Decision Report

Application for Works Approval

Division 3, Part V *Environmental Protection Act 1986*

Works Approval Number	W6120/2018/1
Applicant	Mt Weld Mining Pty Limited
ACN	053 160 400
File Number	DER2017/002205
Premises	Mt Weld Rare Earths Project Elora Road LAVERTON WA 6440 Mining Tenement M38/58
Date of Report	10 April 2018
Status of Report	Final

Table of Contents

1. Definitions of terms and acronyms

In this Decision Report, the terms in Table 1 have the meanings defined.

Table 1: Definitions

Term	Definition
AACR	Annual Audit Compliance Report
ACN	Australian Company Number
AEP	Annual Exceedance Probability
AER	Annual Environment Report
Applicant	Mt Weld Mining Pty Limited
Category/ Categories/ Cat.	Categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
CS Act	*Contaminated Sites Act 2003* (WA)
Decision Report	refers to this document.
Delegated Officer	an officer under section 20 of the EP Act.
Department	means the department established under section 35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Part V, Division 3 of the EP Act.
DMIRS	Department of Mines, Industry Regulation and Safety
DWER	Department of Water and Environmental Regulation As of 1 July 2017, the Department of Environment Regulation (DER), the Office of the Environmental Protection Authority (OEPA) and the Department of Water (DoW) amalgamated to form the Department of Water and Environmental Regulation (DWER). DWER was established under section 35 of the *Public Sector Management Act 1994* and is responsible for the administration of the *Environmental Protection Act 1986* along with other legislation.
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
m^3	cubic metres
Minister	the Minister responsible for the EP Act and associated regulations

MS	Ministerial Statement
mtpa	million tonnes per annum
NEPM	National Environmental Protection Measure
Noise Regulations	*Environmental Protection (Noise) Regulations 1997* (WA)
Occupier	has the same meaning given to that term under the EP Act.
Prescribed Premises	has the same meaning given to that term under the EP Act.
Premises	refers to the premises to which this Decision Report applies, as specified at the front of this Decision Report
Risk Event	As described in *Guidance Statement: Risk Assessment*
TDS	Total dissolved solids
UDR	*Environmental Protection (Unauthorised Discharges) Regulations 2004* (WA)
µg/L	micrograms per litre
Works Approval Holder	Mt Weld Mining Pty Limited

2. Purpose and scope of assessment

On 19 December 2017 Mt Weld Mining Pty Limited submitted an application for a works approval to construct and commission an expansion to their existing rare earths processing plant, in order that the ore processing rate would be capable of achieving up to 443 000 tpa. Mt Weld Rare Earths Project, located 35 km south of Laverton on mining tenements M38/58 and M38/59, is currently a Prescribed Premises under Part V of the EP Act, with a permitted category 5 throughput rate of 242 000 tpa. The Premises is also authorised to operate an onsite putrescible landfill able to accept up to 300 tpa of class 1 inert and putrescible waste. These activities are authorised by existing Licence L8141/2007/2.

The works approval application also seeks approval to construct and commission:

- A new above ground tailings storage facility, TSF3;
- Expansion to the water treatment plant capacity with installation of additional reverse osmosis treatment units and ultrafiltration units;
- Expansion to diesel generated power station to a total capacity of 8MW; and
- Associated increased reagents and bulk diesel fuel storage.

2.1 Application details

Table 2 lists the documents submitted during the assessment process.

Table 2: Documents and information submitted during the assessment process

Document/information description	Date received
Mt Weld Mining (2017) Works Approval Application, signed 19 December 2017	19 December 2017
Kasa Consulting (2017) *Mt Weld Rare Earths Project: TSF3 and Production Expansion Works Approval Application Supporting Document*	19 December 2017
ATC Williams (2017) *Mt Weld Mining Pty Limited; Mt Weld Rare Earths Project Western Australia Tailings Storage Facility 3. Stage 1 Design Report*, December 2017	19 December 2017
Draft Tailings Storage Facility (TSF) and Evaporation Pond Operating Manual	19 December 2017

3. Background

Mt Weld Rare Earths Project commenced construction in 2007, initially processing rare earths ore at a rate of 121 000 tpa. A 'Phase 2' expansion was approved by Works Approval W5078/2011/1 on 5 January 2012, to construct processing plant infrastructure capable of processing at 242 000 tpa.

The major rare earths minerals are contained in secondary phosphates with variable calcium contents. Waste gangue materials are hydrated iron oxides, occurring as very soft, porous, friable siltstone.

Rare earths minerals also contain 'NORMS': naturally occurring radioactive materials. The Mt Weld ore has NORMS at concentrations sufficient to require management under a Radiation Management Plan according to the *Mines Safety and Inspection Regulations 1995* and ARPANSA's *Code of Practice and Safety Guide for Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing 2005*. These matters are primarily managed by the Department of Mines, Industry Regulation and Safety on delegation from the

Radiological Council (WA). Part V of the EP Act has a role in regard to management of processing wastes (generally tailings) and any discharges that may impact on the environment arising from the storage of these wastes. Tailings solids contain approximately 500ppm ThO_2 and 30 ppm U_3O_8, equivalent to a total radiation specific activity of 2 Bq/g.

Water for ore processing was originally sourced by groundwater abstraction from the carbonatite aquifer underlying the open pit and Premises.

For the initial period of the operations, a tailings storage facility was provided by the above ground facility TSF1. The original design approved by Works Approval W4400/2008/1 was intended to capture all decant and underdrainage for reuse in the plant, however due to problems with contaminants in the supernatant water affecting ore processing, and pooling of underdrainage against the embankment, a change was made to direct supernatant and underdrainage, along with raffinate from the reverse osmosis treatment plant, to a series of clay lined evaporation ponds, located to the south of TSF1. Initially 5 evaporation ponds were constructed.

A HDPE liner was installed over the base of the TSF1. Problems with tailings consolidation and water recycle and usage were encountered following commissioning. Tailings consolidation problems have continued throughout the life of the facility and led to original plans to increase the height of the embankments by upstream raising being abandoned.

Subsequently a new tailings facility was required for the Phase 2 expansion to process 242 000 tpa. For the new TSF2, initially a dry stacked tailings proposal was assessed under Works Approval W5645/2014/1. Problems encountered with the filtration system, together with improved management of the TSF1 tailings to recover tailings supernatant and treat this water for reuse in the process led to a change in the TSF2 design to an above ground facility similar to TSF1. Works approval W5645/2014/1 was amended on 14 March 2016 to permit this change. A geosynthetic clay liner as per the original TSF2 design was retained for the slurry fed TSF2, and installed over the base of the TSF to restrict the rate of tailings seepage.

Following investigation and optimisation of TSF1 operation, a process of dry landfarming the tailings to increase evaporation rates has extended the life of these TSFs by providing additional capacity.

Improvements in recycling and water treatment of the TSF supernatant for use in ore processing have led to reduced groundwater abstraction from the carbonatite aquifer.

This works approval application seeks approval to construct and commission an expansion to the processing plant sufficient to operate at 443 000 tpa. The increased processing rate also requires construction of a new tailings storage facility, TSF3, and additional expansion to the diesel generated power station and related increase in diesel storage.

Table 3 lists the prescribed premises categories applied for and subject to this Works Approval W6120/2018/1.

Table 3: Prescribed Premises Categories in the Existing Licence

Classification of Premises	Description	*Approved Premises production or design capacity or throughput*
Category 5	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 or residue from metallic or non-metallic ore are discharged into a containment cell or dam.	242 000 tpa
Category 89	Putrescible landfill	300 tpa

4. Overview of Premises

4.1 Infrastructure

Figure 1: Location of new infrastructure - TSF 3 and processing plant

The proposed additional ore processing and tailings storage infrastructure, as it relates to Category 5 activities, is detailed in Table 4 and with reference to the Site Plan (attached here as Figure 1 and also in the Issued Works Approval).

Table 4 lists infrastructure associated with each prescribed premises category.

Table 4: Mt Weld Rare Earths Category 5 infrastructure

	Infrastructure	**Site Plan Reference**
	Prescribed Activity Category 5	
Upgrade to the Ore Processing Plant to 443 000 tpa		
1	New grinding mill and associated infrastructure (cyclones, feed pumps etc)	As shown by 'grinding circuit' in Figure 1
2	Additional flotation cells, conditioning tanks and associated infrastructure	As denoted by 'Flotation' in Figure 1
3	Additional thickener circuit and filter	As denoted by 'Thickening and Pressure Filtration' in Figure 1
4	Extension to concentrate handling area (extension to concrete hardstand and sump to capture stormwater)	As shown by 'Concentrate handling' in Figure 1
New Tailings Storage Facility (TSF3)		
5	Above ground paddock style facility (approximately 19ha surface area) located north of TSF1 and TSF2.To be constructed in 2 stages.	As shown in Figure 1 by Tailings Storage Facility 3.
6	Tailings delivery and decant return pipelines	As denoted by 'Slurry pipeline' And 'Return Water Pipeline' in Figure 1.
	Directly related activities	
Water Treatment		
7	Expanded Reverse Osmosis plant	As denoted by 'Water treatment ' in Figure 1
8	Additional Ultrafiltration units	
Reagents storage		
9	Storage of sulphuric acid in bulk	As denoted by 'reagent storage' in Figure 1
Power generation		
10	Diesel electricity generation power station upgrade. Increase in capacity to a total of 8MW.	As denoted by 'Power Station' as shown in Figure 1
11	Additional diesel storage (additional 6 X 94 500 L tanks)	As denoted by 'Diesel Storage' in Figure 1

4.2 Exclusions to the Premises

Abstraction of groundwater for mining and ore processing is not covered by licensing under Part V of the EP Act. Licensing for groundwater abstraction is regulated under the *Rights in Water and Irrigation Act 1914*. Similarly mining of rare earths ore and waste rock disposal are

not prescribed categories under the EP Act. Mining of rare earths is regulated under the *Mining Act 1978*.

5. Legislative context

Table 5 summarises approvals relevant to the assessment.

Table 5: Relevant approvals and tenure

Legislation	Number	Subsidiary	Approval
Part IV of the EP Act	Ministerial Statement 476	Mt Weld Mining Pty Limited	Approval to implement proposal for mining and beneficiation rare-earths deposit at Mt Weld.
Part V of the EP Act	W4400/2008/1 as amended (expired)	Mt Weld Mining Pty Limited	Rare earths ore processing plant, TSF1, evaporation ponds 1 – 5
	W5078/2011/1 as amended (expired)		Phase 2 expansion of processing plant to 242 000tpa, evaporation ponds 6-8.
	W5533/2013/1 as amended		Approval to install process water treatment circuit and ponds. (Ponds not constructed).
	W5645/2014/1 as amended		Approval to construct and commission TSF2
	L8141/2007/2		Licence to operate ore processing plant, tailings deposition and water treatment plants. Prescribed for category 5 at 242 000 tpa and category 89 at 300 tpa.

5.1 Part IV of the EP Act

5.1.1 Ministerial Statement 476

Ministerial Statement 476 applies to the Premises. Condition 4-1 specifies that environmental management plans are developed and implemented for the following aspects:

- Surface and groundwater, including conservation of groundwater (also detailed in conditions 5-1, 5-2, 5-3);
- Native flora and fauna conservation;
- Wastewater and residue disposal management plan;
- Decommissioning management plan, including rehabilitation of disturbed sites, overburden dumps and residue ponds (also detailed in condition 8-1 and 8-2);
- Plan for transportation of process materials;
- Radiation management plan;
- Greenhouse gas emissions management plan (also detailed in conditions 6-1 and 6-2); and
- Noise management plan (also detailed in conditions 7-1 and 7-2).

On 22 January 2018 a change to the proposal approved by the Ministerial Statement under section 45C of the EP Act was granted. This change, referred to as Attachment 6 to the Statement, removed the restrictions on the processing capacity and dry tailings processing rates due to these aspects also being regulated under Part V of the EP Act (through Licence L8141/2007/2) and also by the Mining Proposal approved under the *Mining Act 1978.*

Consequently environmental impacts associated with the increased processing rate and tailings deposition rate are assessed through this works approval W6120/2018/1 and the associated existing Licence L8141/2007/2.

5.2 Contaminated sites

The Premises is not reported as a Contaminated Site.

5.3 Part V of the EP Act

5.3.1 Applicable regulations, standards and guidelines

The overarching legislative framework of this assessment is the EP Act and EP Regulations.

The guidance statements which inform this assessment are*:*

- *Guidance Statement: Regulatory Principles (July 2015)*
- *Guidance Statement: Setting Conditions (October 2015)*
- *Guidance Statement: Decision Making (February 2017)*
- *Guidance Statement: Risk Assessments (February 2017)*
- *Guidance Statement: Environmental Siting (November 2016)*

5.3.2 Works approval and licence history

Table 6 summarises the works approval and licence history for the Premises.

Table 6: Works approval and licence history

Instrument	Issued	Nature and extent of works approval, licence or amendment
L8141/2007/1	13/04/2007	New licence to operate a mobile crushing and screening unit to process ore.
W4400/2008/1	17/07/2008	Works approval to construct and commission a crushing and grinding plant; rare earth oxide concentrator at capacity 121 000 tpa; tailings storage facility, water treatment plant and evaporation pond (cells 1 -5).
W4400/2008/1	15/07/2011	Works approval amendment to install a HDPE liner in part of the TSF1 (north-west corner)
W4400/2008/1	15/09/2011	Works approval amendment to install a HDPE liner over the remaining area of TSF1.
W5078/2011/1	5/01/2012	Works approval to authorise construction and commissioning of Phase 2 works for the Processing Plant to increase processing capacity to 242 000 tpa. Increase to Evaporation Pond cells (cells 6- 8). Second diesel generator to increase site power capacity to 8MW. Doubling of diesel storage to 6 x

		94 500 L tanks, upgraded reagent storage.
W5078/2011/1	10/01/2013	Works approval amended to require submission of a commissioning document for Phase 2 works and to require commissioning in accord with the submitted plan.
L8141/2007/2	15/04/2013	Licence re-issue (Phase 2 production capacities not authorised at this re-issue due to works approval construction still occurring at this time).
L8141/2007/2	31/10/2013	Licence amendment to allow for pilot plant trial of tailings dewatering plant (screw press, dewatering system and thickener).
W5533/2013/1	1/05/2014	Works approval to authorise construction and commissioning of plant to treat process water and accompanying construction of additional process water ponds.
W5645/2014/1	18/12/2014	Works approval to authorise design and construction of new TSF2 (dry stacked 50% solids density at deposition), Stormwater Runoff Pond (SWROP) and a screw press and thickener for tailings dewatering.
W5645/2014/1	14/03/2016	Works approval amendment to authorise a change to the TSF2 design from a dry stacking TSF to a conventional slurry fed TSF. Geosynthetic clay liner as originally approved for TSF 2 was retained.
W5533/2013/1	5/04/2016	Works approval amendment to change wastewater discharge volumes and allow installation of multiple clarifiers/ ultrafiltration units.
L8141/2007/2	19/08/2016	Licence amendment to authorise category 5 production capacity increase consistent with W5078 (Phase 2 tonnages), and increase to authorised amount of wastewater discharged to the evaporation ponds.
L8141/2007/2	07/04/2017	Licence amendment to authorise operation of TSF2 following receipt of commissioning and compliance documentation. The amendment also authorises reuse of clarified water for dust suppression. Improvement condition 4.1.1 is removed as the surface water management plan was submitted as required.
L8141/2007/2	14/11/2017	Amendment Notice 1 – authorise removal of clarifiers and discharge of TSF supernatant direct to evaporation ponds, without additional treatment.
W6120/2018/1	10/04/2018	Works approval to construct and commission an expansion to the Processing Plant, Power Station, Water Treatment and a new Tailings Storage Facility, TSF3.

6. Location and siting

6.1 Siting context

The Mt Weld Premises is located approximately 35 km south east of Laverton.

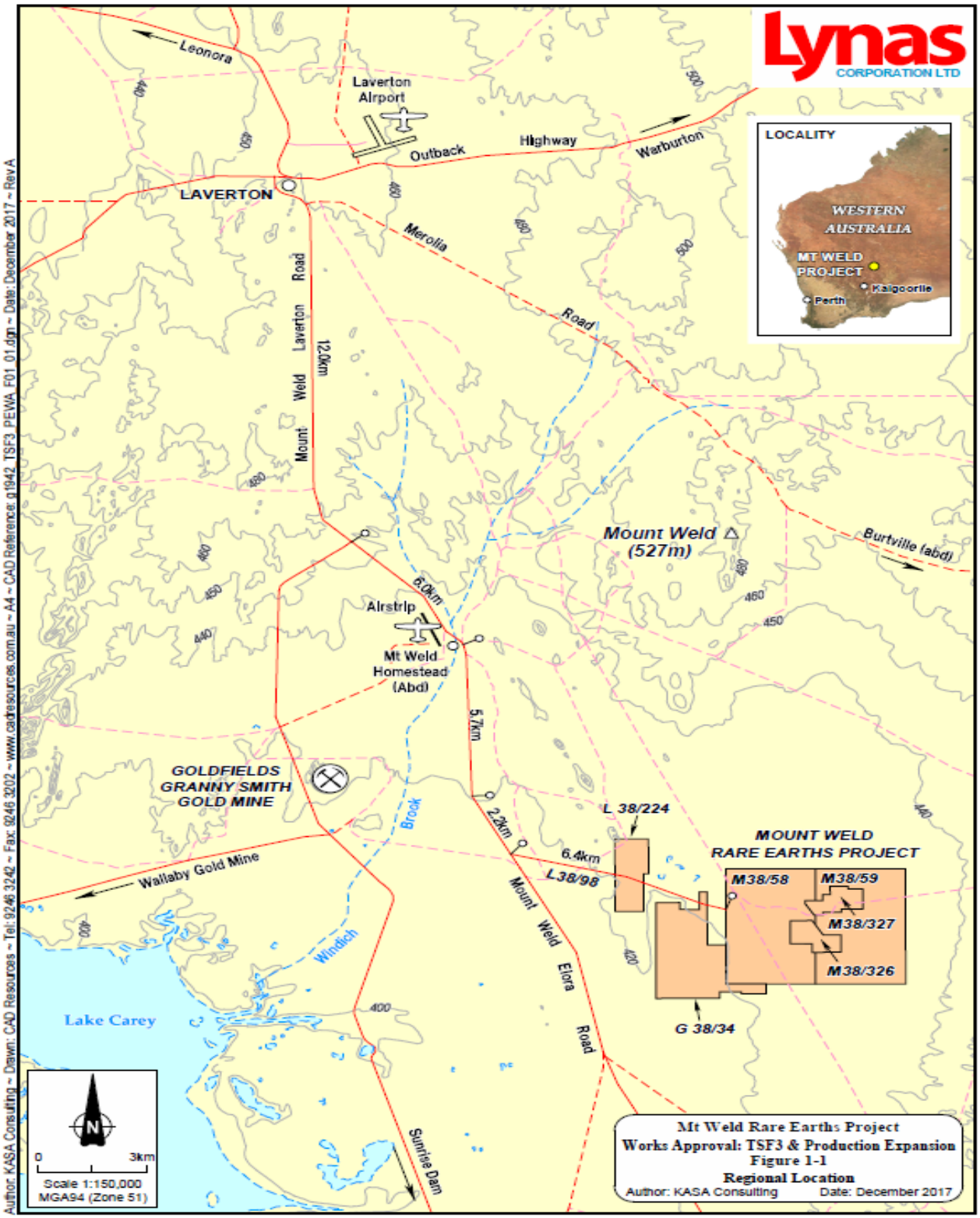


Figure 2: Regional siting of the Mt Weld Premises

6.2 Residential and sensitive Premises

The distances to residential and sensitive receptors are detailed in Table 7.

Table 7: Receptors and distance from activity boundary

Sensitive Land Uses	Distance from Prescribed Activity
Accommodation camp at Granny Smith Mine	10.5 km to the west of the Premises (refer to Figure 2 for an approximate location)
Laverton	35 km to the northwest of the Premises (refer to Figure 2 for an approximate location)
Mt Margaret Aboriginal Community	33 km to the west of Premises (not shown in Figure 2).

6.3 Specified ecosystems

Specified ecosystems are areas of high conservation value and special significance that may be impacted as a result of activities at or Emissions and Discharges from the Premises. The distances to specified ecosystems are shown in Table 8. Table 8 also identifies the distances to other relevant ecosystem values which do not fit the definition of a specified ecosystem.

The table has also been modified to align with the *Guidance Statement: Environmental Siting.*

Table 8: Environmental values

Specified ecosystems	Distance from the Premises
Lake Carey	Located 12 km to the west of the Premises (refer to Figure 2) Major salt lake, terminus of the Carey paleodrainage. Important breeding site for water birds at time of flooding. Habitat for aquatic invertebrate species including shrimp.
Important wetlands – Western Australia	Nearest listed wetland is Lake Ballard (located near the town of Menzies, approximately 150km south west of the Premises) A major breeding area for the Banded Stilt (*Clardorhynchus leucocephalus*)
Biological component	**Distance from the Premises**
Threatened/Priority Flora	One priority 3 species, *Goodenia lyrata*, was recorded within the footprint of the proposed TSF3.

6.4 Groundwater and water sources

The distances to groundwater and water sources are shown in Table 9.

Table 9: Groundwater and water sources

Groundwater and water sources	Distance from Premises	Environmental value
Public drinking water source areas – Laverton Water Reserve - P1	30 km to the north west	Drinking water source area
Major watercourses/waterbodies – Lake Carey	12 km to the west	Major salt lake, terminus of the Carey paleodrainage. Important breeding site for water birds at time of flooding.

		Habitat for aquatic invertebrate species including shrimp.
Groundwater • An unconfined superficial aquifer, of regional extent, formed within surface alluvium, located 20m below ground level; • A confined/semi-confined weathered carbonatite aquifer, formed by the carbonatite regolith, located to the east of the TSF, located 35m below ground level; and • A confined/semi-confined regional weathered bedrock/fresh bedrock aquifer, located below the carbonatite aquifer.	Underlying the Premises; groundwater flow towards the open pit due to groundwater drawdown from mine dewatering	Livestock drinking water source. Carbonatite aquifer also used for mining processing purposes (Mt Weld and adjacent Granny Smith Gold Mine). Groundwater quality in the surficial aquifer is brackish (~2200 – 2500 mg/L) and circum-neutral (pH 6.98 – 7.32: recorded during 2017). Average values for the bedrock aquifer were given as 7.86 pH, salinity at 3275mg/L TDS) (URS 2014).

7. Modelling and monitoring data

7.1 Modelling of seepage transport in groundwater

Concurrent with the TSF2 application, Mt Weld completed a contaminant fate and transport model to estimate the extent to which seepage from the evaporation ponds might be expected to reach downstream groundwater receptors (namely third party livestock producers who may access groundwater bores for livestock drinking water). This study, by AECOM (2014), demonstrated that the lacustrine clays underlying the TSFs and evaporation ponds inhibit the movement of potential contaminants to the extent that it would take approximately 20 years for seepage to reach the groundwater bore LMW10, which is located 500m away from the evaporation ponds. The movement of groundwater is towards the pit, due to groundwater drawdown from groundwater abstraction around the pit for ore processing.

The estimate of 20 years was conservative, as it allowed for no retardation of contaminants (no adsorption) during transport. Concentrations of potential contaminants at LMW10 were all below the ANZECC livestock drinking water guidelines, where available. Lead, thorium, uranium, arsenic, chromium and nickel were identified as the potential contaminants of concern in groundwater seepage. Leachate results were developed from ASLP (Australian Standard Leaching Procedure) testing of tailings. To date groundwater monitoring results (since tailings deposition commenced in 2011) have not recorded any elements at concentrations of concern (refer to section 7.2 below for further detail).

7.2 Ambient Groundwater Monitoring results in vicinity of TSFs and Evaporation Ponds

The most recent Annual Environmental Report (AER) for 2016 indicated that groundwater quality, as measured from bores surrounding the TSF and evaporation ponds, did not detect any contaminants in groundwater at concentrations of concern. Indeed aluminium, arsenic, cadmium, carbonate, chromium, copper, lead, mercury, selenium, thorium, thallium, uranium and zinc recorded concentrations either at the level of detection or at low values. Strontium, sodium, chloride, calcium, magnesium, manganese, potassium, sulfate, nickel, total and soluble iron and molybdenum were at concentrations similar to that of historical levels (Mt Weld 2017).

Standing water levels have recorded a shallowing trend as of 2015, with the shallowest water level recorded at 14 m below ground level. Prior to mining and groundwater abstraction the

surficial aquifer was located at approximately 10 m below ground level, dropping to 16 – 19m below ground level, prior to tailings deposition commencing.

The recent shallowing trend may be indicative of increased water volumes stored within the evaporation ponds, following increased discharge volumes of tailings supernatant and raffinate from water treatment (Mt Weld 2017).

8. Risk assessment

8.1 Determination of emission, pathway and receptor

In undertaking its risk assessment, DWER will identify all potential emissions pathways and potential receptors to establish whether there is a Risk Event which requires detailed risk assessment.

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. Where there is no actual or likely pathway and/or no receptor, the emission will be screened out and will not be considered as a Risk Event. In addition, where an emission has an actual or likely pathway and a receptor which may be adversely impacted, but that emission is regulated through other mechanisms such as Part IV of the EP Act, that emission will not be risk assessed further and will be screened out through Table 10 and Table 11.

The identification of the sources, pathways and receptors to determine Risk Events are set out in Table 10 and Table 11below.

Table 10. Identification of emissions, pathways and receptors during construction

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**		
Construction of new processing plant infrastructure, new diesel power generation and TSF3	Construction of new processing plant, new TSF3 and water treatment infrastructure	Noise	Granny Smith Mine Accommodation camp located 10 km west of the Premises.	Air / wind dispersion	Amenity impacts	No	No sensitive receptors likely to be impacted
		Dust			Amenity impacts	No	No sensitive receptors likely to be impacted

Table 11: Identification of emissions, pathways and receptors during operation

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
TSF3 operation	Tailings delivery and return water pipelines	Tailings slurry/ tailings supernatant	Vegetation and/or soil adjacent to tailings pipeline alignment	Direct discharge	Soil contamination through release of alkaline processing liquors of brackish salinity, low levels of radioactivity, trace levels of metals/metalloids Impact to vegetation health if inundated.	No	Minimal area of native vegetation located on west and east of the TSF 3, bunded by stormwater diversion drain on eastern boundary within 50m of the TSF embankment. Pipelines will be located within bunds (including along the perimeter embankment of TSF) and pressure/flow indication installed to detect loss of pressure and automatically shut down flow in the event of pipeline failure. These controls will be conditioned in the works approval and licence. Existing L8141 Licence condition 1.3.2 requires that all pipelines carrying environmentally hazardous substances are equipped with leak detection and/or provided with secondary containment sufficient to contain the spill for the period equal to the duration between inspections.
	Tailings deposition to TSF3	Tailings seepage	Adjacent vegetation	Infiltration via soils underlying TSF	Groundwater mounding inundating rootzones of vegetation, resulting in poor vegetation health or death	Yes	Surficial groundwater in the vicinity of TSFs and evaporation ponds is located 14 m below ground level (at the shallowest bore) and overlain with 6-15 m lacustrine clays. Since 2014 a shallower trend has been recorded, likely due to increasing deposition to the evaporation ponds (Mt Weld AER 2016).

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
			Groundwater. Groundwater is used for livestock drinking water		Groundwater contamination of livestock drinking water source with alkaline seepage of brackish salinity, low levels of radionuclides, trace levels of metals/metalloids	Yes	Change in liner system proposed for TSF3; relying on underlying clay geology and the hydraulic conductivity of the consolidated tailings themselves to restrict the flow of seepage to the surficial aquifer. Increased volume of tailings deposition and consequent load to TSF3. Existing limit for deposition to the Evaporation Ponds will be maintained. Proportion of tailings supernatant to be discharged to evaporation ponds.
		Tailings supernatant/ tailings solids	Adjacent native vegetation, soils	Overflow from TSF due to extreme rainfall event	Poor native vegetation health from saline alkaline inundation; soil contamination through release of alkaline tailings of brackish salinity, low levels of radionuclides, trace levels of metals/metalloids	Yes	TSF3 Design complies with the DMIRS requirement for storage of a 1% AEP rainfall event over 72 hours (34000m^3) plus an additional 0.5m. Maximum operating pond level of 0.2 m depth (equivalent to 424.5m AHD) will be specified in the TSF and Evaporation Ponds Operating Manual. Embankment heights and surface area via general arrangement drawings for TSF3, will be conditioned in the Works Approval W6120/2018/1. Condition 1.3.3 of Licence L8141/2007/2 prescribes a minimum top of embankment freeboard of 300mm and condition 1.3.4 requires daily inspection of containment infrastructure (including TSFs) embankment freeboards. Once TSF3 is successfully constructed and commissioned, the facility will be authorised to operate by the Licence and subject to those conditions.

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
		Tailings supernatant	Birds	Ingestion/ contact with alkaline supernatant pond or supernatant in the Return Water Pond (RWP)	Elevated pH of supernatant causing soft tissue impacts to birds; possible bird deaths	Yes	The tailings supernatant poses a possible risk to a receptor. Acidic tailings are known to cause impacts to birds and it is suspected that alkaline tailings may act in a similar manner (Donato 2017). Given the proximity of Mt Weld to Lake Carey, birds may access the Mt Weld TSFs, Return Water Pond or evaporation ponds. The salinity of the supernatant (at less than 14 000 mg/L TDS) means that the supernatant may be palatable and that birds may be attracted to the ponds.
Expanded Processing Plant	Additional flotation circuit and thickener circuit	Process liquors and slurries	Soils and groundwater	Overflowing bunds, tanks, pipeline failures direct to soils. Infiltration of soil to groundwater.	Soil and groundwater contamination through release of alkaline processing liquors of brackish salinity, low levels of radioactivity, trace levels of metals/metalloids, rare earth oxides	Yes	Mt Weld have stated that new infrastructure will be located within bunded hardstand areas. Secondary containment within the Processing Plant provided by the Plant Run Off Pond, located to the west of the Processing Plant. All spills outside of bunded areas are directed to this pond.
Expanded Water Treatment Plant	Additional RO plant and ultrafiltration units	Saline groundwater/ saline raffinate	Soils	Direct to ground	Salinisation of the soils; low level radionuclides deposition	No	Ultrafiltration units and RO plant are located in container units and effectively bunded. Also the stormwater system within the processing plant directs any spill from the pipelines feeding these units towards the Plant run off pond (secondary containment).
Expanded diesel power generation	Increase from 3MW to 8MW diesel generated power	Particulates, NOx, SO_2, CO and VOCs airborne emissions	Granny Smith Accommodation camp	Air	Poor ambient air quality due to increase in emissions	No	Expected emission rates of new units to be similar or better to existing units (Kasa 2018a). No sensitive receptors likely to impacted.

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**		
Bulk storage of chemicals	Bulk fuel storage	Breach of containment causing hydrocarbon discharge to land	Soils and groundwater	Direct discharge	Soil and groundwater hydrocarbon contamination	No	Managed under the *Dangerous Goods Safety Act 2004*. Mt Weld holds a Dangerous Goods Licence, DGS02014. (Tanks to be installed are double lined)

8.2 Consequence and likelihood of risk events

A risk rating will be determined for risk events in accordance with the risk rating matrix below.

Table 12: Risk rating matrix

Likelihood	Consequence				
	Slight	Minor	Moderate	Major	Severe
Almost certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	Extreme
Unlikely	Low	Medium	Medium	Medium	High
Rare	Low	Low	Medium	Medium	High

DWER will undertake an assessment of the consequence and likelihood of the Risk Event in accordance with Table 13 below.

Table 13: Risk criteria table

Likelihood		**Consequence**		
The following criteria has been used to determine the likelihood of the Risk Event occurring.		**The following criteria has been used to determine the consequences of a Risk Event occurring:**		
			Environment	**Public health* and amenity (such as air and water quality, noise, and odour)**
Almost Certain	The risk event is expected to occur in most circumstances	Severe	• **onsite impacts**: catastrophic • **offsite impacts local scale**: high level or above • **offsite impacts wider scale:** mid-level or above • Mid to long-term or permanent impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are significantly exceeded	• Loss of life • **Adverse health effects:** high level or ongoing medical treatment • Specific Consequence Criteria (for public health) are significantly exceeded • **Local scale impacts:** permanent loss of amenity
Likely	The risk event will probably occur in most circumstances	Major	• **onsite impacts**: high level • **offsite impacts local scale**: mid-level • **offsite impacts wider scale**: low level • Short-term impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are exceeded	• **Adverse health effects:** mid-level or frequent medical treatment • Specific Consequence Criteria (for public health) are exceeded • **Local scale impacts**: high level impact to amenity
Possible	The risk event could occur at some time	Moderate	• **onsite impacts**: mid-level • **offsite impacts local scale**: low level • **offsite impacts wider scale**: minimal • Specific Consequence Criteria (for environment) are at risk of not being met	• **Adverse health effects:** low level or occasional medical treatment • Specific Consequence Criteria (for public health) are at risk of not being met • **Local scale impacts:** mid-level impact to amenity
Unlikely	The risk event will probably not occur in most circumstances	Minor	• **onsite impacts**: low level • **offsite impacts local scale**: minimal • **offsite impacts wider scale**: not detectable • Specific Consequence Criteria (for environment) likely to be met	• Specific Consequence Criteria (for public health) are likely to be met • **Local scale impacts:** low level impact to amenity
Rare	The risk event may only occur in exceptional circumstances	Slight	• **onsite impact**: minimal • Specific Consequence Criteria (for environment) met	• **Local scale**: minimal to amenity • Specific Consequence Criteria (for public health) met

^ Determination of areas of high conservation value or special significance should be informed by the *Guidance Statement: Environmental Siting.*

* In applying public health criteria, DWER may have regard to the Department of Health's *Health Risk Assessment (Scoping) Guidelines.*

"onsite**"** means within the Prescribed Premises boundary.

8.3 Acceptability and treatment of Risk Event

DWER will determine the acceptability and treatment of Risk Events in accordance with the Risk treatment Table 14 below:

Table 14: Risk treatment table

Rating of Risk Event	Acceptability	Treatment
Extreme	Unacceptable.	Risk Event will not be tolerated. DWER may refuse application.
High	May be acceptable. Subject to multiple regulatory controls.	Risk Event may be tolerated and may be subject to multiple regulatory controls. This may include both outcome-based and management conditions.
Medium	Acceptable, generally subject to regulatory controls.	Risk Event is tolerable and is likely to be subject to some regulatory controls. A preference for outcome-based conditions where practical and appropriate will be applied.
Low	Acceptable, generally not controlled.	Risk Event is acceptable and will generally not be subject to regulatory controls.

8.4 Risk Assessment – Tailings Seepage from TSF3 impacting on livestock water quality and/or adjacent vegetation

8.4.1 Description of tailings seepage from TSF3

Seepage from tailings stored in TSF3 impacting on groundwater levels and quality in the surficial aquifer underlying the TSFs. Groundwater in the local area is accessed for livestock drinking water; however the surficial aquifer is generally not connected with the underlying carbonatite aquifer (5 – 18m of lacustrine clays are located between the aquifers). Vertical leakage does occur between the aquifers in areas where the lacustrine clays are absent however, and via conduits such as bedding features, structural features and uncased boreholes (AECOM 2014).

8.4.2 Identification and general characterisation of emission

AECOM (2014) identified the key contaminants of concern in evaporation pond seepage (noting that evaporation pond discharged include tailings supernatant) as lead (<0.0005 – 0.0032 mg/L), thorium (0.00032 – 0.0016 mg/L), uranium (0.0041- 0.0099 mg/L), arsenic (<0.0001 – 0.0034), chromium (0.02 – 0.05 mg/L) and nickel (<0.01 - 0.02 mg/L). Concentrations at the source were estimated from Australian Standard Leachate Procedure (ASLP) results of tailings residue completed at pH 7 and pH 2.9 in 2012 (Kasa 2013).

pH of the tailings supernatant was estimated at 9.52 and TDS at 2900 mg/L, (brackish salinity). It is noted that this data was from 2014 and recently supplied data indicates tailings decant at a pH of approximately 7.7 – 8.4 (Kasa 2018b). The superficial aquifer pH was recorded at 7.57 and TDS at 2681 mg/L (URS 2014, recorded in ATC Williams 2017).

8.4.3 Criteria for assessment

ANZECC & ARMCANZ (2000) drinking water guidelines for livestock.

Standing water level limit for groundwater of 4m below ground level as prescribed by Condition 3.3.1 of Licence L8141/2007/2.

8.4.4 Applicant controls

No engineered liner for the TSF3 will be utilised, with the underlying hardpan and lacustrine clays considered to provide an effective barrier to the underlying carbonatite aquifer. Hydraulic conductivity of the hardpan is 1 x 10^{-8} m/s whilst the clay hydraulic conductivity is estimated at 1 x 10^{-9} m/s. A silt sand layer will be left intact allowing initial tailings seepage to drain to a sump located at a low point of the impoundment (ATC Williams 2017). The seepage at this point will be redirected to the RWP or back to the processing plant using a dedicated pump and pipework.

The tailings itself will form another barrier, once deposited across the base of the TSF. The tailings layer will have an estimated hydraulic conductivity of 1 x 10^{-8} m/s (ATC Williams 2017). This is equivalent to the hydraulic conductivity of the evaporation ponds, which was the basis of the 2014 AECOM fate and contaminate transport groundwater model (refer to section 7.1 for further detail). As the tailings consolidate, the tailings themselves will have an effective hydraulic conductivity of 1 x 10^{-9} m/s.

Toe drains under the embankment will be cut into the underlying hardpan to ensure that the lateral seepage is captured under the embankment.

Predicted seepage rates peak at 70m^3/day or equivalent to less than 2% of the daily water discharged to the TSF (ATC Williams 2017). Given the hydraulic conductivity of the tailings and that of the underlying hardpan and clay, it is not expected that there will be saturated connectivity between the TSF3 decant pond and the surficial groundwater (ATC Williams 2017).

An additional three monitoring bores (two shallow, one deep) will be installed to provide data on groundwater quality and depths to the east (downstream) and west (upstream) of TSF3. The shallow bores will access the surficial aquifer whilst the deep bore will access the underlying carbonatite aquifer. Any interconnection between the two may be identified at LMW14 and LMW15 (nested bores to the east).

8.4.5 Consequence

If seepage alters groundwater quality such that it impacts on livestock drinking water quality, then the impact is considered to be a mid level impact to an offsite receptor. However given the low concentrations of contaminants modelled in seepage, seepage would have a minimal to undetectable impact on livestock drinking water quality. The consequence of seepage affecting livestock water quality drinking is minor.

If seepage mounding results in elevated standing water levels such that the 4m limit is breached and vegetation is impacted, the consequence is considered mid level, to an onsite receptor and hence, has a moderate consequence.

8.4.6 Likelihood of Risk Event

The surficial aquifer is generally not connected with the underlying carbonatite aquifer (5 – 18m of lacustrine clays are located between the aquifers from ~18 m depth). AECOM (2014) modelling of seepage flow estimated it would take 20 years to reach the bore LMW10, located 500m from the evaporation pond. The likelihood of seepage impacting on surrounding groundwater quality is rare.

The likelihood of seepage resulting in elevated standing water levels such that the 4 m limit is breached and water inundates vegetation rootzones is unlikely.

8.4.7 Overall rating of TSF3 seepage impacting on livestock drinking water quality or adjacent vegetation

Given the consequence and likelihood ratings described above with the risk rating matrix (Table 10) and determined that the overall rating for the risk of seepage impacting on livestock drinking water quality is low.

The risk of elevated standing water levels due to seepage impacting on vegetation is considered medium.

8.5 Risk Assessment – Overflow of tailings from TSF3 or supernatant from the RWP (return water pond) impacting on vegetation and soils

8.5.1 Description of overflow of tailings from TSF3 or supernatant from the RWP

Tailings supernatant is alkaline and of brackish salinity, with trace radionuclides and soluble metals and metalloids (see section 8.5.2 below). A release from the TSF3 or the RWP (receival point for supernatant drainage prior to pumping to the processing plant) onto vegetation may result in poor vegetation health and/or soil contamination.

8.5.2 Identification and general characterisation of emission

Tailings supernatant quality is estimated at pH 7.7 – 8.4 (Kasa 2018b), TDS 2900 mg/L, boron 2.74 mg/L, barium 1.44mg/L, aluminium 0.17 mg/l, strontium 1.1 mg/L, iron 0.6 mg/L, thorium 0.003 mg/L and uranium 0.069 mg/L (URS 2014 in ATC Williams 2017).

8.5.3 Description of potential adverse impact from the emission

Alkaline, saline supernatant may impact on vegetation health, through inundation of vegetation root systems or direct impact to leaves/plants. Release of trace radionuclides and metals/metalloids in solution may result in localised soil contamination.

8.5.4 Applicant controls

The TSF3 design has been designed with adequate capacity to store a 1% AEP rainfall event over 72 hours, providing the maximum operating pond level is kept 0.7m below the embankment (ATC Williams 2017).

Supernatant from TSF3 is directed to the Return Water Pond (RWP) which was originally designed to take gravity flow from TSF2. The capacity in this pond during a rainfall event can only be maintained if the manual valves allowing gravity flow from TSF2 are shut off.

The Applicant has a TSF and Evaporation Ponds Operating Manual with procedures for water management including during emergency events such as large rainfall. The Manual will be updated to account for TSF3 operation (a draft was submitted with this Works Approval Application) (Kasa 2017). The Applicant has given an undertaking to specify the maximum operating pond level for TSF3 in the Manual so as to ensure adequate storm storage capacity is available, and to also specify the operating procedure for closing manual valves allowing flow from TSF2 to the RWP prior to rainfall events, to allow for rainfall capacity in the RWP.

Daily inspections of TSFs operation, including availability of freeboard are completed in accord with the TSF and Evaporation Ponds Operating Manual and are prescribed in existing condition 1.3.4 of Licence L8141/2007/2.

8.5.5 Consequence

If an overflow of tailings impacting on adjacent vegetation or soils from the TSF3 or supernatant overflow from the RWP occurs, then the impact is considered mid level impact to an onsite receptor. Therefore, the consequence is moderate.

8.5.6 Likelihood of Risk Event

The likelihood of tailings being released to vegetation from an overflow from TSF3 or supernatant from the RWP is considered possible. To date the existing TSFs (TSF1 commissioned in 2011 and TSF2 commissioned in 2016) and the RWP (commissioned in 2016) have been operated without recording any overflows.

8.5.7 Overall rating of tailings overflow from TSF3 or supernatant from the RWP

The overall risk rating is medium.

8.6 Risk Assessment – Birds ingesting/contacting with tailings supernatant at TSF3 or the RWP (return water pond)

8.6.1 Description of birds ingesting/contacting with tailings supernatant at TSF3 or the RWP

Tailings supernatant is alkaline and of brackish salinity, with trace radionuclides and soluble metals and metalloids (see section 8.6.2 below). Mt Weld is located relatively close to Lake Carey, which is a known breeding site for birds during flood events. It is possible that birds may be attracted to the Mt Weld Tailings Storage Facilities and ponds; however this is yet to be determined.

8.6.2 Identification and general characterisation of emission

Tailings supernatant quality is estimated at pH 7.7 - 8.4 (Kasa 2018b), TDS 2900 mg/L, boron 2.74 mg/L, barium 1.44mg/L, aluminium 0.17 mg/l, strontium 1.1 mg/L, iron 0.6 mg/L, thorium 0.003 mg/L and uranium 0.069 mg/L (URS 2014 in ATC Williams 2017).

8.6.3 Description of potential adverse impact from the emission

Alkaline supernatant may damage the soft tissues of birds that either ingest tailings liquor (supernatant) or land within supernatant ponds. Documented evidence has demonstrated that acidic tailings result in bird deaths and soft tissue injuries (Donato 2017) and it is thought that alkaline tailings may cause similar impacts.

8.6.4 Applicant controls

The Applicant has detailed three methods of controlling the alkalinity in the tailings discharge:

- By acid addition to the concentrate thickener;
- Addition of reverse osmosis raffinate to the tailings discharge (the pH of raffinate is approximately 7 – 8); and
- Reduced caustic soda consumption in the flotation circuit.

8.6.5 Consequence

If alkaline tailings liquor does result in soft tissue injuries and birds were attracted to Mt Weld tailings and evaporation ponds it may result in a mid level impact to an offsite receptor. Therefore, the consequence may be major.

8.6.6 Likelihood of Risk Event

Given the recent tailings decant data supplied (Kasa 2018b) and the Applicant controls detailed above, the alkalinity of the tailings decant can be controlled so it is below pH 9.0. The likelihood of birds being impacted by the contact with the tailings liquor is therefore considered unlikely.

8.6.7 Overall rating of impact to birds due to contact with tailings supernatant in either TSF3 or the RWP

The overall risk rating is medium.

8.7 Risk Assessment – Process spills from new processing plant infrastructure operation

8.7.1 Description of process spills from new processing plant infrastructure operation

Soil and groundwater contamination through a release of alkaline processing liquors onto unbunded ground within the processing plant.

8.7.2 Identification and general characterisation of emission

Alkaline processing liquors of brackish salinity, low levels of radioactivity, elevated levels of boron and barium, rare earth oxides.

8.7.3 Applicant controls

The Applicant has an existing stormwater drainage plan for the processing plant, with drainage outside of bunded areas directed to the plant runoff pond. This pond has a capacity of 23 000m^3 to contain stormwater runoff equivalent to capturing 80% of 1% AEP rainfall event over 72 hours (total capacity to contain is estimated at 29.2 ML).

The new flotation circuit and thickener circuit will be located within bunded hardstand compounds with sumps to direct any spillage within the compound to a low point to recover spillage back into the process.

8.7.4 Consequence

If spill to ground or bund overflow occurs, then the Delegated Officer has determined that the impact of release of processing liquors will be low level, on site impact. The consequence would be minor.

8.7.5 Likelihood of Risk Event

The likelihood of a release of contaminated water from the plant run off pond or spills resulting in soil contamination is possible.

8.7.6 Overall rating of process spills from new processing plant operation

The overall rating for the risk is medium.

8.8 Summary of acceptability and treatment of Risk Events with Regulatory Controls

A summary of the risk assessment and the acceptability or unacceptability of the risk events set out above, with the appropriate treatment and control, are set out in Table 15 below. Controls are described further in sections 9 and 10.

Table 15: Risk assessment summary

	Description of Risk Event			Applicant controls	Risk rating	Acceptability with controls (conditions on instrument)	Resulting Regulatory Controls
	Emission	**Source**	**Pathway/ Receptor (Impact)**				
1.a	Tailings seepage	Tailings deposition to TSF3	Via groundwater to off Premises livestock drinking water bores	Tailings layer and consolidation to inhibit seepage. Existing geology underlying TSF3 (lacustrine clays) inhibits transport of seepage. Existing groundwater monitoring program (3 added bores).	Minor consequence Rare likelihood **Low Risk**	Acceptable	No further controls beyond the proposed TSF Design and the improvements to the groundwater monitoring program.
1.b.			Via groundwater to vegetation rootzones	Tailings layer and consolidation to inhibit seepage. Existing geology underlying TSF3 (lacustrine clays) inhibits transport of seepage. Existing groundwater monitoring program (3 added bores).	Moderate consequence Unlikely likelihood **Medium Risk**	Acceptable subject to applicant controls conditioned on Works Approval and Licence.	Works Approval to specify construction of the TSF3 in accord with the TSF Design. The existing licence has a limit on the deposition rate of liquor to the evaporation ponds to 810 000m^3/a. Existing groundwater monitoring program is licenced by Licence L8141/2007/2. To be amended to incorporate new bores once they are

	Description of Risk Event			Applicant controls	Risk rating	Acceptability with controls (conditions on instrument)	Resulting Regulatory Controls
	Emission	**Source**	**Pathway/ Receptor (Impact)**				
							constructed. Licence L8141/2007/2 prescribed a limit and trigger value for depth to groundwater in order to protect vegetation health. A revision of the conceptual groundwater model to assess the total mounding under the TSFs and evaporation pond will be required to be completed within 3 months of the works approval issue, to provide an estimate of the timeframe for mounding to impact.
2.	Tailings	Tailings deposition to TSF3	Overflow of facility to ground during rainfall event or due to poor operator control, resulting in vegetation impact and/or soil contamination.	TSF design allows for sufficient capacity providing a maximum operating pond level is not breached. TSFs and Evaporation Ponds Operating Manual prescribes inspections of freeboard, annual geotechnical audits	Moderate consequence Possible likelihood **Medium risk**	Acceptable subject to applicant and regulatory controls conditioned	Construction in accord with the TSF Design will be required by the Works Approval. Licence L8141/2007/2 already requires daily inspections of containment infrastructure for adequate freeboard. It is intended that TSF3 is added to the list of approved containment infrastructure once the facility is constructed in accord with the works approval.
3.	Tailings supernatant	Tailings deposition to TSF3 and	Impact to birds through ingestion /	pH to be managed to keep tailings alkalinity below 9	Major consequence	Acceptable subject to regulatory controls.	pH limits to be placed on the tailings discharge and wastewater discharge to the

	Description of Risk Event			Applicant controls	Risk rating	Acceptability with controls (conditions on instrument)	Resulting Regulatory Controls
	Emission	**Source**	**Pathway/ Receptor (Impact)**				
		supernatant flow to return water pond	direct contact	using: • Acid addition to concentrate thickener; • RO raffinate (pH 7-8) addition to the tailings; and • Reduction in caustic soda consumption.	Unlikely likelihood **Medium risk**		evaporation ponds to ensure alkalinity is controlled below pH 9. Condition 3.2.1 of the Licence will be amended accordingly.
4.	Process liquors	Overflowing bunds, tanks or pipeline failures with the expanded processing plant	Direct to ground or via stormwater overflow of the Plant run-off Pond.	All stormwater within the processing plant is directed to the Plant Run off pond which has a capacity of 23000m^3. This would not avoid soil contamination in the event of a spill to ground, however.	Minor consequence Possible likelihood **Medium Risk**	Acceptable subject to applicant and regulatory controls conditioned.	The Works Approval will require installation of the hardstand bund compounds for the new circuits installed within the Processing Plant. Licence L8141/2007/2 already prescribes the surface water management plan and the contingency control of the Plant Runoff Pond. Inspections of the Plant Runoff Pond are required prior to a forecast storm event to ensure capacity is available. Stormwater drains also require inspection according to condition 1.3.4.

9. Works Approval controls

9.1.1 TSF3 infrastructure

TSF3 will be required to be constructed and commissioned in accordance with the TSF3 Design document. Specifically:

- Siting; and
- Construction in accord with the drawings in the TSF3, Stage 1 Design Report (ATC Williams 2017).

A compliance construction report must be submitted prior to commissioning, signed by the TSF Designer or their engineering representative, detailing compliance with the TSF3 Design Report.

9.1.2 New Processing Plant infrastructure and equipment

The new flotation circuit and thickener and filtration circuit will be required to be located within bunded hardstand compounds that drain to a sump, from where liquor can be recirculated back to the process.

9.1.3 Specified actions

The Applicant shall submit to the CEO a revised conceptual groundwater model for the Premises, showing the extent of groundwater mounding in the vicinity of the TSFs and the Evaporation Ponds, over the foreseeable operational life of the project.

9.1.4 Monitoring requirements

Installation of the three additional groundwater bores, as detailed in ATC Williams (2017) drawings 113214.04_006 and 113214.04_007.

The compliance report shall include bore logs for the newly installed groundwater bores.

Post commissioning of the new diesel generators, testing of point source emissions to air must be completed to demonstrate the emissions are consistent with the design specification for the new units. A copy of the emission testing report is to be submitted to DWER.

10. Licence controls

10.1.1 TSF3 operation

Following successful construction and commissioning, TSF3 will be added to the list of approved containment infrastructure under existing condition 1.3.1 of Licence L8141/2007/2. Conditions 1.3.3 and 1.3.4 will then apply. Condition 3.2.1, process monitoring, will be amended to include recording of tailings volumes discharged to TSF3.

10.1.2 TSF and Evaporation Pond discharges

A pH limit range will be placed on the tailings discharge and wastewater discharges to the evaporation ponds.

10.1.3 New processing plant infrastructure operation

Covered by existing Licence conditions 1.2.1 and 1.3.2 of L8141/2007/2.

10.1.4 Monitoring requirements

Additional monitoring bores will be added to the Licence, under condition 3.3.1, to ensure that potential impacts on groundwater quality and standing water levels from TSF3 seepage are captured.

The pH of the tailings discharge will be required to be monitored on at least a weekly basis.

11. Applicant's comments

The Applicant was provided with the draft Decision Report and draft issued Works Approval on 28 March 2018. The Applicant provided comments which are summarised, along with DWER's response, in Appendix 2.

12. Conclusion

This assessment of the risks of activities on the Premises has been undertaken with due consideration of a number of factors, including the documents and policies specified in this Decision Report (summarised in Appendix 1).

Based on this assessment, it has been determined that the Works Approval will be granted subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

Tim Gentle
Manager Licensing (Resource Industries)
Delegated Officer
under section 20 of the *Environmental Protection Act 1986*

Appendix 1: Key documents

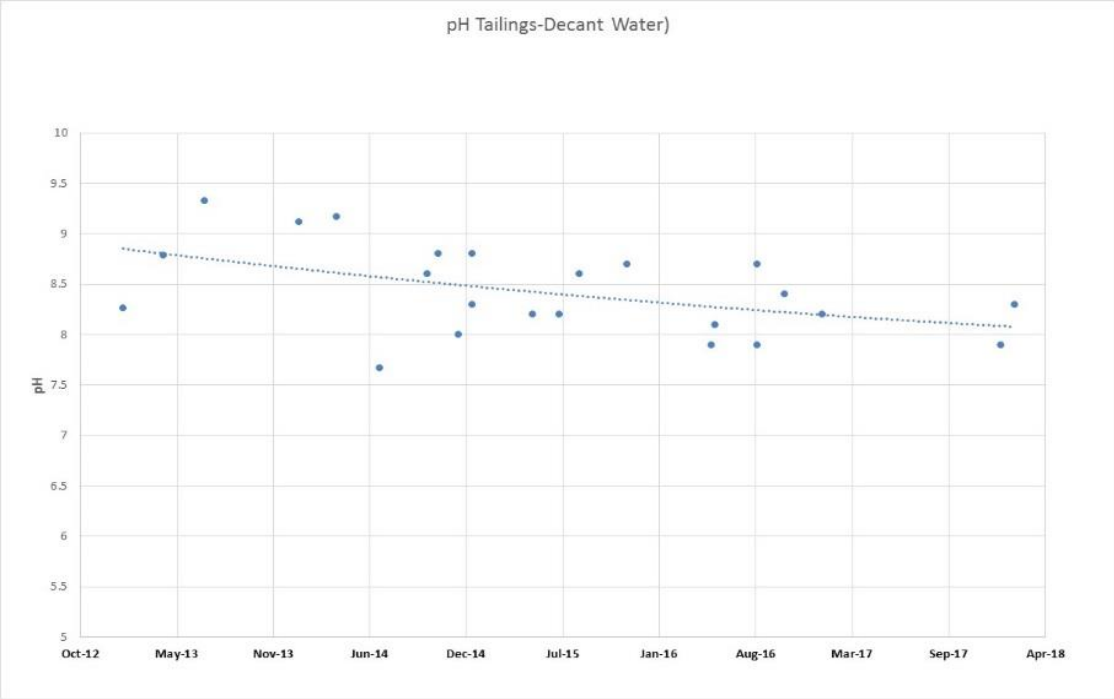
	Document title	In text ref	Availability
1.	AECOM Australia Pty Ltd (2014) *Groundwater Risk Assessment - Evaporation Pond Mt Weld,* 10 March 2014.	AECOM 2014	DWER record (A1039297)
2.	ATC Williams (2017) *Mt Weld Mining Pty Limited. Mt Weld Rare Earths Project Tailings Storage Facility 3, Stage 1 Design Report*, December 2017.	ATC Williams 2017	Appendix 1 to DWER record (A1583038)
3.	Donato, D. (2017) Email from D. Donato to DWER; FW: Query – mine process water and ecotoxicity, sent 22 May 2017, 5:06 PM.	Donato 2017	DWER record (A1643655)
4.	Kasa Consulting (2018a) email from P Jansen to DWER; Re: Mt Weld Works Approval, sent 26 March 2018, 1:37 PM.	Kasa 2018a	DWER record (A1643655)
5.	Kasa Consulting (2018b) email from P Jansen to DWER; RE: Applicant Notification – W6120/2018/1 – Application for a Works Approval – Draft Works Approval and Decision Report, sent 9 April 2018, 10:12 AM.	Kasa 2018b	DWER record (A1649936)
6.	Kasa Consulting (2017) *Mt Weld Rare Earths Project. TSF 3 and Production Expansion: Works Approval Supporting Applicatio*n, 20 December 2017.	Kasa 2017	DWER record (A1583038)
7.	Kasa Consulting (2013) *Mt Weld Rare Earths Project. Assessment of Water Quality and Radiological Effects of Process Water Discharges. Mt Weld Mining Pty Limited*, August 2013.	Kasa 2013	DWER record (A724026)
8.	Licence L8141/2007/2 – Mt Weld Rare Earths Project & Amendment	L8141/2007/2	accessed at www.dwer.wa.gov.au

	Notice 1.		
9.	Ministerial Statement 476.	MS 476	accessed at www.epa.wa.gov.au
10.	URS (2014) Memorandum –TSF2 Approvals Supporting Documentation – Final, 19 February 2014.	URS 2014	Appendix to DWER record (A736818) also summarised in ATC Williams (2017).
11.	DER, July 2015. *Guidance Statement: Regulatory principles.* Department of Environment Regulation, Perth.	DER 2015a	accessed at www.dwer.wa.gov.au
12.	DER, October 2015. *Guidance Statement: Setting conditions.* Department of Environment Regulation, Perth.	DER 2015b	
13.	DER, November 2016. *Guidance Statement: Risk Assessments*. Department of Environment Regulation, Perth.	DER 2016b	
14.	DER, November 2016. *Guidance Statement: Decision Making*. Department of Environment Regulation, Perth.	DER 2016c	

Appendix 2: Summary of applicant's comments on risk assessment and draft conditions

Condition	Summary of Works Approval Holder comment	DWER response
Cover Page	Registered business address should be: Level 1 Suite 3, 5 Tully Road East Perth WA 6004	Updated
Proposed condition 8 (conduct a risk assessment of wildlife interactions with tailings / evaporation ponds)	It is noted that DWER propose to prescribe a condition requiring a risk assessment of the potential likelihood and impact of alkaline tailings or supernatant water on fauna, particularly avifauna that ingest this water. Indeed the TSF Design Report (ATC Williams, 2017) references tailings and supernatant water quality with pH values of approximately 9.52. The pH data referenced in the ATC Williams Design Report was sourced from a study conducted by Aecom in 2014 and was reflective of water tailings and supernatant quality at that time. Since 2015, the following process changes have been implemented that have reduced the pH of this water: **Acid Addition to Concentrate Thickener:** • Increase in addition of acid to the concentrate thickener associated with a lower concentrate grade target. **RO Brine Addition for ETD:** • Addition of RO Raffinate into the tailings stream as part of the Enhanced Tailings Deposition (ETD) process previously	See below.

Condition	Summary of Works Approval Holder comment	DWER response
	reported to DWER. The RO raffinate is typically of pH 7-8 and as such would reduce the tailings pH when added to the stream for ETD. **Reduction in Caustic Soda Consumption:** • Caustic soda consumption has progressively been reduced in the flotation circuit in order to reduce the froth stability/tenaciousness which improves pumpability as well as less gangue mineral entrainment. In summary, the pH shift can be attributed to a combination of increased acid addition to concentrate thickeners, use of RO brine for ETD and lower caustic soda dosage in the flotation circuit. The following plots of pH in tailings/decant water and in combined wastewater to the evaporation pond or used for dust suppression present the current pH trend of effluent discharges:	

Condition	Summary of Works Approval Holder comment	DWER response
		
	On this basis, Mt Weld Mining considers that the risk of fauna impacts from ingestion of alkaline tailings, supernatant or combined wastewater discharges to the evaporation ponds is reduced from that observed in historical data, which was the impetus of DWER's proposed condition. Accordingly Mt Weld Mining requests that DWER reconsider the proposed condition for a toxicity risk assessment given reduced alkalinity.	DWER notes the additional information on tailings pH and the changes made in the process that have resulted in a reduction in pH of the tailings discharge since 2012 (refer graph above – also referenced as Kasa 2018b). DWER accordingly have removed the requirement to complete a wildlife toxicity risk assessment for the Mt Weld tailings and instead require that the tailings are controlled so that the pH is within the range of 5 – 9. Condition 3.2.1 of the Licence will be amended to include the pH limits and to also require at least weekly monitoring of tailings discharge pH.

Condition	Summary of Works Approval Holder comment	DWER response
Decision Report, Table 4	Please note that diesel electricity generation maximum capacity will be 8MW including the proposed new units.	Updated
Decision Report, Table 11	Mt Weld Mining confirms that the 810,000 m^3/yr discharge limit remains adequate and no increase is currently proposed.	Updated
Decision Report, Section 8.4.2	Refer response to Condition 8.	Updated
Decision Report, Section 8.4.4	In regards to DWER's query on seepage / decant water collected at a low point of the impoundment, please note that seepage will be directed via a dedicated pump and pipework to the RWP or back to the plant for retreatment.	Noted and updated
Decision Report, Section 8.6	Refer response to Condition 8.	Noted and updated
Decision Report, Section 8.7	In regards to DWER's query on, the PROP (Plant run off pond) has a capacity of 23.4ML; the required capacity for the 1:100 72 hr AEP is 29.2ML equating to a shortfall of 5.8ML with approximately 80% of total input contained.	Noted and updated
Decision Report, Table 15	Refer response to condition 8.	Noted and updated

Attachment 1: Works Approval W6120/2018/1