Government of Western Australia
Department of Water and Environmental Regulation

Amendment Report

Licence Number	L8934/2015/1
Licensee	Big Bell Gold Operations Pty Ltd
ACN	090 642 809
File Number:	DER2015/002680
Premises	Cue Gold Operations Mining Tenements M20/17, M20/99, M20/192, L20/21, L20/40, G20/1, G20/2, G20/3, L20/39, L20/41, L21/14, M20/252, M20/307, M20/333, M20/418, M20/435 and G20/11
Date of Report	3/09/2020
Decision	**Amended licence**

1. Definitions and interpretation

Definitions

In this Amendment Report, the terms in Table 1 have the meanings defined.

Table 1: Definitions

Term	Definition
AACR	Annual Audit Compliance Report
ACN	Australian Company Number
AER	Annual Environment Report
Amendment Report	refers to this document
Amendment Notice	means an amendment granted under s.59 of the EP Act in accordance with the procedure set out in s.59B of the EP Act
Category/ Categories/ Cat.	categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
CEO	means Chief Executive Officer. CEO for the purposes of notification means: Director General Department Administering the *Environmental Protection Act 1986* Locked Bag 10 JOONDALUP DC WA info@dwer.wa.gov.au
Delegated Officer	an officer under section 20 of the EP Act
Department	means the department established under section 35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Part V, Division 3 of the EP Act.
DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
Existing Licence	The Licence issued under Part V, Division 3 of the EP Act and in force prior to the commencement of and during this Review
Licensee	Big Bell Gold Operations Pty Ltd
m^3	cubic metres
mtpa	million tonnes per annum
Noise Regulations	*Environmental Protection (Noise) Regulations 1997* (WA)

Term	Definition
Occupier	has the same meaning given to that term under the EP Act.
Prescribed Premises	has the same meaning given to that term under the EP Act.
Premises	refers to the premises to which this Amendment Report applies, as specified at the front of this Amendment Report.
Revised Licence	the amended Licence issued under Part V, Division 3 of the EP Act, with changes that correspond to the assessment outlined in this Amendment Report.
Risk Event	as described in *Guidance Statement: Risk Assessment*
UDR	*Environmental Protection (Unauthorised Discharges) Regulations 2004* (WA)

2. Amendment Description

The following guidance statements have informed the assessment and decision outlined in this Amendment Report.

- *Guidance Statement: Regulatory Principles (July 2015)*
- *Guidance Statement: Setting Conditions (October 2015)*
- *Guidance Statement: Risk Assessment (February 2017)*
- *Guidance Statement: Environmental Siting (November 2016)*
- *Guideline: Decision Making. Department of Water and Environment Regulation, Perth, June 2019*

2.1. Purpose and scope of assessment

On 15 May 2020, the Licensee applied to amend the Cue Gold Operations (formerly known as Central Murchison Gold Project – Big Bell) Licence L8934/2015/1 (Licence). The Licensee has requested the following changes to the Licence:

Dewatering of mined pits with discharge to other pits and to Lake Austin

To allow the mining of ore at the Premises, the Licensee plans to transfer water between mined pits located in the north and south Cuddingwarra Project areas (areas located at the Premises). Additionally, some of the dewatering water will be pumped to Lake Austin for disposal and to standpipes for use as dust suppression at the Premises.

The Existing Licence allows for a total of 5,324,556 tonnes of dewatering effluent to be discharge to the environment each year. The total is a combination of 3,500,000 tonnes of dewatering effluent from the Big Bell Project area and 1,824,556 tonnes per year from the Cuddingwarra Project area (Black Swan South pit). However, discharge from the Big Bell Project area to Lake Austin ceased approximately 18 months ago, with discharge currently only occurring to the Shocker/1600 pit located at Big Bell Project area. Additionally, the applicant has advised that mining of the Black Swan underground has not occurred and therefore no dewatering with discharge to Lake Austin has been required.

The Licensee has advised that dewatering discharge to Lake Austin from the Big Bell Project area will not occur while dewatering activities are occurring at the Cuddingwarra Project area. As a result, the Licensee has not applied to increase the total volume of dewatering effluent permitted to be discharged to the environment. The Licensee has also advised that the

dewatering operations will consist of discharge between pits with storage to occur in some of those pits, with discharge to Lake Austin expected to be substantially less than the volumes permitted in the Licence. The Licensee expects a total 2,485,000 m^3 of dewatering effluent will be discharged to Lake Austin in the first year, with a maximum volume of 1,460,000 m^3 expected in subsequent years which is substantially less than the maximum volume of 5,324,556 tonnes currently allowed in the Existing Licence.

Table 2 below provides the proposed water balance for the dewatering activities that will be undertaken at the Cuddingwarra Project area.

Table 2: Cuddingwarra Project dewatering water balance

Pit	Planned Use		Purpose	Current Volume / Projected Inflow (m3)	Capacity (m3)	
	Source	Receiver			Current	Proposed
City of Chester Central	✓	✓	Dewatering	62,387	138,320	283,421
City of Chester NW	✓	✓	Dewatering / Storage	102,879	219,382	284,622
City of Chester South	✓	✓	Dewatering	25,265	67,852	166,725
City of Chester 3850	✓	×	Dewatering	39,000	0	45,395
City of Chester 3975	✓	×	Dewatering	36,000	0	51,487
City of Chester 4050	✓	×	Dewatering	20,000*	0	26,529
Jims Find	✓	✓	Dewatering / Storage	177,000	0	846,463
Coventry South	✓	✓	Dewatering / Storage	80,000*	0	224,379
Coventry	✓	×	Dewatering	12,000	0	70,188
City of Sydney	✓	×	Dewatering	700	0	24,281
Fleece Pool	✓	×	Dewatering	19,000	0	275,362
Golden Gate	✓	✓	Storage	352,368	1,692,125	-
Black Swan	✓	✓	Storage / Dust Suppression	420,174	2,049,203	-
Rheingold	✓	×	Dewatering	1,159,837	4,068,758	-
Rheingold South	✓	✓	Storage	94,866	601,289	-
Black Swan South 1	×	✓	Storage / Dust Suppression	0	Unknown	-
Black Swan South 2/3	✓	×	Dewatering	1,754,554	7,017,842	-
Black Swan South 4	×	✓	Storage	0	Unknown	-
Lady Rosie	✓	×	Dewatering	23,000	364,009	-
South Victory	✓	×	Dewatering	6,000	302,924	-
Black Swan South 5	✓	✓	Storage	118,427	590,811	-
Black Swan South 5 Junior	×	✓	Storage	0	Unknown	-
Chieftain Central	✓	×	Dust Suppression	163,733	573,202	-

Figures 1 and 2 below provide the layout of the proposed dewatering of the Cuddingwarra North and South pits and dewatering infrastructure, along with the direction of flow.

Figure 1: Cuddingwarra North dewatering infrastructure

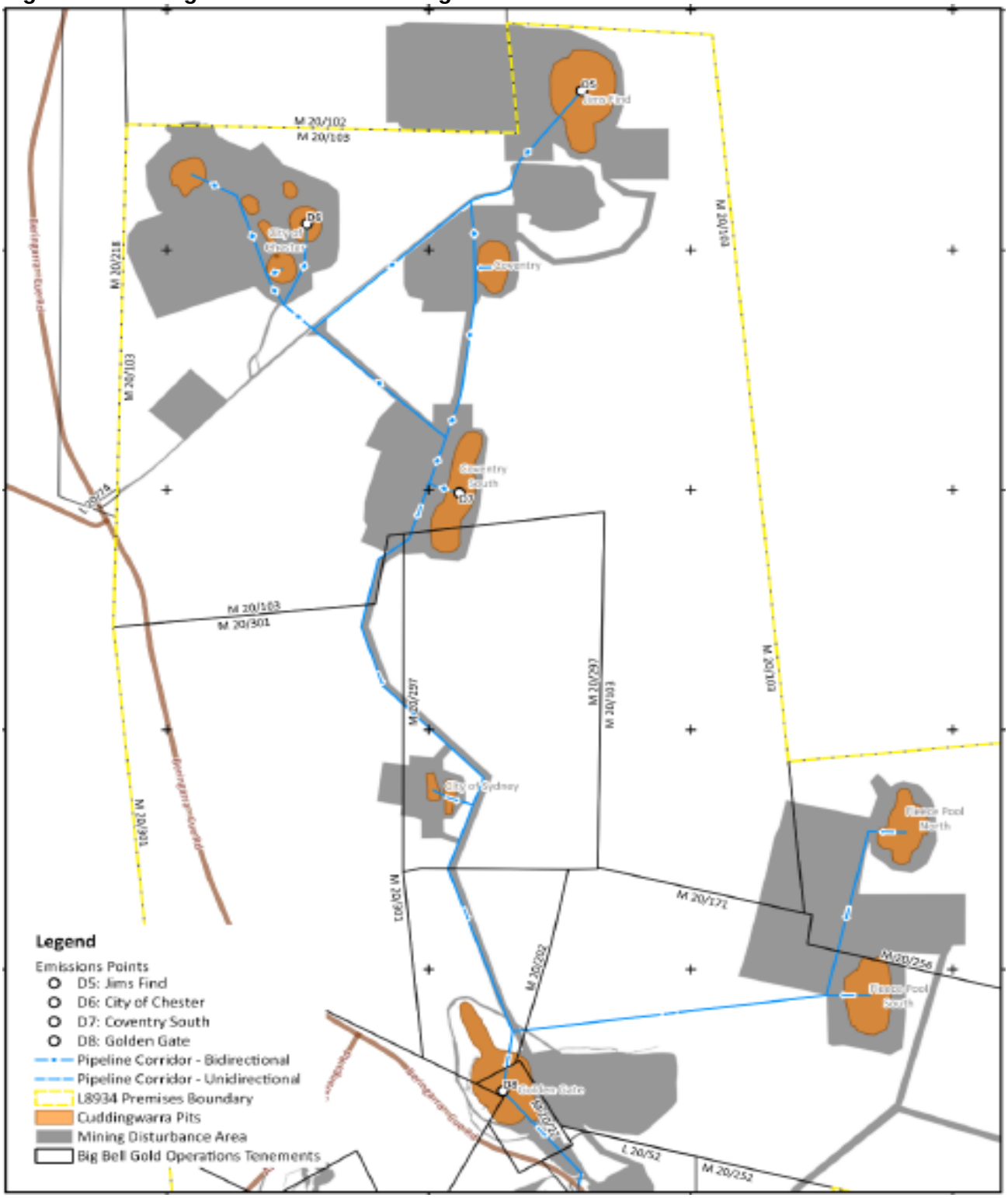
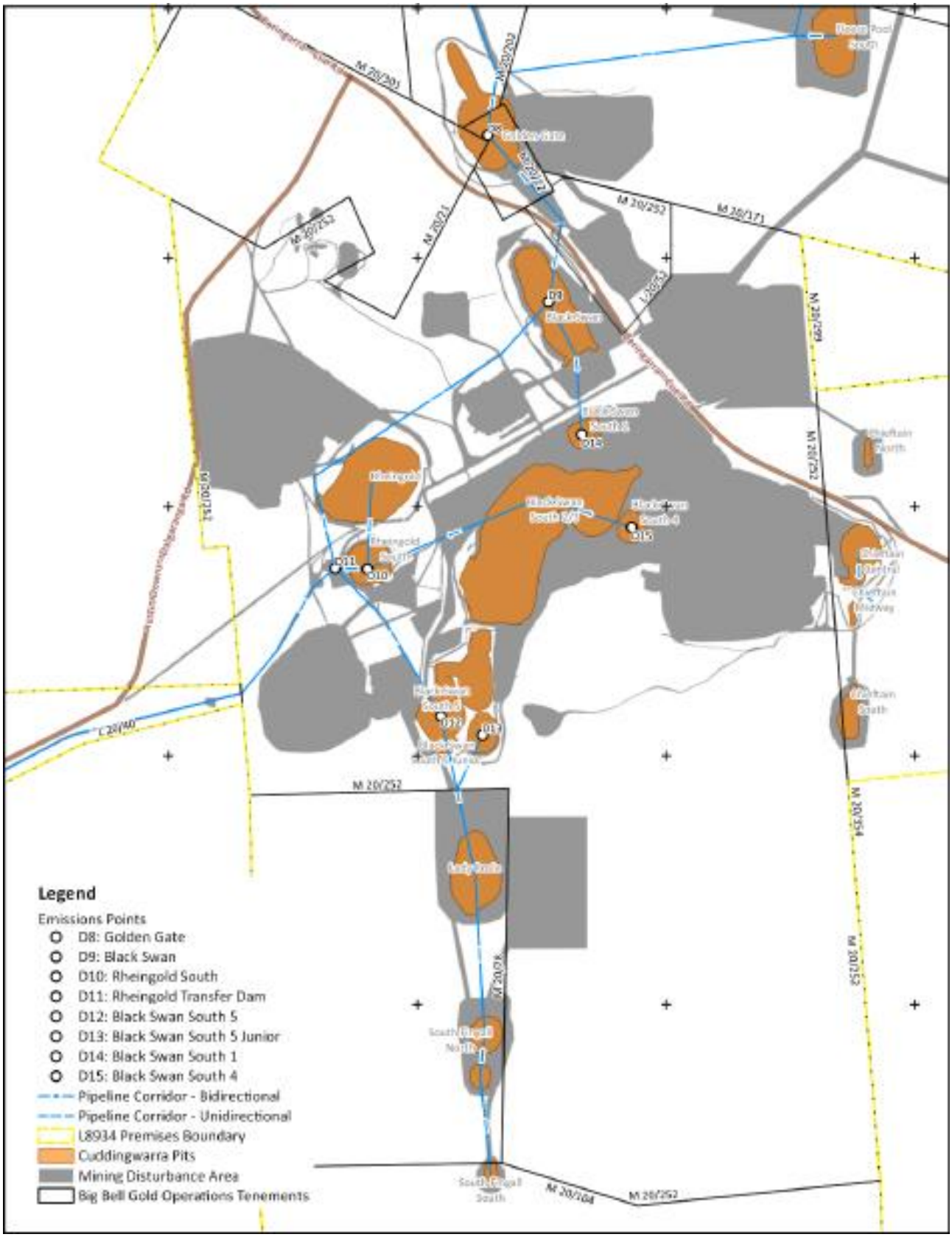


Figure 2: Cuddingwarra South dewatering infrastructure



The Golden Gate pit will receive water from dewatering of the northern pits shown above. Water will initially be transferred amongst these pits in the northern area to facilitate mining, with temporary storage occurring in some of the pits. A total of 683,000 tonnes of water will be

dewatered from the northern pits and stored in the Golden Gate pit which has an available capacity of 1,350,000 tonnes. From the Golden Gate pit water will be transferred to the Black Swan pit then to the Transfer Dam (Dam) prior to discharge to Lake Austin. Water will be pumped from the Black Swan pit for dust suppression use at the Premises or to the Black Swan South 1 pit for storage and dust suppression.

In the Cuddingwarra South area:

- Dewatering of the Black Swan South pit (shown as Black Swan South 2/3 above) with discharge to Lake Austin (as approved in the Existing Licence);
- Rheingold pit water will be discharged into the Rheingold South pit before being pumped to the Dam prior to discharge to Lake Austin; and
- Lady Rosie and South Victory pit water will discharged into either the Black Swan South 5 or Black Swan South 5 Junior for storage and use for dust suppression. Water from the Chieftain pit will be pumped for dust suppression. No discharge to Lake Austin will occur from the dewatering of these pits.

The discharge to Lake Austin will only commence once the dewatering of the Black Swan South and Rheingold pits occurs. The Licensee expects only one pit will be dewatered at a time.

An expected 1,755,000 m^3 of water will be discharged to Lake Austin in the first 6 months followed by a steady state volume of 4,000 m^3 per day (730,000 m^3 over 6 months) to maintain dry pits for mining.

The Licensee plans to manage suspended solids in discharge waters to Lake Austin through the following methods:

- Rheingold South pit – This pit will receive dewatered water from the Rheingold and Black Swan South 2/3 pits to settle solids prior to transferring of the water to the Dam.
- Black Swan South 5 pit – This pit will receive dewatered water from the Lady Rosie and South Victory pits to settle solids prior to transferring of the water to the Dam.
- Dam – The Dam will also assist in settling suspended solids prior to discharge to Lake Austin. The dam will have a capacity of 8,910 m^3 and be designed to facilitate a retention time of 32 hours. A minimum freeboard of 300 mm will be maintained and will be fitted with level sensors to prevent overflowing. The dam will be lined with HDPE to achieve a permeability of 2 x 10^{-10} m/s.

The dewatering pipeline corridors are shown in Figures 1 and 2 above. All additional pipelines will replicate existing dewatering pipelines at the Premises and will be fitted with a leak detection system or inspected daily to identify and rectify any leaks. If a leak detection system is not installed, the pipeline will be bunded within an adequately sized v-drain to contain leaks should the pipeline fail.

Burial of used tyres at the Big Bell Underground Waste Rock Landform

The Licensee plans to bury used tyres at the Big Bell Underground Waste Rock Landform (WRL). The Licensee expects to bury up to 400 light vehicle and 110 heavy vehicle tyres each year at the WRL. The used tyres will be buried in accordance with the requirements of Part 6 of the EP Regulations.

The Licensee has also requested the inclusion of additional mining tenements as part of the Premises description.

2.2. Consolidation of Licence

As part of this amendment package, DWER has also consolidated the licence by incorporating changes made under the following Amendment Notices:

- **Amendment Notice 1** granted 19 December 2018:
  - Increase the throughput for Category 6 to 5,324,556 tpa.
  - New construction conditions for dewatering infrastructure.
  - Changes to the dewatering discharge to Lake Austin monitoring program.
  - Undertake a gap analysis and review within 6 months from the commencement of dewatering of the Black Swan South pit,
  - Updated Premises map to show the new mining tenements.
  - Remove redundant conditions and administrative changes.

- **Amendment Notice 2** granted 19 February 2019:
  - Included new categories 64 (Putrescible landfill) and 85 (sewage facility).
  - Construction conditions for new infrastructure associated with the putrescible landfill and sewage facility.
  - Putrescible landfill management conditions.
  - Inspection and reporting requirements for operating the sewage facility.
  - Conditions for monitoring emissions from the sewage facility.
  - Update to maps showing location of new infrastructure.

The obligations of the Licensee have not changed in consolidating the licence. DWER has not undertaken any additional risk assessment of the Premises related to the previous Amendment Notices.

The previously issued Amendment Notice's will remain on the DWER website for future reference and will act as a record of DWER's decision making.

3. Other approvals

The Licensee has provided the following information relating to other approvals as outlined in Table 2.

Table 2: Relevant approvals

Legislation	Number	Approval
Rights in Water and Irrigation *Act 1914 (RIWI Act)*	Groundwater Well Licence (GWL) 176056(3)	Abstraction of groundwater for mining purposes.
Mining Act 1978	REG ID 37098	Big Bell and Day Dawn dewatering.
	-	Mining proposal application for the Cuddingwarra Project area currently under review by DMIRS.

4. Location and receptors

Table 3 below lists the relevant sensitive land uses in the vicinity of the Prescribed Premises which may be receptors relevant to the proposed amendment.

Table 3: Receptors and distance from activity boundary

Residential and sensitive premises	Distance from Prescribed Premises
Cuddingwarra (abandoned town)	1 km west of the mining infrastructure and located within the Premises boundary. The Cuddingwarra townsite is gazette only and no local government infrastructure remains. **Screened out for receptors.**

Table 4 below lists the relevant environmental receptors in the vicinity of the Prescribed Premises which may be receptors relevant to the proposed amendment.

Table 4: Environmental receptors and distance from activity boundary

Environmental receptors	Distance from Prescribed Premises
Lake Austin	A regional significant salt lake system that supports micro-organisms which form a food source for various bird species. Lake Austin is an ephemeral lake that represents the terminal point of an internally draining basin in the Murchison River catchment, with surface and groundwater flows draining centrally into the lake. Surface runoff is sourced from three main creeks that drain the Weld Ranges to the north. However, these are active only during rainfall, with the lake usually dry for lengthy periods. The lake consists of a long stretch of playa (approximately 75km in length and up to 20km wide) that is dominated by sandy islands. The centre of the lake is bisected by the Great Northern Highway, with bathymetry ranging from 0.5m to 2.0m depth and a flat basin, with surveys not detecting any slope of the lake floor. The Licensee has estimated the total surface area of the lake, excluding islands, as 444km^2 and 773km^2 including islands.
Groundwater	Groundwater levels range from about 3 to 26 metres below ground level. The The TDS of the groundwater in the Cuddingwarra mine area ranges between 65,000 to 157,000 mg/L. Higher salt levels are related to proximity to the Lake Austin salt lake system and paleochannel, with sodium and chloride being the dominant ions. The Groundwater at Lake Austin is reported as being more hypersaline at up to 200,000mg/L TDS.
Water reserve	Water reserve (No. 2638) which is vested in DWER occurs in the vicinity of the Golden Gate Pit. However, DWER has indicated the intention of relinquishing it as it is no longer considered a suitable water source.
Parks and Wildlife Managed Lands and Waters	The water disposal site of Lake Austin is a former pastoral lease that is now unallocated crown land that has been proposed for addition to the conservation estate.
Threatened Ecological Communities and Priority Ecological Communities	The existing dewatering pipeline route passes through the buffer zone of a priority 1 Threatened Ecological Community (TEC). A second priority 1 TEC lies less than 1km north of the existing Cuddingwarra mine, however, this is not near the pipeline. Vegetation onsite is highly disturbed due to mining operations. **No sensitive vegetation onsite (therefore screened out as a receptor onsite).**

5. Risk assessment

The table identifies whether the emissions present a material risk to public health or the environment, requiring regulatory controls.

Table 5: Risk assessment for proposed amendments during construction and operation

Risk Event									
Source/Activities*		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**	**Consequence rating[1]**	**Likelihood rating[1]**	**Risk[1]**	**Reasoning**
Cat. 6 Dewatering	Construction/ installation of dewatering pipelines	Dust	Vegetation	Transport through air	Reduction in vegetation health due to smothering	Slight	Unlikely	Low	The premises is highly disturbed with minimal to no vegetation present.
	Discharge of dewatering effluent between mined pits	Discharge of dewatering effluent into mined pits	Groundwater	Direct interaction with groundwater	Change in water chemistry of groundwater	Slight Only minimal onsite impacts. No offsite impacts	Unlikely This risk event will probably not occur in most circumstances	Low	The pits are of similar water quality as shown in results conducted in March 2020 (see Table 6 below).
		Discharge of dewatering effluent to land due to overtopping of pits and the Dam	Surrounding land (TEC)	Sheet-flow due to overtopping of the mined pit embankment or Dam wall	Changes to salinity levels in surrounding soils impacting health and survival of flora and fauna	Moderate Mid-level onsite impacts	Unlikely This risk event will probably not occur in most circumstances	Medium	Licensee proposes to maintain water levels in the pits at a minimum of 5 metres below ground level. Dam fitted with level sensors to prevent overtopping. Daily inspections conducted to assess freeboard. Can be managed by updates to existing regulatory controls in licence.
	Discharge of dewatering effluent to	Discharge of mine water to surface water	Lake Austin and riparian ecosystems	Direct discharge	Disruption of normal ecosystem	Minor	Possible	Medium	Refer to detailed risk assessment (risk event 1) in Section 6 below.

Risk Event									
Source/Activities*		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**	**Consequence rating[1]**	**Likelihood rating[1]**	**Risk[1]**	**Reasoning**
	Lake Austin from additional mined pits				function Reduction in diversity/ change in species composition Changes to salinity levels impacting health and survival of flora and fauna Potential eutrophication Sedimentation				
	Pipeline rupture	Discharge of dewatering effluent to land	Soils TEC	Direct discharge	Increased soil salinity causing disruption of normal ecosystem function Increased salinity of groundwater	Moderate The pipeline route passes through the buffer zone of a priority 1 TEC	Possible This event could occur at sometime	Medium	The Licensee proposes the following strategies: - All pipelines will be fitted with a leak detection system or inspected daily to identify and rectify any leaks; and - If leak a leak detection system is not installed, the pipeline will be bunded within an adequately sized v-drain to contain leaks should the pipeline fail. Can be managed by existing licence conditions.

Risk Event									
Source/Activities*		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**	**Consequence rating[1]**	**Likelihood rating[1]**	**Risk[1]**	**Reasoning**
Cat. 64 Inert Waste Type 2 landfill		Contaminated run-off from fire	Surrounding soils	Sheet flow	Contamination of surrounding soils and impacts on surrounding vegetation	Minor	Rare	Low	Any runoff from an accidental used tyre fire is expected to remain within the footprint of the WRL Existing conditions adequate. No additional regulatory controls are required to mitigate this risk.

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the Department's Guidance Statement: Risk Assessments (February 2017)

6. Detailed Risk Assessment

1. Risk Event: Discharge of dewatering effluent into Lake Austin

Description of Risk Event

Dewatering of groundwater at the Cuddingwarra Project area to allow mining of ore with discharge to Lake Austin.

The Existing Licence regulates the dewatering of the underground mine at the Big Bell Project area and the Black Swan South 2/3 pit (also referred to as Black Swan South) located at the Cuddingwarra Project area. The discharge of the dewatering effluent from the Big Bell Project area is into mined pits and Lake Austin, and the dewatering discharge from the Black Swan South 2/3 pit is to Lake Austin. The Licensee now proposes to dewater additional mined pits located at the Cuddingwarra Project area with discharge also to Lake Austin at the existing discharge location.

The Licensee has advised that dewatering discharge to Lake Austin from the Big Bell Project area ceased in January 2019. The Licensee has also advised that the discharge from the Big Bell Project area to Lake Austin will not recommence while dewatering of the Cuddingwarra Project area to Lake Austin is in operation.

Identification and general characterisation of emission

The Licensee proposes to dewater pit lakes from existing mined pits at the Cuddingwarra Project area. The Licensee also proposes to dewater newly constructed mined pits. Table 6 below presents results from sampling of existing pit waters in March 2020. The pits are mined below the water table and therefore represent the quality of the groundwater in that area. Consequently, dewatering of newly constructed pits below the water table are expected to have similar water chemistry to the existing mined pits.

The groundwater at Cuddingwarra has a neutral pH and is hypersaline (approximately 97,000 to 130,000 mg/L TDS) with dominant sodium chloride ions. The higher salinity is related to proximity to the Lake Austin salt lake system and paleochannel, with sodium and chloride being the dominant ions.

Nitrate concentrations in the proposed discharge waters are high, however the concentrations are at similar levels observed in the existing discharge waters to Lake Austin as regulated in the Existing Licence. Similarly, ions and metal concentrations in the proposed discharge waters are shown to have minimal variation to the concentrations observed in the existing discharge waters to Lake Austin.

Table 6: Comparison of Water Quality in the Black Swan South 2/3 pit with other pits (new source pits)

Sample ID	Units	Black Swan 2/3	Black Swan	Chieftain Central	Chieftain South	City of Chester Central	City of Chester NW	City of Chester South	Rheingold	Golden Gate	Lake Austin min	Lake Austin med	Lake Austin max
Date		30/03/2020	1/04/2020	1/04/2020	1/04/2020	30/03/2020	30/03/2020	30/03/2020	30/03/2020	31/03/2020	1997-2017	1997-2017	1997-2017
Ca	mg/L	640	620	430	450	660	780	710	810	580	70	1100	11000
Mg	mg/L	6600	7700	11000	12000	8100	6300	6100	5800	8600	51	1320	7200
Na	mg/L	45000	51000	72000	67000	41000	33000	37000	34000	52000	350	16650	87000
K	mg/L	1300	1700	2300	2000	1800	1400	1700	850	1800	16	670	2700
HCO_3	mg/L	310	350	350	330	510	450	410	310	420	18	225	260
SO_4	mg/L	24000	26000	36000	33000	26000	22000	25000	19000	28000	170	4510	16000
Cl	mg/L	95000	100000	140000	140000	87000	69000	73000	70000	110000	980	37000	161000
TDS	mg/L	118365	115765	130195	128856	113035	97175	101790	98121	117716	2300	65400	325000
EC	µS/cm	182095	178100	200203	156616	173885	149458	156616	151390	181068	3700	62900	480000
pH	pH	7.8	7.7	7.5	7.6	7.7	7.8	7.8	7.9	7.7	7.45	7.95	9.75
CO_3	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	1	18
NO_3	mg/L	79	100	100	110	220	160	12	76	87	1	38	130
Al	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.005	0.039	0.24
Cd	mg/L	0.017	<0.01	0.032	<0.01	<0.01	<0.01	<0.01	0.015	<0.01	0.004	0.004	0.004
Cr	mg/L	<0.1	0.12	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.002	0.008	0.135
Cu	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.001	0.014	0.039
Fe	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.02	0.8	99
Mn	mg/L	<0.1	<0.1	0.11	0.15	<0.1	<0.1	<0.1	<0.1	0.3	0.011	0.46	2.9
Ni	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.15	<0.1	0.018	0.018	0.018
Zn	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.02	0.02	0.18
Pb	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.2	0.2
N	mg/L	20	24	26	29	54	38	5.2	19	21	0.6	2	4.2
Alkalinity	mg $CaCO_3$/L	250	290	290	270	420	370	340	250	340			
F	mg/L	<2	<2	<2	<2	<2	<2	<2	<2	<2			
NO_2	mg/L	0.8	0.7	4.4	3.7	4.2	1.2	0.9	0.5	1.5			
Hardness	mg $CaCO_3$/L	29000	33000	46000	50000	35000	28000	27000	26000	37000	2430	6470	21000
As	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.001	<0.001
Co	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Se	mg/L	<0.1	<0.1	<0.1	<0.1	0.18	<0.1	<0.1	<0.1	<0.1	<0.002	<0.002	<0.002
Acidity	mg $CaCO_3$/L	72	96	140	130	150	99	110	53	110			
P	mg/L	<0.02	<0.2	<0.2	<0.2	<0.02	<0.02	<0.02	<0.02	<0.2	0.25	0.25	0.25
Mo	mg/L	<0.1	<0.5	<0.5	<0.5	<0.1	<0.1	0.48	<0.1	<0.5			
Hg	mg/L	<0.00005	0.00009	<0.00005	<0.00005	0.00009	<0.00005	<0.00005	0.00014	<0.00005	<0.00005	<0.00005	<0.00005
Si	mg/L	6.3	6.4	4.7	5.7	12	24	16	13	5.1			

Description of the receiving environment

The location of the discharge point to Lake Austin as approved in the Existing Licence will remain unchanged. A detailed description of the receiving environment at the discharge location is provided in Amendment Notice 1 (19 December 2018) which is available at www.dwer.wa.gov.au.

Description of potential impacts from the emission

A detailed assessment on the potential impacts from discharging dewatering effluent to Lake Austin was provided in Amendment Notice 1. The assessment determined the following main points:

- Research on closed saline-water systems indicates that selenium and mercury are the contaminants of principal concern in these systems due to the ability of these elements to be biomagnified in food webs that typically develop under conditions where there are high evaporation rates;
- Closed saline-water systems such as the discharge area in Lake Austin generally contain algae, brine shrimp, aquatic insects and insect larvae which form a food source for various bird species including migratory. The trophic transfer of selenium and mercury in this food web has the potential to affect bird populations through impacts on developing embryos in eggs. The principal environmental receptors for these elements are therefore birds rather than toxicity to organisms in the water column (which is assumed in the ANZECC guidelines). This means that criteria for mercury and selenium levels in water and in biomass in the water body must be developed at a sufficiently low level to ensure bird populations are protected, even if the concentrations in the water column appear to be harmless to aquatic organisms.
- At the time of the original assessment, there was no information available on the concentration of mercury and selenium in the dewatering discharge water from the Black Swan South 2/3 pit to Lake Austin. Therefore, conditions were imposed requiring the Licensee undertakes sampling of the dewatering waters, prior to discharge commencing, in order to determine the concentrations of selenium and mercury.

The Licensee in March 2020 undertook sampling of the waters contained within the Black Swan South 2/3 pit, and the other pits requiring dewatering at the Cuddingwarra Project area. The results from the sampling program, which includes the concentrations for selenium and mercury, are presented in Table 6 above.

In determining if the risk to the environment will change with the introduction of additional dewatering sources, a comparison between the current dewatering effluent quality from the Black Swan South 2/3 pit to Lake Austin, with the proposed dewatering effluent quality of the additional mined pits to Lake Austin is required. As identified in Table 6 above, the water sampling results indicate there is minimal variation in water chemistry between the current approved dewatering source (Black Swan South 2/3 pit) and the other pits with exception of the following:

- Nickel concentrations were slightly higher at the Rheingold pit however the concentration level is still considered low;
- Selenium concentrations were higher at the City of Chester Central pit, however the concentration level is considered low and the dewatered water will be discharged into the Golden Gate pit initially, which then is discharged into the Black Swan pit, then to Lake Austin resulting in a high dilution factor. The concentration level of selenium in all other pits was below the level of detection; and
- Mercury concentrations were found to be higher at the Black Swan, City of Chester

Central and Rheingold pits when compared with the Black Swan South 2/3 pit, however the concentration levels are still considered low level (0.00009 to 0.00014 mg/L).

Licensee controls and monitoring

The Licensee controls for dewatering discharge to Lake Austin were applied as conditions in the Existing Licence. No changes to the discharge infrastructure at Lake Austin is proposed therefore these controls remain unchanged.

The Licence Holder proposes the following monitoring program after the recommencement of dewatering activities:

- Monthly recording of the water drawn from the Cuddingwarra pits and the volumes discharged to Lake Austin;
- Quarterly field sampling for pH, TDS and electrical conductivity (EC) in the discharge water and surface water at the discharge point into Lake Austin;
- Biannually sampling for Total Recoverable Hydrocarbons in water at the Transfer Dam and Lake Austin;
- Biannually comprehensive analysis of water from dewatered pits, discharge points to pits, transfer dam and Lake Austin; and
- Monthly visual monitoring of sediment at the discharge point into Lake Austin, and sampling for laboratory analysis of major components.

Consequence

The consequence of discharging dewatering effluent into Lake Austin was previously considered moderate as there was no information available on the concentration of mercury and selenium in the discharge waters. Recent sampling of the pit waters at the Cuddingwarra Project area indicates the concertation levels for mercury and selenium are low with a majority at levels below detection. Therefore, the consequence of discharging dewatering effluent into Lake Austin is now considered **minor** as off-site impacts local scale are expected to be minimal.

Likelihood of Risk Event

The likelihood of an occurrence remains as **possible,** even though the current dewatering discharge water quality is comparable to water and groundwater quality at Lake Austin, as the concentrations of metals can increase as the depth of the mine pit increases or underground mining occurs.

Overall rating of Risk Event

The risk rating for the discharge of dewatering effluent from additional pits to Lake Austin is therefore still considered **medium.**

7. Consultation

Table 6: Summary of consultation

Method	Comments received	DWER response
Applicant referred draft documents on 2 September 2020	Email received from Licensee on 2 September 2020 requesting the Rheingold Transfer Dam be removed from infrastructure requirements for the mined pits because not a receiving pit (administrative change). Licensee agreed to waiver the remaining 21-day comment period once that change is made.	Agreed. Changes made and amended Licence prepared for signing.

8. Conclusion

Decision

The Delegated Officer has determined the key emissions associated with dewatering of mined pits with discharge to other mined pits, and dewatering of additional mined pits with discharge to Lake Austin.

Based on the application supporting documentation, the Delegated Officer has determined that the discharge to Lake Austin from dewatering of additional mined pits and dewatering of mined pits with discharge to other mined pits presents a medium risk to the environment as a result of the dewatering effluent discharge to surface water, and accidental discharge of dewatering effluent to land from pipeline failure and overtopping. However, these risks may be acceptable subject to amending the existing regulatory controls outlined below.

The Delegated Officer has also determined that the dewatering and discharge between mined pits and the construction of new dewatering infrastructure presents a low risk to the environment as a result of the dewatering effluent discharge to groundwater and emissions to air. However, these risks may be acceptable subject to amending the existing regulatory controls outlined below.

The Delegated Officer has also made administrative changes to the Existing Licence as set out below.

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

8.1. Summary of amendments

Table 7 provides a summary of the proposed amendments and will act as record of implemented changes. All proposed changes have been incorporated into the revised Licence as part of the amendment process.

Table 7: Licence amendments

Condition No.	Proposed amendments
Not applicable	Change Premises name to Cue Gold Operations.
Not applicable	Licence front page: Include additional mining tenements to the Premises details.
Not applicable	Licence front page: Increase category 64 production/design capacity to 600 tonnes per annual period.
Interpretation	Removed 1.1.1 to 1.1.4 and replaced with latest version.
1.2.3 Table 1.2.3	Updated table by including the additional pits in the Cuddingwarra Project area as containment infrastructure for dewatering effluent. Reduced the pit water level requirement from 10 metres to 5 metres.
1.2.5 Table 1.3.2	Table updated to include the additional pits in the Cuddingwarra Project area. Table also updated by reducing the freeboard of 10 metres to 5 metres.
1.2.6 Table 1.3.3	Table updated by removing the infrastructure construction requirements for the Landfill 2 and Sewage facility as these have now been completed.

1.2.7	Updated to include the used tyre landfill area. Table 1.3.4 updated by combining the total limit for each waste type and increasing the limit to 600 tonnes per annum.
1.2.8	Condition and Table updated to include the used tyre landfill area.
2.2.1 Table 2.2.1	Emission point reference description updated.
2.3.1 Table 2.3.1	Table updated by including the additional pits in the Cuddingwarra Project area as new emission points to groundwater.
2.4.1 Table 2.4.1	Updated table by removing any reference to the commissioning of the sewage facility as it is now fully operational.
3.1.2	Updated to include biannual monitoring requirements.
3.2.1 Table 3.2.1	Emission point reference description updated.
3.3.1 Table 3.3.1	Table updated by including the additional pits in the Cuddingwarra Project area as new monitoring points.
3.4.1 Table 3.4.1	Sampling point reference description updated.
3.6.2	Condition removed as the requirements of this condition have been completed.
Schedule 1: Maps	Premises map updated.
	New maps of the Big Bell Project area and the Cuddingwarra Project area included.
	New maps providing location of dewatering infrastructure, dewatering abstraction and discharge areas, and direction of dewatering discharge.
	New updated map of the landfill areas to include the used tyre landfill area.

Alana Kidd

Digitally signed by Alana Kidd
Date: 2020.09.03 12:22:23 +08'00'

Alana Kidd
Manager, Resource Industries
An officer delegated by the CEO under section 20 of the EP Act

Appendix 1: Key documents

	Document title	In text ref	Availability
1	Licence amendment application received 15 May 2020	Application	DWER record A18939332
2	Big bell Gold Operations Pty Ltd, *Supporting Document Amendment to Licence L8934/2015/1*, May 2020		
3	Email: K. Critchell, *Application for an amendment to Licence L8934/2015/1 under the Environmental Protection Act 1986,* 18 June 2020		DWER record DWERDT297286
4	DWER, July 2015. *Guidance Statement: Regulatory principles.* Department of Environment Regulation, Perth.	-	accessed at www.dwer.wa.gov.au
5	DWER, October 2015. *Guidance Statement: Setting conditions.* Department of Environment Regulation, Perth.	-	
6	DWER, August 2016. *Guidance Statement: Licence duration.* Department of Environment Regulation, Perth.	-	
7	DWER, November 2016. *Guidance Statement: Risk Assessments*. Department of Environment Regulation, Perth.	-	
8	DWER, November 2016. *Guidance Statement: Decision Making*. Department of Environment Regulation, Perth.	-	
9	DWER, June 2019. *Guideline: Decision Making.* Department of Water and Environment Regulation, Perth	-	

Appendix 2: Summary of Licensee comments

The Licensee was provided with the draft Amendment Report and amended Licence on 2 September 2020 for review and comment. The Licensee responded on 2 September 2020 requesting a minor administrative change be made and agreed to waiver the remaining comment period until 25 September 2020.