

RioTinto

**QMM**  
**Water**  
**Report**  
**2024**



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### Legal statement

This report is based on data, samples and information that are not exhaustive and, as a result, the analysis and conclusions provided in the report, although conducted and reached in accordance with professional standards, have inherent limitations. As additional data, samples and information become available we reserve the right to correct, update or otherwise modify all or any part of the report based on such additional data, samples and information.



# Letter from Isabelle Wabete, Managing Director of QMM



I am pleased to share the 2024 *Water Report*, my first as Managing Director of QIT Madagascar Minerals (QMM).

Since arriving in March 2024, it has been an exciting learning curve. I quickly understood that water is integral to QMM's operations and a vital shared resource with the neighbouring communities.

Through our vision of being "The pioneer of sustainable mining in Madagascar", QMM continues to produce the materials the world needs by placing environmental protection, sustainability and longevity at the heart of our operations, with priority given to the community. Our sustainability vision is focused on decarbonisation, environmental protection and community development.

A key fundamental of this sustainability vision is our water strategy, released in 2023, which aims to improve the way we use water within our operations, and to support a shared approach and understanding of water use within the region where we operate.

Across the strategy's 3 pillars, we have advanced our full-scale water treatment plant and various studies, with the aim to implement best practice at site. We have also sought to engage with communities and listen to their concerns, continuing to progress water-related actions that are important to them.

The first 6 months of 2024 saw high monthly rainfall totals, with 2 consecutive months of rainfall above 300 mm. This has tested our water management systems and strategy, enabling us to refine how we operate under intense rainfall conditions and look for opportunities to improve our ability in managing high volumes of water.

Following the pilot phase, the full-scale water treatment plant, combined with the polishing pond, has been operational since March 2024 and has helped QMM fulfil its regulatory requirements. Operation of the water treatment plant led to a year-on-year increase in the ratio of treated water to total water released from 16% in 2022, to 51% in 2023 and 71% in 2024.

Water management at QMM is a daily priority. We are all focused on our impact and ensuring we are living our values aligning to those of the communities. We know we have more to do to protect and preserve the environment around our operations in the Anosy region, and more broadly in Madagascar.

Our consistent community engagement, site tours and mobile community kiosks are helping to bridge the information gap that, we have heard from the communities, has existed. The fiscal agreement, agreed with the Government of Madagascar in 2023, commits US\$4 million each year for the next 25 years, and highlights our determination to contribute to the communities and the region, with the aim of leaving a sustainable legacy in Madagascar.

We continue to progress our rehabilitation efforts. As one of the first mining companies in the world to establish 3 IUCN Category V Protected Areas within the mining perimeter, we take pride in knowing that we are helping to preserve Malagasy forests. And our Group-led nature-based solutions work, particularly with the Makira Natural Park REDD+ and the Tsitongambarika forest protection and restoration projects, aims to contribute to the sustainability of the country, long term.

QMM will only remain successful with the support of our people, the communities and the broader Malagasy stakeholders, and through our determination to listen, learn, adjust the strategy and respond to communities' concerns in relation to our water use.

I hope this report helps in understanding QMM's operational performance and data related to water, and our determination to develop a sustainable mine together with the community. It is the continuation of the 2023 *Water Report* dataset.

We welcome your feedback.

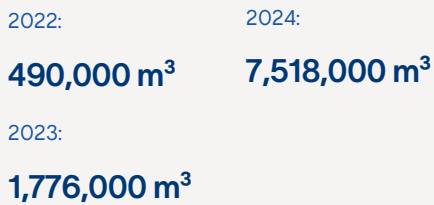
# Water highlights 2022–2024



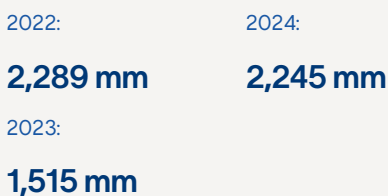
Water import for mineral processing operation for the reporting period:



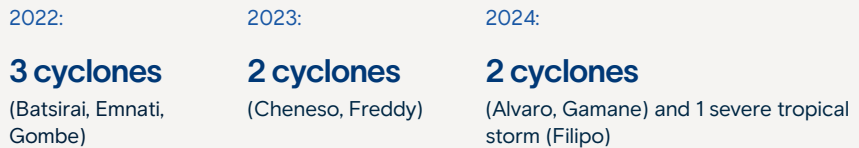
Volume of treated water release



Annual rainfall



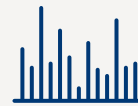
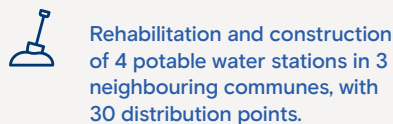
Number of tropical cyclones that affected Madagascar



Volume of emergency water release

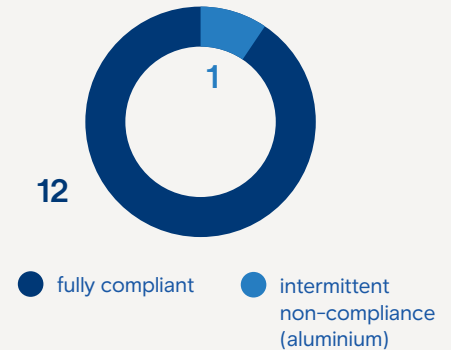


Community access to potable water

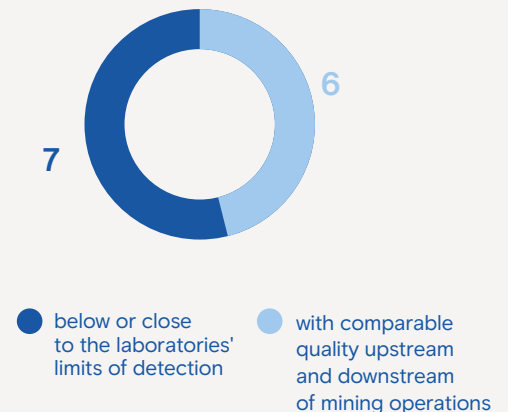


13 Regulated metals per decree for the reporting period

Water release (where the decree applies):



Mandromondromotra River quality



# Glossary of terms

Abbreviation	Definition
ANDEA	Autorité Nationale de l'Eau et de l'Assainissement (or the "Regulator")
DMU	Dry mining units
Eurofins	Eurofins Environment Testing Australia (ISO/IEC 17025 accredited laboratories)
GISTM	Global Industry Standard on Tailings Management
GL	Gigalitre
ha	Hectares
HMC	Heavy mineral concentrate
IUCN	International Union for Conservation of Nature
JBS&G	JBS&G Australia Pty Ltd
km	Kilometres
m	Metres
m <sup>3</sup>	Cubic meters
mm	Millimetres
MSP	Mineral separation plant
NTU	Nephelometric Turbidity Units that are used to measure turbidity, which is the cloudiness or haziness of water caused by particles that are suspended in it
ONE	Office National pour l'Environnement
Paddocks	Water basins for solids settling and water storage
pH	Quantitative measure of the acidity or basicity of aqueous or other liquid solutions
Polishing pond	Water basin that provides additional retention time for improved water clarity and homogeneity
Port	Port of Ehoala
Process water	Water that comes into contact with areas disturbed by mining
QMM	QIT Madagascar Minerals
REDD+	United Nations Climate Change: 'REDD' stands for 'Reducing emissions from deforestation and forest degradation in developing countries'. The '+' stands for additional forest-related activities that protect the climate, namely sustainable management of forests and the conservation and enhancement of forest carbon stocks
Reporting period	October 2023 to December 2024
SEMP	Sectorial Environment Management Plan
Talbot South Africa	Talbot Laboratories, A Division of the Talbot Group (Pty) Ltd (ISO/IEC 17025 accredited laboratories)
TGK	Tsitongambarika forest (45,000-hectare protected area)
WHO	World Health Organization
WRG	Water Research Group
WSP	WSP Canada Inc.
2021 Water Report	QMM Water Discharge Monitoring Data for the 2015-2020 period, March 2021
2023 Water Report	QMM Water Report 2021-2023 for the period January 2021 to September 2023
2024 Water Report	QMM Water Report 2024 for the period October 2023 to December 2024



# Context



This *2024 Water Report* shares QIT Madagascar Minerals (QMM) water management data and performance and builds on the *2023 Water Report*. It includes data from October 2023 to December 2024, so that, together, the 2 reports present data from January 2021 to December 2024.

The report is structured into 3 sections:

- Section 1 – overview of water management at QMM
- Section 2 – QMM's water strategy update
- Section 3 – summary of water management performance over the reporting period

QMM's water reporting forms part of our ongoing commitment to transparency around water management.

# Water management overview



Figure 1: Location of QMM deposit and neighbouring communities

## Locality

QMM is a world-class ilmenite mining project located in the Anosy region of south-eastern Madagascar, near the city of Fort Dauphin (Tolagnaro). Ilmenite is a major source of titanium dioxide that is predominantly used as a white pigment in products such as paint and paper.

QMM also produces zirsill, used in the manufacture of ceramic tiles and certain types of electronic displays, and monazite, used in renewable energy technologies such as high-power permanent magnets used in wind turbines and electric vehicles.

QMM includes the deep-water public Port of Ehoala, from which the products are shipped to customers around the world. The Port serves as an important socio-economic development asset for the south part of Madagascar.

QMM is a joint venture that is 80% owned by Rio Tinto and 20% owned by the Government of Madagascar.

QMM began exploration of the Anosy region in the late 1980s, which led to the discovery of mineral deposits covering 6,000 ha.

The heavy mineral sand deposit area extends over 70 km of the coastal zone surrounding Fort Dauphin. Three deposits of heavy mineral sands, Mandena, Sainte Luce, and Petriky, have been

identified within its boundaries. Currently, only the Mandena deposit is being mined. The current vision is to commence mining operation in Petriky in the early 2030s with the development of Sainte Luce toward the end of the 2030s.

## Operational description

QMM's Mandena operations began in November 2008.

Operations include a mining pond with dredges and a floating wet separation plant, a dry mineral separation plant (MSP), satellite mining areas (dry mining unit or DMU) and a supporting water management system.

The mine is bounded by the Mandromondromotra River and Enandrano River to the east and west respectively, and to the south by an interconnected system of rivers and lakes. The site is authorised by the Malagasy Regulator, the Autorité Nationale de l'Eau et de l'Assainissement (ANDEA), to release water into natural on-lease swamps connected to the Mandromondromotra River at several locations, subject to compliance with water quality criteria.

As part of the water management system, we operate a permanent water treatment plant. As a final treatment step, the water is pumped to a polishing pond from which it flows to the release location. The polishing pond is a water basin that provides additional retention time for improved water clarity and homogeneity.

QMM holds a freshwater extraction permit from the Regulator, renewable every 5 years. The site is currently configured to only

extract water from Lake Lanirano, to provide a potable water supply for the mine workforce and certain host communities. Historically, freshwater has also been extracted for operational mineral processing use; however, this has not occurred since 2014. For this purpose, a weir was installed on the Anony River at the start of the mine in 2009 to prevent intrusion of seawater into the lakes and the Meander River. Figure 2 shows the relative location of these features and surrounds.

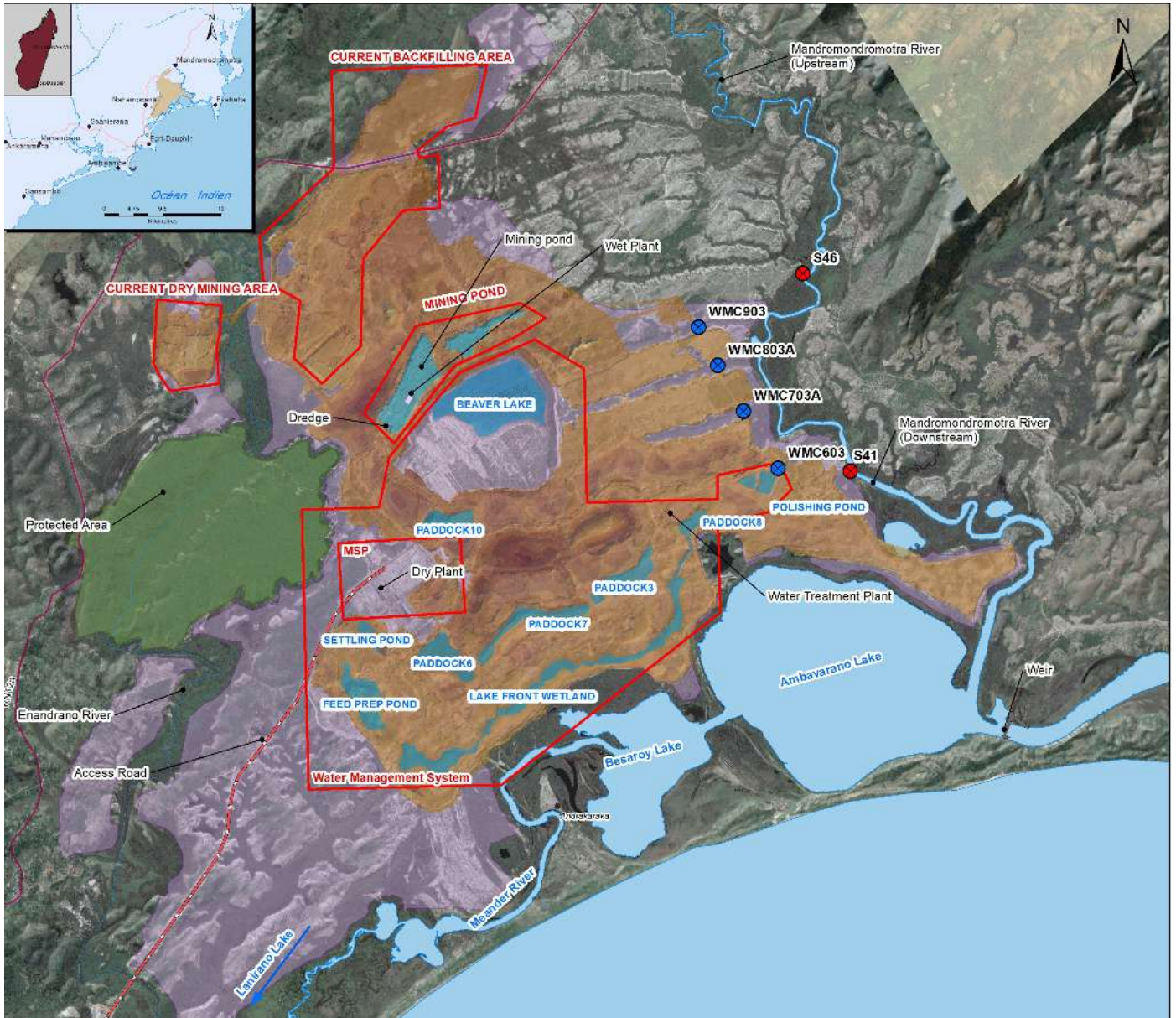


Figure 2 QMM mine site plan and main infrastructure (Q1 2025)

## Monitoring points

### Type

- ⊗ Surface water
- ⊗ Release locations
- Mine-Port Road
- National Road

### Hydrography

- Hydrography
- Main Area
- Water Management System
- Lease Area
- Protected Area

### Sources:

Rio Tinto Géomatiques, Relevés techniques et gestions de données 2023



Partenaire technique de la mine : GWM  
Novembre 2023

QMM uses two different mining methods at Mandena:

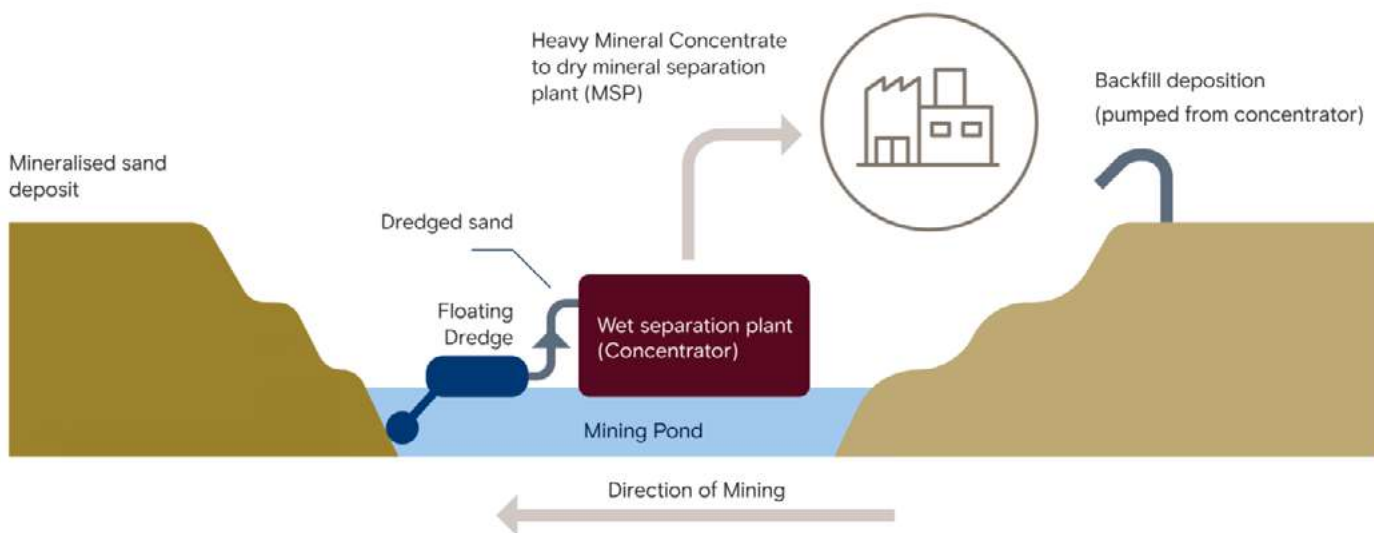
### Dredge mining

This method uses a floating dredge and wet separation plant in a mining pond within the mineralised sand deposit. There are currently 2 dredges working in tandem on the mining pond. Local groundwater flows into the pond and pumps are used to raise or lower the water level as needed. Dredged sand is

transferred as slurry to the floating wet separation plant, where a series of spirals separate heavy mineral concentrate (HMC) from the non-mineralised sands.

The discarded sands are pumped back to close the mining pond or previously mined areas to begin the rehabilitation process.

Water from the mining pond is also used to transport HMC in a slurry from the mining areas to the MSP. Most water used for the slurry transfer is recovered and returned to the mining pond to maintain water levels or is treated via the water management system.



### Dry mining unit (DMU)

Dozers are used to excavate mineralised sands. This material is turned into slurry and then fed into the wet separation plant. As dry mining may occur below the water table, active dewatering pumping is applied to

provide access to mineralised sands. The dewatering water is pumped into the water management system.

Further mineral processing is completed at the MSP, where multiple separation units allow for further extraction of HMC. The MSP

requires a water supply for processing purposes. The water management system allows sediment from the MSP discharge water to settle before this water is reused in the mining process.

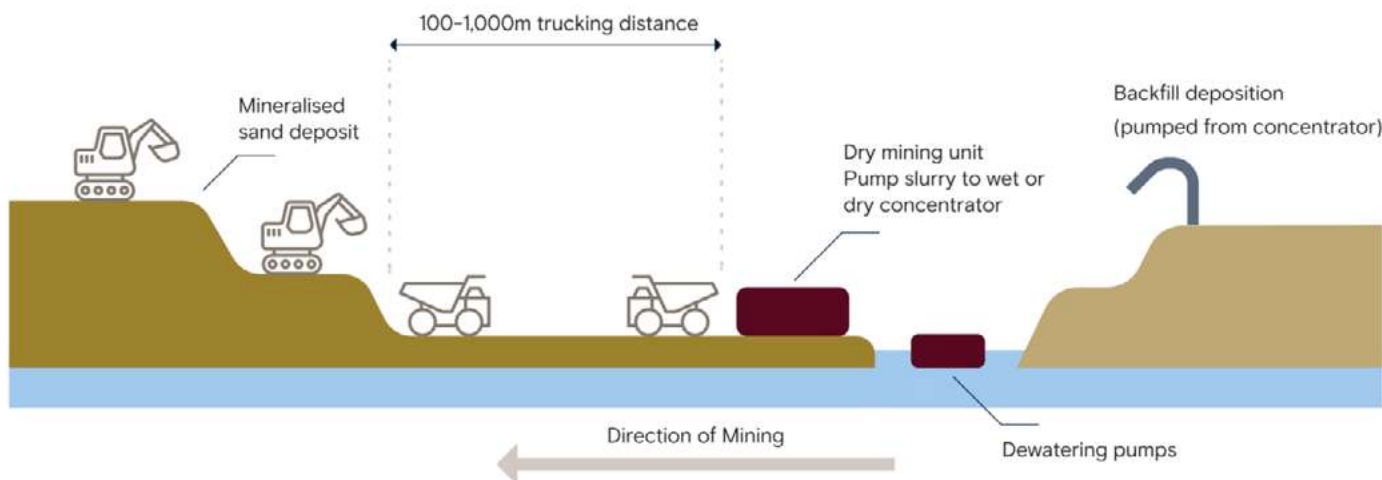


Figure 3: QMM simplified depiction of the mining methods

## Water management system

The mining activity removes materials from the ground. Most of the time, these holes are backfilled. In some specific situations, we may decide to leave holes open to become an integrated part of the water management system for solids settling and water storage. These holes are referred to as paddocks and the water stored within them is referred to as “process water”, which is a combination of mineral processing water, runoff water and groundwater.

We monitor and manage process water through our water management system in three ways:

- Process water is moved through the circuit of water storage paddocks to reduce the suspended solids load.
- Once the process water is clarified, it is either recirculated to meet operation demands or pumped to the water treatment plant for release into the environment.
- The water treatment plant and polishing pond further improve the water quality by adjusting the pH and reducing the aluminium concentration.

While no chemicals are added or used in the mining process, the mining operation does influence the quality of the process water. It lowers the pH of the water, which enables some heavy metals to dissolve in water, mainly aluminium.

Current water balance on site suggests that the mine will continue to operate within a state of water surplus, with water inflow exceeding water outflow, which we need to manage through excess water releases to the environment. Accordingly, we have constructed four release locations to the Mandromodromotra River – WMC603, WMC703A, WMC803A and WMC903. However, only release point WMC603 is currently active and permitted to be used by the Regulator. Release locations are shown in Figure 2.

According to our water management plan, excess process water is released only when necessary to preserve the operational buffer in the water management system. The operational buffer is designed to contain process water within the water management system without outflow into the natural environment. Our systems and processes ensure water elevations are maintained at safe levels to preserve the integrity of our storage infrastructure.

Two situations trigger the need for water release:

- Normal operations: controlled release of water through the water treatment plant and polishing pond at the approved release point WMC603 to maintain the water management system within approved inventory levels at site while maintaining sufficient volume for the mine water demand.
- Intense rainfall conditions: emergency release of additional volume at the approved release point WMC603 to re-establish the required operational buffer at site. During the emergency release, water released is a mix of treated water from the water treatment plant and non-treated water.

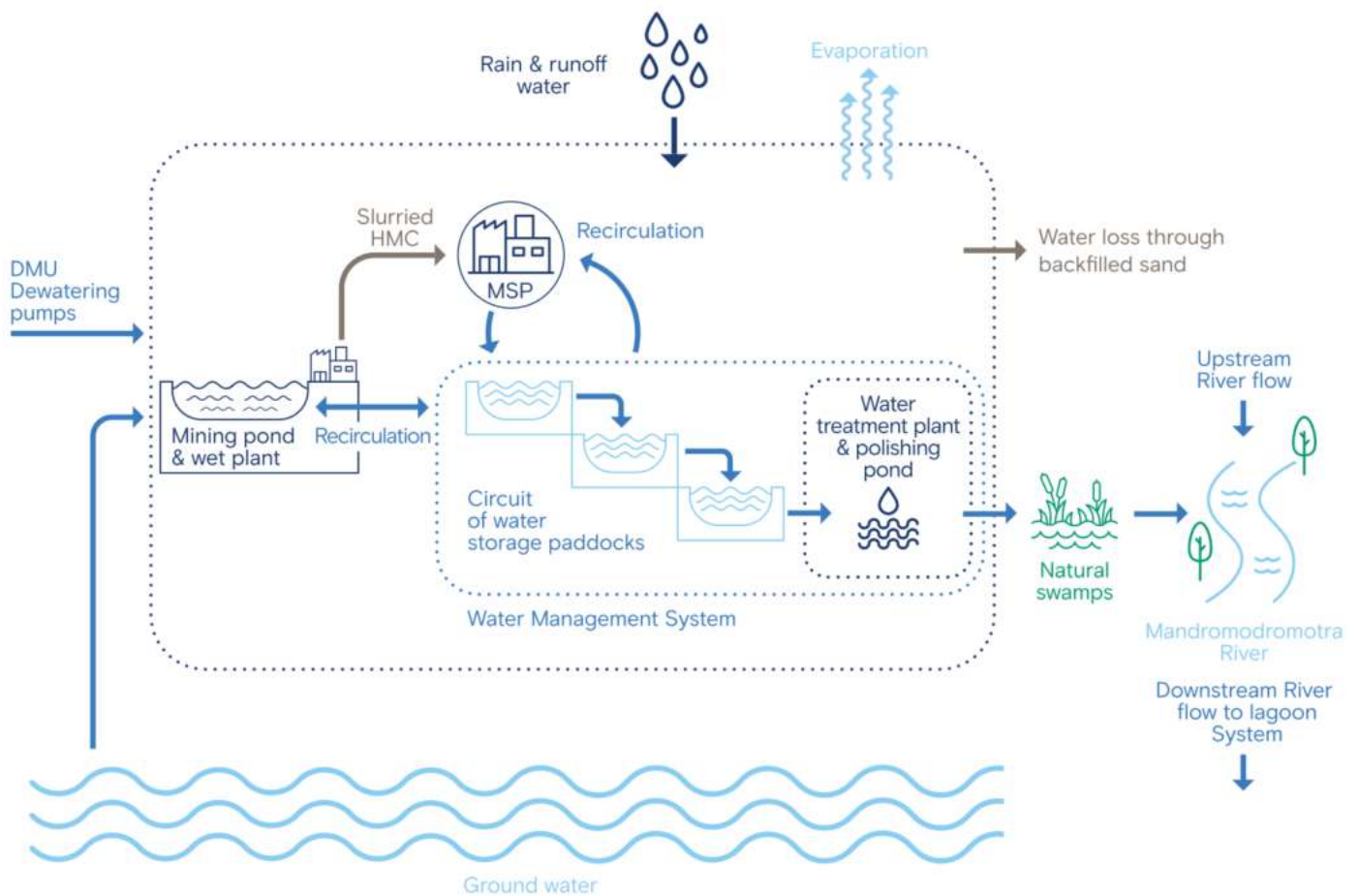


Figure 4: Simplified water flow diagram at QMM



## Monitoring

We conduct an extensive monitoring program on water quality within the mine lease area and around Mandena, in compliance with regulatory requirements. We also conduct additional monitoring and sampling of groundwater, surface water, and marine water quality for the Port activities as part of this program.

In addition to QMM's approved release point (WMC603), two sampling stations in the Mandromondromotra River were selected to represent river quality data upstream and downstream of the approved release point. Figure 2 shows the sampling station locations:

- WMC603: regulatory release point
- S46: located in the Mandromondromotra River upstream of mining operations
- S41: located in the Mandromondromotra River downstream of mining operations

Monitoring data from the 3 sampling stations is presented in Appendix A.

## Legal framework

The following legal requirements apply to water management for our operations:

- Loi n° 98-029 of 20 January 1999 portant Code de l'Eau (J.O. n° 2557 E.S. du 27.01.99, p. 735)
- Décret n° 2003/464 of 15 April 2003 on the classification of surface water and regulation of liquid effluent discharges.
- Décret n° 2003-943 relating to discharges, flows, deposits in surface or underground water in the Legal Framework. The discharge permit applications are granted under this Décret n° 2003-943 and the Décret n° 2003-464.
- Décret n° 2004-635 of 15 June 2004, amending Décret n° 2003-941 of 9 September 2003 related to water monitoring, control of water intended for human consumption and priorities for access to the water resource.
- The valid Sectorial Environment Management Plan (SEMP).

## Internal standards

In addition to applicable standards and regulations adopted by our host countries, all Rio Tinto operations are required to comply with internal standards. Key Rio Tinto standards applicable to water management include:

- Rio Tinto Group E11 – Water Quality Protection and Water Management Standard
- Rio Tinto Group E13 – Chemically Reactive Mineral Waste Management Standard
- Rio Tinto Group D5 – Management of Tailings and Water Storage Facilities Standard and Procedure
- Rio Tinto Group – Communities and Social Performance Standard
- Copies of these are available on the Policies and standards section of the Rio Tinto [website](#).





# Water management strategy

The QMM water management strategy, released in 2023, aims to provide an integrated approach to managing current and future water-related challenges and objectives, acknowledging that water is vital to our environment and access to clean water is a fundamental human right.



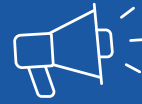
## Protect water resources

- by making changes in our operations to improve water performance and environmental outcomes.



## Engage with the communities

- to collaboratively understand, manage and monitor water in our environment



## Share information

- in relation to our water management practices and performance.

**QMM's vision is to build trust and improve environmental outcomes through our decisions, partnerships and transparency in water management.**

During 2024, QMM implemented the following actions in line with the strategy:

### 1. Protect water resources

- Progressing the WSP Canada Inc (WSP) receiving environment assessment and investigating stakeholder concerns.<sup>1</sup>
- Implementing the full-scale water treatment plant.
- Continuing independent radiation monitoring by JBS&G.

### 2. Engage with communities

- Launching an education-focused campaign to assist the community in understanding QMM's operations.
- Continuing community site visits to ensure a greater understanding of QMM's operations and providing opportunities for the community to ask questions.
- Using a series of mobile community kiosks to share information and listen to communities.
- Progressing the community monitoring program.

### 3. Transparently share information (available on the QMM website)

- Water reports.
- Water dashboard.
- Radiation monitoring.

As further scientific and performance data becomes available, QMM will continue to adjust its water management practices and process as part of our commitment to continuous improvement.



<sup>1</sup>Concerns about water quality (lead, uranium) were raised by UK law firm Leigh Day in a letter sent to Rio Tinto plc in 2024.



## Water Strategy Pillars - 2024 highlights

### 1. Protect water resources

#### Water treatment

Since commissioning the water treatment pilot plant in 2022 and implementing the permanent full-scale treatment in March 2024, close to 10,000,000 m<sup>3</sup> of process water has been treated prior to release in the receiving environment.

Operation of the water treatment plant has seen a year-on-year increase in the ratio of treated water to total water released from 16% in 2022, to 51% in 2023 and 71% in 2024.

The water treatment plant removes on average around 95% of the dissolved aluminium concentration within the process water, and consistently maintains a pH above the national decree of between 6 and 9, prior to release into the receiving environment.

We continue to maximise the use of the water treatment plant as part of our water management system, adjusting according to rainfall and paddock inventory storage.

We also continue to analyse the residue generated from the water treatment plant, with the aim of collecting representative samples over time. This residue, otherwise known as water treatment "sludge", is generated as part of the water treatment process from the reaction of the limestone with the water and the precipitation of suspended solids. Limestone is required to raise the pH, which subsequently reduces aluminium concentration. The residue is currently dewatered and contained in geotextile bags on site. Once analysis is

complete, we will progress long-term options for the management of the water treatment residue. Our plan is to prioritise beneficial re-use of the material if possible.

#### Receiving environment assessment

In 2024, independent environmental experts, WSP were on-site in January, June and November, to conduct a receiving environment assessment. The aim is to expand our understanding of aquatic health in the surrounding environment and enhance the existing monitoring program. The study undertaken by WSP is separate to the water quality monitoring data described in the section on "Performance analysis" and set out in Appendix A.

Samples were collected on-site within QMM's paddocks and polishing pond, and from the receiving environment (Mandromondromotra River, both upstream and downstream of the mine), as well as from other reference sites (Enandrano River and Belavenoka River) for a broad range of substances. Engagement with local scientists also took place during the site visits to gain a better understanding of the aquatic health in QMM's surrounding environment. The study remains ongoing.

Initial water quality sampling results from the receiving environment assessment are consistent with the *2024 Water Report*.

In response to stakeholder concerns, specific attention was given to lead and uranium.<sup>2</sup>

- Lead concentration in water: In the initial sampling program, lead was not

detected in any samples from the site or local lakes and rivers. In a second set of samples that used an even lower laboratory limit of detection for lead (0.0001 mg/L), lead concentrations were identified in certain locations, although were between <0.0001 mg/L (the detection limit) and 0.0003 mg/L. This is significantly below the WHO drinking water guideline value of 0.010 mg/L.

- Uranium concentration in water: Uranium was below the laboratory limit of detection (0.00005 mg/L) in all samples, except at one location in the Mandromondromotra River (S41) (0.00006 mg/L) and in the Belavenoka River (0.00008 mg/L). The Belavenoka River is a few kilometres away from the mining area and so considered a reference site unaffected by the QMM mine. For all samples, uranium remains below the WHO drinking water guideline value of 0.030 mg/L.

To better guide QMM's initiatives and programs, including projects of interest developed in collaboration with the communities, WSP also conducted a social survey, in collaboration with a local consulting firm.

The survey focused on villages near QMM's operations and involved individual interviews, focus group interviews and participatory mapping meetings, to obtain data useful to the receiving environment assessment.

<sup>2</sup> Concerns about water quality (lead, uranium) were raised by UK law firm Leigh Day in a letter sent to Rio Tinto plc in 2024.

## GISTM compliance

In August 2023, in alignment with Global Industry Standard on Tailings Management (GISTM), Rio Tinto disclosed Group-level detailed information on global tailings facilities rated Very High or Extreme under GISTM classifications, with the highest potential consequences in the unlikely event of a failure.

QMM facilities are not classified as Very High or Extreme, and progress is ongoing towards GISTM compliance and disclosure by August 2025.

QMM currently manages process water and facilities under the Rio Tinto standards for Management of Tailings and Water Storage Facilities (D5) and Management of Slope Geotechnical Hazards (D3). Copies of these are available on the Policies and standards section of the Rio Tinto [website](#).

## Radiation study

The JBS&G community study of radiation, published in September 2023 and one of the most comprehensive of its type ever undertaken, concluded that local food sources, water, air and dust are safe from a radiological perspective. QMM has committed to ensuring effective monitoring occurs at appropriate intervals aligned with international guidelines and local requirements.

As part of the ongoing monitoring program, JBS&G undertook a monitoring cycle in November 2024. Results will be available in 2025.

## Improvement in data integrity and capability in testing controls

We routinely sample, monitor, analyse and report to the Regulator water quality within our operation and in the surrounding environment. However, for the results to be meaningful and trusted by our stakeholders, there must be a high degree of confidence in the standards applied by the laboratory analysing the samples.

QMM continues to conduct metal analysis with externally accredited laboratories, building a suitable water quality database for environmental assessment and compliance. In addition to transporting our water samples to Australia for analysis, we explored opportunities to access other accredited laboratories closer to our operations. For our analytical program in 2024, we used the following external laboratories:

- Eurofins Environment Testing Australia (ISO/IEC 17025 accredited laboratories)
- Talbot South Africa (ISO/IEC 17025 accredited laboratories)

Note that for some parameters, these laboratories have different analytical limits of detection, as set out in Appendix A.

Incorporating external laboratory data is an important step in the development and improvement of QMM's water quality dataset.



## 2. Share information

### Water report

This 2024 *Water Report* forms a critical part of our commitment to transparently share water data and performance.

### Water dashboard

In response to stakeholders' interest in receiving information on QMM's water management system performance, in February 2024 QMM launched a monthly water dashboard available on the QMM Water Management [webpage](#).

On a monthly basis, the dashboard reports retrospective data on rainfall, volume of water released into the Mandromondromotra River, and pH and turbidity at the discharge point, and upstream and downstream of the site discharge location.

The dashboard provides a platform for our stakeholders to review, monthly, the operational performance of our water management system.

### Radiation monitoring

Following the publication of the community study of radiation by independent external experts JBS&G in September 2023, JBS&G returned to QMM to undertake a monitoring study in November 2024. The study included monitoring of groundwater and surface water associated with QMM's site and within the communities. The results will be published in 2025.

## 3. Engage with communities

### Site visits

Over 2024, QMM hosted more than 500 community members, civil society organisation members, government officials and other stakeholders, to explain how we operate and our water management process, and importantly, listen and respond to concerns.

### Community kiosk

QMM has implemented a series of mobile community kiosks. These events provide community members with an opportunity to better understand QMM's operations and get to know QMM's people. Most importantly, these enable the community to ask questions and raise concerns directly to QMM. This includes ensuring the community is aware of how it can access QMM's grievance process.

In 2024, more than 2,000 people attended these events, and the initiative will continue in 2025.

### Water education

In 2024, QMM ran an education-focused campaign with local communities and external stakeholders to explain its water management strategy and practices. This included a media and social media campaign launched to coincide with World Water Day in March 2024, and radio broadcasts on local stations, explaining QMM's mining, separation and water treatment process.

QMM also ran a water education campaign to educate its people about its water management and processes, and to answer questions.

## Community potable water access

We are committed to playing our part in protecting water in and around our operations and helping host communities, including the people of Fort Dauphin, have access to potable water.

Over the last 2 years, we have financed the rehabilitation and construction of 4 potable water stations in the 3 communes neighbouring the mine, with 30 distribution points.

As part of the fiscal agreement between the Government of Madagascar and Rio Tinto announced in August 2023, QMM committed to increase support for local communities to US\$4 million per year over 25 years, with half to be spent locally, and half in the region. QMM's community development projects are designed in collaboration with communities, consistent with local, regional and national development plans, and approved by the Malagasy government.

A key project starting in 2025 is the rehabilitation of the state-owned Lanirano water station, which supplies to the town of Fort Dauphin, with a budget of US\$1.2 million.

The community development program also includes projects that assist with the restoration of potable water fountains in the 3 communes neighbouring the mine.

## Community Monitoring

We are progressing a community monitoring program which includes community insights on weather, aquatic life, water and other environmental factors, to help our environmental assessments and foster a shared understanding of the ecosystem.

As part of this initiative, a member of the QMM Communities and Social Performance team participated in a 3-month assignment at Rio Tinto's Diavik Diamond Mine in Canada's Northwest Territories (Diavik). With more than 2 decades of experience working with First Nation communities on understanding environmental priorities, Diavik is an important reference for QMM developing, together with the local communities, its own environmental monitoring program.

Experts in citizen science from the University College London visited QMM in October 2024, to understand the local context and discuss a potential framework that may be suitable for the Malagasy environment.

We aim to begin a pilot in 2025.

## Stakeholder feedback

We take feedback from our stakeholders very seriously. Throughout this 2024 *Water Report*, we have endeavoured to address feedback and comments made with respect to the 2023 *Water Report*.

National and local stakeholders, including the Malagasy authorities, have welcomed QMM's transparency in sharing its water management strategy and data in the 2023 *Water Report*. This 2024 *Water Report* continues this approach and will be shared with key stakeholders.

Several regional civil society organisations have called on QMM to demonstrate further transparency to the community in relation to its operations and water management. QMM's targeted community engagement through its site visits, mobile community kiosks and education campaigns are helping to ensure there is transparency over how QMM manages water at its operations, and that the community is aware of how it can lodge grievances with QMM.

## Proposed 2025 actions

In 2025, QMM plans to:

- Further improve water management system efficiencies with the aim of decreasing the occurrence of emergency release during intense rain periods and improving pH compliance.
- Continue the water education campaign for QMM's people and in the community, including community engagement on water-related concerns.
- Launch the foundations of the community monitoring program.
- Progress on a partnership with a local, in-country limestone supplier, to enhance water management as part of our local supplier development program. This will be QMM's first purchase of limestone in Madagascar.





# Water Performance: October 2023 to December 2024

## Climate

The climate in the Fort Dauphin area is tropical, with a hot, rainy season extending from November to April and a cooler, dry season between May and October. Rainfall is highly variable both seasonally and yearly, which significantly impacts water management on site. Precipitation can range

from approximately 1,000 mm to just over 2,600 mm annually, with an average yearly rainfall of 1,726 mm. When comparing the annual totals, 2024 annual rainfall of 2,245 mm is above historical average.

Rainfall is also influenced by cyclonic activity within the South Indian Ocean, with this region experiencing on average 6 tropical cyclones per year. During 2024, 2 cyclones

and one severe tropical storm affected Madagascar: Alvaro in early January, Filipo in mid-March and Gamane at the end of March. Monthly rainfall for 2024 is presented in Figure 5.

This shows February, March, May, June and September rainfalls were above the historical averages, with March rainfall over 2.5 times the historical monthly average.

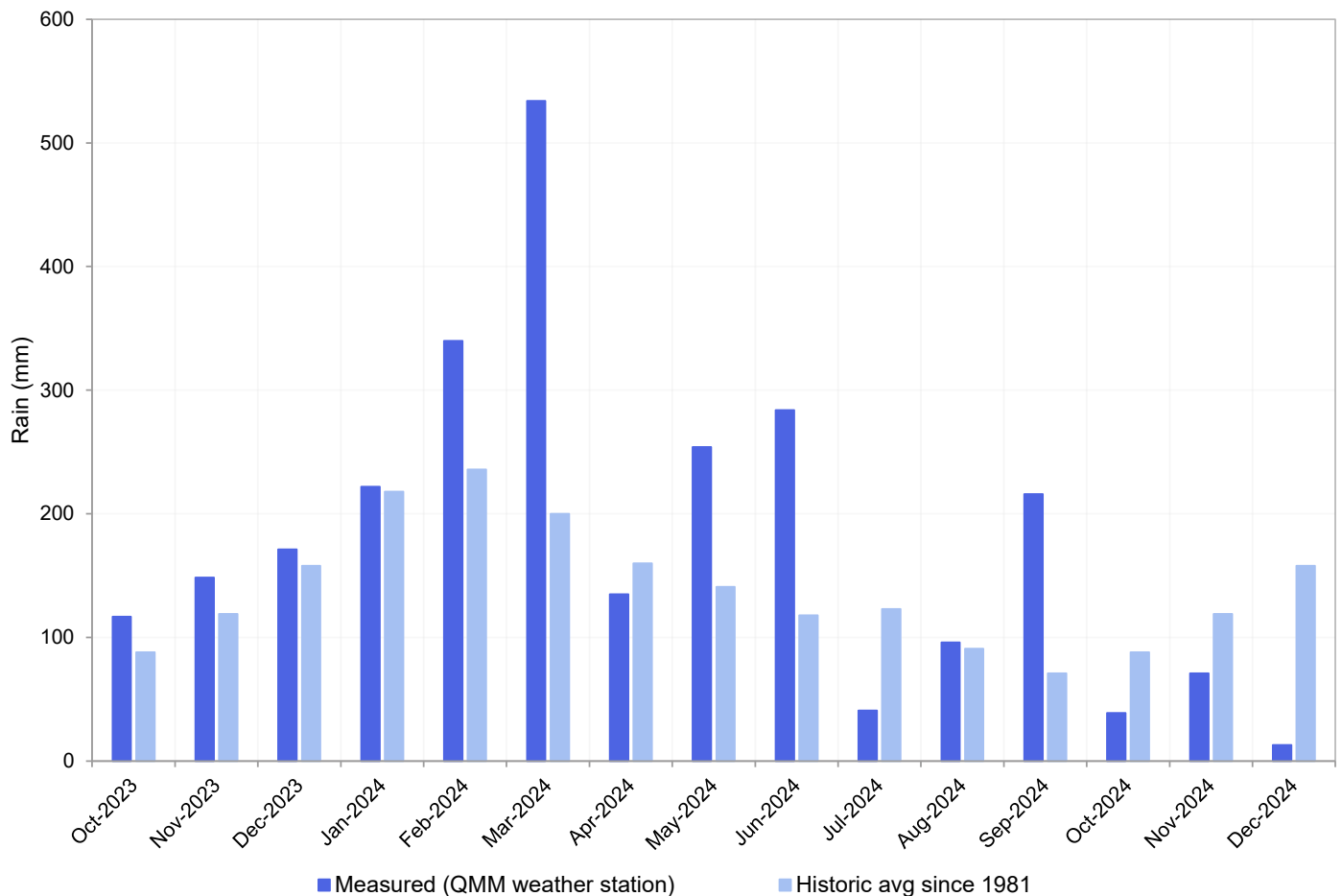


Figure 5: QMM monthly rainfall from October 2023 to December 2024, and historical average

## System inventory

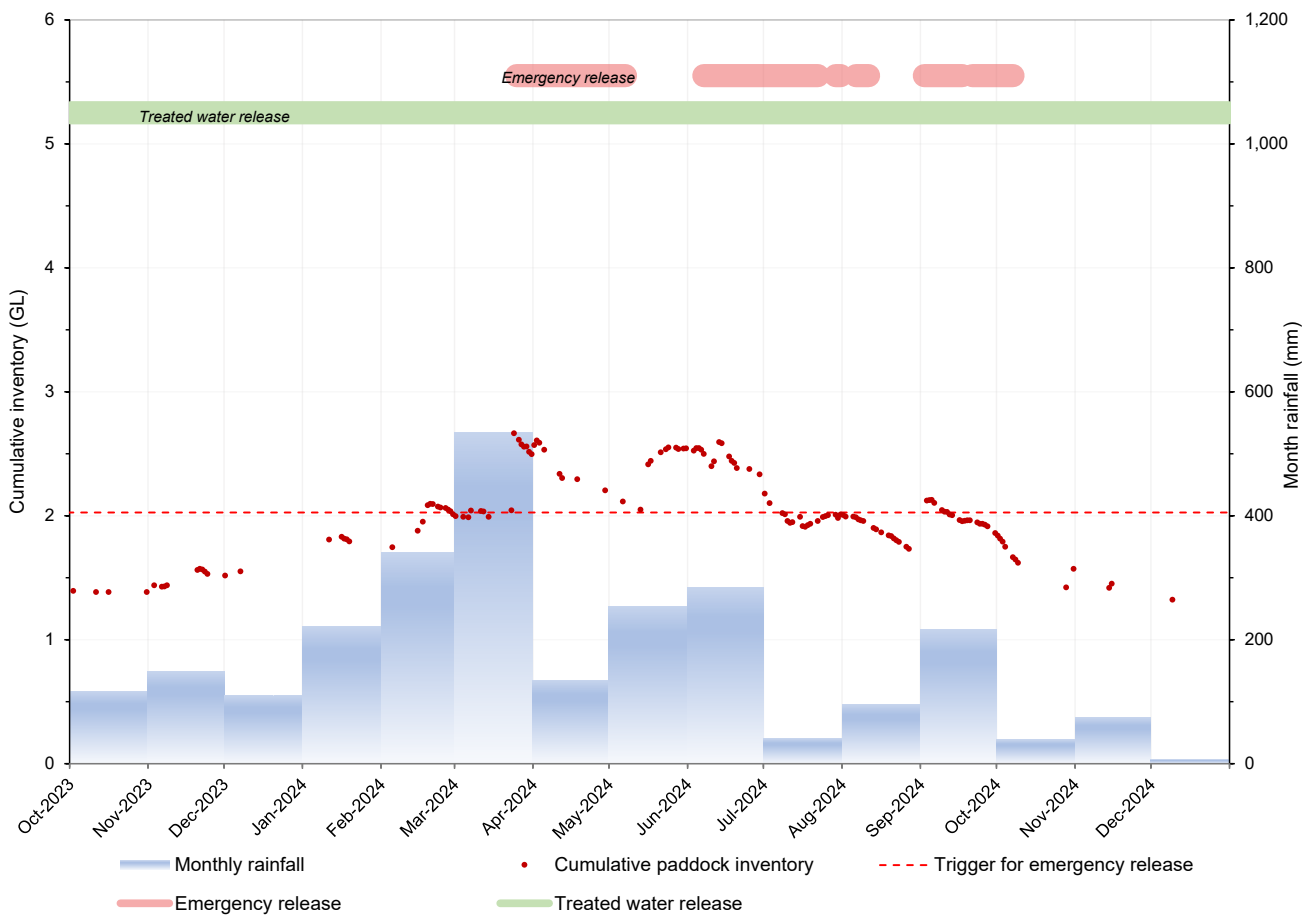


Figure 6: QMM cumulative paddock inventory October 2023 – December 2024

QMM monitors the cumulative inventory in the paddocks, to ensure that operational buffer is available (for more information, see the Water management system section). Figure 6 presents the cumulative paddock inventory for the reporting period. The figure shows:

- Cumulative paddock inventory<sup>3</sup> – representative estimate of the water management containment status.
- Trigger for emergency release<sup>3</sup> – representative estimate of the containment trigger volume for initiating emergency release from the water

management system based on safe water elevations, to preserve the performance of the water management system and integrity of the storage infrastructure.

- Monthly rainfall – drives the paddock inventory increases witnessed during the wet season.
- Treated water release – time-bar showing the occurrence of treated water release flow.
- Emergency release – time-bar showing the occurrence of emergency release flow.

Figure 6 highlights the following:

- The cumulative rain from January to March 2024 triggered the need for an emergency release period.
- Further above-average rainfall in May and June triggered the need to initiate a second emergency release period which continued until early October 2024.
- Monthly release volumes are shown in Figure 7.

<sup>3</sup> Cumulative paddock inventory and emergency release trigger volumes are representative and may change over time due to sedimentation and waste sand placement. Confirmation of underlying assumptions used in the calculation of each item is undertaken as part of the annual water management review process, with the estimated volumes adjusted accordingly.

## Water supply

No freshwater was extracted for use in mineral processing operations during the reporting period, with 100% of QMM operations' water demand supplied through water recirculation.

QMM continues to extract freshwater from Lake Lanirano to provide a potable water supply to its mining workforce and certain host communities including a local orphanage, and the communities of Llafiatinana and Antagnatagna. The annual extraction volume for 2024 was 0.35 GL, consistent with historical extraction levels for 2021 to 2023.

## Site releases

Monthly 2024 process water volumes released into the receiving environment are presented in Figure 7. The increase in treatment plant capacity is evident from March. While emergency releases did occur between March and October, the percentage of water leaving the site in this way was significantly less than in previous years. In 2024, 71% of water leaving the site was treated. This compares with 51% in 2023, and 16% in 2022.

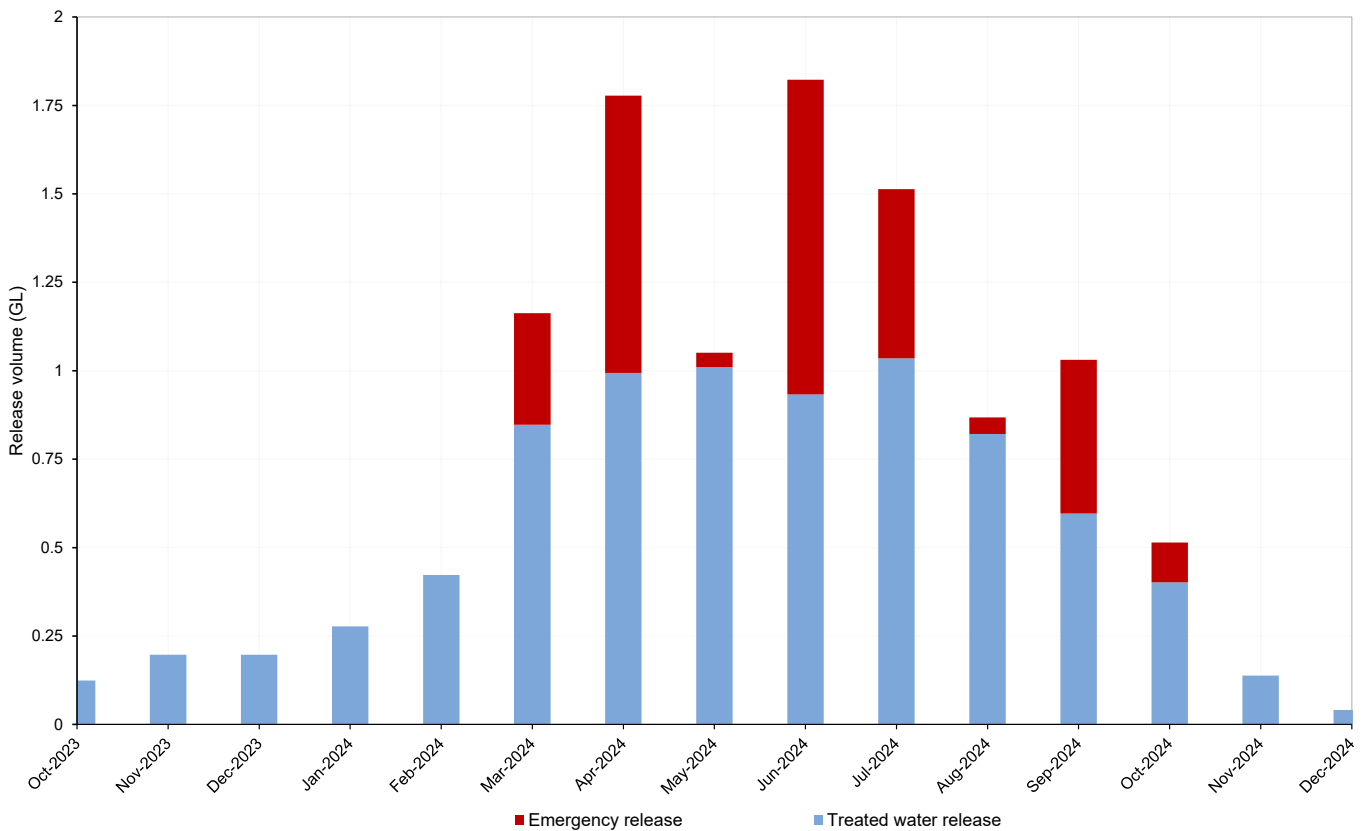


Figure 7: Monthly site release volumes by type for the reporting period

## Monitoring data

Monitoring data is provided in Appendix A, building on the 2023 *Water Report* data to show the trend looking back on 3 years (2022, 2023 and 2024).

Appendix B lists the dataset and graphical representation updates between the current and the 2023 *Water Report*.

External laboratories Eurofins and Talbot did the analysis of metal quality.

Monitoring data is presented in a series of graphs showing water quality data at the release point, and sampling stations upstream and downstream of the release point (refer to Figure 2 for station locations).

Appendix A reference figures for each reported water quality parameter are:

Figure A1: pH

Figure A2: Turbidity

Figure A3: Conductivity

Figure A4: Aluminium

Figure A5: Arsenic

Figure A6: Cadmium

Figure A7: Chromium

Figure A8: Iron

Figure A9: Lead

Figure A10: Manganese

Figure A11: Mercury

Figure A12: Nickel

Figure A13: Selenium

Figure A14: Tin

Figure A15: Uranium

Figure A16: Zinc

High-level analysis of the monitoring data is provided in the section on “Performance analysis”.



## Performance analysis

Conclusions drawn from the 2024 *Water Report* remain consistent with the previous 2023 *Water Report*. Comparison of water quality monitoring data upstream and downstream of the QMM release point shows them to be comparable, with the majority of the regulated metals tested consistently below laboratory limits of detection. Further details are provided below.

### Site release

- Treated water release is compliant with the decree limits for all regulated metals, pH and turbidity; with the exception of one pH reading in March 2024.
- Emergency release water pH levels remain stable and continues to show the effect of the water treatment plant operation. This trend is expected to improve with the ongoing upgrade of the water management system at site.
- Levels of regulated metals in emergency release water are below decree limits, except for aluminium on isolated occasions.

### Upstream and downstream of the release point

- Within the Mandromondromotra River, upstream and downstream of the release point, the majority of the samples are consistently below the laboratory limit of detection for the following parameters.
  - arsenic\*
  - cadmium
  - lead
  - mercury
  - selenium\*
  - tin
  - uranium

\* outlier in 2024 dataset

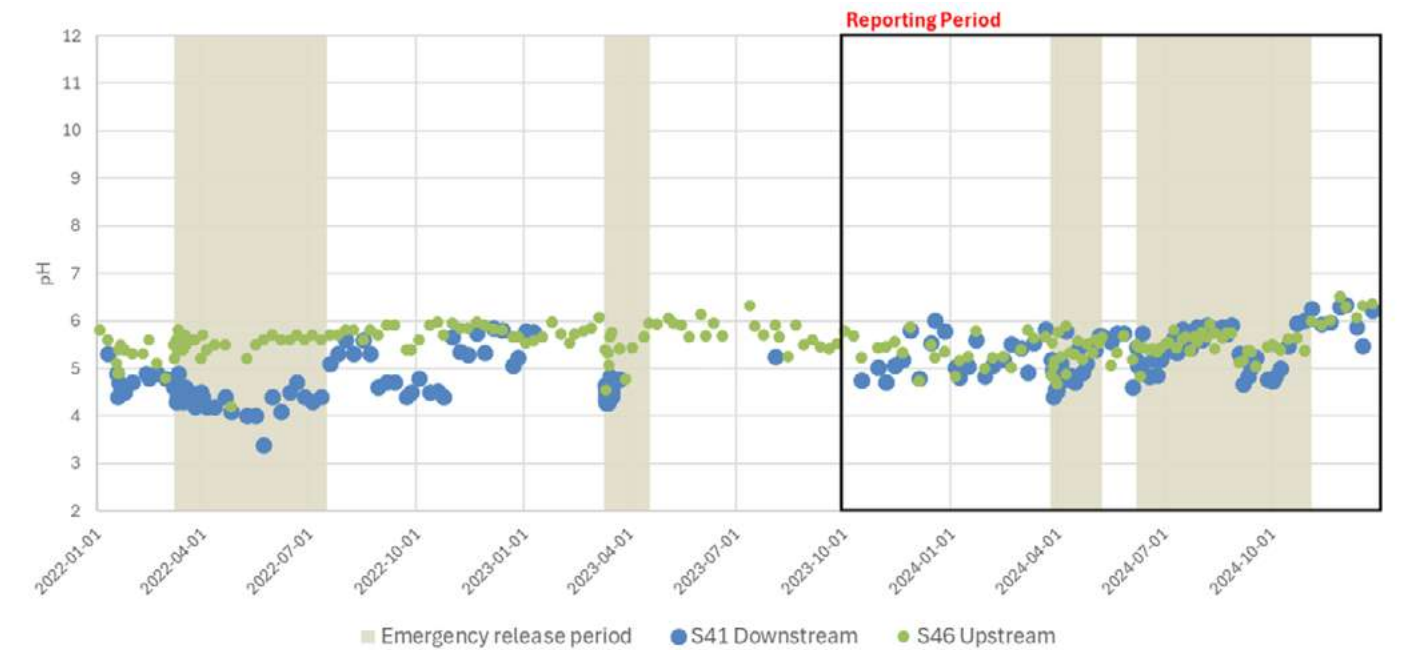
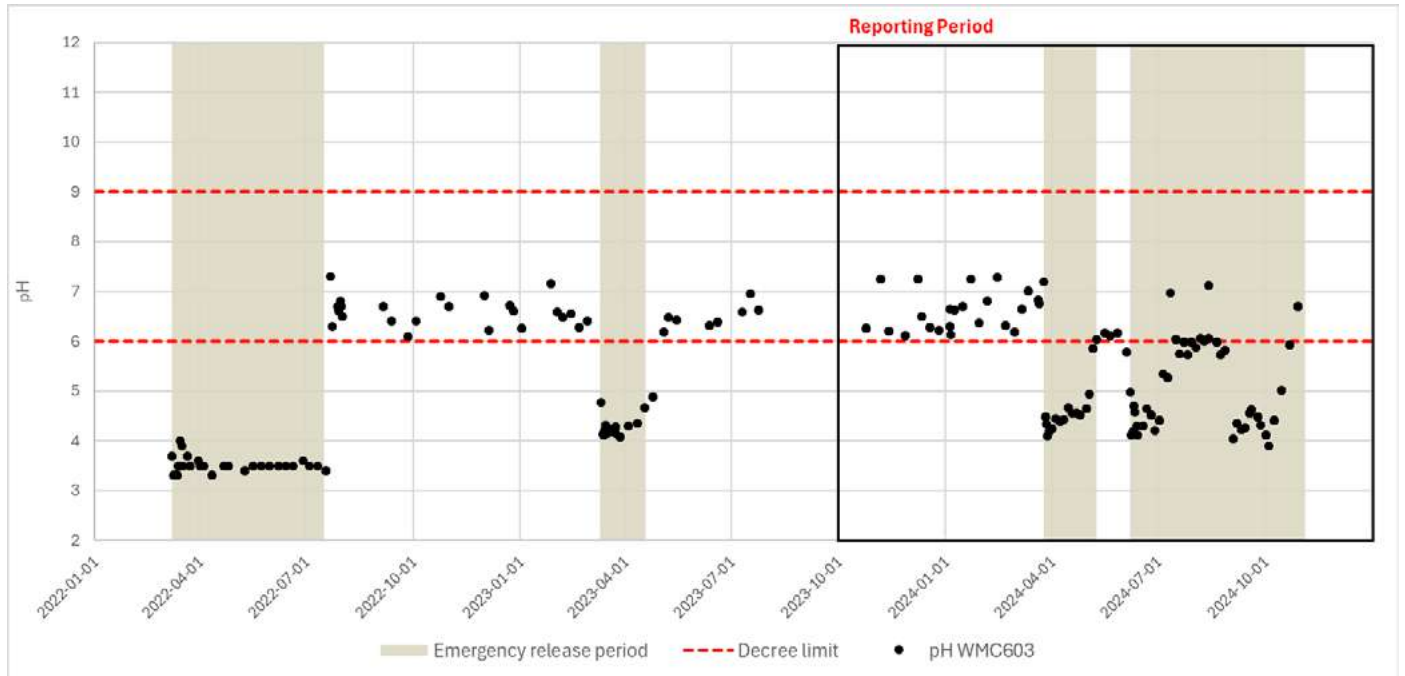
- Within the Mandromondromotra River, upstream samples show detectable levels for the following parameters. Downstream samples remain comparable to upstream:
  - aluminium
  - chromium
  - iron
  - manganese
  - nickel
  - zinc
- Update on previously identified constituents of potential concern:
  - Uranium, lead and cadmium: the levels of uranium, lead and cadmium detected both upstream and downstream of the release point remain below or close to the laboratories' limits of detection in all samples taken.





# Appendix A – Water quality monitoring data 2022-2024

Figure A1: pH



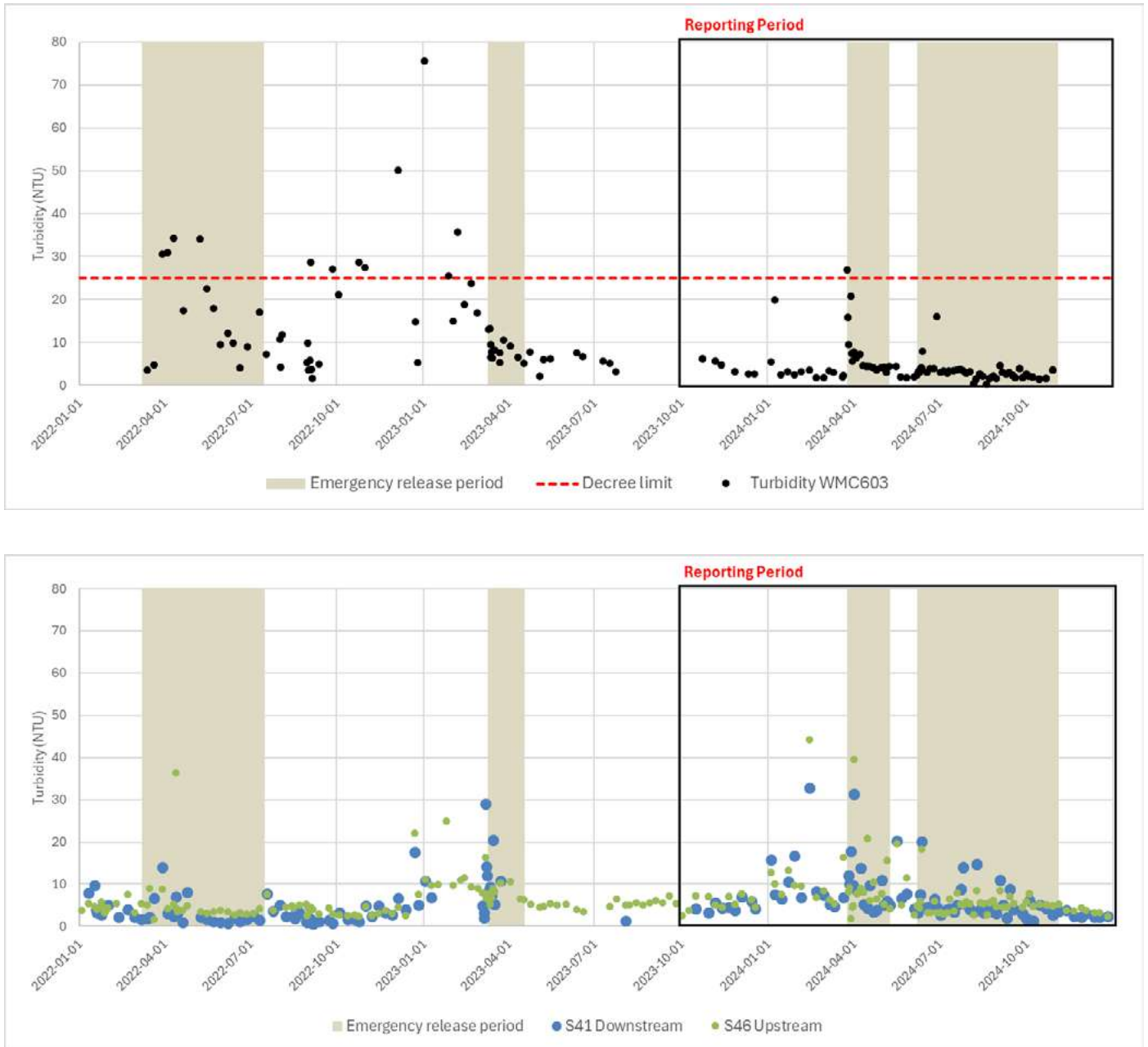
### Discharge at the release point pH commentary

- Water treatment plant release is compliant with the pH decree limit range of 6 to 9, with the exception of one pH reading in March 2024.
- The pH of release water during emergency release periods is higher in 2023 and 2024 compared to 2022, due to blending with increased volumes of treated water.

### Mandromondromotra River pH commentary

- There is less variance between the upstream and downstream Mandromondromotra River pH values after 2022, indicating the increasing influence of the water treatment plant.
- The upstream Mandromondromotra River pH typically ranges between 5 and 6.

Figure A2: Turbidity



Turbidity is the degree of cloudiness in water (or air) that is caused by the presence of suspended solids (Source: Oxford Dictionary).

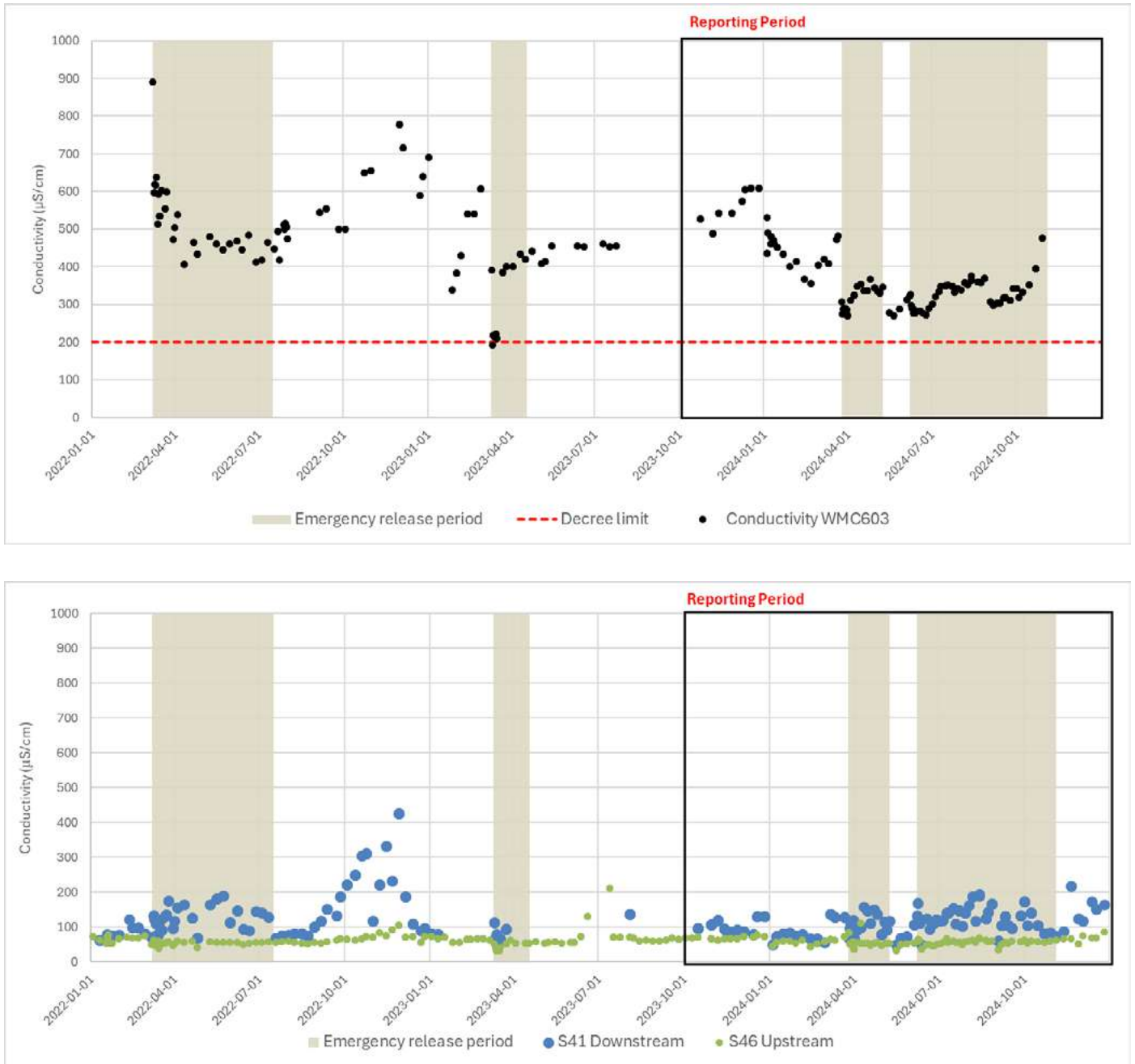
#### Discharge at the release point turbidity commentary

- Exceedances of the turbidity decree limit of 25 Nephelometric Turbidity Units (NTU) are observed prior to March 2023.
- After March 2023, compliance with the turbidity decree limit has been achieved except for one occasion during the 2024 emergency release period.
- This improved turbidity performance is associated with the introduction of the water treatment plant polishing pond in March 2023.

#### Mandromondromotra River turbidity commentary

- Mandromondromotra River turbidity, both upstream and downstream, is generally low throughout the wet and dry season.

Figure A3: Conductivity



Conductivity is a measure of the ability of a sample of water to carry an electrical current, which reflects concentration of ionised substances (dissolved solids) in the water (Source: Oxford Dictionary).

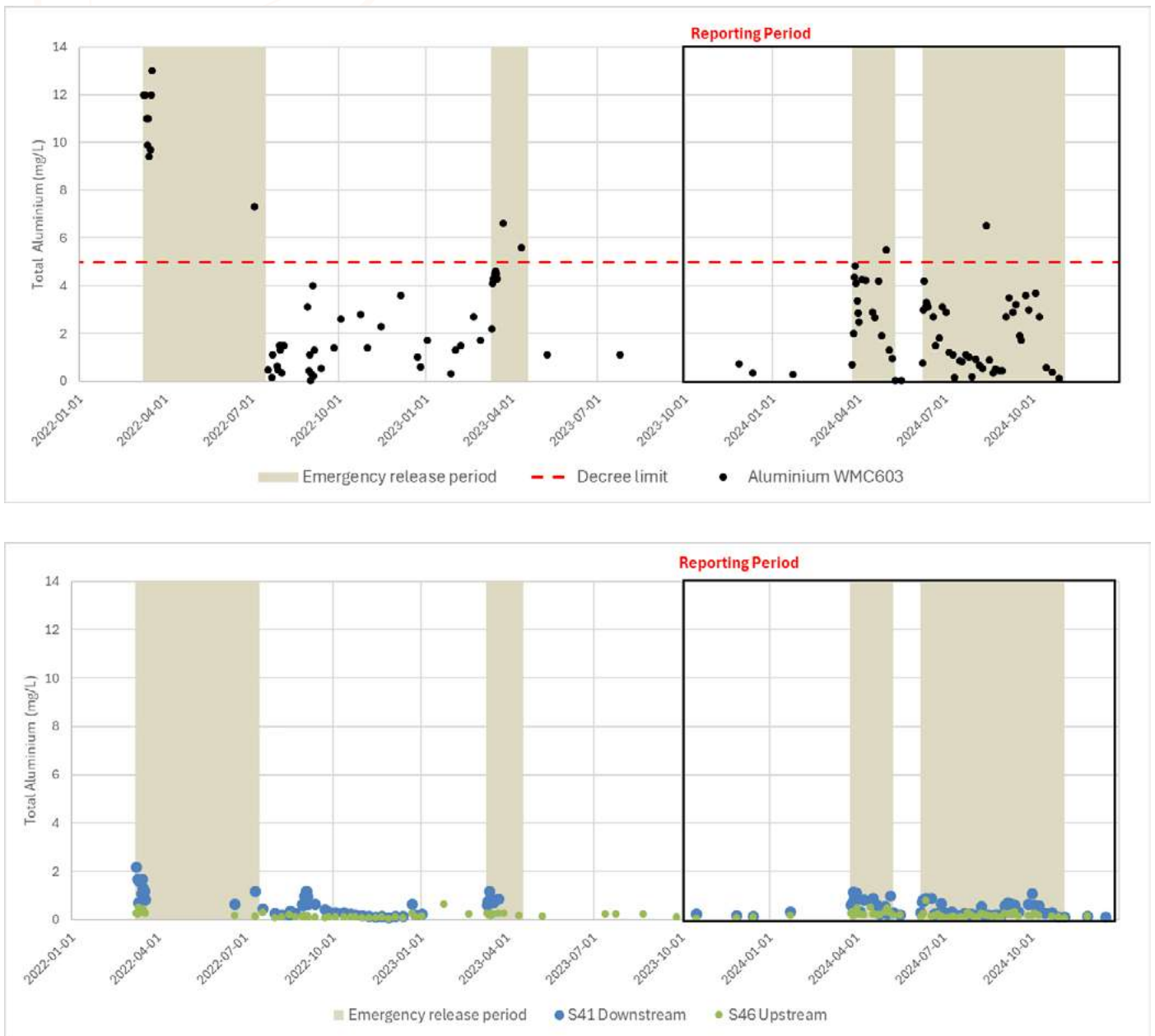
Discharge at the release point conductivity commentary

- Ongoing exceedances of the conductivity decree limit of 200 µS/cm are observed throughout the period.
- Limestone doses for the water treatment plant increase the dissolved salts in the water, which contributes to the conductivity increase.

Mandromondromotra River conductivity commentary

- Mandromondromotra River conductivity downstream shows the influence of the water release.

Figure A4: Aluminium



Detection limit (DL) at 0.05 mg/L (Eurofins and Talbot). Graphical representation is DL/2 as per standard methodology.

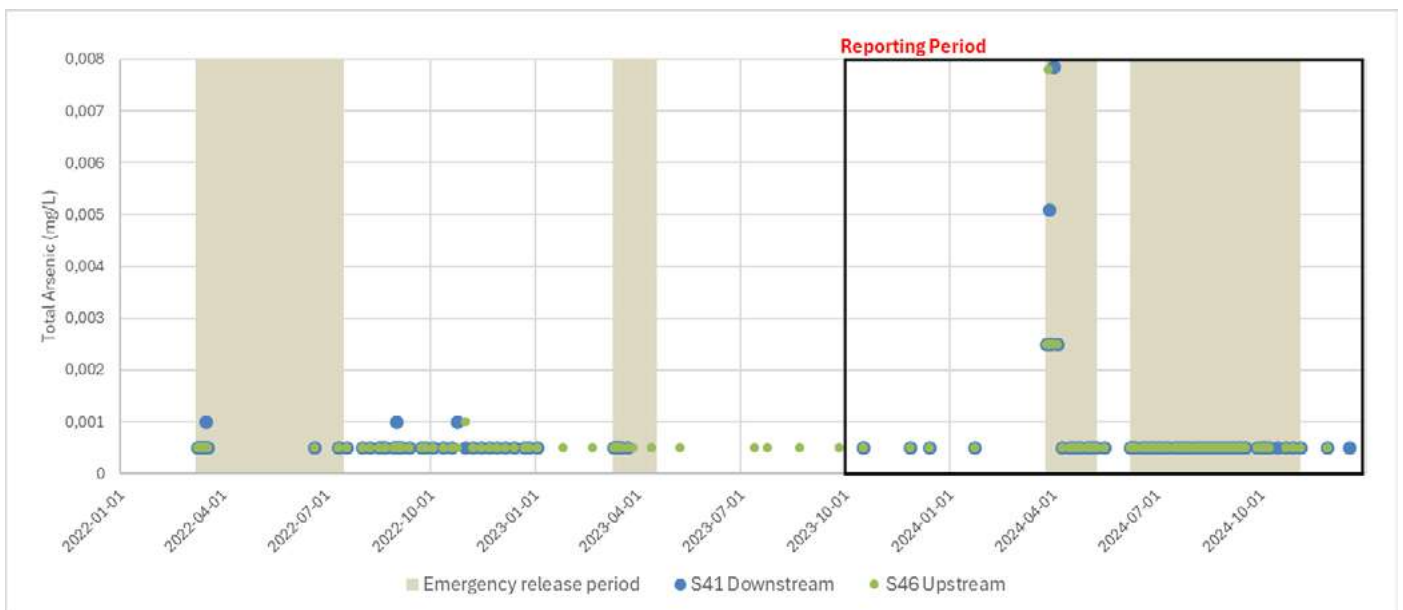
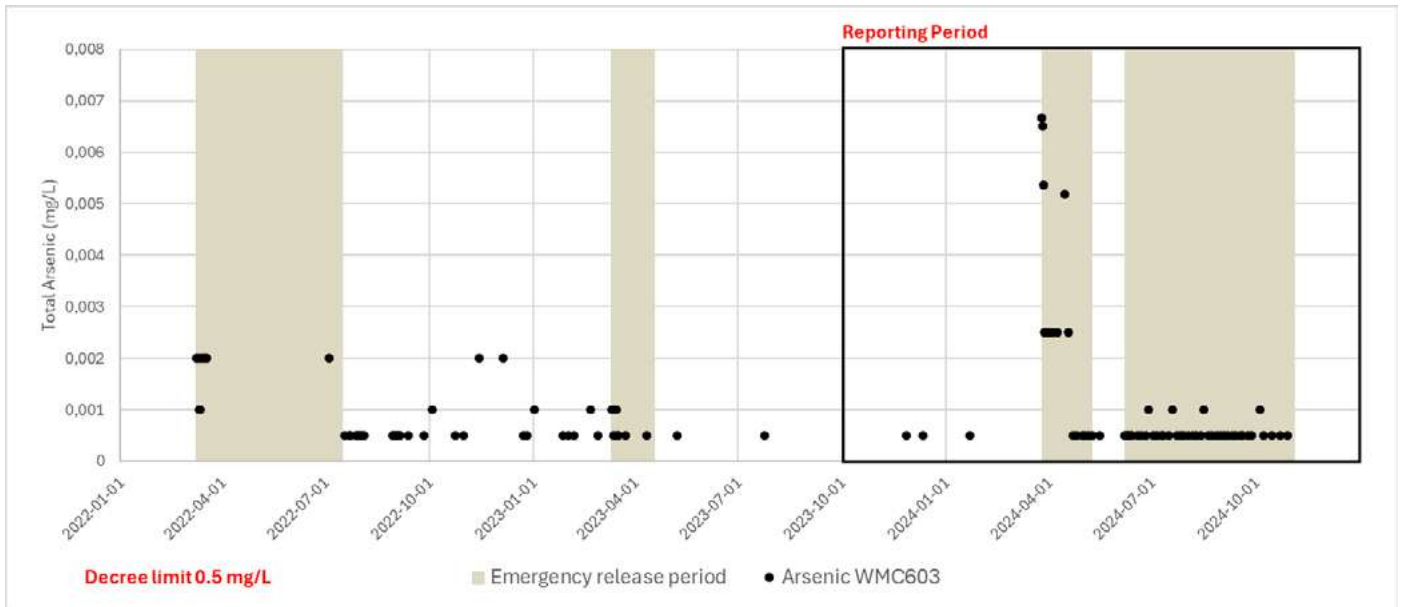
#### Discharge at the release point aluminium commentary

- Since its implementation in 2022, water treated by the water treatment plant is compliant with the aluminium decree limit of 5.0 mg/L.
- Noticeable reduction in aluminium levels from 2022 to 2024 during emergency release periods, due to the implementation of the water treatment plant.

#### Mandromondromotra River aluminium commentary

- The downstream Mandromondromotra River aluminium concentrations show the influence of the water treatment plant operation after August 2022.

Figure A5: Arsenic



Detection limits (DL) at 0.001 mg/L (Eurofins) and 0.005 mg/L (Talbot). Graphical representation is DL/2 as per standard methodology.

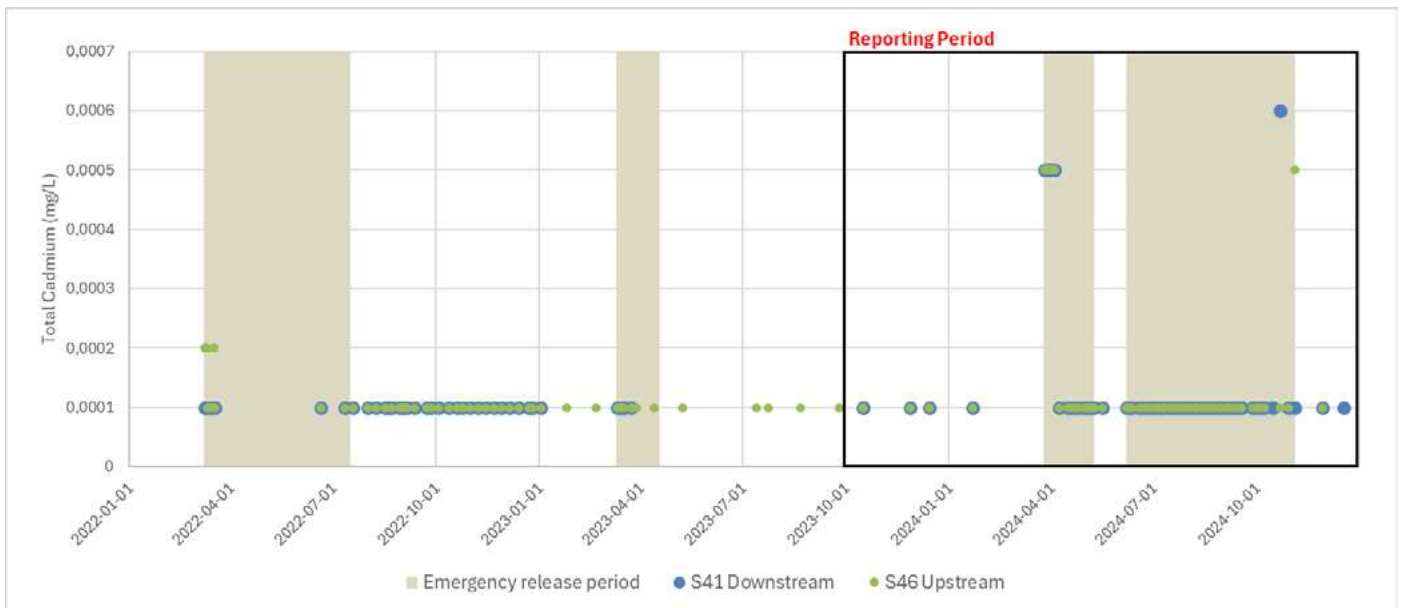
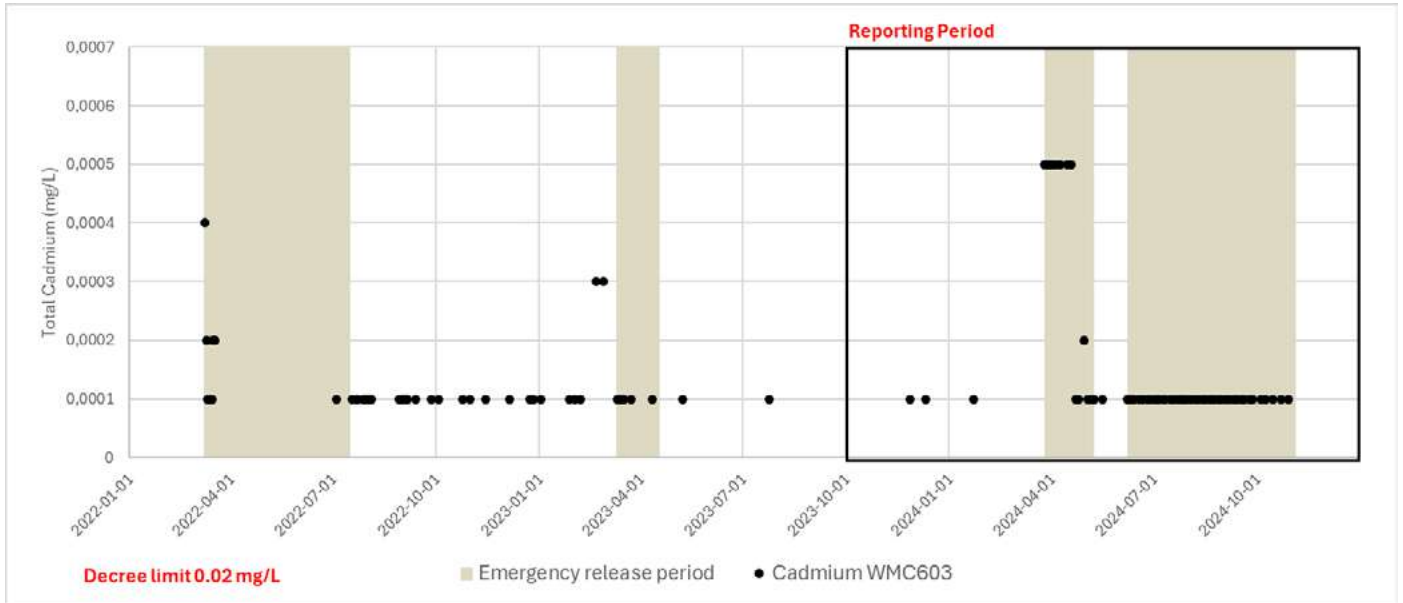
#### Discharge at the release point arsenic commentary

- Treated water and emergency release water are compliant and well below the arsenic decree limit of 0.5 mg/L.
- The majority of discharge samples are below the laboratories' limits of detection of 0.001 mg/L and 0.005 mg/L.

#### Mandromondromotra River arsenic commentary

- The majority of upstream and downstream Mandromondromotra River samples are consistently below the laboratories' limits of detection.
- One outlier was identified in a downstream sample dated 31 March 2024 at 0.335 mg/L. This is not included in the graph due to y-axis scale.

Figure A6: Cadmium



Detection limits (DL) at 0.0002 mg/L (Eurofins) and 0.001 mg/L (Talbot). Graphical representation is DL/2 as per standard methodology.

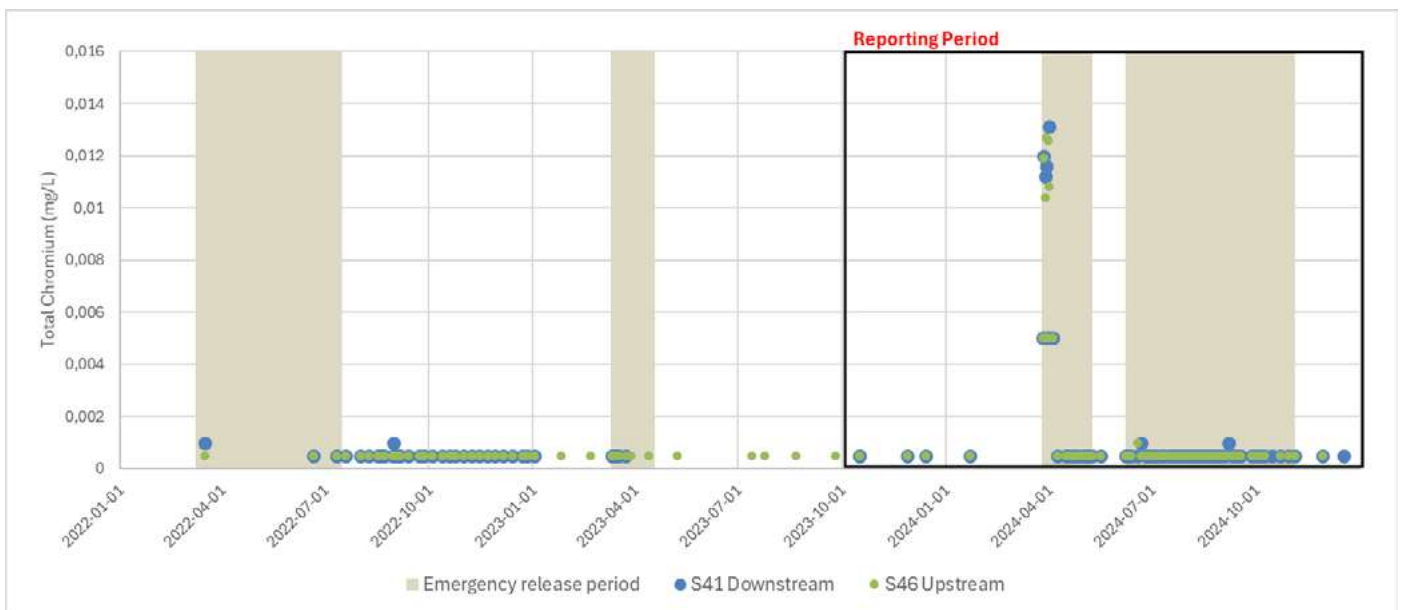
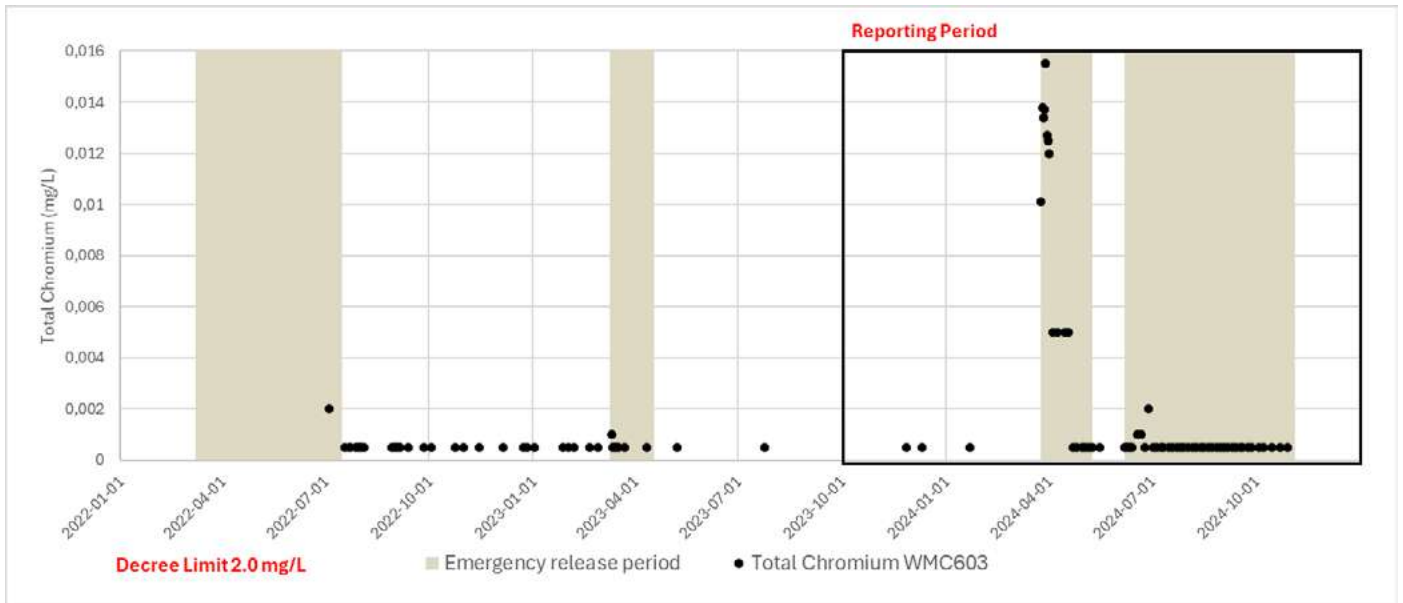
Discharge at the release point cadmium commentary

- Treated water and emergency release water are compliant and well below the cadmium decree limit of 0.02 mg/L.
- The majority of discharge samples are below the laboratories' limits of detection of 0.0002 mg/L and 0.001 mg/L.

Mandromondromotra River cadmium commentary

- The majority of upstream and downstream Mandromondromotra River samples are consistently below the laboratories' limits of detection of 0.0002 mg/L and 0.001 mg/L.

Figure A7: Chromium



Detection Limit (DL) at 0.001 mg/L (Eurofins) and 0.01 mg/L (Talbot). Graphical representation is DL/2 as per standard methodology.

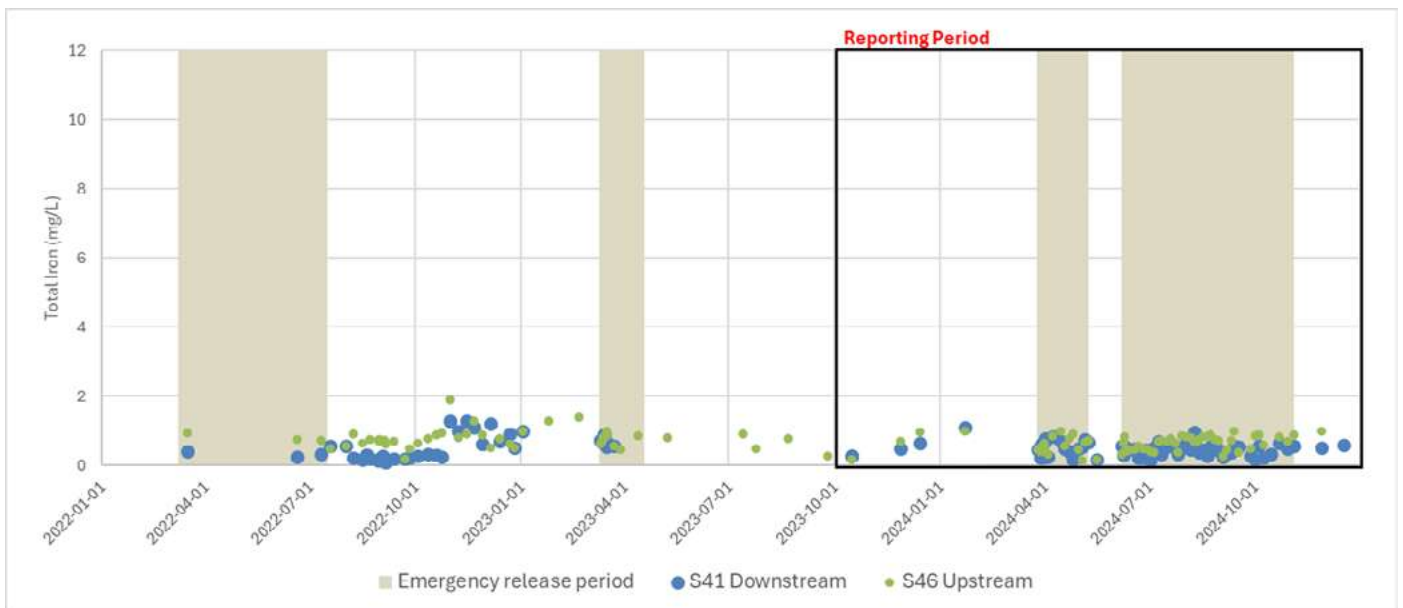
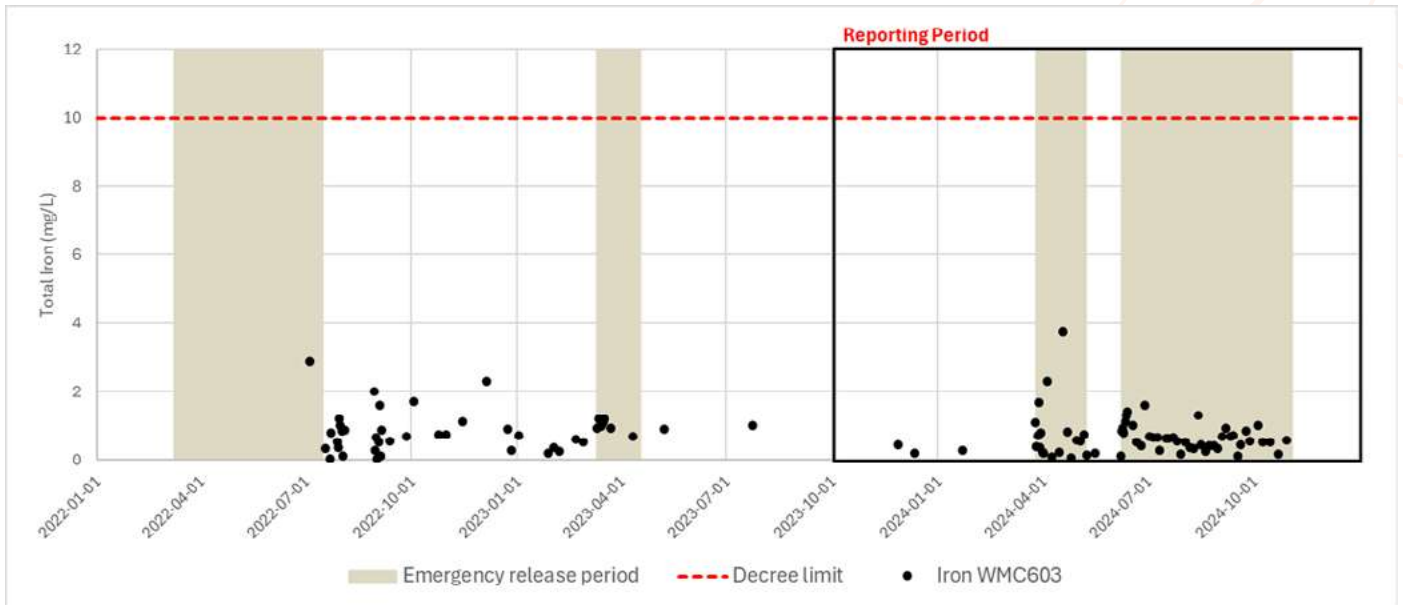
Discharge at the release point chromium commentary

- Treated water and emergency release water are compliant and well below the total chromium decree limit of 2.0 mg/L and the chromium IV decree limit of 0.2 mg/L.
- The majority of discharge samples are below the laboratories' limits of detection of 0.001 mg/L and 0.01 mg/L.

Mandromondromotra River chromium commentary

- The majority of upstream and downstream Mandromondromotra River samples are consistently below the laboratories' limits of detection, except in March 2024 with both upstream and downstream river concentration detected.

Figure A8: Iron



Detection limit (DL) at 0.05 mg/L (Eurofins and Talbot). Graphical representation is DL/2 as per standard methodology.

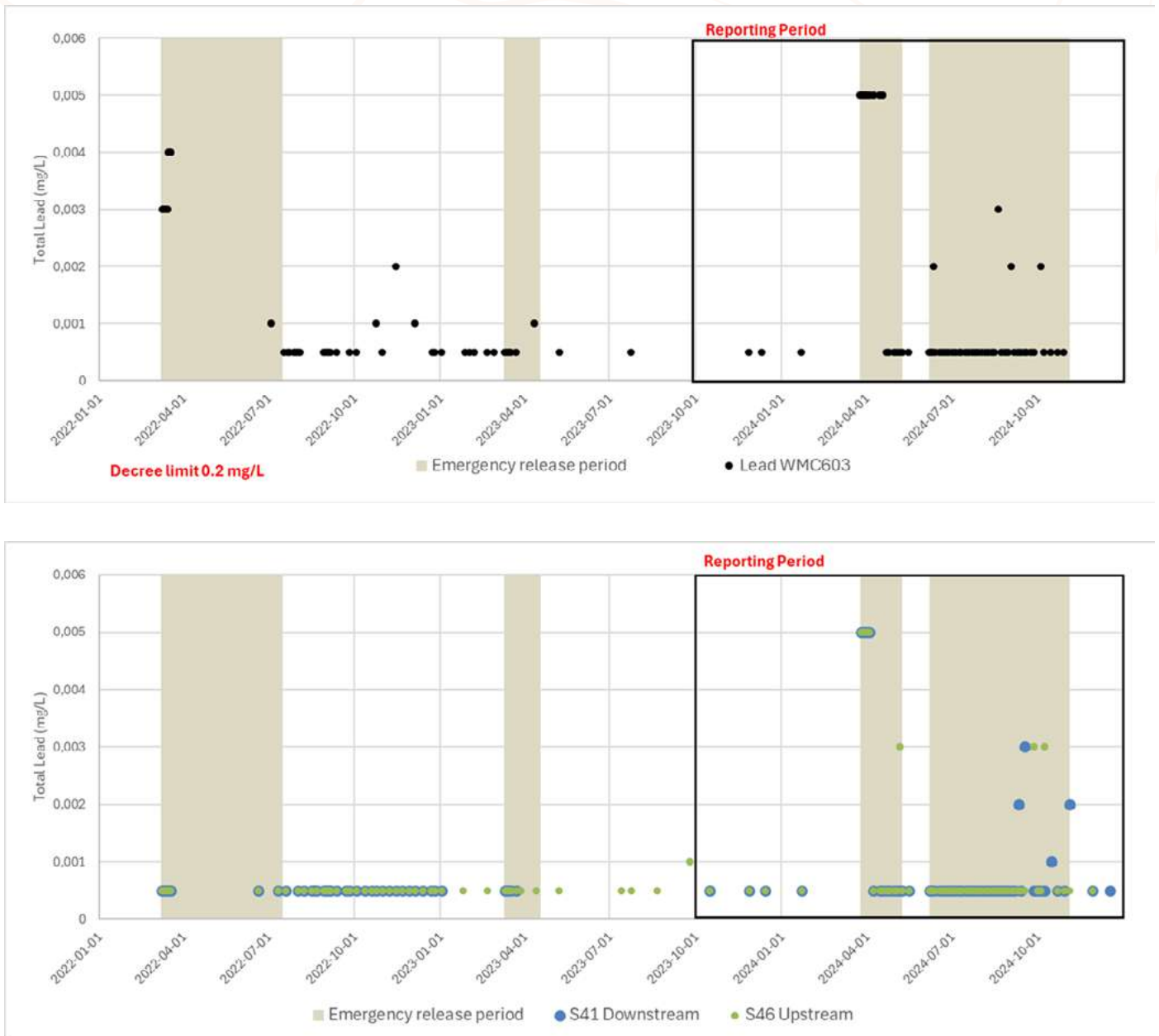
Discharge at the release point iron commentary

- Treated water and emergency release water are compliant and well below the iron decree limit of 10 mg/L.

Mandromondromotra River iron commentary

- Mandromondromotra River iron concentration for both upstream and downstream is generally within the same range.

Figure A9: Lead



Detection limits (DL) at 0.001 mg/L (Eurofins) and 0.01 mg/L (Talbot). Graphical representation is DL/2 as per standard methodology.

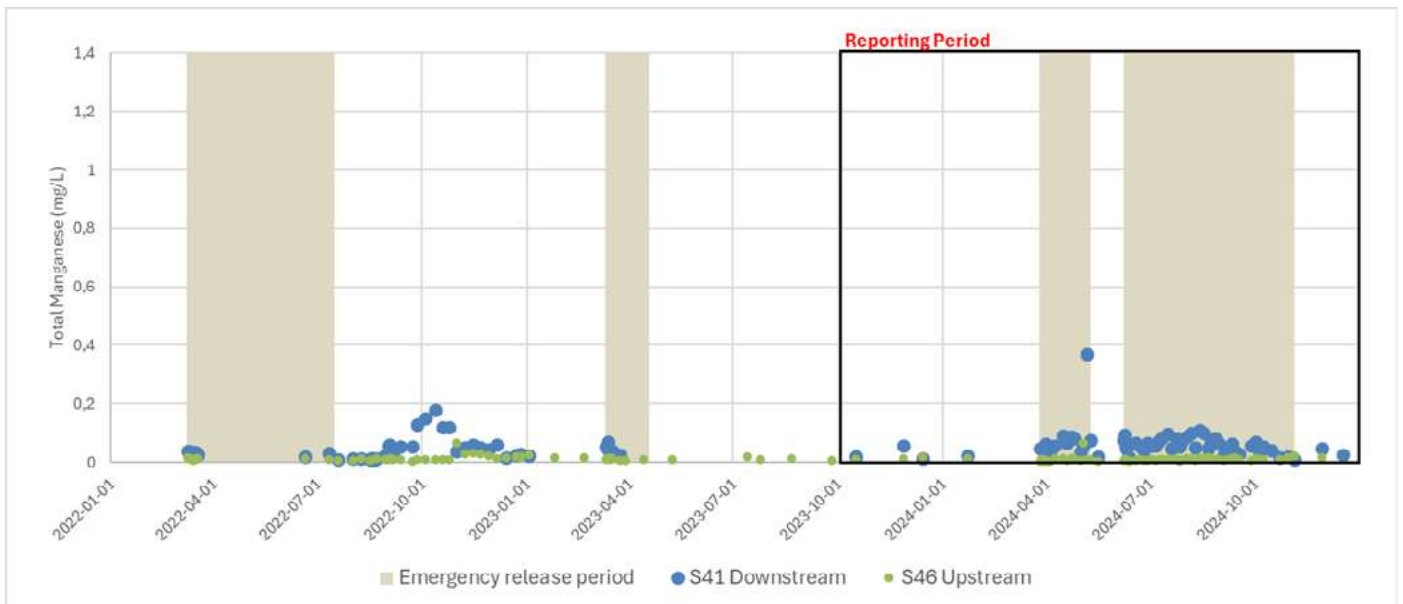
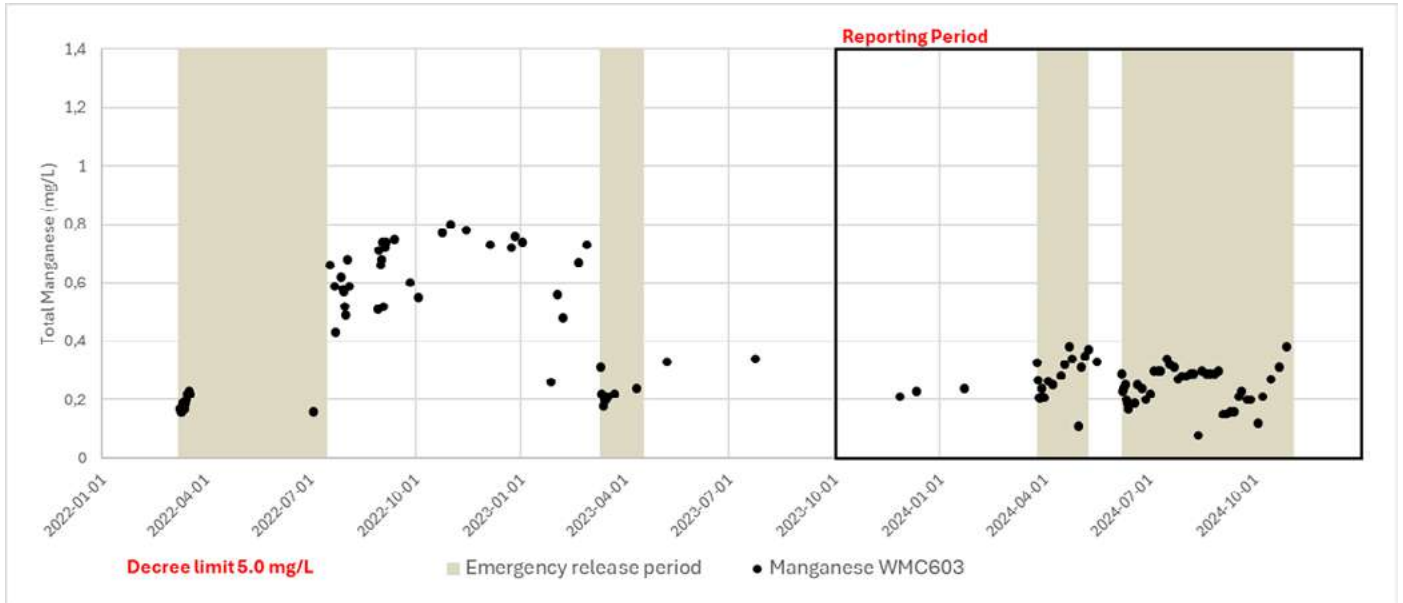
Discharge at the release point lead commentary

- Treated water and emergency release water are compliant and well below the Lead decree limit of 0.2 mg/L.
- The majority of discharge samples are below the laboratories' limits of detection of 0.001 mg/L and 0.01 mg/L.

Mandromondromotra River lead commentary

- The majority of upstream and downstream Mandromondromotra River samples are consistently below the laboratories' limits of detection of 0.001 mg/L and 0.01 mg/L.

Figure A10: Manganese



Detection limits (DL) at 0.005 mg/L (Eurofins) and 0.01 mg/L (Talbot). Graphical representation is DL/2 as per standard methodology.

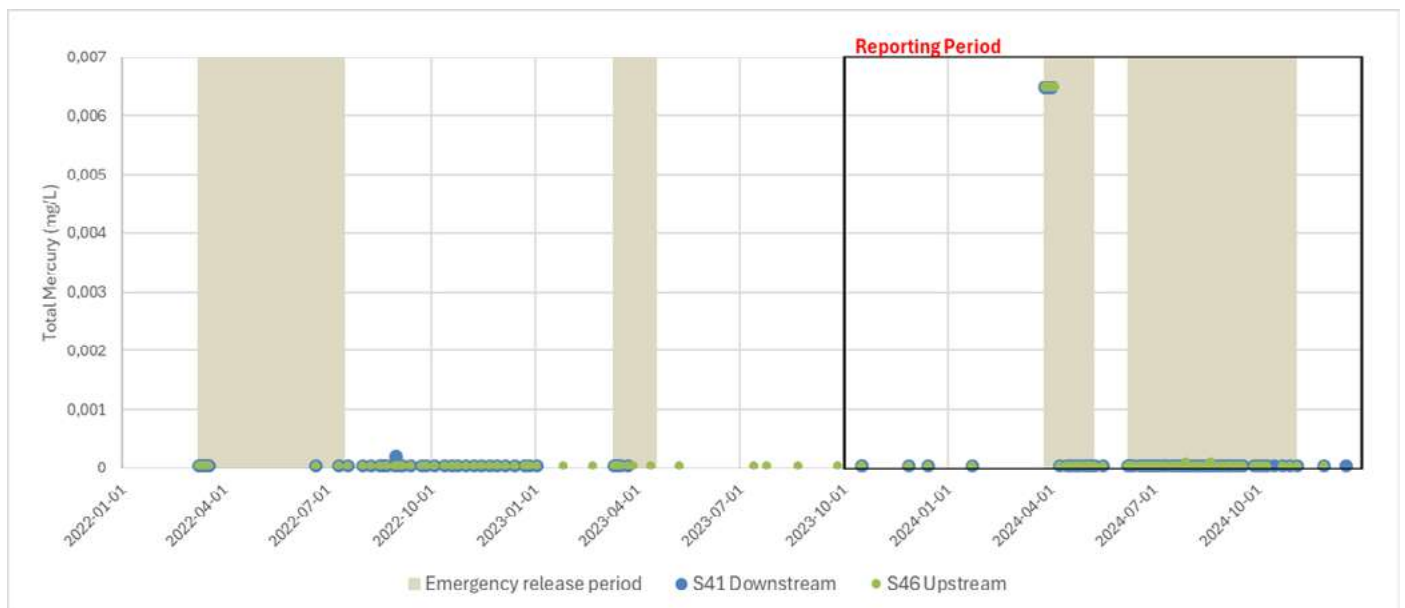
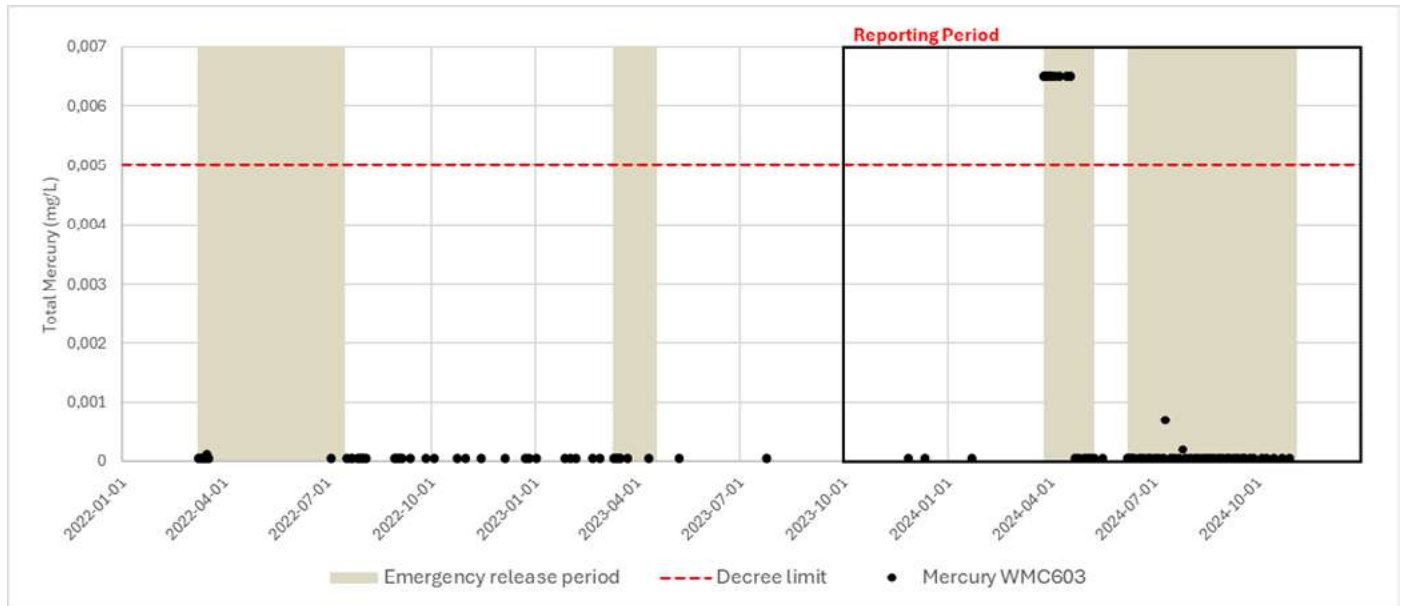
Discharge at the release point manganese commentary

- Treated water and emergency release water are compliant and well below the manganese decree limit of 5.0 mg/L.

Mandromondromotra River manganese commentary

- Mandromondromotra River concentration for both upstream and downstream is low throughout the dry and wet seasons.

Figure A11: Mercury



Detection limits (DL) at 0.0001 mg/L (Eurofins) and 0.013 mg/L (Talbot). Graphical representation is DL/2 as per standard methodology.

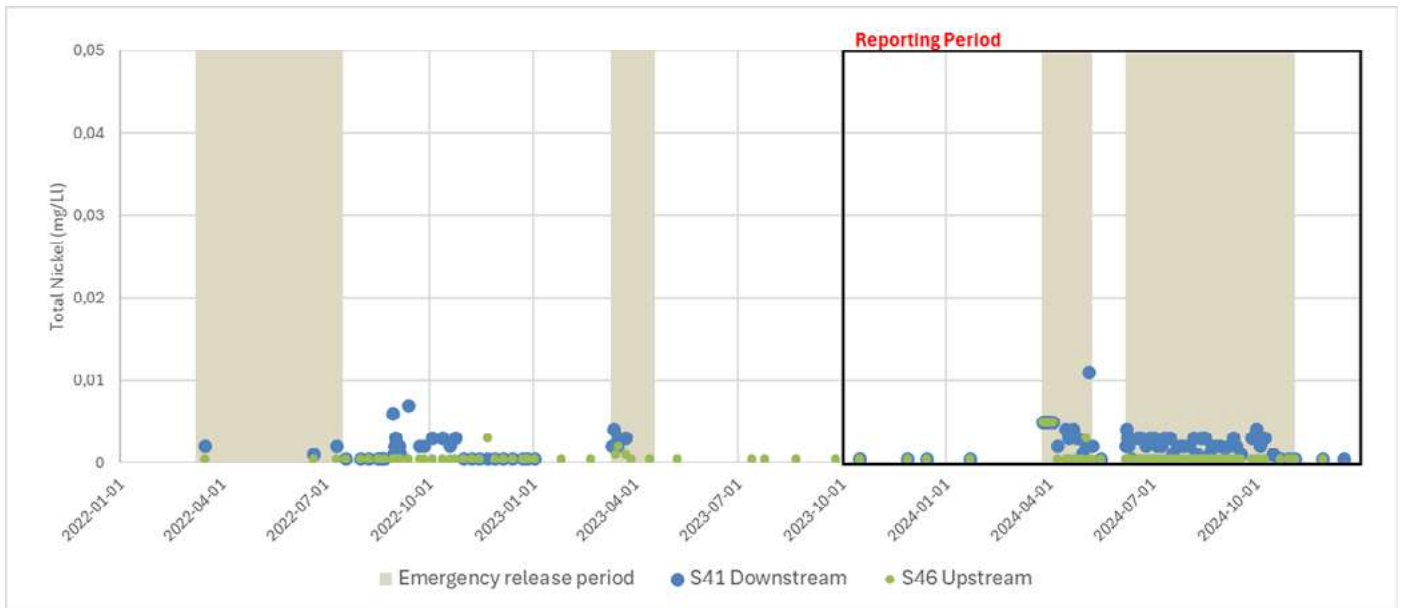
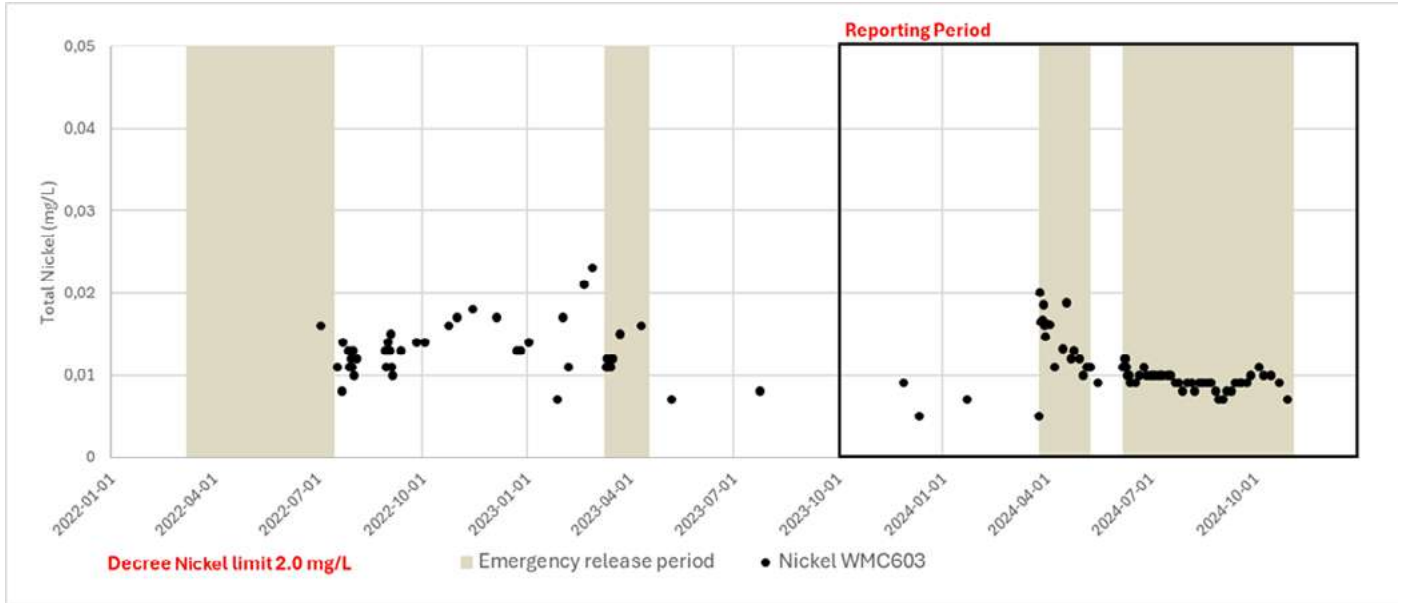
#### Discharge at the release point mercury commentary

- Treated water and emergency release water are compliant and well below the mercury decree limit of 0.005 mg/L, except for instances where the laboratory limit of detection was higher than the decree limit.
- The majority of discharge samples are consistently below the laboratories' limits of detection of 0.0001 mg/L and 0.013 mg/L.

#### Mandromondromotra River mercury commentary

- Upstream and downstream Mandromondromotra River samples are consistently below the laboratories' limits of detection of 0.0001 mg/L and 0.013 mg/L.

Figure A12: Nickel



Detection limits (DL) at 0.001 mg/L (Eurofins) and 0.01 mg/L (Talbot). Graphical representation is DL/2 as per standard methodology.

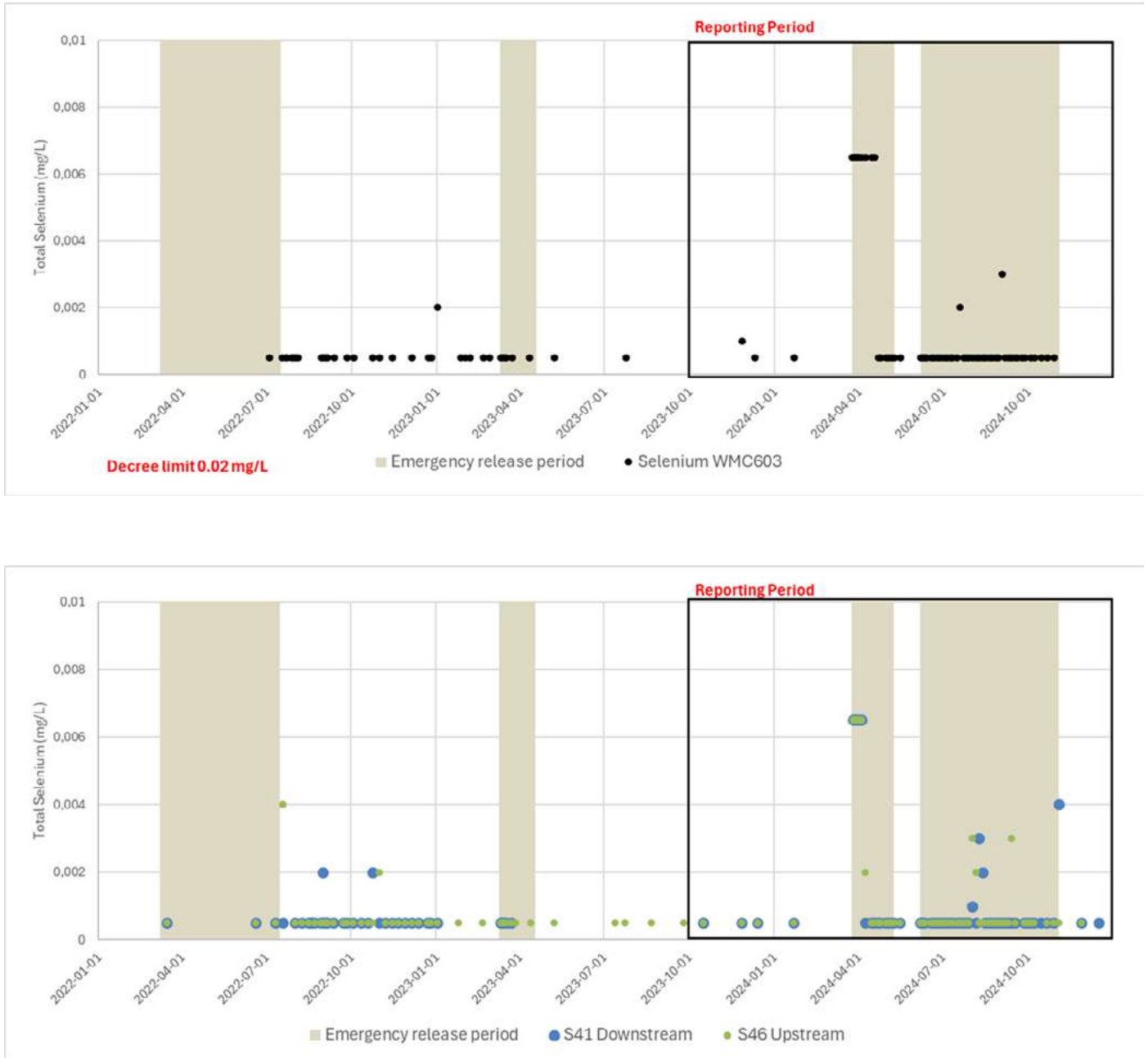
Discharge at the release point nickel commentary

- Treated water and emergency release water are compliant and well below the nickel decree limit of 2.0 mg/L.

Mandromondromotra River nickel commentary

- The majority of upstream and downstream Mandromondromotra River samples are below the laboratories' limits of detection.

Figure A13: Selenium



Detection limits (DL) at 0.001 mg/L (Eurofins) and 0.013 mg/L (Talbot). Graphical representation is DL/2 as per standard methodology.

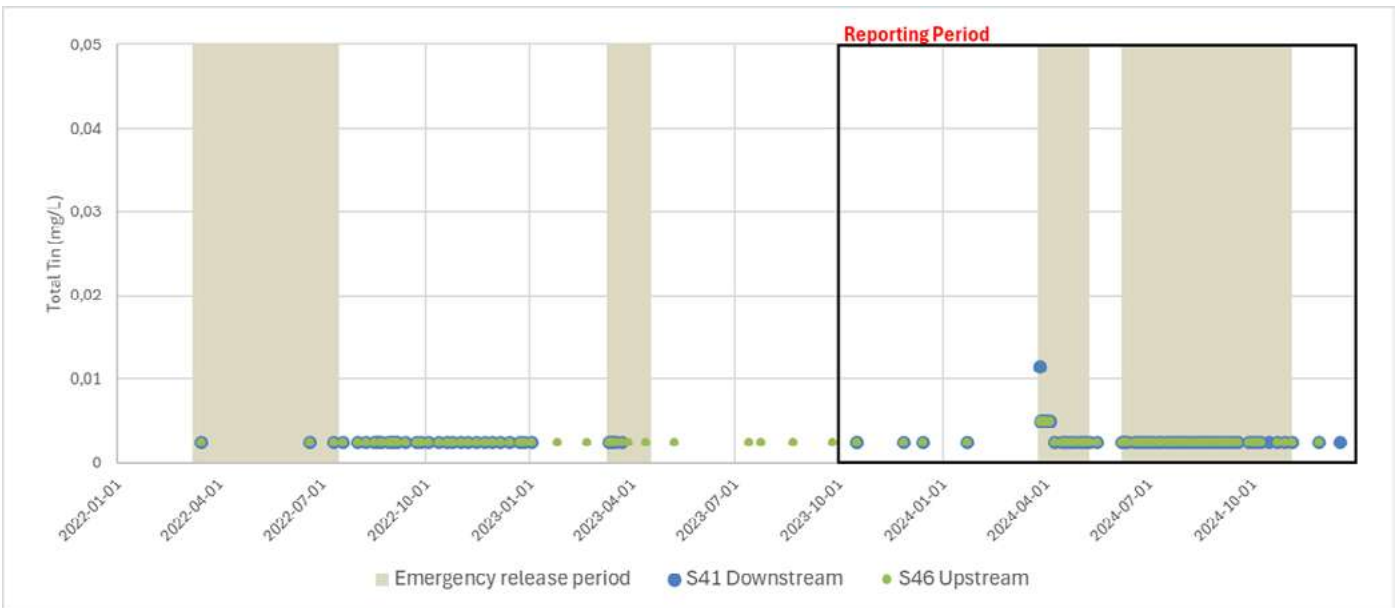
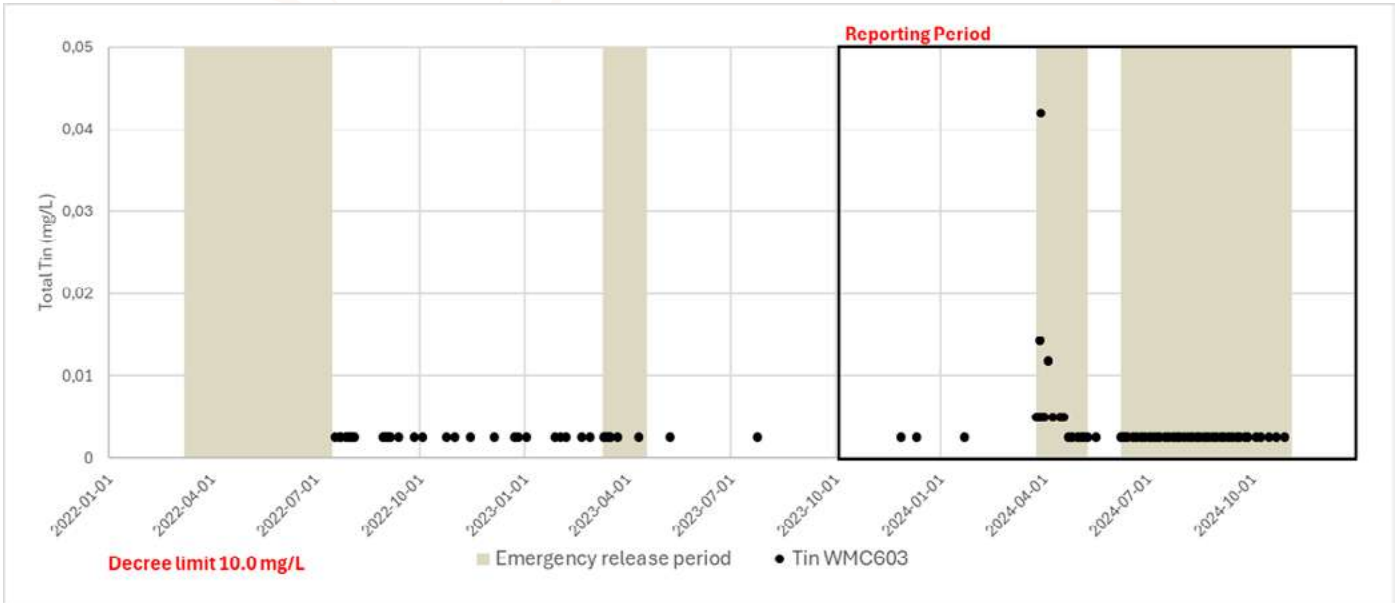
Discharge at the release point selenium commentary

- Discharge samples are consistently below the laboratories' limits of detection of 0.001mg/L and 0.013 mg/L.

Mandromondromotra River selenium commentary

- The majority of upstream and downstream Mandromondromotra River samples are consistently below the laboratories' limits of detection.
- There was one outlier identified on 31 March 2024 at 0.087 mg/L. This is not included in the graph due to y-axis scale.

Figure A14: Tin



Detection limits (DL) at 0.005 mg/L (Eurofins) and 0.01 mg/L (Talbot). Graphical representation is DL/2 as per standard methodology.

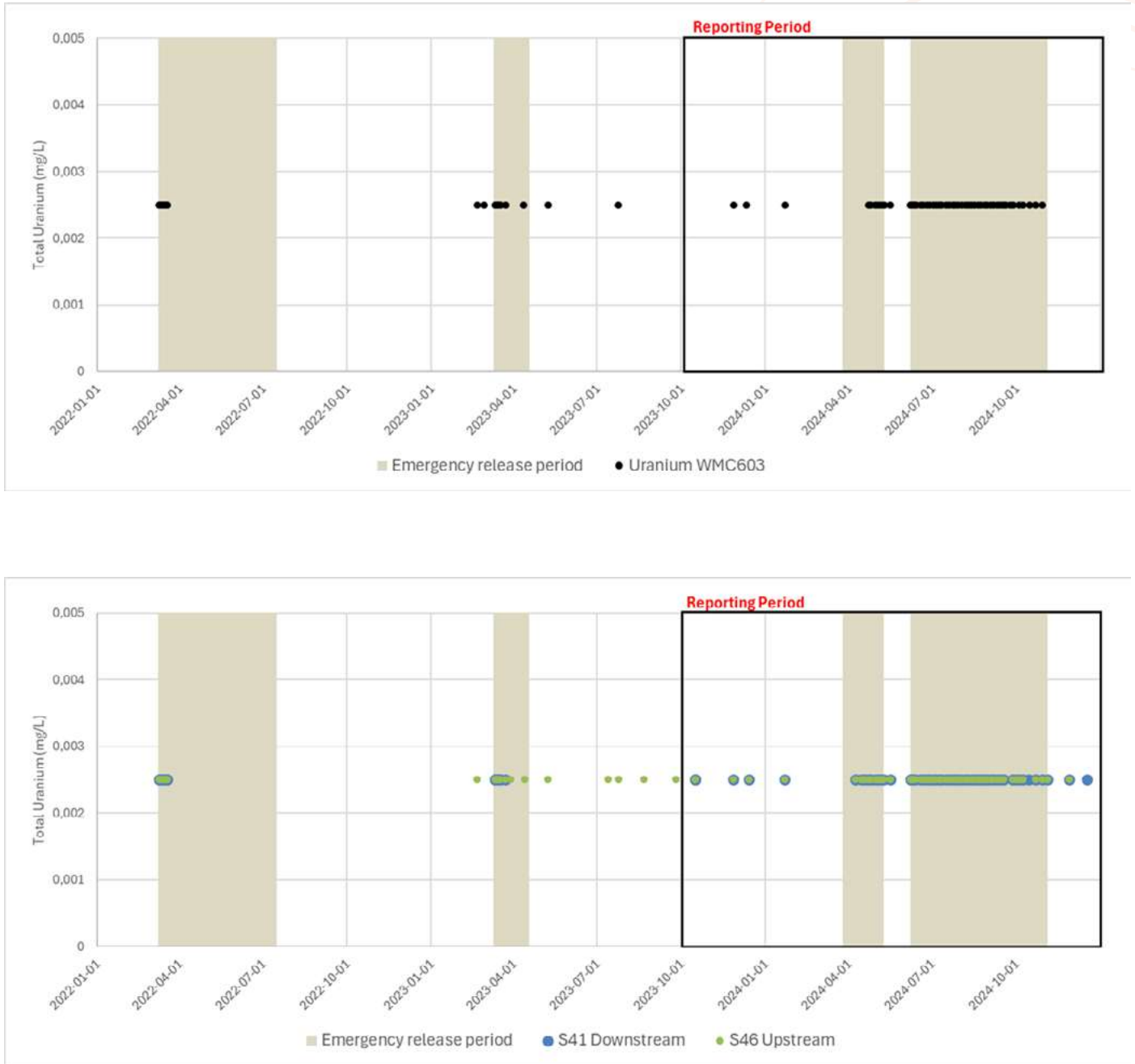
Discharge at the release point tin commentary

- Treated water and emergency release water are compliant and well below the decree limit of 10.0 mg/L.

Mandromondromotra River tin commentary

- Upstream and downstream Mandromondromotra River samples are consistently below the laboratories' limits of detection.

Figure A15: Uranium



Detection Limit (DL) at 0.005 mg/L (Eurofins and Talbot). Graphical representation is DL/2 as per standard methodology.

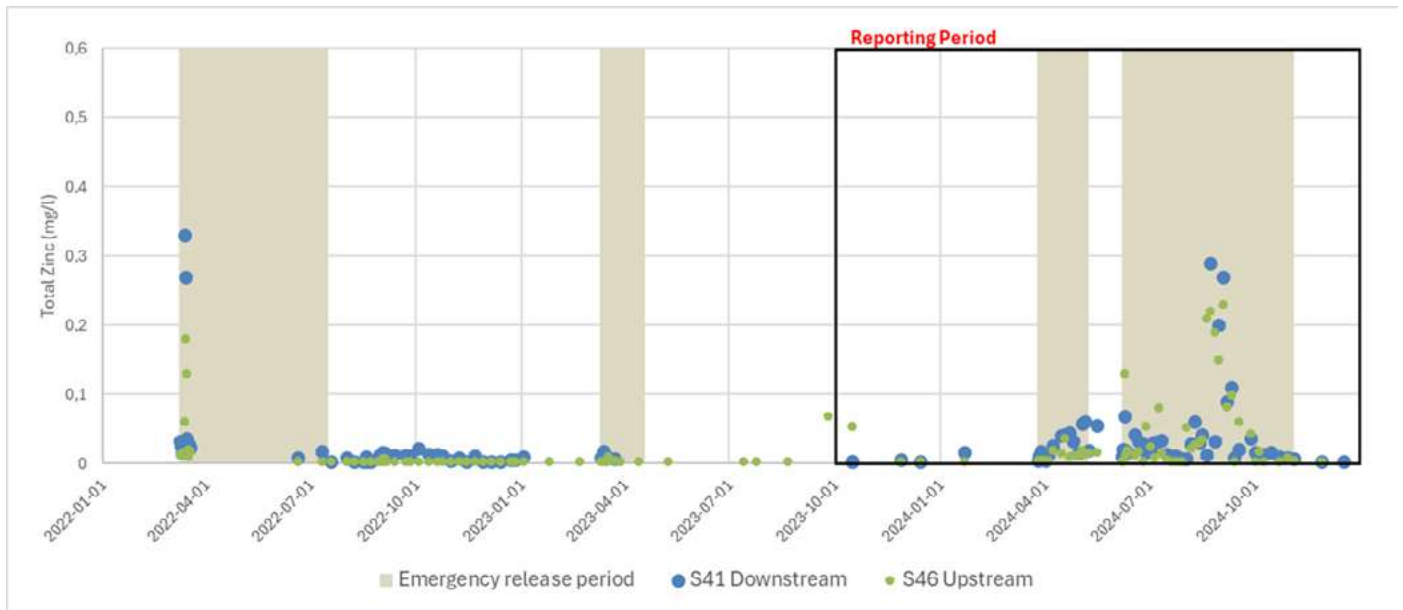
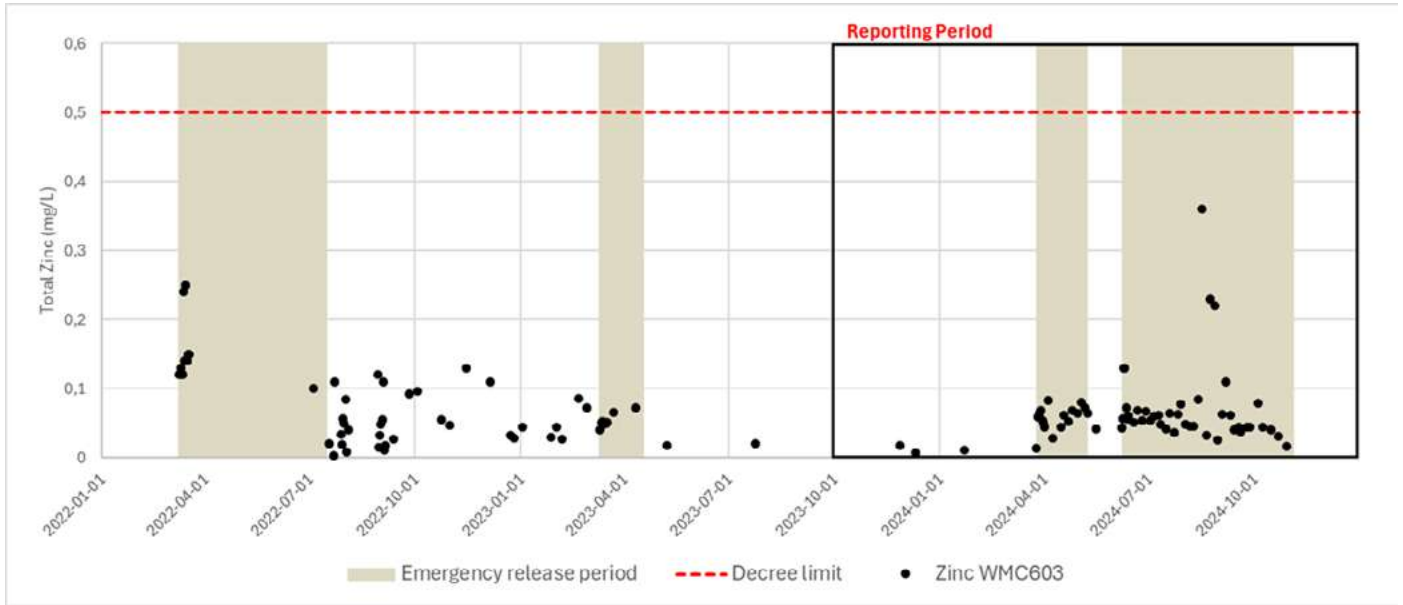
Discharge at the release point uranium commentary

- All discharge samples are below the laboratories' limits of detection of 0.005 mg/L.

Mandromondromotra River uranium commentary

- All upstream and downstream Mandromondromotra River samples are below the laboratories' limits of detection. This is consistent with the findings of the independent community radiation study conducted around QMM's site by international environmental experts JBS&G Australia Pty Ltd between November 2019 and October 2022.

Figure A16: Zinc



Detection limits (DL) at 0.005 mg/L (Eurofins) and 0.01 mg/L (Talbot). Graphical representation is DL/2 as per standard methodology.

Discharge at the release point zinc commentary

- Treated water and emergency release water are compliant with the decree limit of 0.5 mg/L.

Mandromondromotra River zinc commentary

- Mandromondromotra River concentration for both upstream and downstream show a similar trend.

# Appendix B – Errata

1. The *2024 Water Report* graphical representations address the following *2023 Water Report* graphical representation errata:
  - WMC603:
    - Rejected assays due to representativity of sample. Ongoing improvement of sampling procedure: 8 March 2022, 29 August 2022, 10 October 2022, 20 October 2022, 14 November 2022, 1 December 2022, 22 December 2022.
    - 27 February 2023 data were wrongly represented on 27 March 2023.
    - The concentration for the following samples is equal to the laboratory limit of detection (DL) value, but the 2023 graphical representations were incorrect and showed the concentration at DL divided by 2 (DL/2) for the following dates:
      - arsenic: 3 October 2022, 2 January 2022.
      - cadmium: 10 March 2022, 16 March 2022, 17 March 2022, 18 March 2022.
  - S41:
    - The concentration for the following samples is equal to the laboratory limit of detection (DL) value, but the 2023 graphical representations were incorrect and showed the concentration at DL divided by 2 (DL/2) for the following dates:
      - arsenic: 17 March 2022, 31 August 2022, 24 October 2022.
      - chromium: 16 March 2022, 30 August 2022.
  - S46:
    - The concentration for the following samples is equal to the laboratory limit of detection (DL) value, but the 2023 graphical representations were incorrect and showed the concentration at DL divided by 2 (DL/2) for the following dates:
      - arsenic: 31 October 2022.
      - cadmium: 9 March 2022, 10 March 2022, 17 March 2022.
    - Missing data points for chromium: 20 February 2023, 12 - 17, 23 March 2023, 8 May 2023.
    - Missing data points for arsenic, cadmium, lead, mercury, manganese, zinc: 20 February 2023, 28 March 2023, 13 April 2023, 8 May 2023.
2. *2024 Water Report* rain dataset modification from the previous *2023 Water Report*:
  - Updated for a January to December timeframe instead of a December to November timeframe.
  - Cumulative annual rainfall depth values have been updated from the *2023 Water Report*. Changes in data impact the following years:
    - 2021 (1,394 mm modified to 1,496.5 mm)
    - 2022 (2,071 mm modified to 2,288.7 mm)
    - 2023 (1,398 mm modified to 1,515 mm)
  - Prior to 20 December 2023, rainfall data consisted of measurements from the Toalagnaro airport station and gap filling with the MERRA-2 global meteorological gridded model. The divergences in annual totals are attributed to a date offset in the original Toalagnaro timeseries, which then impacted selected MERRA-2 values used in the gap filling. Following 20 December 2023, rainfall measurements are taken from on-site measuring equipment.



# RioTinto

Rio Tinto Tana  
Lot 35, 5<sup>ème</sup> étage,  
Ivandry Business Center,  
Antananarivo 101  
Madagascar

Rio Tinto Fort Dauphin  
Mandena, Fort Dauphin  
614  
Madagascar

