



Application for Works Approval

Part V Division 3 of the *Environmental Protection Act 1986*

Works Approval Number	W6495/2021/1
Applicant	Robe River Mining Co. Pty Limited
ACN	107 210 248
File Number	DER2020/000619
Premises	Mesa J Mineral Lease (ML) 248SA Section 104 As defined by the Premises maps attached to the issued works approval
Date of Report	19 August 2021
Proposed Decision	Works approval granted

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an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

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1. Decision summary

This Decision Report documents the assessment of potential risks to the environment and public health from emissions and discharges during the construction and operation of the Premises. As a result of this assessment, Works Approval W6495/2021/1 has been granted.

2. Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this Decision Report, the department has considered and given due regard to its Regulatory Framework and relevant policy documents which are available at <https://dwer.wa.gov.au/regulatory-documents>.

2.2 Application summary and overview of Premises

On 3 December 2020, the applicant submitted a works approval application to the department under section 54 of the *Environmental Protection Act 1986* (EP Act).

The application is to undertake construction works relating to the increase of storage capacity of TSF3 and a portion of TSF5 at the existing Mesa J (the premises). The premises is approximately 13 km south-west of Pannawonica.

The premises relates to category 5 and the assessed production capacity under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) which are defined in Works Approval W6495/2021/1. The infrastructure and equipment relating to the premises category and any associated activities which the department has considered in line with *Guidance Statement: Risk Assessments* (DER 2017) are outlined in Works Approval W6495/2021/1.

2.2.1 Proposed Activities

TSF3

The proposed modifications to the design of TSF3 to increase its capacity are:

- Enlargement of Embankment 10 in both height and in length. The construction of the embankment requires an area increase of approximately 4 ha. Tailings deposition will stop before reaching the pit rim elevation.
- Installation of steel towers on Embankment 9 to elevate three spigot discharge positions.
- Raises of Embankment 11 and Embankment 4 access road, including installation of an emergency spillway if the post thickener beach slopes deviate significantly from those predicted.

TSF5

The proposed upgrade works for TSF 5 are:

- Construction of embankments to compartmentalise the TSF.
- Deposition of tailings from the embankments and Embankment 8.

It is expected that approximately 3.46 Mt of unthickened Mesa J tailings will be deposited into TSF3 from April 2020 until approximately July 2021. Thereafter, Mesa H tailings will be deposited in TSF3, supplemented for a time by Mesa J tailings.

In October 2021, the tailings will be screened to <0.5 mm and thickened before being pumped from Processing Plant 2 (PP2), the tailings generated at Processing Plant 1 (PP1) will be transported to PP2 for thickening purposes. The comingled and thickened PP1 and PP2 tailings

will be delivered to the TSFs via a single pipeline. The pipeline will fork at the southern end of TSF3, allowing for deposition to take place from the eastern or the western flanks. A branch from the feed to TSF3 will allow for diversion of tailings to TSF5 in the event of an emergency.

Material for TSF embankment raises will be sourced from selected mine waste stockpiles and tailings using downstream or centreline construction method including foundation preparation before construction. TSF5 will be constructed using materials sourced from mine waste stockpiles or the existing sandy tailings. TSF3 embankments will be zoned, comprising of upstream zone of clayey materials and downstream zone of select mine waste materials. The exposed clayey materials at the upstream batter of the embankment will be covered with erosion protection materials (select mine waste). The crest of the embankments will be covered with gravel wearing course materials.

The proposed location of additional activities and infrastructure is shown in Figures 1 and 2.

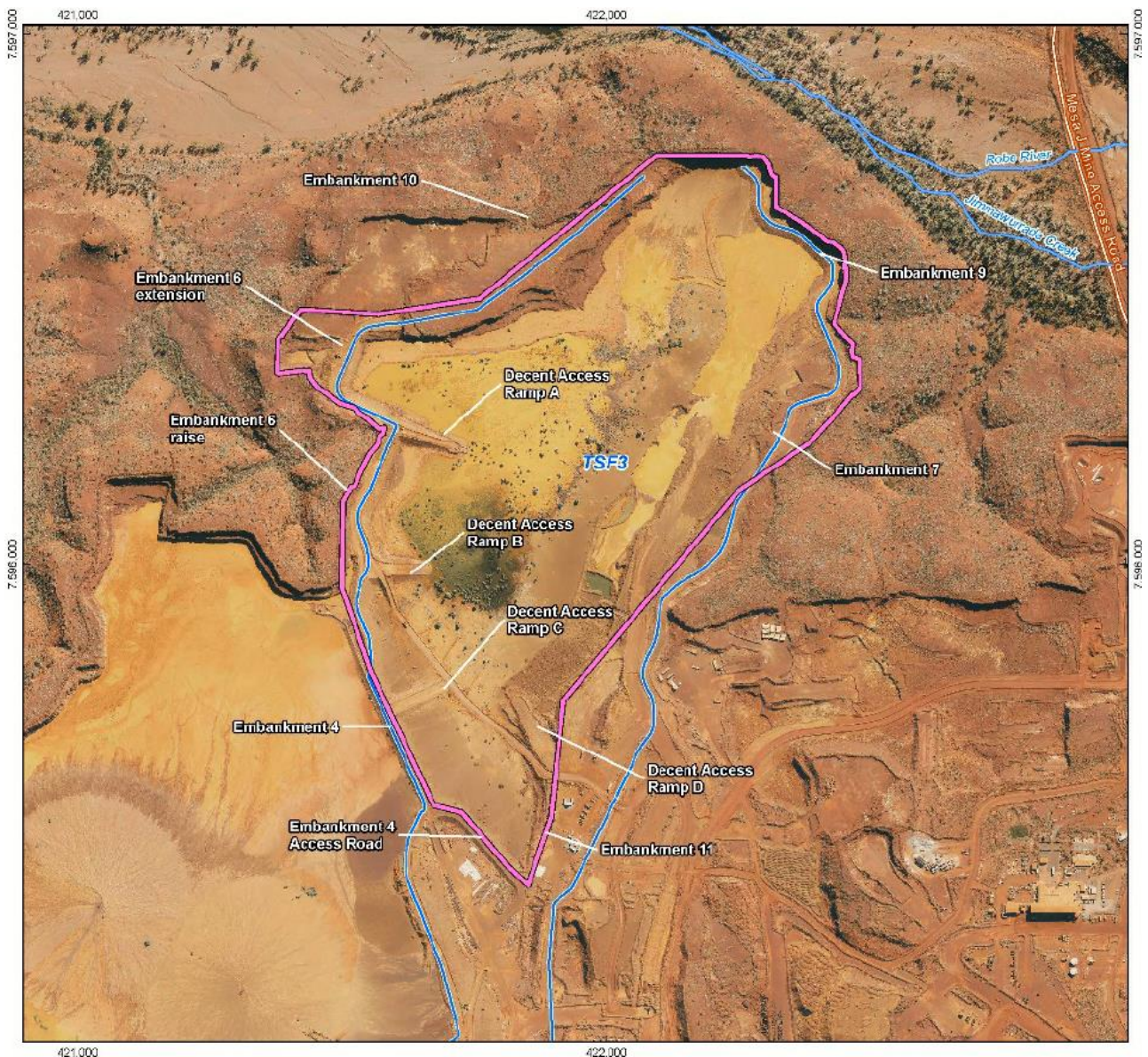


Figure 1 Proposed works at Mesa J TSF3. Pink line denotes TSF3 proposed boundary, blue line depicts waste fines pipeline

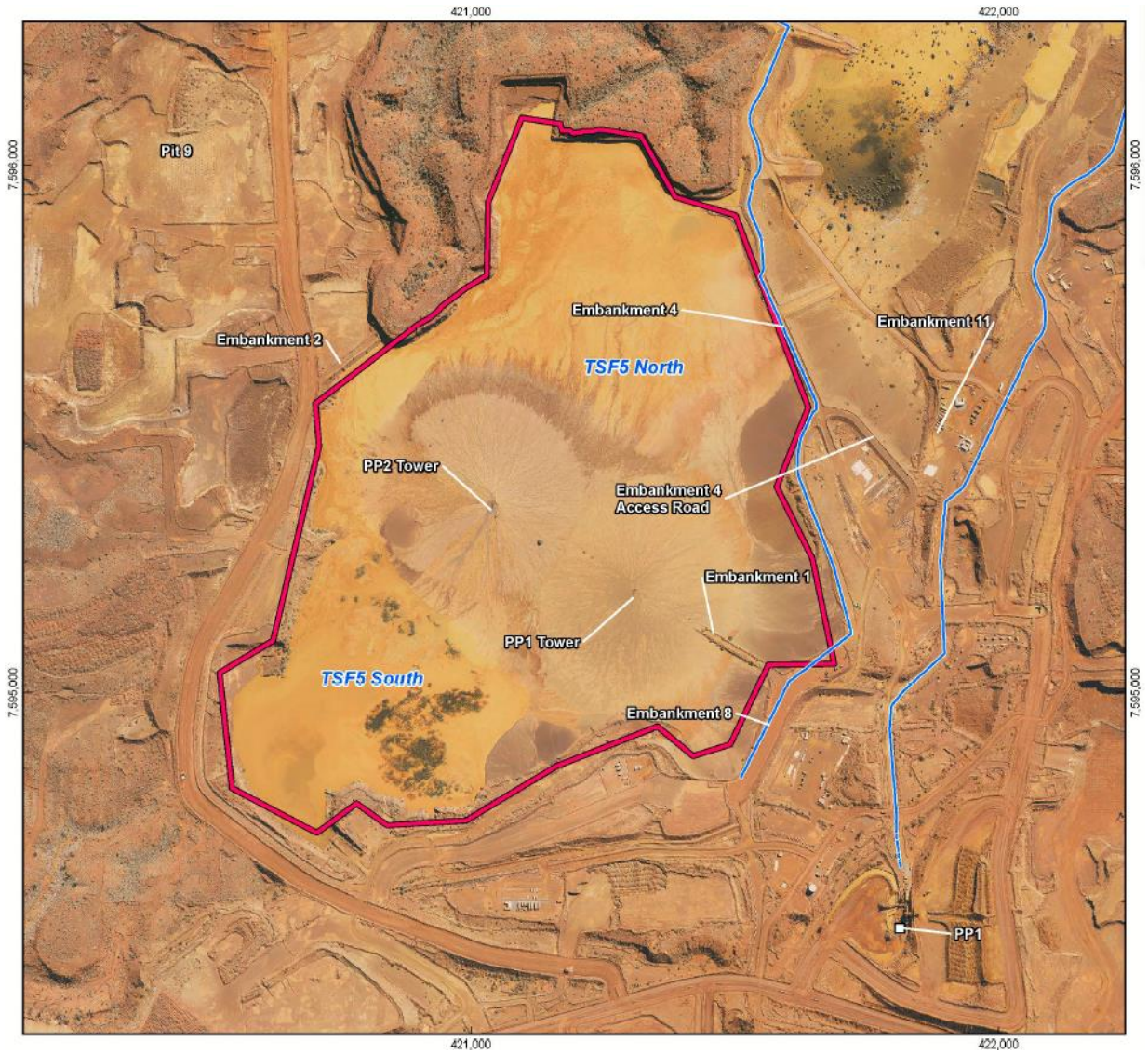


Figure 2: Mesa J TSF5 – red line depicts TSF 5 boundary, blue line depicts waste fine pipeline.

Table 1 summarises the proposed infrastructure associated with Mesa J TSF 3 and TSF 5, plus environmental commissioning requirements.

Table 1: WFC3A Extension proposed infrastructure and equipment.

TSF	Infrastructure and Equipment	Environmental Commissioning
TSF 3	<ul style="list-style-type: none"> - Enlargement of Embankment 10 (height and length) along the north-western flank with a maximum high of 3 m above the existing ground elevation - Deposition of tailings from Embankment 11. - Raises to Embankments 11 and 4 - Installation of an emergency spillway in Embankment 11 	Not required
TSF 3	<ul style="list-style-type: none"> - Installation of three 2 to 3 m high steel deposition towers on Embankment 9 	Required
TSF 5	<ul style="list-style-type: none"> - Construction of embankments to compartmentalise the TSF 5. - Deposition of tailings from the embankments and Embankment 8 - Installation of four vibrating wire piezometers (VWPs). 	Not required

2.2.2 Site characteristics – Mesa J

Mesa J mine is an open cut mine that utilises drilling and blasting methods to expose the ore body for extraction. The blasting process uses ANFO explosives (ammonium nitrate, fuel oil), which may leave residual ammonium nitrate due to incomplete combustion of the explosives.

Dewatering of groundwater has been required to access the ore progressively through the mine life. Dewatering commenced during 1993 and utilises a combination of bores and sumps to obtain the desired reduction in water table. Water generated through the dewatering process is used on site, and excess mine water is released to Jimmawurrada Creek and West Creek through a series of discharge points (see Figure1).

Pre-mining groundwater conditions indicate groundwater flowing from the south-east discharges to perennial pools in the Robe River. These perennials are freshwater systems that provide numerous ecological functions including habitat for aquatic fauna. The perennial pools have long-term connectivity to the groundwater and are expected to be maintained by groundwater discharge during drought periods.

Pre-mining groundwater levels to the southeast of Mesa J were in the order of 160 m AHD and likely declined to around 140 m AHD at the north end of Mesa J.

Tailings generated at the process plants have been disposed into the various TSFs over time. The deposition history for TSF 3 and TSF 5 is as follows:

- TSF3 North between 2009 and 2013. TSF3 North was decommissioned in 2013.
- TSF3 South between 2014 and 2015. In approximately 2016, TSF3 South was renamed TSF5.
- TSF 3 recommissioned in April 2020.
- Deposition into TSF 5 was suspended in September 2020.

Groundwater quality

In 2017, Rio Tinto reviewed all available water quality and water level data for Mesa J to ascertain if seepage from the TSFs had occurred, and to determine the effects of the seepage on the groundwater quality. The review identified that water levels were mostly increasing (11 bores out of 12) in monitoring boreholes located downstream or in the vicinity of TSF3/TSF5 and TSF4 with elevations above the presumed pre-mining water levels. Elevated nitrate concentrations were observed in boreholes located downstream of these Mesa J TSFs. The

investigation concluded that the water levels and water quality data validated the idea that seepage from the TSFs had affected local groundwater levels and water quality in bores surrounding these facilities.

Historical groundwater variations at Mesa J TSF 3 and TSF 5 are shown in Figure 3. Monitoring bore locations at Mesa J are shown in Appendix 3.

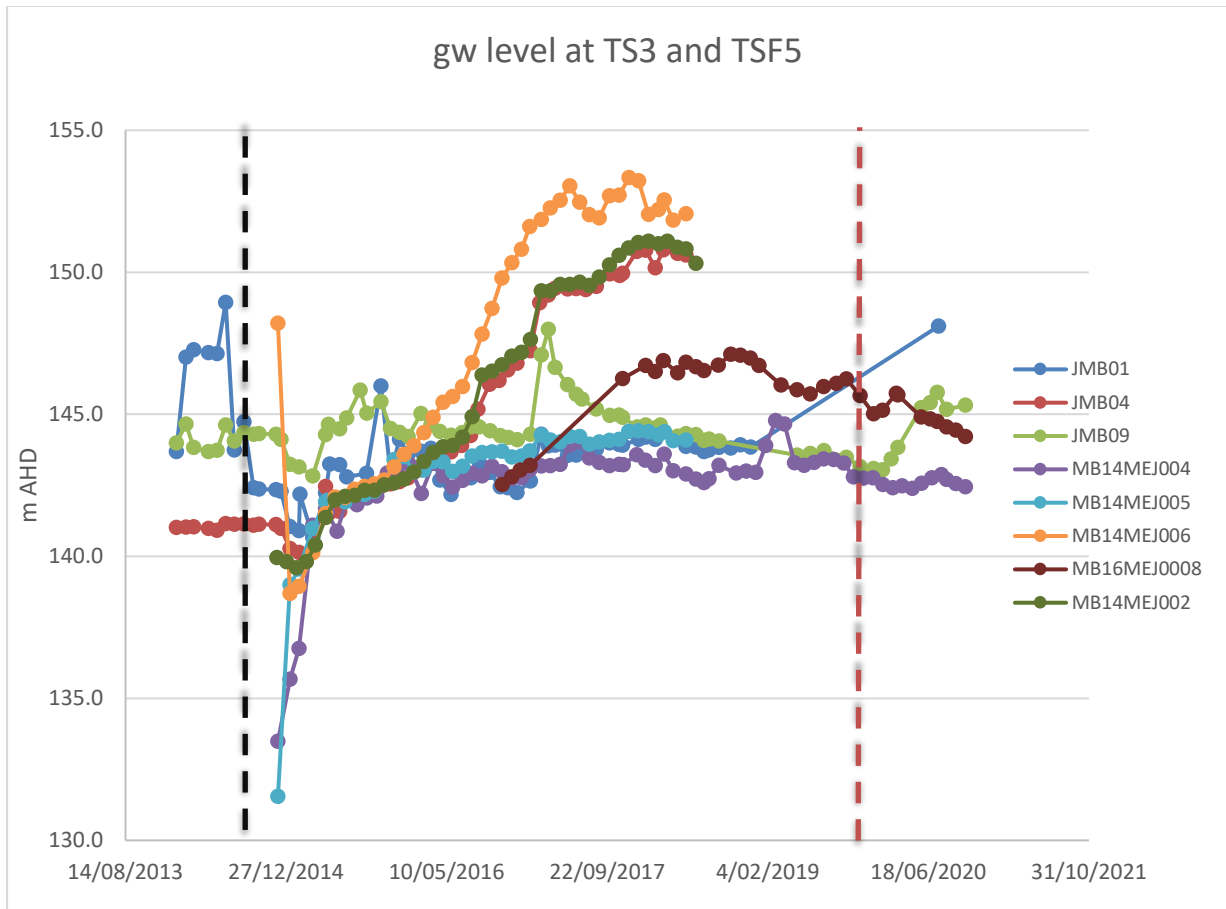


Figure 3: groundwater variation around TSF 3 and TSF 5.

Note 1: black dotted line indicates deposition suspended at TSF 3 and discharge into TSF 5

Note 2: red dotted line indicates restart of tailings deposition into TSF 3

The north-east part of TSF3 is composed of channel iron deposits (CID) and it is connected to the Robe River alluvium for approximately 150 m length of the Mesa J wall (Figure 4). Elsewhere the Robe River alluvium has scoured into basement Marra Mamba Iron Formation (MMIF) and the CID is not directly connected with the Robe River alluvium. The CID is more permeable than the MMIF and represents a potential pathway for seepage from the TSF to the alluvium of the Robe River valley.

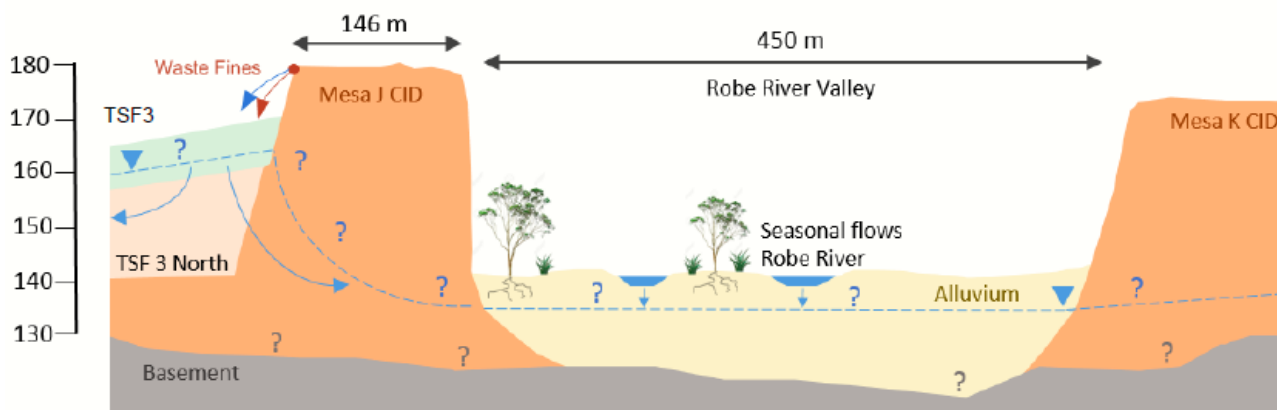


Figure 4: Potential seepage path between TSF3 and Robe River alluvium.

The rate of seepage from the TSF3 was determined using vertical 2D “slice” models in SEEP/W through various sections between TSF3 and Robe River under steady-state conditions. Using the hydraulic conductivity of the CID material assumed to be 4 m/day and the geometry of the TSF, the seepage rate from the northern face of TSF3 was calculated to be about 283 m³/day (0.1 GL/year) over the 150 m CID width at TSF3.

The seepage modelling using steady-state conditions simulates conditions where the tailings and the phreatic surface in the facility were at a specific fixed elevation, however, the calculated seepage rate effectively only applies for one particular point in time. Consequently, the models that were developed for the Mesa J site cannot provide any information about how the seepage rates from TSFs at the site have historically changed over time or will change in the future.

Water levels in monitoring bores near TSF3 and TSF5 are continuing to rise, which suggests that seepage rates from these facilities are continuing to increase. Changes identified in groundwater quality as a result of seepage from Mesa J TSFs include increased concentrations of nitrate as well as an increase in salinity, chromium, copper, zinc and boron.

A review of the groundwater licence for Mesa J, GWL 107678, annual reports (2016 - 2020) show elevated levels of nitrate, chloride and zinc in groundwater and TSF5 decant water. A summary of groundwater monitoring results for TSF 3 and TSF 5 are shown in Table 2.

Nitrate levels in groundwater are up to 36 times above ANZG 2018.

Table 2: Groundwater quality at TSF 3 and TSF 5.

Monitoring Bore	Cl (mg/L)	NO ₃ as N (mg/L)	Zn (mg/L)
TSF3 south east	JMB09		
18/07/2018	252	66	<0.005
20/11/2019	246	67	<0.005
11/09/2020	INP	INP	INP
TSF3 west	MB14MEJ001		
12/12/2015	142	INP	0.024
26/10/2017	143	INP	0.022
18/07/2018	154	11	0.007
9/12/2018	165	11.7	0.03
21/11/2019	161	14	0.065
TSF3 west	MB16MEJ0008		
18/07/2018	84	4.56	0.007
9/12/2018	125	8.06	0.009
20/11/2019	60	0.58	0.021
27/09/2020	73	1.24	0.006
TSF5 west	MB14MEJ002		
12/12/2015	275	INP	0.007
26/10/2017	296	INP	<0.005
TSF5 south	MB14MEJ004		
12/12/2014	160	INP	0.013
12/12/2015	314	INP	0.005
26/10/2017	164	INP	0.009
18/07/2018	165	76	0.017
9/12/2018	172	87	0.008
27/09/2020	179	64	<0.005
TSF5 east	MB14MEJ005 (destroyed in 2018 - replaced by MB19MEJ0001 in 2019)		
12/12/2015	197	INP	0.008
23/07/2016	181	INP	INP
26/10/2017	158	INP	0.005
TSF5 west	MB14MEJ006 (destroyed in 2018 - replaced by MB19MEJ0002 in 2019)		
23/07/2016	268	INP	INP
26/10/2017	214	INP	<0.005
TSF5 south	MB15MEJ004		
23/07/2016	176	INP	INP
18/07/2018	154	64	<0.005
9/12/2018	186	51	0.006
20/11/2019	218	86	<0.005
TSF 5	Decant water		
2016	192	17.6	<0.005
2017	160	13.4	<0.005
2018	178	9.47	0.054
Nov - 2019	171	20.3	<0.005
Sep - 2020	207	11.7	0.003

Note 1: INP – information not provided

Note 2: red bold numbers indicate values above ANZG 2018.

Surface water quality

Mesa J is located at the northern end of the Jimmawurrada-Bungaroo Creek valley, where it joins the Robe River Valley. The mine itself is bordered by Jimmawurrada Creek and floodplain to the east, the Robe River to the north and West Creek drainage line to the west.

The Robe River carries significant underflow in its alluvial bed which maintains perennial pools in the river channel throughout the year. The surface water flows, together with sub-surface flows act to recharge and maintain semi-perennial to perennial pools within the Robe River.

Mine water associated with groundwater dewatering activities, ore processing and collected from TSF sumps and pits is discharged to Robe River via licenced discharge points along Jimmawurrada Creek (Discharge Points 1, 2, 5/5B and 6) and West Creek (Discharge Point A, B and C). Where water has migrated from the TSFs into pits (via the groundwater pathway) this water may also be extracted and released via discharge points along Jimmawurrada Creek or West Creek. Location of discharge points and surface water sampling locations are shown in Figure 5.

RTIO has undertaken water quality monitoring within Robe River pools since 1992. Historical data for Yarramudda pool is presented in Table 4 and Figure 6. Data collection from two locations adjacent to TSF 3 (SW16MEH0004 and SW16MEH0005) started in 2018.

Changes in groundwater quality following seepage from Mesa J TSFs include increased concentrations of nitrate as well as increases in salinity, chromium, copper, zinc and boron.

Monitoring bores SW16MEH0004 and SW16MEH0005 show nitrate values up to 5 times above ANZG 2018 for slightly to moderately disturbed systems (95% protection). Nitrate, zinc and chloride results are shown in Table 3. SW16MEH0004 and SW16MEH0005 are represented as **004** and **005** in Figure 5.

Table 3: Surface water results for sampling points adjacent to TSF3.

	Sampling date	Nitrate as N (mg/L)	Cl ⁻ (mg/L)	Zn (mg/L)
SW16MEH0004 (004 – Figure 5)	3/11/2017	1.4	182	0.011
	5/07/2018	9.42	203	<0.005
	9/10/2018	12.5	220	<0.005
	11/12/2018	8.88	207	<0.005
SW16MEH0005 (005 – Figure 5)	11/04/2018	6.1	198	<0.005
	5/07/2018	5.38	178	<0.005
	9/10/2018	10.3	210	<0.005
	11/12/2018	6.94	194	<0.005

Note: bold numbers denote values above ANZG 2018

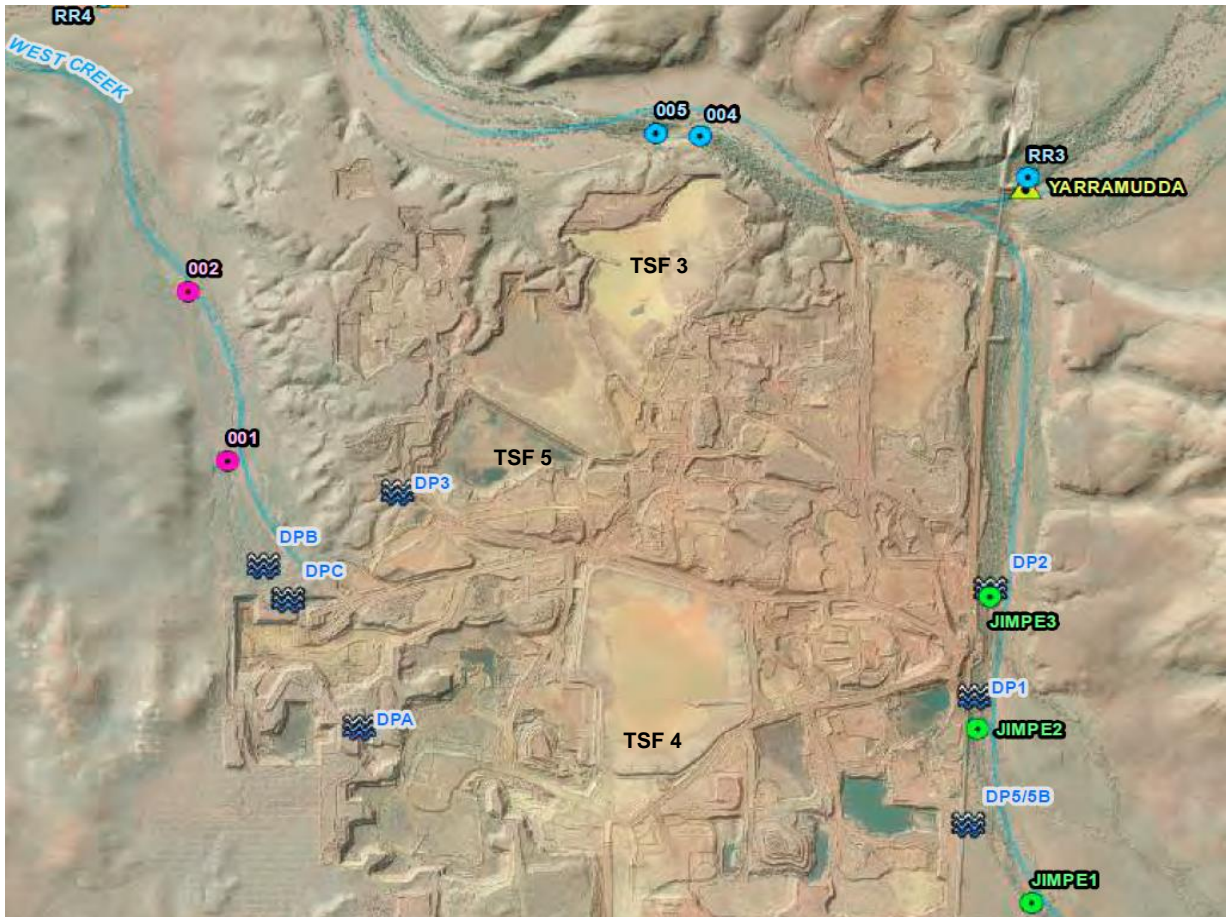


Figure 5: Robe River surface water focal sampling points

Table 4: Surface water historical data for Yarramudda pool.

	Barium	Boron	Copper	Iron	Manganese	Molybdenum	Selenium	Zinc
ANZG 2018 limits (mg/L)	-	0.37	0.0014	-	1.9	0.034	0.011	0.008
27/08/2012	0.03	0.2	<0.005	-	<0.005	<0.01	<0.01	0.0009
28/11/2012	0.04	0.2	<0.005	-	0.014	<0.01	0.02	0.04
25/02/2013	0.05	0.2	<0.001	-	0.01	<0.01	<0.05	0.015
30/05/2013	0.035	0.19	<0.001	-	0.005	<0.001	<0.002	0.008
9/09/2013	0.04	0.2	<0.001	-	0.007	<0.001	<0.002	0.019
30/13/2013	0.042	0.29	<0.001	-	0.008	<0.001	<0.002	0.018
23/02/2014	0.042	0.21	<0.001	-	0.018	<0.001	<0.002	0.004
4/05/2014	0.037	0.41	<0.001	-	0.009	0.006	<0.001	0.004
18/11/2014	0.047	0.25	<0.001	0.016	0.003	<0.001	<0.002	0.006
30/04/2015	0.05	0.22	<0.001	0.13	0.012	<0.001	<0.002	0.006
16/11/2015	0.034 9	0.16	<0.0005	0.009	0.0049	0.0005	0.0004	0.0009
28/06/2016	0.045 4	0.186	<0.0005	0.009	0.0179	0.0004	0.0004	0.0009
28/11/2016	0.062 3	0.215	<0.0005	0.375	0.0133	0.0004	0.0004	0.0009
23/03/2017	0.031 4	0.124	0.0008	0.005	0.0112	0.0004	<0.0002	0.003
13/11/2017	0.036	0.17	<0.0005	0.045	0.0173	0.0004	0.0003	0.002
11/04/2018	0.059 5	0.234	0.0012	0.003	0.0149	0.0005	0.0004	0.001
5/07/2018	0.028 2	0.132	<0.0005	0.048	0.0357	0.0003	<0.0002	0.0009
18/10/2018	0.055	0.21	<0.0001	0.08	0.012	<0.001	<0.001	0.0009
13/11/20108	0.064 2	0.22	0.0018	0.02	0.013	0.0004	0.0004	0.004
9/12/20108	0.060 8	0.191	0.0009	0.04	0.0138	0.0005	0.0004	0.002
22/05/2019	0.065 9	0.205	<0.0005	0.069	0.114	0.0003	0.0003	0.0009

Note: red bold numbers denote values above ANZG 2018

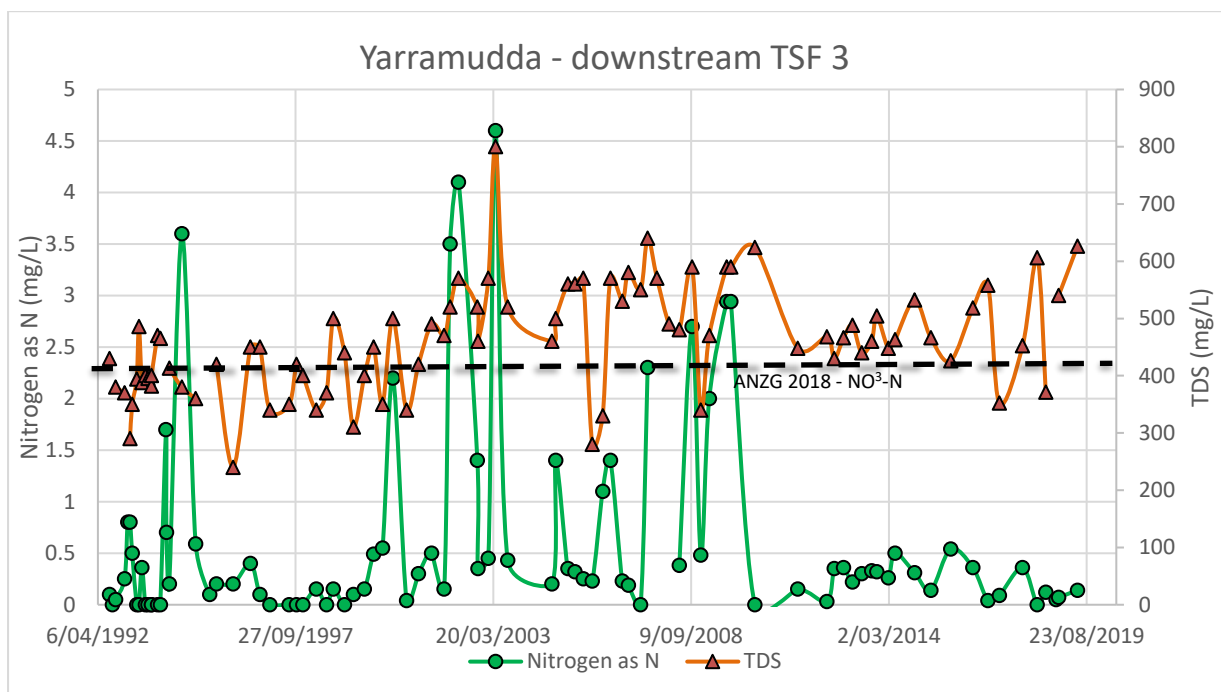


Figure 6: Nitrate and TDS concentration in surface water at Yarramudda pool.

Tailings properties

In 2016, one metallurgical tailings slurry sample from Mesa H which originated from drill hole samples, was tested for:

- sulfur speciation
- acid neutralising capacity (ANC)
- net acid generation (NAG) testing
- carbon speciation
- multi-element solid assay and
- leaching test

The results showed that the sample can be classified as non-acid forming.

The results of the multi-element assay on the tailings solids indicate that the Mesa H tailings sample was significantly enriched in Ag, Be, and Fe and slightly enriched in As, Co, Mo, Se, and W. Leaching test results and pore water composition are shown in Appendix 4.

The geotechnical assessment of the tailings from Mesa H has determined particle size distribution, settling properties and dry density. The test results determined that Mesa H tailings are significantly finer than the Mesa J tailings placed in the TSFs to date. Mesa H tailings has a high percentage of fines (~57% passing 75 μ m sieve). The settling test results for Mesa H tailings reach their initial settled density of 1.04 t/m³ after about 12 days. The maximum dry density of the Mesa H tailings through air drying in the laboratory is 1.95 t/m³, although this density may not be achievable under field conditions.

Flocculant

Flocculant Flopam™ AN 934 SH (Flopam) will be used for the settling of mine waste fines. Flopam is an anionic polyacrylamide (APAM). APAM is a group of high molecular weight polymers formed from polymerisation of the acrylamide monomer.

A risk assessment report evaluating the environmental impacts of Flopam was submitted as part of this works approval. The report stated that the polyacrylamide flocculant will sorb, acrylamide is mobile but will degrade, and mixing in groundwater will lead to dilution. Furthermore, it is stated that if it does make it to surface waters, it will bind to sediment.

Department considerations:

- Groundwater is more appropriately conceptualised as parallel “streamtubes” with minimal mixing, so the conservative assumption would be no mixing or dilution occurs along the groundwater pathway
- Sorption of polyacrylamide to aquifer materials may occur, but sorptive capacity can be exceeded, leading to advancement of a contaminant plume
- The sorptive capacity of the alluvial aquifer material, or of surfaces within fractures in the bedrock aquifer, may be very low to start with, with little mineral surface area or organic matter to provide sorptive capacity
- Acrylamide degradation rates are likely dependent on a number of physico-chemical and biological factors, which may not be optimal in groundwater environment between the TSF and pools. The conservative assumption would be that no degradation occurs *and*
- Polyacrylamide breaks down to acrylamide in the presence of sunlight. It may occur in the TSF prior to movement into groundwater. This could lead to greater load of acrylamide to groundwater than anticipated. If polyacrylamide makes it to the pools, this process of breakdown of polyacrylamide to acrylamide could presumably also occur in the pools, even if the polyacrylamide is sorbed to particles.

2.3 Department of Mines, Industry Regulation and Safety (DMIRS) – geotechnical review summary

The design details and discussions presented in the Storage of Mesa H Tailings at the Mesa J Mine Site, Supporting Document for Part V Works Approval Application, prepared by Golder Associates Pty Ltd, referenced 895943-092-R-Rev0 show the following:

- TSF3 and TSF5 are in-pit tailings storage facilities with a series of embankments constructed in topographic lows to increase storage capacity. TSF5 has a ridge line separating it into two sections with two decant ponds - northern and southern sections
- The final tailings level after the completion of tailings deposition into the modified (expanded) TSF3 will be maintained below the Embankment 10 crest elevation and the pit rim elevation. If TSF3 is operated as stated in the report, the risk of tailings slurry flow in the north-westerly direction (Robe River direction) is negligible even if Embankment 10 fails
- In TSF3, tailings discharged points will be located and managed to ensure that the decant pond will always be located at its southern end. This further reduces the risk of failure of Embankment 10
- In the event of an unanticipated breach of TSF3 and TSF5 the flow of materials will be in a southerly direction away from the Robe River. This has been demonstrated by dam-break studies as recommended in the DMIRS Code of Practice (COP) on tailings management
- In accordance with the DMIRS COP on tailings management and ANCOLD (Australian National Committee of Large Dams) guidelines, the report used the outcome of the dam-break studies to assign hazard ratings to the two TSFs. The report shows that the TSF modification/expansion designs have been developed to match Category 2, Medium Hazard
- To reduce the risk of failure of Embankment 4 or Embankment 11 of TSF3, the decant pond is to be located away from these embankments by depositing some tailings from the southern flank. In TSF5 the decant pond will be in the south-western side against the as-excavated pit rim, well away from the embankments

- Geotechnical stability assessment has been undertaken for the critical sections of the TSF3 and TSF5 embankments. The results indicate that the computed factors of safety against possible modes of embankment failures are above the minimum recommended values for normal operating and seismic loading conditions. The effect of phreatic surface on the stability of the embankments has been considered in the geotechnical stability assessment. The report shows that the stability assessment has been undertaken in accordance with the DMIRS and ANCOLD recommendations
- The report presents an assessment of freeboard at the final stages of deposition when the deposited tailings level is at highest design level (when freeboard is minimum). The results of the assessment show that the available freeboard will be well above the minimum requirements recommended in the DMIRS and ANCOLD guidelines.
- An Emergency Response Plan (ERP) for the modified TSF3 and TSF5 has been provided. The report recommends updating the ERP if the operating conditions are changed during the life of TSF3 and TSF5 South. DMIRS endorses this recommendation.

Based on the information provided in the report, DMIRS consider that the modifications proposed for TSF3 and TSF5 are geotechnically acceptable.

DMIRS has considered the effect of groundwater and phreatic surface within the TSFs on embankment stability. However, the review did not focus on the environmental impacts, if any, on the groundwater regime around TSF3 and TSF5.

2.4 Part IV of the EP Act

The existing Mesa J Iron Ore Development was assessed by the Environmental Protection Authority (EPA), and approved under Ministerial Statement (MS) 1141 in July 2020.

MS 1141 states the implementation of the Revised Proposal shall ensure that no irreversible impact to the health of the Robe River pools, Robe River and Jimmawurrada Creek ecosystems, including associated riparian vegetation, as a result of groundwater abstraction and/or discharge of surplus water.

Requirements of MS 1141 are not re-assessed in this decision report and are not duplicated as conditions in the works approval.

3. Risk assessment

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guidance Statement: Risk Assessments* (DER 2017).

To establish a Risk Event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission.

3.1 Source-pathways and receptors

3.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises construction and operation which have been considered in this Decision Report are detailed in Table 5 below. Table 5 also details the proposed control measures the applicant has proposed to assist in controlling these emissions, where necessary.

Table 5: Proposed applicant controls

Emission	Sources	Potential pathways	Proposed controls
Construction			
Dust	Construction activities and vehicles movements	Transport through air	Dust will be managed via: <ul style="list-style-type: none"> • Dust suppression will be implemented (including use of water trucks, control of vehicle movements / restricted speeds). • Standard management procedures are expected to effectively mitigate the risk of dust emissions during construction.
Noise	Construction activities and vehicles movements	Air	<i>Environmental Protection (Noise) Regulations 1997</i> and standard operating procedures are expected to effectively mitigate the risk of noise during construction. Specific controls are not proposed.
Operation			
Seepage	Tailings.	Seepage to groundwater towards Robe River	<ul style="list-style-type: none"> • Use of a tailings thickener to reduce the amount of water reporting to the in pit TSFs • Maintain the decant pond as far away as reasonably possible from the identified channel iron deposits (CID) pathway and Robe River • Divide TSF5 into two zones, separated by a near-central division embankment to contain tailings and supernatant water in the southern section, as far away as reasonably possible from the identified CID pathway and Robe River • Restrict decant pond depth and extension to the minimum possible by pumping water to the process plant • Develop a new TSF with appropriate controls as soon as practicable • Monitor the decant pond level and extent • selection of flocculant in consideration of chemistry • Meeting the current ANZG water quality guideline framework • Develop a contingency plan if flocculant is detected in monitoring bores as required by W6425/2020/1 Conditions 11d • Use ecological screening value based on ecotoxicological literature to establish levels of concern

Emission	Sources	Potential pathways	Proposed controls
Supernatant water from tailings adjacent to pit wall along northern flank	Deposition of tailings in TSF3 from towers	Preferential pathways in the geology	<ul style="list-style-type: none"> Monitoring of water pressures in vibrating wire piezometers (VWPs) Develop site-specific guideline values (SSGV)
Tailings overtopping	Deposition of tailings in TSF3	Direct discharge to soils and vegetation	The existing Embankment 4 access road and Embankment 11 will contain at least the design stormwater storage capacity (1:5000 AEP, 72-hour event) during deposition of Mesa H tailings into TSF3

3.1.2 Receptors

In accordance with the *Guidance Statement: Risk Assessment* (DER 2017), the Delegated Officer has excluded employees, visitors and contractors of the applicant from its assessment. Protection of these parties often involves different exposure risks and prevention strategies, and is provided for under other state legislation.

Table 6 and Figures 7 and 8 below provide a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises (*Guidance Statement: Environmental Siting* (DER 2016)).

Table 6: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	Distance from prescribed activity
Aboriginal community Kuruma People	Springs and pools of the Robe River have significant value for the Kuruma Marthudunera People. Approximately 500 m from TSF3.
Township of Pannawonica Residential Premises/ Homesteads/ Hospitals (Pannawonica)	Approximately 13 km north-east of the premises. The Delegated Officer considers it unlikely a risk based on the distance from proposed activities. Therefore, this receptor is not further considered in the risk assessment below
Environmental receptors	Distance from prescribed activity
Pilbara Groundwater (proclaimed under RIWI Act) Underlying groundwater (non-potable purposes)	Regional groundwater flows from south and southeast to the north and north-west towards Robe River (north of premises).
Public Drinking Water Source Area (PDWSA)	Bungaroo Creek Water Reserve (P1), intersects the premises; approximately 1.8 km from TSF3
Surface water	The Robe River passes adjacent to the north of TSF3. The Robe River is ephemeral and supports permanent

	<p>springs and pools.</p> <p>Robe River/Robe River pools used for drinking, cooking, swimming purposes by traditional owners and other visitors.</p>
Threatened and/or priority flora	<p><i>Triodia pisolitica</i> occur on mesa escarpments within the Premises to the north of TSF3 and east of TSF 5. <i>Rhynchosia Bungarensis</i> (P4) have also been identified within the premise boundary.</p>

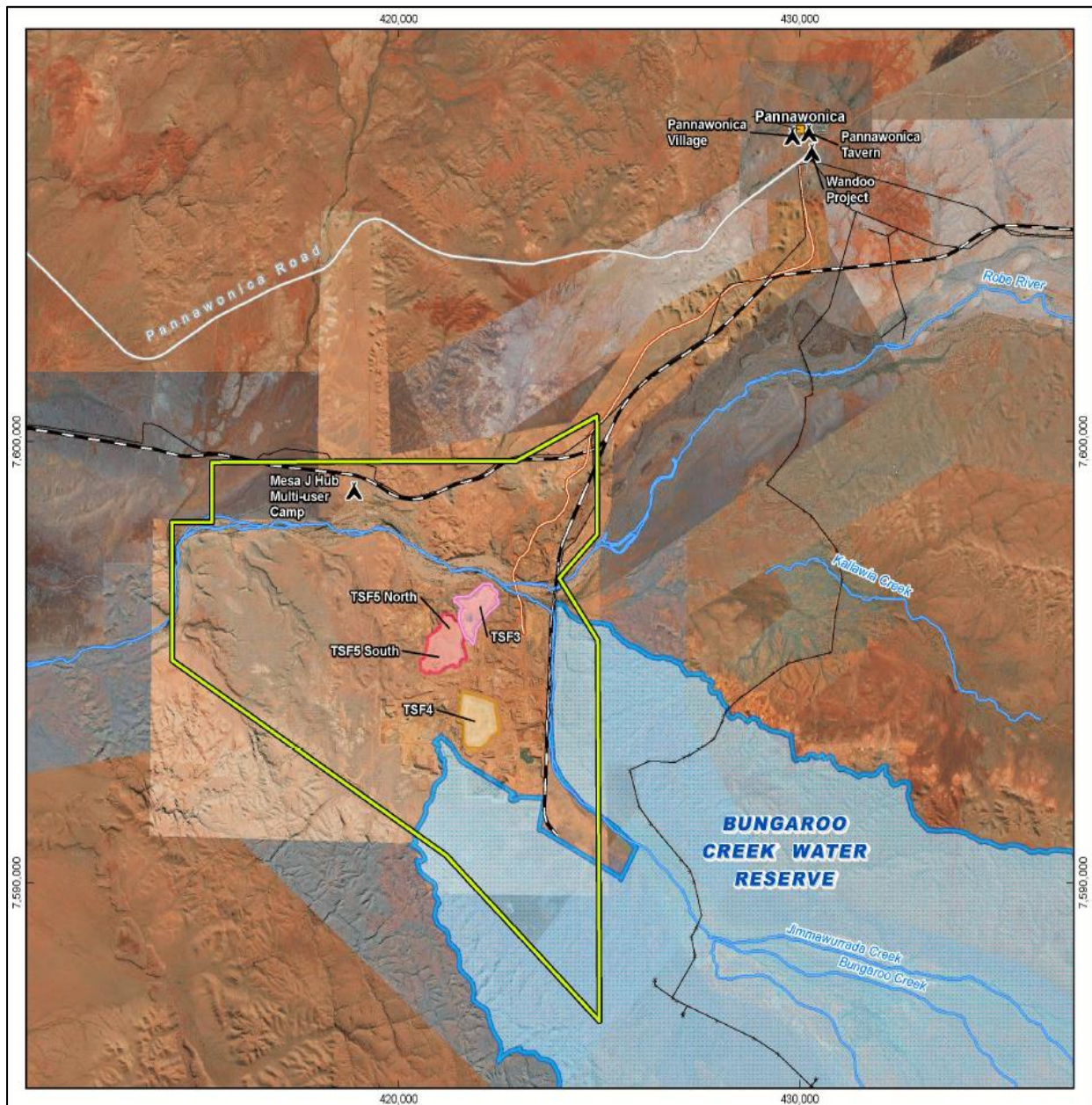


Figure 7: Distance to sensitive receptors

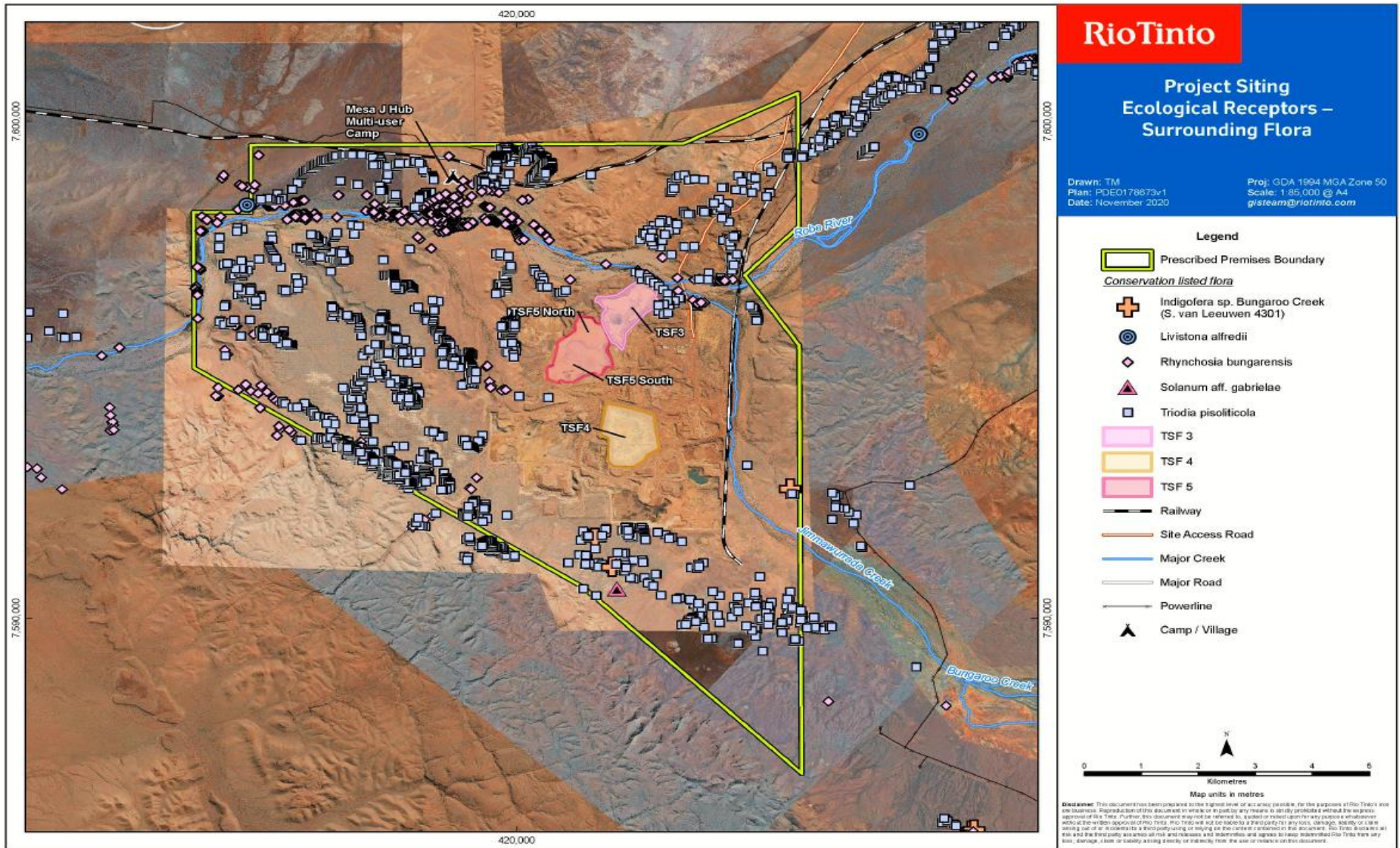


Figure 8: Mesa J sensitive receptors - flora

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MESA J

3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guidance Statement: Risk Assessments* (DER 2017) for each identified emission source and takes into account potential source-pathway and receptor linkages as identified in Section 3.1. Where linkages are in-complete they have not been considered further in the risk assessment.

Where the applicant has proposed mitigation measures/controls (as detailed in Section 3.1), these have been considered when determining the final risk rating. Where the Delegated Officer considers the applicant's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the works approval as regulatory controls.

Additional regulatory controls may be imposed where the applicant's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 7.

Works Approval W6495/2021/1 that accompanies this Decision Report authorises construction and time-limited operations. The conditions in the issued Works Approval, as outlined in Table 7 have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

A licence is required following the time-limited operational phase authorised under the works approval to authorise emissions associated with the ongoing operation of the Premises i.e. tailings deposition. A risk assessment for the operational phase has been included in this Decision Report, however licence conditions will not be finalised until the department assesses the licence application.

Table 7: Risk assessment of potential emissions and discharges from the Premises during construction, commissioning and time limited operation

Risk Event					Risk rating ¹ C = consequence L = likelihood	Applicant controls sufficient?	Conditions ² of works approval	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
Construction								
Construction activities for TSF lift, tower installation, vehicle movements	Dust	Air/windborne pathway causing impacts to health and amenity	Kuruma People using Robe River/pools 500 m from TSF3	Refer to Section 3.1	C = Slight L = Possible Low risk	Y	N/A	N/A
	Noise							
Commissioning and time limited operation								
Pipelines to new towers	Tailings containing metals, metalloids and residual flocculant discharging to land	Direct discharge from rupture of pipelines causing contamination	Soils	Refer to Section 3.1	C = Moderate L = Unlikely Medium Risk	Y	Condition 8, Table 3 included with Commissioning requirements for daily visual inspections Condition 13, Table 4 included for monitoring of pipeline and towers during time limited operations.	Regulating these controls ensures that infrastructure is installed and constructed correctly to minimise emissions and discharges to the environment.
Deposition of tailings into TSF3 and 5	Tailings containing metals, metalloids and residual flocculant seeping into groundwater/surface water	Seepage and infiltration through subsurface impacting the quality and ecology of surface water/groundwater; Potential adverse health impacts as Robe River pools are used for	Kuruma People 500 m from TSF3; PDWA, surface water (Robe River, Pools), groundwater	Refer to Section 3.1	C = Major L = Likely High Risk	N	Condition 1, Table 1 included for discharge points and VWPs. Condition 4, Table 2 included for the installation of ambient groundwater monitoring/recovery bores network. Condition 5, Table 5 included to determine	Refer to 3.3.1. Since Mesa J TSF3 and TSF5 are not regulated under the Mining Act, an annual TSF audit report will be required once TSF3 and TSF5 are

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		recreational purpose					<p>baseline ambient groundwater conditions at new monitoring bores.</p> <p>Condition 13, Table 4 included to ensure that tailings is thickened appropriately and decant pond minimised.</p> <p>Condition 14, Table 5 included for monitoring of tailings and decant during time limited operations.</p> <p>Condition 16, requirement for ongoing geochemical and geotechnical testing of the tailings from Mesa H.</p> <p>Condition 17, requirement to develop a transient seepage model.</p> <p>Condition 18, requirement to provide a nitrate management plan.</p> <p>Condition 21 requires one-off sediment analysis</p> <p>Condition 21 (c)(iv) requires water balance where the rate of evaporation is not assumed to the same as the pan evaporation rate.</p>	incorporated into the Licence L6820/1993/12.
	Overtopping	Discharge of waste fines outside of the containment infrastructure	Localised soils and vegetation	Refer to Section 3.1	C = Slight L= Possible Low risk	Y	Condition 15, Table 5 included for freeboard to be maintained during time limited operations.	Provided the freeboard is maintained, it is unlikely that the TSF will overtop

									so limiting the freeboard is deemed suitable regulation
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Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guidance Statement: Risk Assessments* (DER 2017).

Note 2: Proposed applicant controls are depicted by standard text. **Bold and underline text** depicts additional regulatory controls imposed by department.

3.3 Detailed risk assessment for tailings deposition

3.3.1 Seepage impact

Since 1993 mine water from dewatering and other activities (e.g. ore processing) has been discharged to the Robe River via discharge points along Jimmawurrada and West creeks. Discharges ceased in 2001 due to concerns around contamination of the river (particularly high nitrate and salt); water was instead delivered to an unlined lake adjacent to the creek (Lake Phil). Re-commencement of discharges to the river occurred in 2007, suggested to support water levels in the river pools. Seepage has been demonstrated and is generally expected through the entire period of operation.

Surface water levels from bores show a rapid contaminant response to tailings deposition, and analysis of surface and ground water quality data confirms that seepage water (in addition to direct discharge) already reaches the riverine receiving environments.

The surface water quality data used to assess impacts associated with the Mesa J TSFs to date provides an overall representation of conditions within the receiving environments to monitor impacts to species. However:

- Variability in past monitoring frequency (including gaps in data over time) limits the confidence in the environmental impact assessment
- Some chemicals of potential concern (COPCs), particularly new contaminants such as acrylamide, are absent
- Ammonia from blasting residues may also be present in mine dewater discharge and groundwater at elevated concentrations. Laboratory leach testing under aerobic conditions (leading to oxidation of ammonia to a greater degree than would occur in groundwater) will not show up in the testing results
- Mine dewater discharges (directly to the river), which are comprised of groundwater from the site, must be monitored for the same suite of analytes as the surface water receptors and groundwater.

The biological monitoring to date (sites/species/frequency) is generally considered adequate to assess significant impacts of tailings deposition into TSF 3 and TSF 5. However:

- Interpretation of data is limited by variability in timing of monitoring (neither capturing nor standardising seasonality). In addition to variability associated with seasonality, any impact would be confounded when pools are connected during wetter seasons
- Impact assessment does not appear to consider phytoplankton and macrophyte data (these data were referred to but not analysed) given the relationship of these ecosystem components with elevated nitrate levels
- The potential for accumulation of contaminants in sediment or in tissues of flora/fauna is unknown. This could present a significant risk if accumulation sites become a source under different conditions, or if the capacity for assimilation diminishes or reaches a plateau.

Elevated concentration of nitrate and salt in both groundwater and surface water represents a risk to sensitive receptors such as permanent pools within the Robe River— particularly given that assimilation of nutrients is finite. These pools act as important refuges for the maintenance of aquatic fauna in the river. Further studies to better describe the risks is essential.

The current monitoring bore network is considered inadequate for monitoring seepage movement directly between the northern extremities of TSF3 and the river frontage. There are no bores in place to provide seepage monitoring coverage over this area, which marks the closest extent between the TSF network and the Robe river. Any fugitive contaminants seeping into the river from the TSF through this location are unlikely to be detected or intercepted. A

network of recovery and monitoring bores should be installed around the TSF perimeter, with focus on the northern side facing the Robe River to intercept seepage.

Additional site investigations should be carried out to enable the design of an optimal recovery bore system. The implementation of a mathematical seepage model to better understand seepage movement should be considered. The model should be revised annually after comparison with the results of monitoring. The seepage recovery system should be operated until nitrate, chlorine, and zinc concentrations in monitored groundwater return to pre TSF deposition levels.

As indicated in section 2.2.2, the SEEP/W modelling that has been carried out to date at the Mesa J mining site was carried out in steady-state mode. This means that this modelling is unable to indicate how the seepage rates and the mass-fluxes of nitrate from TSFs would change over time with ongoing tailings disposal.

Treatment options must be explored for discharges, potentially in combination with capture of seepage.

The works approval will require:

- Four new groundwater monitoring/recovery bores to be installed between the TSF and Robe River, including TSFMB3a.
- Additional monitoring/recovery bore to be installed south of TSF 3 (TSFMB3b)
- Monthly TSF water balance
- Tailings from Mesa H sampling and analysis
- Transient-mode seepage models for TSF3 and TSF5, and that these are calibrated with historical water level data that indicate how groundwater mounding near these facilities has evolved with successive tailings lifts
- Management plan to reduce the impacts of nitrate concentrations in the Robe River
- Once-off sediment analysis (metal suite) from adjacent pools.

4. Consultation

Error! Reference source not found.8 provides a summary of the consultation undertaken by the department.

Table 8: Consultation

Consultation method	Comments received	Department response
Application advertised on the department's website (29/01/2021)	None received	N/A
Shire of Ashburton advised of proposal (29/01/2021)	None received	N/A
Robe River Kuruma People (29/01/2021)	None received	N/A
Department of Mines, Industry Regulation and Safety (DMIRS) Technical advice request (18/02/2021)	DMIRS replied on 15 April 2021 advising on the geotechnical aspects of the TSF 3 and TSF 5 embankment raises. Refer to Section 2.3	
Applicant was provided with draft documents on 18 May 2021	Response received on 18 June 2021 Refer to Appendix 1	Refer to Appendix 1
Applicant was provided with a second draft documents on 15 July 2021	Response was received on 6 August 2021 Refer to Appendix 1	Refer to Appendix 1

5. Conclusion

Based on the assessment in this Decision Report, the Delegated Officer has determined that a works approval will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

References

1. ANZG 2018. Australian and New Zealand Governments and Australian state and territory governments. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Canberra. <http://waterquality.gov.au/anz-guidelines>
2. Department of Environment Regulation (DER) 2016, *Guidance Statement: Environmental Siting*, Perth, Western Australia.
3. DER 2017, *Guidance Statement: Risk Assessments*, Perth, Western Australia.
4. DER 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
5. Rio Tinto 2020. *Works Approval supporting document – Mesa J and K Iron Ore Mine – L6820/1993/12*, RTIO-HSE-0348038
6. Golder Associates Pty Ltd 2020. *Storage of Mesa H tailings at the Mesa J site – Supporting document for Part V works approval application*, 1895943-092-R-Rev0 – December 2020.
7. Rio Tinto 2019. *Triennial aquifer review 2016-2018 – Mesa J GWL 107678(12)*, dated 31 March 2019
8. Rio Tinto 2021. *Annual aquifer review 2020 – Mesa J GWL 107678 (12)*, dated 31 March 2021
9. DWER, *Internal Advice – River Science*. Internal reference A1998243
10. DWER, *Internal Advice – Contaminated Sites*. Internal reference A2000016
11. DWER, *Internal Advice – Water Planning*. Internal reference A1999106

Appendix 1: Summary of applicant's comments on risk assessment and draft conditions

Condition	Summary of applicant's comment	Department's response
<p>Condition 1 – Table 1</p> <p>1. In pit tailings storage facility TSF3</p>	<p>The applicant requests that Table 1 be revised as follows: 1. In pit tailings storage facility TSF3 Modifications.</p>	<p>Amended</p>
	<p>Deposition of unthickened tailings from Embankment 11 is considered overly prescriptive</p>	<p>Amended – unthickened removed</p>
	<p>Location and Number of Spigots /Discharge Points: Tailings are proposed to be deposited into TSF3 from one or more tailings discharge points, altered as required to support the deposition strategy. Reference to the specific location and number of spigots is considered overly prescriptive and does not allow for the adaptive management of tailings deposition during operation to provide more capacity for tailings storage, manage the beach slopes and maintain the decant pond to the south of the facility.</p> <p>Deposition is proposed to be managed through the implementation of the revised Operating Manual (which includes a deposition plan) and as such, an amendment to Table 1 is requested to allow deposition from tailings discharge points located along the embankments at the indicative locations shown in Figure 2.</p>	<p>Amended - Deposition via one or more tailings discharge points located along the embankments at the locations shown in Figure 2</p>
	<p>Details, Location and Capacity of Decant Pumping System: The existing decant pumps and decant water return pipeline will continue to maintain the decant pond at a level that provides storage capacity for the 1:100 AEP, 72-hour ARI rainfall event with at least 0.5 m of freeboard. No modifications to the existing decant system are proposed and as such, an amendment to Table 1 is requested to remove the reference to the decant system.</p>	<p>Amended subject to - applicant to provide details of the decant system (number of pumps and pumping capacity of each pump) to be included in the decision report</p>


Condition	Summary of applicant's comment	Department's response
Condition 1 – Table 1 2. In pit tailings storage facility TSF5	The applicant requests that Table 1 be revised as follows: 1. In pit tailings storage facility TSF5 Modifications.	Amended
	Number of Spigot Points: The applicant requests that Table 1 is amended to allow deposition from tailings discharge points located along the embankments at the indicative locations shown on Figure 5.	Amended – Figure 5 is now Figure 6
	The applicant requests that Table 1 be revised as follows: Installation of 4 vibrating wire piezometers (VWPs) located along the embankments at the indicative locations shown in Figure 5.	Amended
	Details, Location and Capacity of Decant Pumping System: No modifications to the existing decant system are proposed and as such, an amendment to Table 1 is requested to remove the reference to the decant system.	Amended subject to - applicant to provide details of the decant system (number of pumps and pumping capacity of each pump) to be included in the decision report
Condition 3	Administrative - correct wording	Amended
Condition 4	Administrative – correct Figure number	Amended
Condition 8 – Table 3	Twice daily inspections of pipelines during commissioning: Given that the scope is limited to relocation rather than installation of pipework; relocating the existing pipeline to Embankment 10 (PP2 line) and connecting the existing PP1 line to the towers on Embankment 9, daily inspections of pipelines are proposed. Daily inspections align with the existing inspection schedule for the TSF. Pressure transmitters and flow metres installed on tailings lines will provide feedback of any piping failures.	Amended to daily inspections
Condition 13 – Table 4	Administrative – correct numbering	Amended
Condition 13 – Table 4	Change twice daily inspection to daily inspections	Amended
Condition 13 – Table 4	Visual inspections of components of the TSF are proposed to be undertaken daily during time limited operations. It is not practical to undertake daily inspections of all of the components and so, monthly or	Table 4 has been amended as follow: Daily inspection logs of the following:

Condition	Summary of applicant's comment	Department's response
	<p>quarterly records are proposed to be maintained for those:</p> <ul style="list-style-type: none"> • A review of beaching performance will only be able to be provided following the quarterly survey of the beach profile. • A review of the size of the decant pond will also only be able to be provided following the quarterly survey however, a visual inspection is proposed to be undertaken daily to confirm that the required freeboard is available and the volume of tailings is proposed to be recorded monthly to meet the intent of this. <p>Table 5 of the draft works approval also requires the works approval holder to monitor groundwater during time limited operations and as such an amendment to Table 4 is requested to remove the reference to quarterly groundwater monitoring.</p>	<ul style="list-style-type: none"> • Routine inspections for all components of the TSF including: • Decant pumps, valves • Delivery pipeline • Discharge locations and beaching performance • Location and size of decant pond • Freeboard • General integrity of embankment • Seepage downstream of main embankment <p>Monthly records of:</p> <ul style="list-style-type: none"> • Volume of tailings discharged • Volume of decant recovered <p>Quarterly records of the following:</p> <ul style="list-style-type: none"> • Groundwater monitoring. • Location and size of decant pond • Log of TSF 3 VWP-16U/L and VWP-21 • Log of TSF 5 VWP-22 U/L and VWP-22 U/L
Condition 14 – Table 5	<p>Amendments to Table 5 are requested to remove references to bores that are not able to be monitored.</p> <p>JMB03 does not exist and is not referenced in any Licence or works approval documentation. As such, reference to JMB03 is requested to be removed from the works approval.</p>	<p>JMB03 is presented as “existing monitoring bore locations” in GOLDER Mesa J TSF 3 Design in support of works approval application Mesa H tailings – Project number 1895943, document number 092-R, Rev. 0, Figure F006 – TSF 3 and TSF 5 instrumentation plan.</p> <p>Applicant to review the drawings and provide comments.</p>
Condition 14 – Table 5	<p>Monitoring bores MB14MEJ005 and MB14MEJ006 have been destroyed. The replacement monitoring bores for MB14MEJ005 and MB14MEJ006 already exists and are accounted for in the monitoring locations listed (MB19MEJ0001 and MB19MEJ0002). As such, references to MB14MEJ005 and MB14MEJ006 are requested to be removed from the works approval.</p>	<p>Amended – reference removed</p> <p>TSFMB3a and TSFMB3b to be installed as recovery/monitoring bores.</p>

Condition	Summary of applicant's comment	Department's response
	<p>As part of the works approval application, two new bores are proposed to be installed, one located downstream of Embankment 10 (TSFMB3a) and one located downstream of Embankment 11 (TSFMB3b).</p>	
<p>Condition 14 – Table 5</p>	<p>Table 5 of the draft Works Approval also requires the works approval holder to install and monitor five additional bores; three new groundwater recovery bores and two gravel bores located to north of TSF3.</p> <p>There are significant limitations to the installation of bores in these locations with terrain limiting access on the northern façade and heritage and environmental constraints limiting access to the other proposed locations.</p> <p>Most notably, the assessment timeframe for relevant heritage and environmental approvals required to access the proposed locations in the Robe River are expected to be years. As such, compliance with this condition is not possible.</p> <p>Protection of the Robe River is an existing requirement of Ministerial Statement 1141 and the installation of groundwater interception bores represents a potential Response Action which could be implemented, subject to relevant heritage and environmental approvals, if the monitoring required by the Environmental Management Plan (required by MS 1141) identifies that seepage from TSF3 is affecting the Robe River.</p> <p>It is requested that the groundwater monitoring required by the Works Approval is limited to the existing groundwater monitoring network listed in L6820/1993 (as amended), as well as the two additional bores proposed to be installed in the works approval application (TSFMB3a located downstream of Embankment 10 and TSFMB3b located downstream of Embankment 11). New groundwater monitoring locations with complex approvals requirements are requested to be removed.</p> <p>The monitoring locations provided as Figure 4-1 (Groundwater Monitoring Bore Locations and Groundwater Contours) in the <i>Works Approval Supporting Document</i> are provided as Attachment 6.</p>	<p>DWER has removed the requirement of the two gravel bores. However, this decision may be reversed depending on sediment samples from the pool results</p> <p>However, the current monitoring bore network is considered inadequate for monitoring seepage movement directly between the northern extremities of TSF3 and the river frontage. There are no bores in place to provide seepage monitoring coverage over this area, which marks the closest extent between the TSF 3 network and the Robe river. Any fugitive contaminants seeping into the river from the TSF through this location are unlikely to be detected or intercepted.</p> <p>No alternative mitigation measures were proposed by the applicant.</p> <p>Given the high risk of seepage migrating through the CID towards the Robe River and the lack of monitoring / recovery bores between TSF 5 and TSF 3, the requirement of three additional recovery bores remains (refer to 3.3.1 of this decision report).</p> <p>Seepage is not regulated under MS 1141, Part V is the regulatory instrument. Thus, there is no duplication in regulation.</p>

Condition	Summary of applicant's comment	Department's response
Condition 14 – Table 5	Table 5 of the draft Works Approval requires the works approval holder to monitor for concentrations of parameters (TDS, alkalinity, nitrate, nitrite, ammonia, major ions, metals and acrylamide) bimonthly. Consistent with other recent works approvals for tailings storage facilities, quarterly monitoring for concentrations of these parameters is proposed.	No change to the frequency – each site is assessed according to the risk posed by the activity and receiving environment.
Condition 14 – Table 5	The applicant requests that Table 5 be revised to remove the reference to polyacrylamide. Polyacrylamides are macromolecules that cannot be analysed in commercial laboratories. However, the polymer, polyacrylamide breaks down into the monomer, acrylamide in the environment and acrylamides can be analysed in commercial laboratories. As such, analysing for the monomer (acrylamide) and not the polymer (polyacrylamide) is proposed.	Amended based on limitations in analytical analysis.
Condition 14 – Table 5	Applicant provided list of VVPs	List of VVPs included in Table 5
Condition 16	Administrative - spelling of behavior (American) within Condition 16 be revised to <i>behaviour</i> (British).	Amended
Condition 16 – Table 6	Contaminants: Acrylamide, polyacrylamide The applicant requests to remove the reference to polyacrylamide (as above).	Amended based on limitations in analytical analysis.
Condition 16 – Table 6	Request to reformat the table	Amended
Condition 19	Amendments to Condition 19 are requested to ensure the use of capitals and spaces in these terms is consistent throughout the document.	Amended
Condition 20	It is requested that time limited operations be authorised under the works approval for 180 calendar days, to allow enough time for the assessment and determination of a Licence Amendment application.	Amended

Condition	Summary of applicant's comment	Department's response
Condition 21 (d)	Administrative error The applicant requests that Condition 21 (d) be revised to remove the reference to WFC3A.	Amended to reflect TSF3 and TSF 5.
Figure 1, Figure 2 and Figure 5	Administrative changes	Amended
Schedule 2	Applicant provided prescribed premisses coordinates	Amended
Applicant response to second draft works approval		
Condition	Summary of applicant's comment	Department's response
Details, Location and Capacity of Decant Pumping System	Decant access ramps allow access for decant return water pumps ('TruFlo 200' Pumps with capacity to pump up to 200L/s through floating 'turrets' attached to their inlets) to facilitate removal of water from the decant pond. Pumping rates will be varied as required to maintain a shallow decant pond (pond elevation that provides sufficient freeboard to meet design requirements and reduce potential seepage) in the south of the facility, away from the northern embankment. There is no existing decant infrastructure in TSF5 as this facility is not currently in use. The decant system from TSF3 would be relocated to TSF5 if / when deposition into this facility is planned to recommence.	Noted

Condition	Summary of applicant's comment	Department's response
		
Condition 1, Table 1	<p>The existing Embankment 4 Access Road and Embankment 11 will contain at least the design stormwater storage capacity (1:5000 AEP, 72-hour event) during deposition of Mesa H tailings into TSF3, unless the beach profile differs significantly from that expected and modelled. If this occurs and additional freeboard is required, these embankments will be raised in a downstream direction to provide the requisite freeboard. At that time, an emergency spillway would also be constructed to accommodate the additional flows that would occur from occurrence of the 72-hour probable maximum flood (PMF).</p> <p>As such, the applicant requests that the Works Approval note that raises to Embankments 11 and 4; and installation of the emergency spillway in Embankment 11 will only be undertaken if required.</p>	Amended to include <i>if required</i>

Condition	Summary of applicant's comment	Department's response
Condition 4, Table 2	The bores installed as part of the groundwater monitoring network for TSF3 will initially be monitoring bores which will be converted to recovery bores if required to manage seepage, detected via monitoring. As such, the Licensee requests that the Works Approval reference new monitoring / recovery bores.	Amended
Condition 14, Table 5	An amendment to Table 5 is requested to remove reference to JMB03, this bore no longer exists and as such, is not able to be monitored. The Licensee acknowledges that this bore is shown as an existing monitoring bore on Figure F006 in the Supporting Document for Part V Works Approval Application document (Golder 2020). The data that supported this figure, provided by the Licensee to the Consultant, has been interrogated and shows JMB03 to be 'abandoned'. Rio Tinto's hydrology team have also confirmed via ground-truthing that JMB03 no longer exists. As such, reference to JMB03 is requested to be removed from the Works Approval. The Licensee notes that existing monitoring bores, MB14MEJ001 and MB16MEJ0008 are nearby to where JMB03 was historically located and provide groundwater monitoring information for the local area.	Monitoring bore removed from table
	<p>Table 5 of the draft Works Approval also requires the works approval holder to install and monitor five new bores, as indicated in Figure 8.</p> <p>Of the five new bores, one will be located downstream of Embankment 10 (TSFMB3a) and one will be located downstream of Embankment 11 (TSFMB3b). TSFMB3a and TSFMB3b are already accounted for within Table 5 and as such, the Licensee requests that the table be revised to require three new bores in addition to TSFMB3a and TSFMB3b as indicated in Figure 8 (Attachment 2).</p> <p>Of the three new bores required (in addition to TSFMB3a and TSFMB3b), the westernmost bore (Location 1) is located within a significant heritage area (Attachment 3). Access to this region is also expected to be challenging, with limited access through treacherous terrain, requiring tracks to intersect other heritage sites. The extensive consultation and assessment timeframe for relevant heritage approvals required to access Location 1 has been assessed and is anticipated to be at least 2 years.</p>	<p>Given the extent of the DPLH sites adjoining the TSF3 site the department understands the difficulties to install monitoring/recovery bores on the escarpment. The terrain on the escarpment would also make it very hard to mobilise equipment without further disturbance to these areas.</p> <p>The department accepts the new bore sites proposed by the applicant, although they are likely to consistently report elevated levels of seepage, given their proximity to the TSF. This will necessitate frequent pumping and recovery, with the recovered seepage requiring redispersal further away from the TSF perimeter.</p> <p>The inability to install monitoring bores further downgradient of the TSF (towards the river) means it will be hard to detect seepage plumes that make it past these monitoring/recovery bores. Any contamination</p>

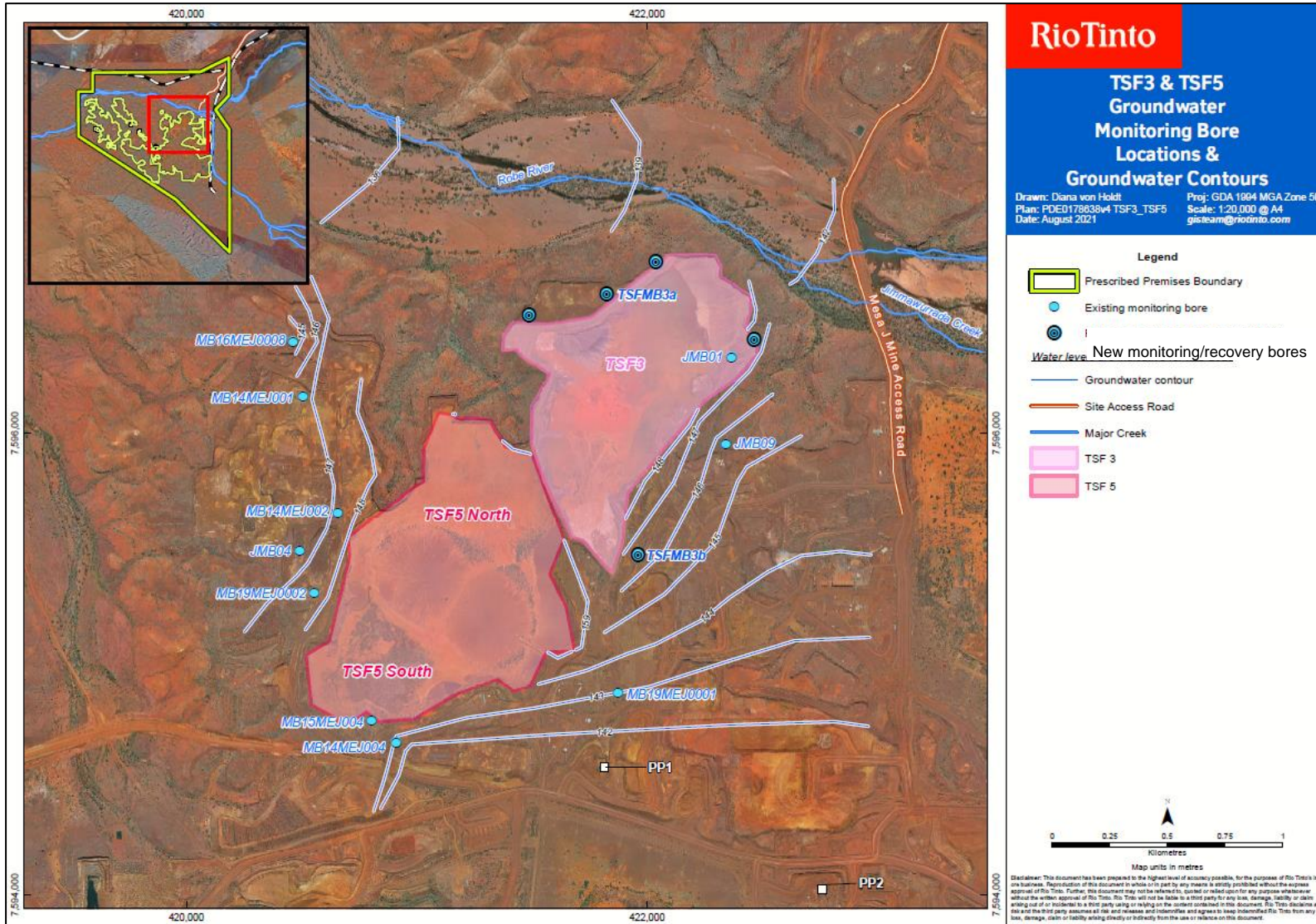
Condition	Summary of applicant's comment	Department's response
	<p>The applicant requests that the new bore is located slightly east of Location 1, avoiding significant heritage areas while still providing groundwater monitoring data downgradient of TSF3.</p> <p>Of the three new bores required (in addition to TSFMB3a and TSFMB3b), the northernmost bores (Locations 3 and 4) are within the mesa façade with significant environmental and heritage values.</p> <p>The northern façade of the mesa, adjacent to the Robe River, was specifically excluded from Ministerial Statement 1141 so as to ensure the preservation of the escarpment for the protection of environmental values (these escarpments support caves, gorges, gullies and breakaways that represent critical habitats for threatened species including the Northern Quoll, Pilbara Leaf-nosed Bat, Ghost Bat, and Pilbara Olive Python) as well as to maintain the mesa façade for the protection of heritage values (including both amenity and significant rockshelters). Further information on the significance of the environmental and heritage values of the mesa façade is available within the Mesa J Revised Proposal Environmental Review Document and the Report and Recommendations of the Environmental Protection Authority (Report 1668), available at Mesa H Proposal (Revision to Mesa J Iron Ore Development) EPA Western Australia.</p> <p>Access to northern façade of the mesa is also expected to be particularly challenging, with bores (and access tracks) on sloping terrain requiring cuts into the escarpment.</p> <p>The applicant requests that new bores are located west of Location 3 and south of Location 4, avoiding the northern façade of the Mesa landform, adjacent to the Robe River to ensure the preservation of significant environmental and heritage values while still providing groundwater monitoring data downgradient of TSF3</p>	<p>will only be detected once its already in the sensitive receptor (river alluvials/ pools). A commitment to remediation of any contamination recorded in these receptors can be included in the Mine Closure Plan. Contaminated sites must be informed so that these areas can be appropriately flagged.</p> <p>The proposal to install of dual-purpose monitoring/seepage recovery bores is noted and supported.</p>
Conditions 4, 5, 13, 15 and Figures 2 and 5	Administrative corrections	Amended
Condition 12, 20 and 21	-	Conditions amended to align with standard DWER guidelines for time limited operation (TLO) timeframes. The changes were discussed and agreed with applicant on 19/08/2021.

Appendix 2: Application validation summary

SECTION 1: APPLICATION SUMMARY		
Application type		
Works approval	<input checked="" type="checkbox"/>	
Date application received	3/12/2020	
Applicant and Premises details		
Applicant name/s (full legal name/s)	Robe River Mining Co. Pty Limited	
Premises name	Mesa J and Mesa K	
Premises location	State Agreement Mineral Lease (ML) 248SA	
Local Government Authority	Shire of Ashburton	
Application documents		
HPCM file reference number:	DER2020/000619	
Key application documents (additional to application form):	Ecotoxicity Assessment Geochemical Assessment Impact of flocculant in tailings Contaminant transport – Hydrogeology / seepage assessment for Mesa K and Mesa J	
Scope of application/assessment		
Summary of proposed activities or changes to existing operations.	<p><u>TSF3 upgrade works</u></p> <ul style="list-style-type: none"> - Enlargement of Embankment 10 (height and length). - Installation of three 2 to 3 m high steel deposition towers on Embankment 9. - Deposition of unthickened tailings from Embankment 11. - Raises to Embankments 11 and 4. - Installation of an emergency spillway in Embankment 11. <p><u>TSF5 upgrade works</u></p> <ul style="list-style-type: none"> - Construction of embankments to compartmentalise the TSF. - Deposition of tailings from the embankments and Embankment 8. 	
Category number/s (activities that cause the premises to become prescribed premises)		
Table 1: Prescribed premises categories		
Prescribed premises category and description	Assessed production or design capacity	Proposed changes to the production or design capacity (amendments only)
Category 5: Processing or beneficiation of metallic and non-metallic ore	13,000,000 tonnes per year	N/A* *A licence amendment will be submitted to increase production to 20Mtpa

Legislative context and other approvals		
Has the applicant referred, or do they intend to refer, their proposal to the EPA under Part IV of the EP Act as a significant proposal?	Yes <input checked="" type="checkbox"/>	Managed under Part V <input type="checkbox"/> Assessed under Part IV <input checked="" type="checkbox"/>
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes <input checked="" type="checkbox"/>	Ministerial statement No: 776 and 1141 (208 superseded) EPA Report No: 1668
Has the proposal been referred and/or assessed under the EPBC Act?	No <input checked="" type="checkbox"/>	Reference No: -
Has the applicant demonstrated occupancy (proof of occupier status)?	Yes <input checked="" type="checkbox"/>	Iron Ore (Robe River) Agreement Act 1964
Has the applicant obtained all relevant planning approvals?	N/A <input checked="" type="checkbox"/>	If N/A explain why? SA Act
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	N/A <input checked="" type="checkbox"/>	CPS No: N/A No clearing is proposed.
Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?	No <input checked="" type="checkbox"/>	No clearing is proposed.
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	No <input checked="" type="checkbox"/>	Application reference No: N/A Licence/permit No: N/A
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?	No <input checked="" type="checkbox"/>	Name: N/A Type: Proclaimed Groundwater Area/Surface Water Area Has Regulatory Services (Water) been consulted? Yes Regional office: North West
Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?	No <input checked="" type="checkbox"/>	-
Is the Premises subject to any other Acts or subsidiary regulations (e.g. <i>Dangerous Goods Safety Act 2004, Environmental Protection (Controlled Waste) Regulations 2004, State Agreement Act 1964</i>)	Yes <input checked="" type="checkbox"/>	Iron Ore (Robe River) Agreement Act 1964
Is the Premises within an Environmental Protection Policy (EPP) Area?	No <input checked="" type="checkbox"/>	-
Is the Premises subject to any EPP requirements?	No <input checked="" type="checkbox"/>	-
Is the Premises a known or suspected contaminated site under the <i>Contaminated Sites Act 2003</i> ?	No <input checked="" type="checkbox"/>	Classification: N/A Date of classification: N/A

Appendix 3: Mesa J monitoring bores locations



Works Approval: W6495/2021/1

MESA J

Appendix 4: Mesa H geochemical properties

Table 9: Mesa H tailings leaching test results.

Parameter	Unit	Tailings liquid fraction	Leach Test				
			Deionised water 0.75:1 (solid:liquid)	Deionised water 1:2 (solid:liquid)	Saline 2 g/L NaCl	Saline 10 g/L NaCl	Peroxide 1:100 (solid:liquid)
pH Value	pH Unit	8.02	7.5	7.6	7.1	6.9	7.5
Electrical Conductivity	µS/cm	699	445	168	3420	8170	80
Chloride	mg/L	155	88	23	1080	2870	6
Sulfate	mg/L	45	33	9	9	<15	<15
Sodium	mg/L	67	59	24	613	1160	15
Aluminium	mg/L	<0.01	<0.01	0.64	0.08	0.29	12.5
Arsenic	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005
Beryllium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005
Barium	mg/L	0.03	0.152	0.304	0.922	1.74	0.29
Cadmium	mg/L	<0.0001	<0.0001	<0.0001	0.0004	0.001	<0.0005
Chromium	mg/L	<0.001	<0.001	0.006	<0.001	0.005	0.018
Cobalt	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	0.005
Copper	mg/L	<0.001	<0.001	0.004	<0.001	0.002	<0.005
Lead	mg/L	<0.001	<0.001	0.005	<0.001	0.002	<0.005
Iron	mg/L	<0.05	<0.05	3.51	<0.05	0.87	56.9
Manganese	mg/L	0.001	0.002	0.067	0.012	0.17	0.27
Molybdenum	mg/L	<0.001	0.001	0.003	<0.001	<0.001	0.012
Nickel	mg/L	<0.001	<0.001	0.002	0.001	0.002	0.011
Scandium	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	0.4
Selenium	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05
Silver	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005
Silicon	mg/L	12	15	11	12	8	13
Strontium	mg/L	0.106	0.072	0.027	0.238	1.01	0.017
Tin	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	0.006
Titanium	mg/L	<0.01	<0.01	0.03	<0.01	<0.01	0.42
Tungsten	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005
Uranium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005
Zinc	mg/L	0.006	0.006	0.076	0.164	0.209	0.168
Nitrate as N	mg/L	0.58	0.09	0.14	0.16	0.13	0.32

Note: bold numbers denote values above ANZG 2018