

# Independent Monitor **COMMUNITY REPORT**

McARTHUR RIVER MINE

November 2018



The detailed McArthur  
River Mine Environmental  
Performance Annual  
Report for 2017-2018  
can be accessed on the  
Independent Monitor  
website:

[www.mrm-independentmonitor.com.au](http://www.mrm-independentmonitor.com.au)

# Environmental Performance 2017-2018

## Introduction

The Independent Monitor (IM) has prepared this community report to summarise the findings of its assessment of the environmental performance of the McArthur River Mine and Bing Bong Loading Facility for the 2017-2018 Operational Period (from October 2016 to March 2018).

This reporting period has been extended to cover an 18-month timeframe, in order to reduce the time between results and reporting.

Improvements noted during this period include:

- Improved handling and compaction of clays, significantly reducing the number of compaction tests not meeting the specification.
- Completing construction and commissioning of the western perimeter runoff dam (WPROD).
- Testing of tailings deposited at the tailings storage facility (TSF), which has confirmed the lack of oxidation of tailings.
- Improving groundwater monitoring at the McArthur River Mine and Bing Bong Loading Facility by installing new monitoring bores and loggers.
- Commissioning a new computerised network for monitoring and reporting of site water management operations in real time (e.g., pond water levels and water transfers).
- Successfully managing the high rainfall of January 2018 with no uncontrolled releases from any runoff dam or the TSF.
- Developing and implementing an Air Quality Management Plan for the mine site and Bing Bong Loading Facility.
- Refining monitoring sites for the Annual Marine Monitoring Program to better understand contaminants in the study area.
- Planting 84,000 seedlings in 2017, with nearly all grown in the onsite nursery.
- Successfully eradicating weed infestations of neem tree at Bing Bong Loading Facility and devil's claw at the McArthur River floodplain.

A number of areas for improvement have been identified and are detailed in this report.



Old McArthur River Channel Northeast of the Mine

## The Key Issues in this Operational Period

<b>Waste Rock</b>	The key issue at the mine site is the long-term management of waste rock which has the potential to generate acid, saline and/or metalliferous drainage.
<b>Tailings Storage Facility</b>	Management of the TSF is much improved, but some issues continue with regards to stormwater management and seepage.
<b>Barney Creek Haul Road Bridge</b>	Dust from haulage is an ongoing issue at this site, but efforts to capture runoff and sediment have reduced contamination of water and fish.
<b>Water Quality</b>	There is limited impact on downstream water quality to date, and McArthur River Mine (MRM) is giving more attention to assessing mine-derived contaminant loads.
<b>Fish and Shellfish</b>	Metal levels in fish caught on the mine site continue to decline, and were below the recommended guideline levels throughout the McArthur River catchment.
<b>McArthur River Diversion Channel</b>	There is a risk that erosion at the upstream end of the diversion channel could rapidly alter the river's course to align with the old channel, with potential impacts to diversion stability and the mine levee wall.
<b>Bing Bong Loading Facility</b>	Impacts on coastal water quality and marine fauna are minimal and localised. An ongoing issue is the lack of doors on the concentrate shed, which are needed to help control dust.
<b>DPIR Performance</b>	The Department of Primary Industry and Resources (DPIR) and MRM should discuss the recording and reporting of exceedances within the various monitoring programs, to determine whether exceedances are considered non-compliances or incidents.

## Scope of this Report

The role of the IM is to assess the environmental performance of the McArthur River Mine by reviewing environmental assessments, monitoring and audits undertaken by MRM and by the DPIR.

Issues relating to mine safety, community and social issues, and mine administration matters are not included in the assessment.

The scope of the assessment includes the mine itself and Bing Bong Loading Facility.

## Waste Rock

Managing the geochemistry of mine wastes remains the most significant issue for the site. In addition to acid, saline and metalliferous drainage issues, some mine materials have spontaneous combustion potential.



Bulldozing PAF Cell - NOEF

### What is Acid Mine Drainage?

Acid mine drainage (AMD), also called acid, saline and metalliferous drainage, refers to drainage of acidic water from rock. It also includes saline drainage as well as pH-neutral metalliferous drainage.

Potentially acid-forming (PAF) rocks occur naturally in the environment and are harmless when below the groundwater table or deep below the ground surface where oxygen levels are low. When PAF rocks are exposed to air, they can break down, causing acidity.

Similarly, salt and metals are a natural part of rocks and soil, which can leach out when some types of rocks break down in response to air and water. Following rainfall, water containing salt, acid and/or metals can run off into creeks or leach into groundwater.

Acid mine drainage may be controlled by covering rocks with a 'cap' of clay and/or other materials which significantly limit the movement of water and air into the rock below. In some locations, the rock is placed under water, which excludes air and prevents the breakdown of rock.

### AMD Management

McArthur River Mining has continued to make considerable progress in understanding the AMD potential of mine materials (including waste rock, tailings, open cut walls/void and stockpiles). This, combined with improved definition of surface water and groundwater, has resulted in increased confidence in the prediction of potential short- and long-term impacts. McArthur River Mining's proposed AMD management strategies have evolved over the last five years based on this increasing knowledge.

### Environmental Impact Assessment

Since the last IM report, MRM has further advanced geochemical studies and investigations in support of the Draft Overburden Management Project Environmental Impact Statement (OMP EIS) and the Supplementary EIS (SEIS). This has addressed many of the AMD-related concerns previously raised by the IM, and has resulted in a much-improved approach to long-term management.

As at the time of preparing the 2017-2018 IM report, the strategies outlined in the above documents had yet to receive regulatory approval.

The NT EPA has since released their assessment of the EIS and SEIS, and recommended that the Overburden Management Project should proceed.

The Draft OMP EIS and OMP SEIS included new closure strategies that are significantly different from the currently approved closure plan, with the main feature involving a revised cover design for overburden emplacement facilities. It is expected that these strategies will be included in a new Mining Management Plan (MMP), which will go to the DPIR for approval.

### Recommendations

Notwithstanding that the strategies proposed in the Draft OMP EIS and OMP SEIS are yet to be included in a new approved MMP, the IM recommends that MRM undertakes the following actions:

- Proceed with trial cover designs of the new geo-synthetic liner (GSL) cover system to determine constructability and performance, and include physical and chemical testing of the proposed bituminous geomembrane (BGM).
- Undertake an independent review of the GSL cover system design in regard to saturation of the alluvium layer above the GSL and implications for slope stability.
- Carry out a more comprehensive settlement assessment for the Northern Overburden Emplacement Facility (NOEF) with regards to potential effects on the proposed BGM layer, supported by site observation and settlement monitoring during dump construction.
- Expand monitoring of groundwater levels, temperature and gas composition at the NOEF to include the Central West NOEF, thereby allowing the effectiveness of design changes to be quantified. Current monitoring is focussed on the historic areas of waste placement under the original EIS.



Construction Activities on Central West Stage of the NOEF



2-m Dumped PAF Rock Ready for Compaction



Interim Barrier to Help Prevent Transfer of Heat Between Older Dump Area and New Central West Stage

**Improvements/Successes**

The following improvements and successes regarding management of waste rock were noted by the IM during the reporting period:

- Additional drilling of monitoring bores to improve understanding of temperature and gas transport processes in the NOEF.
- Improved waste rock classification.
- Continued placement of newly-mined PAF in flat and compacted (2-m) lifts and placement of covers to help prevent transfer of heat and control oxidation from air moving through the dump.
- Improvements to areas of the west portions of the NOEF through replacement of compacted clay layers and re-encapsulation of problematic PAF areas.
- Preferential construction of covers to prevent transfer of heat on older, end-tipped dump areas of the NOEF.
- Construction and operation of new areas of the NOEF have increased confidence in the ability of the facility to safely store non-benign waste.

## Tailings Storage Facility (TSF)

Since the IM's first site visit in 2014, the operation of the TSF has continued to improve in terms of water management and oversight. McArthur River Mining has continued to balance the need to minimise both the volume of water stored in the TSF with keeping the tailings surface damp (to minimise acidic conditions developing within tailings pore water) and dust generation.

### What are tailings? How does the TSF work?

Tailings are the ground-up rock remaining after extracting metal from the ore.

The tailings are piped from the mine's processing plant and deposited around the perimeter of the TSF. Here, the ground rock settles out, while wastewater flows to the centre of the TSF and is recycled.

The tailings are deposited in thin layers which allows them to dry out and consolidate, thereby increasing the strength of the TSF.



*Salt Crusting on the Surface of TSF Cell 2*

Management of Cell 1 and Cell 2 has not changed from the last IM report. Management of seepage from Cell 1 relies primarily on repair of a temporary and eroded 500-mm clay cover over the tailings before each wet season, with various drains and sumps in place to direct and handle the runoff.

The current management of Cell 2 minimises the water stored in the facility, with active beaching of tailings around the perimeter of the cell, lower water content in the tailings discharge slurry, and water recycling from the TSF for use in the processing plant.

### Improvements/Successes

The most significant success for the TSF in this reporting period is continued effective management of the pond, cyclic deposition, tailings strength gain and monitoring.

Specific successes include:

- Completion of the 2-m raise of TSF Cell 2.
- Construction of a new spillway for TSF Cell 2.
- Updated operating guidelines, operating limits, triggers and actions.
- Ongoing monitoring of piezometric levels, settlement, pond levels, reclaim volumes and beach angles.
- Initiation of surface sampling and water extraction testing of deposited tailings (in the TSF), which confirm the lack of significant acid generation from oxidising tailings.

### Water in the TSF

McArthur River Mining has continued to avoid storing excess water in the TSF.

The main issues during the reporting period related to ponding stormwater at Cell 1, and MRM implemented a number of measures to address this, including real-time water level monitoring, review of the Cell 1 drainage system and implementation of an inspection and maintenance program.

Seepage through the Cell 2 embankment is an ongoing issue and the IM notes that routine visual inspections for evidence of increased seepage should continue.

**What is the problem with seepage?**

Seepage of water from a tailings facility can impact on groundwater quality, for example, making water and soils saltier. There is also potential for the generation of acidic seepage. This in turn can affect aquatic and terrestrial ecosystems where groundwater is discharged to creeks or the surface.

**Recommendations**

The IM recommends that MRM should:

**Design and Operation**

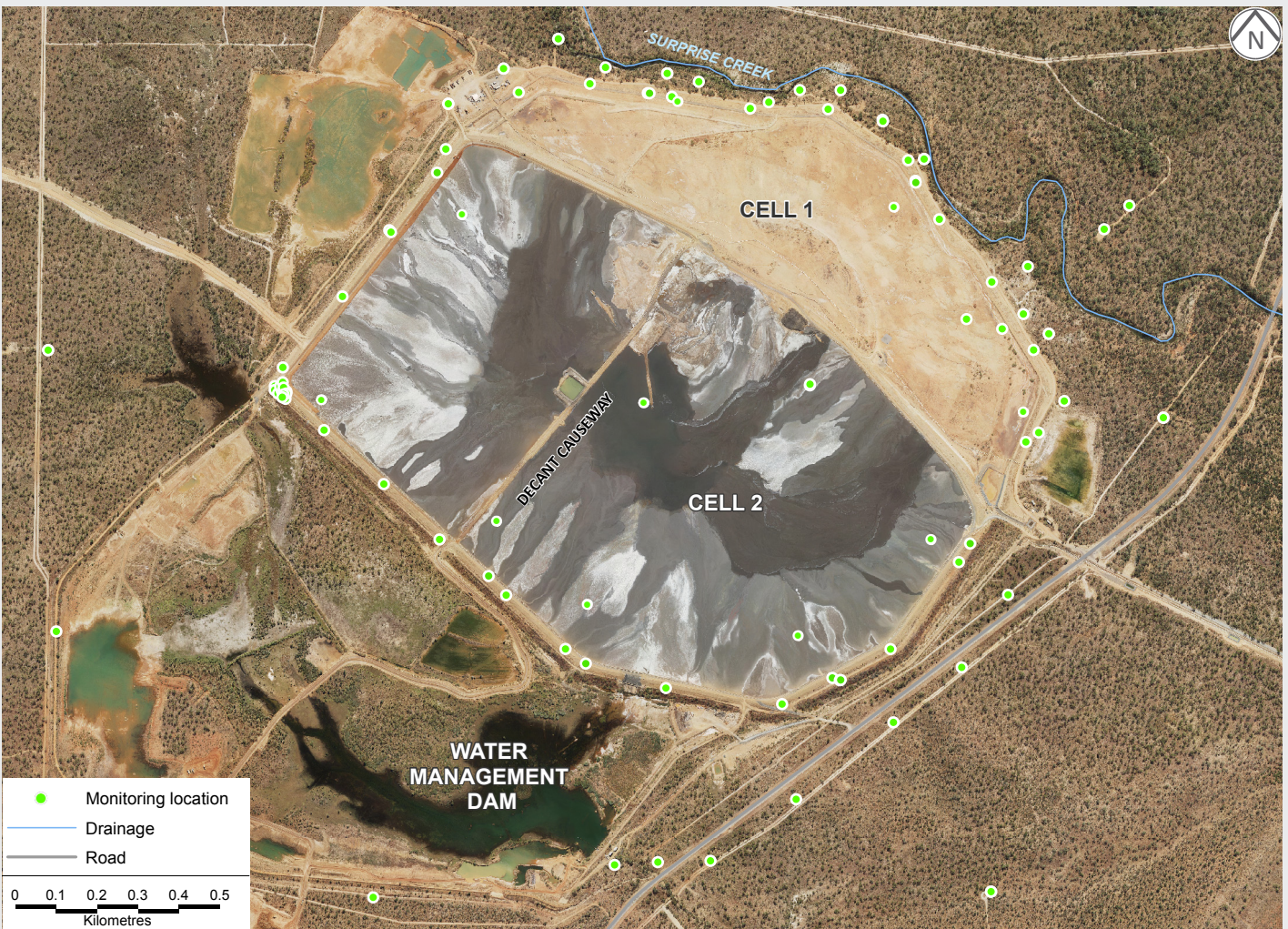
- Modify the TSF Water Management Dam wall to provide 1% AEP flood immunity.
- Include the water-holding capacity of borrow pits in future stormwater capacity assessments.
- Undertake further assessment as to the likely cause of increased water levels in the TSF wall and the implications on wall stability.

**Seepage**

- Undertake further field investigations to better identify groundwater pathways around the TSF.
- Use an updated conceptual model to revise the TSF groundwater model and then estimate current and future seepage impacts and suitable mitigation options.

**Closure**

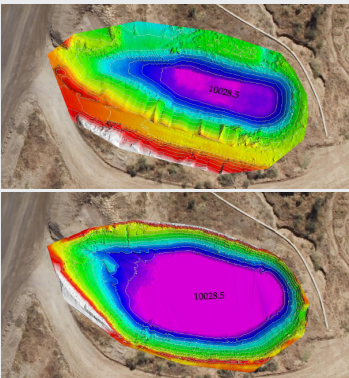
The Draft OMP EIS and OMP SEIS propose reprocessing of tailings and subsequent disposal in the mine pit. The tailings are classified as PAF, albeit with a long lag time, and will ultimately produce acid leachate unless appropriately managed. Preferential placement of tailings in the pit and ultimate inundation of both tailings and pit walls is the most secure long-term strategy for these materials and is strongly supported by the IM.



Overview of TSF Showing Locations of Monitoring Sites

## Dust and the Barney Creek Haul Road Bridge

The area near Barney Creek haul road bridge was one of the dustiest parts of the mine site in 2017-2018. However, MRM have continued to improve measures to capture sediment in runoff (from settled dust). As a result, metals in stream water quality, streambed sediment and fish continue to improve.



Upgrades to Haul Road Bridge Southeast Sump (Before/After)



Sediment Control Structures Near Barney Creek Haul Road Bridge

### Air Quality Management Plan

A formal Air Quality Management Plan (AQMP) was developed in 2017 by MRM in consultation with air quality specialists and the DPIR. The AQMP covers air quality (including dust) monitoring and management at the mine site and at Bing Bong Loading Facility.

The AQMP includes:

- Extensive changes to the dust monitoring network – with fewer sites, but more frequent monitoring. Depositional dust gauges have been reintroduced.
- A decision tool for when dust generation occurs in various situations, with associated management actions.
- A 'trigger action response plan' (TARP) which identifies operational performance trigger levels for a subset of monitoring sites, and associated response actions if required.

Newly documented and/or implemented dust controls in the operational period include:

- Avoiding operation of machinery (e.g., graders) in windy conditions.
- Speed limits for haul trucks on all mine site roads.
- Dust collection devices on all conveyors.
- Monitoring of the moisture content of mine concentrate at Bing Bong Loading Facility prior to loading onto transport barge – with handling preferred while product is slightly damp, to minimise dust.

### Dust at Barney Creek Haul Road Bridge

A range of dust controls have been implemented in the vicinity of Barney Creek haul road bridge, which the IM commends. Despite this, there were frequently high levels of wind-blown dust near the bridge during the 2017-2018 operational period, more so than in the previous period, and more than near the processing plant.

This was due to traffic on and near the bridge – especially waste rock haulage in the dry season. The IM has recommended that MRM should review this increase in dust, and why the existing dust controls don't appear to have been sufficient.

### Water and Sediment Quality

Despite the dust issues near Barney Creek haul road bridge, MRM's ongoing efforts to control contaminated runoff and sediment in this area have improved water quality results. The amount of metals in streambed sediments collected immediately downstream of the bridge has also continued to reduce over the past several years.

McArthur River Mining's efforts in this location have included:

- Enlargements and modifications to the existing sediment sumps adjacent to the bridge, to better capture contaminated runoff.
- Completion of the new 'Mine Infrastructure Area' (MIA) sump to the north of the bridge, which is designed to capture runoff from haul roads surrounding the NOEF, before it reaches the sumps adjacent to the bridge.

During the dry season MRM also used a pump in Barney Creek diversion channel below the haul road bridge to remove creek water that was high in salts.

### Fish

Fish caught at the Barney Creek haul road bridge contained metal levels that were well below maximum permitted concentrations. Results at this site have continued to improve in recent years, likely due to MRM's efforts as described above.



# Water Quality

Monitoring data indicates that mine-associated adverse impacts on downstream surface water quality during the reporting period were limited, and increasing emphasis is being placed on mine-derived loads of contaminants.

### Successes

As has been the case in previous years, MRM has devoted considerable resources to water management. The IM notes the following successes for the reporting period:

- Compliance with trigger values at SW11 has improved, particularly in relation to electrical conductivity (EC) and sulfate (SO<sub>4</sub>).
- McArthur River diversion channel water quality in the 2016 and 2017 dry seasons improved compared with that in the previous dry season.
- The monitoring program provided a suitable basis for MRM's water management decisions.

### Contaminant Loads

In recent years, the IM has provided repeated comment concerning the need for MRM to focus on mine-derived loads of contaminants reporting to McArthur River and the various sources that contribute to these loads.

The IM notes that MRM is devoting increased attention to this issue, and that the waste discharge licence now also refers to the need to determine loads.

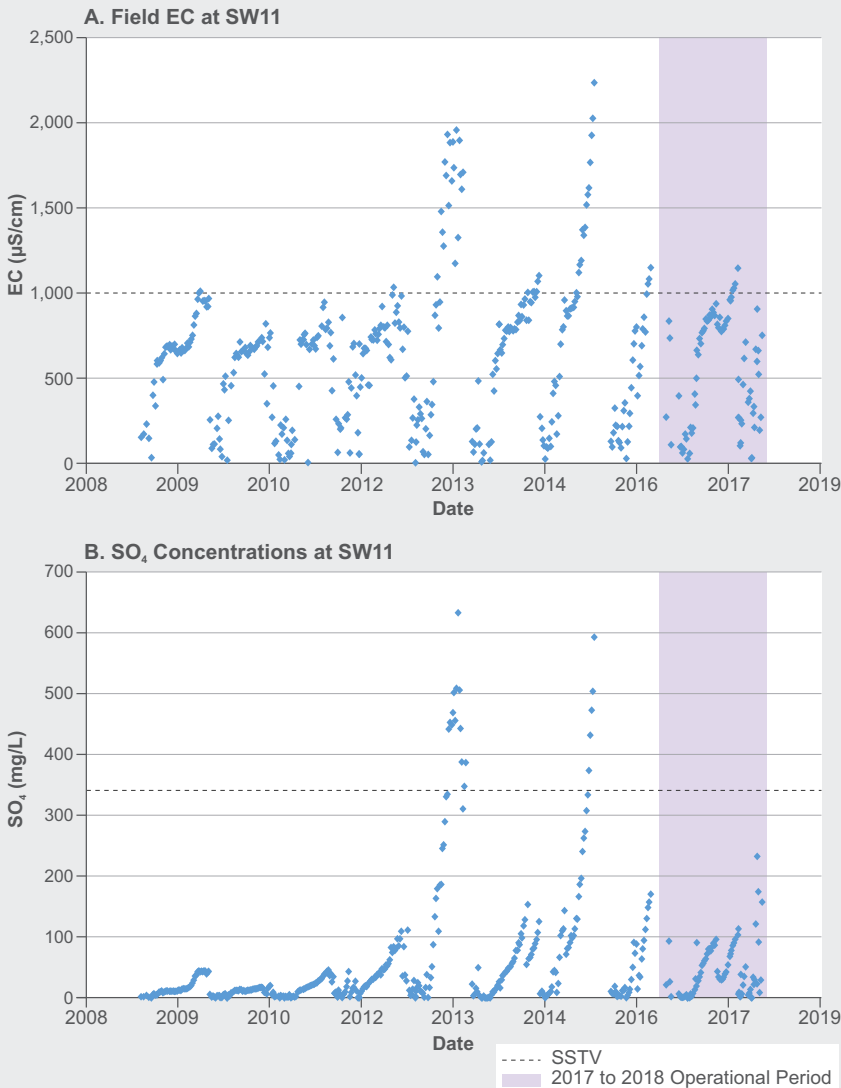
The existing (preliminary) information suggests that mine-derived loads for some contaminants are significant compared to background loads. The next steps are for MRM to further quantify these loads (including contributions from flood events) and changes over time, and determine the associated environmental risks, particularly in terms of impacts on relevant environmental values.

The results should also be used to rank mine-associated sources based on the contributions of contaminants to McArthur River, thereby allowing MRM to prioritise management/mitigation actions.

### Other Recommendations

The IM has further recommended that:

- Environmental values to be protected in Barney Creek, Surprise Creek and McArthur River diversion channel upstream of the regulatory compliance point on McArthur River (SW11) should be determined in conjunction with relevant stakeholders.
- A risk assessment should be undertaken concerning elevated SO<sub>4</sub> concentrations and EC levels at sites that are next to or downstream of MRM facilities. This should take into account the environmental values that require protection and the relevant conditions in the waste discharge licence.
- McArthur River Mining should continue to explore mitigation of elevated concentrations of metals and major ions in Surprise and Barney creeks with a specific objective of removing the need for dry season dewatering of Barney Creek diversion channel and within the context of the environmental values that require protection.
- Discharge of Class 4 (managed release) water by MRM to McArthur River should be maximised, thereby facilitating water management on site, but with due consideration of mine-derived loads and the need to protect the environmental values associated with the river stem.
- Continued focus should be placed on the quality assurance and quality control aspects of MRM's water monitoring program, and a reconciliation of actual versus proposed water sampling events should be completed annually.



EC Levels and SO<sub>4</sub> Concentrations at SW11 Over Time

## Fish and Shellfish

Results from the late 2016 and 2017 surveys for freshwater fish and shellfish indicate that the regular consumption of fish from the McArthur River catchment (and the Limmen and Robinson catchments) presents a very low risk to human health.

Consumption of freshwater mussels should however be limited regardless of where they are found, given that high concentrations of lead and other metals have been recorded in freshwater mussels throughout the region, including catchments outside of the influence of the mine site.

### Lead

Sooty grunter, barramundi, bony bream, chequered rainbowfish, spangled perch, archerfish, cherabin and freshwater mussel were sampled for the 2017 assessment.

For the first time since 2013, no individual environmental indicator species was found to have lead concentrations above the maximum permitted concentration. There were no exceedances of lead in the muscle or liver of commonly consumed finfish species in the current reporting period.

Lead concentrations were highest in samples from species within the diversion channels, suggesting an impact from operations close to the mine pit, the haul road and the NOEF, although a decline in lead concentrations has continued at these sites.

### Other Metals

The levels of other metals (such as zinc and copper) in commonly consumed species were such that a large amount of fish or shellfish would have to be eaten before exceeding the recommended daily intake.

### Citizen Science Program

In response to concerns raised by some community members about the monitoring of metals in fish not meeting their interests (in terms of not monitoring the fish that they eat), MRM commenced a 'citizen science' program to allow the analysis of metals in barramundi caught by the community in the McArthur River and surrounding catchments.

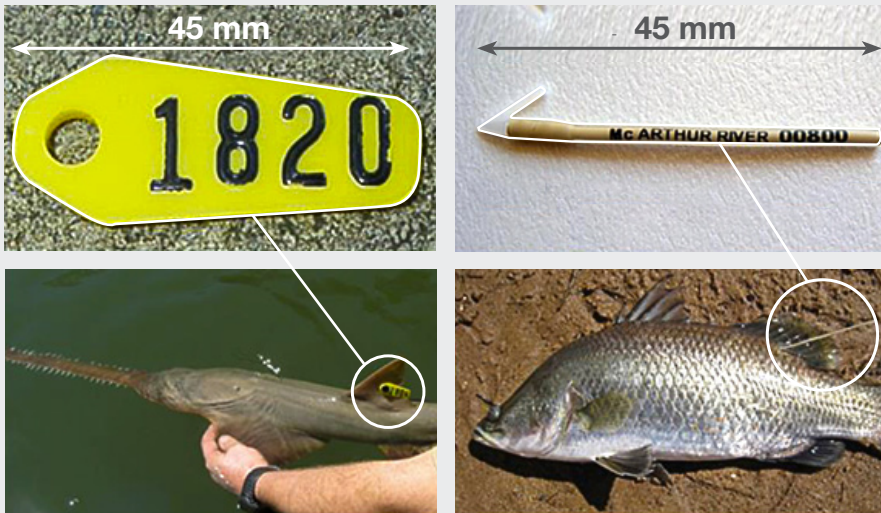
The results of the citizen science program (where fish were collected from King Ash Bay and Manangoora Station) indicated no risk to human health from the consumption of any barramundi analysed.

### Freshwater Fauna Survey

The freshwater fauna survey results continue to demonstrate the influence of wet season rainfall and the duration of river inundation on freshwater biota, i.e., there is lower diversity and abundance of fauna when rainfall is below average, and vice versa in wetter years.



*Blood Testing a Barramundi  
(Source: IPE, 2017)*



Conventional Tagging on Sawfish and Barramundi (Source: IPE, 2017)



Implanting Sawfish and Barramundi with Acoustic Transmitters (Source: IPE, 2017)

**Successes**

The IM notes the following successes for the 2017-2018 operational period:

- Declining levels of contamination in environmental indicator species, likely due to controls implemented by MRM (such as the improvements to sediment sumps at SW19 and a berm along the eastern side of the haul road).
- Continued development of the acoustic monitoring program of migratory species and the first data download and analysis of fish movements within the McArthur River and diversion channel.
- Calculation of maximum daily consumptions amounts for commonly consumed species in addition to comparisons to maximum permitted concentrations, included in the metals in aquatic fauna reports.
- Improved performance of the McArthur River diversion channel as more habitat is provided. Additional large woody debris was installed, along with a new ramp to improve access to the channel. Small and medium woody debris was also added to the diversion channel to improve habitat structure and organic loads in the channel.
- Improved habitat along the edges of the Barney Creek diversion channel following wet season flushing (with less mud and silt, and improved water quality) and improved bank conditions (as vegetation develops).

**Recommendations**

The IM recommends that MRM should:

- Include additional acoustic monitoring stations to provide more detailed information on movements of freshwater sawfish and barramundi through the MRM lease and McArthur River diversion channel.
- Undertake non-destructive sampling methods for freshwater fauna to allow for more individuals to be tagged as part of the tagging/acoustic monitoring program, while still being able to collect samples for metals analysis.

## McArthur River Diversion Channel

The most significant current issue for the McArthur River diversion channel is erosion at the upstream end, which requires addressing to avoid the risk of the river changing course in the future.

### What is large woody debris?

In natural rivers, LWD consists of logs and branches that have fallen into the river or been washed downstream. In artificial channels like the river diversion, LWD is missing, but it can be added back.

LWD can improve channel stability by slowing river flow and reducing erosion. It is also important to river ecology, providing habitat and protection for fish and water bugs.

### Erosion of Banks

The IM commends the completion of an assessment of the potential erosion risk and flow patterns within the diversion channel.

This assessment identified that in the medium to long term, the McArthur River immediately upstream of the diversion channel is at risk of rapidly altering its course to form a new channel (or revert to the original river channel), with potential impacts on diversion stability and the integrity of the mine levee wall.

The IM recommends that this issue be addressed proactively by mitigating erosion, including via installing erosion protection on relevant sections of the mine levee wall.

### Revegetation and Weeds

Although revegetation of the McArthur River diversion channel is an ongoing challenge, progress has noticeably improved since last year's IM visit, with increased retention of seedlings. McArthur River Mining has continued to exert significant effort towards revegetation, planting 84,000 seedlings in 2017, and aiming for 100,000 in 2018. Almost all plants are grown in the on-site nursery, with many from local seed.

An extensive review of the revegetation program has been conducted, resulting in improvements to revegetation methods and monitoring. For example, the approach of planting grasses (as a starting point before trees and shrubs) has been a success, with many being retained despite a significant rainfall event in January 2018.

In the rocky gorge section of the diversion channel, MRM has considered earthworks to decrease the bank slope and potentially facilitate revegetation. However, the IM has recommended that MRM rehabilitate this area in its current form. Further earthworks could have negative impacts on the aquatic environment and are unlikely to significantly increase rehabilitation success.

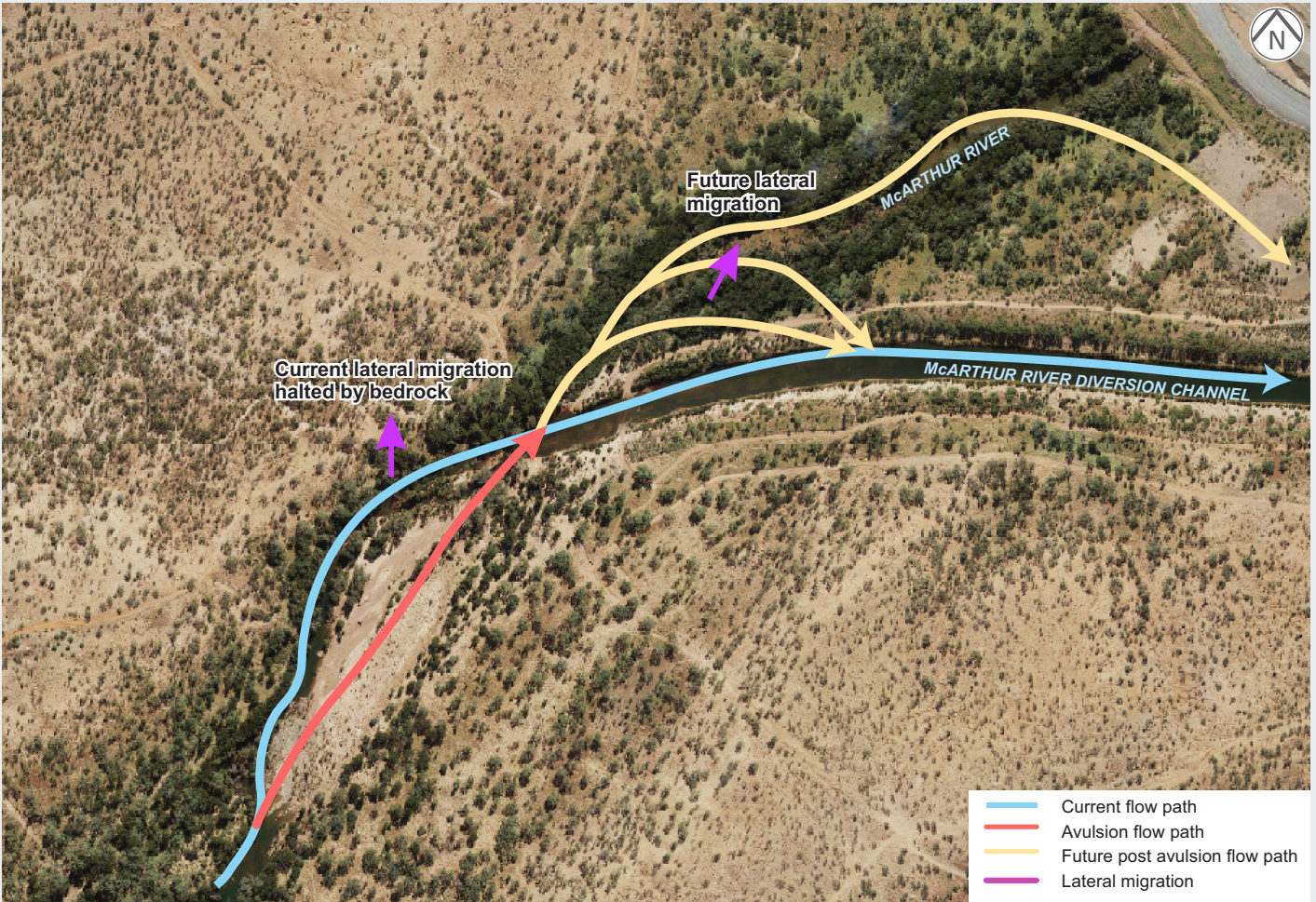
The IM has also recommended that:

- Revegetation monitoring should be undertaken in the rocky gorge along with a suitable control site, as this location will not rehabilitate in the same manner as other sites, and data is required to ensure that it is also rehabilitated to an appropriate stage.
- A targeted completion year should be identified for diversion channel revegetation works in future MMPs, based on results of rehabilitation monitoring programs and tube stock survival rates.

### Large Woody Debris

During 2017, 12 truckloads of large woody debris (LWD) were added to the diversion channel, and MRM started documenting the persistence of LWD as part of annual monitoring. A new program of adding small and medium-sized woody debris was also initiated in 2018. It is intended that smaller debris will contribute organic matter, and that the combination of sizes will create more complex habitats.

The effectiveness of LWD placement in supporting aquatic ecology continues to be demonstrated by survey results with a noted improvement in fish assemblages observed around complex habitats in the diversion channel.



McArthur River Diversion Channel Offtake – Potential Future Flow Paths  
 Source: WRM, 2018a.



Small Woody Debris Being Placed into the McArthur River Diversion Channel

## Bing Bong Loading Facility

Impacts on coastal water quality and fauna are minimal, and tend to be localised to areas in the immediate vicinity of Bing Bong Loading Facility. Impacts to biota are mainly restricted to species of low or no mobility, and individuals that spend a lot of time in the swing basin and shipping channel.

### Dust at Bing Bong Loading Facility

#### Successes

The following improvements to dust management at the loading facility have been noted by the IM in the 2017-2018 operational period:

- Developing and implementing an air quality management plan, and associated trigger action response plan (TARP), that addresses dust issues at Bing Bong Loading Facility.
- Re-introduction of depositional dust gauges, reporting of data from all air quality monitoring units (including the HVAS and TEOM) at the loading facility, and improved quality control for dust monitoring.
- New (or newly reported) dust controls include:
  - Spraying roads at the loading facility with water at least once per day during the dry season.
  - Monitoring of the moisture content of concentrate prior to loading of the MV Aburri or transfer to bulk carriers in the trans-shipment area, with a target level of 13.5% moisture by weight. McArthur River Mining has proposed that they will use a liquid dust suppressant when concentrate moisture contents are less than 12%.

#### Opportunities for Improvement

It was not possible to compare dust results from Bing Bong Loading Facility in the 2017-2018 operational period to those of the 2016 period, as monitoring sites and methods have changed. The IM recommends the following to reduce dust issues at this site:

- The main doors of the concentrate shed have not been able to be closed for at least the past five years. This is a likely cause of dust issues in the local area, and the IM recommends they be replaced as soon as possible. Related to this, the shed's dust extraction system requires repairs and cannot function effectively until the doors are functional.
- The bitumen surface surrounding the loading facility has been in need of repair for several years, and should be repaired to avoid dust and potential for contamination of underlying soils – MRM plan to do this during 2018.
- Analysis of collected dust monitoring data is required to identify causes of data trends and address issues as they arise.

### Marine Ecology

#### Successes

- There were no exceedances of lead or zinc trigger values in sea water from any sampled sites.
- In late 2016, there were no exceedances of any applicable maximum permitted concentrations (MPCs) of metals, from 349 samples taken from seven marine fauna species.
- In late 2017, of 405 samples from eight marine fauna species, there was only one exceedance of an applicable MPC. This result was at a site 28 km from Bing Bong Loading Facility, and likely due to naturally-derived concentrations.
- Algae cover was quantified in all sectors for the first time in 2016 and 2017, which allowed for useful comparisons of trends between years and sectors.
- Collection of barramundi for metal analysis was more successful in 2016 and 2017, allowing for more meaningful comparisons of metal concentrations between Bing Bong Loading Facility and other locations within the study area. None of the barramundi caught in 2016 or 2017 exceeded the relevant MPCs for metals, and results were lower in 2017.
- Refining monitoring sites for the Annual Marine Monitoring Program, with sites around Sir Edward Pellew Islands replaced by new sites to the east of the Bing Bong Loading Facility to better understand sources of contaminants in the study area.

#### Opportunities for Improvement

The IM has recommended that as part of ongoing improvement of the marine program, MRM should:

- Undertake analysis of lead isotope ratios in marine water samples for sites closest to the Bing Bong Loading Facility as well as reference sites, to provide further evidence to demonstrate whether elevated lead concentrations are from MRM operations or other sources.
- Undertake non-destructive sampling methods for barramundi to allow for more individuals to be tagged, while still being able to collect samples for metals analysis. This would provide more detailed data on trends over time and in individuals if recaptured.
- Collect information regarding the timing of coastal water samples, in relation to tide levels.
- Consider establishing artificial oyster habitat near Bing Bong Loading Facility to ensure that rock oysters can continue to be sampled, particularly given their effectiveness as environmental indicator species.

## Review of Department of Primary Industry and Resources Performance

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As well as assessing the environmental performance of MRM's operations, it is also the IM's responsibility to review the DPIR's performance in regulating the McArthur River Mine and Bing Bong Loading Facility.



*Blasting in the Mine Pit*



*McArthur River Diversion Channel Crossing (SW13)*

### Observations

During the 2017-2018 operational period, the DPIR continued a series of field inspections that were aimed at:

- Informing the assessment by DPIR mining officers of the 2013-2015 MMP and amendments.
- Providing an update to management on the status of operations and assessing compliance with DPIR conditional approvals.

The IM notes that:

- Following most of the DPIR's inspections, a detailed site inspection report was compiled.
- During the reporting period there was an improvement with the DPIR's site inspection reports. The IM had previously recommended a consistent approach to reporting and the inclusion of recommendations and required actions. While there remains some variation in reporting structure, the addition of recommendations and actions was a positive inclusion.
- A number of the IM's recommendations to improve performance of the DPIR have been completed during the reporting period. While the DPIR's progress on implementing the IM's recommendations over the past five years has been slow, the DPIR has now commenced work on all outstanding recommendations.

### Opportunities for Improvements

The IM has provided the following recommendations to the DPIR:

- The DPIR should track recommendations or actions provided to MRM in the inspection reports. It would be useful to include a summary table in each inspection report showing progress against previous recommendations or required actions.
- The DPIR and MRM should discuss the recording and reporting of exceedances within the various monitoring programs, in terms of exceedances being considered non-compliances or incidents.
- The DPIR should keep a register of instructions issued to MRM, as well as actions and recommendations from inspection reports.



*Concentrate (Mine Product) in the Bing Bong Loading Facility Storage Shed*

## About the Independent Monitor (IM)

At the end of 2013, the DME (now DPIR) engaged ERIAS Group Pty Ltd to assess the environmental performance of the McArthur River Mine for a five-year period.

2018 is the fifth (and final) year that ERIAS Group has prepared the environmental performance report, as well as this community report.

The IM is supported by a team of specialists that brings together the required skills and experience to fulfil the role, including:

- ERIAS Group (environmental impact assessment, risk and management, water quality, soils, aquatic and marine ecology and closure planning).
- Water Technology (diversion channel, surface hydrology).
- Hydro Scientia (site water management).
- Pells Sullivan Meynink (geotechnical engineering and TSF operating strategies).
- Groundwater Resource Management (groundwater modelling and monitoring).
- Environmental Geochemistry International (geochemistry, TSF and waste rock cover design).
- Low Ecological Services (terrestrial flora and fauna).
- Cambium Group (graphics and mapping).

For more information, go to the IM website:

[www.mrmindependentmonitor.com.au](http://www.mrmindependentmonitor.com.au)