Government of Western Australia
Department of Water and Environmental Regulation

Amendment Notice 4

Licence Number	L8469/2010/2
Licence Holder	Galaxy Lithium Australia Limited
ACN	130 182 099
File Number:	DER2014/001110
Premises	Mt Cattlin Project RAVENSTHORPE WA 6346 Lot 31 on Plan 224145 and Lot 127 on Plan 145763 (part of Mining tenement M74/244) Newdegate-Ravensthorpe Road RAVENSTHORPE WA 6346
Date of Amendment	25 January 2019

Amendment

The Chief Executive Officer (CEO) of the Department of Water and Environmental Regulation (DWER) has amended the above Licence in accordance with section 59 of the *Environmental Protection Act 1986* (EP Act) as set out in this Amendment Notice. This Amendment Notice constitutes written notice of the amendment in accordance with section 59B (9) of the EP Act.

Tim Gentle

Digitally signed by Tim Gentle
Date: 2019.01.25 14:53:50 +08'00'

Tim Gentle
MANAGER – RESOURCE INDUSTRIES
REGULATORY SERVICES

Officer delegated under section 20 of the Environmental Protection Act 1986

Definitions and interpretation

Definitions

In this Amendment Notice, the terms in Table 1 have the meanings defined.

Table 1: Definitions

Term	Definition
ACN	Australian Company Number
AMMP	Airborne Materials Management Plan (2010) revised on 26 September 2017
Annual period	means the inclusive period from 1 September until 31 August in the following year.
Category/ Categories/ Cat.	categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
CEO	for the purpose of correspondence means; Chief Executive Officer Department Administering the *Environmental Protection Act 1986* Locked Bag 33 CLOISTERS SQUARE WA 6850 Email: info@dwer.wa.gov.au;
Delegated Officer	an officer delegated under section 20 of the EP Act
DMIRS	means Department of Mines, Industry Regulation and Safety
DWER	means Department of Water and Environmental Regulation
EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
Existing Licence	The Licence issued under Part V, Division 3 of the EP Act and in force prior to the commencement of and during this Review
Licence Holder	Galaxy Lithium Australia Limited
m^3	cubic metres
mbgl	metre(s) below ground level
mg/L	milligrams per litre
m/s	metre(s) per second
Mtpa	Million tonnes per annum
Mining Act	*Mining Act 1978* (WA)

Noise Regulations	*Environmental Protection (Noise) Regulations 1997* (WA)
ONMP	Operational Noise Management Plan (2016) revision 5 dated 12 July 2017 reference 12843-5-10196
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*
RL	refers to the term 'Relative Level' and is the height or elevation above the point adopted as the site datum for the purpose of establishing levels.
TSF	Tailings Storage Facility
Wall lift 3	means the "wall lift 3" as indicated in Schedule 2.
Wall lift 4	means the "wall lift 4" as indicated in Schedule 2.

Amendment Notice

This amendment is made pursuant to section 59 of the *Environmental Protection Act 1986* (EP Act) to amend the Licence issued under the EP Act for a prescribed premises as set out below. This notice of amendment is given under section 59B (9) of the EP Act.

This Licence amendment notice assesses the construction of two wall lifts to the existing Tailings Storage Facility (**TSF**) cell 1, followed by operations, to service the Spodumene wet process plant at Galaxy Lithium Australia Limited (**Galaxy**) located at Ravensthorpe. The two TSF wall lifts proposed are;

- A wall lift of 5 metres from **RL** 275.3m to **RL** 280.3m and identified as **'wall lift 3'**; plus,
- A wall lift of 4.2 metres from **RL** 280.3m to **RL** 284.5m and identified as **'wall lift 4'**.

The proposal to construct and operate **TSF** cell 1 will not lead to increased annual production capacity currently at 2.0 million tonnes per annum (Mtpa). The annual tonnage of **TSF** waste to be deposited is estimated to be 324,000 tonnes per annum.

The following DWER guidance statements have informed the decision made on this amendment;

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

Amendment description

On 18 October 2018, **Galaxy** submitted a licence amendment application which is the subject of this Amendment Notice. Supporting documents to the licence amendment application included premises maps, TSF cell 1 and cell 2 design report (2010), Galaxy assessment of emissions during construction, latest version of the Galaxy Operational Noise Management Plan (ONMP)

plus Airborne Material Management Plan (AMMP). TSF cell 1 wall lift 3 and 4 are expected to take 10 to 12 weeks per lift to construct. During the construction the wet plant will continue operations. Each wall lift is expected to be constructed separately however the lifts may occur consecutively if the soil material used for construction is deemed suitable. The term of this Amendment Notice coincides with the term of the existing licence.

This Amendment Notice authorises one **TSF wall lift 3** to a maximum height of RL 280.3 metres. The **Galaxy** throughput capacity of 2.0 Mtpa for Category 5 processing and beneficiation of metallic and non-metallic ore activities will not change due to this construction. Consideration of the second proposed wall life (wall lift 4) will be deferred pending receipt of further information.

DWER reviewed the **Application** and **supporting documentation** and confirmed the key TSF infrastructure and equipment that will be assessed during construction. This has been summarised in the Works Approval history discussion below. The operations of the TSF will also be assessed by **this report** considering the current licence conditions.

The emissions associated with the construction and operation of TSF 1 wall lift 3 will be risk assessed to determine impacts upon the environment and public health (see Table 9 below)

Works Approval history

Works Approval W4533/2009/1 was granted on 19 June 2009 and extended on 17 January 2013 to expire on 21 June 2018. The extension of works approval was to allow for construction of TSF Cell 1 wall lifts 3 & 4 whilst ensuring the works approval remain active. Unfortunately, the Works Approval expired before the wall lifts were completed. This licence amendment will assess TSF Cell 1 wall lift 3 and will use the expired works approval assessment plus previous documentation to inform **this report**.

TSF Cell 2 and any subsequent wall lifts will be addressed after the **Licence Holder** submits a new Works Approval application. Any changes to TSF Cell 2 from that which was initially proposed by Works Approval W4533/2009/1 will be reassessed following receipt of the new application.

Historically, Galaxy applied to amend the initial Works Approval due to two significant changes with the tailings management system. The changes included;

- The wet plant process would produce an intermediate product with benign tailings, ie Lithium Carbonate circuit would no longer be constructed; and,
- A drainage system incorporated into the TSF design would control and reduce seepage by around 84% (seepage model prediction) in lieu of original TSF liner permeability of $1x10^{-9}$ m/s being unachievable.

The TSF seepage control and collection was designed with an upstream toe drain, basin compaction, underdrainage system and cutoff trench.

Other approvals

The Licence Holder has provided the following information relating to other approvals as outlined in Table 2.

Table 2: Relevant approvals

Legislation	Number	Approval
Mining Act 1978 (WA) *(Department of Mines, Industry Regulation and Safety)*	Registration Id: 22377 and 26415 (TSF) plus subsequent Amendments	Ravensthorpe Spodumene Project was granted mining approval on 4 November 2009 and Mining Tenement M74/244 was granted on 24 December 2009.

Rights in Water and Irrigation Act 1914 (WA) *(Department of Water and Environmental Regulation)*	GWL167439(5) – expire 18/2/2026 CAW167437(1) - CAW169547(1) – CAW170586(1) -	Process plant – 1.095 GL/yr Construct wells Construct wells Construct wells
Environmental Protection Act 1986 (WA) *(delegated to Department of Mines, Industry Regulation and Safety)*	Native Vegetation Clearing Permit CPS #3045/5- Granted 22/08/2009 expiring on 31/07/2024.	Approval to clear 15 ha within part of Mining Tenement M74/244.

Previous applications were referred for advice to the DWER's Environmental Protection Authority Services (EPA-S) who responded concluding that further consideration for an increase in annual throughput capacity up to 2.0 Mtpa under Part IV of the EP Act is unnecessary. This application will not increase the throughput capacity above 2.0 Mtpa.

Amendment history

Table 3 provides the amendment history for L8469/2010/2.

Table 3 Licence amendments

Instrument	Issued	Amendment
W4533/2009/1	19/06/2009	New works approval for premises construction
W4533/2009/1	8/07/2010	Works approval amendment (removal of Phase 2)
W4533/2009/1	11/10/2010	Works approval amendment (removal of spill trays under conveyors)
L8469/2010/1	14/10/2010	New licence issued for premises operation
L8469/2010/1	7/07/2011	Licence amendment (noise management requirements)
L8469/2010/1	24/05/2012	Licence amendment (TSF manual revision)
W4533/2009/1	24/05/2012	Works approval amendment (extension to expiry for TSF lifts)
W4533/2009/1	17/01/2013	Works approval amendment (reflux classifier)
L8469/2010/2	3/10/2013	Licence reissue
L8469/2010/2	4/09/2014	Licence amendment (groundwater management and conversion to latest DER licence format).
L8469/2010/2	29/04/2016	Amendment Notice 1 granted to extend expiry date to 13 October 2029
L8469/2010/2	02/06/2016	Licence amendment application to include construction of temporary tailings stockpile area and inclusion of Reflux classifiers and Lithium Belt Filter into the wet process plant circuit.
L8469/2010/2	27/03/2018	Amendment Notice 2 granted to increased throughput capacity, remove construction Compliance Report requirements plus reference new acoustics reports and monitoring, minor changes to premise operation conditions, minor changes to monitoring of inputs and outputs and replace Premises maps in Schedule 1. This amendment includes the transfer of Licence from Galaxy Resources Limited to Galaxy Lithium Australia Limited.
L8469/2010/2	21/06/2018	Amendment Notice 3 granted to increase throughput capacity to 2.0 Mtpa, construct, install and commission the feed upgrade circuit, Ultrafine Dense Mass Separation (DMS) circuit including a Wet High Intensity Magnetic Separator (WHIMS) for Tantalite recovery, secondary float re-liberation circuit including a dewatering screw classifier and upgrades to the product circuit.
L8469/2010/2	25/01/2019	Amendment Notice 4 granted to include TSF cell 1 wall lift 3 to final RL height of 280.3m.

Location and receptors

Table 4 lists the relevant sensitive receptors in the vicinity of the primary activity with a location plan enclosed in Figure 1 of this report.

Table 4: Receptors and distance from prescribed activity

Residential and sensitive premises	Distance from Prescribed Premises
Farm residence #1	*Located 1.850 km north west of process plant and residence has been acquired by Galaxy.*
Demountable accommodation #2	*Located 2.160 km south south east of process plant*
Residence #4	*Located 3.430 km east of the process plant and residence owned by the Applicant.*
Farm residence #5	*Located 2.215 km north west of process plant*
Residence #6	*Located 2.560 km south east of process plant.*
Accommodation Camp #8	*Located 2.620 km south east of process plant.*
Farm residence #9	*Located 1.975 km south of process plant.*
Farm residence #10	*Located 2.320 km south west of process plant.*
Residential – Township of Ravensthorpe	*Located ~ 2.650 km east southeast of process plant.*

Table 5 below lists the closest relevant environmental receptors in the vicinity of the prescribed Premises relevant to the proposed amendment.

Table 5: Environmental receptors and distance from activity boundary

Environmental receptors	Distance from Prescribed Premises
Kondinin-Ravensthorpe Groundwater Area (GWA)	*Ravensthorpe Mt Cattlin Spodumene project is part located in the GWA*
Groundwater Production Bores	*There are no other registered groundwater users within 3 km of the Mt Cattlin Spodumene project.*
Mt Cattlin Creek	*Directly east of prescribed premises*
Remnant native vegetation *(Habitat for threatened fauna species)*	*Directly east of prescribed premises*
Esperance Coastal Hydrographic Catchment	*Ravensthorpe Mt Cattlin Spodumene Project is located in the Cattlin Creek catchment bounded by Jerdacuttup River and Phillips River.*
Native Title Claims	*Ravensthorpe Mt Cattlin Spodumene Project is located in the; Single Noongar Claim (Area 1) – Cth claim* *Wagyl Kaip – NNTT registered* *Southern Noongar – NNTT registered*
Clearing Regulation - Environmentally Sensitive Areas (ESA's)	*Premises is located 5.4 km south and 8.6 km north east of restricted clearing Environmentally Sensitive Area.*
Parks and Wildlife managed lands and water	*Overshot Nature Reserve located 2 km north north-west of the Mt Cattlin Spodumene project.* *Vacant Crown Lands located immediately east of the project.*
Ecological communities (TEC's and PEC's)	*Closest Threatened Ecological Community (TEC) is located 1.3km south of the prescribed Premises boundary and 3km south east of the TSF.* *Priority Ecological Community (PEC) is 6.7km east.*
Threatened / Priority Flora	*Threatened flora located 4km northeast of the prescribed Premises boundary (eastern boundary).* *Priority flora located 3.7km south east of the southern boundary.*
Threatened / Priority Fauna	*Closest Threatened fauna recorded immediately east in the vacant crown lands from the Prescribed Premises boundary.*

TSF Groundwater quality monitoring data

There are 7 groundwater monitoring bores and 2 groundwater seepage recovery bores directly downgradient of the TSF. Figure 1 indicates the location of each TSF monitoring and seepage recovery bore.

The depth to groundwater in the area surrounding the TSF varies from 4.5 to 5 mbgl and is limited by licence condition 1.2.7 requiring the TSF monitoring bores remain greater than 3 mbgl. The local shallow aquifer is saline (salinity equivalent to seawater or greater with Electrical Conductivity (EC) between 36,000 µS/cm to 48,100 µS/cm and Total Dissolved Solids (TDS) between 25,560 mg/L to 35,900 mg/L. (AER 2015 - 2018)

The TSF groundwater data indicate low pH and increasing metals and other elements (Fe, Li, B & Fl), whilst Galaxy's tailings are alkaline. The increased contamination of groundwater may be caused by the seepage recovery bores drawdown exposing potential ASS. The drawdown associated with the seepage recovery bores MB3A and WTD28 may have resulted in groundwater acidity, possibly from acid sulfate soils (ASS) being exposed, resulting in increased concentrations of lithium (Li) boron (B) and fluoride (Fl) in the groundwater. Also, recycled and reused groundwater used at the process plant may be progressively increasing metalloid concentration in the tailings returning TSF seepage to the local groundwater.

The applicant has advised (18 January 2019) that the recorded low pH values are likely to be a sampling artifact (ferrolysis reaction) due to insufficient flushing (or no flushing) of the bores prior to sampling. An improvement condition will therefore be added to this amendment requiring an independent review of the current bore monitoring procedure to determine whether this is in fact the case. A second improvement condition will require the applicant to provide a report on the current TSF water balance.

Figure 1: TSF Monitoring Bore locations

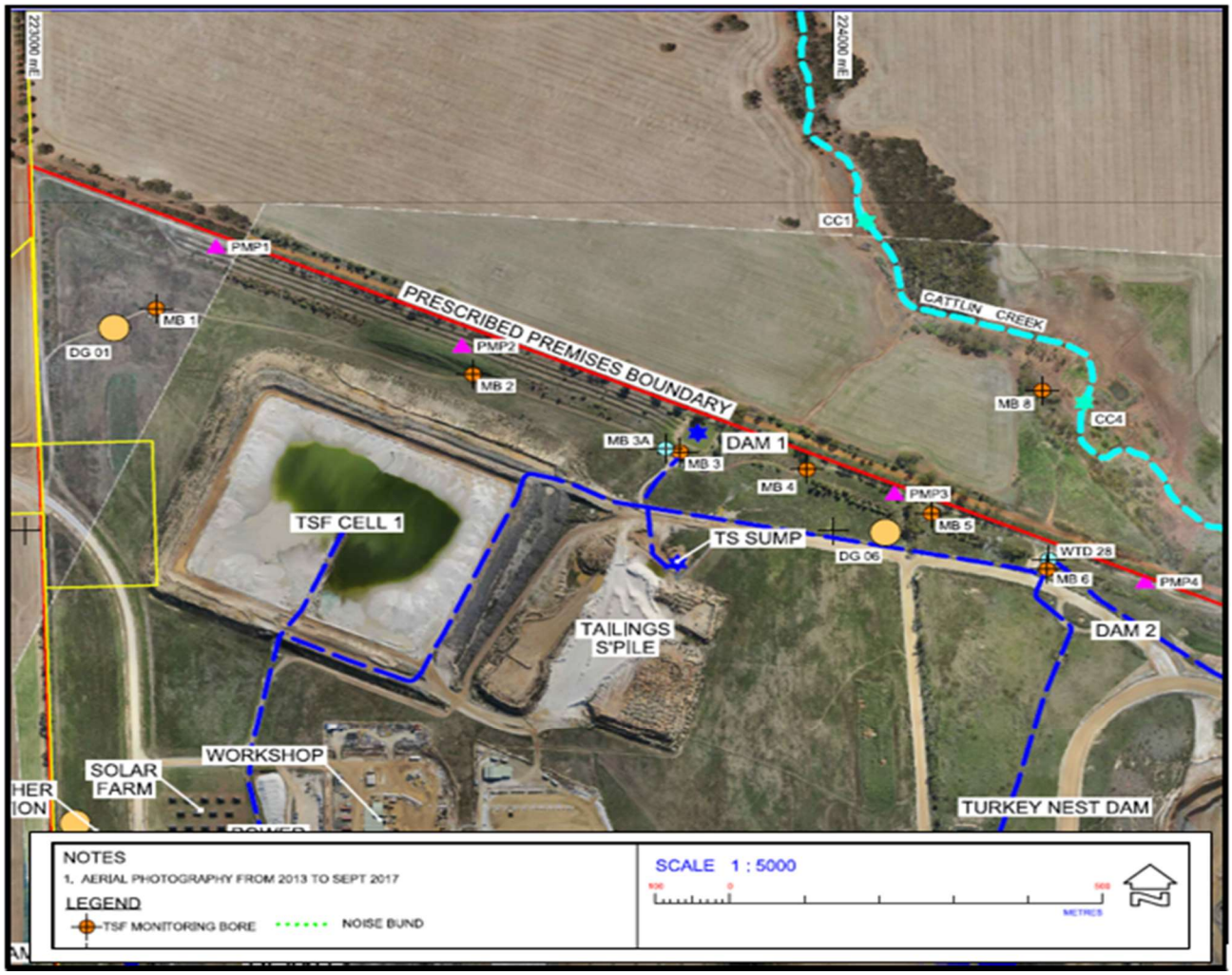
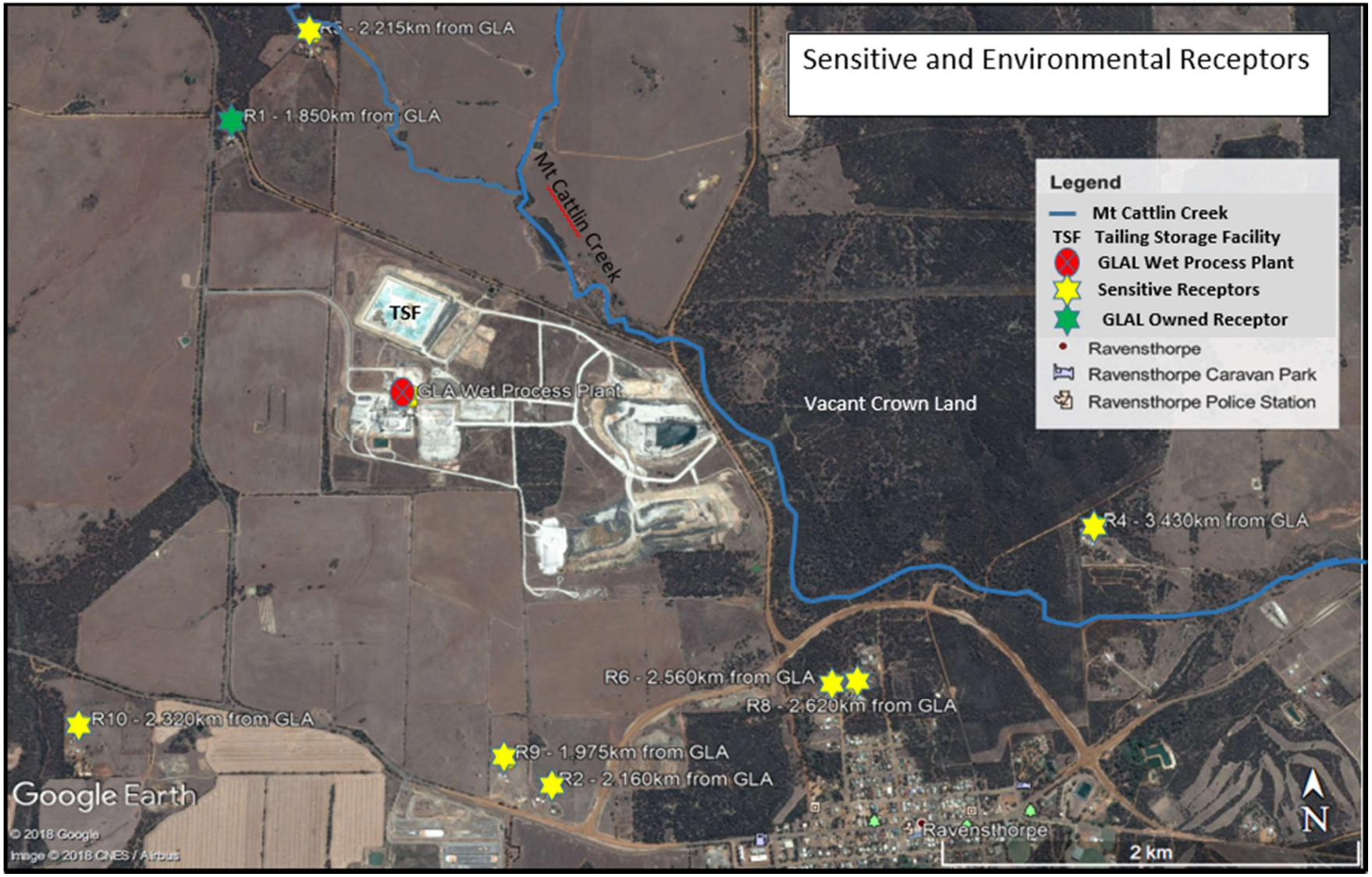


Figure 2: Plan indicating location of sensitive and environmental receptors



Risk Assessment Methodology

The risk assessment following utilizes the risk rating matrix as shown in Table 6, recently updated in accord with DER's *Guidance Statement: Risk Assessments (February 2017).* The risk criteria used in the matrix below is further defined in Table 7 and 8 below.

Table 6 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 7 following:

Table 7: Risk criteria definitions (taken from DER's Guidance Statement: Risk Assessments)

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

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
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.

DWER will determine the acceptability and treatment of Risk Events in accordance with the Risk treatment table 8 below:

Table 8: 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.

Risk assessment

Table 9 below describes the Risk Events associated with the amendment consistent with the *Guidance Statement: Risk Assessments*. This table identifies whether the emissions present a material risk to public health or the environment, requiring regulatory controls.

Table 9: Risk assessment for proposed amendments during construction

Risk Event						Consequence rating	Likelihood rating	Risk	Reasoning
Source/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**				
Cat 5 *Processing or beneficiation of metallic or non-metallic ore*	*Construction of TSF Cell 1 wall lift 3 & 4 earth works, plant and vehicle movements.*	***Dust:*** *Release of particulate matter from construction activities including earthworks, vehicle movements and civil works.*	***Nearby Residents:*** *Located greater than 1.8 km north west from process and crushing plant.*	***Air:*** *Wind dispersion*	*Health and amenity impacts*	*Slight*	*Possible*	*Low*	*Dust generated during construction will be managed in accordance with latest version of Airborne Material Management Plan (AMMP) 2018 conditioned by the licence (2.1.1 & 2.1.2) that includes a stop activity clause during inclement weather conditions.* *Water trucks will be utilized during construction activities plus speed limits implemented to reduce dust generation by vehicles on internal mine roads.* *The general provisions of the EP Act will apply during construction activities.* *The overall risk rating of construction dust impacting residence and local flora is assessed as "low" because dust generated during construction will be short term and sufficient distance from receptors.*
			Local Flora species *Located greater than 1km east of wet process plant*		*Impact to native vegetation health*	*Slight*	*Possible*	*Low*	
		Noise: *Noise associated with equipment and machinery plus vehicles use during construction*	***Nearby Residents:*** *Located greater than 1.8 km north west from process and crushing plant.*	***Air:*** *Wind dispersion*	*Health and amenity impacts*	*Slight*	*Possible*	*Low*	*Noise generated during construction activities is expected to comply with the provisions of the* Environmental Protection (Noise) Regulations 1997 (WA). *Controls imposed by the Licence Holder during construction will be implemented as described in the latest version of the Operational Noise Management Plan (ONMP) 2018.*

Table 9: Risk assessment for proposed amendment during operation

Risk Event						Consequence rating	Likelihood rating	Risk	Reasoning
Source/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**				
Category 5 *Processing or beneficiation of metallic or non-metallic ore*	*Tailings deposition*	***Dust:*** *Generated as a result of finer tailings being deposited*	*Soil and vegetation adjacent to areas Groundwater*	***Air:*** *Wind dispersion*	*Adverse impacts to vegetation health*	*Moderate*	*Rare*	*Medium*	*The overall risk rating of dust being generated as a result of finer tailings being deposited is determined as "medium" as the tails will be wet during operations. Also, any dry tailings will be suppressed using water or suppression products during dry high wind weather conditions, daily inspections will be completed during operations as required by condition 2.1.2 are described as management controls in the most recent version of AMMP.* *The plant upgrade approved by Amendment Notice 3 also considered course rejects (dry) being separated from tailings that reduced inputs to the TSF but increased disposal to the waste dump areas.* *Therefore a new improvement condition requiring leachate testing of fine tailings and course rejects.*
		Waste: *Release of tailings caused by leaks or failure of new tailings pipe/pump*	***Terrestrial ecosystems:*** *local soils, vegetation and surface water*	***Land:*** *Direct discharge from pipe or pump causing infiltration into the soil*	*Inhibit vegetation growth, survival and health impacts.* *Contaminates groundwater with impacts to beneficial uses*	*Moderate*	*Unlikely*	*Medium*	*Daily visual inspections of pipes and pumps for spills, leaks or failures during operations does occur.* *Existing licence condition 1.2.11 manages the tailings pipelines and pumps plus product pipelines, existing conditions 5.2.1 adequately controls reporting of environmental incidents, failures or malfunctions that occur during the annual reporting period.* *Given these controls, the overall risk of tailings or decant water release in the event of a pipeline failure is*

Risk Event						Consequence rating	Likelihood rating	Risk	Reasoning
Source/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts				
									deemed to be "medium" and is consistent with similar industries licence conditions modified to require 12 hourly inspections with an inspection log to be maintained for purpose of compliance auditing.
Category 5 *Processing or beneficiation of metallic or non-metallic ore*	*Tailings deposition*	***Waste:*** *Tailings liquid*	***Groundwater:*** *Local shallow aquifer water table at 4.5 - 5 mbgl. Aquifer salinity equivalent to seawater or greater ~ EC is 36,000 µS/cm to 48,100 µS/cm & TDS* is ~ *25,560 mg/L to 35,900 mg/L. (AER 2015 - 2018)*	***Land:*** *infiltration through the base of the TSF through soil profile into the groundwater*	*Contamination of groundwater with metals or metalloids.* *Groundwater mounding or lateral seepage with negative impacts on roots of vegetation.*	*Moderate*	*Possible*	*Medium*	*The overall risk rating is "medium" as is managed by existing Licence conditions 1.2.7, 3.4.1, 3.4.2, & 5.2.1 requiring TSF groundwater monitoring and reporting.* *Groundwater quality is saline and has no beneficial domestic or livestock uses.* *The TSF drainage collection system captures and diverts TSF decant water back to the wet plant water circuit.* *DWER reviewed the TSF Groundwater monitoring data and observed increased contamination of groundwater caused by TSF seepage containing metalloids being exposure to ASS caused by drawdown from the seepage recovery bores. New condition required for water balance and review of 2010 TSF modelling with the aim to devise alternative TSF seepage management strategies.* *Groundwater seepage is managed by recovery bores MB3A & WTD28 resulting in aquifer water table being drawn down and exposing ASS. TSF monitoring data indicates metalloid concentration have been increasing since operations recommenced in November 2016.. Therefore condition*

Risk Event						Consequence rating	Likelihood rating	Risk	Reasoning
Source/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**				
Category 5 *Processing or beneficiation of metallic or non-metallic ore*									*3.4.1 table 3.8.1 will be amended to include other Lithium, Caesium, Rubidium, Thallium, Bromide, Silicon, Total Nitrogen, Total Phosphorus, Calcium carbonate, Gross-alpha & Gross-beta.* *Annual report 2018 indicates no vegetation impacts observed (Appendix 8 Annual Report 2018). Water quality impacts to the Cattlin Creek tributary (Appendix III of Annual Monitoring Summary) cannot be determined if they are attributed to tailings seepage. This will be reviewed once the SWMP (Licence Condition 4.1.1 – IR1) due to be submitted on 31 January 2019 has been received and reviewed.*
	Tailings overtopping of TSF.	***Waste:*** *Uncontrolled release of tailings/ decant water*	***Terrestrial ecosystems:*** *local soils, vegetation and surface water*	***Land:*** *Direct discharge from overtopping of TSF.*	*Contamination of surrounding soils with metals and metalloids, affecting soil and vegetation*	*Slight*	*Rare*	*Low*	*The overall risk rating is "low" based on application of existing controls. Tailings disposal is limited by existing licence condition 1.2.6 requiring 300 mm freeboard during operations. Tailings deposition will also decrease following the recent plant upgrade.* *Existing condition 3.3.1 Table 3.7.1 ensures routine inspection of TSF is completed and provides adequate control to manage overtopping.*
	TSF deposition and storage of tailings and decant water	***Waste:*** *Tailings facility and decant pond*	***Local fauna*** *Birds and bats*	***Land:*** *Direct ingestion (birds or bats drinking the water)*	*Fauna sickness or death from drinking supernatant water.*	*Undefined*	*Undefined*	*Undefined*	*Water with salinity up to 50 000 ppm is potential attractive to birds and bats. Further consideration of this potential risk will be deferred pending further information and assessment.* *Note – any risk will not be altered by the proposed TSF lifts.*

Decision

The potential emissions associated with the construction and operation of TSF Cell 1 wall lift 3 at the Galaxy Spodumene project are;

- Nuisance noise during TSF construction activities;
- Fugitive dust from TSF construction activities;
- Fugitive dust generated from the TSF during operations;
- Release of tailings caused by leaks or failures of infrastructure;
- Tailings seepage to shallow groundwater aquifer; potential to cause contamination of groundwater or impact on adjacent Cattlin creek system;
- Potential for increasing concentration of contaminants (such as lithium, fluoride, boron) in the groundwater in vicinity of TSF. Exposure of acid sulfate soils from groundwater seepage recovery.
- Tailings or return water spillage from failed pipes, pumps and overflow; and,
- TSF supernatant ingested by local birds and other wildlife.

The Delegated Officer has considered the overall risk of the emissions upon local receptors together with Galaxy's proposed management controls and determined the proposed amendments will not result in emissions which are unacceptable to public health or the environment and therefore grants the Licence amendment to complete construction of TSF cell 1 wall lift 3.

The Licence is amended by;

- Add definitions for ' TSF Cell 1', 'Wall lift 3', 'Wall lift 4',
- New conditions 1.2.16 and 1.2.17 specify the infrastructure to be constructed at TSF Cell 1. **New condition 1.2.18 specifies that wall lift 4 is not authorised at this time**.
- New Condition 5.1.7 requiring compliance reporting once construction has been completed.
- New Condition 5.1.8 requiring certified Geotechnical engineer to report on the TSF wall lift construction.
- Amend licence conditions 2.2.1 to reference the most recent current versions of the ONMP revised on 17 August 2018.
- Amend licence condition 3.4.1 TSF bore monitoring parameters and condition 4.1.1 by including two new Improvement Program requirements being;
    - Independent review of groundwater monitoring
    - Independent assessment of the TSF water balance
- Include Schedule 2 plan titled "Tailing storage facility general arrangements October 2018 and Embankment sections and details October 2018" in this licence amendment.

Changes to the Licence have been made in accordance with DWER administrative changes including the name, logo and contacts for the Department and redefining terms in the licence.

The Delegated Officer has determined the Galaxy Premises risk remains unchanged following the completion of the upgrades to the modular crusher and process plant circuits, increased production throughput and the operation of the modular crushing plant.

Licence Holder's comments

The Licence Holder was provided with the draft Amendment Notice on 24 December 2018. Comments received from the Licence Holder have been considered by the Delegated Officer as shown in Appendix 2.

Amendment

1. New definitions

Definitions of the Licence are amended by insertion of new definitions shown in red text below:

'TSF Cell 1' means the "Tailing Storage Facility Cell 1" as indicated in Schedule 2.

'Wall lift 3' means the "wall lift 3" as indicated in Schedule 2.

'Wall lift 4' means the "wall lift 4" as indicated in Schedule 2. (Note wall lift 4 is not authorised at this time)

2. New Licence conditions

New conditions 1.2.16, 1.2.17, 5.1.7 and 5.1.8 in red text are administrative condition explaining what will be constructed at TSF cell 1 wall lift 3, requiring the construction to be supervised, and certified and then a compliance certificate submitted to the CEO.

1.2.16 The License Holder shall construct TSF cell 1 wall lift 3 as indicated by purple colour numbered 3 in Schedule 2 title "Embankment Sections and Detail October 2018" to finish at a stage crest height of 280.3m RL.

1.2.17 The License Holder shall complete construction of TSF cell 1 wall lift 3 in accordance with the documentation listed in Table 1.2.16 and as depicted in Schedule 2 titled "Tailing storage facility general arrangements October 2018".

1.2.18 Construction of wall lift 4 is not authorised at this time.

Table 1.2.16: Construction requirements[1]

Document	Parts	Date of Document
Galaxy Resources Limited – Mt Cattlin Spodumene Project - Tailing Storage Facility Design – Issued for construction January 2010 by Knight Piesold consulting	TSF design drawings	January 2010
1. Revised Embankment Development Plan	PE801-00133-059	
2. General arrangement (Stage 1)	PE801-00133-060	
3. Embankment Sections and Detail (Stage 1)	PE801-00133-062	
"Galaxy Airborne Material Management Plan (2010)" revised September 2017, amended August 2018 – reference GLA-MTC-AMMP-Rev 2.0-0917.	Supporting document	20 August 2018
1. Site Risk Assessment	Section 2	
2. Dust control strategies	Section 3	
3. Airborne Material Monitoring Program	Section 4	
4. Responsibility and Performance Matrix	Section 5	
"Galaxy Lithium Australia Limited Mt Cattlin Spodumene Project Operational Noise Management Plan Rev 5 dated August 2018 by Herring Storer Acoustics – reference 12843-5-10196.	Supporting document	17 August 2018
1. Noise sensitive receptors	Section 2	
2. Environmental Risk Assessment	Section 3	
3. Noise Management Measures	Section 4	
4. Noise Monitoring Program	Section 5	

5. 6.	Complaint Response Protocol Monitoring locations	Section 6 Appendices A	

5.1.7 The licence holder must within 30 days of each item of infrastructure required by condition 1.2.17 and table 1.2.17 being constructed:

a) undertake an audit of their compliance with the requirements of condition 1.2.17; and
b) prepare and submit to the CEO an audit report of that compliance.

5.1.8 The audit report required by condition 5.1.7, must:

(a) be certified by a suitably qualified professional engineer that each item of infrastructure listed in Table 1.2.16 meets the corresponding specifications and at the locations set out in Table 1.2.16 and has been constructed with no material defects;
(b) contain as constructed plans for the works that show the profile of the infrastructure in mAHD and mBGL; and
(c) be signed by a person authorised to represent the licence holder and contains the printed name and position of that person within the company.

3. Licence condition 2.2.1 is amended by the deletion of the text shown in strikethrough and the insertion of red text shown below.

2.2.1 The Licensee must ensure that noise is managed in accordance with most recent version of the Galaxy Lithium Australia Limited Mt Cattlin Spodumene Project ~~(formerly Ravensthorpe) Spodumene Project -~~ Operational Noise Management Plan, Revision 5 dated 17 August 2018. ~~(May 2017)~~

3.4.1 The Licensee must undertake the monitoring in Tables 3.8.1 according to the specifications in that table and record and investigate results that do not meet any limits specified.

Table 3.8.1: Monitoring of ambient groundwater quality

Monitoring point reference and location as depicted in the Premises Map in Schedule 1	Parameter	Limit	Units	Averaging period	Frequency
MB01, MB02, MB03, MB04, MB05 and MB06	Standing water level	> 3	m(BGL)	Spot sample	(i) Monthly; and (ii) Daily when levels exceed the limit.
		-	M(AHD)		
	pH[1]	-			(i) Four times per year (in November, February, May and August) when tailings deposition into the tailings storage facility is occurring; and (ii) Three times per year (in October, February and June) when tailings deposition into the tailings storage facility is not occurring
	Electrical conductivity[1]		µS/cm		
	Total Dissolved Solids (TDS)		mg/L		
	Sodium		mg/L		
	Calcium				
	Potassium				
	Magnesium				
	Sulphate				
	Chloride				
	Fluoride				
	Aluminium				
	Arsenic				
	Cadmium				
	Cobalt				
	Chromium				

	Copper				
	Iron				
	Manganese				
	Nickel				
	Lead				
	Zinc				
	Barium				
	Boron				
	Chromium (III)				
	Mercury				
	Molybdenum				
	Antimony				
	Selenium				
	Tin				
	Vanadium				
	Uranium				
	Silicon				
	Calcium Carbonate				
	Total Nitrogen				
	Total Phosphate				
	Lithium				
	Caesium				
	Rubidium				
	Thallium				
	Bromide				
	Gross-alpha	-	Bq/L		
	Gross-beta				

Note 1: In-field non-NATA accredited analysis permitted

4.1.1. The Licensee shall complete the improvements in Table 4.1.1 by the date of completion in Table 4.1.1.

Table 4.1.1: Improvement program

Improvement reference	Improvement	Date of completion
IR1	The Licensee shall submit an updated Surface Water Management Plan to the CEO. The plan shall include details relating to: (a) Assessment of capacity of existing stormwater infrastructure to contain runoff from the processing plant, stockpiles, concentrate storage, and laydown areas so that there is zero discharge of contaminated stormwater from the site for a 1 in 100 annual exceedance probability (AEP) storm event over 72 hours; (b) Surface water drainage map of the site showing contours, flow paths and containment cells; (c) If (a) finds existing infrastructure is insufficient, identification of additional infrastructure/operational controls required to ensure no discharges of contaminated stormwater during a 1 in 100 annual exceedance probability (AEP) storm event over 72 hours; and (d) Provision of schedule for constructing additional infrastructure and/or implementing operational controls, if required. (e) Determining impacts of seepage from the temporary tailings stockpile on groundwater quality and groundwater levels.	31 January 2019

IR2	The Licensee shall submit to the CEO a review of the current groundwater monitoring program. The review shall be carried out by an independent tertiary qualified hydrogeologist and shall consider the adequacy of the groundwater monitoring program, including whether bore sampling is being carried out so as to provide data which is representative of the surrounding groundwater. In particular the review is to determine whether recorded low pH readings and elevated levels of some elements (iron, lithium, boron, and fluoride) are the result of acid sulphate soils or are a sampling artefact due for example to insufficient flushing of bores prior to sampling. .	15 April 2019
IR3	The Licensee shall submit to the CEO a water balance assessment for the tailings storage facility for 2017 and 2018. The assessment is to be prepared by an independent tertiary qualified geotechnical engineer with experience in design, construction and operation of tailings storage facilities. The assessment is to provide both data and an analysis of the data. ..	15 April 2019

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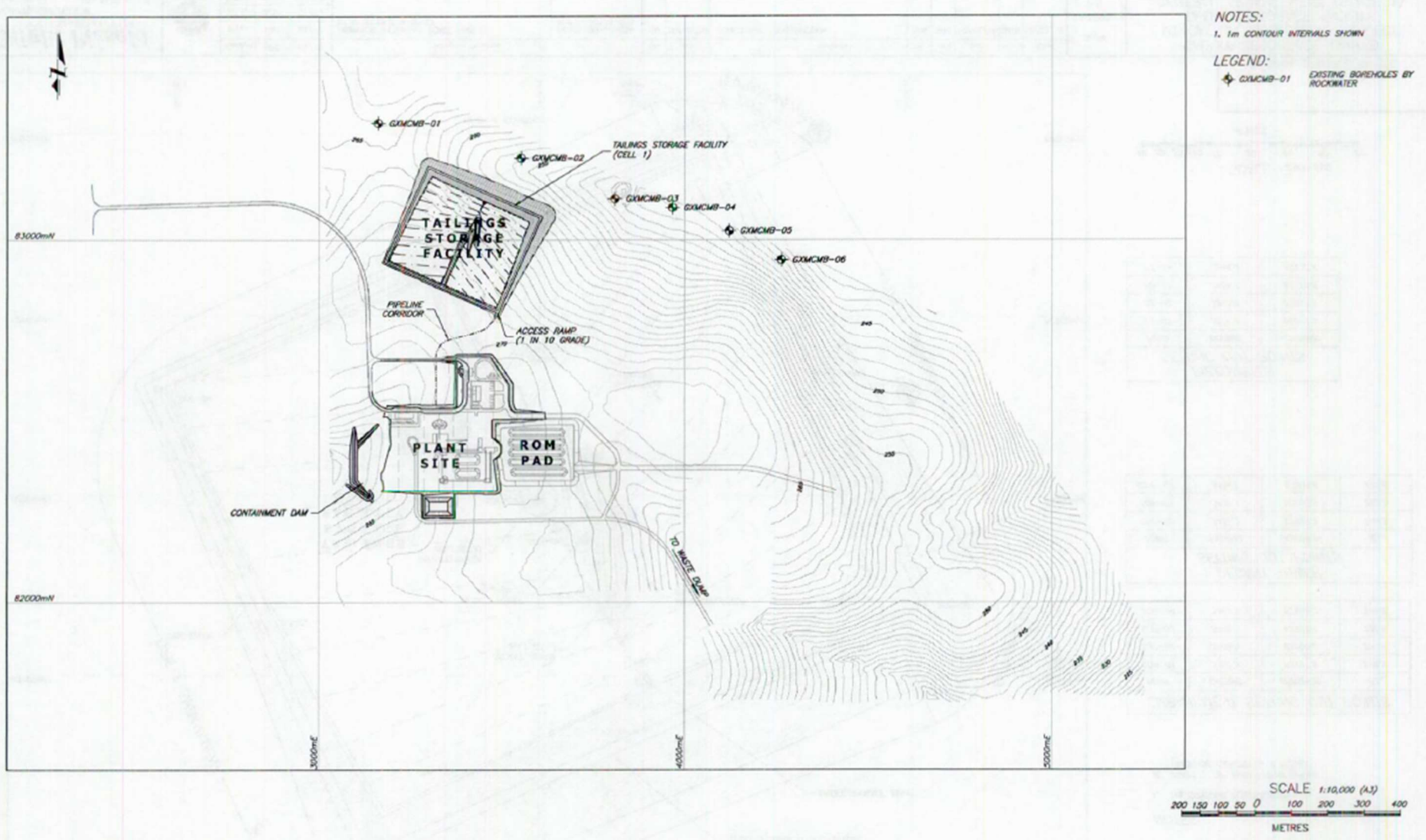
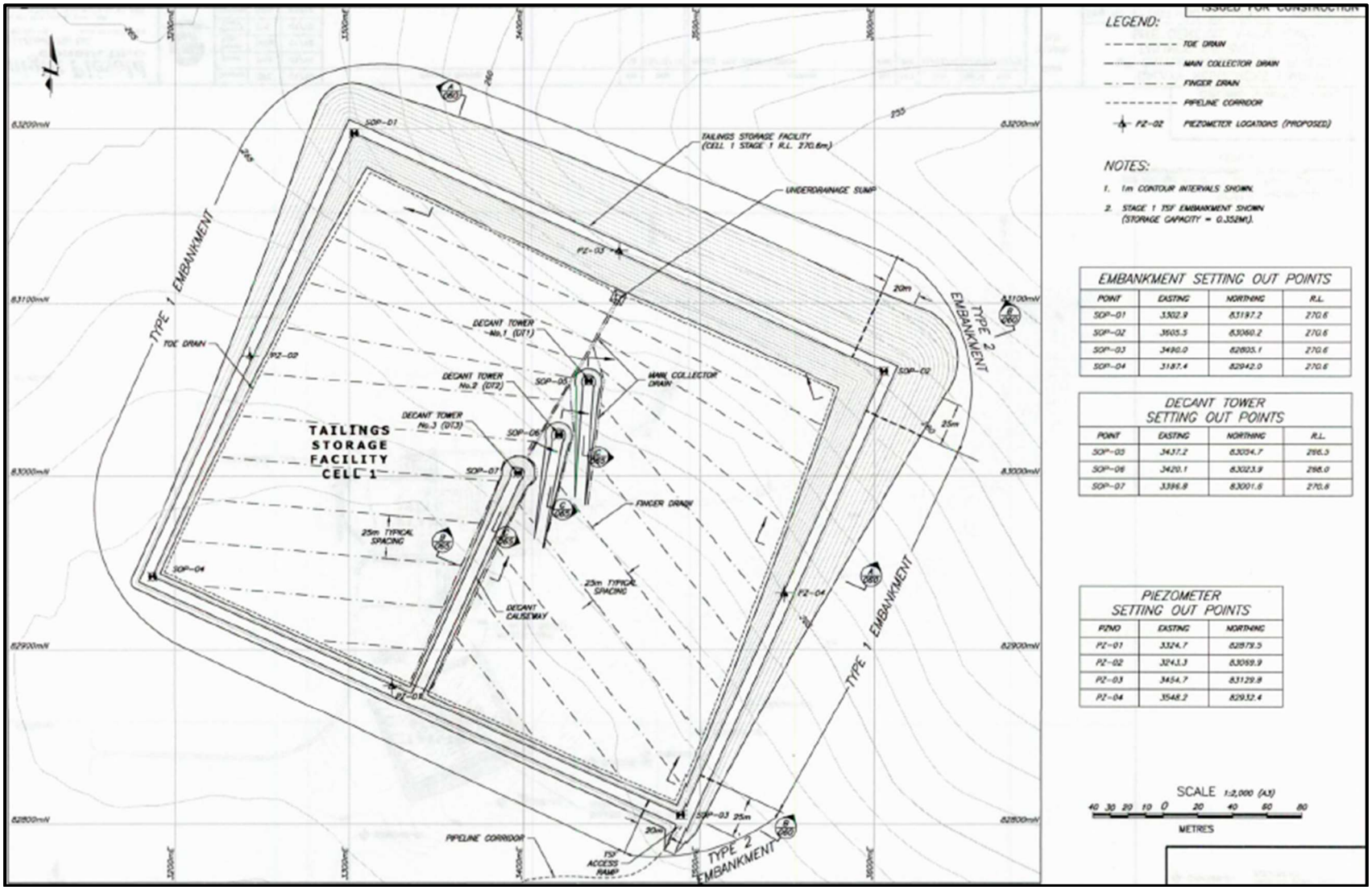
Schedule 2 – Tailing storage facility general arrangements October 2018

The location of wall lift 3 is upon the existing wall of TSF cell 1.

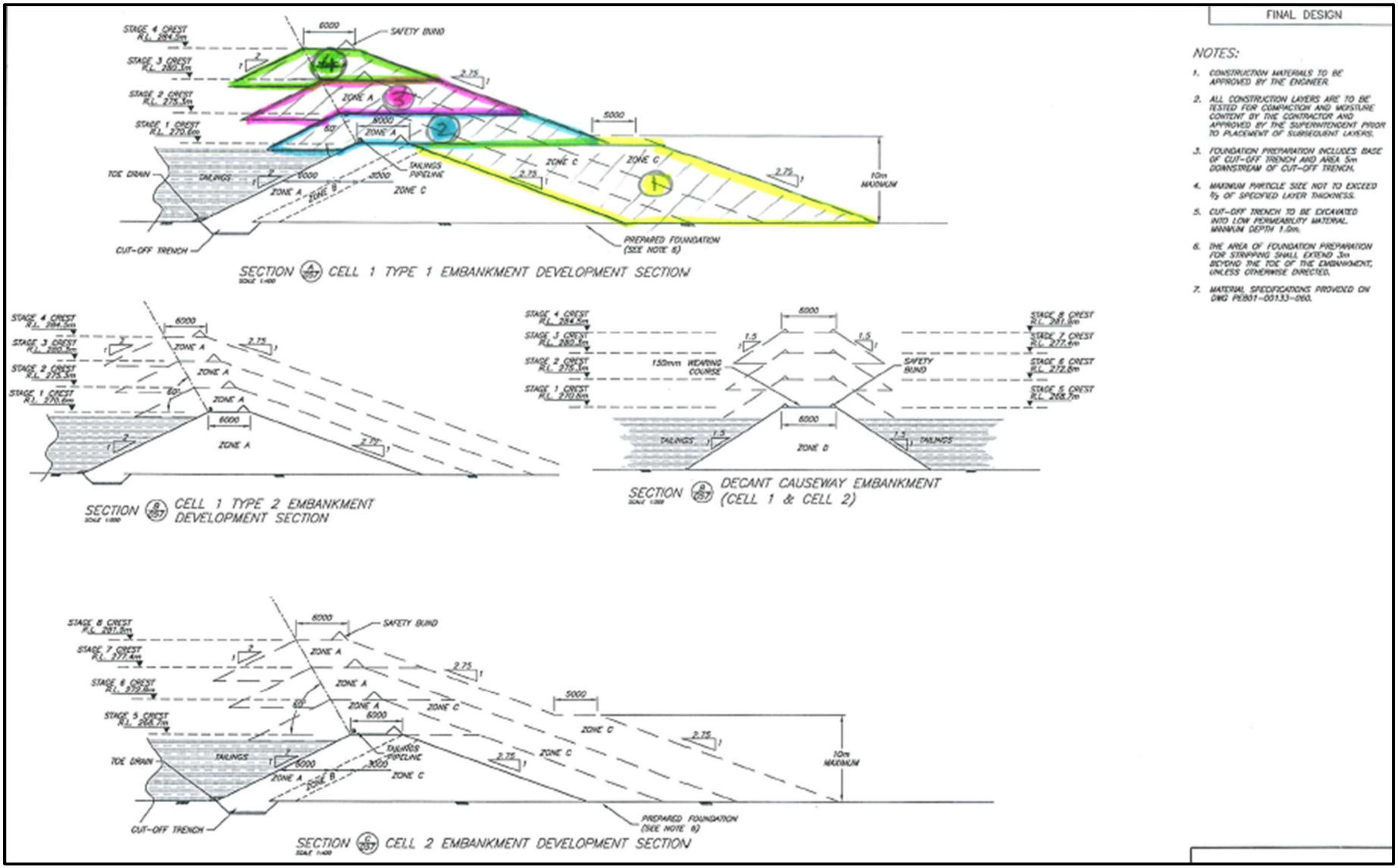


Schedule 2 – Tailing storage facility general arrangements October 2018

The location of wall lift 3 is upon the existing wall of TSF cell 1.

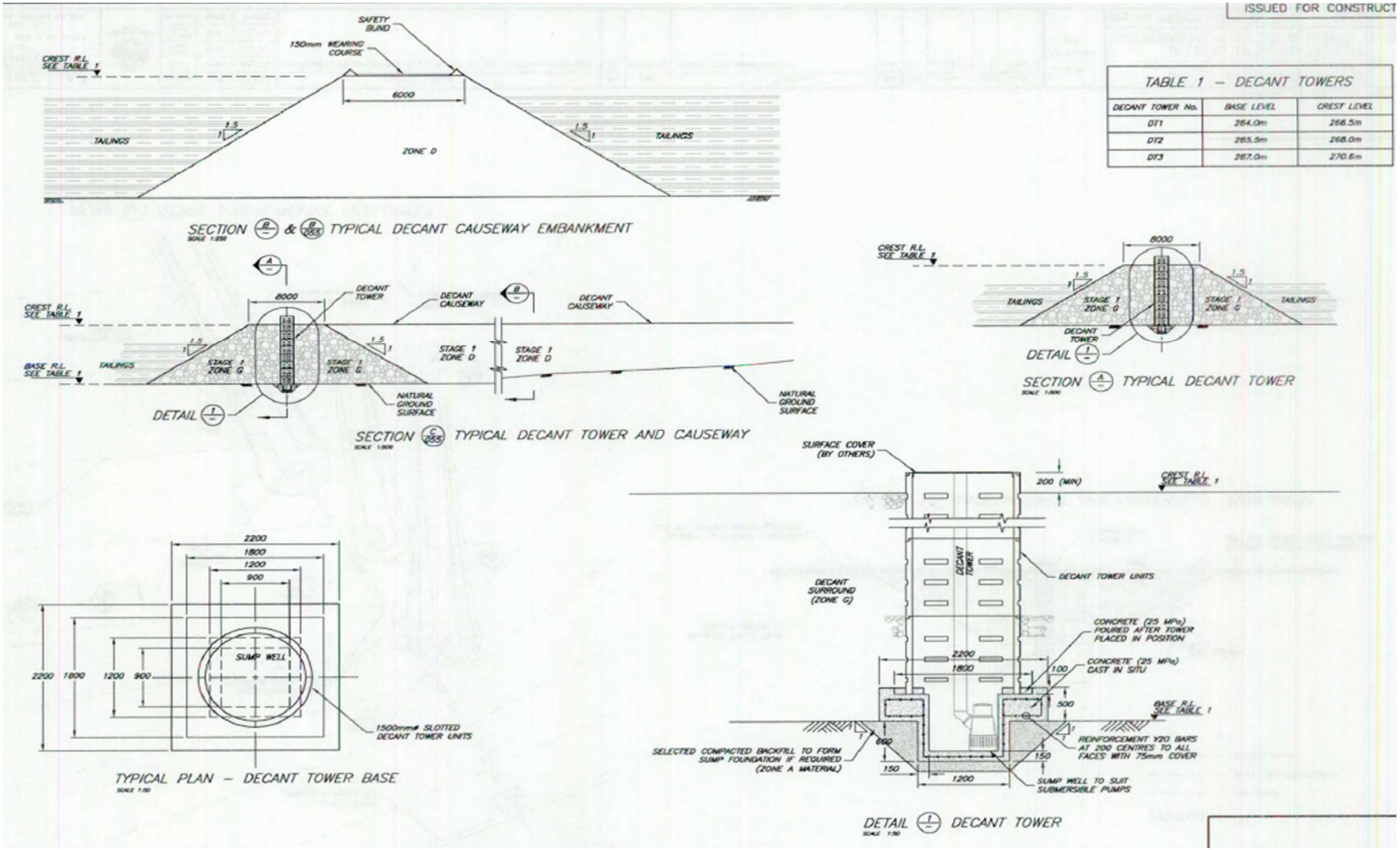


Schedule 2 – Embankment sections and details October 2018



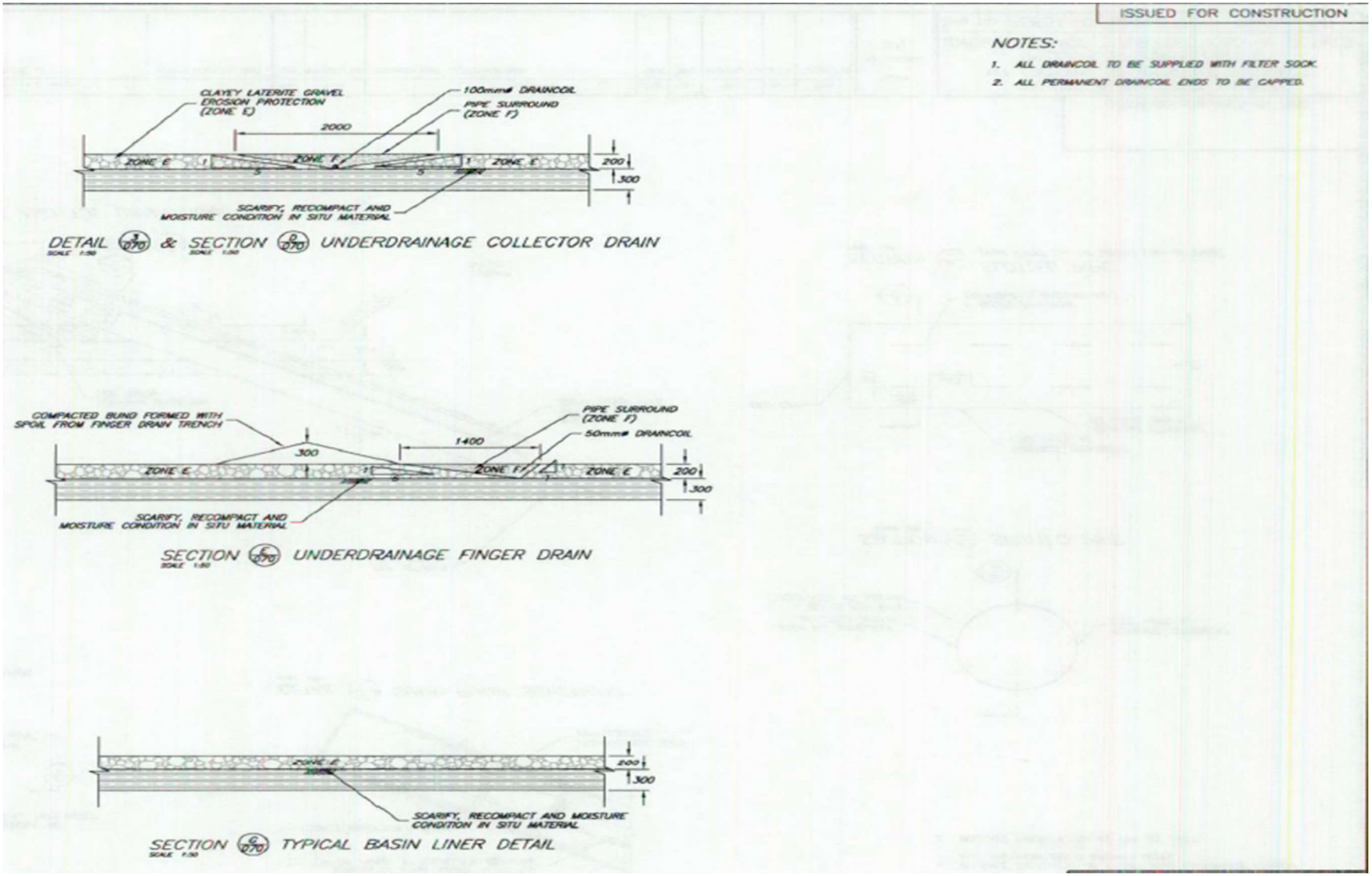
Schedule 2 – Tailing storage facility decant sections and details October 2018

The location of wall lift 3 is upon the existing wall of TSF cell 1.



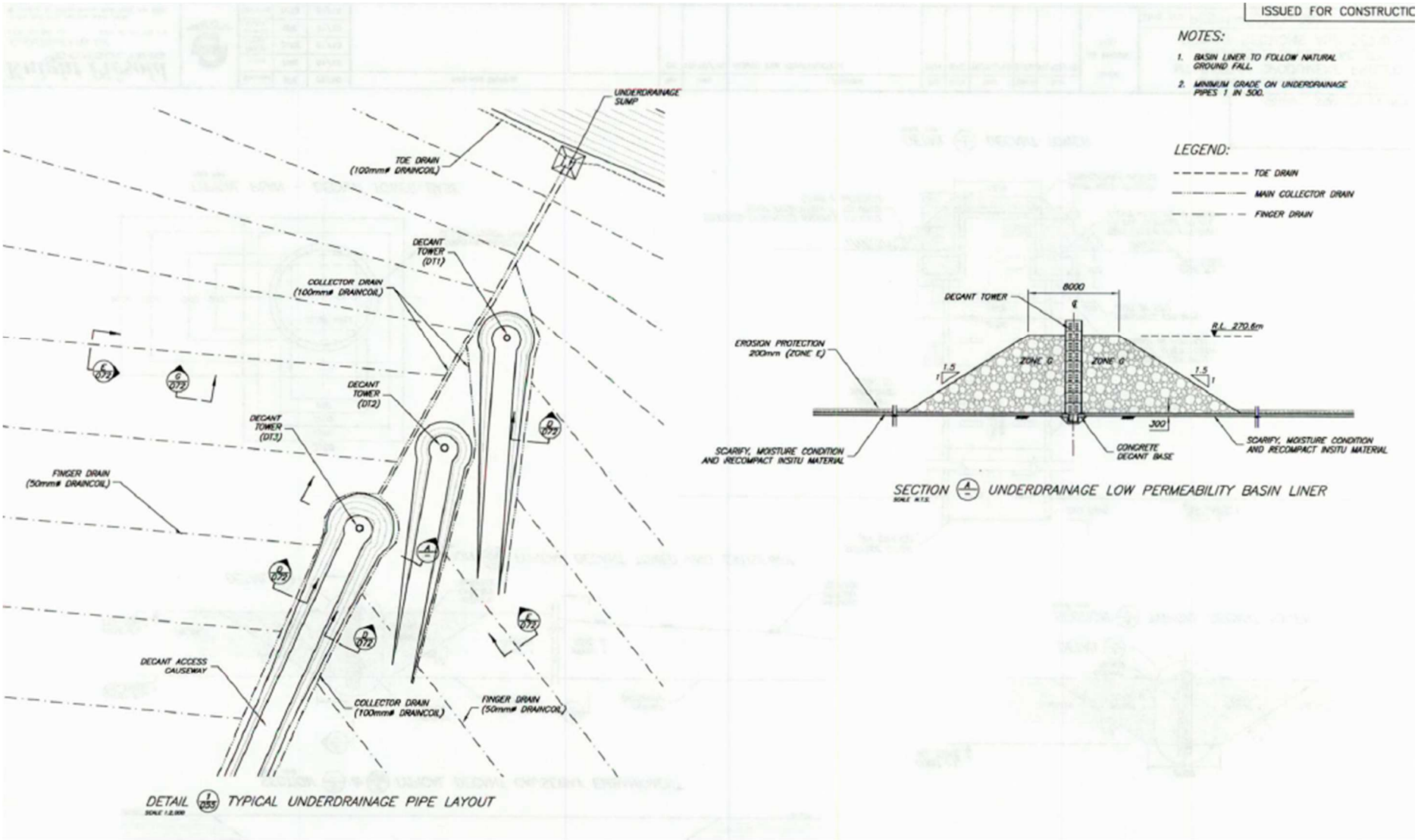
Schedule 2 – Tailing storage facility underdrainage section October 2018

The location of wall lift 3 is upon the existing wall of TSF cell 1.



Schedule 2 – Tailing storage facility underdrainage section October 2018

The location of wall lift 3 is upon the existing wall of TSF cell 1.



Appendix 1: Key documents

	Document title	In text ref	Availability
1	Licence L8469/2010/2 – Ravensthorpe Spodumene Project issued 3 October 2013 and amended 2 June 2016	L8469/2010/2	accessed at https://www.der.wa.gov.au/our-work/licences-and-works-approvals/current-licences
2	Works Approval W4533/2009/1 – Ravensthorpe Spodumene Project amended 24 May 2012	W4533/2009/1	accessed at https://www.der.wa.gov.au/our-work/licences-and-works-approvals/current-licences
3	Application for amendment of Licence L8469/2010/2 dated 18 October 2018	Application	DWER records A1658320
4	Supporting documentation to the application to amend Licence L8469/2010/2 dated 18 October 2018 Attachments 1, 2, 3A, 6A, 7, 8 & 9	Supporting documents	DWER records A1658318 DWER records A1658319
5	Galaxy Lithium Australia Limited – Operational Noise Management Plan – 17 August 2018 – revision 5	ONMP	DWER record A1737713
6	Galaxy Airborne Material Management Plan (2010) revised September 2017, amended 20 August 2018 – reference GLA-MTC-AMMP-Rev 2.0-0917.	AMMP	DWER record A1737711
7	Amendment Notice 2 issued 27 March 2018 and Amendment Notice 3 issued 20 June 2018 to Galaxy Lithium Australia Limited	Amendment Notice	accessed at https://www.der.wa.gov.au/our-work/licences-and-works-approvals/current-licences
8	Galaxy Resources Limited – Ravensthorpe Spodumene Project – Mining Proposal Volume 1 – July 2009 by Keith Lindbeck and Associates	Supporting document	DWER record A1737895
9	Galaxy Resources Limited – Ravensthorpe Spodumene Project – Mining Proposal Volume 2 – July 2009 by Keith Lindbeck and Associates	Supporting Document	DWER record A1737897
10	Galaxy Resources – Mt Cattlin Project – Tailings Storage Facility, permitting Design Addendum – January 2010 by Keith Piesold Pty Limited document reference PE801-00133/5	Supporting Document	DWER record A1737894
11	Galaxy Resources Limited – Mt Cattlin Spodumene Project - Tailing Storage Facility Design – Issued for	Supporting Document	DWER record A1737889

	construction January 2010 by Knight Piesold consulting		
12	Mt Cattlin Spodumene Project – Annual Monitoring Summary GWL167439(6) September 2017 to August 2018 – Report for Galaxy Lithium Australia Ltd – October 2018 by Rockwater Hydrogeological and Environmental Consultant report No.352.0/18/02	Supporting document	DWER record A1739319
13	Email titled "Confirmation of Galaxy Operations" created on 13 November 2018 by officer of DWER and response by Galaxy dated 20 November 2018.	Supporting document	DER records A1739321 & A1744254
14	DER, July 2015. *Guidance Statement: Regulatory principles.* Department of Environment Regulation, Perth.	DER 2015a	accessed at https://www.der.wa.gov.au/our-work/regulatory-framework
15	DER, October 2015. *Guidance Statement: Setting conditions.* Department of Environment Regulation, Perth.	DER 2015b	
16	DER, November 2016. *Guidance Statement: Environmental Siting.* Department of Environment Regulation, Perth.	DER 2016a	
17	DER, February 2017. *Guidance Statement: Risk Assessments*. Department of Environment Regulation, Perth.	DER 2017a	
18	DER, February 2017. *Guidance Statement: Decision Making*. Department of Environment Regulation, Perth.	DER 2017b	

Appendix 2: Summary of Licence Holder comments

The Licence Holder was provided with the draft Amendment Notice on 24 December 2018 for review and comment. The Licence Holder responded on 3 January 2019 with the following comments received about the draft Amendment Notice.

Condition	Summary of Licence Holder comment	DWER response
Improvement conditions	Requirements for additional information on the TSF water balance and on the adequacy of the existing groundwater bore monitoring program were discussed at a joint meeting with the applicant and representatives of DWER and DMIRS on 18 January 2019. At that meeting the applicant agreed to provide the required information.	Improvement conditions 2 and 3 have been included.