



Decision Document

Environmental Protection Act 1986, Part V

Proponent: Northern Star Resources Ltd

Works Approval: W5651/2014/1

Registered office: Level 1
1 Puccini Court
STIRLING WA 6021

ACN: 092 832 892

Premises address: Paulsens Gold Mine
Mining Lease M08/99 and M08/196
Nanutarra-Munjina Road
PARABURDOO WA 6754

Issue date: Thursday, 21 August 2014

Commencement date: Monday, 25 August 2014

Expiry date: Saturday, 24 August 2019

Decision

Based on the assessment detailed in this document the Department of Environment Regulation (DER), has decided to issue a works approval. DER considers that in reaching this decision, it has taken into account all relevant considerations and legal requirements and that the Works Approval and its conditions will ensure that an appropriate level of environmental protection is provided.

Decision Document prepared by:

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1 Purpose of this Document

This decision document explains how DER has assessed and determined the application for a works approval or licence, and provides a record of DER's decision-making process and how relevant factors have been taken into account. Stakeholders should note that this document is limited to DER's assessment and decision making under Part V of the *Environmental Protection Act 1986*. Other approvals may be required for the proposal, and it is the proponent's responsibility to ensure they have all relevant approvals for their Premises.

Works approval and licence conditions

DER has three types of conditions that may be imposed on works approvals and licences. They are as follows;

Standard conditions (SC)

DER has standard conditions that are imposed on all works approvals and licences regardless of the activities undertaken on the Premises and the information provided in the application. These are included as the following conditions on works approvals and licences:

Works approval conditions: 1.1.1-1.1.4, 1.2.1, 1.2.2, 5.1.1 and 5.1.2.

Licence conditions: 1.1.1-1.1.4, 1.2.1-1.2.4, 5.1.1-5.1.4 and 5.2.1.

For such conditions, justification within the Decision Document is not provided.

Optional standard conditions (OSC)

In the interests of regulatory consistency DER has a set of optional standard conditions that can be imposed on works approvals and licences. DER will include optional standard conditions as necessary, and are likely to constitute the majority of conditions in any licence. The inclusion of any optional standard conditions is justified in Section 4 of this document.

Non standard conditions (NSC)

Where the proposed activities require conditions outside the standard conditions suite DER will impose one or more non-standard conditions. These include both premises and sector specific conditions, and are likely to occur within few licences. Where used, justification for the application of these conditions will be included in Section 4.



2 Administrative summary

Administrative details		
Application type	Works Approval <input checked="" type="checkbox"/>	
	New Licence <input type="checkbox"/>	
	Licence amendment <input type="checkbox"/>	
	Works Approval amendment <input type="checkbox"/>	
Activities that cause the premises to become prescribed premises	Category number(s)	Assessed design capacity
	5	500 000 tonnes per annual period
Application verified	Date: 2/04/2014	
Application fee paid	Date: 17/04/2014	
Works Approval has been complied with	Yes <input type="checkbox"/>	No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>
Compliance Certificate received	Yes <input type="checkbox"/>	No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>
Commercial-in-confidence claim	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Commercial-in-confidence claim outcome		
Is the proposal a Major Resource Project?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Was the proposal referred to the Environmental Protection Authority (EPA) under Part IV of the <i>Environmental Protection Act 1986</i> ?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Is the proposal subject to Ministerial Conditions?	Yes <input type="checkbox"/>	Referral decision No: Managed under Part V <input checked="" type="checkbox"/>
		Assessed under Part IV <input type="checkbox"/>
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the <i>Environmental Protection Act 1986</i>)?	Yes <input type="checkbox"/>	Ministerial statement No:
		EPA Report No:
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the <i>Environmental Protection Act 1986</i>)?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
		Department of Water consulted Yes <input type="checkbox"/> No <input type="checkbox"/>
Is the Premises within an Environmental Protection Policy (EPP) Area Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If Yes include details of which EPP(s) here.		
Is the Premises subject to any EPP requirements? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If Yes, include details here, eg Site is subject to SO ₂ requirements of Kwinana EPP.		



3 Executive summary of proposal

Northern Star Resources Limited (NSR) operates Paulsens Gold Mine (PGM). The PGM Tailings Storage Facility (TSF) has been operational since 2005 and was designed to include nine construction stages. Stage 1 construction of the TSF was completed in March 2005 and subsequent stages (lifts) have occurred until the current capacity at Stage 6; maximum height of 12.85 m (RL 205.85). PGM now propose to undertake Stage 7 construction (2 m lift) at the end of 2014 and it is anticipated that Stage 8 and 9 (each a 1.5 m lift) will be undertaken in 2015 and 2016 respectively, resulting in a maximum embankment height of 17.85 m and embankment crest elevation of 210.85 m AHD.

The construction of the TSF does not significantly alter the existing potential environmental impacts associated with the operation of the TSF, or the existing procedures to monitor and manage these impacts. Works Approval W4908/2011/1 commenced on 11 April 2011 to allow construction of TSF Stages 4b-6 and expired 10 April 2014. This works approval relates to construction of TSF Stages 7, 8 and 9.

Licence L7969/2004/3 allows NSR to operate PGM and provides licence conditions which regulate TSF operations at PGM.



4 Decision table

All applications are assessed under the *Environmental Protection Act 1986*, the *Environmental Protection Regulations 1987*, DER's Corporate Statement No. 7 - Operational Risk Management and the risk matrix attached to this Decision Document in Section 6. Where other references have been used in making the decision they are detailed in the decision table.

DECISION TABLE				
Works Approval / Licence section	Condition number W = Works Approval L = Licence	OSC or NSC	Justification (including risk description & decision methodology where relevant)	Reference documents
General conditions	W1.2	N/A	Construction No specific general conditions are required apart from the standard works approval conditions.	General provisions of the <i>Environmental Protection Act 1986</i> .
	L1 - 3 (L1.3)	OSC, NSC	Operation DER's assessment and decision making are detailed in Appendix A.	Application supporting documentation. <i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i> .
Emissions general	W2 L - N/A	N/A	Construction and Operation No specific conditions regarding general emissions have been added to the works approval and no additional conditions are required to be added to the existing licence L7969/2004/3 for the construction and operation of Stage 7, 8 and 9 of the TSF.	General provisions of the <i>Environmental Protection Act 1986</i> . Application supporting documentation. <i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i> .



DECISION TABLE

Works Approval / Licence section	Condition number W = Works Approval L = Licence	OSC or NSC	Justification (including risk description & decision methodology where relevant)	Reference documents
Point source emissions to air including monitoring	W2 L - N/A	N/A	Construction and Operation No specified conditions relating to point source emissions to air, including monitoring of these emissions are required to be added to the works approval or existing licence L7969/2004/3. Dust emissions are discussed under Fugitive Emissions below.	General provisions of the <i>Environmental Protection Act 1986</i> . <i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i> . Application supporting documentation.
Point source emissions to surface water including monitoring	W2 L - N/A	N/A	Construction and Operation There will be no point source emissions to surface water during construction and operation of the TSF. There are no permanent surface water bodies located close to premises. No additional licence conditions for point source emissions to surface water including monitoring are required on L7969/2004/3 as a result of operating Stage 7, 8 and 9 of the TSF.	General provisions of the <i>Environmental Protection Act 1986</i> . Application supporting documentation. <i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i> .
Point source emissions to groundwater including monitoring	W2 L - N/A	N/A	Construction and Operation There will be no point source emissions to groundwater during the construction and operation of Stage 7, 8 and 9 of the TSF. No additional licence conditions for point source emissions to groundwater including monitoring are required on L7969/2004/3 as a result of operating Stage 7, 8 and 9 of the TSF.	General provisions of the <i>Environmental Protection Act 1986</i> . Application supporting documentation. <i>Environmental Protection (Unauthorised Discharges)</i>



DECISION TABLE

Works Approval / Licence section	Condition number W = Works Approval L = Licence	OSC or NSC	Justification (including risk description & decision methodology where relevant)	Reference documents
Emissions to land including monitoring	W2 L – N/A	N/A OSC	Construction and Operation There will be no emissions to land during the construction and operation of Stage 7, 8 and 9 of the TSF. Conditions relating to the discharge of tailings into the TSF are described as emissions to land in the existing licence L7969/2004/3; when the licence is amended to allow the discharge of tailings into the raised TSF these conditions will be listed under General Conditions. DER's assessment and decision making are detailed in Appendix A.	Regulations 2004. General provisions of the <i>Environmental Protection Act 1986</i> . Application supporting documentation. <i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i> .
	W2	N/A	Construction Dust emission resulting from construction of the Stages 7, 8 and 9 will be minimal as tailings deposition will occur from spigots situated around the embankment perimeter. There will be limited use of any premises heavy machinery. A water cart will be employed in dust suppression activities and sprinklers and dust suppression surfactants will be used in conjunction with deposition from the embankment spigots. There will be no dust emission conditions required on the works approval.	General provisions of the <i>Environmental Protection Act 1986</i> . Application supporting documentation.
Fugitive emissions	L1 (L2.6)	OSC	Operation <u>Emission Description</u> <i>Emission:</i> Dust particulate matter (TSP and PM ₁₀). <i>Impact:</i> Contamination of surrounding land and human health effects due to increase in particulate matter. <i>Controls:</i> The use of dust suppression measures such as water carts, visual inspections, dust surfactants, sprinklers etc.	



DECISION TABLE

Works Approval / Licence section	Condition number W = Works Approval L = Licence	OSC or NSC	Justification (including risk description & decision methodology where relevant)	Reference documents
			<p><u>Risk Assessment</u> Consequence: Minor Likelihood: Possible Risk Rating: Moderate</p> <p><u>Regulatory Controls</u> Currently there are no licence conditions regulating dust emissions for the premises. Dust emissions will occur during operation of the premises and emissions can occur from vehicle movements, from infrastructure such as crushers and conveyors etc, and from the TSF. Additional dust emission licence conditions will be added to the existing licence L7969/2004/3.</p> <p><u>Residual Risk</u> Consequence: Insignificant Likelihood: Unlikely Risk Rating: Low</p>	
Odour	W2 L – N/A	N/A	<p>Construction and Operation There will be no odour emissions from the construction of the TSF. No specified conditions relating to odour are required to be added to the works approval or existing licence L7969/2004/3 as a result of construction and operating Stage 7, 8 and 9 of the TSF.</p>	<p>General provisions of the <i>Environmental Protection Act 1986</i>.</p> <p>Application supporting documentation.</p>
Noise	W2 L – N/A	N/A	<p>Construction and Operation No specified conditions relating to noise are required to be added to the works approval or existing licence L7969/2004/3. PGM has a statutory responsibility to comply with the <i>Environmental Protection (Noise) Regulations 1997</i>.</p>	<p>General provisions of the <i>Environmental Protection Act 1986</i>.</p> <p>Application supporting</p>



DECISION TABLE

Works Approval / Licence section	Condition number W = Works Approval L = Licence	OSC or NSC	Justification (including risk description & decision methodology where relevant)	Reference documents
				documentation. <i>Environmental Protection (Noise) Regulations 1997.</i>
Monitoring general	W3 L3	N/A	Construction and Operation There will be no monitoring during construction of the TSF. No specified conditions relating to monitoring general are required to be added to the works approval as a result of construction of Stage 7, 8 and 9 of the TSF. Standard conditions specifying that Australian Standard monitoring methods be used will be added to the existing licence L7969/2004/3	General provisions of the <i>Environmental Protection Act 1986.</i> Application supporting documentation. <i>Environmental Protection (Unauthorised Discharges) Regulations 2004.</i>
Monitoring of inputs and outputs	W3	N/A	Construction and Operation There will be no monitoring of inputs and outputs during construction of the TSF. No specified conditions relating to monitoring of inputs and outputs are required to be added to the works approval or existing licence L7969/2004/3 as a result of construction and operating Stage 7, 8 and 9 of the TSF.	General provisions of the <i>Environmental Protection Act 1986.</i> Application supporting documentation.
Process monitoring	W3 L – N/A	N/A	Construction and Operation There will be no process monitoring during construction or operation of the TSF.	General provisions of the <i>Environmental Protection Act 1986.</i> Application supporting documentation.



DECISION TABLE

Works Approval / Licence section	Condition number W = Works Approval L = Licence	OSC or NSC	Justification (including risk description & decision methodology where relevant)	Reference documents
Ambient quality monitoring	W3	N/A	Construction No specified conditions relating to ambient quality monitoring are required to be added to the works approval as a result of construction and operation of Stage 7, 8 and 9 of the TSF.	General provisions of the <i>Environmental Protection Act 1986</i> .
	L10(a) and (b) (L3.8)	OSC	Operation Groundwater monitoring is specified by the current licence. An additional monitoring bore will be installed on the upstream side of the TSF after construction of Stage 7. This additional bore will be added to the licence via a licence amendment and included into existing licence condition L10(a) and (b) or Refire conditions L3.8.	Application supporting documentation.
Meteorological monitoring	W3	N/A	Construction and Operation There will be no meteorological monitoring during construction of the TSF. No specified conditions relating to meteorological monitoring are required to be added to the works approval or existing licence as a result of construction and operating Stage 7, 8 and 9 of the TSF.	General provisions of the <i>Environmental Protection Act 1986</i> . Application supporting documentation.
Improvements	W4	N/A	Construction There are no Improvements required during construction of the TSF. No specified conditions relating to Improvements are required to be added to the works approval.	General provisions of the <i>Environmental Protection Act 1986</i> .
	L4	OSC	Operation A hydrogeological investigation is to be undertaken post installation of the additional upstream bore after Stage 7 is constructed.	Application supporting documentation.
Information	W5 L1-3 (L5)	N/A	Construction and Operation No specified conditions relating to Information are required to be added to the works approval or existing licence as a result of	General provisions of the <i>Environmental Protection Act 1986</i> .



DECISION TABLE

Works Approval / Licence section	Condition number W = Works Approval L = Licence	OSC or NSC	Justification (including risk description & decision methodology where relevant)	Reference documents
			<p>construction and operating Stage 7, 8 and 9 of the TSF. The works approval will have standard information conditions requiring a compliance certificate be submitted to the CEO at the completion of Stage 7, 8 and 9 and prior to commissioning of the same. Licence conditions 2 and 3 of L7969/2004/3 require the proponent to submit to the CEO an AER and AACR annually. No further licence conditions are required to be added to the licence as a result of operation of Stage 7, 8 and 9 of the TSF.</p>	<p>Application supporting documentation.</p>



5 Advertisement and consultation table

Date	Event	Comments received/Notes	How comments were taken into consideration
28/04/2014	Application advertised in West Australian (or other relevant newspaper)	No comments received	N/A
23/06/2014 and 23/07/2014	Proponent sent a copy of draft instrument	Some minor comments	Incorporated into Decision Document



6 Risk Assessment

Note: This matrix is taken from the DER Corporate Policy Statement No. 07 - Operational Risk Management

Table 1: Emissions Risk Matrix

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Severe
Almost Certain	Moderate	High	High	Extreme	Extreme
Likely	Moderate	Moderate	High	High	Extreme
Possible	Low	Moderate	Moderate	High	Extreme
Unlikely	Low	Moderate	Moderate	Moderate	High
Rare	Low	Low	Moderate	Moderate	High



Appendix A

General Conditions

For a TSF, the principle concerns for DER are accidental discharges of tailings during transport, deposition and storage, and the risk of seepage contaminating groundwater.

There will be no hydrocarbon storage specific to the TSF construction during any of the Stage 7, 8 or 9 embankment lifts. Heavy machinery will operate around the TSF during construction of the TSF but there is no need for servicing / refuelling etc at the TSF during construction. Hydrocarbon and chemical storage will be managed under existing licence conditions. As each stage is constructed on the upstream side of the embankment there will be no stormwater management requirements during construction of each embankment.

The current deposition rate is approximately 56 tph (465,000 tpa assuming a 95% availability) and it is expected that this rate will continue until estimated end of mine life in December 2018. In accordance with the Department of Mines and Petroleum (DMP) ANCOLD guidelines, the facility is a Category 2 TSF with low/significant dam failure consequence rating. Following construction of Stage 8, the facility will be a Category 1 TSF since the minimum embankment height will be greater than 15 m but the consequence rating will remain unchanged. Geotechnical stability analysis of the proposed Stage 7 to 9 embankment raises have been undertaken using SLOPE/W software by Consultants ATC Williams (ATCW), as with previous works approval applications, and the results of the analysis indicate satisfactory factors of safety for both static and earthquake conditions.

Table 1 provides storage capacity of Stage 7 to Stage 9 construction while Figure 1 provides an overview of the construction of all Stages from Stage 1 to 9.

Table 1 Storage Capacity of Stage 7 to Stage 9 construction.

Stage	Maximum crest height (m)	Beach RL (m AHD)	Stage Storage Capacity		Cumulative TSF Storage	
			(m ³)	(tonne)	(m ³)	(tonne)
7	14.85	207.15	439,960	703,940	2,547,270	4,075,630
8	16.35	208.65	475,950	761,520	3,023,220	4,837,150
9	17.85	210.15	479,500	767,200	3,502,720	5,604,350

The methodology of embankment lifts around the TSF perimeter using cyclic deposition of tailings via spigots upstream of the existing TSF embankments will not alter from the previous 8 years (Stages 2 to 6) TSF construction methodology and the current methodology will remain until end of mine; anticipated being December 2018. As with previous construction stages, field investigation (in-situ shear vane testing) will be undertaken prior to each proposed construction stage to confirm that the beach tailings have satisfactory geotechnical strength to support raising the perimeter embankment. As with previous construction stages embankment raises, the raised sections of embankment are constructed using compacted, low permeability tailings and protected from erosion at the crest and downstream side by 300 mm thick layer of well graded, competent waste rock. The slow deposition rate at the TSF combined with high evaporation rates results in the formation of high strength tailing beaches close to the TSF perimeter that can be readily accessed by heavy machinery such as excavators and scrapers. The current rate of deposition, high evaporation rates and the formation of relatively steep beaches (0.8% - 1.0%) precludes the development of a water pond on the tailings surface within the proximately of the embankment. Under normal operation, water does not encroach within a distance of at least 100 m from the embankment.

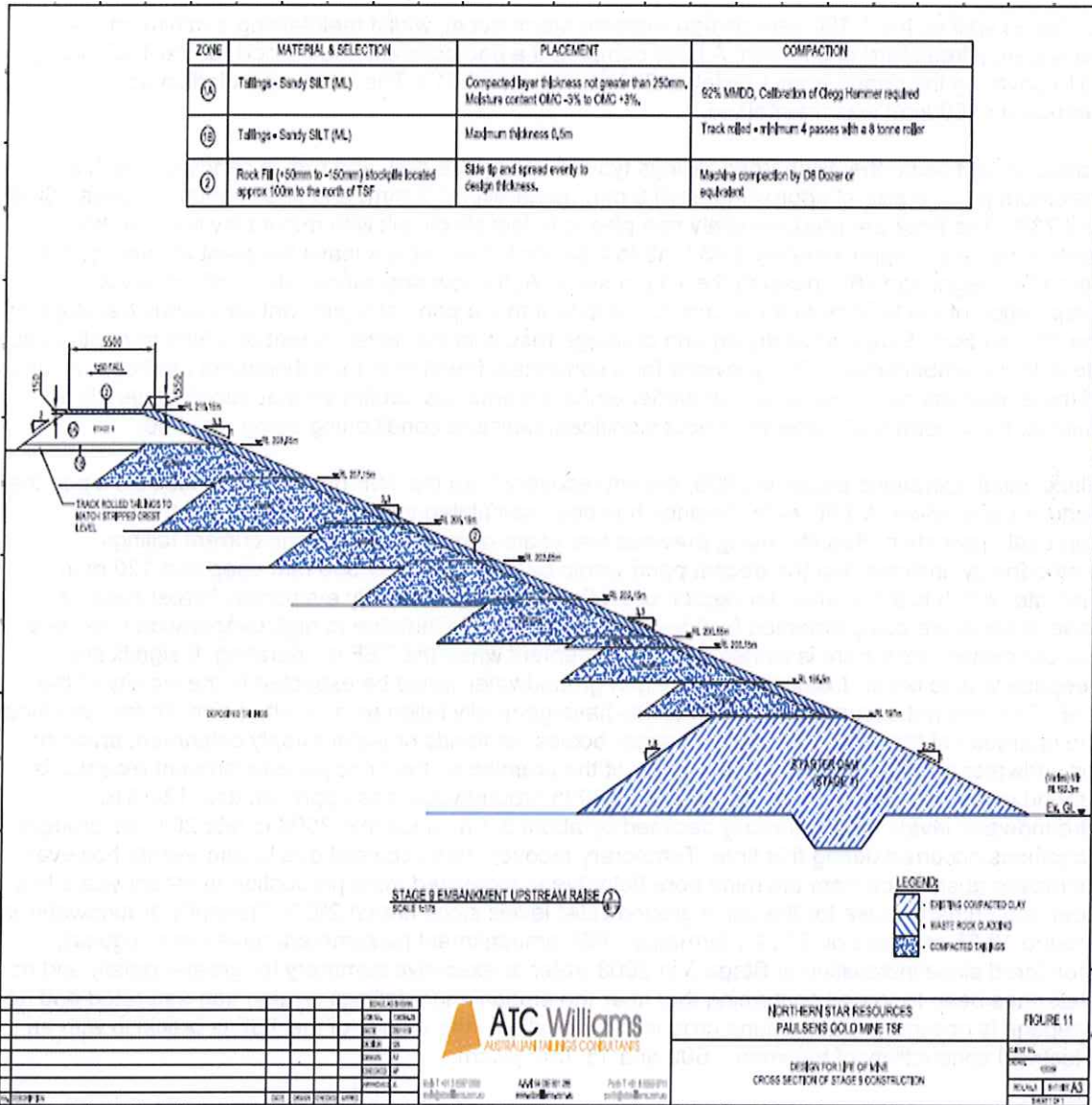


Figure 1 Stage 1 to 9 embankments.

For the purposes on monitoring embankment stability, four sets of standpipe piezometers were installed along the crest of the perimeter embankment after stage 3 construction in 2008. Three standpipe piezometers were installed at each location to depths of 3, 4 and 5 m. The deeper piezometers were installed to within approximately 1 m of the original ground surface. The piezometers have been monitored regularly since installation but none have indicated the presence of a phreatic surface passing through the embankment as all instruments have remained dry. Four additional standpipe piezometers were installed to a depth of approximately 12 m each through the Stage 5 perimeter embankment after construction was completed in October 2012. The piezometers are monitored regularly and no water has been recorded in the instruments confirming that the near embankment tailings remain unsaturated.

The TSF design has considered the impact of a 1:100 year ARI, 72 hour rainfall event on the TSF and the expected available freeboard is in excess of 1.5 m. In addition, in accordance with ANCOLD guidelines, the TSF has sufficient additional stormwater capacity to store 1:10 year wet season



rainfall as well as the 1:100 year design extreme storm event, whilst maintaining a minimum contingency freeboard of 500 mm. ATCW completed a geotechnical audit report for the TSF in July 2013 covering the period from 1 October 2011 to 30 June 2013. The audit report indicated a freeboard of 500mm was maintained.

Based on test work, the discharged tailings typically comprise grey and brown sandy silts with a maximum particle size of approximately 0.6 mm (generally <0.3 mm) and fines content between 60% and 73%. The fines are predominately non plastic to low plastic silt with minor clay content (8%). Particle density is approximately 2.83 t/m³ to 2.87 t/m³. The tailings leave the plant at average 53% solids by weight and 76% passing the 75 µm sieve. At the low deposition rate of 56 tph solids, evaporation of the tailings water occurs to the extent that a pond of significant size rarely develops on the TSF surface. Evaporative drying and drainage results in the development of a high strength beach close to the embankment. This provides for a competent foundation for subsequent upstream raising of the embankment. In-situ testing of earlier embankments has confirmed that beach materials are suitable for construction material without significant moisture conditioning being required.

Since initial operations began in 2005, decant recovery from the TSF has not been feasible since the pond is too shallow. A TSF water balance has been calculated for the TSF as part of the works approval application. Results, using previous two years rainfall averages and current tailings methodology, indicate that the decant pond would be approximately 350 mm deep and 120 m in diameter which is too shallow for decant operations and would rapidly evaporate. Water balance assessments are complemented by operation parameters in that due to high evaporation rates and low deposition rates there is limited pond development when the TSF is operating. If significant seepage was to occur, localised mounding of groundwater would be expected in the vicinity of the TSF. This has not occurred and water levels have generally fallen as a result of climatic factors since the operation of the TSF. There are no water bodies, wetlands or water supply catchment areas or groundwater protection areas in the vicinity of the premise so the principle environment receptor is groundwater. Prior to operation of the TSF in 2005 groundwater was approximately 12-15 m. Groundwater levels have generally declined by about 6-7 m since mid-2006 to late 2010 as drought conditions occurred during this time. Temporary recovery has occurred due to rain events however increased abstraction from the mine bore field due to increased mine production in recent years has been the primary cause for the fall in groundwater levels since March 2009. Presently groundwater is around 18-25 m based on 2013 information. TSF embankment piezometers have been regularly monitored since installation in Stage 3 in 2008 (refer to executive summary for greater detail) and no water has been recorded confirming that near the embankment tailings remain non-saturated and no seepage is occurring. Background groundwater quality in the vicinity of the TSF is brackish with an Electrical conductivity of between 1 500 and 15 000 µs/cm.

Weak acid dissociable cyanide (WAD-CN) concentrations have generally been below 0.1 mg/L and since November 2012 all measured WD-CN concentrations have remained below 0.5 mg/L as required under current licence condition limits except for one sample in July 2012 which was 0.53 mg/L. Subsequent to this incident levels have been remained below 0.05 mg/L. pH data has remained relatively stable and moderately alkaline (between 7.0 and 8.5) despite the tailings being potential acid forming. This indicates the acid neutralising capacity within the tailings and foundation soils is currently sufficient to prevent groundwater acidification as a result of oxidation of acid generating sulphide minerals. TDS has increased in monitoring bores since initial operation and TDS values are now in the range of 8 500 mg/L. This increase in TDS is thought to be due to drought conditions as groundwater levels have decreased. Salinity has increased in bores PMB1, PMB2, PMB3 and PMB5 around the same time that groundwater levels started falling at a significant rate in 2008-2010 with the same relatively stable trends being displayed since 2010/2011. Bores PMB4 and PMB6 have not recorded increases in salinity to date with TDS levels remaining stable below 2 000 mg/L which may indicate that the screens of these bores exist in localised, confined fresh rock aquifer. All dissolved metal concentrations monitored in recent years have remained below the current DER licence limits or ANZECC Guidelines for Fresh and Marine Water Quality (2000) Livestock Drinking Water Quality (post mining land used as confirmed in Mine Closure Plan July 2013) with the exception of a few



elements. The aluminium spike in 2012-13 is attributed to contamination of samples as previous samples were not pronounced. SO_4 increases parallel TDS increases. The observed increase in Mn concentrations in some of the bores is believed to be due to oxygen depletion in the groundwater as a result of limited recharge and reduction of aquifer volume over a prolonged period of falling water levels. Adverse impacts are not expected since groundwater for pastoral use is not locally abstracted from this aquifer. Pastoral bores are approximately 1.7 km and 5 km from the TSF.

The PGM surrounding environment has been investigated by a number of environmental consultants over the years and it has been determined that there are no significant environmental features in the vicinity of the TSF. The project area does not contain declared waterways, RAMSAR wetlands, permanent water bodies or groundwater protection areas. No fauna species of conservation significance have been recorded within the operational boundaries.

Emissions Risk Assessment – Operations and emergency situations

Emission Description

Emission: Discharge of tailings slurry, tailings decant water and seepage water to land and groundwater. Increases in TDS, Mn and CN concentrations from TSF operations.

Impact: Contamination of surrounding land and groundwater systems. Potential impacts on ecology of groundwater from the addition of TDS, Mn and CN.

Controls: Adequate design and construction of the TSF to ANCOLD guidelines. Operation consistent with DMP guidance on Safe Design and Operation of TSFs. Maintaining adequate freeboard via cyclic spigot discharge and staged construction of embankment raises. Groundwater monitoring including installation of an additional monitoring bore upstream to conduct further hydrogeological assessment. Embankment piezometers to monitor phreatic surface.

Risk Assessment

Consequence: Minor

Likelihood: Possible

Risk Rating: Moderate

Regulatory Controls

TSF groundwater monitoring is required for six bores (PMB1-6) consistent with current licence condition 10(a) and (b) for specific parameters and frequencies (quarterly) with a limit for some parameters (TDS, pH and WAD-CN). PGM propose to install an additional monitoring bore upstream of the TSF after construction of Stage 7. This monitoring bore should be amended into the existing licence and then monitored consistent with the monitoring requirements under licence condition 10(a) and (b) in due course.

Given the uncertainty in the increase in Mn and TDS concentrations further hydrogeological assessment of the TSF is warranted. This is best performed under a licence amendment and the licence can be amended to include the requirement for further hydrogeological investigations. This would also provide valuable data for the TDS increases which may lead to a revision of the TDS limits in the licence (currently 3 500 mg/L) and appropriate use of recovery bores once the TDS limit is triggered in accordance with current licence condition 10(c) as the recovery bore program is not currently occurring. Once the additional bore is installed after Stage 7 is constructed, the hydrogeological investigation can commence. Existing licence conditions 8, 9, 10(a) – (d) and 16 require that the TSF is inspected daily and observations are recorded in a dedicated log book; these conditions are adequate to manage the risk associated with operation of the TSF. No additional licence conditions are required for L7969/2004/3 in relation to operation of TSF Stages 7, 8 and 9.

Residual Risk

Consequence: Minor

Likelihood: Possible

Risk Rating: Moderate