Waste Discharge Licence 174-15

Monitoring Report

1 May 2023 to 30 April 2024

MCARTHUR RIVER MINE

McArthur River Mining Pty Ltd

DOCUMENT PROPERTIES

Date	31/08/2024
Department	Environment
Prepared by	McArthur River Mining Pty Ltd
Licence Expiry Date	25 May 2025 (WDL 174-15)

Executive Summary

McArthur River Mining Pty Ltd (MRM) is the operator of the McArthur River Mine (the Mine), which is an open pit zinc, lead and silver mining operation in the Northern Territory (NT) located approximately 700 kilometres (km) south-east of Darwin, and approximately 45 km southwest of the township of Borroloola. MRM is also the operator of the Bing Bong Loading Facility (BBLF), which is located on the Gulf of Carpentaria approximately 95 km north-northeast of the Mine.

This Monitoring Report has been submitted for the period 1 May 2023 to 30 April 2024 (the reporting period) to satisfy conditions of MRM's Waste Discharge Licence (WDL). Three versions of the WDL were in effect during the reporting period, including WDL 174-13 (commenced 10 March 2022), WDL 174-14 (commenced 26 May 2023) and WDL 174-15 (commenced 27 March 2024). These WDLs provided conditional approval during the reporting period for the release of water at specified locations at the Mine and the BBLF. Amendments contained within WDL 174-15 (the WDL) also provided supplementary approval for the temporary use of two additional release locations in response to the impact of Ex-Tropical Cyclone (Ex-TC) Megan at the Mine.

In accordance with Variation of Authorisation (VOA) 0059, MRM was also authorised during the reporting period to undertake conditional releases of water, including at the TSF Water Management Dam (WMD) into Little Barney Creek, via the WMD Release Point.

Strict environmental conditions and a comprehensive monitoring schedule (including water, sediment and biota) continued to remain in place during the reporting period to protect the beneficial uses and community values of the McArthur River and Gulf of Carpentaria marine waters. The following compliance points have been developed:

- SW11 - appropriately located downstream of the operations to identify any potential for impact on the McArthur River downstream of the Mine.
- BBDDP - located downstream of the Dredge Spoil Emplacement Area (DSEA) at the BBLF in the Gulf of Carpentaria.

Site-specific Trigger Values (SSTVs) are listed in the WDL for SW11 and BBDDP to protect the beneficial uses and community values of the downstream environments. During the reporting period, the SSTVs were compared to the water quality monitoring results at SW11 and BBDDP. Any results beyond the SSTVs at the compliance points were investigated to determine the contributing factors and potential environmental risk.

WRM Water & Environment Pty Ltd (WRM) was commissioned by MRM to assess site surface water monitoring data (WRM, 2024b) and mine derived analyte loads (WRM, 2024c) for the reporting period and to inform this monitoring report.

Climate Influences at the Mine

The McArthur River catchment experiences a monsoonal climate regime, which is strongly seasonal with distinct wet and dry seasons. Climatic conditions are known to significantly influence the natural environment in the vicinity of the Mine, in particular the McArthur River and its tributaries. Over the dry season months, the SW11 compliance point in the McArthur River experienced cease to flow conditions between mid-September to late November 2023.

During the reporting period, a significant amount of rainfall, the 7th wettest on record (equating to an exceedance probability of 1 in 20), was measured at the Mine, primarily due to the occurrence of Ex-TC Megan. Ex-TC Megan made landfall on the Carpentaria coast, south-east of Port McArthur, on 18 March 2024 as a category 3 cyclone. It weakened while tracking south further inland through the Carpentaria district and was downgraded to a tropical low on 19 March 2024.

As Ex-TC Megan tracked across the McArthur River catchment, Bureau of Meteorology data indicates that the Mine experienced a peak rainfall intensity of 276 mm over 24-hours (equating to an exceedance probability of 1 in 85). The 48-hour rainfall total during the event was 334.8 mm. This resulted in total rainfall over the 12-

month reporting period of approximately 1,235 millimetres (mm), which is approximately 71% higher than the annual average of 722 mm.

The intense rainfall from Ex-TC Megan caused widespread flooding of the McArthur River, including at the Mine, SW11 and Borroloola (see Plate 1). Water levels in the McArthur River at the Upstream Gauging Station adjacent the Mine peaked at approximately 18 metres (m), with a corresponding river flow of about 4,880 cubic metres per second (m^3/s). Water levels in the McArthur River at the SW11 compliance point peaked at approximately 21.5 m, with a corresponding river flow of about 7,310 m^3/s.

The MRM Incident Management Team convened prior to the arrival of Ex-TC Megan, with preparation undertaken to reduce environmental risk, including the dewatering of storages. Although several low-lying and minor water storages were inundated by the floodwaters at the Mine (MRM, 2024a), the large perimeter runoff dams and Tailings Storage Facility (TSF) were not inundated or overtopped during the event. Overall, the water management system at the Mine performed well during Ex-TC Megan, with excess water from the intense rainfall being diverted to the Open Pit to limit any uncontrolled releases to the receiving environment and to protect the McArthur River.

As a result of Ex-TC Megan, an uncontrolled release of water occurred on the northeast side of the Northern Overburden Emplacement Facility (NOEF) on 26 March 2024. The uncontrolled release was caused by damage sustained to a flood protection levee. Significant measures were undertaken by MRM to rapidly contain the uncontrolled release. Representatives from both the NT Department of Industry, Tourism and Trade (DITT) and the NT Department of Environment, Parks and Water Security (DEPWS) inspected the damaged flood levee and mitigation measures on 27 March 2024.

Climate Influences at the Bing Bong Loading Facility

The BBLF experiences a monsoonal climate regime similar to the Mine, which is strongly seasonal with distinct wet and dry seasons. During the reporting period, the compliance monitoring point BBDDP experienced cease to flow or dry conditions for most of the scheduled sampling events.

During the reporting period, a significant amount of rainfall, the 4th wettest on record (equating to an exceedance probability of 1 in 34) occurred at the BBLF. The total rainfall at the BBLF over the 12-month reporting period was approximately 1,768 mm, which is much higher than the annual average of 902 mm.

The higher-than-average rainfall was primarily due to the occurrence of Ex-TC Megan. However, due to the large storage capacity at the BBLF, the three site runoff ponds were not inundated or overtopped, despite the intense rainfall associated with the event.

Water Treatment and Managed Releases

During the reporting period, water generated at the Mine was treated with hydrated lime in the South-Eastern Perimeter Runoff Dam (NOEF SEPROD) and Southern Perimeter Runoff Dam (NOEF SPROD). The dams were periodically filled with various sources of water for lime treatment. A total of 4,732 tonnes (t) of hydrated lime was used in both dams during the reporting period.

In NOEF SPROD, approximately 3,390 t of hydrated lime was used to treat approximately 513 megalitres (ML) of water during the reporting period, with an additional 1,068 ML of water in treatment at the end of the reporting period. In NOEF SEPROD, approximately 1,342 t of hydrated lime was used to treat approximately 3,024 ML of water during the reporting period.

All treated water was either transferred to the TSF WMD for storage and potential release under conditions of the WDL and VOA, blended back into the mine water circuit for concentrator water supply, or directly released to the receiving environment in accordance with the temporary release conditions outlined in the WDL.

During the reporting period, approximately 3,887.5 ML of water was released to the McArthur River. The following is an approximate breakdown of the total managed releases from each point and source storage:

- 385.5 ML via the Mine Levee Discharge Point (MLDP) (from TSF WMD, Northern Crossing 1A (OP NC1A) and OP P2);

- 31.2 ML via the McArthur River Diversion Channel Discharge Point (MRDC DP) (from TSF WMD);
- 434.4 ML via the Central East Release Point (CERP) (from NOEF SEPROD); and
- 3,036.4 ML via the WMD RP (from TSF WMD).

During the reporting period, there was one instance when a measured concentration at SW11 triggered a notifiable incident under conditions of the WDL while managed releases were occurring. The incident was reported to the Department in accordance with the WDL. The investigation concluded that this instance was unrelated to the managed release activities. Further details pertaining to the investigation are provided below.

Dredging did not occur over the reporting period and dredge spoil was not actively emplaced at the BBLF and as such there were no managed releases from the DSEA.

Downstream McArthur River Water Quality

During the reporting period, there was one instance when a measured concentration at SW11 triggered a notifiable incident under conditions of the WDL. The notifiable incident occurred on 26 March 2024 and was related to a filtered zinc (Zn) concentration at SW11 west was greater than the SW11 SSTV. Notification of this result was provided to the NT DEPWS in accordance with the WDL on the following dates:

- Verbal notification was provided during the inspection of the damaged flood levee on 27 March 2024;
- Email notification was provided on 16 April 2024 following confirmation of the final laboratory result on 15 April 2024; and
- Investigation report (IR020 and 0790-160-A3) summarising the contributing factors and environmental risk was provided by email on 30 April 2024.

The investigation concluded that the uncontrolled release originating from the northeast side of the NOEF (i.e. the damaged flood levee) was a contributing factor to the filtered Zn concentration in the SW11 west sample. However, the investigation also determined that the sample was not considered representative of the McArthur River water at SW11 as it was not:

- collected from the typical SW11 sampling location due to access restrictions;
- connected to the main McArthur River channel; and
- mixed with significant flow from the main McArthur River channel.

Modelling undertaken for the investigation showed that flow in the McArthur River at the time of sampling would have been sufficient to dilute the uncontrolled release below the SW11 SSTV had the sample been taken from fully mixed waters. Additionally, a sample was collected from SW11 east on the same date (i.e. from the opposite bank to SW11 west). This sample contained a concentration of filtered Zn less than 2 micrograms per litre (µg/L) (i.e. well below the SSTV of 32 µg/L) supporting the conclusion that the SW11 west sample was not representative of fully mixed waters.

Following the notifiable incident at SW11 west, water quality sampling was undertaken in the fully mixed McArthur River waters downstream of SW11. The monitoring results from this sampling confirmed that the concentration of all analytes, including filtered Zn, downstream of SW11 were below their respective SSTVs. The monitoring data collected at these sites showed that the risk of environmental harm in the McArthur River was low.

Bing Bong Water Quality

During the reporting period, there were no instances when a measured concentration at BBDDP triggered a notifiable incident under conditions of the WDL.

Analyte Loads

WRM (2024c) estimated the mine derived analyte loads for the reporting period. The assessment noted that load increases due to managed releases from the Mine were generally less than 10 percent (%), except for the analytes filtered manganese (Mn), filtered thallium (Tl), filtered Zn, and sulphate (SO_4).

Due to the intense rainfall and flooding associated with Ex-TC Megan, MRM released a significant volume of water during the reporting period to reduce the risk of uncontrolled releases. As a result of the extreme conditions, MRM was granted an exemption to the annual load limits for total lead and total zinc by the NT DITT on 12 June 2024.

Conclusion

Based on the review of surface water quality monitoring data between 1 May 2023 and 30 April 2024, WRM (2024b) concluded that:

> *There was one notifiable incident under Schedule 1 Item 10 of the WDL relating to a filtered Zn concentration being greater than three times the SW11 SSTV. Although mine affected water was draining from Emu Creek at the time, the investigation concluded the sample taken was not representative of fully mixed McArthur River waters at SW11.*
>
> *…*
>
> *Based on a review of the available data, WRM concluded that the risk of environmental harm in the McArthur River channel downstream of SW11 was low during the notifiable incident.*
>
> *…*
>
> *MRM continue to implement effective controls to minimise the risk of environmental harm of downstream receiving waters due to Mine operations. The review concluded that the beneficial uses and community values of the McArthur River continue to be protected from potential mine derived impacts.*

MRM will continue to implement the existing monitoring program in accordance with conditions of the current WDL and VOA.

Looking north – flooding cut access between the Open Pit and Northern Overburden Emplacement Facility.

Looking north – flooding cut access to the main road between the Site Village and the Concentrator.

Looking north – flooding inundated sections of the Airport and the floodplain surrounding the Open Pit.

Plate 1: Photos (taken 20 March 2024) of flooding at the Mine following Ex-Tropical Cyclone Megan

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1 Introduction

1.1 General

The McArthur River Mine (the Mine) is an Open Pit zinc, lead and silver mining operation in the Northern Territory (NT) located approximately 700 kilometres (km) south-east of Darwin, and approximately 45 km south-west of the township of Borroloola (Figure 1).

In addition to mining activities, operations include an on-site concentrator and processing plant and the Bing Bong Loading Facility (BBLF) located on the Gulf of Carpentaria approximately 95 km north-northeast of the Mine (Figure 1). McArthur River Mining Pty Ltd (MRM) is the operator of the Mine and the BBLF and is a wholly owned subsidiary of Glencore. MRM is the world's largest producer of zinc in bulk concentrate form.

MRM operates consistent with its approved *Mining Management Plan* (2020) and associated amendments. On-site mining and processing activities are conducted within Mineral Lease Northern (MLN) 1121, MLN 1122, MLN 1123, MLN 1124 and MLN 1125 (Figure 2).

The BBLF is located within MLN 1126 (Figure 3). Adjacent to the Bing Bong MLN is the Bing Bong Dredge Spoil Emplacement Area (DSEA), located on the former Non-Pastoral Land Use Approval NP033. It is noted no dredging or dredge spoil emplacement has been undertaken by MRM since 2013.

MRM was granted Waste Discharge Licence (WDL) 174-13 on 10 March 2022 and WDL 174-14 on 26 May 2023. These licences provided conditional approval for the release of water at specified locations at the Mine and BBLF during the reporting period of 1 May 2023 to 30 April 2024 (the reporting period). In addition, due to the impact of Ex-Tropical Cyclone (Ex-TC) Megan at the Mine, MRM was granted WDL 174-15 ('the WDL') on 27 March 2024. The amended licence provided conditional approval for the temporary use of two additional release locations at the Mine. The managed release locations and receiving waters listed in WDL 174-15 include:

- the Mine Levee Discharge Point (MLDP) into the old McArthur River channel;
- the South-East Levee 1 Discharge Point (SEL1 DP) into the Barney Creek Diversion Channel;
- the McArthur River Diversion Channel Discharge Point(s) (MRDC DP) into the McArthur River Diversion Channel;
- the temporary release locations Central Release Point (CRP) and Central East Release Point (CERP) into the Barney Creek Diversion Channel; and
- the Bing Bong Dredge Spoil Drain (BBDDP) into marine waters at the BBLF.

In accordance with Variation of Authorisation (VOA) 0059, MRM was also authorised during the reporting period for the conditional release of water at the TSF Water Management Dam (WMD) Release Point (RP) into the McArthur River catchment via Little Barney Creek.

1.2 Monitoring Report

This Monitoring Report has been submitted in accordance with Schedule 1 Item 13 of WDL 174-15. WDL 174-15 is provided in Attachment 1.

Table 1 and Table 2 reproduces the requirements of this Monitoring Report given in Schedule 1 Item 15 and Condition 40 of WDL 174-15 respectively, along with a reconciliation of the reporting requirements with this Monitoring Report and its Attachments.

A recent review of the environmental performance of the Mine and BBLF over the period 1 May 2023 to 30 April 2024 was undertaken for the *McArthur River Mine 2023-2024 Environmental Monitoring Report* (EMR) (Attachment 2).

To supplement and verify MRM's collection, review and analysis of environmental monitoring data for the EMR, external experts were engaged to review and provide conclusions regarding environmental performance (as reported in the technical appendices to the EMR). The operational activities of the Mine and BBLF during the EMR reporting period are also described in the EMR (Attachment 2). The historical and recent observations of the physical environment relevant to water management and monitoring (e.g. climate, hydrology, river heights) are described in WRM (2024b) in Attachment 2.

During the reporting period, MRM operated under WDL 174-13, WDL 174-14 and WDL 174-15 as well as VOA 0059. The following is a summary of which WDL the Mine was operating under during the 2023/24 reporting period:

- WDL 174-13 was operated under from the start of the reporting period (1 May 2023) to 25 May 2023;
- WDL 174-14 was operated under from 26 May 2023 to 26 March 2024; and
- WDL 174-15 was operated under from 27 March 2024 until the end of the reporting period (30 April 2024).

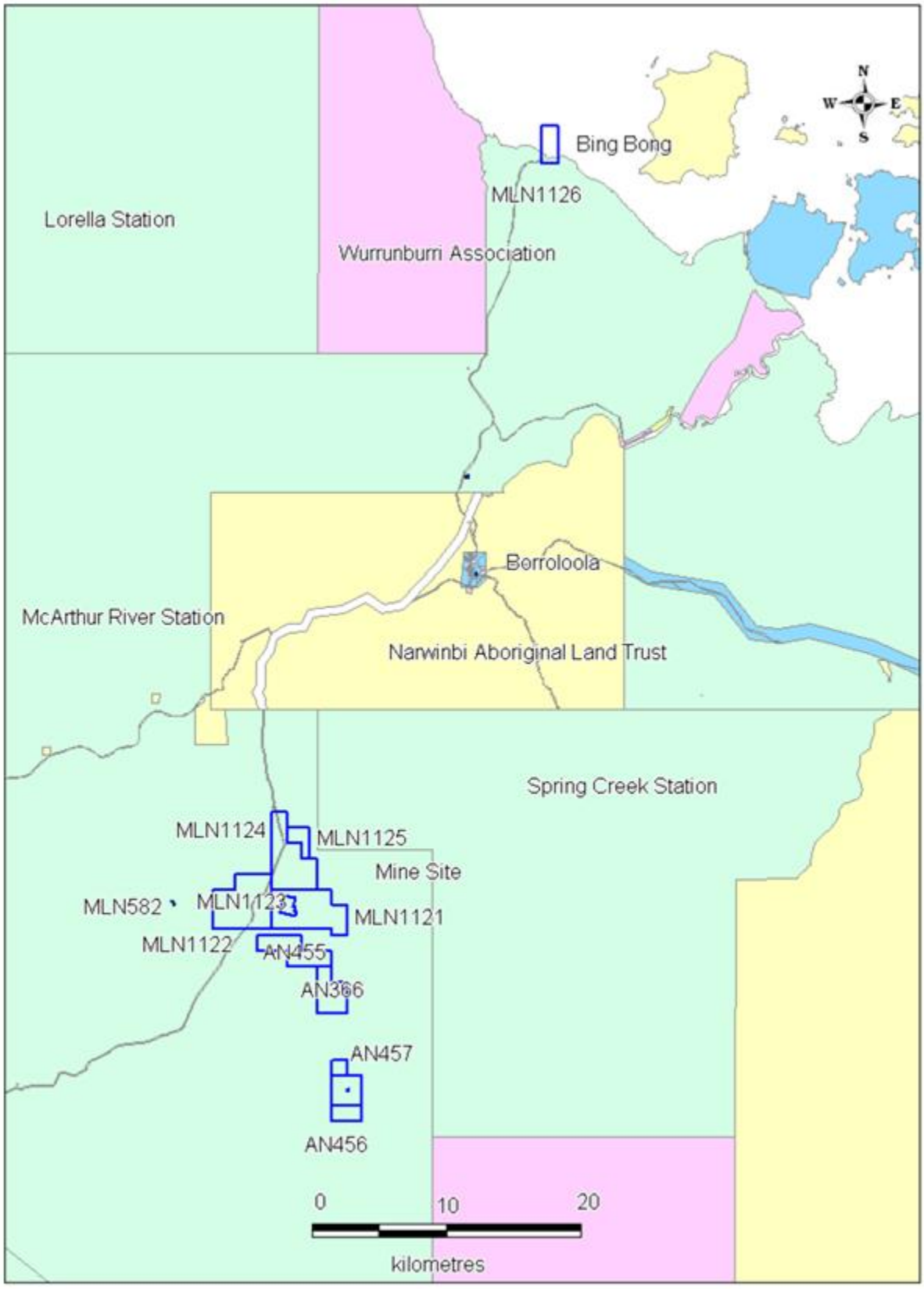


Figure 1: Regional Locality

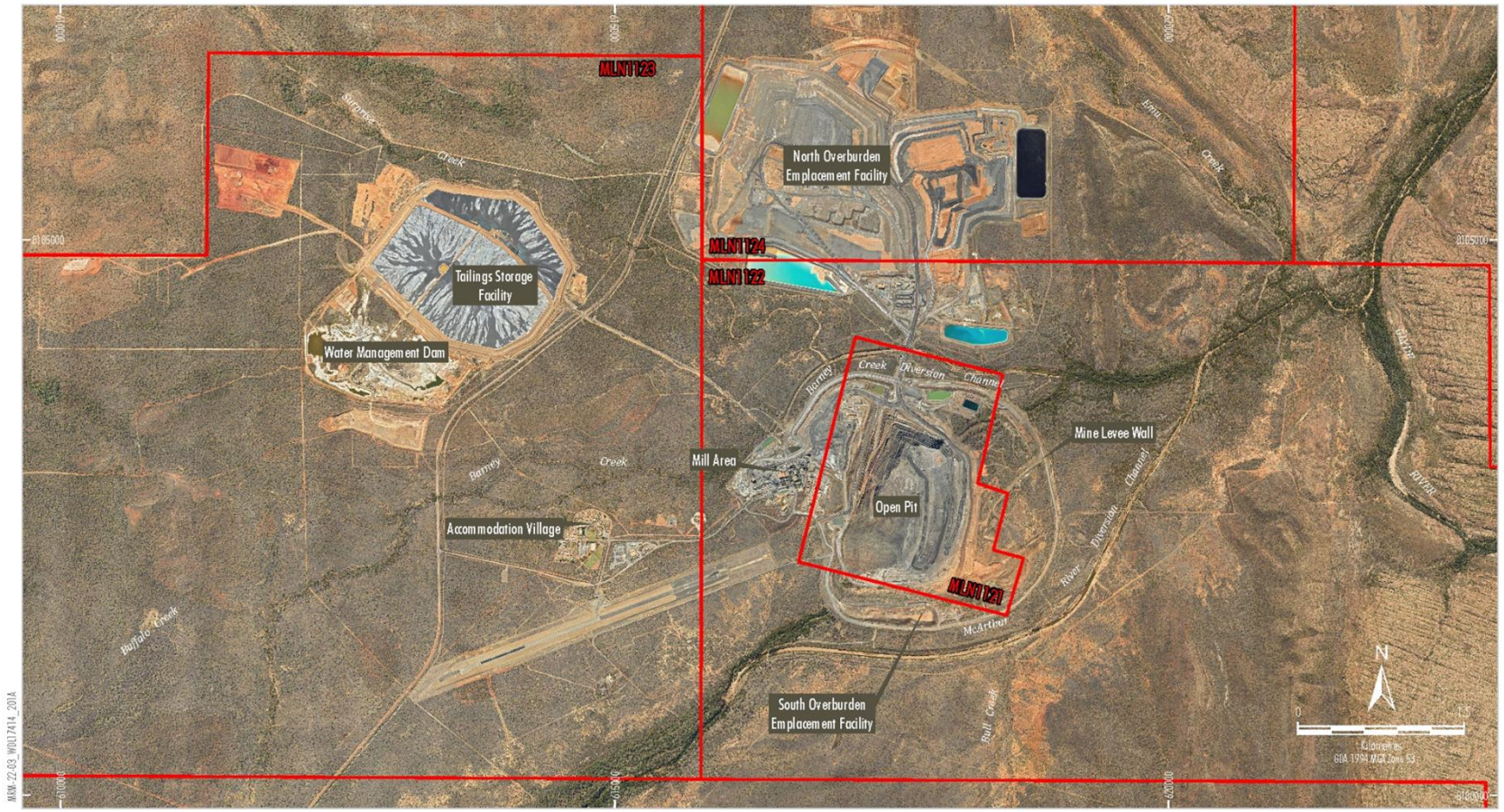


Figure 2: Mine Site

Source: Orthophoto MRM (2022); Department of Environment and Natural Resources (2016); IPE (2019); MRM (2019)

Figure 3: Bing Bong Loading Facility

TABLE 1: WDL 174-15 MONITORING REPORT REQUIREMENTS (SCHEDULE 1 ITEM 15)

Requirement	Section
Schedule 1 Item 15. *in addition to the requirements in condition 40, the licensee must ensure that each Monitoring Report is prepared in the format described in the National Water Quality Management Strategy, Australian Guidelines for Water Quality Monitoring and Reporting, Chapter 7 and must include:*	This Monitoring Report and its appendices have been generally structured consistent with Chapter 7 of the Guideline. This includes the provision of the executive summary and primary technical report. This Monitoring Report is based on reviews completed by the qualified specialists WRM Water & Environment Pty Ltd (WRM) in WRM (2024b) and WRM (2024c) in Attachment 2.
5. *a data analysis and interpretation using the National Water Quality Management Strategy, Australian Guidelines for Water Quality Monitoring and Reporting, Chapter 6;*	This Monitoring Report has been generally structured consistent with Chapter 6 of the Guideline. This includes: • analysis of changes in time and space (Section 4); • checks for data integrity (Appendix A); • comparison of site and water quality guidelines (Section 6); and • interpretation in relation to study objectives (Section 7).
6. *a tabulation of all monitoring data collected as required as a condition of this licence and any additional data used as part of the analysis and interpretation undertaken in the report, to be submitted in electronic Microsoft Excel format;*	Tabulation of data required under the monitoring schedules listed in Condition 27 is provided in electronic Microsoft Excel format (Attachment 3). The data required under the specialist biota monitoring listed in Condition 27 is provided in the EMR (Attachment 2) and its Appendices.
7. *includes total mine-derived loads entering the McArthur River from the mine site for the contaminants listed in Appendix 3 Table 1;*	Refer to Section 4.9 and WRM (2024c) of Attachment 2.
8. *a comparison between the mine-derived load for each contaminant listed in Appendix 3 table 1 and the background loads in the McArthur River (SW11 andSW21) and Glyde River (SW09);*	Refer to Section 4.9 and WRM (2024c) of Attachment 2.
9. *a comparison of the mine-derived contaminant loads, referred to in paragraph 7 of this item, against contaminant loads reporting to the McArthur River from July 2017 to June 2018;*	Refer to Section 4.9 and WRM (2024c) of Attachment 2.
10. *an assessment of all monitoring data (including flow rate and calculated volume from each river contributing to water quality at SW11) and whether the activity has been conducted in a manner that has ensured the McArthur River is being protected at all times from mine related impacts.*	Refer to Section 6 and WRM (2024b) of Attachment 2.

TABLE 2: WDL 174-15 MONITORING REPORT REQUIREMENTS (CONDITION 40)

Requirement	Section
40. The Licensee must ensure that each Monitoring Report:	
40.1. Is prepared in accordance with the requirements of the Administering Agency 'Guideline for Reporting on Environmental Monitoring' (or any other guideline as adopted by the Administering Agency from time to time);	Tabulation of data required under the monitoring schedules listed in Condition 27 is provided in electronic Microsoft Excel format (Attachment 3). The data required under the specialist biota monitoring listed in Condition 27 is provided in the EMR (Attachment 2) and its Appendices.
40.2. Includes a tabulation, in Microsoft® Excel ® format or another format requested by the Administering Agency, of all monitoring data required to be collected in accordance with this licence for the preceding 12 month period);	Refer to Attachment 2 and Attachment 3.
40.3. Includes a tabulation of monthly and annual contaminant loads discharged from the authorised discharge point specified in Item 5 for the preceding 12 month period. Contaminant loads must be calculated for metals, metalloids, nutrients and other parameters (excluding field parameters) listed in the monitoring program specified in Item 11. The calculations must be based on the daily discharge volume and the concentration of contaminant present in the discharge on that day. On the days when a sample was not taken then the concentration of the contaminant must be estimated using Linear Interpolation methodology	Refer to Section 4.9 and WRM (2024c) of Attachment 2.
40.4. Includes long term trend analysis of monitoring data to demonstrate any environmental impact associated with the Licensed Action over a minimum period of three years (of part thereof);	Refer to Section 4 and Attachment 2.
40.5. Includes a summary of any investigations undertaken by the Licensee in accordance with this licence for the preceding 12 month period; and	Refer to Section 6 and WRM (2024b) of Attachment 2.
40.6. Includes an assessment of environmental impact from the Licensed Action.	Refer to Section 6 and Attachment 2.

2 Community Values and Beneficial Uses

2.1 Community Values

Community values are particular values or uses of the environment that are important for a healthy ecosystem or for public benefit, health, safety or welfare, and requires protection from the effects of stressors.

In accordance with the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (Australian and New Zealand Governments [ANZG], 2018), MRM has identified the following community values for the receiving waters downstream of the Mine, including:

- aquatic ecosystems (slightly to moderately disturbed);
- primary industries including stock drinking water, irrigation and general water uses;
- recreation and aesthetics; and
- cultural and spiritual values.

Typically, the most stringent water quality objectives are associated with the protection of aquatic ecosystems. Where more stringent water quality guidelines have been identified for other McArthur River community values (e.g. primary industries, recreation and aesthetics or cultural and spiritual), these have been incorporated into MRM's environmental management and monitoring program targets in addition to the aquatic ecosystem values.

The condition of the McArthur River in the vicinity of the Mine is considered as a 'slightly to moderately disturbed system' due to the influence of pastoralism and grazing throughout the catchment. The ANZG (2018) guidelines recommend that generally a 95 percent (%) species protection level should be applied to slightly to moderately disturbed systems, as is the case for the McArthur River in the vicinity of the Mine.

2.2 Beneficial Uses

The WDL lists the following beneficial uses as declared under the *Water Act 1992* (NT) and the sensitivity of the surrounding land use and environment in the vicinity of the Mine. These include:

- Declared beneficial uses and/or water quality objectives are:
  - McArthur River Area: aquatic ecosystem protection, recreational water quality and aesthetics (Gazette references G9 11 March 1998 and G20 27 May 1988); and
  - McArthur River Catchment Area: environment, cultural and riparian (Gazette reference G10 14 March 2001).
- Sites of conservation significance (SOCS):
  - Sir Edward Pellow Island group (SOCS No. 33);
  - McArthur River coastal floodplain (SOCS No. 34); and
  - Borroloola area (SOCS No. 35).

2.3 Mixing Zones

In accordance with NT EPA *Guidelines on Mixing Zones* (2013), mixing zones are specifically defined areas where the water quality may be below that required to protect environmental values and beneficial uses.

Mixing zones allow for a designated zone of potential impact between the authorised release points and the compliance points, in lieu of prescribing concentration requirements at authorised release points

(NT EPA, 2013). At the Mine, the mixing zone is located between the authorised release points within the mineral leases and the SW11 compliance monitoring point in the McArthur River receiving environment.

The zone extends along the McArthur River from the MRDC DP, past the end of the McArthur River Diversion Channel (Barney Creek and McArthur River confluence), finishing at the northern (downstream) boundary of MLN 1122.

Managed release is also conveyed along Little Barney Creek and Barney Creek (including the Barney Creek Diversion Channel). However, these waterway reaches are in operational areas of the Mine site, are highly ephemeral, are not considered important refugia for the persistence of any aquatic species, nor do they provide a major ecological role within the wider catchment (Indo-Pacific Environmental [IPE], 2019). For these reasons, the Little Barney Creek and the Barney Creek reaches are not afforded mixing zone status.

3 Monitoring Objectives and Method

3.1 Authorised Discharge Points

The authorised discharge, compliance and monitoring points during the reporting period (as detailed in WDL 174-15) are reproduced in Table 3 below, and presented on Figure 4 and Figure 5 for the Mine and Figure 6 for the BBLF. Schedule 1, Items 5 and 6 and Appendix 2 of WDL 174-15 describes the authorised discharge points and source waters. Schedule 1, Item 8 and Appendix 2 of WDL 174-15 describes the compliance points.

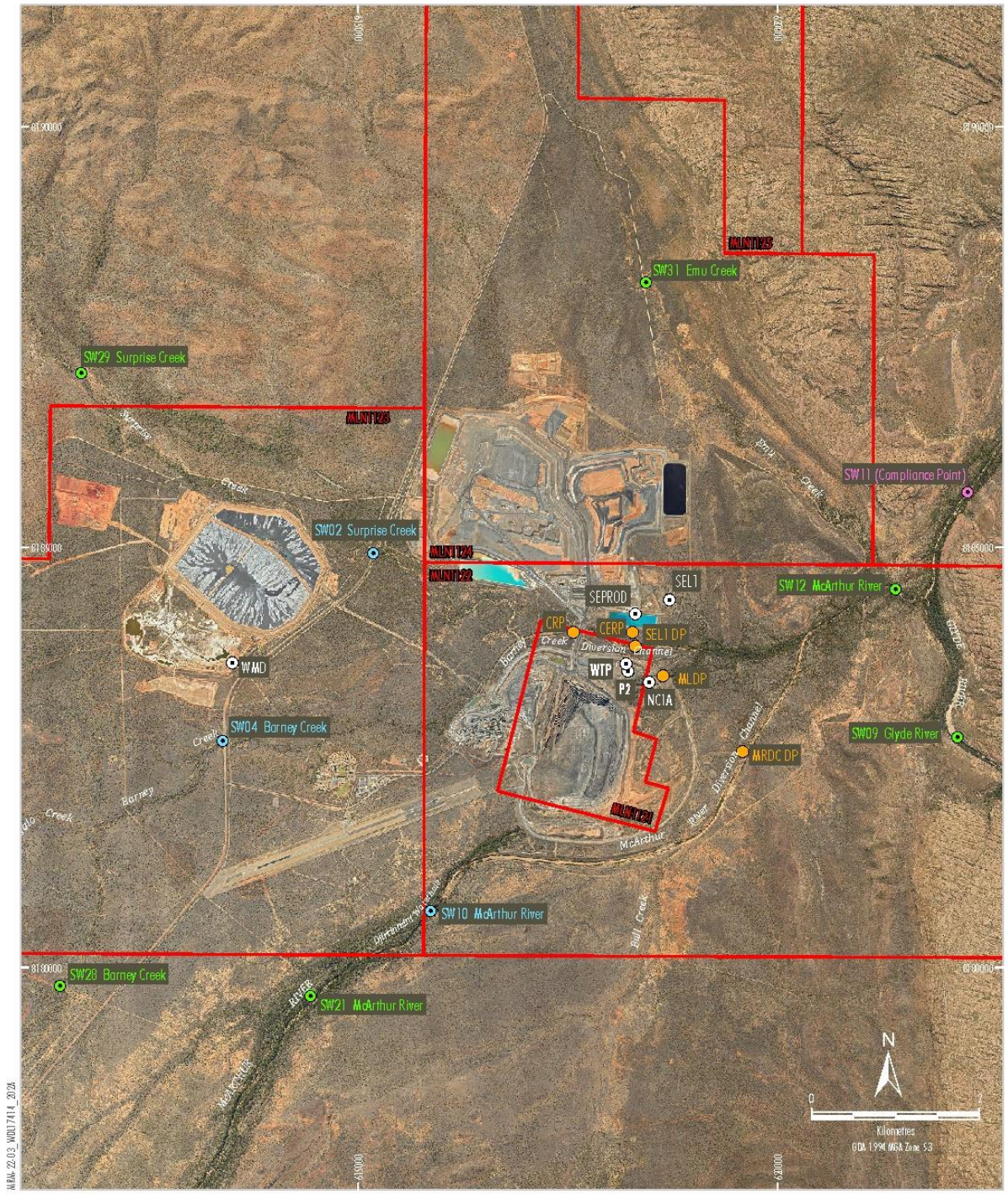
In addition, in accordance with VOA 0059, MRM was authorised during the reporting period for the managed release of water at the TSF WMD into Little Barney Creek via the WMD RP.

3.2 Temporary Release Locations

Due to the impact of Ex-TC Megan at the Mine, MRM was granted WDL 174-15 on 27 March 2024. The amended licence provided conditional approval for the temporary use of two release locations in addition to the authorised discharge points discussed in Section 3.1. Table 3 and Figure 4 presents the temporary release locations for the Mine. Appendix 9, Condition 44 of WDL 174-15 describes the temporary release locations and source waters.

TABLE 3: WDL 174-15 AUTHORISED DISCHARGE AND COMPLIANCE MONITORING POINTS

Point	Description	Location
Authorised Discharge Points		
Mine Levee Discharge Point(s) (MLDP) (Mine levee pumping outlets)	Discharges through MLDP include: 1. Water from the Water Management Dam. 2. Treated water from the Water Treatment Plant via Pond 2 (OP P2). 3. Groundwater from dewatering bores around main pit collected in and then discharged from Pond OP P2. 4. Rain water collecting in the old McArthur River Channel (NC1A) inside the Mine levee. Waters released at MLDP are pumped over the mine levee wall and flow into the Old McArthur River channel upstream of the McArthur River and Glyde River confluence.	Latitude: -16.427423 Longitude: 136.111403
South-East Levee 1 Discharge Point (SEL1 DP)	Discharges through SEL1 DP include: 1. Rainwater runoff, separated from all contaminated seepages, collected in, and discharged from the South-East Levee 1 (SEL1). Discharges are pumped via pipeline to Barney Creek and then flow into the McArthur River. Discharge can only occur when flow as measured in the McArthur River at the downstream gauging station is in excess of 20 cubic metres per second (m^3/s).	Latitude: -16.423824 Longitude: 136.108302
McArthur River Diversion Channel Discharge Point(s) (MRDC DP)	Discharges through MRDC DP include: 1. Water from the Water Management Dam. 2. Treated water from the Water Treatment Plant via OP P2. 3. Groundwater from dewatering bores around main pit collected in and then discharged from OP P2. Waters released at the McArthur River Diversion Channel Discharge Point(s) are pumped into McArthur River Diversion Channel upstream of the McArthur River and Glyde River confluence.	Latitude: -16.435385 Longitude: 136.120196
Bing Bong Dredge Discharge Point (BBDDP)	The BBDDP receives overflow from: 1. The final dredge spoil emplacement area cell when in operation; and 2. Saline water from the perimeter drain which surrounds the dredge spoil emplacement area. At BBDDP passive releases flow across the intertidal flats to the Gulf of Carpentaria via the Bing Bong navigation channel.	Latitude: -15.629683 Longitude: 136.394778
Temporary Release Locations		
Central Release Point (CRP)	Discharges through Central Release Point (CRP) include: 1. Water from the West Perimeter Runoff Dam (NOEF WPROD). Waters released at CRP are pumped via pipeline into the Barney Creek Diversion Channel upstream of the McArthur River and Barney Creek confluence.	Latitude: -16.422297 Longitude: 136.101389
Central East Release Point (CERP)	Discharges through Central Release Point (CRP) include: 1. Water from the NOEF SEPROD. Waters released at CERP are pumped or siphoned into the NOEF SEPROD stilling basin and flow into the Barney Creek Diversion Channel upstream of the McArthur River and Barney Creek confluence.	Latitude: -16.423233 Longitude: 136.107667
Compliance Monitoring Points		
SW11	The monitoring point is situated along the McArthur River approximately at the edge of MLN 1122. SW11 is downstream of the confluence of the Glyde River. SW11 is approximately: • 5 km downstream of MLDP; and • 6 km downstream of SEL1 DP.	Latitude: -16.407386 Longitude: 136.144785
BBDDP	The BBDDP is located on tidal mudflats approximately 750 metres east of the loading facility.	Latitude: -15.629683 Longitude: 136.394778



LEGEND

- Mining Lease
- Authorised Discharge Point / Temporary Discharge Location
- Compliance Point
- Monitoring Site (water & sediment)
- Monitoring Site (flow)
- Monitoring Site (water)

Source: Orthophoto MRM (2022); Department of Environment and Natural Resources (2016); MRM (2020)

Figure 4: Mine Surface Water Monitoring Sites and Release Locations

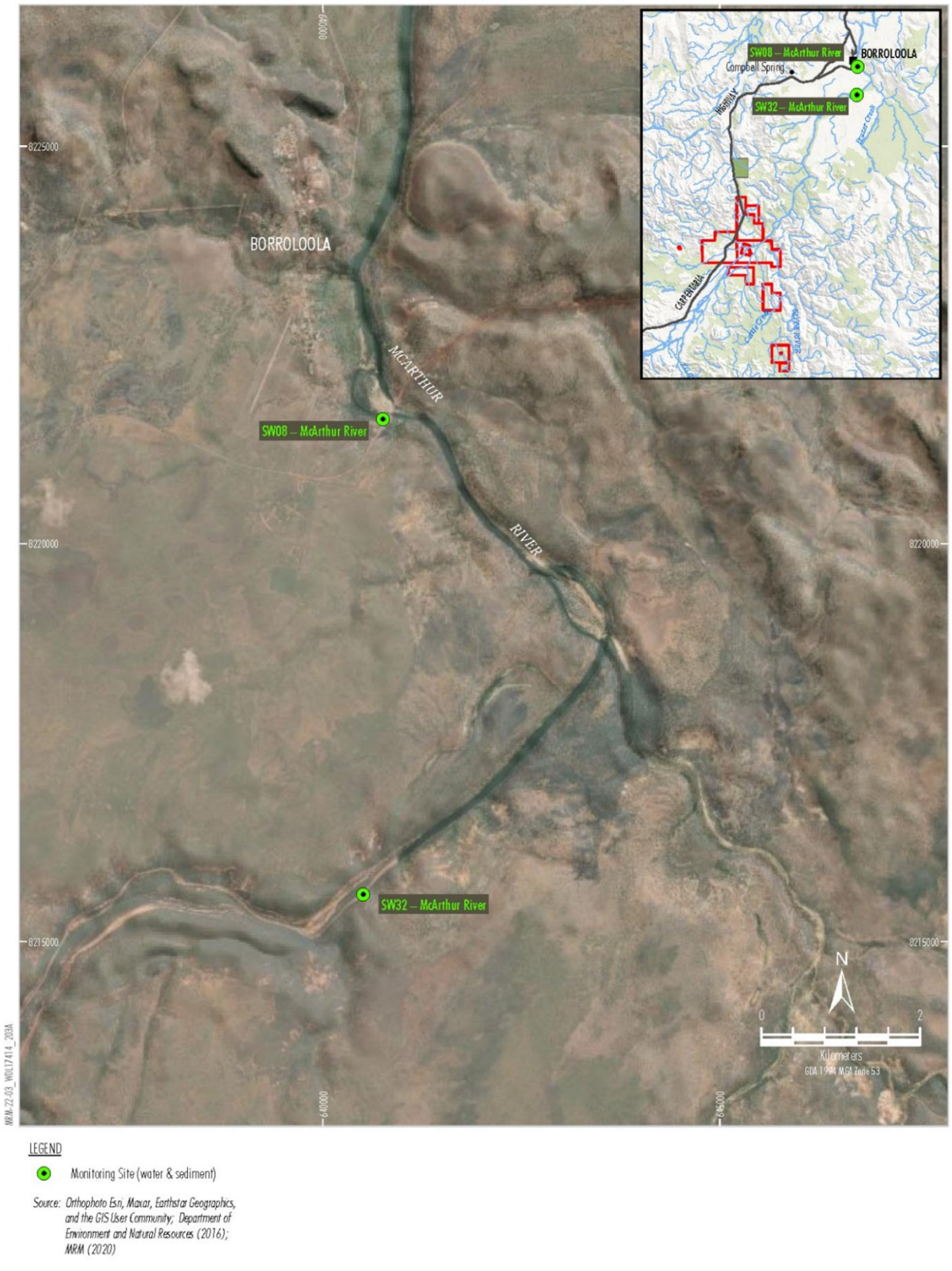


Figure 5: McArthur River Downstream Surface Water Monitoring Sites

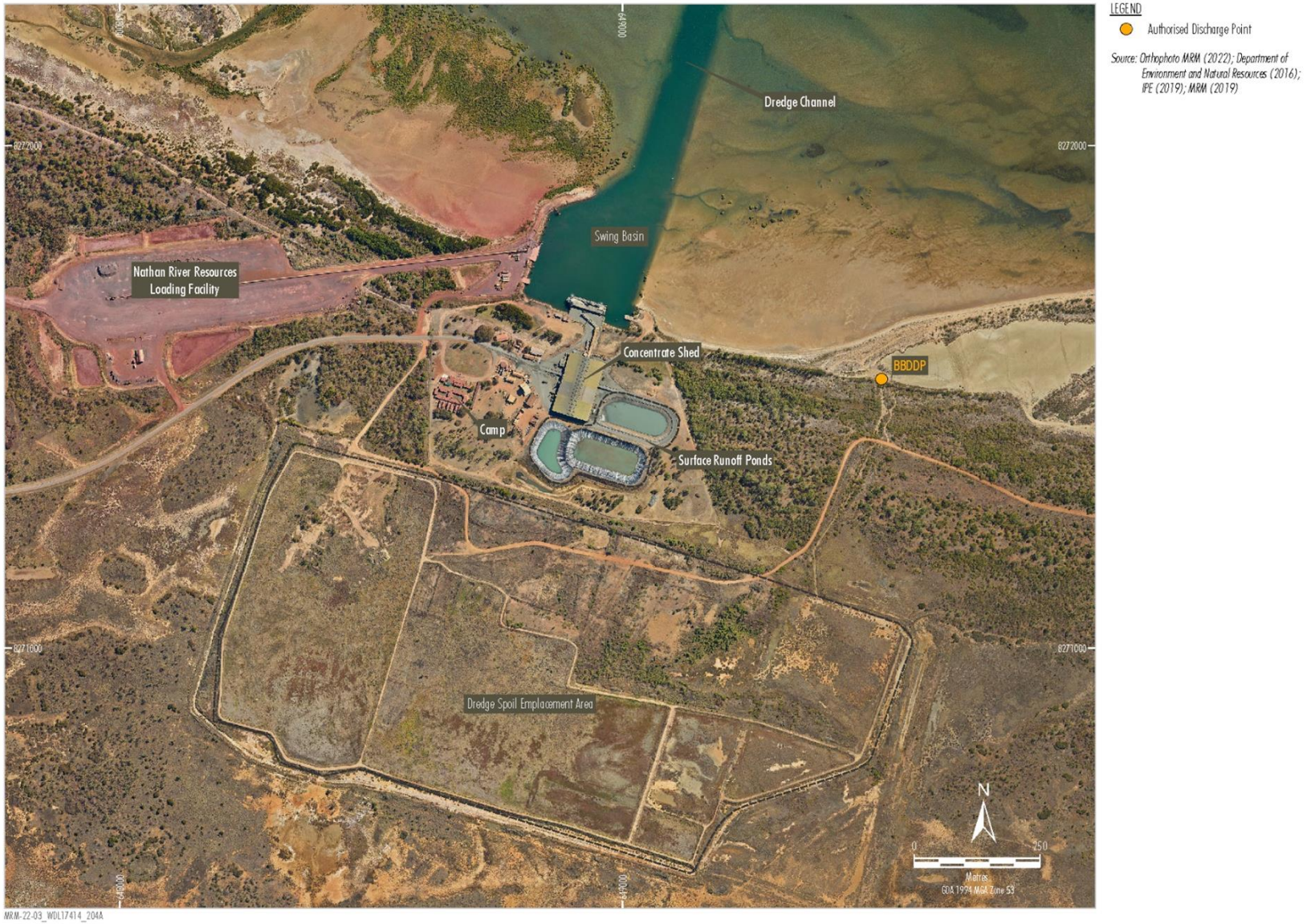


Figure 6: Bing Bong Loading Facility Surface Water Monitoring Sites

3.3 Compliance Points and Trigger Levels

WDL 174-15 details SSTVs for compliance monitoring points SW11 and BBDDP. The SSTVs for the compliance points are reproduced in Table 4 below. SSTV compliance is assessed against Schedule 1 Item 10 of WDL 174-15 which is reproduced below:

Schedule 1 Item 10. Notifiable incidents (conditions 25 and 26):

(a) An exceedance of a trigger value specified in Item 7 at the compliance point in Item 8, on three consecutive sampling occasions;

(b) A measurement outside the range for pH or dissolved oxygen specified in Item 7 at the compliance point in Item 8, on three consecutive sampling occasions;

(c) An exceedance of three or more times a trigger value specified in Item 7 at the compliance point in Item 8;

(d) A discharge of mine-affected water at a point not specified in Item 5 or authorised by another relevant regulatory approval;

(e) A discharge of mine-affected water from a source not specified in Item 6 or authorised by another relevant regulatory approval; or

(f) A failure to comply with condition 23.

TABLE 4: WDL 174-15 COMPLIANCE POINTS AND SSTVS

	Site Code			SW11	BBDDP
Parameter	**Abbreviation**	**Units**	**Analysis**	**SSTVs***	**ANZECC (2000)***
Field Measurements					
pH	pH	pH Units	In situ	6.0-8.5	8.0-8.4
Electrical Conductivity	EC	µS/cm		1,000	-
Dissolved Oxygen	DO	% saturation		85-120	-
Metals and Metalloids					
Aluminium	Al	µg/L	Filtered (0.45 µm)	269	0.5
Arsenic	As			24	2.3
Cadmium	Cd			1.73	5.5
Cobalt	Co			1.4	-
Copper	Cu			9	1.3
Iron	Fe			347	-
Lead	Pb			17	4.4
Manganese	Mn			1,900	80
Nickel	Ni			11	70
Thallium	Tl			58	-
Zinc	Zn			32	15
Total Petroleum Hydrocarbons (TPH)					
Benzene	NA	µg/L		10	500
TPH Fraction	NA			600	600
C6 – C9					
C10 – C14					
C15 – C28					
C29 – C36					
Other					
Sulphate	SO_4	mg/L		1,000	-
Nitrate	NO_3	mg/L		10.6	-

µS/cm = microSiemens per centimetre, µg/L = micrograms per litre, mg/L = milligrams per litre

* SSTVs are applicable to filtered samples for metals and metalloids. The derivation of the SSTVs is documented within the WDL.

3.4 WDL 174-15 Monitoring Program

Schedule 1 Item 11 of WDL 174-15 outlines MRM's monitoring requirements, and the conditions are reproduced below.

Schedule 1 Item 11. Monitoring Program

The Monitoring Program includes:

(a) Surface water monitoring in accordance with Appendices 4 and 5;

(b) Fluvial sediment monitoring in accordance with Appendices 6 and 7; and

(c) Biota monitoring in accordance with Appendix 8.

A summary of reporting period and long-term water quality trends for the McArthur River, including SW11, is provided in Section 4.3. Further information is provided in WRM (2024b) and summarised in the EMR (Attachment 2).

Only a single sample was collected at BBDDP during the reporting period as this location experienced cease to flow or dry conditions for most of the scheduled sampling events. Similarly, as MRM has not undertaken dredging or dredge spoil emplacement since 2013, there is limited data available for long term trend analysis at BBDDP.

The results for all other monitoring required under WDL 174-15, including long-term trend analysis where data is available, can be sourced directly from the specialist consultant reports appended to the EMR (Attachment 2):

- *Assessment of Bioavailable Metal Concentrations and Lead Isotope Ratios of Seafloor Sediments in the Bing Bong Loading Facility Transshipment Area, 2023.*
- *Annual Marine Monitoring Program of the Bing Bong Loading Facility, 2023.*
- *Monitoring of Select Analytes and Lead Isotope Ratios in Fluvial Sediments, Fish and Molluscs of the McArthur River 2023.*
- *Annual Seagrass Survey of the Bing Bong Loading Facility, 2023*.
- *Aquatic Fauna of the McArthur River, Northern Territory, Early Dry Season, 2023*.
- *Aquatic Fauna of the McArthur River, Northern Territory, Late Dry Season, 2023.*
- *McArthur River Freshwater Aquatic Macroinvertebrate Assessment, 2023*.
- *Surface Water Monitoring Report 2023/24* (WRM, 2024b).

The monitoring programs, including the sampling and analysis methodology used, are described in the specialist consultant reports appended to the EMR (Attachment 2). The specialist reports also describe the environmental settings during the sampling and EMR reporting period (where relevant). Additionally, the Mine Derived Analyte Loads Assessment for 2023/24 is included in Attachment 2 (WRM, 2024c).

In addition to addressing the requirements of WDL 174-15, the objectives of the monitoring programs are to help inform the assessment of MRM's performance against its key environmental objectives, which are as follows:

- protect the McArthur River beneficial uses and community values from mining impacts;
- facilitate development of the ecosystems and their functions along the McArthur River Diversion Channel for terrestrial and aquatic flora and fauna;
- achieve a recovering trend in the water quality and ecosystem function in creeks on the Mine site within 20 years of cessation of mining;
- minimise air quality related impacts from the Mine's operations with respect to community health and environment; and
- protect the community values and beneficial uses adjacent to the BBLF and transhipment corridor.

4 Monitoring Results

4.1 Summary of Managed Releases

4.1.1 Release events and volumes

Table 5 presents the releases from MLDP, MRDC DP, WMD RP and CERP to the McArthur River receiving waters during the reporting period. Approximately 3,887.5 ML of water was released to the McArthur River during the reporting period. The following is a breakdown of the total water released from each point and source water:

- approximately 385.5 ML via the MLDP (from TSF WMD, Northern Crossing 1A (OP NC1A) and Pond 2 (OP P2));
- approximately 31.2 ML via the MRDC DP (from TSF WMD);
- approximately 434.4 ML via the CERP (from the South-Eastern Perimeter Runoff Dam (NOEF SEPROD)); and
- approximately 3,036.4 ML via the WMD RP (from TSF WMD).

TABLE 5: MLDP, MRDC DP, CERP AND WMD RP MANAGED RELEASES (SORTED BY RELEASE START DATE)

Release ID	Managed release point	Location Site ID	Release Start Date	Release Finish Date	Total Release (ML)
Event 1: commenced 11:08 on 11 February 2024					
1	MRDC DP	TSF WMD	11/02/2024	11/02/2024	2.5
Event 2: commenced 12:00 on 17 February 2024					
2	WMD RP	TSF WMD	17/02/2024	25/02/2024	450.1
Event 3: commenced 10:10 on 11 March 2024					
3	WMD RP	TSF WMD	11/03/2024	12/03/2024	78.9
Event 4: commenced 10:47 on 18 March 2024					
4	WMD RP	TSF WMD	18/03/2024	26/03/2024	473.7
5	MLDP	TSF WMD	19/03/2024	26/03/2024	184.6
6	MLDP	OP NC1A	20/03/2024	22/03/2024	33.8
7	MLDP	OP NC1A	24/03/2024	24/03/2024	2.3
8	MLDP	OP P2	25/03/2024	25/03/2024	25.8
Event 5: commenced 8:09 on 29 March 2024					
9	WMD RP	TSF WMD	29/03/2024	30/04/2024	2,033.7
10	MRDC DP	TSF WMD	29/03/2024	30/03/2024	28.7
11	CERP	NOEF SEPROD	29/03/2024	9/04/2024	341.3
12	MLDP	OP P2	29/03/2024	4/04/2024	139.0
13	CERP	NOEF SEPROD	14/04/2024	21/04/2024	93.1
				Total	**3,887.5**

4.1.2 Water Treatment

During the reporting period, water generated at the Mine was treated with hydrated lime in the (NOEF SEPROD and NOEF SPROD. The dams were periodically filled with various sources of water for lime treatment. A total of 4,732 tonnes (t) of hydrated lime was used in both dams during the reporting period.

In NOEF SPROD, approximately 3,390 t of hydrated lime was used to treat approximately 513 ML of water during the reporting period, with an additional 1,068 ML of water in treatment at the end of the reporting period. In NOEF SEPROD, approximately 1,342 t of hydrated lime was used to treat approximately 3,024 ML of water during the reporting period.

All treated water was either transferred to the TSF WMD for storage and potential release under conditions of the WDL and VOA, blended back into the mine water circuit for concentrator water supply, or directly released to the receiving environment in accordance with the temporary release conditions outlined in the WDL.

4.2 Tabulation of Monitoring Data

Schedule 1 Item 15 (6) of WDL 174-15 requires that the Monitoring Report provide a tabulation of monitoring data, to be submitted in Microsoft Excel format. The water quality monitoring data for the McArthur River downstream compliance point SW11 is provided in Table 6 for those parameters with corresponding SSTVs.

Sampling was generally undertaken at SW11 on a weekly basis, increasing to daily during managed release events. This excluded the period between mid-September until late November 2023, when cease to flow conditions were observed at SW11. In addition, for several reasons, including the occurrence of Ex-TC Megan, MRM was unable to safely complete all scheduled sampling at surface water monitoring sites, including SW11. Notifications were provided to NT DEPWS regarding these occasions.

The BBDDP is required to be sampled weekly during active dredge disposal. No active dredge disposal occurred during the reporting period and therefore weekly sampling was not required. The BBDDP was inspected on a monthly basis for flow in accordance with the WDL. The water quality monitoring data for the BBDDP compliance point is provided in Table 7 for those parameters with corresponding SSTVs. During the reporting period, the BBDDP experienced cease to flow or dry conditions for most of the scheduled sampling events.

Water quality monitoring data for all surface water monitoring sites outlined in Appendix 4 of WDL 174-15 is tabulated in Attachment 3. These water quality monitoring sites are also shown on Figure 4 and Figure 5.

TABLE 6: WATER QUALITY DATA FOR SW11 SSTV PARAMETERS

Monitoring Location	Date	Flow	Access	Comment	pH – Field	EC – Field	DO – Field	Filtered Al	Filtered As	Filtered Cd	Filtered Co	Filtered Cu	Filtered Fe	Filtered Pb	Filtered Mn	Filtered Ni	Filtered Tl	Filtered Zn	Benzene	TPH C10-C36	SO_4	NO_3
		(Yes/No)	(Yes/No)	SSTVs	(pH Unit)	(µS/cm)	(%)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)	(µg/L)
					6.0-8.5	1,000	85-120	269	24	1.73	1.4	9	347	17	1,900	11	58	32	10	600	1,000	10,600
SW11	7/05/2023 11:28	Yes	Yes	-	8.06	504.3	98.6	<5	0.9	<0.2	<1	<1	<5	<0.5	35	<1	<0.1	<2	<1	<50	13	138
SW11	14/05/2023 15:32	Yes	Yes	-	8.07	632.1	97.2	<5	1.1	<0.2	<1	<1	<5	<0.5	<0.5	<1	<0.1	<2	<1	<50	15	156
SW11	21/05/2023 9:38	Yes	Yes	-	8.08	534.2	95.8	<5	1	<0.2	<1	<1	<5	<0.5	49	<1	<0.1	<2	<1	<50	16	202
SW11	29/05/2023 14:34	Yes	Yes	-	8.16	630.2	103.8	<5	0.8	<0.2	<1	<1	<5	<0.5	56	<1	<0.1	<2	<1	<50	17	139
SW11	4/06/2023 10:11	Yes	Yes	-	8.19	671.5	98.6	<5	0.8	<0.2	<1	<1	<5	<0.5	69	<1	<0.1	<2	<1	<50	18	119
SW11	11/06/2023 11:43	Yes	Yes	-	8.19	678.3	108.1	<5	0.7	<0.2	<1	<1	<5	<0.5	64	<1	<0.1	<2	<1	<50	13	<100
SW11	18/06/2023 9:53	Yes	Yes	-	8.01	720.4	100.3	<5	0.8	<0.2	<1	<1	<5	<0.5	117	<1	0.1	<2	<1	<50	18	141
SW11	25/06/2023 12:33	Yes	Yes	-	8.19	742.5	109	<5	0.8	<0.2	<1	<1	<5	<0.5	99	<1	0.1	<2	<1	<50	19	250
SW11	2/07/2023 9:58	Yes	Yes	-	8.09	710.6	90.8	<5	0.8	<0.2	<1	<1	12	<0.5	122	<1	0.1	<2	<1	<50	19	136
SW11	9/07/2023 11:42	Yes	Yes	-	8.29	745.8	103.4	<5	0.8	<0.2	<1	<1	<5	<0.5	70	<1	0.1	<2	<1	<50	19	105
SW11	16/07/2023 10:29	Yes	Yes	-	8.18	694.6	93.6	<5	0.9	<0.2	<1	<1	7	<0.5	126	<1	0.2	<2	<1	<50	19	108
SW11	23/07/2023 12:19	Yes	Yes	-	8.21	702.8	108.5	<5	0.8	<0.2	<1	<1	9	<0.5	154	<1	0.2	<2	<1	<50	20	115
SW11	30/07/2023 9:13	Yes	Yes	-	8.15	701	82.1	<5	0.8	<0.2	<1	<1	8	<0.5	188	<1	0.2	<2	-	-	21	<100
SW11	6/08/2023 11:45	Yes	Yes	-	8.28	732.3	102.7	<5	0.8	<0.2	<1	<1	5	<0.5	61	<1	0.2	<2	<1	<50	23	<100
SW11	13/08/2023 9:50	Yes	Yes	-	8.07	713.7	88.4	<5	0.6	<0.2	1	<1	6	<0.5	225	<1	0.2	<2	<1	<50	23	<100
SW11	20/08/2023 12:30	Yes	Yes	-	8.24	757.2	108.2	<5	0.8	<0.2	<1	<1	<5	<0.5	45	<1	0.2	<2	<1	<50	25	<100
SW11	27/08/2023 9:57	Yes	Yes	-	8.07	748.8	89.4	<5	0.8	<0.2	<1	<1	<5	<0.5	65	<1	0.2	<2	<1	<50	25	<100
SW11	3/09/2023 9:03	Yes	Yes	-	7.89	783.6	88.8	<5	0.7	<0.2	<1	<1	<5	<0.5	<0.5	<1	0.2	<2	<1	<50	26	<100
SW11	10/09/2023 9:41	Yes	Yes	-	7.98	780.8	88.1	<5	1	<0.2	<1	<1	7	<0.5	<0.5	<1	0.2	<2	<1	<50	25	<100
SW11	17/09/2023 17:01	Yes	Yes	-	8.35	758.3	86.1	<5	1.2	<0.2	<1	<1	21	<0.5	122	<1	0.2	<2	<1	<50	24	<100
SW11	24/09/2023 8:56	No	Yes	No flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW11	1/10/2023 8:42	No	Yes	No flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW11	8/10/2023 9:05	No	Yes	No flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW11	15/10/2023 8:48	No	Yes	No flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW11	22/10/2023 7:13	No	Yes	No flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW11	29/10/2023 0:00	No	Yes	No flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW11	12/11/2023 8:32	No	Yes	No flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW11	19/11/2023 7:37	No	Yes	No flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW11	26/11/2023 16:31	Yes	Yes	-	6.91	97.2	85.5	19	<0.5	<0.2	<1	<1	103	<0.5	8.4	<1	<0.1	<2	<1	<50	3.1	1136
SW11	3/12/2023 10:40	Yes	Yes	-	7.63	78.9	84.9	6	<0.5	<0.2	<1	<1	62	<0.5	2.2	<1	<0.1	<2	<1		4.4	501
SW11	12/12/2023 12:00	Yes	Yes	-	7.7	160.9	101.6	30	1	<0.2	<1	<1	248	<0.5	2.2	<1	<0.1	<2	<1	<50	3.3	<100
SW11	17/12/2023 12:52	Yes	Yes	-	8.2	181.6	118.3	9	0.9	<0.2	<1	<1	190	<0.5	2.1	<1	<0.1	<2	<1	<50	3.6	<100
SW11	24/12/2023 9:56	Yes	Yes	-	7.88	128.3	93.5	26	0.6	<0.2	<1	<1	185	<0.5	3	<1	<0.1	<2	-	-	2.3	272
SW11	31/12/2023 9:39	Yes	Yes	-	8.04	171.7	97.5	24	0.7	<0.2	<1	<1	203	<0.5	7.8	<1	<0.1	<2	-	-	2.8	<100
SW11	7/01/2024 17:04	Yes	Yes	-	7.6	120.9	87	162	0.6	<0.2	<1	<1	342	<0.5	12	<1	<0.1	<2	<1	<50	2.4	1112
SW11	14/01/2024 9:51	Yes	Yes	-	7.15	64.2	86.9	118	<0.5	<0.2	<1	<1	288	<0.5	1	<1	<0.1	<2	<1	<50	1.8	528
SW11	23/01/2024 10:47	Yes	Yes	-	7.59	83.4	91.7	123	0.5	<0.2	<1	<1	311	<0.5	1.1	<1	<0.1	<2	<1	<50	2.1	172
SW11	28/01/2024 9:23	Yes	Yes	-	7.58	107.6	92.8	76	<0.5	<0.2	<1	1	192	<0.5	1.6	<1	<0.1	<2	<1	<50	1.6	136
SW11	4/02/2024 17:31	Yes	Yes	-	7.56	148.6	92.4	29	0.6	<0.2	<1	<1	155	<0.5	34	<1	<0.1	<2	<1	<50	2.7	406

Monitoring Location	Date	Flow	Access	Comment	pH – Field	EC – Field	DO – Field	Filtered Al	Filtered As	Filtered Cd	Filtered Co	Filtered Cu	Filtered Fe	Filtered Pb	Filtered Mn	Filtered Ni	Filtered Tl	Filtered Zn	Benzene	TPH C10-C36	SO_4	NO_3
		(Yes/No)	(Yes/No)	SSTVs	(pH Unit)	(µS/cm)	(%)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)	(µg/L)
					6.0-8.5	1,000	85-120	269	24	1.73	1.4	9	347	17	1,900	11	58	32	10	600	1,000	10,600
SW11	10/02/2024 16:32	Yes	Yes	-	7.48	79.5	86.8	398	<0.5	<0.2	<1	2	584	<0.5	1.6	1	<0.1	<2	<1	<50	2.9	<100
SW11	11/02/2024 14:11	Yes	Yes	-	7.71	99.4	96.7	277	<0.5	<0.2	<1	1	494	<0.5	1.4	<1	<0.1	<2	<1	<50	6.2	135
SW11	18/02/2024 9:22	Yes	Yes	-	7.16	17.6	89.8	84	<0.5	<0.2	<1	<1	129	<0.5	0.8	<1	<0.1	<2	<1	<50	0.3	127
SW11	19/02/2024 10:37	-	Yes	-	6.84	19.3	89.3	208	<0.5	<0.2	<1	<1	235	<0.5	0.5	<1	<0.1	<2	-	-	0.5	129
SW11	20/02/2024 9:53	-	Yes	-	7.32	32.6	87.6	102	<0.5	<0.2	<1	<1	154	<0.5	<0.5	<1	<0.1	<2	-	-	0.5	297
SW11	21/02/2024 17:37	-	Yes	-	7.36	62.4	85.5	50	<0.5	<0.2	<1	<1	156	<0.5	0.9	<1	<0.1	<2	-	-	2.7	218
SW11	22/02/2024 15:42	-	Yes	Helicopter unavailable for sampling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW11	23/02/2024 8:45	-	Yes	-				65	<0.5	<0.2	<1	<1	149	<0.5	1.6	<1	<0.1	<2	-	-	0.6	278
SW11	24/02/2024 9:26	-	Yes	-	6.84	56.2	66.1	47	<0.5	<0.2	<1	<1	169	<0.5	10	<1	<0.1	<2	-	-	2.6	361
SW11	25/02/2024 10:09	Yes	Yes	-	7.77	142.4	87	11	<0.5	<0.2	<1	<1	65	<0.5	<0.5	<1	<0.1	<2	<1	<50	8.5	139
SW11	3/03/2024 11:45	Yes	Yes	-	7.88	185.5	92.8	8	<0.5	<0.2	<1	<1	63	<0.5	4	<1	<0.1	<2	<1	<50	2	<100
SW11	10/03/2024 10:07	Yes	Yes	-	7.73	49.3	93.5	53	<0.5	<0.2	<1	<1	172	<0.5	0.7	<1	<0.1	<2	<1	<50	0.6	<100
SW11	11/03/2024 13:08	-	Yes	-	7.9	76.5	86.6	38	<0.5	<0.2	<1	<1	172	<0.5	21	<1	<0.1	<2	-	-	0.9	138
SW11	12/03/2024 8:56	-	Yes	-	7.96	201.4	95.5	13	<0.5	<0.2	<1	<1	96	<0.5	0.6	<1	<0.1	<2	-	-	14	<100
SW11	24/03/2024 11:06	Yes	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW11	25/03/2024 11:15	Yes	Yes	West side	7.3	222.8	86.5	29	<0.5	<0.2	<1	<1	64	<0.5	16	<1	0.3	24	-	-	56	113
SW11	26/03/2024 9:00	Yes	Yes	West side	7.48	431.4	76.9	8	0.6	<0.2	2	<1	34	<0.5	174	3	0.6	248	-	-	124	<100
SW11	26/03/2024 9:10	Yes	Yes	-	7.72	56.3	81.3	31	0.6	<0.2	<1	<1	177	<0.5	35	<1	<0.1	<2	-	-	0.7	<100
SW11	26/03/2024 14:14	Yes	Yes	-	7.1	58.6	88.4	37	<0.5	<0.2	<1	<1	127	<0.5	5.4	<1	<0.1	<2	-	-	0.5	<100
SW11	26/03/2024 15:25	Yes	Yes	-	7.92	59	88.3	38	<0.5	<0.2	<1	<1	123	<0.5	4.8	<1	<0.1	<2	-	-	0.5	<100
SW11	27/03/2024 10:16	Yes	Yes	-	8.05	70.5	85.8	55	<0.5	<0.2	<1	<1	146	<0.5	8	<1	<0.1	<2	-	-	0.6	<100
SW11	27/03/2024 15:04	Yes	Yes	-	7.35	42.4	98.7	40	<0.5	<0.2	<1	<1	105	<0.5	5.9	<1	<0.1	<2	-	-	0.4	<100
SW11	28/03/2024 11:25	Yes	Yes	-	8.22	29	94.2	36	<0.5	<0.2	<1	<1	78	<0.5	0.6	<1	<0.1	<2	-	-	0.6	<100
SW11	29/03/2024 8:54	Yes	Yes	-	7.3	38.2	89.8	45	<0.5	<0.2	<1	<1	108	<0.5	1.5	<1	<0.1	<2	-	-	0.5	<100
SW11	30/03/2024 9:08	Yes	Yes	-	7.82	90.4	91.1	27	<0.5	<0.2	<1	<1	107	<0.5	2.4	<1	<0.1	<2	-	-	0.8	153
SW11	31/03/2024 9:59	Yes	Yes	-	7.91	39.2	97.2	36	<0.5	<0.2	<1	<1	88	<0.5	0.6	<1	<0.1	<2	<1	<50	0.4	<100
SW11	1/04/2024 11:19	Yes	Yes	-	7.96	40.2	94.7	28	<0.5	<0.2	<1	<1	110	<0.5	0.6	<1	<0.1	<2	-	-	0.4	<100
SW11	2/04/2024 11:00	Yes	Yes	-	7.95	45.3	90.2	27	<0.5	<0.2	<1	<1	99	<0.5	0.6	<1	<0.1	<2	-	-	0.3	<100
SW11	3/04/2024 8:42	Yes	Yes	-	7.68	81	89.4	17	<0.5	<0.2	<1	<1	122	<0.5	0.6	<1	<0.1	<2	-	-	2.6	<100
SW11	4/04/2024 9:43	Yes	Yes	-	7.8	82.3	90.1	35	<0.5	<0.2	<1	<1	146	<0.5	4.6	<1	<0.1	<2	-	-	0.7	<100
SW11	5/04/2024 9:33	Yes	Yes	-	8.13	150.2	92.4	27	<0.5	<0.2	<1	<1	230	<0.5	34	<1	<0.1	<2	-	-	10	159
SW11	6/04/2024 9:06	Yes	Yes	-	7.92	534.3	90.9	7	0.6	<0.2	<1	<1	95	<0.5	43	<1	0.5	<2	-	-	116	248
SW11	7/04/2024 9:22	Yes	Yes	-	8.03	609.4	94.7	<5	0.6	<0.2	<1	<1	53	<0.5	33	<1	0.5	<2	<1	<50	127	302
SW11	8/04/2024 9:08	Yes	Yes	-	8.19	708.5	96.6	<5	0.7	<0.2	<1	<1	25	<0.5	37	<1	0.6	<2	-	-	156	294
SW11	9/04/2024 8:52	Yes	Yes	-	8.16	727.2	97.6	<5	0.7	<0.2	<1	<1	8	<0.5	39	<1	0.5	<2	-	-	153	274
SW11	10/04/2024 8:55	Yes	Yes	-	8.22	745.3	97.8	<5	0.7	<0.2	<1	<1	7	<0.5	50	<1	0.5	<2	-	-	151	264
SW11	11/04/2024 9:08	Yes	Yes	-	8.19	696.8	98.8	<5	0.8	<0.2	<1	<1	7	<0.5	35	<1	0.3	<2	-	-	102	200
SW11	12/04/2024 16:10	Yes	Yes	-	8.18	794.3	103.1	<5	0.8	<0.2	<1	<1	<5	<0.5	29	<1	0.4	<2	-	-	135	162
SW11	13/04/2024 9:16	No	Yes	-	7.69	818.9	94.7	<5	0.8	<0.2	<1	<1	<5	<0.5	48	<1	0.5	<2	-	-	142	160
SW11	14/04/2024 11:40	Yes	Yes	-	8.32	630.8	99.4	<5	0.8	<0.2	<1	<1	<5	<0.5	26	<1	0.1	<2	<1	<50	39	120

Monitoring Location	Date	Flow	Access	Comment	pH – Field	EC – Field	DO – Field	Filtered Al	Filtered As	Filtered Cd	Filtered Co	Filtered Cu	Filtered Fe	Filtered Pb	Filtered Mn	Filtered Ni	Filtered Tl	Filtered Zn	Benzene	TPH C10-C36	SO_4	NO_3
		(Yes/No)	(Yes/No)	SSTVs	(pH Unit)	(µS/cm)	(%)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)	(µg/L)
					6.0-8.5	1,000	85-120	269	24	1.73	1.4	9	347	17	1,900	11	58	32	10	600	1,000	10,600
SW11	15/04/2024 9:30	Yes	Yes	-	8.24	802.4	97.1	<5	0.8	<0.2	<1	<1	<5	<0.5	34	<1	0.4	<2	-	-	124	<100
SW11	27/04/2024 9:51	Yes	Yes	-	8.2	770.6	96.4	<5	0.9	<0.2	<1	<1	<5	<0.5	33	<1	0.3	<2	<1	<50	94	247

Notes: Shaded results show instances whereby monitoring results were beyond the SSTV value. The instances when DO was beyond the SSTV on 26 March 2024 were obtained at both SW11 (west) and SW11 (east).

TABLE 7: WATER QUALITY DATA FOR BBDDP SSTV PARAMETERS

Monitoring Location	Date	Dry (Yes/No)	Access	Comment	pH – Field	EC – Field	DO – Field	Filtered Al	Filtered As	Filtered Cd	Filtered Co	Filtered Cu	Filtered Fe	Filtered Pb	Filtered Mn	Filtered Ni	Filtered Tl	Filtered Zn	Benzene	TPH C10-C36	SO_4	NO_3
			(Yes/No)	SSTVs	(pH Unit)	(µS/cm)	(%)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)	(µg/L)
					8-8.4	-	-	0.5	2.3	5.5	-	1.3	-	4.4	80	70	-	15	500	600	-	-
BBDDP	3/05/2023 15:22	No	Yes	No flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BBDDP	2/06/2023 11:05	No	Yes	No flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BBDDP	1/07/2023 14:55	No	Yes	No flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BBDDP	2/09/2023 11:15	Yes	Yes	No flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BBDDP	3/10/2023 15:31	Yes	Yes	No flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BBDDP	1/11/2023 14:15	Yes	Yes	No flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BBDDP	4/12/2023 12:48	Yes	Yes	No flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BBDDP	10/01/2024 15:15	Yes	Yes	No flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BBDDP	13/02/2024 13:30	No	Yes	No flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BBDDP	7/03/2024 16:20	No	Yes	No flow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BBDDP	29/04/2024 15:05	No	Yes	Flow	7.87	17500	131.5	<5	2.6	<0.2	<1	<1	<5	<0.5	<0.5	<1	0.3	<2	<1	<50	2419	524

Notes: Shaded results show instances whereby monitoring results were beyond the SSTV value

4.3 Rainfall

The McArthur River catchment experiences a monsoonal climate regime, which is strongly seasonal with distinct wet and dry seasons. Climatic conditions are known to significantly influence the natural environment in the vicinity of the Mine, in particular the McArthur River and its tributaries. Over the dry season months, the SW11 compliance point in the McArthur River experienced cease to flow conditions between mid-September to late November 2023.

During the reporting period, a significant amount of rainfall, the 7th wettest on record (equating to an exceedance probability of 1 in 20), was measured at the Mine, primarily due to the occurrence of Ex-TC Megan. Ex-TC Megan made landfall on the Carpentaria coast, south-east of Port McArthur, on 18 March 2024 as a category 3 cyclone. It weakened while tracking south further inland through the Carpentaria district and was downgraded to a tropical low on 19 March 2024.

As Ex-TC Megan tracked across the McArthur River catchment, Bureau of Meteorology data indicates that the Mine experienced a peak rainfall intensity of 276 mm over 24-hours (equating to an exceedance probability of 1 in 85). The 48-hour rainfall total during the event was 334.8 mm. This resulted in total rainfall over the 12-month reporting period of approximately 1,235 millimetres (mm), which is much higher than the annual average of 722 mm. Figure 7 presents the reporting period SILO Patched Point daily and cumulative rainfalls at the MRM Airport station (14704).

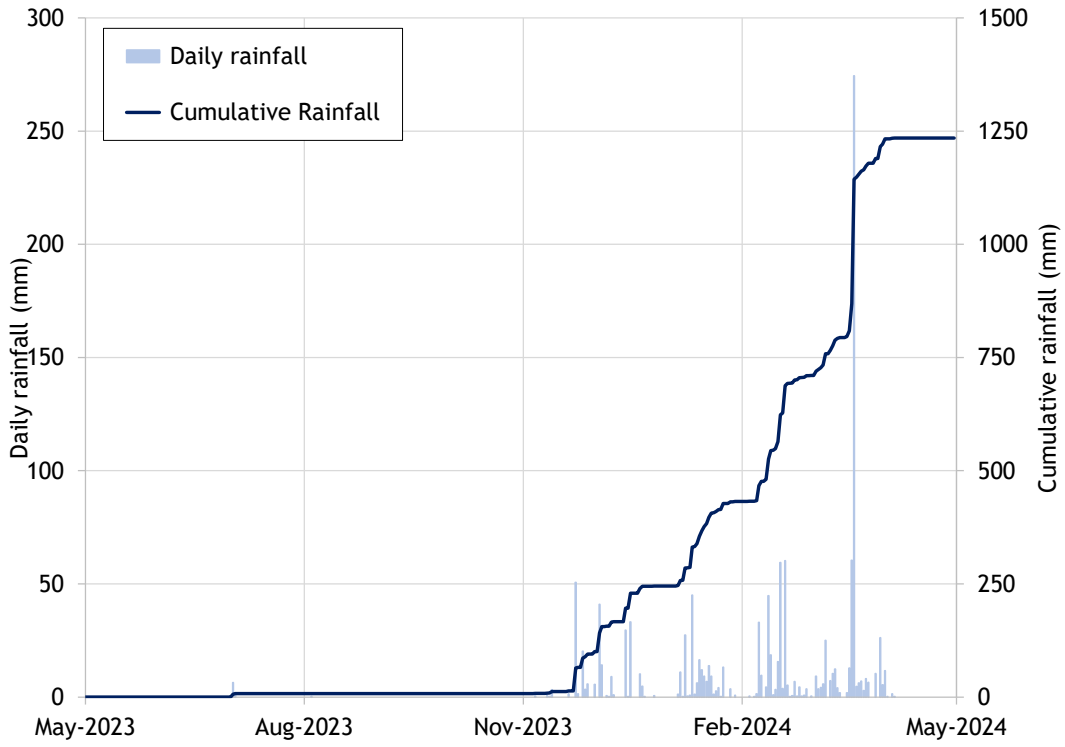


Figure 7: Reporting Period Daily Rainfall and Cumulative Rainfall at MRM Airport

4.4 McArthur River Stream Flow

The intense rainfall from Ex-TC Megan caused widespread flooding of the McArthur River, including at the Mine, SW11 and Borroloola.

Water levels in the McArthur River at the Upstream Gauging Station adjacent the Mine peaked at approximately 18 metres (m) (38.9 m Australian Height Datum (AHD)), with a corresponding river flow of about 4,880 cubic metres per second (m^3/s). Water levels in the McArthur River at the SW11 compliance point peaked at approximately 21.5 m (35.8 m AHD), with a corresponding river flow of about 7,310 m^3/s.

Figure 8 presents the McArthur River water level (m AHD) and flow rate (m^3/s) at the Upstream Gauging Station (USGS / MIM Pump) and SW11 as well as weekly rainfall recorded at the McArthur River Airport station (14704) during the reporting period.

The MRM Incident Management Team convened prior to the arrival of Ex-TC Megan, with preparation undertaken to reduce environmental risk, including the dewatering of storages. Although several low-lying and minor water storages were inundated by the floodwaters at the Mine (reported to the NT EPA as Section 14 Incident Reports) (MRM, 2024a), the large perimeter runoff dams and Tailings Storage Facility (TSF) were not inundated or overtopped during the event.

Overall, the water management system at the Mine performed well during Ex-TC Megan, with excess water from the intense rainfall being diverted to the Open Pit to limit any uncontrolled releases to the receiving environment and to protect the McArthur River.

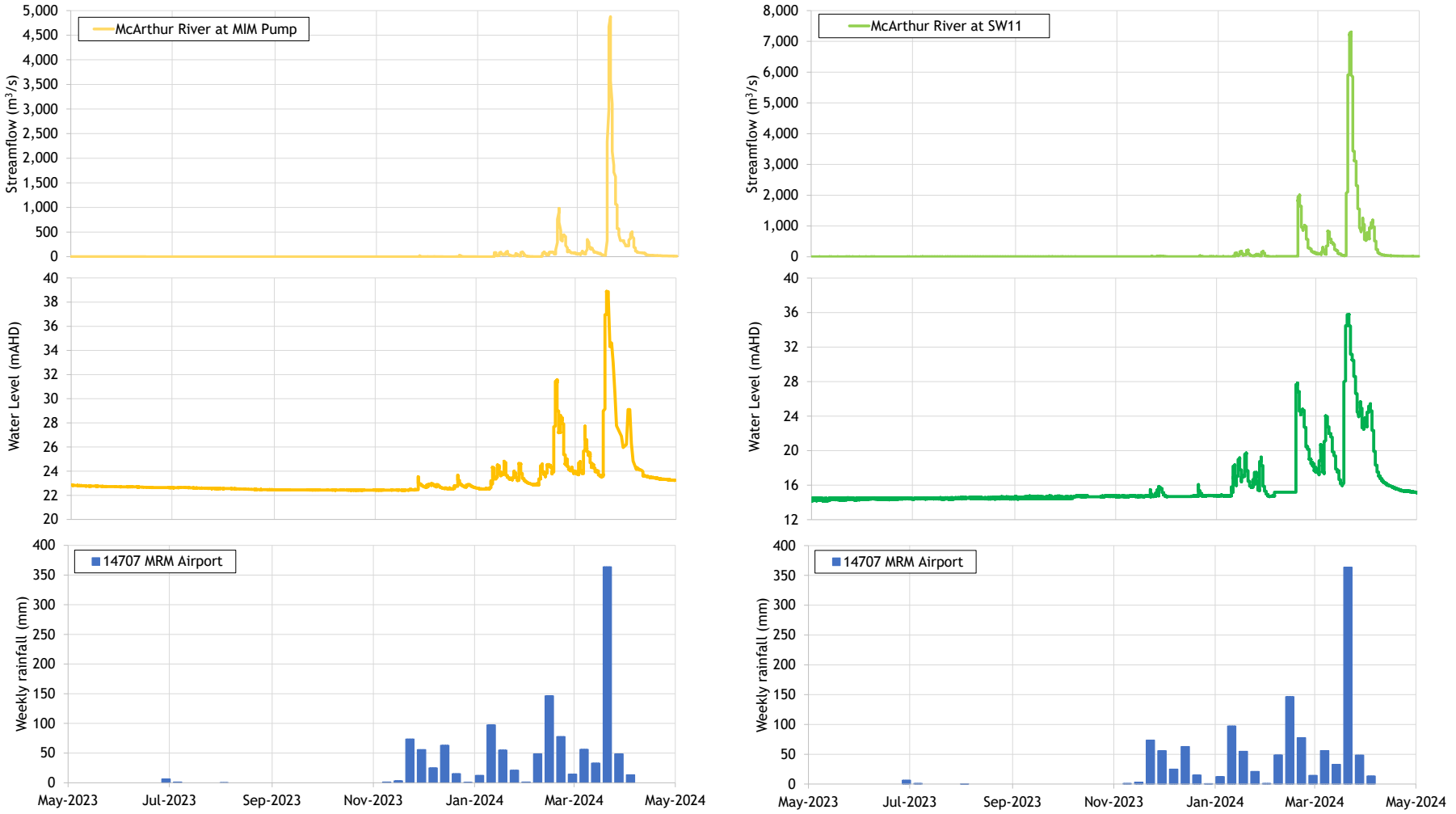


Figure 8: Reporting Period McArthur River Height and Flow for USGS and SW11, Weekly Rainfall at MRM Airport

4.5 McArthur River Surface Water Quality

Surface water quality for each SSTV parameter at select sites on the McArthur River and Glyde River for the reporting period and historically are presented in Chart 1 to Chart 36. The reporting period graphs present the weekly rainfall record from the gauge at McArthur River Airport from the Department of Environment and Science SILO Patched Point Data Service, and the historical graphs present the rainfall as monthly. The majority of the results presented in this section focus on the following key monitoring locations:

- SW21 (upstream McArthur River);
- SW12 (downstream McArthur River);
- SW11 (Compliance Monitoring Point); and
- SW09 (upstream Glyde River).

4.5.1 pH

Field measured pH is presented on Chart 1 for the reporting period. Recorded pH measurements at SW11 were within the SSTV limits. The pH levels during the reporting period were generally consistent with the range of historical values (Chart 2) and ranged between approximately 6.5 and 8.5 (pH units), with the exception of one reading of 8.52 at SW12, which was within the historical range. The pH levels fluctuated during the wet season due to the effects of managed releases and Ex-TC Megan.

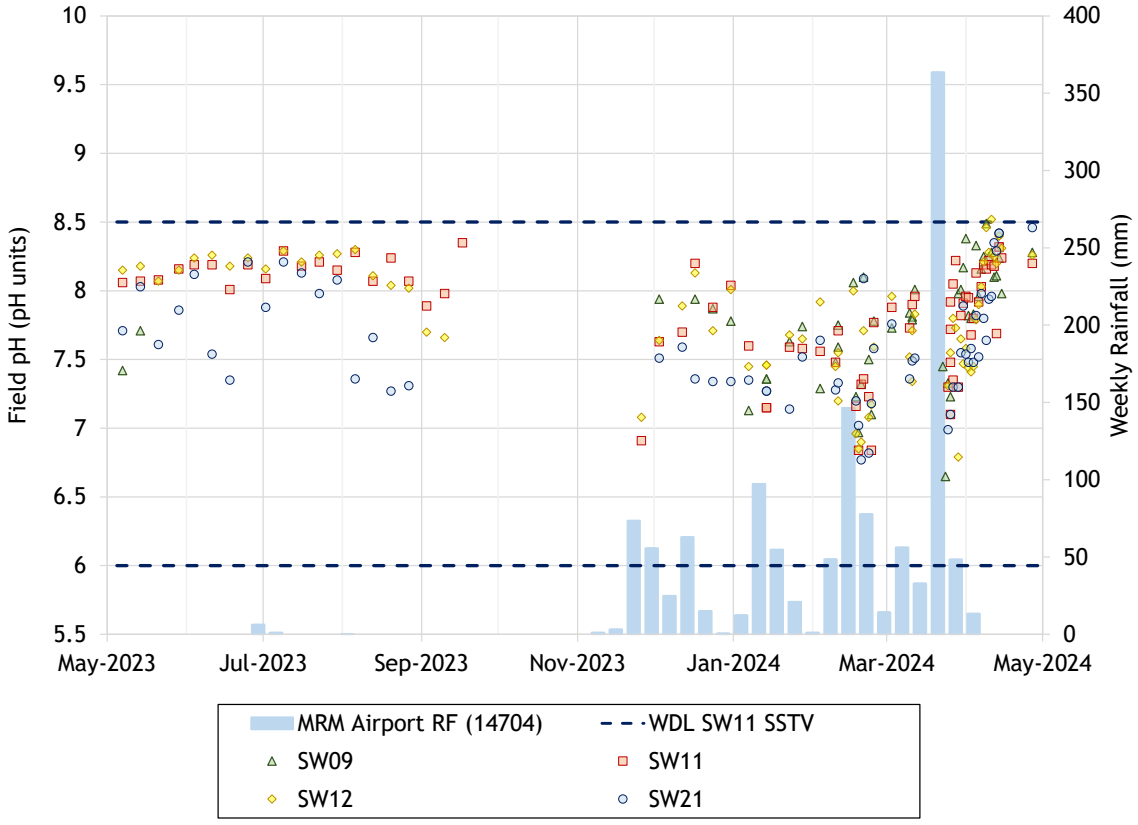


Chart 1: Reporting Period Field pH and Weekly Rainfall – McArthur River and Glyde River Monitoring Sites

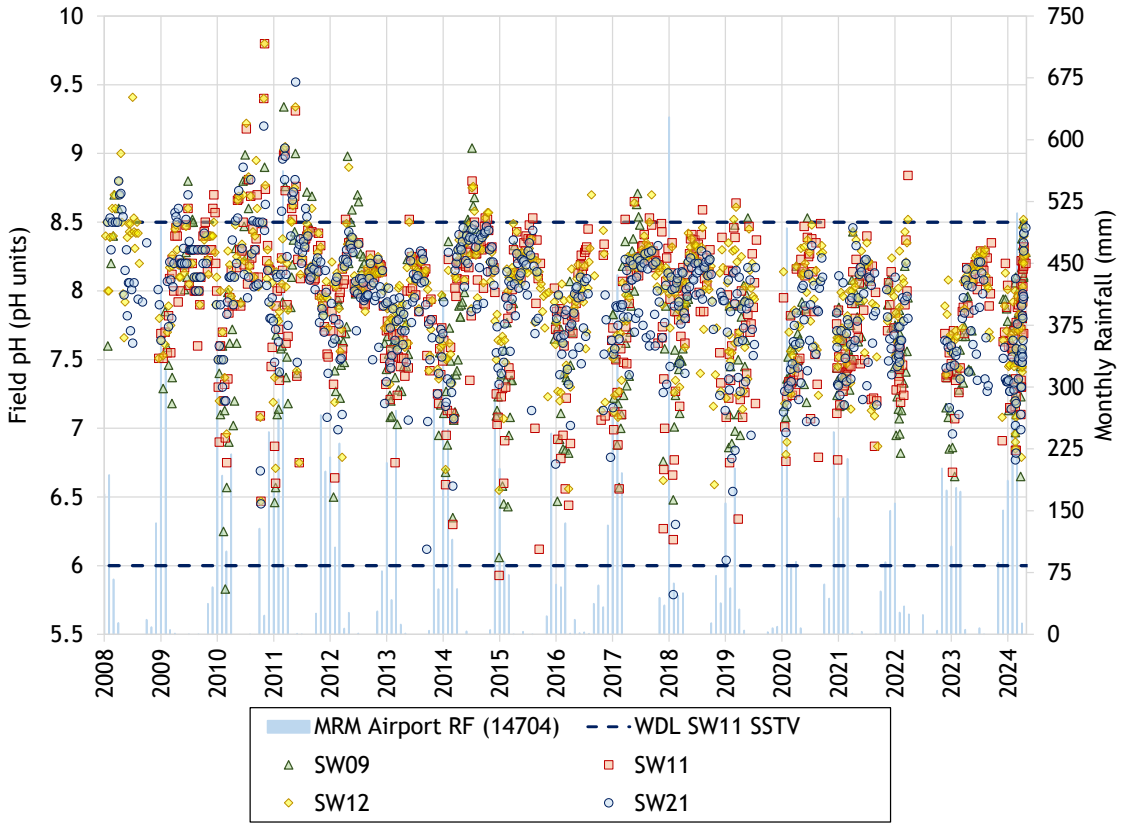


Chart 2: Historical Field pH and Monthly Rainfall – McArthur River and Glyde River Monitoring Sites

4.5.2 Electrical Conductivity

Electrical conductivity (EC) (laboratory measured) levels are presented on Chart 3 for the reporting period. Recorded EC levels were below the SSTV at SW11 during the reporting period. An increasing trend is observed as the dry season progresses as a result of evaporation, reduced flow volumes and a higher contribution from groundwater expressing as surface water baseflow. Rapid decreases in EC occur as a result of the dilution provided by rainfall events. During the reporting period, EC levels were generally consistent with the range of historical values (Chart 4).

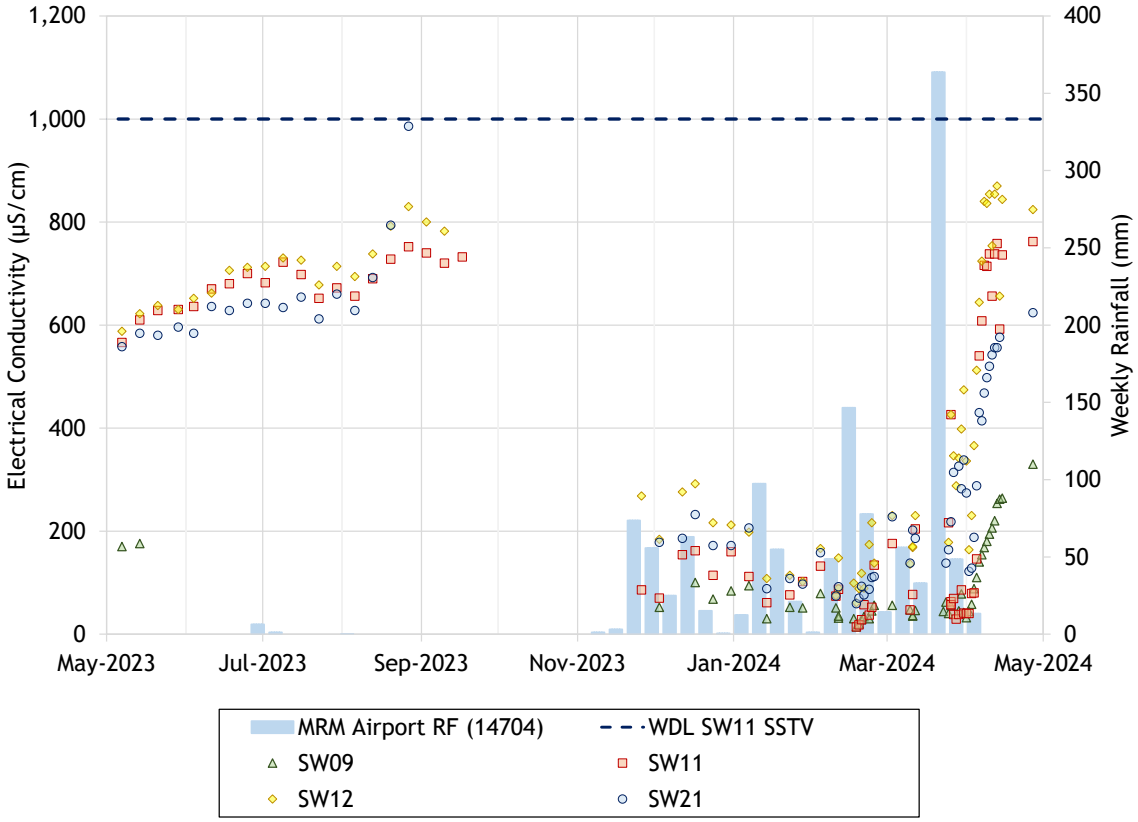


Chart 3: Reporting Period Laboratory Electrical Conductivity and Weekly Rainfall – McArthur River and Glyde River Monitoring Sites

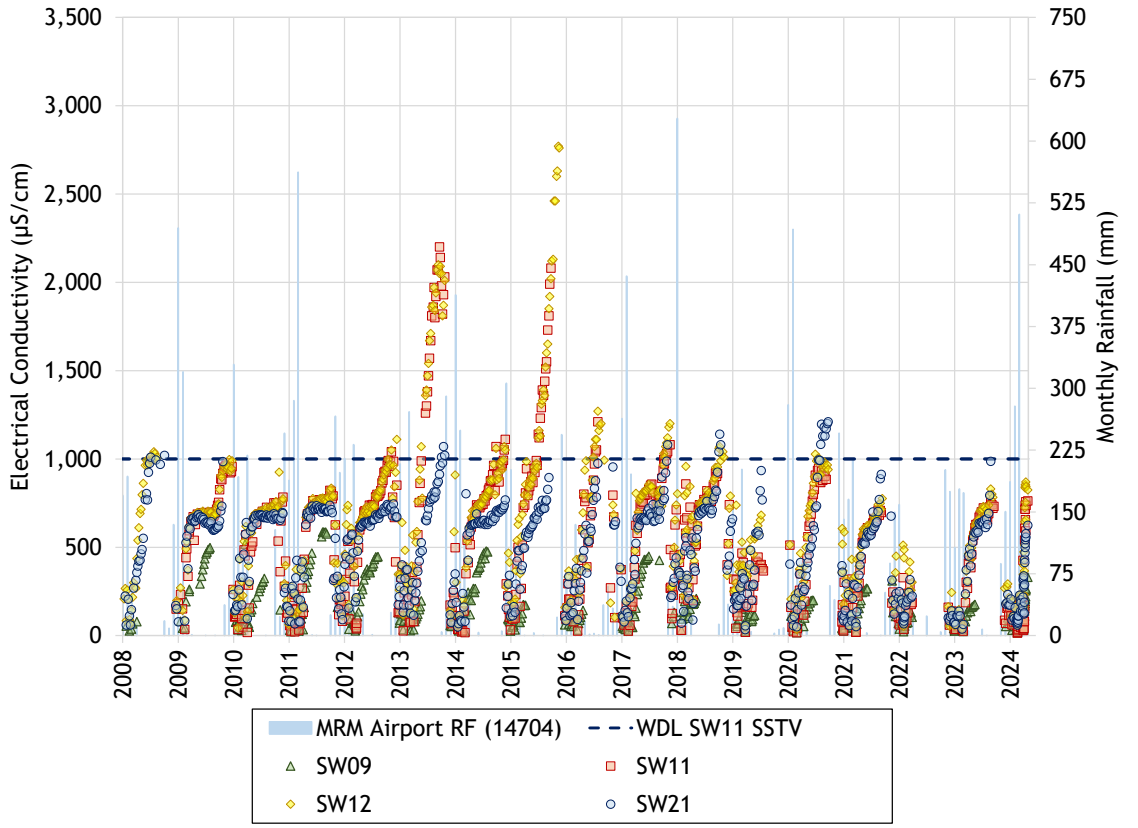


Chart 4: Historical Laboratory Electrical Conductivity and Monthly Rainfall – McArthur River and Glyde River Monitoring Sites

4.5.3 Dissolved Oxygen

Field dissolved oxygen (DO) concentrations are presented on Chart 5 for the reporting period. DO concentrations were typically in the range 60 to 120 % saturation. The levels exhibit a slightly greater variation during the dry season, including sites upstream of the Mine (Chart 6).

There were four instances where the DO water quality parameter measured below the minimum SSTV (85% saturation) at SW11 during the reporting period. None of these were notifiable incidents under Schedule 1 item 10 of the WDL. The non-notifiable incidents are detailed further in Section 6.1.

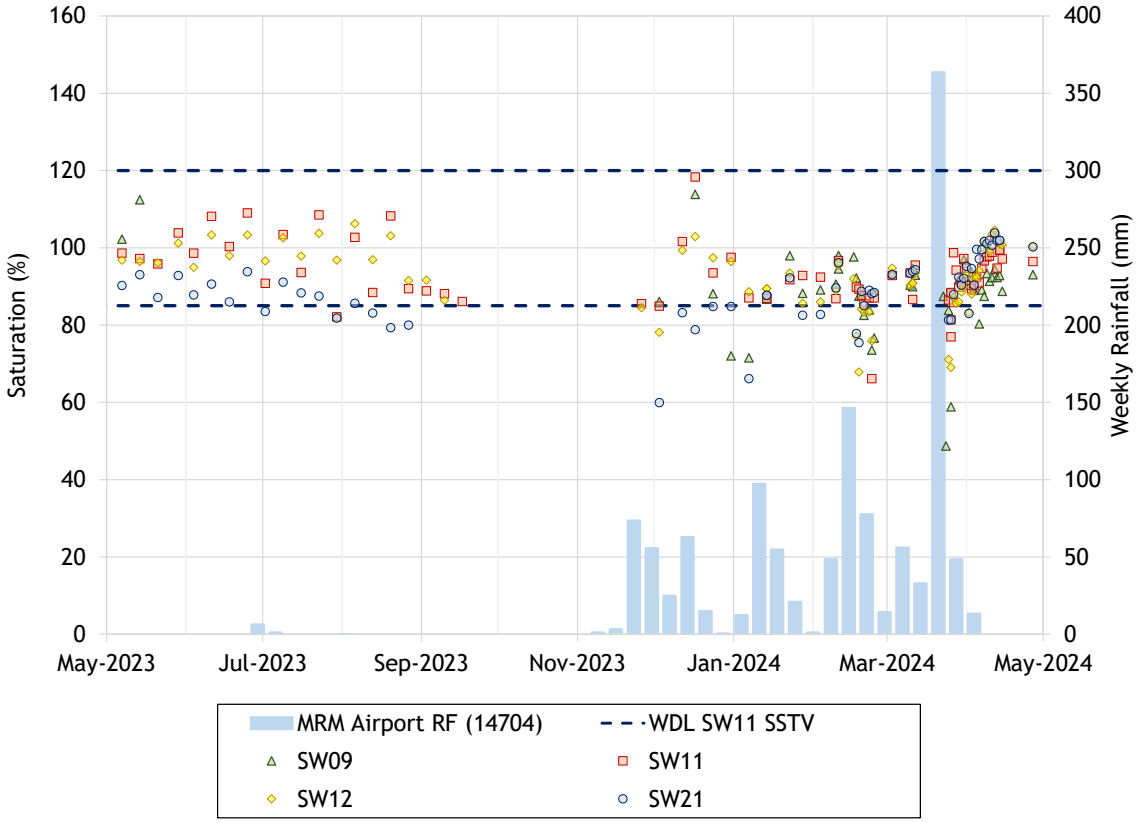


Chart 5: Reporting Period Dissolved Oxygen and Weekly Rainfall – McArthur River and Glyde River Monitoring Sites

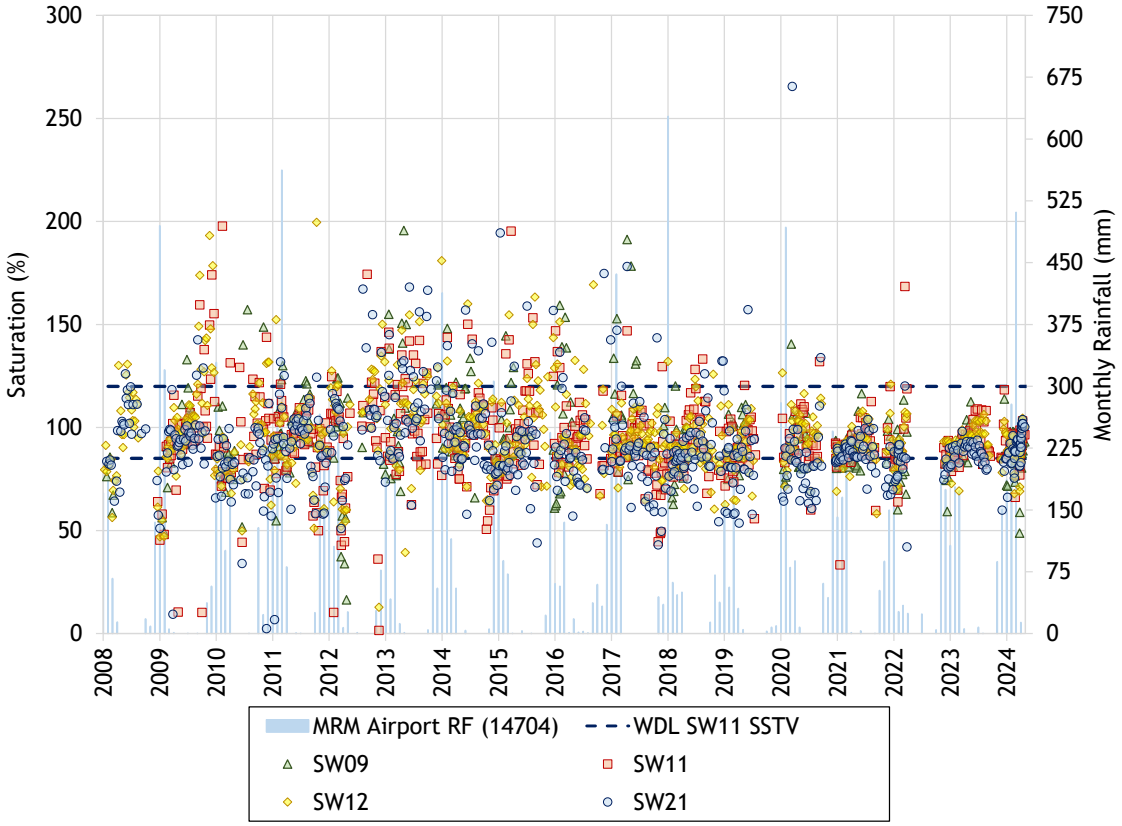


Chart 6: Historical Dissolved Oxygen and Monthly Rainfall – McArthur River and Glyde River Monitoring Sites

4.5.4 Filtered Aluminium

Filtered aluminium (Al) concentrations are presented on Chart 7 for the reporting period. During the reporting period, the recorded filtered Al concentrations were generally consistent with historical trends. The data indicates consistently low concentrations during the dry season, and higher concentrations during the wet season. Spikes in filtered Al, of similar concentration, are observed in the historical time series (Chart 8), also coinciding with periods of high rainfall.

There were two instances where filtered Al concentrations recorded at SW11 were beyond the SSTV during the reporting period and neither of these were notifiable incidents under Schedule 1 item 10 of the WDL. The non-notifiable incidents are detailed further in Section 6.1. Additionally, these instances were unrelated to mining operations and were caused by natural processes.

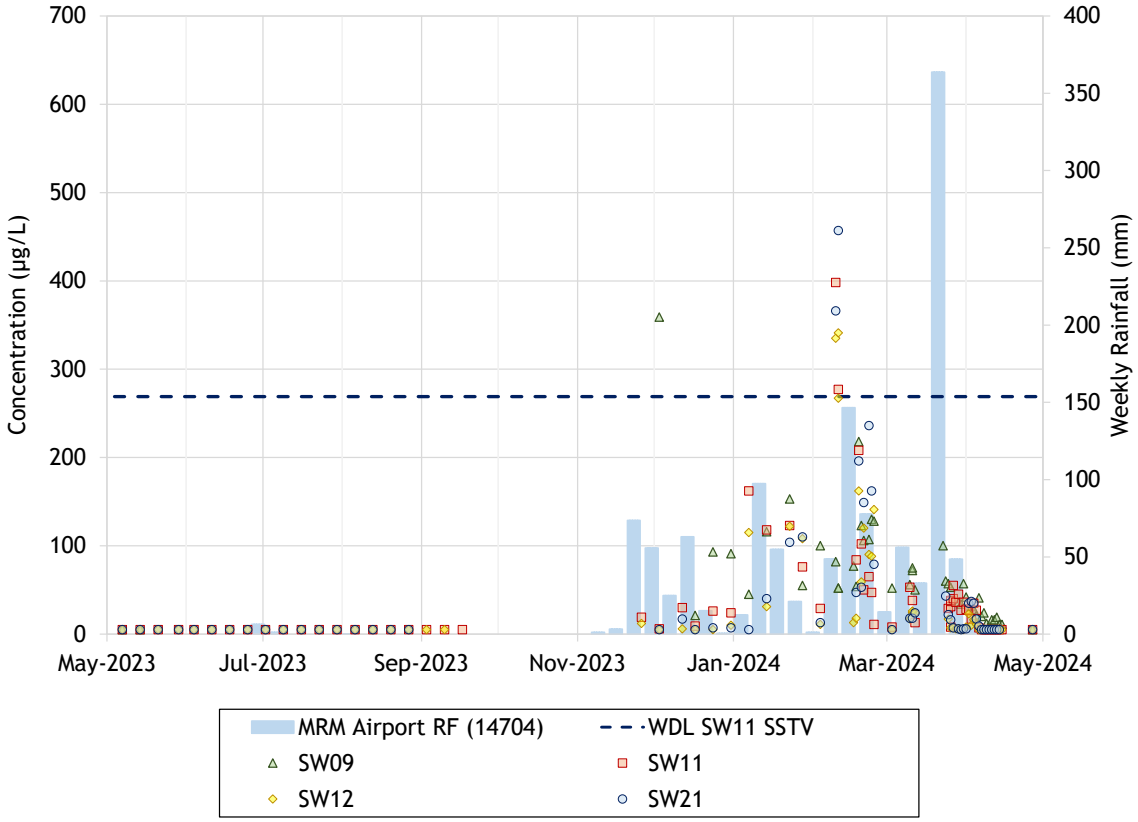


Chart 7: Reporting Period Filtered Al and Weekly Rainfall – McArthur River and Glyde River Monitoring Sites

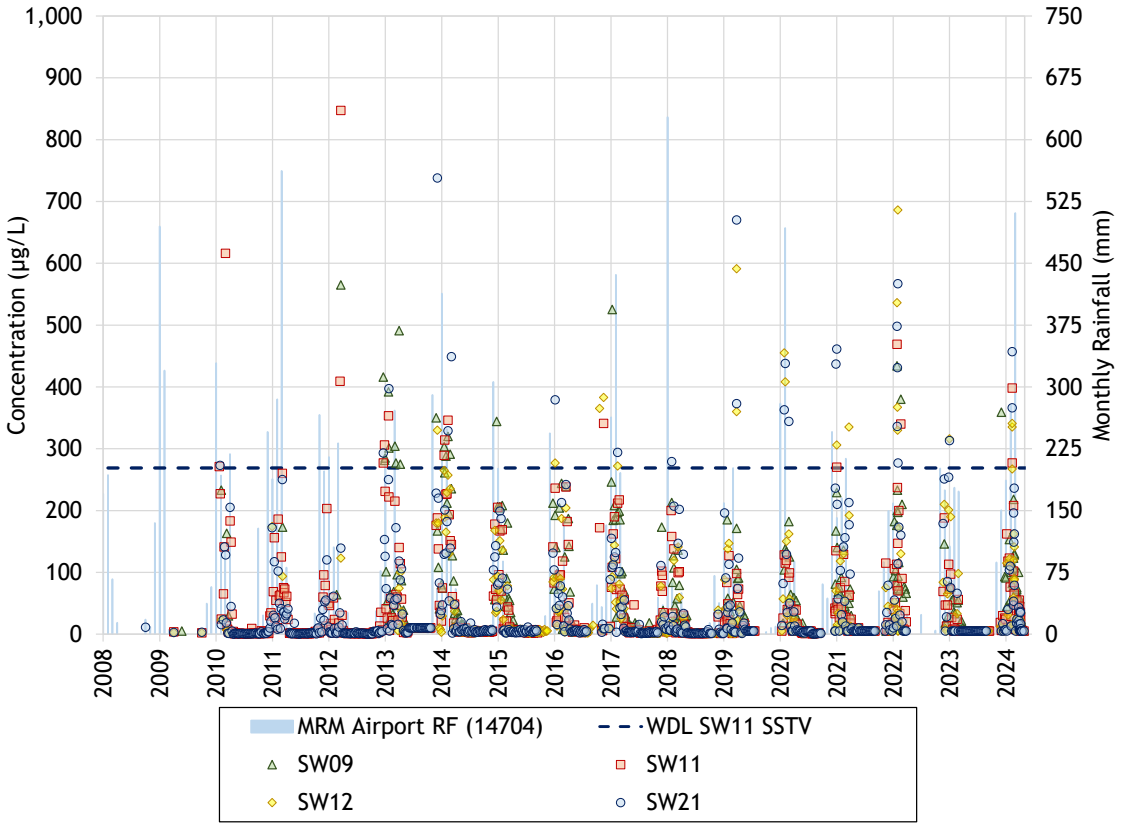


Chart 8: Historical Filtered Al and Monthly Rainfall – McArthur River and Glyde River Monitoring Sites

4.5.5 Filtered Arsenic

Filtered arsenic (As) concentrations are presented on Chart 9 for the reporting period. Recorded filtered As concentrations were below the SSTV at SW11 during the reporting period. Filtered As concentrations were low, which is consistent with the historical data (Chart 10).

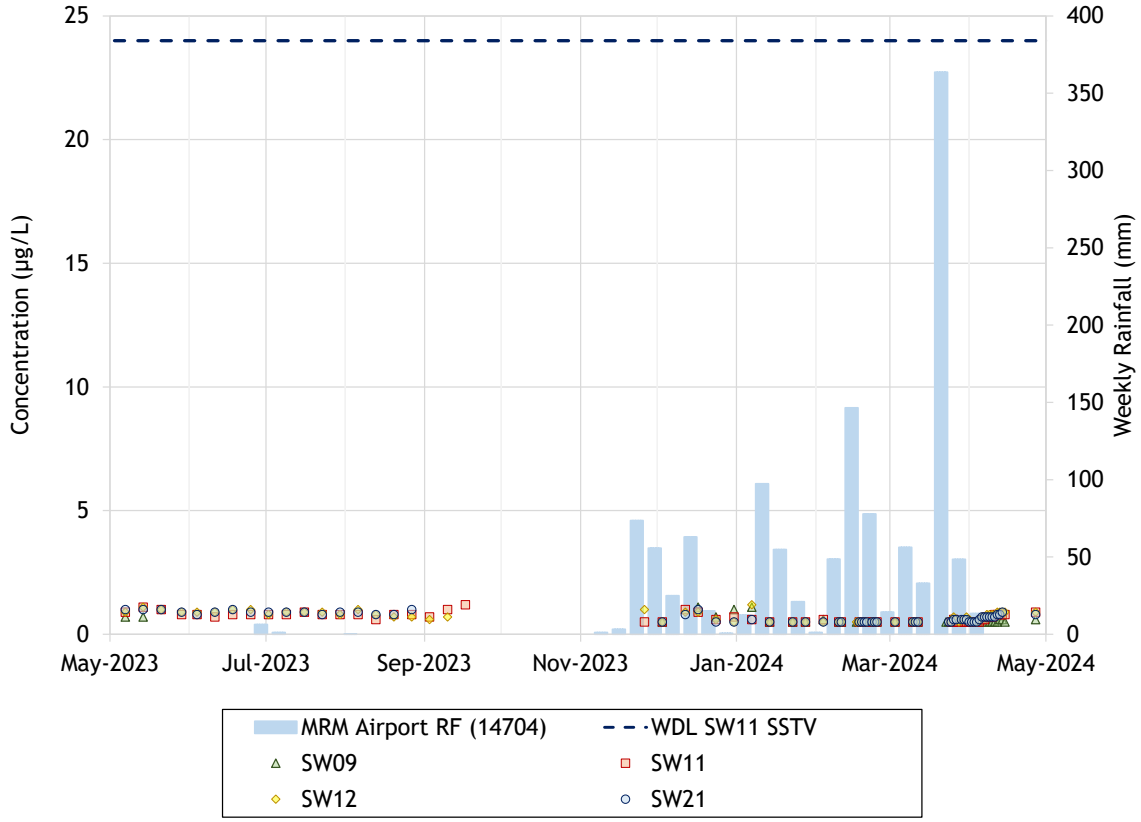


Chart 9: Reporting Period Filtered As and Weekly Rainfall – McArthur River and Glyde River Monitoring Sites

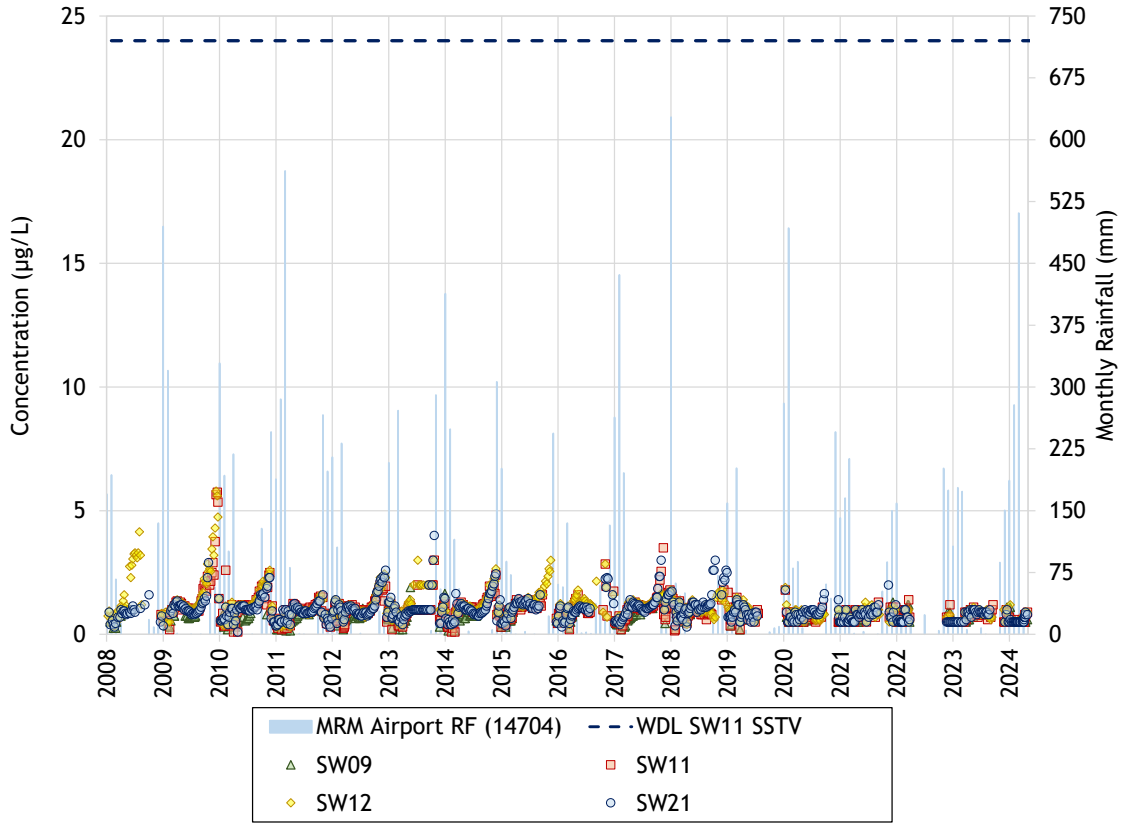


Chart 10: Historical Filtered As and Monthly Rainfall – McArthur River and Glyde River Monitoring Sites

4.5.6 Filtered Cadmium

Filtered cadmium (Cd) concentrations are presented on Chart 11 for the reporting period. Recorded filtered Cd concentrations were below the SSTV at SW11 during the reporting period. The data shows no significant trends during the reporting period. The majority of the samples were below the laboratory limit of reporting (LOR) (0.2 µg/L), and consistent with historical concentrations (Chart 12).

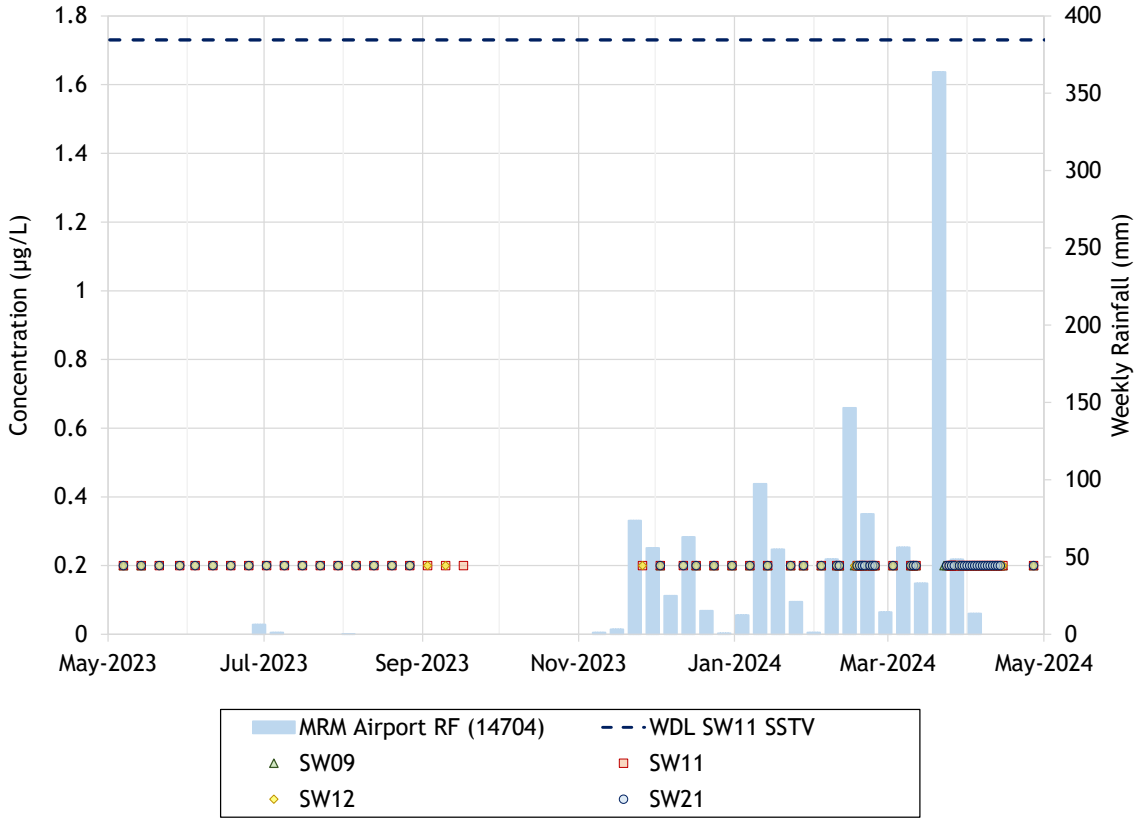


Chart 11: Reporting Period Filtered Cd and Weekly Rainfall – McArthur River and Glyde River Monitoring Sites

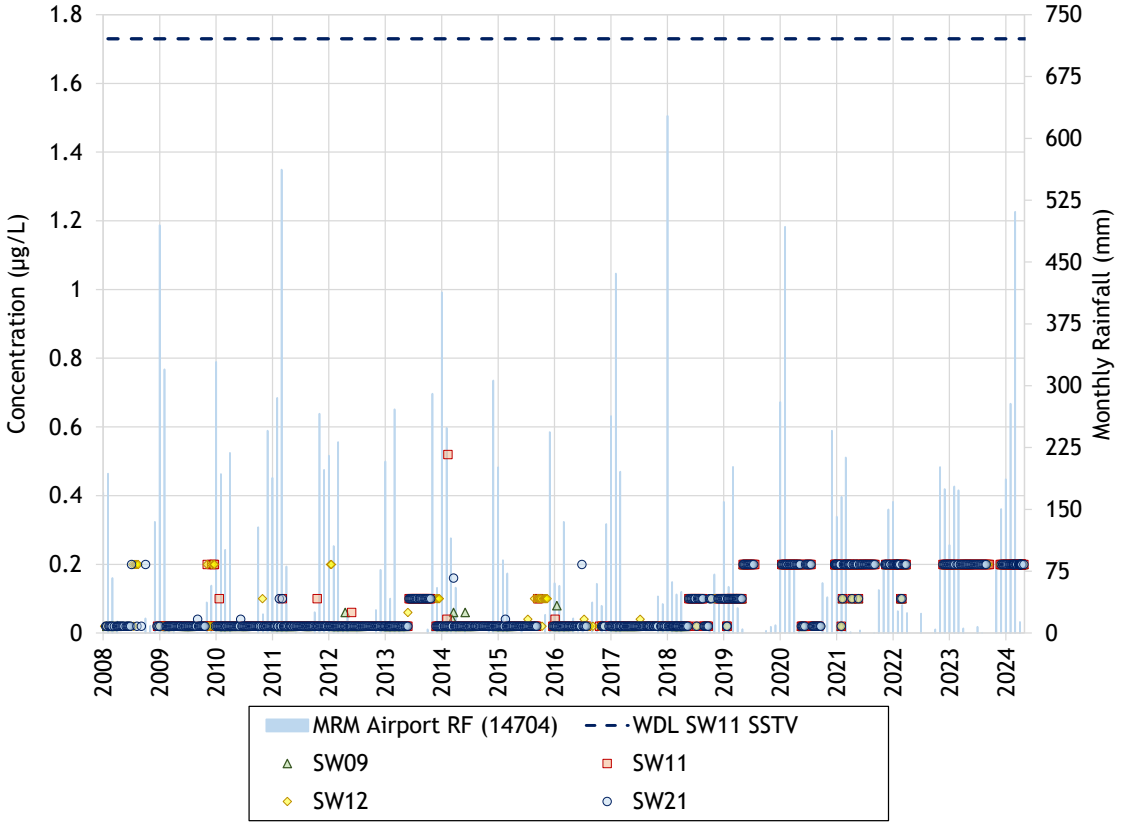


Chart 12: Historical Filtered Cd and Monthly Rainfall – McArthur River and Glyde River Monitoring Sites

4.5.7 Filtered Cobalt

Filtered cobalt (Co) concentrations are presented on Chart 13 for the reporting period. During the reporting period, most of the recorded filtered Co concentrations were consistent with the historical data (Chart 14)

There was a single instance where a recorded filtered Co concentration at SW11 was beyond the SSTV during the reporting period, however this was not a notifiable incident under Schedule 1 item 10 of the WDL. The non-notifiable incident is detailed further in Section 6.1.

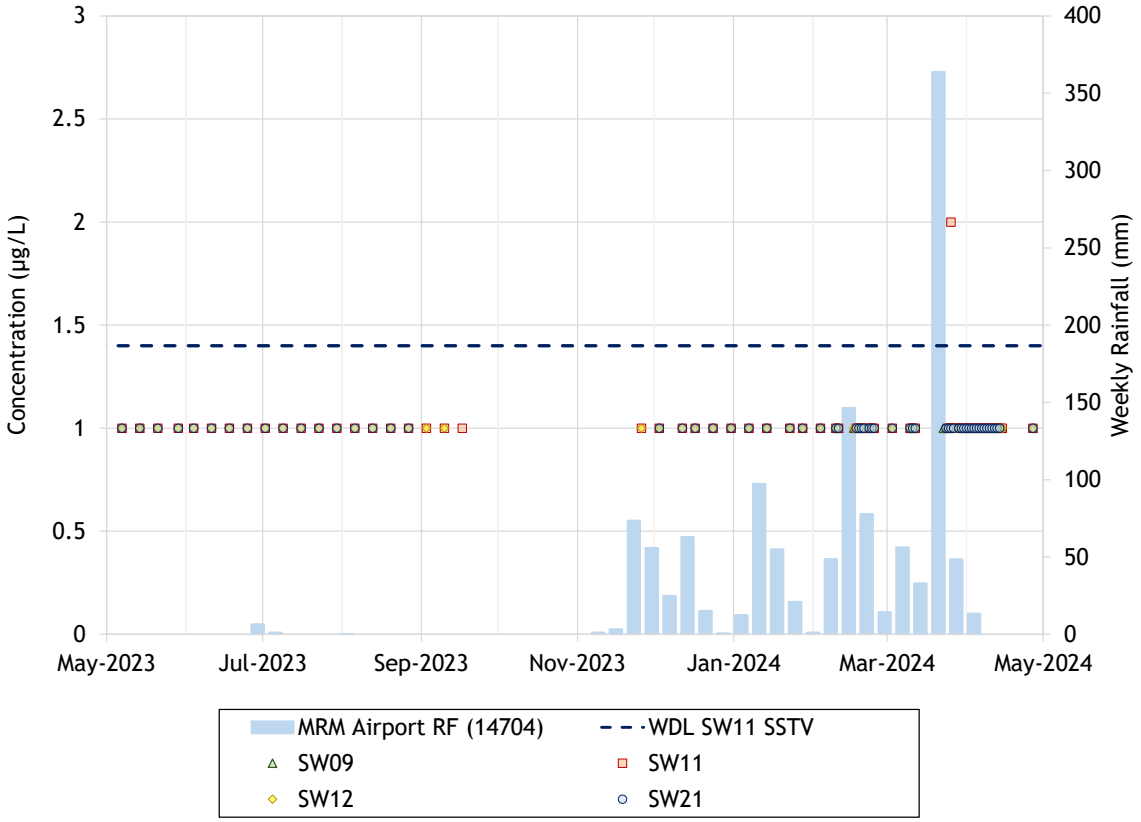


Chart 13: Reporting Period Filtered Co and Weekly Rainfall – McArthur River and Glyde River Monitoring Sites

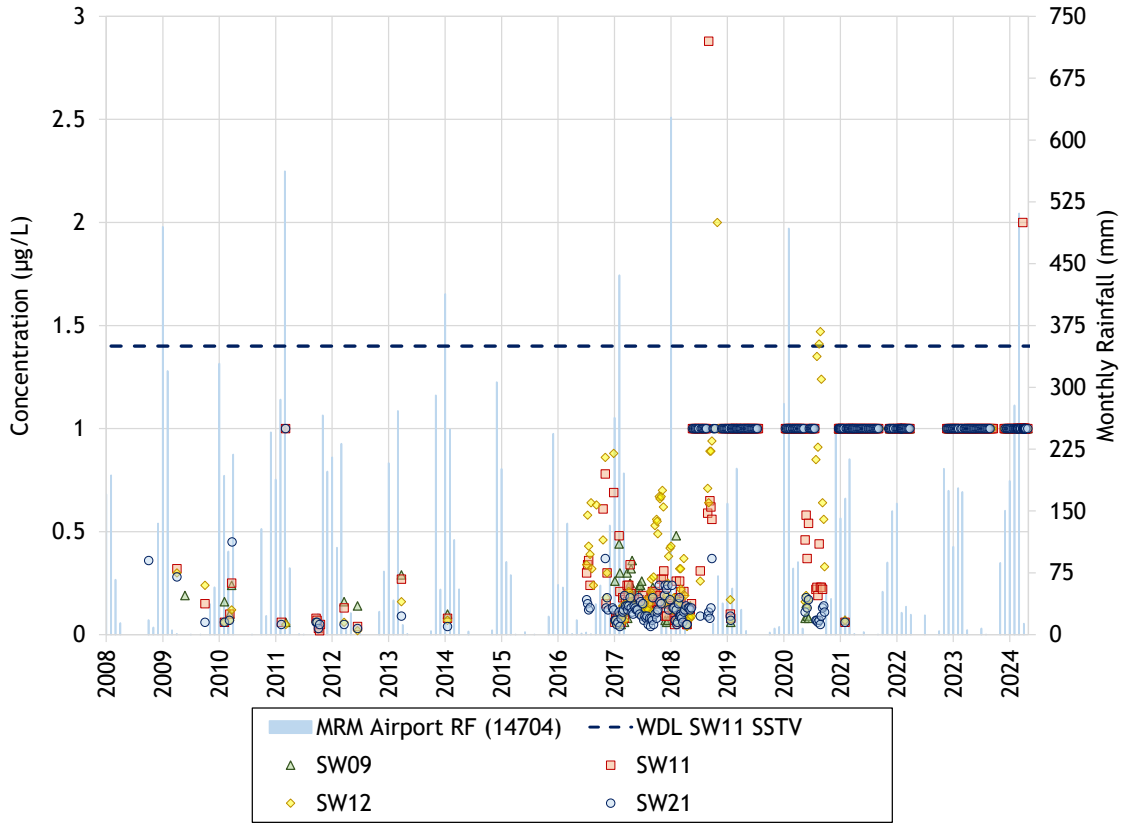


Chart 14: Historical Filtered Co and Monthly Rainfall – McArthur River and Glyde River Monitoring Sites

4.5.8 Filtered Copper

Filtered copper (Cu) concentrations are presented on Chart 15 for the reporting period. Recorded filtered Cu concentrations were below the SSTV at SW11 throughout the reporting period. During the reporting period, almost all measured filtered Cu concentrations were below 1.0 µg/L, which is consistent with the historical data (Chart 16).

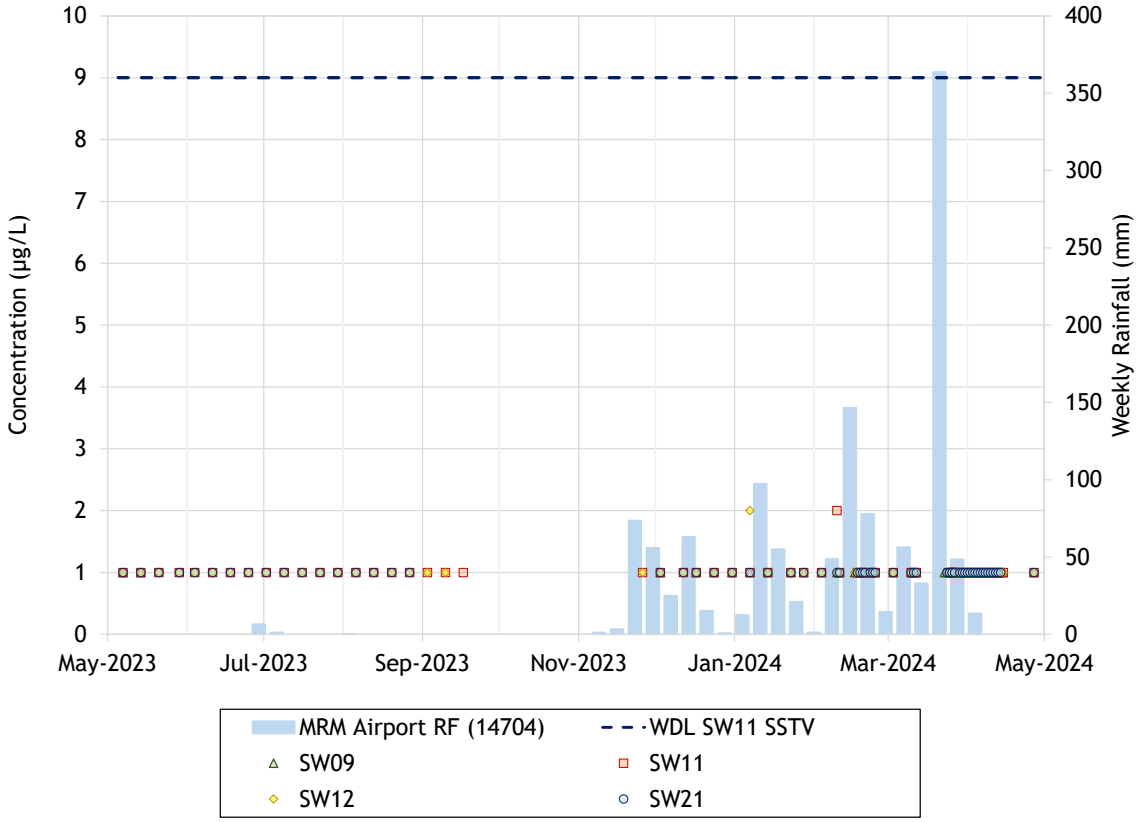


Chart 15: Reporting Period Filtered Cu and Weekly Rainfall – McArthur River and Glyde River Monitoring Sites

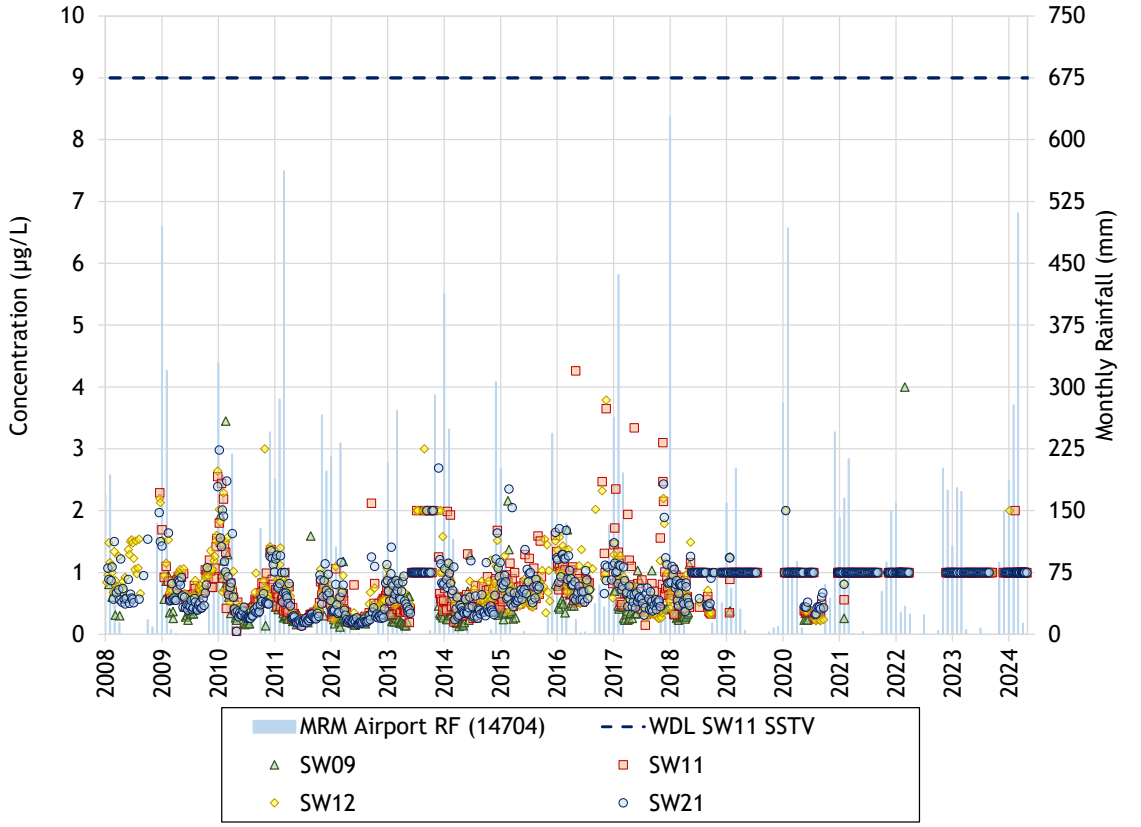


Chart 16: Historical Filtered Cu and Monthly Rainfall – McArthur River and Glyde River Monitoring Sites

4.5.9 Filtered Iron

Filtered iron (Fe) concentrations are presented on Chart 17 for the reporting period. Concentrations were generally lower through the dry season with fluctuations through the wet season associated with the rainfall events. The data for the reporting period is generally consistent with the historical data (Chart 18).

There were two instances where filtered Fe concentrations recorded at SW11 were beyond the SSTV during the reporting period and none of these were notifiable incidents under Schedule 1 item 10 of the WDL. The non-notifiable incidents are detailed further in Section 6.1.

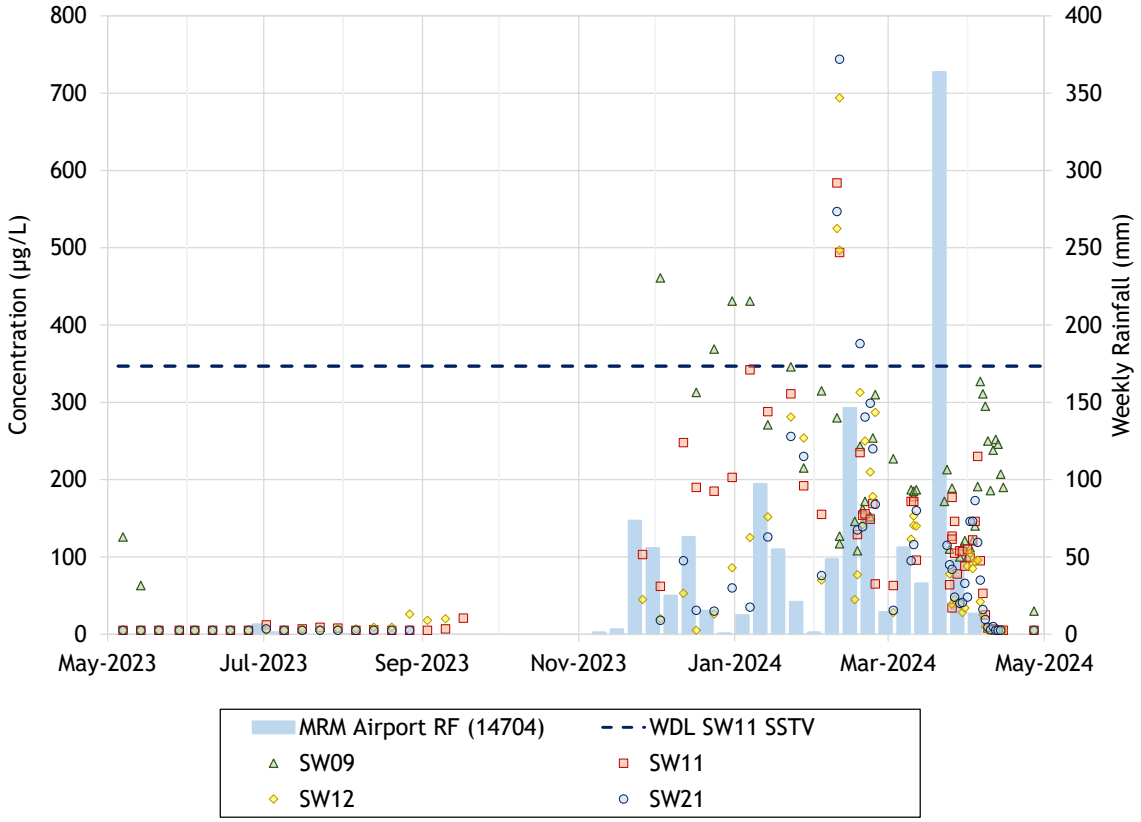


Chart 17: Reporting Period Filtered Fe and Weekly Rainfall – McArthur River and Glyde River Monitoring Sites

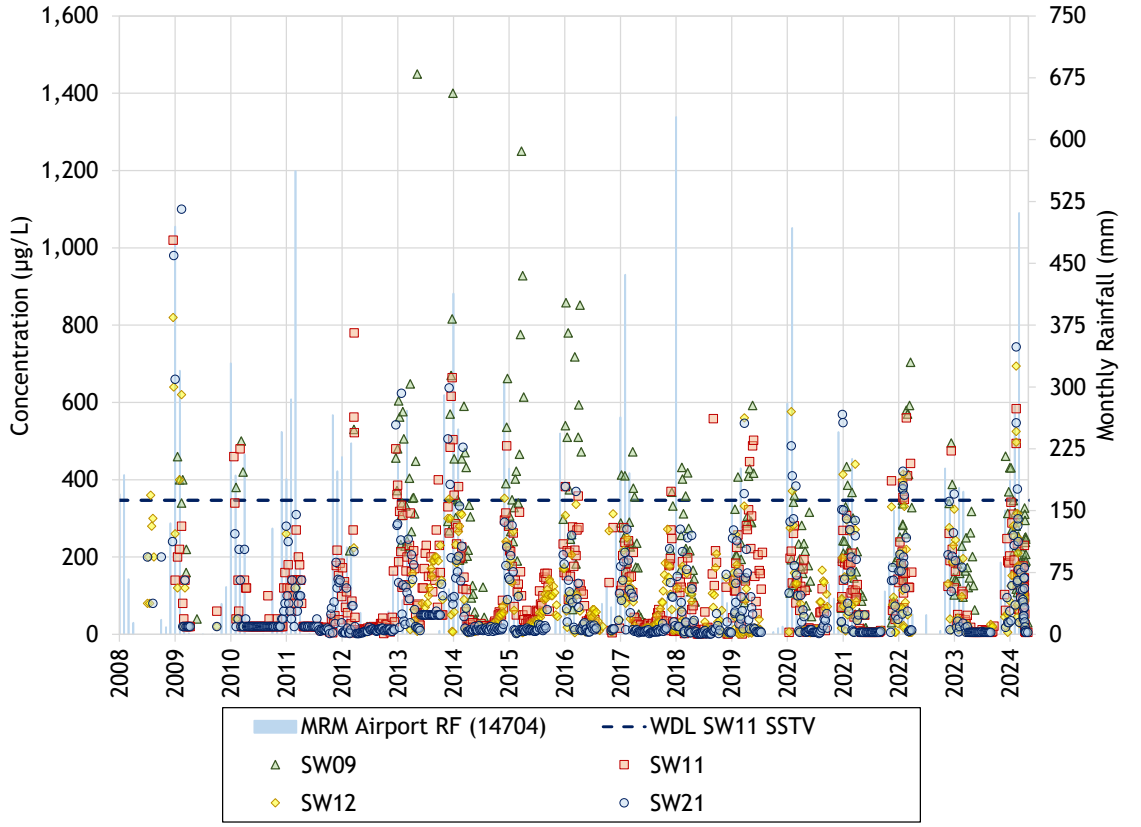


Chart 18: Historical Filtered Fe and Monthly Rainfall – McArthur River and Glyde River Monitoring Sites

4.5.10 Filtered Lead

Filtered lead (Pb) concentrations are presented on Chart 19 for the reporting period. Recorded filtered Pb concentrations were below the SSTV at SW11 during the reporting period. During the reporting period, low concentrations were recorded throughout, with all concentrations except for one (at SW09) below 0.5 µg/L, consistent with the historical dataset (Chart 20).

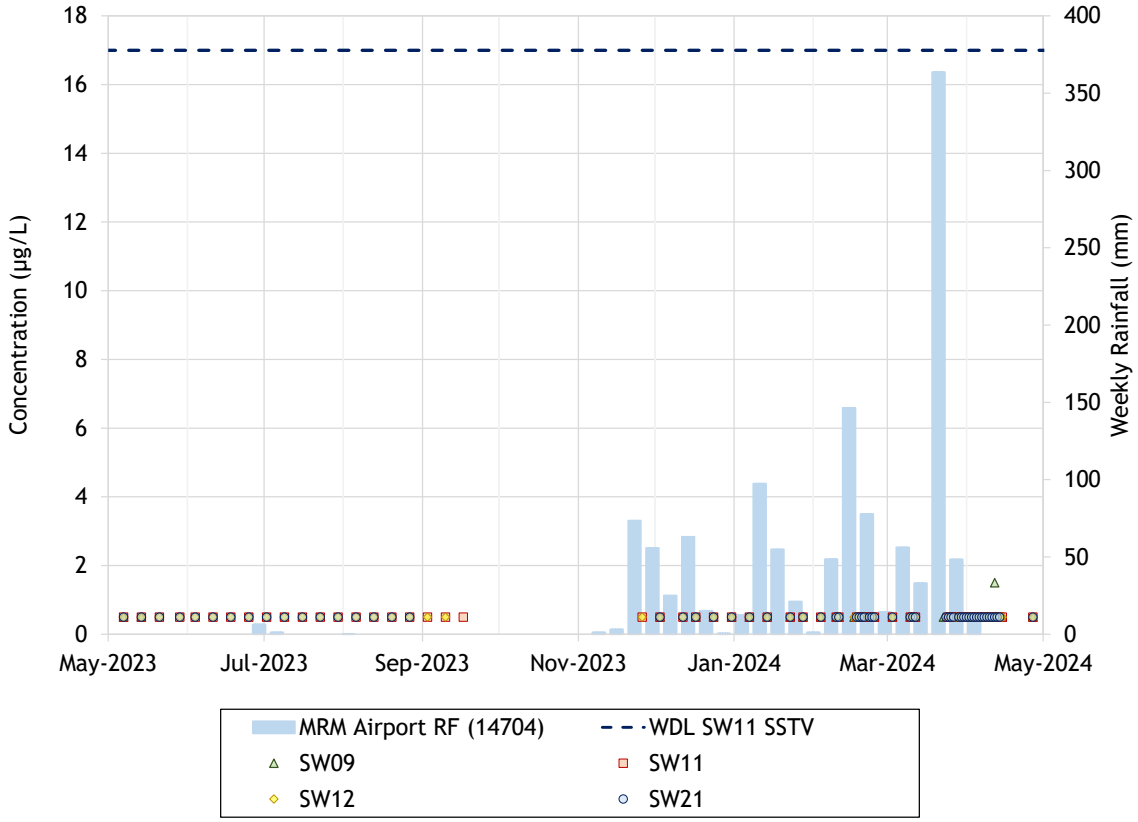


Chart 19: Reporting Period Filtered Pb and Weekly Rainfall – McArthur River and Glyde River Monitoring Sites

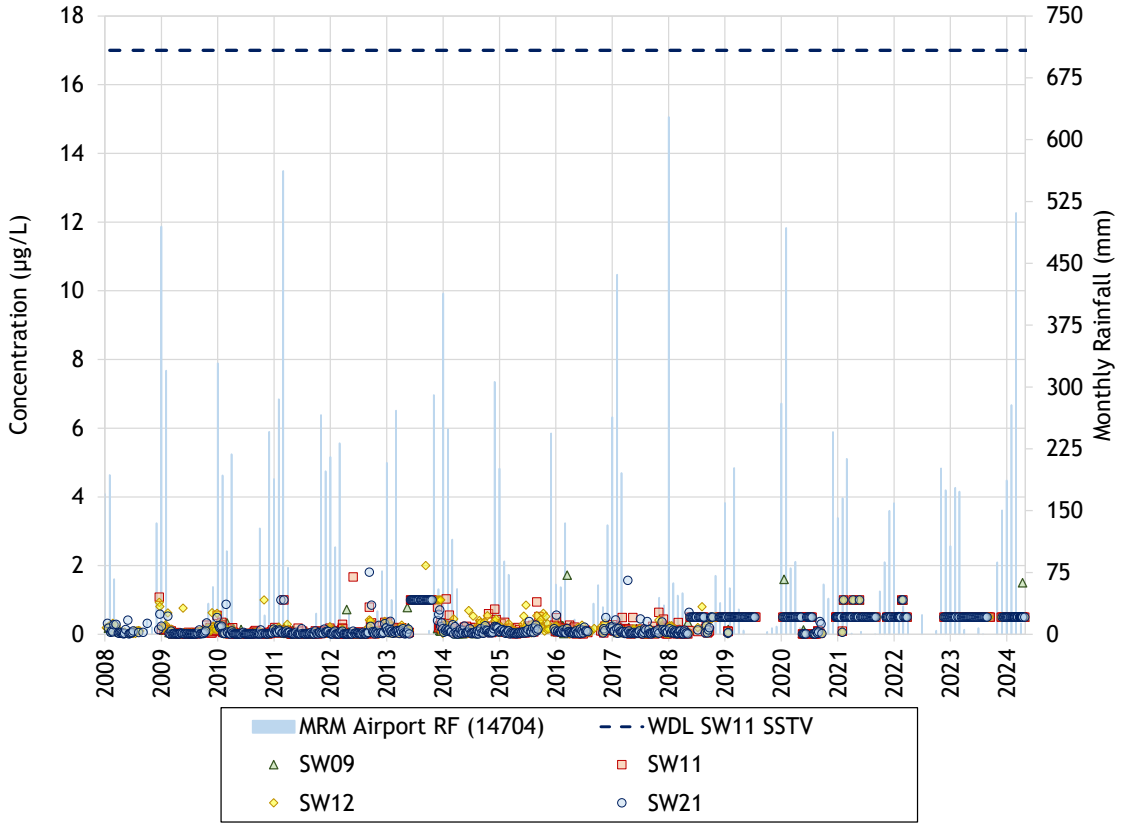


Chart 20: Historical Filtered Pb and Monthly Rainfall – McArthur River and Glyde River Monitoring Sites

4.5.11 Filtered Manganese

Filtered manganese (Mn) concentrations are presented on Chart 21 for the reporting period. Recorded filtered Mn concentrations were below the SSTV at SW11 during the reporting period. The historical data (Chart 22) shows that the filtered Mn levels in upstream McArthur River (SW21) and Glyde River (SW09) were consistently low. Filtered Mn levels downstream of the Mine (SW11 and SW12) were generally low during the wet seasons but comparatively elevated during the dry seasons. During the reporting period, the filtered Mn levels were consistent with the historical trends.

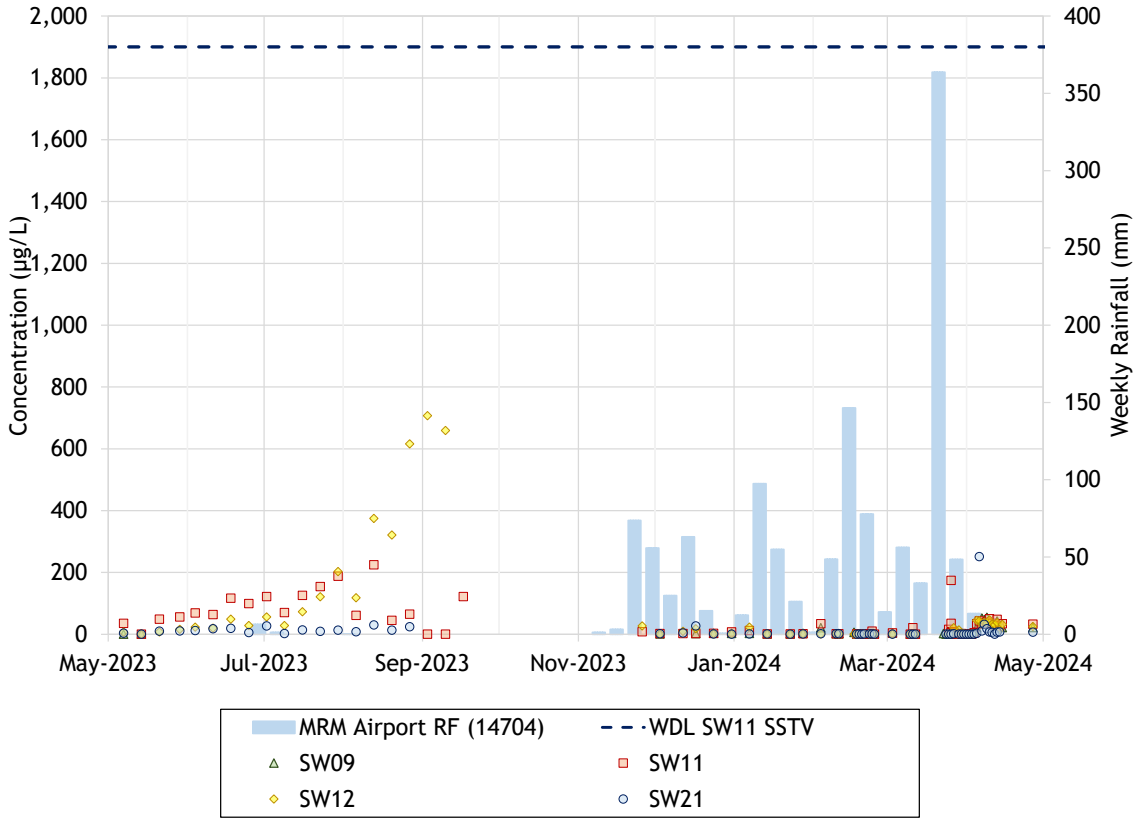


Chart 21: Reporting Period Filtered Mn and Weekly Rainfall – McArthur River and Glyde River Monitoring Sites

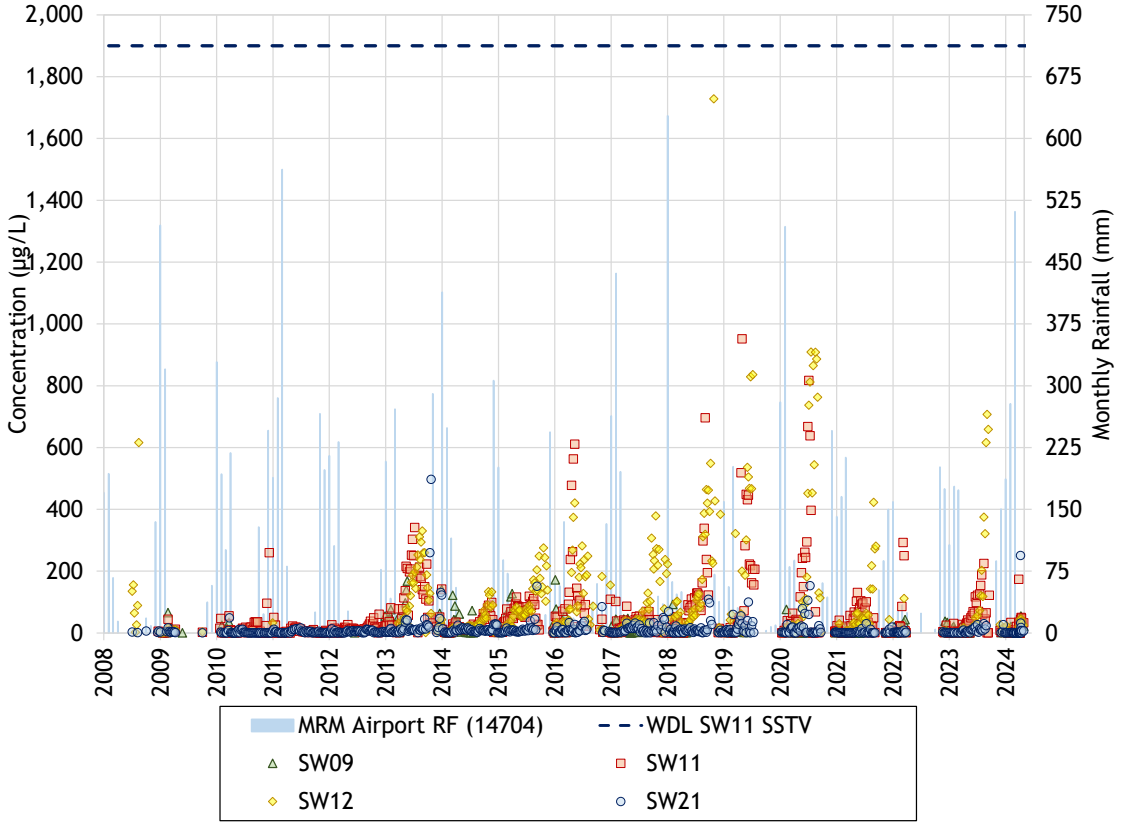


Chart 22: Historical Filtered Mn and Monthly Rainfall – McArthur River and Glyde River Monitoring Sites

4.5.12 Filtered Nickel

Filtered nickel (Ni) concentrations are presented on Chart 23 for the reporting period. Recorded filtered Ni concentrations at SW11 were below the SSTV during the reporting period. Almost all samples for filtered Ni recorded concentrations below 1.0 µg/L. Concentrations during the reporting period were consistent with the historical record (Chart 24).

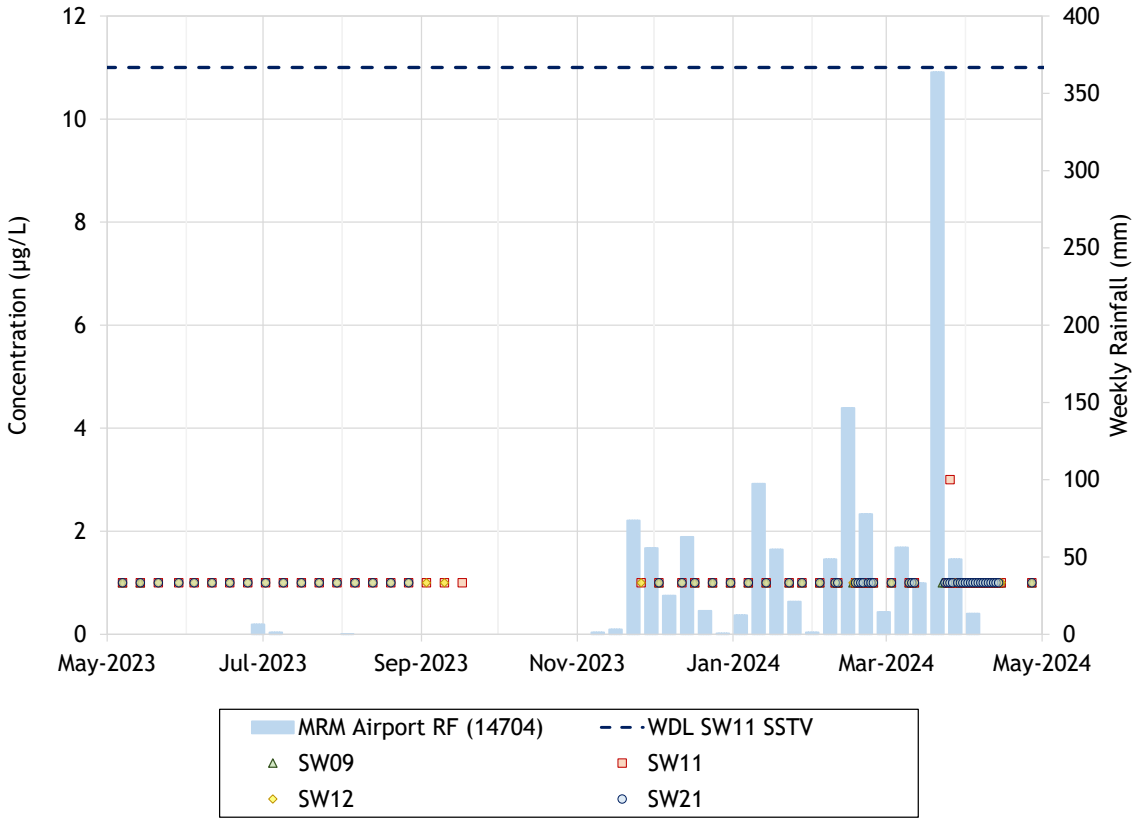


Chart 23: Reporting Period Filtered Ni and Weekly Rainfall – McArthur River and Glyde River Monitoring Sites

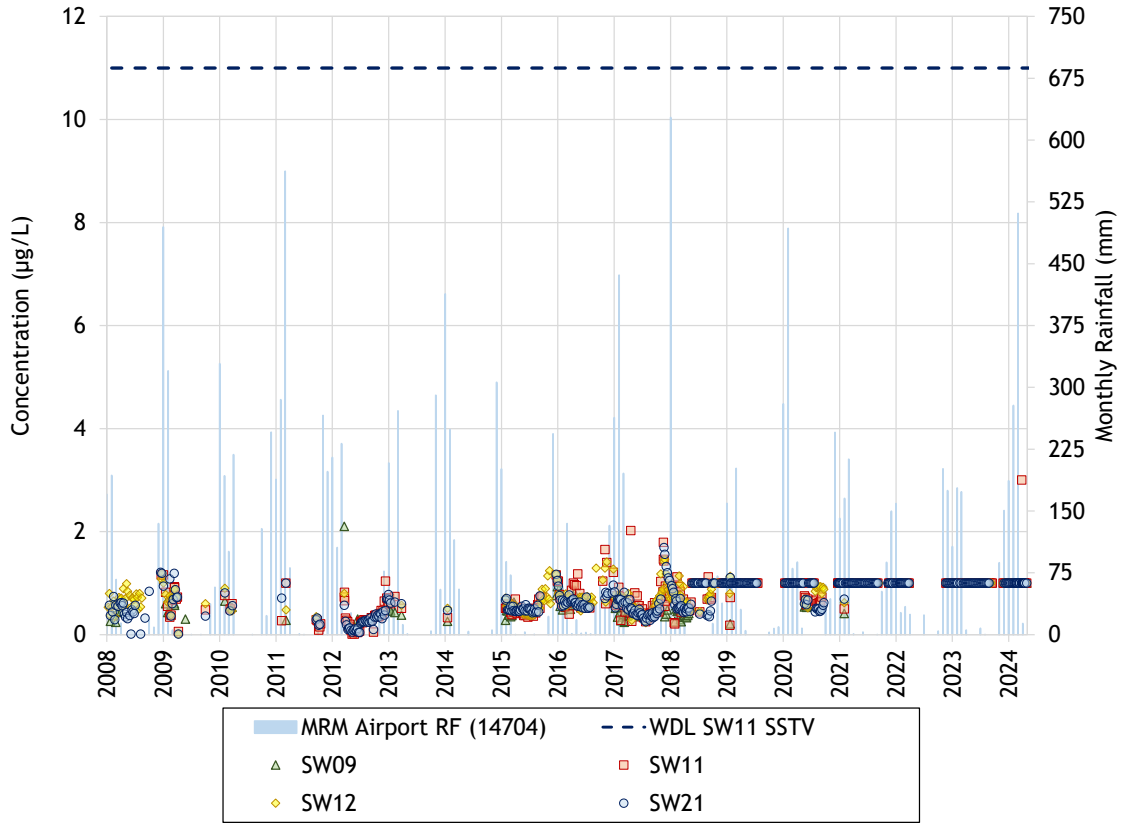


Chart 24: Historical Filtered Ni and Monthly Rainfall – McArthur River and Glyde River Monitoring Sites

4.5.13 Filtered Thallium

Filtered thallium (Tl) concentrations are presented on Chart 25 for the reporting period. Recorded filtered Tl concentrations at SW11 were below the SSTV during the reporting period. All samples for filtered Tl recorded concentrations below 1.0 µg/L. Concentrations during the reporting period were consistent with the historical record (Chart 26).

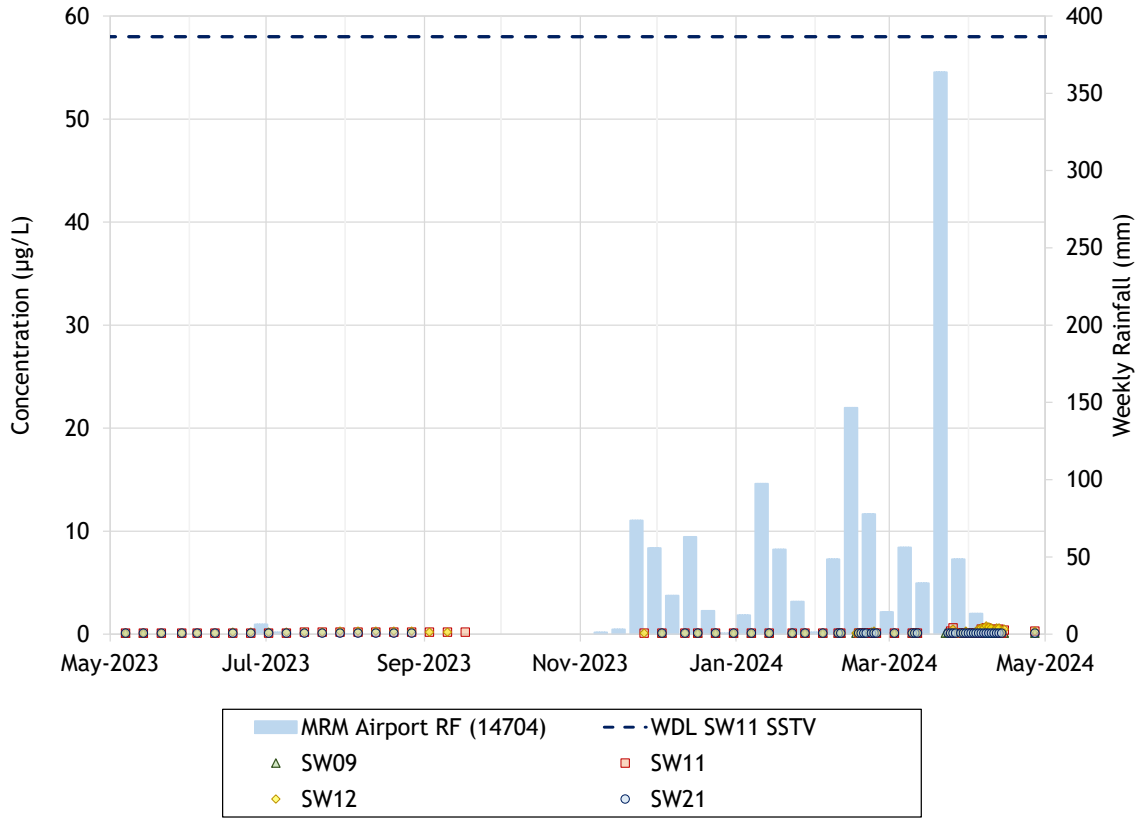


Chart 25: Reporting Period Filtered Tl and Weekly Rainfall – McArthur River and Glyde River Monitoring Sites

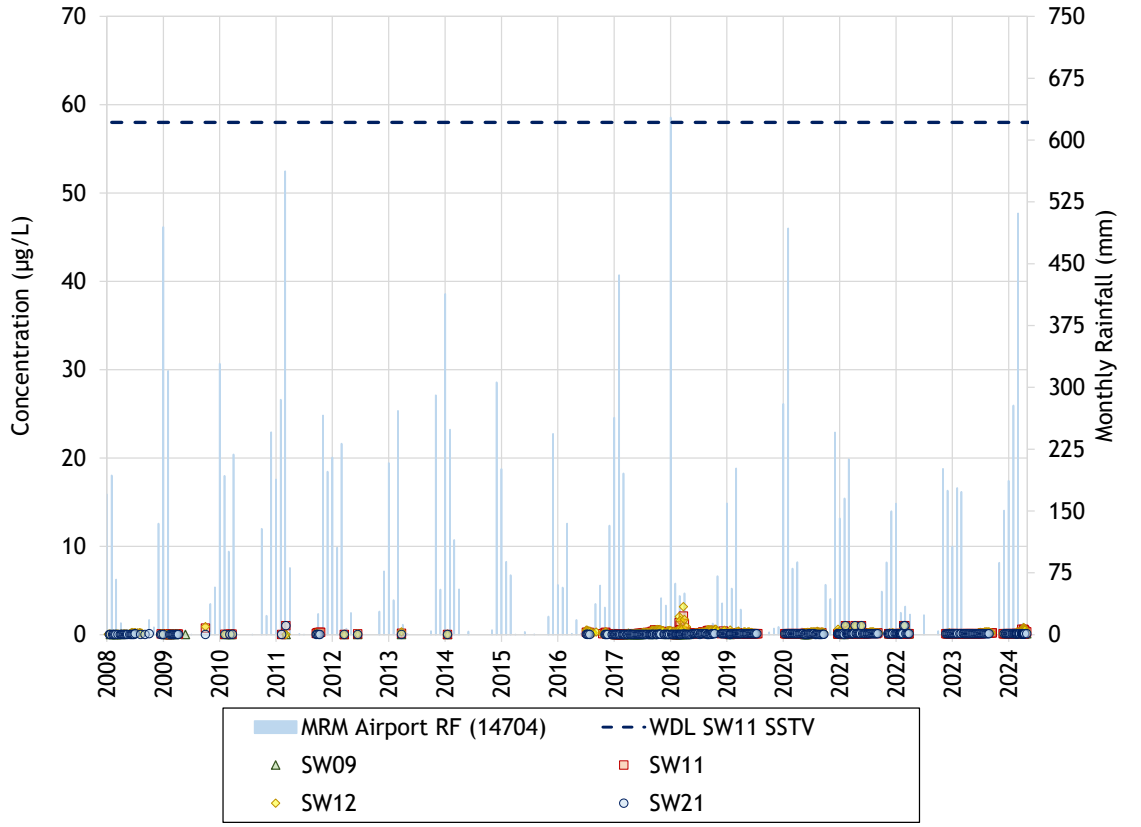


Chart 26: Historical Filtered Tl and Monthly Rainfall – McArthur River and Glyde River Monitoring Sites

4.5.14 Filtered Zinc

Filtered zinc (Zn) concentrations are presented on Chart 27 for the reporting period. The majority of the concentrations measured throughout the reporting period were within the range of historical concentrations (Chart 28).

There was only one instance where a recorded filtered Zn concentration at SW11 west was beyond the SSTV during the reporting period. This resulted in a notifiable incident under Schedule 1 item 10 of the WDL. This incident is detailed further in Section 6.1. A sample was also collected from SW11 east on the same date as the notifiable incident (i.e. from the opposite bank to SW11 west). This sample contained a filtered Zn concentration below the LOR (2 µg/L) indicating that waters at SW11 were not fully mixed.

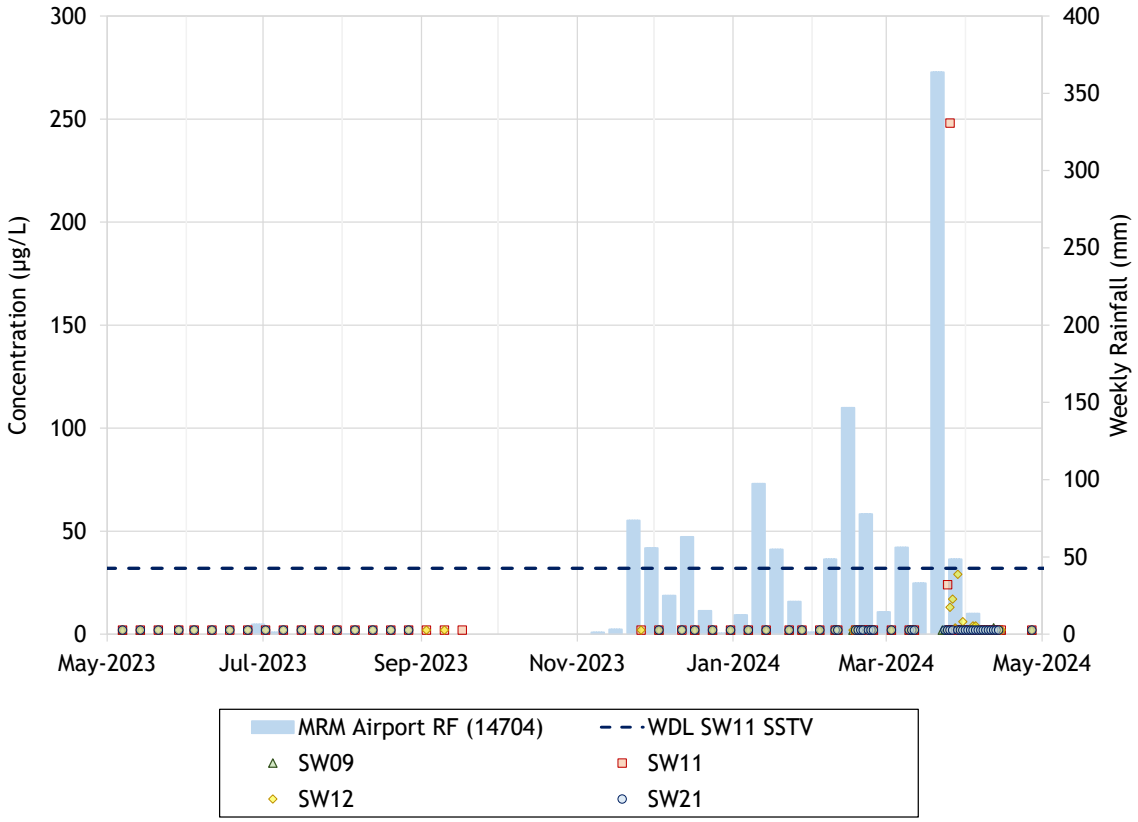


Chart 27: Reporting Period Filtered Zn and Weekly Rainfall – McArthur River and Glyde River Monitoring Sites.

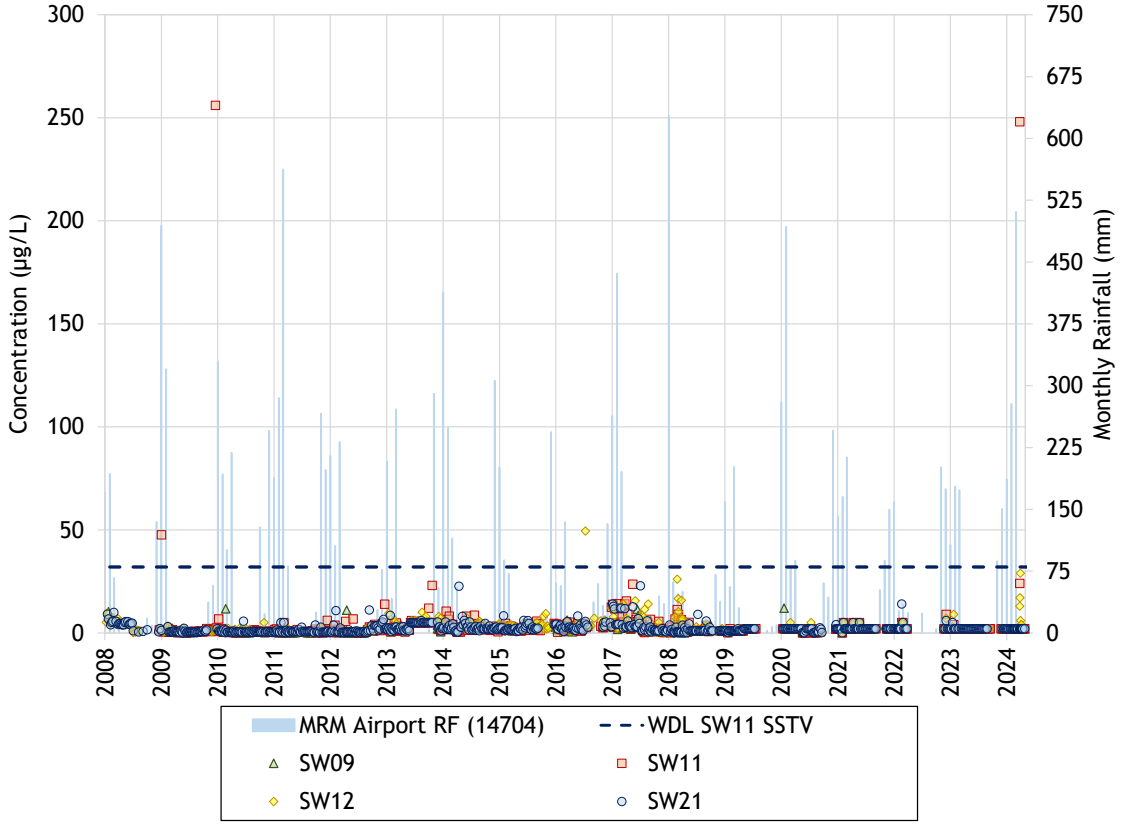


Chart 28: Historical Filtered Zn and Monthly Rainfall – McArthur River and Glyde River Monitoring Sites

4.5.15 Sulphate

Sulphate (SO_4) concentrations are presented on Chart 29 for the reporting period. Recorded SO_4 concentrations at SW11 were below the SSTV during the reporting period. SO_4 concentrations show a similar trend to EC levels where values are highest during the dry season and lowest during the wet season. During the reporting period, SO_4 concentrations were consistent with historical levels (Chart 30).

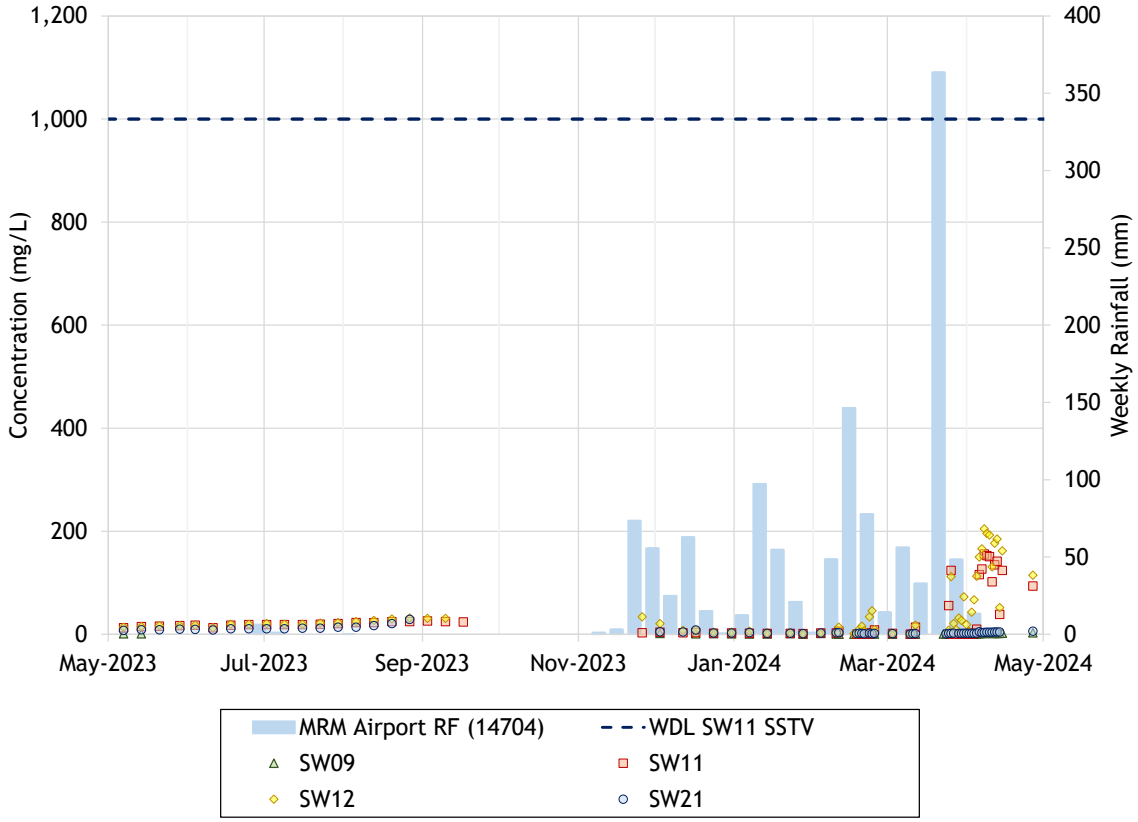


Chart 29: Reporting Period SO_4 and Weekly Rainfall – McArthur River and Glyde River Monitoring Sites

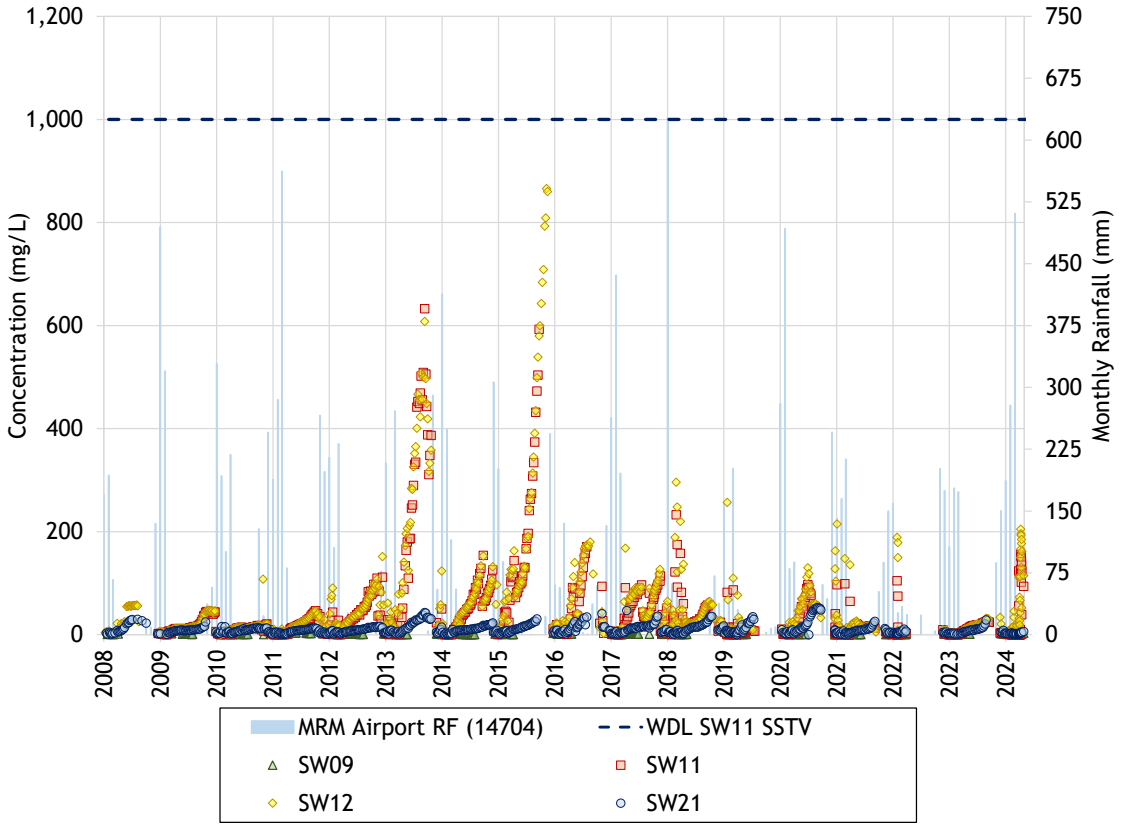


Chart 30: Historical SO_4 and Monthly Rainfall – McArthur River and Glyde River Monitoring Sites

4.5.16 Nitrate

Nitrate (NO_3) concentrations are presented on Chart 31 for the reporting period. Recorded NO_3 concentrations were below the SSTV at SW11 during the reporting period. During the reporting period, SW21 and SW12 NO_3 concentrations remained relatively low, with a few exceptions, while NO_3 concentrations at SW09 and SW11 were elevated from the onset of the wet season. This is consistent with the historical trends (Chart 32). NO_3 concentrations at SW09 were also elevated in April after Ex-TC Megan.

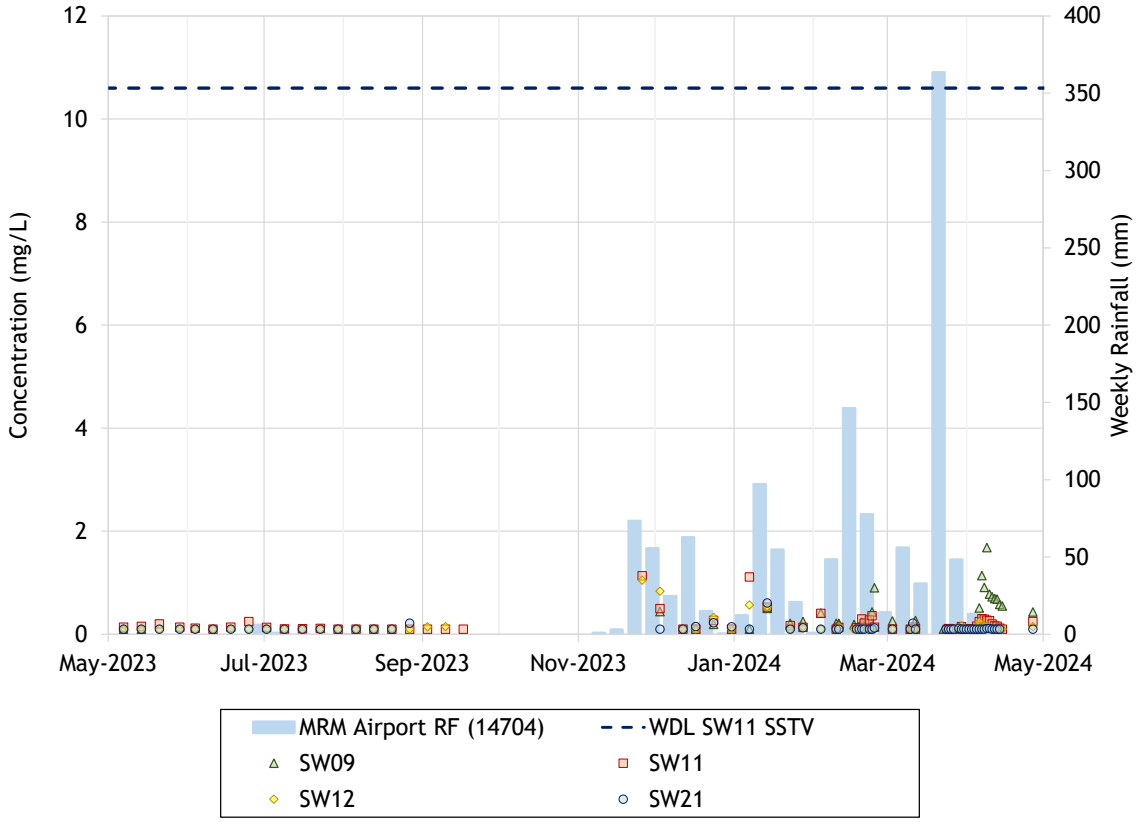


Chart 31: Reporting Period NO_3 and Weekly Rainfall – McArthur River and Glyde River Monitoring Sites

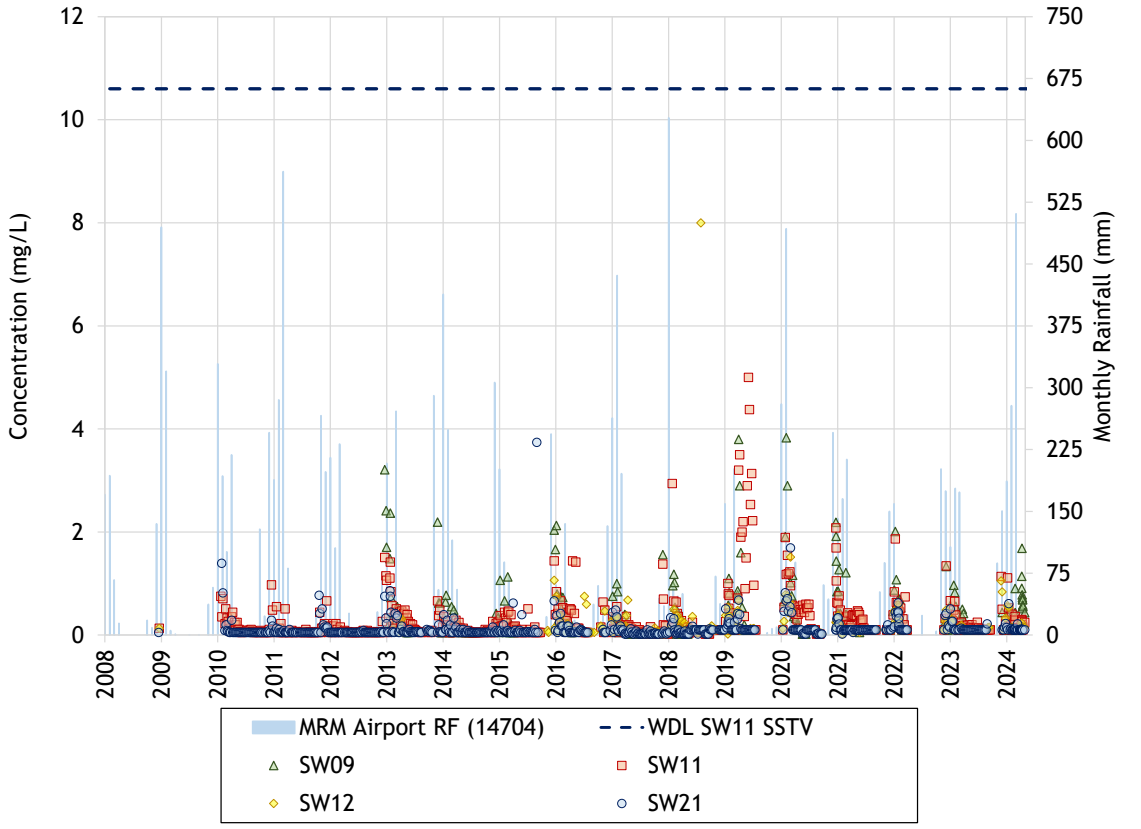


Chart 32: Historical NO_3 and Monthly Rainfall – McArthur River and Glyde River Monitoring Sites

4.5.17 Total Petroleum Hydrocarbons C10 – C36

Total petroleum hydrocarbon (TPH) (C10-C36 sum) concentrations are presented on Chart 33 and Chart 34 for the reporting and historical periods. Recorded TPH C10-C36 concentrations at SW11 were below the LOR (50 µg/L) during the reporting period, which is consistent with the historical data.

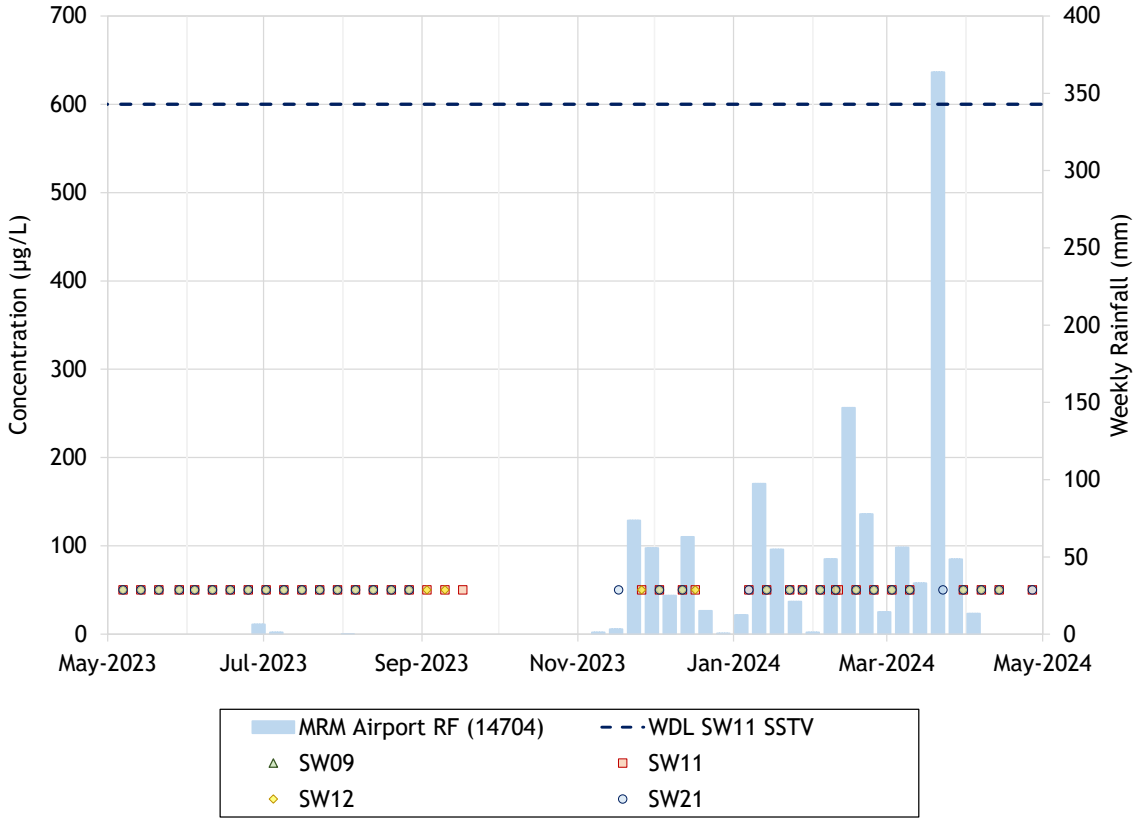


Chart 33: Reporting Period TPH C10-C36 Fraction and Weekly Rainfall – McArthur River and Glyde River Monitoring Sites

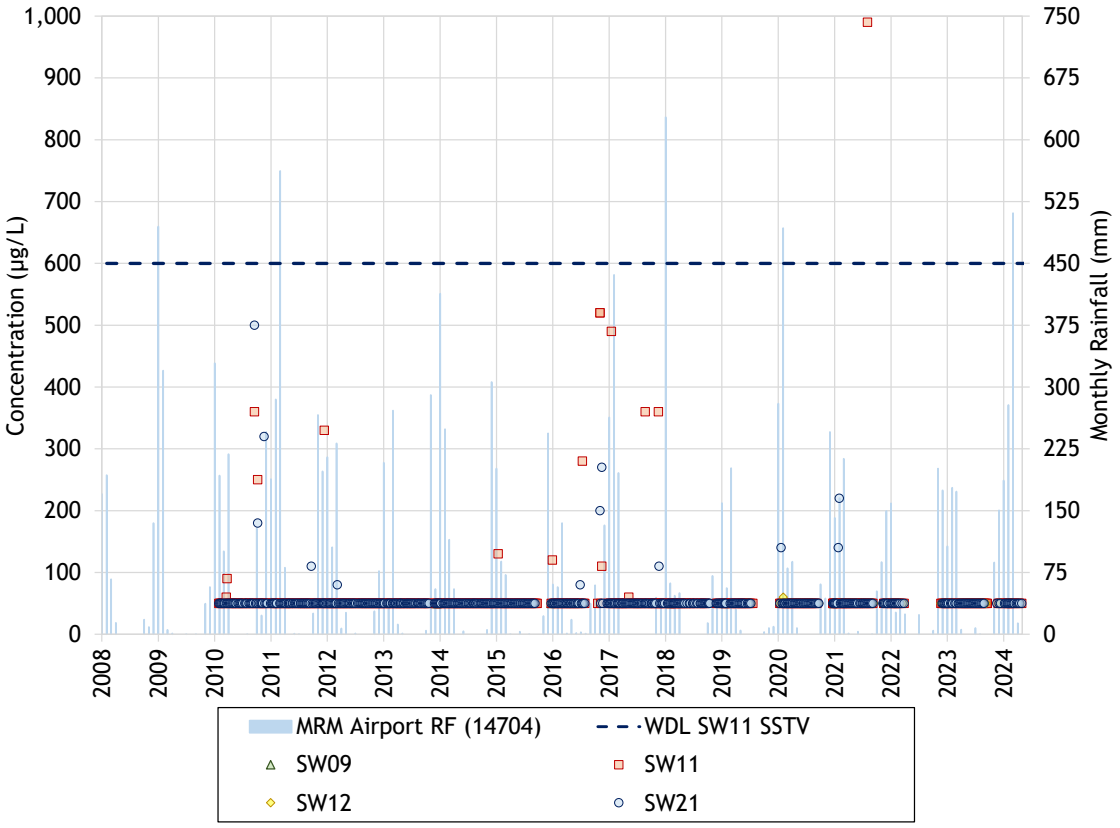


Chart 34: Historical TPH C10-C36 Fraction and Monthly Rainfall – McArthur River and Glyde River Monitoring Sites

4.5.18 Benzene

Benzene concentrations are presented on Chart 35 and Chart 36 for the reporting and historical periods. Benzene concentrations were extremely low during the reporting period. Recorded benzene concentrations at SW11 were below the LOR (1.0 µg/L) and SSTV, which is consistent with the historical data.

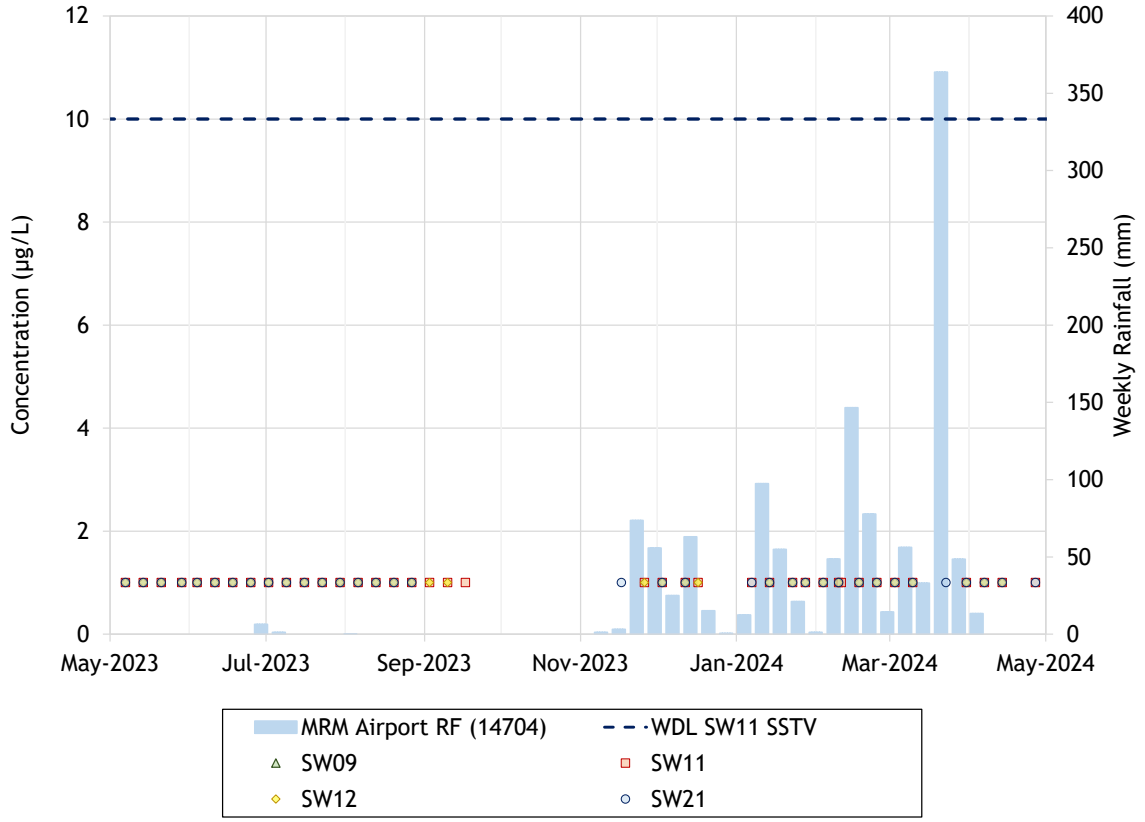


Chart 35: Reporting Period Benzene and Weekly Rainfall – McArthur River and Glyde River Monitoring Sites

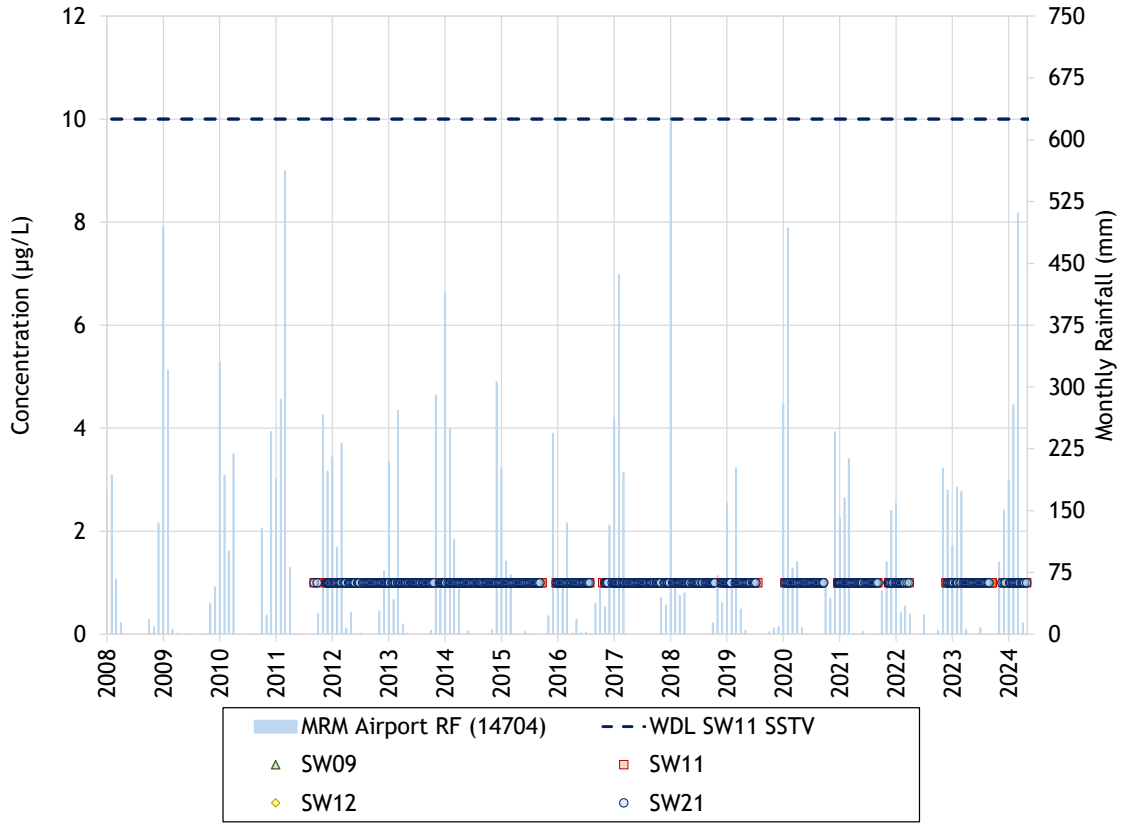


Chart 36: Historical Benzene and Monthly Rainfall – McArthur River and Glyde River Monitoring Site

4.6 Downstream McArthur River

Chart 37 to Chart 42 presents the surface water quality data for McArthur River at SW08 and SW32 for each of the main analytes (pH, EC, SO_4, filtered Tl, filtered Zn, filtered Pb) over the past three years. Additional water quality data for SW08 and SW32 can be found in WRM (2024b). The charts present the weekly rainfall record from the gauge at the McArthur River Airport from the Department of Environment and Science SILO Patched Point Data Service.

Following the notifiable incident at the SW11 compliance point (see Section 4.5.14 and Section 6.1), MRM undertook additional monitoring at downstream McArthur River sites located between SW11 and SW32. As prior sampling results had indicated that waters at SW11 were not fully mixed on the sample date, the intent of the additional downstream monitoring was to sample McArthur River water at fully mixed locations. Three additional surface water monitoring locations DS1, DS2 and DS3 were established along the McArthur River approximately 4 km, 7 km and 9 km downstream of SW11 respectively.

The monitoring results from DS1, DS2 and DS3 confirmed that the concentration of all analytes, including filtered Zn, downstream of SW11 were below their respective SSTVs. The monitoring data collected at these sites showed that the risk of environmental harm in the McArthur River following the notifiable incident was low. Results for DS1, DS2 and DS3 are provided in WRM (2024b).

4.6.1 pH

Field pH measurements are presented on Chart 37 for the past three years. In general, pH levels at SW08 and SW32 were circumneutral to slightly alkaline during the reporting period with all pH levels recorded near Borroloola between 6.5 and 8.5 (pH units).

4.6.1 Electrical Conductivity and Sulphate

EC (laboratory measured) levels are presented on Chart 38 and SO_4 concentrations are presented on Chart 39 for the past three years. EC levels were similar to those in previous years and no measured SO_4 concentrations were elevated beyond 200 mg/L. There were no measured EC levels or SO_4 concentrations beyond the SW11 SSTV at SW08 or SW32 during the reporting period.

4.6.1 Filtered Thallium

Filtered Tl measurements are presented on Chart 40 for the past three years. Recorded filtered Tl concentrations were consistently low at SW08 and SW32 during the reporting period. All samples contained filtered Tl concentrations well below the SW11 SSTV (58 µg/L).

4.6.1 Filtered Zinc

Filtered Zn measurements are presented on Chart 41 for the past three years. Recorded filtered Zn concentrations were consistently low at SW08 and SW32 during the reporting period. All samples contained filtered Zn concentrations well below the SW11 SSTV (32 µg/L).

4.6.1 Filtered Lead

Filtered lead measurements are presented on Chart 42 for the past three years. Recorded filtered Pb concentrations were consistently low at SW08 and SW32 during the reporting period. All samples contained filtered Pb concentrations well below the SW11 SSTV (17 µg/L).

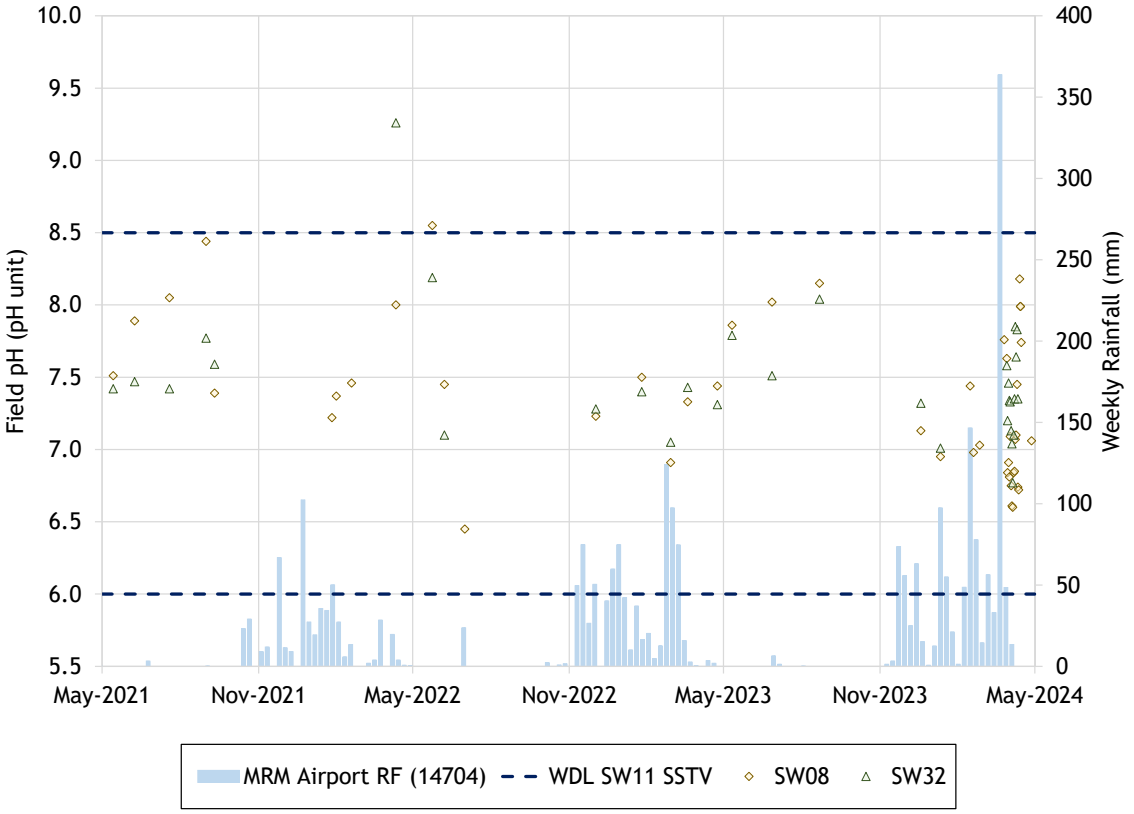


Chart 37: Past Three Years of pH (Field) and Weekly Rainfall – Downstream McArthur River Monitoring Sites

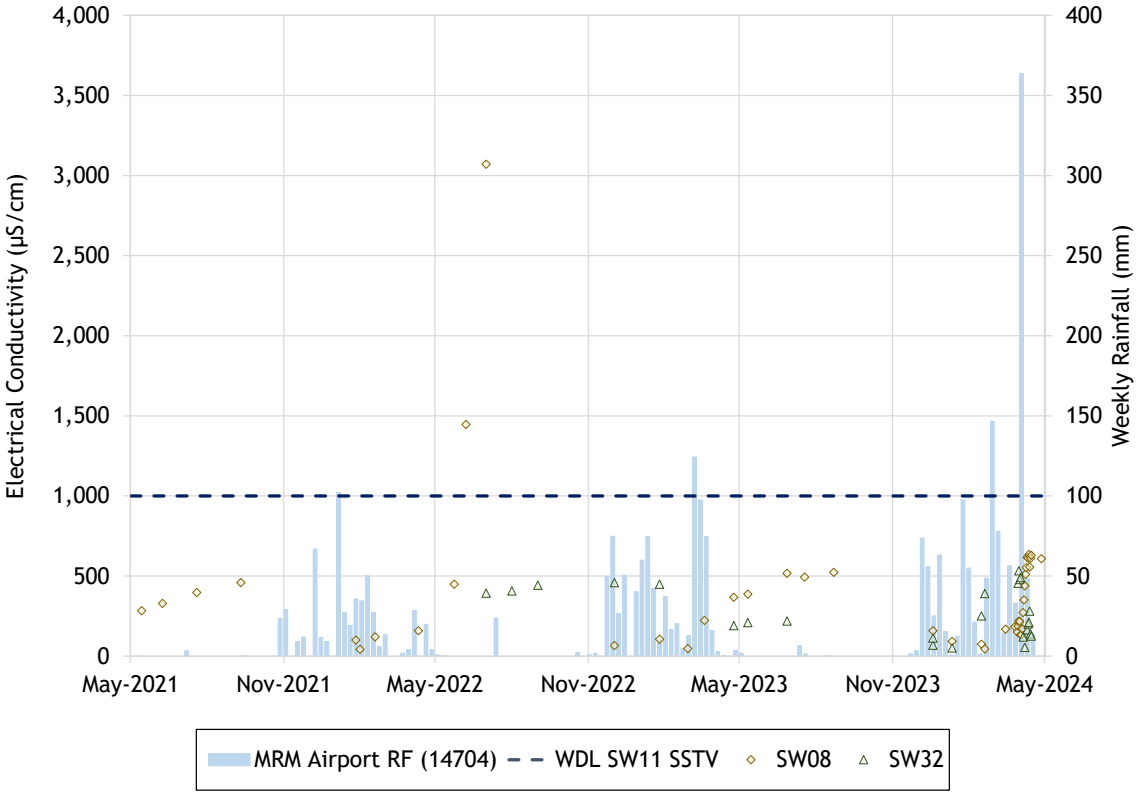


Chart 38: Past Three Years of Laboratory Electrical Conductivity and Weekly Rainfall – Downstream McArthur River Monitoring Sites

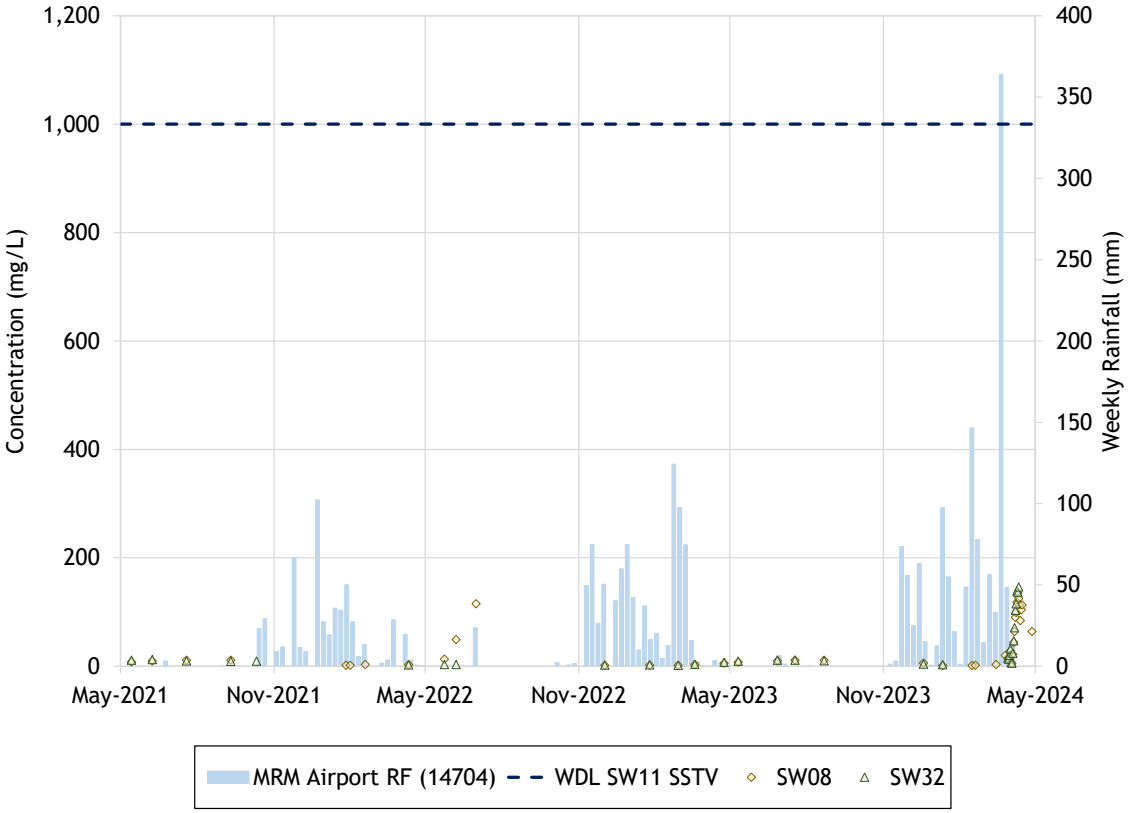


Chart 39: Past Three Years of Sulphate and Weekly Rainfall – Downstream McArthur River Monitoring Sites

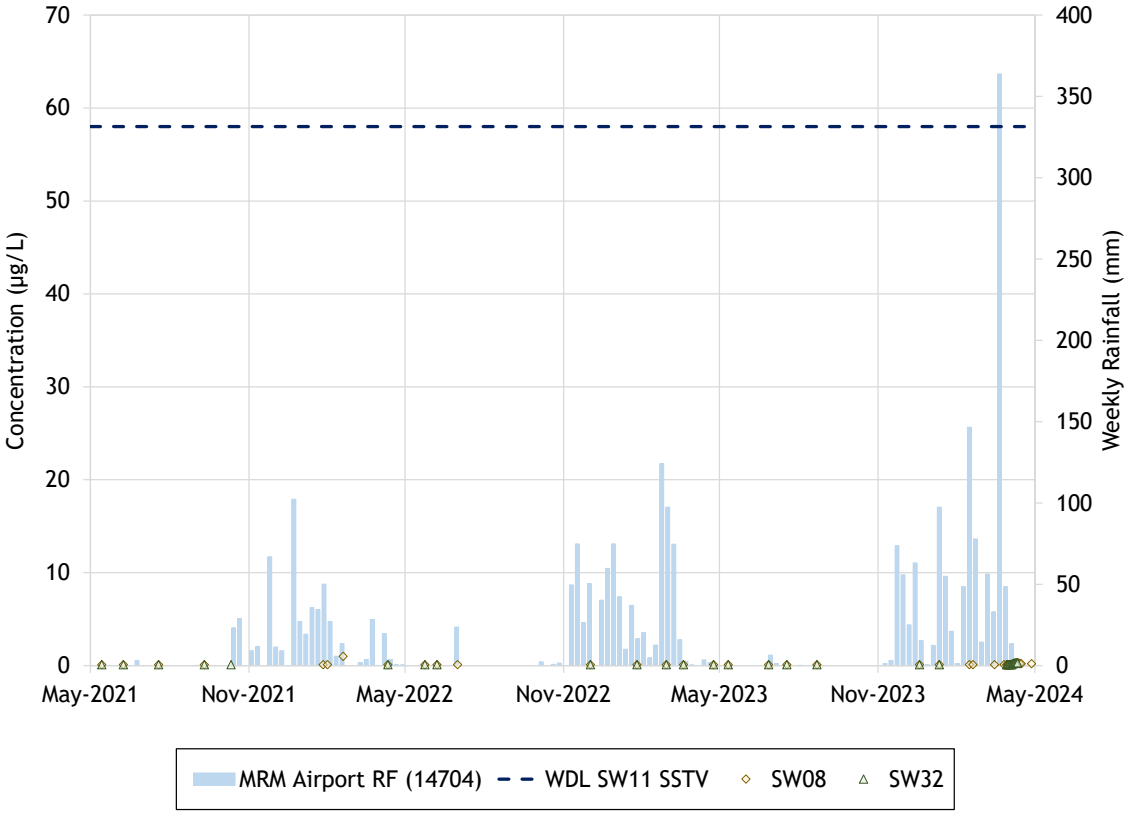


Chart 40: Past Three Years of Filtered Tl and Weekly Rainfall – Downstream McArthur River Monitoring Sites

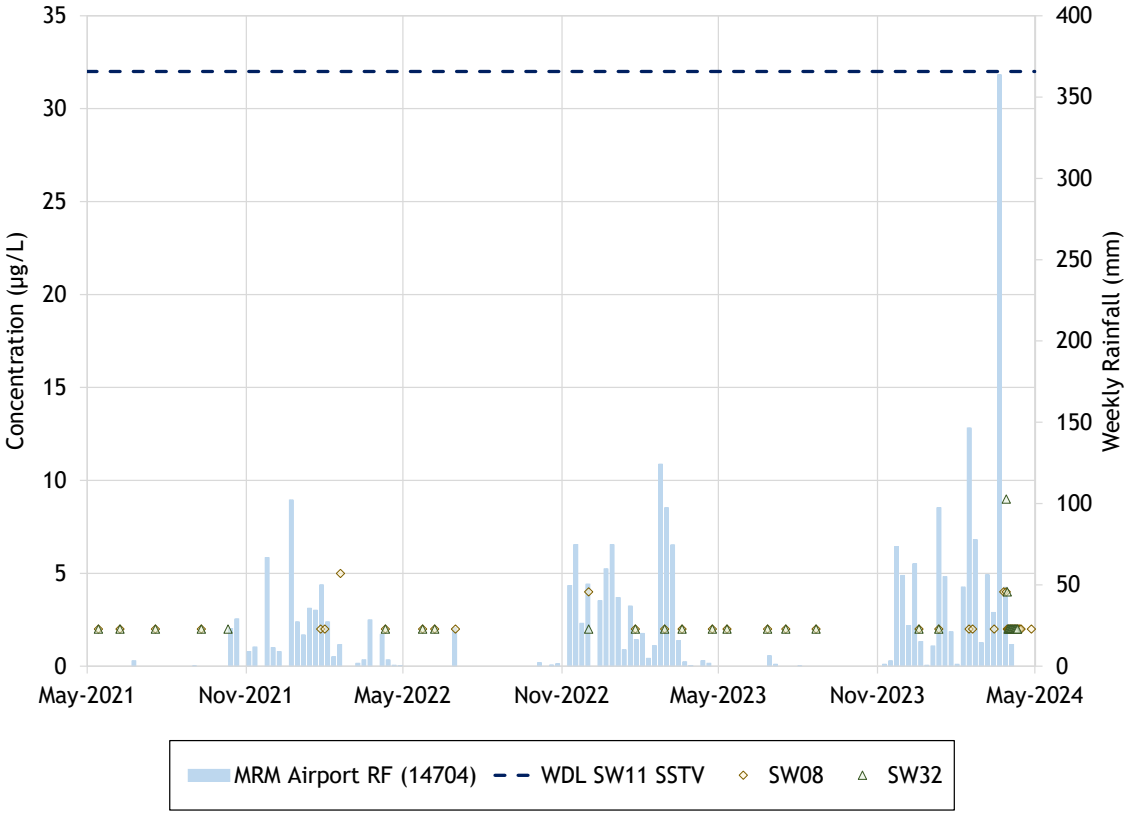


Chart 41: Past Three Years of Filtered Zn and Weekly Rainfall – Downstream McArthur River Monitoring Sites

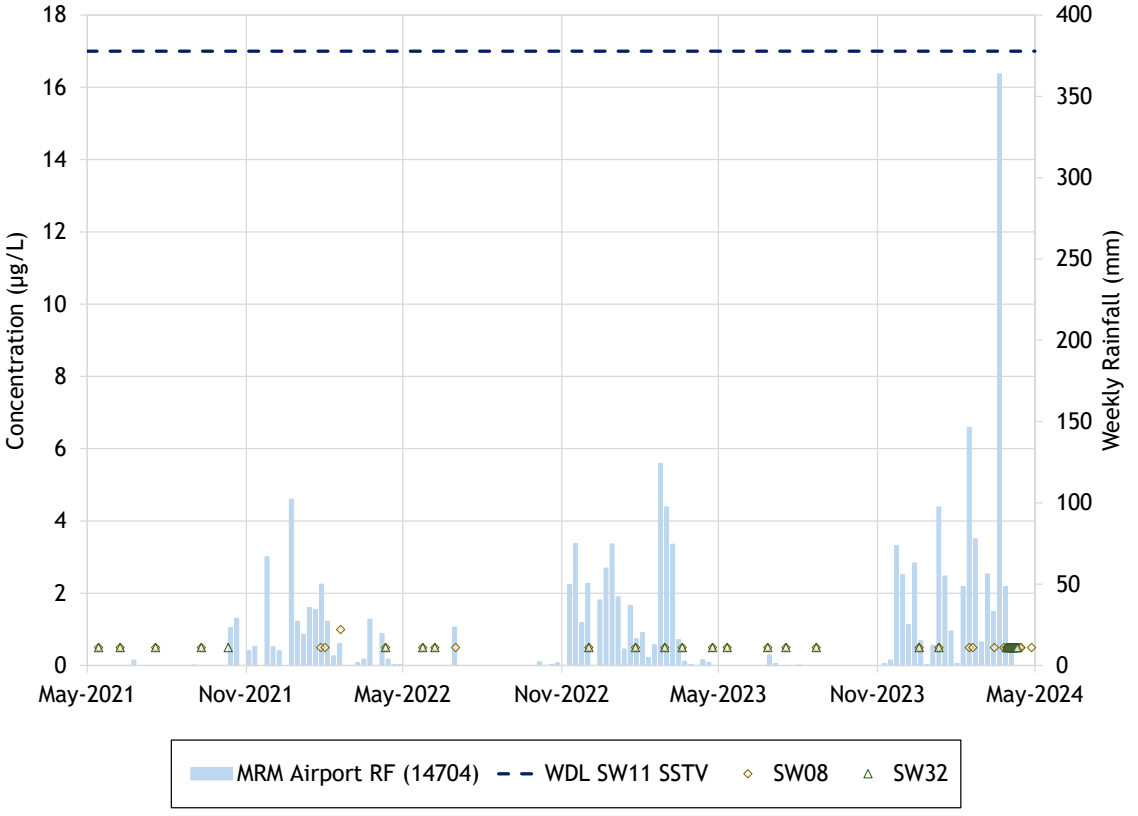


Chart 42: Past Three Years of Filtered Pb and Weekly Rainfall – Downstream McArthur River Monitoring Sites

4.7 Local Creek Stream Flow

The following is a summary of the flows in Surprise, Barney and Emu Creeks during the reporting period:

4.7.1.1 Surprise Creek

Figure 9 presents the water level (m AHD) and flow rate (m^3/s) recorded at the Surprise Creek Gauging Station (SCGS) at SW02 during the reporting period. The daily rainfall recorded at the McArthur River Airport station (14704) is also presented.

Flow at the Surprise Creek gauging station commenced in late November 2023. Prior to this, there were no recorded flows. Peak flows occurred during and just after Ex-TC Megan moved through the catchment. Flows in Surprise Creek peaked at over 200 m^3/s during the event.

4.7.1.2 Barney Creek

Figure 10 presents the water level (m AHD) and flow rate (m^3/s) recorded at the Barney Creek Gauging Station (BCGS) at SW04 for the reporting period. Daily rainfall recorded at McArthur River Airport station (14704) is also presented.

Flow at the Barney Creek gauging station commenced in late November 2023. Prior to this, there were no recorded flows. Peak flows occurred during and just after Ex-TC Megan moved through the catchment. Flows in Barney Creek peaked at approximately 1,000 m^3/s during the event.

4.7.1.3 Emu Creek

Figure 11 presents the water level (m AHD) and flow rate (m^3/s) recorded at the Emu Creek monitoring station SW31 during the reporting period. Daily rainfall recorded at McArthur River Airport station (14704) is also presented.

Flow at SW31 commenced in late November 2023. Prior to this, there were no recorded flows. Peak flows occurred during and just after Ex-TC Megan moved through the catchment. Flows in Emu Creek peaked at almost 250 m^3/s during the event.

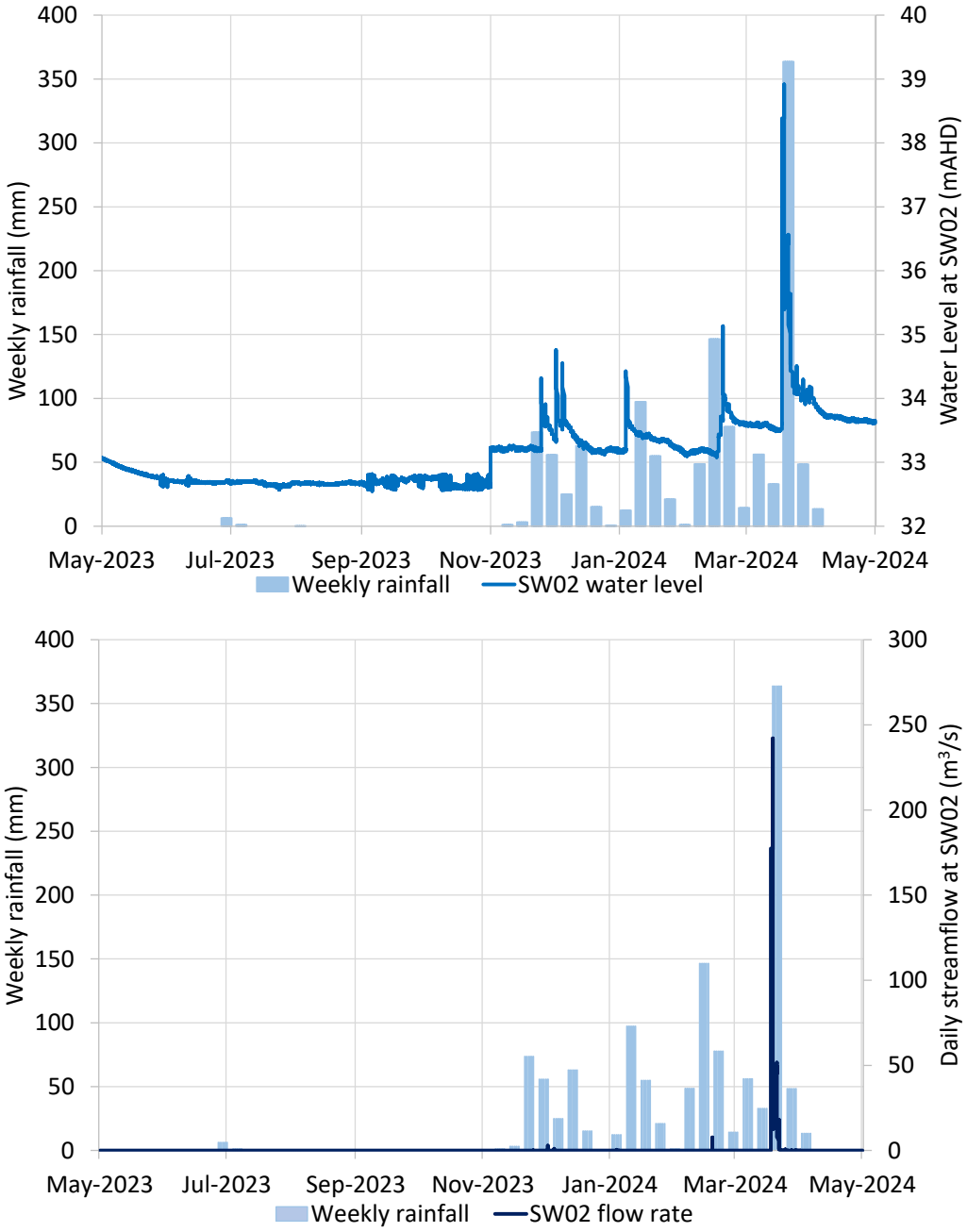


Figure 9: Reporting Period Surprise Creek Water Level and Flowrate

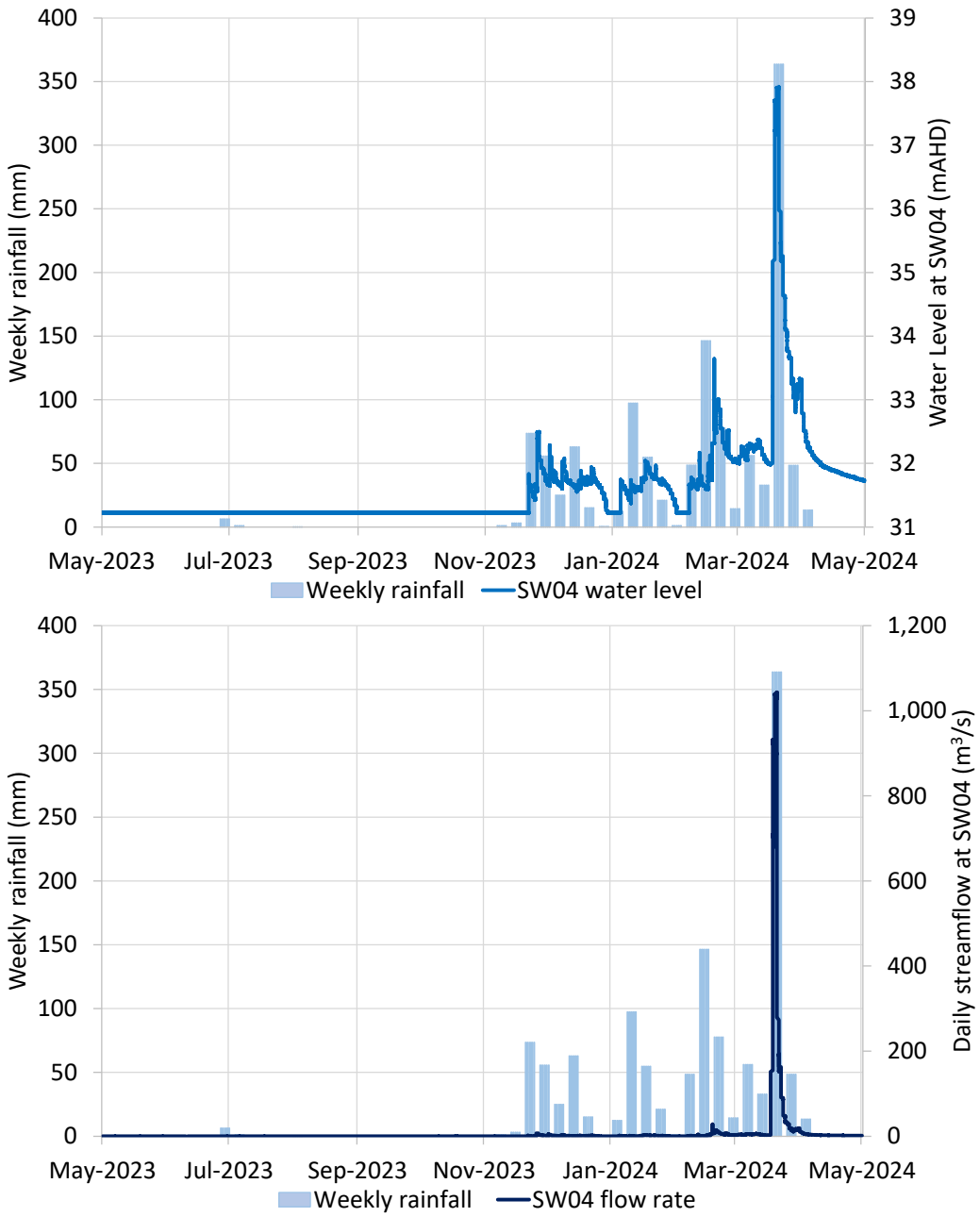


Figure 10: Reporting Period Barney Creek Water Level and Flowrate

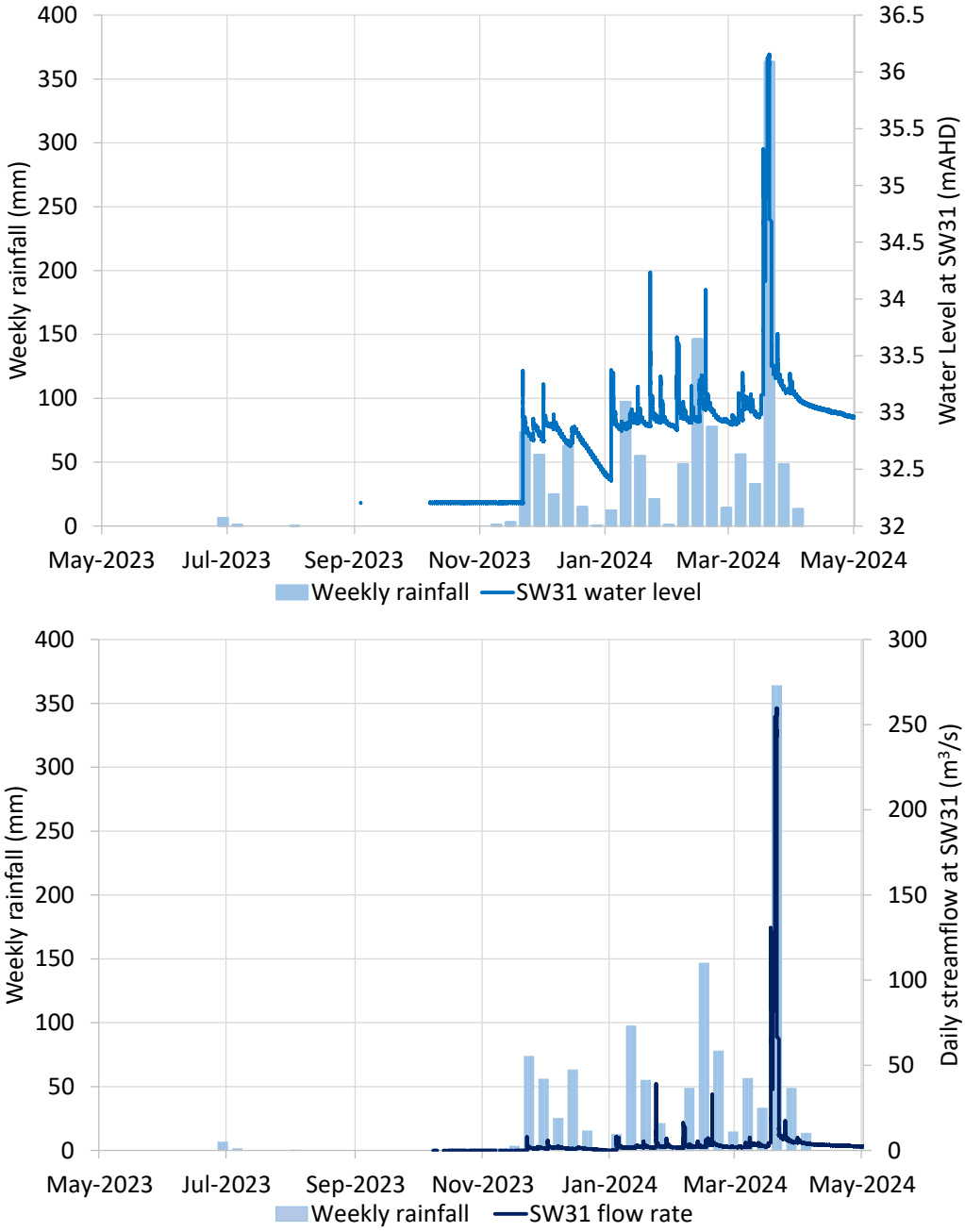


Figure 11: Reporting Period Emu Creek Water Level and Flowrate

4.8 Local Creeks Water Quality

Surface water quality for each of the main analytes (pH, EC, SO_4, filtered Tl, filtered Zn, filtered Pb) at the upstream control locations (SW28, SW29 and SW31) and most downstream locations (SW20, SW24 and SW26) on the local creeks for the past three years, including the reporting period, are presented on Chart 43 to Chart 48 to aid in the discussion of trends. The charts present the weekly rainfall record from the gauge at McArthur River Airport from the Department of Environment and Science SILO Patched Point Data Service.

4.8.1 pH

Field measured pH levels at locations on Surprise Creek (SW29 and SW24), Barney Creek (SW28 and SW20) and Emu Creek (SW31 and SW26) is presented on Chart 43 for the past three years.

4.8.1.1 Surprise Creek

During the reporting period, pH levels at SW29 (upstream Surprise Creek) were typically higher than those recorded at SW24 (downstream Surprise Creek). All pH levels recorded in Surprise Creek during the reporting period were below 8.5.

4.8.1.2 Barney Creek

During the reporting period, pH levels were circumneutral prior to March 2024 (Ex-TC Megan). High pH levels were recorded at SW28 (upstream Barney Creek) and SW20 (downstream Barney Creek) after Ex-TC Megan, with the highest pH levels occurring at SW28.

4.8.1.3 Emu Creek

Prior to Ex-TC Megan, SW31 (upstream Emu Creek) pH levels were typically higher than those recorded at SW26 (downstream Emu Creek) when flows increased. When flows decreased, pH levels at SW26 increased and were generally higher than those at SW31. pH levels notably increase for both SW26 and SW31 after Ex-TC Megan, which may be related to reduced rainfall runoff and a higher contribution from groundwater expressing as surface water baseflow.

4.8.1 Electrical Conductivity and Sulphate

EC (laboratory measured) levels and SO_4 concentrations at locations on Surprise Creek (SW29 and SW24), Barney Creek (SW28 and SW20) and Emu Creek (SW31 and SW26) is presented on Chart 44 and Chart 45, respectively, for the past three years.

4.8.1.1 Surprise Creek

During the reporting period, EC levels and SO_4 concentrations at SW24 (downstream Surprise Creek) were elevated compared to those at SW29 (upstream Surprise Creek). EC levels and SO_4 concentrations at SW24 increase notably after Ex-TC Megan impacted the Mine. SW24 is located downstream of the TSF and NOEF and appears to be influenced by mine derived baseflows.

4.8.1.2 Barney Creek

During the reporting period, the EC levels and SO_4 concentrations at SW20 (downstream Barney Creek) were elevated when compared to those at SW28 (upstream Barney Creek). EC and SO_4 concentrations in Barney Creek during the reporting period were increased during periods when managed releases took place (February 2024 and March/April 2024). This indicates that Barney Creek flows were diluted by McArthur River flows as there were no measured EC levels or SO_4 concentrations beyond the SW11 SSTV during the reporting period.

4.8.1.3 Emu Creek

During the reporting period, the EC levels and SO_4 concentrations at SW26 (downstream Emu Creek) were elevated when compared to those at SW31 (upstream Emu Creek). The recorded EC levels and SO_4 concentrations at SW26 notably increased after Ex-TC Megan impacted the Mine, which is likely due to mine waters draining to Emu Creek. EC levels at SW31 also gradually increased after Ex-TC Megan.

4.8.1 Filtered Thallium

Filtered Tl concentrations in Surprise Creek (SW29 and SW24), Barney Creek (SW28 and SW20) and Emu Creek (SW31 and SW26) is presented on Chart 46 for the past three years.

4.8.1.1 Surprise Creek

Filtered Tl concentrations were consistently low during the reporting period.

4.8.1.2 Barney Creek

Filtered Tl concentrations in Barney Creek were consistently low during the reporting period with exception of elevated filtered Tl concentrations at SW20 (downstream Barney Creek) when managed releases occurred. These elevated filtered Tl concentrations (10 µg/L) were still well below the SW11 SSTV (58 µg/L).

4.8.1.3 Emu Creek

Filtered Tl concentrations in Emu Creek were consistently low during the reporting period, with exception to a slight increase in concentration at SW26 (downstream Emu Creek) likely due to mine waters draining into Emu Creek after Ex-TC Megan.

4.8.1 Filtered Zinc

Filtered Zn concentrations in Surprise Creek (SW29 and SW24), Barney Creek (SW28 and SW20) and Emu Creek (SW31 and SW26) is presented on Chart 47 for the past three years.

4.8.1.1 Surprise Creek

During the reporting period, filtered Zn concentrations were low at SW29 (upstream Surprise Creek) andSW24 (downstream Surprise Creek),and were within the range of the other downstream monitoring locations in the local creeks.

4.8.1.2 Barney Creek

During the reporting period, filtered Zn concentrations were low at SW28 (upstream Barney Creek) and SW20 (downstream Barney Creek) prior to Ex-TC Megan, with exception of one slightly elevated measured concentration on 25 February 2024 (18 µg/L) at SW20, likely associated with managed releases. There is anincrease in filtered Zn concentrations at SW20 on 19 March 2024 (261 µg/L) associated with the extreme rainfall from Ex-TC Megan.

The initial spike in filtered Zn may have been related to overflow from a number of ASW storages that were inundated by Barney Creek and the McArthur River during the associated flooding. There was then a large decrease in filtered Zn (9 µg/L) at SW20 when the next sample was taken on 26 March 2024. This sample date corresponded with the notifiable incident at SW11 (see Section 4.5.1) indicating that Barney Creek was unlikely to be a significant contributor to that incident. Filtered Zn concentrations at SW20 then increased gradually until the end of the reporting period.

4.8.1.3 Emu Creek

Filtered Zn concentrations during the reporting period were generally low at both SW31 (upstream Emu Creek) and SW26 (downstream Emu Creek). However, filtered Zn concentrations at SW26 increased dramatically following Ex-TC Megan with concentrations peaking at 1,070 µg/L. These elevated concentrations were related to an uncontrolled release that was draining into Emu Creek from a damaged flood protection levee. These filtered Zn concentrations were also associated with the notifiable incident at SW11 (west) on 26 March 2024, see Section 6.1.

4.8.1 Filtered Lead

Filtered Pb concentrations in Surprise Creek (SW29 and SW24), Barney Creek (SW28 and SW20) and Emu Creek (SW31 and SW26) is presented on Chart 48 for the past three years.

4.8.1.1 Surprise Creek

Filtered Pb concentrations were consistently low during the reporting period. Most samples at the two Surprise Creek locations measured filtered Pb concentrations below the LOR (0.5 µg/L).

4.8.1.2 Barney Creek

Filtered Pb concentrations were consistently low during the reporting period. Most samples at the two Barney Creek locations measured filtered Pb concentrations below the LOR (0.5 µg/L).

4.8.1.3 Emu Creek

Filtered Pb concentrations were consistently low during the reporting period. Most samples at the two Emu Creek locations measured filtered Pb concentrations below the LOR (0.5 µg/L). This included the downstream Emu Creek site SW26.

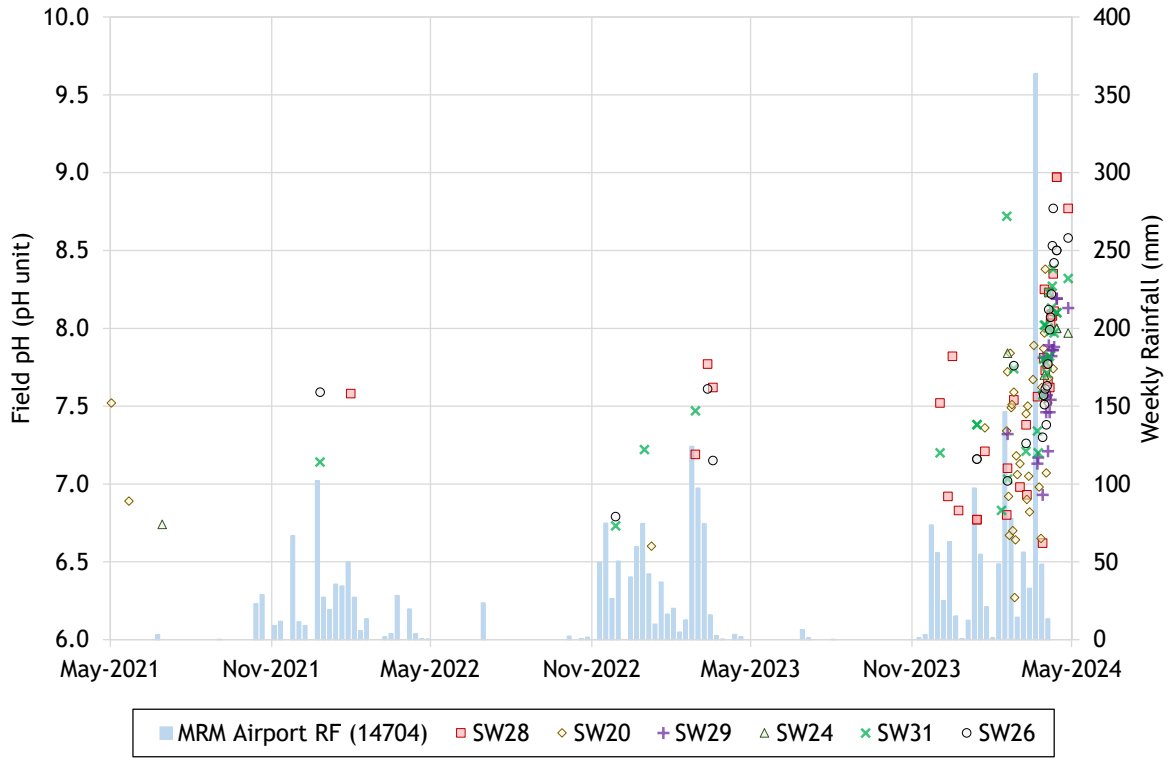


Chart 43: Past Three Years of Field pH and Weekly Rainfall – Local Creeks Monitoring Sites

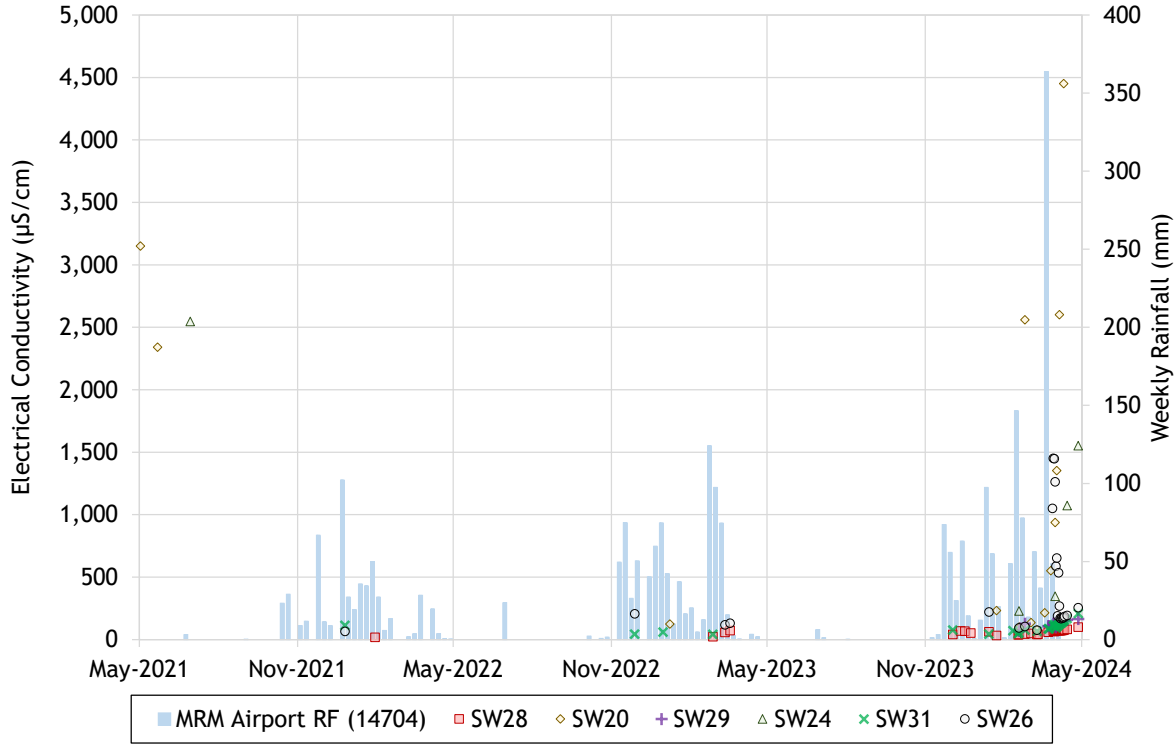


Chart 44: Past Three Years of Laboratory Electrical Conductivity and Weekly Rainfall – Local Creeks Monitoring Sites

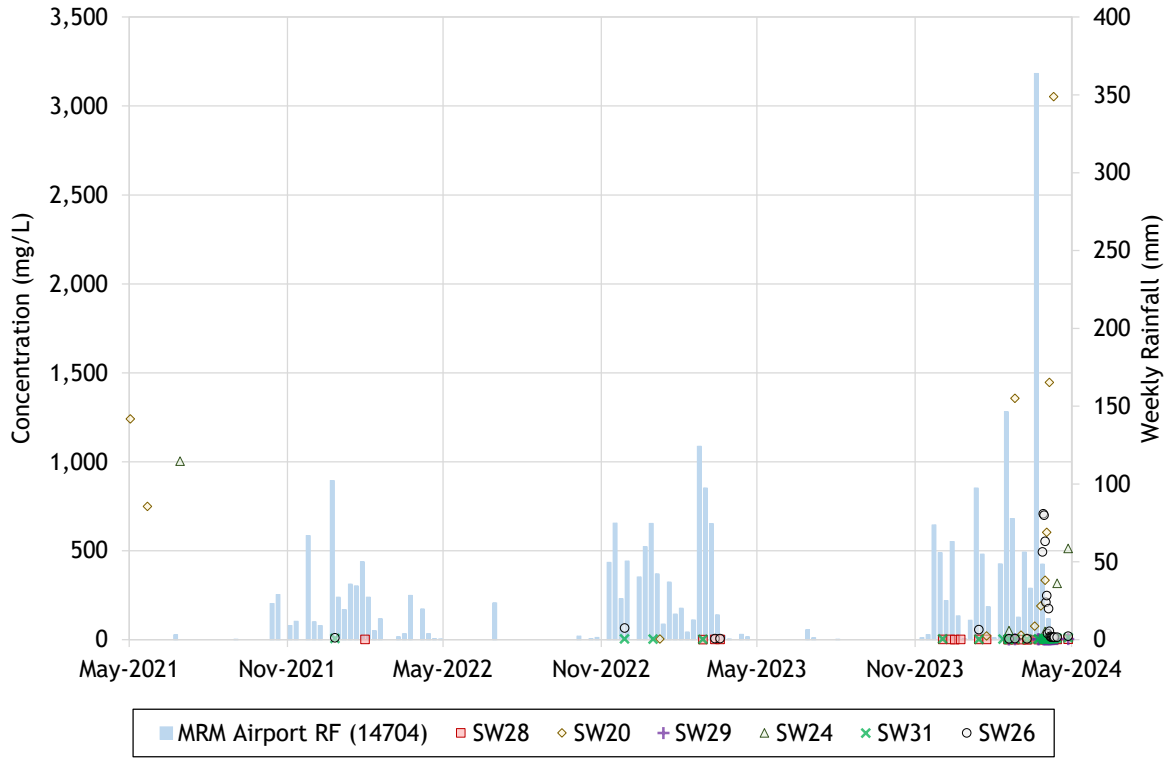


Chart 45: Past Three Years of Sulphate and Weekly Rainfall – Local Creeks Monitoring Sites

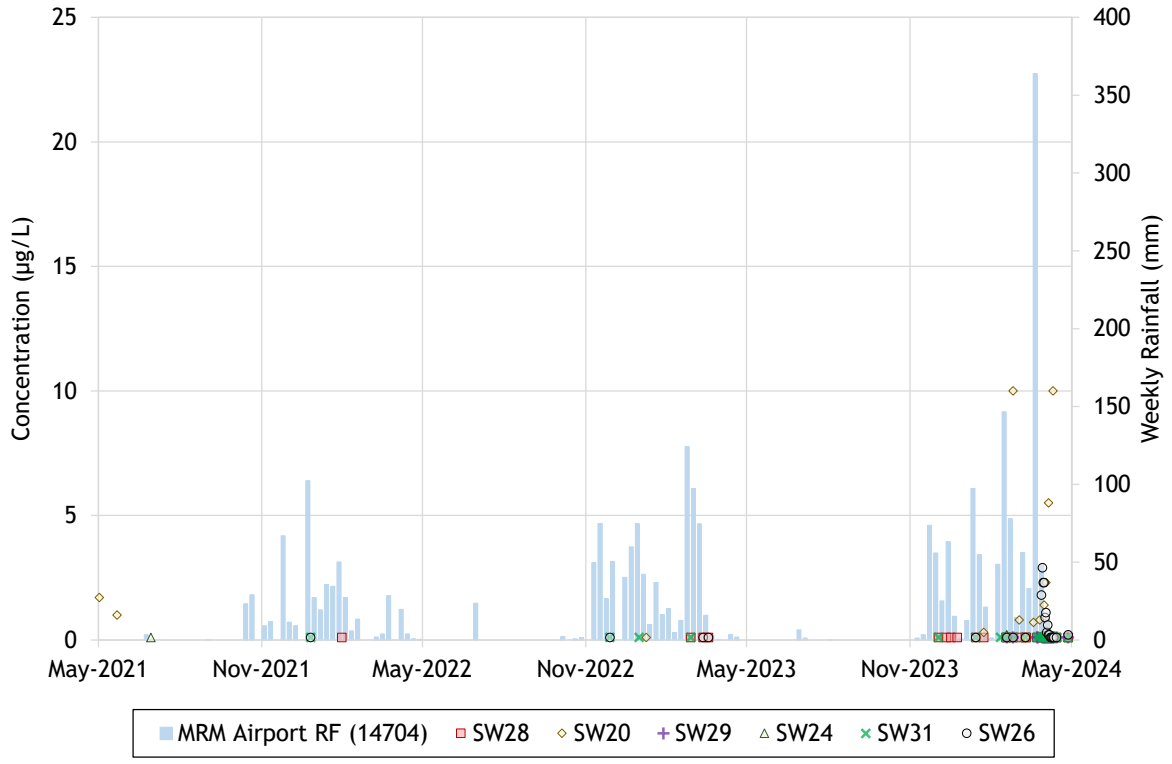


Chart 46: Past Three Years of Filtered Tl and Weekly Rainfall – Local Creeks Monitoring Sites

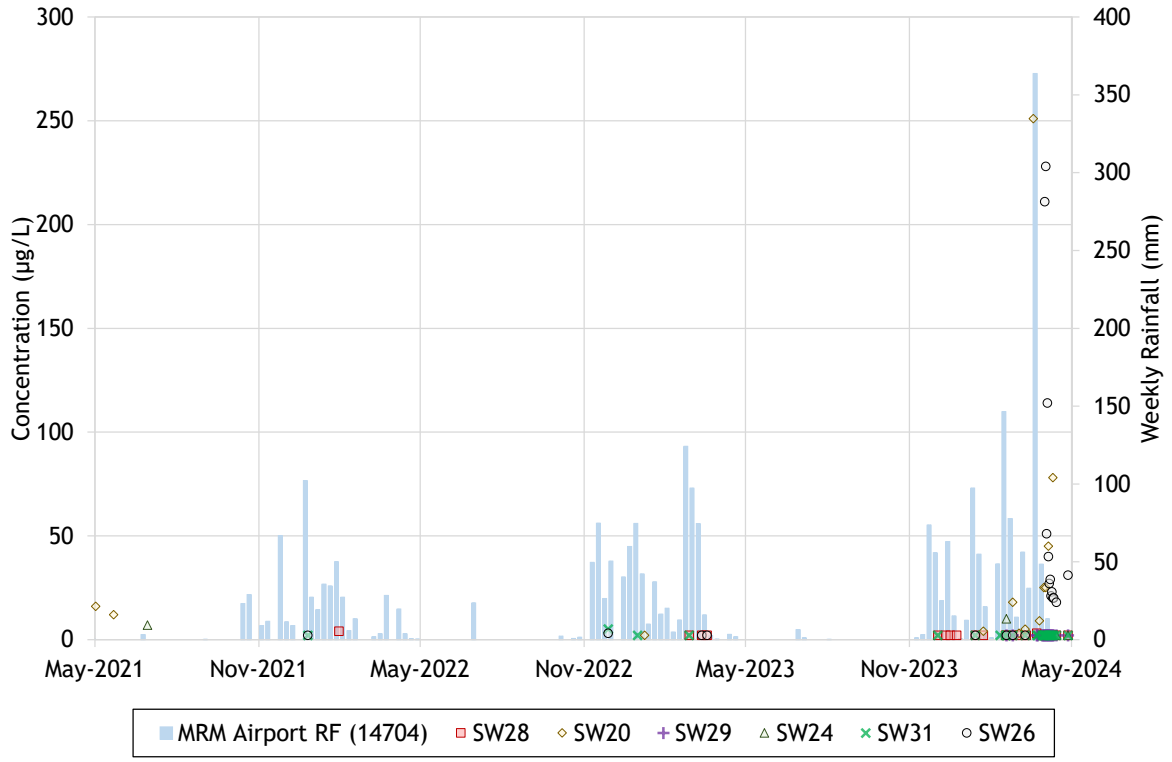


Chart 47: Past Three Years of Filtered Zn and Weekly Rainfall – Local Creeks Monitoring Sites

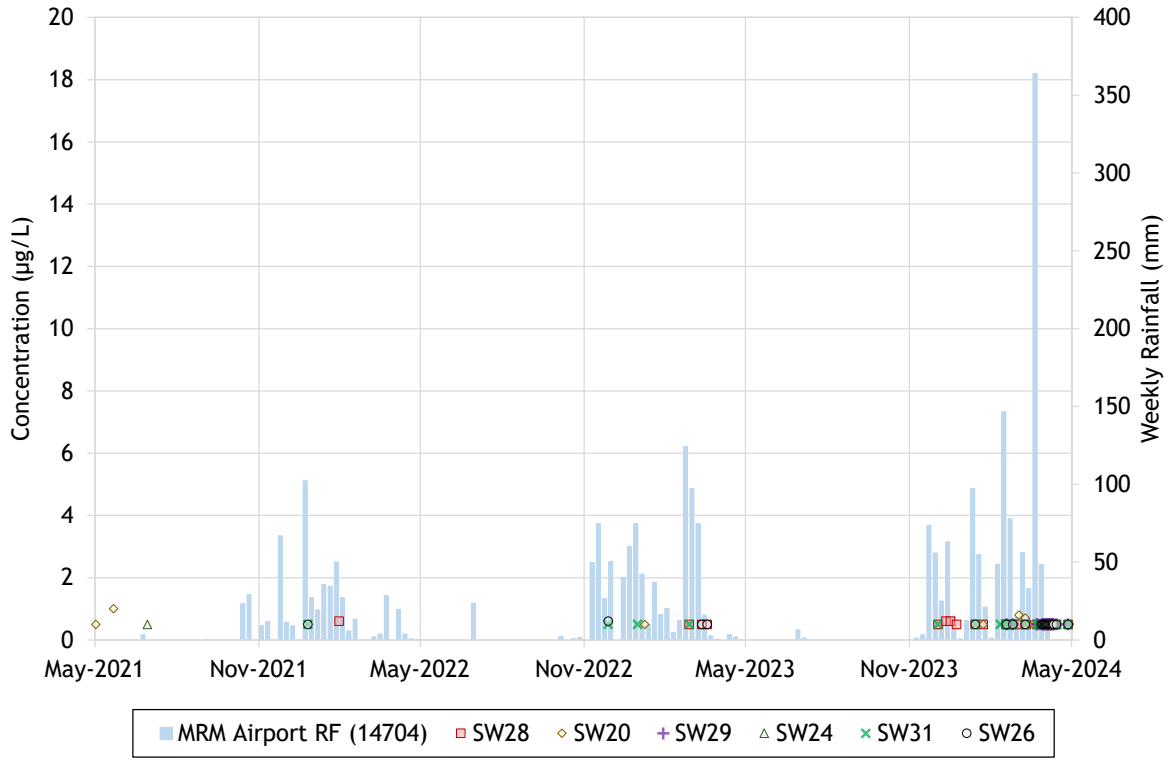


Chart 48: Past Three Years of Filtered Pb and Weekly Rainfall – Local Creeks Monitoring Sites

4.9 Artificial Surface Water Quality Discharged During the Reporting Period

Chart 49 to Chart 54 presents the managed release volumes and the water quality in NOEF SEPROD, OP P2, OP NC1A and TSF WMD source waters and for the following analytes:

- pH;
- EC;
- SO_4,
- Filtered Tl;
- Filtered Zn; and
- Filtered Pb.

The following sections summarise the water quality at the managed release source waters during the reporting period.

4.9.1 South-Eastern Perimeter Runoff Dam

- pH levels at NOEF SEPROD remained relatively consistent throughout the reporting period during managed release events. pH levels were below 5 in May 2023 before increasing above 6 during the remainder of the reporting period.
- EC levels and SO_4 concentrations were higher for the first six months of the year before gradually reducing during November and December 2023. EC levels and SO_4 concentrations were at their lowest at the end of March 2024, but increased again in April.
- Filtered Tl concentrations generally remained similar during the first five months but increased in October 2023 due to transfers from NOEF SPROD. Filtered Tl reduced during mid-November when water from the Underground and Open Pit (UG&OP) was pumped to NOEF SEPROD and remained between 70 µg/L and 110 µg/L from December 2023 to mid-March 2024. There was an increase in filtered Tl concentrations during the April 2024 managed releases likely due to inflows from OP PP, before decreasing prior to the managed releases in mid-April.
- Filtered Zn concentrations remained relatively consistent prior to February 2024 with a few exceptions due to inflows from NOEF SPROD (October 2023), NOEF EPROD (November 2023) and OP LA (March 2024). Filtered Zn concentrations increased during the April 2024 managed releases, due to inflows from NOEF North-East Alpha (NEA) Lake, sump and extraction tower, as well as other seepages dewatered from the north-eastern area of the NOEF.
- Filtered Pb concentrations fluctuated throughout the reporting period, however concentrations stayed below 15 µg/L.

4.9.2 Pond 2

- pH levels at OP P2 remained relatively consistent throughout the reporting period before and after managed releases with exception to one reading that was around 5.5 on 6 April 2024.
- EC levels and SO4 concentrations were higher for the first six months of the year before gradually reducing during November and December 2023. Concentrations were at their lowest at the end of March 2024, but increased in April 2024.
- Filtered Tl concentrations gradually increased from September to mid-November before reducing during the end of November and December 2023. There was however an increase in filtered Tl concentrations during the April 2024 managed releases, likely due to inflows from OP PP via NOEF SEPROD, but decreased shortly thereafter.

- Filtered Zn concentrations were slightly increased during the peak of the dry season before increasing in November. Filtered Zn concentrations reduced when NOEF SEPROD transfers occurred in December 2023. Concentrations generally remained lower throughout the first 3 months of 2024. Filtered Zn concentrations increased during the peak of the April 2024 managed releases due to inflows from OP PP.
- With the exception to some increases, notably in mid-August 2023, filtered Pb concentrations gradually increased from mid-June to mid-September before gradually decreasing. Filtered Pb concentrations increased at the beginning of April 2024, likely due to inflows from OP PP.

4.9.3 Northern Crossing 1A

- There were only two occasions where samples could be taken at OP NC1A due to the storage either being dry or having insufficient water to sample.
- EC, SO_4, filtered Tl and filtered Pb concentrations were low and pH levels were circumneutral.
- Filtered Zn concentrations were elevated in two samples, with the highest sample having concentrations over 4,400 µg/L. It is important to note that these concentrations were obtained shortly after Ex-TC Megan impacted the Mine and without previous samples to determine what the normal zinc range is in OP NC1A it is unclear if the elevated concentrations were due to catchment runoff or from another source.

4.9.4 Water Management Dam

- pH and EC levels and filtered Zn and SO_4 concentrations at TSF WMD remained at relatively consistent levels during and after managed releases. Concentrations were however at their lowest during the April 2024 managed releases following dilution associated with rainfall from Ex-TC Megan.
- Filtered Tl concentrations were higher in early December as NOEF SPROD water was treated in NOEF SEPROD and transferred to TSF WMD via OP P2. The filtered Tl concentrations decreased subsequent to rainfall events. After Ex-TC Megan impacted the Mine, filtered Tl concentrations were at their lowest during the first half of April when managed releases were at their peak and increased slightly at the end of April.
- Filtered Pb concentrations were low during the reporting period. There was a slight increase in concentrations likely due to evapoconcentration as dam levels were near their lowest from October to November. Filtered Pb concentrations decreased subsequent to rainfall events.

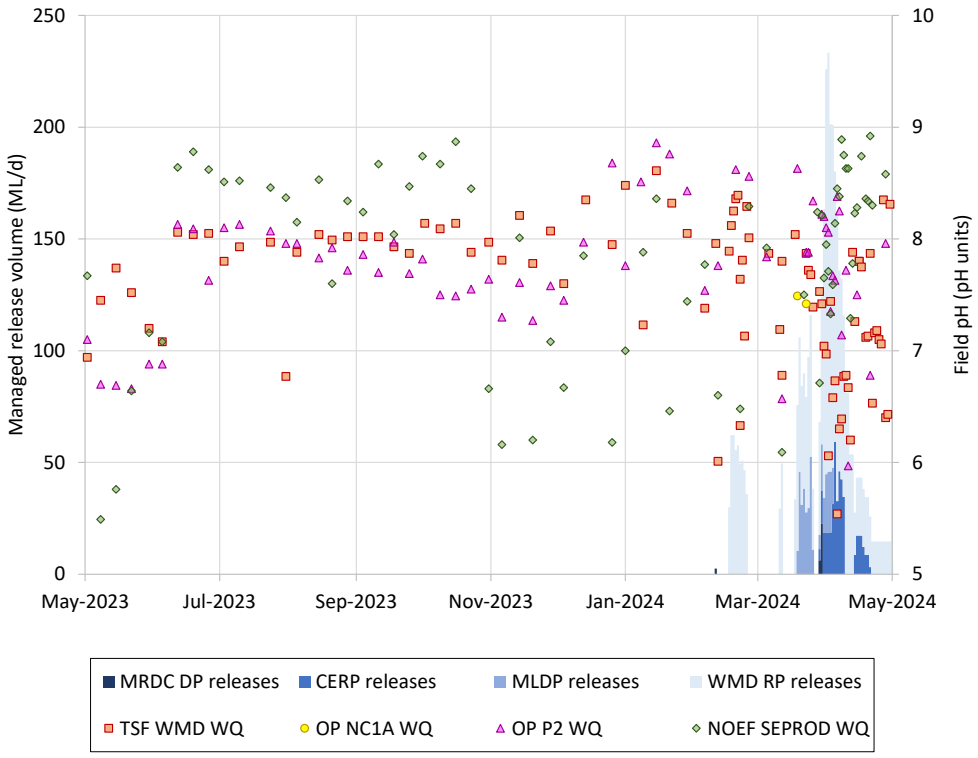


Chart 49: Reporting Period Field pH for OP P2, OP NC1A, NOEF SEPROD, OP NC1A and TSF WMD with managed release volumes

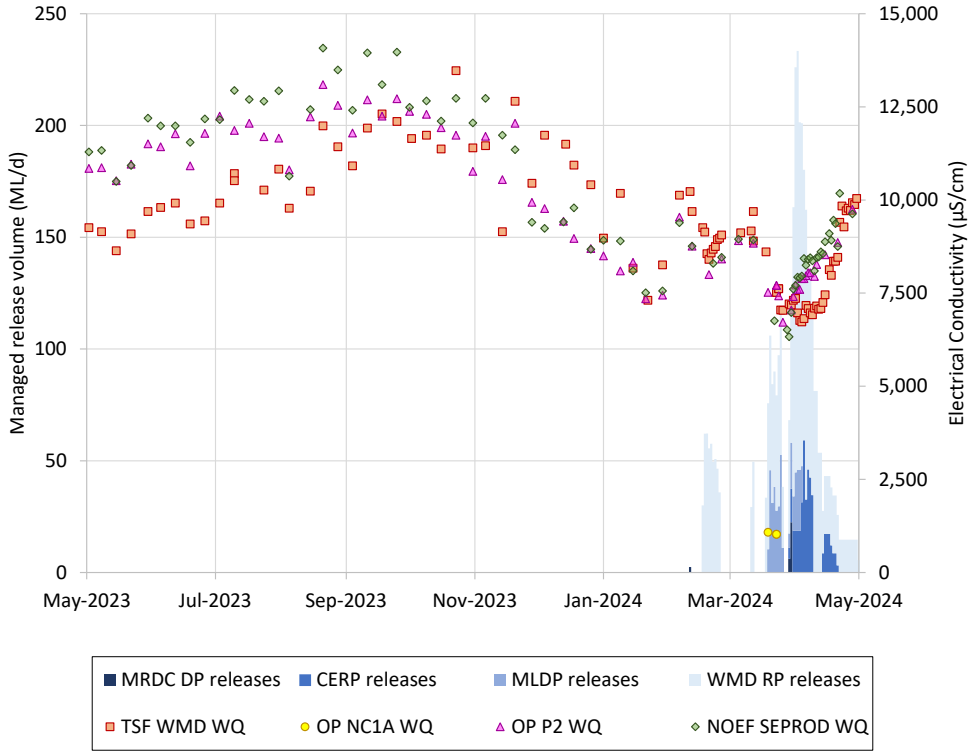


Chart 50: Reporting Period EC for OP P2, OP NC1A, NOEF SEPROD, OP NC1A and TSF WMD with managed release volumes

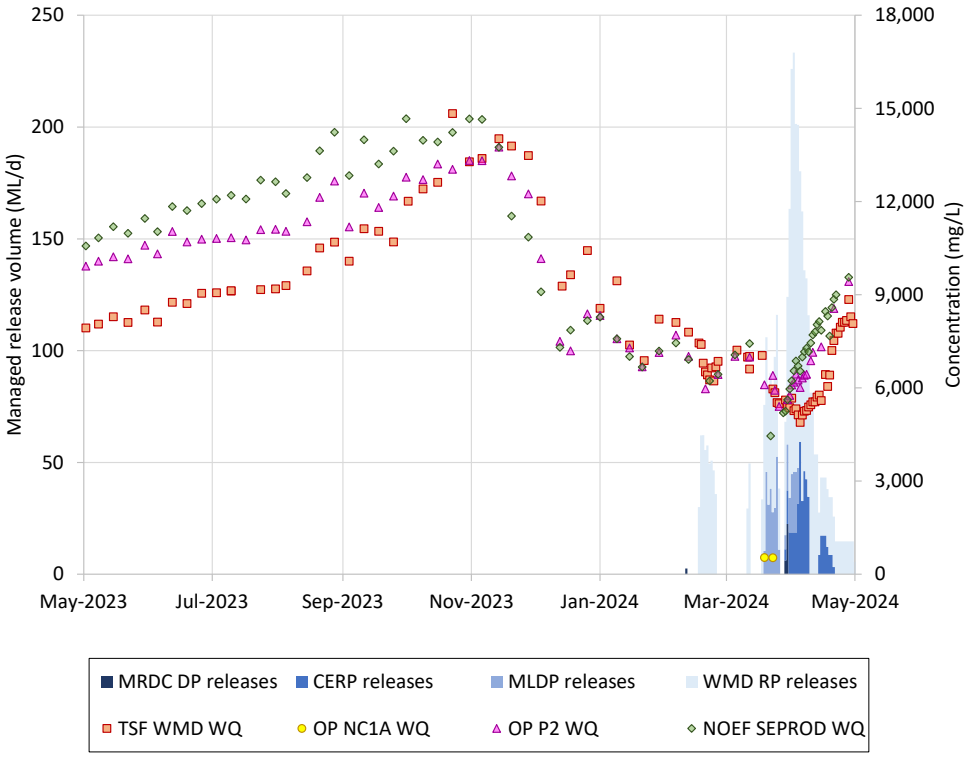


Chart 51: Reporting Period SO_4 for OP P2, OP NC1A, NOEF SEPROD, OP NC1A and TSF WMD with managed release volumes

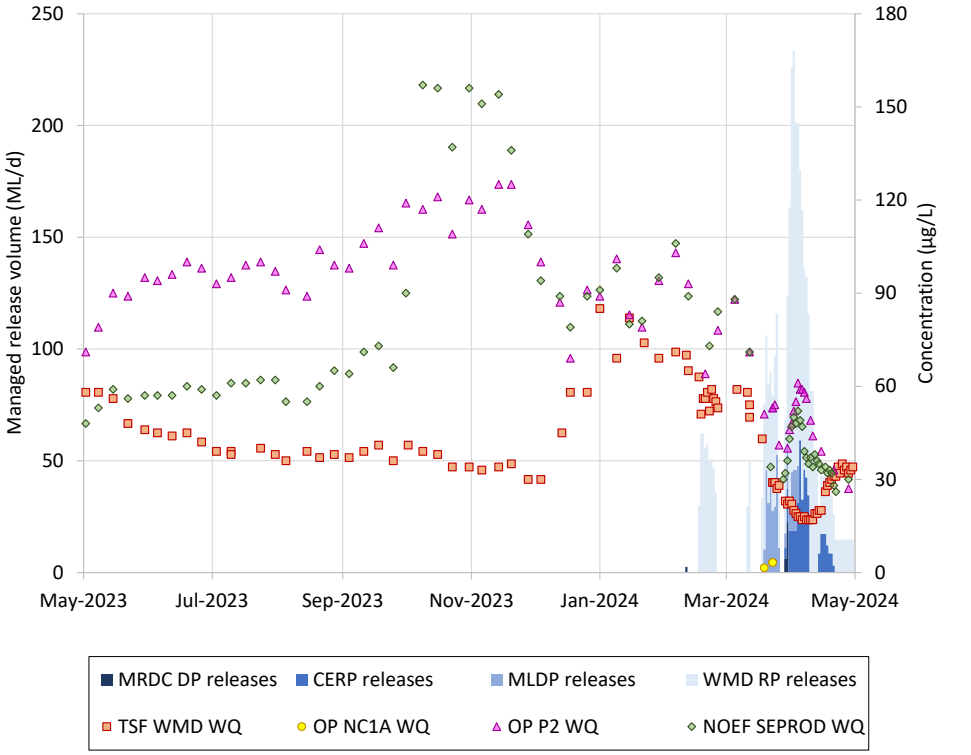


Chart 52: Reporting Period Filtered Tl for OP P2, OP NC1A, NOEF SEPROD, OP NC1A and TSF WMD with managed release volumes

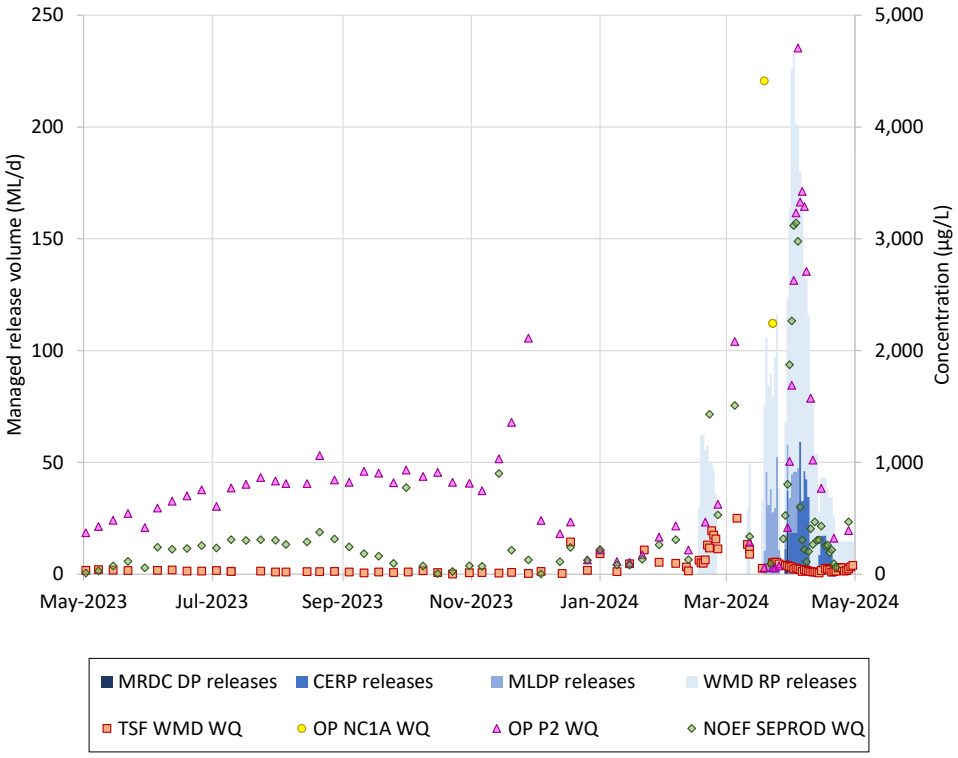


Chart 53: Reporting Period Filtered Zn for OP P2, OP NC1A, NOEF SEPROD, OP NC1A and TSF WMD with managed release volumes

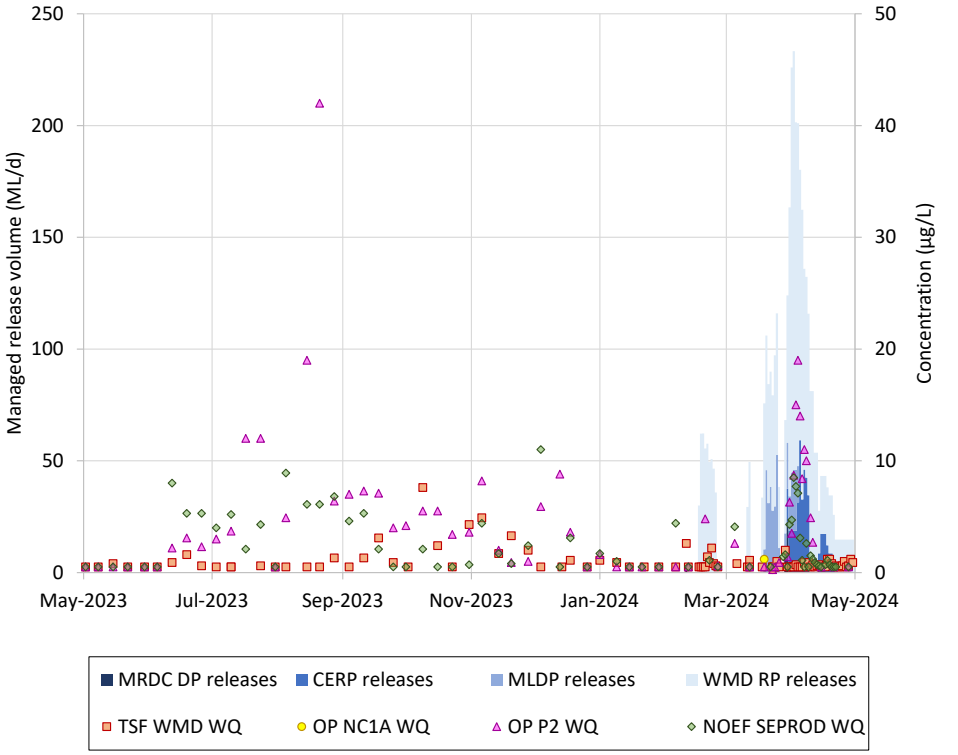


Chart 54: Reporting Period Filtered Pb for OP P2, OP NC1A, NOEF SEPROD, OP NC1A and TSF WMD with managed release volumes

5 Analyte Loads

5.1 Methodology

Analyte loads were estimated for the period between 1 May 2023 and 30 April 2024 by WRM (2024c). The full assessment report is provided in Attachment 2, with a summary of key findings provided below.

The loads assessment was undertaken to:

- estimate the actively released mine derived analyte loads produced by the Mine from managed releases during the current reporting period;
- compare the annual managed release loads released since 2017/18 reporting period; and
- compare the managed release loads to the background loads in McArthur River (at SW21 and SW11) and Glyde River (at SW09) during the current reporting period.

Analyte loads for the reporting period were estimated using the following methodology:

1. Daily surface water volumes:
    a. Daily water level data at SW11 was provided by MRM. Water level data was converted to streamflow volumes using the rating curves presented in WRM (2024c).
    b. Daily streamflow volumes at USGS / MIM Pump were obtained from the NT Government website and applied to calculations at SW21.
    c. Glyde River water level data was available from 11 November 2023. Due to the significant tailwater impacts from the McArthur River during the wet season, the Glyde River rating curve was considered unsuitable for estimating the Glyde River flows. In lieu of this, the Glyde River flow was derived by subtracting flow at SW21 (McArthur River upstream), SW02 (Surprise Creek), SW04 (Barney Creek) and SW31 (Emu Creek) from the flow at SW11 (McArthur River downstream).
2. Daily analyte concentrations:
    a. Analyte concentrations were typically recorded on a daily timestep when managed releases occurred and a weekly timestep when managed releases were not occurring. Where daily concentrations were unavailable, linear interpolation between the recorded data points was used.
    b. Water quality values that were listed as below the LOR were assumed to be equal to the LOR value, which likely overestimated the concentration (and therefore the estimated load).
3. Annual analyte load estimation:
    a. The annual analyte loads for a given period were estimated by:
        i. Multiplying the interpolated daily concentrations by the interpolated daily flows to give an estimated daily load.
        ii. Summing the estimated daily loads over the annual reporting period.

In loads assessments, the total concentrations are considered more environmentally significant, especially for those analytes with the potential for bioaccumulation in sediment-ingesting biota and biomagnification within the aquatic food chain.

5.2 Background and Managed Release Loads

5.2.1 2023/24 load estimates

Loads estimates, which are presented in Table 8, included the McArthur River and Glyde River upstream of the Mine (at SW21 and SW09 respectively) and mine derived analyte loads produced by the Mine from managed releases.

Given the array of inherent uncertainties in the calculation of annual analyte loads in natural systems such as the upstream McArthur River, there are a number of limitations in the current assessment. These include (WRM, 2024c):

- There is a naturally high uncertainty in estimating loads in natural systems due to their dynamic nature and natural variability. Weekly or even daily water quality measurements may not capture a number of the natural processes that affect water quality during a flow event. Hence, there is a level of uncertainty in the estimated annual analyte loads, particularly for natural surface water reporting locations; and
- It is very difficult to accurately measure every source of water in a dynamic system such as the McArthur River and the Mine to the point that the sum of pre-mine analyte loads and mine derived analyte loads will equal the post-mine loads. As such, it is impossible to achieve an accurate metal balance.

The following observations, as reported in WRM (2024c), were made:

- *The McArthur River flow volume passing post mine gauging station SW11 was approximately 102% higher than the sum of pre-mine gauging stations (SW21) for the reporting period. This is mainly due to the contribution of natural surface water sources including the Glyde River, Barney Creek, Surprise Creek, Emu Creek and Bull Creek.*
- *Increases in the estimated analyte loads due to managed releases from the Mine were generally less than 10%, except for manganese (filtered), zinc (filtered), thallium (filtered), and sulphate.*
- *the managed release loads for total lead were greater than 100% of those discharged over the 2017/18 reporting period. This was due to the significant volume of water discharged from the Mine as a result of widespread rainfall and flooding caused by Ex-Tropical Cyclone Megan.*

Due to the significant rainfall and flooding associated with Ex-Tropical Cyclone Megan, MRM discharged a significant volume of water to limit the risk of uncontrolled releases and open pit inundation. As a result of the extreme conditions, MRM requested an exemption to the load limits for total lead and total zinc on 14 April 2024, which was granted on 12 June 2024 by the NT Department of Industry, Tourism and Trade.

TABLE 8: ESTIMATED SURFACE WATER FLOW VOLUMES AND ANALYTE LOADS FOR THE PERIOD 1 MAY 2023 TO 30 APRIL 2024

Parameter	Unit	SW21 + SW09 (pre-mine)	Managed Releases from the Mine	Percentage Increase
Total Flow	ML	4,576,209	3,887.5	0.08%
Filtered Al	kg	294,147	19.9	0.01%
Total Al	kg	25,134,888	684.4	0.00%
Filtered As	kg	2,330	7	0.30%
Total As	kg	14,894	11.1	0.07%
Filtered B	kg	75,716	2,801.3	3.70%
Total B	kg	114,779	3,125.8	2.72%
Filtered Cd	kg	915	2.4	0.26%
Total Cd	kg	9,403	3.1	0.03%
Filtered Co	kg	4,576	26.8	0.59%
Total Co	kg	15,652	28.2	0.18%
Filtered Cu	kg	4,576	3.9	0.09%
Total Cu	kg	26,114	4.2	0.02%
Filtered Fe	kg	705,252	29.1	0.00%
Total Fe	kg	22,453,058	732.7	0.00%
Filtered Pb	kg	2,288	4.7	0.21%
Total Pb	kg	20,840	19.7	0.09%
Filtered Mn	kg	8,419	2,760.2	32.79%
Total Mn	kg	213,446	3,104.2	1.45%
Filtered Hg	kg	46	0	0.00%
Total Hg	kg	307	0.2	0.06%
Filtered Ni	kg	4,576	39.3	0.86%
Total Ni	kg	23,691	42.6	0.18%
Filtered Tl	kg	458	120.8	26.43%
Total Tl	kg	9,447	123.2	1.30%
Filtered Zn	kg	9,152	1,211.8	13.24%
Total Zn	kg	50,405	1,621.1	3.22%
SO_4	tonnes	5,301	23,289.0	439.33%
NO_3	kg	613,851	7,393.4	1.20%
TDS	tonnes	392,033	36,287.1	9.26%
TSS	tonnes	304,115	52.8	0.02%

kg = kilograms, TDS = total dissolved solids, TSS = total suspended solids

5.2.2 Comparison of 2017/18 Managed Release Loads

The NT EPA Assessment Report 86 (under Recommendation 3) recommends that the annual loads of Pb and Zn released to the McArthur River each year should not be elevated beyond the loads released over the 2017/18 period (see WRM, 2019), considering seasonal variations in rainfall and subject to future annual load calculations. Load limits on total Zn and total Pb in managed release waters are therefore provided as a commitment in the Mine's environmental management plans.

The annual managed release loads for total Pb and total Zn for the previous five years have been compared to the managed release loads for the 2017/18 period (Chart 55). The following is of note regarding the managed releases loads during the reporting period:

- The estimated 2023/24 managed release load for total lead (19.7 kg) was higher than the load released in 2017/18 (15.8 kg); and
- The estimated 2023/24 managed release load for total zinc (1,621.1 kg) was lower than the load released in 2017/18 (3,429 kg).

Due to the intense rainfall and flooding associated with Ex-TC Megan, MRM released a significant volume of water during the reporting period to limit the risk of uncontrolled releases and Open Pit inundation. As a result of the extreme conditions, MRM was granted an exemption to the annual load limits for total lead and total zinc by the NT DITT on 12 June 2024.

Potential risk to the downstream environment associated with the managed release load for total lead is expected to be negligible in the context of the total lead load transported by the McArthur River during the reporting period. For comparison, the natural background (pre-mine) total lead load transported by the McArthur River during the reporting period was estimated at 20,840 kg (Table 8). This value is orders of magnitude greater than the managed release total of 19.7 kg.

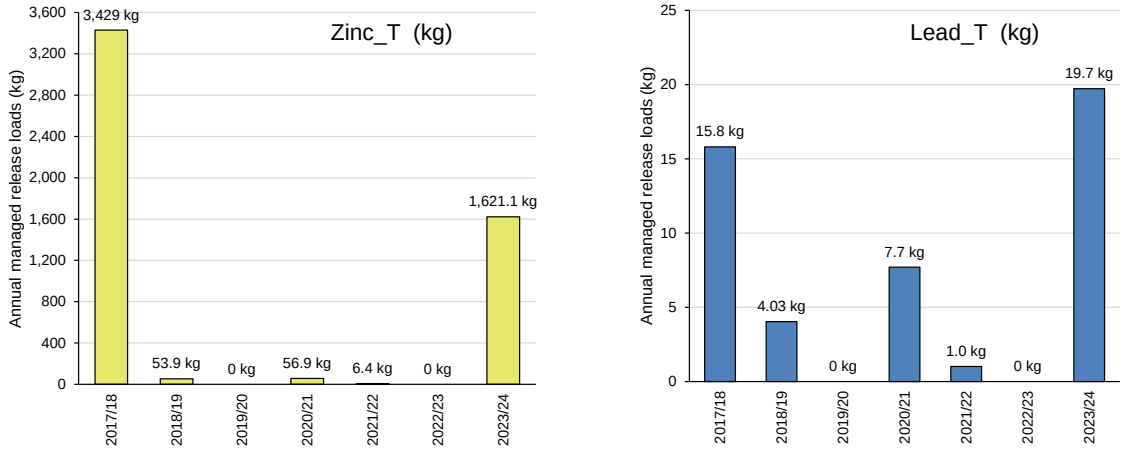


Chart 55: Comparison of Estimated Total Zinc and Total Lead Loads 2023/24 to 2017/18

6 Discussion

During the reporting period, all water quality results collected at SW11 and BBDDP were compared to the relevant SSTVs in the WDL. Any results beyond the SSTVs at these compliance points were investigated to determine the contributing factors and potential environmental risk. Factors investigated included:

- whether managed release was occurring at the time;
- other potential contributions from MRM's operations; and
- comparison to water quality results at upstream control sites (e.g. catchments unaffected by the Mine, such as the Glyde River and the upstream McArthur River).

In addition, any water quality results that triggered a notifiable incident under Schedule 1 Item 10 of the WDL required the investigation report to be submitted to the NT DEPWS.

During the reporting period there were 10 instances when measured concentrations at SW11 were beyond the SSTVs (Table 9). These instances were related to DO and filtered concentrations of Al, Co, Fe and Zn. Of these, there was only one instance when a concentration triggered a notifiable incident under conditions of the WDL. This notifiable incident was related to a filtered Zn concentration at SW11 west being greater than the SW11 SSTV (see Section 6.1).

At the BBDDP, there were two instances when measured concentrations were beyond the SSTVs (Table 9) during the reporting period. These instances were related to pH and filtered As. Neither of these results triggered a notifiable incident under Schedule 1 Item 10 of the WDL.

TABLE 9: REVIEW OF ANALYTE RESULTS AT SW11 AND BBDDP AGAINST WDL 174-15 SSTVS

Site	Sample Date	Analyte Result (the Mine)					Analyte Result (BBLF)		Occurred during Managed Release?	Related to Managed Release?	Notifiable Incident Triggered?	Related to MRM Operations?
	Quality Parameter	DO	Al*	Co*	Fe*	Zn*	As*	pH				
		% sat	µg/L	µg/L	µg/L	µg/L	µg/L	pH units				
	SSTV	85 – 120	269	1.4	347	32	2.3	8.0 – 8.4				
SW11	30 July 2023	82.1	-	-	-	-	-	-	No	No	No	No
SW11	10 Feb 2024	-	398	-	584	-	-	-	No	No	No	No
SW11	11 Feb 2024	-	277	-	494	-	-	-	Yes	No	No	No
SW11	24 Feb 2024	66.1	-	-	-	-	-	-	Yes	No	No	No
SW11 (west)	26 Mar 2024	-	-	-	-	248	-	-	Yes	No	Yes	Influenced, but not primary causal factor.
SW11 (west)	26 Mar 2024	-	-	2	-	-	-	-	Yes	No	No	Influenced, but not primary causal factor.
SW11 (east & west)	26 Mar 2024	81.3 & 76.9 (respectively)	-	-	-	-	-	-	Yes	No	No	No
BBDDP	29 April 2024	-	-	-	-	-	2.6	7.87	No	No	No	No

* Analytes are filtered

6.1 Review of SW11 Monitoring Data and SSTVs

The section below provides further details on the analytes for which concentrations were elevated beyond the SSTVs at SW11 (DO, filtered Al, filtered Co, filtered Fe and filtered Zn).

During the reporting period, there were seven instances when a measured concentration was beyond the SSTV at SW11 while managed releases were occurring (Table 9). However, subsequent investigations determined that managed releases did not significantly contribute to any of the concentrations elevated beyond the SSTVs at SW11. WRM (2024b) reviewed the relevant investigations and agreed with the findings.

6.1.1 McArthur River Dissolved Oxygen

DO concentrations were outside the SSTV range at SW11 on four occasions during the reporting period. Each of the four measured concentrations were below the minimum SSTV (85 % saturation). None of the occasions where DO was outside the SSTV range at SW11 triggered a notifiable incident under Schedule 1 Item 10 of the WDL. DO concentrations below 85 % were frequently recorded for many monitoring sites along the McArthur River during the middle and late stages of the wet season, including monitoring sites upstream of the Mine. DO concentrations outside the SSTV range at SW11 were not sustained, with all concentrations returning to the defined SSTV range in the subsequent sampling event. The data indicated that DO concentrations below the SSTV at SW11 were likely caused by natural catchment variation.

The DO concentrations outside the SSTV range at SW11 during the reporting period are considered non-mine related and resultant of natural river processes. WRM (2024b) reviewed the relevant investigations and agreed with the findings.

6.1.2 McArthur River Filtered Aluminium

Filtered Al concentrations were beyond the SSTV at SW11 on two occasions during the reporting period. Neither of these measured concentrations triggered a notifiable incident under Schedule 1 Item 10 of the WDL. In one instance, managed releases were occurring when a filtered Al concentration was beyond the SSTV at SW11, however filtered Al concentrations in the managed releases were lower than those at the upstream McArthur River control monitoring location (SW21). Hence, the managed releases would not have contributed to the filtered Al concentration beyond the SSTV at SW11.

Both filtered Al concentrations beyond the SSTV at SW11 coincided with elevated filtered Al concentrations in the McArthur River at monitoring location SW21, which is located upstream of the Mine. They also coincided with a substantial increase in flow originating from the upper McArthur River catchment. The McArthur River, upstream of the Mine, as an influencing factor is further supported by the comparable concentrations of filtered Al at monitoring sites SW21 and SW12, which indicated no apparent influence from the Mine. SW12 is located on the McArthur River upstream of the confluence with the Glyde River but downstream of all Mine catchments.

Filtered Al results beyond the SSTV at SW11 during the reporting period were considered non-mine related and the resultant of natural river processes. WRM (2024b) reviewed the relevant investigations and agreed with the findings.

6.1.3 McArthur River Filtered Iron

Filtered Fe concentrations were beyond the SSTV at SW11 on two occasions during the reporting period. Neither of the measured concentrations triggered a notifiable incident under Schedule 1 Item 10 of the WDL. In one instance managed releases were occurring when a filtered Fe concentration was beyond the SSTV at SW11, however filtered Fe concentrations in the managed releases were lower than those at the upstream McArthur River control monitoring location (SW21). Hence, the managed releases would not have contributed to the filtered Fe concentration beyond the SSTV at SW11.

Both filtered Fe concentrations beyond the SSTV at SW11 coincided with elevated filtered Fe concentrations in the McArthur River at monitoring location SW21, which is upstream of the Mine. They also coincided with a substantial increase in flow originating from the upper McArthur River catchment. The McArthur River, upstream of the Mine, as an influencing factor is further supported by the comparable concentrations of filtered Fe at monitoring sites SW21 and SW12, which indicated no apparent influence from the Mine. SW12 is located on the McArthur River upstream of the confluence with the Glyde River but downstream of all Mine catchments.

Filtered Fe results beyond the SSTV at SW11 during the reporting period were considered non-mine related and the resultant of natural river processes. WRM (2024b) reviewed the relevant investigations and agreed with the findings.

6.1.4 McArthur River Filtered Cobalt

A single filtered Co concentration was beyond the SSTV at SW11 during the reporting period but did not trigger a notifiable incident under Schedule 1 Item 10 of the WDL. Managed releases were occurring at the time, however filtered Co concentrations in the managed releases were below the LOR (1 µg/L). This concentration was also measured at the upstream McArthur River control monitoring location (SW21).

The non-notifiable result involving filtered Co was obtained on the same day and from the same sample (SW11 west) as the filtered Zn result that triggered a notifiable incident. Investigations concluded that uncontrolled release originating from the northeast side of the NOEF (i.e. the damaged flood levee) likely influenced the filtered Co concentration at SW11 west on this date. However, a review of conditions at the time of sampling determined that the SW11 west water quality was not considered representative of McArthur River water at SW11 as it was taken from a western overbank channel that was separated from the main channel of the McArthur River.

In addition, a dilution ratio assessment undertaken for the investigation showed that flow in the McArthur River on the date of the result should have been sufficient to dilute the filtered Co source below the SSTV. Furthermore, the filtered Co sample obtained from SW11 east on the same date (i.e. from the opposite bank to SW11 west) contained a concentration less than the LOR (1 µg/L). The data at SW11 east supported the conclusion that the SW11 west sample was not representative of fully mixed waters. WRM (2024b) reviewed the relevant investigation and agreed with the findings.

Following the filtered Co concentration beyond the SSTV at SW11, water quality sampling was undertaken in the fully mixed McArthur River waters downstream of SW11. The monitoring results from this sampling confirmed that the concentration of all analytes, including filtered Co, downstream of SW11 were below their respective SSTVs.

6.1.5 McArthur River Filtered Zinc

Chart 56 presents the filtered Zn concentrations for SW09, SW11, SW12 and SW21 during March and April 2024. During the reporting period, there was one instance when a measured concentration at SW11 triggered a notifiable incident under conditions of the WDL. The notifiable incident occurred on 26 March 2024 and was related to a filtered Zn concentration at SW11 west being three times greater than the SSTV. Notification of this result was provided to the NT DEPWS in accordance with the WDL on the following dates:

- Verbal notification was provided during the inspection of the damaged flood levee on 27 March 2024;
- Email notification was provided on 16 April 2024 following confirmation of the final laboratory result on 15 April 2024; and
- Investigation report (IR020 and 0790-160-A3) summarising the contributing factors and environmental risk was provided by email on 30 April 2024.

The investigation (WRM, 2024a) concluded that an uncontrolled release originating from the northeast side of the NOEF (a damaged flood levee) was a contributing factor to the filtered Zn concentration in the SW11 west

sample. However, the investigation also determined that the sample was not considered representative of the McArthur River water at SW11 as it was not:

- collected from the typical SW11 sampling location due to access restrictions;
- connected to the main McArthur River channel; and
- mixed with significant flow from the main McArthur River channel.

Further, modelling undertaken for the investigation (WRM, 2024a) showed that flow in the McArthur River at the time of sampling would have been sufficient to dilute the uncontrolled release below the SSTV had the sample been taken from fully mixed waters. Additionally, a sample was collected from SW11 east on the same date (i.e. from the opposite bank to SW11 west). This sample contained a concentration of filtered Zn less than 2 micrograms per litre (µg/L) (i.e. well below the SSTV of 32 µg/L) supporting the conclusion that the SW11 west sample was not representative of fully mixed waters.

Following the notifiable incident at SW11 west, water quality sampling was undertaken in the fully mixed McArthur River waters downstream of SW11. The monitoring results from this sampling confirmed that the concentration of all analytes, including filtered Zn, downstream of SW11 were below their respective SSTVs. The monitoring data collected at these sites showed that the risk of environmental harm in the McArthur River was low (WRM, 2024a).

Following identification of the damaged flood levee on the northeast side of the NOEF, significant measures were undertaken to rapidly restrict and contain the uncontrolled release. The following key actions were taken:

- Identification of all known uncontrolled release locations at the toe of the NOEF;
- Construction of embankments lined with alluvium to capture releases where visible seepage was occurring;
- Construction of sumps to pump releases back to the Mine water management system for reuse or treatment; and
- Immediately ceasing managed releases from WMD RP and MLDP until mitigation measures were installed and operational.

Additional surface water monitoring was also undertaken to ensure that the uncontrolled releases from the northeast side of the NOEF were suitably contained before recommencing managed releases.

Representatives from both the NT DITT and the NT DEPWS inspected the damaged flood levee and mitigation measures on 27 March 2024

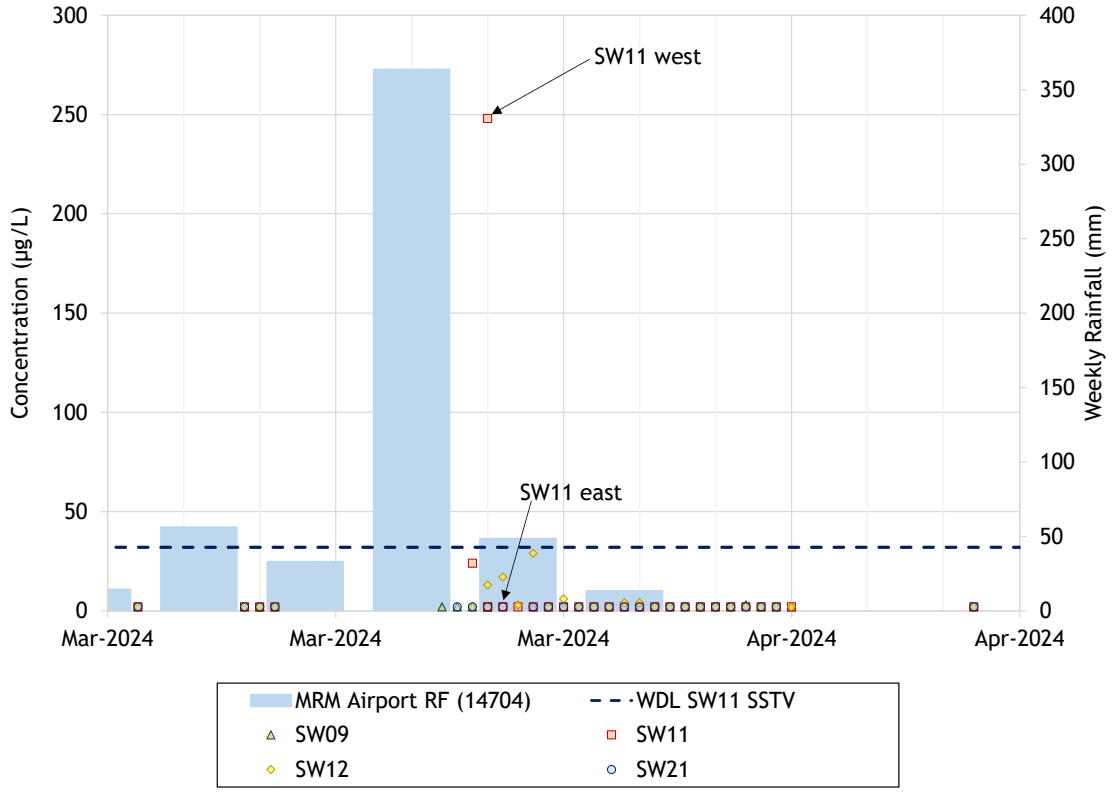


Chart 56: March 2024 and April 2024 filtered Zn and Weekly Rainfall - McArthur River and Glyde River Monitoring Sites

6.2 Review of BBDDP Monitoring Data and SSTVs

As described in the WDL, the dredge spoil perimeter drain exit point (i.e. the authorised discharge and compliance monitoring point BBDDP) is located on the tidal mudflats to the east of the BBLF. The dredge spoil perimeter drain is constructed around the external boundary of the DSEA to intercept saline water (i.e. runoff or seepage from the dredge spoil emplacement area).

6.2.1 Bing Bong Loading Facility Filtered Arsenic and pH

During the reporting period, a single sample taken from the BBDDP on 29 April 2024 contained a filtered As concentration and field pH level beyond the SSTVs. Neither result triggered a notifiable incident under Schedule 1 Item 10 of the WDL.

The investigation (MRM, 2024b) concluded that the filtered As and field pH result beyond the SSTVs were likely due to naturally occurring sources, including locally derived seawater and groundwater influences. As a result, the potential risk of environmental harm was considered low. WRM (2024b) reviewed the relevant investigation and agreed with these findings given the filtered As and field pH results were:

- similar to their respective SSTVs;
- similar to each of the filtered As and field pH background concentrations in seawater and groundwater; and
- there were no managed releases occurring from the DSEA at the time of sampling.

The filtered As and field pH results at BBDDP were therefore considered unrelated to the BBLF and the result of natural influences.

7 Conclusion

This Monitoring Report has been submitted in accordance with Schedule 1 Item 12 of WDL 174-15 and covers the reporting period 1 May 2023 to 30 April 2024. Site surface water monitoring data and mine derived analyte loads for the reporting period have been assessed by WRM (2024b and 2024c respectively).

In addition to addressing the requirements of WDL 174-15, the objectives of the monitoring programs are to help inform the assessment of MRM's performance against its key environmental objectives, which are as follows:

- protect the McArthur River's beneficial uses and community values from mining impacts;
- facilitate development of the ecosystems and their functions along the McArthur River Diversion Channel for terrestrial and aquatic flora and fauna;
- achieve a recovering trend in the water quality and ecosystem function in creeks on the Mine site within 20 years of cessation of mining;
- minimise air quality related impacts from the Mine's operations with respect to community health and environment; and
- protect the community values and beneficial uses adjacent to the BBLF and transhipment corridor.

During the reporting period, a significant amount of rainfall was measured at the Mine, primarily due to the occurrence of Ex-TC Megan. This resulted in total rainfall over the 12-month reporting period of approximately 1,235 mm, which is much higher than the annual average of 722 mm. The intense rainfall from Ex-TC Megan caused widespread flooding of the McArthur River, including at the Mine, SW11 and Borroloola.

Although several low-lying and minor water storages were inundated by the floodwaters at the Mine, the large perimeter runoff dams and TSF were not inundated or overtopped during the event. Overall, the water management system at the Mine performed well during Ex-TC Megan, with excess water from the intense rainfall being diverted to the Open Pit to limit any uncontrolled releases to the receiving environment and to protect the McArthur River.

During the reporting period, the BBLF also experienced a significant amount of rainfall, primarily due to the occurrence of Ex-TC Megan. The total rainfall at the BBLF over the 12-month reporting period was approximately 1,768 mm, which is much higher than the annual average of 902 mm. Despite the intense rainfall associated with the event, the three site runoff ponds at the BBLF were not inundated or overtopped due to their large storage capacity.

During the reporting period, water generated at the Mine was treated with hydrated lime. Treated water was either transferred for storage and potential release under conditions of the WDL and VOA, blended back into the mine water circuit for concentrator water supply, or directly released to the receiving environment in accordance with the temporary release conditions outlined in the WDL.

During the reporting period, approximately 3,887.5 ML of water was released to the McArthur River in accordance with the WDL. Subsequent investigations determined that managed releases did not significantly contribute to any of the concentrations elevated beyond the SSTVs at SW11.

There was a single instance during the reporting period when a measured concentration at the SW11 compliance point triggered a notifiable incident under conditions of the WDL. Notification of this result was provided to the NT DEPWS in accordance with the WDL.

The investigation concluded that an uncontrolled release originating from the northeast side of the NOEF from a damaged flood levee was a contributing factor to the notifiable incident. However, the investigation also determined that the sample was not considered representative of the McArthur River water at SW11. Overall, the investigation and monitoring data showed that the risk of environmental harm in the McArthur River resultant of the notifiable incident was low.

During the reporting period, there were no instances when a measured concentration at the BBDDP compliance point triggered a notifiable incident under conditions of the WDL.

Due to the intense rainfall and flooding associated with Ex-TC Megan, MRM released a significant volume of water during the reporting period to reduce the risk of uncontrolled releases and Open Pit inundation. As a result of the extreme conditions, MRM was granted an exemption to the annual load limits for total lead and total zinc by the NT DITT on 12 June 2024.

Based on the review of surface water quality monitoring data between 1 May 2023 and 30 April 2024, WRM (2024b) concluded that:

> *There was one notifiable incident under Schedule 1 Item 10 of the WDL relating to a filtered Zn concentration being greater than three times the SW11 SSTV. Although mine affected water was draining from Emu Creek at the time, the investigation concluded the sample taken was not representative of fully mixed McArthur River waters at SW11.*
>
> *…*
>
> *Based on a review of the available data, WRM concluded that the risk of environmental harm in the McArthur River channel downstream of SW11 was low during the notifiable incident.*
>
> *…*
>
> *MRM continue to implement effective controls to minimise the risk of environmental harm of downstream receiving waters due to Mine operations. The review concluded that the beneficial uses and community values of the McArthur River continue to be protected from potential mine derived impacts.*

MRM will continue to implement the existing monitoring program in accordance with conditions of the current WDL and VOA.

8 Certification

I, Lana Treasure, have reviewed this report and I confirm that to the best of my knowledge and ability all the information provided in the report is true and accurate.

Lana Treasure
Manager – Health, Safety and Environment
McArthur River Mining Pty Ltd

9 References

Australian and New Zealand Environment and Conservation Council and the Agriculture and Resource Management Council of Australia and New Zealand (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.*

Australian and New Zealand Governments (2018) *ANZ Guidelines for Fresh and Marine Water Quality.*

Indo-Pacific Environmental (2019) Memorandum; *Recommendations on potential bund heights within the Barney Creek Channel.*

McArthur River Mining Pty Ltd (2024a) *Section 14 Incident Report (Waste Management and Pollution Control Act).*

McArthur River Mining Pty Ltd (2024b) *Exceedance of the WDL 174-15 SSTVs for field pH and filtered arsenic at the Bing Bong Dredge Discharge Point.*

Northern Territory Environmental Protection Authority (2013) *Guidelines on Mixing Zones.*

Northern Territory Environmental Protection Authority (2018) *McArthur River Mining Pty Ltd – McArthur River Mine Overburden Management Project Assessment Report 86.*

WRM Water & Environment Pty Ltd (2019) *Mine Derived Analyte Loads Assessment 2017/18.*

WRM Water & Environment Pty Ltd (2024a) *IR020 – Notifiable incident, Ex-Tropical Cyclone Megan surface water investigation report for filtered zinc at SW11 west on 26 March 2024.*

WRM Water & Environment Pty Ltd (2024b) *Surface Water Monitoring Report 2023/24*.

WRM Water & Environment Pty Ltd (2024c) *Mine Derived Analyte Loads Assessment2023/24.*

10 Abbreviations

Acronym	Definition
%	percent
Al	Aluminium
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZG	Australian and New Zealand Governments
As	Arsenic
BBDDP	Bing Bong Dredge Spoil Discharge Point
BBLF	Bing Bong Loading Facility
Cd	Cadmium
CERP	Central East Release Point
CRP	Central Release Point
Cu	Copper
DEPWS	Department of Environment, Parks and Water Security
DO	dissolved oxygen
DP	discharge point
EC	electrical conductivity
EMR	Environmental Monitoring Report
Fe	Iron
Hg	Mercury
IPE	Indo-Pacific Environment
kg	kilograms
km	kilometres
L/s	litres per second
LOR	limit of reporting
m	metres
m^3/s	Cubic metres per second
mg/L	milligrams per litre
ML	megalitres
MLDP	Mine Levee Discharge Point
MLN	Mineral Lease Northern
Mn	Manganese
MRDC DP	McArthur River Diversion Channel Discharge Point
MRM	McArthur River Mining Pty Ltd
Ni	Nickel
NO_3	Nitrate
NT	Northern Territory
EPA	Environment Protection Authority
P2	Pond 2
Pb	Lead
RP	Release Point
RPD	Relative percentage difference
SEL 1 DP	South-east Levee 1 Discharge Point
SO_4	Sulphate

Acronym	Definition
SOCS	sites of conservation significance
SSTV	site-specific trigger values
TDS	total dissolved solids
the Mine	McArthur River Mine
TPH	Total Petroleum Hydrocarbons
TSS	Total suspended solids
WDL	Waste Discharge Licence
WMD	Water Management Dam
WRM	WRM Water & Environment Pty Ltd
Zn	Zinc
µg/L	micrograms per litre
µS/cm	microSiemens per centimetre

Appendix A

Quality Assurance

All surface water samples have been collected according to MRM management plans and procedures and the requirements of WDL 174-15 (Conditions 32, 33 and 35), which includes:

- Collection of samples in accordance with the Monitoring Program or in connection with the Licensed Action or this licence, are obtained by, or under the supervision of a qualified sampler.
- All samples are analysed at a laboratory with current NATA accreditation or equivalent; and
- Detection and reporting limits are appropriate to determine compliance with this licence.
- The date on which the sample was collected;
- The time at which the sample was collected;
- The location at which the sample was collected;
- The name of the person who collected the sample;
- The chain of custody forms relating to the sample;
- The field measurements (if any) and analytical results (if any) relating to the sample; and
- Laboratory quality assurance and quality control documentation.

Quality assurance and quality control is routinely undertaken as part of the natural surface water monitoring program. This includes collection of duplicate samples and analysis of both field and laboratory 'blank' samples.

To monitor the consistency of the laboratory instruments used to measure water quality and examine the variability introduced during sample collection and preparation, MRM frequently collects duplicate water samples as part of the monitoring program. The relative percentage difference (RPD) between these duplicate analyses and the original analytical result provides a useful measure of instrumental consistency.

The relationship between concentrations of analytes (i.e. filtered primary metals, total primary metals and major ions) in the original samples and concentrations of the analytes in the blind sample are presented on Chart A1 to Chart A3. The following is of note regarding the duplicate sample analysis during the reporting period:

For primary filtered metals, a total of 86 duplicate samples (1,720 analyte samples) were collected during the reporting period. Of the 1,720 analyte samples, 104 analyte samples were beyond 20% of the RPD. Only 26 of the 104 samples beyond 20% of the RPD had concentrations greater than ten times the LOR. These 26 instances as follows:

- Filtered Aluminium in 5 duplicate samples;
- Filtered Barium in 2 duplicate samples;
- Filtered Boron in 7 duplicate samples;
- Filtered Iron in 7 duplicate samples; and
- Filtered Manganese in 5 duplicate samples.

For primary total metals, a total of 86 duplicate samples (1,720 analyte samples) were collected for primary total metals during the reporting period. Of the 1,720 analyte samples, 206 analyte samples were beyond 20% of the RPD. Only 57 of the 206 samples beyond 20% of the RPD had concentrations greater than ten times the LOR. These exceedances were as follows:

- Total Aluminium in 14 duplicate samples;
- Total Antimony in 1 duplicate sample;
- Total Barium in 2 duplicate samples;
- Total Boron in 13 duplicate samples;
- Total Iron in 14 duplicate samples;
- Total Manganese in 9 duplicate samples; and

- Total Vanadium in 4 duplicate samples.

For major ions, a total of 86 duplicate samples (602 analyte samples) were collected for major ions during the reporting period. Of the 602 analyte samples, 46 analyte samples were beyond 20% of the RPD. Only 3 of the 46 samples beyond 20% of the RPD had concentrations greater than ten times the LOR. These 3 instances were as follows:

- Sulphate in 3 duplicate samples.

None of these results are indicative of instrument malfunction or procedural errors, and the analytical reproducibility indicated is adequate for monitoring of natural surface water. Overall, the duplicate results show low variability which provides a high degree of confidence in the monitoring program data.

Blank water samples are routinely analysed to check that the analytical instruments are not reporting erroneously high values (e.g. due to contamination or instrument malfunction). 94 blank samples were prepared and sent for analysis from the surface water monitoring program during the reporting period. In general, the quality of the blanks was very high, with most target analytes below the limit of detection. The results provide further confidence in the monitoring program data. Further details of the quality assurance results are provided in WRM (2024b) in Attachment 2.

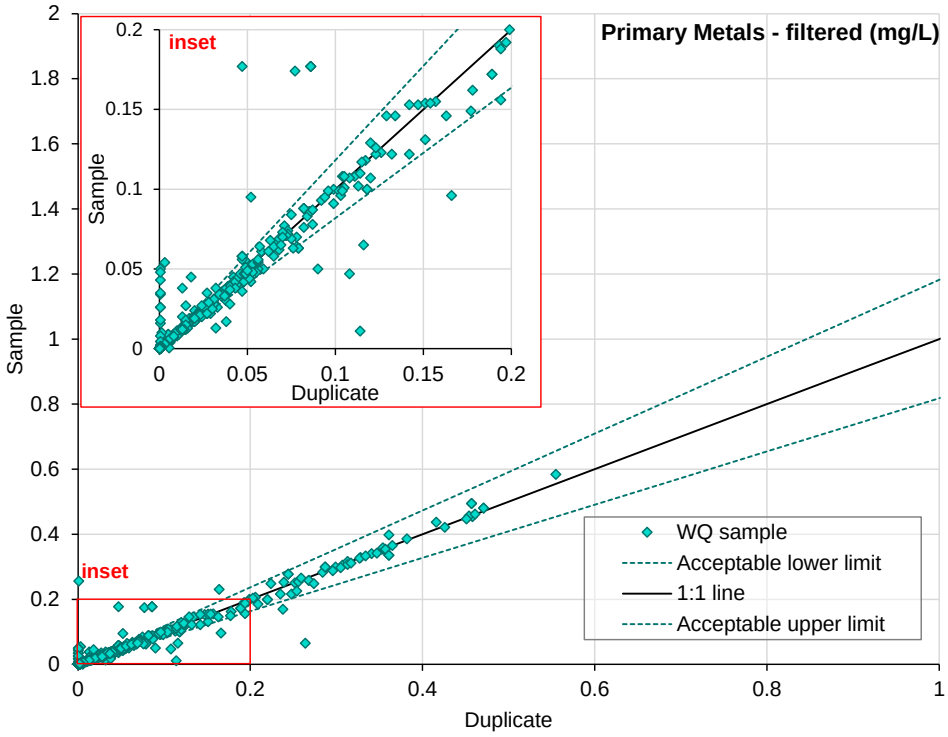


Chart A1: Relationship Between Filtered Primary Metal Concentrations in Samples and Blind Duplicates

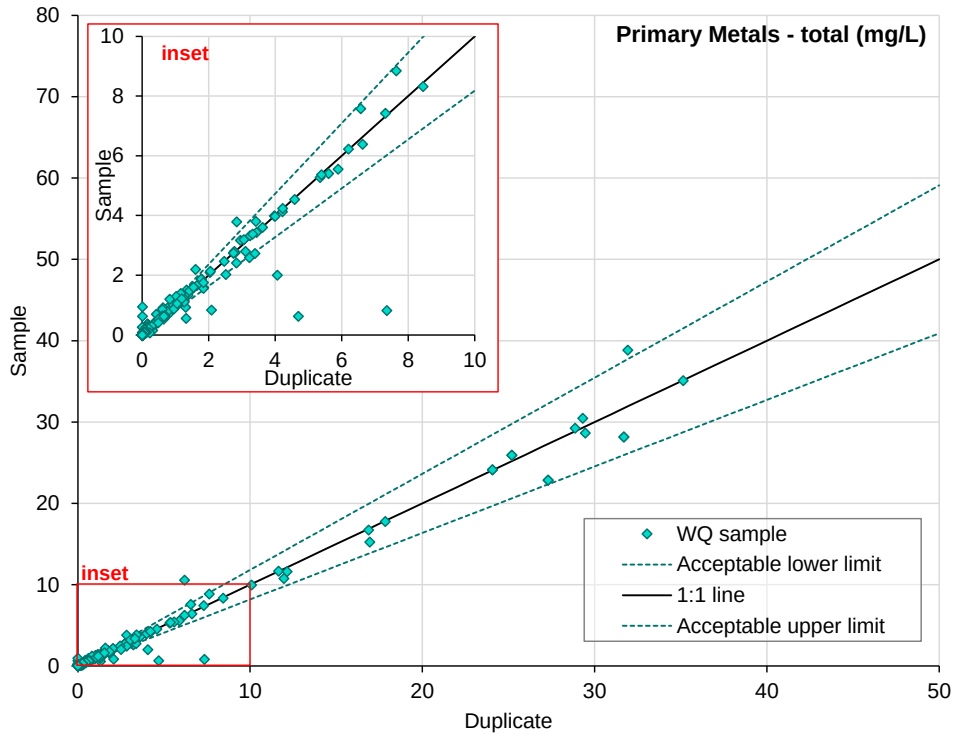


Chart A2: Relationship Between Total Primary Metal Concentrations in Samples and Blind Duplicates

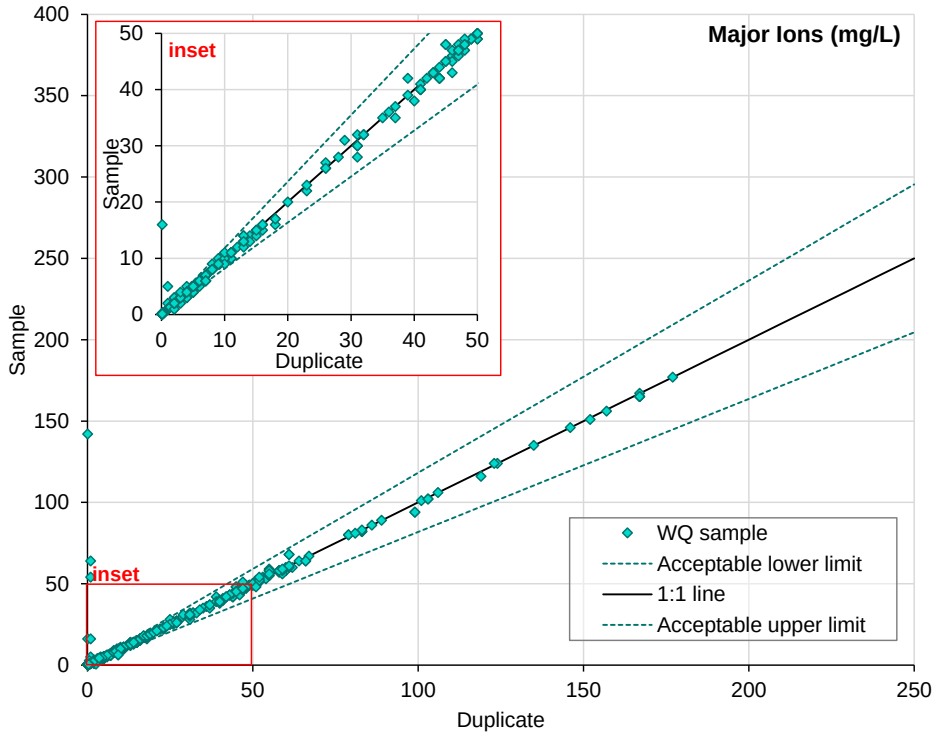


Chart A3: Relationship Between Major Ion Concentrations in Samples and Blind Duplicates

Attachment 1

Waste Discharge Licence 174-15

Attachment 2

McArthur River Mine 2023 – 2024 Environmental Monitoring Report

(download link to documents provided separately)

Attachment 3

Tabulated Monitoring Data for the 2023/24 Period

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