REPORT TO THE
MINISTER FOR ENVIRONMENT

APPEAL IN OBJECTION TO THE CONDITIONS APPLIED TO A LICENCE

L9029/2017/1: MT HENRY PROJECT
NORSEMAN, SHIRE OF DUNDAS

PROPONENT: AVOCA MINING PTY LTD

Appeal Number 022 of 2019

November 2019
APPEAL SUMMARY

The Shire of Dundas (appellant) appealed against the conditions of licence L9029/2017/1 granted to Avoca Mining Pty Ltd (licence holder) by the Department of Water and Environmental Regulation (DWER). The licence authorises the discharge of dewater from the Mt Henry Project (premises) to Lake Dundas.

The appellant submitted that:
- reassessment of the proposed dewater discharge activities is needed to more accurately account for the potential impacts to Australian brine shrimps (*Parartemia*) and the banded stilt (*Cladorhynchus leucocephalus*), and
- the conditions imposed by DWER to address the risk of impacts need to be improved.

In response to the appeal, DWER reviewed its risk assessment. This included consideration of new information provided in relation to the banded stilt and *Parartemia*. DWER considered that its risk rating was still valid but recommended the licence duration be shortened to match the discharge period assessed, and that monitoring methodology requirements should be improved.

Having considered the information presented during the investigation, the Appeals Convenor considered that DWER's assessment of the risks to *Parartemia* and the banded stilt was supported by the available evidence. The Appeals Convenor considered that DWER has imposed conditions that enable changes to the abundance/diversity of *Parartemia* to be identified as well as changes to the key parameters affecting their survival. However, the Appeals Convenor agreed with DWER’s recommendation that the monitoring requirements could be improved and also recommended that one element of the monitoring program be amended to address an inconsistency identified in monitoring frequencies.

**Recommendations**

The Appeals Convenor recommended that the appeal be allowed to the extent that:

1. The duration of the licence is amended to five years.
2. The monitoring requirements in Schedule 3 of the licence are amended to make explicit that analysis of water and sediment quality is to be carried out at a sufficient level of detection to allow comparison with the relevant default values in the current version of the ANZECC/ARMCANZ (2000) Water Quality Guidelines.
3. The monitoring frequency listed in Table 6 of Schedule 3 of the licence is amended to six monthly in relation to anions and cations and total metals and trace elements.
INTRODUCTION

The Shire of Dundas (appellant) appealed against the conditions of licence L9029/2017/1 granted to Avoca Mining Pty Ltd (licence holder) by the Department of Water and Environmental Regulation (DWER). The licence is for the discharge of dewater from the Mt Henry Project (premises) to Lake Dundas. DWER granted the licence under Part V Division III of the Environmental Protection Act 1986 (EP Act) on 28 March 2019.

The Mt Henry Project is an open pit gold mining operation located about 20 kilometres (km) south of the town of Norseman in the Shire of Dundas (refer Figure 1). In order to access ore at depth, groundwater must be removed from the pit and discharged elsewhere.

Figure 1: Approximate location of premises (indicated by red star)

The premises (refer Figure 2) is a Category 6 prescribed premises which is defined under Schedule 1 of the Environmental Protection Regulations 1987 as ‘Mine dewatering; premises on which water is extracted and discharged into the environment to allow mining of ore’. Abstraction of groundwater has been approved separately under a licence issued under section 5C of the Rights in Water and Irrigation Act 1914 (GWL181866(1)).

Figure 2: Premises boundary (indicated by pink outline)
OVERVIEW OF APPEAL PROCESS

In accordance with section 106 of the EP Act, a report was obtained from DWER in relation to the issues raised in the appeal. The licence holder and the appellant were also consulted on the issues raised.

The environmental appeals process is a merits-based process. Appeal rights in relation to a licence are against the specifications of a licence (i.e. whether the conditions of the licence are adequate or appropriate to minimise, manage or abate pollution and to ensure that the premises is operated in an environmentally acceptable manner). Enforcement of and compliance with the conditions of a licence is a matter for DWER as the regulator and beyond the scope of considerations for an appeal.

This document is the Appeals Convenor’s formal report to the Minister for Environment under section 109(3) of the Act.

OUTCOMES SOUGHT BY APPELLANT

The appellant is seeking for the risks from the proposed dewater discharge activities to be reassessed to more accurately account for the potential impacts to Australian brine shrimps (Parartemia) and the banded stilt (Cladorhynchus leucocephalus). The appellant is also seeking for improvement to the licence conditions to address the risk of impacts.

GROUNDS OF APPEAL

The appeal investigation considered two grounds of appeal:

- Ground 1 – Risk Assessment
- Ground 2 – Controls

GROUND 1: RISK ASSESSMENT

The appellant questioned whether the risk assessment conducted by DWER adequately characterised the impacts of the dewater discharge to Parartemia and the banded stilt. The appellant submitted that the dewater discharge activities will change the lake salinity and chemistry to a level that may influence or stop the banded stilt from visiting or breeding at Lake Dundas. The appellant also raised concerns around the potential for dewater to be exposed to acid forming material in the pit.

In support of their concerns, the appellant provided a copy of a thesis prepared by Reece Pedler on the banded stilt. The thesis included, among other things, a review of historically published information on the banded stilt. The review revealed banded stilt nesting:

- occurs in large, densely packed colonies on tiny islands in inland ephemeral salt lakes
- is initiated rapidly and synchronously following unpredictable rainfall or flooding
- is non-seasonal and apparently totally opportunistic
- relies on an abundant source of Parartemia
- is often unsuccessful, despite the infrequent nature of nesting attempts.

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Consideration

In assessing the licence application, DWER considered baseline data provided with the application including:

- groundwater quality at the pit
- surface water quality of Lake Dundas
- metals/metalloids in sediment at Lake Dundas
- aquatic invertebrate diversity of Lake Dundas.

The baseline aquatic invertebrate surveys recorded two *Parartemia* at Lake Dundas; *P. serventyi* and *P. veronicae*.

DWER’s assessment found that:

- the aquatic invertebrates were an important part of the food chain and provided food for birds
- the daily dewater discharge may cover between 15 ha and 62 ha depending on evaporation rates
- the increased salt loading from the discharge is significant over the immediate localised area
- the dewater discharge has elevated concentrations of cobalt, copper, nickel and zinc.

DWER noted that a reduction in aquatic invertebrate species abundance and diversity may occur as a result of:

- change in lake hydroperiod
- increase in metals in sediment
- increase in salt loading/salt crust formation.

DWER determined the overall risk rating to aquatic biota to be ‘Medium’. The assessment took into account the wide distribution of the aquatic invertebrate species recorded (compared to the localised impact within a lake measuring 38,000 ha) and the period of the discharge (i.e. up to five years). DWER advised that at the time of assessment there was no information available confirming that the banded stilt had been recorded at Lake Dundas.

Following receipt of the appeal, DWER contacted the author of the banded stilt thesis (Reece Pedler) who advised:

Some of the 60 banded stilt that I satellite tracked during my PhD study visited Lake Dundas and Lake Cowan during the short period that I was able to track banded stilts in Western Australia (in 2014). This gives an indication that these lakes are suitable for the species under some conditions following heavy rainfall/flooding.

Mr Pedler also directed DWER to studies conducted by Mr Brian Timms on *Parartemia*. Subsequently DWER obtained information indicating that some *Parartemia* populations have been lost from Western Australia due to salination of lakes.

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In response to receipt of the new information, DWER reviewed its risk assessment. DWER considered that their risk rating was still valid as:

- the potential impacts are limited to a local scale
- the discharge is for a short duration, and
- the discharge is relatively small in extent.

During consultation with the appellant, it was submitted that dewater may be acidic which may impact *Parartemia*. Such impacts were not discussed in DWER’s Decision Report. The appellant’s submission is supported by published information that most species of *Parartemia* live in alkaline waters with the three exceptions being *P. acidiphila*, *P. contracta* and *P. mouritzi*. There is evidence, however, that *P. serventyi* can survive mildly acid conditions of secondary salinised waters.4

A desktop hydrogeological assessment provided as supporting information to the application outlines that sulfide material in the open pit is primarily in the form of pyrrhotite (with lesser amounts of arsenopyrite and pyrite).5 In response to the appeal, DWER advised that pyrrhotite has limited potential for acid generation on oxidation citing research undertaken by Belzile et al. (2004)6. DWER advised that the risk of acid generation is further reduced by:

- the presence of dolerite in the host rock, which indicates the host rock has a substantial amount of acid neutralising capacity, and
- the presence of calcretes, located downgradient of the site which are also acid neutralising.

It is considered that the Decision Report should have discussed acidification impacts, but it is noted that the acidification risk from the dewater discharge is not considered significant by DWER and would not have changed the risk rating.

In relation to salt load impacts, DWER’s assessment considered a report by *actis* Environmental Services7 provided as supporting information to the application. *actis* estimated the increased salt load from a discharge of 400,000 kL pa would be equivalent to a 100% increase of the existing salt load of Lake Dundas over an average 356 ha. The appeal investigation identified that this finding was incorrectly referenced in DWER’s Decision Report. The 100% increase over 356 ha was characterised by DWER as relating to a discharge of 400,000 kL pa over a ten year period rather than a one year period.

DWER has since acknowledged this error but advised that the impacts are still expected to be highly localised (i.e. equivalent to a 100% increase over less than 10% of the 38,000 ha lake). DWER also acknowledged inconsistencies with the discharge period confirming five years was the period assessed, not ten years, or the nine years ultimately granted. DWER therefore recommended that the licence duration should be reduced from nine to five years.

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Conclusion

It is considered that DWER’s assessment of the risks to Parartemia and the banded stilt is supported by the available evidence. The new information received by DWER does not alter the predicted scale of impacts. The discharge is hypersaline but Lake Dundas is approximately 38,000 ha in size and the dilution factor is expected to be significant.

Noting the inconsistency of the licence duration with the discharge period assessed, it is recommended that the licence duration be reduced from nine to five years. The licence holder was consulted on this recommendation and did not object.

GROUND 2: CONTROLS

The appellant questioned whether the conditions imposed on the licence are adequate to prevent, control, abate or mitigate the impacts to Parartemia and the banded stilt.

Consideration

The following controls relating to aquatic biota were identified by DWER in its Decision Report as being required on the licence:

- recording of total volume of water discharged
- six monthly monitoring of the quality of the discharge water
- annual monitoring of the receiving surface water quality and sediment
- annual monitoring of aquatic invertebrates at the discharge site and a control site.

DWER ultimately applied the following related conditions on the licence:

- a requirement to record the total volume of dewater discharged to Lake Dundas
- a requirement to monitor the quality of dewater (at the dewatering draw point) including:
  - monthly monitoring of electrical conductivity, pH, total dissolved solids and total suspended solids
  - annual monitoring of anions and cations
  - annual monitoring of total metals and trace elements
- a requirement to monitor the quality of the receiving surface water and sediment (at both the discharge site and five control sites) including:
  - monthly monitoring of electrical conductivity, pH, total dissolved solids and total suspended solids
  - annual monitoring of moisture content, nitrite, nitrate, total nitrogen, total phosphorous and total organic carbon
  - annual monitoring of anions and cations
  - annual monitoring of total metals and trace elements
- a requirement to monitor aquatic biota and algae (at both the discharge site and at least one control site).
A requirement to report monitoring data to DWER annually was also imposed on the licence. Schedule 3 of the licence stipulates that monitoring reports must contain an assessment of any trends observed from data over time, and recommendations to improve the dewater discharge monitoring program or improve operational management so as to reduce impact on the receiving environment.

DWER’s Decision Report noted that baseline groundwater and surface water quality testing for cobalt, chromium, copper, lead and zinc was not carried out to a sufficient level of detection to allow comparison against the ANZECC & ARMCANZ (2000) Water Quality Guidelines\(^8\) (Table 1; Table 2). In response to the appeal, DWER suggested monitoring methodology requirements of the licence should be amended to ensure sufficient levels of detection for monitoring results.

### Table 1. Background surface water quality at Lake Dundas\(^9\)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>LDNC1</th>
<th>LDNC2</th>
<th>LDNB1</th>
<th>LDNB2</th>
<th>ANZECC &amp; ARMCANZ (2000) Guideline for protection of 95% of species in marine environments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobalt</td>
<td>mg/L</td>
<td>&lt;0.002*</td>
<td>&lt;0.002*</td>
<td>&lt;0.005*</td>
<td>&lt;0.005*</td>
<td>0.001</td>
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<tr>
<td>Chromium</td>
<td>mg/L</td>
<td>&lt;0.01*</td>
<td>&lt;0.01*</td>
<td>&lt;0.025*</td>
<td>&lt;0.025*</td>
<td>0.0044</td>
</tr>
<tr>
<td>Copper</td>
<td>mg/L</td>
<td>&lt;0.002*</td>
<td>0.0026</td>
<td>&lt;0.005*</td>
<td>&lt;0.005*</td>
<td>0.0013</td>
</tr>
<tr>
<td>Lead</td>
<td>mg/L</td>
<td>0.0026</td>
<td>&lt;0.002</td>
<td>&lt;0.005*</td>
<td>&lt;0.005*</td>
<td>0.0044</td>
</tr>
<tr>
<td>Zinc</td>
<td>mg/L</td>
<td>0.04</td>
<td>&lt;0.02*</td>
<td>&lt;0.05*</td>
<td>&lt;0.05*</td>
<td>0.015</td>
</tr>
</tbody>
</table>

* detection level insufficient

### Table 2. Water quality of groundwater sampled at the premises (indicative of the dewater)\(^10\)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Bore MTHWE02</th>
<th>Bore MTHWE03</th>
<th>Bore MTHWE04</th>
<th>Bore MTHWE07</th>
<th>ANZECC &amp; ARMCANZ (2000) Guideline for protection of 95% of species in marine environments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobalt</td>
<td>mg/L</td>
<td>0.01</td>
<td>0.02</td>
<td>&lt;0.05*</td>
<td>&lt;0.05*</td>
<td>0.001</td>
</tr>
<tr>
<td>Copper</td>
<td>mg/L</td>
<td>&lt;0.005*</td>
<td>&lt;0.005*</td>
<td>&lt;0.025*</td>
<td>&lt;0.25*</td>
<td>0.0013</td>
</tr>
<tr>
<td>Zinc</td>
<td>mg/L</td>
<td>0.03</td>
<td>0.09</td>
<td>&lt;0.05*</td>
<td>&lt;0.05*</td>
<td>0.015</td>
</tr>
</tbody>
</table>

* detection level insufficient

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The licence holder was consulted on this recommendation and submitted that analysis of water and sediment quality at a level of detection to allow comparison against the ANZECC/ARMCANZ (2000) Water Quality Guidelines is problematic at the premises due to the hypersaline water conditions. The licence holder provided a copy of a laboratory report showing the limit of reporting for cobalt, chromium, copper, lead and zinc was 0.01 mg/L. This detection level is insufficient for comparison to the default values for all but zinc. The licence holder contended that the detection level should only be required to the relevant limit of reporting.

Further advice was subsequently requested from DWER which advised:

- [It] has confirmed that ALS laboratories in Perth are able to analyse sediments at a level of detection sufficient to allow comparison with the relevant default values in the ANZECC / ARMCANZ Water Quality Guidelines.
- An additional step is required to prepare the sediments to overcome the effects of a high chloride concentration. The sediments are digested first, then the metals/metalloids analysed by liberating these as a hydride gas from the saline matrix and analysis carried out using standard low level detection equipment (for example, Inductively Coupled Plasma Mass Spectrometry).
- The metals/metalloids can then be accurately determined to the detection levels that allow comparison with the ANZECC guidelines.

Noting analysis to a sufficient level of detection should be achievable, it is considered that the amendment recommended by DWER should be implemented. This will improve the monitoring program by allowing better analysis of trends in the data and potential impacts to *Parartemia* and the banded stilt.

During the appeal investigation an inconsistency was also noted in the monitoring frequency stated in Table 6 of the licence in relation to anions and cations and total metals and trace elements of the dewater. The frequency is currently stated as annual, whereas the Decision Report (section 10.2.3) and DWER’s appeal response state that this monitoring should be undertaken six monthly. The licence holder was consulted on this matter and did not object to the frequency being amended to six monthly.

**Conclusion**

The licence conditions imposed enable changes to the abundance/diversity of *Parartemia* to be identified as well as changes to the key parameters affecting their survival. The licence also requires the licence holder to identify and report trends to DWER and make recommendations as to how to reduce impacts. If the impacts to *Parartemia* are not highly localised as expected, this requirement provides a mechanism for appropriate remedial action to be taken.

However, it is considered that monitoring requirements could be improved as recommended by DWER. The monitoring requirements should also be amended to address an inconsistency identified in monitoring frequencies for one element of the monitoring program.

**OTHER MATTERS**

The appellant also raised concerns about the potential for mining activities to result in displacement of birds and the level of consultation undertaken by the licence holder. In response to these matters DWER advised:

- The licensing process under Part V Division 3 of the EP Act is limited to regulation of emissions and discharges to the environment. The activity regulated under the licence is
specifically the discharge of mine dewater to the lake. The question as to whether mining activities as a whole may disturb or displace birds is therefore outside the scope of the licence.

The Decision Report states that the application for the works approval and licence was advertised on 13 March 2017. The Decision Report further states that the application was referred to the Shire of Dundas for consultation, with the Shire responding that it had no objection to the application.

The licensing process under Part V Division 3 of the EP Act is limited to regulation of emissions and discharges to the environment. It does not provide a mechanism to require a licence holder to consult further with stakeholders.

CONCLUSIONS AND RECOMMENDATIONS

For the reasons stated in this report, it is considered that DWER’s assessment in relation to the risk of impacts to Parartemia and the banded stilt was generally supported by, and consistent with, available scientific information. However, it was identified that the licence duration should be amended to reflect the five year discharge period assessed.

In relation to the licence conditions, DWER has imposed conditions that enable changes to the abundance/diversity of Parartemia to be identified as well as changes to the key parameters affecting their survival. However, it was identified that monitoring should be improved by requiring adequate levels of detection and an inconsistency in the monitoring frequencies should be rectified.

The Appeals Convenor therefore recommends that the appeal be allowed to the extent that the duration of the licence is amended to five years, and that the licence conditions are amended as follows:

- the monitoring requirements in Schedule 3 of the licence are amended to make explicit that analysis of water and sediment quality is to be carried out at a sufficient level of detection to allow comparison with the relevant default values in the current version of the ANZECC/ARMCANZ (2000) Water Quality Guidelines
- the monitoring frequency listed in Table 6 of Schedule 3 of the licence is amended to six monthly in relation to anions and cations and total metals and trace elements.

The final wording of conditions is a matter for the Department under section 110 of the EP Act.

Emma Gaunt
APPEALS CONVENOR

Investigating Officer: Simon Weighell, A/Senior Appeals Officer