Government of Western Australia
Department of Water and Environmental Regulation

Amendment Report

Application for Licence Amendment

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

Licence Number	L8469/2010/2
Licence Holder	Galaxy Lithium Australia Limited
ACN	130 182 099
File Number	DER2014/001110-1
Premises	Ravensthorpe Spodumene Project Newdegate-Ravensthorpe RAVENSTHORPE WA 6346 Part of Mining Tenements M74/244, G74/13 and L74/46 as defined by the map in Schedule 1 and the coordinates in Schedule 2
Date of Report	09/08/2024
Decision	Revised licence granted

Christine Pustkuchen

Digitally signed by Christine Pustkuchen
Date: 2024.08.09 11:58:12 +08'00'

Manager, Resources Industries
INDUSTRY REGULATION (STATEWIDE DELIVERY)

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

Table of Contents

1. Decision summary

Licence L8469/2010/2 is held by Galaxy Lithium Australia Limited (Licence Holder) for the Ravensthorpe Spodumene Project (the Premises), located within tenements M74/244, G74/13 and L74/46.

This Amendment Report documents the assessment of potential risks to the environment and public health from proposed changes to the emissions and discharges during the operation of the Premises. As a result of this assessment, Revised Licence L8469/2010/2 has been granted.

2. Scope of assessment

2.1 Regulatory framework

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

2.2 Application summary

On 5 December 2023, the Licence Holder submitted an application to the department to amend Licence L8469/2010/2 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The following amendments are being sought:

- Decommissioning of tailings deposition at the 2SE Pit Tailings Storage Facility (TSF) as it has reached capacity;
- Extension of the tailings and decant pipelines to the completed NE Pit and create a new in-pit TSF (NE In-Pit TSF);
- Extension of the Prescribed Premises boundary to include the stockpiling of coarse rejects in the Waste Dump 2 (WD2) expanded footprint;
- Installation of NE in-pit TSF recovery bores;
- Inclusion of additional groundwater monitoring locations and dust monitoring locations; and
- Removal of the Improvement Program condition (dust) due to meeting its requirements.

2.2.1 NE In-Pit TSF

An In-Pit TSF (2SE Pit TSF) was added to Licence L8469/2010/2 on 11 February 2022 and tailings deposition began in March 2022. Currently the 2SE Pit TSF is the only active TSF at the Premises that is used for tailings deposition. The Licence Holder is expected to achieve capacity within the 2SE in-pit TSF in the middle of 2024 which then the Licence Holder will begin decommissioning the 2SE TSF in accordance with the mine closure plan within mining proposal Reg ID 101404. Regulation of decommissioning and closure of the 2SE TSF will be regulated by the Department of Energy, Mines, Industry Regulation and Safety under the *Mining Act 1978.*

The Licence Holder has proposed to construct a new in-pit TSF (NE Pit TSF) to deposit tailings once the 2SE Pit TSF has reached capacity. Works will involve the construction of a ‘V’ trench and bunding to house the tailings and return water pipelines, the proposed pipeline pathways are presented in Figure 7. Once the 2SE Pit TSF is no longer in use the pipelines will be repurposed and moved to the NE Pit TSF. There is no proposed native vegetation clearing for the works and all earthworks will occur within the Prescribed Premises boundary.

The NE Pit TSF is a historic mine pit void, it has an approximate storage volume of 1.27 metric tonnes (Mt) and has an estimated storage life of 6.19 years based on an adopted conservative tailings dry density of 1.7 t/m^3 and the sites tailings production of 350,000 tonnes per annum (tpa). The NE Pit TSFs minimum crest height is 229 RL at the southeast of the pit and the pit has a depth of 185 RL. A 0.5 m freeboard from the shallowest part of the pit was proposed with a topping up period to occur prior to decommissioning to enable filling in any depressions on the tailing surface and around the permitter where excess freeboard remains (Tetra Tech Coffey 2023). The NE Pit TSF storage capacity curve presenting the elevation and storage volume is presented in Figure 1.

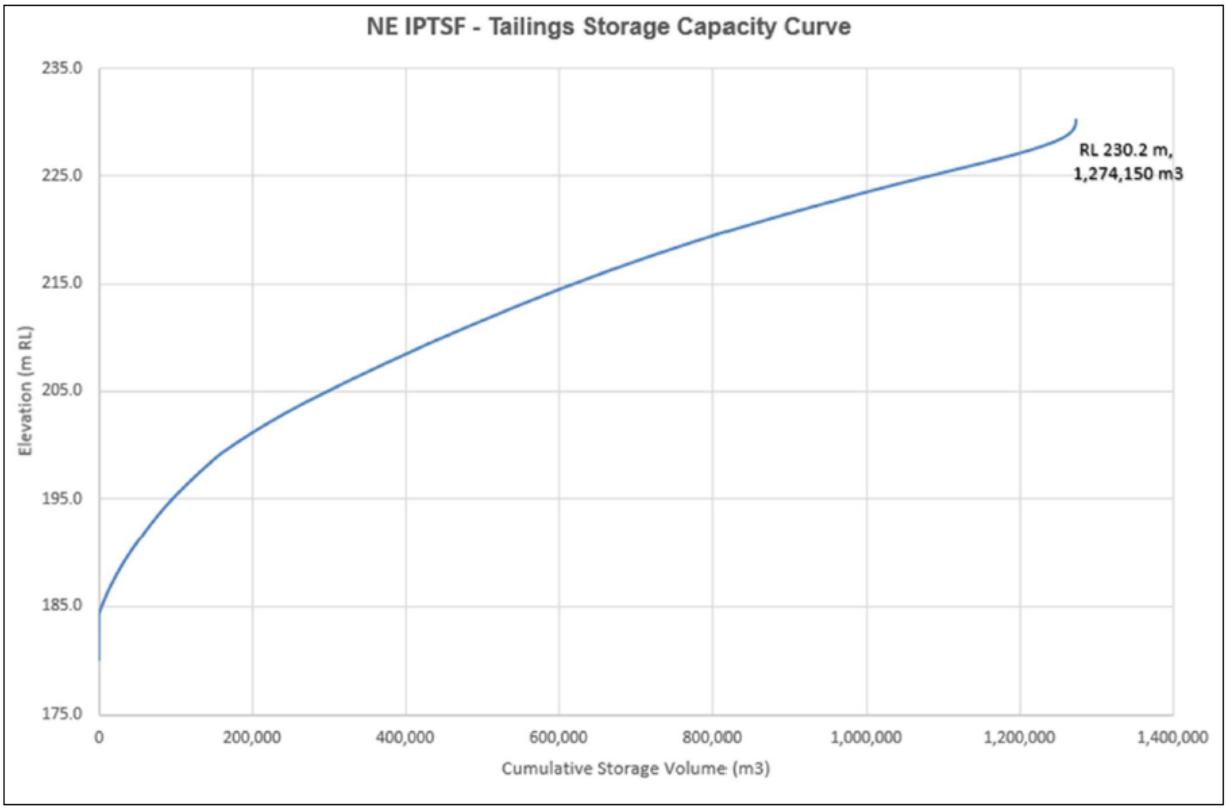


Figure 1: Tailings Storage Capacity Curve (Source: Tetra Tech Coffey 2023)

Tailings will be deposited at a single discharge point at the western side of NE TSF (Figure 8) to control the tailings beach and supernatant pond development to facilitate supernatant water recovery from the facility and to optimize TSF capacity.

A decant pump will not be used for decant recovery for the NE Pit TSF, instead two recovery bores (WTD35 and WTD36) will be constructed west of the NE Pit TSF to collect the supernatant from the pond that will develop at the southern access pit ramp (Figure 8). This method of decant recovery differs from the 2SE Pit TSF as a decant waster system was utilized. It is proposed that the supernatant pond will be kept as small as practical to maximise underdrainage through the historic waste dump (WD1) to WTD35 and WTD36 (Figure 7). Abstracted decant water from the recovery bores will be pumped to two holding tanks before returning to the processing plant.

WD1 is comprised of the basalt waste from previous pit developments, Due to decant seeping through WD1 to the recovery bores there is a risk for leaching of metals, it is confirmed that the rock waste in WD1 is considered to be an inert non-acid forming (NAF) material with high structural stability and has a low risk of generating acid or metalliferous drainage (Tetris Environmental 2021). The NE Pit TSF base and other sides is comprised of basalt resulting in the decant to travel through the WD1 preferential pathway due to the lower hydraulic conductivity within WD1 (rock fill embankment) (Figure 2). The Licence Holder has a

contingency arrangement that will use an existing trailer/skid mounted pump that will allow water recovery directly from the TSF pond if required.

Material Types	Hydraulic conductivity, k (m/s)
Tailings	1.0×10^{-8}
Rock fill embankment	1.0×10^{-3}
Basalt Foundation	1.0×10^{-8}

Figure 2: Hydraulic conductivity (sourced from Advisian 2019)

2.2.2 Coarse rejects stockpile and premises boundary changes

The Licence Holder has requested an amendment to the prescribed premises boundary to accommodate additional coarse reject stockpiling. Coarse reject stockpiling will occur within WD2 which is located at the western portion of the premises (Figure 7) and was approved under *Mining Act 1978* Reg ID 116546 granted on 29 September 2023. The expansion of the Premises boundary has resulted in the addition of tenements G74/13 and L74/46 to the Licence. The Delegated Officer has granted the expansion of the prescribed premises boundary to the Licence, with the new premises boundary presented in Figure 1 of Licence L8469/2010/2.

The Licence Holder produces approximately 750,000 tonnes per annum (tpa) of coarse rejects from the Processing Plant. The material generally consists of k-felspar, quartz, microcline, muscovite, tourmaline, albite and <5% basalt and granodiorite. The Licence Holder intends to either reprocess the coarse reject material or use it as an inert aggregate (i.e. road-base or clean fill).

2.2.3 Monitoring Locations

Groundwater Monitoring bores

The Licence Holder has requested to add additional groundwater monitoring bores to the licence (Figure 9):

- Three monitoring bores (MB22 to MB24) located at north, northeast and east of the proposed NE Pit TSF to monitor groundwater impacts relating to the operation of the TSF; and
- Seven monitoring bores (MB30 to MB36) which encapsulates the WD2 boundary to the north, west and south to monitor groundwater impacts relating to the operation of the coarse rejects stockpile.

Dust Deposition Gauges

The Licence Holder has also proposed a change in dust monitoring sites (Figure 3) to better accommodate the change of works. Two new dust monitoring sites DDG 18 and DDG 19 were installed in November 2023 to monitor conditions associated with the increase of the WD2 footprint and the expansion of the prescribed premises boundary for the proposed coarse reject stockpile. DDG 01, DDG 02 and DDG 07 have also been removed and relocated to more relevant locations. DDG 01 (now renamed as DDG 13) was moved approximately 100 m away from the previous location in April 2022. DDG 02 (now renamed as DDG 22) was moved to the northwest boundary on 28 June 2024. DDG 07 (now renamed as DDG 11) was moved approximately 250 m from the previous location in February 2021. DDG 14, 15, 16 and 17 were installed in April 2022 and a summary of the locations are presented in Table 1 and Figure 3. These proposed locations have been accepted and will be added to the licence.

Table 1: Dust monitoring sites proposed and description of location

Dust monitor site	Description
DDG 11	In bushland northeast of mine.
DDG 12	East of the coarse rejects stockpile (decommissioned and relocated on 28 June 2024 renamed as DDG22).
DDG 13	North of the decommissioned TSF.
DDG 14	Adjacent to the Cattlin Creek and north of the Floater Road upgrade.
DDG 15	Adjacent of NE Pit TSF and SE Pit TSF.
DDG 16	South of NE Pit TSF and SE Pit.
DDG 17	At Ravensthorpe Airport approximately 30 km southeast of the prescribed premises.
DDG 18	South of Coarse Reject Stockpile in WD2.
DDG 19	West of Coarse Reject Stockpile in WD2.
DDG 22	Located Far North West boundary.

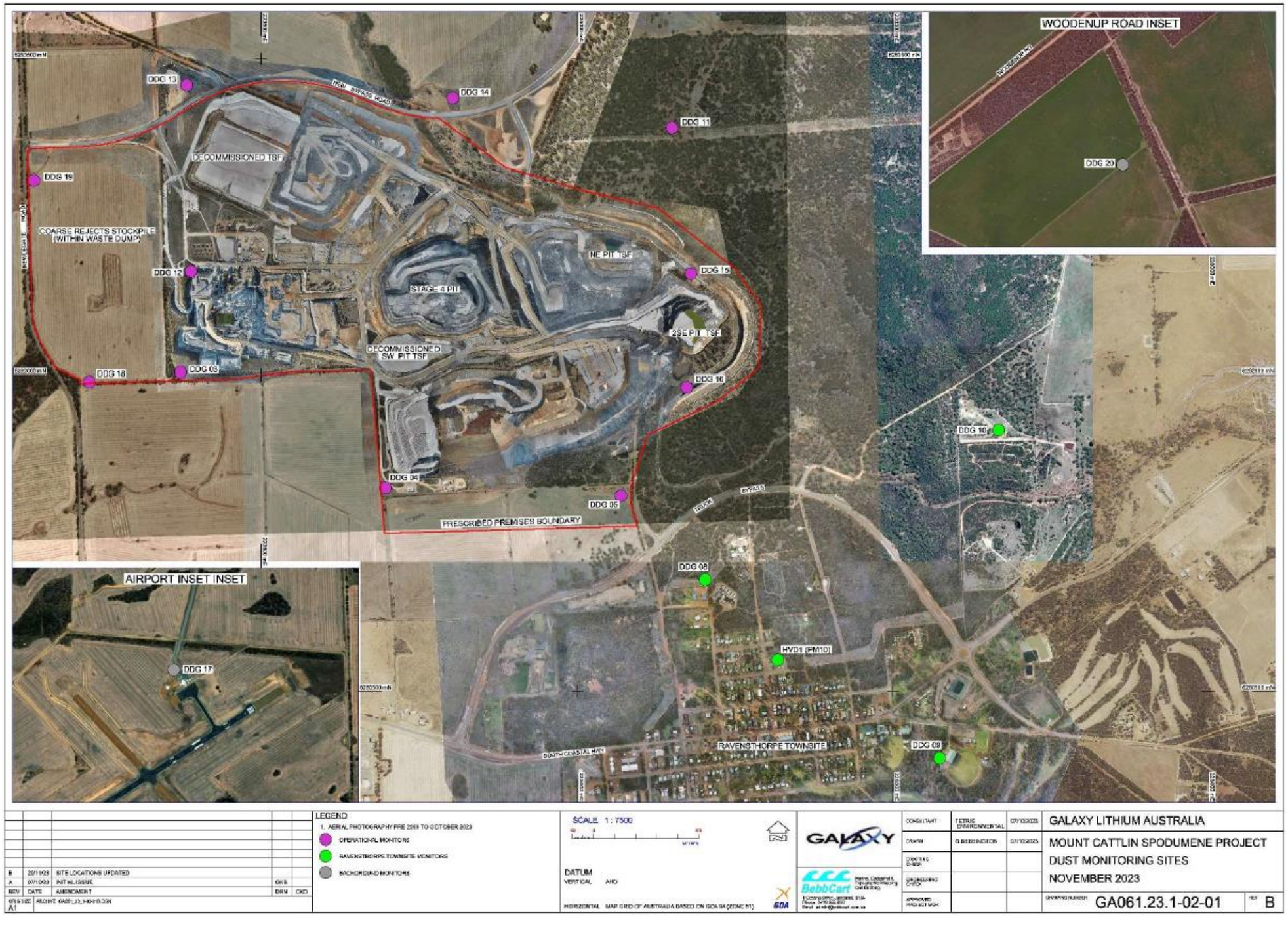


Figure 3: Dust Monitoring Sites

Note: DDG locations and IDs have changed as a result of this amendment. Updated locations and IDs are presented in Figure 3 Schedule 1 of Licence L8469/2010/2.

2.2.4 Improvement Program – dust monitoring

Current dust monitoring requirements within Licence L8469/2010/2 includes the requirement to monitor dust emissions at the premises boundary using dust deposition gauges (DDGs) to monitor for deposition and characterisation of dust potentially affecting the amenity of off-site receptors. A Hi-Vol air sampler is also located within the town of Ravensthorpe which monitors PM^{10} concentrations to monitor impacts on human health.

An Improvement Program (condition 4.1.1) was added to Licence L8469/2010/2 during a licence amendment on 30 June 2020. Condition 4.1.1 was implemented due to the proposal of night-time operations, the history of dust complaints and the proximity of the site to sensitive receptors. The conditions intent was to provide evidence of the robustness of the ambient air monitoring implemented by the Licence Holder. The expectation of the condition is to identify and remove any data gaps, uncertainties and environmental risks associated with fugitive dust emissions from the Premises.

Condition 4.1.1 requires Galaxy to prepare and submit a sampling and analysis plan (SAP) for the ongoing ambient air monitoring to monitor ground level concentrations of contaminants at sensitive receptor(s). The SAP requires:

i. *A review of the existing monitoring locations and methods (including monitoring of background dust and contaminant levels) to determine whether any changes or additions are required;*

ii. *Parameters to be monitored which as a minimum must include:*

   a. *Total particulates (PM10);*

   b. *Metals and metalloids (whole suite of analytes);*

   c. *Asbestiform material;*

   d. *Mica; and*

   e. *Crystalline silica.*

iii *Proposed monitoring methodology in accordance with AS/NZS 3580.9.3: Determination of total suspended particulates: High volume sampler gravimetric method and detection limit for each parameter being monitored;*

iv *Sampling methodology proposed including details of any quality assurance/quality control procedures which will be established;*

v *Proposed duration of each sampling event and justification for same; and*

vi *A plan for commencing the ongoing ambient air monitoring, prior to commencing night time operations, and no later than three months from the sampling and analysis plan being submitted.*

To comply with condition 4.1.1 the Licence Holder engaged Environmental Technologies & Analytics Pty Ltd (ETA) to review, revise and provide an ambient air monitoring program review (Galaxy 2020b) of the ongoing Airborne Material Management Plan (AMMP) (Galaxy 2020a) and provided guidance to the Licence Holder to comply with the requirements of condition 4.1.1 (ETA 2020a). The report was submitted to the Department within the Licence Holders 2019 to 2020 Annual Environmental Report (AER) on 16 November 2020.

Upon receiving the report the department determined that it complies with the requirements of condition 4.1.1 and therefore condition 4.1.1 will be removed from the Licence L8469/2010/2 as requested by the Licence Holder.

2.4 DWER-initiated Amendment - Premises dust review

The department undertook a review of the Sample and Analysis Plan (ETA 2020a) submitted by the Licence Holder (to meet the requirements of condition 4.1.1) as well as some additional documents provided by the applicant, these documents include:

- the Licence Holders latest AMMP (Galaxy 2020a),
- the 2020 Annual Dust Monitoring review (ETA 2020b),
- Ambient Air Monitoring Program – Review of Dust Composition Results (ETA 2023) and
- the 2023 Annual Dust Monitoring Review (ETA 2024).

As a result of the review the delegated officer has determined to make some additional amendments to the licence regarding dust monitoring. Findings of the departments technical review are outlined in the below sections.

2.4.1 Data Gaps

Incomplete site weather data

Within the 2023 annual monitoring report (ETA 2024) it was indicated that the Licence Holder operates an automatic weather station (AWS) which is a consumer grade Vantage Pro2, Wireless which provides meteorological data at 5-minute intervals (Figure 4). There is no indication whether the AWS meets the requirements of AS/NZS 3580.1.1: *Methods for sampling and analysis of ambient air, Part 1.1: Guide to siting air monitoring equipment* and *AS/NZS 3580.14: Methods for sampling and analysis of ambient air, Part 14: Meteorological monitoring for ambient air quality monitoring applications* and the report recommended that the Licence Holder re-establishes the integrity of the site weather station to ensure that data can be used in analysis and in response to dust investigations and decision making.

The Department supports the recommendation that the site weather station is re-established so that it meets the requirements of AS/NZS 3580.1.1. As a result, a condition has been added to the licence requiring the Licence Holder to ensure that the AWS is compliant with AS/NZS 3580.1.1. The Department has also amended condition 3.5.1 to require the Licence Holder to monitor wind direction and strength in accordance with AS/NZS 3580.14 to better understand dust emissions impacts of receptors. Further discussion on the Departments additional and amended conditions is presented in Table 3.

Figure 4: Location of the automatic weather station at the premises.

Relocation of the existing DDG09 (located within the townsite) with the high-volume sampler (HV01)

In the 2020 Ambient Air Monitoring Program report (ETA 2020a) a recommendation was to relocate DDG 09 to HV01 within the townsite to avoid impacts from localised sources. Recent monitoring data indicates that DDG09 recorded higher concentrations than all townsite samples, indicating an organic source contribution. The department notes that the recommendation to relocate DDG 09 was not implemented in the 2022 and 2023 monitoring period.

The Department supports this recommendation to relocate DDG 09 to HV01. Further discussion on the Departments additional conditions is presented in Table 3. It's noted that DDG 09 has been renamed to DDG 21 and was relocated next to HV01 on 28 June 2024.

PM_{10}

Technical advice has indicated that the use of ambient air quality criteria as limits in licence conditions is not practical due to the evidence of multiple fugitive sources of dust in the local environment. Evidence of multiple dust sources is demonstrated in Figure 5 and Figure 6 through the high concentrations of dust within the background DDG (DDG 20). DDG 20 background monitor is located on agricultural property 17 km north of the Mt Cattlin Operations and appears to be impacted by seasonal farming activities (harvesting, ploughing of soil) and other localised sources (ETA 2024).

The Department has amended condition 3.5.1 to remove the word "limit" and replaced with "target" for the PM_{10} parameter. The word change implementation ensures that the Licence Holder does not have to notify a breach of a limit as per condition 4.3.1 if dust monitoring station (HV01) reports a PM_{10} concentration of 50 µg/m^3 over a 24-hour period. The Department has also added condition 3.5.2 to require the Licence Holder to conduct an investigation fort the potential causes for the target value (50 µg/m^3) to exceed and report the findings to the Department within 3 months of exceeding the target.

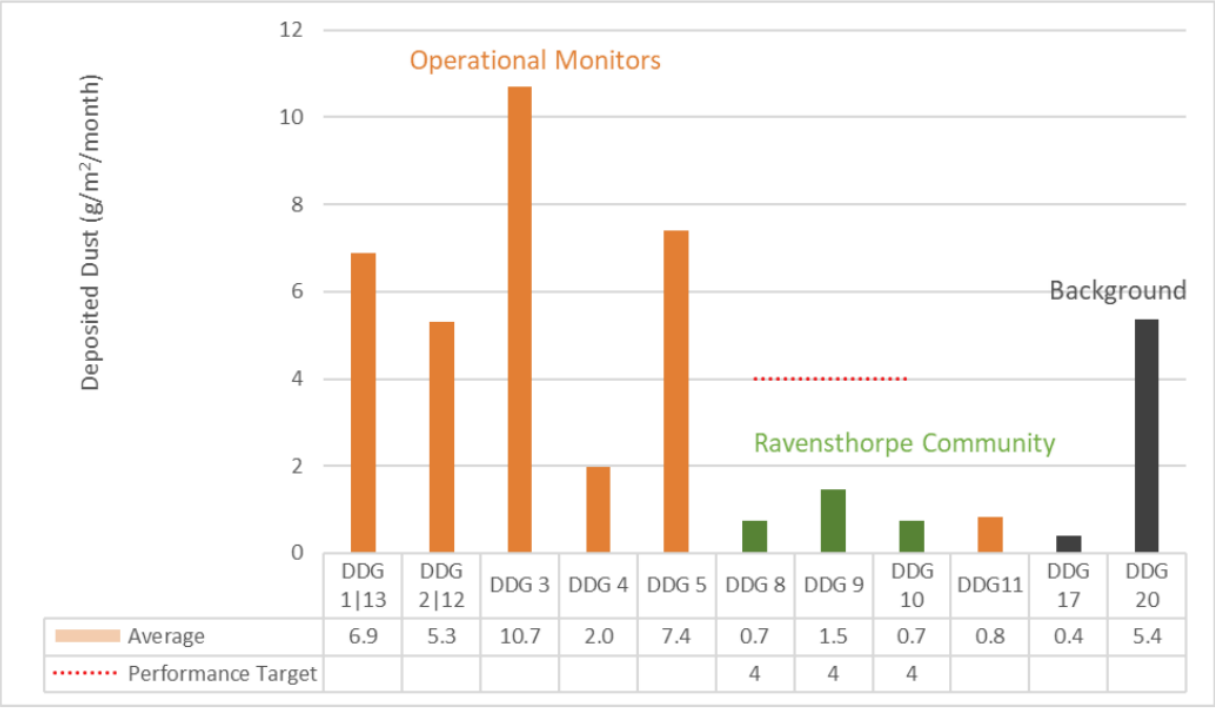
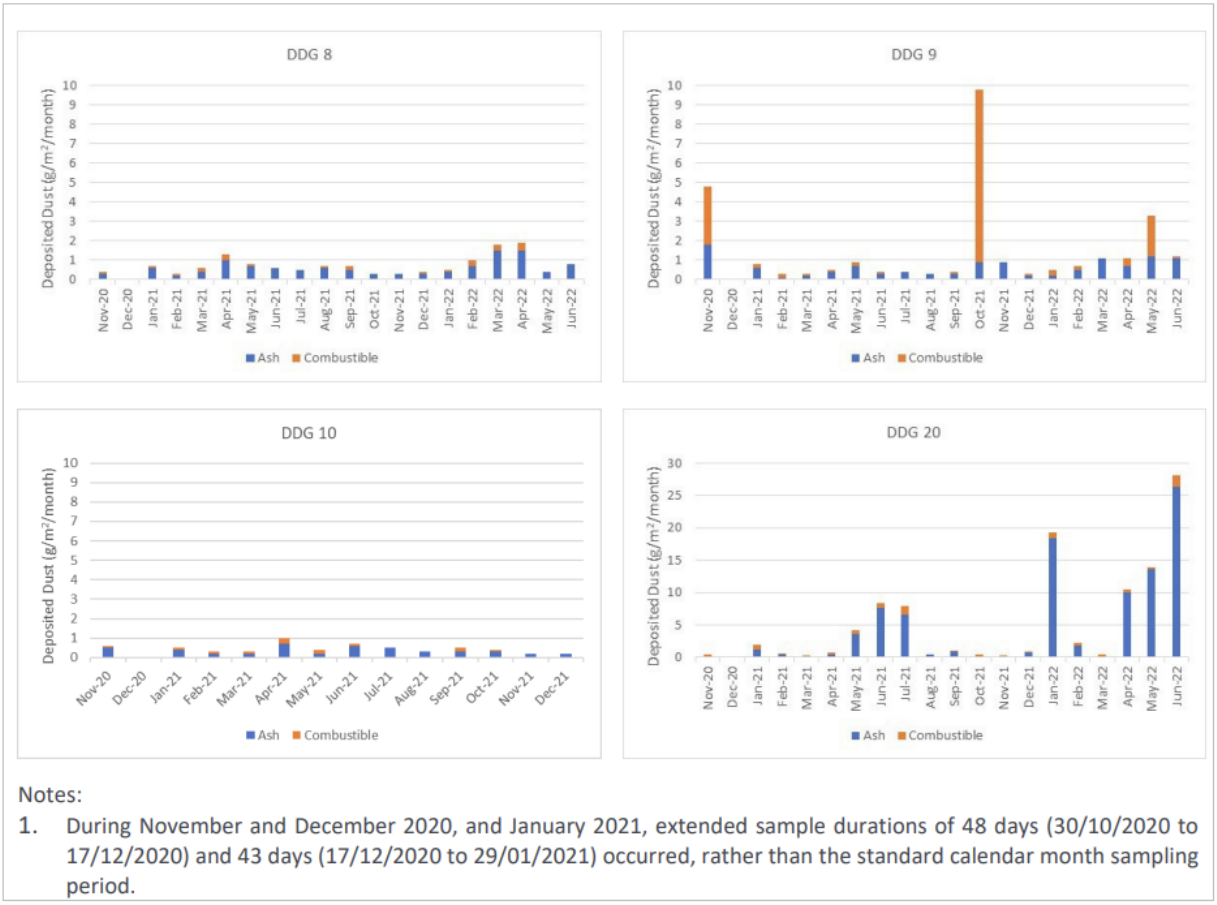


Figure 5: Annual average recorded dust deposition results from November 2020 to June 2022 (sourced from ETA 2023)



Notes:

1. During November and December 2020, and January 2021, extended sample durations of 48 days (30/10/2020 to 17/12/2020) and 43 days (17/12/2020 to 29/01/2021) occurred, rather than the standard calendar month sampling period.

Figure 6: Dust deposition results – Monthly trends of selected sites (sourced from ETA 2023)

2.4.2 Asbestiform, mica and silica

Within the Ambient Air Monitoring Program Review document (ETA 2020a) it is mentioned that the assumption for the requirement to monitor asbestiform and mica within the improvement program condition was to confirm the presence or absence of asbestiform and mica in the dust. As a result the Licence Holder undertook a monitoring program where samples were collected quarterly for asbestiform and mica analysis with data reporting whether asbestiform and mica were “detected” or “not-detected”.

Respirable Crystalline Silica (RCS) was also monitored through the DDGs and was collected in line with *AS/NZS 3580.10.1:2016 Method 10.1 Determination of particulate matter – deposited matter – gravimetric method*.

A summary of the results is presented in Table 2 and the findings included:

- Asbestos mineral fibres were identified in five of the 22 samples, all asbestos fibres were classified as cleavage fragments (non-asbestiform) or were below the reporting limit. Positive detects occurred in the same sample period and was also reported in the background location (ETA 2023);
- Analysis of dust deposition for mica and RCS returned positive detects in most samples but was predominantly at non-respirable particle sizes (i.e. greater than PM100), with the smaller size ranges (PM10 and PM4) being at trace (approximately 1% by weight) or sub-trace (less than 1% by weight) concentrations (ETA 2023); and

- Crystalline silica was observed or detected in all samples. The majority was observed/reported at a non-respirable size range (>PM_{100}) while the smaller size ranges (PM_{10} and PM_4) were reported at either 1% or less.

The department notes that the methodology used to sample asbestiform, mica and silica were not in accordance with an ambient air sampling method *(AS/NZS 3580.14)* and therefore the Department acknowledges that the results cannot be compared to ambient air criteria. Notwithstanding, results presented in Table 2 show that there are low concentrations of silica and mica within the samples collected and where high concentrations were observed these were of non-respirable fractions (>PM_{100}) and therefore of low human health risk. As a result of this sampling it has been determined that ongoing sampling requirements for mica, silica and asbestos is not necessary and conditions will not be added to the licence.

Table 2: Summary of respirable fibre, silica and mica results November 2020 – December 2021 (sourced from ETA 2023)

Sample Round	Sample Date (Lab Date received)	DDG	Sample	Asbestos Fibres Observed	Asbestiform	Silica[1]	Mica[1]
1st	30.10.2020 to 17.12.2020 (10.02.2021)	DDG58	21_0221_01	No		Sub-trace[2]	Trace[3]
		DDG59	21_0221_02	No		Sub-trace	Trace
		DDG60	21_0221_03	No		Sub-trace	Trace
		DDG70	21_0221_04	No		Sub-trace	Trace
2nd	29.01.2021 to 01.04.2021 (05.05.2021)	DDG58	21_0743_01	**Yes**	Non-asbestiform [4]	Sub-trace	Trace
		DDG59	21_0743_02	No		Sub-trace	Sub-trace
		DDG60	21_0743_03	No		Sub-trace	Trace
		DDG70	21_0743_04	No		Sub-trace	Trace
3rd	03.05.2021 to 02.06.2021 (24.06.2021)	DDG58	21_1041_01	**Yes**	Below reporting limit [5]	Trace	Trace
		DDG59	21_1041_02	**Yes**	Non-asbestiform [6]	Trace	Trace
		DDG60	21_1041_03	No		Trace	Trace
		DDG70	21_1041_04	**Yes**	Non-asbestiform [7]	Trace	Trace
4th	02.08.2021 to 02.09.2021 (22.09.2021)	DDG58	[8]	-	-	-	-
		DDG59	21_1558_02	No		Trace	Trace
		DDG60	[9]	-	-	-	-
		DDG70	21_558_04	No	ND	Sub-trace	Sub-trace
5th	17.11.2021 to 20.12.2021 (21.01.2022)	DDG58	22_0093_01	No	ND	Minor [10]	High
		DDG59	22_0093_02	No	ND	Trace	High
		DDG60	22_0093_03	No	ND	Trace	High
		DDG70	22_0093_04	**Yes**	Non-asbestiform [7]	High [11]	Trace
6th	16.02.2022 to 16.03.2022 (07.04.2021)	DDG58	22_0538_01	No	ND	High [11]	High
		DDG59	22_0538_02	No	Trace [12]	Minor [10]	Low to Trace
		DDG60	22_0538_03	No	ND	High [11]	Trace to Low
		DDG70	22_0538_04	No	ND	High [11]	Trace

Notes:
1. Thoracic (PM_{10}) and Respirable (PM_4) size fraction.
2. Sub-trace amount means concentration of less than 1% by weight of sample.
3. Trace amount means concentration of approximately 1% by weight of the sample is in the respirable (PM_4) size range.
4. A single, countable serpentine asbestos fibre was observed, as a possible identification of antigorite. Classified as a cleavage fragment (non-asbestiform) due to non-parallel sides.
5. A single, countable amphibole asbestos fibre was observed, as a possible identification of ferro-actinolite. This is below the reporting limit of 3 fibres per 100 fields as per NOHSC:3003 (based on air sampling of ~ 1 m^3).
6. A single, non-countable cleavage fragment of amphibole mineral was observed, as a possible identification of ferro-actinolite. This is non-asbestiform as per NOHSC:3003.
7. A single, non-countable cleavage fragment of amphibole mineral was observed, as a possible identification of actinolite. This is non-asbestiform as per NOHSC:3003.
8. No Sample analysis report provided to ETA.
9. Laboratory reported insufficient volume in the DDG / bottle for analysis.
10. Crystalline silica was observed/detected at minor concentrations, but this includes non-respirable (PM_{100}) sizes.
11. Crystalline silica was observed/detected at high concentrations, but this includes non-respirable (PM_{100}) sizes.
12. No asbestos mineral fibre was observed. Trace quantities of non-countable actinolite were present.

2.4.3 Summary of conditions added to Licence L8469/2010/2

The amendments to Licence L8469/2010/2 as a result of the DWER-initiated dust review and the results of the Improvement Program are presented in Table 3.

Table 3: Summary of amendments and justification to Licence L8469/2010/2

Licence Condition	Amendment to Licence	Justification
3.5.1	Reworded "limit" to "target" of 50 µg/m^3 from the Ravensthorpe town site Hi-Vol monitor (HV01) within Table 3.5.1: Monitoring of air and dust.	Due to the evidence of multiple fugitive sources the limit has been removed from Table 3.5.1 in Licence L8469/2010/2 and replaced with "target" as was recommended by technical advice. The location and monitoring requirements of HV01 monitoring requirements is unchanged.
3.5.2	Added condition to require Licence Holder to investigate and report to the CEO any exceedance to the target in condition 3.5.1.	It is noted that the Airborne Material Manage Plan that the Licence Holder operates under requires any exceedance of the 50 µg/m^3 of PM_{10} is investigated to determine if the Premises has contributed to the exceedance (Galaxy 2020a). The addition of condition 3.5.2 is to inform the Department of high concentrations within the townsite prior to the submission of the AER.
3.5.1	Amended condition requiring the Licence Holder to monitor wind direction and strength at the AWS.	The department has identified incomplete site weather data and wind monitoring at the Premises, this "*limits the capacity of Galaxy personnel to proactively manage or respond to dust observations and complaints* (ETA, 2023)." ETA recommended to re-establish the integrity of Mt Cattlin weather station. The requirement for an AWS to be operational and maintained to monitor the AWS as per *AS/NZS 3580.14* and to be included within the AER.
3.5.1	Amended the location of DDG 09 to be located next to HV01 within Figure 3.	Due to dust impacts from localised sources the location of DDG 09 within Licence L8469/2010/2 Schedule 1, Figure 3 has been amended to move DDG 09 next to HV01 within the townsite in order to avoid impacts from localised sources, this change was recommended by ETA (2020b) and is supported by the department. It's noted that DDG 09 has been renamed to DDG 21 and was relocated next to HV01 on 28 June 2024.
3.5.1	Added the requirements to monitor lithium and manganese and zinc at HV01.	During the 2020-2022 monitoring period, (ETA 2023) trace metals were analysed and were reported above LOR from the HVAS PM_{10} sampler these included, lithium, manganese, nickel and zinc. ETA (2023) recommended that lithium is continued to be sampled for as it is a more appropriate indicator of the Mt Cattlin Project and to also regularly sample for manganese and zinc. A single result for nickel was reported above LOR during the 2020-2022 monitoring (ETA 2023) and is considered an abnormal result. ETA (2024) noted that zinc was reported at very low concentrations and was less than 1% of the guideline value (46 µg/m^3) in the DWER draft *2019 Guideline – Air Emissions* (Toxikos 2012).

Licence Condition	Amendment to Licence	Justification
		It is noted that the maximum concentration reported of zinc during the monitoring period from November 2020 to June 2022 (ETA 2023) was reported at 5% of the guideline.
3.5.1	Added a note within Table 3.5.1 requiring the analysis of PM_{10} to be reported with a LOR of 1 µg/m^3.	It was observed in the 2023 annual monitoring period (ETA 2024) PM_{10} LOR was reported at 10 µg/m^3 when all other monitoring periods the LOR was reported at 1 µg/m^3. AS/NZS 3580.9.6 stated *the concentrations of 1 µg/m^3 and greater can be determined using a 24-hour sampling period if the mass of the filter is determined under carefully controlled laboratory conditions.* A footnote has been included within Table 3.5.1 which requires the LOR to be reported at 1 µg/m^3.

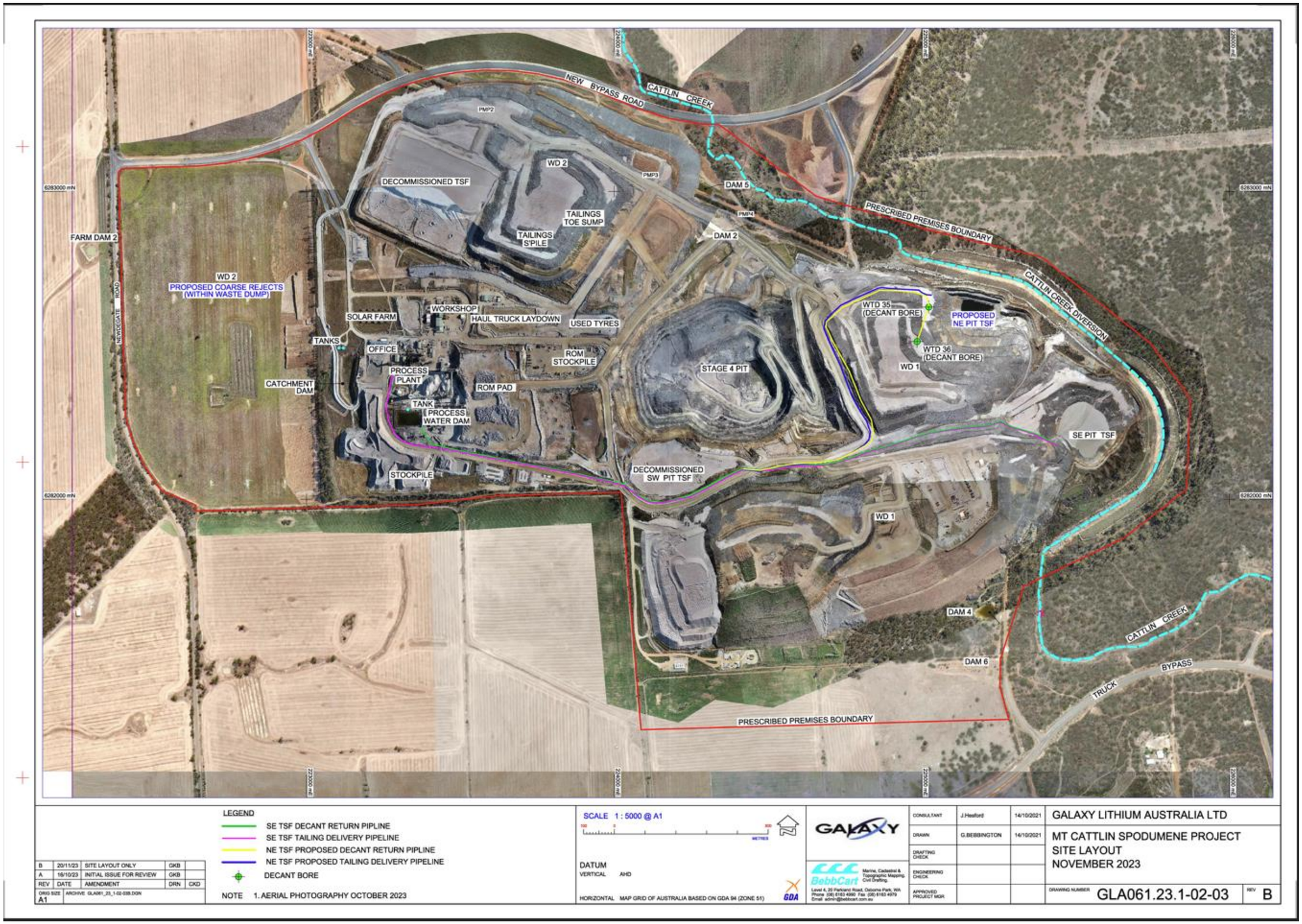


Figure 7: Current and proposed tailings delivery and decant return pipeline locations

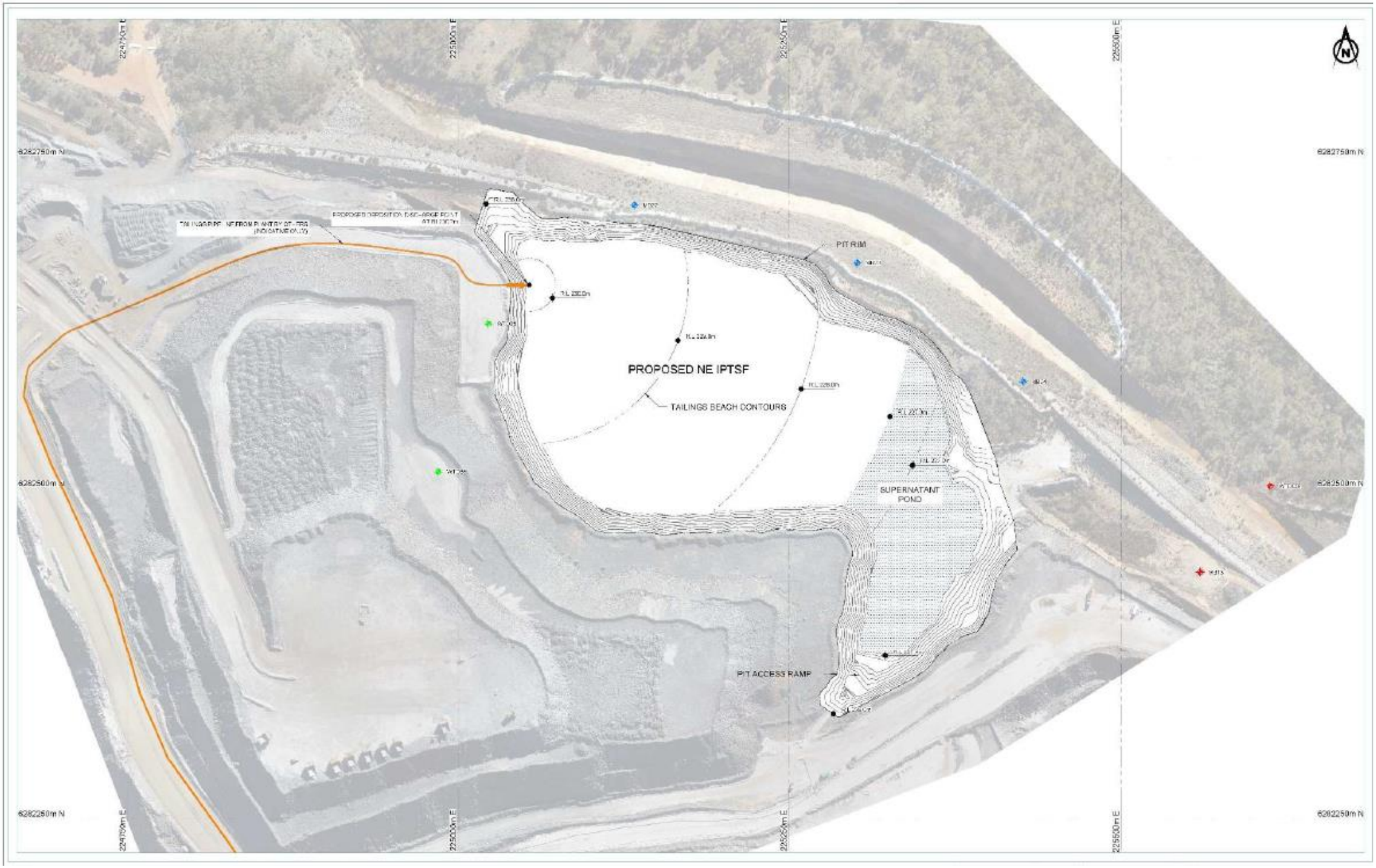


Figure 8: Tailings discharge point at NE TSF (Source: Tetra Tech Coffey 2023)

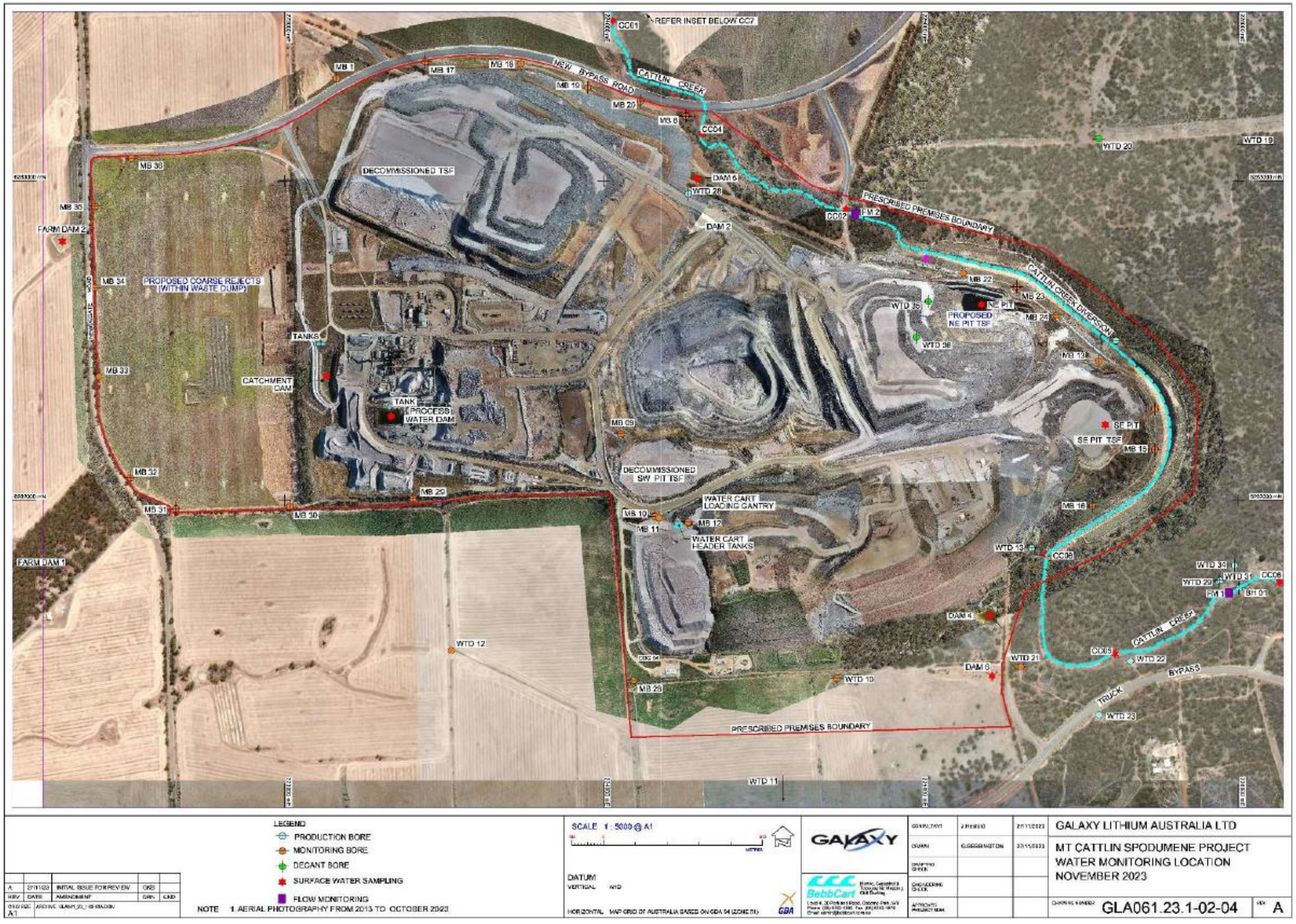


Figure 9: Groundwater Monitoring Location

3. Risk assessment

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guideline: Risk assessments* (DWER 2020).

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

3.1 Source-pathways and receptors

3.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises construction and operation which have been considered in this Amendment Report are detailed in Table 4 below.

Table 4 also details the proposed control measures the Licence Holder has proposed to assist in controlling these emissions, where necessary.

Table 4: Licence Holder controls

Construction Phase			
Emission	**Sources**	**Potential pathways**	**Proposed controls**
Noise	Onsite vehicle and plant movements during construction of infrastructure	Air/windborne pathway	• Compliance with noise regulations under: Environmental Protection (Noise) Regulations 1997. • Implementation of the approved Mt Cattlin Project Noise Management Plan (Galaxy 2019).
Dust	Onsite vehicle and plant movements during earthworks.	Air/windborne pathway	• Airborne Materials Management Plan includes regular sampling of dust deposition gauges around the mine site and a hi-volume sampler in the town of Ravensthorpe; • Water trucks will be utilized on road and during construction activities; • Implementation of speed limits; and • Implementation of the Mt Cattlin Project Airborne Management Plan (Galaxy 2020a).
Operations Phase			
Emission	**Sources**	**Potential pathways**	**Proposed controls**

Dust	Dry tailings sediment in Pit TSF	Air/windborne pathway	• Airborne Materials Management Plan includes regular sampling of dust deposition gauges around the mine site and a hi-volume sampler in the town of Ravensthorpe; • Tailings will be wet during operations; • Implementation of speed limits; and • At closure tailings disposal will remain at least 1 m below put crest and be encapsulated with waste rock; and • Implementation of the Mt Cattlin Project Airborne Management Plan (Galaxy 2020a).
	Stockpiling of coarse reject material from plant to WD2	Air/windborne pathway	• Implementation of the Mt Cattlin Project Airborne Management Plan (Galaxy 2020a); and • Material deposited with mostly consists of larger >6 mm material and consist of approximately 4% moisture content.
Tailings slurry and/or supernatant water	Pipeline leading to/from NE in-pit TSF	Spill/leak from pipeline	• Pipeline located within 'V drain' to act as a secondary containment infrastructure; • Daily inspections of pipelines carried out of suitable staff.
	Overtopping of NE Pit	Direct discharge to land	• Operational freeboard of 300 mm below the lowest point of the TSF embankment.; and • Pre-existing Licence requirements for daily visual inspections when tailings deposition in the TSF is occurring.
Leachate	NE In-Pit TSF	Seepage to soils and groundwater	• Decant recovery bores • Basalt pit walls are of low hydraulic conductivity; • Groundwater monitoring of surrounding monitoring bores; and • Vegetation health monitoring.
Contaminated stormwater	Coarse reject stockpile	Direct discharge to land or infiltration to groundwater	• Monitoring bores installed surrounding the Premises; • Toe drains and sump to collect water runoff; and • All infrastructure areas designed to contain a 72 hour, 1 in 100-year

			Annual Exceedance Probability (AEP) event.

3.1.2 Receptors

In accordance with the *Guideline: Risk assessments* (DWER 2020), 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.

Table 5 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises *(Guideline: Environmental siting* (DWER 2020)).

Table 5: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	**Distance from prescribed activity**
Residential Premises	The nearest residential dwelling is located approximately 1.5 km south of the proposed NE in-pit TSF.
Creswick Pastoral Homestead	The nearest homestead is approximately 3.3 km southeast of the proposed NE in-pit TSF.
Environmental receptors	**Distance from prescribed activity**
Threatened Ecological Community	A P3 Threatened Ecological Community is located approximately 1.5 km southeast of premises boundary and 2.3 km from the proposed NE in-pit TSF.
Threatened / Priority Flora	A threatened flora located approximately 3.2 km northeast of the eastern premises boundary and 3.7 km from the proposed NE in-pit TSF. A priority 1 and 3 flora are approximately 3.5 km from the premises boundary and 4.5 km from the NE in-pit TSF. Applicant has advised that a priority 3 flora is located approximately 100 m from the premises boundary.
Native Vegetation	Dense native bushland appears to be adjacent (120 m from the proposed TSF) to the prescribed premises boundary at the eastern portion of the site. Remnant native bushland also appears to exist at the southwestern portion of the new proposed premises at the coarse rejects within waste dump (40 m).
Cattlin Creek (*ephemeral)*	An ephemeral creek (Cattlin Creek) is located immediately north, east and south of the prescribed premises. In the 2019 Cattlin Creek was diverted under S18 of the *Aboriginal Heritage Act 1972* to enable the expansion of mining from Dowling Pit to 2SE and 2NE Pits (Mining Plus 2021).

	The ephemeral creek now flows from the north to the southeast passing 100 m north of the proposed NE in-pit TSF (Figure 7).
Groundwater *(no beneficial use other than for mining or industrial purposes)*	It is understood that there is likely to be a deep fractured rock system and a shallow perched aquifer at the site. Groundwater in the newly installed monitoring bores surrounding the proposed NE TSF (MB22-24) ranged from 15.3 to 52 meters below ground level (mbgl) (Arcadium 2023). Groundwater samples collected from MB22, MB23 and MB24 had an average pH of 6.3, TDS of 33,323 mg/L and had concentrations above 500 mg/L were: sulphate, chloride, magnesium, sodium, lithium, manganese, boron and caesium.

3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020) for those emission sources which are proposed to change and takes into account potential source-pathway and receptor linkages as identified in Section 3.1. Where linkages are in-complete they have not been considered further in the risk assessment.

Where the Licence Holder has proposed mitigation measures/controls (as detailed in Section 3.1.1), these have been considered when determining the final risk rating. Where the Delegated Officer considers the Licence Holder's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the licence as regulatory controls.

Additional regulatory controls may be imposed where the Licence Holder's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 6.

The Revised Licence L8469/2010/2 that accompanies this Amendment Report authorises emissions associated with the operation of the Premises i.e. processing and beneficiation of metallic or non-metallic ore.

The conditions in the Revised Licence have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

Table 6. Risk assessment of potential emissions and discharges from the Premises operation

Risk Event					Risk rating[1] C = consequence L = likelihood	Licence Holder's controls sufficient?	Conditions[2] of licence	Comments / Justification for additional regulatory controls
Source/Activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Licence holders controls**				
Construction								
Construction of pipeline and associated infrastructure including earthworks	Dust and Noise	**Pathway** Air/windborne pathway. **Impact** Impacts to receptor health and sites amenity.	• Nearby residences (1.5 kms) • Creswick Pastoral Homestead (3.3 km) • Threatened / Priority Fauna (1 km) • Threatened Ecological Community (1.5 km)	Refer to Section 3.1.1	C =Slight L =Unlikely **Low Risk**	Y	Condition 2.1.1 – Dust emissions management (restrict vehicle speed limits. Condition 2.1.2 – Measures preventing fugitive dust liftoffs.	N/A
Operation								
Deposition of tailings into NE in-pit TSF	Tailings and decant water	**Pathway** Seepage through base of pit to groundwater **Impacts** Reduction in groundwater quality, groundwater mounding, and/or mobilisation of potentially contaminated leachate.	• Native vegetation (20 m) • Priority Flora (100 m)	Refer to Section 3.1.1	C = Moderate L = Possible **Medium Risk**	N	Condition 1.2.7 – construction, design, and timeframe requirements for recovery bores. Condition 3.2.1 – Monitoring of volume of tailings discharge to TSF and decant recovered. Condition 3.4.1 – Groundwater monitoring requirements surrounding and **trigger and limit levels for wells surrounding NE in-pit TSF.** **Condition 3.4.2 – Requires submission of a seepage management plan if SWL trigger levels are reached.** **Condition 3.4.3 – Requires implementation of the seepage management plan and additional recovery bores.**	Discussed further in Section 3.3
		Pathway Seepage through embankments of pit wall to nearby ephemeral creek. **Impacts** Damage to surrounding vegetation and/or mobilisation of potentially contaminated leachate.	• Cattlin Creek - *ephemeral* (100 m) • Native vegetation (20 m)					

Risk Event					Risk rating[1] C = consequence L = likelihood	Licence Holder's controls sufficient?	Conditions[2] of licence	Comments / Justification for additional regulatory controls
Source/Activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Licence holders controls**				
		Pathway Overtopping of pit and discharge to land. **Impacts** Direct contact degrading environmental receptors.	• Native vegetation (20 m) • Cattlin Creek - *ephemeral* (100 m) • Priority Flora (100 m)	Refer to Section 3.1.1	C = Moderate L = Unlikely **Medium Risk**	Y	Condition 3.2.1 – Monitoring of volume of tailings discharge to TSF and decant recovered. Condition 3.3.1 – Daily/weekly inspection of TSF including freeboard capacity. Condition 3.3.3 – Requires perimeter bunds surrounding the TSF to divert stormwater away from the pit. Condition 3.3.4 – Operational freeboard of 300 mm.	Existing inspection and stormwater diversion requirements have been updated to include the new NE In- Pit TSF. Applicant controls have been deemed acceptable and have been added as conditions within the licence as per DWER Guideline: *Risk Assessments.*
		Pathway Spill or leak from pipeline discharging to the surrounding environment. **Impacts** Direct contact to receptors degrading environmental values.	• Native vegetation (20 m) • Cattlin Creek - *ephemeral* (100 m) • Priority Flora (100 m)	Refer to Section 3.1.1	C = Minor L = Unlikely **Medium Risk**	Y	Condition 1.2.6 – Pipelines containing tailings/product require containment, telemetry and/or automatic cutoff systems. Condition 1.2.7 – Construction and design requirements for pipelines. Condition 3.3.1 – Daily/weekly inspection of pipelines.	Pipelines will be constructed within 'V' drain. Pre-existing pipeline construction and operation requirements within the Licence have been updated to include the new pipelines leading to and from the NE in-pit TSF. Applicant controls have been deemed acceptable and have been added as conditions within the licence as per DWER Guideline: *Risk Assessments.*
Stockpiling of Coarse Rejects at WD2	Leachate containing metals	**Pathway** Seepage (may contain metals/metalloids) or stormwater runoff from stockpile **Impacts** Potentially contaminated leachate transported by stormwater offsite to receptors.	• Native vegetation (40 m) • Groundwater	Refer to Section 3.1.1	C = Minor L = Unlikely **Medium Risk**	N	Condition 1.2.13 – Collection of surface water runoff. Condition 3.4.1 – groundwater monitoring	Applicant controls have been deemed acceptable and have been added as conditions within the licence as per DWER Guideline: Risk Assessments.

Risk Event					Risk rating[1] C = consequence L = likelihood	Licence Holder's controls sufficient?	Conditions[2] of licence	Comments / Justification for additional regulatory controls
Source/Activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Licence holders controls**				
	Dust	**Pathway** Air/windborne pathway. **Impact** Impacts to receptor health and sites amenity.	• Native vegetation (40 m)	Native vegetation (40 m)	C =Slight L =Unlikely **Low Risk**	Y	Condition 2.1.2 – Measures preventing fugitive dust liftoffs. Condition 3.5.1 – Dust monitoring requirements. Condition 3.5.2 – Dust investigation requirements.	Material will primarily consist of >6 mm fragments and have approximately 4% moisture content limiting dust generation for the activity. Existing conditions on the licence have been deemed adequate to manage this risk event.

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guideline: Risk assessments* (DWER 2020).

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

3.3 Detailed risk assessment for seepage of leachate from NE in-pit TSF

3.3.1 Characteristics of emission

There are no changes to the tailings geochemistry between the current active SE Pit TSF and the proposed NE Pit TSF. Advisian (2019) advises that the tailings do not contain any environmentally risk bearing concentrations of metals, radioactive elements, rare earth minerals, fibrous materials or potential acid generating compounds. Ore mined for processes at the site consists of granitic pegmatites which are a simple igneous rock consisting of mostly feldspar (65%), quartz (25%) and contains approximately 5% of accessory minerals which include lithium bearing spodumene and tantalite.

Tailings deposited at NE TSF is expected to contain 15-20% solids with an approximate particle size distribution of 63-89% sand and 10-32% fines (<0.075 mm). The solids will be made up of primary inert K-felspar and quartz (total of 90%). Tailings are expected to have total dissolved solids (TDS) concentration of approximately 6,000 mg/L and a pH of 8.6 (Coffey 2021).

3.3.2 Receptors and potential adverse impacts

Receptors identified in respect to the seepage of tailings from NE TSF are limited to: Cattlin Creek, nearby native vegetation and priority flora. Groundwater and its potential users were discounted for this assessment as groundwater parameters presented within Galaxy 2023a suggests that the groundwater salinity is elevated and not suitable for stock water-supply or other purposes other than mining or industrial purposes.

Cattlin Creek is a saline ephemeral drainage line that was diverted by the Licence Holder in 2019 to enable the expansion of mining (Mining Plus 2021) the creek is approximately 100 m northeast of the NE pit. The channel of Cattlin Creek is approximately 223 mRL and the pit rim is approximately 229 mRL (Galaxy 2023b). Because the creek channel is lower there is a risk if groundwater surrounding the pit rises to a level where seepage into the creek can possibly occur, this could result in the transport of contaminants of potential concern downstream.

Priority flora P3 *Acacia biforia* is located approximately 100 m from the prescribed premises boundary, native vegetation is also identified to be approximately 40 m from the NE Pit. There is a potential for groundwater levels to rise due to groundwater mounding from deposition of tailings. Groundwater has a potential to rise towards the root zone of the priority flora and native vegetation causing degradation or death to the receptors due to high groundwater TDS concentrations (40,000 mg/L).

3.3.3 Licence Holder's Proposed controls

To mitigate the effects of groundwater mounding caused by the leaching of tailings into the groundwater the Licence Holder has proposed a decant water recovery system involving two decant recovery bores (WTD35 and WTD36) (Figure 10) located down the assumed hydraulic gradient through a waste dump (Figure 11) next to the NE Pit TSF. The TSF design takes advantage of an existing backfill area (waste dump), which will serve as a containment barrier for the proposed NE Pit TSF.

The Licence Holder has also installed groundwater monitoring bores (MB22, MB23 and MB24) in October 2023 along the northeastern boundary of the NE Pit (see Figure 10) to allow monitoring of the groundwater surrounding the in-pit TSF for signs of seepage impacts.

Figure 10: NE Pit TSF with installed monitoring bores (orange) and proposed decant bore locations (green)

Figure 11: Embankment Section (AA) through NE Pit TSF for seepage analysis (Source: Tetra Tech Coffey 2023)

The Licence Holder has a vegetation monitoring location (PMP11) approximately 100 m northwest of the NE Pit crest (Figure 12) and will continue to be monitored to assist in determining if tailings deposition in the NE Pit has a negative impact on the nearby vegetation. Vegetation monitoring is not a conditioned requirement of the existing licence.

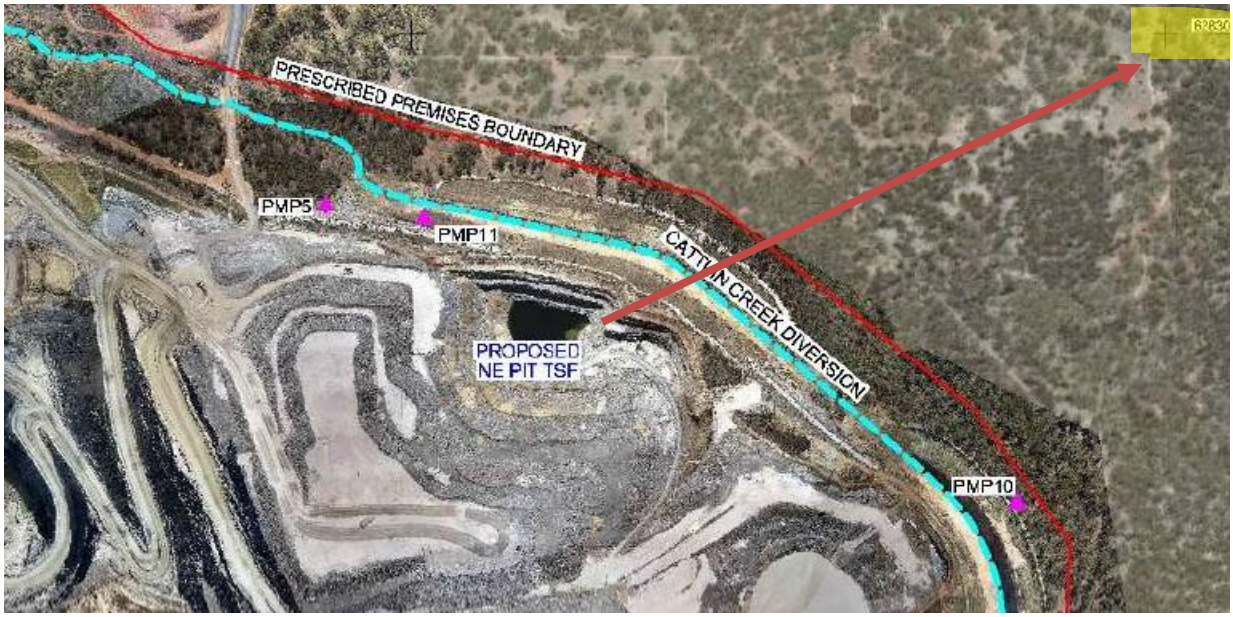


Figure 12: Vegetation monitoring locations nearby NE Pit

3.3.4 Licence Holder's Seepage Assessment and hydrogeological assessment

A seepage assessment was completed by Tetra Tech Coffey (2023a) using a groundwater module of the Rocscience computer software package (Slide). It is noted that the seepage analysis model does not account for three-dimensional effects such as seepage flow along faults and geological structures.

Assumptions were incorporated within the assessment which included minimum crest elevation of approximately RL 229 m and maximum tailings level of 300 mm operational freeboard below the lowest embankment.

The predicted preferential pathway for the water seepage from the TSF is through the rock waste dump (Figure 11) due to the high hydraulic conductivity of 1.0 x 10^{-3} meters per second (m/s) when compared with the tailings and pit foundation of basalt hydraulic conductivity (1.0 x 10^{-8} m/s) (Advisian 2019). The seepage analysis result through the rock waste dump was estimated to be at 92.785 m^3/day (approx. 33,866.525 m^3/year) (Tetra Tech Coffey 2023a).

The Licence Holder also engaged Tetra Tech Coffey to carry out a hydrogeological assessment for the NE IPTSF (Tetra Tech Coffey, 2023b). This assessment report outlined the following:

- Mining and dewatering activities at the premises has created a groundwater sink at the proposed NE IPTSF. The current groundwater level at the pit is about 185 mAHD and the pre-mining groundwater level at the site is about 225 mAHD (40 m drawdown).
- When initially filled with tailings, the groundwater flow regime around the NE IPTSF may change from a groundwater sink during mining/dewatering to a groundwater recharge source.
- Based on groundwater monitoring results and trends observed in for existing SE IPTSF monitoring bores (MB13-MB16, and WTD13), it is unlikely that any groundwater mound would extend significant distances from the eastern NE IPTSF perimeter. Groundwater levels of WTD07, located northeast of the SE IPTSF, remain 15 m below the pre-mining groundwater levels.
- Even though the hydraulic head in bedrock will show mounding, the comparative hydraulic conductivity and flow rate westwards through the broken rock pit embankment will be several orders of magnitude higher than eastward seepage in bedrock, which will

predominantly occur via secondary porosity features (fractures, faults and anomalies) of the bedrock.

- Preferential drainage of the NE IPTSF will therefore be maintained into internal (waste rock filled) mine voids and towards the proposed abstraction bores that will continue to abstract water for process plant supply.
- It is therefore anticipated that boundary discharge/seepage rates to potential external receptors will be negligible.

3.3.5 Risk Assessment

Technical review of the applications supporting documents including the hydrogeological assessment carried out by Tetra Tech Coffey has been undertaken. It has been determined that the department agrees that a significant portion of the seepage from the NE in-pit TSF is likely to be captured by the proposed decant recovery bores, however there is a small risk that some seepage could bypass the decant recovery bores and migrate through bedrock fractures away from the TSF towards receptors. The effectiveness of the proposed decant bores (WTD35 and WTD36) located down hydraulic gradient in the waste rock dump would largely depend on the distribution of fracture zones in the bedrock to the east of the pit and on the intensity of the fracturing. As these factors are likely to show a large spatial variability, there is no guarantee that groundwater recovery would be as effective near the proposed NE in-pit TSF as it was for the SE in-pit TSF.

It is, however considered unlikely that impacts to Cattlin Creek will occur as the Cattlin Creek diversion channel (223 mRL) is considerably higher than the base of the NE Pit (170 mRL) which further reduces the risk off seepage and mounding to have impact of Cattlin Creek (Galaxy 2023b).

It was brought to the attention of the department that in a Tetra Tech Coffey Report (2022) it is stated that the solids concentration of tailings delivered to the existing SE In-Pit TSF ranged between 19 and 25%, with an average over the audit period of 26% between August 2021 to July 2022. Within the initial SE Pit TSF design the tailings slurry to be deposited into the SE IPTSF was proposed to be 40-50% solids. The proposed tailings solid concentration of the NE In- Pit TSF is proposed to be approximately 15-25%. To limit groundwater mounding and seepage caused by tailings deposition into a TSF a high volume of solids with the tailings discharged is advised (usually 40% or higher).

To assist in the determination of the potential for groundwater mounding to occur a review of surrounding groundwater monitoring bore results at the active 2SE Pit TSF (MB13 to MB16) was undertaken to investigate the effect that deposition of the high water content tailings had on groundwater levels surrounding the in-pit TSF. Measured groundwater standing water level (SWL) in surrounding monitoring bores to 2SE Pit TSF reported a groundwater level rise of approximately 10 -15 m since tailings were deposited in March 2022. Figure 13 presents the groundwater mounding that has occurred surrounding the 2SE Pit TSF specifically at MB13, MB14 and MB15 recording high groundwater levels when compared with the surrounding groundwater environment. It is noted that groundwater levels appear to have plateaued and are unchanged by seasonal effects and tailings deposition in monitoring bores MB13 to MB16 as presented in Figure 14.

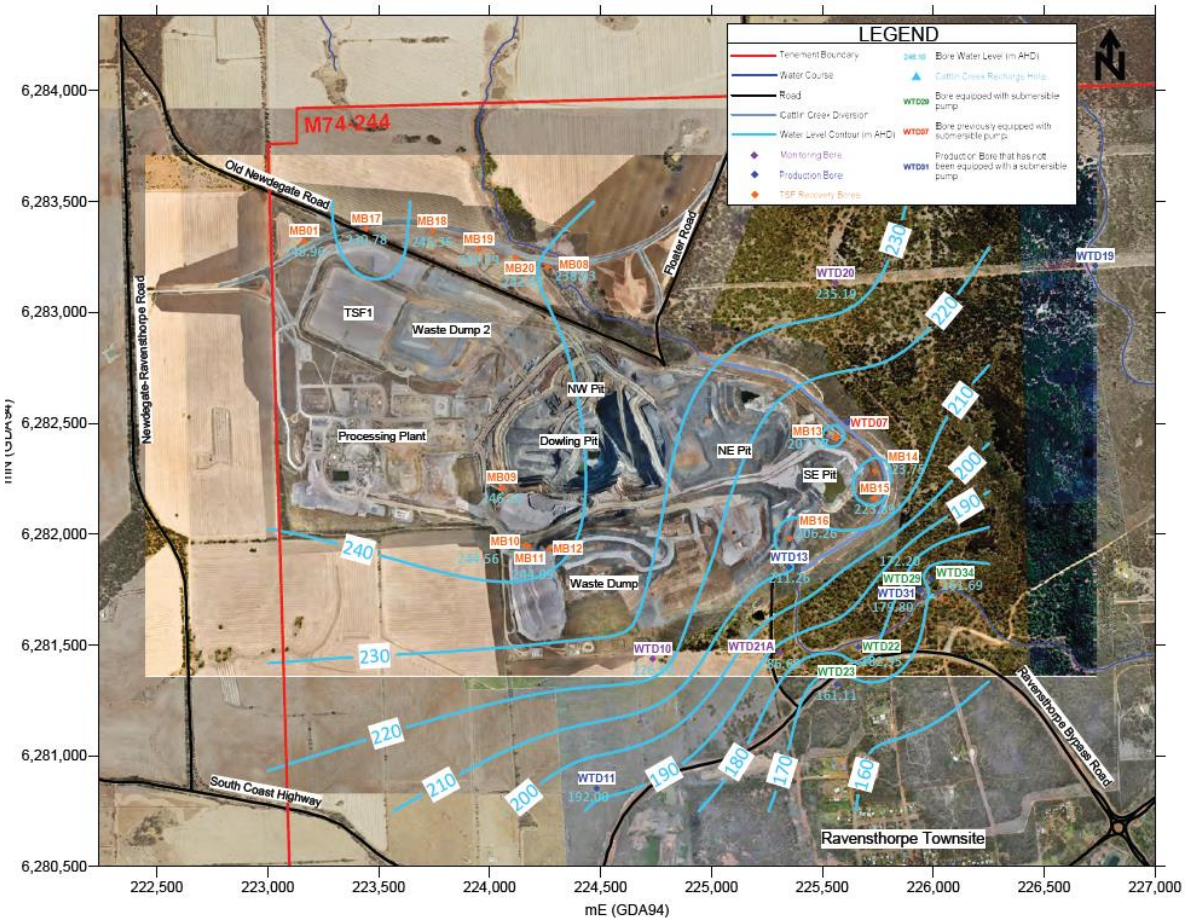


Figure 13: Groundwater contours for December 2022 (Source: Rockwater 2023)

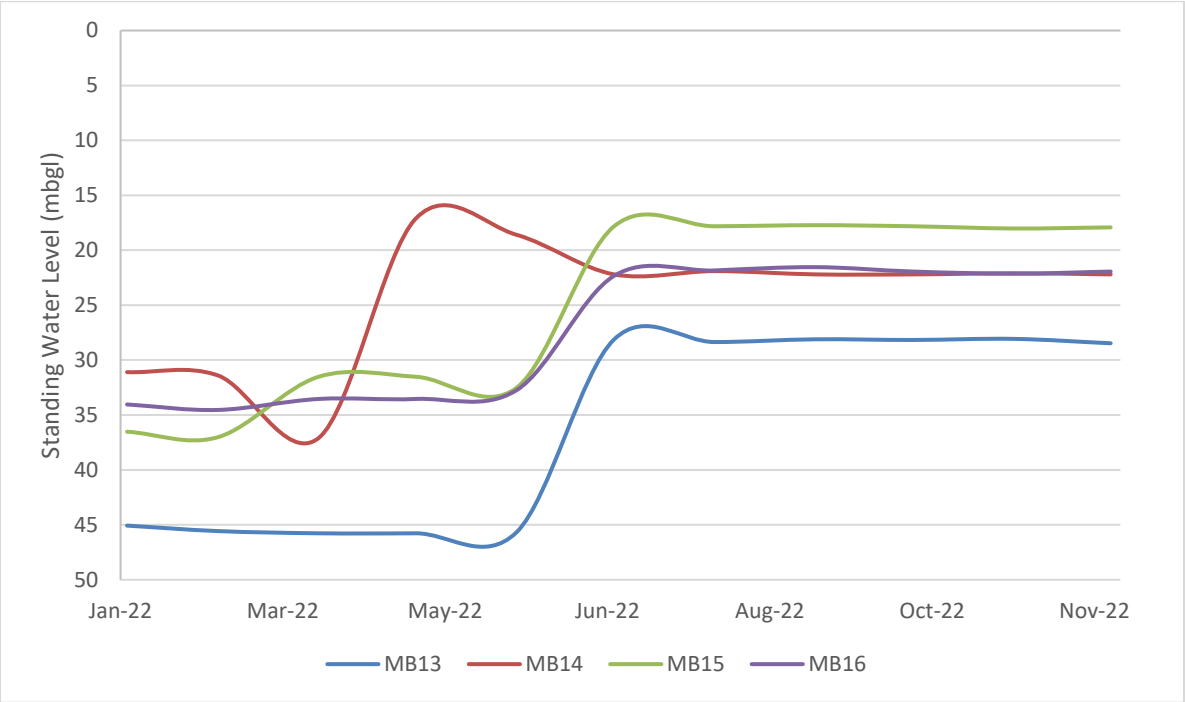


Figure 14: Measured SWL around 2SE Pit TSF (Information sourced from Rockwater 2023)

As shown by the groundwater monitoring data around the existing 2SE Pit TSF the high-water content of the tailings has resulted in a rise in groundwater levels of approximately 10 meters. The high water- content of the tailings being discharged into the proposed NE In-Pit TSF therefore increases the risk that groundwater mounding near the new in-pit TSF may occur.

The proposed abstraction bores within the waste rock dump may be effective in maintaining groundwater levels surrounding the in-pit TSF, however due to the high-water content of the tailings and the unknown variability in the fracture zones in the bedrock to the east of the pit there is uncertainty in how effective they may be.

Consequence and Likelihood of Risk Event and Rating

If mounding of the groundwater table surrounding NE In-Pit TSF occurs then the Delegated Officer has determined that this may result in a **Moderate** impact to the receptor (native vegetation). Groundwater mounding where groundwater comes into contact with the root zones of vegetation at the surface may result in vegetation death or stress due to waterlogging etc.

The likelihood of this risk event occurring has been determined to be '**possible**' due to the high-water content of tailings.

The Delegated Officer has compared the consequence and likelihood ratings described above the risk rating matrix outlined within *Guideline: Risk Assessments* (DWER 2020) and determined that the overall rating for this risk event is **Medium**.

Regulatory controls

The applicant's proposed management measures i.e. monitoring of groundwater levels and quality within the constructed monitoring bores surrounding the NE In -Pit TSF ((MB22 to MB24) will be added to the conditions of the licence.

As a result of the high-water content of the tailings (which was unknown at the time of the assessment for the existing 2SE Pit TSF), additional regulatory controls have been deemed necessary to be added to the licence in the form of a standing water level target (6 mbgl) and limit (3 mbgl) on the groundwater monitoring bores surrounding the in-pit TFS. The requirement for a seepage management plan to be implemented if the trigger level is reached has also been added to the licence. Thes additional regulatory controls will ensure that impacts to vegetation does not occur.

4. Consultation

Table 7 provides a summary of the consultation undertaken by the department.

Table 7: Consultation

Consultation method	Comments received	Department response
Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) advised of proposal 23 January 2024.	DEMIRS responded to the Department on 25 January 2024 and advised that the mining proposal to support the construction of the NE pit TSF (Reg ID 122598) was submitted to DEMIRS on 18 January 2024 and is generally consistent with the proposed amendment to L8469/2010/2. The proposal involves the following: • NE Pit TSF is to be used once the operational Stage 2 SE Pit TSF reaches capacity.	Noted, DWER has been made aware of the small-scale mobile crushing and screening plant. The licence holder should consider whether operation of this plant trigger's category 12 which is not currently authorised by the licence.

	• Extension of the existing tailings deposition and decant pipelines from the SE Pit TSF to the NE Pit TSF. • Increasing the height of WD1, to accommodate the waste material that was previously assigned to the site of the proposed NE Pit TSF. It is proposed that the highest (290 mRL) bench of WD1 be extended eastwards, resulting in central/eastern areas of the landform being raised from 270 mRL to 290 mRL. • Addition of a small-scale mobile crushing and screening plant and equipment to convert benign basalt mine waste into construction materials. Historically, potential impacts to and from ground and surface water, and risks from potentially acid forming materials have been areas of concern. DEMIRS will consider these, and other environmental risks, during the assessment AND will implement controls where necessary.	
The Shire of Ravensthorpe was advised of proposal 23 January 2024.	None received.	N/A
Licence Holder was provided with draft amendment on 12 June 2024 and comments were received on 11 July 2024	Refer to Appendix 1.	Refer to Appendix 1.

5. Conclusion

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

5.1 Summary of amendments

Table 8 provides a summary of the proposed amendments and will act as record of implemented changes. All proposed changes have been incorporated into the Revised Licence as part of the amendment process.

Table 8: Summary of licence amendments

Condition no.	Proposed amendments
Front Page	Added G74/13 and L74/46 to the Premises

Instrument Log	Amended typographical throughout and provided summary of this licence amendment.
1.1.2	Provided additional contrary intention
1.2.2	Removed dust suppression dam from condition.
1.2.3	Removed dust suppression dam from the condition.
1.2.7	Removed mention of “2SE” and replaced with “NE Pit TSF.” Added construction requirements for decant recovery bores.
1.2.8	Amended audit report requirement from 30 days after construction to 60 days.
1.2.10	Deleted. Removed groundwater monitoring bore requirements.
1.2.11	Deleted. Removed condition requiring a bore completion report.
1.2.13	Added condition to ensure the capture of surface water runoff from reject stockpiles.
3.2.1	Pluralised Tailings Storage Facility to Tailings Storage Facilities and added recovery bores.
3.3.1	Added NE in-pit TSF to Table 3.3.1 to require monitoring. Removed Dust suppression dam and SW in-pit TSF monitoring requirements
3.3.3	Added NE in-pit TSF to require perimeters bunds to divert stormwater away from the pit.
3.3.5	New condition to require a 300 mm operational freeboard.
3.4.1	Added NE In-Pit TSF bores (MB22 – MB24) to monitoring requirements. Added a trigger and limit level for NE In-pit TSF bores. Added boundary monitoring bores MB30 to MB36 to Table 3.4.1. Added “Decommissioned” to SW in-pit TSF.
3.4.2	Added condition requiring submission of a seepage management plan if trigger levels in MB22 – MB24 are reached.
3.4.3	Added condition requiring the implementation of the seepage management plan.
3.5.1	Replaced “Limit” to “Target” Removed DDG 1, DDG 2 and added DDG 11 through to DDG 20, the AWS and HV01 weather station to Table 3.5.1. Added footnote which required PM_{10} to be reported at 1 $\mu g/m^3$
3.5.2	Added condition requiring investigation for exceedance of target in condition 3.5.1 and to report the findings to the CEO.
4.1.1	Deleted. Removed Improvement Program.
Schedule 1 Figures	Updated Figure 1 Updated Figure 2 Updated Figure 3 Added Figure 4 Added Figure 5
Schedule 2	Updated premises boundary coordinates with new boundary coordinates.

References

1. Advisian 2019, In-Pit Tailings Storage Facility. SW Pit, Mt Cattlin Spodumene Project. (Report 201012-00739-SS-REP-0001.
2. Arcadium Lithium 2023, Mt Cattlin Spodumene Project: 2023 Monitoring Bore Completion Report.
3. Coffey 2021, Mt Cattlin 2SE Pit TSF Design Report. Report prepared for Galaxy Lithium Australia Ltd. Reference 754-PERGE288515.
4. Coffey Tetra Tech 2023, Mt Cattlin NE Pit TSF Design Report. Report prepared for Galaxy Lithium Australia Ltd.
5. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
6. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
7. DWER 2020, *Guideline: Risk Assessments*, Perth, Western Australia.
8. Environmental Technologies & Analytics (ETA) 2020a, Mt Cattlin Spodumene Project: Ambient Air Monitoring Program Review.
9. ETA 2020b, Annual Dust Monitoring Review: Galaxy Resources Mt Cattlin Project. Final Version 1, Project Number: 1160.
10. ETA 2023, Mt Cattlin Spodumene Project: Ambient Air Monitoring Program – Review of Dust Composition Results.
11. ETA 2024, Annual Dust Monitoring Review, Galaxy Lithium Australia: Mt Cattlin Project. Draft Report, Version 1, Project Number: 1429.
12. Rockwater 2023, Mt Cattlin Spodumene Project, Triennial Monitoring Review: GWEL167439(7), September 2019 to December 2022.
13. Galaxy 2019, Noise Management Plan 02-MTC-ENV-PLA-0201.
14. Galaxy 2020a, Mt Cattlin Project Airborne Management Plan.
15. Galaxy 2020b, Mt Cattlin Spodumene Project, 1 September 2019 – 31 August 2020 Annual Environmental Report for Prescribed Premises Licence, L8469/2010/02 – Category 05.
16. Galaxy 2023a, Response to Notification of Breach of Condition on M 74/244 (31 August 2023).
17. Galaxy 2023b, Mt Cattlin Spodumene Project, Annual Environmental Report for Prescribed Premises Licence 8469/2010/02 – Category 05.
18. Toxikos 2012, Air guideline values for selected substances (Group B), prepared for the Department of Environment and Conservation, Perth, Western Australia.
19. Tetra Tech Coffey 2023, Mt Carrin Operations, NE In-Pit TSF Design for Galaxy Lithium Australia Pty Ltd, 754-PERGE326787.
20. Tetra Tech Coffey 2022, TSF Audit report, 754-PERGE303682.
21. Mining Plus 2021, Galaxy Resources Ltd – Mt Cattlin NI 43-101, Technical Report.
22. Tetris Environmental 2021, Mount Cattlin Operations Mining Proposal, 2SE Pit Tailings Storage Facility, Registration ID: 101404.

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

Condition	Summary of Licence Holder's comment	Department's response
Introduction	The Licence Holder has informed the Department that the dust suppression dam is no longer in operation and has requested it to be removed from the Licence. The Licence Holder identified that there are now two waste rock dumps at the premises. The Licence Holder has also suggested that additional clarification of current and decommissioned TSFs within the Premises.	The Department has removed mention of dust suppression dam within the introduction of the Licence. The Department has included an additional waste rock dump under the list of infrastructure. The Department has listed the three in-pit TSFs and the paddock TSF within the Premises.
1.1.2	The Licence Holder has requested that 'dust suppression dam' definition is removed as it is no longer in operation.	The Department has removed mention of the dust suppression dam from the definitions
1.2.2	The Licence Holder has requested to remove the freeboard requirement for the dust suppression dam as it no longer exists. The Licence Holder has also identified additional catchment dams at the premises.	The Department has removed the mention of dust suppression dams from the licence condition. Please see comment for condition 3.3.1 regarding the additional catchment dams.
1.2.3	The Licence Holder has requested to remove the mention of dust suppression dam within the condition as it no longer exists.	The Department has amended the condition by removing the mention of dust suppression dam.
1.2.7	Suggestion to remove construction requirements that are duplicated from Condition 1.2.6.	The Department has removed duplication of conditions by removing construction requirements in condition 1.2.7 that are listed in condition 1.2.6.
	The Licence Holder identified that there will likely be four recovered decant water holding tanks at the NE in-pit TSF recovery bores.	Amended the requirement for the number of recovered decant water holding tanks from "two" to "up to four."
	The Licence Holder confirmed that the automatic weather station (AWS) is AS/NZS compliance and provides wind strength, direction and win-run data in 5-minute intervals.	The Department has removed the requirement for the licence holder to ensure that the AWS complies with AS/NZS 3580.1.1:2016. It's noted that monitoring requirements at the AWS within Table 3.5.1 is unchanged.

Condition	Summary of Licence Holder's comment	Department's response
	It is requested that the AWS requirement to ensure the AWS compliance with AS/NZS 3580.1.1:2016 is removed.	
	Requested to remove the requirements to relocate DDG 09 to the new location next to HV01 as the DDG was already moved to HV01 on completed on 28 June 2024.	The Department has removed the requirement for the relocation of the DDG to HV01. The Department notes that the movement of DDGs outside of a licence amendment is considered a non-compliance with condition 3.5.1 as monitoring points referenced must be located at the same location as presented in Schedule 1: Figure 3 of Licence L8469/2010/2. It is recommended that in the future an amendment is sort prior to relocation of monitoring points.
1.2.8	The Licence Holder has requested that the 30-day audit report submission requirement after the construction of infrastructure is amended to be extended to 90 days.	The Department has extended the audit report requirement to 60 days instead of the original 30 days. A 90-day submission timeframe from the construction/installation of the infrastructure is considered too long and may impact the Department from completing compliance checks associated with the infrastructure.
1.2.10 and 1.2.11	The Licence Holder has mentioned that conditions 1.2.10 and 1.2.11 are no longer relevant. The ROM Optical sorter was operated on day shift only between March 2020 and December 2021. The Licence Holder has since been operating a different optical basalt separation unit (TOMRA 1) and was superseded in 2022 by a larger scale TOMRA 2 unit. Neither of the TOMRA units are located on the higher elevation ROM platform (which caused noise risks) and they are enclosed units (aside from input and output conveyors). The TOMRA units have been operated continuously (24-hr operations), in parallel with the wider DMS Plant since February 2022. The primary crushing circuit operates in accordance with Environmental Protection (Noise) Regulations 1997 and has routinely operated between the hours of 7am and 10pm, except for Sundays and Public Holidays, when operated between 10am and 10pm.	The Department has reviewed the request and the history of the condition 1.2.10 and 1.2.11. It is understood that on 3 April 2021 the Licence Holder submitted a Licence Amendment for L8469/2010/2 to continue operating the crushing/ screening infrastructure including the ROM Optical Sorter and any ancillary infrastructure during night-time operations and had requested that conditions 1.2.13 and 1.2.14 (renumbered to 1.2.10 and 1.2.11) to be removed from the Licence. On 4 March 2022 the Licence Amendment was withdrawn. No amendment applications regarding these conditions and the continuation of nighttime operations have been submitted since this time. An assessment is required in order to authorise ongoing nighttime operations and therefore the removal of these conditions cannot be accepted at this time. Operation during nighttime hours were not part of the scope of this amendment application and it is too late in the processes to add this aspect to the scope. A separate Licence Amendment application is required to be submitted to the department seeking to remove condition 1.2.10 and 1.2.11 from the Licence so that the Department can adequately assess the risks for ongoing nighttime operations.

Condition	Summary of Licence Holder's comment	Department's response
		Please note that continuing nighttime operations is not in accordance with the licence and may be considered an offence under section 58 of the EP Act (contravening licence conditions).
3.3.1	The Licence Holder identified additional catchment dams at the premises.	Not enough information has been provided to the department regarding the additional catchment dams. The Department considers the additional catchment dams may not be related to the operation of category 5: Processing and beneficiation of metallic or non-metallic ore. It is recommended that these dams be included in any future licence amendment applications if the licence holder wishes to have them included on the licence.
	The Licence Holder has requested that the process monitoring requirement at the dust suppression dam is removed as it no longer exists.	The Department has removed the requirement for the monitoring of the Dust Suppression Dam within Table 3.3.1.
	The Licence Holder has informed the Department that the SW In-Pit TSF is decommissioned and does not hold standing water. The TSF has been partially re-excavated, with tailings relocated and dry-stacked onto TSF1. The Licence Holder has requested that the process monitoring requirement is removed.	As tailings deposition into SW in-pit TSF is no longer occurring the Department has removed the requirement for inspections of SW in-pit TSF within Table 3.3.1.
3.3.2	The Licence Holder has requested that the freeboard requirement for SW in-pit TSF is removed as the TSF has been decommissioned.	The Department has removed the freeboard requirement for the SW in-pit TSF as the TSF has been decommissioned.
3.5.1	The Licence Holder identified that the requirement for scanning electron microscopy or equivalent NATA accredited methods was still listed within Table 3.5.1: Monitoring of air and dust. The Licence Holder has pointed out that in accordance with air quality report recommendations (ETA, 2023) the DWER (draft) IR-T15 Amendment report Section 2.4.2, ongoing sampling requirements for mica, silica and asbestiform are not considered necessary.	The Department has removed the requirement to monitor the characterisation of deposited minerals collected within DDGs. The removal of this requirement is due to the findings presented in section 2.4.2 of this amendment licence report.