Government of Western Australia
Department of Water and Environmental Regulation

Decision Report

Application for Works Approval

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

Works Approval Number	W6950/2024/1
Applicant	Andy Well Mining Pty Ltd
ACN	158 108 895
File number	DER2024/000335
Premises	Andy Well Gold Project Mining Tenement M51/870 MEEKATHARRA WA 6642 As defined by the premises map attached to the issued works approval
Date of report	07 February 2025 **(FINAL)**
Decision	Works approval granted

Table of Contents

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 W6950/2024/1 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

Andy Well Mining Pty Ltd (the applicant) owns the Murchison Gold Project that consists of the Andy Well Gold Project and Gnaweeda Project.

On 04 July 2024, the applicant submitted an application for a works approval under section 54 of the *Environmental Protection Act 1986* (EP Act). The application seeks approval to undertake construction works relating to tailings deposition into an existing mined pit (Suzie Pit) at the Andy Well Gold Project (the Premises) which is located approximately 45 km north of Meekatharra (see Figure 1).

Mining operations occurred at the Premises between 2012 to 2017 before the premises was placed into care and maintenance. The applicant purchased the Premises from the previous owner (Silver Lake Resources) in February 2021.

The applicant plans to commence mining and process operations starting with mining a series of open pits at the Gnaweeda Project. The mined ore will then be trucked from the Gnaweeda Project to the Premises where processing will occur. The existing process plant remains largely intact, with only the ball mill removed. The applicant has purchased a 'like for like' replacement ball mill which will be installed to allow processing of ore to resume. The applicant does not plan on making any changes to previous process methodology with produced tailings expected to represent previous operations at the Premises and predicted to be as follows:

- Total Cyanide ex-plant 100 mg/L
- Weak Acid Dissolvable (WAD) Cyanide ex-plant <50 mg/L
- WAD Cyanide in tailings return water <50 mg/L
- Salinity of process water 1,400 mg/L Total Dissolved Solids (TDS)
- Salinity of tailings return water 1,400 mg/L TDS
- pH of slurry ex plant 10 to 11.
- Average slurry density ex-plant 40% solids

When processing recommences, the Premises will have limited capacity for tailings storage within the existing tailings storage facility (TSF) that has approximately six months of storage left across two cells.

The applicant proposes to use a mined pit known as the Suzie Pit as an in-pit TSF (IPTSF) and is the reason for this application. It should be noted that the current licence L8698/2012/1 for the Premises has Suzie Pit as a disposal location for mine dewatering effluent (see Section 3.3.2). An amendment to the licence will be required to remove Suzie Pit as a dewatering

effluent disposal location.

The premises relates to the category and assessed production / design capacity under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) which are defined in works approval W6950/2024/1. 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 W6950/2024/1.

Figure 1: Premises layout including proposed Suzie Pit

2.2.1 Suzie IPTSF

Suzie Pit is located approximately 1 km south of the main open pit at the Premises (see Figure 1). The pit is 56 m deep and has the capacity to hold 474,045 tonnes (300,000 m^3) of tailings material which will allow for approximately 15 months of storage (assuming a tailings dried density of 1.5 tonnes per cubic metre (t/m^3)). The Suzie IPTSF will be constructed to operate with a 0.7 m total freeboard which will provide sufficient capacity to hold a 72 hour 1 in 100 year rainfall event.

The applicant proposes to install a tailings slurry pipeline between the Processing Plant and Suzie IPTSF, as well as a return water pipeline. The pipelines will be located within bunded open trenches (v drain) with regularly installed sumps to prevent tailings and/or return water discharging into the surrounding environment due to leaks or pipeline failure.

Tailings slurry will be discharged into Suzie IPTSF via a pipeline initially hanging over the northwestern pit wall with sufficient length to ensure the deposition of tailings does not impact the pit walls and cause erosion. The applicant also proposes to install other similar single-point discharge pipelines at the western side and then the southern side of the pit to allow the tailings to force the supernatant water pond and pontoon-mounted decant pump up the haul ramp at the north-eastern side of the pit as the level of tailings rises. The final discharge pipelines will be located at the southern and eastern sides of Suzie IPTSF.

A decant pump will remove water from the tails as they settle and consolidate, with collected water then pumped back to the Processing Plant for reuse. The applicant proposes to cease depositing tailings into Suzie IPTSF when the tailings reach 2 m below the pit crest. See Figure 2 below for tailings deposition points and recovery pump location.

During mining of the Suzie Pit, overburden was removed and then placed around the perimeter of the pit creating a bund that serves to direct stormwater around the western edge where it is then redirected into naturally occurring drainage channels at the Premises.

The applicant proposes to install a total of six groundwater monitoring bores within potential flow paths which are controlled structurally and lithologically by fractured rock (see Figure 2). The bores will be installed so they can be operated as recovery bores if required.

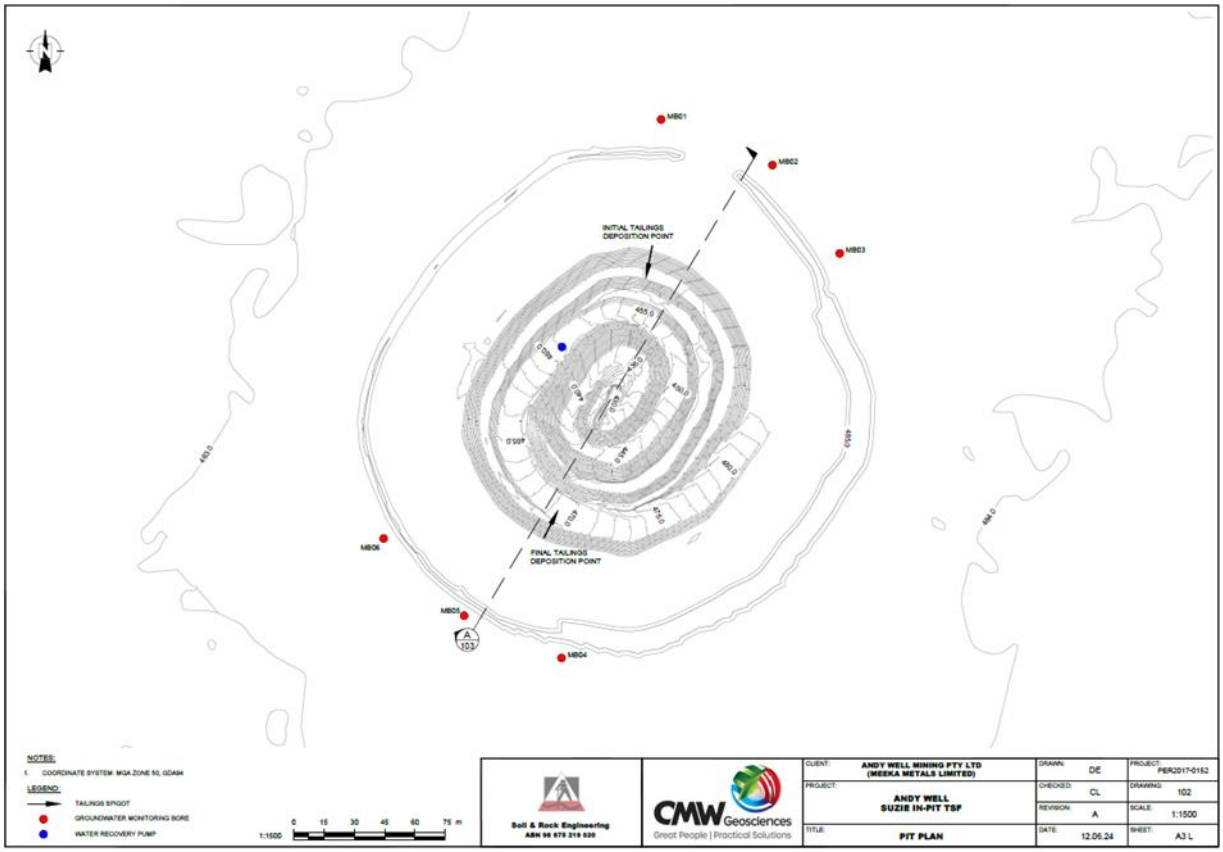

Figure 2: Suzie IPTSF layout including monitoring bore locations

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

Table 1: Proposed applicant controls

Emission	Sources	Potential pathways	Proposed controls
Construction			
Dust	Construction of the pipelines	Air / windborne pathway	A water cart will be used to control dust emissions during clearing and earth moving activities.
Noise		Air / windborne pathway	No controls proposed - no potential receptors (see Section 3.1.2)
Operations (including commissioning and time limited operations)			
Tailings and decant return water	Pipeline spills and leaks	Direct discharge to land	• Pipeline corridor positioned along roadside verge connecting the Processing Plant with Suzie IPTSF; • Pipeline installed as per Australian standard (AS/NZS 4130:2003-Polyethylene pipes for pressure applications); • Pipeline contained within a V drain with regularly installed collection sumps to contain leaks. Pre-use inspection and commissioning to identify any leaks; and • Daily pipeline inspection for leaks, ruptures or any signs of damage.
Seepage of leached metals and/or cyanide from stored tailings mass	Stored tailings at Suzie IPTSF	Seepage to land through pit embankments and base	• Minimising the supernatant pond to the smallest practical size; • Use of decant pump to remove water for reuse at the process plant. • Operate and maintain tailings thickener at the plant to maintain an average slurry density ex-plant of 40% solids. • Undertake rehabilitation of the pit as soon as practically possible. A non-acid forming (NAF) cover layer will be placed over the tails and will be contoured to promote the shedding of water.

Emission	Sources	Potential pathways	Proposed controls
		Mounding	• Dewatering activities at the Premises will lower groundwater levels during operations. • Six groundwater monitoring bores will be installed outside the pit bund and used to check groundwater levels. These bores will be located along strike to present the best location to monitor ground water level in the rock aquifer. • If monitoring bores indicate groundwater levels are at or above 4 metres below groundwater level (mbgl), pit water recovery will be increased and rate of tailings disposal will be reduced. • Installation of dual purpose groundwater monitoring/recovery bores.
Tailings from overtopping of pit crest		Direct discharges from overtopping	• No tailings deposited within 2 m of pit crest; • Minimum total freeboard of 0.7 m including an allowance for sufficient capacity to hold a 72 hour 1 in 100 year rainfall event; • Freeboard survey markers on pit wall; • Daily inspections of freeboard; • Appropriately sized decant pump for the removal of water; and • Existing earthen bund positioned around the western edge of the pit to redirect stormwater into natural drainage channels.
Supernatant pit water containing metals and residual cyanide	Storage of tailings material generated from ore processing (gold)	Direct ingestion by fauna (birds and bats)	• Operate decant infrastructure (pontoon pump) to minimise supernatant pond size; • Implement bird deterrent measures if required; and • Routine water sampling to monitor quality.

3.1.2 Receptors

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

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

Human receptors	**Distance from prescribed activity**
Yugnunga-Nya Native Title Claim Group	Includes M51/870
Karalundi Aboriginal Education Community	10 km north of the Premises. **Screened out. Distance is considered too great to be considered a receptor for this application.**
Killara Homestead	25 km south-east of the Premises. **Screened out. Distance is considered too great to be considered a receptor for this application.**
Munarra Station Pastoral Lease Holder	The Premises is located on Munarra Station.
Environmental receptors	**Distance from prescribed activity**
Groundwater Water samples collected across the ore body area show salinity as TDS ranging between 990 and 1400 mg/L. pH levels for all water samples were slightly alkaline, ranging from 7.9 to 8.1. Groundwater in this area is used for stock watering purposes and mining operations. The relative concentrations of the major ions for each water sample were found to be very similar in composition. All samples were determined to be of the sodium-chloride water type, typical of endpoint type groundwater with long residence times and little indication of recharge. Deeper groundwater flow within the basement lithologies will be controlled locally by the dominant north to south trending structures and associated shearing and jointing. Shallower groundwater flow through superficial sediments and weathering profiles are influenced by local topography and drainage. Regional groundwater flow is expected be to the west into the Yalgar River and Murchison River drainage systems.	Depth to groundwater is approximately 25 - 27 mbgl at the Premises. Site visit by SRE in 2024 observed the water level within the pit at approximately 27 mbgl. Note: Total depth of pit is 53 mbgl.
Pastoral bore – Bonus Bore	1.9 km to the south of Suzie IPTSF
Threatened/Priority Flora Vegetation	There is no Threatened or Priority Flora recorded within a 2 km radius of the Prescribed Activity. **Screened out. Distance is considered too great to be considered a receptor for this application.**
Threatened/Priority Ecological Communities	There are no Threatened Ecological Communities or Priority Ecological Communities within a 2 km radius of the Premises.

	Screened out. Distance is considered too great to be considered a receptor for this application.
Threatened/Priority Fauna	No Threatened/Priority Fauna within a 2 km radius of the Premises. **Screened out. Distance is considered too great to be considered a receptor for this application.**
Migratory bird species	Premises is located within a defined migratory route (bird corridor).
Surface Water	No permanent surface water systems or drainage channels are recorded within a 2 km radius of the Premises. Drainage at the Premises and the immediate surrounding area is through broad sheet-flows. **Screened out. Distance is considered too great to be considered a receptor for this application.**

3.2 Risk ratings

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

Where the applicant has proposed mitigation measures/controls (as detailed in Section 3.1), these have been considered when determining the final risk rating. Where the delegated officer considers the applicant's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the works approval as regulatory controls.

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

Works approval W6950/2024/1that 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).

An amendment to licence L8698/2012/1 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 3: Risk assessment of potential emissions and discharges from the premises during construction, commissioning and time limited operations

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
Construction								
Clearing of vegetation for pipeline corridors where the tailing pipeline deviates from the existing track alignment Installation of tailings discharge and return water pipelines, pumps	Dust	**Pathway:** Air / windborne pathway **Impact: D**ecline in vegetation health	Native Vegetation	Refer to Section 3.1	C = Slight L = Unlikely **Low Risk**	Y	N/A	N/A
Commissioning								
Commissioning of tailings discharge and return water pipelines	Tailings and tailings return water due to ruptured/leaking pipelines	**Pathway:** Direct discharge to land **Impact:** Contamination of soils with metals and salts inhibiting vegetation growth	Native Vegetation	Refer to Section 3.1	C = Slight L = Possible **Low Risk**	Y	Conditions 1, **2**, **3,** 9, **10**, 11 and 12	The Delegated Officer considers the proposed controls by the applicant are sufficient to reduce risk associated with pipeline leaks / rupture and have been conditioned within the works approval in accordance with DWER Guideline: Risk Assessments. Standard conditions relating to recording and reporting have been applied to the works approval.
Operation (time-limited-operations)								
Discharge of tailings and recovery of water at Suzie IPTSF	Tailings and tailings return water due to ruptured/leaking pipelines	**Pathway:** Direct discharge to land **Impact:** Contamination of soils with metals and salts inhibiting vegetation growth	Native Vegetation	Refer to Section 3.1	C = Slight L = Possible **Low Risk**	Y	Conditions 1, 2, 3, **13**, **14**, **15**, **21**, **22**, **23**, **25** and **26**	The Delegated Officer considers the proposed controls by the applicant are sufficient to reduce risk associated with pipeline leaks / rupture and have been conditioned within the works approval in accordance with

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
								DWER Guideline: Risk Assessments. Standard conditions relating to commencement and duration of time limited operations, and also recording and reporting, have been applied to the works approval.
Storage of tailings at Suzie IPTSF	Tailings	**Pathway:** Direct discharge to land from overtopping **Impact:** Contamination of soils with metals and salts inhibiting vegetation growth	Native Vegetation	Refer to Section 3.1	C = Moderate L = Unlikely **Medium Risk**	Y	Conditions 1, 2, 3, **13**, **14**, **15**, **21**, **22**, **23**, **25** and **26**	The Delegated Officer considers controls proposed by the applicant are sufficient to reduce risks associated with overtopping. Applicant's controls have been conditioned within the works approval in accordance with DWER Guideline: Risk Assessments Standard conditions relating to commencement and duration of time limited operations, and also recording and reporting, have been applied to the works approval.
	Tailings seepage	**Pathway:** Infiltration through the base and embankments of the Suzie IPTSF **Impact:** Contamination of groundwater used for stockwatering and groundwater	Groundwater used for stockwatering Native vegetation	Refer to Section 3.1	C = Moderate L = Possible **Medium Risk**	Y	Conditions 1, 2, 3, 4, 5, **6**, **7**, **8**, **13**, **14**, **15**, 16, 17, **18**, **19**, **20**, **21**, **22**, **23**, **25** and **26**	See section 3.3

Risk events					Risk rating [1] C = consequence L = likelihood	Applicant controls sufficient?	Conditions [2] of works approval	Justification for additional regulatory controls
Sources / activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Applicant controls**				
		mounding causing impacts on native vegetation used as a food source by fauna and livestock						
	Supernatant pond containing some elevated metals, arsenic and WAD-CN	**Pathway:** Direct interaction with IPTSF supernatant pond and ingestion of pond water **Impact:** Detrimental impact on health and wellbeing	Fauna / migratory birds	Refer to Section 3.1	C = Moderate L = Possible **Medium Risk**	Y	Conditions 1, 2, 3, **13**, **14**, **15,** 16, 17, **18**, **21**, **22**, **23**, **25** and **26**	The Delegated Officer considers the applicants proposed monitoring of supernatant pond waters is adequate for assessing any potential impacts to fauna / migratory birds due to poor water quality. The applicant's proposed monitoring has been conditioned within the works approval in accordance with DWER Guideline: Risk Assessments A discharge limit for WAD-CN in tailings was proposed by the applicant. The Delegated Officer considers the proposed limit is acceptable and therefore has been conditioned within the works approval in accordance with DWER Guideline: Risk Assessments.

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

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

3.3 Detailed risk assessment for seepage from Suzie IPTSF

3.3.1 Overview of risk event

The storage of tailings in Suzie IPTSF could result in seepage through the walls and base of the pit potentially causing contamination of groundwater, which is used for stockwatering purposes, and groundwater mounding leading to stress and death of native vegetation.

3.3.2 Tailings disposal

The applicant plans to dewater Suzie Pit (remove the pit lake) before discharging a total of 474,000 tonnes of tailings slurry sub-aerially over 15 months. The tailings will be discharged from a single open-ended pipe on the northwestern end of the pit. The discharge pipe will be installed at a sufficient length to reach the bench below the haul road near the base of the pit to allow deposition to occur without eroding the sides of the pit. Small openings in this pipe arranged at 5 m intervals will allow continuous discharge as the level of tailings rises. Other similar single-point discharge pipes will be deployed from the western side and then the southern side of the pit to allow the tailings to force the supernatant water pond and pontoon-mounted decant pump up the haul ramp at the north-eastern side of the pit as the level of tailings rises. The ultimate discharge pipes will be located to the southern and eastern sides of the pit.

The applicant plans to keep the supernatant pond as small as practical which should have the effect of reducing seepage and evaporation from the surface of the pond and hence will assist in optimising the water recovery and tailings density.

The applicant undertook a basic tailings settlement analysis (one-dimensional consolidation theory) assuming the maximum depth of tailings will be 53 m, natural ground water at 25 mbgl and the initial filling of Suzie IPTSF occurs within the first 9 months. Results from the analysis were summarised by the applicant and are presented below:

- During the initial filling of the pit the in-situ tailings are not anticipated to have achieved full primary consolidation under self-weight conditions. On-going consolidation and resulting tailings surface settlement is expected in the period following deposition. Considering the variable geometry of Suzie Pit, the expected initial tailings beach surface may be within a few metres of the expected maximum tailings level.
- The achievable tailings density (dry and bulk) at full primary self-weight consolidation varies with depth, ranging from an initial near surface dry density of 1.55 t/m^3 up to approximately 1.9 t/m^3 at depths below 50 m.
- The time required to achieve different primary self-weight consolidation is a function of the efficiency of the surface water removal and any potential seepage losses into what is known as the Upper Transition Zone Aquifer, which extends from the base of saprolite to around 35 to 40 m below ground together with any influence from adjacent mine dewatering activities. Total surface settlement is potentially achievable within 3 to 5 years, and with periodic topping up as part of normal operations the final tailings surface will likely be achieved well before the current life of mine is reached.

The applicant did note the one-dimensional consolidation theory does not allow for the influence of drainage accelerating the self-weight consolidation process via:

- Water recovery as part of the decant operation.
- Natural drainage through the pit walls into the surrounding ground forming the containment of the Suzie IPTSF.
- Potential that dewatering undertaken as part of any open pit or underground mining activities within the Upper Transition Zone Aquifer, which extends from the base of saprolite to around 35 to 40 m below ground in a highly weathered and fractured zone

might, might impact consolidation.

3.3.3 Tailings geochemical characteristics

The method proposed by the applicant to process mined ore through the existing Andy Well processing plant, will remain unchanged from previous ore processing operations. The applicant in May 2024 engaged ALS Metallurgy Pty Ltd (ALS) to undertake test work on samples taken from the Turnberry and St Annes deposits to gain a better understand of expected tailings characteristics. ALS prepared two composite samples of tailings representative of the ore bodies from 15 tailings leach residues from each ore body. These composites were engineered to reflect the nature of tailings when mined via open pit and underground methods. The results show the tailings contain between 0.02% Sulphur (S) (St Annes ore body) and 0.55% S (Turnberry ore body). The potential acid forming ration for both tailings is 5.0 and 7.2 respectively, a number greater than two indicates material is unlikely to be acid forming (Pendragon, 2024).

ALS observed the most dominant metals in the tailing samples were Iron, Aluminium and Manganese. In regard to potential contamination from the tailings once deposited in Suzie IPTSF, ALS determined the following is relevant:

- Barium, Beryllium, Boron, Cadmium Mercury and Selenium are absent.
- Chromium, Cobalt, Copper, Lead, Thorium, Uranium, Vanadium and Zinc occur in low concentrations and in all instances below the relevant *National Environment Protection (Assessment of Site Contamination) Measure* (ASC NEPM) Areas of Ecological Significance Investigation Levels.
- Arsenic occurs in concentrations between 61 mg/kg (Turnberry) and 854 mg/kg (St Annes) exceeding the ASC NEPM Areas of Ecological Significance Investigation Level of 40 mg/kg.
- Nickel occurs in concentrations between 39 mg/kg (St Annes) and 56 mg/kg (Turnberry) exceeding the ASC NEPM Areas of Ecological Significance Investigation Level of 30 mg/kg.

A geochemical abundance index (GAI) was used to assess enrichment of the tailings by metals/metalloids. The GAI calculations for tailings samples from the Turnberry and St Annes deposits indicate that only one element, namely Arsenic, is enriched. The Turnberry deposit had a GAI of 3, and the deposit from St Annes a GAI of 7.

The applicant also assessed the potential for metalliferous drainage under pH conditions of 5, 7 and 9. The applicant found in general all metals were low with the exception of Arsenic, Aluminium, Iron, and Beryllium. The applicant did note that the grind size of the tails was low and test work involved constantly tumbling the sample over a 24 hour period. Therefore, because these conditions are highly unlikely to be encountered within the pit, the applicant proposes there would be a reduction in the potential for leaching.

The applicant also proposes if there was any seepage of metals from the pit it would be limited due to the sealing effects of the fine ground tails, and would only occur for a short period. To minimise any potential leaching of metals, the applicant plans on keeping the supernatant pond size as low as possible and will undertake rehabilitation of the pit as soon as practically possible. A cover layer (NAF) will also be placed over the tails and will be contoured to promote the shedding of water.

3.3.4 Hydrological assessment

Suzie Pit is a shallow pit (56 m deep) that mainly intersects the porphyry/quartz-carbonate mineralised zones that have moderate permeability. These zones are of limited extent along-strike and interconnection between zones across-strike (Rockwater, 2024). This was observed by the applicant when there was little impact noted on Suzie pit when the Wilber pit (shown in

Figure 3) and underground mine workings were being dewatered. Most permeability is likely to be in transition zone rocks between 40 m and 80 m depth, although some permeable zones have been intersected to 120 m depth (Rockwater, 2024). There is also probably restricted hydraulic connection between the fractured-rock aquifers at the Premises and the alluvial/colluvial aquifers intersected on pastoral bores and wells. The department notes the closest pastoral bore used for stock watering is located at least 1.9 km away (Bonus stockwatering bore).

The groundwater table at the Premises was between 5 to 7 m deep prior to mining occurring at the premises. During mining of Suzie Pit, dewatering flows of up to 1,000 m^3/day were recorded, much of which is interpreted by the applicant to have been from storage in the mineralised zones. Since mining ceased in 2017, the pit lake level in Suzie pit has stabilised at 18 m below the original static water level, with groundwater inflow and rainfall accumulation balancing evaporative losses. A water balance for the pit indicates low groundwater flows into the pit of about 27 m^3/day from throughflow along the mineralised zone. The pit lake within Suzie pit currently sits at 27 m below the level of the pit crest. The pit sits within the upper transition zone aquifer, which exists between 35 to 40 mbgl, in a highly fractured zone. The zone is highly oxidised with iron staining on fracture surfaces. Due to typically low permeability and low bore yields, the alluvial aquifers are generally not directly utilised, other than for stockwatering bores.

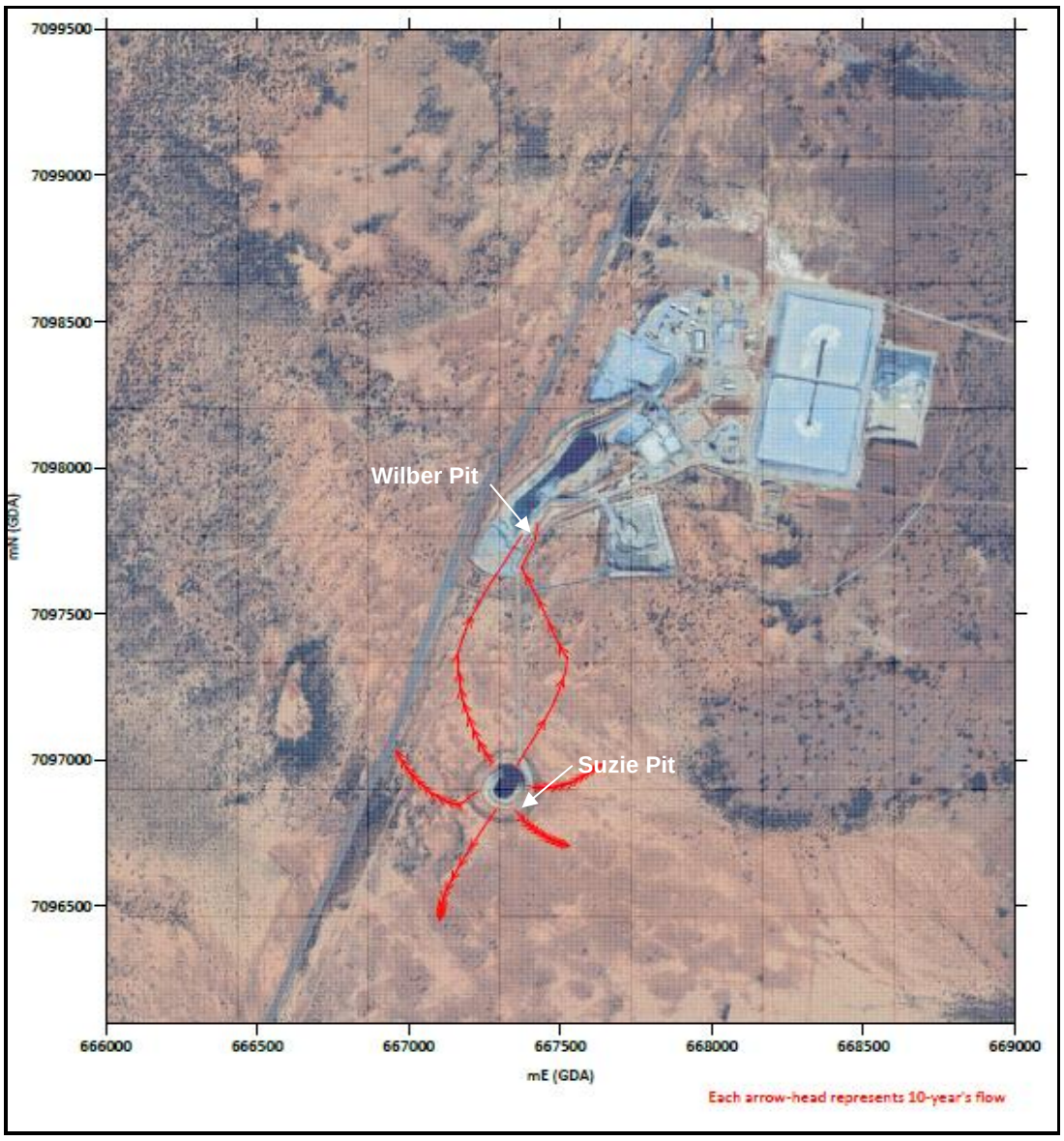

Figure 3: Model calculated flow path at Suzie IPTSF

Numerical flow-path modelling results submitted by the applicant for a worse-case scenario of no reduction in aquifer permeability resulting from tailings emplacement, and a continuing source of water for seepage from the pit, indicates that groundwater would flow radially from Suzie IPTSF:

- to distances of 220 m to 300 m across-strike after 100 years;
- to 400 m along-strike to the south-west; and
- take 70 to 100 years to reach Wilbur pit 830 m to the north (see Figure 3 above).

The applicant again expects the Wilbur pit to form a groundwater sink due to low water inflows and high evaporative losses.

3.3.5 Water balance

A preliminary water balance analysis provided by the applicant uses inflows and outflows from Suzie IPTSF and estimates the balance after water return has been optimised. Water shortfall or water in excess of requirements was indicated on a monthly and annual basis. Water inflows to Suzie IPTSF consists of rainfall, incident-rainfall on the impoundment area only (the perimeter bunds excludes external runoff) and slurry water from the plant. Water outflows consist of evaporation from the supernatant pond and running beaches, evapo-transpiration from drying beaches, seepage, retention of water within tailings and water returned to the plant.

The following information was used for calculating the water balance:

- Average monthly rainfall figures for Meekatharra (recording period: 1944 to 2023), annual average 232 mm per annum (pa).
- Annual average evaporation is estimated at approximately 3504 mm/year.

The applicant applied the following assumptions for calculating the water balance:

- Operational hours 8,000 pa.
- Runoff co-efficient of 1.0 from the surface of the tailings.
- In-situ dry density of tailings 1.55 t/m^3 and the tailings stack is assumed to be saturated.
- Maximum decant pond area is assumed to be 4,400 m^2.
- Wet beach areas are assumed to be 4,060 m^2.
- Seepage is assumed to be 1.0 x 10^{-9} m/sec/m^2.

The applicant applied a 66% water recovery (approximate 59 tonnes per hour) based on the water balance and the performance of other similar tailings storage facilities for gold projects operated in Western Australia.

Using the assumptions above, together with average rainfall and evaporation, the applicants preliminary water balance results for Suzie IPTSF calculated a slight deficit of approximately 7 m^3/pa. As a result, the applicant determined the water recovery system (decant pump and piping) must have a minimum capacity of not less than 70% of the slurry water volume to ensure adequate water removal, particularly during high rainfall periods.

3.3.6 Risk assessment and decision

Results from recent analysis of composite tailings samples identified elevated Arsenic concentration levels (see section 3.3.3) which may impact groundwater quality. The applicant suggests the period of Arsenic release to groundwater would be short-lived (less than 5 years) and would probably only occur during the operational life of Suzie IPTSF.

The application was referred internally to the department's Principal Hydrogeologist who suggests the applicant has underestimated the extent to which Arsenic discharge could take

place from Suzie IPTSF for the following reasons:

- Overpressure that would be produced in porewater during consolidation of the tailings material, would "squeeze" a more significant amount of water from the materials into groundwater than would be expected from passive drainage through a matrix with a low permeability. This forced discharge of contaminated porewater would continue until the pressure differential between the tailings porewater and surrounding groundwater dissipates, which could take longer than 5 years; and
- Geochemical testing of the tailings materials only assessed the potential to release Arsenic under chemically oxidising conditions (i.e., under conditions when they will be exposed to atmospheric oxygen). However, it is likely that some of the tailings will be submerged below the water table as the mine void is progressively filled, and as nearby mine dewatering ceases. Under these conditions, the release of Arsenic from submerged tailings can increase (see a discussion of this issue in Mahoney et al., 2005).

The department's Principal Hydrogeologist also considers the applicant has underestimated the extent to which there are environmental receptors near Suzie IPTSF that could be affected by Arsenic contamination of groundwater. The department's Principal Hydrogeologist considers that deep rooted vegetation could access contaminated groundwater in areas where the water table is within approximately 5 m of the land surface. Under these conditions, vegetation would have the potential to bioaccumulate Arsenic which could then be transferred to grazing livestock and wildlife. The risk of vegetation bioaccumulating significant levels of Arsenic would be particularly high at sites where the Arsenic concentrations in groundwater near the water table exceed the *ANZECC and ARMCANZ 2000* long-term irrigation (LTV) criterion of 100 µg/L.

Considering the above factors, the department has determined the applicant must have suitable strategies to manage potential impacts of Arsenic contamination on nearby environmental receptors. The department notes the applicant has proposed an increase in decant water recovery, reduce tailings discharge rates and utilise recovery bores to recover contaminated groundwater if groundwater levels are observed at or above 4 mbgl. Therefore, the department has determined to include the proposed applicant controls as conditions in the works approval with the exception of a groundwater level limit of 4 mbgl or above. The department considers that deep rooted vegetation could access contaminated groundwater in areas where the water table is within about 5 m of the land surface.

4. Consultation

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

Table 4: Consultation

Consultation method	Comments received	Department response
Application advertised on the department's website on 19 August 2024	None received	N/A
Department of Mines, Industry Regulation and Safety (DEMIRS) advised of proposal 20 August 2024	DEMIRS replied on 27 August 2024 stating / advising that *"DEMIRS has received a Part 2 Mining Proposal from Andy Well Mining (Registration ID 127640) on M 51/870. The proposal is for the in-pit disposal of tailings into the Suzie Pit and appears to align with the supporting documents you have provided. The proposal is currently under*	Noted.

Consultation method	Comments received	Department response
	assessment and DEMIRS has no further comments."	
Department of Planning, Lands and Heritage (DPLH) advised of proposal on 20 August 2024	DPLH replied on 23 August 2024 stating / advising that "*with known Aboriginal heritage contained within the tenement and limited Aboriginal heritage surveys conducted across this location there may be the requirement for any proposed activities to seek authorisation and approval from the DPLH prior to proceeding.* *The Department does not object to the application but outlines the obligations contained within the Aboriginal Heritage Act 1972 (AHA) in which the activities are regulated under for the protection, preservation and registering of Aboriginal heritage."*	Noted.
Yamatji Marlpa Aboriginal Corporation advised of proposal on 10 September 2024	No comments received. Note comments received from DPLH (see above).	N/A
Munarra Station advised of proposal on 10 September 2024	No comments received.	N/A
Applicant was provided with draft documents on 24 January 2025	On 06 February 2025 the applicant replied stating they have reviewed the approval and are happy for the final documents to be issued.	N/A

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. Australian and New Zealand Environment and Conservation Council, Agriculture and Resource Management Council of Australia and New Zealand (ANZECC and ARMCANZ) 2000, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*.
2. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
3. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
4. DWER 2020, *Guideline: Risk Assessments*, Perth, Western Australia.

5. Andy Well Mining Pty Ltd, Andy Well Mine Works Approval Application 04/07/2024, West Perth, Western Australia.
6. Suzie Pit Works Approval Application form dated 4 July 2024.
7. Meeka Metals, Andy Well Mine, *Works Approval Supporting Information Document, Category 5 – Processing or beneficiation of metallic or non-metallic ores*, 4 July 2024.
8. Soil & Rock Engineering Pty Ltd (SRE), Andy Well Project, *Suzie Pit Tailings Storage Facility Design Report*, 14 June 2024.
9. Rockwater, *Suzie In-Pit TSF Andy Well, Hydrogeological Assessment,* report for Meeka Metals Ltd, November 2024.
10. Andy Well Gold Project, Meeka Metals Limited, *Gnaweeda Project: Turnberry and St Annes Mining Areas Tailings Characterisation,* November 2024.
11. Meeka Metals, Murchison Gold Project, Works Approval W6950/2024/1, *Response to Request for Further Information,* 26 November 2024.
12. Mahoney et al., 2005, Mahoney, J., Langmuir, D., Gosselin, N. and Rowson, J., 2005. Arsenic readily released to pore water from buried mill tailings. Applied Geochemistry, 20, 947-949.