



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	DER2014/000887-1~8
Premises	<p>Southern Cross Operations (SXO) MARVEL LOCH WA 6426 Mining Leases M77/7, M77/8, M77/10, M77/26, M77/31, M77/66, M77/86, M77/109, M77/112, M77/113, M77/114, M77/137, M77/138, M77/175, M77/193, M77/197, M77/224, M77/225, M77/239, M77/251, M77/347, M77/352, M77/380, M77/408, M77/424, M77/431, 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, M77/775, M77/790, M77/811, M77/969, M77/977, M77/1036, and M77/1275, Miscellaneous Licences L77/51, L77/87, L77/112, L77/113, L77/114, L77/126, L77/128, L77/162, L77/167, L77/173, L77/281, L77/290, P77/3792 and General Purpose Leases G77/1-3</p> <p>As defined by the Premises maps attached to the Revised Licence</p>
Date of Report	19 August 2022
Decision	Revised licence granted

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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, applicant) for the Southern Cross Operations (the Premises), located on 45 mining tenements, 15 miscellaneous licences and one general purpose lease at Marvel Loch, WA. Only mining tenements M77/193, M77/197, M77/224, M77/225, M77/352, M77/721, M77/811, M77/969, M77/1275 and miscellaneous licence L77/51 are relevant for the purposes of this amendment.

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 construction and 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. The Revised Licence has been granted in a new format with existing conditions being transferred, but not reassessed, to the new format.

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

The applicant is seeking to dewater pits at the Greater Transvaal Complex (GTC) to support further mining at Sunbeam underground. Historically the pits at the GTC were dewatered north into Fraser's pit. As Fraser's pit is reaching capacity, an alternative discharge location is required, initiating this amendment.

On 9 April 2022, 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:

- Changes to premises boundary through addition of mining tenements M77/66, M77/197, M77/224, M77/408, M77/655, M77/1275 and miscellaneous licence L77/51 and L77/290. Removal of tenements P77/3792, P77/3793, L77/91 and L77/145;
- Construction and operation of a dewatering pipeline and new discharge point; and
- Construction and operation of a Class II/III putrescible landfill site

This amendment is limited only to changes to Category 6 and 64 activities from the existing Licence and are shown in Figure 1. No changes to the aspects of the existing Licence relating to Category 5 and 57 have been requested by the Licence Holder. Table 1 below outlines the proposed changes to the existing Licence.

Table 1: Proposed throughput capacity changes

Category	Current throughput capacity	Proposed throughput capacity	Description of proposed amendment
6	6,000,000 tonnes per annual period	6,000,000 tonnes per annual period	<ul style="list-style-type: none">• Construction and operation of a new

		(No change)	dewatering pipeline; and <ul style="list-style-type: none"> New discharge point
64	2,000 tonnes per annual period	2,000 tonnes per annual period (No change)	<ul style="list-style-type: none"> Construction and operation of a new Class II/III putrescible landfill site.

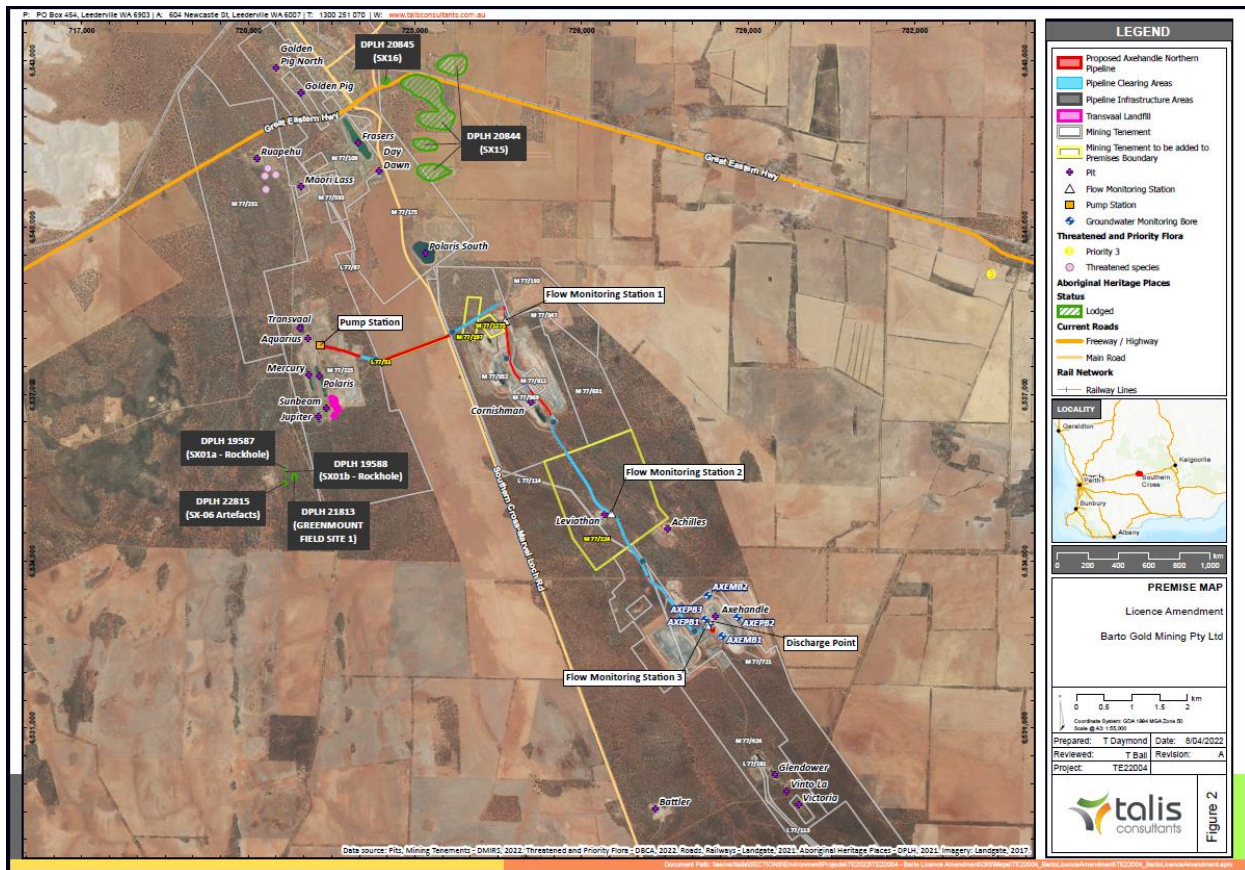


Figure 1. Map of prescribed premises depicting location of proposed activities

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
Construction			
Dust	Dust	Air/windborne pathway	<ul style="list-style-type: none"> • Use of watering truck to prevent dust emissions. • Earth works stopped during high winds. • Undertaking dust management.
Noise	Noise		<ul style="list-style-type: none"> • Construction only during daytime.
Hydrocarbon spills	Machinery spills during construction of pipeline	Directly to soil	<ul style="list-style-type: none"> • Servicing and refueling vehicles and equipment off-site. • Keep spill kits on machinery. • Prompt clean-up of spills.
Operation Category 6 – Mine dewatering			
Hypersaline mine dewater	Operation of dewatering	Pipeline leak/rupture	<ul style="list-style-type: none"> • Pipeline installed to contain spillage in the event of a leak. • Pipeline to have monitoring stations, communicating via radio telemetry – if leaks are detected, the transfer pumps will shut off automatically. • Where above ground and outside of mining areas – pipeline will be in swales to contain leakage and direct flows to scour ponds. • Scour valves will discharge to appropriately sized scour ponds. Recommended volumes for scour ponds should account for scour operation and pipeline failure. • Burial of pipeline through the Polaris drainage line. • Daily inspection of the pipeline and discharge point.
	Deposition and storage of mine dewater in Axehandle Pit	Overflow of pit	<ul style="list-style-type: none"> • Maintaining a freeboard of 20m.
Hydrocarbon spills/leaks	Spills from pumps from dewatering	Directly to soil	<ul style="list-style-type: none"> • Check pumps daily. • Prompt clean-up of spills.
Groundwater contamination and seepage	Storage of mine dewater in Axehandle Pit	Seepage into groundwater and water	<ul style="list-style-type: none"> • Max water storage for pit will be 345m AHD to avoid interaction with paleochannel sediments until a geotechnical assessment on saturated pit wall stability is completed.

Emission	Sources	Potential pathways	Proposed controls
		lines	<p>Acid Mine Drainage (AMD) risk will be managed through:</p> <ul style="list-style-type: none"> Conduct static and kinetic leach testing of waste material. Assess potential for AMD in underground. Assess potential contingency water management and treatment options for AMD affected water
Operation Category 64 – Class II or III putrescible landfill site			
Odour	Accumulation of putrescible waste	Air/windborne pathway	<ul style="list-style-type: none"> Waste in the tipping area will be covered in line with the licence requirements.
Landfill leachate	Contaminated water in area of landfill trenches	Seepage through base of landfill cell to groundwater	<ul style="list-style-type: none"> Only accepting waste types permitted in the licence. Base of the trench would have a minimum 2 meters depths to ground level. Maintaining undisturbed groundwater separation of more than 2 meters between base of waste disposal area and the highest groundwater level. Only small waste volumes will be accepted in the landfill.
Windblown waste	Landfilling of inert and putrescible waste	Air/windborne pathway	<ul style="list-style-type: none"> Waste is placed in defined trenches. Waste with a higher potential to become airborne will be covered as soon as practicable after deposit or by the end of the working week after deposit. Adherence to tipping heights and area and minimum covering requirements according to waste types in accordance with licence conditions. Landfill trench will have a 2 meters depth to ground level. Tipping Area would be restricted to a maximum linear length of 30 meters.
Hydrocarbon spills	Machinery spills during landfilling	Direct discharge to land	<ul style="list-style-type: none"> Servicing and refueling vehicles and equipment off-site. Keep spill kits on machinery. Prompt clean-up of spills.

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 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 environmental receptors and distance from prescribed activity

Human receptors	Distance from prescribed activity
N/A	N/A
Environmental receptors	Distance from prescribed activity
Remnant native vegetation	Within prescribed premises. Surrounding areas of activities and construction are characterized as healthy ('Good' to 'Very Good') populations of <i>Eucalyptus</i> and <i>Acacia</i> dominated woodlands.
Threatened or Priority Flora	Several mapped occurrences of threatened or priority flora as follows: <ul style="list-style-type: none"> • <i>Lissanthe scabra</i> (Priority 2) mapped 2.7km north from proposed pipeline and 3.3km north from proposed landfill in 1978 • <i>Verticorida elizabethiae</i> (Priority 1) mapped 2.8km north from proposed pipeline and 3.8km north of proposed landfill in 1926 • <i>Dariesia microcarpa</i> (Threatened) mapped 2.9km north from proposed pipeline and 3.8km north of proposed landfill in 2009
Threatened fauna	Malleefowl (<i>Leipoa ocellata</i>) classified as Vulnerable under the <i>Environmental Protection and Biodiversity Conservation Act 1999</i> . The closes mapped sitting recorded in the DBCA Databased was 2.5km west from the landfill and pipeline in 2003. In a survey (Barto 2021) three (two active and one inactive) Malleefowl mounds have been recorded approximately 25km south-east of the proposed activities within the premises boundary.
Surface Water Bodies and Lines	Ephemeral surface water drainage system (Polaris palaeodrainage system) intercepts the proposed location of the pipeline, located 890m east of the landfill and 4.2km west of the discharge point. This drains through Lake Cotton (1.2km north of pipeline and 2km north of landfill), into Lake Polaris (2.2km north of pipeline and 3km north of landfill) and ending up in Lake Koorkoordine (7.7km north of pipeline). Due to the topography of this area, surface water is likely to run towards these water bodies north of the landfill and pipeline pumps. SXO is located in the Lake Julia sub-catchment which forms part of the regional Yilgarn River Catchment in the western extent of the Avon River Catchment.
Rights in Water Irrigation Act 1914 (RIWI) Ground Water Proclamation Area	The prescribed premises lies on the Goldfields Groundwater Area.

	<p>Groundwater ranges between 370m AHD in the south to 340m AHD near the GTC. Ground surface level is 360m AHD at Axehandle pit, and between 357.5-366m AHD near the GTC.</p> <p>Local groundwater is saline to hypersaline – minimal beneficial use</p>
<p>Aboriginal Heritage Sites</p>	<p>The nearest Aboriginal heritage site (Rockhole and isolated artifacts) is 2.3km south-west of the proposed pipeline and 1.2km south-west of the landfill.</p> <p>The second nearest Aboriginal heritage site is 2.8km north of the pipeline and 4km north from the landfill.</p> <p>Screened out as a receptor as distance considered too great.</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 L4597/1988/14 that accompanies this Amendment Report authorises emissions associated with the operation of the Premises i.e. mine dewatering with new discharge point and new landfill class II/III location.

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								
Earth moving activities for construction of dewatering pipeline and landfill Vehicle movements	Dust	Pathway: Air / windborne pathway Impact: Smothering of vegetation and disturbance to fauna	Native vegetation, including priority and threatened flora	Refer to Section 3.1	C = Slight L = Unlikely Low Risk	Y	Condition 24: Dust suppression measures using a water truck during construction phase of landfill	The controls proposed by the applicant are considered sufficient and have been conditioned within the licence as regulatory controls for the design and construction of the landfill.
	Noise		Threatened fauna				N/A	As the duration of the construction phase is short, the receptors are unlikely to be impacted by noise emissions during this time.
Commissioning and operation (Category 6 – Mine dewatering)								
Commissioning and operation of dewatering pipeline	Hypersaline mine dewater	Pathway: Pipeline leak or rupture, resulting in overland runoff (discharge to land) Impact: Disturbance to fauna, nearby vegetation and contamination into water bodies	Native vegetation, including priority and threatened flora Threatened fauna Landholder property	Refer to Section 3.1	C = Minor L = Possible Medium Risk	Y	Condition 1: pipeline spill mitigation Condition 3: pipeline inspection Condition 24: pipeline construction Condition 26 & 27: ECR requirements	The current licence contains conditions for the operation of a dewatering pipeline. The applicants proposed controls for secondary containment will be conditioned a regulatory controls in the construction requirements for the pipeline. In addition to these measures, regular cleaning of the pipes will be sufficient to prevent with blockages leading to pipe rupture. The proposed commissioning phase of the pipeline is also considered a necessary and relevant control to ensure the pipeline has been constructed appropriately.

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				
Deposition of mine dewater to Axehandle Pit	Hypersaline mine dewater	<p>Pathway: Overtopping, resulting in overland runoff (discharge to land)</p> <p>Impact: Disturbance to fauna, nearby vegetation and contamination into water bodies</p>	<p>Native vegetation, including priority and threatened flora</p> <p>Threatened fauna</p>	Refer to Section 3.1	<p>C= Minor</p> <p>L = Rare</p> <p>Low Risk</p>	Y	<p>Condition 5: Axehandle freeboard</p> <p>Condition 24: pipeline inspection</p> <p>Condition 32: monitoring at point of emission</p> <p>Condition 33: cumulative volumes of mine</p>	<p>Axehandle Pit will include additional freeboard requirements due to a risk related to pit wall stability. This will mitigate the risk of overtopping.</p> <p>Axehandle Pit freeboard will be revised in the new licence to maintain a freeboard of 20m.</p>

Risk Event					Risk rating ¹	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	C = consequence L = likelihood			
	Hypersaline mine dewater	Pathway: Seepage and infiltration – lateral movement of pit lake water through walls Impact: Saturation of pit wall may affect stability of infrastructure integrity and pit water could transfer to the palaeochannel sediments.	Polaris palaeochannel Groundwater mounding and quality Groundwater depressions	Refer to Section 3.1	C = Minor L = Unlikely Medium Risk	Y	Condition 2: containment infrastructure Condition 3: pipeline inspection Condition 5: Axehandle freeboard Condition 32: monitoring at point of emission Condition 33: cumulative volumes of mine dewater Condition 34: GW bore monitoring	Refer to Section 3.3
	AMD affecting water quality of dewatering effluent			Refer to Section 3.1	C = Minor L = Rare Low Risk	Y	Condition 24: pipeline construction with monitoring point Condition 32: monitoring of dewater discharge (pH monthly)	Refer to Section 3.4
Operation (Category 64 - Putrescible landfill site)								
Use of vehicles to transport waste and burying waste	Dust	Pathway: Air / windborne pathway Impact: Smothering of vegetation and disturbance to	Native vegetation, including priority and threatened flora Threatened	Refer to Section 3.1	C = Slight L = Unlikely Low Risk	Y	Condition 16: waste processing	The controls proposed by the applicant are considered sufficient and have been conditioned within the licence as regulatory controls for the design and construction of the landfill. Minimal fugitive dust emissions

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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				
		fauna	fauna					are expected and likely to only be from a small area, in the tipping and landfill face. No additional regulatory controls have been included.
	Noise	Pathway: Air / windborne pathway Impact: disturbance to fauna	Threatened fauna				N/A	There are minimal noise emissions expected. The Delegated Officer has determined that no additional regulatory controls are required.
	Hydrocarbon spills	Pathway: direct discharge to land Impact: contamination of soil, impacting flora and fauna	Native vegetation, including priority and threatened flora Threatened fauna				Condition 12: collect hydrocarbon waste Condition 13: fuel traps at vehicle wash down areas	Noting that there are no hydrocarbons stored on site and there are existing licence conditions, the Delegated Officer considers the risk of spills to receptors as low.
Landfilling of inert and putrescible waste	Windblown waste	Pathway: direct discharge to land Impact: disturbance to vegetation	Native vegetation, including priority and threatened flora	Refer to section 3.1		Condition 16: waste processing Condition 17: landfilling requirements Condition 18: cover requirements Condition 19: landfill security Condition 20: windblown waste Condition 21: illegal burning	The Delegated Officer has determined that existing licence conditions and proposed applicant controls are sufficient. No additional regulatory controls will be implemented in the licence conditions.	

Risk Event					Risk rating ¹	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	C = consequence L = likelihood			
Accumulation of putrescible waste	Leachate	Pathway: discharge to land – seepage of leachate into soil / groundwater Impact: contamination to groundwater	Polaris palaeochannel Groundwater contamination	Refer to Section 3.1	C = Minor L = Unlikely Medium Risk	Y	Condition 16: waste processing Condition 18: cover requirements Condition 24: design requirements Condition 26 & 27: ECR requirements	
	Contaminated stormwater	Pathway: surface water runoff Impact: Contamination of soil and vegetation	Native vegetation, including priority and threatened flora		C = Slight L = Rare Low Risk	N/A	Condition 16: waste disposal in defined trench or within an area enclosed by earthen bunds	The Delegated Officer considers controls to be sufficient to manage the risk. Additional regulatory controls are not required.

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. **Bold and underline text** depicts additional regulatory controls imposed by department.

3.3 Detailed risk assessment for seepage

3.3.1 Source, pathway and receptor

The nearest palaeodrainage line occurs west to the proposed discharge point at Axehandle Pit and intercepts the proposed placement of the dewatering pipeline, as shown in Figure 2. This drainage line is associated with the chain of salt lakes that trail north of the premises, passing through the town of Southern Cross. Ground water levels on the premises range from 340m AHD near the GTC pits to 370m AHD further south of the premises. This palaeochannel could be impacted if seepage flow from the pit interacts with palaeochannel sediments that trend west towards that water line. The inferred base of these sediments is at an elevation of approximately 345m AHD, 20 mbgl at the Axehandle Pit area.



Figure 2. Location of proposed pipeline and nearby water courses and bodies

3.3.2 Applicant proposed controls

To mitigate the risks of pit lake water travelling through palaeochannel sediments into the channel, the applicant has proposed to control the freeboard of Axehandle Pit at an elevation to avoid this. The applicant has provided a 6-year water balance model of Axehandle Pit to estimate water elevation in the pit (Figure 3). This water balance compares the pit lake level that would occur due to natural groundwater recharge, and from the additional dewatering approved in this amendment. This model indicates that the initial dewatering of the Sunbeam, Polaris and Aquarius pits, in addition to the ongoing surplus dewatering at Sunbeam underground, would increase the pit lake level to 321m AHD by the end of the 6-year period which will allow for an approximately 24m freeboard between the maximum water elevation and the estimated elevation of the palaeochannel sediments.

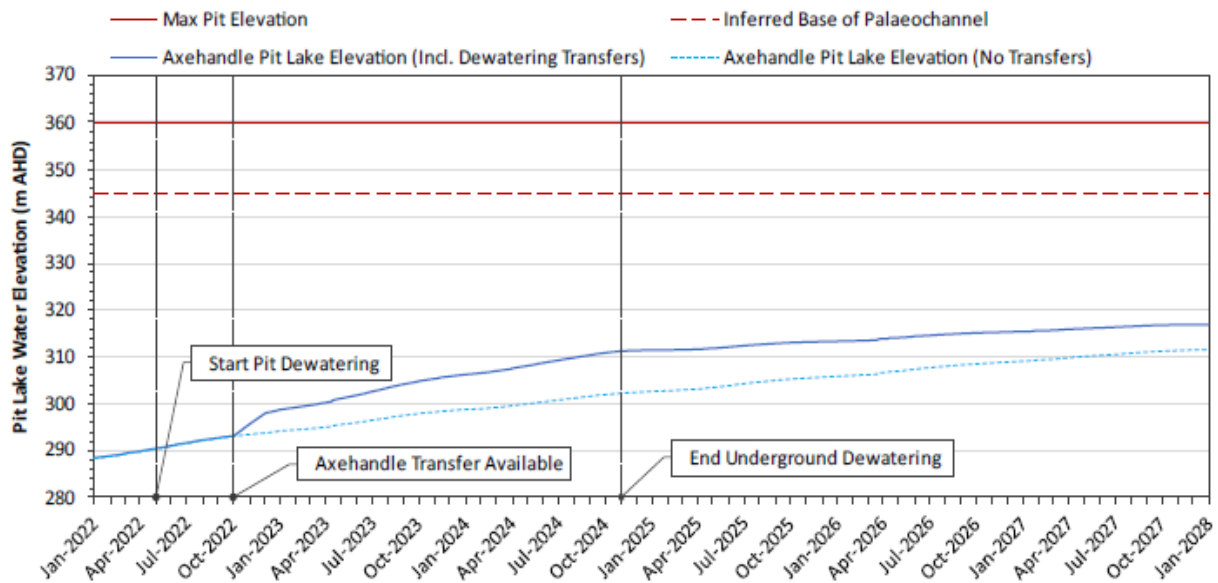


Figure 3. Predicted pit lake of Axehandle pit with and without water discharge from Sunbeam underground project

The crest level elevation of Axehandle pit is 365m AHD. The applicant has proposed a 20m freeboard to ensure the pit lake does not reach the elevation of 345m AHD where it will interact with palaeochannel sediments. This control should remain until such time where a geotechnical assessment can be conducted to evaluate the pit wall stability under re-saturated conditions. This will need to be reassessed if future dewatering into Axehandle pit is proposed that requires changes to the capacity above the 20m freeboard limit. The applicant has also produced a 100-year water balance to predict the natural pit lake recovery following the dewatering of the GTC. This is shown in Figure 4.

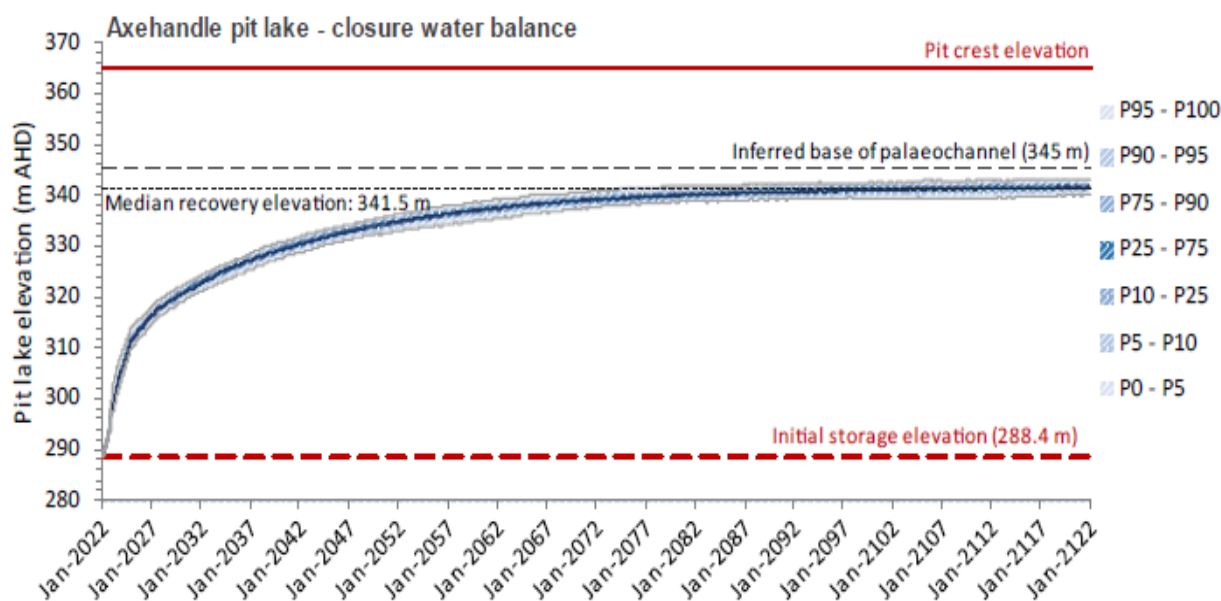


Figure 4. Axehandle pit lake 100-year recovery prediction

3.3.3 DWER assessment

As shown in above the estimated pit lake level following the dewatering into Axehandle pit will be approximately 24m below the inferred palaeochannel elevation advising that the likelihood of this interaction to be “unlikely”. As the consequence rating to this risk occurring is “minor”, this gives an overall risk rating of “medium”. The applicant’s proposed control will be conditioned into the licence as a new freeboard limit for Axehandle pit. With the addition of this condition, the Delegated Officer considers the risk to be acceptable and can be sufficiently managed within the conditions of the licence.

Monitoring of additional bores surrounding Axehandle pit have also been included as part of the existing conditions. This includes measuring standing water levels which will assist in modelling seepage and the impacts to groundwater levels.

3.3.4 Addition of Cadmium monitoring

Pit lake water quality testing has indicated Aquarius pit to historically show high concentrations of Cadmium, as high as 0.018mg/L has been recorded in 2020. It has been recommended by the consultant who have compiled a report on behalf of the applicant, that Cadmium be included in the suite of metals as part of the monitoring requirements. The Delegated Officer has determined that this recommendation will be conditioned within the licence, to capture the potential spread of Cadmium into Axehandle pit.

3.4 Detailed risk assessment for AMD affecting water quality of dewatering discharge into Axehandle pit

3.4.1 AMD Source

The applicant has provided information on the water quality at the proposed dewatering pits, as shown in Figure 5.

Table 5. Pit water quality information

Pit	TDS (mg/L)	TSS (mg/L)	pH
Aquarius	140000	6.0	7.2
Polaris	170000	120.0	6.9
Sunbeam	180000	13.0	7.0
Axehandle	120000	-	7.6

A suite of metals from Sunbeam pit were not provided as the pit water was considered inaccessible. The current water quality measures do not indicate any high risks associated with the initial proposed dewatering, due to neutral pH of the pit water and similarities in properties between the GTC pits and the discharge location at Axehandle. The dewatering for this amendment is required to support proposed underground mining at Sunbeam to commence once the initial dewatering is complete. The estimated duration of this proposed mining is 2 years, from October 2022 until October 2024. Preliminary testing of the material at Sunbeam under has indicated high risk of AMD with 75% of samples classed as Potentially Acid Forming (PAF) (EMM, 2022).

AMD, if left untreated and without adequate measures to control spread to water ways, poses risk to the environment and human health. This includes impacts to aquatic life, riparian vegetation, other uses of contaminated water streams, and bioaccumulation of metals within the food chains (DoW, 2009).

As dewatering occurs, the operational water table will reside below the exposed PAF material, decreasing the likelihood of interaction with water prior to dewatering. The applicant has stated that due to this they expect the discharge during underground dewatering to not be affected by AMD and will have similar water quality characteristics to that of the natural groundwater.

AMD is expected to influence groundwater quality during re-flooding at cessation of mining. The potential influences of AMD, including the potential for downstream impacts, are to be addressed as part of closure studies for the project, subject to Department of Mines, Industry Regulation and Safety (DMIRS) conditions on the Sunbeam Mining Proposal (REGID 110772).

3.4.2 Pathway and receptors

Should waste materials at Sunbeam underground produce AMD, contaminated water may be transferred to Axehandle pits during the surplus dewatering. Through this process, the potentially contaminated water may spread, increasing the number of pathways to receptors. These include pipeline rupture, Axehandle pit over topping and pit wall seepage. The receptor likely to be impacted the most is the salt lake ecosystems, should contaminated water enter the palaeochannel and spread off the premises. Adjacent native vegetation can also be impacted by spills of AMD contaminated discharge.

3.4.3 Applicant proposed controls

As it is unlikely that dewatering discharge water will be contaminated by AMD from Sunbeam underground, the applicant's proposed actions are geared towards AMD detection and

monitoring rather than preventative. These actions include:

1. An additional monitoring point located along the proposed pipeline to allow for monitoring of mine dewater prior to the discharge into Axehandle pit.
2. A monitoring program that would include monthly pH measurements and quarterly sampling for a range of water quality parameters including major cations and anions and metals).
3. Monitoring will be provided in the Annual Environmental Report to the department.

Monitoring along the pipeline will allow data collection of mine dewater prior to dilution in the pit lake water.

3.4.4 DWER assessment

As mentioned above the likelihood of the risk of AMD impacting the water quality of the dewatering discharge is 'rare' resulting in a 'low' risk rating as PAF rock backfilled to mined out stopes will be located above the operational water table.

AMD is only expected to influence the groundwater quality during re-flooding at cessation of mining. This issue will be managed during closure and will be addressed as part of closure studies for the project and regulated by DMIRS.

The applicant's proposed controls will be conditioned as regulatory controls in the amended licence to ensure water quality is monitored on a frequent basis and data submitted to the Department as part of the Annual Environmental Report where trends can be assessed, and the risk re-assessed based on the information provided if required.

4. Consultation

Table 6 provides a summary of the consultation undertaken by the department.

Table 6: Consultation

Consultation method	Comments received	Department response
Southern Cross resident listed as a stakeholder for this premises, advised of proposal on 17 May 2022.	Southern Cross resident has objections against the continued dewatering to Fraser's pit with concerns of pit water above the allowable licence limit. Comments received on the 23 of May 2022.	This comment is considered to relate to an activity outside the scope of this assessment. Potential non-compliances to breach of existing licence conditions should be referred to Pollution Watch and will be dealt with the Departments Compliance and Enforcement branch.
Owner of the Unkovich land that lease L77/51 runs through, and the dewatering pipeline will be constructed underneath, advised of proposal on 24 May 2022	N/A	N/A
Licence Holder was provided with draft amendment on 29 June 2022.	Licence Holder had meeting with DWER representatives to discuss the draft instrument and conditions on 18 July 2022.	Refer to Appendix 1: Summary of Licence Holder's comments on risk assessment and draft conditions

	Refer to Appendix 1: Summary of Licence Holder's comments on risk assessment and draft conditions for formal response during comment period.	
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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 7 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 8 lists the consolidation of conditions completed as part of this amendment.

Table 7: Summary of licence amendments

Condition no.	Proposed amendments
-	Changes to premises details to include mining tenements M77/197, M77/224, M77/1275, M77/408, M77/655, M77/66 and miscellaneous licences L77/51 and L77/290. Removal of tenements P77/3793, L77/91 and L77/145.
-	Changes to Instrument log to include current amendment.
-	Changes to condition numbering revised to current licence format.
-	Changes to all Table numbering and captioning revised to current licence format.
2	Changes to Table 1 to include Axehandle Pit as an additional containment cell for mine dewater.
3	Changes to Table 2 to include Axehandle pit as additional inspection location.
16	Changes to Table 4 to include Transvaal landfill as an authorized landfill location.
16	Changes to Table 4 include removal of last row related to landfill construction requirements.
24	Changes to Table 6 to include design and construction requirements for Axehandle dewatering pipeline and Transvaal landfill.
32	Changes to Table 8 to include new emission to land for Axehandle dewatering pipeline.
32	Changes to Table 8 to include Cadmium as a monitored element for emission points.
32	Changes to Table 8 to include monthly monitoring of pH for dewater discharge to Axehandle pit
33	Changes to Table 9 to include Transvaal landfill and Axehandle discharge point as a process monitoring point.
35	Changes to Table 11 to include monitoring bores around Axehandle pit (AXEPB1,

	AXEPB2, AXEPB3, AXEMB1, AXEMB2).
5	Additional condition to include the 20m freeboard for Axehandle Pit.
-	<p>Updated premise map to show the additional tenements.</p> <p>Map of landfill locations updated to include a figure of Transvaal landfill.</p> <p>Map of infrastructure to be constructed updated to include a figure of Axehandle dewatering pipeline.</p> <p>Addition of Figure captions to all maps and images referred to in Schedules of the licence.</p>

Table 8: Consolidation of licence conditions in this amendment

Existing condition	Condition summary	Revised licence condition	Conversion notes
N/A	Introduction	N/A	Revised to current licensing format.
1.1.1 1.1.2	Interpretation and definitions	N/A Interpretation section, Definitions and Table 15	Redundant condition. Revised to current licensing format.
1.1.3	Australian or other standard	N/A Interpretation section	Redundant condition. Revised to current licensing format.
1.1.4	Reference to code of practice	N/A Interpretation section	Redundant condition. Revised to current licensing format.
N/A	All Conditions	N/A	New numbering revised to current licencing format
N/A	All Table Captions	N/A	New Table number and naming convention
Schedule 2 Reporting and Notifications	Annual Audit Compliance Report Form N1 Notification	N/A	Redundant attachment. Deleted from Licence Forms accessed at www.dwer.wa.gov.au

References

1. Barto, 2021. *Southern Cross Operations Mine Closure Plan*. EGS S01002031. Version 2, Revision: 4.
2. Department of Water (DoW) 2009, *Proposed guidelines for treating acid drain water in the Avon catchment, Western Australia: adapting acid mine drainage treatment systems for saline acidic drains*, Perth, Western Australia.
3. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
4. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
5. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Risk Assessments*, Perth, Western Australia.
6. EMM, 2022. *Axehandle Northern Pipeline, Supporting Documentation for Proposed Surplus Mine Water Discharge*. Prepared for Barto Gold Mining Pty Ltd.

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

Condition	Summary of Licence Holder's comment	Department's response
Condition 43	<ul style="list-style-type: none"> • During operational period, it is proposed that water pumped from the Sunbeam underground system be deposited in the Axehandle pit lake. It is expected the chemistry of pumped water will be dominated by that of the local baseline groundwater and likely to be analogous to the water already occupying the Axehandle pit lake, i.e highly saline (TDS 80,000-120,000 mg/L) • The risk that AMD will affect Axehandle pit lake water quality is very low for the following reasons <ul style="list-style-type: none"> - PAF rock backfilled to mined out stope will be located above the operational water table. Any AMD generated within these backfilled stopes would be transported to the water table only very slowly via percolation of seepage through unsaturated rock - PAF rock contains some (albeit limited) acid neutralization capacity. Thus, onset of acid conditions is not expected to occur immediately. Kinetic testing is planned in accordance with MP Reg110772 (pending approval), and will inform evaluation of reaction rates, and time to acid onset. <p>Performance Criteria described in MP states "kinetic testing undertaken to determine the rate of PAF material oxidation and to guide the water management". This commitment will become a tenement conditions as per current DMIRS processes and compliance with this commitment will be regulated by DMIRS</p> • Monitoring of water quality during operation will ensure early detection of AMD in the unlikely event that conditions do not evolve as expected. Plans are in place to establish monitoring point along the Transvaal to Axehandle pipeline so that water can be sampled prior to discharge to the pit lake. The monitoring program would include monthly pH measurements, and quarterly sampling for a range of water quality parameters (e.g. major cations and anions and metals). Such a monitoring plan will generate data on the pumped water quality prior to mixing with and being diluted by, the pit lake water. Results will be assessed for trends and provided in the annual environmental reports for DWER and DMIRS • AMD is expected to influence groundwater quality during re-flooding at cessation of mining. The potential influences of AMD, including the potential for downstream impacts, are to be addressed as part of closure studies for the project, subject to DMIRS conditions on the Sunbeam MP (REGID 110772) 	<p>DWER has considered the applicant's justification accept to mitigate the risks of AMD and why Condition 43 of the draft should be removed.</p> <p>The applicants new proposed controls to monitor water quality prior to the discharge at Axehandle pit will be conditioned within the amendment licence.</p>
Outstanding issues	<ul style="list-style-type: none"> • Map of Marvel Loch landfill • Map of Victoria's pipeline • Map of Victoria's Turkey's Nest 	N/A

Condition	Summary of Licence Holder's comment	Department's response
	<ul style="list-style-type: none"> • Updated Prescribed premises boundary map • Clearer image of the proposed Transvaal Landfill 	
Changes to Prescribed premises	<ul style="list-style-type: none"> a) Removal of dead tenements that are no longer held by Barto: P77/3791, P77/3793, L77/91 and L77/145 b) Addition of the M77/66 to the tenement list. This tenement has previously been included in the Prescribed premises map but not listed under the premises details c) Addition of a miscellaneous licence L77/290 to the prescribed premises to connect the prescribed premises area together (previously connected by now dead tenements). L77/290 is fully owned by Barto and there is currently a haul road running through the tenement linking Cornishman area to Marvel Loch; and d) Addition of M77/408 and M77/655 to close the unnecessary gaps within the Prescribed Premises area. These tenements are owned by Barto. 	This request to update the prescribed premises has been noted by DWER and requested changes will be included.

Appendix 2: Application validation summary

SECTION 1: APPLICATION SUMMARY				
Application type				
Amendment to licence	<input checked="" type="checkbox"/>	Current licence number:	L4597/1988/14	
		Relevant works approval number:	N/A	<input type="checkbox"/>
Date application received	9 th April 2022			
Applicant and Premises details				
Applicant name/s (full legal name/s)	Barto Gold Mining Pty Ltd			
Premises name	Southern Cross Operations (SXO)			
Premises location	<p>Activities related to Category 6 (Dewatering) are located in mining leases: M77/193, M77/197, M77/224, M77/225, M77/352, M77/721, M77/811, M77/969, M77/1275 and miscellaneous licence: L77/51.</p> <p>Tenements L77/51, M77/197, M77/1275 and M77/224 need to be included in the premise boundary with this amendment.</p> <p>Activities related to Category 64 (Class II or III putrescible land) are located wholly within mining lease M77/225</p>			
Local Government Authority	Shire of Yilgarn			
Application documents				
HPCM file reference number:	DER2014/000887-1~8			
Key application documents (additional to application form):	<p>Supporting documents (DWERDT589394) including:</p> <ul style="list-style-type: none"> • <i>Proof of occupier status</i> • <i>Copy of DWER Licence L4597/1998/14 – Appendix A</i> • <i>Premise map – Figure 2</i> • <i>Proposed activities</i> • <i>Map of area proposed to be cleared</i> • <i>Additional information for clearing assessment</i> • <i>Other approvals and consultation</i> • <i>Emissions and Discharges</i> • <i>Waste Acceptance</i> • <i>Siting and Location</i> • <i>Hydraulic Design Report – Appendix B</i> • <i>Licence Amendment Fee Calculation – Appendix C</i> • <i>Alexhandle Northern Pipeline – Proposed Surplus Mine Water Discharge – Appendix D</i> <p>These documents are all attached in separate PDF (Attachment 8) than the Licence Application Form</p>			
Scope of application/assessment				

Summary of proposed activities or changes to existing operations.	<p><u>Licence Amendment</u></p> <p>Construction and operation of a Category 6 dewatering pipeline approximately 11.3km long, pumping approximately 891,500 tonnes/year to an existing discharge Pit</p> <ul style="list-style-type: none"> • Inclusion of Axehandle Pit as an approved discharge location • Inclusion of additional tenements to the premise boundary to permit construction and operation of that pipeline • No change to throughput <p>Construction and operation of a Category 64 Class II or III putrescible landfill site</p> <ul style="list-style-type: none"> • Located in southern parts of GTC on cleared land and within premise boundary • No change to throughput
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Category number/s (activities that cause the premises to become prescribed premises)

Table 1: Prescribed premises categories

Prescribed premises category and description	Proposed production or design capacity	Proposed changes to the production or design capacity
Category 6: Mine dewatering: premises on which water is extracted and discharged into the environment to allow mining of ore	6,000,000 tonnes per annual period	No change in production capacity
Category 64: Class II or III putrescible landfill site	2,000 tonnes per annual period	No change in production capacity

Legislative context and other approvals

Has the applicant referred, or do they intend to refer, their proposal to the EPA under Part IV of the EP Act as a significant proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Referral decision No: Managed under Part V <input type="checkbox"/> Assessed under Part IV <input type="checkbox"/>
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Ministerial statement No: EPA Report No:
Has the proposal been referred and/or assessed under the EPBC Act?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Reference No:
Has the applicant demonstrated occupancy (proof of occupier status)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Certificate of title <input type="checkbox"/> General lease <input checked="" type="checkbox"/> L77/51 (27/7/2023) Mining lease / tenement <input checked="" type="checkbox"/> <ul style="list-style-type: none"> • M77/193 (6/1/2030) • M77/197 (20/3/2030) • M77/224 (28/6/2030) • M77/225 (28/6/2030) • M77/352 (17/4/2031) • M77/721 (30/11/2040) • M77/811 (1/12/2024) • M77/969 (30/6/2041) • M77/1275 (8/9/2036) Other evidence <input type="checkbox"/> Expiry:

Has the applicant obtained all relevant planning approvals?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	Approval: Expiry date: If N/A explain why? Premise relating to this amendment are located on mining tenement, not freehold land
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	CPS No: <i>Clearing for pipeline construction will come under the exemption that allows clearing of up to 10 hectares per financial year per authority (tenement) area for clearing regulated under the Mining Act 1978.</i> <i>Permit for landfill not required as no clearing of remnant vegetation is required for the inclusion of the Transvaal landfill.</i>
Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Application reference No: N/A Licence/permit No: N/A
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Application reference No: Licence/permit No: GWL59227(9) and GWL104620(6)
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Name: Goldfields Groundwater Area Type: Proclaimed Groundwater Area Has Regulatory Services (Water) been consulted? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Regional office: Goldfields
Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Name: N/A Priority: N/A Are the proposed activities/ landuse compatible with the PDWSA (refer to WQPN 25)? Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>
Is the Premises subject to any other Acts or subsidiary regulations (e.g. <i>Dangerous Goods Safety Act 2004, Environmental Protection (Controlled Waste) Regulations 2004, State Agreement Act xxxx</i>)	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	<i>Mining Act 1978</i> <i>Right in Water and Irrigation (RIWI) Act 1914</i>
Is the Premises within an Environmental Protection Policy (EPP) Area?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Is the Premises subject to any EPP requirements?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	

<p>Is the Premises a known or suspected contaminated site under the <i>Contaminated Sites Act 2003</i>?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>Classification:</p> <p>4 sites that fall on the path of the proposed pipeline are still <i>Awaiting Classification</i>.</p> <p>(DEC13053, DEC13059, DEC13051, DEC13057)</p> <p>One site located to the south of the landfill (DER2017/407) where the <i>Report not substantiated</i></p> <p>Date of classification: N/A</p>	
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