Amendment Report

Application for Licence Amendment

Division 3, Part V *Environmental Protection Act 1986*

Licence Number	L9036/2017/1
Licence Holder	Altura Lithium Operations Pty Ltd
ACN	095 384 491
File Number	DER2017/000279
Premises	Pilgangoora Lithium Project M45/1230 and M45/1231 MARBLE BAR WA 6760
Date of Report	26/06/2020

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1. Definitions of terms and acronyms

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

Table 1: Definitions

Term	Definition
ACN	Australian Company Number
AEP	Annual Exceedance Probability
Altura	Altura Lithium Operations Pty Ltd
Annual Period	means a 12 month period commencing from 1 July until 30 June in the following year
ARI	Average Recurrence Interval
ADWG	Australian Drinking Water Guideline
Category/ Categories/ Cat.	categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
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 is responsible for the administration of Part V, Division 3 of the EP Act
DER	Department of Environment Regulation
DMIRS	Department of Mines, Industry Regulation and Safety
DMS	Dense Media Separation
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.
EC	Electrical Conductivity
EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
FT	Flotation-Tailings

Term	Definition
g/t	grams per tonne
HDPE	High Density Polyethylene
KP	Knight Piesold Pty Ltd
Licence Holder	Altura Lithium Operations Pty Ltd
m	metres
mbgl	metres below ground level
Mt	million tonnes
Mtpa	million tonnes per annum
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 Assessments*
RiWI Act	*Rights in Water and Irrigation Act 1914*
RL	Reduced Level
SMDD	Standard Maximum Dry Density
TSF	Tailings Storage Facility
TDS	Total Dissolved Solids
UDR	*Environmental Protection (Unauthorised Discharges) Regulations 2004* (WA)
WRL	Waste Rock Landform
µg/L	micrograms per litre
µm	micrometres
µS/cm	microSiemens per centimetre

2. Application

Altura Lithium Operations Pty Ltd (Licence Holder) (Applicant) (Altura) submitted an application on 18 October 2019 to the Department of Water and Environmental Regulation (DWER) for an amendment to licence L9036/2017/1 under the *Environmental Protection Act 1986* (EP Act).

The application was for Tailings Storage Facility (TSF) Stages 3 and 4 embankment raises to 13.1 metres (m) by upstream method, increase of annual throughput to 1.54 million tonnes per annum (Mtpa) and burial of approximately 100 tyres per year in the Waste Rock Dump (WRD).

Altura subsequently notified DWER that the TSF design would be changed to a downstream construction method, and on 25 March 2020 submitted the *Pilgangoora Lithium Project Tailing Storage Facility Stage 3/4 Raise Permitting Design Report*, prepared by Knight Piesold Pty Ltd, March 2020 (KP, 2020). Stages 3 and 4 will be constructed by one construction raise, and has been renamed Stage 3/4.

3. Scope

This application assessment relates to category 5 activities at the Premises as defined in Schedule 1 of the Environmental Protection Regulations 1987 (EP Regulations). Proposed changes to the existing licence production or design capacity or throughput are shown in Table 2.

Table 2: Prescribed Premises Category

Classification of Premises	Description	Existing licence premises production or design capacity or throughput	Proposed premises production or design capacity or throughput
Category 5	Processing or beneficiation of metallic or non-metallic ore	Process plant - 1,400,000 tonnes per Annual Period TSF - 770,000 tonnes of tailings per Annual Period	Process plant – 1,540,000 tonnes per Annual Period TSF – 770,000 tonnes of tailings per Annual Period

The Applicant stated that up to 100 tyres or 2 tonnes of tyres per annum would be buried. This amount does not meet the production or design requirements of a prescribed premises category as defined in Schedule 1 of the EP Regulations and is therefore not within the scope of this assessment. Burial of tyres is required to be disposed of in accordance with Part 6 of the EP Regulations. The applicant has also stated that the location of each burial site, number of tyres and approximate volume will be recorded in the Waste Tyre Burial Register and stored on site.

This Amendment Report assesses emissions and discharges associated with the construction and operation of the TSF Stage 3/4 raise and increase in design capacity/throughput.

This assessment has resulted in DWER issuing amended Licence L9036/2017/1 which is contained in Attachment 1.

4. Background

4.1 General

The premises is located on M45/1230 and M45/1231, which is owned and managed by the Licence Holder. The Project comprises of an open pit mining operation, lithium process plant, tailings storage facility and waste landform. The process plant is designed to treat lithium ore at a rate of 1.54 Mtpa to produce lithium concentrate, resulting in a tailings discharge rate of 0.77 million tonnes per annum (Mtpa).

Over the life of the mine (14 years), a total of approximately 10 Million tonnes (Mt) of tailings is expected to be produced (KP, 2020). The TSF is expected to reach a final embankment height in excess of 15 m.

The TSF comprises one semi-circular cell and was designed as a paddock style facility with a soil liner beneath the decant pond area, an underdrainage system and a pump out decant system.

KP (2016) and KP (2020) rated the TSF as a 'HIGH' B for the Dam Failure Consequence Category, and 'LOW' for the Dam Spill Consequence Level based on the ANCOLD Guidelines on Tailings Dams (ANCOLD, 2012).

The TSF operates under an Operating Manual prepared in accordance with *The Guidelines on the Development of an Operating Manual for Tailings Storage,* (1998).

5. Tailings characterisation

KP (2020) summarises the results of tailings geochemical testing conducted by Graeme Campbell and Associates (GCA, 2016):

- The tailings material is considered Non Acid Forming (NAF).
- Metals elevated significantly above crustal abundance limited to non-toxic or low toxicity metals bismuth, lithium, tin and tantalum.
- Tailings solids and waste rock materials have been classified as non-radioactive.
- The supernatant was found to meet the guidelines for the release from mining operations and livestock drinking water.
- Given the supernatant pH of 7.7 and low rainfall of the Pilbara, GCA (2016) considered the acidification of the supernatant pond or tailings pore water due to weakly acidic rainwater during operations is not envisaged.

Preston Consulting (2017a) states that "*From all geochemical viewpoints, the FT and DMS solids streams are inert with 'near-zero' risk for water-quality impacts where left in a free-draining state. This affords considerable 'degrees- of-freedom' in options for the management of these process-streams GCA 2016a".*

DER (2016) states "*the tailings soldis appear to be enriched in numerous metals, in particular lithium, arsenic, chromium, lead, zinc, thallium, bismuth, tin and tantalum. Uranium and thorium are also generally associated with lithium deposits"*.

DER (2016) states that "*It is significant to note that the concentrations of uranium measured in the initial pre-rinse cycle for flotation-tailings solids (24.7 µg/L), and in the 12 week cycle for the dense-media separation solids (22.2 µg/L), exceeded Australian Drinking Water Guideline values (17 µg/L), so it is incorrect to assert that "the FT-solids-leachates were essentially potable…*".

DER (2016) also states that "*Humidity cell testing did not reveal concentrations of trace metals at levels posing any environmental concern*".

DWER considers that while the leaching tests carried out to date are reasonable, and indicate a relatively low risk in regard to initial leachate water quality, DWER believes that the conclusion by *GCA, 2016* that the FT and DMS-solids streams are "inert with 'near-zero' risk for water quality impacts where left in a free-draining state" has far overreached the scope of the tests carried out.

The Licence Holder has committed to sampling the TSF slurry water annually over the life of the mine.

5.1 TSF Stage 1/2

Altura completed construction of TSF Stages 1 and 2 in January 2018 to a design prepared by KP, 2016.

The TSF is located adjacent to the west side of the waste rock dump and comprises a single cell, multi-zoned downstream profile, semi-circular embankment with a final basin footprint area of approximately 29 ha.

Seepage control and underdrainage collection systems have been constructed, with:

- Decant pond area liner approximately 140 m radius of low permeability material (200 m depth) conditioned and compacted.
- A cut off trench located beneath the upstream Zone A for the entire length of the embankment and has been excavated to extend through to competent foundation material.
- TSF underdrainage system consists of underdrainage constructed around the decant pond area, branch drains in the natural drainage alignments, and embankment upstream toe drains.
- Underdrainage collection tower and sump positioned at the low point within the TSF basin - underdrainage flows to a collection sump and is pumped to the process water circuit.
- Decant system is constructed on the eastern side of the TSF basin - supernatant water and rainfall runoff from the tailings surface is pumped back to the process plant by pumps located in the decant tower situated on the eastern embankment.

An emergency spillway is constructed for discharge of a Probably Maximum Flood event.

5.2 Tailings discharge

Tailings are discharged to the TSF by sub-aerial deposition methods, being delivered by a distribution line along the embankment crest (excluding the eastern embankment) with discharge by spigot offtakes at 25 m intervals. Supernatant water and rainfall runoff from the tailings surface is pumped back to the process plant by pumps located in the decant tower.

The original TSF design by KP, 2016 was based on parameters for tailings with a particle size of approximately 80 percent passing 92 micrometres (µm) transferring via a slurry pipeline at a range of 50-60 % solids from the process plant to the TSF.

TSF audit reports in 2019 and 2020 identified that the tailings deposited have a smaller solid proportion than anticipated (35 – 40%), but the percentage of solid deposition had increased.

5.3 Piezometers

Vibrating Wire Piezometers (VWP) are installed in embankments to monitor the phreatic surface.

5.4 Groundwater monitoring bores

Monitoring bores were installed at four locations around the TSF as shown in Figure 1. In each location two bores were drilled, one shallow (approximately 10 m depth) and one deep (extending 25 m below the water table). The shallow bore is intended to detect any seepage from the TSF flowing within the surface sediment, whilst the deep bore will monitor the water levels and chemical composition of the groundwater.

Figure 1: TSF monitoring bore locations – existing licence

6. TSF proposed Stage 3/4

6.1 Tailings design parameters

The Stage 3/4 tailings design parameters are based on:

- Operating discharge percent solids is 35 - 40% solids w/w, which is lower than the 60% solids w/w tested for the Fine Tailings Sample in 2016.
- The testing indicated the rate of supernatant release was quick with the majority of water released within one day. The supernatant release is estimated to be between 35 – 50 % of the initial water volume in slurry;
- With suitable air drying of the tailings slurry, efficient underdrainage and well managed pond, a settled density of 1.2 t/m^3 to 1.3 t/m^3 is expected for the tailings;
- In the range of expected settled densities, the vertical permeability of the tailings sample is approximately 1.0 x 10^{-6} m/s. As the tailings consolidate, it is anticipated that the permeability will reduce by half an order of magnitude; and
- The results indicate the sample has low compressibility and will consolidate quickly under self-weight of additional deposition.

KP (2020) reports that the latest survey indicate higher tailings dry densities are being achieved (1.6 t/m^3), assumed due to improved cycling of deposition locations. However densities of 1.3 t/m^3 are used for the Stage 3/4 design.

The tailings design parameters used by KP (2020) for Stage 3/4 are summarised in Table 3 below.

Table 3: Stage 3/4 tailings design criteria

Parameter	Value
Maximum Air Dried Density	1.36 t/m^3
Beach Slope	1V : 80H – 1V:120H
Solids Content	35 - 40%
Supernatant Release	35 - 50%
Underdrainage Release	0 - 30%
Vertical Permeability	1.0 x10^{-6} m/s
Coeff. Of Consolidation (c_v)	344 m^2/yr
Coeff. Of Volume Decrease (m_v)	0.010 m^2/kN
Compression Index (c_c)	0.162

6.2 Embankment elevation

Downstream construction methods were utilised for the existing Stage 1/2 embankment. The original design for Stages 3 and 4 was by upstream construction method (KP, 2016) but has now been redesigned for construction by downstream method and will be constructed as one Stage 3/4 raise. Embankment crests and storage capacities are shown in Table 4.

Table 4: Staged embankment crest

Stage	TSF storage capacity (cumulative)	TSF Embankment Elevation*1	Max Raise Height	Maximum TSF Embankment Height
1/2 (completed)	1.6. Mt	186.0 m RL	9.0 m	9.0 m
3/4	2.61 Mt	190.3 m RL	4.3 m	13.3 m

*1 Embankment crest elevations include a minimum freeboard and stormwater capacity for 100 year Annual Recurrence Interval (ARI) 72 hour storm event occurring on an average conditions pond

6.3 TSF Design Criteria

The TSF design criteria and parameters adopted by KP (2020) are summarised in Table 5 below.

Table 5: TSF Design criteria (KP, 2020)

TSF DESIGN	SPECIFICATION
Tailings Production - Jan to June 2020 - July 2020 onwards	 0.77 Mtpa 0.77 Mtpa
Storage Capacity - Stage1 / 2 (existing) - Stage 3 / 4 - Total to Stage 4	 1.3 Mt 1.9 Mt 3.2 Mt
Embankment Freeboard	0.3 m minimum to embankment crest for tailings elevation. 0.5 m minimum to embankment crest (or spillway invert for average pond plus design storm (1 % Average Exceedance Probability (AEP) 72 hour).
Stormwater Capacity - Short duration - Long duration	 1 % AEP 72 hour duration storm event superimposed over average conditions operating pond volume. Average conditions. 1 % AEP, 1 year wet sequence.
Spillway	Probable Maximum Flood storm event.
Earthquake Loading	Operating Basis Earthquake (OBE) – 1,000 years Safety Evaluation Earthquake (SEE) – 10,000 years Maximum Credible Earthquake (MCE)
Factors of Safety (target values) - Long-term drained - Short-term drained (potential	 1.5

loss of containment) - Short-term undrained (no potential loss of containment) - Post-seismic	1.5 1.3 1.0 – 1.2
TSF EMBANKMENTS	
Construction	Multi-zoned earth fill embankment, upstream low permeability zone on upstream face. Downstream raise construction methods.
Construction Materials	Remove unsuitable foundation soils from embankment footprint for use as embankment fill (if suitable). Low permeability Zone A material from local borrow or suitable tailing materials. Structural fill Zone C material from mine waste. Erosion Protection (Zone E) from mining operation. Coarse rockfill (decant Zone G) processed on site and supplied from mining operation.
TSF BASIN	
Basin Liner	Decant area: Scarified and re-compacted in-situ material to 200 mm depth and/or import, moisture conditioned and compacted 200 mm suitable low permeability material.
Tailings Underdrainage System	Main collector drains, finger drains and embankment toe drains installed to collect seepage water from the tailings mass and discharge it to a collection sump for pumping back to the tailings supernatant pond. The main collector drains are positioned in the natural creek lines. The finger drains were constructed at 20 m spacing within a 140 m radius at the area of the decant tower. The toe drains were placed at the western embankment upstream toe with a second drain offset by approx. 45m from the upstream toe in the TSF basin. Branch and Finger Drains - Corrugated, perforated tubing surrounded by sand (Zone F) and wrapped in geotextile (continuously seamed or heat welded).
TSF OPERATION	
Slurry Characteristics	~ 40 % solids by weight. Tailings beach slope = 80H:1V (horizontal distance to vertical change) to 120H: 1V Maximum Density = 1.3 tonnes per m^3.
Fluid Management	Basin underdrainage system gravity feeds into collection sump and is returned to the process plant via submersible pump.

	Decant tower system will remove supernatant solution and return to the plant via submersible pump. .
General	Upstream spigot deposition of tailings from embankment crest and TSF perimeter except along the waste dump embankment. The supernatant pond is to be maintained at the decant tower location at the waste dump side, remote from the main embankment.
Monitoring	Monitoring bores downstream of embankment to monitor groundwater level and quality. Piezometers in embankments to monitor phreatic surface. Embankment settlement pins to monitor movement of the embankment.
TSF REHABILITATION	
Final Embankment Slopes	External to waste dump – 3.0H:1V (overall), with 5 m horizontal benches at 10 m height increments.
Cover Profile	Generally shaped to achieve dry closure with no ponding (water shedding).
Capping	Mine waste (nominal 0.3 m thickness), covered with topsoil (0.2 m), re-vegetation.
Closure spillway	Probable Maximum Flood storm event.

6.4 TSF water management

6.4.1 Storage volume

KP (2020) conducted site water balance modelling in order to estimate the TSF Stage 3/4 operating pond volumes, design storm pond volumes and extreme climate condition storage and concluded:

- The water balance is negative during the life of the Stage 3/4 TSF. The available water from the TSF is less than the required process plant make-up requirements.
- Under average conditions the supernatant pond stays at the minimum operating size or very close to minimum size each year, and consequently ponding of water against the external embankments is unlikely to occur under any storm event.

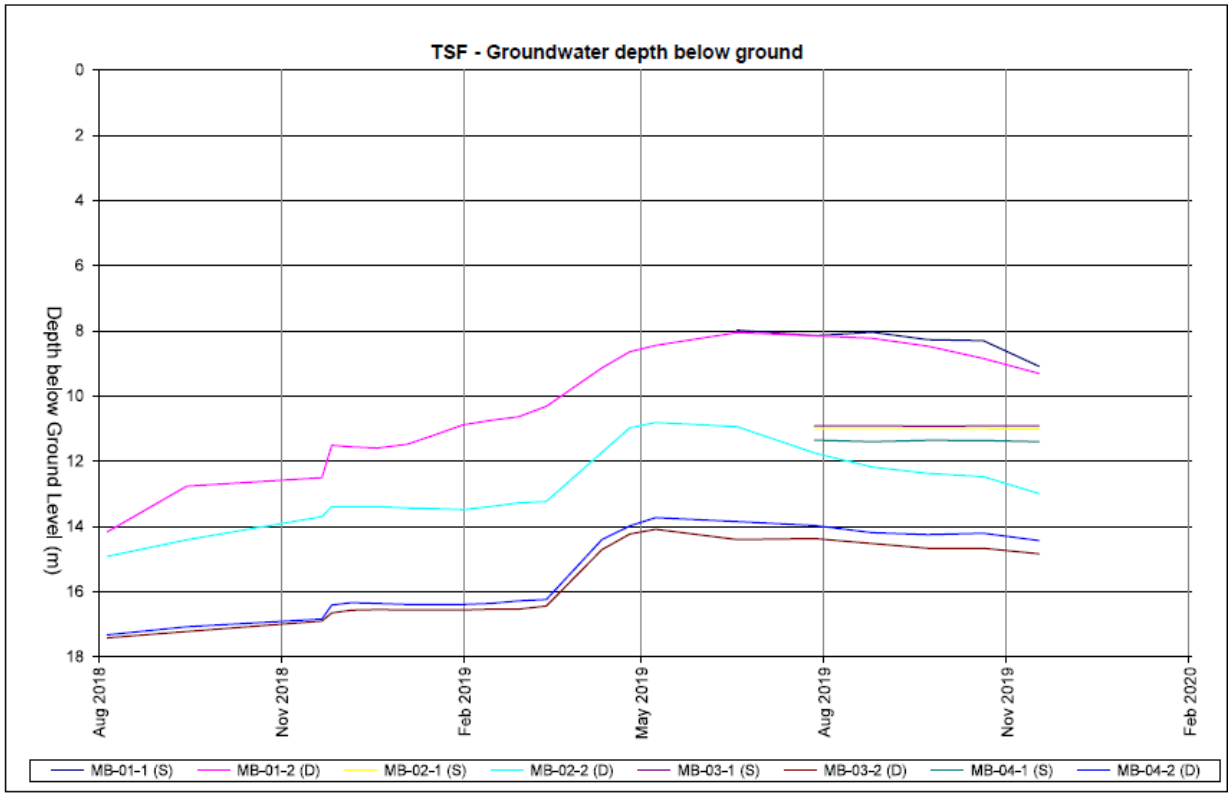
6.4.2 Seepage

To reduce seepage losses through the TSF, a number of seepage control and underdrainage collection features have been built into the design of the TSF (Section 5.1 above).

Groundwater levels at the TSF were 15 to 18 mbgl prior to operations. Groundwater levels rose after initial tailings deposition and to July 2019, but showed a decreasing trend for the following months as shown in Figure 2 below (from TSF 2019 Audit). Bore MB-01-02 recorded 14 mbgl in August 2018 and reached 8 mbgl in July 2019 but showed some reduction to 9 mbgl by November 2019.

The TSF 2019 Audit considered the increase was in direct response to initial tailings discharge with the decrease in response to formation of the tailings beach across the basin area and more continual operation of deposition and increase of the settled densities of deposited tailings.

Figure 2: Groundwater levels at the TSF



For the 2019 water balance, the TSF 2019 audit noted that data records were not available between April 2019 and December 2019. No decant return water was recorded during this period as tailings discharge occurred in the northern section of the TSF where the beach surface had not yet been established.

6.4.3 Seepage modelling

KP (2020) used the seepage analysis program SEEP/W to evaluate:

- The potential rate of seepage losses from the TSF to provide an indication of the potential environmental impact from operation of the TSF.
- The potential volumes of water collected in the basin underdrainage systems.
- The effect of underdrainage system on the overall phreatic surface in the facility.

The analysis was undertaken for three supernatant pond conditions (average, large and extreme ponds). KP (2020) notes that a large variation in these conditions may be present across the TSF footprint, which can have a significant impact on the estimated rates. The results of the seepage analysis are summarised in Table 6.

Table 6: Modelled seepage loss

Pond Size (m)	Underdrainage System Operation	Seepage Loss			Into Drains	
		($m^3/s/m$)	($m^3/s/m^2$)	(kL/ha/day)	($m^3/s/m$)	(L/s)
350 (3 mths)	No drains	1.3E-05	9.0E-08	77	0E+00	0.0
	Full underdrainage	1.2E-05	8.2E-08	71	4E-05	23.9
250 (6 mths)	No drains	1.4E-05	9.6E-08	83	0E+00	0.0
	Full underdrainage	1.3E-05	8.5E-08	73	2E-05	6.6
150 (constant)	No drains	1.3E-05	8.7E-08	75	0E+00	0.0
	Full underdrainage	1.2E-05	7.8E-08	68	3E-06	0.6

KP(2020) provided conclusions, in summary, that:

- Based on the results, full operation of underdrainage system benefits the control of seepage to a limited extent. The seepage modelling indicates that for a 4 year period (up to Stage 4), the embankments are expected to remain unsaturated.
- The embankment toe drains, and underdrainage system will act to draw down the phreatic surface adjacent to and within the embankments, reduce seepage loss through the facility, improve consolidation, and will increase the density of the tailings and effective storage capacity.

KP (2020) notes the facility should be operated to achieve the minimum pond size practicable.

6.4.4 Groundwater quality

Groundwater quality monitoring results at the TSF groundwater monitoring bores for the 2019 period indicated:

- Concentrations between boreholes appeared to be generally consistent.
- All of the concentration levels other than Arsenic and Boron were below the ANZECC Guidelines for Fresh and Marine Water Quality.
- All concentrations were below the ANZECC Guidelines for livestock drinking water.
- Levels have not deviated significantly from initial results in 2018.
- Arsenic recorded a maximum reading of 0.036 mg/L and Boron a maximum reading of 1.6 mg/L.
- Lithium recorded a maximum of 1.1 mg/L (guidelines not established by ANZECC 2000).

(TSF 2019 audit).

7. Legislative context

Table 7 summarises approvals relevant to the assessment.

Table 7: Relevant approvals and tenure

Legislation	Number	Approval
Mining Act (WA) 1978	Reg ID 86477	Pilgangoora Mining Proposal Rev 4 Approved 25 May 2020
Section 51E of the EP Act	Clearing permit 7246/2	Approved 1 June 2017.
RIWI Act	GWL182856	Groundwater abstraction for water supply and mine dewatering borefield systems - 1,270,000 kilolitres per annum.

7.1 Part IV of the EP Act

The Licence Holder has stated that the initial Pilgangoora Lithium Project was not referred to the Environmental Protection Authority (EPA) under Part IV of the EP Act as it was not considered to have a significant impact on the environment. Likewise, the proposal for this amendment has not been referred to the EPA.

7.2 Part V of the EP Act

7.2.1.1 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: Setting Conditions (October 2015)
- Guidance Statement: Environmental Siting (November 2016)
- Guidance Statement: Risk Assessment (February 2017)
- Guidance Statement: Decision Making (June 2019)
- Guideline: Industry Regulation Guide to Licensing (June 2019)

7.2.1.2 Clearing

The clearing of native vegetation is not approved under the existing or amended Licence. Refer to Table 7 for information on clearing approvals for the premises.

7.2.2 Works approval and licence history

Table 8 summarises the works approval and licence history for the premises prior to this amendment.

Table 8: Works approval and licence history

Instrument	Issued	Nature and extent of works approval, licence or amendment
W6036/2017/1	7/07/2017	New works approval for category 5 (process plant and TSF) and category 12 (mobile crushing facility to be used for construction purposes only).

L9036/2017/1	11/09/2018	New Licence for category 5 (process plant and TSF).

7.3 Other relevant approvals

7.3.1 Radiation Safety Act 1975

The Licence Holder previously engaged Radiation Professionals to prepare a preliminary assessment of the predicted uranium and thorium radioactivity concentrations within the ore and the waste products.

Radiation Professionals (2016) found that due to the overall low uranium and thorium level details as provided in the application, the requirements of the Code (ARPANSA, RPS 9) "*are not applicable*" to the Premises. "*It is not anticipated that any pre-operational baseline or radiation management actions is needed*".

There have been no relevant changes to the materials mined or expected to be mined since the Radiation Professionals (2016) assessment and the initial licence assessment.

More detailed information can be accessed by the licence decision report dated 11/09/2018 and Radiation Professionals (2016).

8. Consultation

A letter inviting comment was sent to the Department of Mines Industry Regulation and Safety (DMIRS). DMIRS responded (in summary):

- An amended Mining Proposal that includes a change to the design of the TSF embankment lifts 3 and 4 (from an upstream design to a downstream design) was being assessed with considerations for geotechnical stability and closure.
- Tailings deposited appear to have a smaller solid proportion than anticipated (35-40% rather than 40-60%). It appears that the percentage of solid deposition has increased recently and may now be better aligned with the operating strategy and reduction of ongoing environmental risk.
- DMIRS has not specifically assessed the burial of tyres into a waste rock landform. The burial of tyres (and other mining detritus) is common practice in mining operations. However, considerations should be given to the compression of tyres due to weight of waste rock and weathering. DMIRS advises that a single large tyre cell should not be constructed as there is a risk of critical failure as the weight of the waste rock atop the tyres can cause the tyres to collapse under pressure. This may affect the stability of the waste rock landform and the safety of operators within the footprint and surrounds of the waste rock landform.

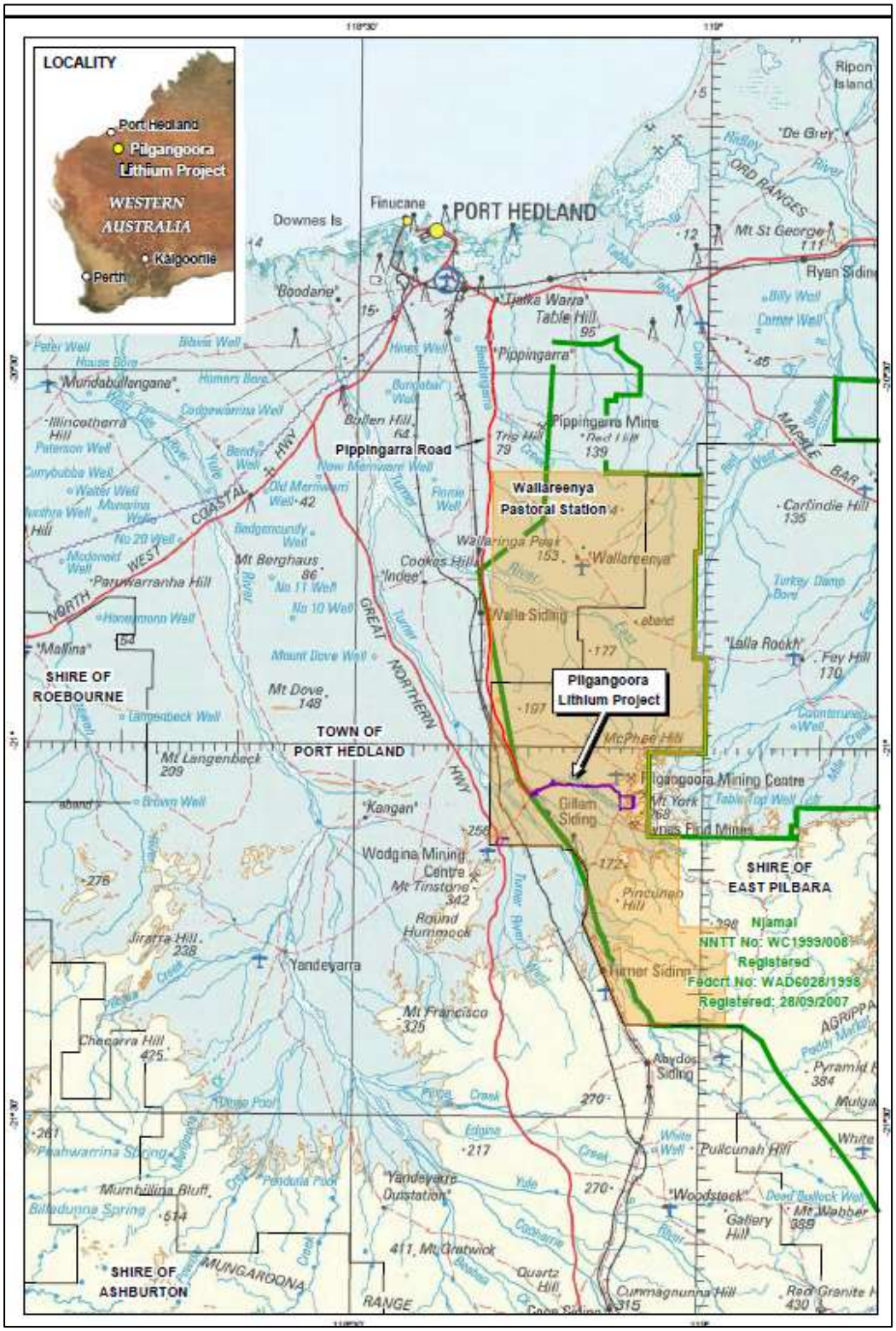
9. Location and siting

9.1 Siting context

The premises is located within the Pilbara region of Western Australia, on the Wallareenya Pastoral Lease, an active cattle grazing property. The homestead is located approximately 35 km north of the Premises.

Pilbara Minerals Limited's Pilgangoora Lithium-Tantalum Project is adjacent to the premises.

Figure 3: Regional location



9.2 Regional climate

The region experiences a semi-desert tropical climate characterised by hot days and sporadic rainfall, often associated with cyclonic events (Mining Proposal, 2017). The climate at the

Premises is classified as arid-tropical with two distinct seasons, hot summers from October to April and mild winters from May to September.

9.3 Sensitive land users

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

The distance to the closest sensitive land user and status as a potential sensitive receptor to the proposed activities is shown in Table 9.

Table 9: Sensitive land users

Land user	Distance from the Premises	Potential receptor status
Pilbara Minerals Limited's Pilgangoora Lithium-Tantalum Project onsite accommodation camp	5 km to the north-east of the TSF.	Not considered a sensitive receptor due to distance.

9.4 Specified ecosystems

The distances to specified ecosystems (*Guidance Statement: Environmental Siting,* DER 2016) and status as sensitive receptors are shown in Table 10.

Table 10: Specified ecosystems

Environmental value	Distance from the Premises	Potential receptor status
Department of Biodiversity, Conservation and Attractions - Managed Lands and Waters	Mungaroona Range Nature Reserve boundary is located approximately 80 km south-west of the Premises.	Not considered a sensitive receptor due to distance.
Ramsar Sites in Western Australia	The Fortescue Marshes is located approximately 140 km south of the Premises.	Not considered a sensitive receptor due to distance.
Declared Rare Flora (DRF), Threatened Ecological Communities (TEC) and Priority Ecological Communities (PEC).	The 2016 field flora and vegetation survey did not identify any threatened or priority flora (Mining Proposal, 2017). There are no DRF, TECs or PECs within a 30 km radius of the Premises.	Not considered a sensitive receptor due to distance.
Threatened or Priority Fauna	A Level 2 vertebrate fauna assessment was conducted by Natural Area Consulting Pty Ltd in May 2016 which found the following: • The presence of the Rainbow Bee-eater (*Merops ornata*), which is listed as a Migratory species under the *Environment Protection and Biodiversity Conservation Act 1999 (*EPBC Act). The species is considered a seasonal visitor to the area as the rocky ground is suitable	Not considered as sensitive receptors due location.

	for construction of nesting burrows and it was found near the water bore. • Two active mounds of the Priority 4-listed Western Pebble-mound Mouse (*Pseudomys chapmani*) were observed in the stony plains to the north-west of the site although no individuals were observed.	

9.5 Groundwater and water sources

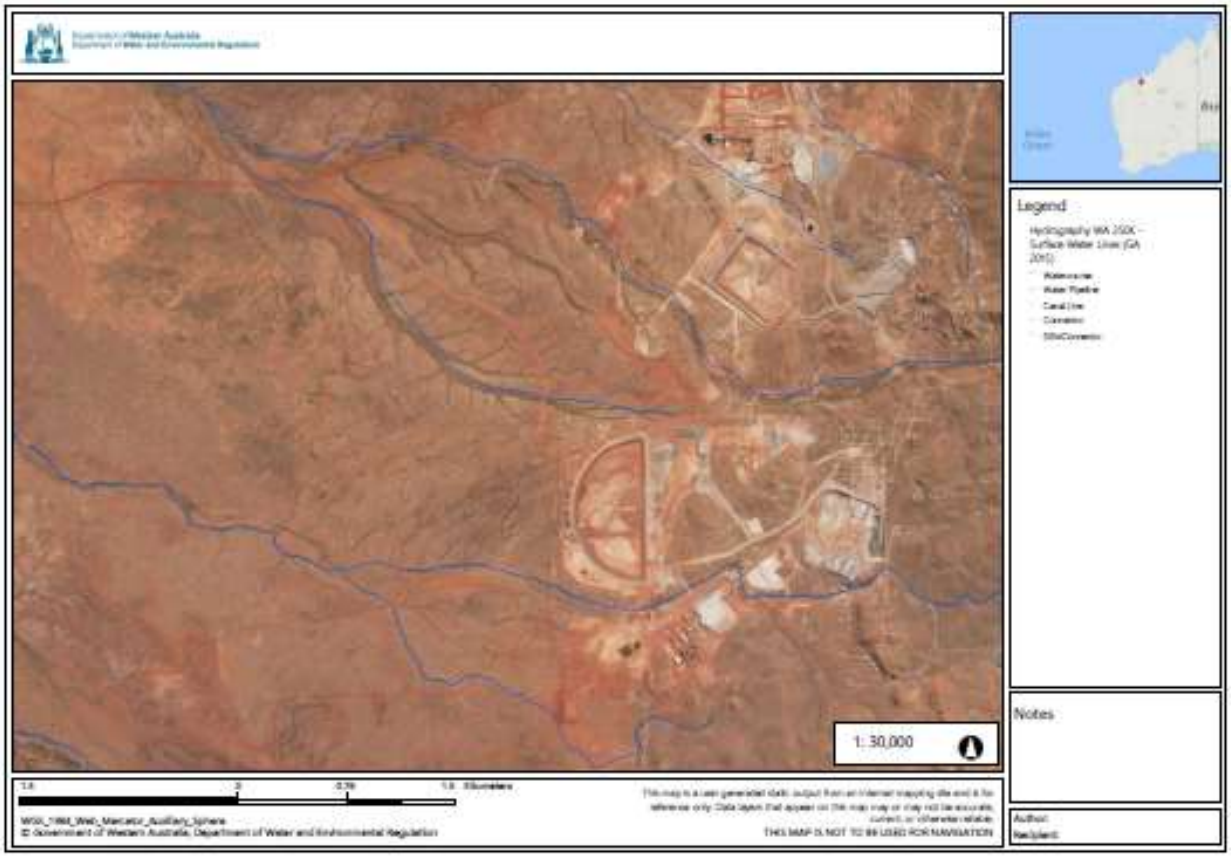
The distances to groundwater and water sources are shown in Table 11.

Table 11: Groundwater and water sources

Groundwater and water sources	Distance from Premises	Sensitive receptor status
Public Drinking Water Area	Approximately 50 km north-west of the Premises.	Not considered a sensitive receptor due to distance.
Watercourses are shown in Figure 4 below. Local drainage is generally westward, but with some flow to the north and south. The Premises is located within the Chinnamon Creek sub-catchment of the Turner River catchment.	Minor ephemeral creeks are located to the north and south of the TSF. Chinnamon Creek and McPhee Creek are approximately 2.5 km south and 8 km south-east of the Premises respectively.	Ephemeral creeks considered as sensitive receptors.
Groundwater and groundwater salinity Groundwater salinity (Total Dissolved Solids (TDS)) is 500-1,000 mg/L which is considered marginal (Salinity status classifications). Recharge of groundwater is from surface water runoff and flooding events.	The Premises is located within the Proclaimed Pilbara Groundwater and Surface Water Area. During construction of monitoring boreholes for TSF stage 1/2, water was encountered between 15 and 18 m. A pastoral bore is located on the premises and the closest pastoral bore is approximately 1 km west.	The groundwater is suitable for stock watering. Considered a sensitive receptor.

Surface water lines area shown in Figure 4 below. The semicircular development feature visible in the landscape is the Altura premises TSF.

Figure 4: Surface water lines



9.6 Hydrogeology

GDS, 2016a states that groundwater in the Port Hedland and Pilgangoora region is generally unconfined and occurs in weathered fractured bedrock aquifers comprising granite and greenstone. Recharge occurs mostly from river flow and the most important areas for groundwater resources are in the vicinity of major surface water courses. To the west of the Premises, production bores are constructed along the Turner River, which has significant recharge. To the south, groundwater occurs in fractured bedrock associated with the Breccia borefield and fairly significant recharge from Chinnamon Creek.

The local hydrogeology of the project area can be summarised as follows:

- Aquifer type (Fractured rock);
- Water Levels are approximately 20 to 30 metres below ground level (mbgl);
- Direction of groundwater flow (predominantly to the west); and
- Direction of surface water flow (predominantly to the west).

9.7 Topography

The TSF is located on a gently sloping and sparsely vegetated plain that falls at approximately 1V:7.5 H to the west.

10. Risk assessment

10.1 Determination of emission, pathway and receptor

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.

The identification of the sources, pathways and receptors to determine Risk Events is set out in Tables 12 and 13 below.

Table 12: Identification of emissions, pathway and receptors during construction

Risk Events						**Continue to detailed risk assessment**	**Reasoning**
Sources/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**		
Category 5	Movement of earth and operation of machinery	Dust	Adjacent vegetation	Air / wind dispersion	Potential suppression of photosynthetic and respiratory functions	No	Limited impact on vegetation (dust impacts are temporary and no Declared Rare Flora, TECs or PECs within or in a 30 km radius of the Premises).
		Contaminated stormwater	Ephemeral creeks - riparian vegetation	Stormwater runoff Gravity flow overland	Contamination of drainage lines with sediment and hydrocarbons in sediment Loss of riparian vegetation	No	The Licence Holder has implemented the following controls: • Surface water is managed in accordance with *EMP, 2017*; • *"General collector and diversion drains redirect surface water flows from major infrastructure locations and into ephemeral drainage lines*" (W6036 Compliance Report, 2018a); The Delegated Officer considers the general provisions of the EP Act and *Environmental Protection (Unauthorised Discharges) Regulations 2004* sufficient in terms of regulatory controls.

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**		
		Leaks and spills of hydrocarbons and chemicals	Soils vegetation adjacent to the TSF. Groundwater	Direct spill or leak to ground	Soil and/or groundwater contamination	No	Managed under Dangerous Goods Site Licence number DGS022272. The general provisions of the EP Act and *Environmental Protection (Unauthorised Discharges) Regulations 2004* apply, as does the *Dangerous Goods Safety Act 2004* and associated Regulations.

Table 13: Identification of emissions, pathway and receptors during operation

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**		
Processing or beneficiation of metallic or non-metallic ore	Deposition of tailings into the TSF Stage 3/4	Discharge of tailings from TSF embankment failure	Drainage lines in pathway of tailings Soil and vegetation	Direct discharges to land and infiltration to soil	Death or adverse impact to adjacent vegetation Soil contamination	No	Not within scope – stability of embankments assessed and managed by DMIRS under the *Mining Act 1978*.
		Tailings, decant and stormwater overflow from the TSF	Soils adjacent to the TSF. Terrestrial ecosystems adjacent to the TSF	Direct discharge	Inundation and soil contamination inhibiting vegetation growth and survival	Yes – Refer to section 10.5	Potential for impacts to soils and vegetation if overflows occur.
		Increased tailings seepage due to additional mass of tailings deposition, and actual solids content of tailings being less than that assumed for initial TSF design for the	Soil Subterranean fauna Adjacent vegetation Groundwater of beneficial use	Seepage to groundwater adjacent to the TSF and seepage from the base of the TSF with infiltration into	Groundwater mounding Inundation of vegetation root zones, resulting in poor vegetation health or death Soil contamination	Yes – Refer to section 10.5	Potential for impacts to vegetation and groundwater with beneficial use.

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
		completed Stage 1/2 base and seepage controls		soils	inhibiting vegetation growth and survival Contamination of groundwater of beneficial use.		

10.2 Consequence and likelihood of risk events

A risk rating will be determined for Risk Events in accordance with the risk rating matrix set out in Table 14 below.

Table 14: 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 15 below.

Table 15: 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.

10.3 Acceptability and treatment of Risk Event

DWER will determine the acceptability and treatment of Risk Events in accordance with the risk treatment table 16 below:

Table 16: 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.

10.5 Risk Event – TSF Stage 3/4 overtopping

10.5.1 Description of risk event

Overtopping of TSF embankment.

10.5.2 General characterisation of emission

The results for the multi-element-analysis for process-stream-solids samples indicate elevated concentrations of lithium, arsenic, chromium, lead, zinc, thallium, bismuth, tin and tantalum. Uranium and thorium are also generally associated with lithium deposits.

Decant also has the potential to become concentrated as it is recycled through the process.

10.5.3 Potential adverse impact from overtopping

Discharge of tailings, decant and stormwater by embankment overtopping may impact upon adjacent vegetation through toxicity and physical smothering, as well as sedimentation and contamination of surface water systems.

10.5.4 12.6.4 Criteria for assessment

ANZECC 2000 (but does not provide a lithium trigger value for freshwater ecosystem protection, however advice (Broberg et al., 2011) indicates values of >1 mg/L are considered of concern).

10.5.5 Applicant controls

The TSF is operated according to the Code of Practice: Tailings storage facilities in Western Australia and the TSF Operating Manual (2018).

TSF Stage 3/4 embankment and construction has been designed for an anticipated two year deposition and rainfall events, with total freeboard of 500 mm maintained, and emergency spillway for discharge of a Probably Maximum Flood event.

Altura has reported to DWER by annual reporting, compliance with the existing 500 mm freeboard requirement and no operational issues to date. The TSF audit carried out by Knight Piesold Limited on 10 December 2019 (TSF 2019 audit) included inspection of the basin area, spillway, supernatant pond and freeboard, and concluded that "*overall the TSF is well operated and developed with no significant issues noted".*

10.5.6 Consequence of Risk Event

The impact of TSF overtopping could result in localised soil contamination and smothering of vegetation. Ephemeral creeks draining west are located approximately 100 m to the north and south of the TSF. There is no conservation significant vegetation in the vicinity of the TSF.

Therefore, impacts are considered low level on-site and consequence is **minor**.

10.5.7 Likelihood of Risk Event

Based upon the Applicant's controls, the likelihood of the consequence is **rare**.

10.5.8 Overall rating of TSF overtopping

The overall rating of risk for TSF overtopping and seepage is **Low**.

10.5.9 Regulatory controls

The Applicant's controls have lowered the risk.

The licence will be amended to include conditions for Stage 3/4 requiring construction as

proposed by the KP 2020 Stage 3/4 design, and approval for deposition of tailings into Stage 3/4 after submission of compliance documents.

The existing licence includes the Applicant's control for total freeboard of 500 mm to be maintained, and will remain applicable for Stage 3/4.

10.6 Risk Event – TSF Stage 3/4 seepage

10.6.1 Description of risk event

Storage of an additional 770,000 tonnes per year of tailings within TSF Stage 3/4, with further risk of seepage through the base and embankments.

10.6.2 General characterisation of emission

The results for the multi-element-analysis for process-stream-solids samples indicate elevated concentrations of lithium, arsenic, chromium, lead, zinc, thallium, bismuth, tin and tantalum. Uranium and thorium are also generally associated with lithium deposits.

Decant has the potential to become concentrated as it is recycled through the process.

DWER considers that while the leaching tests carried out to date are reasonable, and indicate a relatively low risk in regard to initial leachate water quality, DWER believes that the conclusion by *GCA, 2016* that the FT and DMS-solids streams are "inert with 'near-zero' risk for water quality impacts where left in a free-draining state" has far overreached the scope of the tests carried out.

Evidence from mines in rare-element pegmatites elsewhere in Western Australia and internationally indicates that significant amounts of lithium, caesium and rubidium can be leached from mine wastes that can lead to contamination of surface water and groundwater. Some of the lithium is released into solution during the milling of spodumene ore (Bradley et al., 2010), and significant concentrations of this element can accumulate within mine processing water and can seep into groundwater through tailings disposal sites.

10.6.3 Potential adverse impact from seepage

Lateral movement of seepage through ground may contaminate soil and impact vegetation in the path of the seepage through inundation and toxicity of contaminants.

Leaching of tailing contaminants through soil into local groundwater may impact on beneficial uses of groundwater.

10.6.4 Criteria for assessment

The ANZECC water quality guidelines for livestock drinking water provide a criteria for assessment for groundwater. There is currently no ANZECC water quality guideline value for livestock water supplies for lithium, caesium and rubidium.

It is noted that lithium does not include a trigger value for freshwater ecosystem protection, however advice (Broberg et al., 2011) indicates values of >1 mg/L are considered of concern.

10.6.5 Applicant controls

Stage 3/4 embankment raise to be constructed to KP (2020) design.

Stage 1/2 has been constructed as per KP (2016) design. Tailings underdrainage system has been constructed and four vibrating wire piezometers (100 m length) installed.

Tailings consolidation is encouraged by methods including subaerial deposition by spaced spigots, the active beach is rotated around the TSF, and supernatant and rainfall removed by

decant pump.

The TSF is operated according to the Code of Practice: Tailings storage facilities in Western Australia and the TSF Operating Manual (2018).

10.6.1 Consequence of Risk Event

Groundwater mounding may impact deep rooted vegetation in the vicinity of the TSF. There is no environmentally significant vegetation in the vicinity.

Groundwater quality is of beneficial use for livestock watering. Based upon the potential contaminants in the tailings leachate, seepage of leachate to groundwater may reduce the quality of groundwater over time.

Specific consequence criteria may be at risk of not being met at a low level, off site, local scale, and therefore consequence is considered **moderate**.

10.6.2 Likelihood of Risk Event

Key factors are:

- Tailings deposited have a smaller solid proportion than anticipated which may increase the likelihood of seepage loss.
- The TSF has been constructed with a seepage collection system to reduce loss of seepage and for reuse in the process plant, but seepage loss is anticipated.
- The site water balance has been modelled as negative, and the percentage of solid deposition increased in the 2019 period. Groundwater levels rose in the initial stages of tailings deposition to July 2019 but showed a decreasing trend for the following months.
- Management of tailings deposition and the decant pond will be required to encourage maximum consolidation of tailings.

It is considered that seepage of tailings leachate to groundwater could occur at some time, therefore the likelihood of the risk event is **possible**.

10.6.3 Overall risk rating of TSF seepage

The overall rating of risk for TSF seepage risk event is determined to be **medium**.

10.6.4 Regulatory controls - seepage

The premises should be managed so as to ensure that groundwater quality is maintained at its baseline level to ensure that groundwater quality remains suitable for its highest beneficial use.

The licence will be amended to include conditions for Stage 3/4 requiring construction as proposed by the KP 2020 Stage 3/4 design, and approval for deposition of tailings into Stage 3/4 after submission of compliance documents.

The existing licence condition 4 requires a water balance. Condition 4 will be amended to better clarify the water balance purpose to enable tracking seepage loss, and for monthly rather than annual records.

The existing licence condition 8 requires groundwater monitoring at four bores near the embankments of the TSF. Condition 8 will be amended to include an additional monitoring bore EX19CHC05 which is located approximately 800 m west and downstream of the TSF. The bore will provide downstream background monitoring data for comparison against the TSF bores.

The groundwater monitoring suite includes Fluoride by PC Titrator which will be removed as requested by the Applicant, because it provides the same information as Fluoride by ISE.

The existing licence requires reporting of groundwater monitoring with a comparison against

previous results and environmental criteria to be included with the Annual Audit Compliance Report. For better clarity, the licence will be amended to require submission of an Annual Environment Report including water balance results and groundwater monitoring with comparisons with previous years and environmental criteria.

Given the beneficial uses of the underlying groundwater and expected seepage losses, condition 12 has been added for reporting of exceedences of the ANZECC 2000 guidelines for livestock drinking water, within 30 days of monitoring.

11. Category 5 design and production capacity

The existing licence category 5 design and production capacity is 1,400,000 tonnes per annum (tpa) for the process plant. The Applicant has requested this be increased to the plant's actual design capacity of 1,540,000 tpa. The tailings discharged to the TSF will remain unchanged at 770,000 tpa.

The risk of dust, noise, stormwater, and tailings emissions will essentially remain the same with the increase in licence design and production capacity. Therefore, the Delegated Officer has determined the category 5 process plant design and production capacity will be increased to 1,540,000 tpa as requested.

12. Summary of amendments

Table 17 provides a summary of the proposed amendments and will act as record of implemented changes. All proposed changes have been incorporated into the amended licence as part of the amendment process.

Table 17: Summary of licence amendments

Existing condition no.	Revised condition no.	Proposed amendments
Front cover		Category 5 process plant production or design capacity increased to 1,540,000 tpa
1	N/A	Removed as licence format update - redundant condition
2	1	Table 3 amended to include Stage 3/4
5	4	Water balance required monthly with addition of estimate of lost seepage
8	7	Changes to groundwater monitoring requirements: • Additional off-site monitoring well. • Removal of monitoring parameter Fluoride by PC titrator. • Removal of redundant monitoring requirements (results submitted).
9	N/A	Removal of redundant monitoring requirement (results submitted)
13	11	Monitoring results to be submitted by AER.
N/A	12	Requirement to report groundwater monitoring when ANZECC 2000 livestock guidelines are exceeded.
N/A	14	TSF Stage 3/4 construction requirements.

N/A	15	Submission of construction compliance audit report.
N/A	16	Requirements of construction compliance report.
N/A	17	Approval for deposition of tailings into Stage 3/4 upon submission of construction compliance report.
Schedule 1	Schedule 1, Figure 2	Groundwater monitoring bore map updated.
Schedule 2, Table 4	Schedule 2, Table 5	Category 5 process plant production or design capacity increased to 1,540,000 tpa.
Schedule 2, Table 5	Schedule 2, Table6	Inclusion of Site Plan 5.
Schedule 3	Schedule 3	Addition of Site plan 5 Stage 3/4 general arrangement.

13. Determination of Licence conditions

The conditions in the Issued Licence in Attachment 1 have been determined in accordance with the *Guidance Statement: Setting Conditions*.

Licence conditions may be subject to change following site inspections by DWER.

DWER notes that it may review the appropriateness and adequacy of controls at any time and that, following a review, DWER may initiate amendments to the issued licence under the EP Act.

14. Licence Holder's comments

The Licence Holder was provided with the draft decision report and draft licence on 22 June 2020. The Licence Holder had no comments and on 24 June 2020, requested the 21 day comment period be waived.

15. Conclusion

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

Alana Kidd
Manager, Resource Industries
Delegated Officer
under section 20 of the *Environmental Protection Act 1986*

Appendix 1: Key documents

Document Title	In text ref	Availability
Altura Lithium Operations Pty Ltd, 18 October 2019, *Application form* for a licence amendment, and supporting document: *Pilgangoora Lithium Project Works Approval & Operating Licence Amendment (L9036/2017/1),* and further correspondence	Application	DWER records (A1833235, A1879478, A1883664, A1895130, A1906990))
Altura Lithium Operations Pty Ltd, Email from Stephen Danti 20 January 2019, *Re: Applicant Notification - Application For An Amendment To Licence L9036/2017/1 - Request For Further Information*		DWER records (A1860164)
Australian and New Zealand and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, October 2000. *National Water Quality Management Strategy, Australian and New Zealand Guidelines for Fresh and Marine Water Quality*	ANZECC, 2000	accessed at http://www.waterquality.gov.au
Australian Radiation Protection and Nuclear Safety Agency, August 2005, *Code of Practice & Safety Guide for Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing* – Radiation Protection Series Publication No. 9.	(ARPANSA, RPS 9)	accessed at http://www.arpansa.gov.au
Bradley, D.C., McCauley, A.D. and Stillings, L.M., 2010. *Mineral-Deposit Model for Lithium-Cesium-Tantalum Pegmatites.* US Geological Survey, Scientific investigations Report 201050700-O	Bradley et. al, 2010	available at https://pubs.er.usgs.gov/publication/sir20105070O
Broberg, K., Concha, G., Engström, K., Lindvall, M., Grandér, M. and Vahter, M., 2011. *Lithium in drinking water and thyroid function. Environmental Health Perspectives*, 119(6), 827-830	Broberg, et al, 2011	available at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3114818/pdf/ehp-119-827.pdf
Department of Environment Regulation, 11 November 2016 response to request for Technical Advice – Altura Pilgangoora Lithium Project, received from Dr Bill Richmond.	DER, 2016	DWER records (A1194792)
Department of Mines and Petroleum, *2013 Code of Practice: Tailings storage facilities in Western Australia*	Code of Practice: Tailings storage facilities in Western	accessed at http://www.dmp.wa.gov.au

Document Title	In text ref	Availability
	Australia	
DER, July 2015. *Guidance Statement: Regulatory principles.* Department of Environment Regulation, Perth.	N/A	accessed at http://www.der.wa.gov.au
DER, October 2015. *Guidance Statement: Setting conditions.* Department of Environment Regulation, Perth.		
DER, November 2016. *Environmental Siting.* Department of Environment Regulation, Perth.		
DER, February 2017. *Guidance Statement: Risk Assessments*. Department of Environment Regulation, Perth.		
DWER, June 2019. *Guideline: Decision Making*. Department of Water and Environmental Regulation, Perth.		
DWER, June 2019. *Guideline: Industry Regulation Guide to Licensing.* Department of Water and Environmental Regulation, Perth.		
EP Act Part V Licence L9036/2017/1	Existing licence	accessed at www.der.wa.gov.au
EP Act Part V Works Approval W6036/2017/1, Pilgangoora Lithium Project, issued 7 July 2017	W6036/2017/1	accessed at www.dwer.wa.gov.au
Graeme Campbell and Associates Pty Ltd, July 2016, *Pilgangoora Project, Geochemical Characterisation of Flotation-Tailings and Dense-Media-Separation-Solids Samples, Implications for Process-Stream Management*, prepared by for Altura Mining Limited	GCA, 2016	DWER records (A1377473)
Groundwater Development Services (GDS) Pty Ltd , 14 December 2016, *Pilgangoora Project Drilling Investigations Hydrogeologic Report,* prepared by for Altura Mining Limited, SHS010-GWS-Doc142, Rev 5	GDS, 2016a	DWER records (A1377473)
Groundwater Development Services Pty Ltd , 14 December 2016, *Pilgangoora Project Groundwater Monitoring Strategy*, prepared for Altura Mining Limited, SHS021-GWS-Doc181	GDS, 2016b	DWER records (A1377473)
Knight Piesold Pty Ltd, December 2016, *Pilgangoora Lithium Project Tailings*	KP, 2016	DWER records (A1377473)

Document Title	In text ref	Availability
Storage Facility Final Design Report, prepared by for Altura Mining Limited, PE801-00317/07, Rev 0		
Knight Piésol Pty Ltd, April 2018, *Tailings Storage Facility Operating Manual*, prepared for Altura Mining Limited, PE801-00317/17 Rev A.	TSF Operating Manual, 2018	DWER records (A1712754)
Knight Piésol Pty Ltd, March 2020, *Tailings Management Facility Audit December 2019*, prepared for Altura Mining Limited, PE801-00317/23 Rev 1	TSF 2019 audit	DWER Records (A1896017)
Knight Piesold Pty Ltd , March 2020, *Pilgangoora Lithium Project Tailings Storage Facility Stage 3/4 Raise Permitting Design Report*, prepared by for Altura Mining Limited, PE801-00317/22, Rev 0	KP, 2020	DWER records (A1885401)
Preston Consulting Pty Ltd , 20 February, 2018, Pilgangoora Lithium Project Revised Mining Proposal M45/1230, M45/1231, L45/400 & L45/404 (ALT-COR-BUS-DOC-0035 Rev 1), prepared by for Altura Mining Limited, 15 February 2017	Mining Proposal, 2017	DWER records (A1383409)
Radiation Professional, 24 November 2016, *Preliminary Assessment of the Radionuclide Mass Balance and Regulatory Impact for the Altura Exploration Pty Ltd Pilgangoora Lithium Project*, AJM161109 Rev 0	Radiation Professionals, 2016	DWER records (A1377473)

Attachment 1: Issued Licence L9036/2017/1