



Application for Works Approval

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

Works Approval Number W3150/2025/1

Applicant Karora (Higginsville) Pty Ltd

ACN 108 547 217

Application number APP-0032325

Premises Higginsville Gold Project

Legal description

Within the mining tenements G15/19,G15/23, G15/26, G15/27,G15/29 L15/282, L15/288, L15/298, L15/302, L15/347, L15/382, L15/389, M15/31, M15/225, M15/231, M15/289, M15/325, M15/338, M15/348, M15/351, M15/352, M15/375, M15/506, M15/507, M15/512, M15/528, M15/580, M15/581, M15/597, M15/610, M15/620, M15/629, M15/639, M15/640,M15/642, M15/681, M15/748, M15/786, M15/817, M15/1132, M15/1790, M15/1814

As defined by the premises maps attached to the issued works approval

Date of report 26 May 2026

Decision Works approval granted

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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 construction and operation of the premises. As a result of this assessment, works approval W3150/2025/1 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 7 November 2025, Karora (Higginsville) Pty Ltd (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 Category 5 Processing or beneficiation of metallic or non-metallic ore at Higginsville Gold Project (the premises). The premises is approximately 55 km north of town of Norseman.

The applicant is seeking approval to construct and operate a in-pit tailings storage facility at Graveyard Pit (GYTSF), and to construct and operate a new processing plant with a maximum throughput of 2.6 million tonnes per annum (Mtpa), replacing the currently approved 1.5 Mtpa plant, while utilising the existing supporting infrastructure.

The premises relates to Category 5 and the assessed design capacity under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) which are defined in works approval W3150/2025/1. 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 W3150/2025/1.

In addition to Category 5 activities, the premises also undertake categories 6, 54 and 64 activities, which are authorised under operating licence L9155/2018/1.

2.3 Proposed Activities

The applicant seeking approval for the following proposed works which will be carried out within the existing prescribed premises.

2.3.1 Higginsville Processing Plant (HPP) expansion and upgrade

The applicant is seeking approval to increase the throughput of the current processing plant to approximately 2.6 Mtpa from 1.5 Mtpa. The processing plant is located within the mining tenement M15/348 and will be utilising the existing plant infrastructure. The proposed works include new infrastructure and additions to the existing processing plant.

The existing four-stage crushing circuit will be replaced with a new primary crusher, SAG mill, and pebble crusher, supported by upgraded conveyor systems to increase throughput. The current tertiary crusher will be repurposed for pebble crushing. A new lime silo will improve pH control during milling.

Processing improvements include gravity circuit enhancements, upgraded electrowinning, and expansion of the gold room with new furnaces and secure storage to handle increased gold production.

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To support higher throughput, additional leach tanks will be added to the carbon-in-leach (CIL) circuit, existing tanks will be upgraded, and the thickener will be enhanced for greater slurry capacity and water recovery. The elution and carbon regeneration circuits will also be expanded and optimised with new equipment and modifications.

Water for ore processing will mainly come from TSF return water and seepage bores, with additional supply from the Chalice area and dewatering at the Higginsville Project. Two new ponds (raw and process) will support higher demand, with total plant water needs of 46 m³/h fresh, 370 m³/h raw, and 378 m³/h process water. Proposed Higginsville processing plant layout is depicted in Figure 1 below.

Tailings will continue to be deposited in the existing TSF (TSF2–4SC), supported by in-pit TSFs as required, with upgraded pipelines and pumps to handle increased throughput.

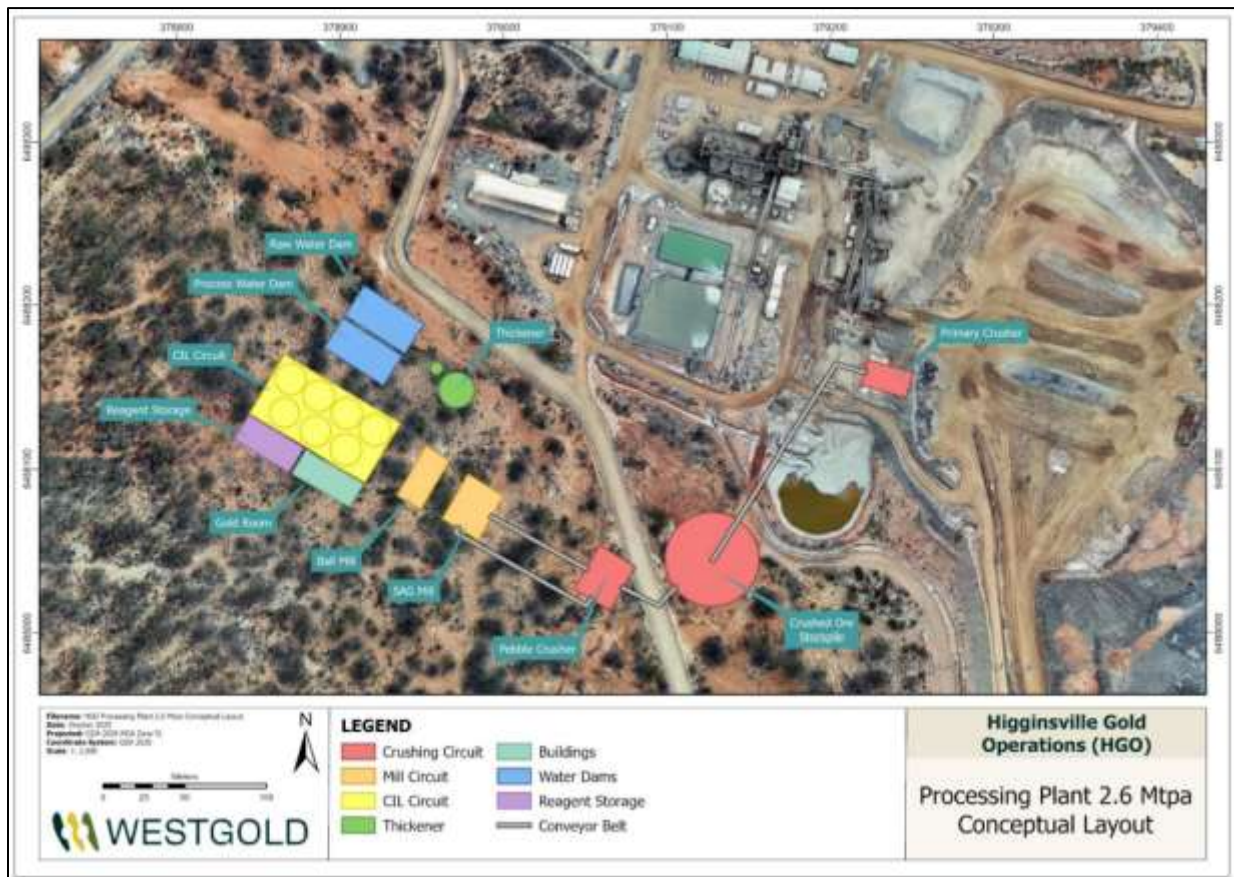


Figure 1: Proposed Higginsville 2.6 Mtpa Processing Plant Layout

2.3.2 Graveyard in-pit TSF

The applicant seeks approval to construct and operate the existing Graveyard Pit, located within mining tenements M15/338 and M15/375, as an in-pit tailings storage facility (GYTSF). The pit is located approximately 3.0 km south of the Higginsville Processing Plant and lies within a Tertiary palaeovalley system where several nearby pits have previously been used successfully as in-pit TSFs (Figure 2). At a processing rate of 1.5 Mtpa (prior to upgrade the processing plant) and a tailings density of 1.2 t/m³, the GYTSF is estimated to provide approximately 369,800 m³ of storage, equivalent to about 3.5 months of tailings deposition. The facility is categorised as “Low” under the Department of Mines, Petroleum and Exploration (DMPE) Hazard Rating and “Very Low” under Australian National Committee on Large Dams (ANCOLD) guidelines. Its use is intended to provide interim capacity while the next embankment raise at TSF2–4 Super Cell (Stage 5) is constructed.

The existing tailings pipeline corridor passes approximately 600 m east of the pit and can be

used for the proposed facility with only a short extension and no additional vegetation clearing is required. Tailings will be delivered to the pit via large-diameter High-density polyethylene (HDPE) pipelines extending at least 5 m over the pit crest and discharged from three spigot locations around the pit perimeter to control beach formation and pond location. These spigots will be located at southern perimeter (Location 1), western perimeter (Location 2) and northern perimeter (Location 3). Deposition will occur in four stages using above discharge points to guide the pond toward the north, where supernatant water will be recovered by a pontoon-mounted decant pump and returned to the Higginsville Processing Plant (Figure 3).

The pit is approximately 20 m deep and is underlain by low-permeability sediments. Three additional groundwater monitoring bores are proposed around the pit to allow monitoring of groundwater conditions around the TSF.

Tailings discharge locations are proposed to follow existing erosion gullies. To prevent these gullies from becoming active again, they will be fully backfilled and stabilised before any spigots are installed. The applicant has committed to completing all gully remediation works prior to any spigot construction, to ensure the ground is stable.

The GYTSE is designed to contain a 1-in-100-year, 72-hour rainfall event while maintaining a minimum operational freeboard of 0.5 m. No additional contingency freeboard is proposed.

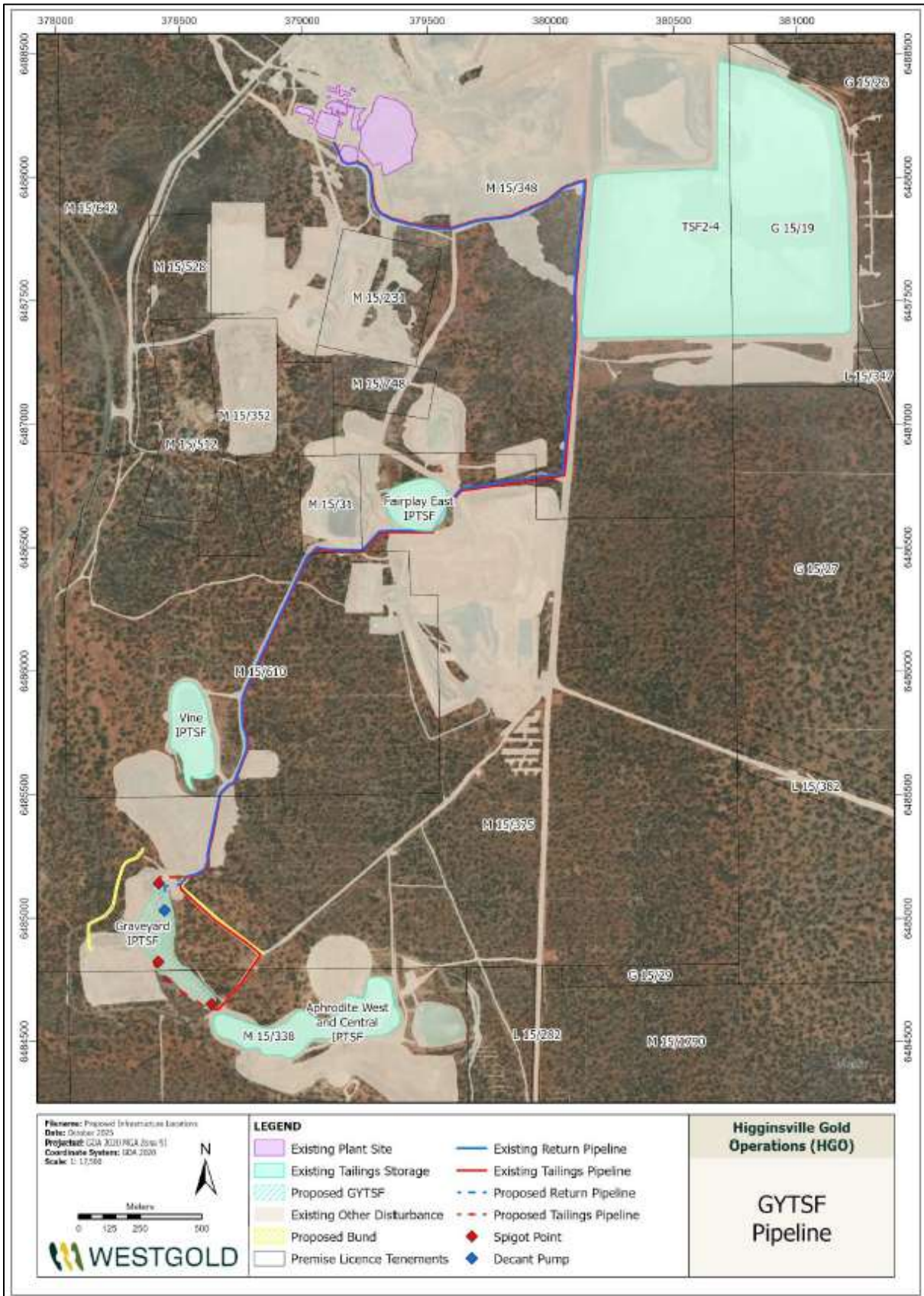


Figure 2: Proposed Graveyard In-pit TSF, tailings delivery and return pipelines

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Figure 3: Graveyard in-pit TSF proposed tailing discharge locations

2.4 Hydrology, Tailings Characteristics and Seepage

2.4.1 Local hydrology and hydrogeology

Graveyard pit is one of several pits within a tertiary palaeovalley system, of which the other pits previously used for either tailings or hypersaline water storage are located (Figure 2). The other pits include Aphrodite West and Central (filled with tailings), Aphrodite East was used for hypersaline water storage, and Vine has been historically used for water and tailings. Graveyard pit currently contains pit water, and the water levels are lower than the adjacent pits. Which may indicate a negligible hydraulic gradient in the area.

Stream flows in the area are ephemeral, occurring only after rainfall, and surface runoff ultimately drains toward Lake Cowan. Groundwater recharge is generally low due to the arid climate and high evapotranspiration rates. Regional groundwater flow is generally flow towards south-east, following the natural hydraulic gradient. Groundwater quality is typical of the Goldfields, being hypersaline with salinity from 30,000 to 60,000 mg/L Total Dissolved Solids (TDS) at the monitoring bores and exceeding 250,000 mg/L TDS in some pit water samples.

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The groundwater pH seems to be highly variable with some monitoring bores showing acidic conditions (pH<4).

Supporting documentation indicates that, due to the Graveyard pit location in a low-lying area in the paleochannel, it intersects with three major ephemeral flood lines; northern, western, and southern. The northern flood line directs surface water runoff into Graveyard Pit, where it is opportunistically reused as low-salinity process water. The western flood line is partly diverted south by a bund, while the southern flood line follows natural drainage toward Lake Cowan (Coffey, 2025).

It has been stated that, during GYTSF operation, these surface flows will be required to be diverted away from the pit to prevent contamination as well as to maintain the tailings storage capacity. To achieve that, the applicant has proposed a diversion drain system, which divert the northern flood line away from the pit and connects to the southern flood line to flow towards Lake Cowan. This diversion channel also avoids the reactivation of erosion gullies at the northern perimeter and mitigates the risk of erosion and pit overtopping. The applicant also proposes gravel and cobble armouring to be included at critical points along the channel to prevent erosion. Additionally, existing abandonment bunding will be upgraded at the north-west and north-east of the pit to mitigate any adverse impacts from a 1 in a 100-year flood event.

2.4.2 Tailings characteristics

The tailings produced from processing ore sourced from the Beta Hunt underground mine, along with additional ore from the Two Boys underground mine, demonstrate geochemical properties that are generally low risk. Chemical analysis of the tailings indicate that the tailings are non-acid forming (NAF), with an alkaline pH, thus the potential for acid rock drainage is minimal. The salinity of the tailings is very high dominated by sodium and chloride. Multi-element composition results (Table 1) indicate WAD cyanide is within the accepted level for tailings discharge (<50 mg/L), but it is at the upper end of this range and may still present a moderate wildlife-toxicity risk.

Table 1: Chemical composition of the Tailings

Parameter	Units	Results
pH	pH Units	8.6
Conductivity at 25°C	µS/cm	184,880
Total Dissolved Solids (TDS)	mg/L	120,990
Sodium	mg/L	40,445.0
Potassium	mg/L	810.0
Magnesium	mg/L	824.1
Calcium	mg/L	3630.6
Chlorine	mg/L	64,562.0
Sulfate	mg/L	3,430.0
Bicarbonate	mg/L	41.0
Carbonate	mg/L	38.0
Hydroxide	mg/L	<1.0

Fluoride	mg/L	<0.1
Silica	mg/L	1.5
Ammonia	mg/L	47.0
Nitrate	mg/L	30.0
Iron	mg/L	11.6
Copper	mg/L	2.5
Zinc	mg/L	0.3
Nickel	mg/L	0.8
Cobalt	mg/L	0.6
Silver	mg/L	0.006
Mercury	mg/L	<0.005
Weak Acid Dissociable (WAD) Cyanide	mg/L	49.3

2.4.3 Seepage

The applicant has conducted a preliminary seepage assessment as a part of a hydrogeological study. The supernatant water will be recovered using a pontoon pump or similar system placed along the ramp, and all recovered water will be returned to the Higginsville plant for reuse. No extra seepage-control measures are proposed. The hydrological assessment indicates the pit is not hydraulically connected to the regional groundwater system, and the seepage risk is considered low due to the low-permeability geology. The facility has enough capacity to contain a 1-in-100-year, 72-hour rainfall event while maintaining a minimum operational freeboard of 0.5 m, with no additional contingency beyond this.

There are nine existing monitoring bores within the prescribed premises, which will be utilised to monitor groundwater quality. Three new monitoring bores (GYMB1, GYMB2 and GYMB3) will also be installed around the GYTSF and added into the monitoring bore network and will undertake groundwater quality monitoring as per the operating licence conditions (Figure 4).

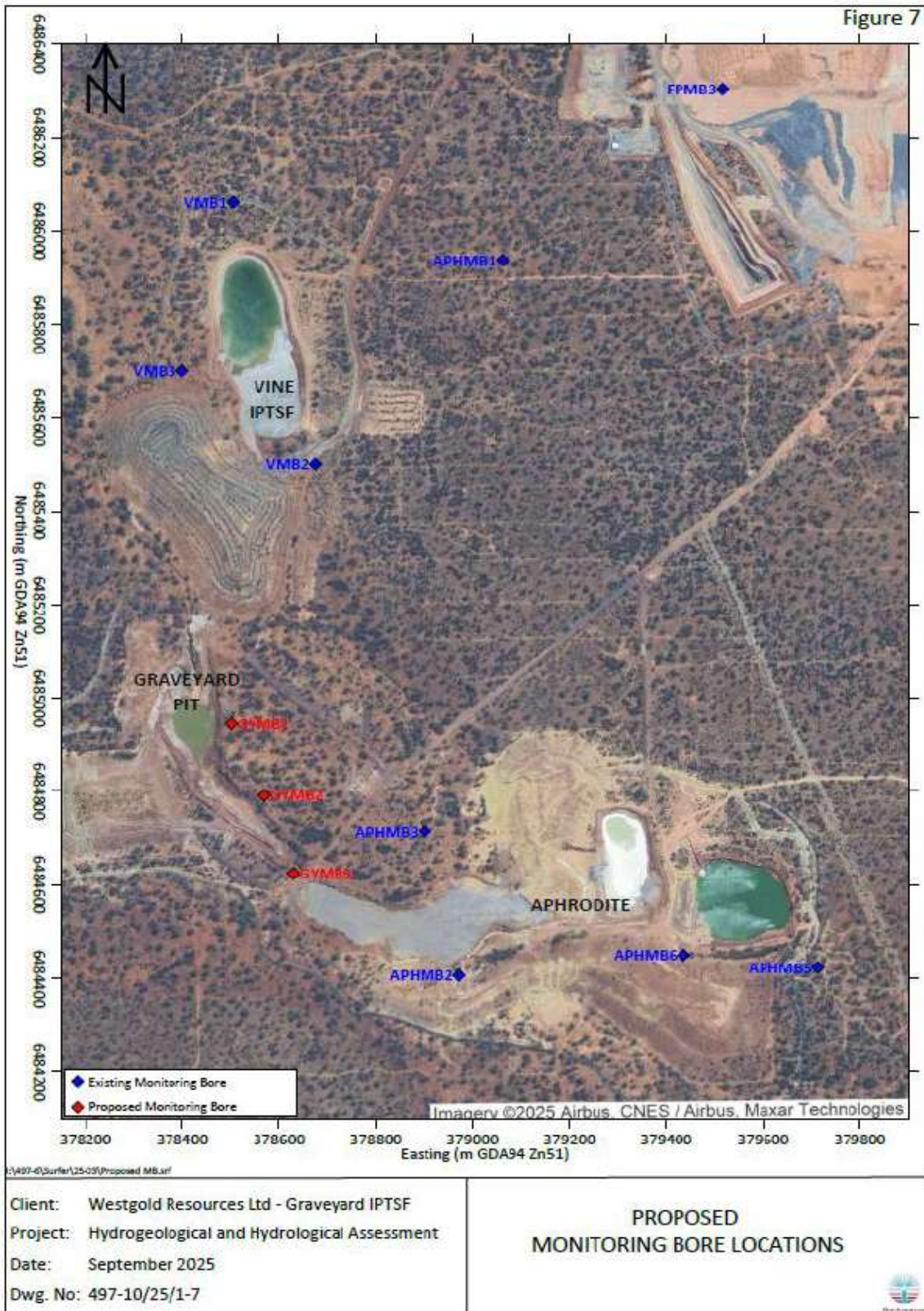


Figure 4: Monitoring bore network at Higginsville project (existing and proposed)

2.4.4 Water Balance

Water balance analyses for the proposed GYTSTF has been completed using a simple mathematical model to estimate monthly inflows and outflows under average climate conditions. The assessment considered rainfall and slurry water inputs, as well as evaporation, seepage losses, and water retained within the tailings, based on site-specific conditions and operating

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assumptions.

Under average climatic conditions, the analysis indicates that approximately 66.8% of slurry water can be recovered, equivalent to about 402,662 m³ per year. Water recovery is influenced by facility operation, particularly pond size and beach management, and is also affected by slurry properties, discharge continuity, climatic conditions, and decant system efficiency.

The water balance and historical data indicate that Graveyard Pit is not hydraulically connected to groundwater, and infiltration is minimal due to the low permeability of surrounding sediments and bedrock (Rockwater, 2025).

3. Risk assessment

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

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

3.1 Source-pathways and receptors

3.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises construction and operation which have been considered in this decision report are detailed in Table 2 below. Table 2 also details the control measures the applicant has proposed to assist in controlling these emissions, where necessary.

Table 2: Proposed applicant controls

Emission	Sources	Potential pathways	Proposed controls
Construction			
Dust	Installation of processing plant infrastructure	Air/windborne pathway	<ul style="list-style-type: none"> • Water cart with dribble bars to be onsite during the construction phase. • Speed limits will be enforced to minimise dust generation. • Work to be paused during high wind periods. • Visual dust inspection.
	Remediation work at GYTSE and installation of tailings delivery pipelines	Air/windborne pathway	
Operation			
Dust	Operation of Higginsville processing plant	Air/windborne pathway	<ul style="list-style-type: none"> • Conveyor transfer points, crushing operations, and ore stockpiles to be fitted with spray systems or enclosed covers where practicable. • Water cart with dribble bars to be onsite during the operation phase.
Contaminated		Overland runoff	<ul style="list-style-type: none"> • Surface runoff to be diverted around plant

Stormwater			operational areas and into sumps.
Hydrocarbon and Reagent		Overland runoff	<ul style="list-style-type: none"> • Spill kits to be placed at all storage locations. • Storage area to be complied Australian Standard AS 1940: The Storage and Handling of Flammable and Combustible Liquids. • Storage to be fully bunded with impervious floors to contain a minimum of 110% of the largest vessel or 25% of the total volume. • Inspections and maintenance of hydrocarbon and reagent tanks, pipelines, and transfer systems to be carried out.
Process water	Storage of process water in the process water pond	Overland runoff / containment failure	<ul style="list-style-type: none"> • Daily inspection as per the operating licence. • Lined with HDPE liners and to be connected to the overflow catchment dam.
Tailings / decant water	Discharge of tailings at GYTSE	Seepage / infiltration from the base and walls of the TSF	<ul style="list-style-type: none"> • Three additional monitoring bores to monitor groundwater level and quality surrounding GYTSE. • Daily inspections of decant pump operation, safety equipment, supernatant pond levels, freeboard. • Ongoing quarterly groundwater quality monitoring
		Discharge to land due to overtopping	<ul style="list-style-type: none"> • Minimum 0.5m operational freeboard to be maintained. • Daily inspections of decant pump operation, safety equipment, supernatant pond levels, freeboard. • Conduct annual external TSF audit • Surface water runoff will be prevented from discharging into the in-pit TSF via a diversion drain system that reroutes the northern floodline around the west side of the pit • Diversion channels to be constructed with a 6m width base with 1V:3H side slope, containing Longitudinal grade of 0.5 m per 300 m with a flow capacity of 18 m³/s, corresponding to a 10% AEP rainfall event. • Gravel and cobble armouring to be included at critical points along the channel. • Additional and upgraded bunding to be constructed along the northwest and northeast of the GYTSE
		Discharge to land from leaks / spills or rupture of tailings and	<ul style="list-style-type: none"> • Tailings pipelines to be inspected at least once per shift. • Pipelines to be located within V drains to contain any potential spills between visual

		decant / return water pipelines	<p>pipeline integrity inspection.</p> <ul style="list-style-type: none"> • Scour pits to be located within adequate intervals.
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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 3 and Figure 5 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises (*Guideline: Environmental Siting* (DWER 2020)).

Table 3: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	Distance from prescribed activity
Human Receptors	No human receptors identified within 50km. Screened out as no pathway to receptor.
Environmental receptors	Distance from prescribed activity
Native vegetation	Directly adjacent to the TSF on all sides
Avifauna: 130 bird species including Peregrine falcon and the fork tailed swift (specially protected and migratory under the BC Act 2016)	In the surrounding area
Underlying groundwater - Goldfields Groundwater Area	<p>Premises is located within the proclaimed groundwater area.</p> <p>Depth to groundwater ~16 to 20m within the premises. Groundwater salinity ranges between 60,000 and 200,000mg/L.</p> <p>There are no known groundwater users in the vicinity of the premises.</p>
Surface Water – Lake Cowan	<p>Located approximately 6km to the south of the GYTsf and 7km to the east of the processing plant.</p> <p>The lake is predominately dry but may contain water following heavy rain. Water ponded in the lake is most likely lost to evaporation and seepage.</p>
Surface Water – ephemeral drainage lines	200m to the north of the GYTsf and 350m to the southwest of the GYTsf

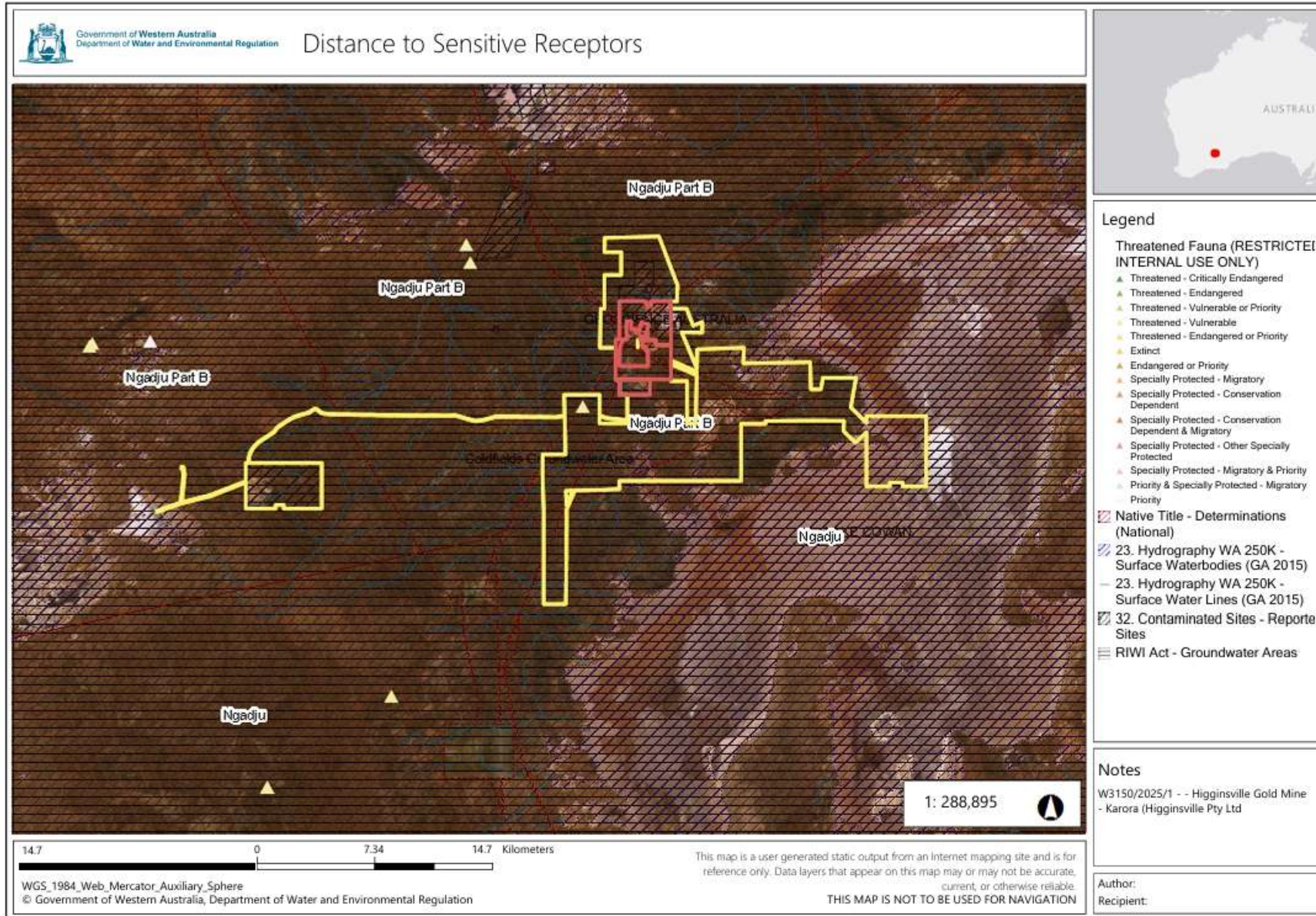


Figure 5: Distance to sensitive receptors

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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 4.

Works approval W3150/2025/1 that accompanies this decision report authorises construction and time-limited operations. The conditions in the issued works approval, as outlined in Table 4 have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

A licence amendment 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. Category 5 activities. 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 4: Risk assessment of potential emissions and discharges from the premises during construction and operation

Risk events					Risk rating ¹	Applicant controls sufficient?	Conditions ² of works approval	Justification for additional regulatory controls / DWER comments
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls	C = consequence L = likelihood			
Construction								
Category 5: Installation of processing plant Construction of two new water storage ponds (Raw and Process)	Dust	Pathway: Air/windborne pathway Impact: Potential impact on vegetation health	Native vegetation	Refer to Section 3.1.1	C = Slight L = Possible Low Risk	Y	Condition 3 – Infrastructure Construction requirement	N/A
Time-limited operations								
Category 5: Operation of processing plant	Dust	Pathway: Air/windborne pathway Impact: Potential impact on vegetation health	Native vegetation	Refer to Section 3.1.1	C = Minor L = Unlikely Medium Risk	Y	Condition 3 – Infrastructure Construction requirement Condition 10 – Infrastructure operational requirement	Applicant's proposed controls for managing dust during the operation of the processing plant have been deemed acceptable and have been conditioned on the works approval.
	Potentially contaminated stormwater	Pathway: Overland runoff Impact: Ecosystem disturbance and impact to groundwater	Native vegetation groundwater	Refer to Section 3.1.1	C = Minor L = Unlikely Medium Risk	Y	Condition 3 – Infrastructure Construction requirement Condition 10 – Infrastructure operational requirement	Applicant's proposed controls for managing potentially contaminated stormwater have been deemed acceptable and have been conditioned on the works approval.
	Hydrocarbons	Pathway: Direct discharge to land Impact: Ecosystem disturbance	Native vegetation	Refer to Section 3.1.1	C = Minor L = Unlikely Medium Risk	Y	Condition 3 – Infrastructure Construction requirement Condition 10 – Infrastructure operational requirement	Applicant's proposed controls for managing hydrocarbons have been deemed acceptable and have been conditioned on the works approval.
	Storage of water at process water pond	Pathway: Seepage to groundwater through the walls or base of the process water pond causing contamination and/or mounding	Native vegetation groundwater	Refer to Section 3.1.1	C = Minor L = Unlikely Medium Risk	Y	Condition 3 – Infrastructure Construction requirement Condition 10 – Infrastructure operational requirement	Applicant's proposed controls for managing seepage from the process pond have been deemed acceptable and have been conditioned on the works approval.

		causing impacts to native vegetation Impact: Ecosystem disturbance and impact to groundwater						
		Pathway: Overtopping of pond causing a direct discharge to land. Impact: Ecosystem disturbance and impact to groundwater			C = Minor L = Unlikely Medium Risk	N	Condition 3 – Infrastructure Construction requirement Condition 10 – Infrastructure operational requirement	Insufficient information regarding the process water pond was provided within the supporting documentation, and no management measures have been proposed to address potential risks such as overtopping during operation. Consequently, the delegated officer has determined to include conditions in the works approval requiring appropriate freeboard is maintained and the pond is sized adequately to contain rainfall events without overtopping.
Category 5: Operation of Graveyard in-pit TSF	Tailings	Pathway: Seepage / infiltration from the base and walls of the TSF causing contamination and/or mounding causing impacts to native vegetation Impact: Potential contamination of soil, groundwater quality or impacts to vegetation health	Native vegetation Soil groundwater	Refer to Section 3.1.1	Refer to Section 3.3 – Detailed risk assessment of seepage impacts to groundwater and vegetation			
		Pathway: Overtopping Impact: Potential impact on soils, surface water, groundwater and nearby native vegetation	Native vegetation Soil groundwater	Refer to Section 3.1.1	C = Moderate L = Possible Medium Risk	Y	Condition 3 – Infrastructure Construction requirement Condition 10 – Infrastructure operational requirement Condition 12 – Process monitoring Condition 16 – Undertake water balance	The applicant has proposed the use of a pontoon-mounted decant recovery system to reclaim supernatant water from the tailings slurry within the Graveyard In-Pit Tailings Storage Facility (GYTSF). In addition to supernatant water, a key source of water entering the pit is direct rainfall. It is noted that three flood lines intersect the GYTSF, creating the potential for additional surface water inflow into the pit. To address this, the applicant has proposed the construction of diversion drains to redirect surface water away from the storage facility. This diversion system is designed to prevent contamination of the supernatant pond, maintain available storage capacity, and mitigate overtopping risk. These measures are considered appropriate and have been included as conditions within the Works Approval. In addition, the applicant has proposed the realignment and reinforcement of existing abandonment bunding to ensure complete separation of external surface water inflows from the GYTSF. Collectively, these controls are critical in minimising stormwater ingress and reducing overtopping risk and have also been conditioned within the works approval. While a preliminary water balance has been provided as part of the supporting documentation, the potential for ongoing surface water inflows necessitates continued monitoring. Accordingly, the Delegated Officer has determined that the applicant must develop an annual site water balance to better understand water movement and ensure effective water management throughout operation of the TSF. <u>Erosion gullies</u> Historical surface erosion has led to the development of incised gullies at three locations (southern, western, and

								northern perimeter of the pit). These gullies act as channels that allow stormwater inflow into the pit which could increase seepage and also minimise capacity of the pit leading to overtopping. The applicant has proposed to perform remediation work along these erosion gullies to repair and reinforce the areas before installation of the spigots at the discharge locations, to prevent reactivation of erosion gullies and further inflow of stormwater The Delegated officer decided to condition the applicant's commitments to remediate the gullies prior to installation of spigots, tailings delivery pipelines and commencement of tailings deposition.
	Tailings and decant / return water	Pathway: Discharge to land from leaks / spills from tailings and decant / return water pipelines Impact: Potential contamination of soil and nearby ground water. Inundation of vegetation leading to stress/death	Native vegetation Soil groundwater	Refer to Section 3.1.1	C = Minor L = Possible Medium Risk	Y	Condition 3 – Infrastructure Construction requirement Condition 10 – Infrastructure operational requirement	The Delegated Officer has considered the applicant's proposed controls for managing potential risks associated with tailings and decant discharge due to pipeline leaks or ruptures and has determined that these measures are acceptable. Accordingly, they have been conditioned within the works approval.
	Decant water containing high concentration of salinity, cyanide and other contaminants of concern	Pathway: direct access through ingestion Impact: deterioration of avian health including specially protected and migratory under the BC Act 2016)	Avifauna	Refer to Section 3.1	C = Minor L = Unlikely Medium Risk	Y	N/A	High concentrations of heavy metals, particularly cyanide, associated with the processing of gold ore, can be harmful to transient birds using the decant pond as drinking water sources. Water quality data provided by the licence holder indicates that salinity concentrations of the tailings slurry water was approximately 120,000 mg /L. This concentration is expected to render the water unpalatable to most birds. No additional regulatory controls are required to be added to the works approval at this time.

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 Risk assessment of seepage impacts to groundwater and vegetation

Seepage from TSFs has been identified as a key environmental risk during operations. Seepage can result in groundwater mounding when the infiltration of water causes the groundwater table to rise leading to detrimental effect on vegetation health from the exposure of the root zone to hypersaline and waterlogged conditions. Supporting documentation indicates that other pits which have been used for tailings disposal within the same palaeochannel system, namely Aphrodite West, and Vine pits, have already contributed to measurable changes in groundwater conditions. Specifically, groundwater mounding has been observed at the Vine and Aphrodite West pits, of which are located in close proximity to the Graveyard pit. Operation of Vine pit as an in-pit TSF has resulted an increase about 13 m from original level of 40.93 mbgl in November 2019 to 17.49 mbgl in June 2024 (Higginsville AER 2020 and 2024). These observations suggest that similar groundwater mounding impacts could be expected at the GYTSE, highlighting the need for careful monitoring and management of groundwater interactions over time.

TSF seepage can also result in groundwater contamination through the infiltration of metals, metalloids, and chemical compounds such as WAD cyanide. Tailings analysis confirms that it is non-acid forming (NAF), with an alkaline pH, thus the potential for acid rock drainage is minimal. WAD cyanide is within the accepted level for tailings discharge (<50 mg/L), but it is at the upper end of this range (49.3 mg/L) and may still present a moderate toxicity risk. Longer term seepage of WAD cyanide can contaminate groundwater.

To mitigate any impacts from potential seepage, the applicant has proposed some acceptable controls and those have been conditioned in the works approval. In addition to that, where there are insufficient controls to manage potential risks, the department has specified additional regulatory requirements.

3.3.1 Applicant's proposed controls

The applicant has proposed controls to manage seepage impacts including;

- Recovery of decant water via a pontoon mounted pump.
- Installation of 3 additional monitoring bores around Graveyard pit and quarterly monitoring of water levels, pH, TDS/EC and quarterly monitoring of metals, metalloids and WAD Cyanide.
- Optimise water recovery through maintaining the supernatant pond no more than 20% of the tailings beach area using phased deposition of tailings.

3.3.2 Risk Assessment

The hydrological assessment submitted by the Applicant indicates that the Graveyard Pit is effectively isolated from the surrounding groundwater system. This is due to the low permeability of the palaeovalley sediments and underlying bedrock. Furthermore, the tailings deposited in the pit are composed of low-permeability materials, which further restrict the movement of seepage.

Thus, based on the information provided within the supporting documents, the department has assessed each relevant risk event and determined a risk rating, based on the consequence and likelihood of impacts to sensitive receptors, in accordance with the Guideline: Risk assessments (DWER 2020).

Given the short period of operation, the Delegated Office has;

- considered the consequence of seepage from Graveyard in-pit TSF could have minor impacts on the groundwater quality and native vegetation; and

- considered the likelihood of impacts from seepage to sensitive receptors as possible during operation.

It is determined that the overall rating for the risk of impacts from seepage, based on a consequence of minor and likelihood of possible is **medium**.

3.3.3 Regulatory controls

Monitoring baseline groundwater quality

Monitoring baseline water quality around a TSF is essential to identify and evaluate any potential seepage impacts arising from tailings deposition and long-term storage. Notably, the supporting documentation does not provide sufficient information on baseline concentrations of key contaminants, including metals, sulfates, and cyanide, in groundwater surrounding the Graveyard in-pit TSF. Therefore, establishing a baseline conditions will provide a reliable reference for future comparison. Accordingly, the Delegated Officer has determined that a baseline groundwater monitoring program is required to determine the pre-operational conditions and enable robust assessment and ongoing management of any future seepage related risks. (Condition 5)

Groundwater SWL target and limit

The most immediate effects of seepage are likely to arise from groundwater mounding and the influence of saline water on vegetation in the vicinity of the TSF. Groundwater mounding can occur when seepage from the TSF causes a localised rise in groundwater levels. Overtime, this may lead to increased soil salinity and a consequent decline in vegetation health and productivity. The applicant has indicated that any groundwater mounding associated with the Graveyard Pit is expected to remain steep-sided and localised and is anticipated to dissipate following the cessation of tailings deposition.

Currently, there are no monitoring bores installed around the Graveyard Pit. To address this, the applicant has proposed the installation of three monitoring bores (GYMB1 to GYMB3), positioned to intercept potential groundwater flow paths and facilitate the monitoring and management of seepage impacts. The Delegated Officer considers that the proposed bores are appropriately located and sufficient to detect potential seepage issues during the operation of the Graveyard in-pit TSF.

However, the Delegated Officer has also determined that standing water level targets and limits must be established for the monitoring bores surrounding the TSF. In the event, the monitoring results exceed the specified trigger levels for standing water levels, the applicant will be required to implement timely and effective corrective actions to mitigate mounding and reduce groundwater levels. (Condition 14 and 16)

Water balance

The applicant has developed a preliminary water balance based on monthly inflows and outflows under average climatic conditions, estimating that approximately 66.8% of tailings slurry water will be recovered. However, no specific seepage rate has been determined for the GYTSE, and actual recovery will depend on operational factors such as pond size and beach management. Reduced recovery efficiency may increase seepage risk, and a clearer understanding will only be achieved during operations. If monitoring identifies higher than expected water losses or rising groundwater levels, this may indicate increased seepage and should trigger investigation and corrective action. Accordingly, a condition has been added that requires a water balance (Condition 17).

4. Consultation

Table 5 provides a summary of the consultation undertaken by the department.

Table 5: Consultation

Consultation method	Comments received	Department response
Application advertised on the department's website on 05 January 2026	One public comment received. Refer to Appendix 1	Refer to Appendix 1
Department of Mines, Petroleum and Exploration (DMPE) advised of proposal 23 December 2025	DMPE replied on date advising that "Reg ID 204906, which includes the proposal for conversion of Graveyard Pit to In-Pit TSF (GYTSF), including supporting ancillary infrastructure, and the expansion of the processing plant currently remains under assessment pending the proponent providing evidence of consent to conduct works for a reserve intersection. There do not appear to be any discrepancies noted between the works approval and the MDCP. Information provided in the Works Approval is consistent with the MDCP. DMPE have received geotechnical review, and no issues were identified as part of the assessment. There are no outstanding compliance issues or Required Actions. DMPE does not have any additional concerns regarding the activities proposed in the MDCP."	DWER noted the comments received from DMPE and considered them during the risk assessment.
Applicant was provided with draft documents on 21 May 2026	Refer to Appendix 2	Refer to Appendix 2

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. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
2. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
3. DWER 2020, *Guideline: Risk Assessments*, Perth, Western Australia.
4. Email titled "L9155 - Karora Resources - Avoca Mining Pty Ltd - Higginsville Gold Operations - Annual Environmental Report & AACR - 2019 - 2020" dated 30/09/2020 authored by Alex Ruschmann, available at DWER records (DWERDT345266)
5. Email titled "L9155/2018/1 - Avoca Mining Pty Ltd - Higginsville Gold Operations - Annual Environmental Report AER and Annual Audit Compliance Report AACR - 2020 to 2021" dated 23/09/2021 authored by Alex Ruschmann, available at DWER records (DWERDT507650)
6. Email titled "L9155 - Avoca Mining Pty Ltd - Karora Resources Pty Ltd - Higginsville Gold Operations - Annual Environmental and Audit Compliance Report AER AACR 2021 to 2022" dated 21/09/2022 authored by Brent Sweeney, available at DWER records (DWERDT662323)
7. Email titled "L9155 - Avoca Mining Pty Ltd - Karora Resources Pty Ltd - Higginsville Gold Operations - Annual Environmental and Audit Compliance Report AER AACR - 2022-2023" dated 12/09/2023 authored by Teneille Gilbert, available at DWER records (DWERDT834686)
8. Email titled "L9155/2018/1 - Karora Higginsville Pty Ltd Higginsville Gold Operations - Annual Environmental Report AER and Annual Audit Compliance Report AACR - 2023 to 2024" dated 07/10/2024 authored by Alex Ruschmann, available at DWER records (DWERDT1016542)

Appendix 1: Public comments received during advertising period

Summary of the comment	Department's response
<p><u>TSF design</u></p> <p>The pit sits in a palaeochannel with shallow groundwater, so even small seepage could allow contaminants to move into the surrounding aquifer. A groundwater-flow model using data from all existing and proposed bores is needed to assess how seepage might behave under worst-case conditions.</p>	<p>Risk events associated with seepage has been assessed in sections 3.2 and 3.3 of this decision report.</p>
<p><u>Seepage and Water balance Assumptions</u></p> <p>The Application assumes minimal infiltration and treats the pit as a closed basin, but evidence from nearby facilities shows groundwater mounding can rise over ten metres, potentially driving seepage toward the Graveyard Pit. A seepage-recovery program is recommended, including three additional downgradient bores about 200 m from the pit and monthly monitoring for WAD cyanide, total dissolved solids and major ions during the first two years.</p>	
<p><u>Cyanide Management</u></p> <p>The tailings slurry contains about 49 mg/L of WAD cyanide, just above the 50 mg/L wildlife-protection trigger. The design assumes rapid cyanide breakdown in the supernatant pond, but no kinetic data are provided for the highly saline, alkaline conditions (pH 8.6; TDS ≈ 121 g/L). Bench-scale degradation tests under these site-specific conditions should be required, and an operational limit of 30 mg/L WAD cyanide should be set before any discharge to the decant system.</p>	<p>Risk event has been assessed in sections 3.2 of this decision report.</p>
<p><u>Biodiversity and Fauna impacts</u></p> <p>The conceptual site model identifies birds and bats as receptors but does not assess habitat loss. The proposed 7.3 ha clearing overlaps grassland used by the vulnerable Western Grass-wren (EPBC-listed). A formal Ecologically Sustainable Development assessment with a species-specific habitat-use model is required, along with a mitigation hierarchy that includes at least 1.5 ha of native revegetation using locally sourced seed.</p>	<p>Under Part V, DWER's assessment is limited to emissions and discharges from prescribed activities and their potential impacts on the environment and human health.</p> <p>Matters relating to habitat loss, biodiversity conservation, and impacts on EPBC-listed species are addressed under separate regulatory frameworks, such as the Environmental Protection Act (Part IV) and the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). Accordingly, The requirement for an Ecologically Sustainable Development (ESD)</p>

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	assessment is beyond the scope of Part V of the Environmental Protection Act 1986 (EP Act).
<p><u>Heritage and Indigenous cultural values</u></p> <p>The stakeholder-engagement register notes consultation with the Ngadju Native Title Aboriginal Corporation and the Shire of Coolgardie, but the heritage survey does not identify any Aboriginal sites within the 25 km² project area. However, the Department of Planning, Lands and Heritage records several rock-art sites within the wider tenement. A full cultural-heritage assessment of the entire tenement, especially the Mitchell palaeochannel where rock-art panels are known, should be undertaken. If any sites are found, a cultural-heritage management plan must be prepared in line with the Aboriginal Heritage Act 1972.</p>	<p>Within the scope of Part V of the <i>Environmental Protection Act 1986</i> (EP Act), DWER considers only the impacts to the environment and human health arising from emissions or discharges from prescribed activities.</p> <p>Where culturally significant site(s) may be directly impacted or are located within the premises, the responsibility rests with the works approval holder to ensure compliance with all relevant regulatory requirements, including the preparation and implementation of a cultural heritage management plan under the <i>Aboriginal Heritage Act 1972</i>.</p>
<p><u>Climate-change resilience and extreme-event design</u></p> <p>Recent climate-trend data for the Goldfields show a 12% increase in extreme-rainfall frequencies over the past 30 years. Because the current design is based on a 1-in-2000-year Probable Maximum Flood (PMF), the event selection should be updated, either to a 1-in-500-year event or by applying a 1.2 factor to the PMF, and the required freeboard and bund heights recalculated accordingly.</p>	<p>Risk events associated with freeboard and overtopping has been assessed in sections 3.2 of this decision report.</p>
<p><u>Emergency-response and incident-reporting</u></p> <p>The operations manual provides a generic emergency-action plan but lacks clear notification thresholds for cyanide exceedances, groundwater mounding, or tailings-dam breach. As DWER requires notification within four hours of any water-quality incident, explicit trigger levels, >30 mg/L WAD cyanide, groundwater rise above 4 m bgl, and freeboard loss >0.5 m, should be added, along with a clear escalation pathway from the operator to DWER and the EPA.</p>	<p>Conditions 18 – 19 require the works approval holder to submit a report on the time limited operations authorised under the works approval.</p> <p>Operation of the works authorised under the works approval is approved for a time limited period of 180 days. Ongoing operation will be assessed separately under a licence amendment. Notification requirements will be applied as part of this process.</p>
<p><u>Monitoring-program adequacy</u></p> <p>The proposed quarterly monitoring excludes key trace metals, even though elements such as arsenic (≈725 mg/kg in tailings) occur at elevated levels and can mobilise under changing redox conditions. The monitoring suite should be expanded to include total and dissolved arsenic, lead, mercury, cadmium and selenium, with detection limits ≤0.1 mg/L, and results</p>	<p>Condition 14 of the Works Approval requires continuous groundwater monitoring for contaminant concentrations, including the full suite of metals and metalloids.</p>

<p>submitted to DWER within 30 days of each sampling round.</p>	
<p><u>Cumulative licence compliance</u></p> <p>The Application cites past licence amendments but does not assess the combined impacts of the new in-pit tailings facility, the TSF 2–4 stage-five raise and the proposed expansion of the processing plant to 2.6 Mt/yr. A cumulative-effects assessment is needed to quantify total water use, tailings production and pollutant loadings across all concurrent activities, and to show that the combined totals remain within DWER licence limits (e.g., total abstraction \leq 3 ML/yr).</p>	<p>A separate Licence Amendment application is under assessment for TSF2-4 Stage 5 raise.</p> <p>The expansion of the processing plant is assessed within the Works Approval and continuous operation will require a future Licence Amendment.</p>

Appendix 2: Summary of applicant's comments on risk assessment and draft conditions

Condition	Summary of applicant's comment	Department's response
Condition 11 Table 5	Applicant requested that the "minimum total freeboard of 2 meters" is changed to "minimum operational freeboard of 0.5 meters" to match the advised freeboard limit stated in the Graveyard In-Pit TSF Design Report (Coffey, 2025). The Applicant prefers the operational freeboard in terms of monitoring requirements as it poses a more quantifiable metric and limit to recording/reporting in line with the other TSFs licenced on L9155/2018/1.	The Department has considered the Applicant's request to amend the freeboard requirement and has adopted the change in the Works Approval, as it aligns with the Graveyard In-Pit TSF Design Report (Coffey, 2025) and is consistent with the TSF freeboard requirements in the operating licence.