



Application for Works Approval

Division 3, Part V *Environmental Protection Act 1986*

Works Approval Number W6283/2019/1

Applicant Talison Lithium Australia Pty Ltd

ACN 139 401 308

DWER File Number DER2019/000216

Premises Talison Lithium Mine
Maranup Ford Road
Greenbushes WA 6254
Part of mining leases M01/3, M01/6, M01/7, M01/8, M01/9
Whole of leases M1/16, G01/1, G01/2

Date of Report 2 April 2020

Decision Works Approval granted

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1. Definitions

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

Table 1 Definitions

Term	Definition
ACN	Australian Company Number
Category/ Categories/ Cat.	Categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
Decision report	refers to this document.
Delegated officer	an officer under section 20 of the EP Act.
Department	means the department established under section 35 of the <i>Public Sector Management Act 1994</i> and designated as responsible for the administration of Part V, Division 3 of the EP Act.
DWER	Department of Water and Environmental Regulation As of 1 July 2017, the Department of Environment Regulation (DER), the Office of the Environmental Protection Authority (OEPA) and the Department of Water (DoW) amalgamated to form the Department of Water and Environmental Regulation (DWER). DWER was established under section 35 of the <i>Public Sector Management Act 1994</i> and is responsible for the administration of the <i>Environmental Protection Act 1986</i> along with other legislation.
EPA	Environmental Protection Authority
EP Act	<i>Environmental Protection Act 1986 (WA)</i>
EP Regulations	<i>Environmental Protection Regulations 1987 (WA)</i>
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
m ³	cubic metres
Minister	the Minister responsible for the EP Act and associated regulations
MS	Ministerial Statement
mtpa	million tonnes per annum
NEPM	<i>National Environment Protection (Ambient Air Quality) Measure</i>
Noise Regulations	<i>Environmental Protection (Noise) Regulations 1997 (WA)</i>
PM	Particulate Matter

PM ₁₀	used to describe particulate matter that is smaller than 10 microns (µm) in diameter
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 <i>Guidance Statement: Risk Assessment</i>
TSP	Total suspended particulates
µg/m ³	micrograms per cubic metre

2. Overview of premises

Talison Lithium Australia Pty Ltd (applicant) operates the Talison Lithium Mine (premises) under *Environmental Protection Act 1986* (EP Act) Part V licence L4247/1991/13 for prescribed premises category 5. The premises is located in the Shire of Bridgetown-Greenbushes, immediately to the southern boundary of the Town of Greenbushes, approximately 250 km south of Perth, Western Australia.

The premises has historically been used for tin mining in 1988 and tantalum mining in the 1940's. Currently the mine uses open-pit method, and extracts via drill, blast, load and haul techniques. Crushed ore is then processed in either technical grade or chemical grade plants to produce lithium mineral concentrate. Tailings are discharged into an above ground Tailings Storage Facility (TSF).

Since the licence L4247/1991/13 re-issue in 2013, amendments to reflect additional infrastructure and an increased throughput capacity of spodumene ore to a maximum of 4.7 million tonne per annum (Mtpa) have been made. The premises currently operates two chemical grade processing plants (CGP 1 and 2) and two TSFs (TSF1 and 2). TSF3 is closed has been rehabilitated. TSF1 is currently not receiving tailings.

Table 2 Prescribed Premises Categories in the existing licence

Classification of Premises	Description	Approved Premises production or design capacity or throughput
Category 5	Processing or beneficiation of metallic or non-metallic ore	4.7 Mtpa processing capacity 5 Mtpa deposited tailings

2.1 Description of proposed activity

A works approval application (application) was submitted by the applicant to the Department of Water and Environmental Regulation (department) on 19 March 2019 for an expansion to the mine. Proposed expansion will be within mining tenements M01/6 and M01/7 as depicted in Figure 1 and Figure 2.

The applicant proposes the construction of:

- two additional chemical processing plants (CGP 3 and 4);
- a crusher (Crusher 3);
- a tailings retreatment plant (TRP); and
- a new TSF (TSF4).

This will allow an increased processing rate of 11.6 Mtpa. The applicant also proposes an extension to the premises boundary to accommodate TSF4.

During the assessment, uncertainties around the proposed TSF4, including seepage management were identified, resulting in additional information requested from the applicant. Based on the information provided, the risk to sensitive receptors remains unclear and seepage transport is still not well understood. To progress with the assessment of other proposed activities, the applicant formally requested the department to withdraw TSF4 from the works approval application and will submit a new application for TSF4 at a later date. The premises boundary is extended in this works approval to accommodate the future proposed TSF4 footprint.

The applicant proposes to discharge tailings from commissioning and early operations of the TRP into the currently operating TSF2.

This decision report focuses only on the assessment of proposed CGP 3 and 4, Crusher 3 and the TRP.

Documents provided with the initial works approval application and during the assessment process which have been considered in this assessment are set out in Table 3.

Table 3: Documents and information submitted during the assessment process

Document/information description	Date received
Application Form (works approval) dated 5 March 2019	19 March 2019
Tenement Details Report	
Company Extract	
Assessment of Acid and Metalliferous Drainage	
Mining Proposal Surface Water Assessment	
Hydrogeological Investigation	
Tailings Storage Facility 4 Detailed Design Report	
Dust Impact Assessment	
Acoustic Assessment	
Works Approval Application 1 Supporting Document	
Request for further information dated 22 July 2019	
Map: Woljenup Creek- Neighbours	7 August 2019
TSF4 Water balance	
Response to request for further information	
Request for further information dated 28 August 2019	
Map: Sensitive residential receptor locations	20 September 2019
Map: Groundwater flow and discharge (Indicative bore locations)	
TSF4- Starter embankment underdrainage plan	
TSF4- Starter embankment seepage sump	
Dust management plan	
Response to request for further information	
Request for further information dated 22 November 2019	
Revised dust management draft	10 December 2019
Identified sensitive receptors (dust)	
Osiris dust sampler report	
Meteorological data for past 12 months	
TSF1 and TSF4 seepage management/drainage pipes	
Final TRP design layout	
TRP settlement ponds and drainage plans	
CGP 3 and 4 settlement ponds and drainage plans	
TSF4 final catchment pond design and return pipeline routes	
Request to remove TSF4 from the work approval application dated 10 February 2020	

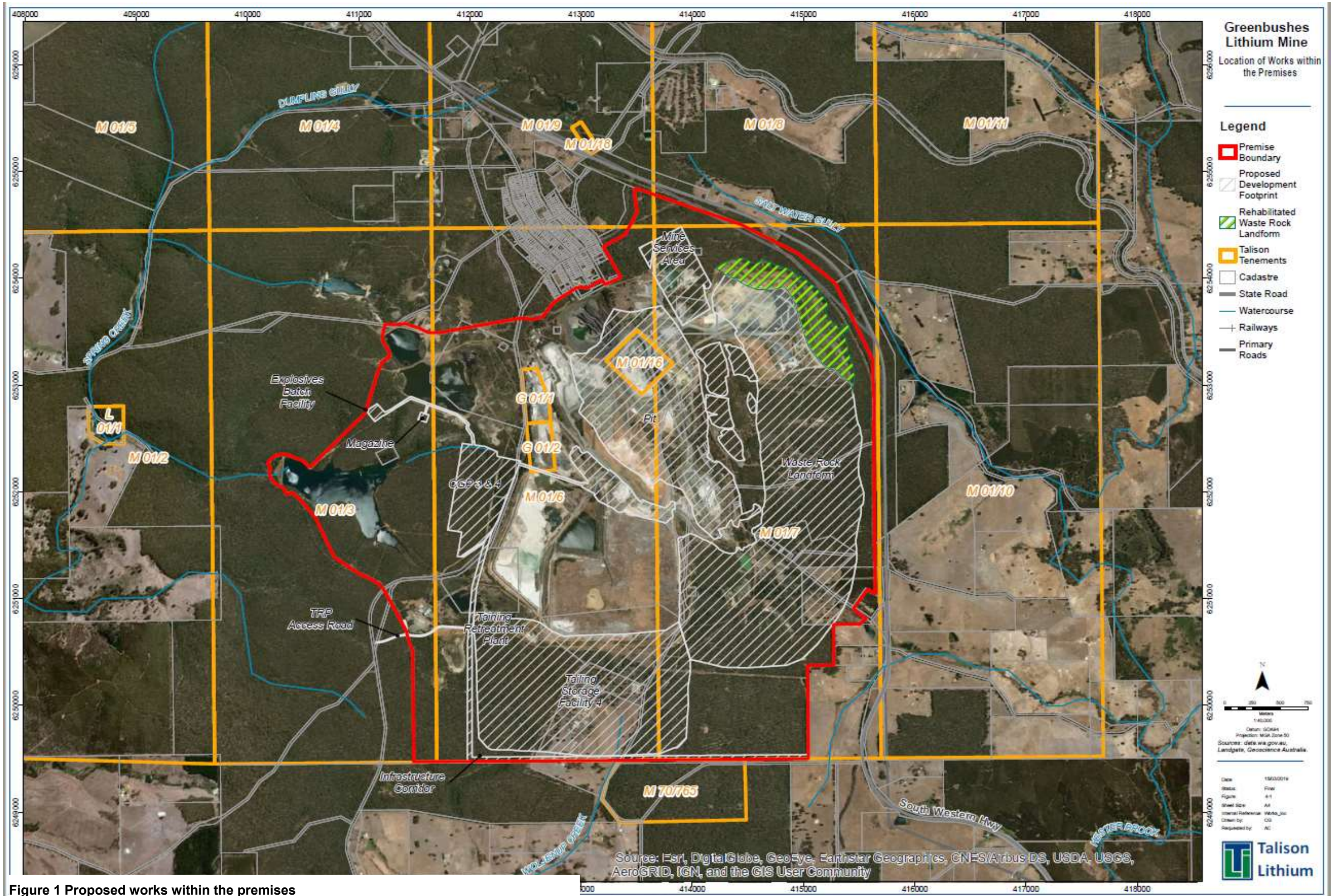


Figure 1 Proposed works within the premises

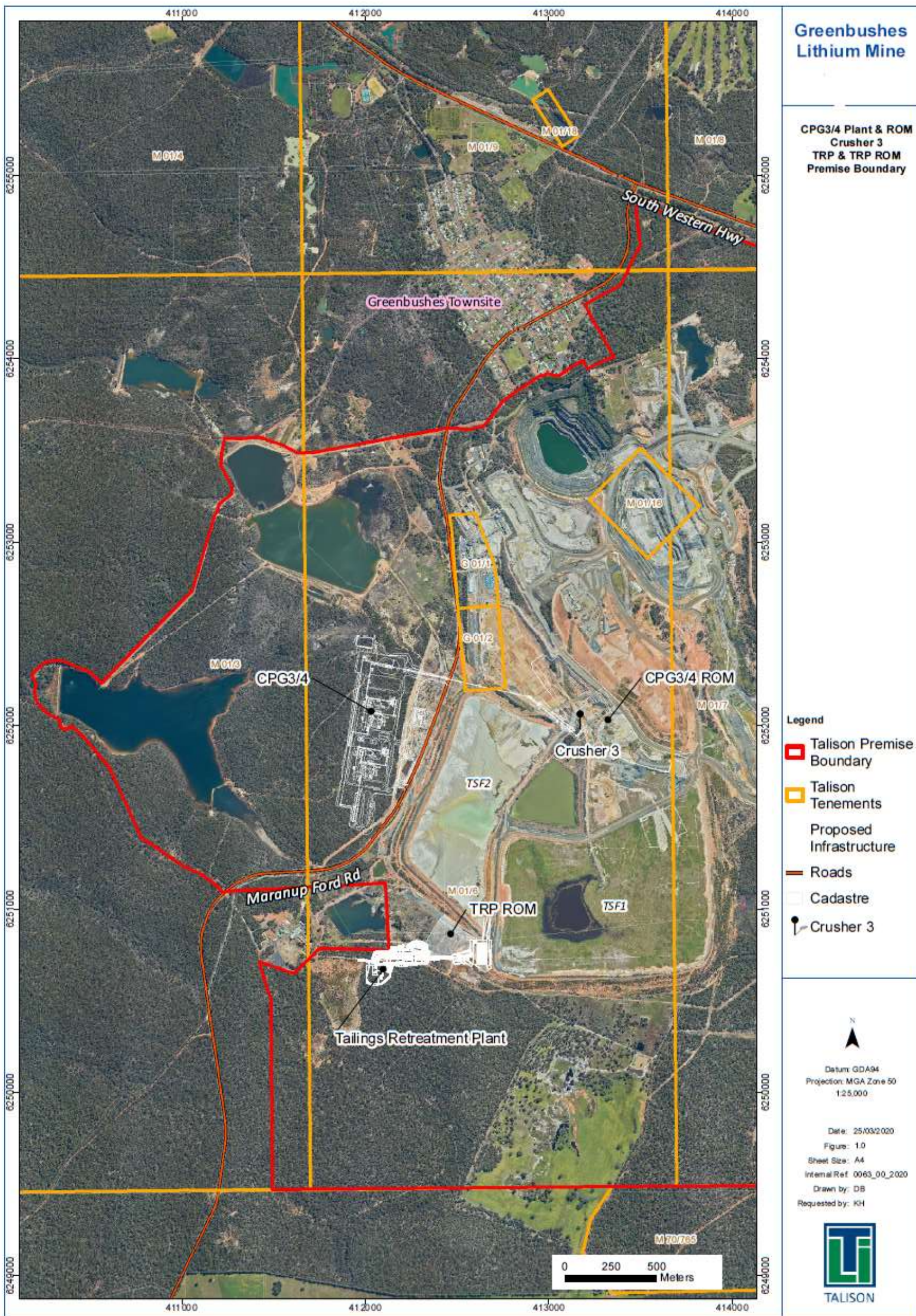


Figure 2 Location of proposed infrastructure

2.2 Operational aspects

Mined ore is trucked to the Run of Mine (ROM) pad and will be either fed directly into the crusher or stockpiled and later transferred into the crusher via front end loader (FEL). Material will undergo two stages of crushing consisting of primary crushing and secondary crushing/screening. Crushed ore will be collected in fine ore stockpiles and conveyed to CGP3 and 4 where it undergoes a primary screen to separate oversize material, which will then be further milled. Both plants will have a processing capacity of 2.4 Mtpa of fine ore feed and can produce 523 kilotonne of per annum (Ktpa) of lithium concentrate. The lithium concentrate produced from CGP 3 and 4 is dewatered and stored at the final product stockpile.

The TRP for tantalum recovery will be located on the southern side of TSF2 (Figure 2). The plant has a similar set up as CGP 3 and 4 but does not require crushing. Material from the top 7 m of TSF1 will be moved by dozers to excavators and then conveyed to a stockpile or directly processed. Tailings produced during commissioning and early operations will be deposited in TSF2 and later into the planned TSF4 (future works approval). The plant will have a processing capability of 2.1 Mtpa and is expected to produce 300 Ktpa of lithium concentrates. The concentrates are then dewatered and stored at the final product stockpile.

Process water for CGP 3 and 4 and TRP is supplied from Clear Water Dam (CWD) and is stored in tanks at each plant. Recycled water and tailings recovered from the process area (CGP 3 and 4, TRP) are pumped through thickeners and returned to the process water circuit or to an operational TSF.

The proposed infrastructure to be installed is detailed in Table 4 below.

Table 4: Talison Lithium Mine facility Category 5 infrastructure

Ref	Infrastructure or Equipment	Site Layout Reference (Figure 2)
Chemical grade processing plants		
1	2x chemical grade processing plants (CGP3 and CGP4) 2.4 Mt capacity each	CGP3/4
2	Run of Mine pad expansion (ROM)	CGP3/4 ROM
3	Fine ore stockpile (FOS)	Not applicable (N/A)
4	Bulk reagent storage	
5	Drainage elements	
Tailings Retreatment Plant		
6	TRP 2.1 Mtpa capacity	Tailings Retreatment Plant
7	ROM stockpile	TRP ROM
8	Bunded high density polyethylene (HDPE) pipeline to main plant	N/A
9	Settlement pond (HDPE lined) designed to maintain a 0.5 m freeboard	
10	Reagent storage area	
Three stage crusher		

Ref	Infrastructure or Equipment	Site Layout Reference (Figure 2)
11	Two stage crushing circuit (Crusher 3) 4.8 Mtpa capacity	Crusher 3
12	Overhead conveyor from Crusher 3 to CGP 3 and 4, across Maranup Ford Road	Conveyor

3. Legislative context and other approvals

Table 5 summarises approvals relevant to the assessment.

Table 5: Relevant approvals and tenure

Legislation	Number	Subsidiary	Approval
Part IV of the EP Act (WA)	Ministerial Statement Number 1111 Greenbushes Lithium Mine Expansion	Talison Lithium Australia Pty Ltd	Statement that a proposal may be implemented pursuant to section 45 of the <i>Environmental Protection Act 1986</i>
Noise Regulations Regulation 17 exemption	Environmental Protection (Talison Lithium Australia Greenbushes Operations Noise Emissions) Approval 2015	Talison Lithium Australia Pty Ltd	Noise levels authorised to be emitted from mine site activities (excluding blasting) are regulated under the Regulation 17 exemption.
Part V of the EP Act (WA)	Native Vegetation Clearing Permit CPS5056/2	Talison Lithium Australia Pty Ltd	Clearing within current project area (120 ha)
Department of the Environment and Energy (DoEE)	EPBC 2013/6904	Talison Lithium Australia Pty Ltd	Clearing for approved extent of Floyds Waste Rock Landform (WRL)
<i>Mining Act 1978</i>	Code 80328 J04090	Talison Lithium Australia Pty Ltd	Mine expansion works, construction of processing plants. Excluding: additional tailings storage facility (TSF4).
<i>Mining Act 1978</i>	N/A	Talison Lithium Australia Pty Ltd	An application is currently being revised by the applicant for the remaining expansion activities including additional TSF4.

3.1 Part IV of the EP Act

In June 2018 the applicant referred the proposal for expansion activities at the existing premises to the Environmental Protection Authority (EPA). The proposal included the development and operation of additional infrastructure for the processing of ore.

Main findings were published in the EPA assessment report (EPA, 2019) and Ministerial Statement (MS 1111) which was granted 19 August 2019.

The EPA report 1635 identified the following key environmental factors relevant to the proposal:

- Flora, Vegetation and Terrestrial Fauna: direct loss of up to 350 ha of native vegetation and priority species as well as potential indirect impacts to vegetation and flora; habitat

for matters of national environmental significance.

- Requires a Conservation Significant Terrestrial Fauna Management Plan.
- Terrestrial Environmental Quality: impacts from potential contamination of soil from tailings and waste storage.
- Inland Waters: potential impacts to surface and groundwater quality through mining operations.
- Air Quality: potential impacts from dust emissions and changes to air quality.
 - Requires a Dust Management Plan and detailed assessment by DWER (Part V of EP Act).
- Social Surroundings: potential impacts from changes to visual amenity, vibration levels, and noise.
 - Visual amenity requires management plan (MS 1111).
 - Noise impacts on human receptors requires a Noise Management Plan to meet specified limits set out in current Regulation 17 approval.

The report refers to DWER (Part V of the EP Act) for detailed assessment and management of emissions and discharges.

MS 1111 sets out following conditions relevant to this works approval:

- Preparation and implementation of a Conservation Significant Terrestrial Fauna Management Plan to avoid and minimise direct or indirect impacts during ground disturbing and all phases of mining activities
- Preparation and implementation of a Visual Impact Management and Rehabilitation Plan to minimise visual impacts (including light spill)
- Preparation and implementation of a Disease Hygiene Management Plan to minimise impacts to flora and vegetation, including from marri canker and dieback;

Requirements of MS 1111 are not assessed in this decision report and are not duplicated as conditions in the works approval.

3.2 Part V of the EP Act

3.2.1 Applicable regulations, standards and guidelines

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

The guidance statements which inform this assessment are:

- *Guidance Statement: Regulatory Principles (July 2015)*
- *Guidance Statement: Setting Conditions (October 2015)*
- *Guideline: Decision Making (June 2019)*
- *Guidance Statement: Risk Assessments (February 2017)*
- *Guidance Statement: Environmental Siting (November 2016)*

4. Consultation

Method	Comment received	DWER response
Application advertised in <i>The West Australian</i> newspaper, <i>The Manjimup Bridgetown Times</i> (25 September 2019) and on DWER's website (comment period ceased 16 October 2019)	No comments received	N/A
Direct interest stakeholders notified 18 September 2019	Two submissions were received. The concerns raised are regarding: <ul style="list-style-type: none"> increased light pollution; noise emissions; visual amenity impacts; water quality of Wolenu Creek on downstream users and contaminant migration offsite as this water is used for irrigation of fruit and vegetables and for grazing stock; not all sensitive receptors were considered or identified in the applicant's supporting documentation. 	<ul style="list-style-type: none"> light pollution and noise have been addressed under the Part IV assessment (MS 1111) and is not further assessed under Part V. uncertainties regarding impacts to surface water and groundwater remain. Further analysis is required for risk assessment of these receptors. This works approval permits construction only. Emissions associated with operations, including impacts to water quality, will be assessed under subsequent licence amendment applications. sensitive receptors have been added to the direct stakeholder database of the department and will be informed of DWER's decision on this application, as well as being referred any future applications that DWER receives in relation to this proposal.
Further consult with Department of Health on potential adverse health impacts	Comment from DOH in regards to dust (DOH, 2020): <ul style="list-style-type: none"> Barium in dust composition analysis concerning; dust assessment provided by applicant did not consider composition and metals present. Further investigation of barium sources should be undertaken. Dust criteria for PM₁₀ should not exceed the <i>National Environment Protection (Ambient Air Quality) Measure 2016</i> (NEPM) which specifies a 24 hour PM₁₀ level of 50µg/m³ No buffer zone between mine and sensitive receptors, being the Greenbushes primary school, are in very close proximity requires adequate dust management and mitigation actions. Recommends monitoring data and exceedances to be publicly available as specified in MS 1111 (condition 5- 	<ul style="list-style-type: none"> additional dust monitoring in works approval at the northern and south west boundary; aligning with NEPM criteria frequent reporting of dust monitoring data to department implementation of trigger values to mitigate dust impacts on sensitive receptors this works approvals permits construction only. A DWER initiated licence amendment will consider reducing PM₁₀ criteria to align with NEPM.

	<p>1)</p> <ul style="list-style-type: none"> • Advises active and comprehensive consultation with sensitive receptors prior to ground disturbing works being undertaken. 	
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5. Air quality monitoring and management

5.1 Applicant dust assessment

The applicant conducted a dust impact assessment (GHD 2019a) to predict the risk of dust emissions from the proposed mine expansion and provided this as part of the supporting documentation. The dust impact assessment evaluated the potential impacts from the increase of the production rate of spodumene ore to 9.5 Mtpa. The AERMOD model was used to predict the total suspended particles (TSP), PM₁₀ and deposited dust for the year 2028, which is representative of the maximum activity expected at the site after the expansion which is when dust emissions will peak.

It should be noted that the 90 µg/m³ for PM₁₀ criteria as currently set out in the licence was used for modelling, which does not align with the NEPM value. The 90 µg/m³ criteria is specific to the high volume (Hi Vol) air sampler which is located at the northern boundary. This licensed value does not apply to other monitoring locations at the premises.

Within a 10 km radius of the premises, 28 sensitive receptors were identified. These included residences of the Town of Greenbushes directly located on the northern boundary, and other receptors close by (Figure 3). The modelling indicates an exceedance of PM₁₀ at seven locations, with a cumulative daily maximum of 141 µg/m³ predicted at receptor H (Table 6).

The dust impact assessment concluded:

- visible dust (as TSP) to be the likely majority of airborne particulates generated from the site;
- predicted maximum daily (incremental) and annual (incremental and cumulative) average for TSP were met, while the maximum daily cumulative TSP may be exceeded;
- PM₁₀ (1 hour average) is predicted to exceed at seven (incremental) or 10 (cumulative) sensitive receptors
- predicted 24 hour and annual PM₁₀ is not exceeding the current licensed criteria (90 µg/m³)
- emissions from construction to be of short term nature and were not included in the emission estimation.

The peer review (ERM 2019) of the dust impact assessment which was provided by the applicant, suggested that the constant emission rates through the year used for modelling, may not be representative. The lack of a cumulative PM₁₀ 1 hour average was also noted, which may underestimate the dust impact. The actual increase of production capacity proposed by the applicant is 11.6 Mtpa, while the dust assessment was based on an increase to 9.5 Mtpa, which could underestimate the impact on sensitive receptors.

Table 6 Predicted 99.9th percentile, maximum 24 hour and annual average concentrations for PM10 ($\mu\text{g}/\text{m}^3$)

The highlighted values represent exceedances.

Receptor	1-hour 99.9 th percentile		24-hour maximum		Annual average	
	Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
Criteria	80		50		25	
Town A	101	113	21	38	5	19
Town B	108	120	28	46	5	18
Town C	60	73	21	39	3	17
Town D	43	56	13	30	2	16
Town E	37	50	10	28	2	16
Town F	37	49	10	28	1	15
A	31	43	10	27	1	15
B	16	28	5	23	1	15
C	25	37	7	24	1	15
D	73	85	17	35	5	19
E	110	122	30	48	6	20
F	69	81	13	30	4	18
G	120	133	26	43	7	21
H	129	141	27	45	5	19
I	52	64	15	33	3	17
J	64	76	15	33	3	17
K	54	67	16	33	3	16
L	72	84	16	34	2	16
N	25	37	6	24	1	15
O	90	102	17	35	3	17
P	84	96	15	33	3	17
Q	34	46	7	24	1	15
R	41	54	12	30	2	16
S	39	51	9	27	1	15
T	25	37	8	26	1	15
U	39	51	11	28	1	15
V	21	33	7	24	1	15
W	40	52	15	32	2	16
HiVol	101	113	19	37	5	18

5.1.1 Applicant dust management plan

A draft dust management plan (DMP) for the premises and a dust composition analysis from the filter of the Hi Vol dust monitor, currently used at the premises, was provided by the applicant at DWER's request.

DWER's review of the draft DMP concluded that there was insufficient detail in regard to dust control measures being implemented in response to specific dust concentrations. No specific details about which operations will be stopped, what actions will be taken when triggers are exceeded, and no specification on timeframes for actions being taken.

DWER identified that the applicant's proposed monitoring method (Osiris portable monitor) is not a standard method and therefore unsuitable for assessing compliance with air quality guidelines. DWER's air quality experts recommend a co-location of the Osiris monitor and tapered element oscillating microbalances (TEOM) monitor should be conducted initially to establish a correlation factor. Based on DWER's review of on-site monthly windroses and long

term rainfall data, a trial period from April to July would be most suitable.

While dust emissions from the construction phase of the project have not been included in the dust assessment, DWER acknowledges that there is potential for unacceptable impacts which may require dust management and monitoring measures. Although the DMP is still in draft format, the applicant's commitments have been relied upon to assess risk in this decision report.

6. Surface water and groundwater management

The proposed increase of production capacity will likely result in a higher lithium and metals/metalloids concentration in the mine water circuit, which can impact surface water and groundwater quality.

Process water with elevated lithium and metals/metalloids concentrations can potentially be released during operations from the following sources:

- process water storage dams;
- TSFs; and
- process water storage for plants.

TSF seepages and off-site impacts from historical and current operations are known to be occurring, and higher contaminant concentrations could lead to additional risk to sensitive receptors. Additionally, increased dust emissions can be deposited on surface water, further increasing potential contaminant concentrations.

6.1 Surface water

Process water is stored in multiple storage dams within the tenements (Tin Shed Dam, Cowan Brook Dam, Clear Water Dam, Austins Dam, Southampton Dam). Ongoing seepages off site from Southampton Dam into Spring Creek, Cowan Brook Dam into Cowan Brook and Cemetery Dam into an unnamed creek, have been identified (GHD, 2019b). The proposed higher production rate are likely to result in higher contaminant concentrations present in the storage dams.

A Water Treatment Plant (WTP) has been approved and constructed (DWER, 2018) which aims to reduce contaminant (e.g. lithium) concentrations in the process water circuit. The WTP has been commissioned, however no confirmation of efficiency and extent of contaminant removal by the WTP of current operations, is available at this date.

The premises was classified as 'Contaminated- restricted use' in 2015 (ID 34013) under the *Contaminated Sites Act 2003*. This requires the applicant to implement a Surface Water Management Plan (SWMP) which is required to be regularly reviewed and updated to reflect changes at the premises and risks to environment, human health or any environmental values. The current version (Version 5) found under the department's records was submitted September 2015 and does not reflect current operations at the premises (SWMP, 2015). The applicant should provide an updated SWMP as part of the licence amendment application associated with this works approval.

6.2 Groundwater

As TSF4 has been withdrawn from the present application, the applicant proposes to deposit tailings produced from the increased production rate from commissioning and early operations into the currently operating TSF2. Seepage from TSF2 is occurring, which is transported to Cowan Brook Dam via an underlying surficial aquifer. Seepage recovery does not capture seepage sufficiently, and depending on characteristics, additional tailings into TSF2 may result in increased emissions from seepage.

Groundwater quality is compared to the mine water circuit geochemical signature to indicate impact to groundwater from process water. The following criteria are identified as indications for mine water circuit impact:

- chloride 200-500 mg/L;
- lithium 6-8 mg/L;
- SO₄:Cl ratios above 0.3; and
- CO₃:Cl ratios above 0.3;
- Mg:Na ratio below 0.2.

Reviewing groundwater quality for the past 2 years (reporting period 2017/2018 and 2018/2019) and comparing to the premises water geochemical signature, one monitoring bore has been identified to be impacted by mine circuit water (MB17/08) and seven bores potentially impacted (MB17/01S, MB17/02S, MB17/01I, MB17/02I, MB17/07D, MB97/5D, MB97/1D). Criteria indicating impacts are trending closer to the mine circuit characteristics with time.

6.3 Uncertainties

Operations including the re-mining of TSF1 and depositing TRP waste tailings into TSF2 will require additional geotechnical and/or hydrogeological information for assessment. Limited information on tailings management is currently available. Therefore potential discharges and emissions into the environment which can impact sensitive receptors is also limited at this time. A detailed risk assessment cannot be undertaken by the department at this date and will be undertaken when more information becomes available, or when the licence amendment application has been submitted for commissioning and operation of proposed activities. This will occur in close collaboration with DMIRS who also regulate matters related to this proposal.

7. Risk assessment

7.1 Determination of emission, pathway and receptor

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

To establish a risk event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission. Where there is no actual or likely pathway and/or no receptor, the emission will be screened out and will not be considered as a risk event. In addition, where an emission has an actual or likely pathway and a receptor which may be adversely impacted, but that emission is regulated through other mechanisms such as Part IV of the EP Act, that emission will not be risk assessed further and will be screened out through Table 9.

The identification of the sources, pathways and receptors to determine risk events are set out in Table 8 and Table 9 below.

7.1.1 Emissions

The potential for emissions to impact on sensitive receptors has been assessed in accordance with the department's risk framework. The key emissions during premises construction which have been considered in this report are dust, hydrocarbon spills, noise and stormwater (Table 8).

The applicant has proposed measures to assist in controlling these emissions, where necessary. The control measures suggested by the applicant have been considered when undertaking the risk assessment.

Following the applicant demonstrating completion and compliance with the works approval, the applicant will need to apply for an amendment to the current prescribed premises category 5 licence under Part V of the EP Act to authorise emissions associated with the operation of the premises i.e. for CGP and 4, TRP, Crusher 3.

A risk assessment for the operational phase has been included in this decision report, however licence conditions will not be finalised until the department assesses the application for a licence amendment. The key emissions considered during premises operation are dust, noise, contaminated stormwater, process water, hydrocarbons and reagent/process fluid, and lithium and metals/metalloids.

7.1.2 Pathways

As dust, noise and stormwater runoff are considered potential emissions, the prevailing wind directions and rainfall are considered. The premises has an on-site meteorological station which was used for the dust and noise modelling. Noise emissions and impacts on human receptors are currently regulated under a Regulation 17 exemption (refer to Table 5) and are not further assessed in this decision report.

Predominantly east south-easterly (3.6 - 8.8 m/s) and west north-westerly winds (up to 11.1 m/s) for the 2015/2016 period were reported in supporting documentation submitted by the applicant. The area of the Talison Lithium mine has been described as Mediterranean climate with dry warm summers and cool, mild winters. Long term data from Bureau of Meteorology shows an average of 703.0 mm rain (2018), mainly occurring between May-September.

Emissions of elevated lithium and metals/metalloids from proposed operations are considered in this decision report. Process water can impact environment by dam water seepage, discharge or overflow of surface water. Process water can also impact groundwater via seepage infiltration into the surficial aquifer.

7.1.3 Receptors

Greenbushes Primary School is located in very close proximity to the northern boundary of the premises (Figure 4). The Town of Greenbushes borders immediately on the northern border of the premises and counts a population of 385 (Australian Bureau of Statistics, 2019). There are several sensitive receptors close (approx. 255 m to 1.7 km) to the south- east boundary. Excluding the Town of Greenbushes, there are 21 identified individual sensitive receptors close to the mine, with half located <1 km from the premises boundary.

There are multiple downstream users, with and without bores, who use water for beneficial use and may be impacted by proposed activities (Figure 5).

Figure 3, Figure 4, Figure 5 and Appendix 1 provide a summary of human receptors in proximity to the premises which have a potential to be impacted from site activities. Environmental receptors are listed in Table 7.

Table 7 Environmental receptors

Environmental receptors	Distance from activity / prescribed premises
Greenbushes State Forest Hester State Forest	This has been addressed in the EPA report and is regulated under Part IV. Therefore, these environmental receptors are not assessed in this decision report.
Threatened/Priority Flora and	

Fauna		
Threatened/Priority Fauna		
Groundwater and water sources	Distance from Premises	Environmental value
Greenbushes Catchment Area (former drinking water source)	Bordering on northern premises boundary	Beneficial use for crop irrigation and stock grazing. No priority areas or protection zones assigned.
Blackwood river	Tributaries running through proposed mine expansion area	Largest catchment in SW of WA Registered Aboriginal Site Provides ecosystem for flora and fauna.
Norilup Brook sub-catchment	CGP 3 and 4 sit within this area	Discharging into Blackwood river (6 km downstream). Provides ecosystem for flora and fauna.
Identified bores in close proximity	Groundwater bores identified south (down-hydraulic gradient) of premises: 700 m, 790 m, 2.8 km south; 2.2 km, 3 km south west, 330 m east	Beneficial use as drinking water, for crop irrigation and stock grazing.

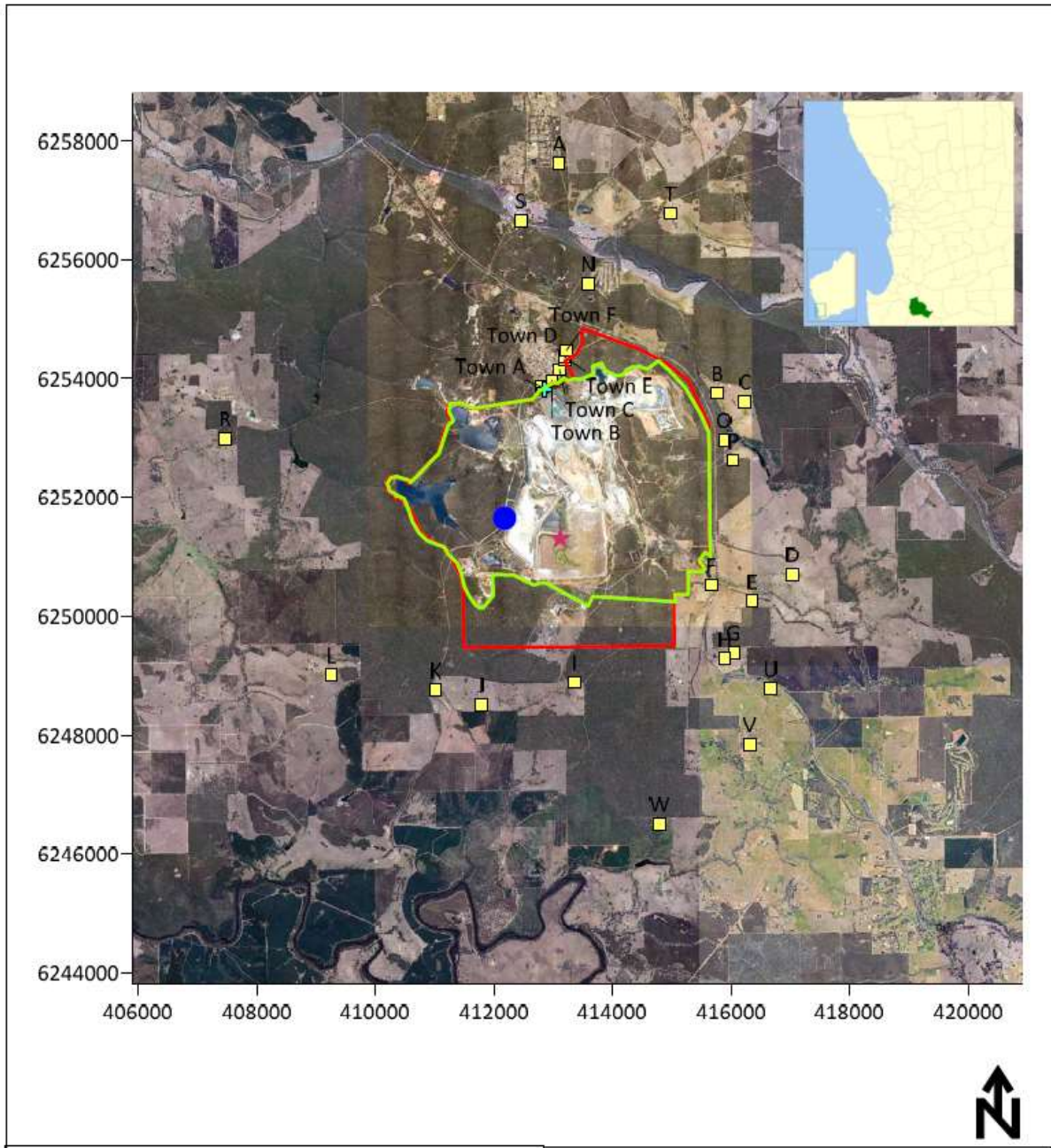


Figure 3 Sensitive residential receptors for dust and noise emissions



Legend

WANow_Index

Notes

Author:
Recipient:



0.3 0 0.16 0.3 Kilometers

WGS_1984_Web_Mercator_Auxiliary_Sphere
© Government of Western Australia, Department of Water and Environmental Regulation.

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Figure 4 Sensitive receptor location Greenbushes Primary School

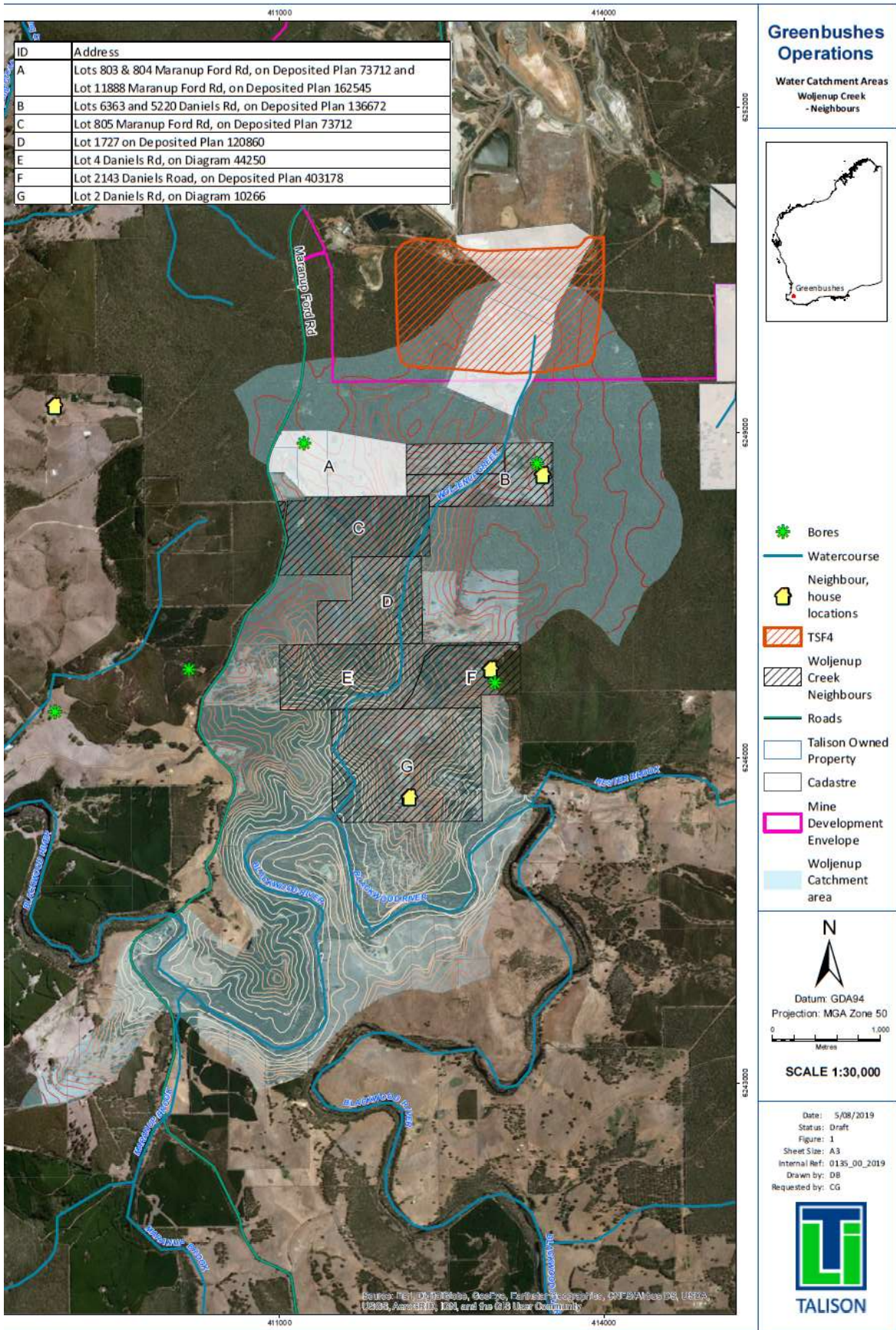


Figure 5 Sensitive receptors in the Woljenu Catchment

Table 8. Identification of emissions, pathway and receptors during construction

Risk Events					Detailed risk assessment	Reasoning	Regulatory Controls (refer to conditions of the granted instrument)	
Sources/Activities	Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts				
Construction of CGP 3 and 4, ROM, Crusher3, and TRP	Construction works including: excavation/compaction of materials, mobile transport on unconsolidated soil and wind erosion of exposed soils	Noise	Fauna in Greenbushes -, and Hester State Forest surrounding the premises	Air/wind dispersion	Impacts to feeding and breeding patterns.	No	Limited evidence of noise impacts impacting on fauna is available. There is expected to be a slight consequence, only occurring under rare circumstances therefore the Delegated Officer considers it low risk.	NA
		Dust	Residences 600 m south of premises boundary, 1.5 km north of CGP 3 and 4, <1 km east of boundary; Town of Greenbushes located immediate at northern premises boundary		Health/Amenity impacts	Yes	Refer to Section 5 and 7.4	Conditions 5, 6, 9-11, 15-17
		Hydrocarbon spills	Benthic organisms and surrounding ecology; Groundwater and surface water systems.	Overland migration; seepage through soil; transport through groundwater.	Impacts to the health of flora and fauna; Contamination of land, groundwater and surface water	No	Hydrocarbons stored in accordance with AS1940:2017 <i>The storage and handling of flammable and combustible liquids</i> , contaminated soil will be disposed at the onsite bioremediation area. <i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i> regulate discharges into the environment from business or commercial activities. The applicant commits to report large spills with potential to cause contamination to the department. There is expected to be a minor consequence, only occurring under rare circumstances. The Delegated Officer considers it low risk and that applicant controls will be sufficient at mitigating impacts	NA
		Stormwater and sediment	Benthic organisms, surrounding water and soil ecology	Infiltration into soil and water systems; overland runoff.	Contamination of surface water and soil.	No	Stormwater potentially contaminated by hydrocarbons during construction is retained onsite and will remain in the mine water circuit. There is expected to be a minor consequence, only occurring under rare circumstances. The Delegated Officer considers it low risk and that applicant controls will be sufficient at mitigating impacts	NA

Table 9: Identification of emissions, pathway and receptors during operation

Risk Events					Continue to detailed risk assessment	Reasoning	Regulatory Controls (refer to conditions of the granted instrument)	
Sources/Activities	Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts				
Cat 5 Processing or beneficiation of metallic or non-metallic ore	Operation of CGP 3 and 4, ROM, Crusher 3, overhead conveyor, TRP	Noise	Fauna in Greenbushes -, and Hester State Forest surrounding the premises	Air/wind dispersion	Adverse impact on habitat conditions	No	It is noted that there is limited studies on noise impacts on fauna. There is expected to be a slight consequence, only occurring under rare circumstances therefore the Delegated Officer considers it low risk.	N/A
		Dust	Residences 600 m south of premises boundary, 1.5 km north of CGP 3 and 4, <1 km east of boundary; Town of Greenbushes located immediate at northern premises boundary		Health/Amenity impacts	Yes	Refer to Section 5 and 7.4	Conditions 5, 6, 9-11, 15-17
		Contaminated stormwater	Benthic organisms, surrounding water and soil ecology	Infiltration into soil and water system	Contamination of surface water, soil	No	Stormwater will be collected by concrete sealed or earthen drains, established within non-plant areas of CGP 3 and 4 and TRP. Stormwater conveyance systems will be installed for surface stormwater and subsoil drainage. Stormwater will be returned to the mine circuit (Clear Water Dam) after collection in sediment basins. Drainage system is designed to accommodate a 10% Annual Exceedance Probability (AEP) storm event with 1 % AEP (100 year) flood flowing overland to boundary drains. Sediment basins designed to have a 1% AEP (100 year API) containment capacity of stormwater from the site and will be HDPE lined. A 0.5m freeboard will be maintained to prevent overtopping. There is expected to be a minor consequence, only occurring under rare circumstances. The Delegated Officer considers it low risk and that applicant controls will be sufficient at mitigating impacts.	N/A
	Increased production capacity	Lithium and metals/metall oids (arsenic, manganese, nickel) released via tailings seepage/contaminated process water releases (tailings decant)	On premises surface water storages: Cowan Brook, Austins, Clear Water Dam, Southampton dam; Off premises surface water receptors, including aquatic ecosystems associated with each receptors: Cowan Brook, Norilup, and Swenkies dam, Mt Jones Reservoir State forest, soils within Premises boundary; surface water, surficial groundwater aquifer	Surficial shallow seepage flows via groundwater and above ground flows to premises surface water dams; overflow from premises dams and seepage from premises dams to downstream water bodies Overland flow	Impacts to freshwater aquatic species abundance and diversity within onsite and offsite surface water receptors; reduced ecological function of those receptors. Soil/ groundwater contamination; adverse vegetation health	Yes	Refer to Section 6 and 7.5	N/A

Risk Events					Continue to detailed risk assessment	Reasoning	Regulatory Controls (refer to conditions of the granted instrument)
Sources/Activities	Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts			
Operation of CGP 3 and 4, ROM, Crusher 3, overhead conveyor, TRP	Hydrocarbons and reagent/process fluid	Surface water, Blackwood River	Shallow aquifer	Impacts to the health of flora and fauna; Contamination of land, groundwater and surface water	No	<p>All process plants and reagent storage are located within concrete bunding to capture spillage and rainfall. Bunding is sized to contain 110% of the capacity of largest storage vessel within bund. Bunds graded to a sump where material can be pumped back to process. Surface water outside of bunded areas will be directed to High Density Polyethylene (HDPE) lined sedimentation pond and returned to mine water circuit.</p> <p>There is expected to be a minor consequence, only occurring under rare circumstances. The Delegated Officer considers it low risk and that applicant controls will be sufficient at mitigating impacts.</p>	

7.2 Consequence and likelihood of risk events

A risk rating will be determined for risk events in accordance with the risk rating matrix set out in Table 10 below.

Table 10: 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 11 below.

Table 11: Risk criteria table

Likelihood		Consequence		
The following criteria has been used to determine the likelihood of the Risk Event occurring.		The following criteria has been used to determine the consequences of a Risk Event occurring:		
		Environment	Public health* and amenity (such as air and water quality, noise, and odour)	
Almost Certain	The risk event is expected to occur in most circumstances	Severe	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Adverse health effects: low level or occasional medical treatment Specific Consequence Criteria (for public health) are at risk of not being met Local scale impacts: mid-level impact to amenity
Unlikely	The risk event will probably not occur in most circumstances	Minor	<ul style="list-style-type: none"> onsite impacts: low level offsite impacts local scale: minimal offsite impacts wider scale: not detectable Specific Consequence Criteria (for environment) likely to be met 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> onsite impact: minimal Specific Consequence Criteria (for environment) met 	<ul style="list-style-type: none"> 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.

7.3 Acceptability and treatment of Risk Event

DWER will determine the acceptability and treatment of Risk Events in accordance with the Risk treatment table 12 below:

Table 12: 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.

7.4 Risk Assessment – Fugitive dust impact (construction and operations)

7.4.1 Description of risk event and

Fugitive dust can be generated from different activities including:

- ground disturbance;
- ore extraction and processing (including crushing and screening activities);
- stockpiling;
- lift off from roads,
- and vehicle movements.

7.4.2 Identification and general characterisation of emission

Construction

Fugitive dust emissions can occur during construction from civil earthworks, wind erosion from disturbed soil surfaces, vehicle movements and infrastructure construction. Construction works are planned for an approximately 5 year period, and the applicant has states that works will be avoided at night where practicable.

Operation

Dust can arise from different sources and activities undertaken within the premises, including vehicle movement on unsealed roads, cons, crushing, ore processing and stockpiling.

An increase of dust emissions from major construction works and operations are expected. Construction is planned across the majority of the site, with the potential to affect sensitive receptors located in very close proximity to the premises. Operation of the proposed

infrastructure will likely result in ongoing increased dust emissions.

A dust analysis was undertaken from five Hi Vol filters from the northern boundary monitoring station between December 2018 and February 2019. The dust composition analysis shows detectable levels of calcium, potassium, magnesium, sodium, aluminum ($27 \mu\text{g}/\text{m}^3$), barium ($46 \mu\text{g}/\text{m}^3$), boron ($35 \mu\text{g}/\text{m}^3$), zinc ($34 \mu\text{g}/\text{m}^3$) and iron ($1 \mu\text{g}/\text{m}^3$) (Talisson, 2020a). The Department of Health (DOH) notes barium identified in the dust composition as had concentrations exceeding the 1 hour guideline for water soluble barium. Further investigations of the source and potential solubility of the barium were recommended (DOH, 2020). These results suggest stringent dust management measures are required to manage dust emissions.

7.4.3 Description of potential adverse impact from the emission

Dust emissions can have adverse impacts on human health. Impacts depend on the dust composition and size. Fine dust particles (PM_{10} and below) can be readily inhaled and are associated with chronic health effects. Fine and coarse dust can cause acute health effects (e.g. eye or breathing irritation).

Dust emissions can cause health impacts as well as amenity impacts on sensitive receptors in close proximity, in particular ones directly influenced by meteorological conditions. Planned expansion works may result in increased dust emissions and potential impacts on sensitive receptors. On 11 February 2020 the departmental Pollution Watch was notified about noticeably dust impacts by the Greenbushes Primary School which is located at the northern border of the premises (DWER reference ICMS 56385).

7.4.4 Criteria for assessment

Relevant air quality criteria are set out in the *National Environment Protection (Ambient Air Quality) Measure* (NEPM). The standard described for PM_{10} is $50 \mu\text{g}/\text{m}^3$ over a 24 hour averaging period.

Conditions in the current licence L4247/1991/13 (Table 3.4.1 in licence) require the applicant to monitor dust particulates at the northern boundary using the Hi Vol monitor, and to not exceed a PM_{10} 24 hour average of $90 \mu\text{g}/\text{m}^3$. This criteria is specific to the location of the Hi Vol and does not apply to the rest of the site.

Advice from the DOH outlines that a PM_{10} (24 hour average) of $90 \mu\text{g}/\text{m}^3$ is unsuitable for monitoring current operations and expansion works and recommends to align with the NEPM criteria (DOH, 2020). The current licence limit will be reassessed as part of the licence amendment associated with this proposal.

The guidance criteria for PM_{10} of $50 \mu\text{g}/\text{m}^3$ over a 24 hour averaging period has been applied in this assessment.

7.4.5 Applicant controls

The application included a draft Dust Management Plan (DMP) outlining the management of dust emissions during construction and operations. Given the DMP is a draft the certainty and accuracy of the commitments by the applicant to implement the controls is not clear.

For the purpose of this assessment, the Delegated Officer has assumed that the proposed controls in draft DMP are representative and has undertaken the risk assessment considering the applicant's commitments in this document.

Existing site controls (including water carts, shielding of product stockpiles, chutes, wet scrubber dust extraction systems for crusher, sprinkler systems) will be continued.

The applicant also proposes more monitoring locations to be installed in addition to the Hi Vol monitoring currently located at the northern boundary. An Osiris dust monitor will be placed nearby the Hi Vol, and another one on the south eastern boundary of the premises for real

time measurements and trigger value monitoring.

7.4.6 Consequence

The dust composition identified that impacts can result in adverse health effects to the sensitive receptors, in particular to ones in immediate proximity to the premises boundary (including the Greenbushes Primary School). Taking into consideration the relevant factors discussed in this report, the criteria for PM₁₀ 24 hour average criteria (50 µg/m³), metals present in the dust being potentially exceeded and uncertainties still remaining, the Delegated Officer has taken a conservative approach to the risk assessment and considers the consequence to be **Major**..

7.4.7 Likelihood of Risk Event

A recent dust complaint at the Greenbushes Primary School was reported to the department and is currently under assessment (DWER reference ICMS 56385).

Taking into consideration that dust complaints have been reported during current operations (36 dust related complaints since reporting period 2015/2016), and production capacity is significantly increasing (4.7 Mtpa to 11.6 Mtpa), dust from construction and operations will probably occur in most circumstances. Therefore, the Delegated Officer considers the likelihood of dust emission impacts to be **Likely**.

7.4.8 Overall rating of dust emissions Risk Event

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix (Table 10) and determined that the overall rating for the risk of dust emissions is **High**.

7.4.9 Regulatory controls

Monitoring

Dust

Dust impacts on sensitive receptors to the east south-east premises boundary need to be assessed by a method recognised by in the Australian Standard 3850. A trial period during construction to assess the adequate trigger value set for the Osiris monitoring is to be completed by temporarily placing the TEOM near receptors. Input from DWER's air quality experts and undertaking a review of meteorology data indicates that a trial from May – August should be carried out to obtain adequate data. Timeframe for temporary TEOM monitoring may be subject to change when more data becomes available.

The siting of the dust monitoring at the premises is required to be compliant with AS/NZS 3580.1.1.

A dust composition is required to be undertaken and reported to the department over a period of 12 months. Frequency of analysis may be revised when monitoring data becomes available. Operation and analysis is required to be NATA accredited and to comply with AS/NZS 3580.9.6.

Dust monitoring is to be reported monthly to the department.

Meteorological

Meteorological monitoring is currently undertaken on site but compliance with relevant Standards is unknown. Trigger values to mitigate dust impacts on sensitive receptors rely on accurate measurements of weather conditions. Meteorological monitoring is to be compliant with AS/NZS 3580.1.1 for adequate siting, and with AS 3580.14 for correct monitoring procedures.

Trigger values and criteria

If trigger values are met, activities contributing significantly to the release of dust emissions are to cease and actions taken to mitigate dust impacts on sensitive receptors.

Dust

A review of the dust monitoring for licence L4247/1991/13 from previous years (2010-2019) confirms consistent dust measurements well below the NEPM standard, with results over 50 $\mu\text{g}/\text{m}^3$ observed on only very rare occasions. Exceedances were confirmed to be due to unrelated activities such as fires in Northcliffe and Boddington (February 2015, 2017), and pipeline installations by Water Corporation in close proximity to the dust monitor (May 2014).

Due to the close proximity of sensitive receptors at the northern boundary of the premises, an initial trigger value of TSP 100 $\mu\text{g}/\text{m}^3$ applies to the two proposed Osiris monitoring, which may be revised after the TEOM trial.

Wind speed

Trigger values for wind speeds are subject to regulatory controls, due to discrepancies between values proposed in the dust management plan draft and dust impact assessment provided by the applicant.

The dust assessment (GHD, 2019a) submitted in support of the application predicts PM_{10} exceedances at a wind speed of 2.2 m/s during cooler months. Wind speeds above 2.2 m/s from May to September, and 7 m/s for the remaining year. These have been set as trigger values which require the applicant to take actions to mitigate dust emissions.

7.5 Risk Assessment - Lithium and metals/metalloids release

A detailed risk assessment of this matter is limited due to insufficient information available to this date. More information on this matter is set out in Section 6. Advice from DMIRS indicates that further geotechnical information will be requested from the applicant in regard to the remaining of TSF1 and deposition of TRP waste into TSF2. DWER will also review this information. A detailed risk assessment will be undertaken when the licence amendment application to include proposed activities set out in this works approval, is submitted.

7.5.1 Description of risk event

Process water with elevated lithium and metals/metalloids concentrations is transported to downstream sensitive receptors via surficial aquifer, overland runoff or surface water migration. The premises is surrounded by State Forest and process water may enter the water ways which discharge into Blackwood River

7.5.2 Identification and general characterisation of emission

Surface water

Ambient monitoring of storage dams undertaken by the applicant as part of current licence requirements (L4247/1991/13), identified elevated concentrations, including lithium and arsenic in the storage dams on-site, as well as in Norilup Dam which is located off site (Table 13). These concentrations are the result of historical and current operations and may increase with higher production capacity.

Table 13 Ambient surface water quality (Talison, 2020b)

Monitoring location	Lithium [mg/L]	Arsenic [mg/L]
Cowan Brook Dam	4.8	0.002
Southampton Dam	10	0.042
Austins Dam	11	0.035
Norilup Dam	0.19	0.002

Groundwater

There is no clear understanding of tailings management resulting from the increased production and depositing tailings from the TRP into TSF2. Uncertainties for seepage management of increased lithium, metals/metalloids concentrations from higher production capacity remain.

7.5.3 Description of potential adverse impact from the emission

The national ANZECC guidelines do not list trigger values for lithium to protect freshwater ecosystems. Site specific testing of the eco-toxicity on three fish species obtained from Norilup Brook identified a trigger value of 0.42 mg/L (University of Western Australia, 2013). This value has been described as conservative in relation to acute toxicity but was found appropriate for potential chronic effects on freshwater species (e.g. reproductive function) (DER, 2016). Additional processing capacity may result in further exceeded concentrations.

Submissions from sensitive receptors downstream (south of TSF1 and TSF2) confirmed that there is a beneficial use of both groundwater and surface water for irrigation of fruit and vegetables and for grazing stock. Uncertainties about seepage impacts of increased contaminant concentrations in surface water remain. Released process water can have adverse impacts on the surficial aquifer and surface water.

7.5.4 Conclusion of this risk event

Due to insufficient information currently available, the risk of lithium and metals/metalloids entering the environment from operations cannot be adequately assessed at this time. A detailed risk assessment will be undertaken with information submitted in support of the licence amendment application following this works approval.

8. Regulatory controls

8.1 Works approval

Rationale and summary of conditions set out in W6283/2019/1 are listed in Table 14.

Table 14 Summary of conditions to be applied

Condition Ref	Reasoning
1 Infrastructure	<p>The conditions are valid, risk-based and contain appropriate controls on infrastructure requirements.</p> <p>Proposed infrastructure is constructed in accordance with application documents and located as set out in Figure 2.</p>
2, 3 Compliance reporting	<p>These conditions are valid and are necessary administration and reporting requirements to ensure compliance.</p> <p>Correct installment and construction of infrastructure is certified and reported to the department within 30 days after completion.</p>
4 – 8 Monitoring	<p>Real time monitoring of PM₁₀ and TSP is undertaken at two locations along the boundary of the premises. This method does not comply with Australian Standards, and therefore requires temporary monitoring of PM₁₀ near sensitive receptors (TEOM) to ensure no exceedances. The TEOM monitoring timeframe or location may be adjusted.</p> <p>Potential adverse health impacts of dust requires close monitoring of dust composition to avoid impacts of sensitive receptors in very close proximity.</p> <p>Meteorological monitoring provides information in case of increased dust emissions and allows for dust suppression to mitigate impacts.</p>
9 – 11 Specified Actions	<p>Criteria for PM₁₀ (24 hour average) is aligned with NEPM, and any exceedance is reported to the CEO on a weekly basis.</p> <p>Sensitive receptors are in very close proximity to activities, and dust composition identified the presence of barium which has the potential to cause adverse health impacts, including targeting the respiratory system or causing hypertension. Multiple dust complaints have been recorded from current operations and uncertainties about dust from construction remain, as this stage was not included in dust modelling submitted to the department.</p> <p>Trigger values for TSP monitoring at the northern and south-western boundary, and triggers for wind speed allows for actions and mitigate any exposure of sensitive receptors.</p>
12 – 14 Records and reporting	<p>These conditions are valid and are necessary administration and reporting requirements to ensure compliance.</p>
15 – 17 Records and reporting	<p>Any exceedances of trigger and/or ambient concentrations of dust emissions are reported to the department on a weekly basis.</p> <p>All ambient monitoring and dust composition data is submitted to the department on a monthly basis. Due to uncertainties of dust impacts during construction, collection of data and frequent review allows adjustment of criteria to ensure no impacts on sensitive receptors</p>

8.2 Proposed licence controls (by amendment to existing licence L4247/1991/13)

Prior to commissioning, the following controls will be imposed as conditions on the existing licence to manage the risk of emissions during operation at the premises. Controls listed in Table 15 are not final and are subject to compliance with conditions of the works approval and may change if additional information becomes available to further inform the risk assessment.

Table 15 Summary of proposed licence conditions

Proposed condition	Reasoning
<p><u>Infrastructure</u></p> <p>Additional infrastructure is included in corresponding condition in existing licence</p>	NA
<p>Infrastructure is required to be located at the agreed location and is maintained/operated in accordance with corresponding requirements.</p>	The conditions are valid, risk-based and contain appropriate controls on infrastructure requirements.
<p><u>Emissions</u></p> <p>Detailed assessment of tailings produced from additional infrastructure (TRP) and deposit into operational TSF2. Ensuring sufficient capacity of TSF2 is available, and controls to reduce seepage and impact on the environment.</p>	Until the additional TSF4 is constructed and commissioned, tailings produced from the increased production capacity (11.6 Mtpa) were proposed to be deposited into operating TSF2. Seepages from TSF2 are known, and adequate tailings management is required.
<p>The PM₁₀ criteria (24 hour average) at the Hi Vol is amended to be aligned with NEPM.</p>	<p>Sensitive receptors are in very close proximity of the premises. The Town of Greenbushes borders on the northern boundary, and a primary school is located immediately next to the premises.</p> <p>DOH advice stated the current PM₁₀ criteria of 90 µg/m³ is not appropriate, and could result in adverse health impacts (DOH, 2020)</p>
<p><u>Monitoring</u></p> <p>Following the review of monitoring data, trigger values for TSP and frequency of reporting may be adjusted.</p> <p>Permanent monitoring (off site) may be required near sensitive receptors if indicated by monitoring data.</p>	
<p><u>Records and reporting</u></p> <p>Annual environmental reports are required.</p> <p>Frequent dust monitoring reporting may be required after reviewing dust monitoring data.</p> <p>Exceedances may be reported within 7 days of event.</p>	

9. Applicant's comments

The Applicant was provided with the draft Decision Report and draft Works Approval on 20 March 2020. The Applicant provided comments which are summarised, along with DWER's response, in Appendix 2.

10. Conclusion

This assessment of the risks of activities on the premises has been undertaken with due

consideration of a number of factors, including the documents and policies specified in this decision report (summarised in Appendix 2).

Due to limited information and pending approvals by DMIRS for operations and tailings deposition, this works approval is limited to the construction of infrastructure. No operations are permitted, until a licence amendment application with sufficient information has been submitted, and a risk assessment undertaken by the department.

This assessment was also informed by a site inspection by DWER officers on 29 November 2019.

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

Lauren Fox
A/MANAGER RESOURCE INDUSTRIES

Delegated Officer
under section 20 of the *Environmental Protection Act 1986*

Appendix 1: Distance to identified human receptors

Human receptors (Refer to Figure 3)	Distance from prescribed premises
A	2.8 km
B	< 1 km
C	< 1 km
D	1.6 km
E	1 km
F	< 1 km
G	1.3 km
H	< 1 km
I	< 1 km
J	< 1 km
K	< 1 km
L	2.3 km
N	< 1 km
O	< 1 km
P	< 1 km
Q	6.3 km
R	2.9 km
S	2.3 km
T	2.8 km
U	1.5 km
V	2.1km
Town A	< 1 km
Town B	< 1 km
Town C	< 1 km
Town D	< 1 km
Town E	< 1 km
Town F	< 1 km

Human receptors (Refer to Figure 5)	Distance from prescribed premises
A	600 m
B	600 m
C	1 km
D	1.6 km
E	2.5 km
F	2.5 km

Appendix 2: Key documents

	Document title	In text ref	Availability
1.	Licence L4247/1991/13 – Talison Lithium Mine	L4247/1991/13	accessed at www.der.wa.gov.au
2.	DWER, 2018 Amendment Notice 3	DWER 2018	accessed at www.der.wa.gov.au
3.	Dust composition results – Hi Vol	Talison 2020a	DWER records (DWERDT249516)
4.	Ministerial Statement 1111	MS 1111	accessed at www.epa.wa.gov.au/
5.	EPA, 2019 Report and recommendations of the Environmental Protection Authority Greenbushes Lithium Mine Expansion	EPA 2019	accessed at www.epa.wa.gov.au/
6.	GHD, 2019 Greenbushes Lithium Mine Expansion Dust Impact Assessment	GHD 2019a	DWER records (A1773846)
7.	Environmental Resources Management Australia Pty Ltd Dust impact assessment- Peer review services	ERM 2018	DWER records (A1773846)
8.	GHD, 2019 Hydrogeological Investigation 2018, Site-Wide Hydrogeological Report	GHD 2019b	DWER records (A1773844)
9.	Talison, 2020 Non-Annual (Quarterly) Report	Talison, 2020b	DWER records (DWERDT249253)
10.	DOH, March 2020 Advice on works approval provided to DWER	DOH 2020	DWER records (A1874027)
11.	UWA, 2013 Centre for Excellence in Natural Resource Management (2013), <i>Ecotoxicology of Lithium</i> , unpublished report for Talison Lithium, Greenbushes, August 2013	University of Western Australia 2013	DWER records (A998376)
12.	DER, 2016 Memorandum from B. Richmond to L. Lavery 'Talison Lithium – new groundwater monitoring network and proposed lithium water	DER 2016	DWER records (A1101888)

	quality targets', 1 February 2016		
13.	ICMS 56385, Dust complaint received by Greenbushes Primary School	ICMS 56385	DWER records (ICMS 56385)
14.	Summary of Records- Contaminated-restricted use, Contaminated Sites Database	ID 34013	accessed at www.der.wa.gov.au
15.	Talison 2015 Surface Water Management Plan, Version 5, 2015	SWMP 2015	DWER records (A998376)
16.	DER, July 2015. <i>Guidance Statement: Regulatory principles.</i> Department of Environment Regulation, Perth.	DER 2015	accessed at www.dwer.wa.gov.au
17.	DER, October 2015. <i>Guidance Statement: Setting conditions.</i> Department of Environment Regulation, Perth.	DER 2015	
18.	DER, November 2016. <i>Guidance Statement: Risk Assessments.</i> Department of Environment Regulation, Perth.	DER 2016	
19.	DWER, November 2019. <i>Guidance Statement: Decision Making.</i> Department of Environment Regulation, Perth.	DWER 2019	
20.	DER, November 2016. <i>Guidance Statement: Environmental Siting</i> Department of Environment Regulation, Perth.	DER 2016	

Appendix 3: Summary of applicant's comments on risk assessment and draft conditions

Condition	Summary of Licence Holder comment	DWER response
Condition 1, Table 1	Applicant provided updated timeframes for the construction schedule.	Table 1 has been amended to reflect the revised construction schedule.
Condition 1 Table 1	Applicant provided maps with location of proposed infrastructure upon request from the department.	Map in Schedule 1 was updated to show all proposed infrastructure locations.
Condition 5 Table 2	Applicant requests correction of averaging period of dust composition analysis required to be amended to 24 h	The averaging time was corrected to 24 h.
Condition 6 Table 3	Applicant requests to report meteorological data every 6 min instead of 5 min.	Reporting time of 6 min is accepted and was amended in text.
Condition 11 Table 6	Applicant requests to correct wind triggers to < 2.2 m/s and > 7 m/s to reflect the values suggested in the dust impact assessment (GHD 2019a)	Wind triggers were amended to reflect the 'less than' and 'greater than' in Table 6.
	Applicant requests a definition for 'weekly' and 'monthly' time periods	These terms have now been included in the 'Definitions' section of the instrument.
Other admin or minor corrections	Summary of Licence Holder comment	DWER response
Decision Report Section 2.2	Applicant requests to include missing word.	Text was updated and the missing word included. Recycled water and tailings recovered from the process area (CGP 3 and 4, TRP) are pumped through thickeners and returned to the process

Condition	Summary of Licence Holder comment	DWER response
		water circuit or to an operational TSF .
Decision Report Section 2.2, Table 4	Applicant requests to fix identified error in text.	Error was fixed in text. Settlement pond (HDPE lined) designed to maintain a 0.5 m freeboard
Decision Report Section 6.1	Applicant requests to fix identified error in text.	Text was amended to fix error. Process water is stored in multiple onsite storage dams within the tenements (Tin Shed Dam, Cowan Brook Dam, Clear Water Dam, Clear Water Pond , Austins Dam, Southampton Dam)
Decision Report Section 7.1.3, Table 7	Applicant notes incorrect claim of drinking water value.	The environmental value referring to drinking water was removed in text.
Decision Report Table 9	Applicant requests to include Clear Water Dam as water storage.	Text was amended to include Clear Water Dam. On premises surface water storages: Cowan Brook-, Austins-, Clear Water -, Southampton dam;
Decision Report Section 7.4.2	Applicant clarifies dust composition analysis was undertaken between December 2018 and February 2019.	Text was amended to correct year of sampling. A dust analysis was undertaken from five Hi Vol filters from the northern boundary monitoring station between December 2018 and February 2020 2019
Decision Report Section 7.4.9	Applicant notes incorrect TEOM trial period.	Text was corrected to reflect the intended trial period. Input from DWER's air quality experts and undertaking a review of meteorology data

Condition	Summary of Licence Holder comment	DWER response
		indicates that a trial from April—July May – August should be carried out to obtain adequate data.
Decision Report Section 7.4.9 and Table 14	Applicant notes incorrect reporting period.	Text was amended to reflect the correct reporting period. Dust monitoring is to be reported annually monthly to the department. Any exceedances of trigger and/or ambient concentrations of dust emissions are reported to the department within 7 days on a weekly basis .

Attachment 1: Works Approval W6283/2019/1
