Government of Western Australia
Department of Environment Regulation

Works Approval

Environmental Protection Act 1986, Part V

Works Approval Holder: Billabong Gold Pty Ltd

Works Approval Number: W5988/2016/1

Registered office: Level 30 Bankwest Tower
108 St Georges Terrace
PERTH WA 6000

ACN: 613 900 922

Premises address: Hermes Gold Project
M52/685
PEAK HILL WA 6642
as depicted in Schedule 1

Issue date: Thursday, 24 November 2016

Commencement date: Monday, 28 November 2016

Expiry date: Wednesday, 27 November 2019

The following category/s from the *Environmental Protection Regulations 1987* cause this Premises to be a prescribed premises for the purposes of the *Environmental Protection Act 1986*:

Category number	Category description	Category production or design capacity	Approved premises production or design capacity
6	Mine dewatering: premises on which water is extracted and discharged into the environment to allow mining of ore	50 000 tonnes or more per year	250,000 tonnes per Annual Period (excess water discharge to creekline)

Conditions
This Works Approval is subject to the conditions set out in the attached pages.

Date signed: 24 November 2016
.....
Alana Kidd
Manager Licensing – Resource Industries
Officer delegated under section 20
of the *Environmental Protection Act 1986*

Works Approval Conditions

1 General

1.1 Interpretation

1.1.1 In the Works Approval, definitions from the *Environmental Protection Act 1986* apply unless the contrary intention appears.

1.1.2 In the Works Approval, unless the contrary intention appears:

'Act' means the *Environmental Protection Act 1986;*

'Annual Period' means a 12 month period commencing from 1 January until 31 December each year;

'CEO' for the purpose of notification means;

Chief Executive Officer
Department Division 3 Part V of the Act
Locked Bag 33 Cloisters Square
PERTH WA 6850
Email: info@der.wa.gov.au;

'Department' means the department established under section 35 of the *Public Sector Management Act 1994* and designated as responsible for administration of Division 3 Part V of the Act;

'kPa' means kilopascal;

'Premises' means the area defined in the Premises Map in Schedule 1 and listed as the Premises address on page 1 of the Works Approval;

'Schedule 1' means Schedule 1 of this Works Approval unless otherwise stated;

'Works Approval' means this Works Approval numbered W5988/2016/1 and issued under the Act*;* and

'Works Approval Holder' means the person or organisation named as the Works Approval Holder on page 1 of the Works Approval.

1.1.3 Any reference to an Australian or other standard in the Works Approval means the relevant parts of the standard in force from time to time during the term of this Works Approval.

1.1.4 Any reference to a guideline or code of practice in the Works Approval means the current version of the guideline or code of practice in force from time to time, and shall include any amendments or replacements to that guidelines or code of practice made during the term of this Works Approval.

1.2 General conditions

1.2.1 The Works Approval Holder shall ensure that the dewatering discharge infrastructure is designed and constructed in accordance with the requirements in Table 1.2.1.

1.2.2 The Works Approval Holder must not depart from the requirements specified in Table 1.2.1 except:

(a) where such departure is minor in nature and does not materially change or affect the infrastructure; or

(b) where such departure improves the functionality of the infrastructure and does not increase risks to public health, public amenity or the environment;

and all other conditions in this Works Approval are still satisfied.

Table 1.2.1: Mine dewatering discharge facility infrastructure requirements

Infrastructure	Requirements (design and construction)
Raw water storage dam	• Capacity of 1,000kL
Water distribution pipeline	• 110mm polyethylene pipe with a maximum operating pressure of 1,250kPa
Excess water discharge pipeline	• Located within creek bed adjacent to bank • Slotted / perforated • 200m in length • With a flow meter to record discharge flow (continuous)

2 Information

2.1 Reporting

2.1.1 The Works Approval Holder shall submit a compliance document to the CEO, following the construction of the works and prior to commencing operations.

2.1.2 The Works Approval Holder must ensure the compliance document:

(a) is certified by a suitably qualified professional engineer or builder confirming that each item of infrastructure specified in Table 1.2.1 has been constructed in accordance with the conditions of the Works Approval with no material defects;

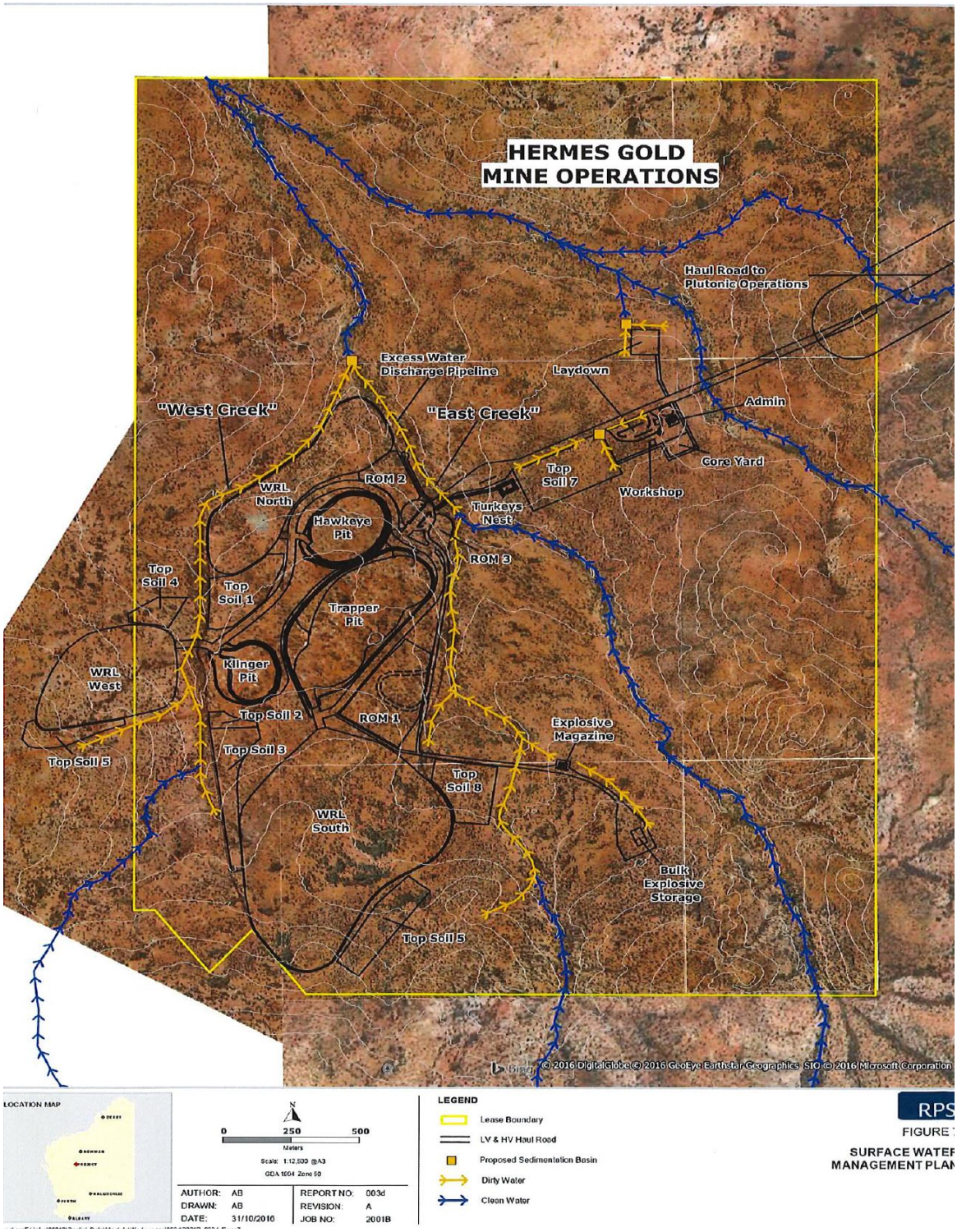
(b) contains a list of any departures authorised under condition 1.2.2 which are certified as being compliant with condition 1.2.2; and

(c) be signed by a person authorised to represent the Works Approval Holder and contain the printed name and position of that person within the company.

Schedule 1: Maps

Premises map

The Premises is shown in the map below. The yellow line depicts the Premises boundary.



Government of Western Australia
Department of Environment Regulation

Decision Document

Environmental Protection Act 1986, Part V

Proponent: Billabong Gold Pty Ltd

Works Approval: W5988/2016/1

Registered office:	Level 30 Bankwest Tower 108 St Georges Terrace PERTH WA 6000
ACN:	613 900 922
Premises address:	Hermes Gold Project M52/685 PEAK HILL WA 6642
Issue date:	Thursday, 24 November 2016
Commencement date:	Monday, 28 November 2016
Expiry date:	Wednesday, 27 November 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:	Sonya Poor Licensing Officer
Decision Document authorised by:	Alana Kidd Delegated Officer

Contents

1 Purpose of this Document

This decision document explains how DER has assessed and determined the application 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.

2 Administrative summary

Administrative details		
Application type	Works Approval ☒ New Licence ☐ Licence amendment ☐ Works Approval amendment ☐	
Activities that cause the premises to become prescribed premises	**Category number(s)**	**Assessed design capacity**
	6	250,000 tonnes per annual period (excess water discharge to creekline)
Application verified Application fee paid	Date: 6/09/2016 Date: 30/09/2016	
Works Approval has been complied with Compliance Certificate received	Yes☐ No☐ N/A☒ Yes☐ No☐ N/A☒	
Commercial-in-confidence claim	Yes☐ No☒	
Commercial-in-confidence claim outcome	NA	
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☒ The proposed activity does not trigger one or more of the criteria within the Memorandum of	Referral decision No: Managed under Part V ☐ Assessed under Part IV ☐

	Understanding between the Department of Mines and Petroleum and the EPA. Therefore, proposal was not referred to the EPA under Part IV of the EP Act	
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, eg Site is subject to SO_2 requirements of Kwinana EPP.		

3 Executive summary of proposal and assessment

A works approval application has been submitted by Northern Star Resources Ltd (NSR) for the construction of a mine dewatering discharge facility at the Hermes Gold Project (the Project). Written notification was received from NSR on 18 October 2016, stating that the proponent for the Project will be Billabong Gold Pty Ltd (Billabong Gold) as the Project, the Plutonic Gold Mine (existing licence L6868/1989/12 for categories 5, 6, 52, 54, 57 and 89) and associated tenements have recently been sold to Billabong Gold.

The mine dewatering discharge facility is to enable the disposal of excess groundwater abstracted from mine dewatering to a nearby creekline immediately to the east of the main mining area (Figure 1). The Project will be located in the Peak Hill district on mining lease M52/685, where cattle raising or activities associated with mining are the primary land uses.

A Department of Water (DoW) groundwater licence (GWL) allows for the abstraction of 400,000 kilolitres (kL) per year. Excess water to be discharged to the environment is 250,000 kL per year or 250,000 tonnes per year over a 25 month duration.

The application states that the proposed mining activities to be undertaken at the Project involve the development of open pits, waste rock landforms and supporting infrastructure. No processing activities will occur at the Project, with all ore hauled (via road) to the Plutonic Gold Mine, which is now operated by Billabong Gold for processing (NSR, 2016).

The Project's ground disturbance footprint will encompass the following mine and infrastructure items:

- Open pits (x3);
- Run-of-mine (ROM) pads (x3);
- Waste rock dumps (x3);
- Topsoil stockpile areas (x8);
- Magazine and bulk product storage compounds;
- Administration building;
- Workshop;

- Power facility (gensets);
- Bulk fuel facility;
- Laydown areas;
- Raw water storage dam;
- Mine dewatering and discharge system (**this works approval**);
- Road access into and around the mine site; and
- Haul road.

The Delegated Officer has determined that the mine dewatering discharge facility triggers category 6 (mine dewatering) under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations). This document is based on an assessment of the application for a Part V *Environmental Protection Act 1986* (EP Act) works approval, which was verified on 6 September 2016. The assessment is for the construction of the mine dewatering discharge facility only.

Location and siting

Siting Context

The Project is located approximately 150 kilometres (km) north of the town of Meekatharra, 80km north of the Andy Well Gold Project operated by Doray Minerals Limited and 60km south-west of the Plutonic Gold Mine (Figure 2). The Project is located within the Doolgunna ex-pastoral lease, now managed by the Department of Parks and Wildlife (Parks and Wildlife).

Sensitive Land Uses

The closest residential area to the Project is the township of Meekatharra, which has a population of approximately 1,377 people in 2011 (2011 Census Quickstats). The nearest place which may attract tourists is the historic Peak Hill town, a heritage-listed abandoned mining centre located 30km east of the Project. There are no registered European or Aboriginal heritage sites within the Project as registered under the *Aboriginal Heritage Act 1972*.

The workforce for the Project will operate on a fly-in/fly out basis from Perth and will be housed at the Plutonic Gold Mine accommodation village approximately 60km north-east of the Project. As the accommodation village is operated by Billabong Gold, it will not be considered a sensitive land use or receptor.

Specified Ecosystems

The Project exists within the DoW Proclaimed Gascoyne River and Tributaries Surface Water Area and the Proclaimed East Murchison Groundwater Area under the *Rights in Water and Irrigation Act 1914* (RiWI Act). The Project is not located within 30km of a Public Drinking Water Source Area (PDWSA) or RAMSAR wetland.

There are no Threatened Ecological Communities (TEC) or Declared Rare Flora (DRF) within or in a 30km radius of the Project area (DER's GIS database). There are no Priority Ecological Communities (PEC) within the Project area, but there is a Priority 1 PEC (Robinson Range vegetation complexes (banded ironstone formation)) approximately 15km from the Project (Parks and Wildlife, 2016). According to the application the Project is situated within the buffer zone of a Priority 1 PEC (Three Rivers Plutonic calcrete groundwater assemblage types on Gascoyne palaeodrainage on Three Rivers Station).

Topography

The topography of the Project area is flat to moderately undulating, bound to the south and west by the Robinson Ranges, and by the Horseshoe Range to the north. The Project is located within the southern extent of the Gascoyne Interim Biogeographical Regionalisation for Australia (IBRA) region, approximately 30km north of the boundary between the Gascoyne and Murchison IBRA regions.

Figure 1: Site layout and excess water discharge pipeline

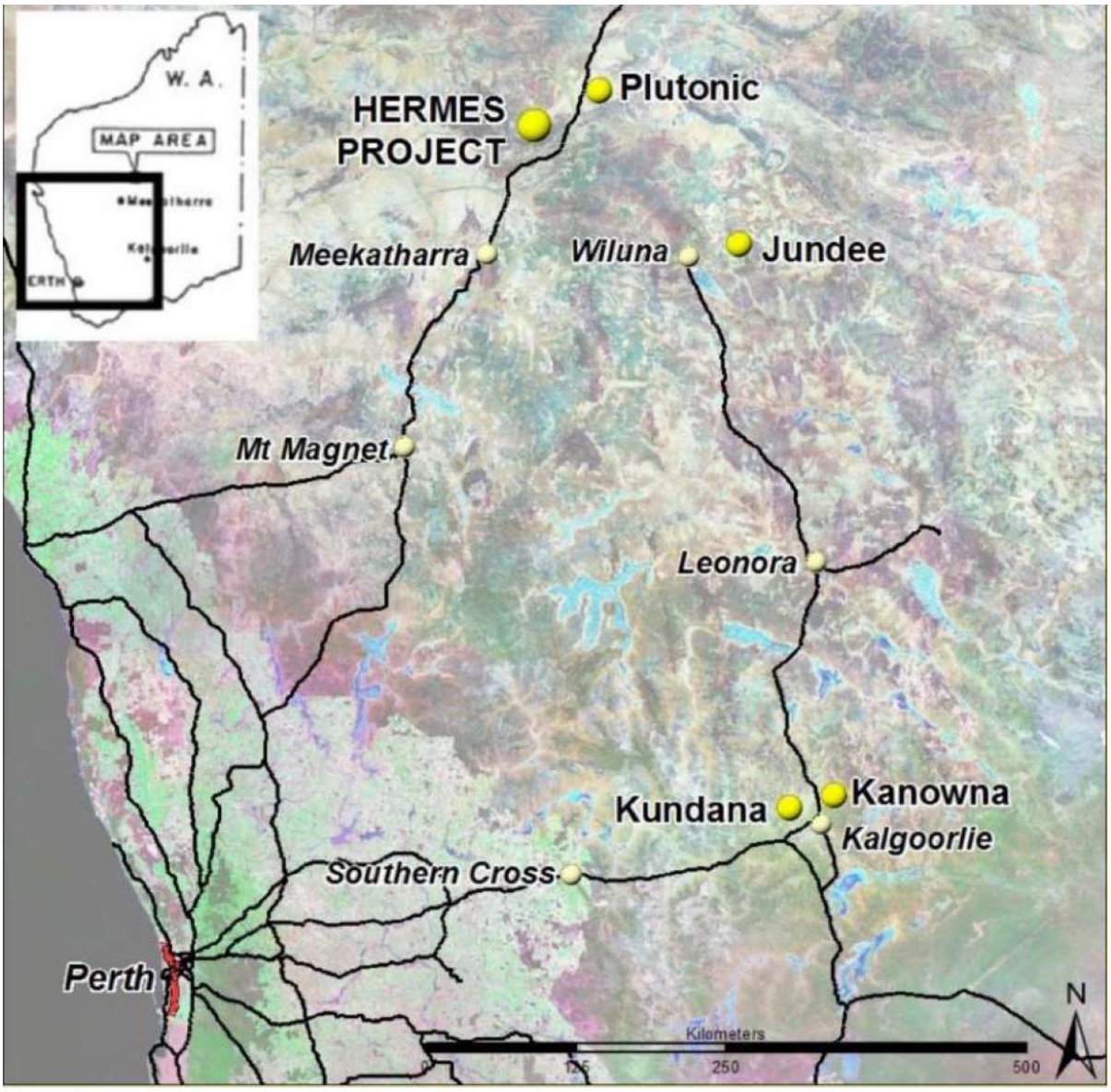


Figure 2: Regional location

Groundwater and water sources

The natural groundwater flow direction is considered to be in a north easterly direction and groundwater levels within the proposed open pits are approximately 30 - 58 metres (m) below ground level (mbgl). Groundwater salinity (total dissolved solids (TDS)) is 500-1,000mg/L, which is considered marginal (DoW, Salinity status classification).

The application states that there are no other known groundwater users within 10km of the proposed pits and given the expected limited nature of the aquifer extent, no impacts in terms of reduced availability of groundwater are likely. In addition, current groundwater levels are confined approximately 50mbgl in non-karstic geology making it unlikely groundwater is being accessed by any groundwater dependant ecosystems.

Surface water drainage in the area generally trends north-west from the Robinson Ranges through the site towards Coodewa Creek, and then into the Gascoyne River 40km north. A watercourse runs

both sides of the mining area, joining just downstream of the infrastructure (West Creek and East Creek) (NSR, 2016).
The creekline watercourse in which excess mine dewatering water will be discharged is ephemeral, only flowing during periods of intense or persistent rainfall events. The creek bed surface is predominantly composed of gravel (2 to 4mm) particle size sediment and has a low gradient, allowing for rapid seepage and minimal erosion or sedimentation.

According to GIS, a major and minor tributary is located approximately 8km west and 5km south of the Project and the Yandthangunna Creek and the Murchison River are located approximately 5km north-east and 18km south-east of the Project respectively.

Meteorology
The region experiences an arid climatic regime. Summer and autumn rainfall is typically associated with summer cyclonic activity, while winter falls are the result of northward straying depressions which originate off the south coast. Summer rains are usually of higher intensity and shorter duration, contributing to an erratic annual range. In comparison, winter falls are more reliable but of lower intensity.

Comparing the average rainfall rates to the average evaporation rates at Meekatharra, average evaporation exceeds average rainfall for every month of the year and annual average evaporation exceeds annual average rainfall by about 3,500mm (NSR, 2016).

Clearing
The clearing of native vegetation is not approved under this works approval. The application states that a Vegetation Clearing Permit (Purpose Permit) application was made to the Department of Mines and Petroleum (DMP) Native Vegetation Assessment Branch in August 2016.

Other approvals
A Mining Proposal including Mine Closure Plan for the Project was submitted to DMP in August 2016. Planning approval is not required as the tenement is approved under the *Mining Act 1978*.

There are two DoW GWLs for the Project under the RiWI Act. GWL183063 for the mine dewatering borefield and GWL182889 for the haul road water supply bores.

Billabong Gold will be required to submit a compliance document following the construction of the mine dewatering discharge facility. A Part V licence application will also need to be applied for and issued prior to the operation of the mine dewatering discharge facility. DER's assessment and decision making with respect to the works approval application is described in section 4 of this document.

4 Decision table

All applications are assessed in line with the *Environmental Protection Act 1986*, the *Environmental Protection Regulations 1987* and 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**
Interpretation	W1.1.1 – W1.1.4. Licence – Definitions.	**Construction** Conditions W1.1.1 and W1.1.2 require that terminology used in the works approval is referenced to appropriate definitions where applicable. W1.1.3 and W1.1.4 requires that the relevant part of an Australian or other standard, and current version of a guideline or code of practice in force during the term of the works approval is used. **Operation** Operation of the mine dewatering discharge facility may refer to terminology and definitions within the following: • EP Act; and • Australian Standards for water quality sampling.	General provisions of the *Environmental Protection Act 1986.* NSR, 2016.
General conditions	W1.2.1 and W1.2.2.	**Construction** Specified infrastructure requirements for the construction of the mine dewatering discharge facility has been included under condition W1.2.1. This condition is considered necessary based on the potential risk to the environment from erosion and scouring, waterlogging, overflows and pipeline ruptures and to ensure regulatory oversight. Condition W1.2.2 allows for minor deviations from the design and construction specifications where such departures are appropriate to improve the functionality of the infrastructure and does not increase the risk to public health, public amenity or the environment.	General provisions of the *Environmental Protection Act 1986*. DER Guidance Statement: *Licensing and works approval process*.

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
	N/A.	**Operation** Operation of the mine dewatering discharge facility will be regulated under the provisions of the: • EP Act; • *Environmental Protection (Unauthorised Discharges) Regulations 2004*; and • *Dangerous Goods Safety Act 2004* and associated Regulations.	NSR, 2016.
Premises operation	N/A. Licence conditions.	**Construction** No approval to operate is granted under the works approval. **Operation** Conditions may be added to the licence relating to containment infrastructure and production or design capacity limits. Descriptive limits may be set through conditions of the licence. A condition regarding recording and investigation of exceedances of limits will therefore be included. Inert Waste Type 1, Inert Waste Type 2 and contaminated solid waste meeting the waste acceptance criteria as specified in the *Landfill Waste Classification and Waste Definitions 1996* and existing licence conditions for L6868/1989/12 will be buried in the designated category 89 putrescible landfill facility located at Plutonic Gold Mine. Based on no waste being buried at the Project, which would trigger a category under Schedule 1 of the EP Regulations, no waste acceptance and processing conditions are required to be added to this licence.	General provisions of the *Environmental Protection Act 1986*. DER Guidance Statement: *Licensing and works approval process*. NSR, 2016.
Emissions general	N/A.	No approval to emit waste from any emissions points at the Project has been granted under the works approval.	General provisions of the *Environmental Protection Act*

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
			1986.
Point source emissions to air including monitoring	N/A.	**Construction and Operation** There will be no point source emissions to air during the construction and operation of the mine dewatering discharge facility. No conditions are required for the works approval and licence.	General provisions of the *Environmental Protection Act 1986.* NSR, 2016.
Point source emissions to surface water including monitoring	N/A. Licence conditions.	**Construction** There will be no point source emissions to surface water during the construction of the mine dewatering discharge facility. No conditions are required for the works approval. **Operation** DER's assessment and decision making is detailed in Appendix A.	General provisions of the *Environmental Protection Act 1986.* NSR, 2016.
Point source emissions to groundwater including monitoring	N/A.	**Construction and Operation** There will be no point source emissions to groundwater during the construction and operation of the mine dewatering discharge facility. No conditions are required for the works approval and licence.	General provisions of the *Environmental Protection Act 1986.* NSR, 2016.
Emissions to land including monitoring	N/A.	**Construction and Operation** There will be no emissions to land during the construction and operation of the mine dewatering discharge facility. No conditions are required for the works approval and licence.	General provisions of the *Environmental Protection Act 1986.* NSR, 2016.
Fugitive	N/A.	**Construction and Operation (Mine dewatering discharge facility)**	General

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
emissions		Dust may be generated during construction of the mine dewatering discharge facility from vegetation clearing and vehicle movements. Dust emissions should not be generated during the operation of the mine dewatering discharge facility. **Mine Operation** Dust emissions will be generated during operations at the Project from mining operations (vehicle movements, vegetation clearing, blasting, mining, material loading and hauling, stockpiling, grading, bulldozing, etc.). The application states that dust emissions will be minimised through the use of water carts to control dust on roads and dust suppression sprays applied at ore loading areas and the ROM pad. <u>Regulatory Controls</u> Fugitive dust emissions are considered a low risk for the Project, given the location of the premises, no sensitive land uses in proximity and no TEC, PEC or DRF within the Project area (refer to section 3 under location and siting). As such fugitive emissions can be sufficiently regulated under section 49 of the EP Act. No conditions relating to fugitive emissions are required to be added to the works approval and licence.	provisions of the *Environmental Protection Act 1986.* *Environmental Protection (Unauthorised Discharges) Regulations 2004.*
Odour	N/A.	**Construction and Operation** There will be no odour emissions during the construction and operation of the mine dewatering discharge facility. No conditions are required for the works approval and licence.	General provisions of the *Environmental Protection Act 1986*.
Noise	N/A.	**Construction and Operation** There is the potential for noise emissions during the construction of the mine dewatering discharge facility. Noise emissions should not be generated during	General provisions of the *Environmental*

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
		operation of the mine dewatering discharge facility. The construction and operation of the mine dewatering discharge facility will need to comply with the *Environmental Protection (Noise) Regulations 1997.* No conditions relating to noise are required to be added to the works approval and licence.	*Protection Act 1986*. *Environmental Protection (Noise) Regulations 1997*.
Monitoring general	N/A. Licence conditions.	**Construction** No approval to emit waste from any emissions points at the Project has been granted under the works approval as such monitoring is not required. **Operation** The licence will include conditions ensuring surface water samples are collected in accordance with the applicable standard, submitted to a NATA accredited laboratory for analysis (where applicable) and that monitoring equipment is appropriately maintained and calibrated.	General provisions of the *Environmental Protection Act 1986*. AS/NZS 5667.1. AS/NZS 5667.6.
Monitoring of inputs and outputs	N/A.	No conditions relating to the monitoring of inputs and outputs are required for the works approval and licence.	General provisions of the *Environmental Protection Act 1986*.
Process monitoring	N/A. Licence conditions.	No conditions relating to process monitoring are required to be added to the works approval. Conditions will be added to the licence for the continuous and accurate recording via flow meters of the cumulative quantity of dewatering discharges to the creekline. This monitoring will enable the assessment of compliance against the authorised discharge from the mine dewatering discharge facility and enable the determination of fees for Part 2 waste and Part 3 discharge component under the EP Regulations.	General provisions of the *Environmental Protection Act 1986*. *Environmental Protection (Unauthorised*

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
			Discharges) Regulations 2004.
Ambient quality monitoring	N/A.	No conditions relating to ambient quality monitoring are required for the works approval and licence.	General provisions of the *Environmental Protection Act 1986*.
Meteorological monitoring	N/A.	No conditions relating to meteorological monitoring are required for the works approval and licence.	N/A.
Improvements	N/A.	No improvement conditions are required for the works approval.	N/A.
Information	W2.1.1 and W2.1.2. Licence conditions.	**Construction** Conditions W2.1.1 requires the submission of a compliance document following construction of the works and prior to operation. Condition W2.1.2 requires that the infrastructure specified in Table 1.2.1 is certified in writing as being compliant in accordance with conditions of the works approval. **Operation** Conditions will be added to the licence requiring the submission of an Annual Environmental Report. Non-annual reporting and notification requirements may also be included.	NSR, 2016. General provisions of the *Environmental Protection Act 1986*.
Works Approval Duration	N/A.	It is proposed to grant the works approval for a three year period. No other statutory approvals have been identified as limiting the duration of the works approval.	N/A.

5 Advertisement and consultation table

Date	Event	Comments received/Notes	How comments were taken into consideration
10/10/2016	Application advertised in West Australian (or other relevant newspaper)	No comments were received	N/A
19/09/2016	Application referred to the following direct interest parties: • DoW; and • Parks and Wildlife	No comments were received from DoW Parks and Wildlife (comments received 11/10/2016) recommended the following: • That a monitoring program be established to monitor the potential effects on vegetation from water discharged to the creekline to the east of the main mining area including the development of trigger and threshold criteria, at which point contingency strategies would be applied; and • Consideration given to the level of risk associated with spreading existing weeds within the creekline given the occurrence of weeds within this area and the potential for these species to be highly invasive given ideal conditions, including a high moisture environment	N/A DER response to Parks and Wildlife comments: • Conditions will be added to the licence for the continuous monitoring of dewatering water discharged to the creekline (refer to process monitoring) • Surface water and vegetation monitoring will also be included on the licence (refer to Appendix B) The management of weeds will not be regulated by DER
8/11/2016	Proponent sent a copy of draft instrument	No comments received. Updated figures provided	Figures updated in decision document and works approval

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

Point source emissions to surface water and monitoring

Initial mining is proposed to be undertaken at the Trapper, Hawkeye and Klinger pits. Mine dewatering will initially be from installed production bores TB07 and TB09, located either end and outside of Hawkeye Pit. These bores will provide water resources for the Project, as well as potential depressurisation of the Hawkeye Pit and to some limited extent the northern end of Trapper Pit.

Groundwater abstracted from these mining pits will be pumped to the raw water storage dam, from which it will be distributed to the following infrastructure as shown in Figure 3:

- A standpipe for dust suppression (water carting); or
- Raw water storage tank (22kL) for water treatment (Reverse Osmosis) for domestic and potable use.

Excess water from the raw water storage dam, will be discharged into a creekline located approximately 500m north-east of the Hawkeye Pit.

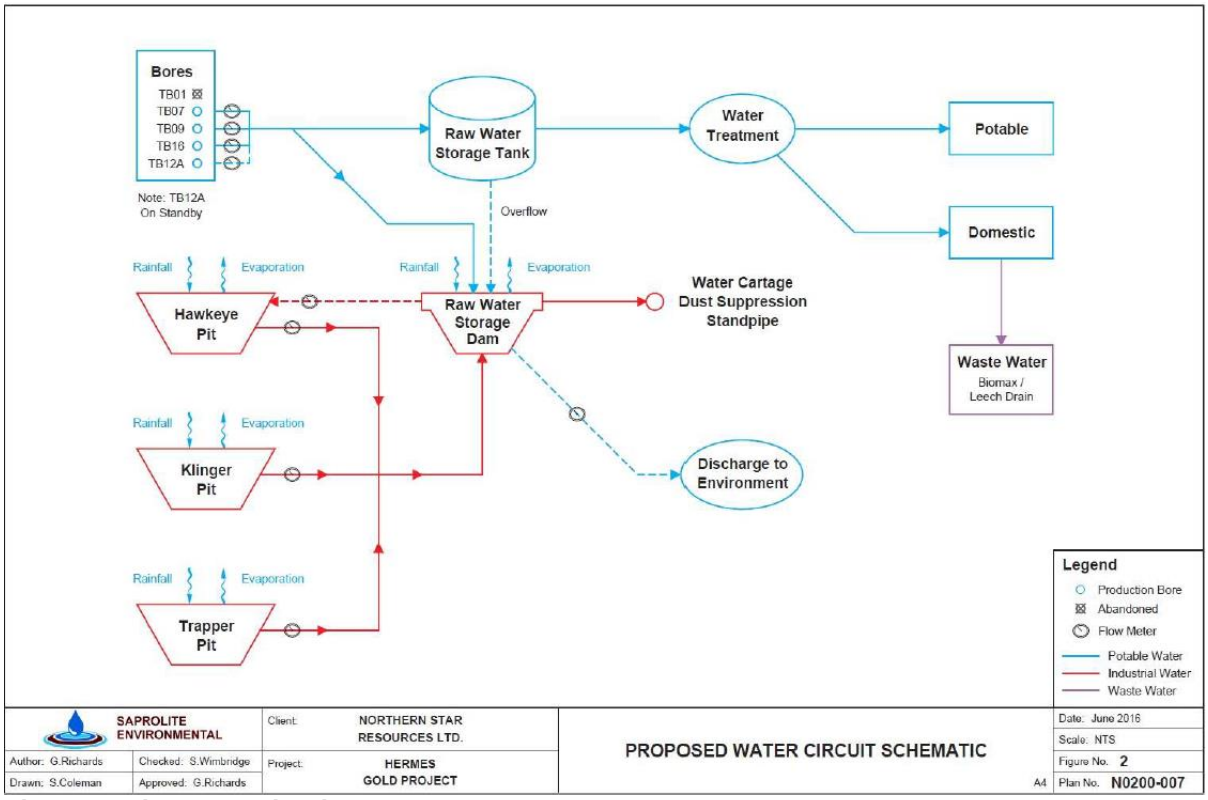


Figure 3: Site water circuit

The application states that the risk of detrimental impacts on the creekline and ecosystem from excess water discharge is considered to be low for the following reasons:

- The water quality of the dewater/discharge water is of a potable water supply standard, having freshwater salinity (TDS 500mg/L) and neutral pH of 8 pH units;
- The proposed discharge volume is relatively small (up to 275kL per day, equating to 3.2 litres per second) and will be spread over 200m length within the creek bed via slotted / perforated pipeline; and
- The proposed life of mine for which the mine dewatering and excess water discharge system will operate is a relatively short duration (2.5 years). Excess water discharge volumes are only expected to potentially exceed 50,000kL per year for 9 months in the second year.

Table 2 provides the baseline (pre-dewatering) groundwater quality results, including comparison against the *Livestock drinking water guidelines* (ANZECC/ARMCANZ, 2000).

Table 2: Laboratory Water Chemistry Analysis Results

Analyte	ANZECC Livestock Watering Guidelines (NWQMS 2000)	TB01		TB07		TB09		TB12A	
		13/04/16	21/04/2016	13/04/16	17/04/2016	13/04/16	13/04/16	13/04/16	24/04/2016
pH Value	-	7.83	8.24	8.39	7.99	7.81	7.72	7.93	7.83
EC @ 25°C	-	929	334	863	215	890	911	951	764
TDS	**4,000**	564	214	477	124	546	542	582	435
Total Hardness as $CaCO_3$	-	155	65	103	34	170	174	168	129
Hydroxide Alkalinity as $CaCO_3$	-	<1	<1	<1	<1	<1	<1	<1	<1
Carbonate Alkalinity as $CaCO_3$	-	<1	<1	4	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as $CaCO_3$	-	178	79	118	38	141	150	174	136
Total Alkalinity as $CaCO_3$	-	178	79	123	38	141	150	174	136
Silicon as SiO_2	-	60.9	11.9	3.6	5.9	62.6	84.3	65.3	15
Silicon	-	28.4	5.55	1.67	2.75	29.2	39.3	30.5	7.02
Sulphate as SO_4	**1,000**	57	27	74	16	57	68	74	65
Chloride	-	110	46	121	29	109	94	114	96
Calcium	**1,000**	29	13	15	7	30	30	31	22
Magnesium	-	20	8	16	4	23	24	22	18
Sodium	-	121	44	118	25	102	104	120	101
Potassium	-	9	3	8	2	6	7	8	6
Aluminium	**5.0**	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	0.02	<0.01
Arsenic	**0.5**	0.027	0.042	<0.001	0.038	0.003	0.009	0.03	0.038
Beryllium	-	NA	<0.001	NA	<0.001	NA	<0.001	NA	<0.001
Barium	-	0.023	0.011	0.022	0.017	0.016	0.04	0.009	0.017
Cadmium	**0.01**	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	**1.0**	0.007	0.008	<0.001	0.004	<0.001	0.006	0.004	0.006
Cobalt	**1.0**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	**0.5**	0.002	<0.001	<0.001	<0.001	0.001	<0.001	0.002	<0.001
Lead	**0.1**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	-	0.029	0.07	0.013	0.002	0.214	0.002	0.002	0.001

Analyte	ANZECC Livestock Watering Guidelines (NWQMS 2000)	TB01		TB07		TB09		TB12A	
		13/04/16	21/04/2016	13/04/16	17/04/2016	13/04/16	13/04/16	13/04/16	24/04/2016
Molybdenum	**0.15**	NA	0.004	NA	0.002	NA	0.002	NA	0.002
Nickel	**1.0**	0.004	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	0.001
Selenium	**0.02**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Silver	-	NA	<0.001	NA	<0.001	NA	<0.001	NA	<0.001
Tin	-	NA	<0.001	NA	<0.001	NA	<0.001	NA	<0.001
Vanadium	-	NA	0.05	NA	0.07	NA	0.05	NA	0.07
Zinc	**20**	0.038	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	0.012
Boron	**5.0**	0.55	0.6	0.44	0.59	0.48	0.52	0.54	0.59
Iron	-	<0.05	<0.05	<0.05	<0.05	0.15	0.06	<0.05	<0.05
Mercury	**0.002**	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Fluoride	**2.0**	NA	0.2	NA	0.2	NA	0.3	NA	0.3
Nitrite as N	**30**	0.88	<0.01	0.09	<0.01	0.01	<0.01	0.07	0.32
Nitrate as N	**400**	13.1	5.64	10.6	3.3	15.6	17	13.9	14.3
Nitrite + Nitrate as N	-	14	5.64	10.7	3.3	15.6	17	14	14.6
Acidity as $CaCO_3$	-	NA	<1	NA	4	NA	11	NA	6

NA Not Analysed
Note: Dissolved Metals and Ions

Emission Description

Emission: Discharge of excess dewatering water via the excess water discharge point to an ephemeral creekline.

Impact: Potential impacts on the water quality of the creek system, riparian vegetation due to waterlogging and altered ecology through presence of additional water and erosion and scouring of the creek embankment at the excess water discharge point.

Controls:

- The raw water storage dam will have a capacity of 1,000kL and will act as a sedimentation basin for the removal of suspended solids before release to the environment;
- The water distribution pipeline will run along the ground surface to the creekline and have a valve connection at entry point into the creekline;

- The excess water discharge will be of a short duration and temporary in nature;
- The discharge to the creekline will be controlled;
- The excess water discharge pipeline will be placed within the creek bed adjacent to the bank and discharge will flow into available mobile bed sediments, increasing the surface area for discharge, therefore minimising erosion; and
- The discharge front will be over multiple points over a 200m length of slotted / perforated pipeline. Water distributed from the perforated pipe will then flow over a broader area, subject to infiltration and evaporation within the main drainage channel.

Risk Assessment

Consequence: The Delegated Officer has determined that the impact from discharges of excess water to the creekline will result in minor impacts to the riparian vegetation and aquatic ecosystems. Therefore, the Delegated Officer considers the consequence to be minor.

Likelihood: The Delegated Officer has determined that an impact to the riparian vegetation and aquatic ecosystems from excess water discharges to the creekline could occur at some time. Therefore, the Delegated Officer considers the consequence to be possible.

Overall Risk Rating: The Delegated Officer has compared the consequence and likelihood ratings described above through the Emissions Risk Matrix (Table 2) and determined that the overall rating of risk for discharges of excess mine dewatering water to the creekline during operation to be **moderate**.

Regulatory Controls

Conditions will be added to the licence requiring Billabong Gold to undertake monitoring of the excess water discharge point during discharge for volumetric flow rate (continuous).

Conditions will also be added to the licence for surface water monitoring. Billabong Gold will be required to undertake quarterly monitoring at the excess water discharge point for Electrical Conductivity, pH, TDS, Ca, Na, Mg, K, SO_4, Cl, NO_3, HCO_3, CO_3, Al, As, Cd, Cr, Cu, Fe, Hg, Mn, Ni, Pb, SiO_2, Total Suspended Solids, Total Petroleum Hydrocarbons and Total Organic Carbon.

The discharge has the potential to affect the health of aquatic ecosystems and riparian vegetation communities in the downstream receiving environment of the ephemeral creekline. Billabong Gold should submit a vegetation monitoring report to DER with the licence application outlining what vegetation monitoring will be undertaken during operation to monitor the potential effects on vegetation from the excess water discharge.

Residual Risk Rating

Consequence: To determine the consequence the Delegated Officer has considered the following:

- Location of the Premises;
- Distance to specified ecosystems including sensitive land uses, PDWSA, TEC, PEC, DRF; and
- Significant waterways.

Based on these considerations, the Delegated Officer has determined that the discharge of excess water to the creekline will result in minor impacts at a local scale. Therefore, the Delegated Officer considers the consequence to be minor.

Likelihood: Based upon the controls Billabong Gold have proposed above and the conditions to be imposed on the licence, the Delegated Officer has determined that adverse impacts to the environment from the discharge of excess water to the creekline are unlikely to occur.

Overall Risk Rating: The Delegated Officer has determined the overall risk of excess water discharged to the creekline is moderate but acceptable, subject to regulatory controls.

References

	Document Title	Availability
1	ANZECC/ARMCANZ, 2000. National Water Quality Management Strategy, Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Australian and New Zealand and Conservation Council and Agriculture and Resources Management Council of Australia and New Zealand, 2000	environment.gov.au
2	DER Guidance Statement: *Licensing and works approval process* (September 2015)	der.wa.gov.au
3	DER Guidance Statement: *Regulatory principles* (July 2015)	
4	DER Guidance Statement: *Setting Conditions* (October 2015)	
5	DoW, Salinity status classification. Understanding-salinity – Salinity status classifications, by total salt concentration table, Department of Water	http://www.water.wa.gov.au/water-topics/water-quality/managing-water-quality/understanding-salinity
6	Email correspondence titled “RE: Hermes Gold works approval application” including attachment “Notification of Sale – Plutonic Gold Operations – DER – 12/10/2016” dated 18 October 2016 from Chris Pyke (Northern Star Resources Limited)	DER internal
7	Landfill Waste Classification and Waste Definitions 1996. Department of Environment and Conservation, Landfill Waste Classification and Waste Definitions 1996 (As amended December 2009)	der.wa.gov.au
8	NSR, 2016. Works Approval Application Supporting Document, Hermes Gold Project – Mine Dewatering, Northern Star Resources Limited, 12 August 2016	DER internal
9	Parks and Wildlife, 2016. Priority Ecological Communities for Western Australia Version 24, Department of Parks and Wildlife, Species and Communities Branch, 24 June 2016	dpaw.wa.gov.au
10	2011 Census Quickstats. Australian Bureau of Statistics, 2011 Census Quickstats for Meekatharra. Accessed 17 October 2016	censusdata.abs.gov.au