



Application for Licence Amendment

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

Licence Number	L4597/1988/14
Licence Holder	Barto Gold Mining Pty Ltd
ACN	161 566 490
File Number	DER2014/000887-1~13
Premises	Southern Cross Operations MARVEL LOCH WA 6426 Mining Leases M77/7, M77/8, M77/10, M77/26, M77/31, M77/66, M77/72, M77/86, M77/109, M77/112, M77/113, M77/114, M77/133, M77/137, M77/138, M77/159, M77/175, M77/193, M77/197, M77/198, M77/217, M77/221, M77/224, M77/225, M77/239, M77/251, M77/347, M77/352, M77/380, M77/408, M77/424, M77/431, M77/432, M77/525, M77/554, M77/555, M77/593, M77/631, M77/638, M77/640, M77/660, M77/655, M77/668, M77/702, M77/745, M77/721, M77/746, M77/747, M77/722, M77/765, M77/766, M77/768, M77/775, M77/790, M77/791 M77/792, M77/793, M77/794, M77/811, M77/969, M77/977, M77/1009, M77/1036, M77/1052 and M77/1275, Miscellaneous Licences L77/51, L77/87, L77/106, L77/112, L77/113, L77/114, L77/126, L77/128, L77/162, L77/167, L77/168, L77/173, L77/281, L77/290, P77/3792 and General Purpose Leases G77/1-3. As defined in Licence L4597/1988/14
Date of Report	04 July 2024
Decision	Revised licence granted

**A/Manager, Resources Industries
Industry Regulation (Statewide Delivery)**

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

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1. Decision summary

Licence L4597/1988/14 is held by Barto Gold Mining Pty Ltd (Licence Holder) for the Southern Cross Operations (the Premises), located at Marvel Loch, Western Australia.

This Amendment Report documents the assessment of potential risks to the environment and public health from proposed changes to the emissions and discharges during the operation of the Premises. As a result of this assessment, Revised Licence L4597/1988/14 has been granted.

The Revised Licence issued as a result of this amendment consolidates and supersedes the existing Licence previously granted in relation to the Premises.

2. Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this Amendment 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

On 15 January 2024, the Licence Holder submitted an application to the department to amend Licence L4597/1988/14 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The following amendments are being sought:

- The addition of mining tenement M77/133 to the prescribed premises boundary;
- Construction and the reinstatement of mine dewater pipelines (Table 1); and
- Inclusion of additional mine dewater discharge locations (Table 1).

Table 1: Summary of new pipelines, reinstated pipelines and new dewater discharge locations.

Construction of new pipeline		New discharge locations	¹ Remaining/inductive capacity with a 10-meter freeboard	Figure Reference
From	To			
Achilles East/West, Achilles South and Achilles North	Axehandle Pit	<ul style="list-style-type: none"> • Achilles East/West; • Achilles South; and • Achilles North. 	1,585,117 kl 2,330,741 kl 464,000 kl	Figure 1
Rhapsody	Windmills/Redox	<ul style="list-style-type: none"> • Rhapsody Pit; • Windmills Pit; and • Redox Pit. 	673,092 kl 1,169,329 kl 249,884 kl	Figure 2
Reinstatement of existing pipelines		New discharge locations	¹ Remaining/inductive capacity	Figure Reference/s

From	To		with a 10-meter freeboard	
Nevoria	Southern Star	<ul style="list-style-type: none"> • GVG Pit; • Hercules Pit; • Grand National Pit; and • Southern Star Pit. 	2,480,013 kl 3,596,546 kl 721,007 kl 1,983,017 kl	Figure 3 and Figure 4
Yilgarn Star	Harris Find	<ul style="list-style-type: none"> • Harris Find Pit. 	247,374 kl	Figure 6
Ruapehu	Maori Lass/Frasers dewater pipeline	<ul style="list-style-type: none"> • Ruapehu; and • Maori Lass Pit. 	245,275 kl 121,580 kl	Figure 7
Existing approved pipelines to be modified		New discharge locations	¹ Remaining/inductive capacity with a 10-meter freeboard	Figure Reference
From	To			
Sunbeam	Axehandle Pit	<ul style="list-style-type: none"> • Cornishman North; • Cornishman Central; and • Cornishman South. 	4,078,810 kl 7,876,308 kl 5,939,094 kl	Figure 8

¹ From measurements taken in September 2023

Barto Gold Mining Pty Ltd have historically discharged mine dewater from open pits and underground mines to various discharge locations. Licence L4597/1988/14 currently authorises discharge of mine dewater to: Marvel Loch Pit, Glendowner Pit, Jaccoletti Pit, Nevoria Pit, Fraser's Pit, Triad Pit, Polaris South Pit, Axehandle Pit, Transvaal Complex, Aquarius Pit, Polaris Pit and Sunbeam Pit and the Yilgarn Star Pit.

The Licence Holder seeks to add tenement M77/133 to the prescribed premises boundary to better reflect current Barto Gold tenements and operational activities. Achilles West Pit occupies most of mining tenement M77/133.

This amendment is limited only to changes to Category 6 activities from the Existing Licence. No changes to the aspects of the existing Licence relating to Category 5, 57 and 64 have been requested by the Licence Holder.

The Licence Holder advises that the Category 6 authorised discharge rate for the Premises will not exceed the current limit of 6,000,000 tonnes per annual period.

In total the amendment includes:

- The addition of 16 new locations as additional Category 6: Mine dewater discharge points: Ruapehu, Maori Lass, Cornishman North, Cornishman Central and Cornishman South, Achilles East/West, Achilles South, Achilles North, GVG, Hercules, Grand National, Harris Find, Southern Star, Windmills, Rhapsody and Redox Pits;

- The construction of two new pipelines – Achilles to Axehandle and Rhapsody to Windmills/Redox; and
- The reinstatement of three historic pipelines – Nevoria to Southern Star, Yilgarn Star to Harris Find and Ruapehu to Maori Lass/Frasers.

2.2.1 Achilles to Axehandle Pipeline

The Licence Holder intends to recommence mining operations at the Achilles mine area via open pit mining (Figure 1). It has been identified that groundwater will most likely be encountered and require dewatering towards the final months of the mining operation. It is proposed that all mine-dewater from the Achilles complex will be pumped to a turkey's nest (to be constructed) and used for dust suppression. If the volume of extracted mine de-water supersedes the dust suppression requirements for the operation the Licence Holder intends to construct a 1.5 km pipeline from Achilles Pits (west/east, south and north) to Axehandle Pit to discharge approximately less than 15,000 kl to Axehandle. As a result, the Licence Holder has requested to add the Achilles pits (Achilles West/East Pit, Achilles South Pit and Achilles North Pit) as additional discharge locations should additional storage space be required in the future from other mining operations.

Three groundwater monitoring bores were recently constructed within the vicinity of the proposed Achilles South pit and were sampled in June 2023. The average field and analytical results were compared with the most recent production bore samples from Axehandle (ranging from 2016 to 2019). The analysis suit included cations, anions and a variety of standard metals. There was no significant difference in groundwater quality between the two locations with the exception of iron which was reported by a single order of magnitude (10 times higher) at Achilles West/East. It is noted that although iron concentrations are higher at Achilles concentrations are reported to be low (0.65 mg/L).

2.2.2 Rhapsody to Redox/Windmills Pipeline

At the time of this licence amendment the Licence Holder is currently mining three pits (Windmills Pit, Redox Pit and Rhapsody Pit). There have been some amendments to the design at Rhapsody Pit which has resulted in the deepening of the pit below the indicative water table to a total depth of 315 m Australian Height Datum (AHD). Similarly to the Achilles to Axehandle pipeline plan the Licence Holder is intending to utilise all mine dewater as dust suppression which will be stored at the Windmills turkey's nest which was previously approved during the May 2022 licence amendment., If the volume of mine dewater is unable to be managed a pipeline of approximately 0.8 km in length will be constructed and mine dewater will be discharged to Windmills Pit, Rhapsody Pit and Redox Pit (Figure 2).

The Licence Holder has advised that water will be encountered due to continued mining at Rhapsody Pit. The Licence Holder expects more dewatering requirements in the future and seeks approval for additional pits as discharge locations to dewater, in anticipation of these events.

At the time of the submission of this Licence Amendment, Windmills and Rhapsody pits were still being mined and had not hit groundwater. Providing the short distance of the pipeline (0.8 km) it can be assumed that the groundwater quality at both locations will be similar and uniform and therefore a medium risk to include Rhapsody Pit, Windmills Pit and Redox Pit as dewater discharge locations as presented in Section 3.2.

2.2.3 Nevoria to Southern Star Pipeline

In 2001 Sons of Gwalia Pty Ltd (Gwalia) resumed mining at its Nevoria operations. A Works Approval (W3515) application was submitted to the Department (previously Department of Environmental Protection (DEP)) for the construction of a pipeline from Nevoria Pit to Southern Star via the Great Victoria Gold Pit (GVG).

The compliance certificate for the pipeline was submitted to the Department in April 2002 and was commissioned in May 2002. The pipeline was later added to the prescribed premises boundary Licence L7721 (Barto 2024).

St Barbara limited purchased the Premises from Gwalia and sent a letter to the Department in 2008 with the request to reinstate the pipeline. The Department responded with a letter on 6 March 2008 with no objections to the discharge of mine de-water from the Nevoria Pit to the GVG Pit with the use of existing infrastructure, with exception of the following works and a compliance letter auditing the works:

- Replacement of a 150 m section of the pipeline;
- Maintenance to the pipeline bund; and
- Installation of telemetry on the pipeline prior to the commencement of dewatering activities from Nevoria Pit to the GVG Pit.

The Licence Holder seeks to reinstate the pipeline and add the following pits as discharge locations for mine dewater from Nevoria: GVG Pit, Hercules Pit, Grand National Pit and Southern Star Pit (Figure 3 and Figure 4).

Groundwater at Nevoria has salinities ranging from 50,000 to 180,000 mg/L total dissolved solids (TDS) (Barto 2024). Sampling at one of the proposed discharge pits Grand National Pit has recorded a pH of 2.7 in May 2023 (Barto 2024) and is very acidic compared to other discharge pits within the area (generally consisting of a pH of 6 to 8).

2.2.4 Yilgarn Star to Harris Find Pipeline

The Yilgarn Star mining area was first mined in 1991 between Gasgoyne Gold and Orion Resources Mining. During the mining operation groundwater was encountered and was extracted and discharged to Banker Lake located approximately 3 km northwest of the pit. In 1994 underground mining at Yilgarn Star began again and operations continued until 2003. Mine dewatering continued to 2005 within the pit for a period after mining was completed to maintain the infrastructure.

A Works Approval for the construction of a 1.4 km pipeline from Yilgarn Start to Harris Find was granted on 9 June 2003 (W144/97/0) and was constructed in September 2003 with discharge commencing in November 2003.

The Licence Holder has requested to reinstate the pipeline to allow for the ability to recommence operations at Yilgarn Star involving dewatering if mining is deemed economical again. Currently a pipeline exists from Yilgarn Star to Nevoria (Figure 5) and an additional secondary pipeline has been granted during a Licence Amendment on 27 January 2023. The proposed reinstated pipeline between Yilgarn Star and Harris Find is presented in (Figure 6).

2.2.5 Ruapehu to Maori Lass/Frasers Pipeline

In 1998 Gwalia commenced mining at the Ruapehu orebody located approximately 3 km west of Southern Cross. Historically the water abstracted from the Ruapehu Pit was used for dust suppression with excess water discharged at Maori Lass Pit located approximately 750 m northwest of southeast of Ruapehu Pit.

The Licence Holder is intending to reinstate the pipeline from Ruapehu to Maori Lass and to construct a new pipeline from Maori Lass to the pre-existing pipeline (Figure 7) that runs from Frasers to the Transvaal Complex.

Pit water was sampled on 28 November 2022 within both Ruapehu Pit and Maori Lass Pit, water analysis included pH, TDS, anions and select metals. All analysed and measure parameters were similar between the two pits and were all within one order of magnitude from each other. It is noted that concentrations of copper and lead were reported above the limit of

reporting (LOR) at 0.033 and 0.028 mg/L respectively at Ruapehu but below LOR at Marri Lass (Barto 2024).

2.2.6 Sunbeam to Axehandle Pipeline

The Sunbeam to Axehandle Pipeline was approved during a licence amendment that was granted on 19 August 2022. At the time of this amendment (the subject of this decision report) the pipeline has yet to be constructed however the Licence Holder has requested to modify the pipeline route to add the Cornishman Complex as discharge locations (Figure 8). The Cornishman Complex comprises of Cornishman North, Cornishman Central and Cornishman South. The complex was not included as an additional discharge location during the 2022 amendment because there was a chance the Licence Holder was going to continue to mine the complex. Inclusion of the Cornishman complex is to allow additional flexibility of de-water storage for Sunbeam Pit or from another source if the mining of Axehandle Pit occurs in the future.

Groundwater conditions were compared between Axehandle and Cornishman Central. Groundwater parameters for Sunbeam were unable to be sampled as the pit lake is inaccessible (EMM 2022a). Groundwater parameters between Axehandle and Cornishman Central were similar with exception to iron and manganese which both were reported higher in the Axehandle monitoring bores by a single order of magnitude when compared with Cornishman Central Pit sample.

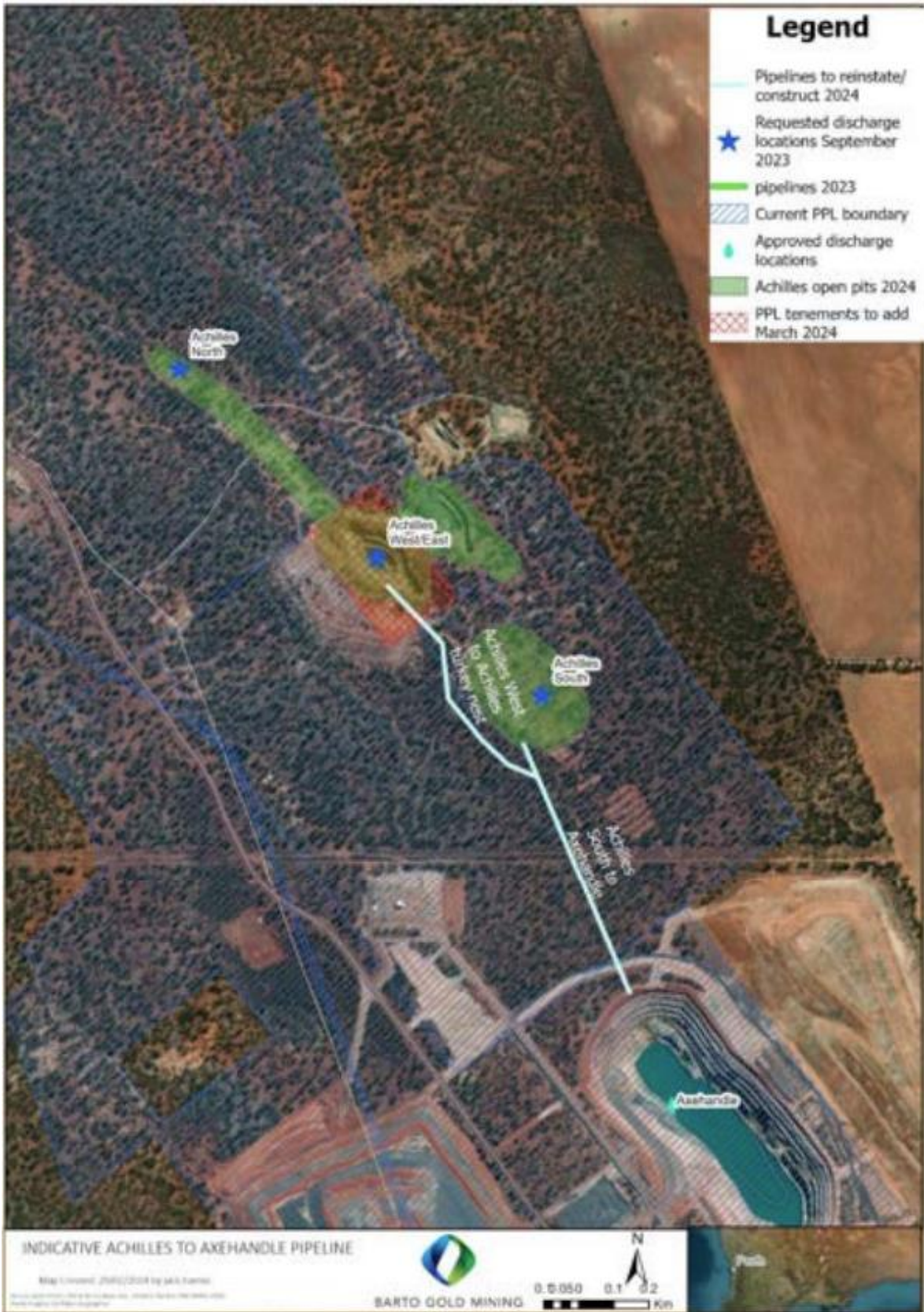


Figure 1: Proposed pipeline from Achilles to Axehandle (sourced from Barto 2024)



Figure 2: Proposed pipeline from Rhapsody Pit to Redox/Windmills Pit (sourced from Barto 2024)

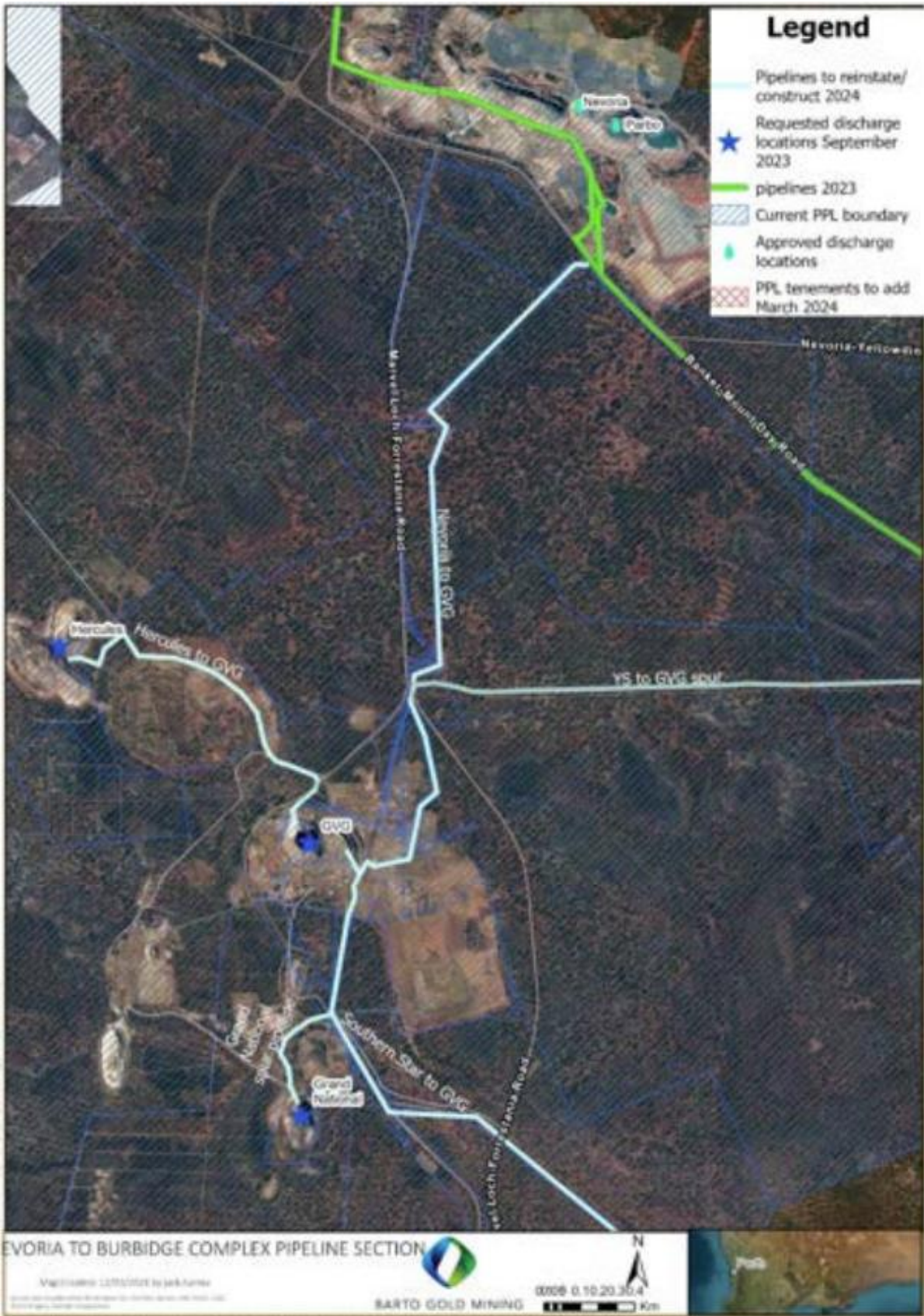


Figure 3: Nevoria to Southern Star Pipeline (Section 1) (sourced from Barto 2024)



Figure 4: Nevorlia to Southern Star Pipeline (Section 2) (sourced from Barto 2024)

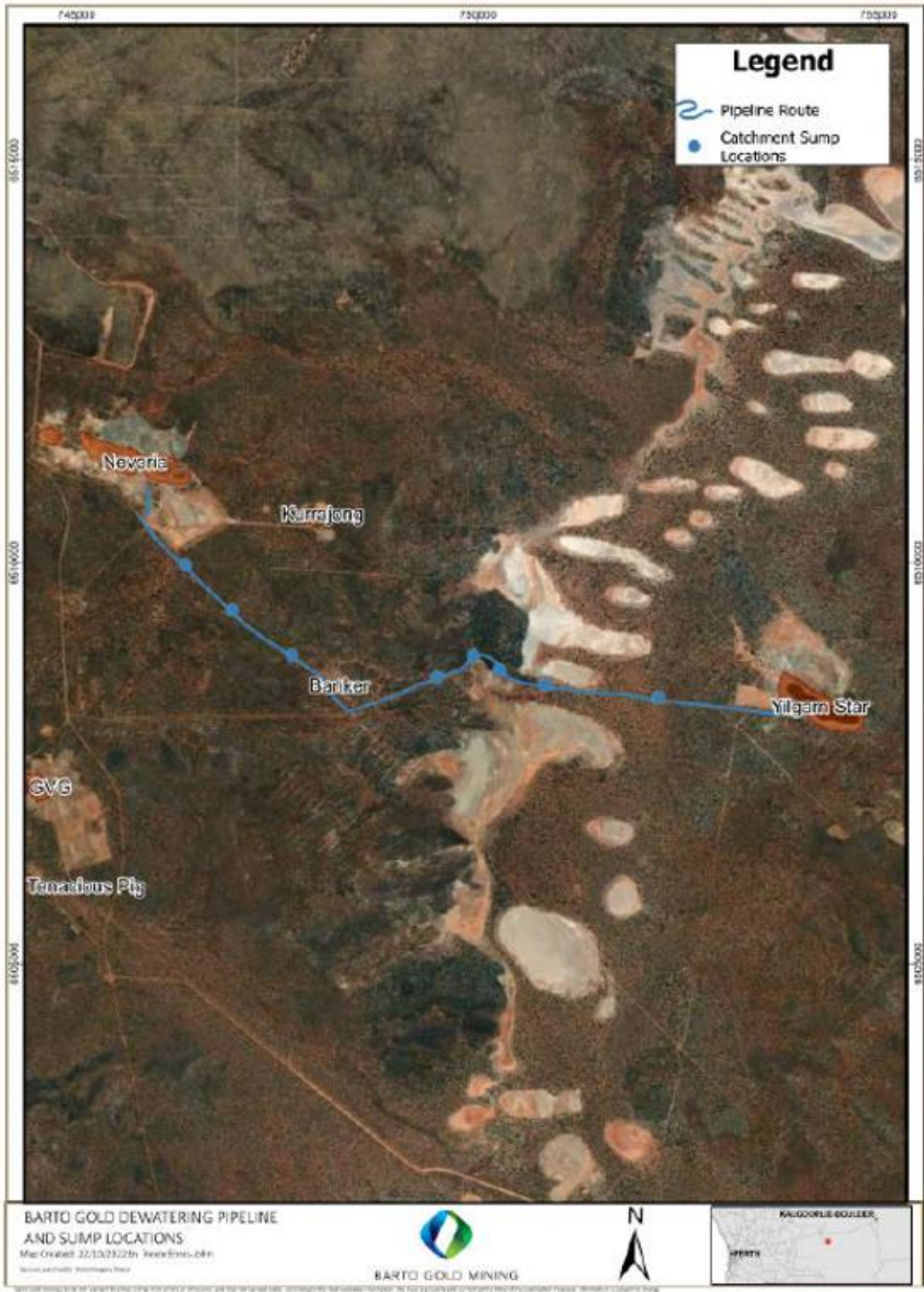


Figure 5: Yilgarn Star to Nevoria Pipeline



Figure 6: Yilgarn Star Pit to Harris Find Pit Pipeline



Figure 7: Ruapehu to Maori Lass Pit to Frasers Transvaal Pipeline

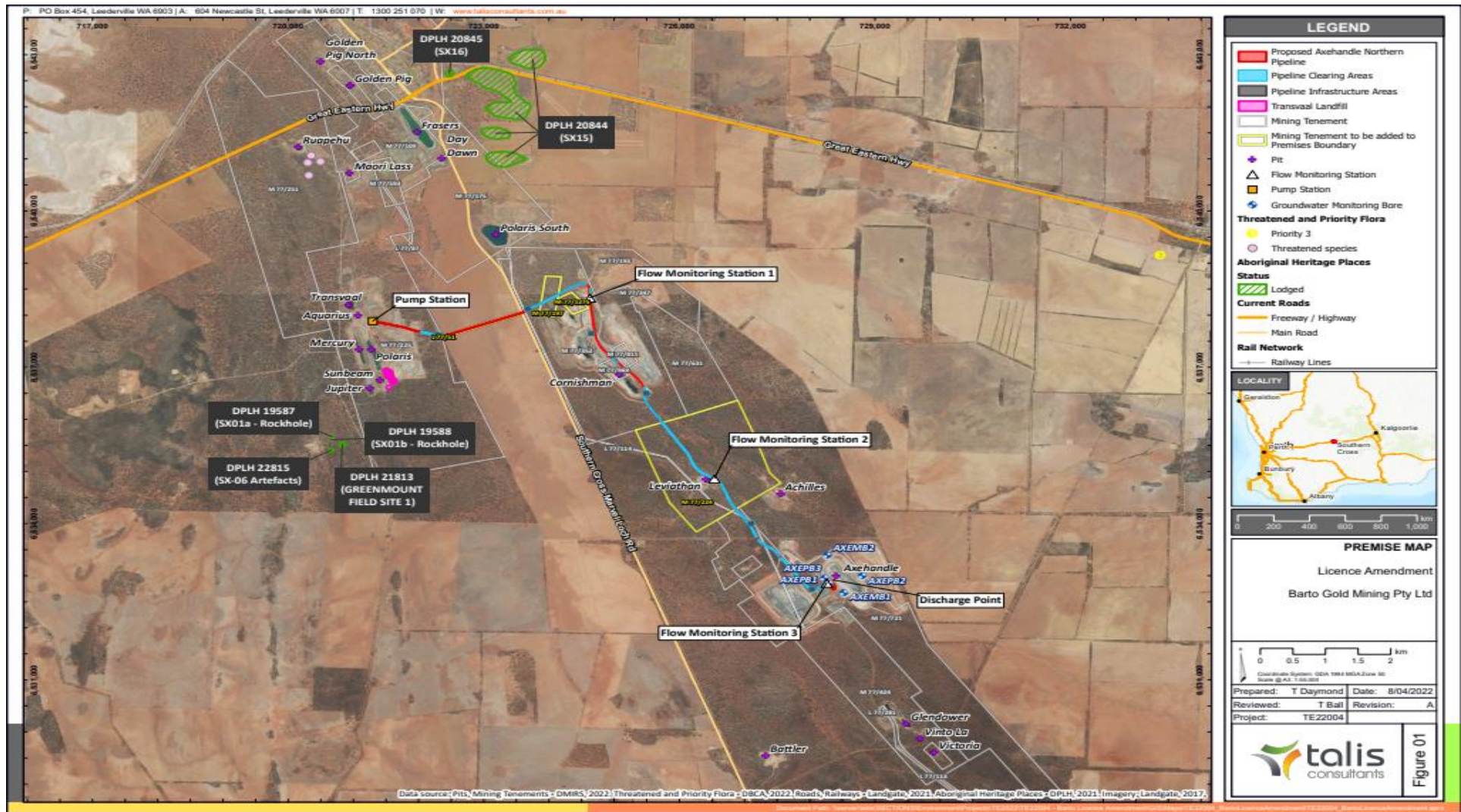


Figure 8: Sunbeam to Axehandle pipeline running adjacent to the Cornishman Complex

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 Amendment Report are detailed in Table 2 below. Table 2 also details the proposed control measures the Licence Holder has proposed to assist in controlling these emissions, where necessary.

Table 2: Licence Holder controls

Emission	Sources	Potential pathways	Proposed controls
Hypersaline water	Transport of mine dewater in pipelines, from source to discharge point.	Mine dewater discharge to land from rupture/leak of dewater pipeline.	<ul style="list-style-type: none"> • Existing Licence conditions: <ul style="list-style-type: none"> ○ Pipelines to be installed within v-drains to contain spillage in the event of a leak; ○ Pipelines have flow meters and telemetry to detect leaks. If leaks are detected, the transfer pumps will shut off automatically; ○ Leaks and spills will discharge into appropriately sized catchment ponds/ sumps; ○ Twice daily inspections of pipelines during operations; and ○ Pipelines constructed to meet the following standards: <ul style="list-style-type: none"> ○ AS/NZS 2033:3008: Installation of polyethylene pipe systems; ○ AS/NZS 4129:2008: Fittings for polyethylene (PE) pipes for pressure applications; ○ AS/NZS 4130:2009 Polyethylene (PE) pipes for pressure applications; and ○ AS/NZS 4131:2010: Polyethylene (PE)

Emission	Sources	Potential pathways	Proposed controls
			compounds for pressure pipes and fittings.
	Discharge of mine dewater water to new discharge points.	Overtopping – direct discharge to land.	<ul style="list-style-type: none"> • Existing Licence conditions: <ul style="list-style-type: none"> ○ Twice daily inspections of pit freeboard during operations; ○ Freeboard of 10 m at all dewater discharge pits; and ○ Pits to hold any inflow received as a result of a 1:100 year, 72 hour duration storm event for at least 72 hours.
		Seepage through pit walls/base.	<ul style="list-style-type: none"> • Existing Licence conditions: <ul style="list-style-type: none"> ○ Twice daily inspections of pit freeboard during operations; ○ Freeboard of 10 m at all dewater discharge pits; and ○ Monitoring of discharge dewater discharge points.
	Discharge of mine dewater water to new turkey nest.	Overtopping – direct discharge to land.	<ul style="list-style-type: none"> • Existing Licence conditions: <ul style="list-style-type: none"> ○ Daily inspections of turkey nest freeboard; ○ Freeboard of 300 mm at all dewater discharge pits; and ○ Turkey nests to hold any inflow received as a result of a 1:100 year, 72 hour duration storm event for at least 72 hours.

3.1.2 Receptors

In accordance with the *Guideline: Risk assessments* (DWER 2020), the Delegated Officer has excluded employees, visitors and contractors of the Licence Holder’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 3 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
Town of Southern Cross	Approximately 1.6 km from Ruapehu Pit and it's new proposed pipeline.
Environmental receptors	Distance from prescribed activity
Groundwater	<p>Groundwater consists of hypersaline water and is generally located approximately 20 to 45 meters below ground level (mbgl) across the Premises.</p> <p>Groundwater has minimal beneficial use outside of mineral processing.</p> <p>The Department completed a search on surrounding groundwater users and concluded that all monitoring bores and wells within 5 km of the prescribed premises boundary are for industry and/or mining purposes. No agricultural abstraction bores were located. The closest groundwater licence (GWL 204077) is approximately 600 m from the prescribed premises boundary and approximately 7.5 km from the closest proposed discharge location (Grand National Pit).</p>
Native Vegetation	<p>Present approximately 20 m from many discharge pits added to the licence from this amendment.</p> <p>and</p> <p>Approximately 10 m from proposed pipeline routes.</p>
Threatened and Priority Flora	<ul style="list-style-type: none"> • Priority 1 (P1) flora <ul style="list-style-type: none"> ○ Located approximately 1.9 km from Harris Ford Pit. • Priority 2 (P2) flora <ul style="list-style-type: none"> ○ Located approximately 2 km from Nevoria Pit. • Priority 3 (P3) flora <ul style="list-style-type: none"> ○ Multiple species location surrounding <u>Hercules</u>, <u>GVG</u> and <u>Grand National</u>, closets is approximately 90 m from Grand National; and ○ Located approximately 80 m from the proposed pipeline route from Nevoria to Southern Star. • Priority 4 (P4) flora <ul style="list-style-type: none"> ○ Located approximately 1 km from Windmills Pit; and ○ Located approximately 1.7 km from Nevoria Pit. • Threatened (T) flora.

	<ul style="list-style-type: none"> ○ Located approximately 30 m from the proposed pipeline route from Ruapehu Pit to Maori Lass Pit; and ○ Located approximately 130 m from Ruapehu Pit.
Priority and Native Fauna <i>Screened out</i>	Fauna is screened out from the assessment as the presence of saline waters (over 50,000 mg/L) acts as a natural deterrent for the flora to not ingest it.
Unnamed Non-Perennial Lakes	<p>Non-perennial lakes located approximately:</p> <ul style="list-style-type: none"> • 80 m northeast of proposed pipeline from Nevorla to Southern Star; • 440 m north from Southern Star Pit; and • 30 m from the Yilgarn Star to Harris Find pipeline.
Lake Polaris	<p>A non-perennial lake located approximately 100 m south of Maori Lass Pit.</p> <p>The proposed Maori Lass to the connection to Frasers pipeline travels directly through it.</p>

3.2 Risk ratings

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

Where the Licence Holder 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 Licence Holder's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the licence as regulatory controls.

Additional regulatory controls may be imposed where the Licence Holder's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 4.

The Revised Licence L45971988/14 that accompanies this Amendment Report authorises emissions associated with the operation of the Premises.

The conditions in the Revised Licence have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

Table 4. Risk assessment of potential emissions and discharges from the Premises during construction and operation

Risk Event					Risk rating ¹ C = consequence L = likelihood	Licence Holder's controls sufficient?	Conditions ² of licence	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Licence Holder's controls				
Construction								
Earthworks and the installation of mine dewater pipelines and turkey nests. and Vehicle movements	Dust	Pathway: Dust transported offsite via air / windborne pathways. Impact: Reduction to site amenity and potential impacts to nearby receptors.	<ul style="list-style-type: none"> Native Vegetation (10 m) 	Refer to section 3.1.1	C = Slight L = Unlikely Low Risk	Y	N/A	Low level dust and noise emissions are expected during the construction of the new pipelines. Construction activities will also be short-term resulting in a low risk for impact to receptors. No additional regulatory controls are required.
	Noise		<ul style="list-style-type: none"> Town of Southern Cross (1.6 km) 		C = Slight L = Unlikely Low Risk	Y		
Operation								
Operation of mine dewater pipelines	Hypersaline water (Mine dewater)	Pathway: Mine dewater discharged to land from rupture/ leak of pipelines. Impact: Reduction in the health of environmental receptors (stress/death from inundation or high salt content of discharge)	<ul style="list-style-type: none"> Lake Polaris (0 m) Non-Perennial lakes (30 m) Native Vegetation (10 m); and Threatened and Priority Flora (30 m) 	Refer to section 3.1.1	C = Minor L = Unlikely Medium Risk	Y	Existing condition 1: Pipeline requirements Existing condition 3: Pipeline inspection requirements Updated condition 24: New pipeline construction requirements	The proposed routes for new dewater pipelines and the reinstatement of existing pipelines are deemed suitably placed. All pipelines are proposed to be laid within a bunded corridor with sumps of adequate size. Pipelines are also required to be fitted with telemetry systems so that in an event of leaks or ruptures of the pipeline the emission is likely to be prevented from encountering sensitive receptors. Existing conditions on the licence adequately manage this risk. Construction requirements for new pipelines (Achilles/Axehandle and Rhapsody/Windmills-Redox) have been added to condition 24.
		Pathway: Mine dewater discharged to pit resulting in overtopping of pit. Impact: Reduction in the health of environmental receptors (stress/death from inundation or high salt content of discharge)	<ul style="list-style-type: none"> Native Vegetation (20 m); and Threatened and Priority Flora (90 m) Non-Perennial lakes (440 m); and Lake Polaris (100 m) 	Refer to section 3.1.1	C = Moderate L = Rare Medium Risk	Y	Existing condition 3: Freeboard inspection requirements Existing condition 5: Freeboard requirements	The licence contains an existing condition requiring dewater discharge pits to have a minimum freeboard of 10 m including the requirement to ensure that the pit can hold any inflow from a 1 in 100 year 72-hour storm event. This condition will apply to the new dewater discharge pits. The Department has assessed the risks of overtopping and it's potential impacts to receptors and has determined that existing conditions adequately manage this risk and no additional regulatory controls are required.

Risk Event					Risk rating ¹ C = consequence L = likelihood	Licence Holder's controls sufficient?	Conditions ² of licence	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Licence Holder's controls				
Discharge of mine dewater to pits	Hypersaline water (Mine dewater)	<p>Pathway: Seepage of hypersaline mine dewater through pit wall.</p> <p>Impact: Groundwater mounding resulting in impacts to environmental receptors at the surface (waterlogging of roots etc).</p>	<ul style="list-style-type: none"> Native Vegetation (20 m); and Threatened and Priority Flora (90 m) Lake Polaris (100 m); and Non-Perennial lakes (440 m) 	Refer to section 3.1.1	C = Minor L = Unlikely Medium Risk	Y	<p>Condition 2: Mine dewater emission locations and requirements</p> <p>Condition 5: Freeboard requirements</p> <p>Condition 29 to 33: discharge point monitoring requirements</p> <p>Condition 37: Monitoring of water volume discharged to each pit requirement.</p>	<p>The licence contains an existing condition requiring dewater discharge pits to have a minimum freeboard of 10 m including the requirement to ensure that the pit can hold any inflow from a 1 in 100 year 72-hour storm event. This condition will apply to the new dewater discharge pits. The 10 m freeboard will reduce the likelihood that any groundwater mounding will reach the root zones of vegetation at the surface (with roots most likely extending 4-5 meters below ground level).</p> <p>Existing conditions have therefore been deemed adequate to manage this risk. No additional regulatory controls are required.</p>
		<p>Pathway: Seepage of hypersaline mine dewater through pit wall.</p> <p>Impact: Changes in groundwater chemistry (pH or metals / metalloids).</p>	<ul style="list-style-type: none"> Groundwater (use – mining/mineral processing only) 	Refer to section 3.1.1	C = Minor L = Unlikely Medium Risk	Y	<p>Updated condition 2: Mine dewater emission locations and requirements.</p> <p>Updated condition 33: discharge point monitoring requirements</p> <p><u>Condition 34-35: Pit water sampling</u></p>	<p>All groundwater source and discharge locations share similar groundwater conditions such that they have similar pH, TDS, anions and metals concentrations. In situations where groundwater analysis results are not available the discharge pit/s are within proximity to the source pit which would suggest that groundwater between the two pits are close to homogenous.</p> <p>The following pits have insufficient monitoring data: Achilles North, Rhapsody, Windmills, Redox, GVG, Hercules, Cornishman North and Grand National. Therefore table 9 has been updated to require pit lake sampling to occur within these pits prior to dewatering discharge commencing. This will allow a baseline for water quality to be obtained. Condition 33 has also been updated to include the new discharge point locations and requires the licence holder to monitor discharge water quality on an annual / six monthly basis with this data to be provided on an annual basis to the department.</p> <p>As mentioned previously, groundwater conditions within the pits are generally homogenous however Grand National Pit was measured to have a pH of 2.7 on 29 May 2023 (Barto 2024). Samples on 26 June 2016 from Grand National Pit also reported elevated concentrations of iron and manganese.</p> <p>Although water from the Grand National Pit is acidic within the pit compared to groundwater surrounding the site the Department has assessed the risks and has amended the Licence to authorise dewatering sourced from Grand National to be discharged to Hercules and GVG pit. The following justifications present the Departments decision.</p> <ul style="list-style-type: none"> There is a relatively short distance from Grand National Pit to Hercules Pit and GVG Pit, being approximately 1.5 km and 2.5 km respectively; During September 2023 Grand National Pit was calculated to have approximately 32,000 kl of

Risk Event					Risk rating ¹ C = consequence L = likelihood	Licence Holder's controls sufficient?	Conditions ² of licence	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Licence Holder's controls				
								<p>water within the Pit. 32,000 kl is a relatively small volume of water within when compared with the overall operation of the premises and the size of the receiving Hercules (3,624,814 kl) and GVG (2,708,193 kl) pits which gives the water an opportunity to dilute to a less acidic pH; and</p> <ul style="list-style-type: none"> The Department has amended Condition 33 to require monitoring of the discharge location of mine dewater sourced from Grand National on a monthly basis during operation; and To ensure that acidic water is not discharged across the Premises Condition 2 in Licence L4597/1988/14 has been amended to only allow mine dewater sourced from Grand National Pit to be discharged to Hercules and/or GVG (located). <p>As there are no nearby groundwater users in the area with the main use of the groundwater being for mining purposes it has been determined that the movement of groundwater between pits will not result in a significant impact to the environment. Ongoing monitoring however is required to ensure this is the case.</p>
Discharge of mine dewater to Achilles turkey nest	Hypersaline water (Mine dewater)	<p>Pathway: Mine dewater discharged to pond resulting in overtopping of pond.</p> <p>Impact: Reduction in the health of environmental receptors (stress/death from inundation or high salt content of discharge)</p>	<ul style="list-style-type: none"> Native Vegetation (20 m); 	Refer to section 3.1.1	<p>C = Minor L = Unlikely Medium Risk</p>	Y	<p>Existing condition 2: Freeboard requirement Existing condition 3: Freeboard inspection requirements Existing condition 4: Freeboard requirements</p>	<p>The licence contains an existing condition requiring dewater turkeys nests to have a minimum freeboard of 300 mm including the requirement to ensure that the pit can hold any inflow from a 1 in 100 year 72-hour storm event. This condition will apply to the new turkey nest.</p> <p>The Department has assessed the risks of overtopping and its potential impacts to receptors and has determined that existing conditions adequately manage this risk and no additional regulatory controls are required.</p>

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

Note 2: Proposed Licence Holder's controls are depicted by standard text. **Underlined text** depicts additional regulatory controls imposed by department.

4. Consultation

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

Table 5: Consultation

Consultation method	Comments received	Department response
Local Government Authority (Shire of Yilgarn) advised of proposal on 9 April 2024	None received	N/A
Southern Cross resident advised of proposal on 9 April 2024	None received	N/A
Licence Holder was provided with draft amendment on (19 June 2024)	Comments were received on the 21/07/2024. Refer Appendix 1	Refer Appendix 1

5. Conclusion

Based on the assessment in this Amendment Report, the Delegated Officer has determined that a Revised Licence will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

5.1 Summary of amendments

Table 6 provides a summary of the proposed amendments and will act as record of implemented changes. All proposed changes have been incorporated into the Revised Licence as part of the amendment process.

Table 6: Summary of licence amendments

Condition no.	Proposed amendments
Front Page	Addition of mining tenement M77/133 to prescribed premises boundary.
2 (Table 1)	Inclusion of new discharge points. Amendment prevents water sourced from Grand National Pit to be discharged to dewater discharge pits other than Hercules and/or GVG Pits.
3 (Table 2)	Inclusion of new discharge points. Amendment to frequency of inspection of mine dewater pipelines and discharge pits from daily to twice daily during operation.
24 (Table 6)	Inclusion of new pipelines and pipelines to be reinstated: <ul style="list-style-type: none"> -Transvaal-Sunbeam/Cornishman/Axehandle dewatering pipeline; -Achilles/Axehandle dewatering pipeline; -Rhapsody/Windmills-Redox pipeline; -Nevoria/Southern Star pipeline; -Yilgarn Star to Harris Find pipeline; -Ruapehu/Maori Lass pipeline; and -Achilles turkey nest.
33 (Table 8)	Inclusion of new monitoring points: Achilles West/East, Achilles South, Achilles North, Rhapsody, Windmills, Redox, Cornishman North, Cornishman Central, Cornishman South, GVG, Hercules, Southern Star, Grand National, Harris Find, Ruapehu, Maori Lass.
35-36 (Table 9)	Pit lake sampling required for new discharge pits: Achilles West/East, Achilles South, Achilles North, Rhapsody, Windmills, Redox, Cornishman North, Cornishman Central, Cornishman South, GVG, Hercules, Southern Star, Grand National, Harris Find, Ruapehu and Maori Lass.
37 (Table 10)	Inclusion of new monitoring points for cumulative volume discharge: Achilles West/East, Achilles South, Achilles North, Rhapsody, Windmills, Redox, Cornishman North, Cornishman Central, Cornishman South, GVG, Hercules, Southern Star, Grand National, Harris Find, Ruapehu and Maori Lass.
Throughout document	Typographical errors corrected.
Definitions	Inclusion of an additional definition for "mRL."

References

1. Barto Gold Mining Pty Ltd 2024, Application for Licence Amendment L4597/1988/14. Version 1, Revision 2.
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. DWER 2021, Amendment Report L4597/1988/14, Amended August 2022
6. EMM Consulting Pty Limited 2021, Water impact assessment Windmills, P210291 RP1.
7. EMM 2022a, Axehandle northern pipeline, supporting documentation for proposed surplus mine water discharge, E210835 RP1.
8. EMM 2022b, Water management operations assessment, Southern Cross Operations site wide water balance June 2022.

Appendix 1: Summary of Licence Holder's comments on risk assessment and draft conditions

Condition	Summary of Licence Holder's comment	Department's response
2	The Licence Holder requested the Department to allow mine-dewater sourced from Grand National Pit to be discharged to GVG or Hercules Pit due to the relatively small amount of water (approximately 30,000 kL) within the Grand National Pit.	The delegated officer agrees that the Licence Holder may discharge water sourced from Grand National Pit to either Hercules or GVG Pit. This decision is discussed within Table 4 of this amendment report.