



## Application for Works Approval

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

---

<b>Works Approval Number</b>	W6536/2021/1
<b>Applicant</b>	Genesis Minerals Limited
<b>ACN</b>	124 772 041
<b>File Number</b>	DER2018/001042-5
<b>Premises</b>	Ulysses Gold Project  Legal description Mining Tenements G40/4, G40/5, G40/6, and Part of Mining Tenements M40/166, M40/107, L40/11, L40/12, L40/30 and L40/34  As defined by the coordinates in Schedule 1 of the Works Approval
<b>Date of Report</b>	30 July 2021
<b>Decision</b>	Works approval granted

**A/MANAGER, RESOURCE INDUSTRIES  
REGULATORY SERVICES**

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

## Table of Contents

<b>1. Decision summary</b>	<b>1</b>
<b>2. Scope of assessment</b>	<b>1</b>
2.1 Regulatory framework	1
2.2 Application summary and overview of Premises	1
2.2.1 Ulysses Processing Plant and mining operations	1
2.2.2 Dewatering	2
2.2.3 Tailings Storage Facility (TSF)	2
2.2.4 Wastewater Treatment Plant and Irrigation Sprayfield	6
<b>3. Risk assessment</b>	<b>6</b>
3.1 Source-pathways and receptors	7
3.1.1 Emissions and controls	7
3.1.2 Receptors	9
3.2 Risk ratings	11
<b>4. Detailed risk assessment</b>	<b>14</b>
4.1 Seepage from base of TSF	14
<b>5. Consultation</b>	<b>15</b>
<b>6. Conclusion</b>	<b>15</b>
<b>References</b>	<b>15</b>
<b>Appendix 1: Summary of applicant’s comments on risk assessment and draft conditions</b>	<b>16</b>
<b>Appendix 2: Application validation summary</b>	<b>21</b>
Table 1: Proposed applicant controls	7
Table 2: Sensitive human and environmental receptors and distance from prescribed activity	9
Table 3: Risk assessment of potential emissions and discharges from the Premises during operation (including time-limited operations)	12
Table 4: Consultation	15

## 1. Decision summary

This Decision Report documents the assessment of potential risks to the environment and public health from emissions and discharges during the construction and operation of the Ulysses Gold Project (the Premises). As a result of this assessment, Works Approval W6536/2021/1 has been granted.

## 2. Scope of assessment

### 2.1 Regulatory framework

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

### 2.2 Application summary and overview of Premises

On 17 March 2021, Genesis Minerals Limited (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 to authorise mining and associated activities at the premises, with the applicant proposing to process 1.6 million tonnes of ore per annum and the life of the project anticipated to be 10 years. The Premises is approximately 30 km south of the Town of Leonora.

The premises relates to the categories and assessed production/design capacity under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) which are defined in Works Approval W6536/2021/1. The infrastructure and equipment relating to the premises category and any associated activities which the department has considered in line with *Guidance Statement: Risk Assessments* (DER 2017) are outlined in Works Approval W6536/2021/1.

An overview of proposed construction works and operational procedures for the premises is outlined below.

#### 2.2.1 Ulysses Processing Plant and mining operations

The Processing Plant at the premises is intended to operate 24 hours a day, 7 days a week, with two panels working continuous 12 hour shifts. Gold ore at the premises is associated with free milling sulphides and can be removed by conventional carbon-in-leach (CIL) processing. Gold ore mined from various locations within the premises is proposed to be stockpiled and blended on the Run-of-Mine (ROM) prior to being processed through the Processing Plant. Gold will be extracted from the ore by utilising the following methods:

- Ore from the ROM stockpiles is crushed then transported via conveyor to the product sizing screen, with any coarse rock red fed into secondary or tertiary crusher;
- Fine ore is sent to the Fine Ore Bin, which has a capacity of 2,400 tonnes and provides mill feed for 12-18 hours depending on throughput rate;
- Lime is added to ore within the ball mill feeder to raise pH, whilst undergoing further size reduction. Water is also added to create a slurry, which is pumped to hydro-cyclones to separate into fine and coarse fractions;
- Fine fractions are passed over a trash screen to remove any foreign objects, whilst the coarse fraction is returned to the ball mill feeder to undergo further size reduction or is fed through a gravity circuit to recover larger gold particles;

- Slurry from the ball mill feeder is fed to the leach tank and thickened to approximately 50-55% solids (w/w) to recover excess water, before cyanide and oxygen are added to dissolve the gold;
- Following the leach tank, the dissolved gold passes through a network of CIL tanks where gold is adsorbed onto activated carbon (maintained at 10-15 g/L in the CIL tanks);
- Following adsorption, the slurry (tailings) is screened to remove any carbon and thickened up to 55% solids (w/w) before disposal to the Tailings Storage Facility. All pre-leach and tailings thickener overflow streams are directed to the Process Water Tank;
- The carbon adsorbed with gold (loaded carbon) is transferred to the elution tank and undergoes an acid soak/acid wash/rise cycle prior to the cyanide/caustic addition stage where the gold is desorbed. The now 'barron carbon' is reclaimed for reactivation and re-use in the gas fired horizontal kiln of the Processing Plant for smelting;
- The 'pregnant' remaining solution is pumped to electrowinning cells where the gold electroplates onto stainless steel cathodes, which are washed down, with the gold sludge filtered and dried in preparation for smelting;
- Smelting using the gas fired furnace produces gold doré bars which are sent on to the Perth Mint for further refinement.

To facilitate mining operations at the Premises, the applicant is also proposing to undertake cutback of the existing Ulysses West, Ulysses, Orient Well, Admiral and Butterfly Open Pits. Mining will also occur at the new Ulysses Far West and Clark Open Pits.

### 2.2.2 Dewatering

The applicant has submitted the Ulysses Gold Project Site Water Balance Study in support of the application, which stipulates that the dust suppression and mining water demand of the site during operations will be 190,000 kL per annum. To accommodate for hot and dry weather conditions, the applicant considers that dewatering throughput for the premises should be assessed for the maximum proposed annual throughput of 250,000kL per annum.

Dewater for dust suppression will be sourced from the dewatering of the Admiral, Butterfly and Orient Well pits and the Ulysses Underground Mine, as well as the dewatering of pit lakes that have formed within the Admiral, Orient Well, Ulysses Central and Ulysses West pits. Dewatering will be undertaken using sumps, with the water pumped into a Turkeys nest with a compacted clay lining prior to reuse. A 500mm freeboard will be maintained on the Turkeys nest to prevent overtopping.

Dust suppression using dewater will occur across the majority of the premises, with the quality of the dewater as determined from site groundwater monitoring to be fresh to brackish (TDS 1500-1920 mg/L) and neutral to slightly alkaline (7.7-8.1).

### 2.2.3 Tailings Storage Facility (TSF)

#### **Operational aspect**

The TSF at the premises will have a footprint of approximately 86 hectares. The Applicant proposes to construct two TSF Cells (Cells 1 and 2) under this works approval application, with two additional cells (Cells 3 and 4) to be constructed under future approvals when they are required due to capacity limits.

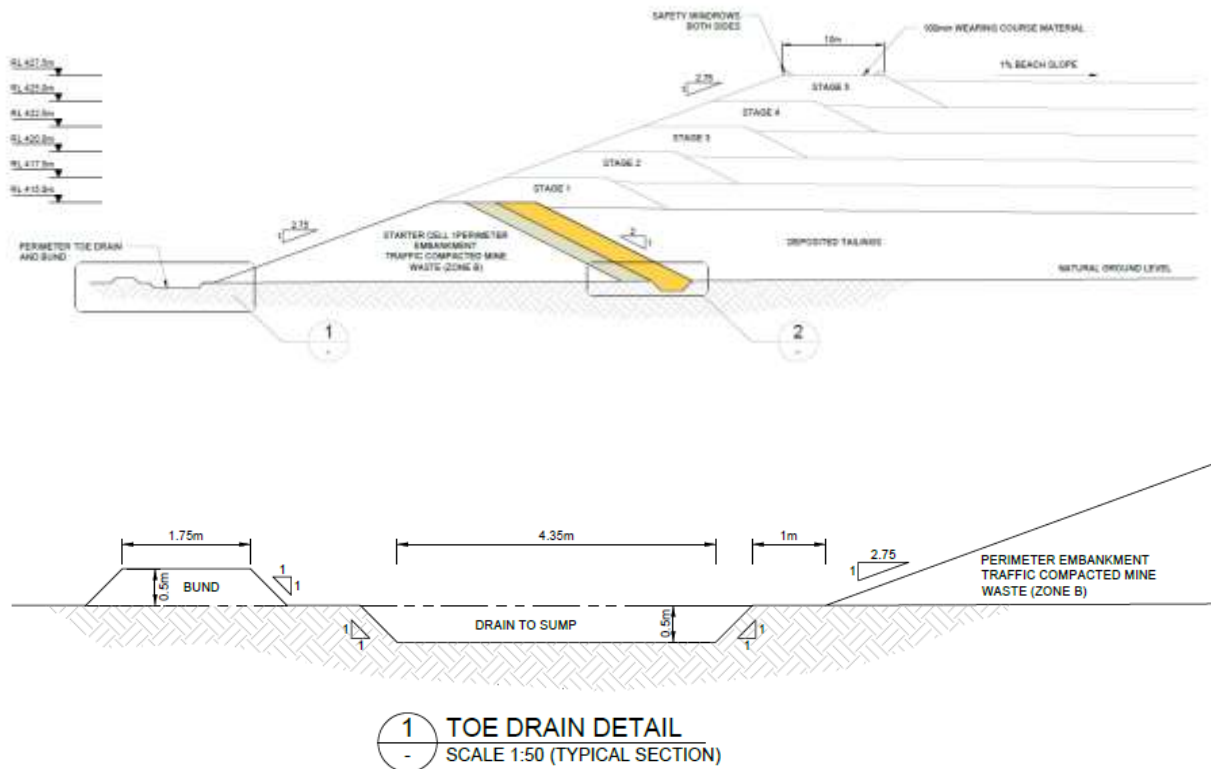
Cell 1 is proposed to have a starter embankment crest level of RL 417.5m and will incorporate five additional upstream embankment raises of 2.5m height each. The final crest level will be RL 427.5m with the maximum embankment height nominally 16.5m. The maximum tailings storage capacity will be 4.84Mm<sup>3</sup> (7.26Mt).

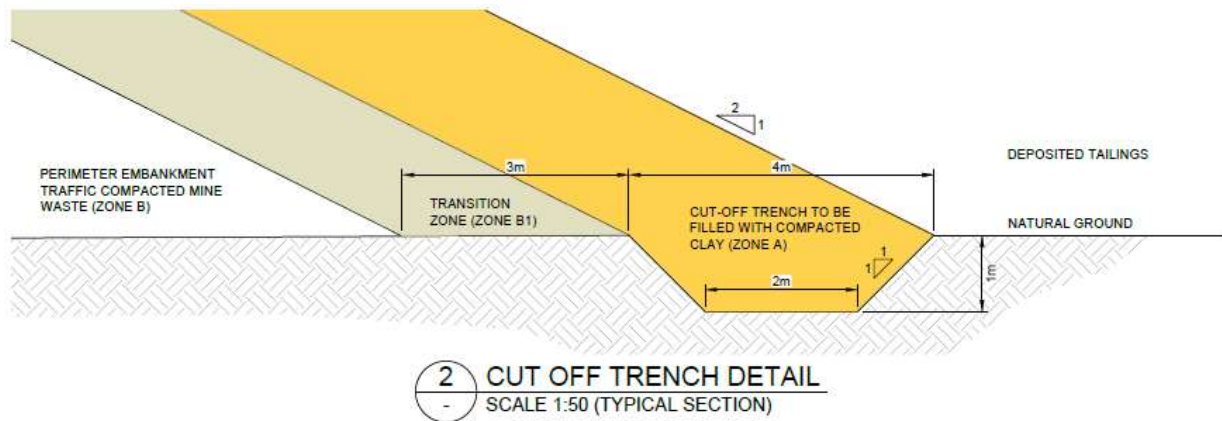
Cell 2 is proposed to have a starter embankment crest level of RL 417.5m and will incorporate four additional upstream embankment raises of 2.5m height each. The final crest level will be RL 427.5m with the maximum embankment height nominally 16.5m. The maximum tailings storage capacity will be 4.84Mm<sup>3</sup> (7.26Mt).

The perimeter embankment of the TSF cells will be constructed using compacted clayey mine waste, borrow fill (Zone A) and traffic compacted mine waste sourced from waste dumps or from the existing open pits (Zone B) as indicated in Figure 1 below. Embankments have design slopes of 1V:2H upstream and an overall 1V:2.15H slope. Subsequent embankment raises will be constructed upstream of the previous embankment height.

**Key finding:** The Delegated Officer notes that the application has proposed five stages for embankment raises to facilitate the anticipated 10 year duration of mining activities.

As works approvals are only granted for five year durations, the first two embankment raises will be considered under this works approval application. The Applicant is advised to seek further approval for subsequent embankment raises when required by operational timeframes.





**Figure 1: TSF embankment construction**

The TSF Cells will be managed as follows:

- Tailings slurry deposition will occur sub-aerially and cyclically in thin layers of 300mm nominal thickness via multiple spigots located on the upstream crest of the perimeter embankment. This will allow tailings to gain optimum density and strength as each layer is subjected to a drying cycle;
- Tailings deposition will occur so that a tailings beach forms and a supernatant pond will be maintained around the central decant structure so as to be a minimum distance of 150m from all perimeter embankments;
- Water will be removed from the surface of the TSF via a decant pump located within the central decant tower and returned to the Processing Plant via the return water pond. Underdrainage water will also be collected and returned to the Processing Plant via the return water pond;
- Seepage from the TSF will be monitored through the installation of six groundwater bores along the downstream perimeter of Cells 1 and 2. Phreatic surface monitoring within the perimeter embankments will be undertaken utilising a network of Vibrating Wire Piezometers to be installed along the upstream embankment toe, the starter embankment crest, and the downstream embankment toe.

### **Seepage management**

Two-dimensional seepage modelling was undertaken in support of this application, which acts to derive groundwater seepage for saturated/unsaturated, steady state flow conditions. Cross sections adopted for the analysis include the starter embankment and the proposed final stage embankment for each TSF Cell (being Cells 1 and 2). Permeability parameters were derived from experience from similar previous projects and materials were presumed to be isotropic due to limited information on the variability of permeability for the materials. The results of the modelling indicated that total seepage flows through the embankment of the TSF cells will be in the range of approximately 30.26 to 54.77m<sup>3</sup>/day (final stage) under normal operating conditions. The seepage analyses also showed that total flow through both the foundation and embankment will range from about 36.38 to 61.32m<sup>3</sup>/day.

Noting these results, a groundwater impact assessment was undertaken by the applicant to estimate the potential increase in groundwater levels and potential radial extent of groundwater mounding from the TSF cells. Transient simulation modelling was conducted for two scenarios over a 30 year timeframe, with the first 10 years representing the Life of Mine (LoM) period:

- Scenario 1 applies a linear increase in seepage between the initial and final stage TSF seepage estimates; and
- Scenario 2 represents a conservative (extreme) case that applies the maximum final stage seepage estimate for the entire LoM (10 years).

Modelling results demonstrated that mounding is expected to be minimal at the end of the LoM, with a maximum hydraulic head increase predicted to range between 0.9m and 1.4m between the TSF cells. As depth to groundwater is 20-25 m below ground level (bgl) in this area, the maximum conservative groundwater level at the LoM is estimated to be approximately 18.6 – 23.6 mbgl based on current levels. The estimated rate of groundwater rise was predicted to be 0.06 to 0.24 m/year during LoM, with 80% to 90% recovery of the water table achieved in the subsequent 20 years post-closure. Groundwater mounding contours for scenario 1 and scenario 2 simulations indicate that the peak of groundwater mounding will occur within Cell 1 when seepage is active, with contours suggesting some elongation of the mound to the north of the TSF area in the direction of the hydraulic gradient. Under both scenarios, the radial extent of groundwater mounding was predicted as follows based on years of operation:

- 5 years of operation - A maximum mound extent between 1.1 to 1.5km east-west and 1.3 to 1.7km north-south;
- 10 year of operation (LoM) - A maximum mound extent between 1.7 to 2.1km east-west and 2.0 to 2.3km north-south; and
- 30 years (20 years post-closure) - A maximum mound extent between 2.5 to 3.0km east-west and 2.6 to 3.1km north-south.

Combined findings from the seepage modelling and groundwater impact assessment conclude that it is unlikely for potential impacts to occur to surrounding receptors as a result of groundwater mounding resulting from 10 years of TSF seepage.

### **Water balance**

A water balance assessment for the TSF during operation was undertaken in support of this application, using expected inflows and outflows to the TSF for calculations. Inflows included rainfall and slurry water, and outflows included evaporation, seepage losses and water retained in tailings (pore water). The analysis also considered the annual and monthly rainfall averages and average evaporation under average climatic conditions.

The results for TSF Cells 1 and 2 indicated that the estimated average annual water return is 0.73 Mm<sup>3</sup>, which equates to 23.2L/s and about 49% of the annual total water inflow (1.53 Mm<sup>3</sup>). The assessment also concluded that on average the expected water outflows per year are:

- 48% recovered by the water recovery system (decant, underdrainage, toe drain);
- 33% retained within the tailings pore spaces;
- 15% lost to evaporation or evapotranspiration; and
- 4% is seepage.

Results also indicated that water recovery will vary with the decant pond size and running beaches. For this reason, the decant pond will be maintained at the smallest practical operational size to maximise water return and enable most of the free water to be recovered through the decant for recycling to the Processing Plant.

### **Tailings characteristics**

The applicant has also commissioned geochemical characterisation of tailings samples generated during metallurgical testing of the ores to be processed at the UGP. The findings of this concluded that the tailings streams discharged into the TSF should be classified as non-acid forming, and that the concentration of metals/metalloids within the tailings is minimal, indicating solubility at circum-neutral-pH during weathering within the TSF is tightly constrained. Within the active TSF the decant water should have a weak acid dissociable (WAD) cyanide concentration of less than the industry standard 50 mg/L target for the protection of wildlife, which corresponds to the efficient volatilisation and degradation of cyanide forms under the arid conditions experienced in the location of the Premises. The Applicant does not anticipate any geochemistry concerns with generated tailings to be deposited within the TSF.

**Key finding:** The Delegated Officer notes that the stability of the new TSF Cells will be considered under a Mining Proposal assessment, which will be undertaken by DMIRS.

The applicant has advised that the Mining Proposal amendment to authorise the construction and operation of the Processing Plant and TSF is currently in draft and is due to be submitted to DMIRS in May/June 2021. It is also noted that the lease for tenement M40/166 will expire on 28 January 2022, and that an application for an extension to the lease was submitted by the applicant to DMIRS on 22 April 2021.

In line with the *Industry Regulation: Guide to Licensing*, the Delegated Officer does not have to make any decision to approve an application for a works approval where other government approvals preclude implementation.

The Delegated Officer will take comments and decisions made by DMIRS into consideration when undertaking the risk assessment relating to the activities sought under this works approval application, however may defer a decision on the application until DMIRS has made a final decision on the Mining Proposal amendment application.

#### 2.2.4 Wastewater Treatment Plant and Irrigation Sprayfield

The applicant plans to install a Wastewater Treatment Plant (WWTP) to treat and dispose of sewage and wastewater generated by the premises accommodation village, which will have capacity to cater for up to 244 people. The WWTP is proposed to be an Activated Sludge Bioreactor packaged plant with the capacity to treat 70m<sup>3</sup>/day of wastewater. The accommodation village will also have a reverse osmosis (RO) plant installed to treat approximately 103kL/day of wastewater, to provide approximately 61kL/day of potable water and result in 42kL/day of RO brines.

The WWTP effluent stream will incorporate treated sewage wastewater and RO brines, and will be disposed of as a blended effluent via irrigation to an irrigation sprayfield with an area of 5 hectares. Total throughput of the blended effluent for irrigation will amount to 112m<sup>3</sup>/day. Sludges accumulated within WWTP infrastructure will be periodically removed and disposed of off-site at an appropriately licenced facility.

**Key finding:** The Delegated Officer notes that the WWTP has not yet been approved by the local government authority, being the Shire of Menzies, and that it is the applicant's intent to submit an application for planning approval in early 2022.

It is the responsibility of the Works Approval Holder to ensure that all relevant approvals are in place prior to construction works occurring, in line with the guideline *Industry Regulation: Guide to Licensing*.

### 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 *Guidance Statement: Risk Assessments* (DER 2017).

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



## 3.1 Source-pathways and receptors

### 3.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises construction and operation which have been considered in this Decision Report are detailed in Table 1 below. Table 1 also details the proposed 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
<b>Operation (including time limited operations)</b>			
<b><u>Category 5</u></b>			
Potentially contaminated stormwater	Spills or leaks of stored environmentally hazardous material	Seepage to land causing direct impacts to soil, surrounding vegetation and potentially underlying groundwater	<p>Hydrocarbons and chemicals will be stored within designated and appropriately bunded areas.</p> <p>The Processing Plant reagent area will have a sump and pump installed to remove any collected water.</p> <p>Surface water around the Processing Plant will be directed via vee drains and culverts into a stormwater collection dam.</p> <p>Any spills of hydrocarbons or chemicals will be immediately cleaned up.</p>
Saline tailings water	Spills or leaks from containment infrastructure		<p>Tailings water and return pipes to be located within earthen bunds draining to sumps to ensure leaks and spills are contained and collected.</p> <p>Tailings water and return pipes to be fitted with leak detection sensors and isolation valves.</p> <p>Raw water pond to be lined with high density polyethylene (HDPE) liner.</p> <p>All infrastructure to be inspected daily.</p>
	Overtopping of TSF		<p>A freeboard of 0.5m will be maintained at all times.</p> <p>TSF cells will be constructed to be able to contain water resulting from a storm event of 1:100 year AEP of 72hrs duration whilst maintaining the required freeboard.</p> <p>Seepage from the slopes of the TSF perimeter embankment will be captured in a bunded Toe Drain surrounding the TSF.</p>
	Seepage from base of TSF		<p>Tailings will be thickened to 55% solids (w/w) to recover excess water before disposal into the TSF.</p> <p>Seepage through deposited tailings will be collected by the TSF's underdrainage system, with recovered water pumped to the HDPE lined</p>

Emission	Sources	Potential pathways	Proposed controls
			<p>return water pond.</p> <p>A cut-off trench will be installed beneath the upstream TSF perimeter embankment to minimize horizontal seepage loss.</p> <p>The decant pond will be maintain at the smallest practical operational size (maximum of 137m diameter and a minimum of 150m away from all perimeter embankments.</p> <p>6 Groundwater monitoring bores will be installed surrounding the TSF and will be monitored monthly for standing water level.</p> <p>Geotechnical investigations conducted on behalf of the applicant determined that the foundation permeability of the TSF is <math>2.7 \times 10^{-8}</math> m/s to <math>6.6 \times 10^{-8}</math> m/s, indicating a low permeability.</p>
<b>Category 6</b>			
Dewater (fresh to brackish)	Dewatering of open pits and mines and discharge of dewater to land via dust suppression	Seepage to land causing direct impacts to soil, surrounding vegetation and potentially underlying groundwater	<p>Discharge of dewater through dust suppression to occur across an area of approx. 2,000 ha within the Premises.</p> <p>Dewatering pipelines will be contained within a minimum 1m bund and inspected daily to identify any leaks/pipe failures or bunding erosion.</p> <p>Turkeys nest for storage of dewater will be clay lined and a 500 mm freeboard maintained at all times.</p>
<b>Category 54</b>			
Sewage waste	Spills or leaks from containment infrastructure	Seepage to land causing direct impacts to soil, surrounding vegetation and potentially underlying groundwater	<p>WWTP infrastructure will be located within a bund to contain spillage from any system components.</p> <p>Capacity of the bund will be at least 110% of the capacity of the largest vessel of the WWTP.</p> <p>Bunded area will contain a sump and pump to return spillages to the WWTP.</p> <p>Infrastructure to be inspected weekly.</p>
Potentially contaminated stormwater			<p>The nutrient application rate of treated wastewater will not exceed that specified for 'Risk Category D' soils as defined by <i>Water Quality Protection Note 22: Irrigation with Nutrient-rich Wastewater</i>.</p> <p>Treated wastewater quality will be monitored monthly.</p> <p>Spinklers will be positioned in a manner that avoids the pooling of treated wastewater.</p>
Wastewater	Disposal of wastewater to the irrigation sprayfield		

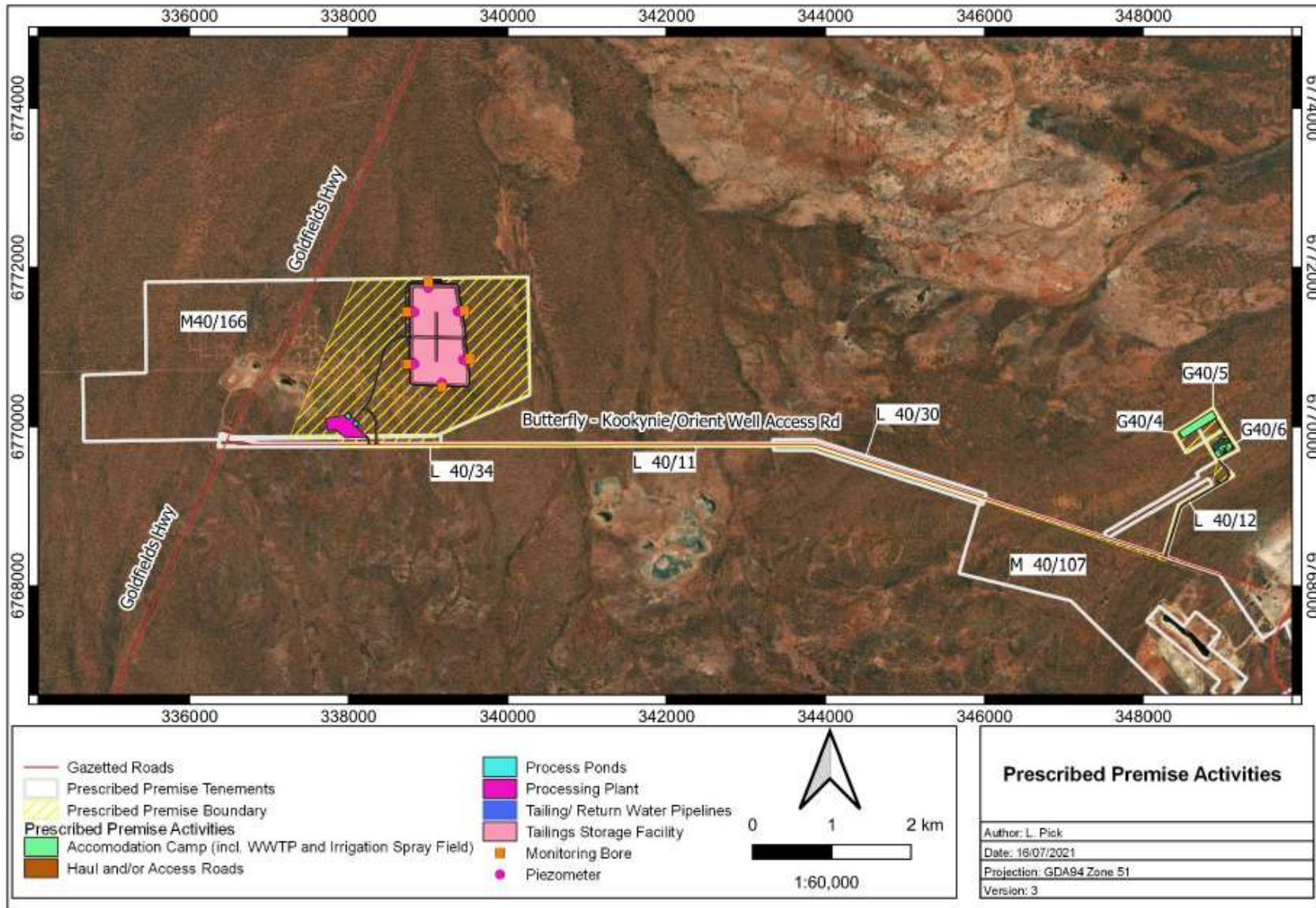
### 3.1.2 Receptors

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

Table 2 and Figure 1 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises (*Guidance Statement: Environmental Siting* (DER 2016)).

**Table 2: Sensitive human and environmental receptors and distance from prescribed activity**

Human receptors	Distance from prescribed activity
Town of Leonora	30 km north of Premises boundary
Environmental receptors	Distance from prescribed activity
Surrounding native vegetation	Mapped within Premises area.
Threatened Fauna <i>Leipoa ocellata</i> (Mallie Fowl)	Distribution mapped within 500 m of Premises boundary
Proclaimed groundwater area <ul style="list-style-type: none"> <li>• Goldfields groundwater area</li> <li>• Underlying groundwater (non-potable purposes)</li> <li>• Groundwater is located 20 – 25 mbgl</li> </ul>	Premises mapped within area



**Figure 2: Premises siting**

Works Approval: W6536/2021/1

## 3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guidance Statement: Risk Assessments* (DER 2017) 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 W6536/2021/1 that accompanies this Decision Report authorises construction 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. 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 operation (including time-limited operations)**

Risk Event					Risk rating <sup>1</sup> C = consequence L = likelihood	Applicant controls sufficient?	Conditions <sup>2</sup> of works approval	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
<b>Category 5</b>								
Operation of the TSF	Potentially contaminated stormwater – spills and leaks of environmentally hazardous material	Seepage to land causing direct impacts to soil, vegetation and potentially underlying groundwater	Underlying groundwater  Threatened fauna mapped within 500m of the Premises	Refer to Section 3.1	C = Moderate L = Unlikely <b>Medium Risk</b>	Y	Conditions 1, 2, 4, 7, 14, 20, 25, 26, 29, 31 and 34	N/A
	Saline water – spills and leaks from containment infrastructure			Refer to Section 3.1	C = Moderate L = Unlikely <b>Medium Risk</b>	Y	Conditions 1, 2, 4, 7, 14, 20, 25, 26, 29, 31 and 34	N/A
	Saline water – overtopping of TSF			Refer to Section 3.1	C = Moderate L = Unlikely <b>Medium Risk</b>	Y	Conditions 4, 9, 11, 25, 26, 31 and 34	N/A
	Saline water – seepage from base of TSF			Refer to Section 3.1	C = Major L = Unlikely <b>Medium Risk</b>	Y	Conditions 2, 4, 9, 11, 25, 26, 29, 31 and 34	Please refer to Section 4.1 below.
<b>Category 6</b>								
Dewatering of open pits and mines	Saline water – spills and leaks from containment infrastructure	Seepage to land causing direct impacts to soil, vegetation and potentially underlying groundwater	Underlying groundwater  Threatened fauna mapped within 500m of the Premises	Refer to Section 3.1	C = Moderate L = Unlikely <b>Medium Risk</b>	Y	Conditions 1, 25 and 26	N/A
Discharge of dewater to land via dust suppression	Saline water – infiltration to land			Refer to Section 3.1	C = Moderate L = Unlikely <b>Medium Risk</b>	Y	Condition 27	N/A
<b>Category 54</b>								

Risk Event					Risk rating <sup>1</sup> C = consequence L = likelihood	Applicant controls sufficient?	Conditions <sup>2</sup> of works approval	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
Operation of the WWTP	Sewage waste - spills and leaks from containment infrastructure	Seepage to land causing direct impacts to soil, vegetation and potentially underlying groundwater	Underlying groundwater	Refer to Section 3.1	C = Moderate L = Unlikely <b>Medium Risk</b>	Y	Conditions 1, 7, 14, 16, 20, 25, 27, 28 and 34	N/A
Discharge of wastewater to the Irrigation Sprayfield	Wastewater		Surrounding native vegetation	Threatened fauna mapped within 500m of the Premises	Refer to Section 3.1	C = Moderate L = Unlikely <b>Medium Risk</b>	Y	Conditions 1, 7, 14, 15, 16, 20, 25, 27, 28 and 34

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guidance Statement: Risk Assessments* (DER 2017).

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

## 4. Detailed risk assessment

### 4.1 Seepage from base of TSF

The seepage of tailings leachate into the underlying groundwater may occur over the operational period of the TSF, with the capacity to impact groundwater quality and surrounding groundwater users. Seepage from the TSF may also result in mounding of the groundwater table surrounding the TSF, which could lead to negative impacts to vegetation in the vicinity.

Groundwater is located approximately 20-25 mgbl at the location of the TSF. The groundwater pH is slightly alkaline and is brackish, mainly sodium-chloride type water. The predominant land uses in the area are mining and pastoralism with local groundwater used as mine water supply and drinking water for cattle.

The applicant has provided seepage modelling and a groundwater impact assessment surrounding the operation of the TSF as part of this works approval application, which has demonstrated that it is unlikely for potential impacts to occur to surrounding receptors resulting from groundwater mounding after 10 years of TSF seepage. To minimise seepage from the TSF, the applicant has proposed the following mitigation strategies:

- Tailings will be thickened to 55% solids (w/w) to recover excess water before disposal into the TSF;
- Seepage through deposited tailings will be collected by the TSF's underdrainage system, with recovered water pumped to the HDPE lined return water pond;
- A cut-off trench will be installed beneath the upstream TSF perimeter embankment to minimize horizontal seepage loss;
- The decant pond will be maintain at the smallest practical operational size (maximum of 137m diameter and a minimum of 150m away from all perimeter embankments);
- Six Groundwater monitoring bores will be installed surrounding the TSF and will be monitored monthly for standing water level; and
- Geotechnical investigations conducted on behalf of the applicant determined that the foundation permeability of the TSF is  $2.7 \times 10^{-8}$  m/s to  $6.6 \times 10^{-8}$  m/s, indicating a low permeability.

In the event that groundwater mounding is discovered to be occurring through groundwater bore monitoring results, the applicant has committed to developing a groundwater recovery plan if the standing water level reaches 6 mbgl. This trigger value will likely be applied to the TSF monitoring bores as a condition of any future operating licence, with a requirement to implement corrective actions in the event standing water level reaches 6 mbgl.

**Key finding:** The Delegated Officer considers that the supporting modelling and assessments provided by the applicant sufficiently demonstrate that the risk to underlying groundwater and surrounding vegetation will be mitigated by the proposed controls.

In the event significant groundwater mounding is discovered due to the operation of the TSF, DWER will require the submission of a groundwater recovery plan by the applicant detailing further mitigation measures to prevent further impacts from TSF operation.

DWER may also initiate an amendment to the works approval and/or subsequent Licence at any time for the Premises should the Delegated Officer determine that a higher degree of regulatory control is required at the Premises to prevent or mitigate emissions and discharges arising from Premises operations.

Additional controls can also be considered for inclusion within the operational Licence for the



Premises should significant issues be identified with TSF operations through the time limited operational period authorised under this works approval.

## 5. 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 24 May 2021	None received	N/A
Shire of Menzies advised of proposal 17 May 2021	None received	N/A
Department of Mines, Industry Regulation and Safety (DMIRS) advised of proposal 17 May 2021	Comments provided 26 May 2021 DMIRS notes that these activities are not currently approved under the <i>Mining Act 1986</i> however the proponent has acknowledged this in their supporting document, stating that an "amendment" is planned.  DMIRS has no concerns with the proposed activities in principle, so long as a Mining Proposal and Mine Closure Plan is submitted to the Department for assessment.	It is the responsibility of the Works Approval Holder to ensure that all relevant approvals are in place prior to construction works occurring, in line with the DWER guideline <i>Industry Regulation: Guide to Licensing</i> .
Applicant provided with draft documents 2 July 2021	Comments provided 15 July 2021 and summarised in Appendix 1 below.	Additional clarification has been sought on the applicants' comments, with responses provided to DWER on 16 July 2021 and 21 July 2021.  DWER's response is summarised in Appendix 1 below.

## 6. 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. Department of Environment Regulation (DER) 2016, *Guidance Statement: Environmental Siting*, Perth, Western Australia.
2. DER 2017, *Guidance Statement: Risk Assessments*, Perth, Western Australia.
3. DER 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.

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

Summary of applicant's comments	Department's response	Summary of applicant's follow up comments	Department's follow up response
Minor formatting issues identified.	Rectified in final revision of draft documents.	N/A	N/A
<p>Updated premises maps and coordinates have been provided to reflect the new premises boundary.</p> <p>Additional tenements details have been provided for the additional area of the Premises boundary.</p> <p>The extension of term for tenement M40/166 was granted by DMIRS on 19 May 2021. The new expiry date for M40/166 is 28/01/2043.</p>	<p>The updated maps do not show the prescribed premises boundary as a continuous area. To ensure this is the case the entire area of the access road between the two previously separated areas will need to be included within the premises boundary.</p> <p>Updated maps showing the boundary, the tenement leases relevant to the area of the access road not previously included in the boundary and updated coordinates will need to be provided.</p>	<p>New maps have been provided encompassing the entire access road, with the premises map now a continuous area.</p> <p>Updated coordinates for the new area and proof of occupancy across additional mining leases have also been provided.</p>	Updated premises maps, tenement details and coordinates have been incorporated into the Works Approval and Decision Report.
<p>The Ulysses Gold Project (UGP) Site Water Balance Study indicates that the dust suppression (and mining) demand is estimated at 6L/s. This equates to an annual water use of around 190,000kL.</p> <p>Mine dewatering rates are variable, and the open pits will be mined at different stages. The average groundwater inflows into the underground workings are about 3L/s. The predicted pit inflow rates range from about 1 to 10L/s. Mine water will be fully</p>	<p>Mine dewatering is defined by the <i>Environmental Protection Regulations</i> (EP Regulations) as the act of extracting and discharging water into the environment to allow for the mining of ore, and becomes applicable for regulation at sites where the production or design capacity for dewatering exceeds 50,000 tonnes or more per year. DWER is currently drafting a new guidance document outlining industry requirements and considerations for Category 6. Under this guidance, DWER will consider that dust suppression is a direct discharge to land for the purpose of Category 6.</p>	<p>Genesis confirms that based on the additional context provided (i.e. DWER guidance that dust suppression is a direct discharge to land for the purpose of Category 6) and the expected dust suppression and dewatering volumes that Category 6 should be included on the Works Approval.</p> <p>Genesis notes that if conditions are dry and hot and more water is required for dust suppression, we request that the licenced Category 6 water use is set at 250,000kL.</p>	<p>Dewatering processes proposed by the applicant have been examined in the Decision Report and considered in DWER's risk assessment.</p> <p>The Delegated Officer considers that the information provided is sufficient to facilitate the addition of Category 6 to the works approval with an annual throughput of 250,000kL.</p> <p>Construction requirements</p>

Summary of applicant's comments	Department's response	Summary of applicant's follow up comments	Department's follow up response
<p>utilised and there is no requirement to manage excess discharge from dewatering activities.</p> <p>Water supplies for the UGP (up to 43L/s) will be drawn from the following sources (in order of priority): dewatering of the Open Pits and Underground Mine; water stored in the existing pit lakes (limited supply); and operation of the Orient Well Borefield</p>	<p>At UGP, if more than 50,000 tpa is dewatered from the open pits for the purpose of mining and this water is discharged for dust suppression, then Category 6 will be relevant for inclusion on the works approval.</p> <p>The Delegated Officer is happy to include Category 6 on the works approval at this stage of the application so long as the following information is provided:</p> <ul style="list-style-type: none"> <li>• areas that dust suppression will occur (i.e discharge locations);</li> <li>• any controls proposed for dewatering pipelines (i.e. auto cut-outs, telemetry, bunding etc.);</li> <li>• Dewater quality; and</li> <li>• Proposed monitoring for spills and leaks and any associated impacts.</li> </ul>	<p>In 2020, Genesis commissioned GRM undertake a Dewatering Assessment for the UGP Admiral, Butterfly, Clark, and Orient Well Pits. Dewatering will be required to maintain dry conditions during mining. The mine water will primarily be used for dust suppression</p> <p>The use of water for dust suppression is licenced under GWL182709(4) and GWL173529(5) across 22 tenements which cover around 2,000ha.</p> <p>Dewatering will be undertaken using sumps with water pumped via pipelines into Turkeys Nests for reuse.</p> <p>Dewatering pipelines will be contained within a minimum 1m bund and inspected daily to identify any leaks/pipe failures or bunding erosion.</p> <p>Groundwater quality at the Admiral, Butterfly, Clark, and Orient Well deposits was assessed as part of the GRM Dewatering Assessment, with the quality of the dewater as determined from site groundwater monitoring to be fresh to brackish (TDS 1500-1920 mg/L) and neutral to slightly alkaline (7.7-8.1).</p>	<p>for dewatering pipelines will be added to the works approval in line with the applicant's advice on pipe construction.</p> <p>Operational and inspection requirements for dewatering pipelines will be added to the time limited operational conditions on the works approval in line with the applicant's advice on operations.</p> <p>Authorised discharge locations for dewater used for dust suppression will be incorporated into the time limited operational conditions on the works approval.</p>
<p>Please remove the dimensions of the raw water pond as these are indicative only. The key environmental control is that the pond is lined.</p>	<p>Dimensions have been removed from construction requirements as requested.</p>	<p>N/A</p>	<p>N/A</p>
<p>The Stormwater Dam will collect</p>	<p>Construction requirements for the surface</p>	<p>N/A</p>	<p>N/A</p>

Works Approval: W6536/2021/1

Summary of applicant's comments	Department's response	Summary of applicant's follow up comments	Department's follow up response
<p>surface water runoff from the processing plant area, not water diverted around the area.</p> <p>Vee drains and culverts are not shown on the site plan, however a updated premises map has been provided to clarify the stormwater dam location.</p> <p>Please remove the dimensions as there are indicative only. The key environmental control is that the pond has a compacted clay base.</p>	<p>water management system have been reworded to reflect surface water flows being directed from the processing plant area into the stormwater dam, as clarified by the applicant.</p> <p>Dimensions for the stormwater dam have also been removed from construction requirements as requested.</p>		
<p>The "self banded, containerised and enclosed Mak Water designed" does not apply to this proposal – reference to the WWTP as an Activated Sludge Bioreactor (ASBR) is more accurate.</p> <p>Given that the discharge will be a combined effluent from the WWTP and RO Plant, it is proposed that the discharge limits are moved from this section and added to the WWTP pipeline construction requirements.</p>	<p>Reference to the design of the WWTP in the construction requirements has been updated as requested.</p> <p>Discharge limits have been placed within the design and construction/installation requirements for the WWTP to specify that the WWTP is capable of treating sewage to the limits specified. WWTP pipelines do not contribute to the treatment of sewage.</p> <p>Separate monitoring of effluent discharged to land has been incorporated into commissioning and time limited operational conditions, where the effluent pipeline is specified as the discharge point.</p>	N/A	N/A
<p>Please remove the dimensions of the return water pond as these are indicative only. The key environmental control is that the pond is lined.</p>	<p>Dimensions have been removed from construction requirements as requested.</p>	N/A	N/A

Summary of applicant's comments	Department's response	Summary of applicant's follow up comments	Department's follow up response
<p>The discharge to the irrigation sprayfield will be combined effluent from the WWTP and RO plant. Hence reference to treated effluent as an emission from the WWTP should be changed to 'Blended effluent from WWTP and RO plant'.</p>	<p>The terminology of 'blended effluent' will be incorporated into the works approval and Decision Report as requested to reflect the blending of WWTP and RO brines at a rate of 70 m<sup>3</sup>/day and 42m<sup>3</sup>/day prior to irrigation at the irrigation sprayfield.</p> <p>Up until this stage the works approval has been assessed under Category 85 with an assessed production/design capacity of 70m<sup>3</sup>/day to reflect the throughput of sewage from the WWTP only, with Category 85 defined under the EP Regulations as having a production/design capacity of more than 20 but less than 100m<sup>3</sup>/day.</p> <p>As the RO brines are being blended with treated sewage and the entire waste stream is being irrigated, DWER considers that the discharge of RO brines should be incorporated as an element of the WWTP throughput. This will ensure that any discharge of contaminants to land via irrigation will be recorded through the monitoring of blended effluent and provide a more accurate representation of discharges to land once treated sewage has been blended, or 'diluted', with the RO brines.</p> <p>As the RO brines will be blended with treated sewage at a rate of 42m<sup>3</sup>/day, the maximum production/design capacity of the WWTP will increase to 112m<sup>3</sup>/day, exceeding the limits defined for a Category 85 prescribed activity.</p>	<p>Genesis confirms that the change from Category 85 to Category 54 is acceptable considering the irrigation of blended effluent will be 112m<sup>3</sup>/day</p>	<p>Category 54 is now incorporated into the works approval.</p> <p>Additional specification has been added to the works approval for the addition of RO brines to treated sewage (forming the blended effluent waste stream) however the regulatory intent of conditions has remained unchanged</p>

Summary of applicant's comments	Department's response	Summary of applicant's follow up comments	Department's follow up response
	As such, DWER will remove reference to Category 85 and incorporate Category 54 into the works approval, which is defined by the EP Regulations as having a production/design capacity of more than 100m <sup>3</sup> /day.		
<p>Given that the discharge to the irrigation sprayfield will be 'Blended effluent from WWTP and RO plant', for the time limited operational period it is proposed that the discharge limits currently specified for the WWTP and associated infrastructure are moved so that the discharge limits are controls for the Irrigation sprayfield.</p>	<p>Discharge limits for the WWTP have been specified as an operational requirement for the treatment of wastewater since the final concentration of discharge parameters in blended effluent will differ from that in treated wastewater due to dilution with RO brines.</p> <p>Discharge limits for treated wastewater also align with the design specifications of the WWTP provided during the assessment.</p> <p>Monitoring of discharge parameters to land via irrigation has been incorporated into time limited operational conditions (being Condition 28, Table 12) of the works approval.</p> <p>The Delegated Officer considers that discharges of contaminants to land will be adequately monitored in this manner.</p>	N/A	N/A

## Appendix 2: Application validation summary

SECTION 1: APPLICATION SUMMARY (as updated from validation checklist)		
<b>Application type</b>		
Works approval	<input checked="" type="checkbox"/>	
Date application received	17 March 2021	
<b>Applicant and Premises details</b>		
Applicant name/s (full legal name/s)	Genesis Minerals Limited	
Premises name	Ulysses Gold Project	
Premises location	Part of Mining lease M40/166 General Purpose Leases G40/4, G40/5 and G40/6	
Local Government Authority	Shire of Menzies	
<b>Application documents</b>		
HPCM file reference number:	DER2018/001042-5~18	
Key application documents (additional to application form):	Genesis Minerals Limited – Ulysses Gold Project Works Approval Application Supporting Information	
<b>Scope of application/assessment</b>		
Summary of proposed activities or changes to existing operations.	<p><u>Works approval</u></p> <ul style="list-style-type: none"> <li>• Construction and operation of the new Ulysses Processing Plant and TSF;</li> <li>• Development of the Ulysses underground mine;</li> <li>• Cutbacks to the existing pits;</li> <li>• Mining of the new Ulysses Far West and Clark open pits;</li> <li>• Construction of new WRL's and extensions to existing WRL's;</li> <li>• Construction of the new accommodation village, WWTP and Irrigation spray field.</li> </ul> <p>The life of the operation is proposed to be 10 years. The applicant is proposing to process 1,600,000 tonnes of ore per annum and treat 70m<sup>3</sup>/day of sewage waste through the accommodation village WWTP. The TSF will consist of 2 cells and associated pipeline infrastructure from the processing plant.</p>	
Category number/s (activities that cause the premises to become prescribed premises)		
<b>Table 1: Prescribed premises categories</b>		
<b>Prescribed premises category and description</b>	<b>Proposed production or design capacity</b>	
Category 5: Processing or beneficiation of metallic or non-metallic ore	1,600,000 tonnes per annual period	
Category 85: Sewage facility	70m <sup>3</sup> /day	
<b>Legislative context and other approvals</b>		

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 <input type="checkbox"/> No <input checked="" type="checkbox"/>	Referral decision No: Managed under Part V <input checked="" type="checkbox"/> Assessed under Part IV <input type="checkbox"/>
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Ministerial statement No: EPA Report No:
Has the proposal been referred and/or assessed under the EPBC Act?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Reference No:
Has the applicant demonstrated occupancy (proof of occupier status)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Certificate of title <input type="checkbox"/> General lease <input type="checkbox"/> Expiry: Mining lease / tenement <input checked="" type="checkbox"/> Expiry: G40/4, G40/5, G40/6 Exp. 14/11/2028 M40/166 Exp. 28/01/2043 M40/107 Exp. 25/07/2032 L40/11 Exp. 06/09/2024 L40/12 Exp 14/02/2025 L40/30 Exp. 25/11/2041 L40/34 Exp. 06/12/2041 Other evidence <input type="checkbox"/> Expiry:
Has the applicant obtained all relevant planning approvals?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A <input type="checkbox"/>	Approval: TBA Expiry date:
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	CPS No: 7052/3
Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Application reference No: N/A Licence/permit No: N/A No clearing is proposed.
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Application reference No: 039989 Licence/permit No: GWL 182709(2), CAW203971(1) and CAW205010(1)



<p>Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?</p>	<p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>	<p>Name: Goldfields groundwater area  Type: Proclaimed Groundwater Area  Has Regulatory Services (Water) been consulted?  Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>  Regional office: Goldfields</p>
<p>Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>Name: N/A  Priority: N/A  Are the proposed activities/ landuse compatible with the PDWSA (refer to <a href="#">WQPN 25</a>)?  Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/></p>
<p>Is the Premises subject to any other Acts or subsidiary regulations (e.g. <i>Dangerous Goods Safety Act 2004, Environmental Protection (Controlled Waste) Regulations 2004, State Agreement Act xxxx</i>)</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	
<p>Is the Premises within an Environmental Protection Policy (EPP) Area?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	
<p>Is the Premises subject to any EPP requirements?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	
<p>Is the Premises a known or suspected contaminated site under the <i>Contaminated Sites Act 2003</i>?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>Classification: report not substantiated  Date of classification: 12 April 2016</p>