Government of Western Australia
Department of Environment Regulation

Works Approval

Environmental Protection Act 1986, Part V

Works Approval Holder: Mt Weld Mining Pty Limited

Works Approval Number: W5645/2014/1

Registered office: Level 1, Tully Road
EAST PERTH WA 6004

ACN: 053 160 400

Premises address: Mt Weld Rare Earths Project
Elora Road
LAVERTON WA 6440
Being mining tenement M38/058 as depicted in Schedule 1.

Issue date: Thursday, 18 December 2014

Commencement date: Monday, 22 December 2014

Expiry date: Saturday, 21 December 2019

The following category/s from the *Environmental Protection Regulations 1987* cause this Premises to be a prescribed premises for the purposes of the *Environmental Protection Act 1986*:

Category number	Category description	Category production or design capacity	Approved premises production or design capacity
05	Processing or beneficiation of metallic or non-metallic ore: premises on which – (a) Metallic or non-metallic ore is crushed, ground, milled or otherwise processed; or (b) Tailings from metallic or non-metallic ore are reprocessed; or (c) Tailings from residue from metallic or non-metallic ore are discharged into a containment cell or dam.	50 000 tonnes or more per year	242 000 tonnes per year

Conditions
This Works Approval is subject to the conditions set out in the attached pages.

Date signed: 14 March 2016
.....
Tim Gentle
Officer delegated under section 20
of the *Environmental Protection Act 1986*

Works Approval Conditions

1 General

1.1 Interpretation

1.1.1 In the Works Approval, definitions from the *Environmental Protection Act 1986* apply unless the contrary intention appears.

1.1.2 In the Works Approval, unless the contrary intention appears:

'Act' means the *Environmental Protection Act 1986;*

'AS/NZS 5667.10' means the Australian Standard AS/NZS 5667.10 *Water Quality – Sampling – Guidance on sampling of waste waters;*

'annual period' means the inclusive period from 1 April until 31 March in the following year;

'averaging period' means the time over which a limit or target is measured or a monitoring result is obtained;

'CEO' means Chief Executive Officer of the Department of Environment Regulation;

'CEO' for the purpose of correspondence means;

Chief Executive Officer
Department Administering the Environmental Protection Act 1986
Locked Bag 33
CLOISTERS SQUARE WA 6850
Telephone: (08) 9333 7510
Facsimile: (08) 9333 7550
Email: info@der.wa.gov.au;

'commissioning' means the process of operation and testing that verifies the works and all relevant systems, plant, machinery and equipment have been installed and are performing in accordance with the design specification set out in the works approval application;

'NATA' means the National Association of Testing Authorities, Australia;

'NATA accredited' means in relation to the analysis of a sample that the laboratory is NATA accredited for the specified analysis at the time of the analysis;

'Premises' means the area defined in the Premises Map in Schedule 1 and listed as the Premises address on page 1 of the Works Approval;

'Schedule 1' means Schedule 1 of this Works Approval unless otherwise stated;

'spot sample' means a discrete sample representative at the time and place at which the sample is taken;

'Works Approval' means this Works Approval numbered W5645/2014/1 and issued under the Act;

'Works Approval Holder' means the person or organisation named as the Works Approval Holder on page 1 of the Works Approval;

1.1.3 Any reference to an Australian or other standard in the Works Approval means the relevant parts of the standard in force from time to time during the term of this Works Approval.

1.1.4 Any reference to a guideline or code of practice in the Works Approval means the current version of the guideline or code of practice in force from time to time, and shall include any amendments or replacements to that guidelines or code of practice made during the term of this Works Approval.

1.2 General conditions

1.2.1 The Works Approval Holder shall construct the works in accordance with the documentation detailed in Table 1.2.1:

Table 1.2.1: Construction Requirements[1]

Document	Parts	Date of Document
Kasa Consulting 2014. Mt Weld Rare Earths Project, Works Approval Application Supporting Documentation: New Tailings Storage Facility and Tailings Dewatering System, Mt Weld Mining Pty Limited, Kasa Consulting,	All, including Drawings and Appendices	March 2014
Kasa Consulting 2016. Mt Weld Rare Earths Project, Works Approval Application Supporting Documentation: TSF2 Modification[2]	All	January 2016
Kasa Consulting 2013. Mt Weld Mining Limited, Mt Weld Rare Earths Project Environmental Management Programme (Version 8). April 2013. Document No.: LampsUp-WA-100-PM-RP-0001	All, including Drawings and Appendices	April 2013
Email correspondence, Requested clarification from Lynas, Deborah Cahill	All	06 June 2014
Hatch 2015. Design of TSF and Return Water Pond, Design Report – Mt Weld TSF2, Revision 4.	All	2 December 2015

Note 1: Where the details and commitments of the documents listed in condition 1.2.1 are inconsistent with any other condition of this works approval, the conditions of this works approval shall prevail.
Note 2: Where the details and commitments of Kasa Consulting (2016) are inconsistent with Kasa Consulting (2014), Kasa Consulting (2016) shall prevail.

1.2.2 The Works Approval Holder shall commission the TSF 2 and Return Water Pond for a period not exceeding seven months.

2 Monitoring

2.1.1 The Works Approval Holder shall undertake the monitoring specified in Table 2.1.1 during the commissioning period.

Table 2.1.1: Process monitoring

Monitoring point reference	Parameter	Units	Averaging period	Method	Frequency
Tailings	Tailings	tonnes	N/A	N/A	Cumulative daily

3 Improvements

3.1.1 The Works Approval Holder shall complete the improvements in Table 3.1.1 by the date of completion in Table 3.1.1.

Table 3.1.1: Improvement program

Improvement reference	Improvement	Date of completion
IR1	The Works Approval Holder shall submit an updated commissioning plan to the CEO. The plan shall address risks associated with commissioning the revised proposal for TSF2. The Works Approval Holder shall implement the revised plan and undertake commissioning in accordance with the plan.	Prior to commissioning

4 Information

4.1 Reporting

4.1.1 The Works Approval Holder shall submit a compliance document to the CEO, following the construction of the works and prior to commissioning of the same.

4.1.2 The compliance document shall:
(a) certify that the works were constructed in accordance with the conditions of the works approval;
(b) be signed by a person authorised to represent the Works Approval Holder and contain the printed name and position of that person within the company.

4.1.3 The Works Approval Holder shall submit a commissioning report for TSF2 to the CEO within 2 months of the completion of commissioning.

4.1.4 The Works Approval Holder shall ensure the report includes;

(a) a summary of the monitoring results recorded under condition 2.1.1;
(b) a summary of the environmental performance of the TSF2 as installed, against the design specification set out in the works approval application;
(c) a review of performance against the works approval conditions; and
(d) where they have not been met, measures proposed to meet the design specification and/or works approval conditions, together with timescales for implementing the proposed measures.

4.2 Notification

4.2.1 The Works Approval Holder shall ensure that the parameters listed in Table 4.2.1 are notified to the CEO and are in accordance with the notification requirements of the table.

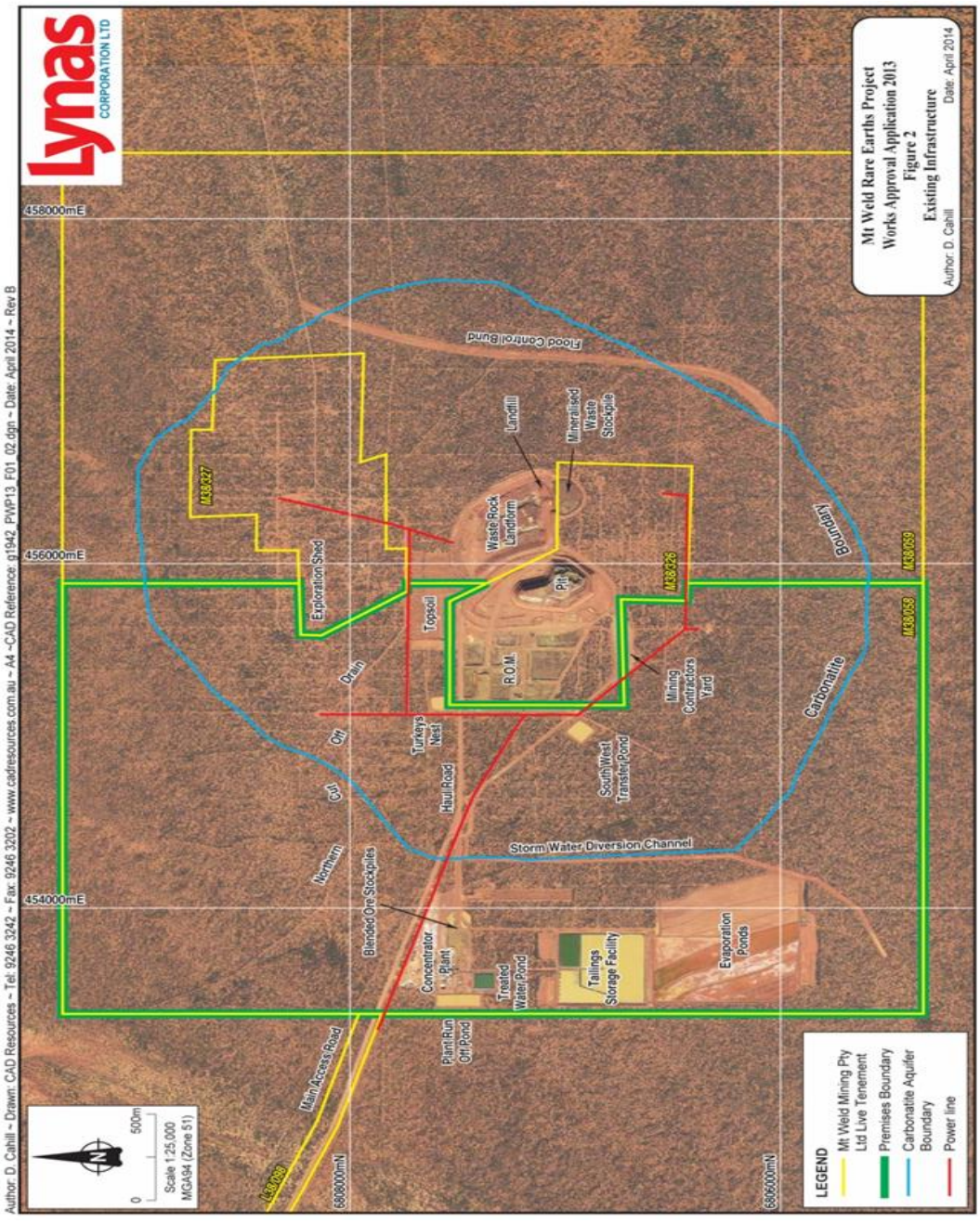
Table 4.2.1: Notification requirements

Condition or table (if relevant)	Parameter	Notification requirement	Format or form
1.2.2	Commencement of commissioning	7 days prior to start	None specified
	Completion of commissioning	7 days after completion	

Schedule 1: Maps

Premises map

The Premises is shown in the map below. The green line depicts the Premises boundary.



Government of Western Australia
Department of Environment Regulation

Decision Document

Environmental Protection Act 1986, Part V

Proponent: Mt Weld Mining Pty Limited

Works Approval: W5645/2014/1

Registered office:	Level 1, Tully Road EAST PERTH WA 6004
ACN:	053 160 400
Premises address:	Mt Weld Rare Earths Project Elora Road LAVERTON WA 6440 Being mining tenement M38/058.
Issue date:	Thursday, 18 December 2014
Commencement date:	Monday, 22 December 2014
Expiry date:	Saturday, 21 December 2019

Decision

Based on the assessment detailed in this document the Department of Environment Regulation (DER), has decided to issue an amendment to the works approval. DER considers that in reaching this decision, it has taken into account all relevant considerations and legal requirements and that the Works Approval and its conditions will ensure that an appropriate level of environmental protection is provided.

Decision Document prepared by:	Louise Lavery Licensing Officer
Decision Document authorised by:	Tim Gentle Delegated Officer

Contents

1 Purpose of this Document

This decision document explains how DER has assessed and determined the application and provides a record of DER's decision-making process and how relevant factors have been taken into account. Stakeholders should note that this document is limited to DER's assessment and decision making under Part V of the *Environmental Protection Act 1986.* Other approvals may be required for the proposal, and it is the proponent's responsibility to ensure they have all relevant approvals for their Premises.

2 Administrative summary

Administrative details		
Application type	Works Approval ☐ New Licence ☐ Licence amendment ☐ Works Approval amendment ☒	
Activities that cause the premises to become prescribed premises	**Category number(s)**	**Assessed design capacity**
	5	242 000 tonnes per year
Application verified Application fee paid	Date: N/A Date:	
Works Approval has been complied with Compliance Certificate received	Yes☐ No☐ N/A☒ Yes☐ No☐ N/A☒	
Commercial-in-confidence claim	Yes☐ No☒	
Commercial-in-confidence claim outcome		
Is the proposal a Major Resource Project?	Yes☐ No☒	
Was the proposal referred to the Environmental Protection Authority (EPA) under Part IV of the	Yes☒ No☐	Referral decision No:

Environmental Protection Act 1986?		Managed under Part V ☐ Assessed under Part IV ☒
Is the proposal subject to Ministerial Conditions?	Yes☒ No☐	Ministerial statement No: 476 EPA Report No: Bulletin 884
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the *Environmental Protection Act 1986*)?	Yes☐ No☒ Department of Water consulted Yes ☐ No ☒	
Is the Premises within an Environmental Protection Policy (EPP) Area Yes☐ No☒ If Yes include details of which EPP(s) here.		
Is the Premises subject to any EPP requirements? Yes☐ No☒ If Yes, include details here, eg Site is subject to SO_2 requirements of Kwinana EPP.		

3 Executive summary of proposal and assessment

Mt Weld Mining operates a rare earth mine and rare earths processing facility located at Laverton Western Australia. The mine is currently operating under Ministerial Statement 476 and Licence L8141/2007/2.

Mt Weld has submitted a works approval to DER to construct:

- a tailings dewatering plant;
- a second tailings storage facility (TSF2);
- a storm water run-off pond (SWROP);
- a pad adjacent to an existing workshop; and
- a surface water diversion drain to the north of TSF2 to divert stormwater runoff around TSF2.

Figure 1 depicts the location of the original proposed infrastructure.

The tailings dewatering plant is proposed to address a historic issue of low solid content tailings derived from the existing processing plant. The tailings dewatering plant includes Ishigaki screw presses. A pilot plant trial of an Ishigaki screw press was conducted by Mt Weld from 21-28 November 2013 through a licence amendment. Mt Weld reported that the trial demonstrated that the screw press has the capacity to increase the solids content of the tailings from 8-9 wt% solids to greater than 50 wt% solids, which is Mt Weld's target consolidation level for the deposition of tailings into TSF2.

TSF2 is an above ground paddock style TSF with a footprint of approximately 18.5 ha and is proposed to be lined with a geosynthetic clay liner (GCL).

The SWROP is proposed to receive stormwater, underdrainage and supernatant liquor from both TSF1 and TSF2. The design storage capacity is equivalent to a 1 in 100, 72 hour, rainfall event over the catchment of TSF1 and TSF2.

A water treatment system to allow re-use of water recovered from the screw press and TSF2 has previously been assessed under Works Approval W5533/2013/1.

The tailings materials have a combined uranium and thorium specific activity of 2.23 Bq/g (page 7 of the Radiation Management Plan) and are considered to be radioactive under Commonwealth ARPANSA legislation.

March 2016 Amendment

This amendment is to authorise changes to the proponent's proposal for works for TSF2. The major change is to replace the dry stacking tailings facility with a conventional slurry fed above ground storage facility, similar to TSF1 in design and operation. The geosynthetic clay liner has been retained. As of December 2015, the liner and the Return Water Pond (previously titled SWROP - Storm Water Run-off Pond) have been constructed. The Return Water Pond is designed to function as a conventional tailings decant pond. A summary of the changes is listed below.

Aspect	Originally Proposed Project Element (W5645/2015/1)	Proposed Modification (this document)
Tailings Delivery Infrastructure	Screw press and thickener followed by dry stacking of tailings delivered to TSF2 via haul trucks	Monitored tailings delivery pipelines around crest of TSF2 (similar to TSF1).
Tailings Deposition Method	'Dry' stacking tailings following dewatering to approximately 50% solids.	Deposit tailings as a slurry (approximately 11% solids) via spigot network. A tailings beach is formed with excess water drained to the Raw Water Pond (RWP) (previously referred to as the Storm Water Runoff Pond (SWROP). The density of beach is approximately 35% solids shortly after deposition, which is air dried.
Decant Return Pump	Decant Return Pump and pipeline back to the Plant with a nominal capacity of 35m^3/hr	Decant return pump and pipeline back to the plant with a nominal capacity of 200m^3/hr.
Management of storm water run-off	Diversion drain north of TSF2	Windrows, 0.5 m high, adjacent to the northern toe of TSF2 and along the eastern edge of the TSF1 access road – refer Figure 6.
Storm Water Run Off Pond	Storm Water Run-off Pond	Return Water Pond – this is a change in terminology only, no change in design is proposed.

A revised map showing the location of this infrastructure follows as Figure 2.

Other changes to the water treatment circuit have been proposed for Works Approval W5533/2013/1 to address water management in the tailings circuit. Some minor errors to the works approval have also been corrected at this time.

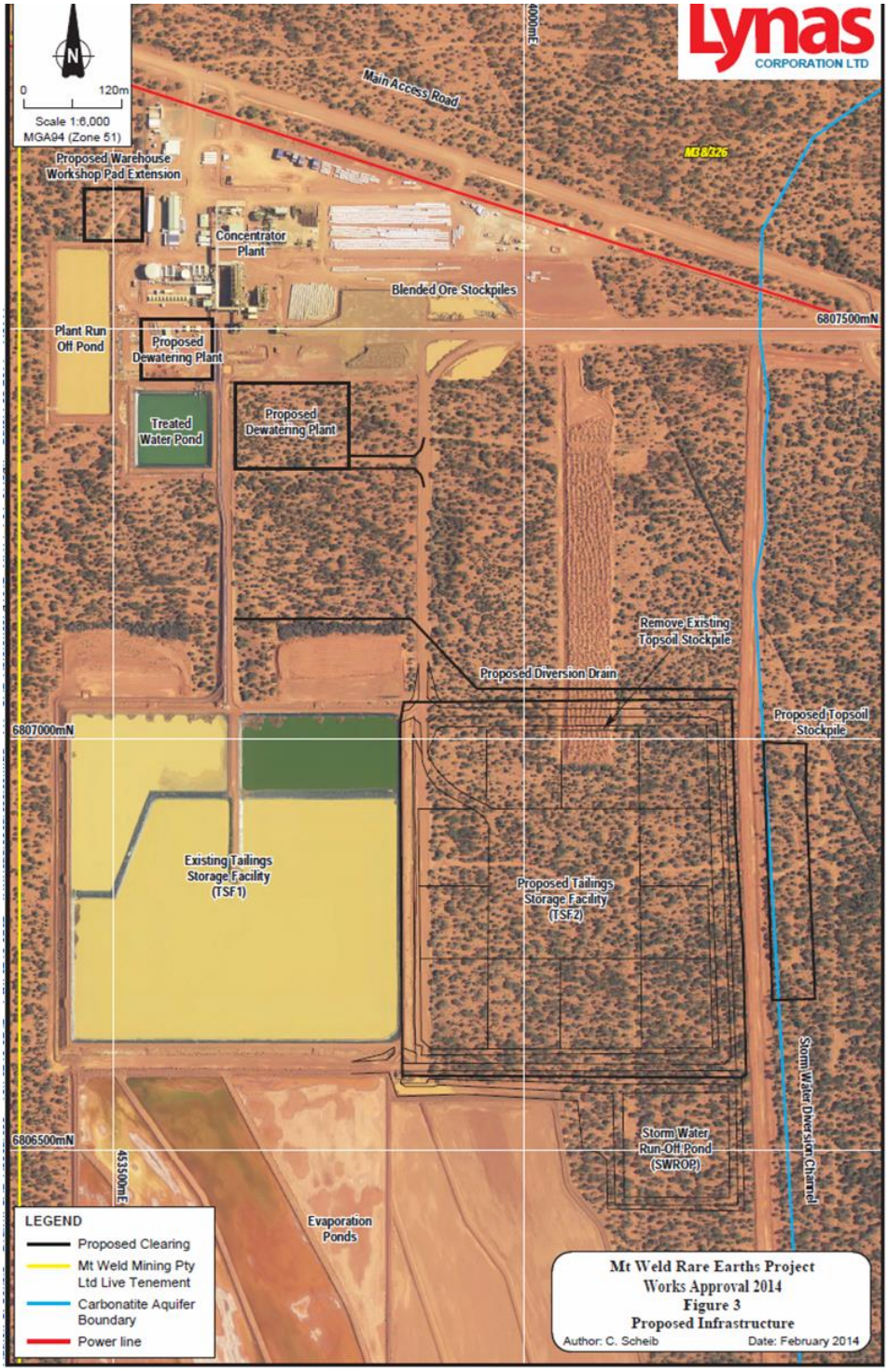


Figure 1: Previous Proposal

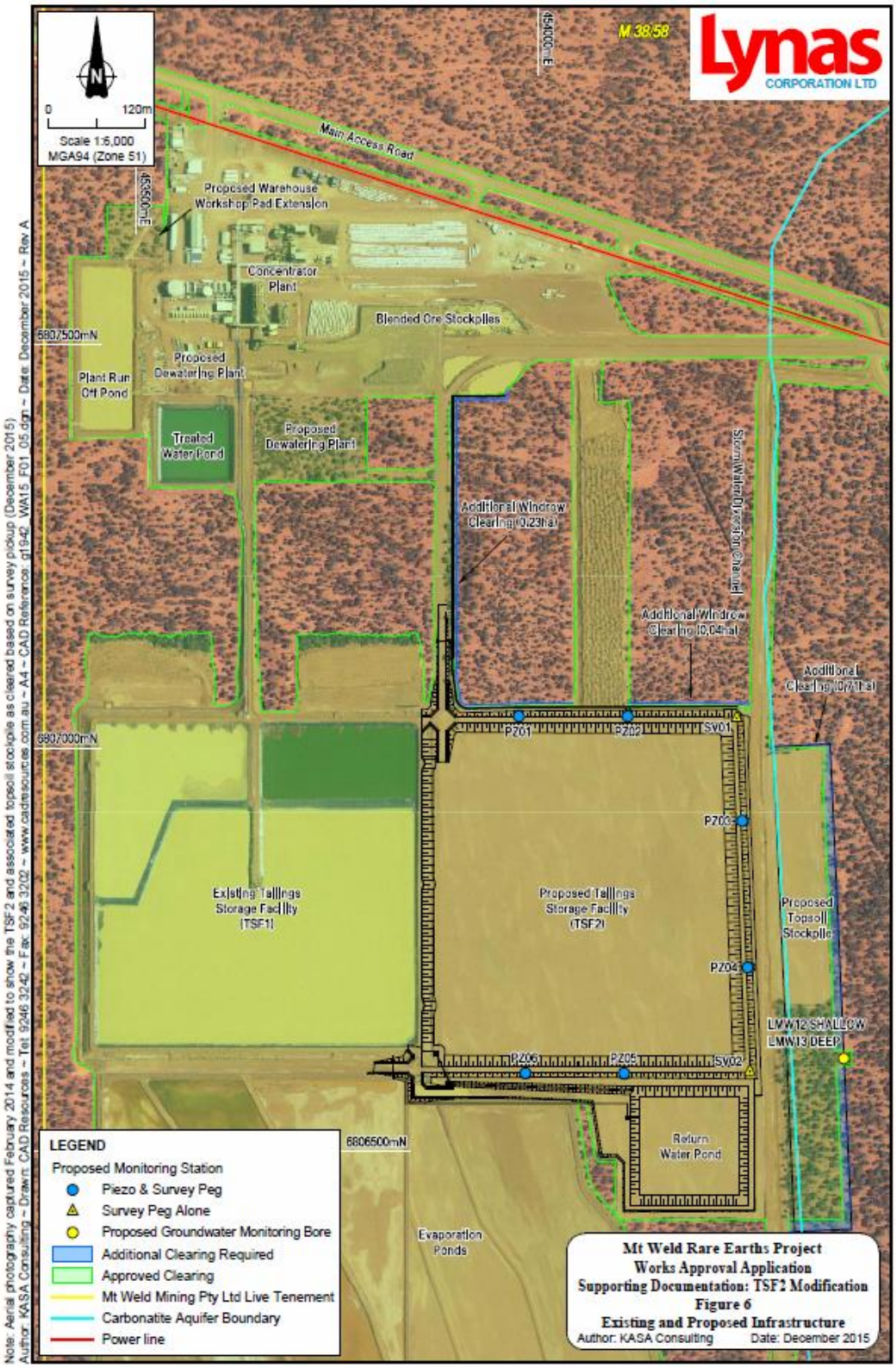


Figure 2: Amended Proposal

4 Decision table

All applications are assessed in line with the *Environmental Protection Act 1986*, the *Environmental Protection Regulations 1987* and DER's Operational Procedure on Assessing Emissions and Discharges from Prescribed Premises. Where other references have been used in making the decision they are detailed in the decision document.

DECISION TABLE			
Works Approval / Licence section	**Condition number** **W = Works Approval** **L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
General conditions	W1.2 L1.3	**Construction and commissioning** General standard conditions have been applied to the Works Approval. To ensure the works are constructed in line with all application supporting documents and to ensure any environmentally hazardous materials are stored appropriately. **Normal Operation** Emission Description *Emission:* Seepage from tailings deposited into TSF2 migrating into groundwater. *Impact:* Potential vegetation death from water inundation of rootzones from seepage. Dispersion of metals, metalloids and radionuclides through groundwater systems above background has the potential for environmental impact where third party users access the groundwater resource. However no other beneficial uses of groundwater, apart from Mt Weld and adjacent gold mine Granny Smith, exist at the present. *Controls:* The proponent proposes to line the TSF with a GCL (geosynthetic clay liner). Testing has shown the tailings have very low permeability and the TSF location is underlain by high plasticity, low permeability, lacustrine clays which impede the vertical movement of seepage from the facility. Seepage flow rates are therefore anticipated to be low. Contingency measures and further	Application supporting documentation General provisions of the *Environmental Protection Act 1986* United Kingdom Environment Agency, "Using Geosynthetic Clay Liners in Landfill Engineering" Hatch (2015) Design of TSF and Process Ponds. Design Report - Mt Weld TSF2. H343736-0000-10-124-0001. Prepared for Mt Weld Mining Pty Ltd, 2 December 2015.

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
		information on the GCL are outlined in Appendix B. In addition to the engineering controls (GCL and a HDPE lined Return Water Pond) Mt Weld will also minimise the risk of seepage by: • Developing and implementing a comprehensive QA/QC program; • Installing two new groundwater monitoring bores downstream of TSF2; • Continuing annual monitoring of groundwater levels and chemical composition; • Complying with existing conditions from Licence L8141/2007/2; and • If any limits triggered, implementing a Groundwater Recovery Plan. <u>Risk Assessment</u> *Consequence*: Moderate *Likelihood:* Unlikely *Risk Rating:* Moderate <u>Regulatory Controls</u> Condition 1.3 will be included in the amended licence to ensure containment infrastructure is appropriately managed, including to ensure the facility is lined to a permeability of 1 x 10^{-9} m/s. GCL has been chosen over HDPE lining to ensure the integrity will not be compromised from mechanical damage. Daily visual inspections will also be specified in conditions for the visual integrity of tailings pipelines and embankment freeboard. Further information in regards to the GCL can be found in Appendix B. Monitoring will also be included in the amended licence and is discussed further under 'Ambient Quality Monitoring'. <u>Residual Risk</u>	

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
		Consequence: Moderate *Likelihood:* Unlikely *Risk Rating:* Moderate **Emergency Operation** <u>Emission Description</u> *Emission:* Seepage from tailings deposited into TSF2 migrating into groundwater from failure of the GCL due to tearing from mechanical disturbance from mobile equipment. This mobile equipment would be used to spread tailings from TSF1 within the floor of TSF2, in order to aid in drying and consolidation. *Impact:* Potential vegetation death from water inundation of rootzones from seepage. Dispersion of metals, metalloids and radionuclides through groundwater systems above background has the potential for environmental impact where third party users access the groundwater resource. However no other beneficial uses of groundwater, apart from Mt Weld and adjacent gold mine Granny Smith, exist at the present. *Controls:* Trials were done during the construction of the TSF2 to assess the impact of mobile equipment on the GCL on installation of the GCL. The trial confirmed that the 300mm cover provides adequate protection for the GCL for a dry cover layer. Procedures will also be detailed in the TSF Manual with respect to use of the low ground bearing pressure equipment within TSF2. <u>Risk Assessment</u> *Consequence*: Moderate *Likelihood:* Unlikely *Risk Rating:* Moderate <u>Regulatory Controls</u> Condition 1.3 will be included in the amended licence to ensure containment	

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
		infrastructure is appropriately managed. Residual Risk *Consequence*: Moderate *Likelihood:* Unlikely *Risk Rating:* Moderate	
Premises operation	W – no conditions L – L1.3	**Emergency Operation – Commissioning and Operations** Emission Description *Emission:* Overtopping of TSF2 and/or Return Water Pond and release of tailings and/or tailings supernatant. *Impact:* Contamination of land and adjacent surface water systems with tailings containing metals, metalloids and radionuclides. Impacts to native fauna and vegetation.The land at the Premises has a gradual gradient to the west and south west towards Lake Carey. There are no drainage lines on the Premises and the area is subject to sheet flow following significant rainfall events. *Controls:* The TSF2 has been designed to accommodate a 1 in 100 year, 72 hour event The return water pond has been sized to contain a 1 in 100 year, 72 hour duration rainfall event has been designed to capture runoff from TSF 1 and TSF 2. This capacity is based on an ANCOLD risk rating of significant and/or high C. The maintenance of TSF storm capacity on the Return Water Pond and TSF2 is dependent on closure of manual decant valves in the field prior to the storm event to prevent release of decant water. The TSF Manual will be updated to include a contingency plan for TSF2 management in adverse weather, including actions and processes for management of the decant valves. An external diversion drain runs to the east of TSF2, and would restrict flow of any released tailings from an overtopped facility	General provisions of the *Environmental Protection Act 1986* Application supporting documentation ANCOLD (2012) Guideline on Tailings Dam Design, Construction and Operation. Australian National Committee on Large Dams Hatch (2015) Design of TSF and Process Ponds. Design Report - Mt Weld TSF2. H343736-0000-10-124-0001. Prepared for Mt Weld Mining Pty Ltd, 2 December 2015.

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
		Risk Assessment *Consequence*: Moderate *Likelihood:* Possible *Risk Rating*: Moderate Regulatory Controls The Licence will include a condition with respect to field inspections of containment infrastructure (TSF2 and Return Water Pond) and a condition specifying the minimum operational freeboards to be maintained at all times. Residual Risk *Consequence*: Moderate *Likelihood:* Unlikely *Risk Rating:* Moderate	
Emissions general	N/A	**Premises construction, commissioning and operation** No specific conditions relating to emissions have been applied to the Works Approval or as additions to Licence L8141/2007/2.	N/A
Point source emissions to air including monitoring	N/A	**Premises construction, commissioning and normal operation** No significant point source air emissions are expected from the construction, commissioning or operation. No conditions are required.	General provisions of the *Environmental Protection Act 1986* Application supporting documentation
Point source emissions to surface water including monitoring	L2.4	**Premises construction, commissioning and normal operation** No significant point source emissions to surface water are expected from the construction, commissioning or operation. No conditions are required.	General provisions of the *Environmental Protection Act 1986* Application supporting documentation

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
Point source emissions to groundwater including monitoring	N/A	**Premises construction, commissioning and normal operation** No significant point source emissions to groundwater are expected from the construction, commissioning or operation. No conditions are required.	General provisions of the *Environmental Protection Act 1986* Application supporting documentation
Emissions to land including monitoring	N/A	**Premises construction, commissioning and normal operation** No significant emissions to land are expected from the construction, commissioning or operation. No conditions are required.	General provisions of the *Environmental Protection Act 1986* Application supporting documentation
Fugitive emissions	N/A	As the TSF2 proposal has been changed to a conventional above ground slurry fed TSF, in which the surface is wet, significant dust emissions from the TSF2 are not expected. Hence conditions are not required for managing dust emissions from the TSF2 or supporting infrastructure.	General provisions of the *Environmental Protection Act 1986* Application supporting documentation
Odour	N/A	**Premises construction, commissioning and normal operation** No significant odour emissions are expected from the construction, commissioning or operation. No conditions are required.	General provisions of the *Environmental Protection Act 1986* Application supporting documentation
Noise	N/A	**Premises construction, commissioning and normal operation** No significant noise emissions are expected from the construction, commissioning or operation. No conditions are required.	General provisions of the *Environmental Protection Act 1986* *Environmental Protection (Noise)*

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
			Regulations 1997 Application supporting documentation
Monitoring general	W2 W2.1.1 W3.1.1	**Construction** No monitoring is required by the Works Approval for the construction of TSF2. Monitoring has been included during the commissioning period as discussed below. **Commissioning** Monitoring of daily tailings tonnages has been included as a part of commissioning. The proponent is required to carry out commissioning in accordance with a revised commissioning plan. An improvement condition has been added to the licence to revise, submit and implement the commissioning plan in accord with the revised proposal. **Operation** Licence L8141/2007/2 currently requires the Licensee to perform routine periodic monitoring of ambient groundwater quality around the TSF and evaporation ponds. This is discussed further under 'Ambient quality monitoring'.	General provisions of the *Environmental Protection Act 1986* Application supporting documentation
Monitoring of inputs and outputs	W3	**Construction, commissioning and normal operation** No monitoring of inputs or outputs are required under the Works Approval or Licence.	
Process monitoring	W3 L3.7	**Construction** No process monitoring is required under the Works Approval or Licence. **Commissioning** Monitoring of daily tailings tonnages has been included as a part of commissioning. The proponent is required to carry out commissioning in accordance with a revised commissioning plan.	General provisions of the *Environmental Protection Act 1986* Application supporting documentation

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
		Normal operation Process monitoring will be included in the next version of the Licence to monitor the volumes of tailings deposited into the TSF and to monitor the volumes of decant water recovered from the TSF.	
Ambient quality monitoring	W3 L11	**Premises construction and commissioning** No ambient quality monitoring is proposed for commissioning. **Normal operation** Refer to the risk assessment carried out in the 'general conditions' section of this table in regards to tailings seepage. Current licence conditions requires ambient groundwater monitoring for standing water level, pH, electric conductivity and total dissolved solids on a quarterly basis. Total hardness, total alkalinity, metals, anions and cations and nutrients are currently required to be monitored annually. However, in order to assess TSF2 performance, the frequency of these parameters will be changed to quarterly. After twelve months of operation, the frequency of these may be re-assessed and amended depending on performance outcome. Currently radionuclides' activity in groundwater are not monitored, however, the licence may require amending to include these parameters given the nature of the ore. Uranium and thorium concentrations are currently included in the monitored parameters.The licence will also be amended to include the two new monitoring bores.	General provisions of the *Environmental Protection Act 1986* Australian Standard AS/NZS 5447.1 – Water Quality – Sampling – Guidance on the design of sampling programs, sampling techniques and the preservation of handling samples. Application supporting documentation
Meteorological monitoring	N/A	**Premises construction, commissioning and normal operation** The risk assessment of dust emissions and odour emissions have been assessed in other sections of this table. No meteorological monitoring will be required during the construction, commissioning or operation of TSF2.	Application supporting document
Improvements	W3.1.1	**Premises construction and commissioning**	ANCOLD (2012)

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
		An improvement condition has been added to the works approval to submit to the CEO an updated commissioning plan to reflect the changed proposal, prior to commissioning commencing. The condition also requires the proponent to implement the updated plan. **Normal operation** At this stage, no specific improvement actions are proposed for inclusion on the Licence.	Guideline on Tailings Dam Design, Construction and Operation. Australian National Committee on Large Dams
Information	W4	**Premises construction and commissioning** Standard conditions for the submission of a compliance document at the end of the construction phase have been included on the Works Approval. Conditions relating to reporting of commissioning have also been added to the Works Approval. **Normal operation** Standard recording, reporting and notification requirements are included on the Licence.	N/A
Licence Duration	N/A	The duration of the licence will not be assessed during this works approval.	N/A

5 Advertisement and consultation table

Date	Event	Comments received/Notes	How comments were taken into consideration
12/05/2014	Application advertised in West Australian (or other relevant newspaper)	No comments received.	N/A
12/05/2014	Application referred to interested parties listed: Department of Mines and Petroleum; Shire of Laverton	No comments received.	N/A
16/12/2014	Proponent sent a copy of draft instrument	Comment received advising of change in registered address.	Address updated.
10/03/2016	Proponent sent a copy of draft amendment to instrument	Comments received noting the change to windrow from previous diversion drain proposal and adding information on GCL trials to Appendix A. The Works Approval holder also noted that consultation had occurred with the Department of Water (DOW) in regard to the changed proposal and DOW had no comment. Minor administrative comments also made.	DER notes that the diversion drain was in the original proposal and is now superseded by the windrow. DER added information in regard to GCL trials to Appendix A. No change to listing of no consultation with DOW in the Decision Document as DER did not consult with DOW in regard to this amendment. Minor administration errors updated where warranted.

6 Risk Assessment

Note: This matrix is taken from the DER Corporate Policy Statement No. 07 - Operational Risk Management

Table 1: Emissions Risk Matrix

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Severe
Almost Certain	Moderate	High	High	Extreme	Extreme
Likely	Moderate	Moderate	High	High	Extreme
Possible	Low	Moderate	Moderate	High	Extreme
Unlikely	Low	Moderate	Moderate	Moderate	High
Rare	Low	Low	Moderate	Moderate	High

Appendix A

TSF2 design and operation

TSF2 is an above-ground paddock style TSF, fully lined with a geosynthetic clay liner achieving a maximum permeability of 1 x 10^{-9} m/s.

Tailings delivery infrastructure is comprised of a 250 mm polyethylene (PE) pipeline with spigots every 25 m around the entire crest of TSF2, decant return pump (RWP decant well) and 250 mm PE pipeline transferring return water back to the plant for subsequent water treatment.

Slurry deposition into TSF2 will occur via multiple discharge spigots located around the crest of TSF2. Approximately 4 to 6 spigots are expected to be open during deposition. The discharge location will be progressively moved around the crest of TSF2 to evenly spread the solids around the TSF area in deposition layers of 200-300 mm. To assist operators manage the deposition layers, a number of flood gauges (markers indicating depth of tailings) will be installed within the TSF area prior to the initial deposition, so that accurate measurements can be made during operations to maximise evaporative drying of each layer. Supernatant liquor will drain towards the south-west corner of TSF2 and form a small decant pond near the decant tower. Supernatant liquor collected by the decant tower will drain into the RWP. The tailings slurry, initially ~11.6% w/w solids, is expected to consolidate to a density of approximately 35% w/w solids due the addition of coagulant and flocculant.

TSF2 will provide approximately 3 years of storage based on current production rates and allowing for the prescribed freeboard and beach angle.

The TSF shall be checked twice daily by site personnel during deposition periods to ensure the facility is functioning as per the design intent. The TSF will be managed by a designated member of the Operations Team who will be responsible for the following:

- Managing operations and staff, including ancillary contractors, to ensure tailings deposition and decant removal is performed in accordance with the deposition plan and the operations manual;
- Monitoring the TSF (ensuring daily, weekly, monthly and annual inspections are conducted and document) and implementation of response plans in the event of any adverse findings;
- Managing TSF short, medium and long-term planning;
- Managing survey controls and systems; and
- Ensuring adherence to the TSF Operations Manual, Occupation Health and Safety, Quality Assurance and Quality Control (QA/QC) processes.

Stormwater conveyance

TSF2 will be to the west (downstream) of the existing diversion drain protecting TSF1 and the evaporation ponds, so drainage modifications will be localised, such as where the drain may need to be locally diverted around an embankment widening for piezometers. A new diversion drain will be constructed along the northern boundary of TSF2, to convey westwards the clean storm water run-off shedding from the localised catchment area upstream of TSF2.

An internal decant will be constructed at the lowest point of TSF2 (southwest corner). The storage capacity of this pond was selected from the 1:100 Annual Exceedance Probability (AEP), 72 hour duration rainfall event, based on a “low” to “significant” consequence rating of water discharge to the environment.

DER has reviewed the justification for selection of the 1 in 100 AEP, 72 hour event as the basis for stormwater management and accept that clean up and restoration of land affected by any tailings loss of containment should be able to be undertaken within a 5 year, at worst 20 year period, therefore

according to ANCOLD 2012's recommended consequence category a rating of Significant or High C is appropriate.

Accordingly in the accompanying licence amendment, DER will require the existing processing plant stormwater plan to demonstrate containment of all potentially contaminated stormwater sufficient to capture rainfall from an 1 in 100 AEP, 72 hour event.

Geosynthetic clay liner

The GCL liner functions by providing a low permeability barrier comprised of bentonite clay to reduce the rate of seepage of liquid through it. The GCL is comprised of a continuous layer of bentonite clay sandwiched between two layers of geosynthetic material. One of the layers is a slim film woven geotextile, selected to provide the GCL with the required tensile strength. The other layer is a non-woven geotextile which provides interlock of the fibres of the two geotextiles, confining and reinforcing the clay. The GCL quality is tested to ensure that both the reinforcement (peel test) and tensile strength meet the required standard.

The GCL is not immune to tearing and in the TSF2 design, resistance to tearing is minimised by the application of a cover layer of 300 mm material on top of the GCL.

With a 300mm layer of material on top of the GCL, wheeled equipment is able to operate under strictly controlled conditions. Trucks must limit braking forces and cannot turn, due to shear forces being transmitted through the material to the GCL. As the tailings design no longer requires trucks to transport and deposit tailings the 600 mm layer has not been installed.

Trials were done during the construction of the TSF2 to assess the impact of mobile equipment on the GCL on installation of the GCL. The trial confirmed that the 300mm cover provides adequate protection for the GCL for a dry cover layer.

Ambient environmental monitoring

An assessment of the potential water quality beneath TSF1 and TSF2 was undertaken. Both the superficial aquifer and average tailings water can be classified as brackish to saline with average total dissolved solids (TDS) of 2,682 and 2,900 mg/L respectively. The superficial aquifer has comparatively elevated concentrations of all major ions, with the exception of silica. Average concentrations of uranium and thorium tend to be relatively similar in both water sources. However, thorium concentrations are generally below detection levels.

Potential seepage water quality was predicted using chemical modelling software. Results indicate very little change in the chemical composition of either the superficial or bedrock aquifers from addition of seepage water. Overall, it appears there may be a slight dilution due to the addition of seepage waters with a comparatively higher water quality. Concentrations of thorium and uranium are likely to be below detection levels.

Parameter	Average Tailings Water	Average Superficial Aquifer	Average Bedrock Aquifer	Average RO Reject (Raffinate)	Blend: Tailings & Superficial Aquifer Composition	Blend: TSF Tailings & Bedrock Aquifer Composition
	Individual Water Sources				Potential Seepage Water	
Calcium	4.39	230.74	115.21	520.77	207.2	103.7
Magnesium	1.66	108.75	124.75	628.46	97.68	112
Sodium	670	698.49	594.04	4,876.92	686.2	592.6

Parameter	Average Tailings Water	Average Superficial Aquifer	Average Bedrock Aquifer	Average RO Reject (Raffinate)	Blend: Tailings & Superficial Aquifer Composition	Blend: TSF Tailings & Bedrock Aquifer Composition
	Individual Water Sources				Potential Seepage Water	
Potassium	9.2	27.33	28.75	148.46	25.32	26.6
Total Alkalinity as $CaCO_3$	501.25	276.8	267.36	910	-	-
Sulfate	281.25	364.86	422.86	2,961.54	117.4	134.9
Chloride	413.75	913.04	1,394.29	7,769.23	1349	989.3
pH	9.52	7.57	7.86	7.96	-	-
TDS	2900	2681	3275	16,437	-	-
Boron	2.74	2.14	2.15	7.62	0.38	0.38
Barium	1.44	0.58	0.06	0.06	0.04	0.03
Aluminium	0.17	0.52	2.23		0.48	2.02
Manganese	0.07	0.11	0.39		0.1	0.36
Strontium	1.1	0.85	1.5	9.35	0.86	1.44
Thorium	0.003	0.05	0	NA	0	0
Uranium	0.069	0.016	0.02	NA	0.024	0.024
Iron	0.6	38.41	3.92	0.35	34.48	3.57
Nitrate as N	6.17	16.49	17.42	256.27	0.15	3.65
Total Phosphorus	0.15	1.08	0.1	0.08	-	-

Source: (URS, 2014)
Table Notes: A number of parameters could not be determined for the blended end member analysis. All parameters are presented as mg/L besides pH which is presented as pH units.

Radiation

Wastes with a low specific activity of thorium and uranium will continue to be generated including tailings, suspended solids in supernatant streams, material collected during plant housekeeping, plant water that would contain suspended solids and stockpile run-off water.