# Decision Report

## Application for Works Approval

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

| | |
|---|---|
| **Works Approval Number** | W6685/2022/1 |
| **Applicant** | Regis Resources Ltd |
| **ACN** | 28 009 174 761 |
| **File number** | DER2022/000105 |
| **Premises** | Duketon Gold Project<br>M38/498 and M38/499<br>Shire of Laverton<br>As defined by the premises maps attached to the issued works approval |
| **Date of report** | 16 November 2022 |
| **Decision** | Works approval granted |

Alana Kidd

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**ALANA KIDD**
**A/ SENIOR MANAGER, RESOURCE INDUSTRIES**
**REGULATORY SERVICES**
an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

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# 1. Decision summary

This decision report documents the assessment of potential risks to the environment and public health from emissions and discharges during the works approval construction and operation of the premises. As a result of this assessment, works approval W6685/2022/1 has been granted.

# 2. Scope of assessment

## 2.1 Regulatory framework

In completing the assessment documented in this decision report, the Department of Water and Environmental Regulation (the department; DWER) 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 and overview of premises

On 10 March 2022, the applicant submitted an application for a works approval to the department under section 54 of the *Environmental Protection Act 1986* (EP Act).

The application is to undertake construction works relating to a new Tailings Storage Facility 3 (TSF3) at the premises - Moolart Well (MLW) which forms part of the Duketon Gold Project, the Duketon North Operation (DNO) (Figure 1). The premises is approximately 110km north of Laverton, WA. TSF3 will be constructed on M38/498 and M38/499.

The premises relates to the Category 5 - Processing or beneficiation of metallic or non-metallic ore and assessed production / design capacity under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) which are defined in works approval W6685/2022/1. The infrastructure and equipment relating to the premises category and any associated activities which the department has considered in line with *Guideline: Risk Assessments* (DWER 2020) are outlined in works approval W6685/2022/1.

The processing plant (carbon in leach) currently operates under L8578/2011/1 with an approved ore processing capacity of 4 million tonnes (Mt) per annum. Moolart Well is the processing hub for all sites within the operational area which includes several satellite pits.

MLW TSF3 has been designed by CMW Geosciences and will be constructed in one single stage. It is an irregular octagonal conventional single paddock cell facility abutting MLW TSF1 to the north. MLW is expected to store approximately 8Mt of tailings over a 2 year 8 months period, assuming average throughput of 3Mtpa and tailings in situ dry density of 1.4t/m$^3$. The overall footprint of MLW TSF3 will be 96.8ha. The embankment height will average 10m, with maximum height of 15m. MLW TSF3 will be constructed to include a cut-off trench nominally 0.6m deep to reduce seepage losses. No liners are proposed for the TSF3 basin.

Surface water within the TSF3 will be removed from the rock ring central decant using a pontoon-mounted decant pump. Return water will be pumped back directly to the process plant for reuse. Tailings will be discharged from multiple spigots along the upstream perimeter embankment crest.

Investigation and exploration drill holes within the TSF footprint are planned to be sealed prior to construction.

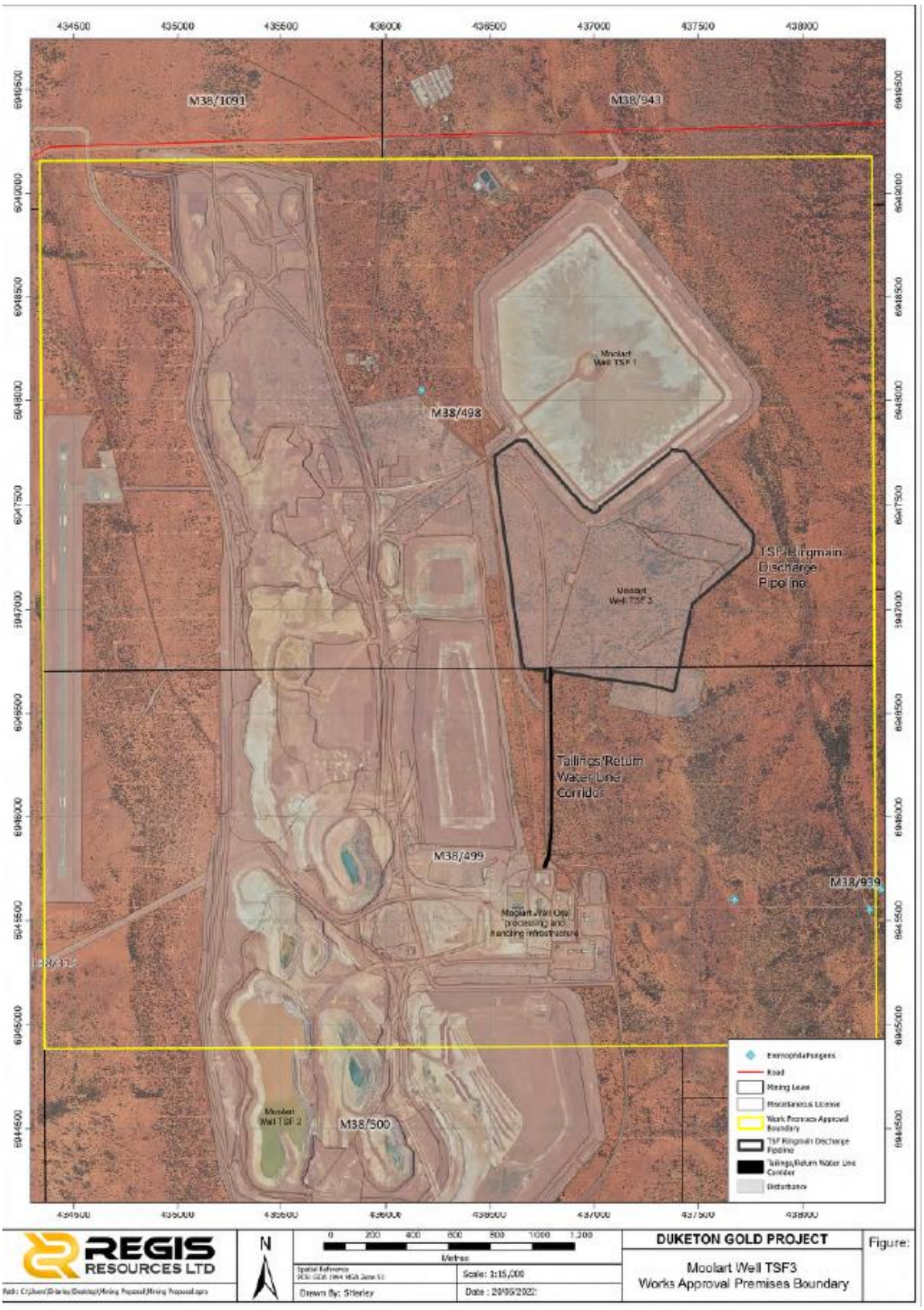


**Figure 1 – Premises Boundary and TSF3 location.**

### 2.2.1 MLW TSF3 DESIGN

TSF3 will be a single cell irregular 'octagonal' facility constructed within a waste dump in a single stage. The total impoundment area will be approximately 96.8 ha (Figure 2). The embankment will be zoned comprising an upstream zone of low permeability roller compacted clayey mine waste (Zone A) and a downstream zone (Zone B) of the waste dump. The decant accessway will be constructed using traffic compacted mine waste (Zone C) materials.

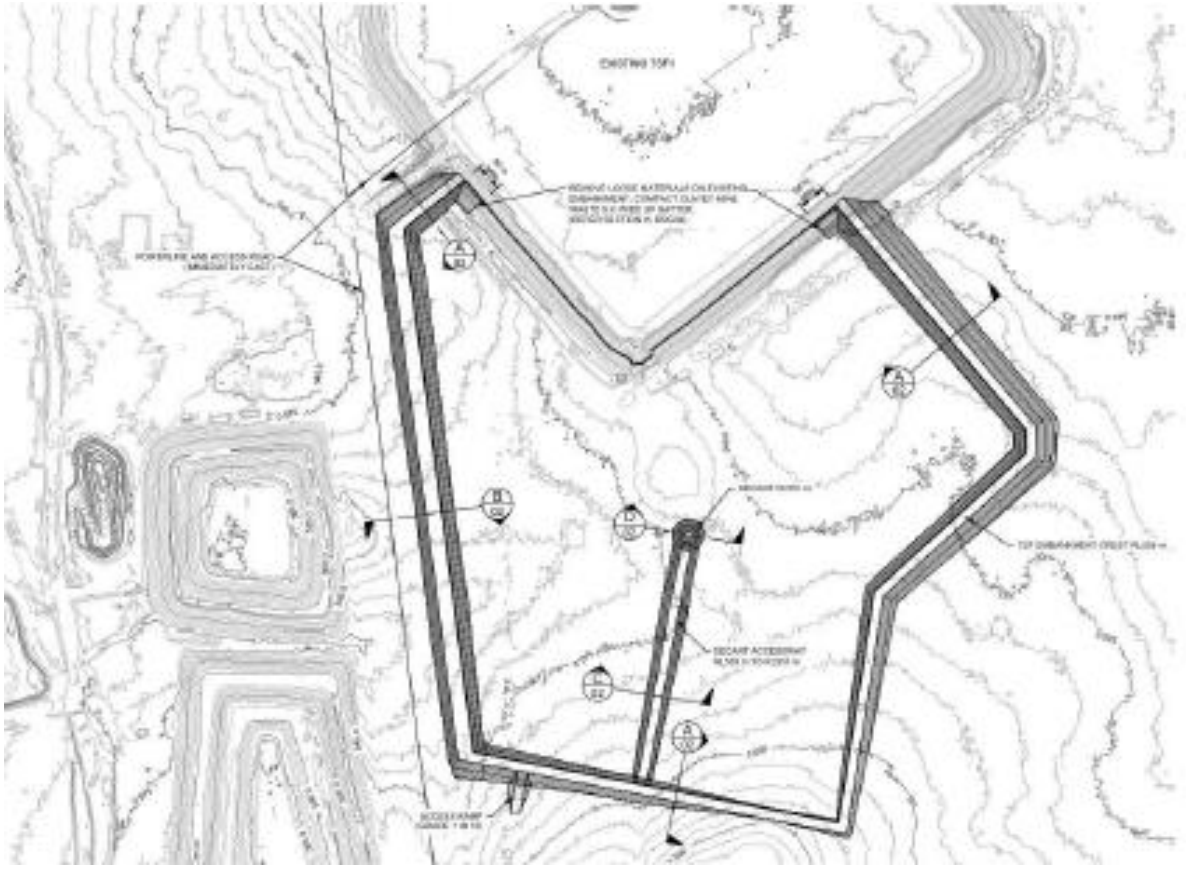

**Figure 2 – TSF3 general arrangements**

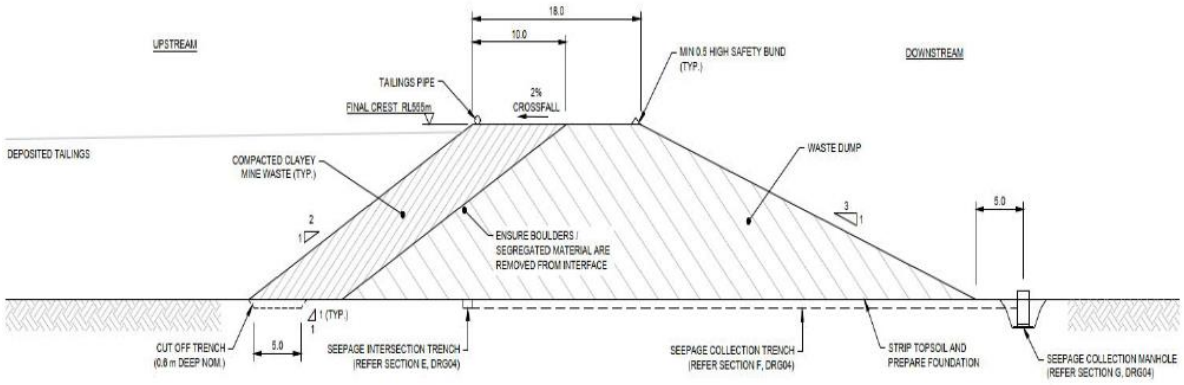


**Figure 3 - Typical Cross Section TSF Embankment *(not to scale)***

TSF3 embankment will have design slopes of 1(V):2(H) upstream and 1(V):3(H) downstream, with a minimum crest width of 18.0m (Figure 3).

A seepage collection system, comprising seepage intersection trenches, collection trenches and

manholes will be constructed underneath parts of the embankment to reduce any potential seepage. The seepage intersection trenches will extend approximately 1.04km underneath the northwest and west embankments, and approximately 0.59km underneath the east and northeast alignments. The seepage intersection trenches are connected to collection manholes by three collection trenches that each extends approximately 63m perpendicular to the embankments.

No liners are proposed for TSF3. The reduction in permeability achieved through compaction of the sandy surface soils within the basin floor is marginal and therefore applicant concludes it is not justified.

The following factors were considered by CMW Geosciences in the TSF3 design:

- Annual tailings production of 3.0 Mtpa.
- Total tailings production of approximately 8.0 Mt.
- Tailings density of 1.4 t/$m^3$ (dry).
- Tailings deposited at 45% solids.
- Tailings beach slope of 1.0%.
- Ore is processed using the Carbon-in-Leach / Carbon-in-Pulp (CIL/CIP) method.
- Tailings Specific gravity of approximately 2.7.
- Tailings effective angle of internal friction, $\phi$ of 32º (assumed based on PSD testing).
- Tailings particle size distribution (PSD) of 55% to 60% passing the 75 µm, and 85% to 90% passing the 300 µm.
- Tailings Permeability, k of $10^{-7}$ to $10^{-8}$ m/s.
- Coefficient of Consolidation, Cv of 200 $m^2$/year to 1,000 $m^2$/year.

Geochemical characterisation has been undertaken of tailings samples at Moolart Well and other satellite ores processed at Moolart Well including Gloster, Dogbolter-Coopers and Petra. A summary of tailings classifications and observations from TSF1 and TSF2 Licence monitoring bores reported in the most recent Annual Environmental Report are presented below:

- Most tailings samples analysed across Moolart Well, Gloster, Dogbolter-Coopers and Petra have been classified as NAF.
- The only PAF tailings samples recorded have been one sample from Mitchell pit, which is the smallest active pit at Moolart Well, and one (out of five) tailings samples analysed from Petra, which has reached its life of mine.
- Licence monitoring bores have very low in WAD CN concentrations (less than 0.1mg/L).
- Except for one outlier, salinities of Licence monitoring bores are generally brackish ranging from 1,300mg/L to 5,100mg/L.
- The pH of Licence monitoring bores have remained circum neutral ranging between 6.84 and 7.87.

TSF3 is expected by applicant to contain almost entirely NAF tailings.

**Water Recovery system**

Surface water will be removed from TSF3 by a pontoon-mounted decant pump located within a rockring type central decant structure. Return water will be pumped directly to the process plant for reuse. The efficacy of the water return system is the key to achieving a high in-situ dry density within the tailings stack. The minimum capacity of the water recovery system should be not less than 420tph including the additional capacity needed to recover water from design storm events.

**Tailings Delivery and Return Water pipelines**

Tailings are transported from the process plant to TSF3 via an HDPE pipeline. At the TSF, the pipeline will split into two distribution lines to distribute the tailings around the active storage. One line distributes tailings to the western section and one to the eastern section.

The tailings distribution lines comprise welded HDPE pipe. The distribution lines have spigot offtakes located at nominally 40m intervals on the embankment. The pipework is located adjacent to the upstream crest of the embankment and perimeter access road. Pipeline route can be seen in Figure 1 above. Existing TSF 1 route will be used with new pipelines installed.

**Tailings deposition**

Deposition will take place via multiple spigots from around the facility. Tailings deposition will be from the perimeter of the storage. Deposition will occur for a period of around two days from each group of spigots. Each spigot comprises a mining hose fitted with a valve/scissor clamp to control flow through the spigot (or similar). During deposition, conductor pipes (slotted) should be utilised to ensure the tailings are deposited at the toe of the embankment.

**Seepage Analysis and flows**

Seepage analyses were undertaken to estimate the position of the phreatic surface for the embankment design at the crest RL555.0m (15.0m maximum embankment height). The analyses were undertaken using the groundwater module of the Slide software package. Slide uses a 2D finite element analysis to determine groundwater seepage for saturated, steady-state flow conditions (seepage flow through geological structures such as joints are not considered). The material permeabilities used in the seepage analyses are based on values derived from CMW site geotechnical investigation and materials laboratory testing supplemented with assumed textbook values, appropriate to the materials.

The seepage analyses carried out indicated that there is only marginal benefit to seepage reduction by compacting the colluvium above the shallow Ferricrete. Seepage analyses estimates up to 20$m^3$/day of seepage flows through the embankment walls.

Before mining and dewatering commenced, groundwater beneath TSF3 would have generally flowed north, following topographic gradients. Dewatering operations at Moolart Well have since had two notable effects on the local groundwater regime: groundwater is both being drawn toward the open dewatered pits, southwest of TSF3, and is mounding beneath TSF1. A cone of depression can be seen to the northeast of TSF1, a result of TSF1 seepage management efforts in the area. In line with groundwater contours, and thus flow, initially, basal seepage from TSF3 will migrate towards the open pits. However, over time, groundwater mounding beneath TSF3 will hydraulically connect TSF3 porewater and groundwater, resulting in a radially flowing seepage front, propagating out from TSF1 and TSF3 (jointly). The resulting seepage front flowing to the south and west will discharge to open pits. Seepage flow north and east will be captured by existing TSF1 seepage management efforts.

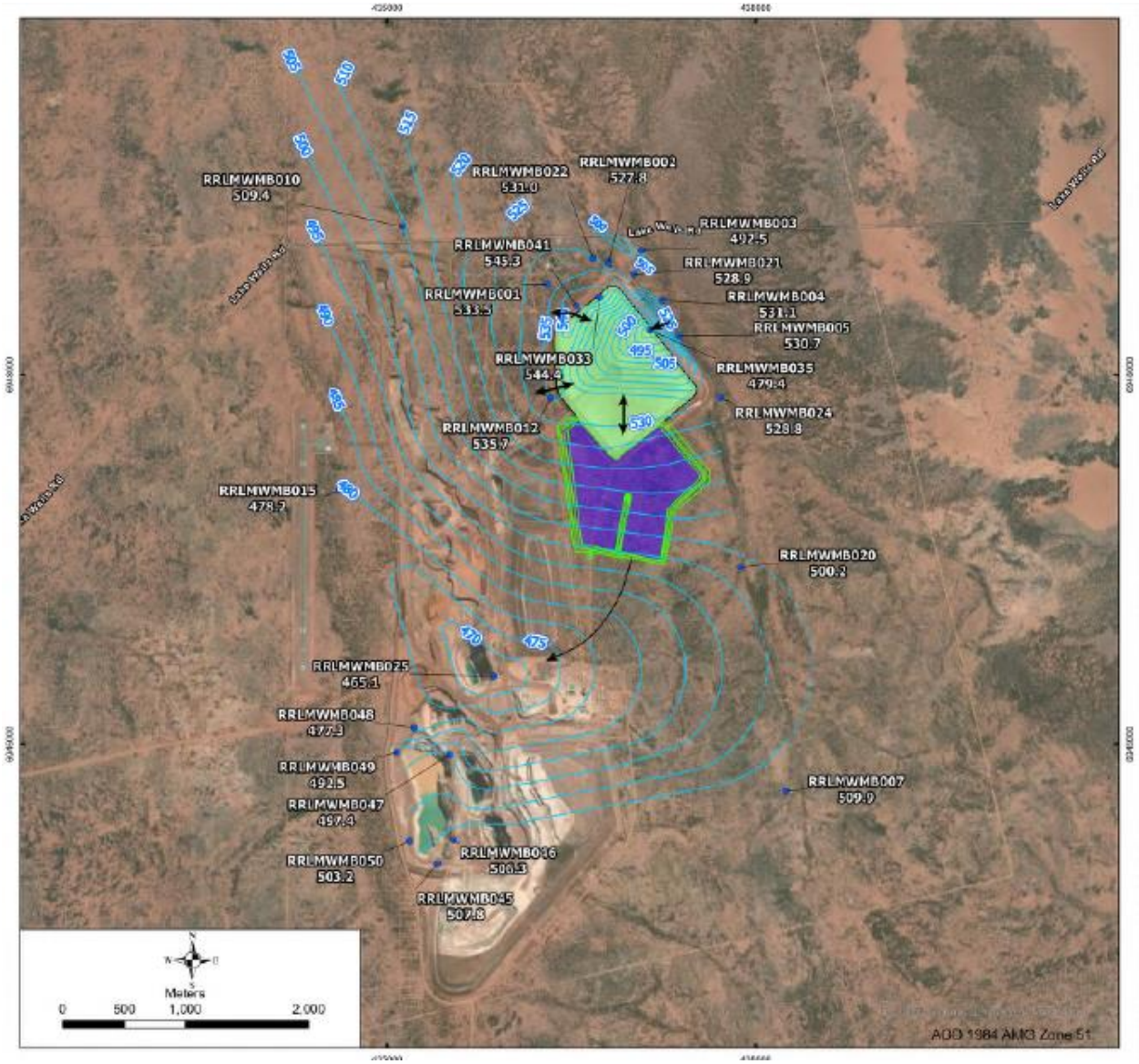


**Figure 4 – Groundwater contours and groundwater/seepage flow direction during TSF operation (considering current dewatering influence).**

### Seepage recovery infrastructure

The design of TSF3 includes an underdrainage system comprising perforated pipe underdrainage lines in seepage interception trenches, grading to collection manholes via seepage collection trenches. Nominally, these trenches will be 1m wide and 0.6m deep, and the collection manholes will be dug to a minimum depth of 1.35m below the invert level of collection trenches. This underdrainage has been designed in conjunction with seepage analyses which estimates around 16m$^3$/day of seepage based on 2-Dimesional flows through the embankment walls.

A production bore exists adjacent to TSF3, RRLMWPB013, that could be used to control water levels in the area. All efforts should be made to preserve this bore during the construction of TSF3 and abstraction from this location is proposed to resume before operations begin.

**Water Balance**

A water balance analysis for the proposed TSF3 operation has been undertaken using a spreadsheet to examine expected TSF3 inflows and outflows.

Inflows and outflows for the facility were estimated on a monthly basis. Inflows include rainfall and slurry water. Outflows include evaporation, seepage losses and water retained in tailings (pore water).

Assumptions and other data adopted for the water balance are listed below:

- Climate data were obtained from the BOM website. Average monthly rainfall figures for Laverton, WA (recording period: 1899 to 2021) with an annual average of 235.7mm/year, and average annual evaporation and evapotranspiration at approximately 3,746mm/year and 1,350mm/year, respectively.
- Tailings area of approx. 92.3ha.
- A tailings runoff coefficient of 0.4 was assumed.
- Pool area equal to approximately 2% of tailings area (radius approx. 150m).
- Running beaches equal to approximately 5% of the tailings area.
- Evaporation pan factor of 0.7.
- Average tailings residual moisture content of 35%.
- Tailings slurry density of 45% solids.
- Tailings production rate of 3.0Mtpa.
- Seepage rate from seepage analyses of approximately 16$m^3$/day.

The results of the analysis indicate potential annual average water returns of 68% of the tailings slurry water deposited into the facility can be expected under average climatic conditions.
The results also indicate that water recovery will vary according to the management of the facility, specifically the size of the pond and running beaches. The actual quantity of water available for return to the plant may vary from the figures presented based on the following factors:

- Variations in slurry density.
- Continuity of tailings discharge.
- Distance between the discharge point and decant pond.
- Size of the decant pond and running beaches from where evaporation is greatest.
- Climatic conditions at the time of operation.
- The efficiency of the decant system during operation.

The efficacy of the water return system is the key to achieving a higher in-situ tailings dry density within the TSF. The minimum capacity of the water recovery system should be not less than 420tph including the additional capacity needed to recover water from design storm events.

**TSF3 proposed performance monitoring and Instrumentation**

Installation of vibrating wire piezometers (VWP) will need to be developed internally within TSF3 to enable the phreatic surface within the TSF embankments to be monitored and stability analyses to be validated in the future. These VWPs will also give early warning of seepage from the TSF. VWP are to be installed as part of the embankment construction. Allowance needs to be made for 3 pairs for a total of 6 VWP (Figure 5). Each pair will have VWP installed in a trench 0.5m wide and 0.3m deep, with one VWP installed at nominally 10m away from the upstream toe of the TSF embankment, and another VWP at 1m inside the upstream crest (i.e. downstream of the upstream embankment zone).

Bentonite collars will be required to reduce the potential for the development of a seepage pathway. The read-out cables are to be installed in PVC electrical conduit to ensure they are not damaged during deposition.

The proposed groundwater monitoring will target a shallow, phreatic aquifer (<10mBGL), as well as the deeper, fractured bedrock aquifer (>40mBGL) with duplex monitoring bores. The proposed location of the 4 monitoring bores proposed to be installed around TSF3 is shown in Figure 5.

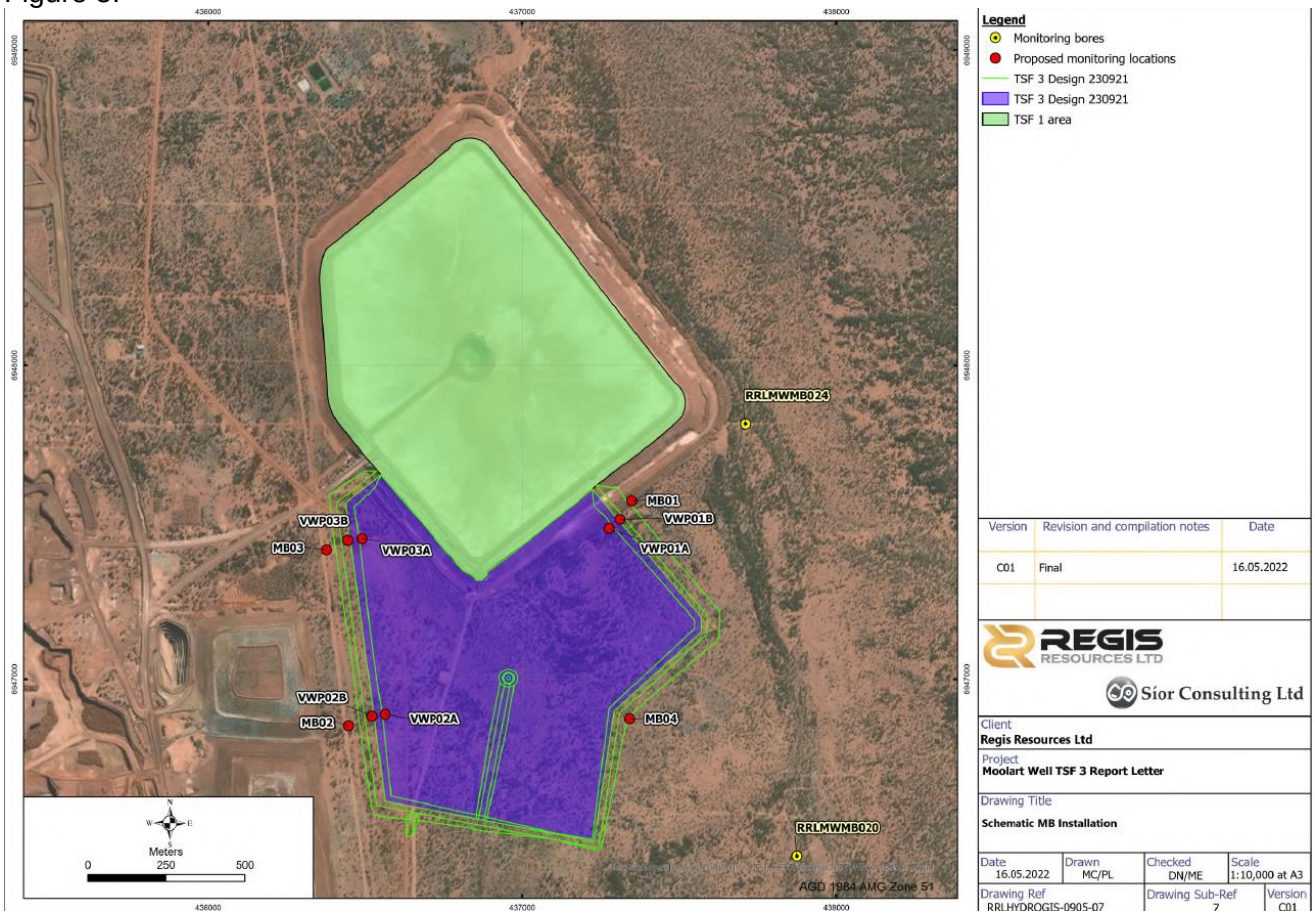


**Figure 5 – Proposed location of monitoring bores and VWPs.**

Existing groundwater monitoring bores RRLMWMB020 and RRLMWMB024 are also proposed to be added to the monitoring programme to represent a groundwater regime upstream of TSF3.

## 2.3 Department of Water and Environmental Regulation – Hydrogeological advice

The application was referred to DWER'S Hydrogeological team (from Contaminated sites Branch – CSB) for technical advice on suitability of seepage analysis and controls, tailings characterisation, water balance and proposed monitoring network. In summary, the following advice was received:

- It is recommended that additional geochemical testing is carried out on synthetic tailings that would be representative of ore materials that would be processed at the Moolart Well site;
- The seepage assessment for MLW TSF3 has been undertaken using suitable methods.CSB recommends that evaporation and other meteorological data are measured at the site on an ongoing basis to improve seepage estimates in water balance;
- CSB has recommended that additional groundwater monitoring locations are included in the proposed monitoring network for the site. The suite of chemical parameters that

are measured in monitoring bores should be reviewed after further geochemical testing of tailings materials has been undertaken; and

- CSB considers that seepage from MLW TSF3 could be managed without the installation of a basal liner, provided that adequate ground improvement works are undertaken on soils that overlie a shallow ferricrete unit beneath the footprint of the facility.

Further details regarding the technical advice above and how it was considered in risk assessment and has informed regulatory controls imposed in the works approval, are detailed in section 3.3 below.

## 2.4 Department of Mines, Industry Regulation and Safety (DMIRS) – advice

Advice from DMIRS was sought during assessment of the application. The following response was received:

*The department has reviewed the information provided and advises that MLW TSF3 relating to the Duketon Gold Project was approved 3 June 2022 under Reg Id 101046. As part of the department's review process the TSF was assessed by Mine Safety Division and following amendments, the project was found to be acceptable.*

# 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, commissioning and operation which have been considered in this decision report are detailed in Table 1 below. Table 1 also details the control measures the applicant has proposed to assist in controlling these emissions, where necessary.

**Table 1: Proposed applicant controls**

| Emission | Sources | Potential pathways | Proposed controls |
|---|---|---|---|
| **Construction** | | | |
| Dust | Construction activities associated with TSF3 and vehicle movement | Air / windborne pathway | • A water truck(s) will be allocated and used during embankment works. |
| Noise | Construction activities associated with TSF3 and vehicle movement | Air / windborne pathway | • No controls proposed. |
| Sediment laden stormwater | Flooding and runoff from TSF 3 construction area | Overland flow | • To manage runoff risks (and associated sedimentation) during the construction phase, a toe berm/sediment trap will be placed along the northwestern construction boundary to intercept runoff. |
| **Commissioning and Time limited operations** | | | |
| Dust | Dry tailings (particulates) on exposed beaches potentially containing concentrations of elements with environmental significance | Air / windborne pathway | • The CMW Geosciences design report indicated that based on experience with TSF1, dust generation from the tailings beaches is not expected as the tailings are saline and a crust is likely to form on the beaches, binding the tailings surface and reducing the potential for dusting. If dust generation becomes an issue (i.e. in periods TSF3 may be inactive), the tailings beaches will be irrigated (i.e. with sprinklers or similar) or tailings deposition managed such that beach areas do not dry back to such that dust generation occurs. |

| Emission | Sources | Potential pathways | Proposed controls |
|---|---|---|---|
| Spillage of tailings and decant return water | Pipeline ruptures | Direct discharges to land and infiltration to soil | • Applicant informed that pipelines will be operated as per current licence, including:<br>  ○ Tailings and return water pipelines to be in bunds or trenches as secondary containment during operation;<br>  ○ Pipelines to have leak detection;<br>  ○ Daily pipeline inspections to detect spills below sensitivity of leak detection.<br>• In the event of pipeline failure, the affected pipeline is to be shut down until repaired and spilled materials collected and/or pumped, as appropriate. |
| Tailings seepage | Deposition of tailings into TSF3 | Seepage to soil/ground adjacent to TSF3 and infiltration to groundwater | • Supernatant recovery system to maximise decant (supernatant) recycling and minimise size of the decant pond.<br>• Installation of new monitoring bores to be added to the groundwater monitoring program.<br>• six vibrating wire piezometers (VWPs) will be installed with the TSF embankment to monitor phreatic surface<br>• Installation of cut off trench under embankments nominally 0.6m deep founded in a cemented ferricrete layer.<br>• Installation of seepage interception trenches parallel to the crest of the embankment flowing into seepage collection manholes for recovery.<br>• Modelling indicates seepage will be 6.1 x $10^{-3}$ $m^3$/day/m of embankment. Total seepage is expected to be 16$m^3$/day during operations and up to 20$m^3$/day from the TSF during closure. |
| Discharge of tailings material | Overtopping | Direct discharges to land and infiltration to soil | • Tailings deposition is cycled around the facility to maximise tailings density and therefore the storage volume.<br>• Tailings deposition is to be carried out such that the supernatant pond is maintained within and around the rock ring decant. The pond is to be always maintained away from the perimeter embankments. |

| Emission | Sources | Potential pathways | Proposed controls |
|---|---|---|---|
| | | | • MLW TSF3 has been designed to have a minimum of 0.7m freeboard, comprising, an operational freeboard of 0.3m, beach freeboard of 0.2m and allowance for a 1% AEP 72-hour event of 0.2m.<br>• Supernatant constantly removed from the TSF through supernatant pumps for recycling in the process plant. Pumps over-sized to allow pumping of at least 420t/h to accommodate water removal from storm events.<br>• Daily decant pond and freeboard inspections. |
| Tailings Water | Ingestion of supernatant from TSF3 by wildlife | Ingestion by wildlife | • WAD Cyanide of existing TSF2 shows concentration of WAD cyanide of less than 50mg/L.<br>• TDS within decant water of TSF2 varies between 5,500 and 14,000mg/L. |

### 3.1.2 Receptors

In accordance with the *Guideline: Risk Assessment* (DWER 2020), the Delegated Officer has excluded the applicant's employees, visitors, and contractors from its assessment. Protection of these parties often involves different exposure risks and prevention strategies, and is provided for under other state legislation.

Table 2, Figure 1 and Figure 6 provide 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 2: Sensitive human and environmental receptors and distance from prescribed activity**

| **Human receptors** | **Distance from activity / prescribed premises** |
|---|---|
| Residential premises | No residential premises or homesteads near prescribed premises.<br>Closes pastoral bore is 2.3km from the prescribed premises.<br>Nearest Town is Laverton - >100km from premises.<br>**Screened out receptors due to distance from prescribed activity.** |
| **Environmental receptors** | **Distance from activity / prescribed premises** |
| Aboriginal heritage site – ID 28617 – Lodged site – Artefacts and Scatter. | >10m from proposed TSF3.<br>Applicant has confirmed Heritage surveys have been conducted and the Muntinjarra People have been consulted. Other heritage place 28617 has been avoided as part of TSF3 design. |
| Underlying groundwater | Underlying proposed TSF3<br>Groundwater quality is typically brackish – 1,000 to 5,000mg/L, but within tolerance of livestock.<br>Depth to groundwater: TSF design report indicates groundwater is located between 18m and 20m below ground level (bgl). |
| Priority Flora<br>*Eremophila pungens* (Priority 4)<br>*Calytrix praecipua* (Priority 3)<br>*Phyllanthus baeckiodes* (Priority 3 | Located within prescribed premises.<br>In DWER Geocortex system, *Eremophila pungens* (Priority 4) is shown within 1km of proposed TSF. |
| Conservation Significant Fauna<br>Mulgara (*Dasycercus cristicauda*)<br>Rainbow Bee-eater (*Merops ornatus*)<br>Although not recorded within the surveys, Slender-billed Thornbill (*Acanthiza iredalei iredalei*), Great Egret (*Ardea alba*), Oriental Plover (*Charandrius veredus*), Fork-tailed Swift (*Apus pacificus*) and the Peregrine Falcon (*Falco peregrinus*) may infrequently be present in the general area. | Located within prescribed premises.<br>Proponent states that one active mulgara burrow was located within the mine site within more than 3km from proposed TSF3. |
| Surface water drainage<br>Minor/ephemeral drainage and associated hyporheic zone.<br>Following significant rainfall events, drainage lines flow northwards to a local drainage depression. All of the northern catchment eventually flows to Lake Wells, located northeast of the project area | Located east of proposed TSF3 (bed within approximately 200-300 meters of proposed TSF3). TSF3 is located outside 1 in 100 AEP rainfall event flooding zone. |
| Localized Soils | Underlying and surrounding TSF3 |

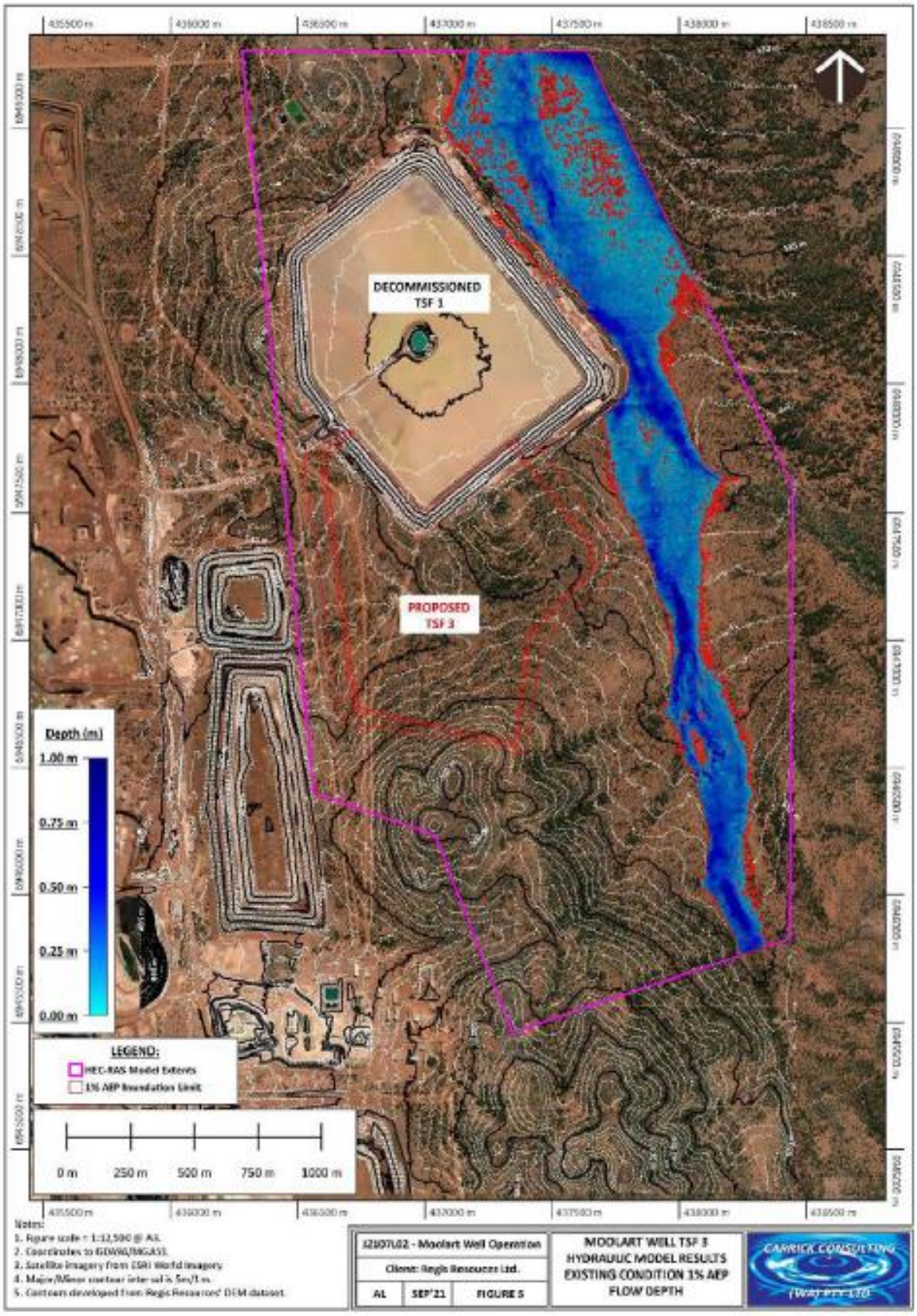


**Figure 6: TSF3's location in relation to surface water drainage (1% AEP model results).**

## 3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020) for each identified emission source 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 applicant has proposed mitigation measures/controls (as detailed in Section 3.1), these have been considered when determining the final risk rating. Where the delegated officer considers the applicant's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the works approval as regulatory controls.

Additional regulatory controls may be imposed where the applicant's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 3.

Works approval W6685/2022/1 that accompanies this decision report authorises construction, commissioning and time-limited operations. The conditions in the issued works approval, as outlined in Table 3 have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

A licence is required following the time-limited operational phase authorised under the works approval to authorise emissions associated with the ongoing operation of the premises (i.e. continued tailings deposition). 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 licence application.

**Table 3: Risk assessment of potential emissions and discharges from the premises during construction, commissioning and operation**

| Risk events | | | | | Risk rating [1] C = consequence L = likelihood | Applicant controls sufficient? | Conditions[2] of works approval | Justification for additional regulatory controls |
|---|---|---|---|---|---|---|---|---|
| **Sources / activities** | **Potential emission** | **Potential pathways and impact** | **Receptors** | **Applicant controls** | | | | |
| **Construction** | | | | | | | | |
| Construction activities associated with Moolart Well TSF3 and vehicle movement | Dust | Air / windborne pathway causing impacts to vegetation health due to dust deposition leading to reduced ability for photosynthesis and smothering | Surrounding Vegetation | Refer to Section 3.1 | C = Slight<br>L = Possible<br>**Low Risk** | Y | N/A | The Delegated Officer considers that construction works are temporary and that the provisions of the *Environmental Protection (Noise) Regulations 1997* and section 49 of the EP Act are sufficient to regulate noise and dust emissions during construction of the TSF embankments. |
| | Noise | Windborne noise which may disrupt nocturnal foraging behaviour | Fauna (including *Dasycercus cristicauda and Merops ornatus*) | Refer to Section 3.1 | C = Slight<br>L = Unlikely<br>**Low Risk** | Y | N/A | |
| | Sediment laden stormwater | Flooding and runoff from TSF construction area impacting surrounding vegetation and resulting in sedimentation of surface water drainage | Surrounding Vegetation<br>Surface water (Few meters east of TSF3) | Refer to Section 3.1 | C = Slight<br>L = Unlikely<br>**Low Risk** | Y | N.A | N.A |
| **Commissioning and Time-limited operations of TSF3** | | | | | | | | |
| Deposition of tailings into Moolart Well TSF3 | TSF supernatant containing concentrations of elements with environmental significance (hypersaline, acidic, with cyanide and potentially containing metals and metalloids) | Seepage / Infiltration of supernatant water through basin and embankments resulting in reduced groundwater quality. | Groundwater (>18 m bgl with south, southwest directional flow). | Refer to Section 3.1 | C = Moderate<br>L = Possible<br>**Medium Risk** | N | Condition 1, **2, 3, 4, 5, 6 13, 14, 17 to 20.**<br>**Monitoring conditions: 21 to 23**<br>**Reporting conditions 7 to 16; 24 and 25**<br>**Notification and records conditions: 26 to 29** | Refer to Section 3.3. |
| | | Groundwater mounding resulting in seepage expression on surface, impacting vegetation and reducing | Land/soils<br>Surface water (Few meters east | Refer to Section 3.1 | C = Moderate<br>L = Possible<br>**Medium Risk** | N | Condition 1, **2, 3, 4, 5, 6 13, 14, 17 to 20.**<br>**Monitoring conditions: 21** | Applicant must ensure seepage expression on surface does not occur and standing water level is maintained below 4m bgl. |

| Risk events | | | | | Risk rating [1] C = consequence L = likelihood | Applicant controls sufficient? | Conditions[2] of works approval | Justification for additional regulatory controls |
|---|---|---|---|---|---|---|---|---|
| **Sources / activities** | **Potential emission** | **Potential pathways and impact** | **Receptors** | **Applicant controls** | | | | |
| | | surface water quality. | of TSF3) | | | | **to 23**<br>**Reporting conditions 7 to 16; 24 and 25**<br>**Notification and records conditions: 26 to 29** | Monitoring of standing water level is required.<br>This is consistent with current licence requirements. |
| | | Ingestion of supernatant from TSF by wildlife leading to reduced fauna health or deaths. | Fauna (including *Merops ornatus*) | Refer to Section 3.1 | C = Moderate<br>L = Unlikely<br>**Medium Risk** | Y | N.A | WAD cyanide concentration in decant water is below 50mg/L, no additional controls are deemed required. |
| | | Overtopping of tailings resulting in direct discharges to land and infiltration to soil resulting in in reduced soil and surface water quality and impacting health of surrounding vegetation | Surrounding Vegetation<br>Land/soils<br>Surface water (Few meters east of TSF3) | Refer to Section 3.1 | C = Moderate<br>L = Unlikely<br>**Medium Risk** | N | Condition 1**, 2, 3, 4, 5, 6 13, 14, 17 to 20.**<br>**Monitoring conditions: 21 to 23**<br>**Reporting conditions 7 to 16; 24 and 25**<br>**Notification and records conditions: 26 to 29** | Refer to Section 3.3. |
| | Dust | Air / windborne pathway causing impacts to vegetation health due to dust deposition leading to reduced ability for photosynthesis and smothering | Surrounding Vegetation | Refer to Section 3.1 | C = Slight<br>L = Possible<br>**Low Risk** | Y | N.A | N.A |
| Tailings delivery and return water pipelines | Spillage of tailings and decant return water through leaks, pipeline ruptures or failure | Direct discharges to land and infiltration to soil resulting in in reduced soil and surface water quality and impacting health of surrounding vegetation | Land/soils<br>Surrounding Vegetation<br>Surface water (~900m of the proposed pipeline route) | Refer to Section 3.1 | C = Moderate<br>L = Possible<br>**Medium Risk** | Y | **Condition** 1**, 13, 14 and 19**<br>**Reporting conditions 7 to 9; 24 and 25**<br>**Notification and records conditions: 26 to 29** | Controls to manage risk related to tailings delivery and return water infrastructure, consistent with current licence requirements are imposed as conditions. |

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

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

## 3.3 Detailed Assessment and additional regulatory controls

***Assessment of the geochemical and physical testing that has been undertaken on tailings materials in the Moolart Well mining hub***

As mentioned above, internal technical advice has been sought regarding tailings geochemical characterisation undertaken to date to inform risks to the environment and suitability of proposed tailings discharge and controls.

The information that has been provided by the applicant has indicated that historically, tailings materials from existing deposition sites in the Moolart Well area have been subjected to acid-base accounting test-procedures, and to leaching tests using the ASLP test-method. This testing has indicated that most of the tailings that were tested were non-acid forming (NAF) materials and that, with a few exceptions, concentrations of constituents of potential concern (CCoPC) that were leached from these materials were low.

However, CSB has some concerns about the geochemical testing that has been undertaken by the applicant, and about whether the testing has adequately assessed the potential impacts of seepage from MLW TSF3 on the quality of groundwater near the proposed facility. The concerns include the following issues:

- The samples from the existing tailings deposition sites appear to be old materials and may not have the same leaching behaviour as freshy milled rock materials that have been subjected to cyanide treatment;
- The tailings materials that were tested may not be representative of the range of ore lithologies that will be imported into the Moolart Well hub from other satellite sites for processing and discharge to MLW TSF3;
- The implied assumption that NAF tailings materials are geochemically benign may not be valid when these materials are subjected to cyanide treatment. This is because metals that are adsorbed in iron oxide phases in tailings particles could form soluble cyanide complexes, and be released into pore-water that could seep into groundwater. Additionally, under reducing conditions near the base of a TSF, iron-reduction reactions may release metalloids like arsenic and antimony from sorption sites on iron oxide minerals into pore-water. That is, it is considered that the testing that has been carried out so far by the proponent has not adequately assessed the risks of CCoPC being released from NAF materials.

Given these limitations, it is recommended that some additional geochemical testing is undertaken on synthetic tailings that are produced from composite samples (at least three composite samples) of the typical mix of ore materials that would be processed at Moolart Well.

These samples should be milled to produce the same particle size distribution as the tailings that will be discharged to MLW TSF3, and should be chemically analysed for a standard suite of metals and metalloids to assess whether specific elements are geochemically enriched by comparison with their average crustal abundances (that is, their Global Abundance Index or GAI values are determined). The composite samples should also be subjected to an acid-base account assessment to determine whether they are potentially acid forming (PAF) materials. Other geochemical tests that should be carried out on the composite samples are:

- The use of extraction tests on a portion of the composite samples with hydrogen peroxide buffered with ammonium citrate using the methodology outlined in Karlsson *et al*. (2021) and then chemically analysing the leachate for a range of CCoPC. The purpose of this test procedure is to determine whether any CCoPC are released from the tailings materials when they are subjected to prolonged oxidation. This test procedure has been shown to produce a more accurate assessment of the leaching risk under oxidising conditions than the more commonly used NAG test (Karlsson, 2022);

- The use of cyanide leaching on a portion of the composite samples to determine the concentrations of CCoPC that would be released during ore processing by cyanide; and
- The use of sub-aqueous column leaching tests on a portion of the composite samples using the methodology that is described in section 7.3 on pages 37 and 38 of the mine-waste testing guidance that was prepared by the Danish Centre for Environment and Energy (DCE, 2018).

These geochemical tests would indicate the leaching potential of the tailings materials under the range of conditions that would possibly occur in MLW TSF3. The results of the testing would indicate which chemical constituents would be of particular concern in groundwater, and these constituents should be included as parameters in the groundwater monitoring program near the TSF.

The physical tests that have been undertaken to assess the geotechnical properties of the tailings are considered to have been undertaken in a suitable manner.

To address CSB recommendations and ensure risks related to seepage from TSF3 are well understood and proposed controls are adequate, condition 6 has been imposed, which requires further geochemistry analysis of tailings.

***Assessment of the seepage analysis that has been undertaken for MLW TSF3***

The seepage rate for MLW TSF3 was estimated using the seepage model SLIDE and through a water balance assessment. Although the overall approach that was used is considered to be sound, there is likely to be a large level of uncertainty in the estimates of evaporation used in the water balance assessment to inform water management and for ongoing calculation of seepage rates.

The main reason for this, is that it was assumed that evaporation rates from the decant pond on MLW TSF3 could be approximated by applying a pan factor of 0.7 to monthly pan evaporation data from Laverton, which is located more than 100km away. This assessment, however, may not be correct. This is because research by CSIRO (McJannet *et al*., 2017) has shown that there may be a very poor correlation between evaporation rates at mines sites in Western Australia and the nearest Bureau of Meteorology monitoring stations.

Additionally, it is not clear from the design report whether the evaporation rate of 0.7 times the Laverton monthly pan evaporation data was assumed to apply to the entire surface of the TSF, or just to the decant pond. The preferred approach to determining evaporation rates on MLW TSF3 would be to undertake site-specific measurements using the methodologies that are outlined in McJannet *et al*. (2022).

Due to the uncertainties in evaporation measurements, it is likely that seepage rates that were estimated from the water balance assessment are unreliable. A condition will be imposed on the operation of MLW TSF3 that site-specific measurements of evaporation, other meteorological data and solar radiation are made at the facility on an ongoing basis (refer to McJannet *et al*., 2017 and McJannet *et al*., 2022 for details on how these data can be used to determine evaporation rates in different ways). These measurements would be required to enable potential changes in the seepage rate from MLW TSF3 to be tracked on an ongoing basis through an assessment of the water balance for the facility.

To address the above CSB recommendation and ensure seepage rates are adequately estimated and monitored, condition 5 and 23 are imposed.

***Assessment of the proposed groundwater monitoring program***

The purpose of groundwater monitoring near a TSF is to assess the degree to which mounding of the phreatic surface takes place within the facility, and to assess whether significant amounts of CCoPC are being transported from the facility in groundwater flow. This generally means that there should be sufficient monitoring bores to assess radial groundwater flow near a TSF that is caused by mounding, and that, in hard-rock terrains, the bores are located on structural

features in bedrock that are the main conduits for groundwater flow.

It is recommended that at least one additional groundwater monitoring sites (Figure 7– bore shown in blue) is included in the monitoring network that was proposed in a response to a request for further information. The inclusion of this additional bore sites would enable the radial characteristics of groundwater flow near the TSF to be more accurately determined. Existing groundwater monitoring bores RRLMWMB020 and RRLMWMB024 should also be added to the monitoring program to represent a groundwater regime upstream of TSF3.

The locations of all bore sites in Figure 7 should only be considered to be indicative. It is recommended that the proponent reviews existing geological and geophysical data from the site to ensure that, wherever possible, the monitoring bores are located on suitable structural features that are likely to be significant conduits for groundwater flow.

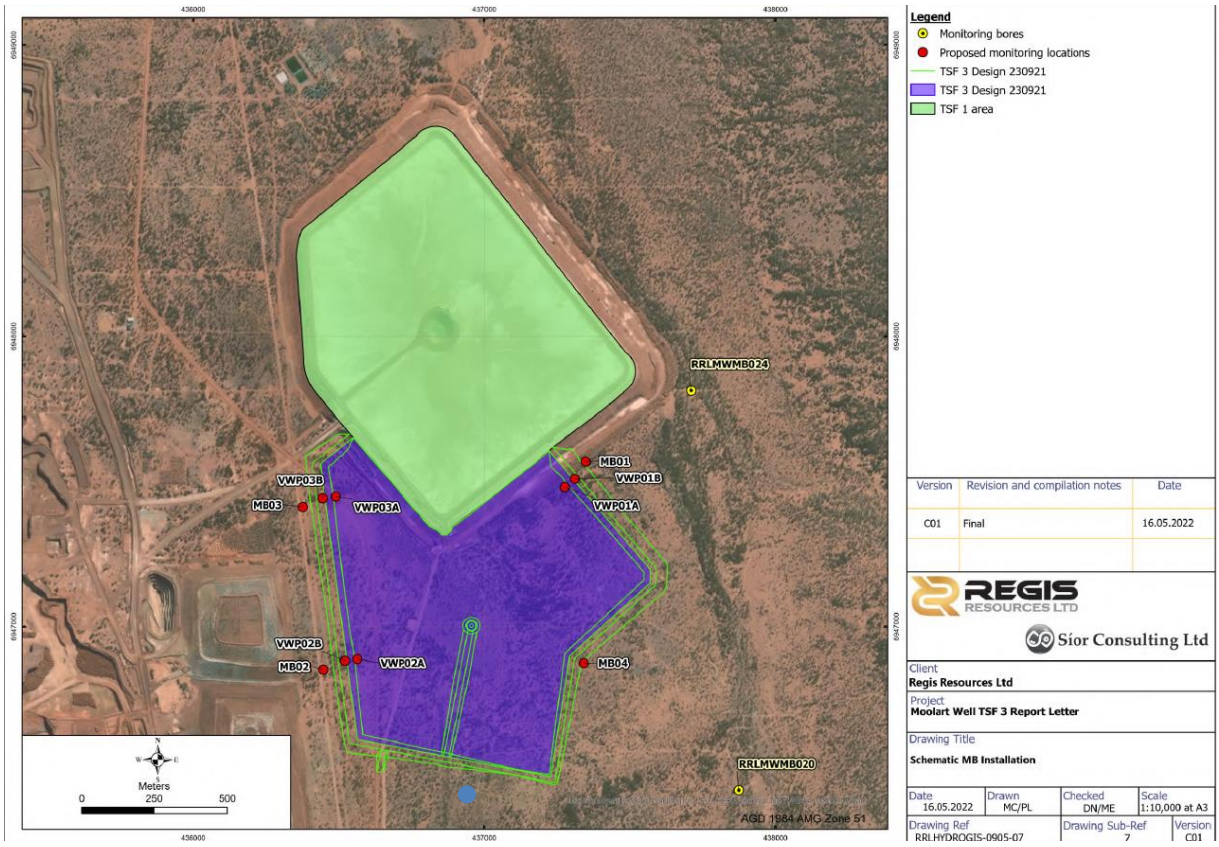


**Figure 7 – Proposed monitoring bores and recommended additional bore (in blue).**

Design requirements for the construction and installation of the proposed monitoring bores have been imposed to ensure bores are installed correctly and able to detect any contamination.

### *Groundwater monitoring frequency and analytes*

The hydrogeological report that was provided as part of the request for further information suggests that the sampling and analysis of groundwater from monitoring bores around MLW TSF3 would take place on a quarterly basis. CSB considers that this would be a suitable monitoring frequency for bores near this facility. However, it is recommended that the range of chemical constituents that are monitored in these bores is reviewed after the geochemical test-work that was recommended above has been undertaken. Although the proposed suite of analytes in the monitoring program is considered to be suitable, it may be necessary to add additional CCoPC after further geochemical testing of the tailings materials has been undertaken.

To address this recommendation, following further geochemical testing of the tailings materials, a review of chemical constituents that are proposed to be monitored is required to be undertaken. This is a requirement of condition 12.

***Assessment of the proposed seepage control measures for MLW TSF3***

The design report has indicated that MLW TSF3 will be unlined. This is because it has been assumed that a ferricrete unit that lies at shallow depth beneath the footprint of the TSF would have a sufficiently low hydraulic conductivity to prevent seepage from travelling through this unit and infiltrating into groundwater. For this reason, the design report has indicated that the toe-drain around the facility would only be constructed to a depth of 0.6, with its based being secured within the ferricrete.

It is not known whether the ferricrete has a widespread distribution within the Moolart Well area, but monitoring has indicated that groundwater quality in the area is vulnerable to contamination from mineral processing activities. Additionally, the ferricrete is likely to be a lateritic duricrust, a by-product of a long and complex history of deep weathering that has been widely investigated in Western Australia (see *e.g*., Anand *et al*., 2018). Although these materials generally have a low primary porosity, they often contain features like abandoned root channels that are potential conduits for water infiltration.

Consequently, CSB was concerned that the proposed toe-drain for MLW TSF3 would be too shallow to intercept seepage that may take place beneath the duricrust unit.

CBS also requested that the sandy surficial regolith was stripped from the surface of the ferricrete unit beneath the footprint of MLW TSF3, and replaced by a finer textured soil cover. This new soil material should then be compacted to a suitable density to fill-in secondary porosity features in the ferricrete to ensure that the final basal liner has a suitably low hydraulic conductivity.

As part of the draft decision documents consultation period, the applicant was requested to revisit proposed design of the toe-drain. Applicant raised a valid point that deepening of the drain would risk damaging the ferricrete layer and increasing its permeability and consequently increasing the risk of perched groundwater flow (interflow) through this unit.

It was also raised by the applicant that the surficial regolith referred to by CSB is a clayey silty and material with a design permeability of $9.7 \times 10^{-7}$m/s as indicated from site specific field testing. The excavation and replacement of the surface layer with a compacted “finer textured soil cover” as proposed by CSB would result in a basal liner material of similar permeability to the in-situ materials and therefore not result in a significant reduction of foundation permeability. A supporting memorandum provided by MLW TSF3’s geotechnical engineering consultants was also provided by the applicant. The memorandum indicates that the proposed seepage controls within the proposed TSF design (underdrainage infrastructure), in addition to the proposed strategies to maximise water return to the plant (60% of slurry water inflow), and the minimum capacity requirements for the return water system would minimize seepage surrounding TSF3. The engineering consultants also note that the early water return for the facility is important and water should not be allowed to accumulate on the facility at start-up (i.e. over several months). Several temporary pump locations should be located within the TSF3 basin to ensure early water return. These locations should comprise a temporary pump within a small rock ring or sump. Suggested locations are shown in drawings below in blue (Figure 8).

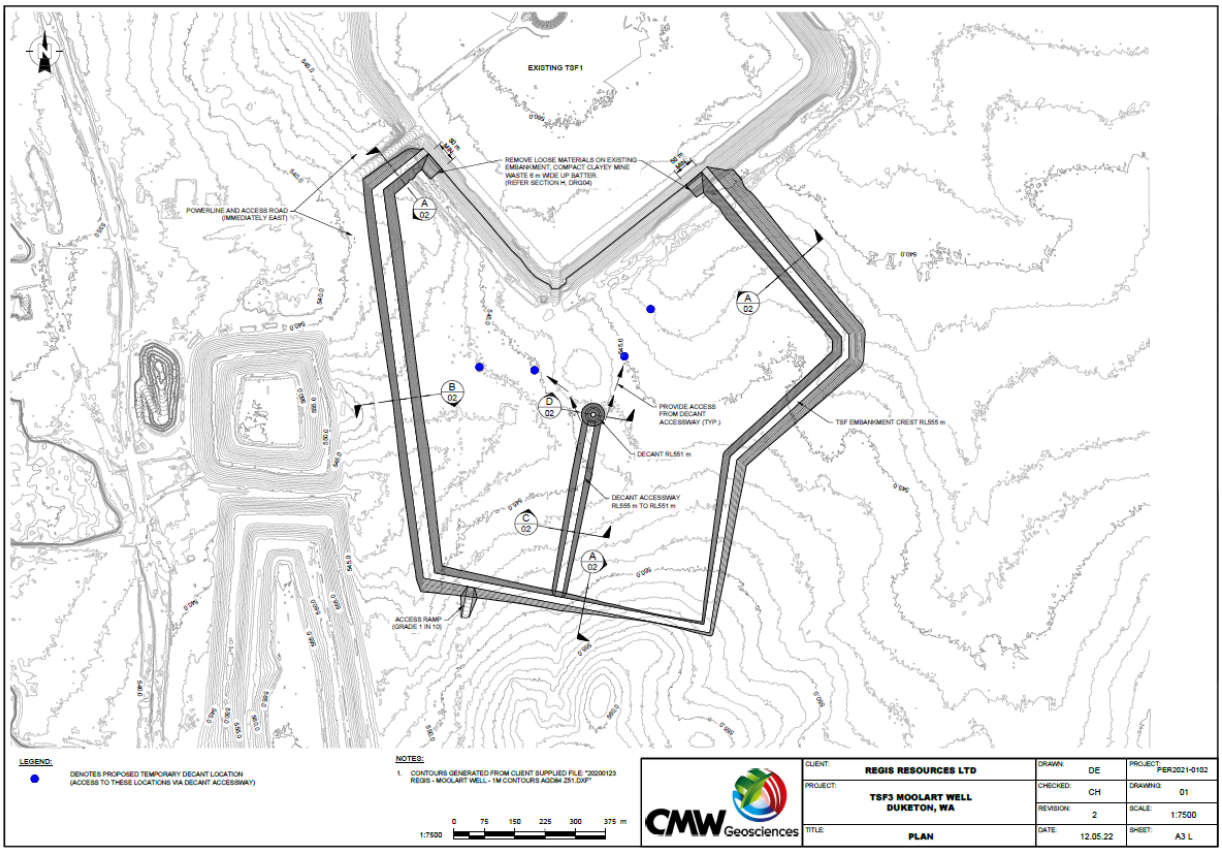


**Figure 8 – Temporary recommended pump locations (in blue).**

The applicant also raised that the hydrogeological memo provided in support of this application indicated that dewatering from the nearby open pits has created a “groundwater sink” to the west of MLW TSF3. Therefore, deeper seepage that may escape the seepage collection system will gravitate towards to the Moolart Well open pit area.

Following a review of applicant’s response and further consultation with CSB hydrogeologist, the Delegated Officer considers that there is still a risk that perched flow could occur within the ferricrete unit. This is because although the matrix of this unit may have a generally low permeability, experience from similar materials elsewhere in the region has indicated that ferricretes can often contain highly permeable zones where there are interconnected macropores which may not be detected in pit-scale permeability testing. Additionally, as perched aquifers in ferricretes may not necessarily be in direct hydraulic connection with deeper aquifers, the shallow remaining seepage might not be captured by the dewatering cone of depression. Consequently, there is still a risk that shallow seepage would be a pathway for transport of contaminants from the TSF which would require monitoring and adequate control. A condition has therefore been imposed to ensure water is not allowed to accumulate on the facility at start up (considered as commissioning and time limited operations phases in the works approval context) as recommended by MLW TSF3 consultant engineers. Also, condition 4 requires applicant to review and install seepage recovery infrastructure in addition to the TSF3 underdrainage seepage recovery system (cut off trenches and sumps included in the TSF3 design report). At minimum RRLMWPB013, needs to be reinstated and/or available for seepage recovery (however its location and targeted aquifer need to be verified to confirm its suitability as an effective recovery bore for TSF3).

The hydrogeological report provided in support of this application states that seepage that flow north and east will be captured by existing TSF1 seepage management efforts. Applicant needs to ensure as part of condition 4 requirements, adequate recovery infrastructure is available /installed or modified if needed (which may include assessment of adequacy of existing TSF1

infrastructure, and whether any improvement works are required). This review needs to be undertaken by a qualified hydrogeologist as part of condition 4.

CSB also recommended that later in life of the TSF (about 3 years after its construction) that ground based geophysical investigation (using suitable EM or electrical technique) along the toe of the TSF is undertaken to confirm whether shallow seepage is taking place, determine its potential extension/receptor and whether further shallow monitoring bores and additional seepage recovery controls are required to monitor and reduce seepage related risks. The Delegated Officer is likely to impose an additional condition to address this recommendation following time limited operations and as part of transference of the facility into the licence.

**Summary of additional regulatory controls:**

Based on the assessment provided in table 3 and information provided in above, the following conditions are imposed to ensure appropriate controls are in place to minimise environmental risks related to seepage and overtopping at Moolart Well TSF3.

- Condition 1 – Design requirements and proposed controls have been conditioned to ensure they are in place prior to commencement of time limited operations.
- Condition 2 - Design requirements for the construction and installation of the proposed monitoring bores have been imposed to ensure bores are installed correctly and able to detect any contamination. The Delegated Officer notes that further conditions related to further geophysical investigation might be imposed to confirm monitoring bore locations and number of bores as part of future transfer of TSF3 into the licence.
- Condition 3, 9 and 10 - It is requested that the Applicant uses the information provided in the national guideline document "*Minimum Construction Requirements for Water Bores in Australia*" for guidance on decommissioning abandoned monitoring bores, if any located within the proposed TSF3 footprint (e.g. TSF1 monitoring bores), this will minimise seepage related risks. The current version of this guideline document (2020) can be downloaded from the following web site: https://adia.com.au/waterwell/water-bore-construction/.
- Condition 4, 9 and 10 - Design requirements for the construction and installation of seepage recovery infrastructure have been imposed to ensure infrastructure are installed correctly and able to collect seepage.
- Condition 5 and 23 - Maintenance of a water balance and on-site meteorological station requirements have been included in the works approval.
- Condition 21 – Groundwater monitoring requirements consistent with current licence (L8578/2011/1). Applicant must ensure seepage expression on surface does not occur and standing water level is maintained below 4mbgl.
- Condition 6, 11 and 12 – Additional tailings geochemical testing required to ensure risks related to seepage from the TSF3 are well understood and proposed controls and monitoring are adequate.
- Condition 13 and 14 – Commissioning requirements imposed, consistent with the design report and applicant commitments. Early water return requirements added as per recommendations from MLW TSF3 consultant engineers.
- Condition 19 – time limited operation requirements imposed consistent with the design report and applicant commitments. Early water return requirements added as per recommendations from MLW TSF3 consultant engineers.

**Reporting**

The works approval also requires the following reports to be submitted:

- Critical Containment Infrastructure Report
- Environmental Construction Reports
- Environmental Commissioning Report
- Time Limited Operations Report

Reporting requirements are necessary to meet compliance conditional requirements of the works approval and for the TSF3 and associated infrastructure to be transferred onto the existing Licence L8578/2011/1.

# 4. Consultation

Table 4 provides a summary of the consultation undertaken by the department.

**Table 4: Consultation**

| Consultation method | Comments received | Department response |
|---|---|---|
| Application advertised on the department's website on 16/05/2022 | No comments received | N/A |
| Local Government Authority (Shire of Laverton) advised of proposal on 23/06/2022 | No comments received | N/A |
| DMIRS advised of proposal on 23/06/2022 | DMIRS responded on 28/06/2022<br>Refer to section 2.3 | Refer to Section 3.3 |
| Applicant was provided with draft documents on 20/09/2022 and 07/11/2022 | The applicant provided comment on 24/10/2022 and 14/11/2022<br>Refer to Appendix 1 | Refer to Appendix 1 |

# 5. Conclusion

Based on the assessment in this decision report, the delegated officer has determined that a works approval will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

# References


1. Anand, R.R., Hough, R.M., Salama, W., Aspandiar, M.F., Butt, C.R.M., Gonzalez-Alvarez, I. and Metelka, V., 2018. Gold and pathfinder elements in ferricrete gold deposits of the Yilgarn Craton of Western Australia: A review with new concepts. *Ore Geology Reviews*, **104**, 294-355.
2. DCE, 2018. *Geochemical Test Work for Environmental Impact Assessments for Mining Projects in Greenland*. The technical guidance document is available from web site https://www.researchgate.net/publication/329152650_Geochemical_test_work_in_environmental_impact_assessments_for_mining_projects_in_Greenland_-_Recommendations_by_DCE_and_GINR.
3. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
4. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
5. DWER 2020, *Guideline: Risk Assessments*, Perth, Western Australia.
6. Gao, H-Y., Xu, Z-M., Ren, Z., Wang, K., Tang, Y-J. and Luo, J-Y., 2021. Laterite as a suitable seepage barrier from a karst-depression tailings impoundment. *Clays and Clay Minerals*, **69**, 1-22.
7. Karlsson, T., Räisänen, M.L., Myöhänen, T., Alakangas, L. and Lehtonen, M., 2021. Hydrogen peroxide ammonium citrate extraction: mineral decomposition and preliminary waste characterisation. *Minerals*, **11**, 706. The paper is available from web site https://www.mdpi.com/2075-163X/11/7/706.
8. Karlsson, T., 2022. *Geochemical and Mineralogical Characterization of Waste Rocks for Preliminary Mine Drainage Quality Prediction*. Doctoral thesis, Luleå University of Technology, Department of Civil, Environmental and Natural Resources Engineering, Geosciences and Environmental Engineering. The thesis is available from web site https://www.diva-portal.org/smash/record.jsf?dswid=1398&pid=diva2%3A1636866.
9. McJannet, D., Hawdon, A., van Niel, T., Boadle, D., Baker, B., Trefry, M. and Rea, I., 2017. Measurements of evaporation from a mine void lake and testing of modelling approaches. *Journal of Hydrology*, **555**, 631-647.
10. McJannet, D., Carlin, G., Ticehurst, C., Greve, A. and Sardella, C., 2022. Determination of evaporation from a tailings storage facility using field measurements and satellite observations. *Mine Water and the Environment*, **41**, 176-193.

# Appendix 1: Summary of applicant's comments on risk assessment and draft conditions

| Condition | Summary of applicant's comment | Department's response |
|---|---|---|
| Condition 1 Table 1 Item 1 (Page 3) | Suggest the wording be changed to:<br><br>The clayey mine waste materials to be used in the upstream zone should be predominantly sandy clay, clayey gravels and clayey saprolite materials ~~from areas towards the top of the Blenheim Pit and Buckingham Pit~~. | Reference to pits removed. |
| Condition 1 Table 1 Item 4 (Page 4) | Delete:<br><br>~~The sandy surficial regolith to be stripped from the surface of the ferricrete unit beneath the footprint of MLW TSF3, and to be replaced by a finer textured soil cover. This new soil material should then be compacted to a suitable density to fill in secondary porosity features in the ferricrete to ensure that the final basal liner has a suitably low hydraulic conductivity.~~<br><br>The sandy surficial regolith referred to by CSB is a clayey silty sand material with a design permeability of 9.7 x $10^{-7}$ $ms^{-1}$ as indicated from site specific field testing. This surficial layer overlies ferricrete and saprolite materials with design permeabilities of 6.6 x $10^{-7}$ $ms^{-1}$ and 3.4 x $10^{-7}$ $ms^{-1}$ respectively, as indicated from site specific field testing. A supporting memorandum provided by MLW TSF3's geotechnical engineering consultants is provided in Attachment A.<br><br>Based on the predominantly clay/silt oxide mine waste materials available at site, excavation and replacement of the surface layer with compacted "finer textured soil cover" as proposed by CSB would result in a basal liner material of similar permeability to the existing insitu materials (~$10^{-7}$ $ms^{-1}$) and therefore not result in a significant reduction of foundation permeability.<br><br>With regard to deeper seepage, the hydrogeological report and modelling for the project indicates dewatering from the nearby open pits has created a "groundwater sink" to the west of MLW TSF3. | As per section 3.3 above. Foundation/base preparation requirements removed. However early water return requirements imposed as recommended by MLW TSF3 consultant engineers.<br><br>Condition 4 also requires applicant ensure there is sufficient seepage recovery infrastructure in place to minimise risks related to seepage, due to perched flow that could still occur within the ferricrete unit. Further conditions might be imposed as part of transfer of the facility into the licence, as described in section 3.3.. |

| Condition | Summary of applicant's comment | Department's response |
|---|---|---|
| | Therefore, deeper seepage that may escape the seepage collection system will gravitate towards to the Moolart Well open pit area. | |
| Condition 1 Table 1 Item 5 (Page 5) | Suggest the wording be changed to:<br>tailings pipelines shall be located within ~~open~~ bunds **or** trenches with sufficient capacity to ensure liquors are captured within the trench for a period equal to the time between routine inspections (minimum ~~once per 12 hour shift~~ **twice daily**). | Condition reworded |
| Condition 4 Table 3 (Page 6) | For clarification Regis interprets "seepage recovery infrastructure/ seepage recovery bores and/or trenches" to be the equivalent of<br>"A seepage collection system, comprising seepage intersection trenches, collection trenches and manholes will be constructed underneath parts of the embankment to reduce any potential seepage.<br>The seepage intersection trenches will extend approximately 1.04 km underneath the northwest and west embankments, and approximately 0.59 km underneath the east and northeast alignments" as stated in the design document. | Condition 4 relates to additional infrastructure required to recover seepage. This needs to be reviewed by a qualified hydrogeologist. At minimum RRLMWPB013, needs to be reinstated and/or available for seepage recovery (as recommended by hydrogeological memo provided in support of application). As discussed in section 3.3 above, there is a risk that shallow seepage would be a pathway for the transport of contaminants from the TSF that would require monitoring and possibly management. |
| Condition 5 Page 7 | Delete:<br>~~The works approval holder must install an on-site meteorological monitoring unit including a Class A Evaporation Pan to measure daily rainfall and evaporation near the Moolart Well TSF3. The monitoring unit and evaporation pan must be installed and determined to be operational prior to the commencement of time limited operations.~~<br>The decision report explains the background for this condition as:<br>"This assessment, however, may not be correct. This is because research by CSIRO (McJannet *et al*., 2017) has shown that there may be a very poor correlation between evaporation rates at mines sites in Western Australia and the nearest Bureau of Meteorology monitoring stations."<br>Use of Class A evaporation pans requires substantial time to maintain with the Bureau of Meteorology having substituted pans for | Condition has been modified to ensure an on-site meteorological unit is available for measurements of rainfall and evaporation to better inform water balance for the TSF3. |

| Condition | Summary of applicant's comment | Department's response |
|---|---|---|
| | newer technologies.<br><br>Regis has an existing weather station at the Moolart Well aerodrome. Whilst the station does not currently measure evaporation, it is prepared to make adjustments to the station to record a measure of evaporation.<br><br>It is cautioned however that longer-term regional datasets will almost always be preferred over short-term site data. | |
| Condition 19 Table 5 Item 1 Page 10 | Suggest wording be changed to:<br><br>throughput **of approximately** 3 million tonnes per annum (tailings).<br><br>Throughput at Moolart Well is expected to be up to 10% more than 3 Mtpa.<br><br>Suggest to delete or the wording be changed to:<br><br>Tailings in the form of slurry will be discharged sub-aerially and rotated cyclically into TSF3 in thin discrete layers~~, not exceeding 0.3m thickness~~.<br><br>Suggest to delete or the wording be changed to:<br><br>Tailings deposition is to be carried out such that the supernatant pond ~~-~~is maintained within and around the rock ring decant. The pond is to be ~~always~~ maintained away from the perimeter embankments. | Please note that this is the discharge rate of tailings into TSF3 not the plant processing capacity/throughput. The design report is based on a tailings discharge rate of 3.0Mtpa. It is expected that applicant operates the facility within the design assumptions made, Applicant is reminded of risks related to continued throughput variation and implications for storage capacity.<br><br>Please note that the assessed design capacity for Category 5: Processing or beneficiation of metallic or non-metallic ore is 4mtpa.<br><br>Wording related to discharge layers and pond modified. |
| Condition 19 Table 5 Item 5 Page 11 | Suggest inspection frequency to be monthly:<br><br>~~weekly~~ **monthly** inspection of flow meters, telemetry, and pressure transmitters | Condition reworded to monthly. |
| Condition 25 Page 14 | Suggest wording be changed to:<br><br>a summary of the time limited operations, including timeframes and amount of the ~~gold~~ **ore** processed. | Condition re worded to ore processed and tailings deposited. |

| Condition | Summary of applicant's comment | Department's response |
|---|---|---|
| Decision Report - Section 3.1.2 Table 2 Page 14<br><br>Mulgara | Suggest wording is corrected.<br><br>Mulgara (*Dasycercus cristicauda*) – ~~Vulnerable under the EPBC Act 1999,~~ **listed as Priority 4 by the Department of Biodiversity Conservation and Attractions** ~~P4 under the Wildlife Conservation Act 1950"~~<br><br>It is noted:<br><br>• the Mulgara is not listed as Vulnerable under the EPBC Act 1999.<br><br>• Wildlife Conservation Act has been repealed<br><br>Priority listings are conducted by the Department of Biodiversity Conservation and Attractions, not under statute.<br><br>Delete<br><br>~~Rainbow Bee-eater (*Merops ornatus*) – Migratory species under the EPBC Act 1999.~~<br><br>The Rainbow Bee-eater is not listed as Migratory under the EPBC Act | Table 2 has been modified accordingly. |
| Decision Report - Section 3.1.2 Table 2 Page 15<br><br>Surface water drainage | Suggested wording is corrected:<br><br>~~Located east of proposed TSF3~~<br><br>~~(bed within few meters of proposed TSF3).~~ TSF3 is located outside 1 in 100 AEP rainfall event flooding zone. | Distance to drainage corrected. |
| Appendix 2 Table 1 Page 28 | Suggest wording amended to:<br><br>Actual throughput **approximately** 3,000,000 tonnes per year. | This reference was made regarding actual tailings discharge rate into TSF3. Reference removed from table to avoid confusion. |

# Appendix 2: Application validation summary

| SECTION 1: APPLICATION SUMMARY | | |
|---|---|---|
| **Application type** | | |
| Works approval | ☒ | |
| Date application received | | 10/03/2022 |
| **Applicant and Premises details** | | |
| Applicant name/s (full legal name/s) | | Regis Resources Limited |
| Premises name | | 009 174 761 |
| Premises location | | Mining leases M38/498 and M38/499 under the Mining Act 1978.<br>Lease holder is Regis Resources Limited |
| Local Government Authority | | Shire of Laverton |
| **Application documents** | | |
| HPCM file reference number: | | DER2022/000105 |
| Key application documents (additional to application form): | | Moolart well TSF3 Works Approval Application Supporting Document<br>MLW TSF3 design report – CMW Geosciences 2021. |
| **Scope of application/assessment** | | |
| Summary of proposed activities or changes to existing operations. | | Regis Resources Limited (Regis) proposes to develop Moolart Well (MLW) TSF3 in order to meet Regis' long terms tailings storage requirements. TSF3 will be constructed on M38/498 and M38/499.<br>The processing plant (carbon in leach) current operates under L8578/2011/1 (expire date is Feb 2041) with an approved capacity of 4Mt per annum. Moolart Well is the processing hub for all sites within the operational area which includes several satellite pits.<br>MLW TSF3 has been designed by CMW Geosciences and will be constructed in one single stage. It is an irregular octagonal conventional single paddock cell facility abutting MLW TSF1 to the north. MLW is expected to store approximately 8Mt of tailings over a 2 year 8 months period, assuming average thourghput of 3Mtpa and tailings in situ dry density of 1.4t/m3. The overall footprint of MLW TSF3 will be 96.8ha. The embankment height will average 10m, with maximum height of 15m. MLW TSF3 will be constructed will include a cut-off trench nominally 0.6m deep to reduce seepage losses.<br>Surface water will be removed from the rock ring central decant using a pontoon-mounted decant pump. Return water will be pumped back directly to the process plant for reuse. Tailings will be discharge from multiple spigots along the upstream perimeter embankment crest. |

**Category number/s (activities that cause the premises to become prescribed premises)**

**Table 1: Prescribed premises categories**

| Prescribed premises category and description | Assessed production or design capacity |
|---|---|
| Category 5 - Processing and beneficiation of metallic or non-metallic ore | 4,000,000 tonnes per annual period at Moolart Well processing plant. |

**Legislative context and other approvals**

| | | |
|---|---|---|
| Has the applicant referred, or do they intend to refer, their proposal to the EPA under Part IV of the EP Act as a significant proposal? | Yes ☐ No ☒ | |
| Does the applicant hold any existing Part IV Ministerial Statements relevant to the application? | Yes ☐ No ☒ | |
| Has the proposal been referred and/or assessed under the EPBC Act? | Yes ☐ No ☒ | |
| Has the applicant demonstrated occupancy (proof of occupier status)? | Yes ☒ No ☐ | Mining lease / tenement ☒ Expiry:<br>M38/498 and M38/499 |
| Has the applicant obtained all relevant planning approvals? | Yes ☐ No ☐ N/A ☒ | N.A activities on mining tenure. |
| Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal? | Yes ☐ No ☐ | CPS No: 6657/10<br>An updated clearing permit application has been submitted for the addition of TSF3 (addition of 5 ha of clearing) |
| Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal? | Yes ☐ No ☒ | |
| Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal? | Yes ☒ No ☐ | Licence/permit No: GWL169314.<br>LO notes that additional approvals might be required for additional monitoring bores. |
| Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)? | Yes ☒ No ☐ | Name: Goldfields<br>Type: Proclaimed Groundwater Area<br>Has Regulatory Services (Water) been consulted?<br>Yes ☐ No ☒ N/A ☐<br>Regional office: Goldfields |

| | | |
|---|---|---|
| Is the Premises situated in a Public Drinking Water Source Area (PDWSA)? | Yes ☐ No ☒ | |
| Is the Premises subject to any other Acts or subsidiary regulations (e.g. *Dangerous Goods Safety Act 2004, Environmental Protection (Controlled Waste) Regulations 2004, State Agreement Act xxxx*) | Yes ☒ No ☐ | • *The Mining Act 1978*<br>• *EP Act 1986*<br>• *Environmental Protection (Controlled Waste) Regulations 2004*<br>• *The Aboriginal Heritage Act 1972*<br>A mining proposal has been submitted to DMIRS for assessment. |
| Is the Premises within an Environmental Protection Policy (EPP) Area? | Yes ☐ No ☒ | |
| Is the Premises subject to any EPP requirements? | Yes ☐ No ☒ | |
| Is the Premises a known or suspected contaminated site under the *Contaminated Sites Act 2003*? | Yes ☐ No ☒ | |