Government of Western Australia
Department of Environment Regulation

Decision Document

Environmental Protection Act 1986, Part V

Proponent: Billabong Gold Pty Ltd
Licence: L6868/1989/12

Registered office:	Level 30 Bankwest Tower, 108 St Georges Terrace PERTH WA 6000
ACN:	613 900 922
Premises address:	Plutonic Gold Mine Mining Tenements: M52/171, M52/170, M52/148, M52/149, M52/150, M52/295, M52/296, and M52/301 MEEKATHARRA WA 6642
Issue date:	Thursday, 4 September 2014
Commencement date:	Thursday, 18 September 2014
Expiry date:	Tuesday, 17 September 2024

Decision

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

Decision Document prepared by:	Cathy Scheib/ Suzy Roworth Licensing Officer
Decision Document authorised by:	Alana Kidd Manager Licensing

Contents

1 Purpose of this Document

This decision document explains how the DER has assessed and determined the application and provides a record of the DER's decision-making process and how relevant factors have been taken into account. Stakeholders should note that this document is limited to the 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.

2 Administrative summary

<table>
<tr><th colspan="3">Administrative details</th></tr>
<tr><td>Application type</td><td colspan="2">Works Approval ☐
New Licence ☐
Licence amendment ☒
Works Approval amendment ☐</td></tr>
<tr><td rowspan="6">Activities that cause the premises to become prescribed premises</td><td>Category number(s)</td><td>Assessed design capacity</td></tr>
<tr><td>5</td><td>5 000 000 tonnes per annual period</td></tr>
<tr><td>6</td><td>1 300 000 tonnes per annual period</td></tr>
<tr><td>52</td><td>24.1 MW (natural gas)</td></tr>
<tr><td>54</td><td>140 cubic metres per day</td></tr>
<tr><td>57</td><td>200 tyres</td></tr>
<tr><td>89</td><td>5000 tonnes per annual period</td></tr>
<tr><td>Application verified
Application fee paid</td><td colspan="2">Date: N/A
Date: N/A</td></tr>
<tr><td>Works Approval has been complied with</td><td colspan="2">Yes☐ No☐ N/A☒</td></tr>
</table>

Compliance Certificate received	Yes☐ No☐ N/A☒	
Commercial-in-confidence claim	Yes☐ No☒	
Commercial-in-confidence claim outcome	N/A	
Is the proposal a Major Resource Project?	Yes☒ No☐	
Was the proposal referred to the Environmental Protection Authority (EPA) under Part IV of the *Environmental Protection Act 1986*?	Yes☐ No☒	Referral decision No: Managed under Part V ☐ Assessed under Part IV ☐
Is the proposal subject to Ministerial Conditions?	Yes☐ No☒	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 *Environmental Protection Act 1986*)?	Yes☐ No☒ Department of Water consulted Yes ☐ No ☐	
Is the Premises within an Environmental Protection Policy (EPP) Area Yes☐ No☒ If Yes include details of which EPP(s) here.		
Is the Premises subject to any EPP requirements? Yes☐ No☒ If Yes, include details here, e.g. Site is subject to SO_2 requirements of Kwinana EPP.		

3 Executive summary of proposal and assessment

The Plutonic Gold Mine (Plutonic) is situated within the boundary of the Three Rivers Station in the Peak Hill Goldfields area of the Gascoyne Basin 180km NNE of Meekatharra in the Shire of Meekatharra. Plutonic has been operating since 1989. Information on the existing environment is detailed in Appendix A.

<u>December 2015 Amendment</u>
The proponent applied for a licence amendment (December 2015) to authorise discharge of water into a natural creek that flows and pools at the base of the Main Waste Rock Dump, on the eastern wall. This discharge would only occur during extreme rainfall events when the Laterite pit has reached capacity and is putting the Main pit (and underground operations) at risk of flooding and where there are no other water-holding facilities with capacity. Water analysis of the Laterite pit water in November 2014 indicated that all parameters fall under the Australian and New Zealand Guidelines for Fresh and Marine Water Quality guidelines (ANZECC, 2000) for livestock drinking water and short-term irrigation. Water quality analysis, erosion prevention measures and vegetation monitoring were included in the Licence in relation to the proposed water discharge.

In addition, DER noted in the 2015 fee renewal that the power generation capacity on site exceeded the threshold for Category 52 – Electrical power generation, Schedule 1, *Environmental Protection Regulations 1987*. The Category 52 threshold had been exceeded when two additional gas generators had been installed in the Plutonic Power Station (PPS) in December 2014. The proponent also applied to the DER to replace Category 84 (Electrical power generation; less than 20 MW in aggregate) with Category 52 (Electrical power generation; 20MW or more in aggregate using natural

gas). The capacity of the power station is 24.1 MW (natural gas). Further details of the PPS are included in Appendix B.

Details of wastewater treatment and irrigation were also added to the licence to ensure site activities are appropriately authorised as detailed in Section 4.

January 2016 Amendment

This licence amendment was to update the requirement that the proponent shall cover tyres at the end of each working day. As there are few tyres each day, the proponent found this impractical. The proponent's method involves the following:

- Tyres are placed flat in the area, spaced at least 100mm from each other;
- Once the area is completely filled with tyres (<200) it is covered with a minimum of 500mm of material;
- The area is filled until it can be levelled to produce a new disposal area; and
- Tyres are then placed on the area spaced at least 100mm from each other and the process is repeated.

The facility becomes full once 200 tyres are deposited, and is then covered on average every 6 – 8 months.

September 2016 Amendment

The licence was amended to include construction conditions for the TSF2 and TSF3 lifts (TSF 2 & 3), which will not affect the premises production or design capacity. The surface water and groundwater monitoring network was aligned. Redundant conditions were also removed; DER considers these conditions unclear, not risk based and unenforceable.

The main emissions from the Premises are the discharge of tailings into tailings storage facilities, irrigation of treated wastewater to land, noise and dust. A separation distance of 38 km exists between the operation and the nearest sensitive premises.

During this amendment the licence was transferred from Northern Star Resources Ltd to Billabong Gold Pty Ltd.

Section 4 below details and justifies the licence conditions and changes.

4 Decision table

All applications are assessed in line with the *Environmental Protection Act 1986*, the *Environmental Protection Regulations 1987* and the DER's Operational Procedure on Assessing Emissions and Discharges from Prescribed Premises. Where other references have been used in making the decision they are detailed in the decision document.

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
General conditions	L1.2.1 – L1.2.2	Generic changes have been made to the General Conditions of this Licence as part of Departmental reform and updates to licence templates. These changes include removing conditions referencing the Code of Practice for the Storage and handling of dangerous goods. The General conditions will be reassessed at the next amendment to ensure they align with DER's reform process. During the September 2016 amendment redundant conditions have been removed. Removal of conditions is discussed in Appendix D.	General provisions of the *Environmental Protection Act 1986.* *Environmental Protection (Unauthorised Discharges) Regulations 2004.* Regulatory principles. *Environmental Protection Act 1986, Part V*; Effective and efficient regulation. Department of Environment Regulation. July 2015.
Premises operation	L1.3.1 L1.3.2 – L1.3.3	Minor changes to Table 1.3.1 were made as part of the December 2015 amendment to ensure that the overall waste acceptance limit of 5000 tonnes per annual period was included as a condition. No other changes were made to the waste acceptance criteria or approved acceptance volume. During the September 2016 amendment, asbestos was added to Table 1.3.1. No changes were made during the December 2015 amendment to condition	General provisions of the *Environmental Protection Act 1986.* *Environmental Protection Regulations 1987*, including Part 6 –

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		L1.3.2 regarding waste processing, and condition 1.3.3 regarding landfill activities. During the January 2016 amendment to include category 57, condition 1.3.2 was modified to include the appropriate storage of tyres. Emission Description *Emission:* Fugitive emissions and dark smoke from burning tyres, as a result of fires. *Impact:* Air quality impacts as a result of increased particulate matter and amenity issues to nearby receptors, native vegetation, wildlife and safety. *Controls:* The proponent's storage method involves the following: • Tyres are placed flat in the area, spaced at least 100mm from each other; • Once the area is completely filled with tyres (<200) it is covered with a minimum of 500mm of material; • The area is filled until it can be levelled to produce a new disposal area; and • Tyres are then placed on the area spaced at least 100mm from each other and the process is repeated. Risk Assessment *Consequence*: Minor *Likelihood:* Unlikely *Risk Rating:* Moderate Regulatory Controls Condition 1.3.2 has been applied to the Licence to ensure that tyres are stored appropriately. Residual Risk *Consequence*: Minor *Likelihood:* Rare	Tyres. *Environmental Protection (Unauthorised Discharges) Regulations 2004.*

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		Residual Risk Rating: Low During the September 2016 amendment, cover requirements for asbestos were added to Table 1.3.3 to ensure appropriate coverage of this material, as during the site's inspection it was noted that asbestos was being deposed of at the landfill. Groundwater varies onsite from 12 – 45 metres below ground level.	
	L1.3.4	During the December 2015 amendment cover requirements were updated in condition 1.3.4 to ensure all approved waste types have specified cover requirements. Table 1.3.3 was updated to cover tyres once 200 have been stored and with 500mm material to be in line with Part 6 – Tyres of the *Environmental Protection Regulations 1987.*	
	L1.3.5	Condition 1.3.5 ensures that windblown waste is recovered to prevent litter.	
	L1.3.6	Old condition 1.3.6 that required the Licensee to ensure that no waste is burnt at the premises except for the purpose of emergency response training was removed during the September 2016 amendment as the *Environmental Protection (Unauthorised Discharges) Regulations 2004* cover this. Condition 1.3.6 identifies the authorised tailings discharge and wastewater treatment locations.	
	1.3.7	Condition 1.3.7 requires adequate freeboard, stormwater diversion around the TSFs and seepage recovery. This reduces the risk of potential overflows, fresh stormwater ingression to the TSF working areas and becoming contaminated and ensures that seepage is recovered.	
	L1.3.8	<u>Emission Description</u> *Emission:* Discharge of untreated or partially treated effluent due to overtopping of wastewater treatment ponds, seepage from the base of ponds or accidental spillage.	

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		Impact: Potential for localised contamination of surrounding soils (including groundwater) and stormwater. *Controls:* The wastewater treatment ponds are lined with High-density polyethylene (HDPE), maintained and protected from stormwater by bunding. <u>Risk Assessment</u> *Consequence*: Minor *Likelihood:* Unlikely *Risk Rating:* Moderate <u>Regulatory Controls</u> Condition 1.3.8 has been applied to the Licence to ensure that overtopping of the ponds does not occur and that the integrity of the containment infrastructure is maintained including ensuring vegetation does not cause damage to the ponds. <u>Residual Risk</u> *Consequence*: Minor *Likelihood:* Rare *Residual Risk Rating:* Low	
	L1.3.9	L1.3.9 requires pipeline controls to ensure that environmentally hazardous materials are prevented from entering the environment.	
	L1.3.10	Condition 1.3.10 has been added to the Licence to ensure that approved production or design capacity for each category that is not specified in Table 1.3.1 is not exceeded. The landfill requirements have been added during the January 2016 amendment.	
	L1.3.11 - 1.3.12	Construction requirements have been added to Table 1.3.6 (Condition 1.3.11) for the September 2016 amendment. Condition 1.3.12 has been	

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		added, requiring the Licensee to operate the TSF2 & 3 lifts in accordance with the conditions of this Licence, following submission of the compliance document. DER's assessment and decision making for TSF2 & 3 lifts are detailed in Appendix C.	
Emissions general	L2.1.1	Descriptive and numerical limits are set through conditions 2.2.1, 2.3.1 and 2.4.1 of the Licence and therefore a condition regarding recording and investigation of exceedances of limits is included in the Licence.	General provisions of the *Environmental Protection Act 1986.*
Point source emissions to air including monitoring	L2.2.1	**Normal Operation** <u>Emission Description</u> *Emission:* Point source emissions to air from the Power Station (natural gas). Off-gas released to air from carbon regeneration and from the gold room. *Impact:* Reduced local air quality above National Environmental Protection (Ambient Air Quality) Measure standards. *Controls:* The Plutonic Power Station operates on natural gas; supplied to site by a pipeline. Every 1000 hours the flue gas is analysed in order to tune the engine. This is performed using a Testo 340 Flue Gas Analyser and the engine is tuned based on NOx readings. Further details of the power generation system are provided in Appendix B. Emissions from carbon regeneration will be determined by ore composition/impurities. Point source emissions are reported annually via the National Pollutant Inventory (NPI) reporting system. The nearest sensitive premises are 38 km away. <u>Risk Assessment</u> *Consequence:* Minor *Likelihood*: Rare *Risk Rating:* Low	General provisions of the *Environmental Protection Act 1986.* *Environmental Protection (Unauthorised Discharges) Regulations 2004.*

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		Regulatory Controls Condition 1.2.1 requires equipment including emissions control measures to be maintained on a regular basis. Condition 2.2.1 defines authorised air emission points. No emission limits are applied as the activity has been assessed as low risk. Residual Risk *Consequence*: Minor *Likelihood:* Rare *Residual Risk Rating:* Low	
Point source emissions to surface water including monitoring	L2.3.1 and L3.2.1	**Emergency operation** Emission Description *Emission:* Discharge of water from Laterite Pit. Water comprises dewatering effluent mixed with rainfall. Laterite Pit contains elevated levels of Total Nitrogen due to mine explosives. *Impact:* Potential inundation of vegetation, changes to soil quality and infiltration to groundwater. Increased sedimentation introduced to the creek line. *Controls:* Water quality results from the Laterite pit demonstrate no exceedances when compared to ANZECC water quality guidelines for short-term irrigation and for livestock drinking water. During discharge water quality will be monitored. Discharge will only occur in emergency circumstances where high rainfall is experienced and no other water holding facilities have available capacity. Water naturally pools in the area after rainfall. The discharge point will be rock armoured to reduce erosion. The discharge point will be inspected after discharge events to monitor the effectiveness of the erosion control. Risk Assessment *Consequence*: Minor	General provisions of the *Environmental Protection Act 1986.* *Environmental Protection (Unauthorised Discharges) Regulations 2004.* *National Water Quality Management Strategy. Australian and New Zealand Guidelines for Fresh and Marine Water Quality Volume 1. The Guidelines. October 2000.*

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		Likelihood: Unlikely *Risk Rating:* Moderate <u>Regulatory Controls</u> Condition 2.3.1 has been applied to ensure that discharge only occurs at the discharge point W1 and with the specified controls. Condition 3.2.1 ensures that when discharge occurs, volumes and water quality are monitored and recorded. Additional parameters were included to align with the parameters for groundwater monitoring to ensure these are also being sampled for, to understand the source of contamination, should these be detected in groundwater. It should also be noted that Laterite pit samples have returned readings in the vicinity of 80mg/L for Total Nitrogen. This is likely to be due to mine explosives being used in the area. This parameter has been included on the licence and Total Phosphorus has also been included to ensure it is limiting to reduce eutrophication risks. Groundwater varies onsite from 12 – 45 metres below ground level and Total Nitrogen has been added to the ambient groundwater monitoring section of the licence to ensure this is monitored to detect issues early. <u>Residual Risk</u> *Consequence*: Minor *Likelihood:* Unlikely *Risk Rating:* Moderate	
Point source emissions to groundwater including monitoring	L – no conditions	There are no point source emissions to groundwater from the premises that require regulation through this section. Note: The proponent previously operated in-pit TSF's at Plutonic however these facilities are no longer used.	General provisions of the *Environmental Protection Act 1986.* *Environmental Protection (Unauthorised Discharges) Regulation*

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			2004.
Emissions to land including monitoring	L2.4.1 and L3.3.1	Emissions to land were not reassessed as part of the licence reissue in 2014. The previous licence did not impose any conditions for emissions to land including monitoring. However, treated wastewater is used to irrigate land and therefore this was reassessed during the December 2015 amendment. **Normal operation** Emission Description *Emission:* Treated wastewater applied to land potentially containing elevated nutrients, BOD and *E.coli*. *Impact:* Impacts may occur to the irrigation area such as waterlogging, negative affects to vegetation health, increased weed growth and increased nutrient loadings. *Controls:* The irrigation area is a rehabilitated area on a remote waste rock dump with no potential for the treated waste water to enter surface water systems. The Zone 550 Waste dump where irrigation occurs has a high fines fraction within the waste rock and therefore has a high absorption capacity for water. The emerging vegetation will benefit from the nutrients contained in the treated wastewater. Risk Assessment *Consequence*: Minor *Likelihood:* Rare *Risk Rating:* Low Regulatory Controls Condition 2.4.1 ensures that the proponent is authorised to discharge treated wastewater to land at the authorised discharge point L1. Condition 3.3.1 ensures that water quality is monitored to track plant performance and	*Environmental Protection (Unauthorised Discharges) Regulations 2004.* General provisions of the *Environmental Protection Act 1986.*

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		ensures that irrigation water quality is monitored so that corrective actions can be implemented if required. No emission limits are applied as the activity has been assessed as low risk. Residual Risk *Consequence*: Minor *Likelihood:* Rare *Residual Risk Rating:* Low	
Fugitive emissions	L – no conditions	**Normal Operation** Emission Description *Emission:* Fugitive dust may result from the daily operation of Plutonic Gold Mine where sources of dust can be attributed to stockpiles, materials handling and crushing, decommissioned tailings storage facilities and vehicle movements on dirt roads. The TSF2 & 3 lifts have the potential to generate dust from movement of materials. *Impact:* Dust emissions can be harmful to human health and the environment. Elevated total suspended particulates (TSP) can impact ambient environmental quality resulting in amenity impacts and can smother vegetation. *Controls:* the proponent implements a series of dust control measures including dust suppressants and reticulation. The nearest sensitive premises is 38 km away. Risk Assessment *Consequence:* Insignificant *Likelihood:* Unlikely *Risk Rating:* Low Regulatory Controls The *Environmental Protection (Unauthorised Discharges) Regulations 2004* apply, and no further regulatory control is required. The previous licence did	*Environmental Protection (Unauthorised Discharges) Regulations 2004.* General provisions of the *Environmental Protection Act 1986.*

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		not impose any conditions for the control of fugitive dust emissions. <u>Residual Risk</u> *Consequence:* Insignificant *Likelihood:* Unlikely *Residual Risk Rating:* Low	
Odour	L – no conditions	Odour is not anticipated to be an issue associated with operation of the Plutonic Gold Mine. The nearest sensitive premises is 38 km away. The proponent is required to comply with the *Environmental Protection (Unauthorised Discharges) Regulations 2004* and no further regulatory controls are applied in the Licence.	*Environmental Protection (Unauthorised Discharges) Regulations 2004.*
Noise	L – no conditions	The proponent is required to comply with the *Environmental Protection (Noise) Regulations 1997* and therefore no further regulatory controls are applied in the Licence.	*Environmental Protection (Noise) Regulations 1997*
Monitoring general	L3.1.1 - L3.1.2	Since in-field non-NATA accredited analysis has been authorised for pH measurements, condition 3.1.2 has been added to ensure that field equipment is calibrated in accordance with manufacturer's specifications.	N/A
Monitoring of inputs and outputs	L3.4.1	Condition 3.4.1 specifies that waste volumes are estimated both of inputs to the landfill, and any waste rejected from the premises. This is a standard addition.	Landfill Waste Classification and Waste Definitions 1996 published by the Chief Executive Officer of the Department of Environment Regulation as amended from time to time.
Process monitoring	L – no conditions	No process monitoring is specified in this Licence.	General provisions of the *Environmental*

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			Protection Act 1986.
Ambient quality monitoring	L3.5.1	**Normal operation** Emission Description *Emission:* Tailings held in TSF's are a waste product from processing and may contain heavy metals, cyanide and accumulation of soluble salts. Seepage from the TSF's into groundwater may occur over time as tailings are deposited. *Impact: S*oluble salts, cyanide, metals and metalloids derived from tailings deposition may impact the quality of groundwater causing adverse effects to groundwater dependant ecosystems and other groundwater users. Depth to groundwater is approximately >14m at the Piranha monitoring bores and > 9m at the trout monitoring bores. *Controls:* The Licensee utilises the following controls: • Maximising water return to process plant; and • Installation of monitoring bores to record standing water levels and water quality. Risk Assessment *Consequence:* Minor *Likelihood*: Possible *Risk Rating:* Moderate Regulatory Controls Condition 3.5.1 is included in the licence requiring the Licensee to monitor ambient groundwater quality around the TSFs on a quarterly basis. The results are then compared against previous year's results, and report the results through the Annual Environmental Report (AER). Target values have been removed from the Licence under the December 2015 amendment but	General provisions of the *Environmental Protection Act 1986.* Plutonic gold Mine. Annual Environmental Report January – December 2014. Published March 2015.

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		may still be used as an internal management tool by the proponent (for example in a Groundwater Management Plan) to ensure that Licence limits are not exceeded. Licence limits are set for: • Standing Water Level, which should be maintained at depths greater than 7m below ground level (compared to a former Licence target of 9m) to prevent impacts to vegetation and soils; • WAD cyanide in groundwater of less than 0.8 mg/L (compared to the former Licence target of 0.5 mg/L) based on reference to the DER publication "*Assessment and management of contaminated sites, contaminated sites guidelines, December 2014*"; and • Arsenic (<0.5 mg/L), Copper (<1.0 mg/L), and Nickel (<1.0 mg/L) which are consistent with the former Licence targets but, based on assessment of groundwater data from the relevant bores between 2012 – 2015, are considered appropriate limits. Further groundwater information is given in Appendix A. During the September 2016 amendment the monitoring suite was updated to include additional metals/metalloids for monitoring at gold mines as these may also be of concern, and to ensure that all bores are monitored for relevant parameters. Additional parameters were also included to align with the parameters for surface water discharge. It has been noted that there is elevated readings of Total Nitrogen in the Laterite Pit. Monitoring bore TD1-5 is the closest to the Laterite Pit to monitor for groundwater quality. Total Nitrogen has been added to the monitoring suite for all bores. <u>Residual Risk</u> *Consequence:* Moderate *Likelihood*: Unlikely *Risk Rating:* Moderate	

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		In addition, Table 3.5.2 has been added to ensure that quarterly photographic vegetation monitoring occurs at the W1 discharge point.	
Meteorological monitoring	L – no conditions	No meteorological monitoring is specified in this Licence.	N/A
Improvements	L4.1.1	Condition 4.1.1, old condition IR1, was added to the Licence to assess the longer-term options in relation to water containment infrastructure and discharge on site. Emergency discharge at point W1 was previously authorised by the DER twice (February 2011 and January 2012) before being authorised on the Licence under the December 2015 amendment. Condition 4.1.1 also ensures that the environmental impacts of discharge at point W1 are assessed. This condition has been removed as the report was provided to DER by the due date. The report requires further assessment and additional improvement conditions, which may be implemented to address the site water balance at a later date. WAD Cyanide levels at PMB56 are elevated when compared to other groundwater monitoring bores. The Licensee has also declared that there is potential that cyanide is being transported from the TSF to the groundwater via seepage, as the facility is not lined. Due to the risks of contamination identified, DER considers it necessary that additional measures be investigated, these have been added to the licence via improvement conditions. An improvement condition (new conditions IR1) has been added to the licence requiring the Licensee to provide management recommendations and commitments including those for seepage, with associated timeframes for completion (inclusive of all inactive TSFs onsite) following: 1. A review of the Hydrogeological Review conducted by WorleyParsons, dated 16 October 2012, which recommended the capping of the Perch Pit TSF; and 2. A review of current and historic groundwater monitoring data for the	N/A

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
		premises. A second improvement condition (new condition IR2) requiring the development of groundwater quality limit values for Aluminium, Antimony, Boron, Cadmium, Chromium, Cobalt, Fluoride, Iron, Lead, Manganese, Mercury, Molybdenum, Selenium, Sulphate, Thallium, Total Nitrogen, Total Phosphorus, Uranium and Zinc using baseline water quality results and in the context of Australian freshwater guidelines. These limits should be used to evaluate water quality results and to guide management of groundwater resources onsite. Following the above information being provided, DER will conduct a review of the licence and be able to determine how and if, the risks identified are being appropriately managed.	
Information	L5.1.1 – L5.1.3 L5.2.1 – L5.2.2 L5.3.1	Updates to L5.2.1 made under the December 2015 amendment are to reflect the current Licence. Correction to L5.2.2 made under the December 2015 amendment. Notifications (Table 5.3.1) have been updated to add a notification requirement for production ceasing or recommencing. This is a standard addition. Condition 5.3.1 has been updated to ensure appropriate compliance documentation is submitted following the completion of the works authorised under condition 1.3.11 and 1.3.12.	N/A

5 Advertisement and consultation table

Date	Event	Comments received/Notes	How comments were taken into consideration
12/11/2015	Proponent sent a copy of draft instrument	The proponent replied on 23/11/2015 and requested: • Clarification on cover requirements for tyres (Type 2 Inert Waste); • That freeboard requirements reflect the gravity feed pond system that results in a freeboard of 150mm (Pond 1), 200mm (Pond 2), 350mm (Pond 3) and 1000mm (Pond 4); and • That monitoring of waste inputs and outputs have an averaging period of monthly to reflect the contractor reporting systems currently in place at the site.	The DER addressed the comments as follows: • The DER clarified that the definition of tyre storage includes deposit, and therefore the current practice at Plutonic comprises storage. Where 100 or more tyres are stored, the proponent should apply to add *Category 57 – Used tyre storage*, to the Licence. Up to 100 tyres, no such category is required. Disposal of tyres should occur in accordance with condition 1.3.4 including cover requirements. • Specified freeboard was removed from the Licence as condition 1.3.8 includes the provision that no overtopping shall occur. Pond 4 is considered to provide sufficient freeboard for the pond system. • A monthly averaging period has been added to the monitoring of inputs and outputs to accommodate the current system on site.
7/7/2016	Proponent sent a copy of draft instrument via 21 day letter	Proponent provided comments regarding the Improvement conditions requesting time for a review of the previous Hydrogeological Review be conducted.	DER modified the Improvement conditions to reflect this.
15/9/2016	Proponent sent a copy of draft instrument via 21 day letter	No comments received.	DER confirmed with the proponent that there were no issues with transferring the licence to the new occupier during this amendment.

6. Emissions and discharges risk assessment framework

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

Existing Environment Information

Landform
The project area contains ephemeral watercourses draining towards the Gascoyne River, located approximately 70 km from site. The surrounding landscape has an overall shallow fall to the north-northeast.

Soils and Geology
Surface soils throughout the Plutonic site typically comprise thin colluvium over laterite cap rock.

The Plutonic Project is located near the south western end of the 50 km long, north east – south west Plutonic Well Greenstone Belt, which occurs in the central portion of the Marymia Inlier. The Plutonic Well Greenstone Belt is interpreted as a regional scale fold thrust belt. The generalised stratigraphic column of the Plutonic Well Greenstone Belt consists of mafic-ultramafic-BIF dominated sequence at the base, passing into mafic dominated and finally clastic sediments at the top.

Surface Water
There are no surface water bodies in the area which are maintained by groundwater flowing from fractured rock aquifers.

Groundwater
Groundwater monitoring at Plutonic since 1993 has shown groundwater quality to be significantly variable over the premises, particularly in relation to total dissolved solid (TDS) levels, which is consistent with fractured rock aquifers and confirms the highly localised nature of the aquifers at Plutonic. Table 1 below shows the variability of groundwater TDS levels at three different pits *prior to tailings deposition*. As shown, TDS varies from 14 000 mg/L near the Dogfish Pit to 480 mg/L near the Perch Pit. Indeed, the variability of groundwater quality over small spatial scales is illustrated at the Perch Pit, where TDS varies from 480 to 1750 mg/L, depending on which fracture is intersected by the monitoring bore. TDS limits have not been set under the December 2015 amendment due to the naturally variable nature of TDS in groundwater.

Table 1: Average level of total dissolved solids from in-pit tailings facilities monitoring bores prior to tailings deposition.

Pit	Bore	Total dissolved solids (mg/L)
Dogfish	DMB1	7080
Dogfish	DMB2	14 000
Dogfish	DMB3	10 220
Callop	MB1	665
Callop	MB2	815
Perch	PMB54	480
Perch	PMB56	1050
Perch	PMB58	1750

Groundwater levels recorded before dewatering commenced at the Trout, Perch, Bream and Barra pits indicate that groundwater ranged from 20 to 30 m below ground level and flowed towards the west.

Water from the trout dewatering bores was sampled in 1999 and 2000 and from the Trout pit in 2002 and 2010. The results are shown in Table 2 below.

Table 2: Groundwater quality around the Trout Pits (all units are in mg/L except for pH).

Parameter	Source			
	TDB1 (13/7/99)	TDB2 (3/2/00)	Trout Pit (24/11/02)	Trout Pit (13/9/10)
TDS	990	675	1000	742
Calcium	1	66	72	65
Copper	<0.01	<0.01	<0.01	0.002
Arsenic	<0.001	0.11	0.26	0.145
Nickel	-	-	<0.01	<0.001
Nitrate	36	48	69	39
pH	8	8.1	8.55	8.21
WAD cyanide	-	<0.01	<0.01	<0.004

The water was fresh (675–1000 mg/L TDS) at Trout, whereas it was saline (19,000 mg/L TDS, Dogfish South pit) in Catfish and Dogfish: the salinity was inversely proportional to dewatering pumping rates (and permeability). That is, the pits intersecting the most permeable rocks (Trout) have the freshest water.

The groundwater is mildly alkaline, and of a sodium chloride/sulphate type, with high magnesium, bicarbonate and nitrate concentrations, and high hardness. It generally has very low metal concentrations, but there are commonly elevated arsenic levels.

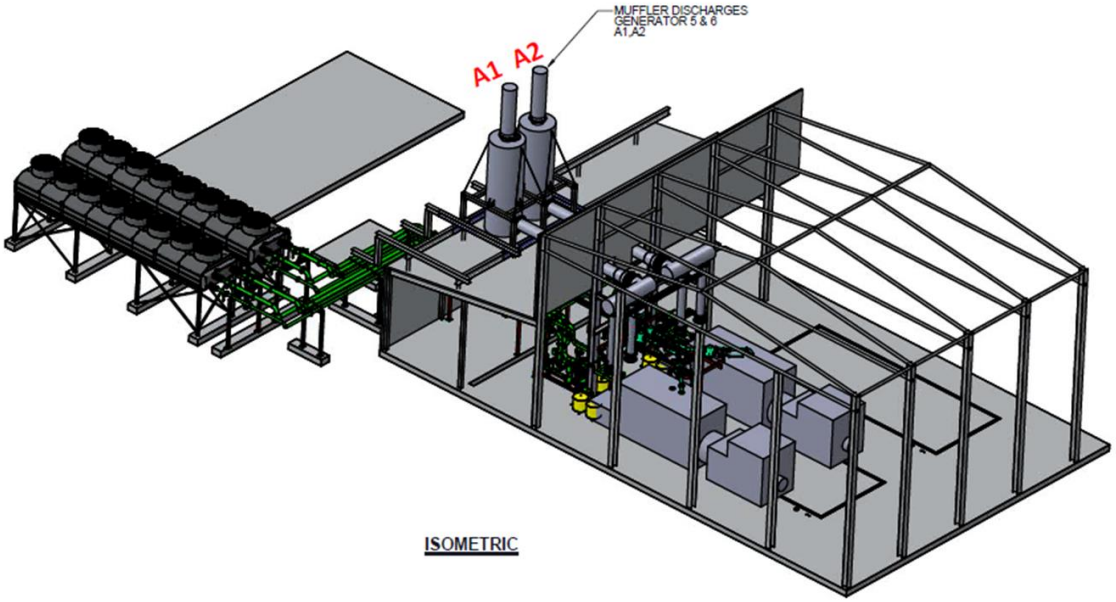
Beneficial use of groundwater

There are no groundwater dependant ecosystems or surface water bodies maintained by fractured rock aquifers. The principal use of groundwater in this area is for stock drinking water; but the nearest bores for stock use are 5.9 km from the Trout Pits.

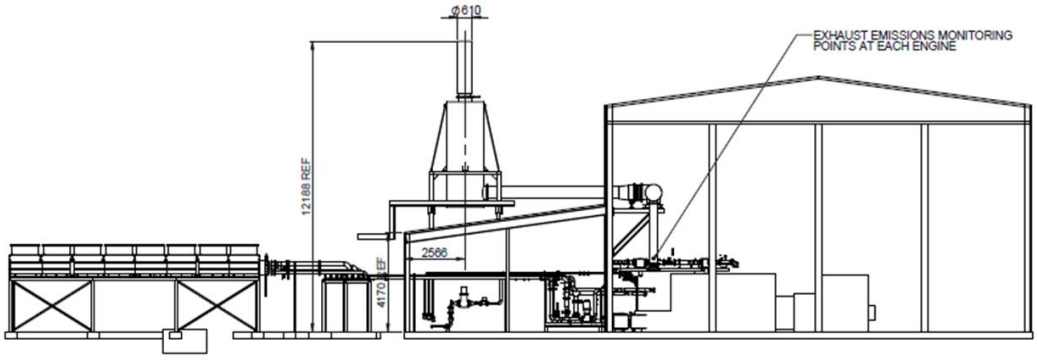
Appendix B

Plutonic Power Station (PPS)

The Plutonic Power Station operates on natural gas; supplied to site by a pipeline. The operating hours are varied on a day to day basis but are approximately 8000 hours per engine per year. A complete stack testing regime is not completed however every 1000 hours the flue gas is analysed in order to tune the engine. This is performed using a Testo 340 Flue Gas Analyser and the engine is tuned based on NOx readings.



ISOMETRIC

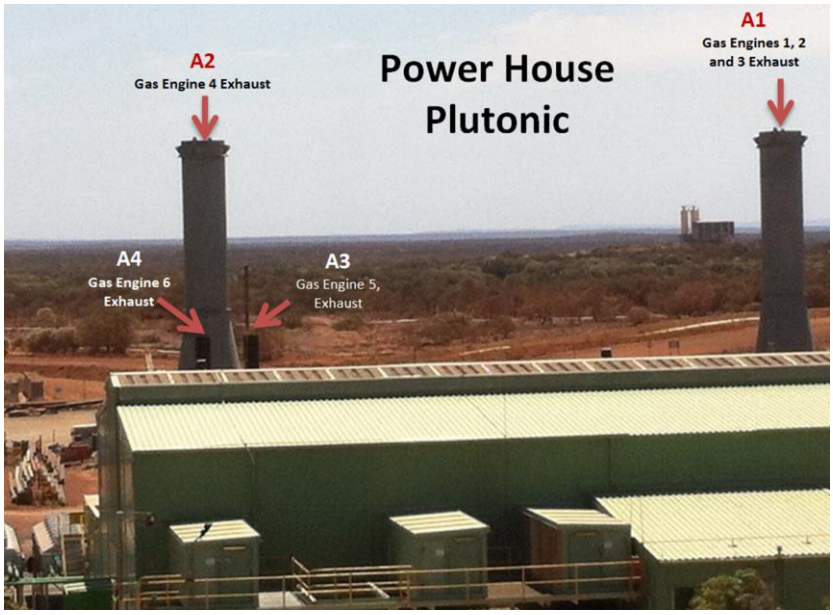


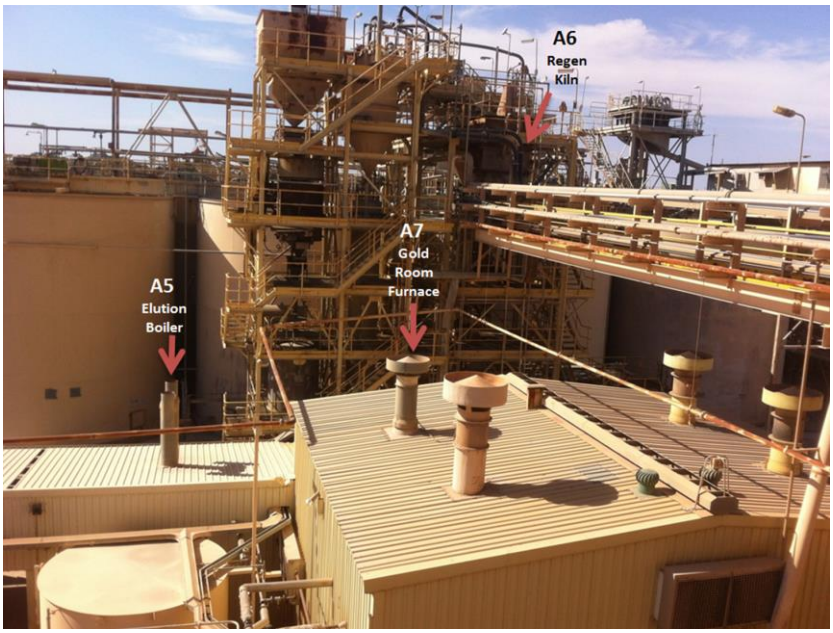
SIDE ELEVATION

	Zenith Pacific Pty Ltd 80 Fearnley Street, CAIRNS, QUEENSLAND, 4870 Ph: (07) 4051 9533 Fax: (07) 4051 9599 23 Brennan Way, Belmont, WESTERN AUSTRALIA, 6104 Ph: (08) 9477 1522 Fax: (08) 9477 1833 Email: Solutions@ZenithPacific.com.au Zenith Pacific This drawing must not be copied or reproduced in any form or used for any purpose other than originally intended without written approval of ZENITH PACIFIC		BY	DATE	TITLE NORTHERN STAR RESOURCES PLUTONIC GOLD MINE POWER STATION UPGRADE EXHAUST SYSTEM - DISCHARGE/MONITORING DETAIL
		DRAWN	G.DOHLER	02.09.2015	
		CHK'D.			
		DES'N.	ZENITH PACIFIC	02.09.2015	
		CHK'D.			
		APP'D.			
					SCALE: 1:100 | A1 | DRG. No.: NP004-DX-825 | REV.: A

In December 2014 two additional gas generators were installed in the Plutonic Power Station. These generators are rated at 3049kW each with an electrical efficiency of 41.6% each (Jenbacher JGS 620 GS-S.L). The generators were installed as the plant load has dropped in recent years as a result of decreased mining activity and the existing generators were too large to operate efficiently with the smaller demand; so the two smaller engines were installed to maintain efficiency.

Photographs of air emission points – both from energy production, carbon regeneration and gold smelting are shown below.





Appendix C

Premises Operation

Tailings Storage Facility 2 & 3 lifts
The current embankments will be raised using a 2.5m embankment lift from the present crest level of RL522.9m to RL525.4m. There will be three 2.5m embankment raises and one 1.6m raise to the final design crest of RL532.0m. The material to be used for the embankment raise will be compacted dried tailings from within TSF2 & 3.

There may be a short term increase in the water requirements and power usage onsite during the construction phase, however, no additional extractions are required.

The lifts have been approved by the Department of Mines and Petroleum.

Emission Description - Seepage
Emission: Seepage containing cyanide and metals/metalloids emitted to groundwater. There could be an increase of 13% to around 374 m^3/day or 4.3 L/sec with a 2 m lift. *Impact:* Contamination of groundwater from seepage and potential mounding. Groundwater varies onsite from 12 – 45 metres below ground level and has a TDS in the vicinity of the TSFs of 344 – 2240 mg/L in the last reporting period. There is no artificial liner for the facilities.
Controls: TSFs managed and operated in general accordance with the Operations Manual. TSFs structure and stability is regulated by DMP. Independent audits will be performed on an annual basis as a minimum, the existing piezometer and groundwater monitoring program will continue, a detailed rehabilitation /decommissioning plan will be prepared prior to decommissioning of TSF2 & 3. It is generally the pond size, depth and location that will drive any modification to seepage rates and, therefore, there will be no significant change at the site as the proponent intends to maintain the operations as outlined by the tailings operating manual.

A geochemical assessment of tailings samples indicates the solids are non-acid forming with trace sulphides and carbonates. The slurry and return water are mildly alkaline and saline. Water is removed from the TSFs via centrally located decant structure and is pumped directly to the processing plant.

Existing seepage collection trenches will be maintained for the operation of the TSF2 & 3 lifts. Review of the seepage recovery measures is performed annually for its effectiveness.

Seepage could potentially increase due to the additional storage capacity added from the lifts, however, water pond on TSF2 & 3 will be kept to a minimum. Ambient monitoring will be conducted to record standing water levels and water quality. Though it should be noted that the TSF bores currently only monitor for pH, TDS and WAD Cyanide, however, the monitoring suite has been extended as part of this amendment. Any seepage collected in downstream trenches should be pumped back to the TSF / process water dam at the plant. Installation/utilisation of recovery bores if required.

Risk Assessment
Consequence: Moderate
Likelihood: Possible
Risk Rating: Moderate

Regulatory Controls
Condition 1.3.11 ensures the TSF2 & 3 lifts are constructed to the standard specified in the design report. Condition 5.3.1 ensures that compliance documentation is submitted. Groundwater monitoring

is required by condition 3.5.1. Results to date have monitored for pH, TDS and WAD Cyanide. The most recent AERs indicate acceptable results for these parameters in the vicinity of TSF2 & 3. TD2-3 has shown higher concentrations of TDS, and WAD Cyanide was slightly higher than the other TSF bores, but dropped back to the lower level at the end of the reporting period. As part of this amendment, the suite has been extended to include additional metals/metalloids for monitoring at gold mines so this will provide a better indication of any seepage. Additional parameters were also included to align with the parameters for surface water discharge.

Residual Risk
Consequence: Moderate
Likelihood: Unlikely
Residual Risk Rating: Moderate

Emission Description - Overtopping
Emission: Tailings and decant water containing cyanide and metals/metalloids would be emitted if the TSF overtopped or failed.
Impact: Contamination of surrounding soils and surface water systems, infiltration of contaminants to groundwater with potential impact to groundwater.
Controls: TSF managed and operated in general accordance with the Operations Manual. Independent audits will be performed on an annual basis as a minimum, the existing piezometer and groundwater monitoring program will continue, a detailed rehabilitation /decommissioning plan will be prepared prior to decommissioning of TSF2 & 3.

Piezometers have remained static for several years, indicating that any seepage is via the floor of the TSFs rather than through the embankments.

Decant water pond is keep to a minimum, there is allowance for 72-hr Major 1:100 year event and operational freeboard is kept to 300mm (minimum).

Embankments are maintained via checking for signs of erosion after rainfall events, crest sloped inwards to shed water into the TSF and embankment downstream slope covered with rock armour to protect from erosion.

Risk Assessment
Consequence: Moderate
Likelihood: Unlikely
Risk Rating: Moderate

Regulatory Controls
Condition 1.3.11 ensures the TSF2 & 3 lifts are constructed to the standard specified in the design report. Condition 5.3.1 ensures that compliance documentation is submitted. Groundwater monitoring is required by condition 3.5.1.

Conditions 1.3.7 and 1.3.9 require adequate freeboard, stormwater diversion around the TSFs, seepage recovery and pipeline controls.

Residual Risk
Consequence: Moderate
Likelihood: Rare
Risk Rating: Moderate

Appendix D

Removal of Conditions

The following conditions were removed during this amendment and are discussed here as per the Director General's Instructions: Decision Document and Conditioning.

Nothing in the Licence shall be taken to authorise any emission that is not mentioned in the Licence, where the emission amounts to:
(a) pollution;
(b) unreasonable emission;
(c) discharge of waste in circumstances likely to cause pollution; or
(d) being contrary to any written law.

The above condition (old condition 1.1.5) was removed as per Operational Procedure IR-OP-02 Redundant Conditions. This condition is not valid, enforceable or risk based. This provision is not a condition. It is an explanatory statement that attempted to provide clarification of the operation of a licence.

The Licensee shall operate and maintain all pollution control and monitoring equipment to the manufacturer's specification or any relevant and effective internal management system.

The above condition (old condition 1.2.1) was removed as per Operational Procedure IR-OP-02 Redundant Conditions. This condition is not enforceable as it is not sufficiently clear or certain. It is unclear, in that:

- the "pollution control and monitoring equipment" required to be operated and maintained is not specified; and
- the maintenance schedule is not specified and is at the discretion of the licence holder though an internal management system, which is subject to a subjective test of being "effective".

The Licensee shall submit to the CEO a report detailing:
1. *An assessment of the site water-balance including:*
   a) *Dewatering rate;*
   b) *Water storage capacity;*
   c) *Water usage rate (demand/outflow rate); and*
   d) *Water storage buffer required for climatic conditions.*
2. *An assessment of the adequacy of current site water storage infrastructure.*

Environmental risk assessment of periodic discharge to W1 area.

This condition (old condition 4.1.1, IR1) has been removed as the report was provided to DER by the due date. The report requires further assessment and additional improvement conditions, which may be implemented to address the site water balance at a later date.