

## **Appendix C**

# **Dam Safety Emergency Plan (DSEP)**

## 1 INTRODUCTION

This Dam Safety Emergency Plan (DSEP) applies to Tailings Storage Facility 3 (TSF3) at the Moolart Well Gold Project (MWGP), a gold mine located approximately 130 km north of Laverton and 790 km northeast of Perth, Western Australia. MWGP is owned by Regis Resources Limited (RRL).

This is a live document, this version is presented as part of the design of embankment construction on the facility. The DSEP should be reviewed at least annually.

## 2 RESPONSIBILITIES

Operational responsibilities for the dam must be allocated to:

- Tailings deposition and decant operation: Process Plant Manager (PPM)/ Process Plant Supervisor (PPS)
- Routine inspections and monitoring: Process Plant Supervisor (PPS)
- Surveillance and safety reporting: CMW or an independent 3<sup>rd</sup> Party
- Routine maintenance: Maintenance Supervisor (MS)/ PPM

An emergency response would typically be initiated by the PPM, PPS or MS and the emergency coordinated by a delegated member/s of the Emergency Response Team (ERT).

## 3 EMERGENCY IDENTIFICATION, EVALUATION AND CLASSIFICATION

TSF3 has been designed with an adequate factor of safety against failure but unpredictable events due to nature or human intervention may compromise the integrity of the facility. For this reason, a matrix of response is required to be actioned should such an event occur. To assist with this several levels of alert have been provided where a different level of awareness and notification is required.

### Emergency Action Plans

One alert level and two levels of action have been identified:

<b>Level 1</b>	<b>Alert Status – early indications</b>
<b>Level 2</b>	<b>Damage Apparent – possible impending failure</b>
<b>Level 3</b>	<b>Catastrophic – dam failure is or has occurred</b>

Procedures have been identified for each level of emergency in Figures C1, C2 and C3 (at the back of this document).

### Reporting Procedures

#### 3.2.1 Level 1 – Alert Status

Any unusual behaviour in the operation of the facility should always be evaluated. The following events fall into this category:

- New seepage is occurring from the embankment.
- New wet soft areas have developed on the embankment.
- Minor cracking on crest or batter slopes of the embankment.

- Movement readings indicate a significant increase in movement (refer TARP document).
- Lack of freeboard in TSF3 (i.e. operational freeboard  $\geq 0.3$  m).

If any of the above are observed, immediate action should be taken in accordance with the Level 1 Action Plan (Plate C1).

### 3.2.2 Level 2 – Damage Apparent

The advancement from a Level 1 to a Level 2 indicates the dam is suffering some distress, care should be taken not to be complacent in identifying a potential Level 2 event, since it is possible that a Level 2 situation can progress to a Level 3 in a short period of time where it would be impossible to prevent an incident.

In this category damage is already occurring, or has occurred, and there is potential for damage to a section of the dam to occur (partial dam weakening). The following are indicative of a Level 2 category:

- Sudden increase in the volume of seepage flow, erosion is noted.
- Flowing seepage water noted from upper sections of the embankment.
- Seepage water is cloudy or is discoloured, tailings observed in the water (indicating possible internal piping).
- Localised slumping is evident of the embankment crest or batter slopes.
- Sinkholes or other movements occur in deposited tailings.
- Discontinuity of alignment of dam crest or profile is noted in excess of 100mm.
- Collected rainfall is in danger of overtopping the dam, or significant overtopping of the dam is occurring from wave action and/or wind set up.

If any of the above take place immediate action is required in accordance with Level 2 Action Plan (Plate C2). The undertaking of any repair or remedial works shall only be initiated if it is SAFE to do so especially if heavy equipment is to be used. Keep clear unless absolutely necessary.

Restrict access to TSF3, notify downstream personnel, close potentially affected roads, advise government agencies and design consultant.

### 3.2.3 Level 3 – Embankment Failure or Break

This level of emergency is called for when one or more of the following has occurred, access to be limited:

- Embankment collapse.
- Breach of embankment is starting to occur, resulting in loss of tailings or floodwater.
- Overtopping and/or erosion of the embankment.
- Outflow of tailings and/or rain water.
- Mobilisation and outflow of tailings due to liquefaction by earthquake.

Actions must be taken immediately in accordance with Level 3 Action Plan (Plate C3) including advising downstream personnel, close roads, advise design consultants, government agencies. Appoint an Emergency Services Coordinator. Restrict access to the dam and priorities those who enter the area, set up road blocks to TSF3 area. Enter with extreme care and initiate hazard initiatives and management plan.

## 4 NOTIFICATION

As detailed above, notification of an emergency situation to relevant authorities and organisations is the responsibility of the PPM, PPS or MS. The contact details of all individuals and organisations are maintained in the site emergency management plan.

- PPM / PPS – RRL
- PPS – RRL
- Police, Fire and Ambulance. State Emergency Services
- Regional Inspector of Mines DMIRS, DWER Kalgoorlie
- CMW Geosciences Pty Ltd (Perth Office) or Dams Safety Adviser

## 5 ACCESS AND COMMUNICATIONS

Access to TSF3 is from the main access road which is located to the west of the facility.

MWGP operates an extensive two-way radio and an internal phone system.

## 6 INUNDATION MAP

The result from breach modelling indicates that the maximum (peak) run-out flow from a 'dam break' under 'worst-case' (Probable Maximum Precipitation, PMP) rainy day conditions will be approximately 751 to 1,539 m<sup>3</sup>/s over 2 hours.

The flow in the project area is expected to flow to the north via channel on the eastern catchment, and to the west into the central catchment trending north.

Flow towards the plant or the camp to the north and to the south, respectively, is considered highly unlikely. A flood from the western and most of the southern embankments would be diverted through low 'channels' towards the west and into the pits. A flood from the east and southeast of TSF3 will flow east to a main creek channel that grades to the north, along the eastern side of TSF1. This flow is at least 800 m from the camp.

The following consequences of a dam break are considered most likely to be:

- A dam break is unlikely to inundate the plant or the camp, however, there is potential for loss of life due to the presence of infrastructure along the western corridor of TSF3.
- No public infrastructure is likely to be affected.
- Economic loss from permanent loss of assets including infrastructure, repairs of damaged sections of TSF, damage to plant and local mine site roads.
- Limited impact on heritage value areas and on the natural environment, and effects on native flora and fauna downstream of TSF3. Damage would reasonably be expected to be concentrated in the ephemeral streams.
- Prolonged damage to the natural environment with potential for contamination of soils and vegetation distress requiring environmental 'clean-up', and permanent damage to heritage areas with remediation possible but difficult.

An Inundation Map is shown below.

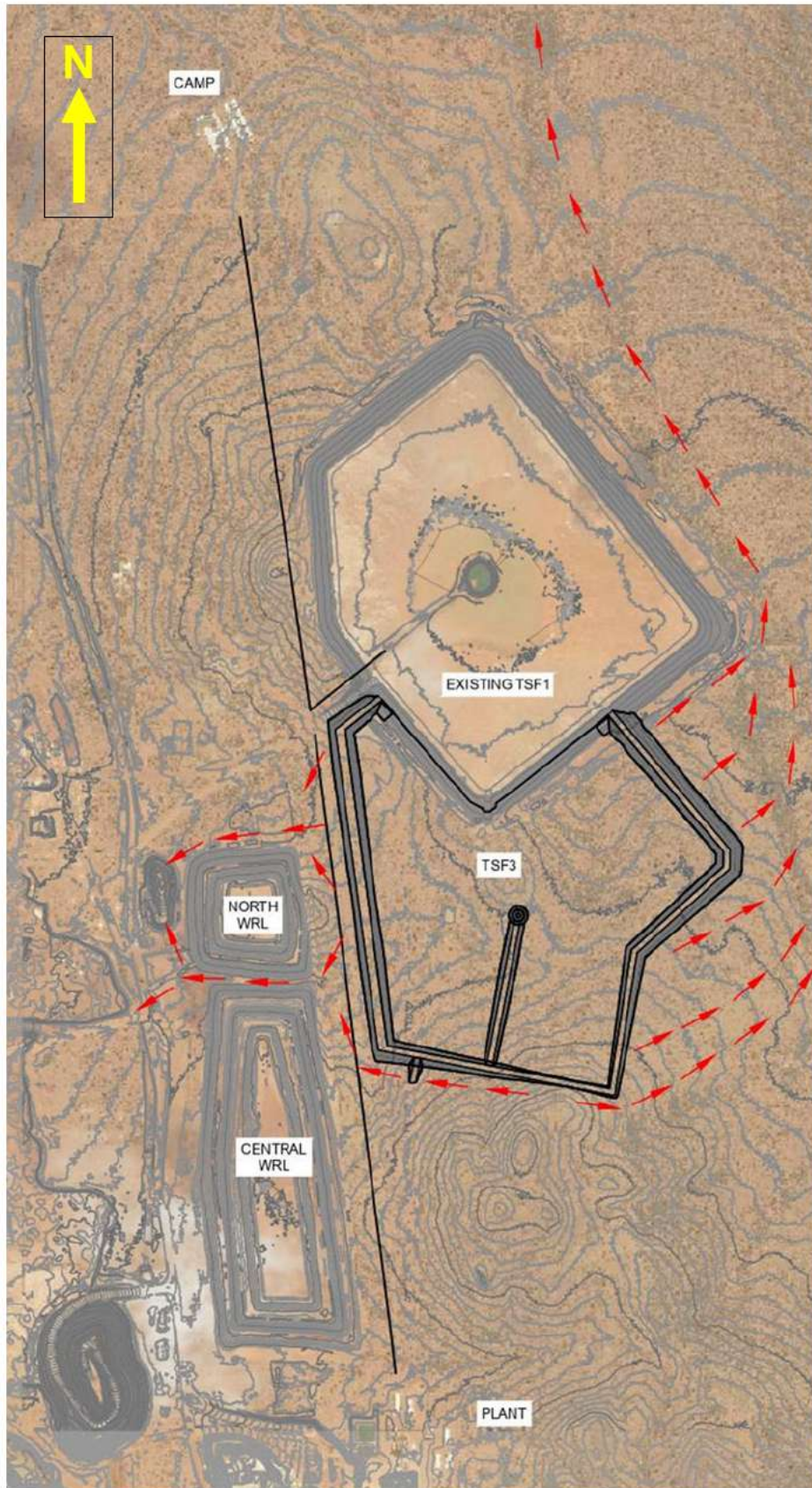


Figure: Inundation Plan (ref: CMW (2021) Design Report)

## 7 PREVENTATIVE ACTIONS

Possible preventative actions for various trigger levels are provided in the table below.

<b>Table: Preventative Actions</b>		
<b>Trigger Level</b>	<b>Issue</b>	<b>Actions</b>
1	<ul style="list-style-type: none"> <li>• New seepage is occurring from the embankment</li> <li>• Minor cracking of embankment</li> <li>• Lack of freeboard</li> </ul>	<ul style="list-style-type: none"> <li>• Monitor decant pond level and extent on TSF3</li> <li>• Reduce decant water pond, as appropriate</li> <li>• Monitor seepage for flow and turbidity</li> <li>• Monitor cracks for additional movement. Escalate to level 2 if movement continues.</li> <li>• Reduce decant water pond level</li> </ul>
2	<ul style="list-style-type: none"> <li>• Sudden increase in seepage, turbid seepage occurring from the embankment</li> <li>• Slumping of embankment (sinkholes etc)</li> </ul>	<ul style="list-style-type: none"> <li>• Monitor decant pond level and extent on TSF3</li> <li>• Reduce decant water pond, as appropriate</li> <li>• Monitor seepage for flow and turbidity</li> <li>• Buttress the embankment downstream of the slump. Escalate to level 3 if movement continues.</li> </ul>
	<ul style="list-style-type: none"> <li>• Imminent overtopping of embankment</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce decant water pond level on facility. Escalate to Level 3 if pumps etc can't cope (i.e. level continues to rise)</li> </ul> <p>All of the above: notification of personnel from downstream (i.e. plant)</p>
3	<ul style="list-style-type: none"> <li>• Embankment collapsing</li> <li>• overtopping of embankment</li> </ul>	<ul style="list-style-type: none"> <li>• Evacuation of personnel from downstream of TSF3 and restrict access to TSF3</li> </ul>

The following completes the DSEP:

- Dam Location and Description Summary
- Inundation Map

## **TSF3 – Dam Safety Plan – Summary Information**

**Location:** Moolart Well Gold Project  
TSF3 approx. centre at 6,947,000 m N, 437,000 m E (MGA Zone 51)

### **Description:**

TSF3 will be an irregular 'octagonal' conventional single paddock (cell) facility abutting existing Tailings Storage Facility 1 (TSF1) to the north. TSF3 will have an impoundment area of approximately 96.8 ha, a maximum embankment height of 15.0 m (final crest RL 555.0 m AHD), and it will be constructed out as part of the MWGP mining operations with the TSF being located partially within a waste dump.

The embankment of TSF3 will be a zoned embankment comprising an upstream zone of low permeability roller compacted clayey mine waste and a waste dump downstream.

**Spillway:** No spillway

**Catchment Area:** approx. 92.3 ha (internal)

**Consequence Category:** Significant

### **Alert Levels:**

Level 1	Alert Status – early indications
Level 2	Damage Apparent – possible impending failure
Level 3	Catastrophic – dam failure is or has occurred

**Notification Protocols:** Refer to flowcharts at front of DSEP

**Flood Plain Name:** Not applicable

### **Consequences of Dam Failure:**

The flow in the project area is expected to flow to the north via channel on the eastern catchment, and to the west into the central catchment trending north.

Flow towards the plant or the camp to the north and to the south, respectively, is considered highly unlikely. A flood from the western and most of the southern embankments would be diverted through low 'channels' towards the west and into the pits. A flood from the east and southeast of TSF3 will flow east to a main creek channel that grades to the north, along the eastern side of TSF1. This flow is at least 800 m from the camp

**LEVEL 1 - ACTION PLAN  
"ALERT STATUS"**

<b>Process Plant Manager:</b>	04.. ... ..
<b>Process Plant Supervisor:</b>	04.. ... ..
<b>CMW Geosciences:</b>	██████████

**CRITERIA (any of the following)**  
 : unusual new seepage from base of embankment  
 : wet areas developing on face of embankment  
 : cracking appears on crest or face on embankment

Notify Process Plant Supervisor

Inspect area

Is Level 1  
Criterion Met

**NO**

Downgrade alert enter in log

Forward to Process Plant Manager for review

**YES**

Notify Process Plant Manager Immediately

Commence monitoring seepage flows instrumentation

Seek technical advice from CMW Geosciences or an independent 3<sup>rd</sup> party

Now stabilised?

Proceed to Level 2 if not controlled initiate new controls

Is the situation stable?

Prepare incident report if required.

Continue monitoring with Frequent inspections

Notify CMW Geosciences or the independent 3<sup>rd</sup> party of any change

Review "Alert" status after reasonable period of stability

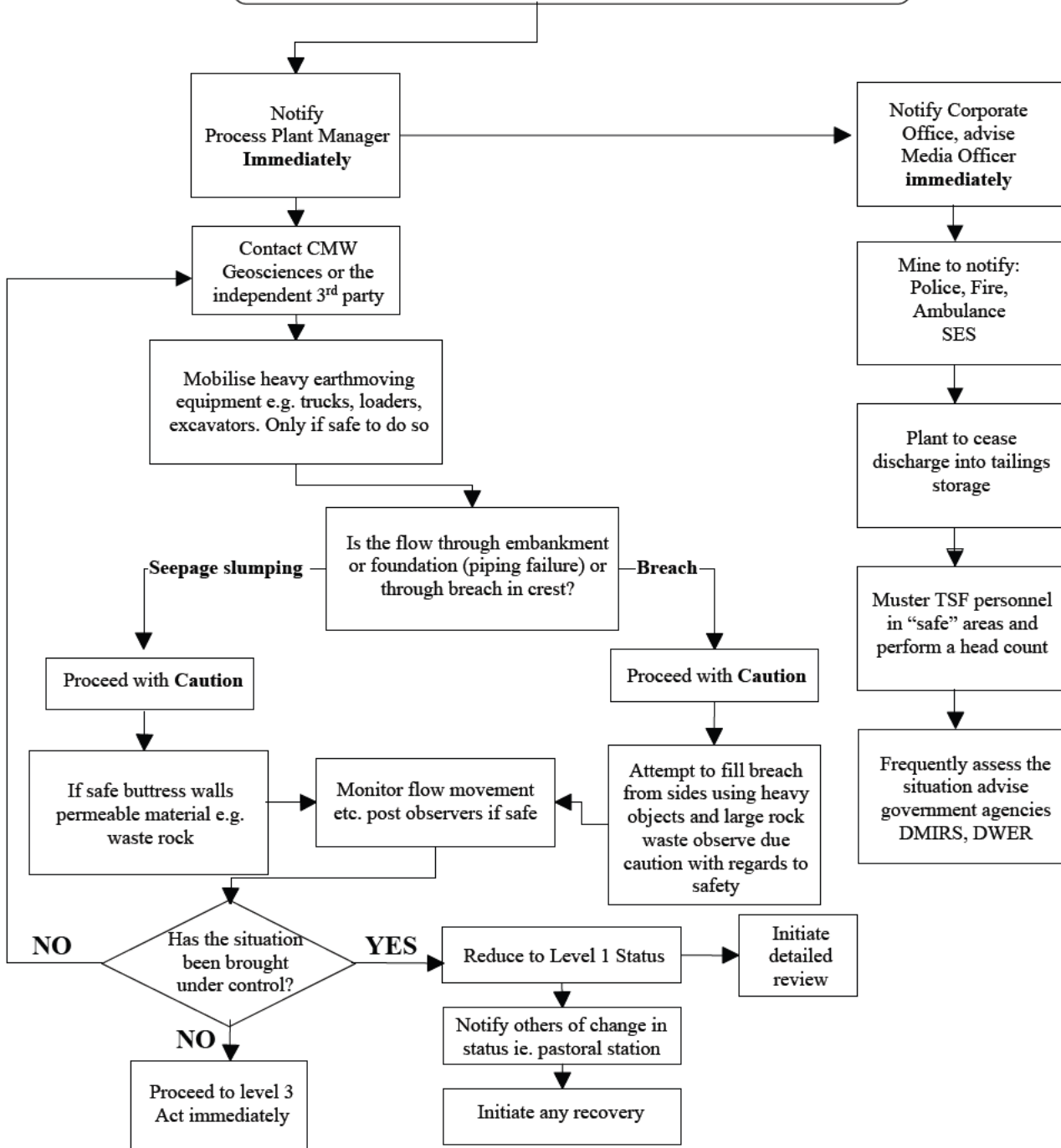


## LEVEL 2 - ACTION PLAN “DAMAGE APPARENT”

<b>Process Plant Manager:</b>	04.. ... ..
<b>Process Plant Supervisor:</b>	04.. ... ..
<b>State Emergency Services (SES):</b>	(08) .... ..
<b>CMW Geosciences:</b>	██████████

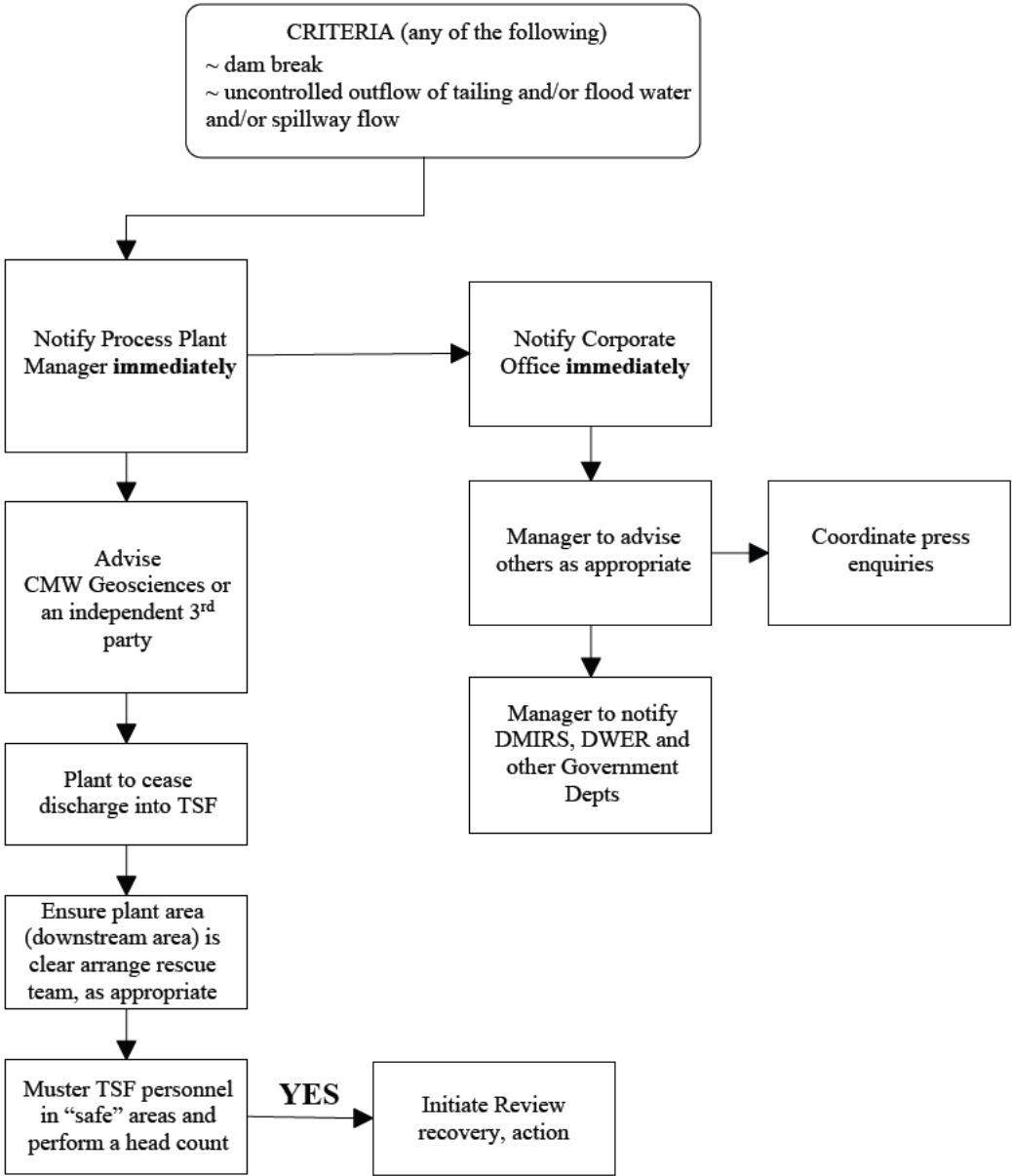
- CRITERIA (any of the following)**

  - : erosion hole formed water
  - : leakage >50 litres per second
  - : overtopping of dam imminent, or waves overtopping
  - : breach of dam imminent
  - : increasing seepage flow rate, turbid flows
  - : slumps on dam face
  - : discontinuity of dam alignment



**LEVEL 3 - ACTION PLAN  
 “DAM FAILURE IS/HAS OCCURRED”**

<b>Process Plant Manager:</b>	04.. ... ..
<b>Process Plant Supervisor:</b>	04.. ... ..
<b>CMW Geosciences:</b>	██████████



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**EMERGENCY CONTACT NUMBERS as at .. / .. / 2021**

**Regis Resources Limited**

**Process Plant Manager**

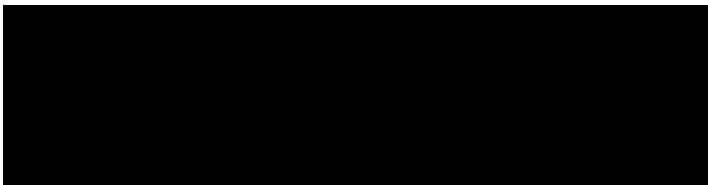
Currently: ...  
Mobile: 04.. ....  
Email: ...

**Process Plant Supervisor**

Currently: ...  
Mobile: 04.. ....  
Email: ...



**Consultants**



**Review Consultant:** *to be appointed, as appropriate*  
Mobile: -

**SES Emergency Line** 132 500  
**Local SES** 132 500

**Mine Rescue** -  
Work phone: -  
Mobile phone: -

**DMIRS**  
Inspector: -  
Phone Number: -

**DWER**  
Inspector: -  
Phone Number: -

# **Appendix D**

## **Risk Register**

Table - Risk assessment summary								
Risk identification		Risk analysis (prior to management / control measures)			Risk management	Risk analysis (subsequent to management / control measures)		
Risk	Possible result	Consequence	Likelihood	Risk matrix rating	Management / control measures	Consequence	Likelihood	Risk matrix rating
Tailings pump breakdown (at plant)	Spillage of slurry: Vegetation distress. Loss of production.	Moderate (3)	Possible (3)	Medium (9)	Use of standby pump. Use of automated systems for failure notification. Regular inspections and maintenance of pump.	Minor (2)	Unlikely (2)	Medium(4)
Tailings line leakage or rupture	Spillage of slurry: Vegetation distress. Loss of production.	Moderate (3)	Possible (3)	Medium (9)	Construction of bunded pipeline corridor. Use of leakage detection system. Regular inspection of TSF and pipeline.	Minor (2)	Unlikely (2)	Medium (4)
Seepage from the TSF	Rising groundwater levels leading to vegetation distress and seepage.	Major (4)	Possible (3)	High (12)	Minimise decant pond on TSF at all times. Installation/utilization of monitoring bores to measure groundwater levels and quality. Recovery of seepage water back to TSF/directly to the plant.	Moderate (3)	Unlikely (2)	Medium (6)
Decant pump breakdown	Increased size of decant pond size. Increased seepage.	Moderate (3)	Possible (3)	Medium (9)	Use of standby pump. Minimise decant pond on TSF at all times. Use of automated systems for failure notification. Regular inspections and maintenance of pump.	Minor (2)	Possible (3)	Medium (6)
Return water line leakage or rupture	Local seepage. Vegetation distress and seepage.	Moderate (3)	Possible (3)	Medium (9)	Construction of bunded pipeline corridor. Use of automated leakage detection system. Regular line inspection and maintenance.	Minor (2)	Unlikely (2)	Medium (4)
Rainfall event	TSF collapse or overtopping. TSF rupture-unconfined tailings. Contamination of soil and vegetation loss.	Severe (5)	Unlikely (2)	High (10)	Decant water pond is kept to a minimum. Allowance for 1:100 year AEP 72 hours storm event. Operational freeboard is kept to 300mm (minimum). Daily inspections.	Severe (5)	Rare (1)	High (5)

Risk identification		Risk analysis (prior to management / control measures)			Risk management	Risk analysis (subsequent to management / control measures)		
Risk	Possible result	Consequence	Likelihood	Risk matrix rating	Management / control measures	Consequence	Likelihood	Risk matrix rating
Rainfall Event	Downstream Embankment erosion.	Minor (2)	Possible (3)	Medium (6)	Checks for signs of erosion after rainfall events. Crest sloped inwards to shed water into the TSF. Embankment downstream slope covered with rock armour to protect from erosion if required.	Minor (2)	Unlikely (2)	Medium (4)
	Increase size of decant pond – Increase in seepage.	Moderate (3)	Possible (3)	Medium (9)	Minimise the size of the water pond. Undertake regular checks of pond and pumps to assess size and depth.	Moderate (3)	Unlikely (2)	Medium (6)
Water runoff	Downstream embankment erosion.	Minor (2)	Unlikely (2)	Medium (4)	Rock armour to decrease embankment wall erosion to staged embankments.	Slight (1)	Rare (1)	Low (1)
Wind	Dust generation. Tailings dust inhalation.	Moderate (3)	Likely (4)	High (12)	Rotate slurry spigots around TSF perimeter embankments. Rehabilitate when decommissioned. Salt crusting should lower dust risk.	Minor (2)	Unlikely (2)	Medium (4)
Earthquake	TSF rupture. Release of tailings. Loss of human life, fauna and/or vegetation. Loss of production.	Severe (5)	Unlikely (2)	High (10)	Adequate design, operate TSF as per design and using Tailings Management Plan. Implementation of Tailings Spill Management Plan. Independent annual audits of the TSF. Regular mill personnel inspections	Severe (5)	Rare (1)	High (5)