



**Licence Number** L8103/1989/3

**Licence Holder** Aragon Resources Pty Ltd

**ACN** 114 714 662

**File Number:** 2013/001965-1

**Premises** Fortnum Gold Mine  
Mining Tenements – M52/6, M52/95, M52/96, M52/98,  
M52/99, M52/132, M52/133

**Date of Amendment** 26 February 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.

**Louise Lavery**

**A/Manager Resource Industries**

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
AACR	Annual Audit Compliance Report
ACN	Australian Company Number
AEP	Annual Exceedance Probability
AER	Annual Environment Report
Amendment Notice	refers to this document
ANZECC	Australian and New Zealand Environment and Conservation Council
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 <i>Environmental Protection Act 1986</i> Locked Bag 33 Cloisters Square PERTH WA 6850 <a href="mailto:info@dwer.wa.gov.au">info@dwer.wa.gov.au</a>
CS Act	<i>Contaminated Sites Act 2003</i> (WA)
Delegated Officer	an officer under section 20 of the EP Act
Department	means the department established under section 35 of the <i>Public Sector Management Act 1994</i> and designated as responsible for the administration of Part V, Division 3 of the EP Act.
DMIRS	Department of Mines, Industry Regulation and Safety
DMP	The former Department of Mines and Petroleum
DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority
EP Act	<i>Environmental Protection Act 1986</i> (WA)
EP Regulations	<i>Environmental Protection Regulations 1987</i> (WA)
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth)

Existing Licence	The Licence issued under Part V, Division 3 of the EP Act and in force
Licence Holder	Aragon Resources Pty Ltd
m <sup>3</sup>	cubic metres
mtpa	million tonnes per annum
NAG	Net Acid Generating
NAF	Net Acid Forming
Noise Regulations	<i>Environmental Protection (Noise) Regulations 1997</i> (WA)
Occupier	has the same meaning given to that term under the EP Act.
PEC	Priority Ecological Community
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 <i>Guidance Statement: Risk Assessment</i>
SWL	Standing water level
TDS	Total dissolved solids
TSF	Tailings Storage Facility

## 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.

The following guidance statements have informed the decision made on this amendment

- *Guidance Statement: Regulatory Principles (July 2015)*
- *Guidance Statement: Setting Conditions (October 2015)*
- *Guidance Statement: Licence Duration (August 2016)*
- *Guidance Statement: Decision Making (February 2017)*
- *Guidance Statement: Risk Assessment (February 2017)*
- *Guidance Statement: Environmental Siting (November 2016)*

### 1. Amendment history

Table 2 provides a summary of the Licence amendment history.

**Table 2: Licence amendments**

Instrument	Issued	Amendment
L8103/1989/3	19/5/2016	Licence amended to authorise dewatering discharge to the Yarlalweelor Creek and administrative correction of the throughput amount in the Licence.
L8103/1989/3	15/12/2016	<b>Amendment Notice 1</b> Licence amended to include: <ul style="list-style-type: none"><li>▪ Construction requirements for the embankment lifts to TSF2; and,</li><li>▪ New dewatering discharge locations (Trev's, Starlight, Tom's, Eldorado and Callie's South Pits) to support onsite operations.</li></ul>
L8103/1989/3	5/10/2018	<b>Amendment Notice 2</b> Licence amendment to include: <ul style="list-style-type: none"><li>▪ Discharge of additional 637,253 tonnes of mine dewater from Nathan's Pit – discharge to Tom's, Starlight, Callie's South, Eldorado and Trev's Pits.</li></ul>
L8103/1989/3	26/02/2019	<b>Amendment Notice 3</b> Licence amendment to authorise the use of the Tom's Pit as an In-pit TSF. Accordingly Tom's Pit is removed from the list of authorised dewater discharge points.

### 2. Amendment description

Aragon Resources holds Licence L8103/1989/3 for the Fortnum Gold Mine located within the Shire of Meekatharra. The Premises are primarily located within tenement M52/132. The Premises include a series of open pits, processing plant, constructed paddock TSF (TSF2) and landfill. The current licence commenced in June 2011 and was amended in 2016 and October 2018. Figure 1 provides a site plan.

The Licence Holder applied to amend the Licence, requesting authorisation to discharge tailings from the existing processing plant to an existing mined pit known as Tom's Pit. Discharge of tailings to Tom's Pit is preferred by the Licence Holder as opposed to further developing the paddock type TSF2 through staged lifting (approved in Licence Amendment Notice 1). Following the filling of TSF2 Cell 1, which is planned to occur in the first quarter of 2019, tailings will be deposited into Tom's Pit in advance of further development of TSF2.

The Licence currently authorises discharge of 1,000,000 tonnes of tailings per annum – no increase in throughput was sought by the applicant.

Tom's Pit is located approximately 800m east of the processing plant. Tom's Pit covers an area of 7.1 hectares and has a maximum depth of approximately 77m. Mining of Tom's Pit ceased in 2018 with economical reserves mined out.

Approximately 1,000,000 tonnes per annum of tailings will be deposited into Tom's Pit, with a solids content of approximately 44%. It is estimated Tom's Pit will accommodate 2.5 million tonnes of tailings.

Tailings will be conveyed from the processing plant to Tom's Pit via a new above ground slurry pipeline laid within a constructed bunded corridor. The tailings slurry pipeline will be installed with two single point discharge points at Tom's Pit. Two spigot points will be located at the pit rim and selectively operated to control the decant pond location, facilitating water return to the plant. One spigot point will initially be located in the south western section of the pit. From this location the tailings will beach to the north, moving the pond location northerly as the facility fills. The second spigot point will be located in the north west of the pit – tailings will beach to the south from this location, moving the pool south. The spigot points will be operated as required to manage the decant pond location.

Tailings will be deposited over approximately 2 ½ years.

Figure 2 shows the location of the tailings slurry pipeline and spigot points.

Supernatant water bleed from deposited tailings and rainfall reporting to Tom's Pit will be collected by a decant structure for return to the plant. A decant pump on a floating pontoon will return water at a rate of 2 000 m<sup>3</sup>/day to 2 500 m<sup>3</sup>/day. The decant water will be returned to the existing process water pond via the existing decant water pipeline which will be moved into the same corridor as the tailings pipeline. The return water pipeline will be approximately 1.2km long.

Amendment Notice 2 (granted on 5 October 2018) authorised the additional discharge of 637,253 kL per year of mine dewater from Nathan's Pit to Tom's Pit (and 4 other existing open Pits). The Licence Holder has advised mine dewater is no longer planned to be discharged to Tom's Pit. The licence conditions have therefore been amended to omit this particular activity.

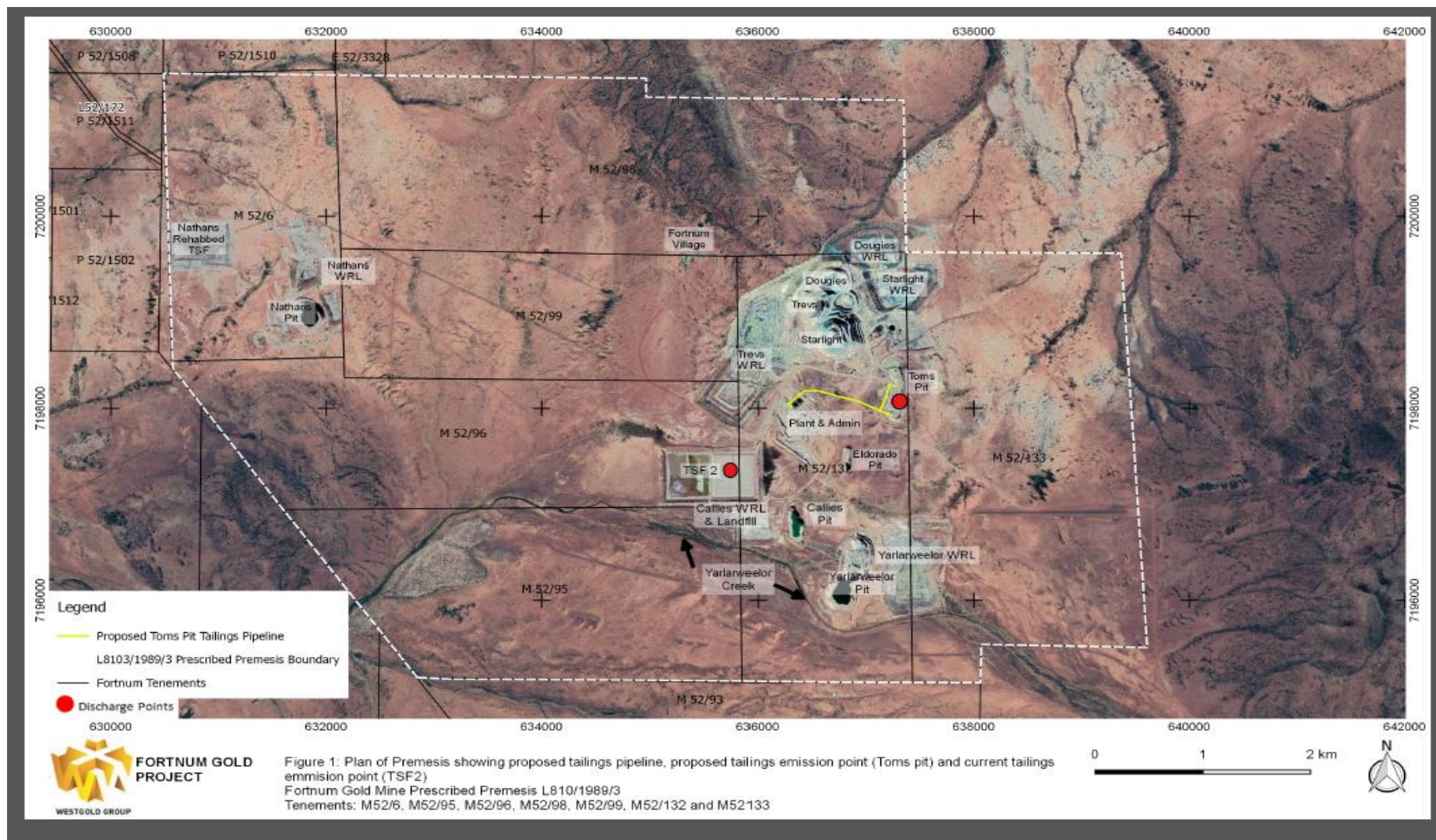


Figure 1: Site plan

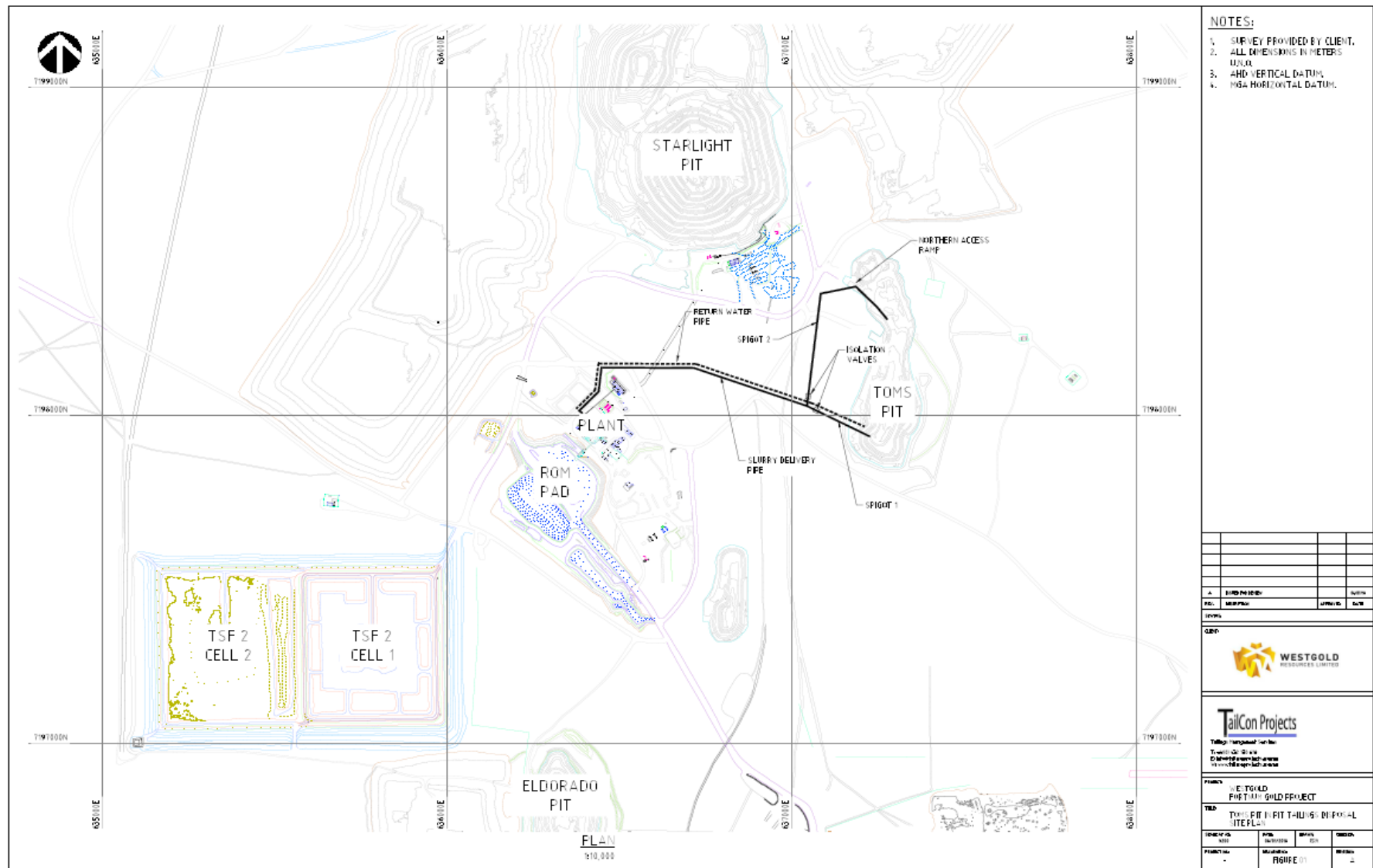


Figure 2: Tom's Pit tailings delivery discharge plan

### 3. Other approvals

Information relating to other approvals is outlined in Table 3.

**Table 3: Relevant approvals**

Legislation	Number	Approval
<i>Mining Act 1978</i>	Reg ID 76509	<p>On 18 January 2019 the Department of Mines, Industry Regulation and Safety (DMIRS) advised that the related Mining Proposal and Mine Closure Plan was under assessment, with further information pending from the Licence Holder.</p> <p>DMIRS additionally advised – “...proposal for Tom’s In-Pit TSF has also been reviewed by a DMIRS Geotechnical Engineer, and the proposed design satisfies the requirements from a safety point of view” (DMIRS 2018).</p>

### 4. Potential receptors

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

**Table 4: Receptors and distance from activity boundary**

Sensitive land uses	Distance from Prescribed Premises
Pastoral station bores/wells	<p>The Licence Holder has identified wells in the region shown on the “Milgun 1:100,000 Geological Sheet (Swager et. Al., 2000)”. These are:</p> <ul style="list-style-type: none"> <li>- Duffey Well (~7kms north-east of Tom’s Pit);</li> <li>- Kinder Bore (~8kms west of Tom’s Pit); and,</li> <li>- Sam Well (~9kms north-north-east of Tom’s Pit).</li> </ul>

Note - The nearest residential premises is the Yulga Jinna Aboriginal Community located approximately 38kms south-east of the premises.

Table 5 below lists the environmental receptors in the vicinity of the Prescribed Premises which may be receptors relevant to the proposed amendment.

**Table 5: Environmental receptors and description**

Environmental receptors	Description
Native vegetation Robinson Range vegetation complexes (banded ironstone formation) Priority Ecological Community	<p>Vegetation in the region of the TSF pipelines and TSF generally appears to be sparse. Aerial photography indicates vegetation density is significantly higher in ephemeral creek lines in the region.</p> <p>Robinson Range vegetation complexes (banded ironstone formation) Priority Ecological Community buffer areas are located in the region. The nearest boundary of these buffer areas is located ~1.3km to the north-west of Tom’s in Pit TSF,</p>

	<p>with other such boundaries located ~2.2km to the east and 4.2kms to the west.</p> <p>There are no threatened/priority flora recorded within the Premises.</p>
Ephemeral creeks - Yarlarweelor creek and other unnamed creeks	<p>Yarlarweelor creek is located ~1.8km south-west of Tom's Pit. An additional unnamed creek is located ~2km north-east of Tom's Pit.</p> <p>Sediments and riparian vegetation within these creeks are considered potential receptors.</p> <p>Aerial photography indicates vegetation density in the region is significantly higher within creek lines.</p>
Groundwater	<p>A summary of the Licence Holder's description of the hydrogeology at Tom's Pit is provided below:</p> <p>The rocks in and surrounding Tom's Pit are generally of low hydraulic conductivity. Historical data indicates low groundwater inflows occurred at Tom's Pit (Rockwater 2018).</p> <p>Depth to groundwater at Tom's Pit was ~490 mAHD (10 to 16m deep) prior to mining. Mine dewatering has resulted in a depth to groundwater of ~433 mAHD (near the base of the Pit) reported for July 2017 approximately 57m below the pre-mining water table.</p> <p>Groundwater flow direction is expected to be northwards.</p> <p>Data from April 2017 and January 2018 indicates groundwater at Tom's Pit monitoring bores is generally slightly alkaline and fresh to slightly saline (approx. 1000 mg/L TDS).</p>

## 5. Tailings Characterisation

The Licence Holder indicates tailings is expected to report weak acid dissociable (WAD) cyanide and total cyanide concentrations of 30-50 mg/L.

The Licence Holder has also undertaken a number of standard geochemical test procedures (excluding kinetic testing) to assess the potential for chemical constituents of environmental concern to be leached from tailings materials at the site. These included:

- Assessing the elemental composition of tailings and comparing their concentrations to average crustal abundances;
- Undertaking an acid-base account of the materials and assessing whether their acid-production capacity exceeds the neutralisation potential of these materials;
- Assessment of tailings NAG pH values; and
- Assessment of the leaching potential of tailings subjected to cyanide solutions.

The available geochemical testing indicates:

- The tailings samples tested were non-acid forming (NAF);
- Metals leach tests typically reported Copper, Manganese and Zinc concentrations above the ANZECC (2000) guideline trigger values for freshwater. Reported concentrations were below available ANZECC (2000) guideline trigger values for livestock drinking water.

Additional consideration of potential contaminants in tailings leachate includes:

- Potential elevated concentrations of chromium in water have been reported at the premises, including within Tom's Pit water and groundwater at the premises. This may have resulted from the exposure of mine wastes (and Pit wall rocks) to oxygen through the process of mining. Consequently, this assessment has identified hexavalent chromium as a potential contaminant in tailings leachate.
- Potential elevated concentrations of nitrate derived from the oxidation of cyanide used in gold processing and possibly also from explosive residues. Nitrate is a strong oxidising agent that can react with sulfide minerals in aquifers to release toxic metals into groundwater.

## 6. Risk assessment

**Table 6** and Table 7 below describe the Risk Events associated with the amendment consistent with the *Guidance Statement: Risk Assessments*. Both tables identify whether the emissions present a material risk to public health or the environment, requiring regulatory controls.

**Table 6: 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				
Construction, mobilisation and positioning of infrastructure	Construction of compacted earth bund pipeline corridor.	Noise	Nil	N/A	N/A	N/A	N/A	Nil	<p>There are no residential premises in the vicinity of the premises that would be impacted by noise and dust from relevant construction activity.</p> <p>The nearest residential premises is the Yulga Jinna Aboriginal Community located approximately 38kms south-east of the premises.</p>
	Installation of tailings slurry and decant return water pipelines	Dust							

**Table 7 : 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				
<b>Operation of Tom's in-Pit tailings storage facility</b>	Tailings delivery and decant water return to and from Tom's In-Pit TSF	Tailings and return water	Soil and native vegetation	Overland flow	Contamination of soils	Moderate	Unlikely	Medium	<p>Tailings slurry and decant return water at the Fortnum Mine will potentially have elevated levels of dissolved solids, cyanide, nitrate, chromium, thallium and other metals.</p> <p>Leakage of tailings and/or decant return water from the delivery pipelines has the potential to contaminate soils/sediments and adversely impact vegetation health, along with habitat for fauna.</p> <p>To mitigate spillage impacts, the Licence Holder will implement the following measures:</p> <ul style="list-style-type: none"> <li>Construct and maintain a compacted earth bund 600-1000mm high adjacent to the pipeline corridor to contain leaks;</li> <li>Undertake daily pipeline integrity inspections;</li> <li>Cease delivery of tailings and decant return water until pipeline leaks are repaired.</li> <li>Collect and dispose spilled tailings slurry into Tom's Pit TSF.</li> </ul> <p>In consideration of the abovementioned measures, the likelihood rating is deemed unlikely. As the consequence of the risk event is rated as moderate, the overall risk</p>
			Unnamed creek north-east of Tom's In-Pit TSF	Direct discharge	<p>Contamination of creek sediments</p> <p>Deterioration of vegetation health or loss of vegetation</p>				

									rating is <b>medium risk</b> .
		<p>Tailings discharge to land – due to overtopping of TSF</p>	<p>Soils and native vegetation</p> <p>Robinson Range vegetation complexes (banded ironstone formation) Priority Ecological Community (PEC) buffer areas (nearest PEC location to the east)</p> <p>Unnamed creek north-east of Tom's Pit</p>	<p>Overland flow</p> <p>Direct contact</p>	<p>Contamination of soils</p> <p>Contamination of creek sediments</p> <p>Deterioration of vegetation health or loss of vegetation</p>	Moderate	Rare	Medium	<p>Tailings slurries typically have high levels of particulate matter. Tailings slurry and decant return water at the Fortnum Mine will potentially have elevated levels of dissolved solids, cyanide, nitrate, chromium, thallium and other metals.</p> <p>Overflow of tailings and/or supernatant from the TSF has the potential to contaminate soils/sediments and adversely impact vegetation health, along with habitat for fauna.</p> <p>The Licence Holder has prepared a TSF Design Report and Operations Manual which incorporate multiple measures to mitigate the risk of overflow from Tom's In-Pit TSF. Measures include:</p> <ol style="list-style-type: none"> <li>1. Use of the following standards and guidelines in the preparation of the TSF design report – <ul style="list-style-type: none"> <li>▪ <i>Code of practice - Tailings Storage Facilities in Western Australia (DMP, 2013).</i></li> <li>▪ <i>Guide to the preparation of a design report for tailings storage facilities (DMP, 2015)</i></li> <li>▪ <i>Guidelines on tailings dams: planning, design, construction, operations and closure (ANCOLD 2012).</i></li> </ul> </li> <li>2. Modelled storage volume of approximately 2.5 million tonnes of tailings.</li> <li>3. A water balance analysis to understand</li> </ol>

									<p>water inflows/outflows and expected water returns from the TSF.</p> <p>4. Perimeter bund wall around the TSF to limit the potential for stormwater inflow.</p> <p>5. Daily and monthly inspections of the TSF.</p> <p>6. Operation of a decant pump to enable water recovery from the TSF, with pump capacity tailored to the predicted return water flow rates.</p> <p>7. The TSF is designed to contain deposited tailings, with a freeboard requirement incorporating a supernatant pond, plus allowance for a 1:100 AEP 72hr storm of 221mm, and 500mm contingency allowance freeboard.</p> <p>In consideration of the storage capacity of the TSF and abovementioned modelling, design and operational measures, tailings discharge to land due to an overtopping event is rated as rare. As the consequence of the risk event is rated as moderate, the overall risk rating is <b>medium risk</b>.</p> <p>The considerable separation distances to the PEC buffer area and regional creeks adds additional weighting to the likelihood rating (rare) and overall risk rating.</p>
		Tailings leachate to groundwater	Groundwater	Mounding	Inundation of root zone vegetation systems	N/A	N/A	N/A	No native vegetation in the immediate area surrounding Tom's Pit that could potentially be impacted.

				Infiltration/ seepage	Deterioration of groundwater quality and groundwater contamination beyond zone of influence of the Starlight and Tom's Pits	Moderate	Unlikely	Medium	Refer to reasoning in detailed risk assessment in section 7.
			Pastoral station bores	Migration of tailings leachate to groundwater and through to the bore locations	Contamination of water supply	Moderate	N/A	N/A	Groundwater pathway from Tom's Pit is expected to be towards the adjacent Starlight Pit. Groundwater drawdown in the vicinity of both pits is expected to minimise the likelihood of seepage flow away from the drawdown area.

## 7. Detailed Risk Assessment

### ***Risk Event: Alteration of local groundwater quality due to tailings seepage from Tom's In-pit TSF***

#### **Description of Risk Event**

Approximately 2.5 million tonnes of tailings with approximately 44% solids content will be deposited into Tom's Pit over a period of 30 months (2 ½ years).

Seepage to groundwater may impact on local groundwater quality. As tailings deposition progresses a potentiometric head will develop, pushing water from the Pit into the surrounding groundwater. Tailings leachate is anticipated to have elevated levels of dissolved solids, metals and nitrate relative to background levels in groundwater. Tailings leachate may also contain elevated levels of cyanide.

#### **Identification and general characterisation of emission**

Approximately 1 million tonnes of tailings will be deposited into Tom's in-Pit TSF per annum over 2 ½ years. The expected solids content by weight in tailings is 44%.

The tailings characterisation is described in section 5.

#### **Description of potential adverse impact from the emission**

Data from 2017 and 2018 provided by the Licence Holder indicates groundwater in the vicinity of Tom's Pit is generally slightly alkaline and fresh to slightly saline (approx. 1000 mg/L TDS).

At the Fortnum Mine, tailings leachate may consist of elevated levels of total dissolved solids, cyanide, metals and nitrate above background levels in groundwater. The discharge and consolidation of tailings at Tom's Pit could potentially cause tailings leachate to migrate through to the surrounding aquifer/s and deteriorate groundwater quality.

It is predicted that as tailings levels rise to above groundwater levels in the surrounding rocks low rates of seepage could occur. Noting that the local groundwater system consists of fractured rock aquifer, seepage is expected to flow northwards and discharge to Starlight Pit (~340m north-west of Tom's Pit) which should remain as a permanent groundwater sink (Rockwater 2018).

The potential deterioration of groundwater quality (due to tailings discharge at Tom's Pit) is therefore expected to be limited to on-site impacts.

In the longer term, it is expected that the consolidation of tailings in Tom's Pit will reduce the seepage of leachate from the Pit into surrounding groundwater. This is because consolidated tailings will have low hydraulic conductivity and will effectively seal-off fractures in Pit walls that are conduits into the surrounding groundwater flow system.

#### **Licence Holder Controls**

The following controls will be adopted:

##### ***Operational***

- The tailings slurry pipeline will be installed with two single point discharge points at Tom's Pit. Two spigot points will be located at the Pit rim and selectively operated to control the decant pond location, facilitating water return to the processing plant;
- The decant pump capacity will be 25-32 L/s to cater for the target water flow rate of 2000 m<sup>3</sup>/day to 2500 m<sup>3</sup>/day. It is expected that water returns of 60% to 70% will be achieved; and
- The tailings slurry and return water flow rates will be metered to assess cumulative volumes against the modelled predictions and therefore support management of water

recovery from the TSF.

### **Inspections and monitoring**

- Daily and monthly inspections of the TSF will be completed, including (but not limited to) inspection of tailings deposition, the location of the decant pond and operation of the decant pump;
- Groundwater monitoring will be undertaken to monitor the potential migration of tailings leachate to groundwater in the vicinity of Tom's Pit.

### **Records**

- Records of inspections, water balance assessments and any corrective actions taken will be maintained by the Licence Holder;
- Compliance with the TSF operational/inspection requirements and the outcomes of groundwater monitoring will be assessed and reported through the Annual Audit Compliance Report and Annual Environmental Report.

### **Consequence of risk event**

It is possible that tailings leachate will have elevated concentrations of dissolved solids, cyanide, metals and nitrate above background levels in groundwater. In the event of significant migration of tailings leachate to groundwater this could cause deterioration of groundwater quality on site.

The consequence of the risk event occurring is rated as *Moderate*.

### **Likelihood of risk event**

While the aquifer/s surrounding Tom's Pit are generally expected to have low hydraulic conductivity, as deposition of tailings progresses, this may generate a potentiometric head which facilitates migration of tailings leachate, causing localised deterioration of groundwater quality.

DWER has considered that the Licence Holder will implement multiple measures to maximise water recovery from the deposited tailings and to facilitate consolidation of the tailings, thereby reducing the potential for seepage of tailings leachate.

The potential deterioration of local groundwater quality (due to tailings discharge at Tom's Pit) is expected to be limited to on-site impacts.

The likelihood of on-site deterioration of groundwater quality such that groundwater quality is altered outside of the area subject to groundwater drawdown from groundwater abstraction (zone of influence) is therefore rated as *Unlikely*.

### **Overall rating of risk event**

DWER has considered the consequence and likelihood ratings described above and determined that the overall rating for the specified risk event is **Medium**.

## **8. Decision**

DWER has reviewed the information provided by the Licence Holder and completed a risk assessment as detailed herein, including consideration for control measures undertaken and to be implemented by the Licence Holder. DWER has assessed the licence amendment application as Medium risk and acceptable, subject to compliance with the licence conditions, including additional and amended conditions detailed in this Amendment Notice.

DWER has also amended the Licence to place the groundwater quality limits in Table 1 and amend Condition 3 to reinstate the requirement to notify DWER within one business day of an exceedance of any limit prescribed in a Licence Condition. The application of trigger values (as per previous Amendment Notice 2) may be reintroduced in the event of adverse groundwater

monitoring results.

## **9. Licence Holder's comments**

The Licence Holder was provided with the draft Amendment Notice on 22 February 2019. Comments received from the Licence Holder have been considered by the Delegated Officer as shown in Appendix 3.

## **10. Amendment**

1. Table 1 of the Licence is amended as detailed below:

Column 1	Column 2	Column 3	Column 4	Column 5
Monitoring sites	Frequency	Parameters	Units	Limit
<b><u>TSF2 Monitoring bores:</u></b>  FTR246D Junction Bore, FTR266D Creek Bore, M1, M2, M3, M4 and M5	Quarterly (January, April, July, October)	Standing Water Level (SWL)	mAHD	N/A
		pH	N/A	<u>Range 6 to 9</u>
		<u>Major ions – Na, K, Ca, Mg, HCO<sub>3</sub>, SO<sub>4</sub>, Cl</u>	<u>mg/L</u>	<u>N/A</u>
		<u>Nitrate-nitrogen (NO<sub>3</sub>-N )</u>	<u>mg/L</u>	<u>N/A</u>
		Total Dissolved Solids (TDS)	mg/L	<u>4000 mg/L</u>
		<u>Cyanide (total)</u> <u>Weak Acid Dissociable-Cyanide (WAD-CN)</u>	mg/L	<u>0.8 mg/L</u>
		Arsenic (As) Antimony (Sb) <u>Boron (B)</u> Cadmium (Cd) Chromium (Cr) - <u>including hexavalent chromium (Cr VI)</u> Cobalt (Co) Copper (Cu) Iron (Fe) Lead (Pb) <u>Manganese (Mn)</u> <u>Mercury (Hg)</u> Nickel (Ni) Selenium (Se) Thallium (Tl) Zinc (Zn)	mg/L	N/A
<b><u>Toms In-Pit TSF:</u></b> <u>Toms 1</u> <u>Toms 2</u> <u>Toms 3</u> <u>Toms 4</u> <u>Toms 5</u> <u>Toms 6</u> <u>Toms 7</u>	<u>Monthly</u>	<u>Standing Water Level (SWL)</u>	<u>mAHD</u>	<u>N/A</u>
	<u>Quarterly</u>	<u>pH</u>	<u>N/A</u>	<u>Range 6 to 9</u>
	<u>Quarterly</u>	<u>Major ions – Na, K, Ca, Mg, HCO<sub>3</sub>, SO<sub>4</sub>, Cl</u>	<u>mg/L</u>	<u>N/A</u>
		<u>Nitrate-nitrogen (NO<sub>3</sub>-N)</u>	<u>mg/L</u>	<u>N/A</u>
		<u>Total dissolved solids (TDS)</u>	<u>mg/L</u>	<u>4000 mg/L</u>
		<u>Cyanide (total)</u>	<u>mg/L</u>	<u>0.8 mg/L</u>

Column 1	Column 2	Column 3	Column 4	Column 5
Monitoring sites	Frequency	Parameters	Units	Limit
		<u>Antimony (Sb)</u> <u>Arsenic (As)</u> <u>Boron (B)</u> <u>Cadmium (Cd)</u> <u>Cobalt (Co)</u> <u>Chromium (Cr) - including hexavalent chromium (Cr VI)</u> <u>Copper (Cu)</u> <u>Iron (Fe)</u> <u>Lead (Pb)</u> <u>Manganese (Mn)</u> <u>Mercury (Hg)</u> <u>Nickel (Ni)</u> <u>Selenium (Se)</u> <u>Thallium (Tl)</u> <u>Zinc (Zn)</u>	<u>mg/L</u>	<u>N/A</u>
Nathan's Pit dewater  <u>(primary dewatering phase)</u>	Four sampling events staged evenly across the duration of the <i>primary</i> dewatering phase required to dewater the Pit.  <i>Refer to note 3 below</i>	pH	N/A	<u>Range</u> _____ <u>6 to 9</u>
		Total dissolved solids (TDS)  Major ions – Na, K, Ca, Mg, HCO <sub>3</sub> , SO <sub>4</sub> , Cl  Total Recoverable Hydrocarbons (TRH)  Arsenic (As) Cadmium (Cd) Chromium (Cr) - including hexavalent chromium (Cr VI) Copper (Cu) Lead (Pb) Nickel (Ni) Nitrate-nitrogen (NO <sub>3</sub> -N) Selenium (Se) Zinc (Zn)	mg/L	<u>N/A</u>
	<i>Quarterly (January, April, July, October)</i>	pH	N/A	<u>Range</u> _____ <u>6 to 9</u>
		Total dissolved solids (TDS)	mg/L	<u>N/A</u>

Column 1	Column 2	Column 3	Column 4	Column 5
Monitoring sites	Frequency	Parameters	Units	Limit
Nathan's Pit dewater  <u>(ongoing dewatering (post-primary dewatering phase))</u>  &  Yarlarweelor Pit dewater	<i>Bi-annual (April &amp; October)</i>	Major ions – Na, K, Ca, Mg, HCO <sub>3</sub> , SO <sub>4</sub> , Cl  Total Recoverable Hydrocarbons (TRH)  Arsenic (As) Cadmium (Cd) Chromium (Cr) - including Hexavalent Chromium (Cr VI) Copper (Cu)Lead (Pb) Nickel (Ni) Nitrate-nitrogen (NO <sub>3</sub> -N) Selenium (Se) Zinc (Zn)	mg/L	<u>N/A</u>
Mine dewatering discharge to Starlight, <del>Tom's</del> , Callie's South, Eldorado and Trev's Pits	Quarterly (January, April, July, October)	pH	N/A	<u>Range 6 to 9</u>
		Total Dissolved Solids (TDS)	mg/L	N/A
	Bi-annually (April & October)	Major ions – Na, K, Ca, Mg, HCO <sub>3</sub> , SO <sub>4</sub> , Cl  Total Recoverable Hydrocarbons (TRH)  Arsenic (As) Cadmium (Cd) Chromium (Cr), including hexavalent chromium (Cr VI) Copper (Cu) Lead (Pb) Nickel (Ni) Nitrate-nitrogen (NO <sub>3</sub> -N) Selenium (Se) Zinc (Zn)	mg/L	N/A

Note 1: **For TSF2 and Tom's Pit monitoring bores standing water level must be determined prior to collection of water samples.**

For monitoring bores, i.e. Junction Bore, Creek Bore, M1, M2, M3, M4 and M5, standing water level shall be determined prior to collection of water samples;

Note 2: Measurement of pH with a serviced and calibrated field water quality meter is permitted. All other parameter analyses must be completed by a NATA accredited laboratory.

Note 3: The primary dewatering phase to remove Nathan's Pit water (excluding any additional ongoing dewatering requirement) is expected to be undertaken over approximately 10 months. Four (4) evenly staged sampling events are required to capture water quality across the Pit lake water column.

**Note 4: The parameter limit for cyanide in groundwater is derived from Department of Health (2014) contaminated sites ground and surface water chemical screening guidelines for non-potable groundwater use.**

## 2. Monitoring Condition 1(d) is amended as detailed below:

- 1(d) The Licensee shall maintain a flow meter to ensure the continuous and accurate recording of the cumulative quantity of dewatering discharge to the Starlight, ~~Tom's~~, Callie's South, Eldorado, and Trev's Pits.

3. Condition 3 of the Licence is amended by the deletion of text shown in strikethrough and the insertion of text in bold underline as shown below.

**3. The Licence Holder shall analyse water sample analysis data against the trigger values in columns 3 and 4 of Table 4.**

**Table 4: Water monitoring parameter trigger values**

Monitoring site	Parameters	Trigger values for groundwater & dewater discharge	Trigger values for livestock drinking water
FTR246D Junction Bore, FTR266D Creek Bore, M1, M2, M3, M4 and M5 (as depicted in Attachment 1)	pH	Range 6 to 9	<b>Range 6.5 to 8.5</b>
	Total Dissolved Solids (TDS)	4,000 mg/L	<b>5,000 mg/L</b>
	Weak Acid Dissociable Cyanide (WAD-CN)	0.5 mg/L	-
	<b>Arsenic (As)</b>	-	<b>0.5 mg/L</b>
	<del>Arsenic (As III)</del>	<b>0.024 mg/L</b>	-
	<del>Arsenic (As V)</del>	<b>0.013 mg/L</b>	-
	<del>Cadmium (Cd)</del>	<b>0.0002 mg/L</b>	<b>0.01 mg/L</b>
	<del>Copper (Cu)</del>	<b>0.0014 mg/L</b>	<b>1 mg/L</b>
	<del>Chromium (Cr)</del>	-	<b>1 mg/L</b>
	<del>Hexavalent chromium (Cr VI)</del>	<b>0.001 mg/L</b>	-
	<del>Iron (Fe)</del>	<b>0.3 mg/L</b>	-
	<del>Lead (Pb)</del>	<b>0.0034 mg/L</b>	<b>0.1 mg/L</b>
	<del>Nickel</del>	<b>0.011 mg/L</b>	<b>1 mg/L</b>
	<del>Selenium (Se)</del>	<b>0.011 mg/L</b>	<b>0.02mg/L</b>
	<del>Zinc (Zn)</del>	<b>0.008 mg/L</b>	<b>20 mg/L</b>
Nathan's, Yarlarweelor, Starlight, Tom's, Callie's South, Eldorado and Trev's Pits  Mine dewatering discharge to Yarlarweelor Creek (as depicted in Attachment 4)	pH	Range 6 to 9	<b>Range 6.5 to 8.5</b>
	Total Dissolved Solids (TDS)	2,000 mg/L	<b>5,000 mg/L</b>
	Total Recoverable Hydrocarbons (TRH)	0.15 mg/L	-
	<b>Arsenic (As)</b>	-	<b>0.5 mg/L</b>
	<del>Arsenic (As III)</del>	<b>0.024 mg/L</b>	-
	<del>Arsenic (As V)</del>	<b>0.013 mg/L</b>	-
	<del>Cadmium (Cd)</del>	<b>0.0002 mg/L</b>	<b>0.01 mg/L</b>
	<del>Chromium (Cr)</del>	-	<b>1 mg/L</b>
	<del>Hexavalent Chromium (Cr VI)</del>	<b>0.001 mg/L</b>	-
	<del>Copper</del>	<b>0.0014 mg/L</b>	<b>1 mg/L</b>
	<del>Nickel</del>	<b>0.011 mg/L</b>	<b>1 mg/L</b>
	<del>Selenium (Se)</del>	<b>0.011 mg/L</b>	<b>0.02mg/L</b>
	<del>Zinc (Zn)</del>	<b>0.008 mg/L</b>	<b>20 mg/L</b>

**Note 1: Metal/metalloid trigger values for groundwater and dewater discharge have been derived from ANZECC/ARMCANZ (2000) 95% trigger values for freshwater.**

**Note 2: TDS and metal/metalloid trigger vales for livestock drinking water have been derived from ANZECC/ARMCANZ (2000).**

**The Licence Holder shall, as soon as practicable but no later than 5pm of the next usual working day, on becoming aware that any limit stated in column 5 of Table 1 for the corresponding parameter stated in column 3 of Table 1 has been exceeded, advise the CEO in writing of the date, time and reason for the exceedance with a limit exceedance report.**

**The limit exceedance report shall include, but not be limited to:**

- (i) the date, time and reason for the exceedance(s);**
- (ii) the potential or known environmental consequences of the exceedance(s);**
- (iii) corrective action taken or planned to mitigate any related adverse environmental consequences if appropriate; and**
- (iv) corrective action taken or planned to prevent a recurrence of the exceedance(s), if appropriate, including a timeline for implementation.**

4. Condition 4 (vii) of the Licence is amended by the deleted text shown in strikethrough and inserted text in bold underline as detailed below:

~~4 (vii) an evaluation of the potential or known environmental risks of any trigger level exceedances; and~~

**4(vii) a monthly water balance over the Tom's In-pit TSF accounting for all inputs (estimates of tailings slurry volumes and solids content; rainfall inputs); and outputs (evaporation and water recovery) to derive a monthly seepage estimate.**

5. Condition 4 (viii) of the Licence is deleted from the Licence.

~~4 (viii) a description of action(s) taken or planned to mitigate adverse environmental impacts.~~

6. Condition 6(a) and Table 5 of the Licence are amended by the addition of text in bold underline as shown below.

6(a) The Licensee must construct the infrastructure listed in Column 1 in accordance with the requirements set out in Column 2 of Table 5 **and at the location as specified in Column 3.**

Table 5: Infrastructure Requirement Table																
Column 1	Column 2	Column 3														
Infrastructure /equipment	Specifications (design and construction)	<u>Infrastructure/ equipment location</u>														
Embankment lifts to Cell 1 and Cell 2 at the TSF2	<ul style="list-style-type: none"><li>The TSF2 is upstream lifted on the existing footprint using mechanically compacted tailings in stages set out below to a final elevation of RL520m:</li></ul>															
	<table><tr><th>Stage</th><th>Description</th></tr><tr><td>1</td><td>Raise Cell 2 by 3m to RL514m</td></tr><tr><td>2</td><td>Raise Cell 1 by 2m to RL514m (can be constructed in parallel with Stage 1 lift)</td></tr><tr><td>3</td><td>Raise Cell 2 by 3m to RL517m</td></tr><tr><td>4</td><td>Raise Cell 1 by 3m to RL517m</td></tr><tr><td>5</td><td>Raise Cell 2 by 3m to RL520m</td></tr><tr><td>6</td><td>Raise Cell 1 by 3m to RL520m</td></tr></table>		Stage	Description	1	Raise Cell 2 by 3m to RL514m	2	Raise Cell 1 by 2m to RL514m (can be constructed in parallel with Stage 1 lift)	3	Raise Cell 2 by 3m to RL517m	4	Raise Cell 1 by 3m to RL517m	5	Raise Cell 2 by 3m to RL520m	6	Raise Cell 1 by 3m to RL520m
	Stage		Description													
	1		Raise Cell 2 by 3m to RL514m													
	2		Raise Cell 1 by 2m to RL514m (can be constructed in parallel with Stage 1 lift)													
	3		Raise Cell 2 by 3m to RL517m													
	4		Raise Cell 1 by 3m to RL517m													
	5		Raise Cell 2 by 3m to RL520m													
	6		Raise Cell 1 by 3m to RL520m													
<ul style="list-style-type: none"><li>Foundation preparation (on tailings) – remove vegetation and organic matters followed by ripping, moisture condition and compaction:</li></ul>																

	<ul style="list-style-type: none"> <li>Foundation preparation (on existing embankment) – remove vegetation and organic matters and remove and stockpile wearing course followed by ripping, moisture condition and compaction;</li> <li>Raise perimeter embankment by borrowing tailings from beach, moisture condition, place and spread, and compact to maximum 300 mm layers;</li> <li>Raise decant causeway by borrowing tailings or waste rock;</li> <li>Raise decant tower slotted concrete rings and place waste rock around;</li> <li>Repair or replace tailings piping and spigots;</li> <li>Repair or replace return water pump and piping;</li> <li>Minimum freeboard for each stage a combined total of the contingency storage allowance (minimum of 500mm) plus extreme storage allowance (1:100 AEP 72 storm of 221 mm);</li> <li>Corresponding central concrete decant tower is extended during each stage; and</li> <li>Repair or replace the lining at the underdrainage collection sump to achieve an impervious barrier for retaining collected seepage water from the TSF2.</li> </ul>	
<b><u>Spill containment earth bund for tailings pipeline corridor to Tom's in-pit TSF</u></b>	<ul style="list-style-type: none"> <li><b><u>Compacted 600-1000mm high earth bund.</u></b></li> <li><b><u>Constructed adjacent to tailings slurry and TSF return water pipeline corridor.</u></b></li> </ul>	<b><u>Tailings slurry and return water pipeline corridor</u></b>
<b><u>Tailings slurry and TSF return water pipelines</u></b>	<ul style="list-style-type: none"> <li><b><u>HDPE pipelines</u></b></li> <li><b><u>Pipelines fitted with flow meters in accordance with manufacturer specifications.</u></b></li> <li><b><u>Tailings slurry pipeline installed with two moveable discharge points at Tom's Pit.</u></b></li> </ul>	<b><u>Tailings slurry and return water pipeline corridor: Tom's Pit.</u></b>
<b><u>Decant return water pump</u></b>	<ul style="list-style-type: none"> <li><b><u>Pontoon mounted decant pump.</u></b></li> <li><b><u>Pump capacity of 25 to 32 litres per second.</u></b></li> </ul>	<b><u>Tom's Pit</u></b>

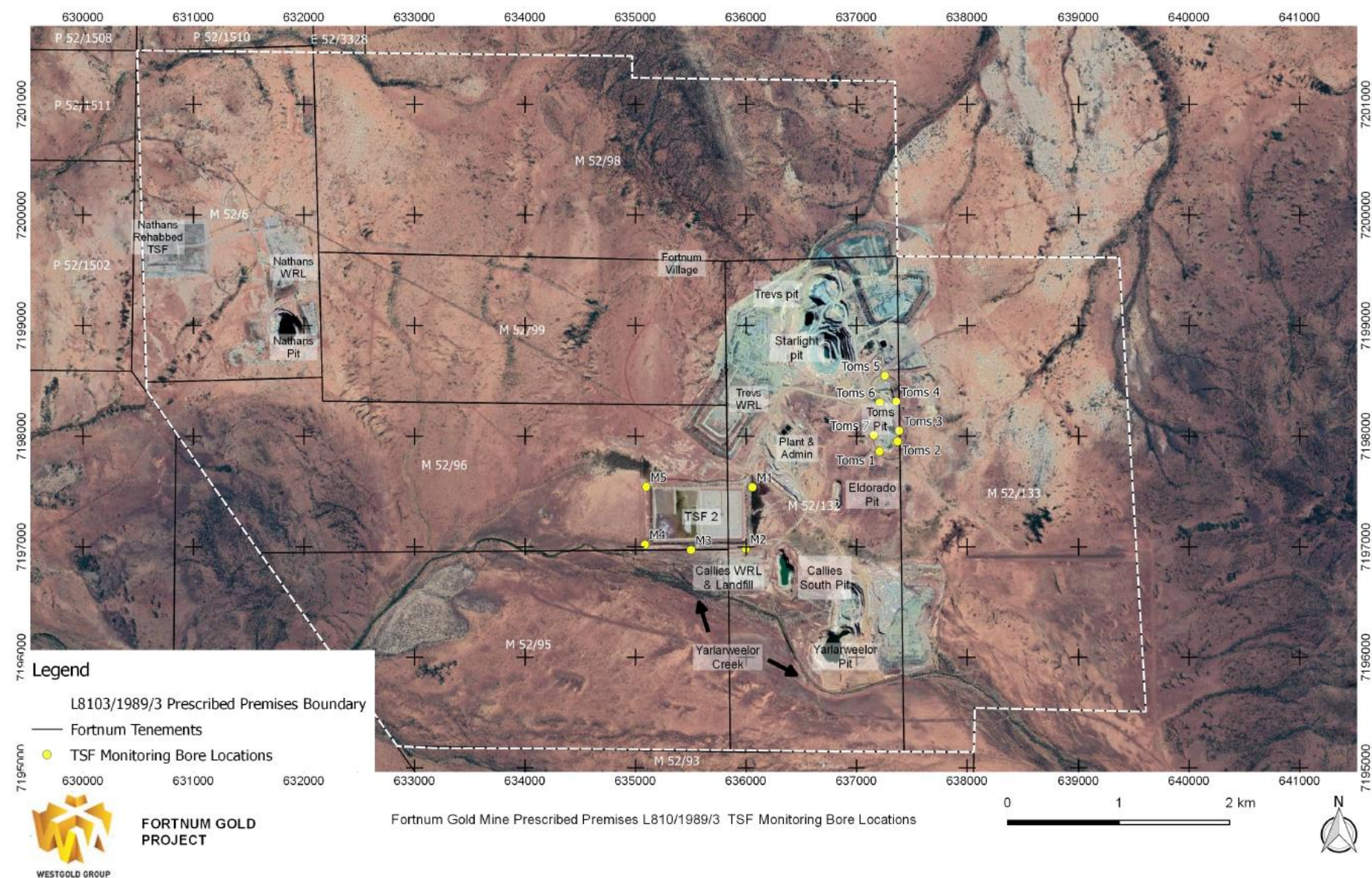
7. Table 6 of the Licence is amended by the addition of text in bold underline as shown below.

**Table 6: Infrastructure and equipment controls table**

<b>Column 1</b>	<b>Column 2</b>	<b><u>Column 3</u></b>
<b>Site infrastructure and equipment</b>	<b>Operational requirement</b>	<b><u>Infrastructure location</u></b>
<ul style="list-style-type: none"> <li>Nathan's Pit dewater pipeline - manufactured with high density</li> </ul>	<ul style="list-style-type: none"> <li>Weekly monitoring of pipeline integrity</li> <li>Cease pumping/flow upon detection of leak in pipeline (pumping/flow may recommence subject to</li> </ul>	:

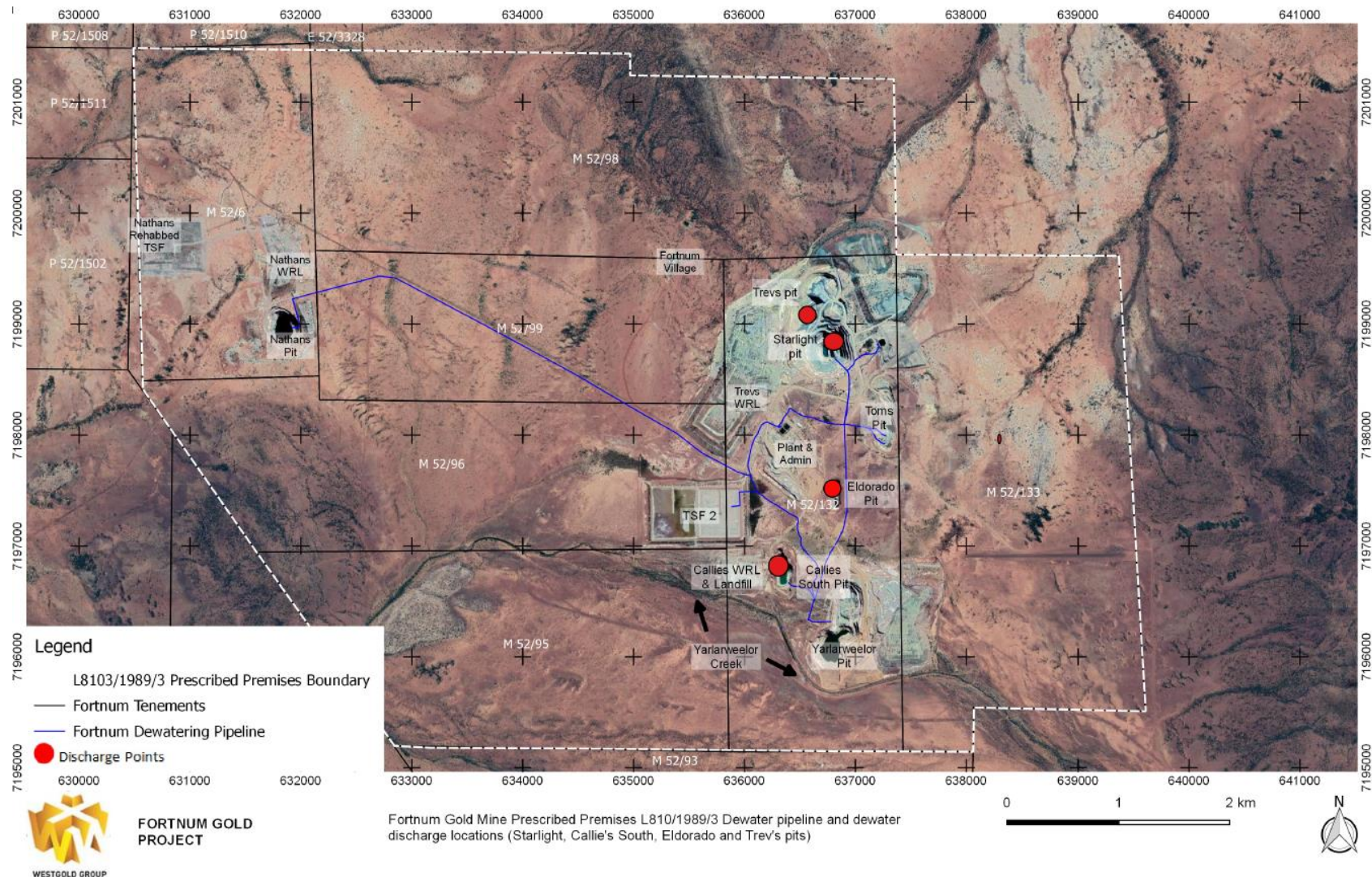
Column 1	Column 2	Column 3
Site infrastructure and equipment	Operational requirement	Infrastructure location
<p>polyethylene (HDPE)</p> <ul style="list-style-type: none"> <li>Existing dewatering /discharge pipe network</li> </ul>	<p>repair of leak).</p>	
<p><u>Tailings slurry and return water pipelines</u></p>	<p><u>Inspections</u></p> <ul style="list-style-type: none"> <li><u>Daily inspections of the integrity of the pipelines</u></li> </ul> <p><u>Monitoring</u></p> <ul style="list-style-type: none"> <li><u>Continuous measurement of tailings slurry flow rate.</u></li> <li><u>Continuous measurement of tailings return water flow rate.</u></li> </ul> <p><u>Contingency actions</u></p> <ul style="list-style-type: none"> <li><u>Immediately cease flow in the event of a leak, until the leakage is repaired.</u></li> </ul>	<p><u>Refer to Appendix 1 of this Amendment Notice 3</u></p>
<p><u>Tom's In-pit TSF</u></p>	<p><u>Tailings deposition &amp; decant return</u></p> <ul style="list-style-type: none"> <li><u>Deposition of tailings from two spigot locations at the pit rim, selectively operated to control the decant pond location and size.</u></li> <li><u>An annual average water return of least 60% for tailings deposited to Tom's In-pit TSF.</u></li> </ul> <p><u>Inspections</u></p> <p><u>Daily inspection including (but not limited to):</u></p> <ul style="list-style-type: none"> <li><u>Condition of tailings distribution and return water pipelines</u></li> <li><u>Tailings spigots</u></li> <li><u>Tailings deposition</u></li> <li><u>Decant pond location and level</u></li> <li><u>Decant pump location and condition</u></li> </ul> <p><u>Monthly inspections including (but not limited to):</u></p> <ul style="list-style-type: none"> <li><u>Condition of tailings distribution and return water pipelines</u></li> <li><u>Tailings spigots</u></li> <li><u>Decant pond location and level</u></li> <li><u>Decant pump location, access and condition</u></li> <li><u>Condition of groundwater monitoring bores</u></li> <li><u>Assessment of water recovery rate</u></li> </ul> <p><u>Freeboard requirement</u></p> <ul style="list-style-type: none"> <li><u>Maintain freeboard including allowance for a 1:100 AEP 72 hour storm and an additional 500mm contingency freeboard.</u></li> </ul>	<p><u>Refer to Appendix 1 of this Amendment Notice 3</u></p>

8. The Figure below is added to the Attachment 1: TSF Monitoring Bore Location Map as Attachment 1B.



9. Attachment 4 (as listed as Figure 2 in Amendment Notice 2 of the Licence) is replaced with the new Attachment 4 as shown below.

**Attachment 4: Dewater pipeline and discharge locations (Starlight, Callie's South, Eldorado and Trev's Pits)**



## Licence L8103/1989/3 – Amendment Notice 3





## Appendix 2: Key documents

	Document title	In text ref	Availability
1	<p>Application to amend Licence L8103/1989/3 for Tom's in-Pit Tailings Storage Facility, including:</p> <ul style="list-style-type: none"> <li>- Application form</li> <li>- Tenement summary report</li> <li>- Site plan</li> <li>- Supporting documentation report</li> <li>- Hydrogeological assessment of Tom's Pit, dated July 2018</li> <li>- Tom's Pit TSF Design report, dated 25 July 2018</li> <li>- In-Pit TSF peer review report, dated 24 July 2018</li> </ul>	Application /Rockwater 2018	DWER records number – A1711858
2	<p>Further information supplied by the applicant, including:</p> <ul style="list-style-type: none"> <li>- Risk assessment document</li> <li>- Tom's Pit monitoring bore locations report, dated October 2018</li> <li>- Tailings characterisation report, dated November 2018</li> </ul>	Application	DWER records number – A1737450
3	Memorandum – technical advice – Fortnum Gold Mine proposed tailings discharge to Tom's Pit, dated 9 January 2019.	N/A	DWER records number – A1756054
4.	Comments from Department of Mines, Industry Regulation and Safety, dated 18 January 2019	DMIRS 2018	DWER records number - A1757065
5	Aragon Resources, Fortnum Gold Mine – Tom's Pit TSF operations, maintenance and surveillance manual – rev O, dated 17 September 2018	Application	DWER records number – A1761537
6	Aragon Resources correspondence – update to application confirming dewater is not planned to be discharged to Tom's Pit	Application	DWER records number – A1761555

### Appendix 3: Summary of Licence Holder comments

The Licence Holder was provided with the draft Amendment Notice on 22 February 2019 for review and comment. The Licence Holder responded on 25 February 2019 waiving the remaining comment period. The following comments were received on the draft Amendment Notice:

Condition	Summary of Licence Holder comment	DWER response
- Decision	Reference to removal of condition 3 queried as there is a condition 3.	Noted and amended text to fix error
Table 1	Reference to Thallium as Ti not Tl	Corrected