

# Review of the Adaptive Management Plan

## McArthur River Mine - Independent Monitor

Department of Primary Industry and Resources

12 June 2020

311011-00041

**Advisian**  
Worley Group

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## PROJECT 311011-00041 - : Review of the Adaptive Management Plan - McArthur River Mine - Independent Monitor

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## Executive summary

### Purpose

The purpose of this report is to document the outcomes of the Independent Monitor's review of the McArthur River Mining Pty Ltd's Adaptive Management Plan (AMP). This report considers the adequacy of the AMP against the relevant requirements of the conditions of Authorisation 0059 issued under the Northern Territory (NT), *Mining Management Act 2001*, dated 15 August 2019. The Authorisation is the mine's principal regulatory approval and its conditions detail the requirements that the AMP must address.

The AMP Revision 0, dated 31 January 2020, is the initial version of the AMP submitted to the Northern Territory Government - Department of Primary Industry and Resources (DPIR). The AMP document considers adaptive management during the mining operations phase and is intended to be a dynamic document with updated versions submitted for approval throughout the mine's life. The AMP comprises the overarching AMP and supporting Management Plans including:

- Appendix A – Water Management Plan (WMP)
- Appendix B – Air Quality Management Plan (AQMP)
- Appendix C – Rehabilitation Management Plan (RMP).

### Review Criteria

This review has primarily focused on the extent to which the AMP satisfies the requirements of Authorisation conditions 131 and 132. The review has also evaluated the extent to which the AMP satisfies other relevant Authorisation conditions. Consideration has been given to the suitability of the AMP (Rev 0) as the framework and basis for future revisions of the AMP.

### Key Findings

The AMP provides a sound basis for planning and an approach to facilitate improved environmental management and decision making over time in response to evolving knowledge and changing circumstances.

The AMP would benefit from the inclusion of further information and clarity for the following:

1. setting clear 'SMART' (Specific, Measurable, Achievable, Results-oriented and Time-fixed) environmental objectives in the AMP and associated Management Plans
2. defining an iterative process to systematically evaluate the effectiveness of management actions and assess progress towards the AMP's environmental objectives
3. defining a process for continual feedback to obtain an improved understanding of environmental performance trends and ecosystem dynamics to inform any adjustments to management actions.

The AMP has been developed consistent with the requirements of the Authorisation, however would benefit from incorporating additional information as described in this review to enhance the extent to which it satisfies the conditions of the Authorisation. The review has found the AMP 'part satisfies' or 'satisfies' the requirements of the Authorisation conditions 131 and 132.

## **Future AMP Revisions**

The mine Operator has provided the AMP document earlier than required in response to the NT Environment Protection Authority's recommendation to review the AMP prior to the approval of the Overburden Management Project (OMP). It is important to note that the Authorisation conditions relevant to the AMP will commence at a future date upon the authorisation of the OMP associated with the Mine Management Plan amendment currently under assessment by DPIR. It is the mine Operator's stated intention to update and submit a revised version of the AMP within the 18 month timeframe from the authorisation of the OMP.

The review has produced 20 comments relevant to the extent that the AMP satisfies the Authorisation conditions and these are described within this AMP review report.

The mine Operator has provided the AMP (Rev 0) document earlier than required and the opportunity exists for aspects of the AMP to be updated and enhanced to better satisfy the conditions and resubmitted to DPIR within the Authorisation's timeframes.

## Acronyms and abbreviations

Acronym/abbreviation	Definition
AMP	Adaptive Management Plan
AQMP	Air Quality Management Plan
CoPCs	Contaminants of Potential Concern
CRG	Community Reference Group
DAWE	Department of Agriculture, Water and the Environment (Commonwealth), formerly Department of the Environment and Energy
DENR	Department of Environment and Natural Resources (NT)
DPIR	Department of Primary Industry and Resources (NT)
EIS	Environmental Impact Statement
EMF	Environmental Management Framework
EMS	Environmental Management System
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
ERA	Environmental Risk Assessment
MMA	<i>Mining Management Act 2001</i>
MMP	Mining Management Plan
NOEF	Northern Overburden Emplacement Facility
NT	Northern Territory
NT EPA	Northern Territory Environment Protection Authority
OMP	Overburden Management Project
RMP	Rehabilitation Management Plan
SMART	Specific, Measurable, Achievable, Results-oriented and Time-fixed (objectives)
SSTVs	Site Specific Trigger Values
TARP	Trigger Action Response Plan
TSF	Tailings Storage Facility
VoA	Variation of Authorisation
WDL	Waste Discharge Licence
WMP	Water Management Plan

# 1 Introduction

McArthur River Mining Pty Ltd submitted an Adaptive Management Plan (AMP), Revision 0, dated 31 January 2020, to the Northern Territory (NT) Department of Primary Industry and Resources (DPIR) for assessment and approval. The McArthur River Mine project Authorisation 0059 (variation dated 15 August 2019) issued under the NT *Mining Management Act 2001* (MMA), requires the Independent Monitor to prepare an AMP review report for DPIR's consideration prior to the approval decision by the Minister for Primary Industry and Resources.

## 1.1 Background

McArthur River Mining Pty Ltd lodged the 2013-2015 Mining Management Plan (MMP) with the NT Department of Mines and Energy (now DPIR) in early 2014. The 2013-2015 MMP incorporated amendments to the classification of the overburden and modification to the Northern Overburden Emplacement Facility (NOEF) design.

The 2013-2015 MMP was referred to the NT Environment Protection Authority (NT EPA) who assessed that the amendments in the MMP were significantly different from the existing approval and determined that an Environmental Impact Statement (EIS) was required to better understand the potential impacts.

In July 2018, the NT EPA completed its assessment of the Overburden Management Project (OMP) EIS and issued *Assessment Report 86* which included 30 recommendations to be considered by Ministers in deciding whether to approve the OMP. This included recommendations that McArthur River Mining Pty Ltd prepare an AMP.

Approval of the OMP, subject to conditions, was granted under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) by the Commonwealth Department of the Environment and Energy (now Department of Agriculture, Water and the Environment, DAWE) *EPBC 2014/7210* on 12 June 2019. It is noteworthy that the EPBC approval alone does not provide approval to undertake a mining activity in the Northern Territory, an authorisation from the DPIR is also required.

Authorisation 0059 variation issued by DPIR on 15 August 2019 reflects the acceptance of the NT EPA's recommendations and also reflects the EPBC Act conditions. An MMP amendment is currently under assessment by DPIR and should it be accepted by the Minister and approved under the MMA, another Authorisation 0059 variation will be issued including conditions. Any future variation will include specific conditions reflecting the Territory and Commonwealth environmental approvals. This pending Authorisation 0059 variation would provide approval under the MMA to undertake the mining activities proposed in the OMP assessed by the NT EPA as having no significant impact on the health of the McArthur River should the 30 recommendations be implemented.

Authorisation 0059 includes conditions that require the Operator to prepare and submit an AMP to DPIR and that the AMP must be reviewed by the Independent Monitor, refer Section 2.2. This Independent Monitor AMP review report has been prepared in response to these conditions.

In response to the NT EPA's recommendations, the AMP is to be reviewed prior to a decision on the MMP amendment approval currently being assessed by DPIR. Additionally, an important intention of this AMP review is to provide transparency to the community on progress towards meeting the Authorisation 0059 conditions.



## 2 Objectives

### 2.1 Review Objectives

The objective of the AMP review is to determine the extent to which the AMP satisfies the requirements of Authorisation 0059. Consideration has been given to the suitability of the AMP (Rev 0) as the framework and basis for future revisions of the AMP in response to the NT EPA's recommendations.

### 2.2 Regulatory Requirements

The Authorisation 0059 conditions 131, 132 and 133 require the mine Operator to prepare and submit an AMP to DPIR for approval and also lists the key elements to be included in the AMP. These conditions reflect the *NT EPA Assessment Report 86, Recommendations 28, 29 and 30 (July 2018)*. These NT EPA recommendations provide additional matters for action by DPIR as the agency responsible for regulation of the mine under the MMA.

Condition 131 requires the AMP to be reviewed by the Independent Monitor with all review findings and Community Reference Group input requirements to be provided to DPIR for approval. An excerpt from Authorisation 0059 condition 131 relating to the Independent Monitor's review requires:

*The AMP must be reviewed by the Independent Monitor or an appropriately qualified, independent third party, and updated with requirements of the Community Reference Group (CRG) (once established under Condition 129), with all review findings and CRG input requirements to be provided to the Department for approval. Refer Table 6-1 for information on the timing of the formation of the CRG.*

The Authorisation 0059 has other condition sub-parts that require the AMP to consider information and data from Monitoring Programs (e.g. Site Specific Trigger Values (SSTV), McArthur River, groundwater, surface water, liner trials, aquatic ecology, air quality) to inform, review and update the AMP. The condition sub-parts that impose the requirements on the AMP are contained in conditions 108, 109, 110, 115, 117, 119, 123 and 130.

Note: The Authorisation 0059 conditions relevant to the AMP will commence at a future date upon authorisation of the OMP associated with the MMP amendment currently under assessment by DPIR. The mine Operator must submit an Adaptive Management Plan within 18 months of the authorisation of the OMP. This provides the opportunity for the AMP (Rev 0) to be updated and a revised version to be submitted to DPIR within the stipulated Authorisation timeframe.

## 3 Scope

The scope for this Independent Monitor's review was to assess the AMP and supporting Management Plans (Appendices A, B and C) to determine the extent to which the AMP satisfies the requirements of the Authorisation 0059. It is recommended that this AMP review is read in conjunction with the AMP.

### 3.1 Reference Documents

The reference documents that were considered during the AMP review are listed in Table 3-1.

Table 3-1: AMP review reference documents

No.	Reference document	Document source
1	AMP, Appendix B of the MMP, McArthur River Mine, 31 January 2020 (56 pages plus appendices)	Operator
2	AMP, Appendix A – WMP (pages 1 to 95)	Operator
3	AMP, Appendix B – Air Quality Management Plan (25 pages)	Operator
4	AMP, Appendix C - RMP 2018 – 2020 (pages 1 to 79)	Operator
5	MMP, MRM, 31 January 2020, (138 pages MMP, excluding appendices)	Operator
6	NT EPA <i>Assessment Report (86)</i> , McArthur River Mine Overburden Management Project, July 2018 (216 pages)	NT EPA
7	NT EPA <i>Guidance on Adaptive Management</i> , December 2018 (10 pages)	NT EPA
8	<i>Variation of Authorisation 0059</i> , issued 15 August 2019 (41 Pages), noting that conditions 106 to 133 address NT EPA recommendations made following assessment of the OMP.	DPIR
9	NT <i>Waste Discharge Licence (WDL) 174-11</i> , dated 28 April 2019 (31 pages)	DENR
10	<i>EPBC (Environment Protection and Biodiversity Conservation Act) Approval 2014/7210</i> , dated 12 June 2019. Condition 6 - AMP	DAWE

### 3.2 Assumptions

#### Other environmental documents

There are approximately thirty-five environmental management documents that exist or are proposed to be developed by the mine Operator as part of an Environmental Management Framework (EMF). The Operator has developed the EMF to provide a framework to help achieve environmental objectives and address various approval requirements in a systematic manner. The EMF is a group of integrated management plans, monitoring programs, guidelines, specifications and procedures designed to facilitate environmental management. A central component of the Operator's EMF is the AMP as the overarching document for environmental management, monitoring, mitigation and reporting of environmental performance against approval conditions. Some of these EMF documents are referred to in the AMP, but not contained within the AMP. These other EMF documents have not been assessed

as part of this review. For clarity the following documents have not been considered as part of this AMP review:

- Air Quality Monitoring Program
- Artificial Surface Water Monitoring Program
- Bing Bong Loading Facility Operational Manual
- Commonwealth Environmental Monitoring Plan
- Concentrate Transport Procedure
- Conceptual Mine Closure Plan
- Emergency Response Plan
- Fairy Wren Translocation Plan
- Fire Management Plan
- Freshwater Ecology Monitoring Program
- Freshwater Sawfish Plan
- Migratory Shorebirds Plan
- NOEF Operational Management Plan
- Riparian Bird Monitoring Plan
- Surface Water Monitoring Program
- Tailings Storage Facility Life of Mine Plan
- The Bing Bong Loading Facility Environment Management Plan and 8 Monitoring Programs/plans
- The McArthur River Mine Health and Hygiene Management Plan 2019-2024
- Unplanned Closure Plan
- Waste Management Plan
- Weed Management Plan
- Other Management Plans or Monitoring Programs and procedures yet to be developed.

## **Waste Discharge Licence**

Conditions 47 to 50 of the *Waste Discharge Licence (WDL) 174-11* (commencement date 28 April 2019) under the *Water Act 1992* have not been reviewed in this report. A future review of the AMP by the Independent Monitor will be conducted on behalf of DPIR, noting conditions of Authorisation 0059 require compliance with WDL 174-11.

## **EPBC 2014/7210 Approval**

Condition 6 of the EPBC Approval 2014/7210 dated 12 June 2019 has not been reviewed for this report. The Commonwealth approval requires the approval holder to submit an AMP within 48 months of the date of approval, i.e. due 12 June 2023. A future review of the AMP by the Independent Monitor considering EPBC approval requirements will be undertaken as a component of the annual performance review.

## 4 Approach

### 4.1 Review Approach

The approach to undertake the review was based upon the guidance provided in the United States EPA's *Peer Review Handbook 4<sup>th</sup> Edition* (EPA, 2014). Key tasks are illustrated in Figure 4-1 and outlined below.

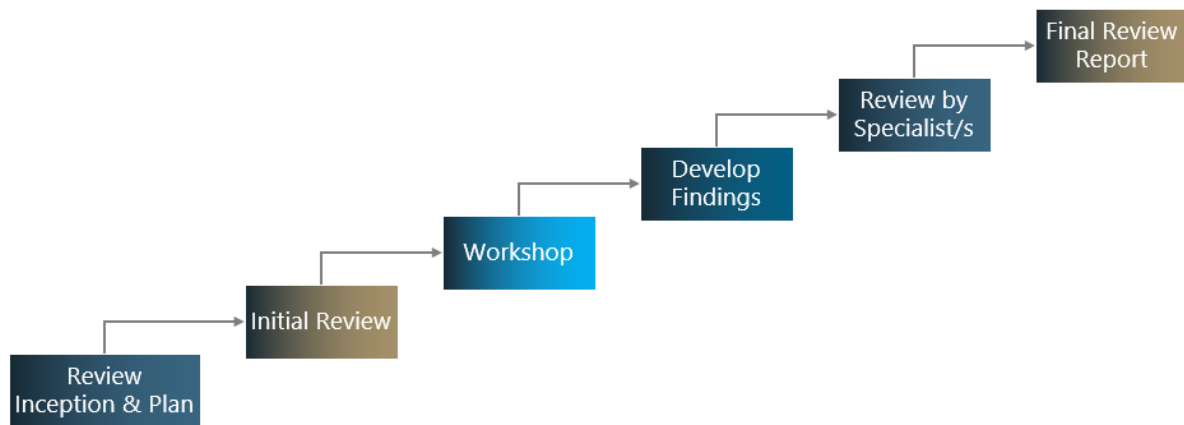


Figure 4-1: Review approach overview and key tasks

**Review Inception and Plan** – an AMP Review scope and resources plan was prepared to confirm the proposed review criteria and reference documents. DPIR confirmed the review criteria as the requirements of Authorisation 0059 Condition 131 and other relevant conditions.

**Initial Review** – the relevant regulatory documents (Table 3-1) were reviewed first. Then the AMP was reviewed to assess the extent to which the AMP satisfies the requirements of the Authorisation 0059.

**Workshop** – the report reviewers participated in a workshop to present and discuss the findings of the initial review. The review team sought to reach a consensus on the extent to which the AMP satisfies the Authorisation 0059.

**Develop Finding** – utilising the findings from the initial review and the workshop a draft report was compiled for internal review.

**Review by Specialists** – the draft report was provided to the Advisian Regional Managing Consultant, Environment and Society for technical and quality assurance review. Feedback comments and edits were incorporated into final draft and submitted to DPIR.

**Final Review Report** – initial feedback comments from DPIR were incorporated into a revised draft version of this report. Feedback was obtained from DPIR with respect to factual correctness or interpretations and assumptions presented. Subsequently the mine Operator will be given the opportunity to comment on the draft report and any necessary revisions will be incorporated.

## 4.2 Review Criteria

This review has focused on the extent to which the AMP satisfies the conditions of the Authorisation 0059. The extent to which the AMP satisfies conditions 131, 132 and 133 is the primary consideration. These Authorisation 0059 conditions provide the review criteria to assess the AMP. The Authorisation review findings are presented in Section 6.3.

Other Authorisation 0059 conditions that reference the AMP are of secondary importance to conditions 131, 132 and 133. These other Authorisation 0059 conditions are considered in Section 6.4.

## 4.3 Review Comments

The review of the extent to which the AMP satisfies the Authorisation 0059 conditions has produced considerations that have been developed into review comments. If further information to address these review comments is incorporated into the AMP, this would increase the extent to which the AMP satisfies the Authorisation 0059 conditions. The Authorisation 0059 review comments are described in Section 6.

## 4.4 Review Team

A team with relevant experience and qualifications was assembled to conduct the AMP review. These people are listed in Table 4-1:

Table 4-1: Review team members

Name	Position	Qualifications	Years' experience	Review role
Simon Wakefield	Principal, Managing Consultant, Environment and Society, Asia Pacific	B. Eng., M.Env.Eng (Hons.)	25	Technical Review RMP
Luke Stalley	Principal Environmental Consultant	B. Eng., M.Env.Mgmt.	28	Lead Env. Auditor, AMP Review, Aquatic Ecology
Dominic Dowling	Principal Environmental Consultant	PhD (Eng), B Eng (Hons 1)	20	Risk Management, AMP Review
Michael Butcher	Lead Water Resources Engineer	B Eng., Env. (Hons)	23	Surface Water, WMP
Lekha Siraz	Principal Hydrogeologist	PhD (hydrogeology), M.Sc. (geology), B.Sc.	30	Groundwater
Tanya Reedman	Senior Environmental Consultant	B.Eng.Env. (Hons), MBA Tech Mgt	20	Air Quality
Elena Miceski	Managing Consultant, Society, Governance and Engagement, Asia Pacific	B.Soc.Sc (Hons)	20	Stakeholder Engagement, CRG

## 5 Findings

### 5.1 Summary Findings

The AMP Revision 0, dated 31 January 2020, is the initial version of the AMP submitted to DPIR as part of the MMP in 2020. The AMP is an integral component of the 2020 MMP amendment proposing mining activities as presented in the OMP assessed by the NT EPA. The document primarily considers adaptive management during the mining operations phase but is intended to be a dynamic document with the Operator submitting updated versions for approval throughout the mine's life, including post-mining.

The purpose of the AMP is to provide a sound basis for planning and an approach to facilitate continuous incremental improvement in environmental management and decision making in response to evolving knowledge and changing circumstances.

The AMP has been developed consistent with the requirements of the Authorisation 0059 conditions 131 and 132, however would benefit from incorporating additional information to enhance the extent to which the AMP satisfies the conditions. The review has found the AMP 'part satisfies' or 'satisfies' the requirements of the Authorisation 0059 conditions 131 and 132 refer to Table 6-1 and Table 6-2.

Authorisation 0059 condition 133 is a future requirement where written notice to Minister is required where trends indicate environmental objectives are unlikely to be met by implementing the AMP, refer to Table 6-3. A series of considerations in relation to the review of other Authorisation conditions relevant to the AMP is presented in Section 6.4.

This review provides comments that may assist both DPIR and the mine Operator with improvements to documents to articulate and determine progress towards and the achievement of desired environmental outcomes.

Three key review considerations that would benefit the AMP are:

- setting clear 'SMART' (Specific, Measurable, Achievable, Results-oriented and Time-fixed) objectives in the AMP and associated Management Plans for the desired environmental outcomes and to guide adaptive decision making.
- defining an iterative process to systematically evaluate the effectiveness of management actions (including Monitoring Programs, performance indicators and data) to assess progress towards the achievement of the 'SMART' environmental management objectives.
- defining a process for continual feedback to obtain an improved understanding of environmental performance trends and ecosystem dynamics. This would inform adjustments to adaptive management actions to facilitate environmental objectives being met.

It is important to note that the Authorisation 0059 condition 131 requirement to submit an AMP to DPIR is not triggered until authorisation of the OMP associated with the MMP amendment (currently under assessment by DPIR) is granted. The mine Operator has provided the AMP (Rev 0) document earlier than required in response to the NT EPA's recommendation to have the AMP reviewed prior to the approval of the OMP.

The Authorisation 0059 requires mine Operator to submit an AMP within 18 months of the authorisation of the OMP. Therefore, the opportunity exists for the AMP (Rev 0) to be updated and

enhanced and for a revised version to be submitted to DPIR within the stipulated timeframe. Further, it is the mine Operator's stated intention to update and submit a revised version of the AMP within the 18 months timeframe from the authorisation of the OMP.

## 6 Authorisation Conditions Review

### 6.1 Relevant Conditions

The Authorisation 0059 is the mine's principal regulatory approval to operate in the NT and the Authorisation 0059 conditions stipulate the requirements that the AMP must address. The primary Authorisation 0059 conditions are condition 131 (refer to Table 6-1), condition 132 (refer to Table 6-2) and condition 133 (refer to Table 6-3).

In the context of this review the Authorisation 0059 conditions that mention the AMP, (i.e. conditions 108, 109, 110, 115, 117, 119, 123 and 130), are of secondary importance. These conditions refer to information and data from Monitoring Programs to inform, review and update the AMP. These other Authorisation conditions are considered in Table 6-4 to Table 6-11 of Section 6.4.

### 6.2 Review categories

Five ranking categories have been utilised to consider the extent that the AMP satisfies each relevant Authorisation condition. The categories adopted are:

1. **Satisfies** – Authorisation condition is satisfied
2. **Part Satisfies** - Authorisation condition is partially satisfied
3. **Does Not Satisfy** - Authorisation condition is not satisfied
4. **Future** – Authorisation condition is a future requirement
5. **n/a** – Authorisation condition is not applicable to this AMP review

The Authorisation conditions relevant to the AMP have been reproduced in Table 6-1 to Table 6-11. An assessment of the level that the AMP satisfies each Authorisation 0059 conditions is provided along with relevant comments.



### 6.3 Conditions 131,132 and 133

Table 6-1: Authorisation Condition 131

Authorisation Condition 131	AMP Level	Considerations
<p>Within 18 months of the authorisation of the Overburden Management Project, the Operator must submit an Adaptive Management Plan to the Department, which includes the following key elements:</p>	<p>Satisfies</p>	<p>Variation of Authorisation 0059 issued 15 August 2019.            Authorisation of the OMP is a future event.            Initial AMP (Revision 0) submitted 31 January 2020.            It is the mine Operator's stated intention to provide an updated and revised version of the AMP to DPIR within 18 months of the authorisation of the OMP.</p>
<p>a. clear, measurable environmental objectives for all significant environmental risks and potential impacts</p>	<p>Part Satisfies</p>	<p><b>Environmental Objectives</b></p> <p>Four key environmental management objectives have been established (AMP, p.14) to align with NT EPA recommendations and overarching environmental outcomes. These are high level overarching objectives, which are supplemented by measurable/SMART environmental triggers detailed in the associated Management Plans.</p> <p>Whilst the triggers are measurable, the AMP overarching objectives themselves are not. This poses a challenge for long-term monitoring and assessment of progress. For example, trigger levels may never be reached, however this does not necessarily mean that environmental performance objectives are being met or that potential impacts may not have occurred. Measurable/SMART objectives and intermediate targets for the AMP and associated Management Plans and Monitoring Programs will help to confirm acceptable overarching performance and to assess progress over time.</p> <p>To demonstrate achievement of the four overarching objectives, acceptable results and effective performance of the individual Management Plans and Monitoring Programs against their respective SMART objectives should be considered collectively and cumulatively to substantiate that the requirements of the AMP are being met. For example, if the WMP's water quality objectives are being satisfied but fluvial sediment quality objectives are not, then it is possible that the overarching objective/s is not being achieved.</p>

Authorisation Condition 131	AMP Level	Considerations
		<p>To assist the AMP to meet the Authorisation requirement of <i>clear, measurable environmental objectives</i> a relevant reference is the NT EPA Guidance on Adaptive Management (December 2018) which refers to the development of SMART objectives.</p> <p><b>Comment 01:</b> Develop SMART objectives for the AMP and associated Management Plans and Monitoring Programs.</p> <p><b>Significant Risks &amp; Potential Impacts</b></p> <p>The AMP does not describe how the ‘significant environmental risks’ are defined. There is reference to the Environmental Risk Assessment (ERA), Appendix A of MMP 2020, however it is not clear whether the environmental risks included in the AMP are the ‘medium’ and/or ‘high’ risks from the ERA, and whether they relate to the ‘inherent’ or ‘residual’ risk ratings. As a result, it is difficult to determine whether all ‘significant environmental risks’ have been adequately addressed in the AMP.</p> <p><b>Comment 02:</b> Provide clear definition of ‘significant environmental risk’ in the AMP. Ensure all significant environmental risks are adequately addressed in the AMP. Provide details of the mechanism to ensure future significant environmental risks are identified and incorporated in future revisions of the AMP.</p>
<p>b. <i>measurable performance indicators to show that objectives are on target to be met</i></p>	<p>Part Satisfies</p>	<p>Measurable performance indicators are included as triggers for actions, but are not directly linked with measurable objectives (as noted in a., above), therefore there is limited ability to assess whether objectives are on target to be met.</p> <p>The WMP’s surface water section has a narrow scale of performance measures which limits the overall effectiveness of adaptive management, which relies on improving management practices by learning from the outcomes of past and current practices. There is no systematic way of measuring improvement in performance against the management objectives beyond not exceeding performance triggers.</p> <p>There does not appear to be any clear link between the rehabilitation performance indicators and rehabilitation objectives.</p>

Authorisation Condition 131	AMP Level	Considerations
		<p><b>Comment 03:</b> Provide clear linkages between measurable performance indicators and their respective objectives (SMART).</p> <p><b>Comment 04:</b> Provide a process, utilising measurable performance indicators, to assess progress to demonstrate that objectives are on target to be met.</p>
<p>c. <i>pre-determined triggers to warn of potential for performance indicators to be exceeded, as informed by monitoring</i></p>	<p>Satisfies</p>	<p>The Trigger Action Response Plan covers three levels, and is linked with monitoring results. The trigger levels for monitoring of water, air quality and rehabilitation are listed in <i>Table 7: Trigger Action Response Plan (TARP)</i>.</p>
<p>d. <i>realistic and achievable contingency interventions to maintain performance indicators if triggers are consistently exceeded</i></p>	<p>Part Satisfies</p>	<p>The contingency measures included in the AMP are a list of possible measures, ranging from simple through to complex (AMP p.50). There is limited detail relating to how and when these contingency measures will be implemented or whether these potential measures are realistic and/or achievable.</p> <p><b>Comment 05:</b> Provide further detail on potential contingency measures to demonstrate that the interventions are realistic and achievable. As an alternative to providing these details in the plan, the AMP could reference that further details of potential contingency measures are maintained in a 'contingency measures register' which includes information such as ease of implementation, indicative timing (considering design, procurement, implementation, commissioning), approvals required, maturity of solution, ability to meet requirements, temporal or operational constraints, monitoring, etc.</p>
<p>e. <i>clearly defined management measures/actions that are capable of being implemented in a timely way to meet performance indicators and environmental objectives</i></p>	<p>Part Satisfies</p>	<p>The management measures/action are defined in the Management Plans and Monitoring Programs including: monitoring sites, monitoring parameter/analytes and monitoring frequency which are listed in <i>Table 6: Environmental Monitoring Program Summary</i>.</p> <p>Management measures/actions are included, however, the timelines associated with measures and actions are not.</p> <p>Refer also to review comments related to contingency measures in d., above.</p>

Authorisation Condition 131	AMP Level	Considerations
		<p><b>Comment 06:</b> Include further detail on timelines for the implementation of management measures and actions.</p> <p><b>Comment 07:</b> Provide further groundwater information to clearly define management measures for potential exceedances of performance indicators for Contaminants of Potential Concern (CoPC) in groundwater in target monitoring areas (e.g. pit, NOEF, TSF areas).</p> <p><b>Comment 08:</b> Provide further air quality information to clearly define management measures/action for spontaneous combustion, dust and total suspended particulates.</p> <p><b>Comment 09:</b> Provide further progressive rehabilitation information to clearly define planned management measures/action, in addition to the McArthur River and Barney Creek Diversion Channel areas, for the remainder of the site and across all domains. Provide further detail on the proposed rehabilitation processes, responsibility and timing (short, medium and long term stages) and show links between measures/actions, performance indicators and rehabilitation objectives.</p>
<p>f. <i>monitoring in accordance with relevant Recommendations in this Report* to determine whether management measures are effective and to inform the need for adjustments to management measures or need for alternatives</i></p>	<p>Part Satisfies</p>	<p>There is a stated intention that the AMP will be subject to ongoing annual reviews as part of the Operator’s environmental performance reporting. However, a review to evaluate the effectiveness of management measures/actions to inform the need for adjustments or alternatives may be implied but is not specifically described in AMP Section 8.</p> <p><b>Comment 10:</b> Provide further information on the process to assess the Monitoring Programs’ effectiveness and the process for adaptive adjustment. The design of the Monitoring Programs should facilitate the collation of data that enables progress to be assessed in relation to performance indicators and objectives by:</p> <ul style="list-style-type: none"> <li>• evaluating progress towards achieving management objectives</li> <li>• identifying when a trigger level for action has been reached</li> <li>• increasing understanding of ecosystem function and status, in order to better identify appropriate adaptive management actions</li> </ul>

Authorisation Condition 131	AMP Level	Considerations
		<ul style="list-style-type: none"> <li>improving models and understanding of ecosystems dynamics through comparison of predictions against monitoring data.</li> </ul>
<p><i>g. a continual feedback system to inform appropriate actions to be initiated when triggered and environmental objectives are always being met</i></p>	<p>Part Satisfies</p>	<p>There is a stated intention that the AMP will be subject to ongoing annual reviews as part of the Operator’s environmental performance reporting. However, a mechanism to provide a continual feedback system is not clearly described in AMP Section 8.</p> <p><b>Comment 11:</b> Provide further information on a continual feedback system.</p>
<p><i>h. continual development of new management actions as required based on knowledge gained from experience at the site and elsewhere across industry</i></p>	<p>Part Satisfies</p>	<p>There is a stated intention that the AMP will be subject to ongoing annual reviews as part of the Operator’s environmental performance reporting. However, a process to provide continual development of new management actions as required based on knowledge gained from experience at the site and elsewhere across industry is not clearly described in AMP Section 8.</p> <p><b>Comment 12:</b> Provide more information on a process for continual development of new management action.</p>
<p><i>The AMP must be reviewed by the Independent Monitor or an appropriately qualified, independent third party, and updated with requirements of the Community Reference Group (CRG) (once established under Condition 129), with all review findings and CRG input requirements to be provided to the Department for approval.</i></p>	<p>Future</p>	<p>It is anticipated that the CRG will be established in late 2020 / early 2021, and that the CRG will be available to review future AMP revisions.</p> <p>Although not explicitly stated within the AMP, the mine Operator’s website provides evidence that the Operator has an ongoing engagement program with its local communities and stakeholders. McArthur River Mining Pty Ltd also completed a comprehensive engagement campaign to support its OMP EIS (December 2016).</p>

\* **Note:** it is assumed that ...*Recommendations in this Report...* refers to the *NT EPA Assessment Report 86*.

Table 6-2: Authorisation Condition 132

Authorisation Condition 132	AMP Level	Considerations
<p>Unless agreed otherwise in writing by the Department, the Adaptive Management Plan must:</p>	-	-
<p>a. clearly set out the management objectives and performance indicators</p>	Satisfies	<p>Management objectives and performance indicators are clearly set out, however they are not all readily measureable, refer Condition 131 a., above.</p>
<p>b. provide clarity on the triggers for changes to management actions, and responsibility and evidentiary basis for decision making</p>	Part Satisfies	<p>The trigger levels for changes to management actions for monitoring of water, air quality and rehabilitation are listed in Table 7: TARP process. However, responsibility and evidentiary basis for decision making should be clearly described.</p> <p><b>Comment 13:</b> Provide further information on a process for initiation of certain actions if triggers are exceeded including:</p> <ul style="list-style-type: none"> <li>timeframes for initiation of actions and discontinuance (refer 132 c, below)</li> <li>allocation of responsibility</li> <li>description of approach to evidentiary basis for decision making.</li> </ul>
<p>c. establish the timeframe for initiation of certain actions if triggers are exceeded, including decisions to discontinue an activity and clarify responsibility and evidentiary basis for decision-making</p>	Part Satisfies	<p>The TARP process has some timeframes for actions if triggers are exceeded but does not clarify responsibilities or an evidentiary basis for decision making.</p> <p>Refer 132 b, above.</p>
<p>d. establish a process for adjusting triggers that includes the regulator</p>	Part Satisfies	<p>The AMP states it will be subject to ongoing reviews and revisions and would be updated in consultation with appropriate regulatory authorities but does not specifically describe a mechanism for adjusting triggers that involves the regulator.</p> <p><b>Comment 14:</b> Include a process for adjusting triggers that includes the regulator.</p>
<p>e. establish transparent monitoring, reporting and review requirements</p>	Part Satisfies	<p>The AMP establishes monitoring, reporting and review requirements but does not specifically describe a process for how these will be designed to be transparent.</p>

		<b>Comment 15:</b> Provide more information on a process to clearly outline how transparency in monitoring, reporting and review will be undertaken.
f. <i>establish processes to achieve transparency and stakeholder engagement in Adaptive Management Plan design and implementation that includes NT EPA, DEE* and Community Reference Group; and</i>	Part Satisfies	The AMP does not describe a process to achieve transparency and stakeholder engagement. <b>Comment 16:</b> Include a section that specifically addresses how stakeholder input has been considered in the preparation of the AMP. The AMP could also clearly articulate any plans or processes for future stakeholder and community engagement, including with the NT EPA, DAWE and CRG to attain transparency regarding the AMP.
g. <i>set out the mechanism for periodic review by Independent Monitor, which must not exceed a frequency of every three years</i>	Part Satisfies	AMP refers to condition 131 of the Authorisation (AMP p.53), but not condition 132 <i>the mechanism for periodic review.</i> <b>Comment 17:</b> Include information on the mechanism for AMP periodic review by the Independent Monitor and that the review must not exceed a frequency of every three years.
<i>Any amendment to the AMP must be provided to the Department for re- approval.</i>	Future	<b>Comment 18:</b> Include an acknowledgement that any amendment to the AMP must be provided to the Department for re-approval.

**\*Note:** DEE (Department of Environment and Energy - Commonwealth) is now the Department of Agriculture, Water and the Environment (DAWE)

Table 6-3: Authorisation Condition 133

<b>Authorisation Condition 133</b>	<b>AMP Level</b>	<b>Considerations</b>
<p><i>The Operator must provide written notice to the Minister and to the NT EPA (under clause 14A of the Environmental Assessment Administrative Procedures 1984) where trends indicate performance indicators and environmental objectives will not or are unlikely to be met by implementing the Adaptive Management Plan.</i></p>	<p><i>Future</i></p>	<p>No description regarding providing written notice to the NT EPA on performance indicators and environmental objectives trends is currently included in the AMP.</p> <p><b>Comment 19:</b> Provide information on a process for the Operator to provide written notice to the DPIR Minister and to the NT EPA where trends indicate performance indicators and environmental objectives will not or are unlikely to be met by implementing the AMP.</p>



## 6.4 Other Conditions

Table 6-4: Authorisation Condition 108

Authorisation Condition 108	AMP Level	Considerations
<i>Within 18 months of Authorisation of the Overburden Management Project, the Operator must submit a plan to the Department for review, that:</i>	-	-
a. <i>Enables measurement of total loads of lead and zinc and is consistent with requirements of Condition 117;</i>	n/a	-
b. <i>Quantifies and ensures annual loads of lead and zinc discharged to the McArthur River in future years (July to June) do not exceed the loads discharged in 2017-2018 (as per Condition 38.c), taking into account seasonal variations in rainfall, and subject to future annual load calculations;</i>	n/a	-
c. <i>includes recommendations and outcomes arising from audits of loads by the Independent Monitor; and</i>	n/a	-
d. <i>include sufficient detail to inform the development of monitoring and management measures (including but not limited to early warning alerts and intervention levels), as part of the site wide Adaptive Management Plan (Condition 131).</i>	Satisfies	<p>Lead and Zinc trigger levels for total lead and zinc loads are listed in AMP Table 7: TARP. Each trigger level is linked to an actions/response and corresponding environmental objectives, performance indicator and monitoring site/parameter/frequency/sample size.</p> <p>Samples are collected in accordance with the Operator’s Waste Discharge Procedure PRO-2200035.</p>
<i>Unless otherwise agreed in writing by the Department. The plan once approved by the Department must be implemented.</i>	n/a	-

Table 6-5: Authorisation Condition 109

Authorisation Condition 109	AMP Level	Considerations
109. Within 18 months of Authorisation of the Overburden Management Project, the Operator must submit a plan to the Department for review, that shall include:	-	-
a. site-specific trigger values determined in accordance with Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 2018 framework, incorporating ANZECC (2000) guidelines, at appropriate monitoring locations, in accordance with Condition 117; and	n/a	-
b. a commitment that creeks on the mine site to show long-term improving trends in water quality within 20 years after cessation of mining.	n/a	-
<p>The plan, once approved by the Department must be implemented. The relevant findings from the plan must be incorporated into the Adaptive Management Plan (AMP).</p>		<p>Part Satisfies</p> <p>SSTVs for sampling location SW11 are referred to in AMP Table 7: TARP. It is not specifically stated if the SSTVs have been determined in accordance with the ANZECC Guidelines.</p> <p><b>Comment 20:</b> Include information to confirm SSTVs have been determined in accordance the ANZECC Guidelines.</p>

Table 6-6: Authorisation Condition 110

Authorisation Condition 110	AMP Level	Considerations
Within 18 months of authorisation of the Overburden Management Project, the Operator must calculate contaminant loads and contaminant concentrations entering creeks and the McArthur River using system modelling.	-	-
The modelling must use suitable site-specific data collected as part of Condition 117 and be subject to review by the relevant independent panel at three year intervals. Specific assumptions to be tested include but are not limited to:	n/a	-
a. groundwater flow paths; and	n/a	-
b. attenuation of metals from mine-derived wastes.	n/a	-
The Operator must provide a written response to the Department, if an independent technical panels, required under Condition 113, review of the models and modelling outputs, and the data collection programs that informed the model development include recommendations and/or improvements. All relevant outputs must be used to inform and update the Adaptive Management Plan.	Future	It is anticipated that modelling for groundwater contaminant loads and concentrations will be utilised in the future to inform and update the AMP.

Table 6-7: Authorisation Condition 115

Authorisation Condition 115	AMP Level	Considerations
<p>Within 24 months of authorisation of the Overburden Management Project, the Operator must submit a NOEF geosynthetic liner cover system plan to the Department for review. The plan must:</p>	-	-
<p>a. outline a process (including timelines) to test and evaluate (i.e. criteria) the constructability and effectiveness of geosynthetic liner cover options including a geosynthetic liner /compacted clay layer combination; and</p>	n/a	-
<p>b. include implementation of trials on rehabilitated stages of the NOEF.</p>	n/a	-
<p>All relevant performance parameters must be monitored, including but not limited to:</p>	n/a	-
<ul style="list-style-type: none"> <li>• slope stability during extreme events;</li> </ul>	n/a	-
<ul style="list-style-type: none"> <li>• cover performance as a result of heat effects;</li> </ul>	n/a	-
<ul style="list-style-type: none"> <li>• tolerance of the geosynthetic liner to expected differential settlement;</li> </ul>	n/a	-
<ul style="list-style-type: none"> <li>• veracity of cover longevity predictions;</li> </ul>	n/a	-
<ul style="list-style-type: none"> <li>• likely long-term maintenance requirements.</li> </ul>	n/a	-
<p>Reporting of trial results and monitoring outcomes shall be provided within three years from the plans submission, and every three years thereafter, to the relevant independent panel and the Community Reference Group for review, and shall be audited by the Independent Monitor. The Operator must provide a written response to the Department, if review from the relevant panels and Community Reference Group require matters to be addressed.</p>	n/a	-
<p>The plan, once approved by the Department must be implemented. The relevant outcomes of trials and monitoring must be used to inform the Adaptive Management Plan and closure planning for the mine.</p>	Future	The NOEF geosynthetic liner cover system trial is in its early stages and the trial’s outcomes are anticipated to be included in future revisions of the AMP.

Table 6-8: Authorisation Condition 117

Authorisation Condition 117	AMP Level	Considerations
<p><i>Within 12 months of authorisation of the Overburden Management Project, the Operator must review and synthesise all available and relevant information to submit a revised water monitoring program/ plan (surface water and groundwater) to the Department for review, ensuring the plan is capable of identifying and quantifying impacts of mining activities on the environmental values and beneficial uses of the McArthur River. The plan must be able to allow assessment of compliance to Condition 108 and include sufficient detail to inform/develop/update the Adaptive Management Plan. The program/ plan, at a minimum must:</i></p>	Future	It is anticipated that revised WMP will be submitted to meet condition 117 requirements and include sufficient detail to inform/develop/update the AMP.
<p><i>a. quantify loads of lead and zinc entering the McArthur River each year;</i></p>	n/a	-
<p><i>b. quantify impacts to water quality and trends in groundwater to determine that objectives and targets are being met, including the effectiveness of source control to reduce loads as low as is reasonably practicable;</i></p>	n/a	-
<p><i>c. develop appropriate future trigger values for waterways on the mine site and the McArthur River in accordance with the ANZECC Guidelines. In the interim, the trigger values in the most current WDL shall be used.</i></p>	n/a	-
<p><i>The revised program/plan must:</i></p>	-	-
<p><i>a. be prepared in consultation with the NT EPA;</i></p>	n/a	-
<p><i>b. be prepared in consultation with the relevant independent panel.</i></p>	n/a	-
<p><i>The plan, once approved by the Department must be implemented. Any variation and/or updates to the program/ plan (e.g.to maintain the currency of the monitoring network), must be undertaken in consultation with the relevant independent panel.</i></p>	n/a	-
<p><i>The results of the program must be reported annually to the Department and audited by the Independent Monitor every three years. The results of the program together with any audits/review findings must be published on the Operator's website.</i></p>	n/a	-

Table 6-9: Authorisation Condition 119

Authorisation Condition 119	AMP Level	Considerations
<p><i>Within 18 months of authorisation of the Overburden Management Project, the Operator must submit an aquatic ecosystem monitoring program to the Department for review, that provides improved understanding of aquatic ecosystems in the McArthur River from changing water flows, levels and quality, including available dry season habitat. The program must:</i></p>	n/a-	-
<p><i>a. assess impacts of the mine on water levels in refuge pools/waterholes, upstream and downstream of the mine, including in the McArthur River diversion channel;</i></p>	n/a	-
<p><i>b. assess impacts of the mine on water quality in refuge pools/waterholes in the dry season; and</i></p>	n/a	-
<p><i>c. assess impacts of the mine on the health of aquatic biota in the McArthur River using non-lethal sampling methods.</i></p>	n/a	-
<p><i>The program must be designed to be integrated with requirements of the Adaptive Management Plan (Condition 131 and Condition 132). The program, once approved by the Department must be implemented.</i></p>	Future	It is anticipated that an Aquatic Ecosystem Monitoring Program will be submitted to meet condition 119 requirements and be designed to be integrated with the requirements of the AMP.

Table 6-10: Authorisation Condition 123

Authorisation Condition 123	AMP Level	Considerations
<p><i>The Operator must develop or revise and submit an existing air quality plan within 12 months of this Authorisation to the Department for review, that monitors sulfur dioxide emissions at an appropriate location between the NOEF and sensitive receptors determined in consultation with NT EPA.</i></p>	n/a	-
<p><i>The monitoring plan must include objectives, locations, frequency of monitoring, trigger values and reporting commitments to manage and protect any potential air quality risk to human health outside of the mineral lease. Evidence of consultation with the NT EPA must be provided at the time of the plan submission. The plan, once approved by the Department must be implemented. The results of the plan for each reporting frequency made available on the Operator's website and incorporated/updated/revise, where relevant, with the Adaptive</i></p>	Future	It is anticipated that an Air Quality Monitoring Program will be submitted to meet condition 123 requirements and designed to be incorporates/updated/revise with the AMP.

Authorisation Condition 123	AMP Level	Considerations
Management Plan. Initial monitoring results to be reported within 6 months of the plan being accepted by the Department.		

Table 6-11: Authorisation Condition 130

Authorisation Condition 130	AMP Level	Considerations
Within 18 months of authorisation of the Overburden Management Project, the Operator must undertake a synthesis of all environmental monitoring programs that assess impacts of mining activities on the environmental values and beneficial uses of the McArthur River, in accordance with NT EPA's overarching environmental outcome (Condition 108). The revised monitoring programs must:	n/a	-
a. use outputs generated for review and synthesis of water monitoring programs, as part of addressing Condition 117:	n/a	
b. demonstrate how all monitoring data collected under various monitoring programs and management plans were considered and synthesised (e.g. conceptual site models, trend analysis); and	n/a	
c. be incorporated in the Adaptive Management Plan.	Future	It is anticipated that a synthesis of all environmental Monitoring Programs that assess impacts of mining activities on the environmental values and beneficial uses of the McArthur River will be incorporated into the AMP.

## 7 Conclusion

The AMP has been developed consistent with the requirements of the Authorisation 0059 although there are some aspects that could be improved to better satisfy parts of the Authorisation 0059 conditions. The review has found the AMP 'part satisfies' or 'satisfies' the requirements of the Authorisation 0059 conditions 131 and 132. The review has found that the AMP (Rev 0) is a suitable foundation and basis for the development of future AMPs to meet the Authorisation 0059 requirements.

The review identified that the AMP would benefit from incorporating further information and providing greater clarity to:

- set 'SMART' environmental objectives in the AMP and supporting Management Plans to facilitate environmental objectives being met and to guide adaptive decision making
- define an iterative process to evaluate the effectiveness of environmental management actions and to assess progress towards set AMP objectives
- define a process for continual feedback to obtain an improved understanding of environmental performance trends and ecosystem dynamics to inform any adjustments to management actions.

Provided that the AMP (Rev 0) is updated to address the review comments, the AMP will provide a sound and robust basis for environmental planning, management and continuous improvement. A revised AMP will further assist to facilitate improved environmental management and decision making over time in response to evolving knowledge and changing circumstances.

Within the current Authorisation 0059 timeframe for the submission of the AMP, the opportunity exists for the AMP to be updated, enhanced and resubmitted. The mine Operator has provided the AMP document earlier than required in response to the NT EPA's recommendation to review the AMP prior to the approval of the OMP. It is the mine Operator's stated intention to update and submit a revised version of the AMP within the 18 month timeframe from the authorisation of the OMP.