OBJECTIVES

EOE’s broad closure objectives for the Mine Site are listed below and are generally similar to those presented in the ANZMEC / Minerals Council of Australia (2000) *Strategic Framework for Mine Closure*.

- **Planning** - To ensure the process of closure occurs in an orderly, cost-effective and timely manner as a result of good planning.

- **Financial Provision** - To ensure the cost of closure is adequately represented in Company accounts and the community / I&I NSW is not left with a liability.

- **Implementation** - To ensure there is a clear accountability, and adequate resources, for the preparation and implementation of a comprehensive Closure Plan.

- **Standards** - To establish a set of agreed and measurable indicators (closure criteria) that will demonstrate the successful completion of the closure process.

- **Relinquishment** - To reach a point where the Company has met agreed completion criteria to the satisfaction of the Responsible Authority.
• **Liability** - To reach a point where the Company can relinquish all leases without incurring any ongoing liability.

• **Environmental** - Ensure that on, and following closure, the site will not be the source of any ongoing environmental pollution.

### 3.3 CLOSURE CRITERIA

Closure or completion criteria are generally a set of indicators used to measure the successful completion of the closure process. They should reflect the area’s individual set of environmental, heritage, social and economic circumstances.

Ideally, closure criteria should be identified and agreed upon with the relevant government agencies prior to detailed closure planning commencing. However, progressive rehabilitation and subsequent monitoring allows completion criteria to be tested and refined. As a result, the closure criteria identified Table 2 are indicative only.

### 3.4 CLOSURE TIMELINES

It is acknowledged that EOE is currently assessing the feasibility of reprocessing tailings material within the Mine Site. As a result, implementation of mine closure activities would not be appropriate until that assessment has been completed. As a result, this Preliminary Mine Closure Plan would only be implemented following a decision by EOE not to proceed with the proposed tailings re-treatment operation. Notwithstanding this, however, EOE would commence implementation of this plan by April 2017, namely within 7 years of the date of this report. Prior to implementation of mine closure activities, this document and the security estimate would be reviewed and a *Final Mine Closure Plan* and updated security calculation prepared, if required.

In the event that tailings reprocessing operations commence within the Mine Site, a new *Preliminary Mine Closure Plan* would be prepared, possibly in conjunction with or as part of a *Mining Operations Plan*.

Finally, it is noted that ongoing monitoring, maintenance and record keeping activities identified in Sections 7 and 9 would be undertaken as required prior to April 2017 irrespective of whether EOE elects to commence tailings reprocessing activities.

### 4 EXISTING ENVIRONMENT

#### 4.1 INTRODUCTION

This section presents a brief overview of the existing environment within and surrounding the Mine Site. This information will be important to identify the rehabilitation completion criteria that will be required to be achieved prior to lease relinquishment as well as the closure risks that will be required to be addressed during planning for and implementation of rehabilitation operations.
<table>
<thead>
<tr>
<th>Closure Criteria</th>
<th>Indicator</th>
<th>Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety/stability</td>
<td>• All structures left in a safe and stable state</td>
<td>• No significant erosion / movement of landforms during closure period.</td>
</tr>
<tr>
<td></td>
<td>• No significant slumping/geotechnical failure of rehabilitated waste dumps</td>
<td>• No significant erosion / subsidence around ventilation shaft / escape way caps.</td>
</tr>
<tr>
<td></td>
<td>• No significant erosion / subsidence around ventilation shaft / escape way caps.</td>
<td></td>
</tr>
<tr>
<td>Sustainable Landform</td>
<td>• Rehabilitated landform is sustainable for its intended land use in the long term</td>
<td>• Rehabilitated landform is being utilised for its intended use.</td>
</tr>
<tr>
<td></td>
<td>• Rehabilitated landform is being utilised for its intended use.</td>
<td>• No degradation of the landform as a result of its intended use.</td>
</tr>
<tr>
<td></td>
<td>• Annual photo monitoring after rehabilitation is established and the landform is being utilised for its intended use.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• If rehabilitated landform is not being utilised for its intended use, document reasons on an annual basis.</td>
<td></td>
</tr>
<tr>
<td>Surface Water Contamination</td>
<td>• All contaminated water contained so as to not impact on downstream surface water quality including impacting aquatic ecosystems, limiting agricultural use and/or causing human health risk.</td>
<td>• All potentially contaminated water contained within the Mine Site.</td>
</tr>
<tr>
<td></td>
<td>• All water containment structures are maintained and no dam failures occur</td>
<td>• Tailings Dam drainage water quality improves and stabilises.</td>
</tr>
<tr>
<td></td>
<td>• Surface water quality of closure domain area runoff improves and stabilises.</td>
<td>• Rehabilitated surfaces are stable with minimal erosion.</td>
</tr>
<tr>
<td></td>
<td>• Vegetation in disturbed areas is self sustaining and requires no more maintenance than surrounding area of vegetation.</td>
<td>• Annual visual inspections and photo monitoring.</td>
</tr>
<tr>
<td></td>
<td>• Vegetation in disturbed areas is self sustaining and requires no more maintenance than surrounding area of vegetation.</td>
<td>• Water quality monitoring.</td>
</tr>
<tr>
<td></td>
<td>• Vegetation has become established on all applicable closure domain landforms.</td>
<td>• Annual dam failure/leakage assessments</td>
</tr>
<tr>
<td></td>
<td>• Vegetation coverage has been stable or improving for at least 12 months.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Limited erosion is visible.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Insect activity is visible.</td>
<td></td>
</tr>
<tr>
<td>Air Quality</td>
<td>• Dust leaving the site does not pose a potential pollution or health risk</td>
<td>• Annual visual inspections and photo monitoring.</td>
</tr>
<tr>
<td></td>
<td>• Annual visual inspections and photo monitoring.</td>
<td>• No unreasonable levels of dust during windy conditions.</td>
</tr>
<tr>
<td>Vegetation establishment</td>
<td>• Vegetation in disturbed areas is self sustaining and requires no more maintenance than surrounding area of vegetation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Vegetation has become established on all applicable closure domain landforms.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Vegetation coverage has been stable or improving for at least 12 months.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Limited erosion is visible.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Insect activity is visible.</td>
<td></td>
</tr>
</tbody>
</table>
4.2 EXISTING ENVIRONMENT SURROUNDING THE MINE SITE

4.2.1 Topography and Drainage

4.2.1.1 Regional and Local Topography & Drainage

The topography surrounding the Mine Site is characterised by generally flat terrain, sloping gently to the southeast with some localised hills and ridges (Figure 1). A dominant feature is a north-south trending ridgeline known as the Wallarooibie Range located approximately 5km to the east of the Mine Site. Isolated hills, including Taylors Hill, located approximately 1km to the southwest of the Mine Site also occur in the vicinity of the Mine Site.

The regional drainage consists of scattered indistinct watercourses converging on Bolaro and Mirrool Creeks, approximately 4km south of the Mine Site. These creeks flow in a westerly direction and are tributaries of the Murrumbidgee River.

4.2.2 Climate

4.2.2.1 Source of Data

The climate data presented in the following subsections has been sourced from the following Bureau of Meteorology weather stations.

- Ardlethan Post Office (station number 074000) located approximately 4km to the southeast of the Mine Site (temperature and rainfall data).
- Leeton Caravan Park (station number 073038) located approximately 45km to the southwest of the Mine Site (wind and relative humidity).
- Temora Research Station (station number 073038) located approximately 39km to the east-southeast of the Mine Site (evaporation).

4.2.2.2 Temperature

Table 3 presents the long-term monthly average temperatures at Ardlethan Post Office for the period 1909 till the present. On average, January is the hottest month, with a mean maximum temperature of 32.3°C and a mean minimum temperature of 16.3°C. July is the coldest month, with a mean maximum temperature of 14.1°C and a mean minimum temperature of 2.7°C.

4.2.2.3 Rainfall

Table 2 presents the mean monthly rainfall data at Ardlethan Post Office for the period 1895 to the present. On average, annual rainfall is 481.mm, with mean monthly rainfall being relatively constant throughout the year. Winter (June to August) experiences more rain days per month, with an average of 6.7 days, compared to the remainder of the year with an average of 4.7 days per month. This implies that the months that experience fewer days per month experience higher intensity rainfall events.
### Average Monthly Climate Statistics

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Annual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature (°C)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean maximum</td>
<td>32.3</td>
<td>31.1</td>
<td>28.7</td>
<td>23.3</td>
<td>18.0</td>
<td>14.7</td>
<td>14.1</td>
<td>15.6</td>
<td>19.2</td>
<td>22.7</td>
<td>25.9</td>
<td>30.5</td>
<td>21.3</td>
</tr>
<tr>
<td>Mean minimum</td>
<td>16.3</td>
<td>16.4</td>
<td>13.5</td>
<td>9.4</td>
<td>6.1</td>
<td>3.3</td>
<td>2.7</td>
<td>3.6</td>
<td>5.8</td>
<td>8.8</td>
<td>10.6</td>
<td>13.9</td>
<td>10.0</td>
</tr>
<tr>
<td>Rainfall (mm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>43.1</td>
<td>37.2</td>
<td>36.6</td>
<td>36.4</td>
<td>40.4</td>
<td>41.7</td>
<td>42.7</td>
<td>43.6</td>
<td>38.7</td>
<td>45.2</td>
<td>39.3</td>
<td>36.0</td>
<td>481.0</td>
</tr>
<tr>
<td>Median</td>
<td>26.2</td>
<td>25.6</td>
<td>25.2</td>
<td>23.3</td>
<td>29.9</td>
<td>37.0</td>
<td>41.2</td>
<td>41.9</td>
<td>33.9</td>
<td>38.8</td>
<td>32.3</td>
<td>27.4</td>
<td>476.4</td>
</tr>
<tr>
<td>Mean number of days of rain ≥ 1 mm</td>
<td>3.5</td>
<td>3.0</td>
<td>3.0</td>
<td>3.6</td>
<td>4.8</td>
<td>5.6</td>
<td>6.6</td>
<td>6.3</td>
<td>5.2</td>
<td>5.3</td>
<td>4.0</td>
<td>3.6</td>
<td>50.6</td>
</tr>
<tr>
<td>Relative Humidity (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean 9am relative humidity (%)</td>
<td>46</td>
<td>50</td>
<td>55</td>
<td>64</td>
<td>75</td>
<td>82</td>
<td>82</td>
<td>75</td>
<td>63</td>
<td>56</td>
<td>47</td>
<td>46</td>
<td>62</td>
</tr>
<tr>
<td>Mean 3pm relative humidity (%)</td>
<td>27</td>
<td>32</td>
<td>37</td>
<td>43</td>
<td>54</td>
<td>58</td>
<td>61</td>
<td>52</td>
<td>45</td>
<td>41</td>
<td>31</td>
<td>30</td>
<td>43</td>
</tr>
<tr>
<td>Evaporation (mm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean daily</td>
<td>8.8</td>
<td>7.9</td>
<td>5.9</td>
<td>3.6</td>
<td>2</td>
<td>1.2</td>
<td>1.2</td>
<td>1.8</td>
<td>2.8</td>
<td>4.4</td>
<td>6.5</td>
<td>8</td>
<td>4.5</td>
</tr>
<tr>
<td>Wind Speed (km/h)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean 9am wind speed (km/h)</td>
<td>10.1</td>
<td>9.1</td>
<td>10.4</td>
<td>8.2</td>
<td>7.4</td>
<td>5.5</td>
<td>6.1</td>
<td>7.6</td>
<td>10.6</td>
<td>9.9</td>
<td>10.3</td>
<td>8.9</td>
<td>8.7</td>
</tr>
<tr>
<td>Mean 3pm wind speed (km/h)</td>
<td>10.7</td>
<td>9.1</td>
<td>10.9</td>
<td>8.3</td>
<td>8.9</td>
<td>7.4</td>
<td>8.2</td>
<td>9.2</td>
<td>11.8</td>
<td>9.9</td>
<td>11.0</td>
<td>10.1</td>
<td>12.2</td>
</tr>
</tbody>
</table>

Note 1: Source = Bureau of Meteorology’s Ardlethan Weather Station
Note 2: Source = Bureau of Meteorology’s Leeton Caravan Park Weather Station
Note 3: Source = Bureau of Meteorology’s Temora Research Station Weather Station

#### 4.2.2.4 Relative Humidity

Table 2 presents the long-term monthly average humidity at the Temora Research Station for the period 1955 to 1975. Summer (November to February), with an average 3:00pm relative humidity of 30%, tends to be marginally less humid that the remainder of the year, with an average 3:00pm relative humidity of approximately 50%.

#### 4.2.2.5 Evaporation

Evaporation is a function of ambient temperature, wind and the saturation deficit of the air. Table 2 presents evaporation data from Bureau of Meteorology’s Temora Research Station Weather Station. It is estimated that the Temora Research Station experiences a water deficit, with evaporation exceeding rainfall throughout the year. The average annual evaporation is 1 642mm, more than three times the average annual rainfall in Ardlethan of 481mm. Assuming that the evaporation data from the Temora Research Station is applicable for Ardlethan, an annual net evaporation of 1 161mm would be expected.

#### 4.2.3 Air Quality

Air quality surrounding the Mine Site is typical of a rural environment where influences are determined principally by the season and the nature of surrounding agricultural activities.
Dust is the main air contaminant. Principal sources of dust in the vicinity of the Mine Site are from:

- the movement of vehicles or livestock over unsealed access roads, haul roads, farm tracks and areas devoid of vegetation;
- wind-blown dust from cleared or heavily grazed areas, including areas cleared for mining-related purposes; and
- the sowing and/or cultivation of crops.

4.2.4 Noise

Predominant noise sources in the vicinity of the Mine Site include:

- farm machinery;
- livestock;
- birds and other native fauna; and
- wind in trees.

4.2.5 Flora and Fauna

Figure 4 presents an overview of the areas surrounding the Mine Site. In summary, the areas to the south, southwest and west of the Mine Site are vegetated, while areas to the north, northeast and east of the Mine Site has been cleared to cultivation.

4.3 EXISTING ENVIRONMENT WITHIN THE MINE SITE

4.3.1 Mine Site Topography

Figure 5 presents the topography within and surrounding the Mine Site. The topography has been significantly altered by mining operations, including the construction of three open cuts, waste rock emplacements, stockpiles, tailings dams and freshwater dams. A ridgeline trending north south is located along the western side of the mine site.

East of this ridgeline is the Spring Valley Tailings Dam, Spring Valley Freshwater Dam, Tailings Dam No.1, Sulphide Dam, Lower Dam, Horseshoe Dam and the operational and administration buildings for the mine site.

The northern section of the Mine Site contains the open cut areas. The Ardwest/Wild Cherry Open Cut is the largest open cut of the three, with a depth approximately 260m below surface. A waste rock emplacement with an elevation of approximately 300m AHD separates the Ardwest/Wild Cherry Open Cut from the Northern Evaporation Ponds. The White Crystal Open Cut is located in the northeastern section of the Mine Site on the northern side of site access road. Adjacent to the northern boundary of the White Crystal Open Cut is Stackpool Open Cut, the smallest of the three open cuts.
Figure 4
SURROUNDING LAND USES
AND VEGETATION

REFERENCE
- Ardelthan Hard Rock Mine Site Boundary
- Cadastral Boundary
- Limit of EOE Land Ownership (offset for clarity)
Figure 5
MINE SITE TOPOGRAPHY
AND CATCHMENTS

REFERENCE
- Ardlethan Hard Rock Mine Site Boundary
- Existing Open Cut Area
- Contour (m AHD)(Interval = 5m)
- Track
- Building

SCALE 1:15 000
Elevations across the mine site vary from 300m AHD along ridgelines and crests of waste rock emplacements to 260m to 270m AHD at the crests of the open cuts and in the vicinity of the tailings and freshwater dams.

The Mine Site may be divided into the following catchments (Figure 5).

- **Spring Valley Upper Catchment** – This catchment includes the Spring Valley Tailings dam. All surface water and seepage from the tailings dam flows to the Spring Valley Dam from where it is allowed to evaporate. No water from this catchment is permitted to flow off-site.

- **Spring Valley Lower Catchment** – This catchment includes undisturbed areas down slope of the Spring Valley Dam. Surface waters within this catchment are not impacted by mining-related disturbance and are permitted to flow off-site.

- **Mill and Tailings Dam Catchment** – This catchment includes the remaining tailings dams, the Mill area and sections of the office and workshop area. Surface water within the catchment flows to the Mill Reclaim Pond from where an overflow pipe directs water to the Ardwest/Wild Cherry Open Cut. No water from this catchment is permitted to flow off-site.

- **Waste Rock Emplacement Catchment** – This catchment includes the Ardwest/Wild Cherry Waste Rock Emplacement. As surface water within this catchment flows to the Northern Evaporation Ponds. No water from this catchment is permitted to flow off-site.

- **Ardwest/Wild Cherry Open Cut Catchment** – This catchment includes the Ardwest/Wild Cherry Open Cut and is an internally draining catchment. No water from this catchment is permitted to flow off-site.

- **White Crystal/Stackpool Open Cut Catchment** – This catchment includes the White Crystal and Stackpool Open Cuts. All surface water within this catchment flow either directly or via a drainage channel, to the Stackpool Open Cut. From there the water either evaporates or flows via three drill holes to the Ardwest/Wild Cherry Open Cut. No water from this catchment is permitted to flow off-site.

- **Northern, Southern, Eastern and Western Catchments** – These catchments include undisturbed areas surrounding areas of former mining-related disturbance. Surface waters within this catchment are not impacted by mining-related disturbance and are permitted to flow off-site.
4.3.2 Groundwater

A groundwater study was undertaken by F.W. Lannen & Associates Pty Ltd to support an application for a proposed landfill operation within the Mine Site. A copy of that document has not been located, however, a summary is presented in the Environmental Impact Statement prepared ERM Mitchell McCotter in 1996 and revised by Perram & Partners in 1998. That study concluded that the granitic rocks that host the tin mineralisation within the Ardlethan Tin Mine are an aquifuge, or a geologic formation which has no interconnected openings and cannot hold or transmit water. In addition, the report notes that a number of bores were constructed by previous operators of the mine in Ordovician sediments and succeeded only in locating small quantities of highly saline groundwater. As a result, no significant groundwater resources are known or anticipated in the vicinity of the Mine Site.

4.3.3 Heritage

The Mine Site is highly disturbed and, as a result, items of Indigenous or non-Indigenous heritage are unlikely to remain within the Mine Site.

4.3.4 Soils

The Mine Site does not include any significant areas of remaining soil resources.

4.3.5 Contaminated Land

No contaminated land has been identified within the Mine Site. It is, however, acknowledged that there is potentially contaminated land within the footprint of the existing tailings dams, particularly the older dams that may not have been appropriately clay lined when constructed.

5 Closure Risks and Assumptions

5.1 Closure Risks

Table 4 presents a brief overview of the risks associated with closure of the Ardlethan Hard Rock Tin Mine, together with an indicative risk rating (Low, Moderate, High) and risk management strategy. It is noted that the identification of these risks and the indicative risk ratings has not been the subject of a formal risk identification and assessment process. These risks, risk ratings and management strategies are provided to give a framework for the closure domains and actions identified in Sections 5 and 6 respectively.
### Table 4
Closure Risks

<table>
<thead>
<tr>
<th>Closure Risk</th>
<th>Indicative Risk Rating</th>
<th>Comment/Risk Management Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insufficient financial resources to complete identified closure activities</td>
<td>Low</td>
<td>It is noted that a substantial security is held by I&amp;I NSW for the Ardlethan Hard Rock Tin Mine and that EOE will be required to ensure that this security is updated to reflect the activities identified in this document. As a result, should EOE be unable to complete the identified closure activities, sufficient resources would be available to ensure that I&amp;I NSW are able to complete the work required.</td>
</tr>
<tr>
<td><strong>Air Quality</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk of causing air pollution - dust/heavy metals/other</td>
<td>Low</td>
<td>Air pollution could be caused by wind-blown erosion from bare areas, disturbance to stable areas, clearing or demolition and earthwork rehabilitation activities. Air pollution could be in the form of deposited or particulate dust and heavy metals or other contaminants within the dust. There are no records of dust-related complaints associated from dust emissions within the Mine Site and none are anticipated.</td>
</tr>
<tr>
<td><strong>Water</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk of causing erosion</td>
<td>Low</td>
<td>Erosion could be caused by water runoff over bare areas or areas which are not sufficiently stabilised by vegetation. There is no evidence of significant erosion within the Mine Site.</td>
</tr>
<tr>
<td>Contaminated (chemical-laden) water leaving the Mine Site causing impacts on downstream aquatic ecology, agriculture and health risks.</td>
<td>Low to Moderate</td>
<td>Contaminated or chemical-laden water occurs within the Ardwest/Wild Cherry and Stackpool Open Cuts, the tailings dams, Mill Reclaim Dam and Spring Valley Dam. Water within the Mill Reclaim Dam and Stackpool Open Cut flows to the Ardwest/Wild Cherry Open Cut. Water within the Spring Valley Upper Catchment (Figure 5) flows to the Spring Valley Dam. Both these structures appear to be unlikely to overflow or leak.</td>
</tr>
<tr>
<td>Dirty (sediment-laden) water leaving the Mine Site causing impacts on downstream aquatic ecology, agriculture and health risks.</td>
<td>Moderate</td>
<td>Dirty or sediment-laden water from the Ardwest/Wild Cherry Waste Rock Emplacement flows to the Northern Evaporation Ponds. This water does not appear to be contaminated. There is no history of these ponds overflowing. However, potential exists for the diversion structures on the western margin of the waste rock emplacement to fill with sediment over time. This can be managed through cleaning out of the structures. In the event of failure of the structures, the potential impact would be limited to minor siltation of the surrounding land. No impacts on surface water drainages would be likely to occur.</td>
</tr>
<tr>
<td><strong>Ecology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk of ongoing weed control &amp; management requirement</td>
<td>Moderate</td>
<td>Areas that have not been adequately rehabilitated may require ongoing weed maintenance. There is no evidence of significant weed infestation within the Mine Site.</td>
</tr>
<tr>
<td>Risk of impact on native fauna</td>
<td>Low</td>
<td>Native fauna could be impacted through contamination of surface (drinking) water. There is no evidence of significant fauna impacts within the Mine Site.</td>
</tr>
<tr>
<td>Failure of revegetation activities</td>
<td>High</td>
<td>It is noted that vegetation has become established within disturbed sections of the Mine Site. However, establishment of vegetation will be highly constrained by availability of soil resources and climatic conditions. As a result, potential exists for failure of revegetation activities. Management measures incorporated in this plan include the following.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Collection of seed of species and individuals which appear to be thriving in disturbed areas of the Mine Site.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Investigation of the most appropriate revegetation methods.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Implementation of revegetation progressively to ensure lessons learnt during initial stages are incorporated into later stages of rehabilitation.</td>
</tr>
</tbody>
</table>
## Table 4 (Cont’d)  
**Closure Risks**

<table>
<thead>
<tr>
<th>Closure Risk</th>
<th>Indicative Risk Rating</th>
<th>Comment/Risk Management Strategy</th>
</tr>
</thead>
</table>
| **Noise**                                         |                        | **Risk of creating excessive noise / vibration**  
Low  
Excessive noise or vibration could occur from rehabilitation earthworks or demolition or through the presence of buildings or infrastructure that moves during wind events. There is no evidence of significant noise-related impacts associated with the Mine Site.                                   |
| **Aboriginal Heritage**                           |                        | **Risk of impact on areas of identified Aboriginal heritage**  
Low  
No sites of Aboriginal heritage have been identified within the Mine Site and as such, closure activities will be limited to areas of previous disturbance.                                                                                                                   |
| **Soil Resources**                                |                        | **Insufficient soil resources**  
High  
It is noted that very limited stockpiles of soil material remain within the Mine Site, potentially limiting the success of revegetation programs. Management measures incorporated in this plan include the following.  
- Investigation of the viability of stockpiles soil resources within the Mine Site.  
- Investigation of the most appropriate methods for spreading and utilising stockpile soil resources.  
- Investigation of methods to enable other materials such as tailings or imported materials to be used as growth medium or mixed with the stockpiled soils.  
- Investigation into the viability and success of seeding tailings material or waste rock without using topsoil.                                                                  |
| **Acid Rock Drainage**                           |                        | **Ongoing acid rock drainage issues**  
Low to Moderate  
Acid leachate is associated with seepage from each of the tailings dams, the White Crystal Waste Rock Emplacements and open cuts. No acid generation has been observed associated with the Ardwest/Wild Cherry Waste Rock Emplacement. All surface waters in areas of observed acid generation are presently contained within the Mine Site and there is no evidence that low-pH water currently or would in the future flow from the Mine Site. |
| **Visual Amenity**                                |                        | **Risk of disruption to visual amenity**  
Low  
Impact on visual amenity is subjective. The visual impact of mining infrastructure (or conversely rehabilitation) could be viewed as positive or negative by the community and stakeholders. However, it is noted that disturbed sections of the Mine Site are not typically visible from residences surrounding the Mine Site. |
| **Safety and Ground Stability**                   |                        | **Ongoing unauthorised access and vandalism**  
Moderate  
It is noted that the Mine Site is currently the subject of occasional unauthorised access and vandalism. It is anticipated that once rehabilitation operations are complete that such access will become less frequent as items of value will have been removed from the site. To the Company’s knowledge, there have been no personal injury-related incidents associated with unauthorised access to the Mine Site. |
|                                                   |                        | **Ongoing ground stability issues**  
Low  
There are no issues associated with significant ground instability within the Mine Site and none are anticipated.                                                                                                                                                                                                                                               |
5.2 Closure Assumptions

The following assumptions have been made in relation to the proposed closure activities.

- The rehabilitation completion criteria are the criteria that would have applied at the time that mining activities at the Ardlethan Hard Rock Tin Mine ceased in 1986.
- The closure activities assume that there is no possibility of subsequent mining operations. As such, this Preliminary Closure Plan assumes complete closure and relinquishment of the leases.
- Any area in the vicinity of fuel storage/use is considered hydrocarbon contaminated.
- Any area that is associated with processing activities, including tailings storage areas, has potential to be contaminated and is assumed to require remediation until proven otherwise.
- Concrete slabs and footings have been assumed to be removed to ground level and the remaining slab and/or footing covered over.
- Existing safety bunds around the open pit voids are adequate and that additional safety barriers are not required.
- Existing contaminated water management structures, namely the Mill Reclaim Pond and over flow pipe, Spring Valley Dam and White Crystal diversion channels are sound and additional remediation work is not required.
- Material, including pipework, broken concrete and other similar material, may be placed within one or more excavations within one of the tailings dams and covered.
- The Construction Area Domain includes waste rock material with a nil acid generation potential. This area would remain unrehabilitated for future use as a source of road construction material.

6 CLOSURE DOMAINS

Figure 6 presents the closure domains for the Ardlethan Hard Rock Tin Mine. These domains have been selected based on similar closure requirements and outcomes.

7 CLOSURE ACTIONS AND MONITORING

Table 5 presents the closure activities proposed for each domain identified in Figure 6.
Figure 6

CLOSURE DOMAINS
## Table 5
Closure Actions and Monitoring

<table>
<thead>
<tr>
<th>Task</th>
<th>Activity</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Domain 1 – Spring Valley Tailings Dam Domain</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closure Objectives</td>
<td>• Safe, stable landform.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Non-polluting.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Development of sustainable vegetative cover</td>
<td></td>
</tr>
<tr>
<td>Completion Criteria</td>
<td>• No significant erosion or geotechnical failure.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Clean water diversions operating effectively and are non-eroding.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• All potentially contaminated surface water is contained.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Surface is not the subject of dust generation through wind erosion.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Vegetation established in areas of placed soil material and becoming established in other areas.</td>
<td></td>
</tr>
<tr>
<td>Decommissioning</td>
<td>• Nil</td>
<td></td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>• Rectify drainage to ensure that surface of the tailings dam is completely free draining.</td>
<td>A small depression in the western section of the domain (Figure 6) is and will continue to be a leachate recharge location unless removed.</td>
</tr>
<tr>
<td></td>
<td>• Place approximately 200mm of coarse material over all areas of open tailings</td>
<td>A capping of coarse material will prevent generation of wind blown dust and will assist with seed retention and germination.</td>
</tr>
<tr>
<td></td>
<td>• Repair all areas of erosion and repair / modify surface water control structures as appropriate.</td>
<td>Minor areas of erosion are present.</td>
</tr>
<tr>
<td></td>
<td>• Place fine material / soil in ‘islands’ covering between 20% and 40% of the surface of the tailings dam and wall and revegetate with appropriate species sourced from locally collected seed.</td>
<td>The tailings dam currently has patches of fine material/soil with evidence of regeneration of vegetation. Replicating these patches across the remainder of the domain will assist with colonisation of remaining sections of the tailings dam and provide habitat for woodland birds.</td>
</tr>
<tr>
<td>Monitoring</td>
<td>• Visual inspection and photographic record annually for remainder of lease term.</td>
<td>Photographic locations should be marked with a painted concrete block and photographs should be taken at the same time of day, same direction and using the same focal length or zoom.</td>
</tr>
</tbody>
</table>
### Table 5 (Cont’d)

#### Closure Actions and Monitoring

<table>
<thead>
<tr>
<th>Task</th>
<th>Activity</th>
<th>Comment</th>
</tr>
</thead>
</table>
| Domains 2 and 3 – Spring Valley Toe Dam and Catch Dam Domains | **Closure Objectives**                                                    | - Safe, stable landform.  
- Total containment of all potentially contaminated surface waters.                                                                 |
|                       | **Completion Criteria**                                                  | - No significant erosion or geotechnical failure.  
- Clean water diversions operating effectively and are non-eroding.  
- All potentially contaminated surface water is directed to the Spring Valley Catch Dam. |
|                       | **Rehabilitation**                                                      | - Construct clean water diversions to divert clean water away from areas of contaminated water flow.  
- Construct a series of collection drains and channels to collect contaminated leachate from the Spring Valley Tailings Dam and direct it into the Spring Valley Dam.  
- Ensure that the surface water structures are of sufficient size to retain all contaminated water/divert all clean water to a 1 in 100 year rainfall event  
- Revegetate all disturbed areas outside the clean water diversion bund. |
|                       | **Monitoring**                                                          | - Visual inspection and photographic record annually for remainder of lease term.  
- Undertake annual water quality analysis (pH, electrical conductivity) and report results to I&I NSW  
- It is likely that the pH will decrease and electrical conductivity of water within the Spring Valley Dam will decrease and increase respectively with addition leachate inflow and evaporative loss. |
|                       |                                                                         |                                                                                                                                          |
### Table 5 (Cont’d)
**Closure Actions and Monitoring**

<table>
<thead>
<tr>
<th>Task</th>
<th>Activity</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domains 4, 5 and 6 – Tailings Dam 1, Lower Tailings Dam and Horseshoe Tailings Dam Domains</td>
<td><strong>Closure Objectives</strong>&lt;br&gt;• Safe, stable landform.&lt;br&gt;• Non-polluting.&lt;br&gt;• Development of sustainable vegetative cover</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Completion Criteria</strong>&lt;br&gt;• No significant erosion or geotechnical failure.&lt;br&gt;• Clean water diversions operating effectively and are non-eroding.&lt;br&gt;• All potentially contaminated surface water is contained or directed to the Mill Reclaim Pond Domain.&lt;br&gt;• Surface is not the subject of dust generation through wind erosion.&lt;br&gt;• Suitable vegetation established in areas of placed soil material and becoming established in other areas.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Decommissioning</strong>&lt;br&gt;• Remove all pipework and other materials and dispose of in an appropriate location.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Rehabilitation</strong>&lt;br&gt;• Reprofile the tailings dam surface to form a free draining, stable landform.</td>
<td><strong>Small depressions in the area and will continue to be a leachate recharge location unless removed.</strong></td>
</tr>
<tr>
<td></td>
<td>• Place approximately 200mm of coarse material over all areas of open tailings.</td>
<td><strong>A capping of coarse material will prevent generation of wind blown dust and will assist with seed retention and germination Minor areas of erosion are present.</strong></td>
</tr>
<tr>
<td></td>
<td>• Repair all areas of erosion and construct / repair / modify surface water control structures as appropriate.</td>
<td><strong>Minor areas of erosion are present.</strong></td>
</tr>
<tr>
<td></td>
<td>• Place fine material / soil in ‘islands’ covering between 20% and 40% of the surface of the tailings dam and revegetate with appropriate species sourced from locally collected seed. It is noted that the middlings material, if not reprocessed or following reprocessing, may be suitable for use as top dressing material</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Monitoring</strong>&lt;br&gt;• Visual inspection and photographic record annually for remainder of lease term.</td>
<td><strong>Photographic locations should be marked with a painted concrete block and photographs should be taken at the same time of day, same direction and using the same focal length or zoom.</strong></td>
</tr>
</tbody>
</table>

**R. W. CORKERY & CO. PTY. LIMITED**
### Table 5 (Cont’d)  
Closure Actions and Monitoring

<table>
<thead>
<tr>
<th>Domain 7 – Mill Reclaim Pond</th>
<th>Task</th>
<th>Activity</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closure Objectives</td>
<td></td>
<td>• Safe, stable landform.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Non-polluting.</td>
<td></td>
</tr>
<tr>
<td>Completion Criteria</td>
<td></td>
<td>• No significant erosion or geotechnical failure.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Clean water diversions operating effectively and are non-eroding.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• All potentially contaminated surface water is contained or directed to the Wild Cherry / Ardwest Open Cut.</td>
<td></td>
</tr>
<tr>
<td>Decommissioning</td>
<td></td>
<td>• Remove all pipework and other materials and dispose of in an appropriate location.</td>
<td></td>
</tr>
<tr>
<td>Rehabilitation</td>
<td></td>
<td>• Ensure that pond is structurally sound and that the overflow pipe to the Wild Cherry/Ardwest Open Cut is sound.</td>
<td></td>
</tr>
<tr>
<td>Monitoring</td>
<td></td>
<td>• Inspect the dam wall and overflow pipe annually for signs of leakage.</td>
<td>• The Mill Reclaim Pond would appear to be sound, however, ongoing monitoring will be required.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Photographic record annually for remainder of lease term.</td>
<td>• Photographic locations should be marked with a painted concrete block and photographs should be taken at the same time of day, same direction and using the same focal length or zoom.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Undertake annual water quality analysis (pH, electrical conductivity) and report results to I&amp;I NSW</td>
<td>• It is likely that the pH will decrease and electrical conductivity of water within the Spring Valley Dam will decrease and increase respectively with addition leachate inflow and evaporative loss.</td>
</tr>
</tbody>
</table>

## Domain 8 – Mill and Office Area Domain

<table>
<thead>
<tr>
<th>Task</th>
<th>Activity</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closure Objectives</td>
<td>• Safe, stable landform.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Non-polluting.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Development of sustainable vegetative cover</td>
<td></td>
</tr>
<tr>
<td>Completion Criteria</td>
<td>• No significant erosion or geotechnical failure.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• All potentially sediment-laden surface water is directed to the Mill Reclaim Pond Domain or a suitable sedimentation pond.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Surface is not the subject of dust generation through wind erosion.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Suitable vegetation established.</td>
<td></td>
</tr>
</tbody>
</table>
### Table 5 (Cont’d)
Closure Actions and Monitoring

<table>
<thead>
<tr>
<th>Task</th>
<th>Activity</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decommissioning</td>
<td>• Remove / demolish all remaining buildings with the exception of the administration buildings and remaining buildings constructed from concrete or bricks.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Excavate a number of emplacement sites and push all waste material into the excavated holes and cover.¹</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Leave concrete footings in place.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Excavate and treat onsite all hydrocarbon contaminated soil.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Ensure that the area around the crusher footings is safe through backfilling or blasting/crushing/reprofiling.</td>
<td>It is assumed that some contamination will be associated with the former diesel storage tanks.</td>
</tr>
<tr>
<td></td>
<td>• Reprofile and rip the domain area to form a stable, free draining landform.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Construct/repair surface water diversion structures to ensure that surface water flows to either the Mil Reclaim Pond or the Wild Cherry/Ardwest Open Cut.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Spread appropriate soil material or other growth medium.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Revegetate domain with appropriate species sourced from locally collected seed.</td>
<td></td>
</tr>
<tr>
<td>Monitoring</td>
<td>• Visual inspection and photographic record annually for remainder of lease term.</td>
<td>Photographic locations should be marked with a painted concrete block and photographs should be taken at the same time of day, same direction and using the same focal length or zoom.</td>
</tr>
</tbody>
</table>

¹ It is noted that approval from the Environment Protection Authority and / or Council may be required for this task.
Table 5 (Cont’d)
Closure Actions and Monitoring

<table>
<thead>
<tr>
<th>Task</th>
<th>Activity</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Domain 9 – Construction Materials Domain</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Closure Objectives</strong></td>
<td>• Safe, stable landform.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Non-polluting.</td>
<td></td>
</tr>
<tr>
<td><strong>Completion Criteria</strong></td>
<td>• No significant erosion or geotechnical failure.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• All potentially sediment-laden surface water is directed to the Mill</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reclaim Pond Domain or a suitable sedimentation pond.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Surface is not the subject of dust generation through wind erosion.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Area remains available for extraction of construction materials.</td>
<td></td>
</tr>
<tr>
<td><strong>Decommissioning</strong></td>
<td>• Nil</td>
<td></td>
</tr>
<tr>
<td><strong>Rehabilitation</strong></td>
<td>• Reprofile walls to a safe angle.</td>
<td></td>
</tr>
<tr>
<td><strong>Monitoring</strong></td>
<td>• Nil</td>
<td></td>
</tr>
<tr>
<td><strong>Domain 10 – Ardwest/Wild Cherry Waste Rock Emplacement Domain</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Closure Objectives</strong></td>
<td>• Safe, stable landform.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Non-polluting.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Development of sustainable vegetative cover</td>
<td></td>
</tr>
<tr>
<td><strong>Completion Criteria</strong></td>
<td>• No significant erosion or geotechnical failure.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• All potentially sediment-laden surface water is directed a suitable</td>
<td></td>
</tr>
<tr>
<td></td>
<td>sedimentation pond.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Surface is not the subject of dust generation through wind erosion.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Suitable vegetation established.</td>
<td></td>
</tr>
<tr>
<td><strong>Decommissioning</strong></td>
<td>• Nil</td>
<td></td>
</tr>
<tr>
<td><strong>Rehabilitation</strong></td>
<td>• Spread topsoil or other fine material as required on the outer toe of</td>
<td></td>
</tr>
<tr>
<td></td>
<td>the waste rock emplacement and revegetate domain with appropriate tree</td>
<td></td>
</tr>
<tr>
<td></td>
<td>species sourced from locally collected seed.</td>
<td></td>
</tr>
<tr>
<td><strong>Monitoring</strong></td>
<td>• Visual inspection and photographic record annually for remainder of</td>
<td>• Photographic locations should be marked with a painted concrete block</td>
</tr>
<tr>
<td></td>
<td>lease term.</td>
<td>and photographs should be taken at the same time of day, same direction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and using the same focal length or zoom.</td>
</tr>
</tbody>
</table>
### Table 5 (Cont’d)
#### Closure Actions and Monitoring

<table>
<thead>
<tr>
<th>Domain 11 – Alluvial Processing Plant Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Task</strong></td>
</tr>
<tr>
<td>Closure Objectives</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Completion Criteria</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Decommissioning</td>
</tr>
<tr>
<td>Rehabilitation</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Monitoring</td>
</tr>
<tr>
<td>Domain 12 – Ardwest/Wild Cherry Open Cut Domain</td>
</tr>
<tr>
<td><strong>Task</strong></td>
</tr>
<tr>
<td>Closure Objectives</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Completion Criteria</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Decommissioning</td>
</tr>
</tbody>
</table>
### Domain 12 – Ardwest/Wild Cherry Open Cut Domain (Cont’d)

<table>
<thead>
<tr>
<th>Task</th>
<th>Activity</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rehabilitation</strong></td>
<td>• Repair and upgrade perimeter bunding and fencing as appropriate.</td>
<td></td>
</tr>
<tr>
<td><strong>Monitoring</strong></td>
<td>• Visual inspection and photographic record annually for remainder of lease term.</td>
<td>• Photographic locations should be marked with a painted concrete block and photographs should be taken at the same time of day, same direction and using the same focal length or zoom.</td>
</tr>
<tr>
<td></td>
<td>• Undertake annual water quality analysis (pH, electrical conductivity) and report results to I&amp;I NSW</td>
<td>• It is likely that the pH will decrease and electrical conductivity of water within the Spring Valley Dam will decrease and increase respectively with addition leachate inflow and evaporative loss.</td>
</tr>
</tbody>
</table>

### Domain 13 – Carpathia Domain

<table>
<thead>
<tr>
<th>Task</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Closure Objectives</strong></td>
<td>• Safe, stable landform.</td>
</tr>
<tr>
<td></td>
<td>• Non-polluting.</td>
</tr>
<tr>
<td></td>
<td>• Development of sustainable vegetative cover</td>
</tr>
<tr>
<td><strong>Completion Criteria</strong></td>
<td>• No significant erosion or geotechnical failure.</td>
</tr>
<tr>
<td></td>
<td>• All potentially sediment-laden surface water is directed a suitable sedimentation pond of the underground workings</td>
</tr>
<tr>
<td></td>
<td>• Surface is not the subject of dust generation through wind erosion.</td>
</tr>
<tr>
<td></td>
<td>• Suitable vegetation established.</td>
</tr>
<tr>
<td><strong>Decommissioning</strong></td>
<td>• Nil</td>
</tr>
<tr>
<td><strong>Rehabilitation</strong></td>
<td>• Retain historic stone walls and mining equipment.</td>
</tr>
<tr>
<td></td>
<td>• Repair and upgrade bunding and fencing around potential collapse zone as appropriate.</td>
</tr>
<tr>
<td></td>
<td>• Plug drill holes and reprofile domain.</td>
</tr>
<tr>
<td></td>
<td>• Deep rip, spread appropriate soil material or other growth medium and revegetate with appropriate species sourced from locally collected seed.</td>
</tr>
<tr>
<td>Task</td>
<td>Activity</td>
</tr>
<tr>
<td>------</td>
<td>----------</td>
</tr>
<tr>
<td><strong>Domain 13 – Carpathia Domain</strong> <em>(Cont’d)</em></td>
<td></td>
</tr>
<tr>
<td>Monitoring</td>
<td>• Visual inspection and photographic record annually for remainder of lease term.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Domain 14 – Stackpool Open Cut Domain</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Closure Objectives</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Safe, stable landform.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Non-polluting.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• No significant erosion or geotechnical failure.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• All potentially contaminated surface water directed to the Wild Cherry / Ardwest Open Cut.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Surface is not the subject of dust generation through wind erosion.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Suitable fences and/or bunds exist to prevent unauthorised/ inadvertent access.</td>
<td></td>
</tr>
<tr>
<td><strong>Completion Criteria</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Repair and upgrade perimeter bunding and fencing as appropriate.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Ensure that drain holes remain open and are not subject to blockage</td>
<td></td>
</tr>
<tr>
<td><strong>Rehabilitation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Visual inspection and photographic record annually for remainder of lease term.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Undertake annual water quality analysis (pH, electrical conductivity) and report results to I&amp;I NSW</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Photographic locations should be marked with a painted concrete block and photographs should be taken at the same time of day, same direction and using the same focal length or zoom.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• It is likely that the pH will decrease and electrical conductivity of water within the Spring Valley Dam will decrease and increase respectively with addition leachate inflow and evaporative loss.</td>
<td></td>
</tr>
</tbody>
</table>
### Table 5 (Cont’d)
**Closure Actions and Monitoring**

<table>
<thead>
<tr>
<th>Task</th>
<th>Activity</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Domain 15 – White Crystal Open Cut Domain</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closure Objectives</td>
<td>• Safe, stable landform.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Non-polluting.</td>
<td></td>
</tr>
<tr>
<td>Completion Criteria</td>
<td>• No significant erosion or geotechnical failure.</td>
<td>• No significant erosion or geotechnical failure.</td>
</tr>
<tr>
<td></td>
<td>• Internally draining.</td>
<td>• Internally draining.</td>
</tr>
<tr>
<td></td>
<td>• Surface is not the subject of dust generation through wind erosion.</td>
<td>• Surface is not the subject of dust generation through wind erosion.</td>
</tr>
<tr>
<td></td>
<td>• Suitable fences and/or bunds exist to prevent unauthorised/inadvertent access.</td>
<td>• Suitable fences and/or bunds exist to prevent unauthorised/inadvertent access.</td>
</tr>
<tr>
<td>Decommissioning</td>
<td>• Nil</td>
<td></td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>• Repair and upgrade perimeter bunding and fencing as appropriate.</td>
<td>• Repair and upgrade perimeter bunding and fencing as appropriate.</td>
</tr>
<tr>
<td>Monitoring</td>
<td>• Visual inspection and photographic record annually for remainder of lease term.</td>
<td>• Visual inspection and photographic record annually for remainder of lease term.</td>
</tr>
<tr>
<td></td>
<td>• Photographic locations should be marked with a painted concrete block and photographs should be taken at the same time of day, same direction and using the same focal length or zoom.</td>
<td>• Photographic locations should be marked with a painted concrete block and photographs should be taken at the same time of day, same direction and using the same focal length or zoom.</td>
</tr>
<tr>
<td><strong>Domain 16 – White Crystal Waste Rock Emplacement Domain</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closure Objectives</td>
<td>• Safe, stable landform.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Non-polluting.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Development of sustainable vegetative cover</td>
<td></td>
</tr>
<tr>
<td>Completion Criteria</td>
<td>• No significant erosion or geotechnical failure.</td>
<td>• All potentially sediment-laden surface water is directed a suitable sedimentation pond.</td>
</tr>
<tr>
<td></td>
<td>• Surface is not the subject of dust generation through wind erosion.</td>
<td>• Surface is not the subject of dust generation through wind erosion.</td>
</tr>
<tr>
<td></td>
<td>• Suitable vegetation established.</td>
<td>• Suitable vegetation established.</td>
</tr>
<tr>
<td>Decommissioning</td>
<td>• Nil</td>
<td></td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>• Clean out perimeter drain on northern and eastern sides of the waste rock emplacement.</td>
<td>• Clean out perimeter drain on northern and eastern sides of the waste rock emplacement.</td>
</tr>
<tr>
<td></td>
<td>• Plant screening vegetation at the toe of the emplacement.</td>
<td>• Plant screening vegetation at the toe of the emplacement.</td>
</tr>
<tr>
<td>Monitoring</td>
<td>• Visual inspection and photographic record annually for remainder of lease term.</td>
<td>• Visual inspection and photographic record annually for remainder of lease term.</td>
</tr>
<tr>
<td></td>
<td>• Photographic locations should be marked with a painted concrete block and photographs should be taken at the same time of day, same direction and using the same focal length or zoom.</td>
<td>• Photographic locations should be marked with a painted concrete block and photographs should be taken at the same time of day, same direction and using the same focal length or zoom.</td>
</tr>
</tbody>
</table>
### Domain 17 – White Crystal Alluvial Domain

#### Closure Objectives
- Safe, stable landform.
- Non-polluting.
- Development of sustainable vegetative cover

#### Completion Criteria
- No significant erosion or geotechnical failure.
- All potentially sediment-laden surface water is directed to a suitable sedimentation pond.
- Surface is not the subject of dust generation through wind erosion.
- Suitable vegetation established.

#### Decommissioning
- Nil

#### Rehabilitation
- Install appropriate surface water drainage to ensure that domain remains internally draining.
- Reprofile, deep rip and revegetate domain with appropriate tree species sourced from locally collected seed.

#### Monitoring
- Visual inspection and photographic record annually for remainder of lease term.
- Photographic locations should be marked with a painted concrete block and photographs should be taken at the same time of day, same direction and using the same focal length or zoom.

### Domain 18 – Northern Evaporation Pond and Drainage Structures

#### Closure Objectives
- Safe, stable landform.
- Non-polluting.
- Development of sustainable vegetative cover

#### Completion Criteria
- No significant erosion or geotechnical failure.
- All potentially sediment-laden surface water is directed to a suitable sedimentation pond.
- Surface is not the subject of dust generation through wind erosion.
- Suitable vegetation established.

#### Decommissioning
- Nil
Table 5 (Cont’d)
Closure Actions and Monitoring

<table>
<thead>
<tr>
<th>Task</th>
<th>Activity</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Domain 18 – Northern Evaporation Pond and Drainage Structures (Cont’d)</strong></td>
<td></td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>• Review the design of the dams and confirm that they are capable of containing a 1 in 100 year rainfall event.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Remove sediment from drainage structures as required.</td>
<td></td>
</tr>
<tr>
<td>Monitoring</td>
<td>• Visual inspection and photographic record annually for remainder of lease term.</td>
<td>• Photographic locations should be marked with a painted concrete block and photographs should be taken at the same time of day, same direction and using the same focal length or zoom.</td>
</tr>
</tbody>
</table>

8  CLOSURE COSTS

Anticipated closure costs for the Ardlethan Hard Rock Tin Mine have been provided separately. A security of $750,000 is currently held for the Project.

9  ONGOING MAINTENANCE, MONITORING AND RECORD KEEPING

9.1 ONGOING MAINTENANCE

Closure planning and design has been conducted to ensure minimal ongoing maintenance requirements. Ongoing maintenance within the Mine Site will be limited to the following.

(a) Targeted noxious weed control over the entire Mine Site on an annual basis if required.

(b) Remedial earthworks in areas where significant rill or gully erosion is evident.

(c) Supplementary seeding/revegetation in areas where monitoring indicates that revegetation has not been successful.

(d) Placement of additional soil / growth medium in the event that reseeding / revegetation operations identified in (c) above are not successful.

(e) Remediation where annual monitoring indicates that the existing surface water control structures, including diversion banks and channels, the Mill Reclaim Pond overflow pipe and storage structures are leaking or are inadequate.
9.2 MONITORING

Ongoing monitoring within each domain is identified in Table 4. In summary, EOE will undertake the following monitoring annually, typically in spring. This monitoring will commence prior to the completion of the closure activities identified in Table 4 and will continue until relinquishment of all mineral authorities.

- Visual inspection for each domain with emphasis placed on identifying:
  - areas where revegetation operations have not meet the required closure criteria;
  - areas where weeds have become established;
  - areas of erosion or sedimentation; and
  - evidence of potentially contaminated water leaking from the Mill Reclaim Pond or overflow pipe or the Spring Valley Dam.

- Photographic documentation of each domain. Typically photographs would be taken from a fixed photo location marked by a painted concrete block or similar. A procedures manual will be developed describing how the photos are to be taken, the time of year and day that they are to be taken, the focal length or zoom to be used and the direction of each photo. Typically the photos will overlap to form a panorama of the domain.

- Water sampling using calibrated field meters to determine the pH and electrical conductivity of surface water within the Ardwest/Wild Cherry and Stackpool Open Cuts, the Mill Reclaim Pond and the Spring Valley Dam.

9.3 RECORD KEEPING

Within 28 days of the completion of the annual environmental monitoring program, EOE will prepare a brief report in accordance with the requirements of Guidelines to the Mining, Rehabilitation and Environmental Management Process published by the NSW Department of Primary Industries – Mineral Resources in 2006. The report would:

- document the results of the current and previous monitoring, including graphs;
- provide copies of the photographs taken of each domain;
- outline the results of the visual inspection;
- describe activities undertaken during the previous 12 months and those proposed during the subsequent 12 months
10 MINERAL AUTHORITY RELINQUISHMENT

It is envisaged that following completion of the closure activities and achievement of the criteria established in Section 3.3 and Table 5, that EOE would undertake monitoring for a period of at least 12 months. Once the Company has established to its own satisfaction that the completion criteria identified in Section 3.3 and Table 5 have been, achieved a site inspection will be arranged with the relevant government agencies with a view to satisfying those agencies that all relevant closure activities have been completed and the required criteria achieved. An application would then be made to relinquish the relevant mineral authorities and have the associated security released.
Appendices

(Total No. of pages including blank pages = 54)

Appendix 1  Review of Environmental Factors
Appendix 2  Letter of Change
Appendix 1

Review of Environmental Factors

(Total No. of pages including blank pages = 42)
EOE (No. 75) Pty Limited

ABN: 95 006 829 787

(A wholly owned subsidiary of Australian Tin Resources Pty Ltd)

Review of Environmental Factors for the Ardlethan Tin Tailings Bulk Sample and Pilot Plant Program

Prepared by:

R.W. CORKERY & CO. PTY. LIMITED
This page has intentionally been left blank
EOE (No. 75) Pty Limited

ABN: 95 006 829 787

(A wholly owned subsidiary of
Australian Tin Resources Pty Ltd)

Review of Environmental Factors

for the

Ardlethan Tin Tailings
Bulk Sample and Pilot Plant Program

Prepared for:

Australian Tin Resources Pty Ltd
ABN: 17 124 654 380
Level 2, 53 Berry Street
NORTH SYDNEY NSW 2060

R. W. Corkery & Co. Pty. Limited
Geological & Environmental Consultants
ABN: 31 002 033 712

Prepared by:

R.W. Corkery & Co. Pty. Limited

Telephone: (02) 9959 5599
Facsimile: (02) 9420 2108
Email: pfwindow@atresources.com.au

Brooklyn Office:
1st Floor, 12 Dangar Road
PO Box 239
BROOKLYN NSW 2083

Orange Office:
Suite 15, 256 Anson Street
ORANGE NSW 2800

Telephone: (02) 6362 5411
Facsimile: (02) 6361 3622
Email: mail@rw Corkery.com

Ref No. 754/03
September 2008
DECLARATION

I, Peter Richard Francis, Director of EOE (No. 75) Pty Limited (ABN: 17 124 654 360), declare that the information contained within the Review of Environmental Factors is neither false nor misleading

Name: Peter Francis

Signature:

Date: 18 September 2008
# CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>DECLARATION</td>
<td>1</td>
</tr>
<tr>
<td>1 Introduction</td>
<td>1</td>
</tr>
<tr>
<td>1.1 Scope</td>
<td>1</td>
</tr>
<tr>
<td>1.2 The Project Site</td>
<td>1</td>
</tr>
<tr>
<td>1.3 The Applicant</td>
<td>1</td>
</tr>
<tr>
<td>1.4 Background to the Proposal</td>
<td>3</td>
</tr>
<tr>
<td>1.5 Licences and Approvals Required</td>
<td>3</td>
</tr>
<tr>
<td>1.6 Mineral Authorities Held</td>
<td>4</td>
</tr>
<tr>
<td>1.7 Zoning</td>
<td>4</td>
</tr>
<tr>
<td>1.8 Stakeholder Consultation</td>
<td>9</td>
</tr>
<tr>
<td>2 Description of the Activity</td>
<td>9</td>
</tr>
<tr>
<td>2.1 Introduction</td>
<td>9</td>
</tr>
<tr>
<td>2.2 Site Establishment and Infrastructure</td>
<td>9</td>
</tr>
<tr>
<td>2.3 Extraction and Stockpiling of Tailings and Middlings</td>
<td>10</td>
</tr>
<tr>
<td>2.4 Processing Activities</td>
<td>11</td>
</tr>
<tr>
<td>2.5 Reject Management</td>
<td>12</td>
</tr>
<tr>
<td>2.6 Rehabilitation</td>
<td>15</td>
</tr>
<tr>
<td>3 Existing Environment</td>
<td>15</td>
</tr>
<tr>
<td>3.1 Topography and Drainage</td>
<td>15</td>
</tr>
<tr>
<td>3.1.1 Regional and Local Topography &amp; Drainage</td>
<td>15</td>
</tr>
<tr>
<td>3.1.2 Project Site Topography</td>
<td>15</td>
</tr>
<tr>
<td>3.2 Local and Regional Geology</td>
<td>16</td>
</tr>
<tr>
<td>3.3 Climate</td>
<td>16</td>
</tr>
<tr>
<td>3.3.1 Source of Data</td>
<td>16</td>
</tr>
<tr>
<td>3.3.2 Temperature</td>
<td>19</td>
</tr>
<tr>
<td>3.3.3 Rainfall</td>
<td>19</td>
</tr>
<tr>
<td>3.3.4 Relative Humidity</td>
<td>19</td>
</tr>
<tr>
<td>3.3.5 Evaporation</td>
<td>20</td>
</tr>
<tr>
<td>4 Environmental Impacts and Management</td>
<td>20</td>
</tr>
<tr>
<td>4.1 Introduction</td>
<td>20</td>
</tr>
<tr>
<td>4.2 Air</td>
<td>20</td>
</tr>
<tr>
<td>4.2.1 Existing Environment</td>
<td>20</td>
</tr>
<tr>
<td>4.2.2 Management Measures</td>
<td>20</td>
</tr>
<tr>
<td>4.2.3 Environmental Effects</td>
<td>21</td>
</tr>
<tr>
<td>4.3 Surface Water</td>
<td>21</td>
</tr>
<tr>
<td>4.3.1 Existing Environment</td>
<td>21</td>
</tr>
<tr>
<td>4.3.2 Management Measures</td>
<td>21</td>
</tr>
<tr>
<td>4.3.3 Environmental Effects</td>
<td>22</td>
</tr>
<tr>
<td>4.4 Groundwater</td>
<td>22</td>
</tr>
<tr>
<td>4.4.1 Existing Environment</td>
<td>22</td>
</tr>
<tr>
<td>4.4.2 Management Measures</td>
<td>22</td>
</tr>
<tr>
<td>4.4.3 Environmental Effects</td>
<td>22</td>
</tr>
<tr>
<td>4.5 Soils</td>
<td>23</td>
</tr>
</tbody>
</table>
## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.6</td>
<td>Noise</td>
</tr>
<tr>
<td>4.6.1</td>
<td>Existing Environment</td>
</tr>
<tr>
<td>4.6.2</td>
<td>Management Measures</td>
</tr>
<tr>
<td>4.6.3</td>
<td>Environmental Effects</td>
</tr>
<tr>
<td>4.7</td>
<td>Flora and Fauna</td>
</tr>
<tr>
<td>4.8</td>
<td>Chemical and Hazardous Substance Management</td>
</tr>
<tr>
<td>4.9</td>
<td>Contaminated Land</td>
</tr>
<tr>
<td>4.10</td>
<td>Natural Resource Use</td>
</tr>
<tr>
<td>4.11</td>
<td>Impact on the Community</td>
</tr>
<tr>
<td>4.12</td>
<td>Visual Assessment</td>
</tr>
<tr>
<td>4.13</td>
<td>Heritage</td>
</tr>
<tr>
<td>4.14</td>
<td>Land Use</td>
</tr>
<tr>
<td>4.15</td>
<td>Cumulative Environmental Impacts</td>
</tr>
<tr>
<td>4.16</td>
<td>Summary of Management Measures</td>
</tr>
<tr>
<td>5</td>
<td>SUMMARY OF IMPACTS AND CONCLUSIONS</td>
</tr>
<tr>
<td>5.1</td>
<td>Justification of the Activity</td>
</tr>
<tr>
<td>APPENDIX 1</td>
<td>PART 5 APPLICATION FORM</td>
</tr>
</tbody>
</table>

## FIGURES

- Figure 1: Locality Plan .............................................. 2
- Figure 2: Local Setting and Project Site Layout ............... 5
- Figure 3: Mineral Authorities ...................................... 7
- Figure 5: Regional Topography and Drainage .................. 17
- Figure 6: Local and Project Site Geology ..................... 18

## TABLES

- Table 1: Average Monthly Climate Statistics ................. 19

## PLATES

- Plate 1: Tailings and middlings would be excavated using an excavator and off-road haul truck .................. 13
- Plate 2: Processing Plant similar to what would be installed within the Project Site, showing feed hopper, control cab, tromell and jigs .................. 13
- Plate 3: Cyclone similar to what would be installed within the Processing Plant .................. 13
- Plate 4: Spirals similar to what would be installed within the Project Site .................. 13
- Plate 5: Shaker table similar to what would be installed within the processing plant .......... 14
1 INTRODUCTION

1.1 Scope

This Review of Environmental Factors (REF) has been prepared by R.W. Corkery & Co. Pty Limited on behalf of the Applicant, EOE (No. 75) Pty Limited (EOE), a wholly owned subsidiary of Australian Tin Resources Pty Ltd (ATR). This document has been prepared to support an application for approval from the Department of Primary Industries - Mineral Resources (DPI-MR) under Part 5 of the Environmental Planning and Assessment Act 1979 to extract a bulk sample of tailings and middlings from the Ardlethan Tin Mine and undertake metallurgical test work using a small on-site processing plant. A copy of the Part 5 Application Form for the Proposal is included as Appendix 1.

This document outlines the proposed extraction, processing, reject management and rehabilitation operations, describes the existing environment within and surrounding the Project Site, and assesses the environmental impacts of the proposed activity. The document has been prepared in accordance with the document Guidelines for Review of Environmental Factors (ESB18) prepared by the DPI-MR and dated June 2006.

1.2 The Project Site

For the purposes of this document, the land which is the subject of the development application is referred to as the “Project Site” and includes all areas of proposed disturbance related to the Proposal. The Project Site is located approximately 4km to the northwest of the town of Ardlethan in the Coolamon Local Government Area (Figure 1). It is noted that the Project Site occurs within the broader Ardlethan Tin Mine Site (“Mine Site”). However, as only a portion of the Mine Site would be disturbed by the proposed activities, the Project Site occupies a smaller area than the Mine Site.

1.3 The Applicant

EOE (No. 75) Pty Limited (EOE) is a wholly owned subsidiary of Australian Tin Resources Pty Ltd (ATR). ATR was formed in early 2007 with the specific objective to purchase, extract and re-treat the tin tailings at the Ardlethan Tin Mine. In order to achieve this objective, ATR acquired EOE from the administrators of Telminex NL, the previous operators of the mine, in July 2007.
1.4 Background to the Proposal

Tin mining first commenced at Ardlethan in 1922. Initial mining operations were comparatively small scale and utilised both open cut and underground mining methods. However, during the period 1965 to 1986, Aberfoyle Resources Ltd mined and processed approximately 9 million tonnes of primary, hard-rock, tin-bearing ore averaging 0.46% tin by open cut mining methods from three open cuts, namely the Ardwest/Wild Cherry, White Crystal and Stackpool Open Cuts. In addition, during processing operations a number of tailings dams were constructed (Figure 2). These operations ceased in 1986 due to the reduced tin prices and the depletion of economically viable resources. There has been no further hard rock mining activity since 1986.

Further recovery of alluvial tin (in the form of cassiterite – SnO₂) was undertaken by Telminex NL (through Marlborough Resources) between 2000 and 2003 from alluvial and deep lead tin deposits down slope from the primary hard-rock deposits. Following a further drop in tin prices Telminex NL was placed into administration and ceased operations in 2003. The DPI - MR has since undertaken a comprehensive rehabilitation program to re-instate the areas of alluvial mining left unrehabilitated by Telminex NL. The areas of hard rock mining, together with the processing areas and tailings dams have yet to be, or have only been partially rehabilitated.

ATR has purchased those assets of EOE that are within the former hard rock mine area, including those Mining Lease covering the Ardwest/Wild Cherry, White Crystal and Stackpool Open Cuts, the former processing plant and facilities areas and the tailings dams. ATR proposes to reprocess the tailings within the tailings dams to extract the remaining cassiterite and place the tailings from the reprocessing operations within the Ardwest/Wild Cherry Open Cut. In the process, ATR would rehabilitate a number of areas of disturbance within the Project Site, including the tailings dams, processing plant area and facilities area.

In order to enable ATR to identify the most appropriate processing methodology, confirm the recoveries that would be likely to be obtained and obtain sufficiently large samples of concentrate for testing by ATR’s customers, the Company proposes to extract a bulk sample of up to 20,000t of tailings and middlings material and process that material through a small trial processing plant. Middlings material is ground material that was diverted partway through the process of the material and placed within the tailings dams.

1.5 Licences and Approvals Required

ATR contends that the extraction and test processing activity is the equivalent of extraction of a bulk sample under an exploration licence. Under such a licence, extraction of a bulk sample is considered to be Category 3 exploration and approval is required from the DPI-MR under Part 5 of the Environmental Planning and Assessment Act 1979 before the work can commence. The Department requires that a REF be prepared to enable the environmental impacts of the proposed activity to be determined.

No other licences or approvals will be required.
1.6 Mineral Authorities Held

**Figure 3** presents a plan showing the mineral authorities held by EOE, together with a list of those authorities and the Mining Act they were granted under.

1.7 Zoning

The Project Site is zoned Zone 1(a) (General Rural) under the *Coolamon Local Environment Plan 1995*. The objectives of this zone are as follows:

"To promote the proper management and utilisation of resources by:

(a) protecting, enhancing and conserving:

(i) agricultural land in a manner which sustains its efficient and effective agricultural production potential,

(ii) soil stability by controlling and locating development in accordance with the soil capability,

(iii) forests of existing and potential commercial value for timber production,

(iv) valuable deposits of minerals, coal, petroleum and extractive materials by controlling the location of development for other purposes in order to ensure the efficient extraction of those deposits,

(v) trees and other vegetation in environmentally sensitive localities where the conservation of the vegetation is significant to scenic amenity or natural wildlife habitat or is likely to control land degradation,

(vi) water resources for use in the public interest,

(vii) localities of significance for nature conservation, including localities with rare plants, wetlands and significant wildlife habitat, and

(viii) the environmental heritage of the Coolamon local government area,

(b) preventing the unjustified development of prime crop and pasture land for purposes other than agriculture,

(c) facilitating farm adjustments,

(d) minimising the cost to the community of:

(i) fragmented and isolated development of rural land, and

(ii) providing, extending and maintaining public amenities and services, and

(e) providing land for development for other non-agricultural purposes, in accordance with the need for that development."

Mining, and hence mineral exploration, is a permissible activity within this zone.
1.8 Stakeholder Consultation

A conceptual project development plan meeting with the DPI-MR was held in relation to the proposed tailings re-treatment project on 22 November 2007. In addition, a planning focus meeting in relation to that proposal was held on 29 November 2007, with Coolamon Shire Council and the Departments of Primary Industries, Environment and Climate Change and State and Regional Development in attendance.

At these meetings the tailings re-treatment proposal was discussed, including the likely requirements of the attendees in relation to the matters to be addressed in the *Environmental Impact Statement* that would be required to accompany the development application. Subsequent to those meetings, Director General’s Requirements for the Proposal were received. The matters raised during those meetings and identified by the Director General’s Requirements have been taken into consideration during the preparation of this document.

No consultation has been undertaken with the community in the vicinity of Ardlethan because ATR is conscious of not overly raising the expectations of the community in relation to the Ardlethan Tin Mine, particularly taking into consideration the history of operations at the site. ATR intends to undertake extensive consultation should the proposed bulk sample and trial processing indicate that the tin tailings re-treatment proposal is viable.

2 DESCRIPTION OF THE ACTIVITY

2.1 Introduction

This section provides a description of the proposed activity and the rehabilitation that would be implemented in the event that the trial processing indicates that it would not be viable to progress to full-scale tailings extraction and re-processing operations. In the event that the proposed full-scale tailings re-treatment proposal does proceed, the rehabilitation of the Project Site would be addressed in the *Environmental Impact Statement* that would accompany the Development Application for the development.

2.2 Site Establishment and Infrastructure

The following activities would be required to enable trial extraction and processing of tailings and middlings material. The location of each of the activities described below are indicated on Figure 2 and photographs of equipment that may potentially be installed are presented in Plates 1 to 5.

- Upgrading of the site access road to permit safe, all weather access for light and heavy vehicles.
- Reconnection of the electricity supply and remediation of the powerlines that have been vandalised during the period since mining operations ceased. If, however, reconnection of the power supply will unduly delay commencement of extraction of the bulk sample and trial processing operations, diesel generators may be utilised.
• Installation of the trial gravity separation processing plant. This plant is a transportable plant and would comprise:
  - a feed hopper and trommel;
  - jigs;
  - cyclones;
  - spirals; and
  - shaking tables.

The trial processing plant would be installed in the area of the previous processing plant and would be installed in a manner that would ensure that all surface water in the vicinity of the processing plant flows to the existing tailings facilities. Mobilisation and installation of the processing plant is anticipated to take approximately 8 weeks.

• Installation of a pumping and reticulation system to pump makeup water from the Mill Reclame Dam to the trial processing plant. In the event that insufficient water is available within that dam, water would be pumped from the Ardwest/Wild Cherry Open Cut to the processing plant.

• Remediation of part of the existing office and amenity facilities or, in the event that the existing facilities are not able to be remediated or repaired, installation of portable office and amenities buildings.

In addition to the site establishment activities identified above, ATR would initially clean up and remove from site the rubbish and other waste material left following decommissioning of the mine prior to the purchase of EOE by ATR. Following this initial program, ATR would continue to progressively clean up and remove from site remaining rubbish and other waste material and would make safe and secure or, if that is not possible, demolish any buildings not immediately required for the proposed activities.

2.3 Extraction and Stockpiling of Tailings and Middlings

Extraction of tailings and middlings material would be undertaken within two areas identified on Figure 2. The maximum of depth of extraction would be approximately 2.5m and a maximum of 20 000t of tailings and middlings would be extracted at an average rate of 1 000t per week for a period of approximately 20 weeks, following mobilisation and commissioning of the processing equipment.

In summary, extraction procedures would be as follows.

• Tailings and middlings material would be extracted using an excavator and one off-road haul truck (Plate 1).
Tailings and middlings extraction would be undertaken between the hours of 7:00am and 6.00pm, seven days per week. However, ATR anticipate that extraction and processing operations would, in general, be undertaken Monday to Friday, with operations only required on the weekend in the event of equipment breakdown or unavailability.

A maximum of 20 000t of tailings and middlings material would be extracted during the proposed bulk sample and trial processing operation. ATR anticipate that the average extraction rate would be approximately 200t per day or approximately 1 000t per week.

2.4 Processing Activities

Processing operations would be undertaken within the trial processing area as indicated on Figure 2. In summary, ATR proposes to install a transportable gravity separation plant capable of processing up to 30t per hour of tailings or middlings to produce a tin concentrate. Assuming a recovery of 50%, approximately 80t of concentrate may be produced during the trial processing operations. The components of the processing plant are identified in Section 2.2. This subsection presents a summary of the proposed trial processing activities and Figure 4 presents a flow chart of those activities.

It is noted that the proposed activities would allow ATR to identify the most appropriate processing methodology to maximise recovery of cassiterite (SnO₂) from the tailings and middlings material. As a result, the procedures used during the life of the trial processing operation may vary. As a result, the following description is indicative only. However, in the event that ATR proposes to significantly alter the processing operations from those described below, particularly if the proposed rate of production would be higher than 30t per hour or additional components, such as a trial flotation circuit, are added to the processing plant, additional approvals would be sought from the DIP-MR.

The indicative processing activities would include the following:

- A front-end-loader would be used to load tailings and middlings material from the ROM Stockpiles into the feed hopper.
- The material would be passed to a trommel which would break up any aggregations of tailings and middlings material and would separate oversize and undersize material (Plate 2).
• Undersize material from the trommel would be passed to a series of jigs which would separate the denser material from the less dense material.

• The denser material from the jigs would be passed to a series of cyclones which would further classify the material based on density (Plate 3).

• The cyclone underflow would be passed to a series of spirals (Plate 4) and then a shaking table (Plate 5) which would further classify the tailings and middlings material.

• The denser material from the shaking table would form the tin concentrate which would be dewatered and stockpiled before being loaded into bulka-bags or similar for transportation from the site for further metallurgical test work or as bulk samples for ATR’s customers to test for consistency and suitability for further processing.

At this stage, ATR does not propose to use any chemicals of flotation techniques during the trial processing operations. Should it become necessary to do so to enable ATR to adequately establish the optimal processing methodology during full-scale re-treatment operations, additional approvals from the DPI-MR would be sought.

ATR proposes to undertake processing operations between 7.00am and 6.00pm, seven days per week. As noted previously, ATR anticipate that extraction and processing operations would, in general, be undertaken Monday to Friday, with operations only required on the weekend in the event of equipment breakdown or unavailability.

### 2.5 Reject Management

It is not anticipated that any reject material will be produced during extraction operations. If, however selected material is extracted but is unsuitable for processing, that material would be stockpiled adjacent to the extraction area and would, if appropriate, be pushed back into the extraction area following completion of extraction-related operations.

During the trial processing activities the following reject material would be generated.

- Oversize material from the trommel.
- Tailings material remaining after removal of tin concentrate.

This material would be allowed to flow or would be pumped to the Lower Dam. The re-processed tailings material would be allowed to settle and the decant water would be returned to the processing plant for reuse.
Plate 1: Tailings and middlings would be excavated using an excavator and off-road haul truck.

Plate 2: Processing Plant similar to what would be installed within the Project Site, showing feed hopper, control cab, trommel and jigs.

Plate 4: Spirals similar to what would be installed within the Project Site.
Plate 5: Shaker table similar to what would be installed within the processing plant.

Figure 4
Proposed Processing Flow Chart

Source: Australian Tin Resources Limited
2.6 Rehabilitation

In the event that the proposed bulk sample and trial processing operations indicate that re-treatment of the tailings materials would not be economically viable, ATR would undertake the following activities to rehabilitate disturbance associated with the proposed activities.

- Decommissioning and demobilisation of the processing plant. It is anticipated that this component will require approximately 4 weeks to complete.
- The extraction areas would be reprofiled to ensure that all slopes are less than 1:5 (V:H) and that no hazards associated with the reshaped extraction areas remain.
- The processing plant and all temporary buildings and other equipment would be dismantled and removed from site.
- All areas of disturbance, with the exception of the extraction areas would be reprofiled to ensure that they are free draining and that all surface waters continue to flow to the tailings dams.
- If not already done, the mine site and all remaining infrastructure would be would be made secure.
- A mine closure plan would be prepared to the satisfaction of the DPI-MR. This document would describe the agreed rehabilitation activities that would be implemented prior to relinquishment of the mining leases.

3 EXISTING ENVIRONMENT

3.1 Topography and Drainage

3.1.1 Regional and Local Topography & Drainage

The topography surrounding the Project Site is characterised by generally flat terrain, sloping gently to the southeast with some localised hills and ridges (Figure 5). A dominant feature is a north-south trending ridgeline known as the Wallaroobie Range located approximately 5km to the east of the Project Site. Isolated hills, including Taylors Hill, located approximately 1km to the southwest of the Project Site also occur in the vicinity of the Project Site.

The regional drainage consists of scattered indistinct watercourses converging on Bolaro and Mirrool Creeks, approximately 4 kilometres south of the Project Site. These creeks flow in a westerly direction and are tributaries of the Murrumbidgee River.

3.1.2 Project Site Topography

Figure 6 presents the topography within and surrounding the Project Site.
The topography within the Ardlethan Mine Site has been significantly altered by mining operations, including the construction of three open cuts, waste rock emplacements, stockpiles, tailings dams and freshwater dams. A ridgeline trending north-south is located along the western side of the mine site. Intermittent drainage lines to the west of this ridgeline flow west into the adjacent agricultural land.

East of this ridgeline is the Spring Valley Tailings Dam, Spring Valley Freshwater Dam, Tailings Dam No.1, Sulphide Dam, Lower Dam, Horeshoe Dam and the operational and administration buildings for the mine site. The Spring Valley Fresh Water Dam located at an elevation of 250m AHD and forms the lowest drainage point for the southern section of the Mine Site.

All surface water drainage within the Project Site flows to the Mill Reclaim Dam. During the recent rehabilitation operations undertaken by the DPI-MR, a pipeline was installed from the Mill Reclaim Dam to the Ardwest/Wild Cherry Open Cut to allow overflow water from that dam to flow to the open cut without being released to natural drainage.

The northern section of the Mine Site contains the open cut areas. The Ardwest Wild Cherry Open Cut is the largest open cut of the three, with a depth 260m. A ridgeline of 300m AHD separates the Ardwest/Wild Cherry Open Cut from the Northern Evaporation Ponds. The White Crystal Open Cut is located adjacent to the eastern boundary of the Mine Site on the northern side of site access road. Adjacent to the northern boundary of the White Crystal Open Cut is Stackpool Open Cut, the smallest of the three open cuts.

Elevations across the mine site vary from 300m AHD along ridgelines to 260m to 270m AHD at the crests of the open cuts and in the vicinity of the tailings and freshwater dams.

3.2 Local and Regional Geology

3.3 Climate

3.3.1 Source of Data

The climate data presented in the following subsections has been sourced from the following Bureau of Meteorology weather stations:

- Ardlethan Post Office (station number 074000) located approximately 4km to the southeast of the Project Site (temperature and rainfall data).
- Leeton Caravan Park (station number 073038) located approximately 45km to the southwest of the Project Site (wind and relative humidity).
- Tamora Research Station (station number 073038) located approximately 39km to the east-southeast of the Project Site (evaporation).
3.3.2 Temperature

Table 1 presents the long-term monthly average temperatures at Ardlethan Post Office for the period 1909 till the present. On average, January is the hottest month, with a mean maximum temperature of 32.3°C and a mean minimum temperature of 16.3°C. July is the coldest month, with a mean maximum temperature of 14.1°C and a mean minimum temperature of 2.7°C.

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Annual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature (°C)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean maximum</td>
<td>32.3</td>
<td>31.1</td>
<td>28.7</td>
<td>23.3</td>
<td>18.0</td>
<td>14.7</td>
<td>14.1</td>
<td>15.6</td>
<td>19.2</td>
<td>22.7</td>
<td>25.9</td>
<td>30.5</td>
<td>21.3</td>
</tr>
<tr>
<td>Mean minimum</td>
<td>16.3</td>
<td>16.4</td>
<td>13.5</td>
<td>9.4</td>
<td>6.1</td>
<td>3.3</td>
<td>2.7</td>
<td>3.6</td>
<td>5.6</td>
<td>6.9</td>
<td>10.6</td>
<td>15.9</td>
<td>10.0</td>
</tr>
</tbody>
</table>

Rainfall (mm)²

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Annual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>43.1</td>
<td>37.2</td>
<td>35.6</td>
<td>36.4</td>
<td>40.4</td>
<td>41.7</td>
<td>42.7</td>
<td>43.6</td>
<td>38.7</td>
<td>45.2</td>
<td>39.3</td>
<td>36.0</td>
<td>481.0</td>
</tr>
<tr>
<td>Median</td>
<td>26.2</td>
<td>25.6</td>
<td>25.2</td>
<td>25.8</td>
<td>30.9</td>
<td>37.0</td>
<td>41.2</td>
<td>41.9</td>
<td>33.9</td>
<td>38.8</td>
<td>52.3</td>
<td>27.4</td>
<td>476.4</td>
</tr>
<tr>
<td>Mean number of days of rain ≥ 1 mm</td>
<td>3.5</td>
<td>3.0</td>
<td>3.0</td>
<td>3.6</td>
<td>4.6</td>
<td>5.6</td>
<td>6.6</td>
<td>5.3</td>
<td>5.2</td>
<td>5.3</td>
<td>4.0</td>
<td>3.8</td>
<td>50.6</td>
</tr>
</tbody>
</table>

Relative Humidity (%)²

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Annual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean 9am relative humidity (%)</td>
<td>46</td>
<td>50</td>
<td>55</td>
<td>64</td>
<td>70</td>
<td>82</td>
<td>75</td>
<td>63</td>
<td>59</td>
<td>47</td>
<td>48</td>
<td>62</td>
<td></td>
</tr>
<tr>
<td>Mean 3pm relative humidity (%)</td>
<td>27</td>
<td>32</td>
<td>37</td>
<td>43</td>
<td>54</td>
<td>58</td>
<td>61</td>
<td>52</td>
<td>45</td>
<td>41</td>
<td>31</td>
<td>30</td>
<td>43</td>
</tr>
</tbody>
</table>

Evaporation (mm)²

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Annual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean daily</td>
<td>8.8</td>
<td>7.0</td>
<td>5.9</td>
<td>3.6</td>
<td>2.1</td>
<td>1.2</td>
<td>1.2</td>
<td>1.8</td>
<td>2.8</td>
<td>4.4</td>
<td>6.5</td>
<td>8.5</td>
<td>4.5</td>
</tr>
<tr>
<td>Mean 9am wind speed (km/h)</td>
<td>10.1</td>
<td>9.1</td>
<td>10.4</td>
<td>8.2</td>
<td>7.4</td>
<td>5.5</td>
<td>6.1</td>
<td>7.6</td>
<td>10.6</td>
<td>9.9</td>
<td>10.3</td>
<td>8.9</td>
<td>8.7</td>
</tr>
<tr>
<td>Mean 3pm wind speed (km/h)</td>
<td>10.7</td>
<td>9.1</td>
<td>10.9</td>
<td>8.3</td>
<td>8.9</td>
<td>7.4</td>
<td>8.2</td>
<td>9.2</td>
<td>11.8</td>
<td>9.9</td>
<td>11.0</td>
<td>10.1</td>
<td>12.2</td>
</tr>
</tbody>
</table>

Note 1: Source = Bureau of Meteorology’s Ardlethan Weather Station
Note 2: Source = Bureau of Meteorology’s Leeton Caravan Park Weather Station
Note 3: Source = Bureau of Meteorology’s Temora Research Station Weather Station

3.3.3 Rainfall

Table 1 presents the mean monthly rainfall data at Ardlethan Post Office for the period 1895 to the present. On average, annual rainfall is 481 mm, with mean monthly rainfall being relatively constant throughout the year. Winter (June to August) experiences more rain days per month, with an average of 6.7 days, compared to the remainder of the year with an average of 4.7 days per month. This implies that the months that experience fewer days per month experience higher intensity rainfall events.

3.3.4 Relative Humidity

Table 1 presents the long-term monthly average humidity at the Temora Research Station for the period 1955 to 1975. Summer (November to February), with an average 3:00pm relative humidity of 30%, tends to be marginally less humid that the remainder of the year, with an average 3:00pm relative humidity of approximately 50%.
3.3.5 Evaporation

Evaporation is a function of ambient temperature, wind and the saturation deficit of the air. It is estimated that the Temora Research Station experiences a water deficit, with evaporation exceeding rainfall throughout the year. The average annual evaporation is 1642mm, more than three times the average annual rainfall in Ardlethan of 481mm. Assuming that the evaporation data from the Temora Research Station is applicable for Ardlethan, an annual net evaporation of 1161mm would be expected.

4 ENVIRONMENTAL IMPACTS AND MANAGEMENT

4.1 Introduction

This section provides, for each of the environmental aspects identified in the document *Guidelines for Review of Environmental Factors*, a brief overview of the existing environment surrounding the Project Site, the mitigations measures that ATR would implement to minimise the impact of the proposed activities on those aspects of the environment and the anticipated environmental effects of the proposal, taking into consideration the proposed mitigation measures.

4.2 Air

4.2.1 Existing Environment

Air quality surrounding the Project Site is typical of a rural environment where influences are determined principally by the season and the nature of surrounding agricultural activities.

Dust is the main air contaminant. Principal sources of dust in the vicinity of the Project Site are from:

- the movement of vehicles or livestock over unsealed access roads, haul roads, farm tracks and areas devoid of vegetation;
- wind-blown dust from cleared or heavily grazed areas, including areas cleared for mining-related purposes; and
- the sowing and/or cultivation of crops.

4.2.2 Management Measures

ATR would adopt the following management measures to ensure that that dust related to the proposed operations does not adversely impact the area surrounding the Project Site.
Haul roads and other internal tracks would be watered regularly to limit dust lift-off caused by vehicle movements.

The extraction, processing and reject management operations would be operated in a manner that would minimise dust lift-off. This may include varying the discharge location of the tailings and using a water cart or sprinklers when required to keep surfaces moist.

The sign-posted speed limit within the Project Site would be 25 km/hour.

4.2.3 Environmental Effects

Taking into account the fact that the proposed extraction and processing operations would be relatively small scale, the distance from the Project Site to the closest residence, namely the “Coo-I-Noo” homestead (approximately 2.2 km), the other sources of dust surrounding the Project Site and the above management measures, there would be no adverse air quality-related environmental effects related to the proposed activities.

4.3 Surface Water

4.3.1 Existing Environment

Surface water catchments within and surrounding the Project Site have been heavily modified by previous mining operations, in particular the construction of the tailings dams, waste rock emplacements and open cuts.

Surface water flows within the former processing area, Tailings Dam 1 and the Lower, Sulphide and Horseshoe Dams flow to the Mill Reclaim Dam. Following rehabilitation operations undertaken by the DPI-MR in 2007, a pipe was installed that allows surface waters within the Mill Reclaim Dam to flow to the Ardwest/Wild Cherry Open Cut. As a result, no surface waters within the Project Site are permitted to flow to natural drainage.

4.3.2 Management Measures

ATR would adopt the following management measures to ensure that the proposed operations do not adversely impact on the surface water resources surrounding the Project Site.

- All surface waters within areas disturbed by the proposal would be directed to the existing tailings dams. No surface waters from disturbed sections of the Project Site would be permitted to flow to natural drainage.

- Surface water diversion structures would be progressively constructed to ensure that surface water flows from previously disturbed sections of the Ardlethan Tin Mine not within the Project Site are diverted to the Mill Reclaim Dam or one of the open cuts and are not permitted to flow to natural drainage.
4.3.3 Environmental Effects

Taking into account the fact that the Project Site currently, and would continue to, operate as a nil-discharge site, and the fact that no chemicals would be used during the trial processing operations, there would be no significant impact on the surface water resources within or surrounding the Project Site.

4.4 Groundwater

4.4.1 Existing Environment

A groundwater study was previously undertaken by F.W. Lannen & Associates Pty Ltd to support an application for a proposed landfill operation within the Ardlethan Mine Site. That study concluded that the granitic rocks that host the tin mineralisation within the Ardlethan Tin Mine are an aquifuge, or a geologic formation which has no interconnected openings and cannot hold or transmit water. In addition, the report notes that a number of bores were constructed by previous operators of the mine in Ordovician sediments and succeeded only in locating small quantities of highly saline groundwater. As a result, no significant groundwater resources are known or anticipated in the vicinity of the Project Site.

4.4.2 Management Measures

ATR would adopt the following management measures to ensure that that the proposed operations do not adversely impact on the groundwater resources in the vicinity of the Project Site.

- All hydrocarbons and chemicals with the potential to contaminated groundwater would be stored within appropriately bunded areas or in self-bunded tanks.
- Spill kits would be maintained in the vicinity of all hydrocarbon and chemical storage and transfer areas. In addition, employees would be trained in the use of the kits.

4.4.3 Environmental Effects

Taking into account the fact that the only groundwater resources identified in the vicinity of the Project Site are highly saline, the proposed depth of extraction and the fact that all hydrocarbons and other chemicals that would be used within the Project Site would be appropriately managed, there would be no significant impact on the groundwater resources within or surrounding the Project Site.
4.5 Soils

The Project Site does not include any significant areas of remaining soil resources. As a result, the proposed activities would not have a significant impact on soil resources.

4.6 Noise

4.6.1 Existing Environment

Predominant noise sources in the vicinity of the Mine Site include:

- farm machinery;
- livestock;
- birds and other native fauna; and
- wind in trees.

4.6.2 Management Measures

ATR would adopt the following design and operational safeguards during the life of the proposed activities to minimise the potential for adverse noise-related impacts.

- Hours of operation would be restricted to between 7.00am and 6.00pm.
- All mobile equipment used would be maintained to the manufacturers’ specifications.
- All trucks used for transporting material to and from the Project Site would be fitted with appropriate exhaust controls to ensure they satisfy the DECC criterion for vehicle exhausts of ≤95dB(A) at 1m.
- Equipment with lower sound power levels would be used in preference to more noisy equipment.

4.6.3 Environmental Effects

Taking into account the distance from the Project Site to surrounding residences a minimum of (approximately 2.2km), the relatively small scale nature of the proposed activities and the above management measures, there would be no noise-related adverse environmental effects related to the extraction of a bulk sample and trial processing activities.
4.7 Flora and Fauna

The entire area of the Project Site has been previously disturbed. As a result, the proposed activities would not have an adverse effect on threatened species, populations of ecological communities.

4.8 Chemical and Hazardous Substance Management

The only hazardous chemicals or substances that would be stored or used within the Project Site would be hydrocarbons. ATR estimates that the maximum volume of hydrocarbons, primarily diesel, that would be stored within the Project Site would be approximately 5 000L.

As identified in Section 4.4.2, all hydrocarbons stored within the Project Site would be stored within appropriately bunded areas or in self-bunded tanks and spill kits would be located in the vicinity of all hydrocarbon storage and transfer points.

As a result, the proposed activities would not be likely to result in environmental incidents associated with chemicals or hazardous substances.

4.9 Contaminated Land

No contaminated land has been identified within the Project Site or surrounding Ardlethan Mine Site. It is, however, acknowledged that there is potentially contaminated land within the footprint of the existing tailings dams, particularly the older dams that may not have been appropriately clay lined when constructed. However, as this proposal would not result in extraction of tailings material to the base of the tailings dams and would not disturb any potentially contaminated material, this environmental aspect is not relevant to the proposal.

4.10 Natural Resource Use

The proposal would not disturb natural resources and, if the trial extraction and processing activities indicate that re-treatment of the tin tailings is viable, reprocessing of this material will reduce the requirement for natural resources elsewhere to be disturbed. In addition, if the tailings material can be relocated from the existing tailings dams to the Ardwest/While Cherry Open Cut and the footprints of the tailings dams rehabilitated, then those areas would be able to be used for other beneficial purposes. As a result, the proposal is likely to result in increased availability of natural resources.
4.11 Impact on the Community

The proposal would result in the creation of approximately four full-time equivalent positions for the life of the proposal, namely approximately 30 weeks. While staffing levels have yet to be finally determined, it is likely that one manager or technical supervisors and three operators would be required. When filling those positions, ATR would give preference to suitable individuals who live in the vicinity of the Project Site. In addition, ATR estimates that approximately $200,000 would be paid to employees during the life of the proposed activities. ATR estimates that a significant proportion of these funds would be spent in the vicinity of Ardlethan or surrounding communities, increasing economic activity surrounding the open cut.

ATR would, most probably, establish a presence in Ardlethan during the life of the proposed activities, including renting a residence for non-local and visiting employees. This, together with the provision of services that will be required during the life of the proposal, would result in increased economic activity in the area surrounding the Project Site, with flow-on benefits for the entire community.

Finally, it is not anticipated that there will be any adverse impacts related to the proposal on aspects of the environment such as noise, air quality or visual amenity. As a result, ATR do not anticipate any adverse impacts associated with the proposal on the community surrounding the Project Site.

As a result, the proposed extraction of a bulk sample and trial re-treatment of tailings and middlings materials within the Project Site would be likely to have positive impact on the community surrounding the Project Site.

4.12 Visual Assessment

The Project Site is highly disturbed and the proposal would not result in significant additional disturbance. In addition, ATR would implement a program of cleaning up and remediating sections of the Ardlethan Mine Site, improving the visual amenity of the site as a whole. Finally, the Project Site is only visible from areas within the Ardlethan Mine Site.

As a result, the proposal is not expected to result in any significant adverse impact to the visual amenity of the Project Site or its surrounds.

4.13 Heritage

The Project Site is highly disturbed and, as a result, there are no items of Indigenous or non-Indigenous heritage within the Project Site. As a result, the proposal is unlikely to result in adverse impacts to any items or areas of heritage significance.
4.14 Land Use

The Project Site is currently unrebuitabilted. As a result, at present the Project Site has no beneficial land use. The proposal would have no significant adverse environmental impacts. As a result, there would be no adverse impacts on existing land uses surrounding the Project Site.

4.15 Cumulative Environmental Impacts

The scale of the proposed activities and the area of resulting disturbance is significantly less than the scale of previous activities and areas of disturbance within the Mine Site. In addition, the proposal would not result in disturbance of additional land. Finally, there are no other mining or industrial land uses surrounding the Project Site. As a result, the proposed activities are not likely to result in significant cumulative environmental impacts in the vicinity of the Project Site.

4.16 Summary of Management Measures

The following provides a brief summary of the management measures described above.

- Haul roads and other internal tracks would be watered regularly to limit dust lift-off caused by vehicle movements.

- The extraction, processing and reject management operations would be operated in a manner that would minimise dust lift-off. This may include varying the discharge location of the tailings and using a water cart or sprinklers when required to keep surfaces moist.

- The sign-posted speed limit within the Project Site would be 25 km/hour.

- All surface waters within areas disturbed by the proposal would be directed to the existing tailings dams. No surface waters from disturbed sections of the Project Site would be permitted to flow to natural drainage.

- Surface water diversion structures would be progressively constructed to ensure that surface water flows from previously disturbed sections of the Ardlethan Tin Mine not within the Project Site are diverted to the Mill Reclaim Dam or one of the open cuts and are not permitted to flow to natural drainage.

- All hydrocarbons and chemicals with the potential to contaminated groundwater would be stored within appropriately bunded areas or in self-bunded tanks.

- Spill kits would be maintained in the vicinity of all hydrocarbon and chemical storage and transfer areas. In addition, employees would be trained in the use of the kits.

- Hours of operation would be restricted to between 7.00am and 6.00pm.
• All mobile equipment used would be maintained to the manufacturers’ specifications.

• All trucks used for transporting material to and from the Project Site would be fitted with appropriate exhaust controls to ensure they satisfy the DECC criterion for vehicle exhausts of ≤95dB(A) at 1m.

• Equipment with lower sound power levels would be used in preference to more noisy equipment.

5 SUMMARY OF IMPACTS AND CONCLUSIONS

5.1 Justification of the Activity

Extraction of a bulk sample and trial re-treatment of tailings and middlings material would provide the following benefits to the community of Ardlethan and surrounding areas.

• The provision of four full-time equivalent positions and injection of $200 000 in wages into the communities surrounding the Project Site. It is envisaged that most of these individuals would be local, long-term residents of Ardlethan or surrounding communities, or would relocate temporally to the area surrounding the Project Site. The employees would also support and utilize the social and welfare-related aspects of the community, including local sporting clubs, schools and services.

• ATR would employ the services of local businesses, including transport, waste removal, metal fabrication and fuel and equipment-supply contractors during the life of the proposed activities, further stimulating the economy.

• Extraction and trial processing of the bulk sample is the only way that ATR can adequately assess the metallurgical properties of the tailings and middlings material and whether a full-scale re-treatment operation would be viable.

• On-site processing of the extracted tailings and middlings material will remove the need to transport this material considerable distances for testing elsewhere. Also, on-site processing will enable a more realistic assessment of the metallurgical properties of the tailings and middlings materials using the water from the Mill Reclaim Dam or the Ardwest/Wild Cherry Open Cut. It is water from this open cut that would be used during full-scale re-treatment operations.

• The production of a tin concentrate will enable ATR customers to test the concentrate material for consistency and quality before ATR progress to full scale re-treatment operations. This will enable ATR to put in place contracts for sale of this material before having to outlay significant capital establishing the full scale operation.
APPENDIX 1

PART 5 APPLICATION FORM
### Application Form

**NSW DEPARTMENT OF PRIMARY INDUSTRIES**

**Application Form**

**Mineral Resources Division**

**Environmental Sustainability Branch**

**Environmental approval/assessment**

**ESB-F01**

This form must be filled out by the company when seeking an environmental assessment and/or approval associated with a title issued under the Mining Act 1992 or Petroleum (Onshore) Act 1991.

- Failure to provide all relevant information will result in processing delays or rejection of the application.
- Activities must not commence until the application is assessed and written approval is received.

---

1. **Project details**
   - **Mine/project name:** Ardlethan Tin Mine
   - **Title(s):** See Figure 3
   - **Titleholder:** EOE (No. 75) Pty Ltd
   - **Operator:** Australian Tin Resources Limited

2. **Contact details**
   - **Contact name:** Peter Francis
   - **Position:** Director
   - **Contact company:** Australian Tin Resources Limited
   - **Contact address:** PO Box 1506, NORTH SYDNEY NSW 2059
   - **Telephone:** 02 9959 5599
   - **Mobile:** 0412 178 128
   - **Facsimile:** 02 9420 2106
   - **Email:** pfrancis@atresources.com.au

3. **DPI Environmental Sustainability Branch Region in which operations are located**
   - [ ] Broken Hill
   - [ ] Orange
   - [ ] Singleton
   - [ ] Wollongong

4. **Local Government Area in which operations are located**
   - Coolamon Local Government Area

5. **Type of approval being sought**
   - [ ] Mine Operations Plan (MOP)
   - [ ] Petroleum Operations Plan (POP)
   - [ ] Subsidence Management Plan (SMP)
   - [ ] Exploration activity
   - [ ] Other (please specify)

6. **Activity description**
   - Briefly describe the activity: Extraction of a bulk sample and trial processing

7. **For renewals or variations on previous approvals only**
   - **Name of previous approval:**
   - **Date of previous approval:**
   - **Reason for variation:**

---

1. **Except for Category 2 exploration activities, where ESB-F04: Surface Disturbance Notice should be used.**

---

**Office Use Only**

- **Date received:**
- **Application ID:**
- **Receiving Officer:**
- **Referred to:**

---

**R. W. CORKERY & CO. PTY. LIMITED**
8  How does the *Environmental Planning & Assessment Act 1979* apply to this application?

*You must answer YES to one of a), b), c) or d) below.*

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
<tr>
<td>b)</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
<tr>
<td>c)</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
<tr>
<td>d)</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
</tbody>
</table>

a) Is the activity subject to approval under Part 3A of the *Environmental Planning & Assessment Act 1979*?

(Schedule 1 of the *State Environmental Planning Policy (Major Projects)* 2005 defines types of activities which are subject to Part 3A).

If yes, attach a copy of your approval, development consent or legal advice.

b) Is the activity subject to development consent under Part 4 of the *Environmental Planning & Assessment Act 1979*?

(Clause 7 of the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries)* 2007 defines types of activities which require development consent under Part 4).

If yes, attach a copy of your approval, development consent or legal advice.

c) Is the activity subject to assessment under Part 5 of the *Environmental Planning & Assessment Act 1979*?

(All activities are subject to assessment under Part 5, except for those activities which require approval under Part 3A, or development consent under Part 4, or are defined as exempt development under clause 10 of *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries)* 2007).

If yes, attach an explanation or legal advice as to why Part 5 applies. A Review of Environmental Factors (REF) must be supplied as per ESB18: Guidelines for Review of Environmental Factors.

d) Is the activity exempt development under clause 10 of *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries)* 2007?

If yes, explain why activity is exempt development:

9  For activities subject to the *Environmental Planning & Assessment Act 1979*, is the proposed activity consistent with an existing project approval, development consent or Mining/Petroleum Act approval?

No

10  Are any other approvals required?

List any other required approvals, name the approval authority and describe the status of any applications:

No

11  Rehabilitation Cost Estimate

A Rehabilitation Cost Estimate must be submitted with all applications (refer to ESB20: Rehabilitation Security Deposit Requirements for Mining and Petroleum Titles or ESB21: Rehabilitation Security Deposit Requirements for Exploration Titles)

<table>
<thead>
<tr>
<th></th>
<th>Title grant</th>
<th>Title renewal</th>
<th>Title transfer</th>
<th>Title cancellation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Name of plan/document the estimate is based on:

<table>
<thead>
<tr>
<th></th>
<th>Maximum disturbance within a MOP/POP/REF period</th>
<th>Snapshot of current disturbance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Period covered by the estimation: Start date | End date

Intended date of review:

Current security deposit held by DPI: $  Rehabilitation Cost Estimate: $  Rehabilitation Cost Estimate attached? YES
12 Supporting documentation
List any other supporting documentation attached to this application (e.g. MOP, POP, SMP, REF, existing approvals etc.):
Review of Environmental Factors

13 Privacy Notice
NSW DPI requires the information referred to in this application to assess the environmental impact of your proposed activity. Failure to supply the information may result in delays or rejection of your application. NSW DPI may make the information on this form and any attachments available for inspection by members of the public, including by publication on NSW DPI’s website or by displaying the information at any of its offices. If you consider any part of your application to be confidential, please provide that part in a separate addendum clearly marked “Confidential”. NSW DPI may also provide the information to other government agencies for the purposes of its assessment. You may access or correct your information by contacting NSW DPI.

14 Titleholder certification
I certify that the information contained in this application, and the attached documentation, is a true and accurate assessment of the potential environmental impacts of the activity proposed to be undertaken.

Provision of false or misleading information is an offence under s.374 of the Mining Act 1992 and/or s.135 of the Petroleum (Onshore) Act 1991.

Name: Peter Francis
Signature: 
Position / Title: Director
Date: 18 September 2008

Provision of false or misleading information is an offence under s.374 of the Mining Act 1992 and s.135 of the Petroleum (Onshore) Act 1991.

Lodgment of applications
One hard copy and one electronic copy of all applications must be provided to the Department.
For lodgment in person or by post, see www.dpi.nsw.gov.au/minerals/environment/contacts.
For lodgment by email (a 5MB size limit applies), use minres.environment@dpi.nsw.gov.au.
Appendix 2

Letter of Change

(Total No. of pages including blank pages = 10)
Greetings Michael

On 18 September 2008, EOE (No. 75) Pty Limited (the Applicant) submitted a Review of Environmental Factors (REF) to the Division of Resources and Energy to extract a bulk sample for processing using a pilot gravity separation plant. The application was made for Category 3 Exploration activities to be undertaken under the Mineral Authorities held by the Applicant for the Mine and was subsequently approved by the Department. You have previously advised that the approval remains on foot.

The objective of the exploration program was to demonstrate the feasibility of the proposed processing methodology for reprocessing of tailings at the Ardlethan Tin Mine. Should the proposed processing methodology establish that the tailings may be economically re-processed; the Applicant intends to submit a development application to reprocess the historic tailings and to and rehabilitate the footprints of the various tailings emplacements.

As a result of unfavourable market conditions at the time, as well as the requirement to further refine the processing methodology, the bulk sample and pilot plant program did not proceed. A recent turnaround in the market for tin, improved results from benchtop processing tests and renewed interest from prospective clients, the Applicant proposes to undertake the approved bulk sample exploration activities.

The Applicant recently commissioned Mineral Technologies to further review and investigate the design and operation of a new Tailings Re-processing Pilot Plant. That review has resulted in a number of minor adjustments to the proposed exploration activities, including the location of the proposed pilot plant and extraction areas. All of the changes proposed are located within areas of previous disturbance.

The purpose of this letter is to outline the scope of those changes and to request that the 2008 REF and this letter be appended to the existing Mining Operations Plan for the Ardlethan Hard Rock Tin Mine as per your email advice of 26 May 2015.
Figure 1 and 2 present the approved and proposed layout of the exploration activities and Table 1 presents an overview of the principal changes to the proposed activities. In addition and as requested, I have also attached

- the original Review of Environmental Factors prepared to describe the exploration activities;
- a Rehabilitation Cost Estimate prepared to cover only the proposed bulk sample exploration activities; and
- the approved Mining Operations Plan.

I trust that this provides the information that you require at this stage. Please do not hesitate to contact me should you require further information.

Regards

Mitchell Bland
Principal Environmental Consultant

Attached: Review of Environmental Factors
Rehabilitation Cost Estimate
Mining Operations Plan
<table>
<thead>
<tr>
<th>Item</th>
<th>Approved Activities</th>
<th>Proposed Adjusted Activities</th>
<th>Justification</th>
<th>Additional Risk</th>
<th>Additional Management Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extraction areas¹</td>
<td>Suflhide Dam and Horseshoe Dam</td>
<td>Multiple locations within Tailings Dam No 1, Lower Dam and Horseshoe Dam</td>
<td>Will provide better sampling regime all tailings resource areas</td>
<td>Negligible – all areas already disturbed</td>
<td>All extraction pits to be backfilled</td>
</tr>
<tr>
<td>Plant type</td>
<td>Gravity separation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant throughput rate</td>
<td>Up to 30t/hr</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant and ROM area¹</td>
<td>Adjacent to former mill</td>
<td>West of former office</td>
<td>Less earthworks required to establish a flat working area</td>
<td>Negligible – site is already disturbed</td>
<td>Nil</td>
</tr>
<tr>
<td>Process water source</td>
<td>Mill Reclaim Dam</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tailings redeposition area</td>
<td>Lower Dam</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours of operation</td>
<td>7am-6pm, 5 days/week</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project duration</td>
<td>Up to 20 weeks</td>
<td>Up to 26 weeks</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note 1: See Figures 1 and 2