Government of Western Australia
Department of Water and Environmental Regulation

Amendment Notice 4

Licence Number	L7798/1993/6
Licensee	Silver Lake (Deflector) Pty Ltd
ACN	101 224 999
File Number:	2010/003052
Premises	Gullewa Gold-Copper Operations Mining Tenements M59/49, L59/49, L59/64, M59/68, M59/132, M59/294, M59/356, M59/391, M59/392, M59/335, M59/442 L59/35, M59/507, M59/336, M59/522, L59/71, L59/158, L59/159 and L59/160 Morawa - Yalgoo Road
Date of Amendment	10 December 2019

Amendment

The Chief Executive Officer (CEO) of the Department of Water and Environmental Regulation (DWER) has amended the above Licence in accordance with section 59 of the *Environmental Protection Act 1986* (EP Act) as set out in this Amendment Notice. This Amendment Notice constitutes written notice of the amendment in accordance with section 59B(9) of the EP Act.

Alana Kidd

Manager, Resource Industries

Regulatory Services

an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

Definitions and interpretation

Definitions

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

Table 1: Definitions

Term	Definition
ACN	Australian Company Number
AER	Annual Environment Report
Amendment Notice	refers to this document
ANZECC	means the most recent version and relevant parts of the *Australian and New Zealand Environment guidelines for fresh and marine water quality Volume 1 – 3* (Australian and New Zealand Environment and Conservation Council, Agriculture and Resource Management Council of Australia and New Zealand);
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 6919 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
Ha	means Hectare

HDPE	Means High-density polyethylene
kL	kilolitre
Licensee	Silver Lake (Deflector) Pty Ltd
L/s	means litres per second
m^3	cubic metres
mbgl	metres below ground level
Minister	the Minister responsible for the EP Act and associated regulations
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 Decision Report applies, as specified at the front of this Decision Report.
Risk Event	as described in *Guidance Statement: Risk Assessment*
SWL	Standing Water Level
tpa	Tonnes per annum
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
tpa	tonnes per annum

Amendment Notice

This amendment is made pursuant to section 59 of the *Environmental Protection Act 1986* (EP Act) to amend the Licence issued under the EP Act for a prescribed premises as set out below. This notice of amendment is given under section 59B(9) of the EP Act.

This notice is limited only to an amendment for an increase in the throughput at the processing plant, to relocate the dewatering discharge outlet, increase the throughput of the waste water treatment plant (WWTP) and size of the irrigation field, and install new monitoring bores and a recovery bore at the tailings storage facility (TSF). The limit set for Standing Water Level (SWL) as part of the TSF monitoring requirements will also be assessed in this amendment.

The following guidance statements have informed the decisions made on this amendment:

- *Guidance Statement: Decision Making (April 2019)*
- *Guidance Statement: Risk Assessment (February 2017)*
- *Guidance Statement: Environmental Siting (November 2016)*

Amendment description

Deflector Mining Limited operated the Gullewa Gold-Copper Operations (Premises) through Licence L7798/1993/6 (Licence). Silver Lake Resources Limited has now purchased Deflector Mining Limited and all associated assets and has changed the name of the company to Silver Lake (Deflector) Pty Ltd (Deflector). The Australian Company Number (ACN) has remained the same and therefore the Licensee for the Premises has not changed but has had a name change only.

The prescribed activities authorised through the Licence are described below:

Table 2: Prescribed activities at the Premises

Category Number	Category description	Category production or design capacity	Approved Premises production or design capacity
5	Processing or beneficiation of metallic or non-metallic ore	50,000 tonnes or more per year	700,000 tonnes per annual period
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	750,000 tonnes per annual period
64	Class II landfill site	20 tonnes or more per year	4,000 tonnes per annual period
85	Sewage facility: premises- a) On which sewage is treated (excluding septic tanks); or b) From which treated sewage is discharged onto land or into waters	More than 20 but less than 100 cubic metres per day	35 cubic metres per day

The Licensee submitted an application to DWER on 12 July 2019 for an amendment to their Licence to allow for an increase in the throughput at the processing plant, to relocate the dewatering discharge outlet, increase the throughput of the wastewater treatment plant (WWTP) and size of the irrigation field, install new monitoring bores and a recovery bore at the tailings storage facility (TSF) and assess the suitability of the limit set for SWL in the groundwater

monitoring bores at the TSF. Further detail is provided in the sections below.

Increased throughput at the processing plant

Category 5 of the Licence currently allows for 700,000 tonnes of ore to be processed at the Premises per year. The Licensee now proposes to increase this throughput to 760,000 tpa.

The existing crushing/screening plant and process circuit has a design capacity of 750,000 tpa. The Licensee now proposes to increase the licensed throughput up to 760,000 tpa (an additional 10,000 tpa over the design capacity of the existing plant) through the following changes:

- Install ore sorters adjacent to the existing crushing and screen circuits (see Figure 1 below). The ore sorters are density based sorting equipment used to remove harder basalt gangue rock. The ore sorters consist of small conveyors and feed hoppers feeding the existing conveyor system with selected ore. A total of 760,000 tpa of ore will be feed through the ore sorters first with an expected 10,000 tpa of reject ore sent to the waste rock dump. The ore sorter system will be fitted with dust suppression systems.
- The remaining approximately 750,000 tpa from the ore sorters will then be sent to the existing crushing and screening plant for processing. The existing plant already has a design capacity to process up to 750,000 tpa, and therefore no actual changes are required to this facility. Tailings waste will continue to be sent to the existing TSF for disposal. The total tailings sent to the TSF for disposal will increase to 750,000 tpa, as a result of the increase in throughput at the processing plant by an additional 50,000 tpa.

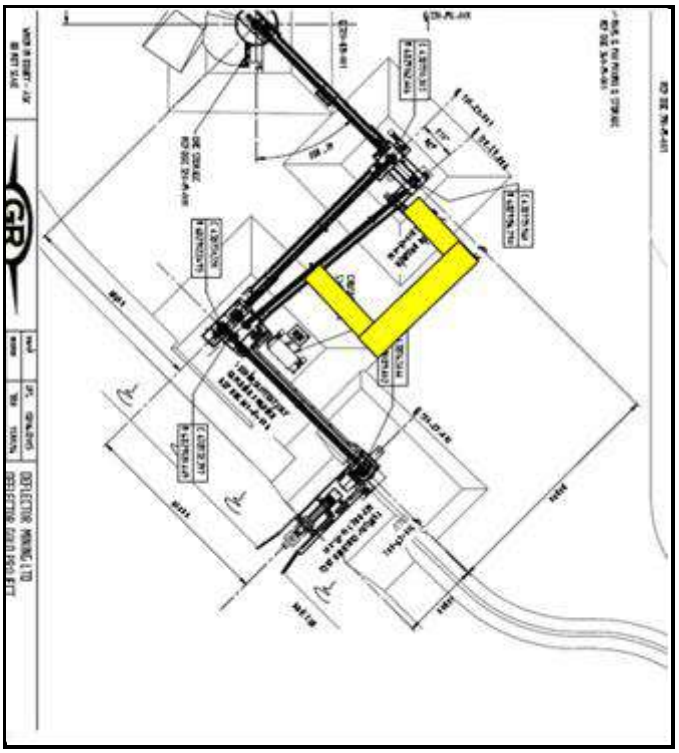


Figure 1: Ore sorters (highlighted in yellow)

Installation of a water clarification plant

Dewatering effluent from the underground mine is currently discharged to the Golden Stream Pit which is used as a storage node and facilitates settlement of suspended materials. The Licensee now plans to install a clarification modular unit (Clarifier) to reduce the suspended solids in the dewatering effluent prior to discharge into the Golden Stream open pit.

The Licensee trialed the use of a mobile clarifier at the Premises during 2018, however it was found to be unsuccessful in reducing suspended materials in the dewatering effluent. In May 2019 the Licensee commenced trialing the Siltbuster technology with multiple methodologies. These trials were run from 16 May 2019 until 10 June 2019. With the addition of flocculants the trials were found to be successful with results presented in the table below.

	29-May-19		01-Jun-19		06-Jun-19		09-Jun-19	
Field	Siltbuster Inflow	SiltBuster Product	Siltbuster Inflow	SiltBuster Product	Siltbuster Inflow	SiltBuster Product	Siltbuster Inflow	SiltBuster Product
Aluminium, Al (mg/L)	0.009	0.084	0.006	0.044	0.006	<0.005	<0.005	<0.005
Arsenic, As (mg/L)	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	0.002	0.001
Cadmium, Cd (mg/L)	0.004	0.005	0.005	0.006	0.003	0.005	0.003	0.003
Calcium, Ca (mg/L)	1,000	990	1,000	990	1,400	1,400	1,400	1,400
Chloride, Cl (mg/L)	23,000	23,000	23,000	22,000	21,000	21,000	20,000	21,000
Copper, Cu (mg/L)	0.063	0.065	0.19	0.13	0.026	0.027	0.011	0.008
Electrical Conductivity (uS/cm)	58,000	58,000	56,000	56,000	56,000	56,000	57,000	57,000
Iron, Fe (mg/L)	<0.01	0.021	0.023	<0.01	0.038	0.024	0.018	0.02
Lead, Pb (mg/L)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Magnesium, Mg (mg/L)	1,600	1,600	1,600	1,600	2,200	2,200	2,300	2,300
Manganese, Mn (mg/L)	0.71	0.7	0.55	0.58	0.44	0.71	0.3	0.42
Mercury (µg/L)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel, Ni (mg/L)	0.25	0.26	0.23	0.25	0.27	0.31	0.2	0.2
pH** (No unit)	7.9	7.8	7.8	7.6	8	7.7	8.3	8.2
Potassium, K (mg/L)	220	220	230	230	320	320	330	320
Selenium (mg/L)	0.004	0.002	0.009	0.005	0.002	0.005	0.005	0.004
Sodium, Na (mg/L)	9,600	9,600	10,000	10,000	12,000	11,000	10,000	11,000
Total Dissolved Solids (mg/L)	39,000	38,000	40,000	39,000	41,000	41,000	41,000	42,000
Total Suspended Solids Dried at 103-105C (mg/L)	2,500	9	1,600	42	4,000	8	2,300	93

The Licensee now proposes to install a permanent Clarifier at the Premises. The Clarifier will be installed on a purpose built concrete pad which will be graded to a sump to capture any spills. Dewatering effluent will be pumped from the underground mine into the Clarifier for treatment. The treated water will then be pumped via an existing bunded 280 mm pipeline to the Golden Stream open pit for further settling.

The Clarifier will consist of lamella plates and the addition of flocculants to reduce suspended solids. The underflow (wastes) generated at the Clarifier will be pumped to the processing plant at the Premises to recover any gold or copper. Wastes from the process plant are directed to the Tailings Storage Facility (TSF). The Clarifier is designed to manage up to 50 L/s.

The Clarifier will be equipped with a high level alarm which automatically activates a diversion valve to direct the underground inflow straight to the Golden Stream open pit in the event of a malfunction in the Clarifier. Water levels in the Golden Stream open pit will be maintained to ensure there is sufficient capacity to store dewatering effluent during maintenance and emergency situations. The location of the proposed Clarifier is shown in Figure 2 below.

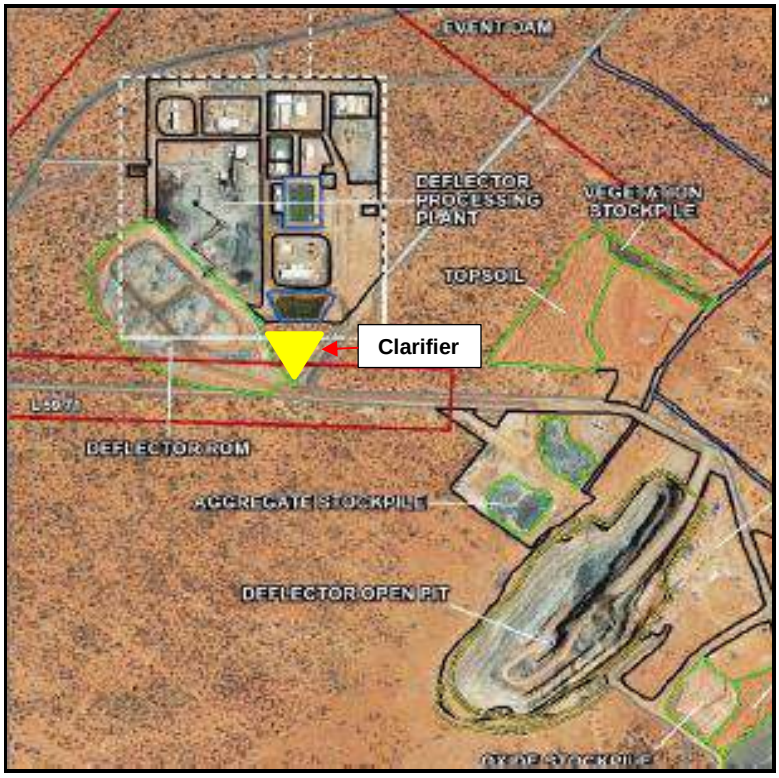


Figure 2: Clarifier location

The expected water quality from the proposed Clarifier is shown in the table below. Metals are measured as dissolved metals. The expected water quality was determined by averaging all technologies investigated. The Licensee reviewed these results and confirmed they can be achieved with the selected Siltbuster technology.

Total Suspended Solids	<300 mg/L
Copper	<0.07 mg/L
Sodium	<15,000 mg/L
Aluminum	<0.12 mg/L
Cadmium	<0.005 mg/L
Iron	<0.18 mg/L
Magnesium	<1,800 mg/L
Calcium	<1,600 mg/L
Potassium	<370 mg/L
Manganese	<0.8 mg/L
Nickel	<0.3 mg/L
Selenium	<0.005 mg/L
Arsenic	<0.001 mg/L
Lead	<0.003 mg/L

Table 3: Expected metal concentrations following clarification treatment

Total Dissolved Solids are expected to remain high however less than 44,000 mg/L with a pH range of 6.5 to 8.5.

Relocation of the dewatering discharge outlet

Water stored in the Golden Stream pit is reused in the processing plant and for dust

suppression. In order to maintain a balanced discharge quantity to the Golden Stream pit, any excess water not required in the processing plant or used for dust suppression is pumped to a series of clay lined settlement ponds located at the discharge point for further settlement of materials, with a final discharge to the floodplain of the Salt River. The discharge point is located in a low lying area with no defined drainage channels. The current extent of the dewatering discharge flows in a southerly direction (adjacent to the Salt River) however never intercepts the Salt River which is located approximately 1.5 km away.

The discharge of saline dewatering water to the Salt River discharge location, at levels historically above the Licence limit, has had an observable impact on vegetation. This impact includes the total death of most native vegetation species within the immediate discharge area with only salt tolerate species surviving, and death or high levels of stress on vegetation further down the discharge extent. Satellite imagery indicates a total of 75 Ha has been affected.

As a consequence, the Licensee through consultation with DWER, had to implement short-term changes to their dewatering discharge program to reduce any further impacts, while new alternative methods for the disposal of dewatering effluent at the Premises were planned and implemented. These interim changes include maximizing water use at the Premises where possible through increased dust suppression, increased use in the processing plant and use of evaporators at the TSF. Prior to these changes, dewatering water was being discharged to the current Salt River discharge location at rates of up to 66 L/s , however the current dewatering discharge rate now averages 23.8 L/s.

In addition to the short term changes implemented by the Licensee, DWER initiated an amendment to the Licence on 20 July 2018 (Amendment Notice 2) approving the discharge of dewatering effluent to the current Salt River discharge outlet only until the 31 December 2019. This date was set to allow the Licensee time to determine a more suitable dewatering discharge location and apply to DWER to update the Licence. In light of the improvements made by the Licensee to date, DWER has since revised this to the 31 March 2020 to facilitate more time to finalise the approvals process and allow.

Stantec Australia Pty Ltd (Stantec) were commissioned to investigate a range of alternative discharge options for the Licensee as part of the approach to manage the mine's dewatering discharge. The investigation was conducted in two stages, Stage 1 of the investigation identified Salt River and Burra Lake as potentially viable receiving environments, in contrast to the current discharge point. Stage 2 of the discharge options study comprised reporting on minor (September 2018) and major (January 2018) flood surveys of Salt River and Burra Lake, collectively referred to as "the baseline ecological assessment". The aim of the baseline ecological assessment was to determine the ecological values of Salt River and Burra Lake, in relation to the potential influence of dewatering discharge.

Stantec were also commissioned to undertake an ecotoxicity study of Salt River aquatic biota (Stantec, July 2019). The results of the study were finalised in July 2019. The objective of the study was to gain an understanding of the potential bioavailability and toxicity of metals within the proposed discharge water and the likely risk to biological communities in the river. The outcomes from this study is discussed further in Risk Event 2 of this Amendment Notice.

As a result of the above studies, the Licensee has now determined the most suitable location for the dewatering discharge outlet is directly into the Salt River (see Figure 3). This was based upon risk to the environmental factors of this area taking into consideration water quality, sediment, dispersion rates and infiltration.

The pipeline corridor from the Golden Stream open pit to the new discharge location in the Salt River will be within Miscellaneous Licence L59/160. The pipeline will be installed adjacent to a cleared access road for the purpose of routine inspections and maintenance. The pipeline will be bunded along the whole length. The pipeline will have a maximum diameter of 280 mm and will be constructed out of HDPE. Spill sumps will be located at low points to capture any leaks.

Figure 3: Dewatering discharge pipeline corridor

At the dewatering discharge terminus, a designed and purpose-built energy dissipater will be installed. The energy dissipater will consist of a 20m long, 0.5m deep, geotextile lined drain perpendicular to the riverbank with rock armouring extending to the riverbed (Figure 4). The geotextile lining is included to ensure seepage is minimised.

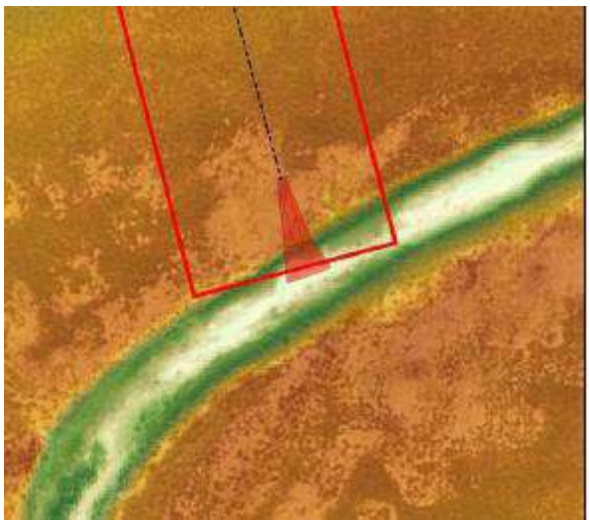


Figure 4: Rock lined drain entering Salt River

At the end of the discharge pipe, and at the start of the drain, a polypipe 'T' piece/spigot will be installed with holes to ensure water energy is dissipated before free flowing down the drain to the riverbank (Figure 5). This is designed to ensure scour and erosion is minimised both on the riverbank and the riverbed. The pipe will be anchored at the terminus to reduce the risk of movement in a flood event.

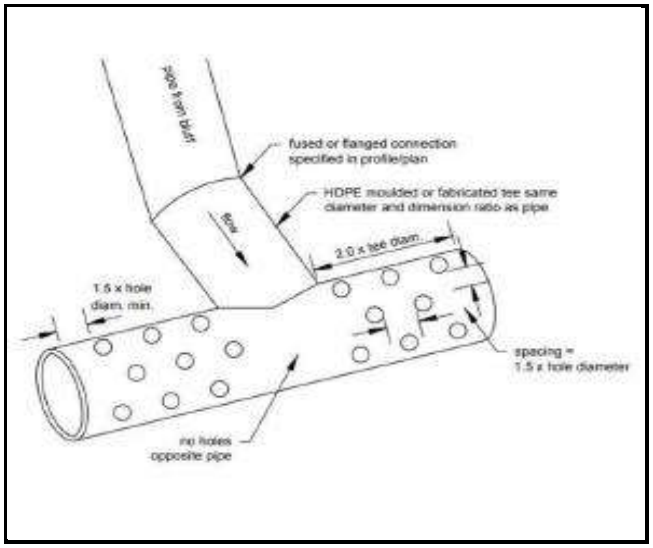


Figure 5: Energy dissipating pipe terminus

Increased throughput at the WWTP and an increase to the irrigation field

The WWTP at the Premises treats sewage generated at the 150 person accommodation village and the administration village. The WWTP was designed and constructed to treat up to 35 m^3 per day with the treated wastewater discharged to an approximate one hectare fenced irrigation area.

The WWTP is a sequence batch reactor system and comprises of a series of tank modules that contain anaerobic and aerobic bioreactors, clarification chamber (sludge settlement and removal), disinfection chamber with chlorine and a pump out chamber. The treated wastewater

is discharged to the irrigation field through a sprinkler system that can be isolated for separate spray zones. Table 4 below shows the quality of the treated waste water discharged to the irrigation area over the last couple of years.

Sample Quarter	pH	Ecoli	BOD	Residual chlorine	Total P	Total N	TSS
Q1-2017	8	<2	58	7	7.7	0.27	190
Q2-2017	8.4	<1	<5	1	7.1	0.14	150
Q3-2017	8.2	<10	<5	25	6.1	<0.5	160
Q4-2017	-		83		7.7	0.1	-
Q1 - 2018	-	<1	22	2.6	8.1	6.8	-
Q2 - 2018	8.8	100	200	1.3	6.8	0.14	850
Q3 - 2018	8.9	2	37	1.2	8.1	<0.05	740
Q4 - 2018	8.7	550	110	0.1	7.9	0.06	990
Q1-2019	9.5	<10	10	1.1	6.4	0.05	360

Table 4: WWTP Water Quality Analysis

The Licensee now plans to add a further 50 rooms to the accommodation village and therefore will make modifications to the existing WWTP so it is capable of treating up to 50m^3 per day. This capacity is still below 100m^3 per day which would trigger category 54 as per the EP Regulations. The modification will include the addition of an appropriately sized activated sludge bioreactor. The Licensee will also increase the size of the irrigation area to four Ha (see Figure 6) to facilitate the extra discharge required from the WWTP.

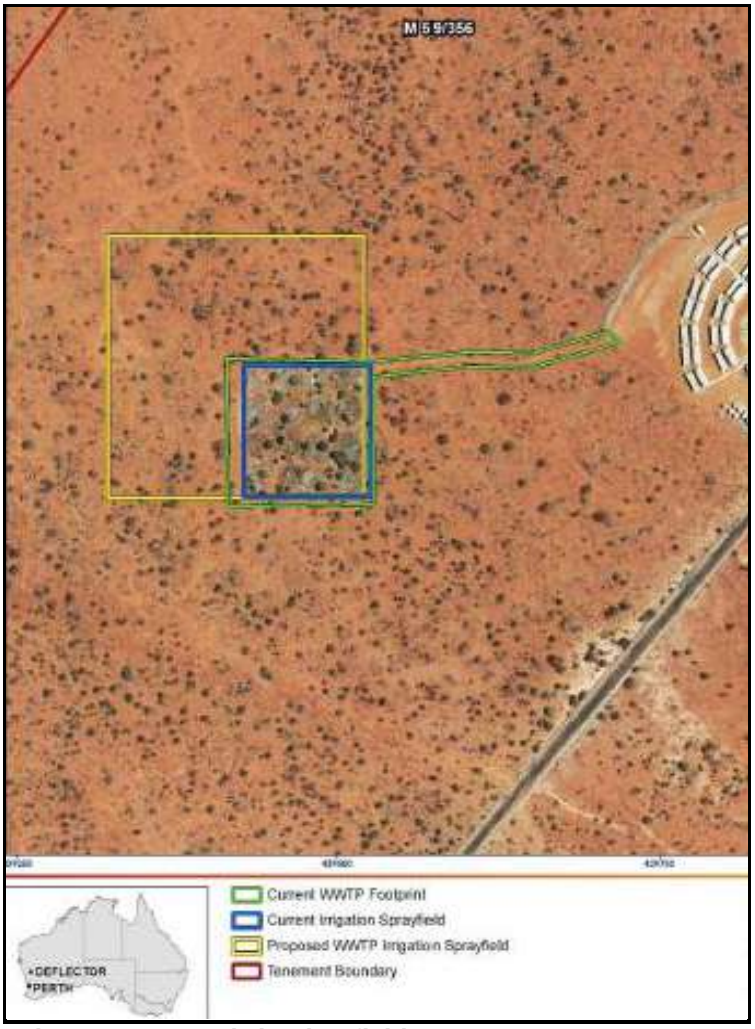


Figure 6: WWTP irrigation field

The Licensee expects the upgraded WWTP will achieve the same concentrations levels as the existing WWTP.

Installation of additional groundwater monitoring bores and a recovery bore at the TSF

Groundwater Resource Management Pty Ltd (GRM), of behalf of the Licensee, carried out a hydrogeological study and groundwater modelling of the Gullewa Region in early 2019 (GRM, 2019). The groundwater study indicated that levels around the TSF would increase through the Life of Mine because of continuous seepage from the TSF. Routine sampling of groundwater monitoring bores TSFMB01 to TSFMB07, which are located at the toe of the TSF (see Figure 7), indicate there has been a continuous increase in the groundwater levels. However, the groundwater study indicates that the Monarch mine void, which is situated directly south of the TSF, would intercept seepage and control groundwater levels around the TSF. Additionally, the groundwater study indicated the data from groundwater monitoring bores TSFMB01 to TSFMB07 might not be representative of the groundwater conditions in the aquifer, as water levels might be influenced by pressures exerted on the aquifer from the TSF. As a result, the Licensee has now installed four new groundwater monitoring bores (TSFMB08 to TSFMB11) and a recovery bore (TSFRB01) at the TSF (see Figure 7).

These new groundwater monitoring bores are located between 50 to 150 metres away from the TSF as the groundwater study indicates they will better represent the condition of the groundwater around the TSF (GRM, 2019). The Licensee proposes to amend the Licence by replacing the requirement to routinely sample groundwater monitoring bores TSFMB01 to TSFMB07, with sampling of new groundwater monitoring bores TSFMB08 to TSFMB11 instead. The Licensee proposes the replaced monitoring bores located in the toe of the TSF, can be equipped with bore pumps so they can be used to manage rising groundwater levels in that area.

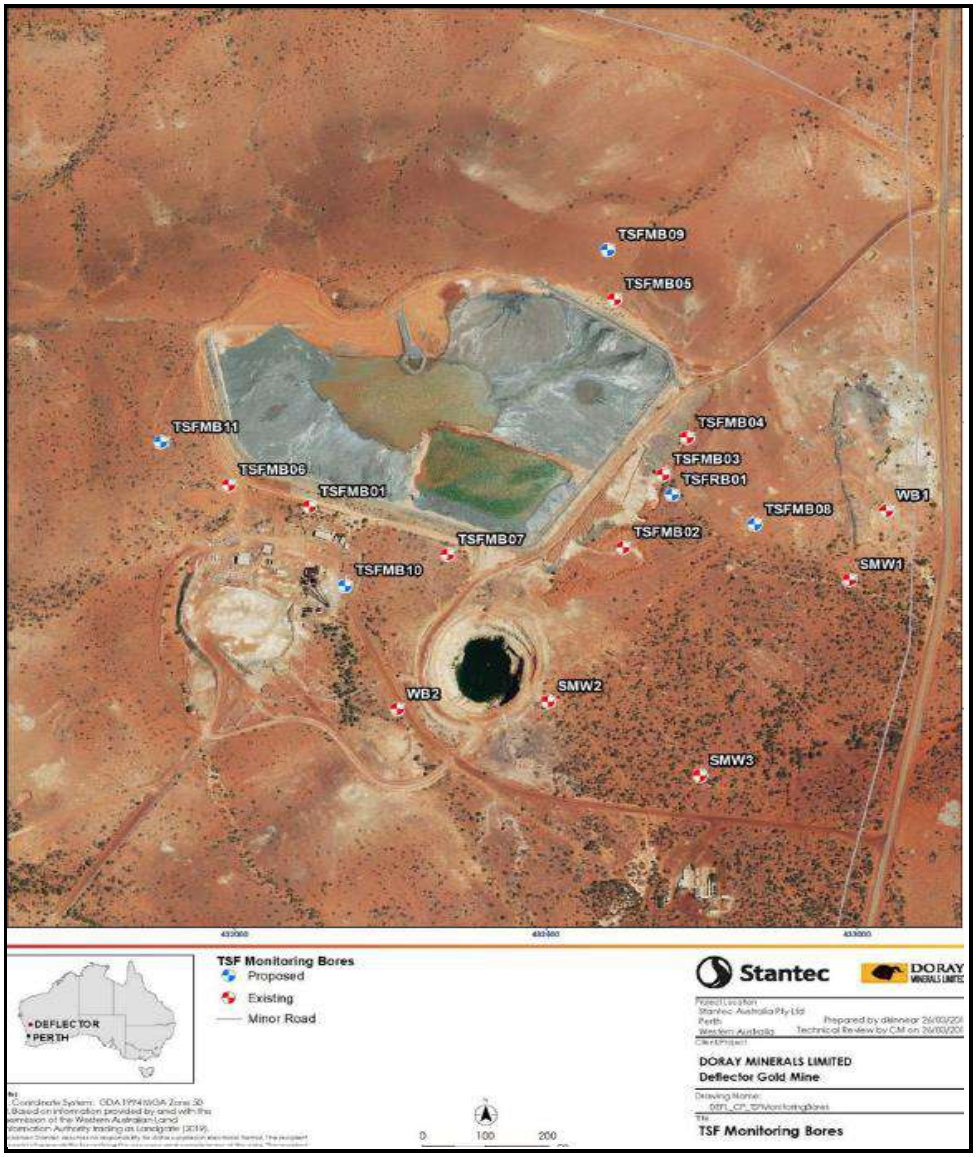


Figure 7: TSF and Monarch in-pit TSF Groundwater monitoring bores

Assessment of the limit set for SWL in the TSF

The Licence currently sets a limit of 8 metres below ground level (mbgl) for SWL at all ambient groundwater monitoring bores at the Premises. The Licensee has requested the limit for SWL is reduced to 4 mbgl in line with other similar type of industries in this region.

Amendment history

Table 5 provides the amendment history for L7798/1993/6.

Table 5: Licence amendments

Instrument	Issued	Amendment
L7798/1993/6	25/07/2008	Licence amendment to transfer the Licence from ATW (Australia) Pty Ltd to Mutiny Gold Ltd
L7798/1993/6	21/01/2016	Licence amendment to change the occupier name to Deflector Mining Ltd, include dewatering to the Golden Stream Pit and Salt River, and convert the Licence to template version 2.9

L7798/1993/6	Amendment Notice 1 11/06/2018	Increase the production of category 5 from 300,000 tonnes to 700,000 tonnes per annual period, addition of category 64 class II putrescible landfill, addition of category 85 sewage facility and extension of the prescribed premises boundary.
L7798/1993/6	Amendment Notice 2 20/07/2018	Increase dewatering discharge to current amount being discharged at the Salt River discharge location while alternative methods of disposal are planned and implemented.
L7798/1993/6	Amendment Notice 3 16/10/2018	Amendment to allow an embankment lift at the Gullewa Tailings Storage Facility and the installation of an in-pit TSF at the Monarch Pit.
L7798/1993/6	Amendment Notice 4 10/12/2019	Amendment to allow an increase in the throughput for category 5 and 85, relocation of the dewatering discharge outlet, reduce the SWL limit and install new groundwater monitoring bores and a recovery bore at the TSF.

Other Approvals

Department of Mines, Industry Regulation and Safety (DMIRS)

Mining Proposal (Reg ID 83066) approved 20 November 2019.

Department of Water and Environmental Regulation

- License to take Water - GWL168757 (6) for 4,700,000 kL.
- Native Vegetation Clearing Permit – CPS 5128/4 for an area of 295 Ha including L59/160 for the new dewatering discharge location.

Location and receptors

Table 6 below lists the relevant sensitive land uses in the vicinity of the Prescribed Premises which may be receptors relevant to this amendment.

Table 6: Receptors and distance from activity boundary

Residential and sensitive premises	Distance from Prescribed Premises
The Premises is isolated with the nearest town of Yalgoo located approximately 60 km away. The Barnong Station homestead which is located 10 km away is managed by the Department of Biodiversity, Conservation and Attractions (DBCA). The homestead is unoccupied and is in a state of disrepair. DBCA has advised DWER there are no plans to repair the homestead for the purpose of occupation.	60 km from the Premises

Table 7 below lists the relevant environmental receptors in the vicinity of the Prescribed Premises which may be receptors relevant to the proposed amendment.

Table 7: Environmental receptors and distance from activity boundary

Environmental receptors	Distance from Prescribed Premises and description
Salt River	The Salt River is located approximately 3.0 km away in an east to south easterly direction from the Premises. The area is typically associated with sheet flow that contributes to the nearby Salt River during periods of heavy rainfall. The river is the main drainage channel for the catchment and is up to 30 m wide, and is often fed by minor tributaries. In the vicinity of the mine, the river flows in a southerly direction for approximately 15

	km, before intercepting a chain of salt lakes including Burra Lake which is the local terminus. While the river is substantial in length, drainage along the channel and surrounding floodplain can be highly diffuse (Stantec, 2017). The Salt River supports permanent pools of saline water in topographic lows. Water quality is highly saline (20,000 - 23,000 mg/L TDS) and alkaline (pH 8.3 - 8.4), with elevated concentrations of total nitrogen and some metals. Refer to Risk Event 2 for a more detailed description of the Salt River
Burra Lake	The Burra Lake provides a local terminus or compensation basin for the Salt River and is located approximately 15 km south of the Premises. The Salt River intercepts the lake from the northern end and is the main source of inflow. Drainage occurs in a southerly direction through the Burra Lake. The lake is approximately 1.2 km by 0.9 km across, forming a large shallow evaporative basin. The lake typically has short hydroperiods due to high evaporation rates and shallow water depths, with the lake rarely flooding in its entirety. During the baseline ecological assessment, the water depths ranged from less than 0.1 m during the minor flood to more than 0.5 m during the major flood survey. The lake bed is made up of predominantly clay, with evidence of salt deposition and accumulation on the playa. There is a low lying primary dune system surrounding the lake with occasional elevated sandstone quartz outcropping on the western side. The lake is highly productive during flooding, with primary producers comprising benthic algal mats and macrophytes providing a food source for a range of aquatic invertebrates and waterbirds. The riparian zone is dominated by samphire (*Tecticornia*) and several chenopod species. Burra Lake has also been affected by secondary salinisation, with the addition of salts from the river and the surrounding catchment via runoff. The lake is located on a working pastoral station which is currently stocked with cattle which is causing degradation.
Groundwater	The Premises is located within a greenstone belt that forms part of the Yilgarn Craton. Information from the Mindat database (refer to web site www.mindat.org) indicates that the site is underlain by a sequence of high-magnesium basalts of Archaean age that have been intruded by dolerite and dolerite-lamprophyre dykes. These basement rocks have been intensively weathered to depths of about 35 metres, and are locally overlain by lateritized alluvial sediments that vary in thickness from about 2.5–10 metres. Groundwater is likely to be found in two distinct settings beneath the Premises: in one or more bedrock aquifers that consist of fracture zones within basalts and other basement rocks; and in shallow regolith that overlies basement rocks. It is likely that the shallow regolith forms an ephemeral perched aquifer that is only likely to contain fresh-brackish groundwater for short periods after heavy rainfall events, whereas the bedrock aquifers will contain small amounts of saline to hypersaline groundwater on a permanent basis. The rate of groundwater flow in fractured bedrock is likely to be limited by the generally low hydraulic conductivity of these materials. Additionally, the presence of dykes, faults or other structural features in the vicinity of the Premises is likely to compartmentalise groundwater in bedrock into a number of distinct flow-systems that will only have a limited degree of hydraulic interconnection. This is supported by the large variations in groundwater salinity that are observed near the Premises. Recent groundwater sampling of the monitoring bores at the TSF shows TDS levels of between 3,500 to 6,000 mg/L.
Fauna	A number of ecological assessments have been undertaken at the Premises over the years, however the information presented below relates to assessments undertaken in tenement L59/160 where the dewatering infrastructure will be located, and area of discharge within the Salt River.

	The occurrence of potentially conservation significant fauna (mallefowl, peregrine falcon, and the gilled slender blue-tongue) is considered highly unlikely in the area, due to the lack of suitable habitat, a long history of land disturbance from grazing, timber cutting and mining, and disturbance created by mining, including light exposure at night and the noise associated with operations and equipment (Ninox Wildlife Consulting 2011). Targeted surveys found no suitable habitat was present and did not locate any specimens Aquatic vertebrate fauna During the baseline ecological assessment, four aquatic vertebrate fauna species were recorded from Salt River, comprising two fish and two amphibian taxa (frog). One fish species (*Craterocephalus cuneiceps*) was recorded in sites SR02 and SR03 (see figure 9) during the minor flood survey, and from sites SR01, SR03 and SR04 during the major flood survey. The second species (*Gambusia holbrooki*) identified at all sites during both flood surveys with the exception of site SR06 during the major flood survey. *Craterocephalus cuneiceps* is a native fish species widespread in river systems throughout the Murchison and Gascoyne regions of WA. It commonly inhabits slow-flowing streams and isolated pools and is capable of withstanding high temperatures and salinities. *Gambusia holbrooki was* an introduced species in the 1920s and is listed under the *Fisheries Resources Management Act 1994* as “noxious” due to its threat to other aquatic biota through aggressive predation of eggs and larvae and competition for food. Two amphibian species were recorded from Salt River and only during the major flood survey; *Neobatrachus kunapalari* (Wheatbelt frog; SR01, SR06) and *Pseudophryne occidentalis* (western toadlet; SR03). The frog fauna of the WA arid zone is relatively poorly known due to their dependenceon intermittent rainfall and flooding, as well as habitat inaccessibility during heavy rainfall events (WAM 2017a). The occurrence of native fish and frogs was primarily within the upper reaches of Salt River, north of the proposed discharge location. This suggests that the semi-permanent and permanent pools are important refuge for aquatic vertebrate fauna, which have an important role as top level predators, affecting prey abundance and habitat availability and extent (Kingsford et al. 2006). More than 33,000 aquatic invertebrate specimens from 104 taxa were recorded at the Salt River and Burra Lake during the baseline ecological assessment. Of these, more than 22,000 specimens from 88 taxa occurred in Salt River and 11,000 specimens from 46 taxa were found in Burra Lake. More than 11,500 specimens from 62 taxa were recorded from inundated sites and rewetting trials during the minor flood survey, with a notable increase during the major flood survey to more than 21,500 specimens from 84 taxa. Crustaceans (brine shrimp) were the dominant group in both surveys and are considered characteristic of inland waterbodies in Australia. Crustaceans were also a key component of resting stages (dormant eggs) within the sediment, with the ability of these taxa to produce desiccation-resistant eggs integral to wetland recovery after flooding (Waterkeyn et al. 2011). Brine Shrimp are also a known food source for migratory birds. Salt River was more diverse than Burra Lake during both surveys. The higher diversity at Salt River was likely attributed to greater habitat availability and complexity, compared to the more homogenous conditions of Burra Lake.
Flora	Terrestrial assessments were undertaken on the proposed pipeline option for the alternative discharge location (Figure 3 above). The broad vegetation units generally migrate from an Acacia shrubland near the existing Deflector and Golden Stream open pits, through to a low floodplain consisting of Chenopods and halophytic plant communities comprising mainly samphire (*Tecticornia*) and salt bush (*Atriplex*) and finally ending at Salt River and the associated riparian vegetation. A total of 22 taxa representing eight families were identified from the riparian zone of Salt River and Barra Lake with Chenopodiaceae being the most diverse family dominated by the genus Tecticornia (Samphire).

	No threatened or priority-listed flora of conservation significance have been found, with habitat in the area considered extensive throughout the Yalgoo bioregion (Stantec 2017b). Several Banded Ironstone Formation listed as Priority Ecological Community's (PEC) are located within 5-10 km of the Premises boundary, however no impacts have occurred as a result of operations at the Premises. No groundwater dependent ecosystems have been identified during environmental assessments.

Risk assessment

Tables 8 and 9 describe the Risk Events associated with the amendment consistent with the *Guidance Statement: Risk Assessments*. The table identifies whether the emissions present a material risk to public health or the environment, requiring regulatory controls.

Table 8: Risk assessment for proposed amendments during construction

Risk Event						Consequence rating	Likelihood rating	Risk	Reasoning
Source/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**				
Cat 5 Install ore sorting equipment at the processing circuit	Construction of infrastructure	Dust	Surrounding vegetation	Air/wind dispersion	Smothering of vegetation causing detrimental effects on the health of vegetation	Slight Minimal on-site impacts	Rare The risk even may only occur in exceptional circumstances	**Low**	Processing plant is surrounded by other infrastructure with the nearest vegetation located approximately 150 m away. Limited amounts of dust are expected to be generated with the installation of ore sorting equipment to existing infrastructure. Any dust generated during construction is likely to remain within the footprint of the processing infrastructure. No additional regulatory controls are required to mitigate this risk. Any potential dust emissions can be regulated by section 49 of the EP Act.
		Noise	No receptors. Nearest sensitive premises is the town of Yalgoo which is 60 km away.		None expected	-	-	-	No receptor present. Construction works are minimal. No additional regulatory controls are required to mitigate this risk. The distance is considered too great to impact offsite receptors. The provisions of the *Environmental Protection (Noise) Regulations 1997* are applicable.
Cat 6 Installation of new dewatering pipeline and outlet into Salt River	Earthworks and construction of infrastructure	Dust	Surrounding vegetation	Air/wind dispersion	Smothering of vegetation causing detrimental effects on the health of vegetation	Slight Minimal on-site impacts	Possible The risk event could occur at some time	**Low**	Dust is likely to be generated during the clearing of vegetation for the installation of the dewatering pipeline and discharge area. The control of dust emissions will be through the use of water trucks when required. Only a short construction time frame is expected for the installation of the pipeline and discharge outlet.

									No additional regulatory controls are required to mitigate this risk.
		Noise	No receptors. Nearest sensitive premises is the town of Yalgoo which is 60 km away.		None expected	-	-	-	No receptor present. No additional regulatory controls are required to mitigate this risk. The distance is considered too great to impact offsite receptors. The provisions of the *Environmental Protection (Noise) Regulations 1997* are applicable.
Cat 6 Installation of clarification modular unit	Earthworks and construction of infrastructure	Dust	Surrounding vegetation	Air/wind dispersion	Smothering of vegetation causing detrimental effects on the health of vegetation	Slight Minimal on-site impacts	Rare The risk even may only occur in exceptional circumstances	**Low**	The clarification modular unit is located within the footprint of the processing area. Any dust generated from vehicle movements during construction is likely to remain within this area. No additional regulatory controls are required to mitigate this risk. Any potential dust emissions can be regulated by section 49 of the EP Act.
		Noise	No receptors. Nearest sensitive premises is the town of Yalgoo which is 60 km away.		None expected	-	-	-	No receptor present. Prefabricated modular unit therefore construction works are minimal. No additional regulatory controls are required to mitigate this risk. The distance is considered too great to impact offsite receptors. The provisions of the *Environmental Protection (Noise) Regulations 1997* are applicable.
Cat 85 Upgrade to the sequence batch reactor and increase size of irrigation area	Earthworks and construction of infrastructure	Dust	Surrounding vegetation	Air/wind dispersion	Smothering of vegetation causing detrimental effects on the health of vegetation	Slight Minimal on-site impacts	Rare The risk even may only occur in exceptional circumstances	**Low**	Minor changes required at the batch reactor and the installation of additional sprinklers and fencing required at the irrigation area are not expected to generate large amounts of dust. The control of dust emissions will be through the use of water trucks when required.

									No additional regulatory controls are required to mitigate this risk. Any potential dust emissions can be regulated by section 49 of the EP Act.
		Noise	No receptors. Nearest sensitive premises is the town of Yalgoo which is 60 km away.		None expected	-	-	-	No receptor present. Minor changes required at the batch reactor and the installation of additional sprinklers and fencing required at the irrigation area are not expected to generate excessive noise emissions. No additional regulatory controls are required to mitigate this risk. The distance is considered too great to impact offsite receptors. The provisions of the *Environmental Protection (Noise) Regulations 1997* are applicable.

Table 9: Risk assessment for proposed amendments during operation

Risk Event						Consequence rating	Likelihood rating	Risk	Reasoning
Source/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**				
Cat 5 Processing or beneficiation of metallic or non-metallic ore	Increased sorting and screening of ore from 700,000 up to 760,000 tpa	**Dust:** associated with screening and sorting of ore	Surrounding vegetation	Air/wind dispersion	Smothering of vegetation causing detrimental effects on the health of vegetation	Slight Minimal on-site impacts	Rare The risk even may occur in exceptional circumstances	**Low**	Processing plant is surrounded by other infrastructure with the nearest vegetation located approximately 150 m away. A small increase in dust generation is expected with the additional screening and sorting of ore, however this will be control by sprinklers and covers in strategic locations. No additional regulatory controls are required to mitigate this risk. Any potential dust emissions can be regulated by section 49 of the EP Act.
		Noise: associated with an increase in screening and sorting of ore	No receptors. Nearest sensitive premises is the town of Yalgoo which is 60 km away.		None expected	-	-	Not applicable	No receptor present. Slight increase in noise expected with the additional screening and sorting of ore. No additional regulatory controls are required to mitigate this risk. The distance is considered too great to impact offsite receptors. The provisions of the *Environmental Protection (Noise) Regulations 1997* are applicable.
Cat 5 Processing or beneficiation of metallic or non-metallic ore	Increased processing of crushed ore (for the recovery of minerals) from 700,000 up to 750,000 tpa	**Waste:** Discharge of tailings due to overtopping of the pit embankment	Surrounding soils and vegetation Groundwater Salt River	Migration through soils Sheet flow across land	Impacts on vegetation Contamination of surrounding soils with metals and metalloids, dissolved solids and cyanide	Minor Low level on-site impacts	Rare The risk event may only occur in exceptional circumstances	**Low**	Daily inspections of the TSF and Monarch in-pit to assess the available freeboard will continue to be conducted in accordance with conditions of the Licence. Water contained within the TSF and Monarch in-pit is recovered for reuse within the processing facility. Remnant vegetation within the area

					affecting soil and groundwater quality				surrounding the two TSF facilities is highly degraded. The Salt River system is located approximately 9 km away from the tailings storage facilities. Impacts to groundwater due to overtopping of the embankment at the TSF facilities is not expected due the depth of the groundwater being greater than 10 metres. The Licensee management measures and existing licence controls are satisfactory with the likelihood of overtopping determined to be rare, therefore the risk to the environment is considered **low**. No additional regulatory controls are required to mitigate this risk.
		Waste: Discharge of tailings and return water from ruptured pipelines as a result of increased flows.	Surrounding soils and vegetation Groundwater Salt River	Direct discharge to land and infiltration through soils to groundwater Sheet flow across land	Impacts on vegetation Contamination of surrounding soils with metals and metalloids, dissolved solids and cyanide affecting soil and groundwater quality	Minor Low level on-site impacts	Possible The risk event could occur at some time	**Medium**	Existing Licence conditions require the Licensee ensures that all pipelines containing tailings and recovered decant water are either: (a) equipped with automatic cut-outs in the event of a pipe failure; or (b) provided with secondary containment sufficient to contain any spill for a period equal to the time between routine inspections; or (c) provided with telemetry systems and pressure sensors along pipelines carrying environmentally hazardous materials to allow the detection of leaks and failures. The existing Licence also requires the Licensee to undertake daily inspections of the pipelines. Remnant vegetation within the area surrounding the two TSF facilities is highly degraded.

									The Salt River system is located approximately 9 km away from the tailings storage facilities. Impacts to groundwater due to infiltration of spilt tailings is not expected due the depth of the groundwater being greater than 10 metres. The Licensee management measures and existing licence controls are satisfactory and the likelihood of discharge of tailings due to pipeline failure determined to be possible with the consequence minor, therefore the risk to the environment is considered **medium**. No additional regulatory controls are required to mitigate this risk.
		Tailings seepage: An increase in discharge of tailings into the tailings storage facilities resulting is an increase in seepage	Groundwater	Seepage through soil Direct interaction with groundwater aquifer	Contamination of groundwater potentially used for livestock drinking purposes Adverse impacts on the health and survival of vegetation inundated with rising groundwater levels	Major On-site impacts high level	Possible The risk event could occur at some time	**High**	1. Refer to detailed risk assessment (risk event 1) below.
Cat 6 Dewatering to allow the mining of ore	Discharging of up to 750,000 tpa of saline dewatering effluent into	**Waste:** Discharge of saline dewatering effluent to surface water	Lake and riparian ecosystems Waterbirds	Direct discharge Seepage	Disruption of normal ecosystem function Impacts to	Moderate Mid-level onsite impacts	Unlikely The risk event will probably not occur in most	**Medium**	2. Refer to detailed risk assessment (risk event 2) below.

	the Salt River		Groundwater		riparian vegetation Eutrophication Contamination of local groundwater Scouring of river bed		circumstances		
		Waste: Discharge of saline dewatering effluent due to pipeline failure	Vegetation Soils Groundwater	Direct discharge to soils Seepage through soils to groundwater	Contamination of surrounding land and groundwater with hypersaline water affecting soil and groundwater quality and causing vegetation stress or death.	Moderate Mid-level onsite impacts	Possible The risk event could occur at some time	**Medium**	The new dewatering pipeline from Golden Stream pit into the Salt River will be installed in a bunded corridor to capture any discharge in the event of a pipeline failure. An access track will be located adjacent to the pipeline corridor for daily inspections and for maintenance when required. Vegetation surveys indicate there are no known Threatened or Priority Ecological Communities in this area however the vegetation is considered in a good to very good condition. Groundwater in this area is highly saline because it is located adjacent to the Salt River. Any spills outside of the pipeline bunding as a result of pipeline failure is not expected to have any effect on groundwater due to the similarities in the water qualities. The Licensee has committed to conducting daily inspections of the dewatering pipeline. Existing licence conditions require daily inspections of the dewatering pipelines to identify any failures, spills or seepage issues.

									The Licensee management measures and existing licence controls are satisfactory to control the risks, therefore the risk to the environment is considered **medium**. No additional regulatory controls are required to mitigate this risk.
Cat 85 Sewage facility	Increased treatment and disposal of wastewater at the WWTP from 35m^3/day up to 50m^3/day	**Odour:** Associated with effluent treatment and disposal	No receptors. Nearest sensitive premises is the town of Yalgoo which is 60 km away.	Air/Wind dispersion	None expected	-	-	Not applicable	No receptor present. No additional regulatory controls are required to mitigate this risk. Any potential odour emissions can be regulated by section 49 of the EP Act.
		Waste: Irrigation to land with nutrient rich waste water	Groundwater Vegetation The Salt River is over 3 km away and is therefore not considered a receptor	Seepage through soils Sheetflow across the land	Contamination of groundwater with nutrient rich wastewater Detrimental effects on native vegetation outside of irrigation area due to increased nutrients in the soil	Slight Minimal on-site impacts	Rare The risk event may only occur in exceptional circumstances	**Low**	The irrigated waste water is not expected to reach groundwater which is located approximately 16 mbgl in that area. Groundwater in the area of the WWTP is highly saline (about 40,000 mg/L TDS). The nearest surface water from the WWTP (Salt River) is located about 3.8 km away. Evaporation rates are high and rainfall low in this area. The sprinklers in the spray field will be rotated on a regular basis to reduce the likelihood of pooling, water logging or runoff. The irrigation area will be increased in size by approximately 400 percent to accommodate an increase in irrigation by approximately 40 percent therefore further diluting the nutrient loading. The upgrade to the existing WWTP is expected to achieve the same discharge water quality results as the existing

									WWTP. The increase in capacity to 50m^3/day remains within the design capacity of between 20 – 100 m^3/day when a Registration of the facility would normally be required and therefore considered a low risk Premises. Existing conditions in the Licence require the Licensee to conduct quarterly sampling of the wastewater and report the results in the AER. The Licensee management measures and existing licence controls are satisfactory with the likelihood of groundwater contamination, and effects on vegetation outside of the irrigation area determined to be rare, therefore the risk to the environment is considered **low**. No additional regulatory controls are required to mitigate this risk.

Detailed Risk Assessment

1. Risk Event: Increased discharge of tailings into the TSF

Description of Risk Event

Increasing the rate of tailings discharged into the TSF by a further 50,000 tonnes per annum.

Identification and general characterisation of emission

Geochemical test work has previously been undertaken on the tailings material. The test work focused on acid formation potential (AFP), multi element composition and mineralogy of the tailings solids samples. Results from the test work are provided below.

Tailings solids:

- Contains accessory-pyrite in a gangue containing trace-carbonates, at most, and classified as Potentially-Acid Forming (PAF);
- Contains major/minor elements either below, or close to, those typically recorded for soils, regolith's and bedrocks derived from un-mineralised terrain. The tailings are slightly enriched with arsenic, selenium, cobalt, copper, silver and bismuth;
- A gangue comprising mainly of a mineral consisting of a silicate of calcium, magnesium, and iron, which occurs in many igneous and metamorphic rocks (hornblende), and a series of tectosilicate (framework silicate) minerals within the feldspar group (plagioclases); and
- The population of pyrite grains in the tailings solids includes varieties that area intrinsically reactive.

Water fraction:

- pH value of between 7.0 to 7.3;
- TDS of 31,503 mg/L;
- Concentration of cyanide forms below the respective detection limits which reflects the infrequent use of sodium cyanide during ore processing; and
- Concentrations of a wide range of minor elements in the tailing slurry water sample were either below, or close to, the respective detection limits.

The removal of 10,000 tpa of harder basalt gangue rock from the processing circuit through the use of ore sorters, is expected to have an negligible effect on the density of the final tailings material as it only contributes to 1.3 % of the total throughput at the crushing and screening plant.

Description of impacts from the increased emission

Routine sampling of existing groundwater monitoring bores (monitoring bores) located at the TSF indicate there has been an increasing trend in the groundwater levels for the past approximately two years (see Figure 8 below). This increasing trend is likely caused from seepage at the TSF. The disposal of an additional 50,000 tonnes of tailings per year into the TSF could increase the rate of seepage.

Increasing groundwater levels can cause impacts on the health and survival of vegetation inundated with rising groundwater levels due to waterlogging and from increased salts in the soils. There is also the potential contamination of the local groundwater, determined as suitable for stock watering purposes in accordance with ANZECC guidelines, with tailings materials high in TDS.

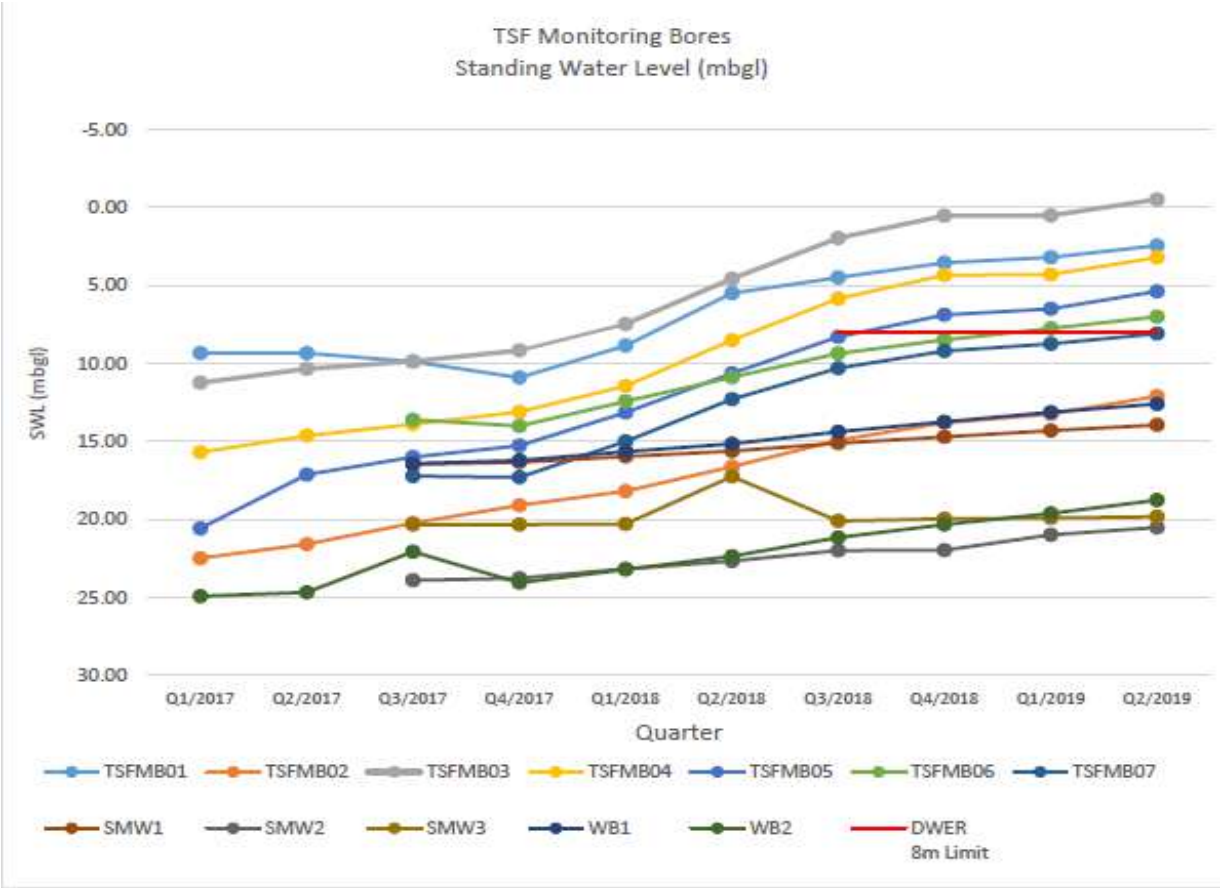


Figure 8: TSF monitoring bores Standing Water Levels

Criteria for assessment

DWER 'Water Quality Protection Guidelines No.2, Mining and Mineral Processing, Tailings facilities', 2000.

The Department of Mines, Industry Regulation and Safety, Code of Practice 'Tailings Storage Facilities in Western Australia', 2013.

Relevant freshwater quality criteria for comparison include ANZECC guidelines for livestock drinking water quality.

Licensee controls

The Licensee currently managers the TSF through procedures set out in the existing TSF operational manual. The operational manual outlines the operating procedures, inspection criteria, monitoring requirements and maintaining log sheets.

Two inspections of the TSF are undertaken for each 12 hour shift. These inspections include checking the:

- pipelines, pumps and valves for leaks;
- discharge locations;
- location and the size of the decant pond; and
- the freeboard is being maintained.

The Licensee maintains flow meters to monitor water recovery from the TSF to assess against water balance model predictions.

The Licensee proposes the original monitoring bores TSFMB01 to TSFMB07 could be equipped with bore pumps and used to manage rising water levels around the TSF if required. The

Licensee has installed four new monitoring bores (and one seepage recovery bore) around the existing TSF and proposes these will replace the existing monitoring bores TSFMB01 to TSFMB07 (see Figure 7 above for the location of existing and new monitoring bores). The Licensee also proposes an additional recovery bore will be installed at the northern side of the TSF if water levels are observed to be rising in the new monitoring bores.

A seepage trench is installed on the southern side of the TSF embankment wall and any captured seepage water is pumped either back to the TSF decant pond or to the Monarch Pit. The Licensee has suggested a second seepage trench may be effective on the eastern side and maybe constructed in lieu of or in addition to the recovery bores if required.

Consequence

The consequence of discharging an additional 50,000 tonnes of tailings material into the TSF is considered **major** as the onsite impacts are high level due to data from monitoring bores near the TSF indicating that excessive seepage is taking place from this facility, which is leading to the development of a significant groundwater mound around the TSF.

Likelihood of Risk Event

The likelihood of an occurrence is **possible** given that monitoring data is showing seepage from the TSF is already causing rising groundwater levels, and any additionally tailings deposition could increase the seepage rate which could further contribute to the already rising groundwater levels.

Overall rating of Risk Event

The risk rating for the discharge of an additional 50,000 tonnes per year of tailings material into the TSF is therefore considered **high.**

2. Risk Event: Discharge of dewatering effluent into Salt Lake River

Description of Risk Event

The discharge of approximately 750,000 tonnes per year of highly saline dewatering effluent containing slightly elevated copper to the Salt Lake River.

Identification and general characterisation of emission

The requirement to dewater the underground mine at the Premises has remained relatively consistent over time at approximately 50 L/s. Currently the Licensee utilises dewatering effluent for dust suppression and for process water, with some also sent to the TSF for disposal through evaporators. Approximately 20 L/s of the remaining dewatering effluent still requires discharge to the environment.

The dewatering discharge effluent has been monitored on a quarterly basis since March 2015 as part of the requirements of the Licence. A summary of the water quality is provided below.

- The water is highly saline, with a total dissolved solids (TDS) generally between 30,000 to 60,000 mg/L (average 40,000 mg/L).
- Slightly alkaline with an average pH of 7.8
- Several metals where identified, when compared with available ANZECC & ARMCANZ (2000) guideline trigger values, as having concentrations that may be toxic to aquatic biota. These metals include cadmium, chromium, copper, nickel and zinc. In particular, copper was found to be much higher than background levels which reflects the orebody and underground environment. Only minor exceedances on occasions were noted for cadmium and zinc.

- Low suspended solids with an average of approximately 60 mg/L.

The quality of the dewatering effluent prior to treatment is presented in Table 10 below.

	Water Quality Parameters	Under-ground effluent	GSI	Golden Stream outlet	SP	DO	Historic Discharge*	
							Min	Max
Basic	pH (Unit)	7.27	7.67	8.07	7.98	7.94	7.30	8.00
	Total Dissolved Solids	49,600	47,000	47,800	47,300	47,900	31,000	67,400
	Suspended Solids	2,010	1,440	19	29	15	-	-
	Electrical Conductivity (µS/cm)	64,900	59,400	60,900	60,600	61,000	48,462	63,000
Ions	Sodium	12,200	11,200	11,700	11,700	10,800	9,200	16,000
	Magnesium	1,810	1,690	1,750	1,740	1,620	1,400	36,610
	Calcium	1,160	1,120	1,180	1,170	1,090	960	2,340
	Potassium	437	367	391	387	360	140	520
	Chloride	22,300	21,000	21,500	21,700	21,600	21,000	37,800
	Sulfate	3,480	3,110	3,180	3,170	3,200	3,300	3,300
	Bicarbonate	107	151	112	108	104	-	-
	Carbonate	<1	<1	<1	<1	<1	-	-
	Hydroxide	<1	<1	<1	<1	<1	-	-
Nutrients	Total Nitrogen	196	36.5	39.8	38.7	36.2	-	-
	Total Phosphorus	0.06	0.11	0.01	<0.01	<0.01	-	-
	Total Kjeldahl Nitrogen	109	18.8	21	19.8	17.6	-	-
	Nitrate	84.5	16.5	17.1	17.2	16.8	-	-
	Nitrite	2.78	1.17	1.7	1.73	1.83	-	-
	Ammonia	69.9	13.8	13	12.9	12.6	-	-
	Nitrite + Nitrate	87.3	17.7	18.8	18.9	18.6	-	-
Metals & Trace Elements	Aluminum	<0.005	0.006	<0.005	<0.005	<0.005	0.025	0.125
	Arsenic	0.001	0.0016	0.0017	0.0017	0.0017	0.005	0.025
	Barium	0.226	0.077	0.092	0.096	0.092	-	-
	Beryllium	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	-	-
	Cadmium	0.0115	0.0064	0.0046	0.005	0.0048	0.0005	0.087
	Chromium	<0.0005	0.0007	0.0038	0.0037	0.0041	-	-
	Cobalt	0.13	0.0683	0.0336	0.0309	0.03	-	-
	Copper	0.623	0.126	0.01	0.01	0.012	0.009	0.65
	Iron	0.01	0.019	0.01	0.01	0.01	0.025	0.25
	Lead	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.005	0.025
	Manganese	1.28	0.784	0.585	0.534	0.526	0.15	2
	Mercury	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	-	-
	Nickel	0.585	0.401	0.277	0.287	0.274	0.017	0.49
	Selenium	0.01	0.006	0.005	0.006	0.006	0.00	0.05
	Vanadium	0.0017	0.0031	0.0042	0.0038	0.0038	-	-
	Zinc	0.24	0.078	<0.005	<0.005	<0.005	0.068	0.068

Table 10: Dewatering discharge water quality prior to treatment

Toxicity testing was undertaken to investigate potential contaminants within the discharge water and focused on algae and aquatic invertebrates, representing primary producers and lower order consumers respectively. The test organism for algae, chlorophyte (green) *Dunaliella salina,* was one of 41 algal taxa recorded from phytoplankton samples of Salt River. *Dunaliella salina* is commonly used in toxicity testing (Shirazi *et al.* 2015).

Crustaceans, namely ostracods, copepods and branchiopods were the most abundant aquatic invertebrates in Salt River, from which 88 taxa were recorded (Stantec 2019b). Based on this, the closely related branchiopod *Artemia salina* was selected as a surrogate for lower order consumers (Stantec, July 2019). This taxon, which inhabits salt lakes and coastal wetlands, is widely used in toxicology testing (Riisgård *et al.* 2015), and is known to exhibit strong predictive potential for contaminant effects in other species (Persoone and Wells 1987).

During a 72 hour chronic toxicity test based on algal growth, there was no observable toxicity in *Dunaliella salina.* The lack of toxicity to metals observed in *Dunaliella salina* during the Study is likely to reflect two primary factors:

- Metal concentrations within the waters were relatively low compared to concentrations

shown to inhibit the growth of this species; and

- Halotolerant algae such as *Dunaliella salina* are also likely to be inherently tolerant to salts and metals.

The maximum concentration of copper at the underground mine (0.623 mg/L), which is prior to treatment, exceeded levels found to limit growth (EC50) in *Dunaliella salina* (0.38 mg/L) (Visviki and Rachlin 1994). However, during the most recent sampling the concentration of copper at the Golden Stream outlet (final settlement process before discharge) was considerable less at 0.01 mg/L.

The 48-hour acute toxicity test did not cause any toxic effects in *Artemia salina* during the study. For each of the five sites tested, 100% of the *Artemia salina* specimens remained unaffected, regardless of the various treatments or water dilution factors.

The maximum cadmium concentration recorded during the Study (0.0115 mg/L) was well below values previously found to impact movement (EC50) or cause mortality (LC50) in *Artemia salina*.

The toxic effects of nickel on *Artemia* species have been observed at concentrations of above 10 mg/L (Kalcikova *et al.* 2012; Zulkifli *et al.* 2014). The maximum concentration of nickel during this Study was 0.585 mg/L. Similarly, the maximum zinc concentration was 0.24 mg/L, also several orders of magnitude below values known to cause mortality (LC50) (Kalcikova *et al.* 2012; Kokkali *et al* 2011).

Chromium has been associated with altered movement (EC50) at a concentration of 39.9 mg/L in water (Svensson *et al.* 2005). Another study observed reduced hatching (EC45) in *Artemia salina* at a concentration of 80 mg/L (Pawlisz *et al.* 1997). The maximum concentration during this Study was 0.0041 mg/L, well below the concentrations of toxicity for both metals (Stantec, July 2019).

Copper concentrations at the underground (0.623 mg/L) were in excess of that associated with *Artemia salina* mortality (LC50) in a previous study (Zulkifli *et al.* 2014). However, the concentrations related to altered mobility (EC50) or mortality (LC50) vary widely and mostly exceeded the underground concentration (Stantec, July 2019). Mortality (LC50) has been reported at concentrations ranging from 0.2 mg/L to 1,000 mg/L, with increasing sensitivity in response to longer exposure periods (Corner and Sparrow 1956; Zulkifli *et al.* 2014). Additionally, copper concentrations at the Golden Stream outlet (final settlement process before discharge) are considerable less than the underground mine with recent sampling showing concentrations at 0.01 mg/L.

The absence of discernible toxic effects in *Artemia salina* were consistent with the results for *Dunaliella salina*, although the implications of increased sensitivity over longer exposure periods is an additional consideration. Regardless, for the most part, metal concentrations during this Study were considerably lower than those documented in the literature as metal toxicity thresholds for these taxa. It is also likely that both species have a natural resistance to elevated salinity and metal concentrations, consistent with previous studies (Stantec, July 2019).

Description of the receiving environment

The Salt River is the main drainage channel for the catchment and is up to 30 m wide, and is often fed by minor tributaries. In the vicinity of the mine, Salt River flows in a southerly direction for approximately 15 km, before intercepting a chain of salt lakes including Burra Lake which is the local terminus. While the river is substantial in length, drainage along the channel and surrounding floodplain can be highly diffuse (Stantec, 2017).

The Licensee undertook ecological and hydrological baseline assessments at various locations in the Salt River and also an assessment of the dewatering discharge water.

The Salt River sites sampled during the baseline ecological assessment were located along a stretch of 25 km, upstream and downstream of the Premises (see Figure 9 below).

The Salt River is ephemeral with major flow events being rare however when they do occur they contribute to substantial volumes of water to the river causing erosion and deposition. Minor flow events are more common which cause surface water to pool, particularly in the upper reaches of the river. Several survey sites (SR01, SR02 and SR05) appear to be characterised by semi-permanent to permanent pools, with water depths exceeding a metre. The downstream sites from the disposal location were dry during the minor flood survey, although they were inundated in the major flood survey.

The river bed is characterised by a clay to rocky substrate upstream of the proposed discharge location, which then progresses to highly mobile sands and sandy clay further downstream. The highly mobile sands is a feature of the location for the proposed dewatering discharge outlet. This allows for rapid infiltration into the profile. Elevated sandy banks or calcareous outcropping is also evident along most sections of the river with the exception of a floodplain area at location SR06 as shown in Figure 9 below.

The survey observed a diverse range of aquatic habitat types during the flooding events which were highly productive, and supported an array of algae, macrophytes, aquatic invertebrates, fish, frogs and waterbirds. The riparian zone was typically characterised by a range of samphires (*Tecticornia*) and other chenopods.

The Salt River has historically been affected by various land use practices including clearing for agriculture and pastoralism. This area has now been destocked as part of the Barnong Station which is managed by DBCA.

Table 11 below provides a summary of the baseline ecological assessment of Salt River.

Waterbody	Hydrology/hydrogeology	Water Quality	Sediment Quality	Biological Assemblage	New or Listed Taxa	Ecological Values
Salt River	Upper Reaches (north of Premises) • Semi-permanent to permanent pools • Defined channel • Clay, sand or rocky substrate Lower reaches (south of Premises) • Predominantly dry, infrequent flow • Defined to braided channel • Clay or sand substrate	• Alkaline (pH 8.0 to 9.7) • Hyposaline to Mesosaline (6,450 to 28,100 mg/L) • Variable nutrients (total nitrogen <3.0 mg/L) • Elevated copper (natural mineralisation within catchment)	• Alkaline • Low to high salt loads • Variable nutrients • Elevate nickel	Total assemblage of 235 taxa	Aquatic invertebrates • *Coxiella sp.* • *Cyprinotus sp.* • *Reticypris sp*.	Upper reaches above the discharge outlet were 'High'. Below the Premises 'Low' to 'Medium'

Table 11: Summary of habitat characteristics, aquatic and riparian biota, new and listed taxa, and ecological values for baseline ecological assessment of Salt River

The Licensee expects that there will be some degree of natural resilience of organisms inhabiting the naturally salinised Salt River. An ecotoxicity study of Salt River aquatic biota has been undertaken (Stantec, July 2019) with toxicity testing on salt tolerant species showing no adverse effects, even when exposed to water directly from the underground. However, some aquatic biota inhabiting the river may have a lower salinity tolerance and resilience to elevated metal concentrations.

The catchment for Salt River also shows enrichment of copper, nickel and chromium, while the characteristics of Salt River (alkaline, elevated ions and metals, with fine clays and organics for complexation) are also likely to reduce potential toxicity (Stantec 2019b). The most recent survey conducted by the Licensee (Stantec, July 2019) was required to verify these claims.

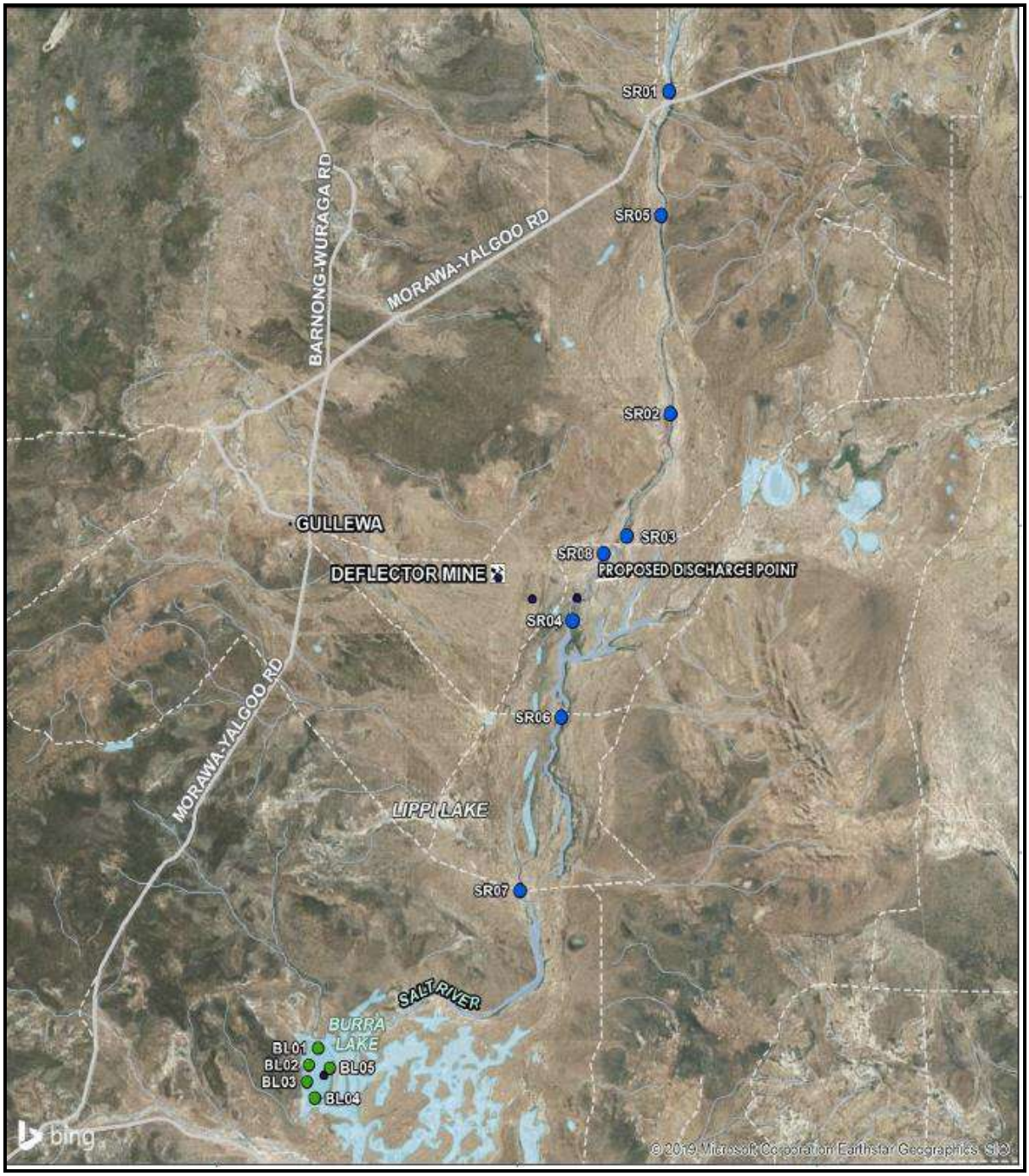


Figure 9: Salt River sampling sites

Salt River - Option 1

The Licensee considered a number of options for the disposal of excess dewatering effluent to the environment. These options included disposal to the Salt River at 3 separate locations (Options 1, 2 and 3) and to the Burra Lakes. The Burra Lakes option has now been withdrawn due to the cost and complexities associated with the distance from the Premises. The Licensee has now determined Option 1 (see Figure 10 below) was the most suitable disposal area.

This stretch of river lies south of the semi-permanent to permanent pools in the upper reaches of the Salt River. The river channel for Option 1 is reasonably well defined for approximately 2.7 km, and comprises a predominantly sandy substrate which is rarely inundated. Stantec (2018) developed a high level catchment rainfall-runoff model (Model) and confirmed the ephemeral, and predominantly dry nature of Salt River. Runoff is sporadic and occurs for short periods of

time, followed by lengthy dry periods. The Licensee has determined the groundwater below the river channel is expected to be at between 2 to 3 metres in the absence of recent river flows.

Figure 10: Dewatering disposal Option 1 to Salt River

Description of potential impacts from the emission

The potential impacts to the Salt River are discussed below.

- A previous risk assessment undertaken by the Licensee (Stantec, January 2019) identified that elevated metals within the dewatering discharge effluent may pose a toxicity risk to receptors inhabiting Salt River, and a secondary risk to migratory birds who use the aquatic biota as a food source. The risk assessment identified several metals of concern which were identified through the assessment of historical discharge data. These metals included cadmium, chromium, copper, nickel and zinc. The metals were shown to be elevated in comparison to available ANZECC & ARMCANZ (2000) guideline trigger values, in concentrations that may be toxic to aquatic biota, and in particular copper has been much higher than background levels (Stantec, July 2019).

  Selenium and mercury are also considered highly toxic and are also known to biomagnify up the food chain. However, the concentration of these elements in the dewatering discharge effluent has shown to be either below detection or well below available guidelines, therefore are not considered a toxicity risk (Stantec, July 2019).

- Erosion and build-up of sediments at the discharge outlet smothering aquatic biota and riparian vegetation.
- Elevated salts in surface water and sediments above background levels causing adverse effects on aquatic biota and riparian vegetation. Increased likelihood of salt crust on the river bed.
- Breach of the storage capacity during major flood events.
- Discharge of accumulated metals from Salt River into the Barra Lake during major flooding events.
- Increased hydroperiods in Salt River affecting aquatic biota and riparian vegetation.

  The Licensee undertook a baseline hydrological assessment in 2018 which included modelling the extent of the dewatering impact to the Salt River. The Salt River flows for a further 24 km south of the Premises before intercepting a chain of salt lakes including the Burra Lake described in Table 7 above. The river and lakes are predominately dry with flow estimated for approximately 2% of the time, which is typical for this region (Stantec, 2019). The surrounding floodplains are flat with gradients less than 0.3%.

  Dewatering plumes were assessed at a discharge rate of 15, 25 and 50 L/s to predict the extent of the downstream impact. At 25 L/s (maximum expected discharge rate at the Premises) the wetted footprint is expected to reach 4.5km. Even at 50 L/s the wetted footprint is expected to dissipate well before the Burra Lake at 6.2 km (see Figure 11 below). The Burra Lake is 24 km away. Groundwater is predicted to extend a further 40 to 60% past the surface extent and therefore still well before the salt lakes systems further downstream.

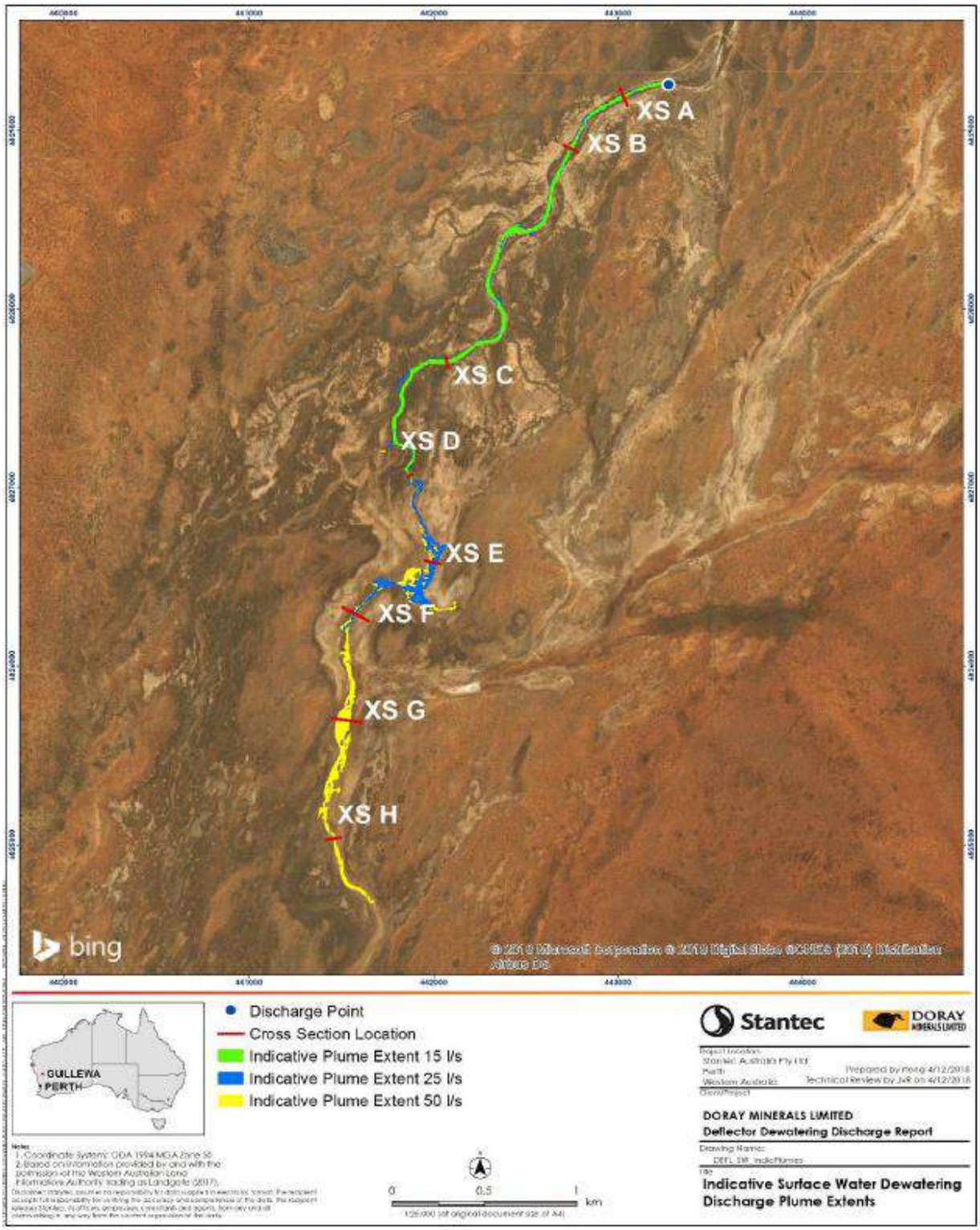


Figure 11: Hydrological modelling indicative discharge extents at 15, 25 and 50 L/s rates for Option 1

Criteria for assessment

Department of Water, *Western Australian water in mining guidelines*, Report no. 12, May 2013.

Relevant water quality criteria for comparison include ANZECC guidelines for marine water quality.

Relevant sediment quality criteria for comparison include ANZECC sediment quality guidelines.

Licensee controls

Erosion Control

The Licensee proposes to install a 20 m long rock lined drainage area that extends over the riverbank to the bed of the Salt River (see Figure 4 above). Dewatering effluent will be discharged onto the rock drainage area via an energy diffusion device (see Figure 5 above) before flowing into the river through gravity. Dewatering flow velocity is reduced through the use of the energy diffusion device and rock lining. Once the dewatering effluent reaches the river bed the flow rates are expected to be low at less than 0.1 m/s. The installed discharge infrastructure has been designed to withstand a 1 in 20 year flood event.

Daily inspections of the dewatering discharge infrastructure will be conducted.

Increased hydroperiods in the Salt River

In order to reduce dewatering discharge rates to the Salt River, the Licensee will continue to maximise the reuse in the processing circuit, for dust suppression purposes and operation of evaporators at the TSF when possible.

Discharge downstream of the Premises (Option 1) where the channel is incised, sandy and predominately dry allowing greater infiltration.

The Licensee will implement spatial and ecological monitoring to assess hydroperiods impacts annually and during major foods.

Consider cessation of discharge for short periods (two to four weeks) following major flood events, to enable aquatic biota to emerge, persist and reproduce in low salinity conditions, as required.

Re-evaluate hydrological modelling results following the commencement of discharge and assess the water extent downstream.

Elevated metals

Discharge into the Salt River is only expected to occur for approximately 5 years.

Sediment samples were collected at all locations shown in Figure 9 during the baseline ecological assessment. The samples were collected following a 2017 minor flood event and a 2018 major flood event. The Licensee will continue to collect quarterly water and sediment quality data from Salt River and Burra Lake to develop site specific background or control site ranges (trigger values), for comparison to discharge water quality.

In order to reduce dewatering discharge rates to the Salt River, the Licensee will continue to maximise the reuse in the processing circuit, operation of evaporators at the TSF and use for dust suppression where possible.

Use of the Golden Stream pit as a settling pond and the Clarifier to reduce metal concentrations in the dewatering discharge effluent. If trigger values (see decision below for including trigger values) are exceeded, continue to investigate effective engineering and design of settling ponds and water treatment technologies to reduce suspended solids and metal concentrations, prior to discharge to the river.

Implement a suitable ecological monitoring program to assess impacts annually and during major floods. If required, consider ceasing discharge (2 – 4 weeks) to the river during major floods. Assess metal concentrations within the river post-cessation of discharge and if required intermittently flush area with freshwater from borefield to aid natural mitigation.

The dewatering discharge outlet will be located downstream of the conservation significant taxa which were identified upstream of the Premises.

Elevated salts in surface water and sediments

Reduce environmental discharge volume via re-use in mining processes and evaporators where possible. Salinity levels in dewatering discharge effluent are similar to background ranges and salt balance indicates negligible salt loads compared to catchment salt loads.

Additional dissipation and dilution of salts during major floods.

Implementation of a suitable ecological monitoring program to assess impacts annually and during major floods. If required, consider ceasing discharge to the river during major floods. Assess salt loads of river post-cessation of discharge and if required intermittently flush area with freshwater from borefield to aid natural mitigation.

Licensee proposed monitoring program

Proposed discharge monitoring program:

Emission Point Reference	Parameter	Units	Frequency
Golden Stream Pit (water)	Major ions and metals - copper, sodium, chloride, aluminium, cadmium, iron, magnesium, mercury, molybdenum calcium, potassium, manganese, nickel, selenium, arsenic and lead.	mg/L	Quarterly
	TDS/TSS		
	Total recoverable hydrocarbons		
	pH (field)	pH units	
	Volumetric flow rate	m^3/day	Continuous
Salt River Proper discharge location (Water)	Cumulative volume	kL	Continuous
	pH (field)	pH units	Monthly for 6 months then quarterly
	TDS/TSS	mg/L	
	Major ions and metals - copper, sodium, chloride, aluminium, cadmium, iron, magnesium, mercury, molybdenum calcium, potassium, manganese, nickel, selenium, arsenic and lead.		
SR01 - SR08 BL01 - BL05 (Water, and Biota)	pH (field)	pH units	6 monthly
	TDS/TSS	mg/L	
	Major ions and metals - copper, sodium, chloride, aluminium, cadmium, iron, magnesium, mercury, molybdenum calcium, potassium, manganese, nickel, selenium, arsenic and lead.	mg/L	
	Aquatic Ecology – diversity and abundance	N/A	Annually after flood event

Proposed soil monitoring program:

Monitoring point reference	Parameter	Units	Averaging period	Frequency
Outfall discharge location PSC9, DEFD01, DEFD07, DEFD10, DEFD16, DEFD18, DEFD21 and DEFD22	Cadmium Copper Nickel	mg/kg	Spot sample	Quarterly
SR01 - SR08 BL01 - BL05	Cadmium Copper Nickel	mg/kg	Spot sample	Quarterly

Consequence

The consequence of discharging dewatering effluent directly into the Salt River is considered **moderate** as the onsite impacts are mid-level and offsite impacts are low level due to the quality of the dewatering discharge effluent being of similar ionic composition to the surface water sampled at Salt River with the exception of Copper which is higher, conservation significant taxa are identified upstream of the discharge area and are also widespread elsewhere, at 25 L/s (maximum expected discharge rate at the Premises) the wetted footprint is expected to only reach 4.5km downstream, the Burra Lake is located over 24 km downstream of the discharge, the river banks are elevated (incised) at the discharge location where the river bed is sandy and predominately dry allowing greater infiltration, and the riparian vegetation being dominated by salt tolerant species with no priority flora taxa identified from the riparian zone.

Likelihood of Risk Event

The likelihood of an occurrence is **unlikely** as the areas of ecological significance are located upstream of the discharge, background copper concentrations are naturally high due to the local mineralisation of the area, the riparian vegetation is dominated by salt tolerant species and the Burra Lake system is located over 24 km away.

Overall rating of Risk Event

The risk rating for the discharge of dewatering effluent to Salt River is therefore considered **medium.**

Decision

Increased throughput at the processing plant

Based upon the applicant supporting documentation and additional information and data available to DWER, the Delegated Officer has determined the following points:

- Increasing the category 5 throughput by an additional 50,000 tpa presents a high risk to the environment due to the additional tailings material being discharged into the TSF causing an increased rate of seepage from the TSF, and a potential surface expression due to the increased pressure.

However the Delegated Officer has determined these risks are acceptable subject to the proposed Licensee controls, amendments to the existing regulatory controls in the Licence and the addition of new Licence conditions as shown below.

The approved premises production or design capacity has been amended to include the throughput limit of 760,000 tpa for category 5.

Condition 1.3.8 is included as a new condition for the construction of the ore sorter at the processing plant.

Table 3.4.4 has been amended by removing groundwater monitoring bores TSFMB01 – TSFMB07, and including new groundwater monitoring bores TSFMB08 – TSFMB11.

Table 4.3.1 has been amended to include the notification requirements following the completion of the works.

Table 3.4.1 has been amended by reducing the SWL limit from 8 mbgl to 4 mbgl for all groundwater monitoring bores at the TSF and Monarch in-pit TSF.

Table 3.4.2 has been amended to include TSF vegetation monitoring requirements.

Relocation of the dewatering discharge outlet

Based upon the applicant supporting documentation, the Delegated Officer has determined that the relocation of the dewatering discharge outlet presents a medium risk to the environment due to a potential increase in the concentration of metals within sediments affecting aquatic biota, increased salt levels within the surface water affecting riparian vegetation and aquatic biota, erosion of the river bed and a reduction in the storage capacity. However these risks are acceptable subject to amendments to the existing regulatory controls in the Licence and the addition of new conditions as shown below.

Condition 1.3.8 is included as a new condition for the construction of the dewatering effluent clarification unit, dewatering discharge outlet and dewatering pipelines.

Table 2.2.1 has been amended by extending the expiry date for ceasing dewatering discharge to land. This will allow additional time to complete the approvals process for the new dewatering discharge location, and installation of the dewatering infrastructure.

Table 4.3.1 has been amended to include the notification requirements following the completion of the works.

Condition 2.4 has been included as a new condition to authorise the discharge of dewatering effluent to surface water.

Condition 3.4.1 has been amended to include new table 3.4.4 for the monitoring of surface water quality.

Table 3.4.3 has been amended to include sediment monitoring within the Salt River.

Condition 3.6.1 has been included as a new condition for the monitoring of the dewatering effluent discharged into the new discharge location at Salt River. A trigger value, requiring reporting to DWER in accordance with condition 4.3.1, has been included for copper. Copper concentrations in the underground mine are currently as high as 0.623 mg/L (July 2019) with historically levels in the discharge water up to 0.65 mg/L, however with improvements in the management of sediments in dewatering effluent at the Premises, levels have since dropped with sampling results indicating copper levels as low as 0.01 mg/L at the Golden Stream outlet prior to discharge to the environment (see Table 10 above).

The ANZECC & ARMCANZ (2000) guidelines set a copper concentration level of 0.008mg/L for the protection of 80 % of species in marine environments. However, with the background concentration levels for copper elevated due to the natural mineralisation within the catchment and therefore a naturally higher tolerance by aquatic biota, and recent testing indicating there were no toxic effects of the discharge water on *Dunaliella salina* (algae) and *Artemia salina* (brine shrimp) species, this guideline level has not been applied as a limit or trigger value in the Licence as it is considered too low.

Additionally, the Licensee proposes to install a Clarifier which is expected to reduce the copper concentration in dewatering effluent to be below 0.07 mg/L (currently 0.126 mg/L), before discharge into the Golden Stream pit for further settlement before a final discharge to the environment. Therefore the final concentration of copper within the dewatering discharge effluent to the environment is expected to drop even further than the discharge concentration of

0.012 mg/L. Consequently, a trigger value of 0.07 mg/L has been set for copper in dewatering effluent discharged to surface water at the Premises. An exceedance of this trigger value will require the Licensee to undertake reporting requirements as set out in condition 4.3.1 of the Licence. Trigger values have not been applied to cadmium, chromium, nickel and zinc (other metals of concern) as their current concentration levels are well below the ANZECC & ARMCANZ (2000) guidelines.

Table 4.3.1 has been amended to include the reporting requirements for a breach of a trigger value set in Table 3.6.1.

Schedule 1 Maps has been amended by the inclusion of a new map describing the location of the dewatering discharge outlet to the Salt River.

Schedule 1 Maps has been amended by the inclusion of a new map describing the monitoring points defined in Table 3.4.3 and 3.4.4.

Increase the throughput at the WWTP

Based upon the applicant supporting documentation, the Delegated Officer has determined that an increase in the capacity of the WWTP and the irrigation area presents a low risk to the environment. Construction conditions and compliance reporting have been included as new conditions to the Licence as shown below. Existing conditions regulate the emission to land and the monitoring of those emissions. No additional regulatory controls are required to mitigate this risk.

The approved premises production or design capacity has been amended to include the throughput limit of 50 m^3/day for category 85.

Condition 1.3.8 is included as a new condition for the construction of the upgrade to the WWTP and the increase in the irrigation field.

Table 1.3.6 has been amended to include the notification requirements following the completion of the works.

Schedule 1 Maps has been amended by replacing the map defined in Table 2.2.1 with a new map of the upgraded WWTP irrigation area.

Additional amendments

Previous condition 2.3 ‘Emission to groundwater’ and corresponding Table 2.3.1 have been updated to condition 2.5 ‘Emission to groundwater’ and corresponding Table 2.5.1 as there was already an existing condition 2.3 ‘Emission to air’.

Table 3.4.2 has been amended to correctly define all photo monitoring sites at the Salt River discharge area at mining tenement L59/64.

Table 4.2.1 of condition 4.1.1 has been amended to include the additional reporting requirements in the Annual Environmental Report.

Schedule 1 Maps has been amended by updating the map defined in Table 3.4.2 with a new map to show all vegetation monitoring locations defined in Table 3.4.2.

Amendment

1. The Licence Premises address is amended by the inclusion of the additional mining tenements shown in bold and underline below.

Gullewa Gold-Copper Operations

Mining Tenements M59/49, L59/49, L59/64, M59/68, **M59/132**, **M59/294**, M59/356, M59/391, M59/392, M59/335, M59/442 L59/35, M59/507, M59/336, M59/522, L59/71, **L59/158**, **L59/159** and **L59/160**
Morawa - Yalgoo Road

2. The Licence is amended by the deletion of the text shown in strikethrough below and the inclusion of the bold text shown in underline below.

Category number	Category description	Category production or design capacity	Approved Premises production or design capacity
5	Processing or beneficiation of metallic or non-metallic ore	50,000 tonnes per annual period	7~~0~~**6**0,000 tonnes per annual period
6	Mine dewatering	50,000 tonnes or more per annual period	750,000 tonnes per annual period
64	Class II landfill site	20 tonnes or more per year	4,000 tonnes per annual period
85	Sewage facility: premises- a) on which sewage is treated (excluding septic tanks); or b) from which treated sewage is discharged onto land or into waters	More than 20 but less than 100 cubic metres per day	~~35~~ **50** cubic metres per day

3. The Licence is amended by the deletion of the text shown in strikethrough below and the inclusion of the bold text shown in underline below.

2.2.1 The Licensee shall ensure that where waste is emitted to land from the emission points in Table 2.2.1 and identified on the map of emission points in Schedule 1 it is done so in accordance with the conditions of this Licence.

Table 2.2.1: Emissions to land		
Emission point reference on Map of emission points	Description	Source including abatement
Salt River	Rock-armoured gabion outlet/s	Water from dewatering of mine. Approved to discharge a maximum of 750,000 tonnes per annual period until the ~~31 December 2019~~ **31 March 2020**
Irrigation spray field	Discharge of treated wastewater by irrigation to land	Treated waste water from the waste water treatment facility.

4. The Licence is amended by the insertion of the following Conditions shown in bold and underline:

2.4 Emission to surface water

2.4.1 The Licensee shall ensure that where waste is emitted to surface water from the emission point in Table 2.4.1 and identified on the map of emission points in Schedule 1 it is done so in accordance with the conditions of this Licence.

Table 2.4.1: Emissions to surface water		
Emission point reference on Map of emission points	**Description**	**Source including abatement**
Salt River discharge point as shown in Schedule 1	**Dewatering effluent**	**Water from dewatering of mine.** **Approved to discharge a maximum of 750,000 tonnes per annual period** **Dewatering effluent discharged via an energy dissipater which consists of a 20m long, 0.5m deep, geotextile lined drain perpendicular to the riverbank with rock armouring extending to the riverbed**

5. The Licence is amended by the deletion of the text shown in strikethrough below and the inclusion of the bold text shown in underline below.

3.4.1 The Licensee shall undertake the monitoring in Tables 3.4.1, ~~and~~ 3.4.2, 3.4.3 **and 3.4.4** according to the specifications in those tables and present this information in the Annual Environmental Report, including a comparison against the appropriate ANZECC 2000 water quality trigger values and previous years' monitoring data.

Table 3.4.1: Monitoring of ambient groundwater quality					
Monitoring point reference and location as depicted in Schedule 1	Parameter	Units	Limit	Averaging Period	Frequency
Monitoring bores: ~~TSFMB01;~~ ~~TSFMB02;~~ ~~TSFMB03;~~ ~~TSFMB04;~~ ~~TSFMB05;~~ ~~TSFMB06;~~ ~~TSFMB07~~; **TSFMB08, TSFMB09, TSFMB10, TSFMB11**, SMW1; SMW2; SMW3; WB1; and WB2	Standing Water Level[1]	m(AHD)	~~8~~ **4** mbgl	Spot sample	Monthly
	pH[2]	-	-	Spot sample	Quarterly
	Major ions and metals – Aluminium Arsenic Bicarbonate Cadmium Calcium Chloride Chromium Cobalt Copper Iron Lead Magnesium Manganese Mercury Molybdenum Nickel Nitrate Potassium Selenium Sodium Sulfate Thallium Zinc	mg/L			
	Total dissolved solids				
	Weak Acid Dissociable Cyanide (WADCN)		0.5 mg/L		

Table 3.4.2: Monitoring of ambient vegetation quality				
Monitoring point reference and location as depicted in Schedule 1	Parameter	Requirements	Frequency	Method
Photo monitoring sites: ~~PS#1 – PS#4, PMS#1, PMS#6 and PSC#9~~ **Salt River Discharge L59/64 PS1 – PS11 and SC9**	Vegetation health (i.e. decline in vegetation or change in composition)	The Licensee shall on a monthly basis: (i) take photographic images; (ii) provide a general environmental description of the site; and (i) record any changes to vegetation health or composition which may have been induced by dewatering.	Monthly while dewatering is occurring and quarterly thereafter	Visual inspection and photographs
TSF Monitoring EMP01 – EMP04		**The Licensee shall on a monthly basis:** **(i) take photographic images;** **(ii) provide a general environmental description of the site; and** (iii) **record any changes to vegetation health or composition which may have been induced by seepage from the TSF.**	**Quarterly**	

Table 3.4.3: Monitoring of ambient soil quality				
Monitoring point reference and location as depicted in Schedule 1	Parameter	Units	Averaging period	Frequency
Soil monitoring sites: PSC-9, DEFD01, DEFD10, DEFD16, DEFD18, DEFD07, DEFD21 and DEFD22	Cadmium Copper Nickel	mg/kg	Spot sample	Quarterly
Salt River sampling sites: SR01, SR02, SR03, SR04, SR05, SR06, SR07, SR08, BL01, BL02, BL03, BL04 and BL05				

Table 3.4.4: Monitoring of ambient surface water quality				
Monitoring point reference and location as depicted in Schedule 1	**Parameter**	**Units**	**Averaging period**	**Frequency**
Salt River sampling sites: SR01, SR02, SR03, SR04, SR05, SR06, SR07, SR08, BL01, BL02, BL03, BL04 and BL05	**pH**	**pH units**	**Spot sample**	**6 monthly when water is present**
	TDS **TSS**	**mg/L**		
	Major ions and metals - copper, sodium, chloride, chromium, aluminium, cadmium, iron, magnesium, nickel, calcium,			

	potassium, manganese, nickel, selenium, arsenic, lead and zinc.			
	Aquatic ecology – diversity and abundance	**-**		**Following a flood event (river flow)**

6. The Licence is amended by the insertion of the following condition as shown in bold and underline:

1.3.8 The Licensee must install and undertake the works for the infrastructure and equipment:

(a) specified in Column 1; and

(b) to the requirements specified in Column 2;

of Table 1.3.6 below.

Table 1.3.6: Infrastructure and equipment requirements table

Column 1	Column 2
Infrastructure	Requirements (design and construction)
Clarification modular unit	• **Installed on a purpose built bunded concrete pad graded to a sump to capture any spills;** • **Designed to manage up to 50 L/s; and** • **Equipped with a high level alarm which automatically activates a diversion valve to direct the underground inflow straight to the Golden Stream open pit in the event of a malfunction in the Clarifier.**
Ore sorter at processing plant	• **Fitted with dust suppression systems**
Additions to WWTP and expansion of irrigation area	• **Modify the existing WWTP so it is capable of treating a maximum of 50 m^3 per day of untreated wastewater;** • **Increase the size of the irrigation spray field to a minimum of four hectares;** • **Install the additional sprinkler system so separate spray zones can be isolated; and** • **Install stock proof fencing around the perimeter of the irrigation area, except in areas where a gate is located.**
Dewatering discharge outlet at Salt River	• **Construction of a 20m long, 0.5m deep, rock lined trapezoidal drain perpendicular to the river bank that extends over the riverbank and terminates in the bed of the Salt River;** • **The rock lined drain is lined with a geotextile fabric to minimise seepage;** • **Dewatering discharge outlet onto rock drain is fitted with an energy diffusion device; and** • **All dewatering discharge infrastructure is designed to withstand a 1 in 20 year flood event.**

Column 1	Column 2
Infrastructure	Requirements (design and construction)
Dewatering pipelines	• **equipped with automatic cut-outs in the event of a pipe failure; or** • **provided with secondary containment sufficient to contain any spill for a period equal to the time between routine inspections; or** • **provided with telemetry systems and pressure sensors along pipelines carrying environmentally hazardous materials to allow the detection of leaks and failures.**

7. The Licence is amended by the insertion of the following condition as shown in bold and underline:

1.3.9 The Licensee shall operate the clarification modular unit, ore sorter, WWTP additions, dewatering discharge outlet at Salt River and new dewatering pipelines in accordance with the conditions of this Licence, following submission of the compliance documents required under condition 4.3.1.

8. The Licence is amended by the deletion of the text shown in strikethrough below and the inclusion of the bold text shown in underline below.

2.3~~5~~5 Emission to groundwater

2.3~~5~~5.1 The Licensee shall ensure that where waste is emitted to groundwater from the emission point in Table 2.3~~5~~5.1 and identified on the map of emission points in Schedule 1 it is done so in accordance with the conditions of this Licence.

Table 2.3~~5~~5.1: Emissions to groundwater		
Emission point reference on Map of emission points	Description	Source including abatement
Golden Stream Pit	End of pipe discharge	Water from dewatering of mine.

9. The Licence is amended by the insertion of the following condition in bold and underline:

3.6 Monitoring of emission to surface water

3.6.1 The Licensee shall undertake the monitoring in Table 3.6.1 according to the specifications in that table and present this information in the Annual Environmental Report, including a comparison against previous years' monitoring data.

Table 3.6.1: Monitoring of emissions to surface water				
Emission point reference	**Parameter**	**Units**	**Trigger value**	**Frequency**
Salt River **As shown in Map of emission points in Schedule 1.**	**Cumulative volume**	**kL**	**Not specified**	**Continuous**
	pH[1]	**pH units**		**Monthly for the first 6 months of discharge then quarterly thereafter**
	Total Dissolved Solids	**mg/L**		
	Total Suspended Solids			
	Copper	**mg/L**	**0.07**	
	Major ions and metals - sodium, chloride, aluminium, cadmium, chromium, iron, magnesium, calcium, potassium, manganese, nickel, selenium, arsenic, lead and zinc.	**mg/L**	**Not specified**	

Note 1: In-field non-NATA accredited analysis permitted.

10. The Licence is amended by the inclusion of the bold text shown in underline below in Table 4.3.1.

Table 4.3.1: Notification requirements			
Condition or table	**Parameter**	**Notification requirement[1]**	**Format or form[2]**
L1.3.2, L2.2.1 and Table**s** 3.4.1 **and 3.6.1**	Breach of any limit **or trigger value** specified in the Licence	Part A: As soon as practicable but no later than 5pm of the next usual working day. Part B: As soon as practicable	N1
Table 1.3.5	Geotechnical Investigation Report certifying each item of infrastructure or component of infrastructure specified in Column 1 of Table 1.3.5 has been constructed with no material defects and to the requirements specified in Column 2. The report must be prepared or reviewed by a person with tertiary qualifications in Civil or Geotechnical Engineering and at least two years employment in geotechnical structures.	Within 60 days of the completion of each stage of the works specified in Column 1 of Table 1.3.5	None specified
Table 1.3.6	**Construction Compliance Report certifying each item of infrastructure or component of infrastructure specified in Column 1 of Table 1.3.6 has been constructed with no material defects and to the requirements specified in Column 2.**	**Within 60 days of the completion of each Stage of the Works specified in Column 1 of Table 1.3.6**	**None specified**
3.1.5	Calibration report	As soon as practicable.	None specified
Table 3.3.1	The Licensee shall notify the CEO of any TSF pipeline failures and provide an estimate of the tailings and slurry lost due to the failure within one week of the incident.	As soon as practicable but no later than 5pm of the next usual working day. Volume estimate provided within one week of the incident.	None specified
Table 3.3.1	The Licensee shall notify the CEO of any dewatering pipeline failures and provide an estimate of the mine dewatering water lost due to the failure within one week of the incident.	As soon as practicable but no later than 5pm of the next usual working day. Volume estimate provided within one week of the incident.	None specified

Table 3.4.2	The Licensee shall notify the CEO of any identified detrimental vegetation impacts as a result of dewatering discharge, including details of a strategy for remediation works.	Within one week of the detrimental vegetation impacts being identified.	None specified

Note 1: Notification requirements in the Licence shall not negate the requirement to comply with s72 of the Act
Note 2: Forms are in Schedule 2

11. The Licence is amended by the inclusion of the bold text shown in underline below.

4.1.1 The Licensee shall submit to the CEO an Annual Environmental Report by 31 March each year. The report shall contain the information listed in Table 4.2.1 in the format or form specified in that table.

Table 4.2.1: Annual Environmental Report		
Condition or table	**Parameter**	**Format or form[1]**
-	Summary of any failure or malfunction of any pollution control equipment and any environmental incidents that have occurred during the annual period and any action taken	None specified
Table 1.3.1	Actual throughput for the annual period for Categories 5, 6 and 85	
Table 3.2.1	All dewatering water monitoring parameters specified in Table 3.2.1	
Table 3.3.1	Summary of the TSF inspections including details on any seepage, spills or leaks and corrective measures undertaken to rectify any issues identified.	
Table 3.3.1	Summary of the dewatering pipeline and discharge point inspections including details on any identified pipeline failures, seepage, spills or leaks and corrective measures undertaken to rectify any issues identified.	
Table 3.4.1	All ambient groundwater quality monitoring parameters specified in Table 3.4.1	
Table 3.4.2	All ambient vegetation quality monitoring parameters specified in Table 3.4.2	
Table 3.4.3	All ambient soil quality monitoring parameters specified in Table 3.4.3	
Table 3.4.4	**All ambient surface water quality monitoring parameters specified in Table 3.4.4**	
Table 3.5.1	All emission to groundwater monitoring parameters specified in Table 3.5.1	
Table 3.6.1	**All emission to surface water monitoring parameters specified in Table 3.6.1**	
4.1.3	Compliance	Annual Audit Compliance Report (AACR)
4.1.4	Complaints summary	None specified

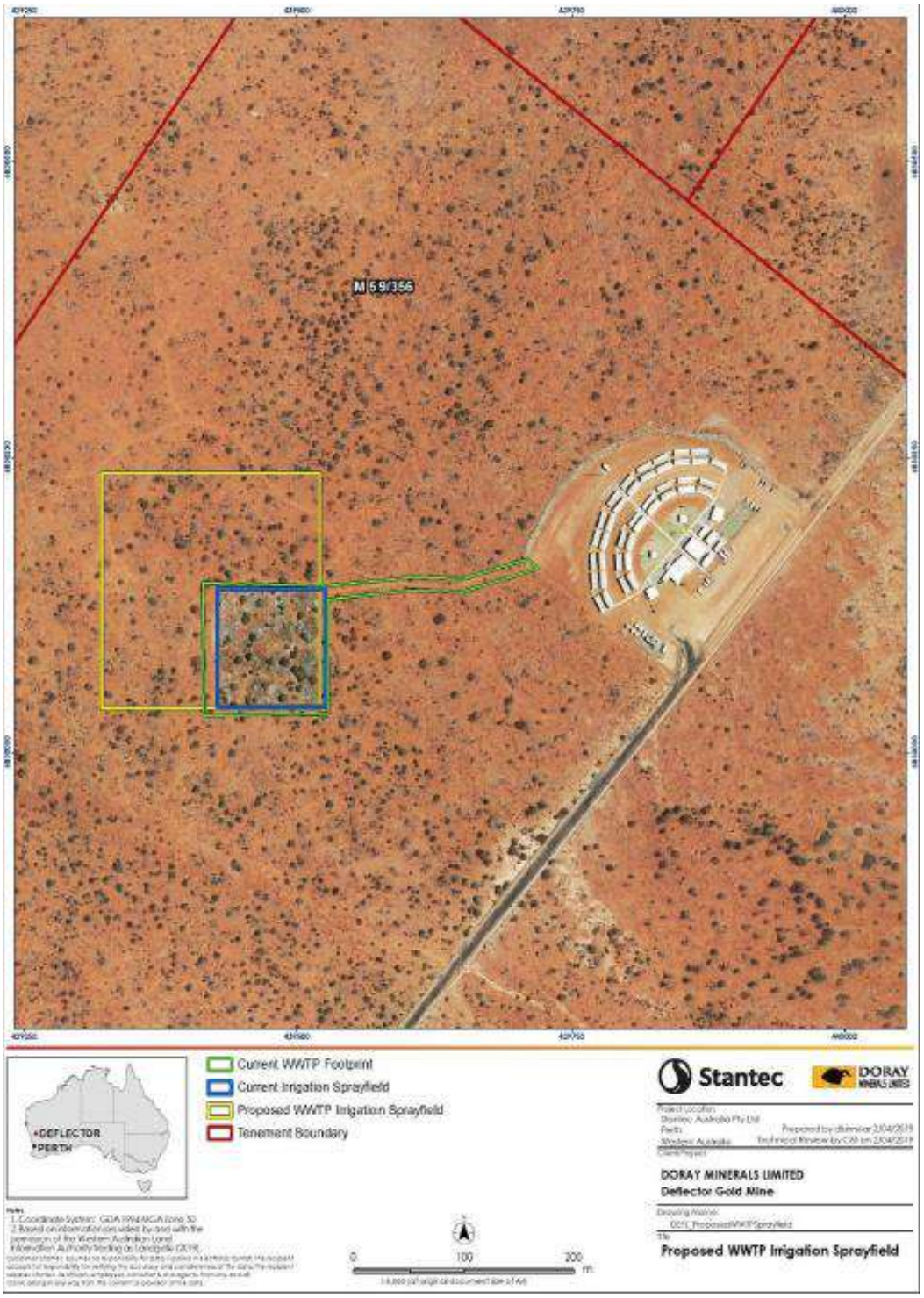
Note 1: Forms are in Schedule 2

12. The Licence is amended by insertion of the map below into Schedule 1 Maps:

The location of the dewatering discharge to Salt River defined in Table 2.4.1 is shown below.

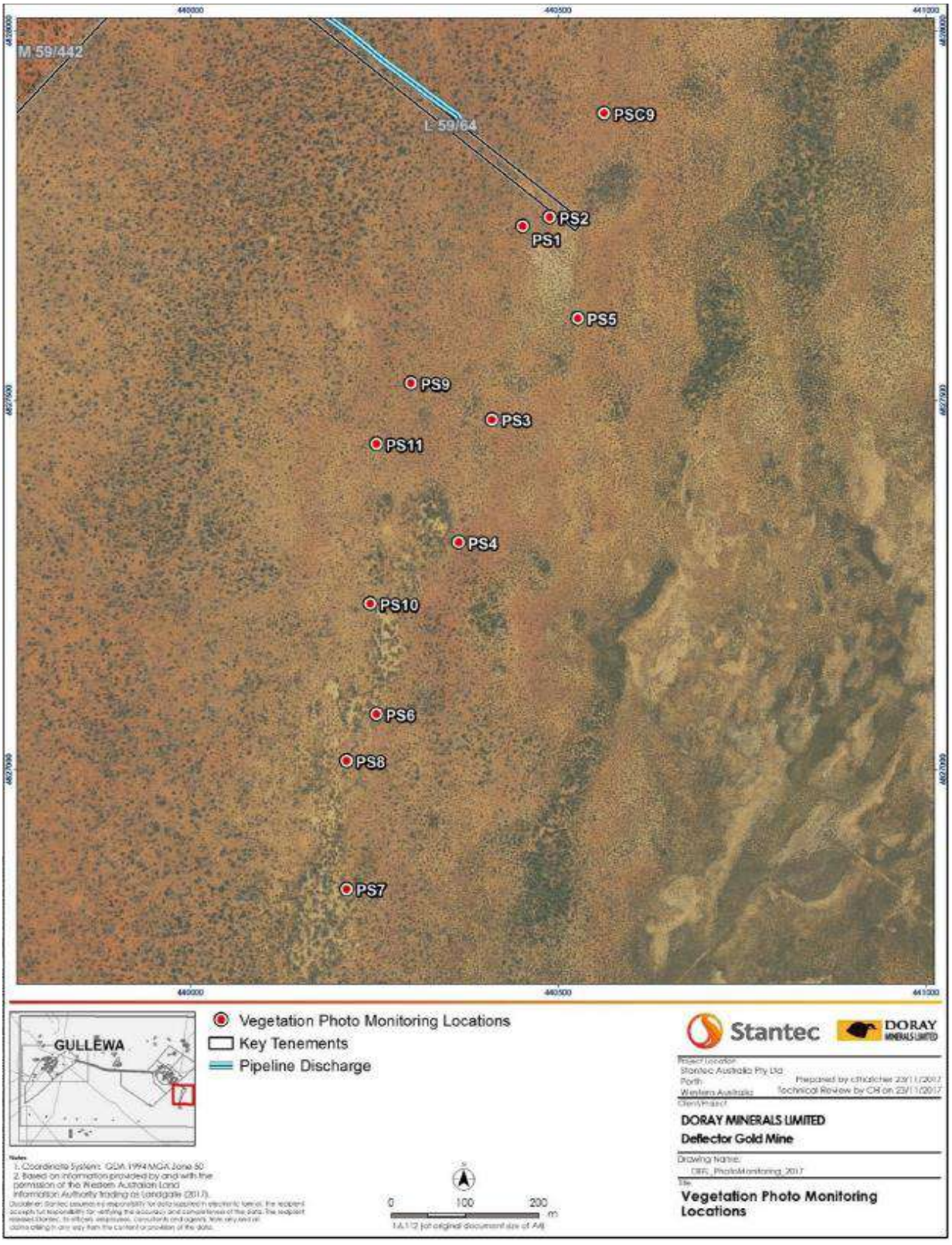
13. The Licence is amended by replacing the Schedule 1 map defined in Table 2.2.1 with the new map shown below.

The location of the irrigation spray field defined in Table 2.2.1 is shown in the map below.



14. The Licence is amended by replacing the Schedule 1 map defined in Table 3.4.2 with the new map shown below.

The location of the vegetation quality monitoring points defined in Table 3.4.2 are shown below.

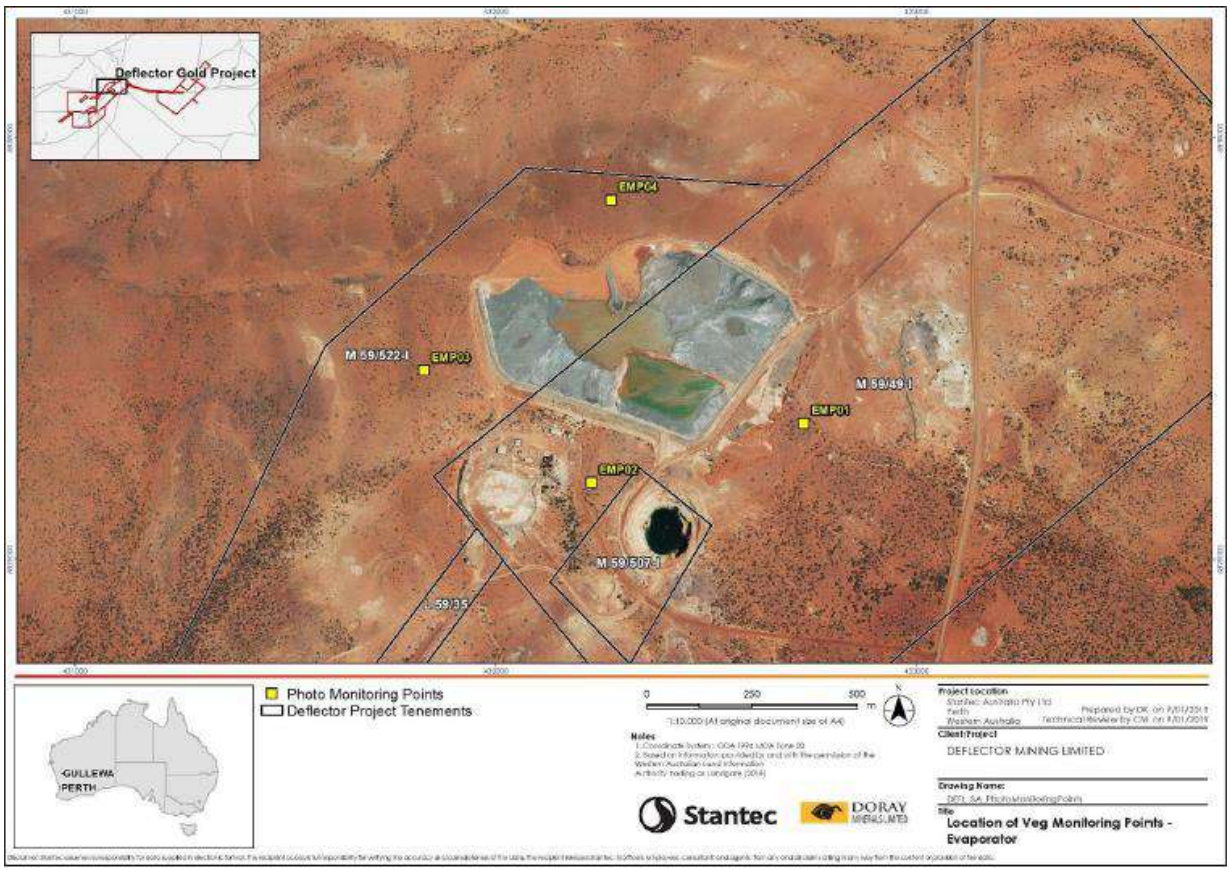


15. The Licence is amended by insertion of the map below into Schedule 1 Maps:

The location of the monitoring points defined in Tables 3.4.3 and 3.4.4 are shown below:

16. The Licence is amended by insertion of the map below into Schedule 1 Maps:

The location of the photo monitoring points defined in Table 3.4.2 are shown below:



Licensee comments

The Licensee was provided with the draft Amendment Notice 4 on 27 November 2019.

Comments received from the Licensee have been considered as shown in Appendix 2.

Appendix 1: Key documents

	Document title	In text ref	Availability
1	Licence L7798/1993/6 – Gullewa Gold/Copper Operations	L7798/1993/6	accessed at www.dwer.wa.gov.au
2	Licence Amendment application	Application	DWER record DWERDT179051
3	Deflector Mining Limited (Silver Lake (Deflector) Pty Ltd), Amendment (4) Application Supporting Document, 12 July 2019	Supporting documentation	DWER record DWERDT179042
4	Email dated 25/08/2019, Deflector Licence Amendment, information for additional processing equipment	-	DWER record A1818490
5	Email dated 13/09/2019, Deflector response to further information request	-	DWER record A1827473
6	Deflector Mining Limited Annual Environmental Report 2018	AER, 2018	DWER record A1777673
7	Steve Appleyard, DWER Principal Hydrogeologist, Contaminated Sites , memorandum, 10 September 2019	-	DWER record A1827482
6	DWER, July 2015. *Guidance Statement: Regulatory principles.* Department of Environment Regulation, Perth.	-	accessed at www.dwer.wa.gov.au
7	DWER, October 2015. *Guidance Statement: Setting conditions.* Department of Environment Regulation, Perth.	-	
8	DWER, August 2016. *Guidance Statement: Licence duration.* Department of Environment Regulation, Perth.	-	
9	DWER, November 2016. *Guidance Statement: Risk Assessments*. Department of Environment Regulation, Perth.	-	
10	DWER, November 2016. *Guidance Statement: Decision Making*. Department of Environment Regulation, Perth.	-	
11	DWER, June 2019. *Guideline: Decision Making.* Department of Water and Environment Regulation, Perth	-	
12	Kingsford, R. T., Georges, A. and Unmack, P. J. (2006). Vertebrates of desert rivers: meeting the challenges of temporal and spatial unpredictability. In: R. Kingsford (ed) Ecology of Desert Rivers. Cambridge	Kingsford et al, 2006	-

	University Press, Cambridge, UK, pp 154-200		
13	Ninox Wildlife Consulting, 2011. A level 1 vertebrate fauna assessment of the Gullewa Gold Copper Project – north of Morowa, Western Australia. Prepared for Mutiny Gold	Ninox Wildlife Consulting, 2011	DWER record A1514911
14	Stantec. (2017a). Deflector Gold and Copper Operations: Desktop review and discharge options study. Internal report for Doray Minerals Limited.	Stantec, 2017a	DWER record DWERDT179042
15	Stantec. (2017b). Deflector Gold Mine: Level 1 flora, vegetation and fauna survey. Internal Report prepared for Doray Minerals Ltd, Perth, Western Australia.	Stantec, 2017b	
15	Stantec. Deflector Gold and Copper Mine: Baseline Aquatic Ecology and Discharge Impact Assessment of Salt River and Burra Lake. Internal report prepared for Doray Minerals Ltd, January 2019	Stantec, January 2019	
16	Deflector Dewatering Discharge Infrastructure – Concept Design, Stantec 2019	Stantec, 2019	
17	Stantec. Ecotoxicity Study of Salt River Aquatic Biota. Internal report prepared for Doray Minerals Ltd, July 2019	Stantec, July 2019	DWER record A1844446
18	Waterkeyn, A., Vanschoenwinkel, B., Vercampt, H., Grillas, P. and Brendonck, L. (2011). Long-term effectsof salinity and disturbance regime on active and dormant crustacean communities. *Limnol. Oceanogr.* 56(3): 1008-1022.	Waterkeyn et al, 2011	-
19	Persoone, G. and Wells, P. G. (1987). Artemia in Aquatic Toxicology: A Review. In: P. Sorgeloos, D. A. Bengison, W. Decleir and E. Jaspers (eds) Artemia Research and its Applications, vol Volume 1. Morphology, Genetics, Strain Characterization, Toxicology. Universa Press, Wetteren, Belgium, pp 259-275	Persoone & Wells 1987	-
20	Shirazi, A., Shariati, F., Keshavarz, A. K. and Ramezanpour, Z. (2015). Toxic effect of aluminium oxide nanoparticles on green micro-algae *Dunaliella salina*. *International Journal of Environmental Research* 9(2): 585-594.	Shirazi *et al* 2015	-

21	Riisgård, H. U., Zalacáin, D., Jeune, N., Brandt Wiersma, J., Lüskow, F. and Pleissner, D. (2015). Adaptation of the Brine Shrimp *Artemia salina* (Branchiopoda: Anostraca) to Filter-Feeding: Effects of Body Size and Temperature on Filtration and Respiration Rates. *Journal of Crustacean Biology* 35(5): 650-658.	Riisgard *et al* 2015	
22	Visviki, I. and Rachlin, J. W. (1994). Acute and chronic exposure of *Dunaliella salina* and *Chlamydomonas bullosa* to copper and cadmium: effects on growth. *Archives of Environmental Contamination and Toxicology* 26(2): 149-153.	Visviki and Rachlin 1994	-
23	Kalcikova, G., J., Z.-K. and Zgajnar Gotvajn, A. (2012). Artemia salina acute immobilisation test: a possible tool for aquatic exotoxicity assessment. *Water Science and Technology* 66(4): 903-908.	Kalcikova *et al*. 2014	-
24	Zulkifli, S. Z., Aziz, F. Z. A., Ajis, S. Z. M. and Ismail, A. (2014). Nauplii of Brine Shrimp (Artemia salina) as a Potential Toxicity Testing Organism for Heavy Metals Contamination. In: A. Z. Aris, T. H. T. Ismail, R. Harun, A. M. Abdullah and M. Y. Ishak (eds) From Sources to Solution. Springer Science & Business Media, Singapore, pp 233-237	Zulkifli *et al. 2014*	-
25	Kokkali, V., Katramados, I. and Newman, J. D. (2011). Monitoring the Effect of Metals Ions on the Mobility of *Artemia salina* Nauplii. *Biosensors* 1: 36-45.	Kokkali *et al*. 2011	-
26	Svensson, B. M., Mathiasson, L., Mårtensson., L. and Bergström, S. (2005). *Artemia salina* as Test Organism for Assessment of Acute Toxicity of Leachate Water from Landfills. *Environmental Monitoring and Assessment* 102: 309-321.	Svensson *et al*. 2005	-
27	Pawlisz, A. V., Ketn, R. A., Schneider, U. A. and Jefferson, C. (1997). Canadian Water Quality Guidelines for Chromium. *Environmental Toxicology and Water Quality* 12: 185-193.	Pawlisz *et al.* 1997	-
28	Groundwater Resource Management, *Monitoring Borehole Completion Report: Gullewa Tailings Storage*	GRM, 2019	DWER record A1848610

	Facility and Borefield, *Deflector Mine,* May 2019		

Appendix 2: Summary of Licensee comments

The Licensee was provided with the draft Amendment Notice 4 on 27 November 2019 for review and comment. The Licensee responded on 4 December 2019. The following comments were received on the draft Amendment Notice.

Summary of Licensee comment	DWER Licence — Points for clarification/discussion	DWER response
Can the specific flocculant chemistry be removed to reduce operational constraints?	The Licensee proposed the use of feCl or AlOH which was mentioned within the amendment notice.	Supported.
Upon further aboriginal heritage surveys a more direct route has been identified by the Licensee.	Option 1 was originally proposed.	Supported. Map in amendment notice updated to show dewatering pipeline corridor. Only minor variation to original Option 1.
Licensee provided groundwater study in support of replacement monitoring bores at the TSF (GRM, 2019).	DWER originally suggested the replacement groundwater monitoring bores at the TSF may represent the condition of the groundwater.	Supported. Amendment notice updated to include outcomes of groundwater study.
The Licensee advised they had invested considerable resources into investigating engineering/technologies to reduce TSS and metal concentrations and believe the chosen engineering solution will be suitable. The Licensee proposed if the proposed water quality parameters/trigger levels could not be met, further investigations will be conducted.	DWER proposed to include the following as part of the Licensee controls section: *Continue to investigate effective engineering and design of settling ponds and water treatment technologies to reduce suspended solids and metal concentrations, prior to discharge to the river.*	Supported. Trigger values are now included as part of the amendment notice and DWER acknowledges the extra effort the Licensee has undertaken to reduce TSS in the dewatering discharge water.
The Monitoring Borehole Completion Report, Gullewa Tailings Storage Facility and Borefield was provided to support the new bore hole locations. SLR provides a copy again for review.	DWER proposed in its decision that the Licensee has not provided sufficient information to demonstrate that the proposed replacement monitoring bores will produce comparable groundwater potentiometric head levels to the original	Supported. The Licensee had provided sufficient information to demonstrate that the proposed replacement monitoring bores would produce comparable groundwater results to the original bores, and

	bores, or to demonstrate that they are located in appropriate locations to monitor seepage from the Gullewa TSF.	demonstrated that they are located in appropriate locations to monitor seepage from the Gullewa TSF. These statements have been removed from the Decision section.
This has now been addressed after the embankment wall construction phase.	DWER proposed that seepage is taking place from the TSF because the Licensee was not adequately managing inputs and outputs from the facility.	Supported. The Licensee has now provided evidence to show the supernatant pond at the TSF is away from the TSF embankment, is reduced in size and located at the decant. This statement in the Decision has been removed.
This has been addressed with improved supernatant management after the construction phase. A memo report will be provided	A new condition was proposed requiring the Licensee to '*Identify measures that will be undertaken to address the current water imbalance at the TSF in order to reduce seepage"*	Supported. Proposed condition 5 for the requirement to provide evidence that measures had been undertaken to address the current water imbalance has been removed.
Please review provided borehole completion report.	A new condition was proposed requiring the Licensee to demonstrate that the proposed replacement monitoring bores TSFMB08 to TSFMB11 are located in appropriate locations to monitor seepage from the Gullewa TSF	Supported. The Licensee provided the groundwater study in support of replacement monitoring bores at the TSF (GRM, 2019). Proposed condition 5 for the requirement to demonstrate the new monitoring bores at the TSF are suitable for monitoring seepage has been removed.
Please can these be replaced with TSFMB08-11? The Licensee wishes to update the License by removing the requirement to monitor bores TSFMB01-07, and instead monitor bores TSFMB08-11.	Monitoring bores TSFMB01-07 were proposed to be retained in Table 3.4.1 of the Licence.	Supported. The Licensee has provided evidence to support groundwater monitoring bores TSFMB08-11 will provide suitable data to monitor for seepage at the TSF. Additionally, the Licensee has provided supporting evidence that suggests the current monitoring bores TSFMB01-07 are being affected from pressure exerted by the TSF and are not reflecting true

		groundwater conditions. The requirement to monitor these bores has been removed.
Some of the monitoring quadrats are located in the drainage channel inundation area. These plants are likely to be impacted when inundated (as is shown during extended natural hydroperiods). Suggest wording amended to show impacts outside of the drainage channel.	-	Partially supported. Table 3.4.2 of the Licence already requires the Licensee to only record any changes to vegetation health or composition *'which may have been induced by dewatering'*. The notification requirements in accordance with column 2 of Table 4.3.1 of the Licence has been amended to include '…as a result of dewatering discharge'.