

# Environmental Assessment Report

## Centre Pit Expansion

*Savage River Mine*

Grange Resources  
(Tasmania) Pty Ltd

*April 2021*



ENVIRONMENT PROTECTION AUTHORITY

## Environmental Assessment Report

Proponent	<i>Grange Resources (Tasmania) Pty Ltd</i>
Proposal	<i>Centre Pit Expansion</i>
Location	<i>Savage River Mine</i>
NELMS no.	10364/1
Electronic Folder No.	EN-EM-EV-DE-259058-001.001
Document No.	D21-45987
Class of Assessment	2B

## Assessment Process Milestones

20 December 2019	Referral received by the Board
11 February 2020	Guidelines Issued
16 January 2021	Start of public consultation period
13 February 2021	End of public consultation period
23 March 2021	Date draft conditions issued to proponent
14 April 2021	Statutory period for assessment ends

## Acronyms

AMD	Acid and Metalliferous Drainage
ANC	Acid Neutralising Capacity
Board	Board of the Environment Protection Authority
CP	Centre Pit
CPN	Centre Pit North
CPS	Centre Pit South
DPEMP	Development Proposal and Environmental Management Plan
DPIPWE	Department of Primary Industries, Parks, Water and Environment
EIA	Environmental impact assessment
EMPC Act	<i>Environmental Management and Pollution Control Act 1994</i>
EMPCS	Environmental management and pollution control system
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i>
LUPA Act	<i>Land Use Planning and Approvals Act 1993</i>
NAF	Non-Acid Forming
NC Act	<i>Nature Conservation Act 2002</i>
PAF	Potentially Acid Forming
RL	Reduced Level
RMPS	Resource management and planning system
ROM	Run of Mine
SD	Sustainable development
SRRP	Savage River Rehabilitation Program
TSP Act	<i>Threatened Species Protection Act 1995</i>

---

## Report Summary

This report provides an environmental assessment of Grange Resources (Tasmania) Pty Ltd.'s proposed centre pit expansion at Savage River Mine.

Grange Resources (Tasmania) Pty Ltd proposes to dewater and recommence mining in Centre Pit North and Centre Pit South, and merge them into one combined pit, referred to as Centre Pit. The current pit design involves a cut back to the pit walls and extending the pit depth, with an excavation of approximately 31 Mt of ore and 255 Mt of waste, of which 106 Mt is classified as Potentially Acid Forming.

The proposal also includes the development of a new waste rock dump, designed to contain 11 million m<sup>3</sup> of material.

This report has been prepared based on information provided in the Environmental Impact Statement. Relevant government agencies and the public were consulted, and their relevant submissions, representations and comments considered as part of the assessment.

Further details of the assessment process are presented in section 1 of this report. Section 2 describes the statutory objectives and principles underpinning the assessment. Details of the proposal are provided in section 3. Section 4 reviews the need for the proposal and considers the proposal, site and design alternatives. Section 5 summarises the public and agency consultation process and the key issues raised in that process. The detailed evaluation of key issues is in section 6, and other issues are evaluated in section 7. Issues not assessed by the Board are listed in section 8. The report conclusions are contained in section 9.

Appendix 1 contains a table of proponent management measures. Appendix 2 contains the environment protection notice for the proposal.

## Contents

1	Approval Process.....	1
2	SD Objectives and EIA Principles.....	2
3	The Proposal .....	3
4	Need for the Proposal and Alternatives.....	9
5	Public and Agency Consultation .....	10
6	Evaluation of Key Issues.....	11
6.1	Dewatering Centre Pit South.....	12
6.2	Groundwater and surface water management (mining stages 1, 2 and 3 post CPS dewatering) .....	23
6.3	Mine waste management.....	29
7	Other Issues assessed by the Board .....	35
8	Issues not assessed by the Board .....	44
9	Report Conclusions.....	45
10	Report Approval.....	46
11	References.....	47
12	Appendices.....	48

## I Approval Process

As required by section 27(1) of the *Environmental Management and Pollution Control Act 1994* (EMPC Act), Grange Resources (Tasmania) Pty Ltd (Grange) referred the proposal to the Board of the Environment Protection Authority (the Board) on 20 December 2019<sup>1</sup>. The proposal is defined as a 'level 2 activity' under clauses 2 (e) and 5 (c) of Schedule 2 of the *Environmental Management and Pollution Control Act 1994* (EMPC Act), being a mine and mineral works.

The Board required that information to support the proposal be provided in the form of an Environmental Impact Statement (EIS) prepared in accordance with guidelines issued by the Board on 2 November 2020. Several drafts of the EIS were submitted to EPA Tasmania for review against the guidelines prior to finalisation and acceptance on behalf of the Board on 21 December 2020.

The EIS was released for public inspection for a 28-day period commencing on 16 January 2021. Advertisements were placed in *The Advocate Newspaper* and on the EPA website. The EIS was also referred to relevant government agencies for comment. No representations were received.

The assessment has been undertaken cognisant of the *Goldamere Pty Ltd (Agreement) Act 1996* (Goldamere Act). The Goldamere Act limits the proponent's liability under Tasmanian law and indemnifies the Company for certain environmental liabilities arising from past operations, including any contamination, pollutant or pollution on, beneath or emanating from the Land which has been caused by past operations.

It provides overriding provisions in relation to Tasmanian legislation and provides for the approval and ratification of an Agreement with respect to mining operations at Savage River.

It also limits the State's ability to impose a condition or restriction in relation to meeting measurable environmental standards in respect of water quality, soil contamination or any other criterion which may be affected by contamination or pollution caused before the commencement of the Agreement. It does not however limit the requirement for Grange to operate to Best Practice Environmental Management, as defined by the EMPC Act.

Finally, pre-stripping works of the Centre Pit South east wall down to 245m RL were approved by the EPA Director on 7 October 2019. This is referred to as mining Stage 01A and is shown in Figure 17 of the EIS. Works are expected to be completed by May 2021.

The proposal referred to the Board for assessment does not include these works.

---

<sup>1</sup> The proposal was first referred to the Board on 17 June 2019. Further information to inform the proposal was subsequently submitted on several occasions between 17 June 2019 and 20 December 2019, at which time there was sufficient understanding of the proposal to proceed to assessment.

---

## 2 SD Objectives and EIA Principles

The proposal must be considered by the Board in the context of the objectives of the Resource Management and Planning System of Tasmania (RMPS), and in the context of the objectives of the Environmental Management and Pollution Control System (EMPCS) (both sets of objectives are specified in Schedule 1 the EMPC Act). The functions of the Board are to administer and enforce the provisions of the Act, and in particular to use its best endeavours to further the RMPS and EMPCS objectives.

The Board must assess the proposal in accordance with the Environmental Impact Assessment Principles defined in Section 74 of the EMPC Act.

### 3 The Proposal

Grange proposes to dewater and recommence mining in Centre Pit North (CPN) and Centre Pit South (CPS) at its Savage River Mine (Figure 1), and merge the pits into one combined pit, referred to as Centre Pit. The current pit design involves a cut back to the pit walls and extending the depth, with an excavation of approximately 31 Mt of ore and 255 Mt of waste, of which 106 Mt is classified as Potentially Acid Forming (PAF). The proposed final pit will have a finished depth of -25 m RL<sup>2</sup>.

Centre Pit will be mined in a series of stages (stage 1, 2, and 3, see Figure 2) over 13 years.

The EIS indicates that stage 3 may be mined before stage 2, or alternatively mined concurrently, depending on strategic priorities and requirements closer to the time.

CPS currently contains approximately 2.7 GL of water to an estimated depth of 50 m. Grange propose to dewater the pit at the same time as the commencement of mining (stage 1), discharging to Savage River via the South Lens water body (historic flooded pit). Dewatering is expected to take between 78 and 312 days to complete, dependant on pumping rate (Table 7 of the EIS).

CPN was subsequently backfilled with waste rock on cessation of mining in 2001. It is estimated that 0.58 GL of water is also stored within the void space of this pit. According to the EIS, CPN may not require a program of specific dewatering as such, rather it will dewater naturally (seep) to Centre Pit during mining (stages 1 and 3).

Figure 3 illustrates the current storage of water in the pits, topography, and northern extent of stage 1 mining.

Waste rock excavated during mining will be placed on the existing B Dump and Southern Dump and Broderick Creek Dump. A new waste rock dump will also be created adjacent to the current mill, designed to contain 11 million m<sup>3</sup> of material. In addition, waste rock will be used to construct a buttress for the Main Creek Tailings Dam and Emergency Tailings Dam walls to improve the long-term factor of safety.

Grange has indicated that it does not intend to increase the rate of ore processed beyond that currently permitted, being 3 Million tonnes per annum. Tailings produced from the processing of ore from Centre Pit will be deposited into either the existing Main Creek Tailings Dam or South Deposit Tailings Storage Facility, depending on operational requirements at the time of processing.

The proposal will also involve the following related elements:

- Construction of a flood levee along Savage River between CPN and South Lens to prevent water from entering the pit during extreme events.
- Construction of a haul road to the west of the proposed pit.
- Widening of the western Savage River crossing and haul roads on site.
- Redirection of the Emergency Tailings Dam spillway.

Note, where referred to in this report, CPS means the current flooded pit, and CPN means the previously mined pit to the north which currently contains waste rock back fill.

---

<sup>2</sup> CP South and CP North were previously mined to 70 m RL and 30 m RL respectively.

Centre Pit where referred to in this report means the proposed expansion of CPS and CPN, and the mining of stages 1, 2 and 3.

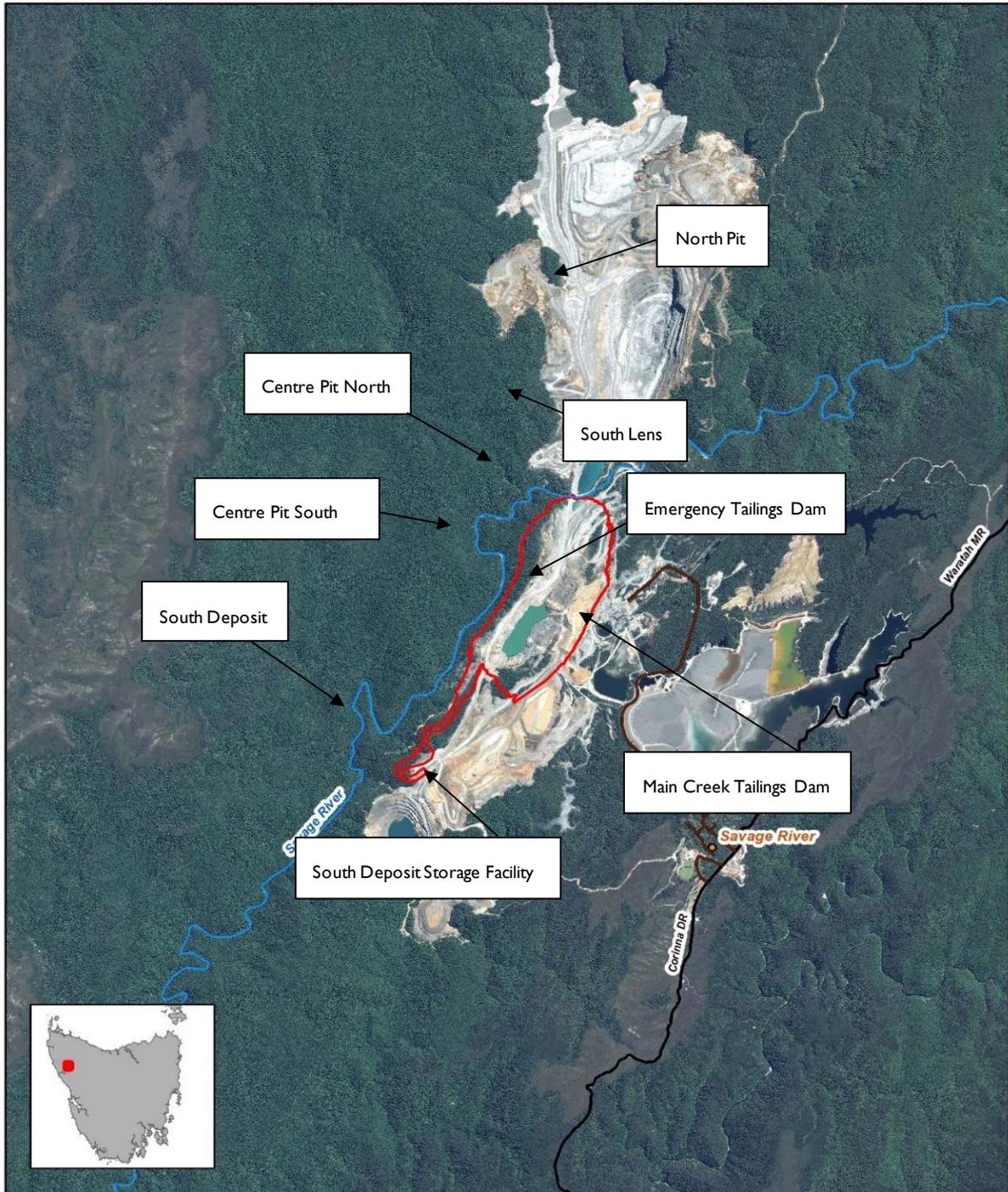
The main characteristics of the proposal are summarised in Table 1. A detailed description of the proposal is provided in Section 2 of the EIS.

**Table 1: Summary of the proposal's main characteristics**

Activity	
Extraction and processing of up to 3 million tonnes of ore per annum.	
Location and planning context	
<b>Location</b>	Savage River Mine is located in north-west Tasmania (latitude 41°29'25"S, longitude 145°12'03"E), 45 km west of the Murchison Highway. The nearest localities are Corinna 24 km to the south-west and Waratah 38 km to the north-east. The proposed Centre Pit expansion is located within the existing Savage River Mine footprint, to the south and east of Savage River (Figures 1 and 2).
<b>Land zoning</b>	Rural Resource and Environmental Management.
<b>Land tenure</b>	Crown Land, the majority of which is vested as State Forest.
<b>Mining lease</b>	ML 2M/2001, ML 14M/2007, ML 11M/2008, and ML 4M/2019
<b>Lease area</b>	ML 2M/2001 has total area of 4987 hectares
<b>Bond</b>	Mineral Resources Tasmania (MRT) has indicated that discussions in regard to a review of the security deposits held for the Savage River mine tenements, including consideration of the Centre Pit expansion, have commenced with Grange. MRT further indicated that the EPA will be included in the review process, along with the management committee for the SRRP, where relevant with respect to the Goldamere Act.
Existing site	
<b>Land Use</b>	Existing mine site.
<b>Topography</b>	Savage River mine is located at an elevation of between 100 m and 350 m in a valley incising the easternmost extension of the Western Ranges. The area is characterised by erosional and depositional glacial landforms.
<b>Geology</b>	Savage River mine is located within the Arthur Metamorphic Complex and exploits a series of magnetite-rich lenses which extend from north of Savage River to north of Pieman River.
<b>Soils</b>	Soils at the mine site are classified as 'Soils on Precambrian Dolomite' and depending on the parent rock are either 'sandy' or 'clayey'. Sandy soils are developed to depths of about 0.1 m on quartzite, while clay soils are well developed to depths of up to tens of metres. Top-soils are generally thin.
<b>Hydrology</b>	<p>The mine site is dissected by Savage River, which flows between CPN and South Lens (Figure 1). The river at this location is effectively flowing across a man-made 'pillar', elevated above the existing base of CPN (currently back filled) and South Lens (currently acting as a water storage and treatment facility).</p> <p>Savage River flows into the Pieman River approximately 16 km upstream from the coast.</p> <p>Two main tributaries of Savage River flow through the mine site; Broderick Creek which forms part of the Broderick Creek Flow Through and enters Savage River just downstream of South Lens, and Main Creek, of which the Main Creek Tailings Dam and Old Tailings Dam are located at its headwaters, with South Deposit Tailings Storage Facility located approximately 2 kms further downstream.</p>

<p><b>Natural Values</b></p>	<p>No threatened vegetation communities listed under the Tasmanian <i>Nature Conservation Act 2002</i> (NC Act) or the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act) were identified within the proposed expansion area.</p> <p>No threatened flora species listed under either the Tasmanian <i>Threatened Species Protection Act 1995</i> (TSP Act) or the Commonwealth EPBC Act were recorded within the area or are considered likely to occur.</p> <p>The following fauna species listed under the TSP Act and or the EPBC Act may occur and or have habitat within the mining lease;</p> <ul style="list-style-type: none"> <li>• Spotted-tailed Quoll;</li> <li>• Tasmanian Devil;</li> <li>• Grey Goshawk; and</li> <li>• Tateid (formerly known as Hydrobiid) snail species (<i>Beddomeia bowryensis</i> and <i>B. trochiformis</i>).</li> </ul>
<p><b>Local region</b></p>	
<p><b>Climate</b></p>	<p>Rainfall is approximately 1,961 mm per annum. Annual minimum and maximum temperatures are 13.7 and 16.2 degrees centigrade, respectively.</p>
<p><b>Surrounding land zoning, tenure and uses</b></p>	<p>The northern and north-eastern boundaries of the lease border Savage River Regional Reserve.</p> <p>The Savage River Pipeline Regional Reserve and Donaldson River Nature Recreation Area borders the mine to the west.</p> <p>The Meredith Range Regional Reserve borders the mine to the east and south. West of this reserve, and to the south of the mine is an area of Future Potential Production Forest managed by the Department of Primary Industries, Parks, Water and Environment (DPIPWE).</p> <p>The Centre Pit expansion area is located within the Savage River Regional Reserve, approximately 2.3 km from the privately-owned Savage River accommodation area.</p>
<p><b>Species of conservation significance</b></p>	<p>The following listed species are known to occur in the local area;</p> <ul style="list-style-type: none"> <li>• Spotted-tailed Quoll;</li> <li>• Tasmanian Devil; and</li> <li>• Tateid snail (<i>Beddomeia bowryensis</i> and <i>B. trochiformis</i>).</li> </ul>
<p><b>Proposed infrastructure</b></p>	
<p><b>Major equipment</b></p>	<p>Existing plant/machinery will be used, including:</p> <ul style="list-style-type: none"> <li>• Trucks, loaders and excavators;</li> <li>• Primary crushers, grinding and ball mills and magnetic separators;</li> <li>• Concentrator; and</li> <li>• Slurry pipeline.</li> </ul> <p>According to the EIS, additional machinery may be required to satisfy increased waste rock stripping ratios and greater haul distances.</p>
<p><b>Other infrastructure</b></p>	<p>Existing infrastructure will be used, including:</p> <ul style="list-style-type: none"> <li>• ROM and stockpile areas;</li> <li>• Main Creek Tailings Dam;</li> <li>• South Deposit Tailings Storage Facility;</li> <li>• South Lens water treatment system; and</li> </ul>

	<ul style="list-style-type: none"> <li>Waste rock dumps; Broderick Creek Dump, and B Dump and Southern Dumps.</li> </ul> <p>Alterations to the following infrastructure will take place:</p> <ul style="list-style-type: none"> <li>Road passing to the west of the proposed Centre Pit will be relocated further west;</li> <li>Widening of haul roads and Savage River crossing;</li> <li>Buttressing of the Emergency Tailings Dam and Main Creek Tailings Dam walls; and</li> <li>Relocation of the Emergency Tailings Dam spillway.</li> </ul> <p>The following infrastructure will be developed:</p> <ul style="list-style-type: none"> <li>East Mill waste rock dump; and</li> <li>Savage River flood levee.</li> </ul>
<b>Inputs</b>	
<b>Water</b>	No additional water input is required.
<b>Energy</b>	Energy requirements at present include fuel for extraction vehicles, trucks and processing systems. An increase in energy consumption may occur if the mining fleet is increased due to increased strip ratios.
<b>Other raw materials</b>	Clay material for waste rock dump construction.
<b>Wastes and emissions</b>	
<b>Liquid</b>	Mine pit water from the dewatering of CPS and during operations from the mining of stages 1, 2 and 3, waste rock dump run-off and seepage, tailings dam seepage, and stormwater runoff from the ROM pad, roads, stockpile areas and other infrastructure areas.
<b>Atmospheric</b>	Dust from excavation, material haulage, blasting and blow-off from stockpiles and disturbed areas.
<b>Solid</b>	Waste rock and other general mining waste (e.g. general refuse, metal waste, waste tyres, machinery servicing waste etc, including controlled waste).
<b>Noise</b>	From excavators, heavy mine vehicles, front end loaders, overland conveyor, processing plant (crushers) and blasting.
<b>Greenhouse gases</b>	Generation of greenhouse gas emissions may increase as additional machinery may be required to satisfy increased stripping ratios and greater haul distances.
<b>Construction, commissioning and operations</b>	
<b>Proposal timetable</b>	No formal commissioning process will occur. Centre Pit (stages 1, 2 and 3) is proposed to be mined over a period of 13 years.
<b>Operating hours (ongoing)</b>	Savage River mine operates continuously 24 hours per day, seven days per week.
<b>Other key characteristics</b>	
Truck movements will be limited to internal mine activity with all material being transported to Port Latta by pipeline. Employee vehicles numbers will not increase as a result of the proposal.	



Grange Resources Pty Ltd

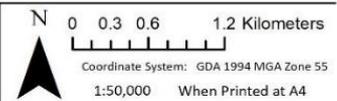
Centre Pit Expansion  
Savage River Locality

**pitt&sherry**

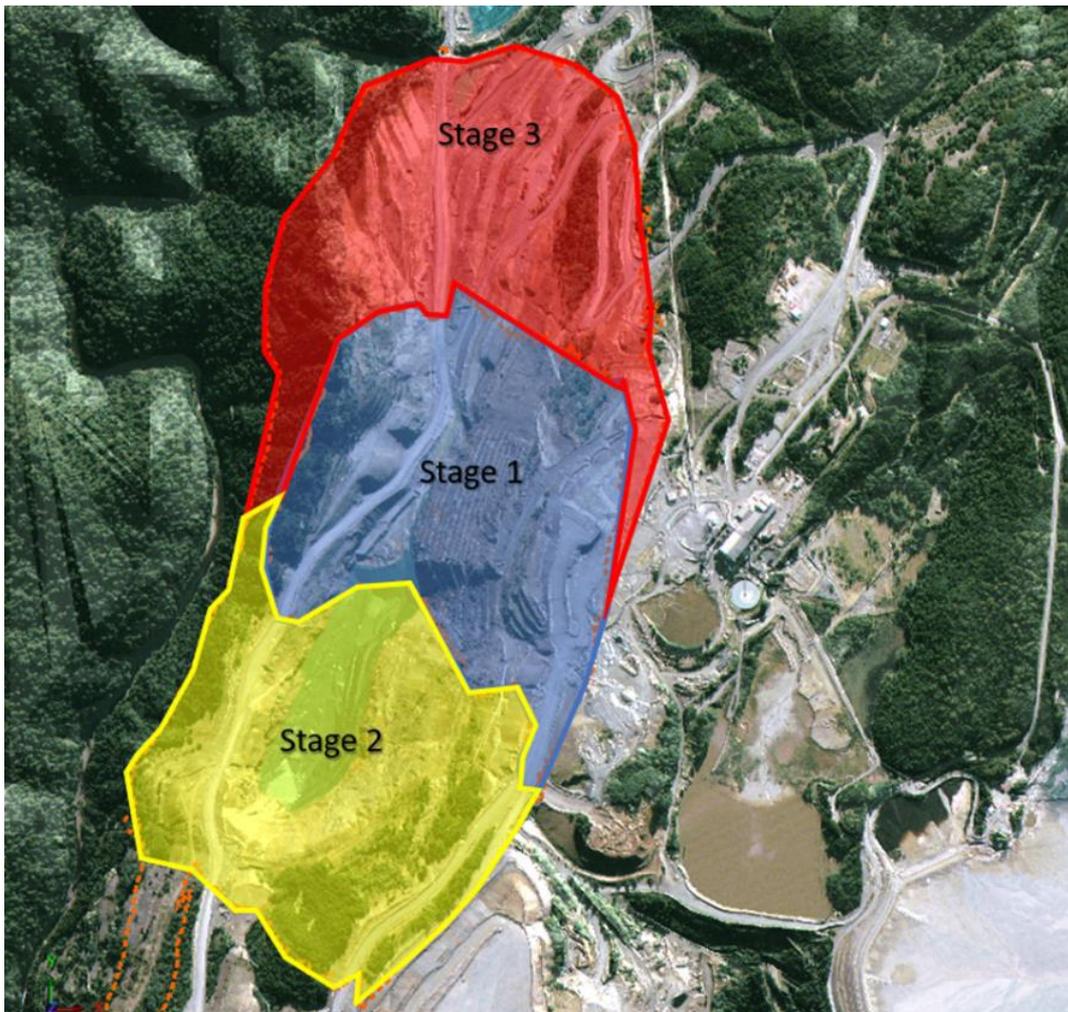
**Legend**

- Centre Pit Expansion Area
- Savage River
- Savage River township
- Access Road
- State Road

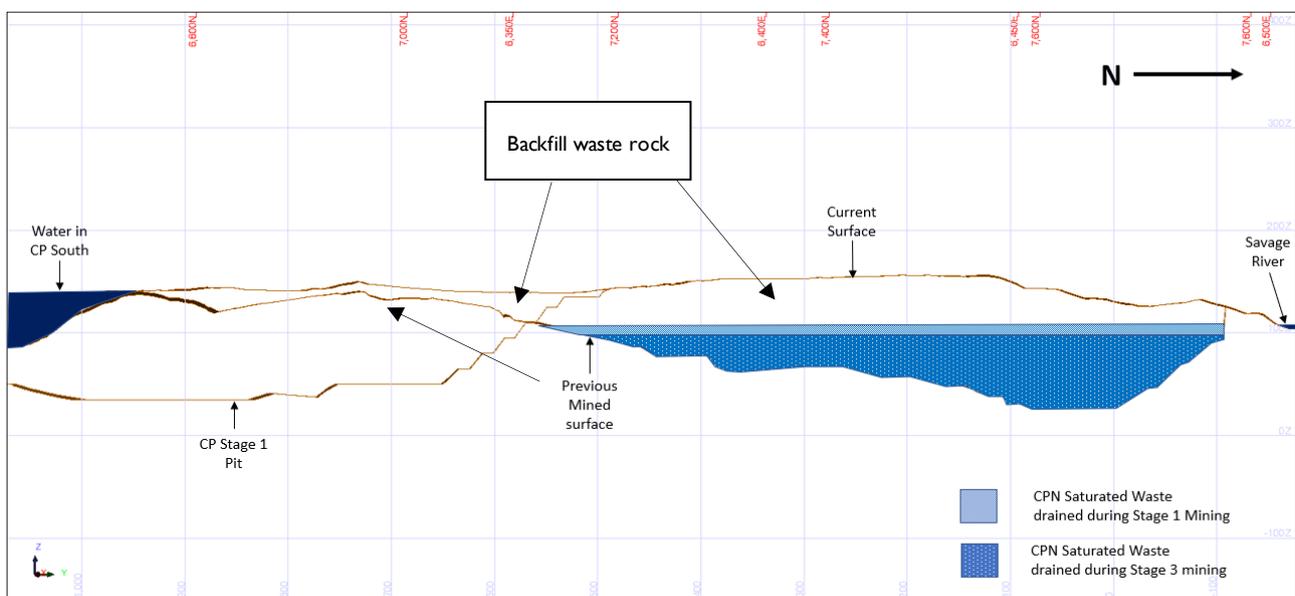
MAP REF	HB20068R2	DATA	Base map from Grange Resources
REVISION	A	SOURCES	Base data from The LIST
AUTHOR	klawrence		(C) Tasmanian Government
DATE	12/03/2020		Project data from pitt&sherry & Grange Resources



**Figure 1: Savage River Mine (altered from Figure 2 of the EIS)**



**Figure 2: Centre Pit mine plan (Figure I4 of the EIS), showing stages 1, 2 and 3.**



**Figure 3: Centre Pit oblique section showing saturated CPN and northern end of CPS water body (altered Figure 44 of the EIS).**

---

## 4 Need for the Proposal and Alternatives

According to the EIS, the expansion of Savage River Mine to include the area between CPN and CPS is the most logical and practical proposal to mine identified resources on the site. The proposal includes the reworking and expansion of previously mined pits, using existing infrastructure and personnel, rather than expanding into previously undisturbed areas.

Alternative pit designs have been considered in response to ongoing geotechnical work. This is discussed further in Section 6.3 (see also Section 2.5 of the EIS).

A number of alternatives have been considered for the closure of the mine, including the backfilling of Centre Pit and South Deposit with waste rock. This is discussed in Sections 6.7.1.1 and 8 of the EIS.

## 5 Public and Agency Consultation

No public representations were received.

The EIS was referred to a number of government agencies/bodies with an interest in the proposal. Submissions were received from the following:

- Conservation Assessments and Wildlife Management Branch, Natural & Cultural Heritage Division, Department of Primary Industries, Parks, Water and Environment; and
- Aboriginal Heritage Tasmania, Natural & Cultural Heritage Division, Department of Primary Industries, Parks, Water and Environment.

The key points raised during the public and agency consultation period are detailed under the relevant issue, in Sections 7 and 8. The points raised have been considered in the evaluation of the issues, as relevant.

The following Divisions/areas of the Department of Primary Industries, Parks, Water and Environment also provided advice on the DPEMP:

- Regulator, EPA Tasmania; and
- Water Specialist, EPA Tasmania.

This advice has been considered in the evaluation of the relevant issues.

No specific public consultation was undertaken by Grange for the proposed activity.

According to the EIS, Grange has had an extended involvement in the Savage River Rehabilitation Program (SRRP), and the proposed activity is consistent with the objectives and suggested actions of the SRRP Strategic Plan.

## 6 Evaluation of Key Issues

The key environmental issues relevant to the proposal that were identified for detailed evaluation in this report were:

- Dewatering Centre Pit South
- Groundwater and surface water management (mining stages 1, 2 and 3)
- Mine waste management

Each of these issues are discussed in the following subsections.

### **General conditions**

The following general conditions will be imposed on the activity:

- **G1** Access to and awareness of conditions and associated documents
- **G2** Incident response
- **G3** No changes without approval
- **G4** Change of responsibility
- **G5** Change of ownership
- **G6** Annual Environmental Review
- **G7** Notification of works
- **G8** Centre Pit mining

### **Legal obligations**

The following legal obligations are detailed in the permit:

- **L01** Aboriginal relics requirements
- **L02** EMPCA
- **L03** Storage and handling of dangerous goods, explosives and dangerous substances

### **Other information**

Other information included in the permit:

- **O11** Waste Management hierarchy
- **O12** Notification of incidents under section 32 of EMPCA

## 6.1 Dewatering Centre Pit South

### 6.1.1 Description

CPS contains approximately 2.7 GL of water, at an estimated depth of 70 m. It requires dewatering prior to the mining of stage 1 below 135 m RL, which according to Grange is the current water level in the pit. Grange has indicated that it will mine stage 1 and dewater CPS concurrently, with a minimum buffer of 20 m to 30 m maintained between the active mine bench and the water level (Tony Ferguson, pers comm.).

It is proposed to pump the pit water to South Lens, via a dewatering tank and CPN Pond, and discharge to Savage River via the existing South Lens outfall (Figure 4).

#### **Existing water quality and water management practices on site**

According to the EIS, water overflows CPS to CPN at 135 mRL and percolates through waste rock contained in CPN. CPN was backfilled on cessation of mining but is estimated to contain 0.58 GL of water.

Under the present water management scenario, water from CPN discharges to South Lens from the CPN pond through a viaduct at 109 m RL. The volume of water discharged to South Lens reflects rainfall, with flow rates averaging approximately 100 L/s, but regularly range up to 250 L/s during events (Figure 50 of the EIS).

CPS water quality, including depth profiles from two locations, are detailed in Tables 11, 12, 14, 18, and 19 of the EIS. The key water quality characteristics are summarised as follows:

- pH is uniform over depth at approximately 7.6 pH units;
- Electrical conductivity (EC) ranged from 1,600  $\mu\text{S}/\text{cm}$  to 1,700  $\mu\text{S}/\text{cm}$ ;
- Sulphate ranged from 827 to 912 mg/L; and
- The water body has low concentrations of copper and zinc, and variable concentrations of cobalt, nickel, manganese and iron; Cu - 1 to 8  $\mu\text{g}/\text{L}$ , Co - 5 to 116  $\mu\text{g}/\text{L}$ , Ni - 60 to 109  $\mu\text{g}/\text{L}$ , Zn - 10 to 23  $\mu\text{g}/\text{L}$ , and Mn - 62 to 1690  $\mu\text{g}/\text{L}$ .

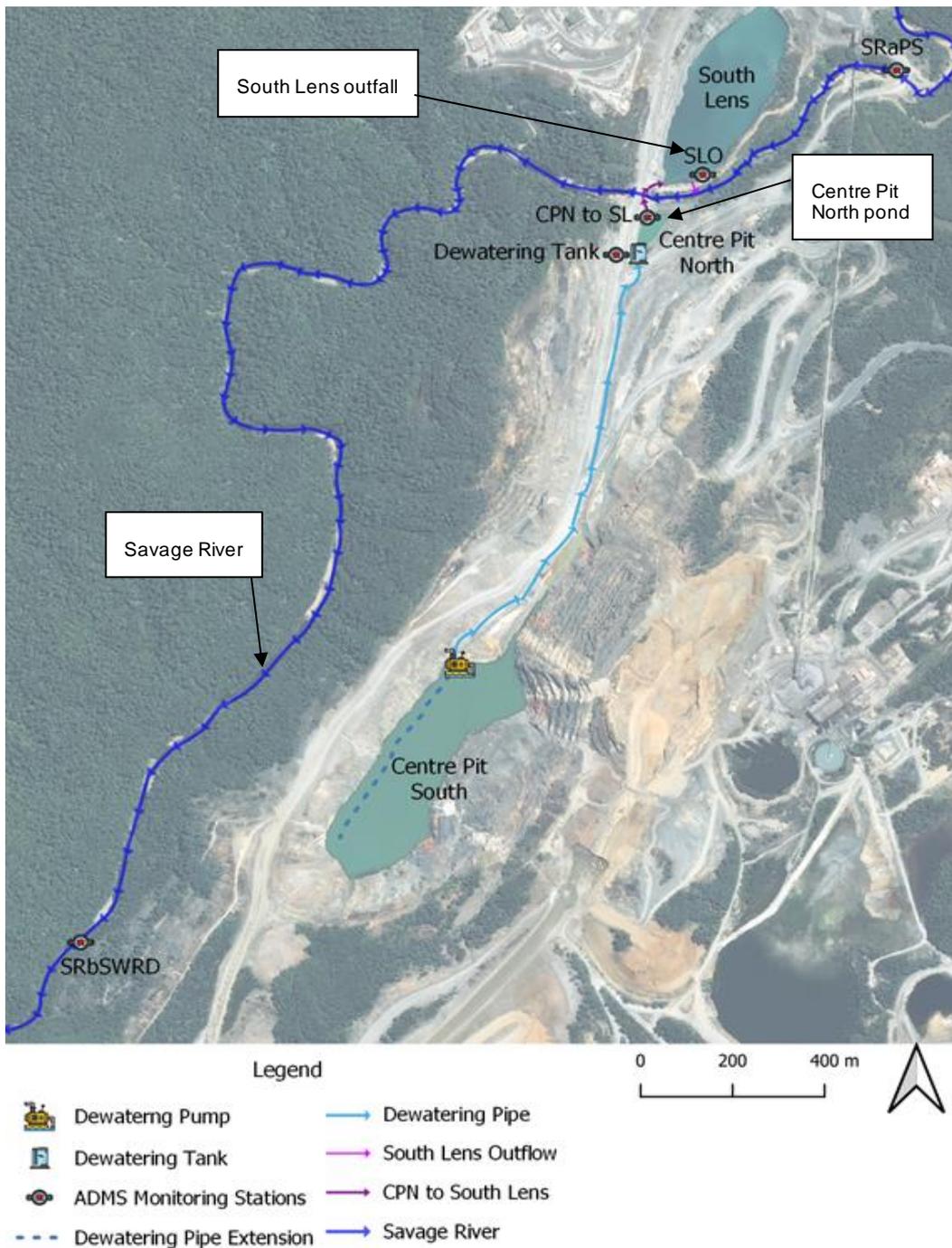
The quality of the CPN discharge to South Lens is summarised in Tables 14 and 17 of the EIS. It is generally of much poorer quality than CPS water, consistent with neutral mine drainage, i.e. high levels of alkalinity and increased concentrations of metals not removed at pH values over 7 (average concentration Co - 245.3  $\mu\text{g}/\text{L}$ , Zn - 52.7  $\mu\text{g}/\text{L}$ , Ni - 197.1  $\mu\text{g}/\text{L}$ , Mn - 2622  $\mu\text{g}/\text{L}$ ). Copper is also elevated, with an average concentration of 142.2  $\mu\text{g}/\text{L}$ .

According to the EIS, South Lens is the central water treatment facility for the mine. Retention of water within South Lens enables neutralisation of acid drainage and precipitation of metal hydroxides. The body of water also acts as a 'sediment retention pond' for mine site run-off.

There are a number of input streams to South Lens, including CPN pond, North Dump Drain, and more recently, since 2017, a large volume of water derived from Broderick Creek via North Pit.

According to Appendix D, the North Dump Drain is the major source of metals, sulphate and acidity to South Lens, whereas water derived from Broderick Creek (Bretts Drain and North Pit discharge) provides the majority of the neutralisation capacity. This water is characterised by

neutral pH, low metal concentrations, elevated concentrations of alkalinity, and moderate sulphate.



**Figure 4: Pumping strategy (Figure supplied by Grange 4 March 2021). Water quality monitoring sites are shown as; “SRbSWRD” (Savage River below Southwest Rock Dump), “Dewatering Tank” (tank receiving CPS pumped flow), “CPN to SL” (Centre Pit North pond discharge), “SLO” (South Lens outfall), and “SRaPS” (Savage River above Pump Station).**

Table 14 of the EIS provides water quality data for the South Lens discharge (to Savage River), with comparison to CPN outflow and CPS pit water. Overall, the water quality of South Lens

discharge is slightly poorer than that of CPS water, but significantly better than what is discharged from CPN pond.

### **Proposed Centre Pit South dewatering strategy**

Grange proposes to pump at a rate of 100 L/s from CPS when flow rates at the Savage River monitoring site SRaPS (Savage River at Pump Station), located above the South Lens outfall (Figure 4), are less than 1.5 m<sup>3</sup>/s. At flows greater than 1.5 m<sup>3</sup>/s at this location, the maximum pump rate will be determined by equation 1, as detailed below, up to a maximum of 500 L/s.

$$Max_{pump} = \frac{\left( SRaPS \text{ flow rate in } \frac{m^3}{s} \right) \times 1000 \times 1.85 \times 0.57}{0.0189 \times (CPS \text{ SO}_4^{2-} \text{ concentration in mg/L}) - 2.6415}$$

$$Sulphate \text{ in mg/L} = 0.3424 \times \text{Conductivity in } \mu\text{s/cm} - 14.935$$

Equation 1: Maximum pump rate from Centre Pit South as a function of flow in the Savage River at SRaPS and sulphate in CPS. The equation was originally derived for the dewatering of South Deposit Pit to ensure that sulphate concentrations within Savage River remained within acceptable levels. Figure 5 I of the EIS illustrates pump rates based on 2020 flows in Savage River and a sulphate concentration in CPS of 800 mg/l.

Flows will be adjusted up or down by increments of 100 L/s, rounded down to the nearest 100 L/s.

According to the EIS, the volume and timing of water discharged from South Lens will be directly affected by the pumping from CPS, with relatively higher flows discharged to Savage River during low flow periods when pumping is maintained at 100 L/s.

### **Potential impact of Centre Pit South dewatering on South Lens and Savage River water quality**

Section 3 of Appendix D provides an analysis of the water quality of South Lens, its input streams and mechanisms driving metal removal. The following provides a summary of the key points:

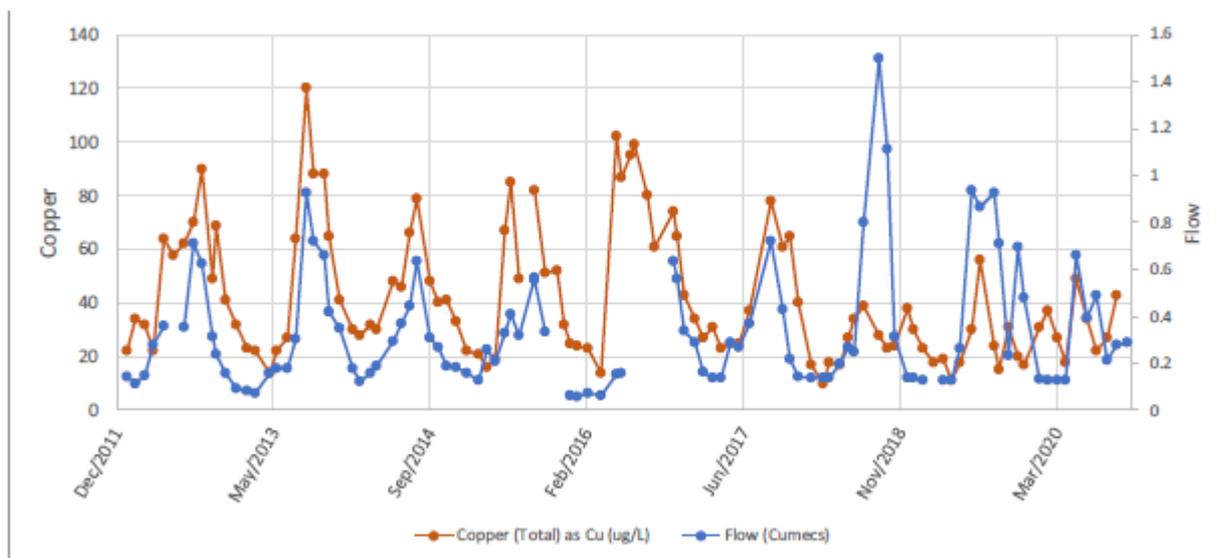
- There has been a large increase in flow to South Lens from North Pit since 2017, up to 0.6 m<sup>3</sup>/s of additional flow, with the largest increases occurring during winter.
- Prior to this input, there was a good correlation between the South Lens discharge flow rate and copper concentrations, with elevated concentrations coinciding with periods of high flow. This was interpreted as reduced hydraulic retention time (HRT) within the South Lens during periods of high inflow limiting copper removal (i.e. less time for neutralisation and precipitation of hydroxides).
- Since 2017 there has been a poor correlation between South Lens discharge and copper concentrations (Figure 5). Metal removal has been at least maintained, and potentially increased, despite a reduction in HRT with the input from North Pit.
- HRT is no longer considered a critical factor for metal removal in South Lens. It is now surmised that the high concentrations of alkalinity and suspended solids in the North Pit inflow have increased the rate of metal removal by increasing available surface area for metal precipitation and adsorption.

Section 6.2.4 of the EIS provides a discussion of the potential impact to Savage River as a result of CPS dewatering. It is based on the following assumptions:

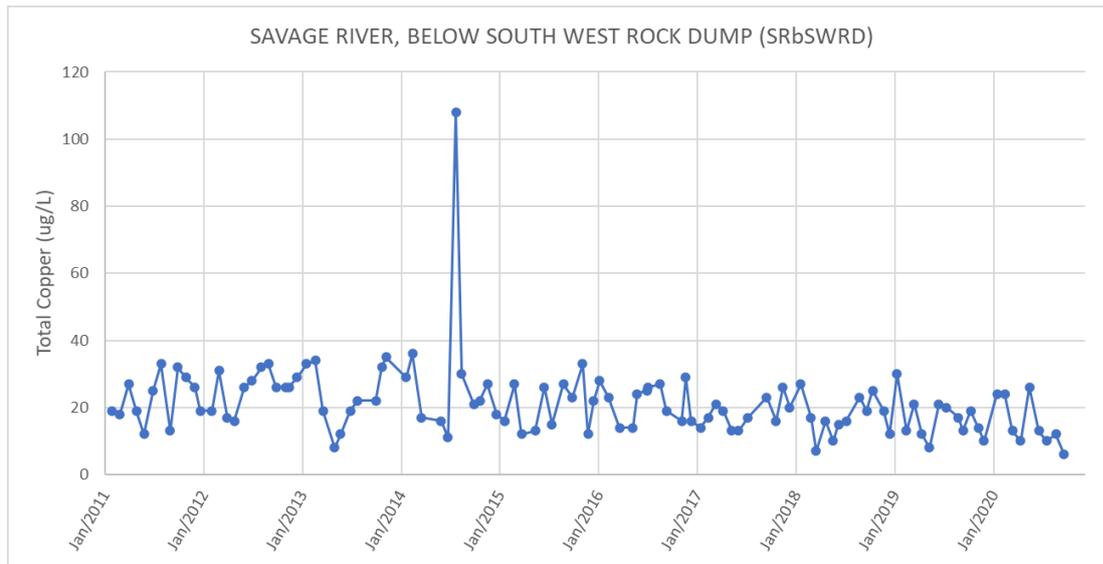
- All inflows to South Lens, including the increased inflow from North Pit, remain unchanged during the pumping period.
- HRT of South Lens is no longer a critical factor controlling metal removal in South Lens, with removal rates independent of CPS pump discharge to South Lens.
- Estimated removal rates for copper and nickel in South Lens are 75% and 10% respectively (based on recent mass-balances see Table 15 of the EIS). Cobalt and zinc are expected to have similar removal rates to nickel. These are assumed to remain unchanged.
- The pump rate from CPS is governed by Equation 1.
- The concentrations of key parameters (copper, nickel, cobalt, zinc and sulphate) in the discharge to South lens is equivalent to the current 90<sup>th</sup> percentile CPN concentrations (see Section 6.1.2, shown in Table 2 as ‘trigger values’ for CPN pond).

The maximum increase in concentrations in Savage River of key parameters, as a result of the proposed CPS dewatering strategy, is estimated to be as follows (Table 22 of the EIS); Cu increase of 3-4 µg/L, Ni increase of 10-14 µg/L, Co increase of 13-18 µg/L, Zn increase <5 µg/L, and sulphate increase of 83-118 mg/L.

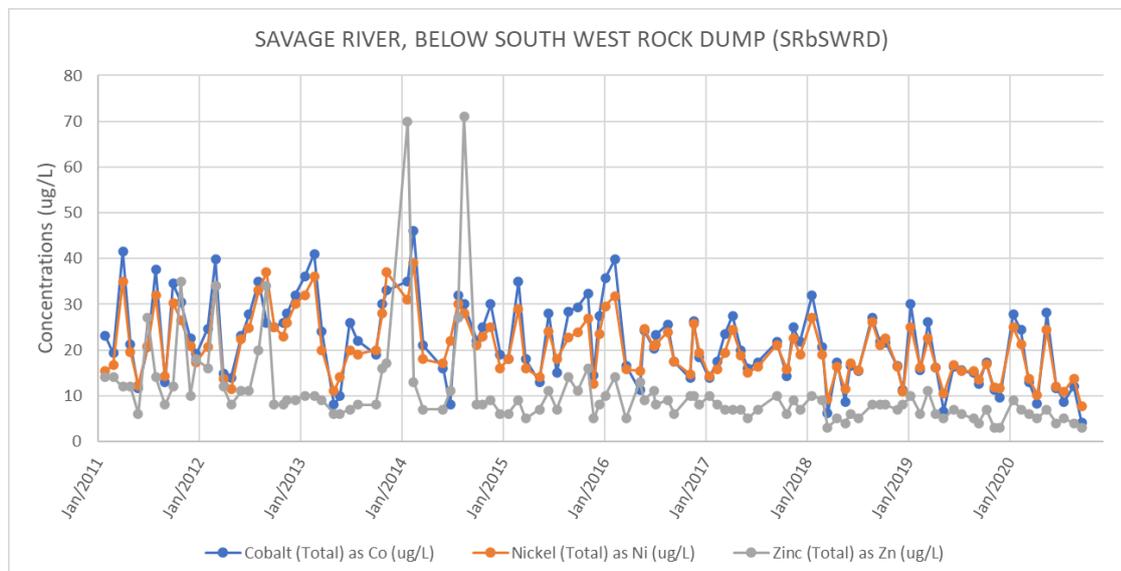
As comparison, figure 6 shows the copper, cobalt, nickel, and zinc concentrations in Savage River downstream from South Lens outfall from 2011 to present.



**Figure 5: South Lens outfall total copper concentration and flow rate (Figure 47 of the EIS).**



6a



6b

**Figure 6 Time series of total copper (6a) and dissolved cobalt, nickel and zinc (6b) concentrations in Savage River from 2011 to present (Figures 52 and 53 of the EIS).**

The EIS concludes the following:

- The estimated increase in copper concentrations in the Savage River is within the existing variability of concentrations in the river and therefore is likely to pose a low risk to the environment.
- Nickel concentrations in Savage River presently range from about 5 to 25 µg/L. The proposed dewatering could increase concentrations to between 15 and 39 µg/L, which is

above recently recorded levels. As the water in CPS is very hard (>1,000 mg/L), the risk to the environment is considered low<sup>3</sup>.

- Estimated increase of Co would also increase concentrations above recently recorded levels. As the concentrations should remain below the moderate, low reliability trigger of 90 µg/L<sup>4</sup>, the risk to the environment is considered low.
- Estimated increase in zinc (<5 µg/L) would increase concentrations above recent values but remain within values previously recorded over the past few years and would be unlikely to pose a risk to the environment.
- Sulphate concentrations in Savage River range from 58 (10th percentile) to 247 mg/L (90th percentile) with a median value of 146 mg/L (2016 to 2020). Compared to these values an increase of up to 118 mg/L would be considered high.

The EIS considers that the estimated increase in concentrations of metals in Savage River is likely to be lower than that detailed above, as the metal concentrations in CPS are considerably lower than the 90<sup>th</sup> percentile CPN values used in the analysis.

For comparison, Table 23 of the EIS provides an estimate of the increase in concentrations in Savage River based on maximum concentrations recorded from CPS water and considers these a more likely estimate.

### 6.1.2 Management measures

Section 6.3 of the EIS describes the proposed dewatering strategy, monitoring regime and management responses in detail.

#### **Monitoring**

Table 25 of the EIS summarises the monitoring strategy that will be implemented during dewatering of CPS.

Continuous flow, EC, turbidity and pH monitoring will be undertaken at the following sites (Figure 4):

- CPS discharge tank at the CPN pond;
- the discharge from CPN pond to South Lens;
- the South Lens outflow;
- Savage River above the pump station (SRaPS); and
- Savage River below South West Rock Dump (SRbSWRD).

---

<sup>3</sup> The ANZG (2018) formula for nickel toxicity has been used to revise trigger values in the Savage River in relation to hardness. Trigger Values for Ni derived by applying the formula are shown in Table 24 of the EIS, with a revised trigger value of 54 µg/L with average hardness of 195 mg/l.

<sup>4</sup> According to the EIS, the ANZG (2018) guidelines contain an 'unknown' percentile protection level for cobalt of 1.4 µg/L, which is well below the existing concentrations in the Savage River. The ANZG (2018) technical brief for cobalt states that a freshwater moderate reliability trigger value of 90 µg/L could be derived for cobalt, but there are some experimental results for chronic toxicity that are below this value, making the moderate reliability trigger ambiguous.

The continuous monitoring probes established at these sites will be linked to the Ajenti water information system. Alarm conditions will be implemented within Ajenti in response to changes in water quality as detailed in Table 2 below.

At the initiation of pumping, weekly monitoring will also be undertaken at the above sites. The suite of parameters will include: alkalinity, acidity, total and filtered metals and metalloids (Al, As, B, Cd, Co, Cr, Cu, Fe, Hg, Mn, Mo, Ni, Pb, Se, Zn) cations (Na, K, Ca, Mg) anions (SO<sub>4</sub>, F, Cl) and TSS. In situ measurements of pH, EC, turbidity and temperature will also be taken.

Water samples will be submitted to a NATA registered laboratory for analysis. Total copper and nickel concentrations will also be determined on site to provide near real time results.

Weekly monitoring will continue throughout the first 3-months of dewatering. If dewatering extends beyond 3-months, the monitoring strategy will be reviewed with the potential to reduce monitoring.

Once dewatering of the pit is complete, monitoring will revert to monthly as is presently implemented.

### Management response

The dewatering process will be guided by monitoring results, with management actions implemented if trigger values are exceeded (Table 2).

**Table 2: Summary of water quality triggers and management responses (altered from Table 26 of the EIS)**

Control	Trigger	Action	Implementation
Pump operations	Flow at SRaPS.	Based on equation 1 and adjusted every 24 hours based on average flow over preceding 12-hours.	Automated through Ajenti, with email notification sent to Grange.  Alarm set and email notice sent if flow decreases more than 50% from previous 12-hour average.
Pump operations	Flow at SRaPS < 1.5 m <sup>3</sup> /s.	Pump rate decreased to 100 L/s.	Automated email from Ajenti alerts when flow decreases below 1.5 m <sup>3</sup> /s and above 1.5 m <sup>3</sup> /s.
Water quality	Water quality at CPN pond exceeds triggers <sup>1</sup> including EC values based on previous 12-hour average EC.	Increase onsite Cu and Ni monitoring at SL outflow to 2/week.	Automated email from Ajenti alerts if EC values exceed the trigger value (not in table 26 of EIS, stated in text section 6.3).
Water quality	Water quality at South Lens outflow exceeds triggers <sup>2</sup> , including EC values based on previous 12-hour average EC.	Decrease pump rate by 100 L/s & investigate cause. Increase monitoring at CPN and SL outflow to 2/week. If triggers exceeded for an additional week, decrease pump rate by another 100	Automated email from Ajenti alerts if EC values exceed the trigger value (not in table 26 of EIS, stated in text section 6.3).

		L/s to a minimum of 100 L/s. If water quality at SRbSWRD remains within trigger limits, re-evaluate SL outflow triggers.	
Water quality	Water quality at SRbSWRD exceeds triggers <sup>3</sup> , including EC values based on previous 12-hour average EC.	Decrease pump rates by 100 L/s. Increase monitoring at SL outflow and SRbSWRD to 2/week. Evaluate change and report to EPA.	Automated email from Ajenti alerts if EC values exceed the trigger value (not in table 26 of EIS, stated in text section 6.3).

1 – Trigger values based on 90<sup>th</sup> percentile CPN water quality (includes Cu - 230 ug/l, Ni – 222 ug/L, Co – 282 ug/l, Zn – 74 ug/l, EC – 2758 uS/cm, Table 27 of EIS). Note these values were used in the analysis of the impact to Savage river water quality, as discussed above in Section 6.1.1.

2 – Trigger values based on 90<sup>th</sup> percentile SL discharge water quality (includes Cu - 76 ug/l, Ni – 129 ug/L, Co – 173 ug/l, Zn – 35 ug/l, EC – 1815 uS/cm, Table 28 of EIS).

3 – Trigger values based on 90<sup>th</sup> percentile Savage River below Southwest Rock Dump water quality (includes Cu - 26 ug/l, Ni – 25 ug/L, Co – 28 ug/l, Zn – 10 ug/l, EC – 788 uS/cm, Table 29 of EIS).

## Reporting

The following reporting will be undertaken:

- Notify the EPA as soon as practicable if a trigger value has been exceeded, the suspected reason for the exceedance, and what management action(s) have been implemented.
- Summarise and report monitoring results and management actions on a weekly basis via email to the EPA, including the range of pump rates implemented during the week.
- Provide monthly report to the EPA, which will include a detailed summary of the monitoring results and an update as to when dewatering is likely to be completed.

### 6.1.3 Public and agency comment and responses

No comment was received.

### 6.1.4 Evaluation

A key risk of the proposal is the potential for the dewatering of CPS to result in an unacceptable impact on Savage River.

According to the EIS, water overflows from CPS to CPN at 135 mRL. Water is discharged from CPN pond to South Lens through a viaduct located at 109 mRL, with the groundwater gradient reducing from 135 m RL to 109 m RL through the CPN waste rock.

According to Appendix C, once pumping commences, the poor-quality discharge from CPN pond will continue to enter South Lens, but the relative volume will decrease as the groundwater gradient within the waste rock backfill between CPS and CPN pond decreases. As pumping progresses, the groundwater level in CPN backfill is expected to flatten and the contribution of water from this area cease. The proponent correspondingly anticipates that the quality of water

discharged from CPN pond to South Lens will improve, as the poor quality CPN water is effectively 'replaced' by water dominated from the CPS pumping regime.

Note, Appendix C also refers to water contained within the waste rock in CPN draining southward to CPS pit once the groundwater level in CPS is drawn down. While it is understood that the topographic divide between the two pits is at 135 m RL, detail of the topography and likely groundwater flow between the two pits is not clearly understood from Figure 44 of the EIS, nor the text.

It is nevertheless agreed that the quality of the water discharged from CPN pond to South Lens will improve as the dewatering progresses, with the quality likely to be strongly influenced by the CPS discharge, albeit with some element of mixing with water derived from CPN.

The assessment of the potential impact to Savage River as a result of the proposed CPS dewatering, based on the current 90<sup>th</sup> percentile CPN pond concentrations is therefore considered conservative.

Indeed, Appendix C further notes that there was effectively a 'double' accounting of metals and sulphate in the impact assessment as the existing input from CPN, which will effectively cease and be replaced with discharge dominated from CPS, is included in the background concentrations in South Lens and Savage River.

Given the conservative nature of the assessment, and the temporary nature of the dewatering activity, approximately 3 to 4 months, the proposed dewatering is unlikely to result in environmental harm. It is agreed that the potential increase in concentrations in Savage River is likely to be in the order of that shown in Table 23 of the EIS, as based on CPS water quality.

It should also be noted that the pump rate will be rounded down to the nearest 100 L/s, and applied in increments of 100 L/s, thereby effectively 'increasing' the level of dilution compared with that assumed for the impact assessment.

To ensure the pumping regime is undertaken as proposed, condition **EMI** requires the pump rate be determined by equation 1, and applied at appropriate increments up to a maximum of 500 L/s. Condition **EM2** will ensure that water from Centre Pit is only discharged to Savage River via South Lens.

While there is certainly a level of conservatism in the proposed dewatering assessment, it should be noted that the hydrologic and geochemical systems at Savage River Mine are complex and not fully understood. An element of caution should therefore be applied.

The EIS argues that the HRT within SL is no longer a key determining factor in driving metal reduction, due to the increased rate of metal removal brought about by the input of sediment laden alkaline waters (up to 600 L/s). Figure 47 of the EIS however suggests that such inflow may be greatly reduced (<100 L/s) during extended dry periods. Dependant on sedimentation and absorption dynamics within South Lens, the rate of metal removal may decrease during such periods, with HRT potentially becoming increasingly important for metal removal.

While Appendix C contends that HRT is no longer the limiting factor, it acknowledges that the data do not indicate what is the limiting factor, and/or how close the conditions are in South Lens to approaching this limit.

Water quality in CPS may also degenerate during dewatering. Alterations to acidic groundwater input as water level decreases (e.g. derived from under B-dump), disturbance of settled solids, and or changes to pore water in the pit all have the potential to decrease the quality of the water as pumping progresses.

Furthermore, the proximity of the CPN pond inflow point to the South Lens discharge point (Figure 4) may also result in an element of short circuiting, which could reduce the neutralisation and precipitation of metals from the CPN pond discharge.

The adaptive management approach described in the EIS, including the proposed trigger values and management actions, are therefore considered necessary given a level of environmental complexity and uncertainty. The trigger values and associated management actions detailed in Table 2 are acceptable and required by conditions **EM3**, **EM4** and **EM5**.

Condition **EM3** also requires that monitoring at CPN pond is increased to 2/week should a water quality trigger value be exceeded at this location. While it is recognised that the South Lens outflow is the critical response location, being the discharge point to the environment, the increase in monitoring at CPN pond will allow for a better understanding of the system and management response.

Should a trigger be exceeded, the response to increase monitoring to 2 per week will allow for two confirming readings and an element of equilibrium to be reached prior to implementing further changes, proposed on a weekly basis.

The level of reporting to the EPA proposed in the EIS is considered appropriate and important. Conditions **EM3**, **EM4** and **EM5** will ensure that all exceedances of trigger values, and subsequent management actions undertaken, are reported to the Director.

Note, Grange has indicated that should a South Lens trigger value be exceeded when pumping at the minimum rate of 100 L/s (e.g. during low flow conditions, <1.5 m<sup>3</sup>/s), the exceedance will be communicated to the EPA, with further management actions to be agreed on. They have not explicitly stated that they will cease pumping under such circumstances.

Conditions **EM4** and **EM5** require the pump rate to be decreased by 100 L/s should the trigger value at South Lens or SRbSWRD be exceeded, regardless of the operating level of the pump, thereby ensuring pumping ceases if already at the minimum. This is considered important to ensure the protection of Savage River under such circumstances. Indeed, the EIS notes that relatively higher flow contributions from South Lens will occur during low flow periods in Savage River (e.g. < 1.5 m<sup>3</sup>/s). Appendix C further indicates that periods of low flow could result in an increase in sulphate and metal concentrations in Savage River, compared present conditions, due to the effective increase in proportion of water derived from South Lens.

Note, conditions **EM4** and **EM5** are unlikely to impose a significant imposition on Grange given that dewatering of CPS is likely to occur during winter, when low flow periods are unlikely.

According to Appendix C, it is recommended that discharge to South Lens commence at 200 L/s, should flow in Savage River and concentrations of sulphate in CPS permit. Grange have subsequently indicated that it is the intent to commence pumping from CPS at 200 L/s (should equation 1 permit). Note, on commencement there will still be a contribution of flow from CPN, which currently averages at 100 L/s. As noted above, this will likely reduce during the initial stages of pumping however, the effective discharge to South Lens on commencement will likely be in the order of 300 L/s. Given that this is not substantially greater than currently experienced (up to 250 L/s), and noting conditions **EM1**, **EM3**, **EM4** and **EM5** are applied, Grange's approach to commence pumping at 200 L/s is considered acceptable.

Grange has indicated that it is only intended to apply the adaptive management strategy outlined in Table 2 to the CPS dewatering phase, as the volume of inflow to the pit that will require to be managed during mining, is not expected to differ from the current CPN outflow. This is discussed further in Section 6.2.4.

The water quality monitoring programme proposed in the EIS is required by condition **M1** to ensure the adaptive management program required by conditions **EM3**, **EM4** and **EM5** can be implemented. Condition **M1** requires monitoring be undertaken twice weekly for the first 3 weeks, and thereafter weekly. This is considered prudent given the level of uncertainty and will provide a greater level of initial oversight.

The proposed monitoring locations are considered acceptable. It is noted that location 'Savage River below South West Rock Dump' (SRbSWRD) is appropriately 2.4 downstream from the South Lens Outflow point. This is considered sufficient to allow any mixing to occur, given the nature of Savage River, and therefore provides a sound location to assess the impact of dewatering on Savage River.

According to the EIS, if dewatering extends beyond 3-months, the monitoring strategy will be reviewed, with the potential to reduce monitoring. Condition **M1** allows for a case to be submitted to the Director for a change in frequency.

Condition **M2** is required to ensure all sampling and processing is undertaken in accordance with best practice.

The condition **M1** requires weekly reporting of all monitoring results, while condition **M3** requires a more detailed monthly report be submitted to the Director.

#### 6.1.5 Conclusions

The proponent will be required to comply with the following conditions:

**EM1 Centre Pit dewatering flow rate**

**EM2 Centre Pit water management**

**EM3 Centre Pit dewatering investigation trigger levels for Centre Pit North Pond**

**EM4 Centre Pit dewatering investigation trigger levels for South Lens Outflow**

**EM5 Centre Pit dewatering investigation trigger levels for Savage River below Southwest Rock Dump (SRbSWRD)**

**M1 Water quality monitoring requirements**

**M2 Samples and measurements for monitoring purposes**

**M3 Monitoring reporting and record keeping**

## 6.2 Groundwater and surface water management (mining stages 1, 2 and 3 post CPS dewatering)

### 6.2.1 Description

Once CPS dewatering is complete the active pit will still require to be dewatered on an ongoing basis. According to the EIS, current inflows to the pits (CPS and CPN) include water from the B Dump and South Dump complexes, groundwater from the pit walls and in pit catchment, mine road runoff from North Dump, the concentrator and historical AMD from the Crusher Gully area. Note, Grange intends to redirect the Emergency Tailings Dam catchment to Main Creek. Currently the Emergency Tailings Dam spillway directs flow to the Centre Pit catchment.

The EIS indicates that the likely inflow during mining will be between 50 L/s and 250 L/s, in line with current CPN outflows to South Lens.

Note, CPN is also estimated to contain 0.58 GL of water, based on an estimate of 25% void space and a saturation height of 109 m RL. During the mining of Stage 1, approximately 0.14 GL of water from CPN will drain to CPS. During the mining of Stage 3 the remaining 0.44 GL of water will drain to the pit. Pit water will be managed as per normal dewatering practice, i.e. pit floor sump pumping.

All water pumped during the mining of stages 1 and 2 will be pumped to the dewatering tank prior to discharge into the CPN pond and South Lens. During stage 3 mining, the dewatering tank will be relocated across Savage River, and will discharge directly into South Lens.

An assessment of the potential groundwater inflows to the north wall of Centre Pit (i.e. water flowing from South Lens and/or Savage River into the pit through the 'pillar' area, Figure 6) was undertaken by AQ2 (Appendix G).

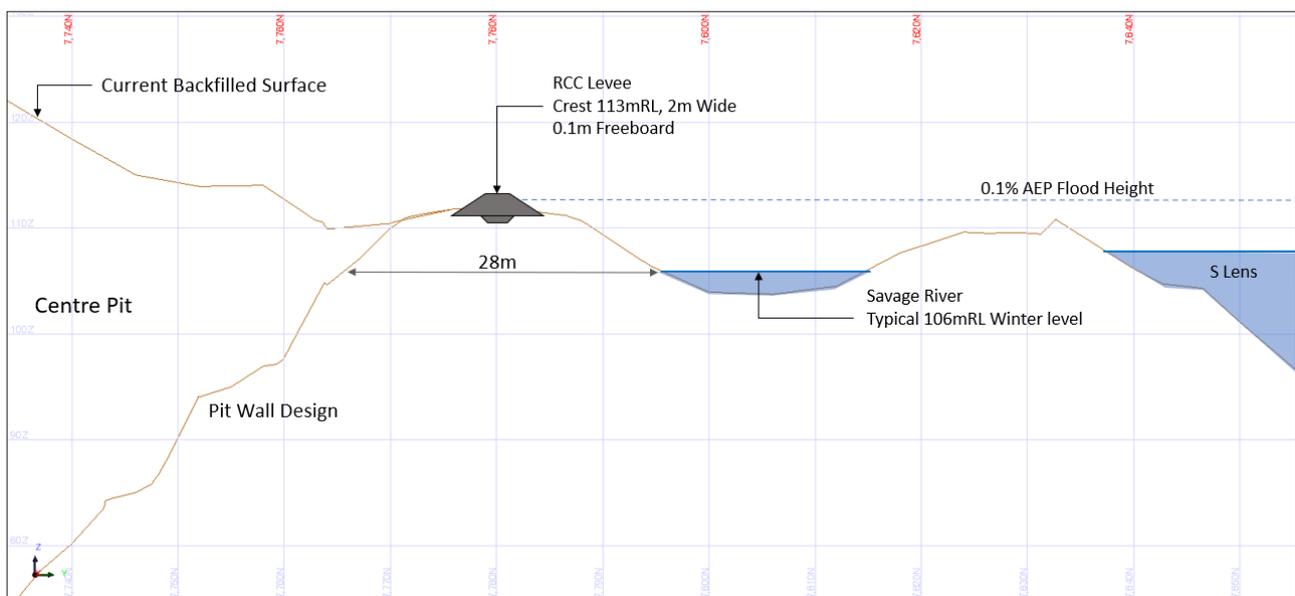
Key outcomes of the assessment were:

- Historical inflows to CPN from the northern wall have been estimated at 2 L/s;
- An analytical flow model was used to predict future inflows to the final pit from the northern wall. The model predicts inflows in the range of 2 to 3 L/s; and
- Pit inflows and outflows have been at steady state for many years, with CPN outflows representing all pit inflows.

According to the EIS, the proposed stage 3 pit will not mine any closer to Savage River than previously mined in CPN (Figure 7). The effective 'pillar' will therefore remain as is, with a minimum distance of 28 m between the northern pit wall and the river channel at an RL of 106 m (Savage River winter flow) (Figure 8).



**Figure 7: Looking south across South Lens to CPN (2000) (Figure 3 of the EIS).**



**Figure 8: Cross section showing Centre Pit, Savage River and South Lens (Figure 38 of the EIS).**

According to the EIS, the sections adjacent to the river have been previously mined to a depth of at least 30 m (Figure 9).

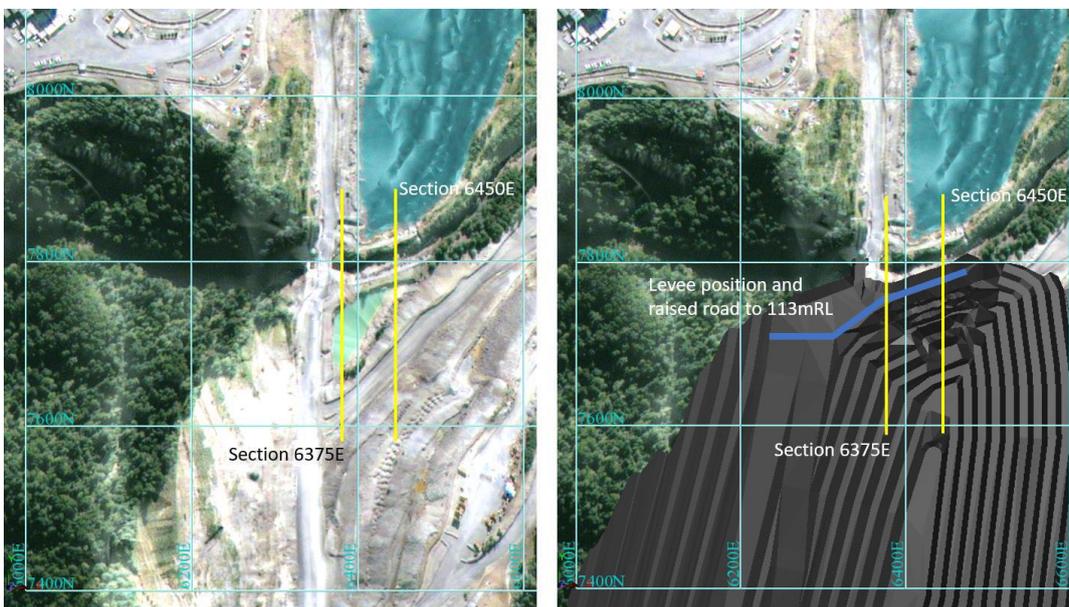
A flood levee 200 m long, 5 m wide (2 m crest width) and surface RL of 113m is proposed to ensure flood waters from Savage River during a 0.1% AEP flood event (112.9mRL flood height, Appendix F) do not enter the pit during operations. The levee crest will provide a minimum 2.2 m buffer between the pit and river, with a 0.1m freeboard (Figure 9).

A roller compacted concrete levee is the preferred design.

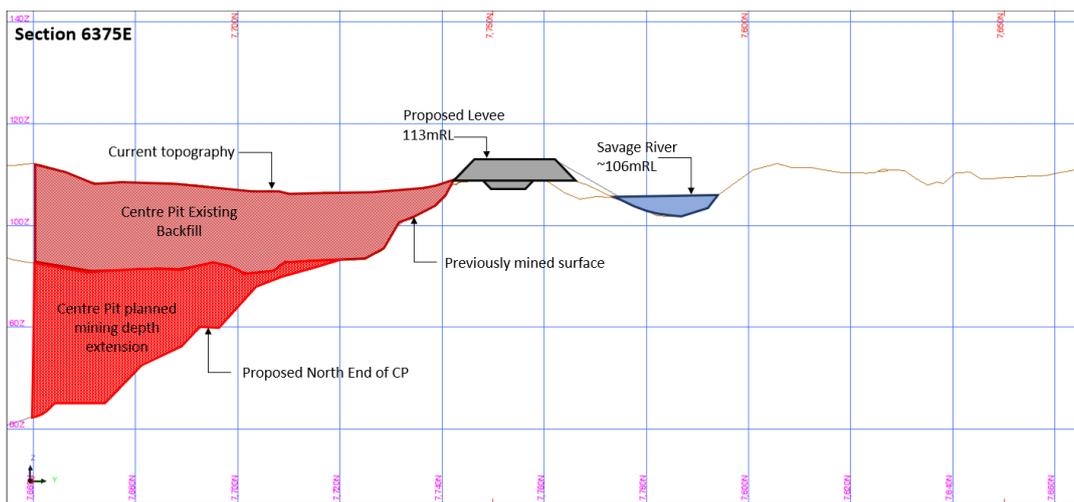
According to the EIS, the levee will be completed prior to commencement of mining in Stage 3. Detailed design requires the completion of geotechnical drilling in the north wall to confirm the accuracy of the previously mined surface and the required depth for the levee keyway.

The western Savage River crossing is currently single lane and will be widened to 40 m to allow 2 lanes of heavy vehicle haulage. According to the EIS, the widening will be constructed in a similar manner to the existing crossing and will not impact the flood level or natural flow of Savage River.

The EIS indicates that all surface waters from disturbed areas will be collected to one of the three centralised locations; South Lens, South Deposit or the SDTSF. Surface water from the Centre Pit area will be diverted via cut off drains and sumps to the centralised treatment in South Lens or allowed to drain into Centre Pit and pumped to South Lens.



a)



b)

**Figure 9 Plan view of ‘pillar’ area with flood levee shown in blue (9a). Section 6375E through north end of Centre Pit, showing flood levee in grey (9b). (Figures 40 and 41 of the EIS).**

### 6.2.2 Management measures

Once Centre Pit South dewatering is completed, monitoring will revert to monthly as is presently implemented.

### 6.2.3 Public and agency comment and responses

No comment was received.

### 6.2.4 Evaluation

According to the EIS, once dewatering of CPS is complete, the inflow to the working pit will likely be in the order of 50 to 250 L/s, in line with current CPN outflows.

During mining of Stage 1, approximately 0.14 GL of water from CPN, contained within the waste rock backfill, will also drain to CPS. The EIS however does not provide any comment on the likely rate of drainage, at what RL the drainage is expected to cease, or whether this is likely to occur during dewatering of CPS or after. It is nevertheless presumed to be in addition to the estimated inflow detailed above, and will likely occur as a seepage, rather than a significant flow.

CPN however likely represents a source of contaminants. Indeed, the majority of backfill waste rock within the pit is currently held below the water table. Excavation of the backfill material within the pit and lowering of the water table during the mining of stages 1 (and 3) has the potential to result in a temporary flush of metals and sulphate.

While the pit inflows, including CPN backfill drainage, should be able to be adequately managed via pit sump collection and pumping as per normal mining practice, it is considered prudent to initially maintain the frequency of water quality monitoring applied during the dewatering of CPS (Condition **MI**). Monitoring may revert to monthly, as is undertaken presently across the mine site, once the risk associated with the backfill seepage flow rate and quality is better understood. This may be achieved during the CPS dewatering process, in which case Grange may submit a case to the Director for a change to condition **MI** on cessation of dewatering.

Note, ongoing monitoring will also include the dewatering tank, as reflected in condition **M1**, which will be in addition to that presently undertaken.

Condition **G7** requires the Director to be notified of the completion of CPS dewatering.

As detailed in Section 6.1, the adaptive management and dewatering strategy proposed by Grange (conditions **EM1**, **3**, **4** and **5**) takes into consideration the quality of the water pumped from CPS, and the pumping rate. Given the lack of current information on the likely quality of the CPN waste rock drainage, flow rates and timing, it is considered prudent at this stage to continue to apply conditions **EM1**, **3**, **4** and **5** once dewatering of CPS has ceased. Grange may submit a case to the Director to cease or alter the adaptive management and dewatering strategy once the risk associated with the CPN waste rock flow rate and quality is better understood.

According to the EIS, during stage 3 mining, the dewatering tank will be relocated across Savage River, as CPN pond will disappear. The remaining 0.44GL of water held within CPN will be pumped either from the south end of CPS as the waste drains south, or from sumps in the north end of CPN. Note, it is unclear in the EIS what effect the drainage of 0.14 GL of water from CPN, during the mining of stage 1, will have on the water level of CPN pond, which is currently at RL 109 m. Condition **EM6** will nevertheless ensure the Director is notified when the water level of the pond drops below RL 109 m. This is considered important as the pond is a proposed monitoring point, with associated trigger values, and is also an established SRRP monitoring location. Dewatering of the pond also has implications for the timing of the relocation of the dewatering tank.

The assessment of potential inflows to the north wall of the stage 3 pit (i.e. flow from Savage River and or South Lens via the 'pillar' section) predicts a low level of seepage, at 2 to 3 L/s, in the order of historical flows experienced during the previous mining of the pit<sup>5</sup>.

The previous mining experience, combined with the fact that stage 3 will not result in the pit being mined any closer to Savage River, provides a level of assurance that significant pit inflow, and the potential dewatering of Savage River, is unlikely to occur. Indeed, to minimize any risk of disturbance and or alteration to the hydrology of the 'pillar' area, it is considered important that mining does not progress any closer to Savage River (condition **G8**).

Geotechnical work, including 3D numerical modelling, has shown the Savage River 'pillar' area to be stable. The EIS indicates that further pit design work for stage 3 may be undertaken however to address a stability issue to the east.

Condition **G8** requires the final pit design be submitted for approval prior to the commencement of stage 3 mining.

It is noted that the design of proposed flood levee is yet to be finalised, and is dependent on the completion of geotechnical drilling in the north wall to confirm the accuracy of the previously mined surface and the required depth for the levee keyway. Condition **G8** also requires the proponent to submit a report detailing the final design of the levee and outcomes from any geotechnical investigations of the north wall. Stage 3 mining (removal of CPN backfill) cannot progress below RL 113 m until the levee has been constructed (Condition **G8**).

---

<sup>5</sup> Extraction from CPN ceased in 2001.

Conditions 11, 26, and 30 of EPN 248/2 require Grange to minimize sediment run-off from disturbed land and collect and treat surface water runoff to Best Practice Environmental Management prior to discharge to the environment.

Condition 31 of EPN 248/2 requires stormwater be diverted away from contaminated areas, and that arising from such areas be treated prior to discharge.

The proposal to collect and divert onsite surface water/stormwater to South Lens, South Deposit or the SDTSF, as described in the EIS, is consistent with Conditions 11, 24, 30 and 31 of EPN 248/2. No further conditions are considered necessary.

### 6.2.5 Conclusions

The proponent will be required to comply with the following conditions:

- G7** Notification of works
- G8** Centre Pit Mining

## 6.3 Mine waste management

### 6.3.1 Description

#### **Waste rock**

The proposed expansion of Centre Pit will excavate approximately 255Mt of waste rock; 70 Mt in stage 1, 85 Mt in Stage 2 and 100 Mt in Stage 3, of which 19 Mt is backfill contained within CPN.

Section 6.7.2 of the EIS provides summary details of the geochemical characteristics of the Centre Pit (CPS and CPN) waste rock.

According to the EIS, waste rock derived from CPN and CPS have similar paste pH values, however, total S is higher for CPS and correspondingly, the NAG pH values are lower. CPN has higher Acid Neutralising Capacity (ANC).

The geochemical data reported for CPN and CPS is nevertheless within the range reported from other pits at Savage River Mine (e.g. North Pit and South Deposit, see Table 30 and Figure 57).

The EIS concludes that the management of waste material from Centre Pit, and corresponding Acid and Metalliferous Drainage (AMD) potential, is not going to present any new, significant geochemical challenges for the site.

Grange classifies waste rock into four types:

- A type - Non-Acid Forming material (NAF) (chlorite-carbonate, calcite schists, magnesite, dolomite, metamorphosed gabbro dolerite and basalt).
- B type – Neutral – low risk material (Western stratigraphic units with albite, chlorite and muscovite).
- C type - NAF (Schist, low sulphide serpentinite and clay).
- D type - Potentially Acid Forming material (PAF) (Chlorite-sulphide schists, sulphide intrusive, serpentinite, talc schist, mixed waste rock and unidentified materials).

Tables 2, 3 and 4 of the EIS detail the amounts of waste rock and type that will be generated from stage 1, 2 and 3 respectively. A total of 106 million tonnes of D type PAF is expected to be generated, inclusive of CPN backfill. According to the EIS, the backfill into CPN will be treated as D-Type (PAF) waste, unless able to be reclassified as other.

Appendix B of the EIS details the waste rock sampling and testing procedures. Test method and frequency is carried out as per Table 5 of Appendix B.

Waste rock will be placed on the existing B Dump and Southern Dump (referred to as Centre Pit Dump in the EIS) and Broderick Creek Dump. A new waste rock dump, referred to as East Mill Dump, will be created adjacent to the current mill. Twenty-eight million m<sup>3</sup> of waste rock will be placed on Centre Pit Dump, 352 million m<sup>3</sup> on Broderick Creek Dump and 11 million m<sup>3</sup> on the East Mill Dump. See Figure 60 of the EIS for a map showing the location of the dumps.

Grange considers that the current practices for the management of waste rock, in particular the management of D type waste (PAF), are sufficient to manage the potential risk of AMD formation as a result of the proposed Centre Pit expansion.

According to section 6.7.5 of the EIS, D type waste will be encapsulated within cells constructed as follows:

- The base and top constructed with a minimum of 2 m of compacted C-type “clay”.

- Sides of covered with a minimum of 3-5 m of un-compacted C-type “clay”. Note Appendix B states “covering with a minimum of 2m”; and
- Outer layer armoured with at least 5 m of A-type material, placed over the final layer of C-type clay capping.

Figure 61 of the EIS shows the proposed end design of Centre Pit Dump (extension of B Dump and Southern Dump). According to the EIS, the integrity of the water shedding cover previously placed on B Dump is not likely to be impacted by the placement of the additional waste and weight.

There will be a 10m wide berm at the base of the waste dump between the pit and the dump, with the current design indicating no requirement for any cut back or removal of pre-existing waste from B Dump.

According to the EIS, the existing dump faces, and berms will be cleaned and brought up to the current waste dump design standard for safe operation and geotechnical stability.

Section 2.5 of the EIS summarises potential pit instability issues in the south east corner of the stage 2 pit. The geotechnical mining report (Mining One consultants) identified a weak toe section below B Dump where the slope of the pit walls (draft pit design) were too steep, potentially resulting in failure up slope and into B Dump. The final pit design included in the EIS has since been updated to use a shallower pit slope in this section (reduced from an inter-ramp slope angle of 42° to 30°) to reduce the risk of instability.

According to the EIS, the pit design for stage 2 will be further modified to improve stability, including redesign of the stage 2 pit wall under B-dump, and further stability analysis to ensure the design/pit wall is stable prior to the start of mining of stage 2. This will include slope stability monitoring and regular pit inspections by on-site geotechnical engineers. The EIS indicates that stage 2 will not be mined for 2 years.

The proposed East Mill Dump will be located adjacent to the current mill in a previously disturbed valley area. The proposed design is shown in Figure 62 of the EIS.

According to the EIS, 0.5 million m<sup>3</sup> of waste rock will also be used to construct a buttress against the Main Creek Tailings Dam and Emergency Tailings Dam walls to improve the long-term factor of safety.

The buttress will be built from A and B type waste rock, with the outside face armoured to prevent erosion (see Figure 63 of the EIS for basic design). The buttress does not require keying into the existing dam walls.

The current model of the Broderick Creek Dump is provided in Figure 64 of the EIS. According to the EIS, waste from stages 2 and 3 will most likely be deposited within the southernmost dump on the west side of North Pit.

Table 5 of Appendix B details the waste rock dump geochemical testing procedures, which include weekly NAG pH and monthly ABA accounting. According to the EIS, geotechnical monitoring of the waste rock dumps is conducted on a routine basis, to monitor for subsidence and verify the integrity of run off control measures.

Section 6 of Appendix B details the quality control and review procedures. Table 6 outlines the waste rock quality control and testing frequency, and Table 7 details the auditing frequency, including independent external auditing, proposed every 2 years.

## **Tailings**

Tailings produced from the processing of Centre Pit ore will be deposited into either the Main Creek Tailings Dam or the South Deposit Tailings Storage Facility, depending on operational requirements at the time of processing. According to the EIS, there is adequate capacity in the tailings storage facilities on the mine site to contain the tailings produced and no operational changes are required.

The EIS (including Appendix H) provides the following information on potential tailings geochemistry and leachate from Centre Pit tails:

- XRD analysis shows that the tails placed in the OTD, known to be from Centre Pit, are dominated by Actinolite ~20%, Albite ~13%, Chlorite ~26%, Kaolinite ~9%, Pyrite ~9% and Serpentine ~17%.
- Laboratory work (Davis Tube Recovery (DTR) tails sampling) undertaken by Grange showed pyrite in samples varied from 6% to 31%.
- The GAI enrichment factors for the Centre Pit samples (Appendix H, Table 1) are higher for Co, Ni, Cu, As, Bi and Pb compared to North Pit.
- It is not possible to ascertain the exact leachate chemistry of the future tailings, however, metals including Cu, Co and Ni are likely to be more mobile under acidic conditions.
- The anticipated pH range of the fluids associated with these tailings is likely to be between ~ 6.5 and 7.5, as these tailings will be deposited, for the most part, into the South Deposit Tailings Storage Facility where the dam pH is between 7 and 7.5 (referenced in the EIS as Ferguson, Pers. Comm.).

The EIS concludes that under the current conditions (i.e. South Deposit Tailings Storage Facility managed at between pH 7.00 and 7.5) the tails management practices on site should be suitable for managing the tails generated from the Centre Pit expansion.

### **6.3.2 Management measures**

#### **Geotechnical monitoring**

Geotechnical analysis and monitoring of Centre Pit wall stability will take place on a continual basis during mining. Monitoring will be conducted using total stations or similar and regular pit inspections will be conducted by on-site geotechnical engineers, and reconciliation of geotechnical design assumptions will be undertaken as mining progresses.

#### **Waste Rock management**

Appendix B, Waste Rock Management Plan, details the following:

- Waste rock types and classification;
- Waste rock dump design, including PAF encapsulation;
- Planning and segregation procedures; and
- Geochemical testing and quality control and auditing procedures.

The EIS indicates that oxygen and temperature probes will be installed in the north and south sections of Centre Pit Dump and the East Mill Dump, initially at the lowest level possible, and close to the final closure height prior to encapsulation.

### 6.3.3 Public and agency comment and responses

No comment was received.

### 6.3.4 Evaluation

The EIS concludes that the waste material excavated from Centre Pit is not going to present any significant geochemical challenges for the site. While detailed results of acid base accounting and geochemical analysis were not provided in the EIS, the summary data presented appears to indicate that the key waste rock geochemical parameters for CPS and CPN are within the range of those of other pits at the mine site. Note, Figure 57 of the EIS does show CPS having more samples with higher NAPP and MPA than CPN, towards the extent of the range experienced on site.

Grange nevertheless has an established waste rock characterisation system and set of procedures for the management of waste, particularly PAF waste. These systems and procedures are described in Appendix B, Waste Rock Management Plan (Plan). Given the geochemical nature of the Centre Pit waste rock, and the proven record of waste management on site, the procedures and systems detailed in the Plan are considered sufficient to manage the waste rock generated from the expansion of Centre Pit, in particular PAF and the potential for AMD formation. Condition **WMI** requires Grange to implement the Plan, which includes any update to the Plan.

To reinforce the proper management of PAF material, and ensure clarity, condition **WMI** specifies the key elements required for the encapsulation of PAF material within an appropriately constructed clay cell, designed to minimize oxygen and water ingress. This is considered necessarily given the slight ambiguity between the EIS (Section 6.7.5) and Appendix B, and the likely construction of PAF cells within the new East Mill Dump.

The proponents undertaking to install oxygen and temperature monitoring probes within Centre Pit Dump and the East Mill Dump will allow for an assessment of the functioning of the dumps. This is considered important and is required by condition **WM2**.

The Waste Rock Management Plan also details established waste categorisation and rock dump geochemical testing procedures, used to ensure appropriate waste segregation is undertaken. The Plan also details Grange's waste rock quality control and review procedures, including established independent external auditing. Condition **WMI** will ensure these testing and quality control procedures are implemented.

According to the EIS, there is no planned cut back of B Dump. This is considered important in order to maintain the integrity of the dump, including the water shedding cover, and to minimise any disturbance to historical PAF and the functioning of the dump (Condition **WM3**).

There is slight ambiguity in Grange's intent however as the EIS refers to the existing dump faces and berms being cleaned and brought up to the current waste dump standard, and a reference to a potential cutback to the B Dump or Southern Dump capping is made in Section 2.5 of the EIS, in relation to geotechnical work and pit redesign.

Condition **WM3** does not preclude an alteration to B Dump or Southern Dump, if required in the future. Grange would nevertheless be expected to submit a case to the Director providing detail

of any proposed cutback, ensuring appropriate measures are in place to minimize disturbance to historical PAF and maintain the geotechnical and geochemical integrity of the dumps.

Condition **EM7** requires any new seepage that is detected on The Land, for example from the proposed East Mill Dump or Centre Pit Dump, be reported to the Director.

Where further work is undertaken on pit design, for example in relation to further stability analysis, condition **G8** requires the proponent to submit a report to the Director for approval detailing the final pit design prior to commencement of stage 2 mining. Condition **G8** also requires the reporting of the results of slope stability monitoring and analysis.

Condition **G7** is imposed to ensure Grange notifies the Director of the commencement of each stage of mining.

According to the EIS, only type A and B waste material will be used for the proposed buttressing of the Emergency Tailings Dam and Main Creek Tailings Dam walls. Condition **WM4** will reinforce this, ensuring that no PAF material will be incorporated into the buttress.

According to information presented in the EIS, the leachate chemistry of tails generated from the processing of Centre Pit ore may differ from that generated from North Pit ore. While detail on the potential leachate chemistry of Centre Pit tails was not provided, the geochemical work presented in Appendix G found high concentrations of some metals, including Co, Ni and Cu, in Centre Pit composite tails samples, with GAI values several times greater than the composite North Pit sample (Table 2, Appendix G). Further work undertaken 10 July 2020 (Appendix G) indicated that the Centre Pit samples were likely to be classified as PAF.

Metals such as Cu, Co and Ni are likely to be more mobile under acidic conditions. According to the EIS, the anticipated pH range of the fluids associated with these tailings is likely to be between ~ 6.5 and 7.5, with the tailings deposited, for the most part, into the SDTSF where the dam pH is between 7 and 7.5.

The following conditions, contained within the SDTSF Permit (PCE 8808 r2), are relevant, in force, and will ensure the facility is managed in a manner that reduces the risk of AMD formation:

- Condition **G9** requires the volume of tailings deposited in the SDTSF, the origin of the ore that was processed to produce those tailings, and related water quality monitoring data to be detailed in the Annual Environmental Review.
- Condition **WM1** requires all tailings discharged to SDTSF that are fully or partly generated from the processing of ore from Centre Pit South be tested on a monthly basis for total sulphur, MPA, ANC, NAG pH and NAG.
  - Note, Condition **WM2**, restricts the tailings discharged into the SDTSF to that derived only from the processing of ore from North Pit, South Deposit Pit or Centre Pit South, unless otherwise approved in writing by the Director. This allows the Director to consider the implications of tails derived from Centre Pit North, including likely geochemistry.
- Condition **WM2** requires tailings either be covered with fresh tailings or inundated with a permanent water cover within 12 months of deposition, or if not covered within 12 months, dosed with alkaline material sufficient to offset any acid generated by the exposed tailings.
- Condition **WM4** requires that establishment of a SDTSF neutralisation system, sufficient to adequately dose exposed tailings with alkaline material to offset any acid generated by those tailings.

### **6.3.5 Conclusions**

The proponent will be required to comply with the following conditions:

**WM1** Waste Rock Management Plan

**WM2** Waste rock dump monitoring

**WM3** B Dump and Southern Dump complex

**WM4** Waste material for construction of the MCTD and ETD buttress

## 7 Other Issues assessed by the Board

In addition to the key issues, the following environmental issues are considered relevant to the proposal and have been evaluated in this section:

1. Natural values
2. Air emissions
3. Noise
4. Environmentally hazardous materials
5. Decommissioning and rehabilitation

Issue 1: Natural values
<b>Description of potential impacts</b>
<p>A total of 57.67 ha of vegetation will be impacted encompassing the following vegetation communities, none of which are listed as threatened under the NC Act (Figure 57 of the EIS):</p> <ul style="list-style-type: none"> <li>• <i>Nothofagus - Atherosperma</i> rainforest – 29.87 ha;</li> <li>• <i>Acacia melanoxylon</i> forest on rises – 11.08 ha;</li> <li>• <i>Acacia dealbata</i> forest – 5.40 ha;</li> <li>• <i>Leptospermum lanigerum – Melaleuca squarrosa</i> swamp forest – 1.11 ha;</li> <li>• <i>Eucalyptus nitida</i> forest over rainforest – 8.38 ha; and</li> <li>• <i>Eucalyptus obliqua</i> forest over rainforest – 1.82 ha.</li> </ul> <p>No threatened flora species listed under either the TSP Act or the EPBC Act were recorded or are considered likely to occur on site.</p> <p>The following fauna species listed under the TSP Act and or the EPBC Act may occur and or have habitat within the proposed disturbance area;</p> <ul style="list-style-type: none"> <li>• Spotted-tailed Quoll;</li> <li>• Tasmanian Devil;</li> <li>• Grey Goshawk; and</li> <li>• Tateid (formerly known as Hydrobiid) snail species (<i>Beddomeia bowryensis</i> and <i>B. trochiformis</i>).</li> </ul> <p>A natural values impact assessment was prepared by North Barker Ecosystem Services, attached as Appendix J of the EIS.</p> <p>According to the EIS, the Spotted-tailed Quoll may utilise habitat within the proposed disturbance area, however such habitat extends well beyond the mine footprint. The Tasmanian Devil is known to occur on the mine site, but denning habitat is considered to be sub-optimal, with no dens found during surveys (Appendix J).</p>

The EIS concludes that the proposed activity is unlikely to impact the Spotted-tailed Quoll or Tasmanian Devil. It notes that these species are mobile with large territories, and the loss of a small area of habitat is unlikely to be significant.

Potential foraging and nesting habitat for the Grey Goshawk is present within the riparian vegetation and *Acacia* community near Savage River (Figure 69 of the EIS) and within *Acacia melanoxylon* forest near CPS (Figure 68). No nests or individuals were recorded however during surveys (Appendix J).

A creek within the southern area of the proposed East Mill Dump (Figure 70 of the EIS) has been identified as potential habitat for tateid snails.

Several trees in the East Mill Dump area were identified as potentially hollow forming, suitable for the Tasmanian Masked Owl. The EIS considers however that the habitat is suboptimal, and the species is unlikely to occur in the area.

### Management measures proposed in the EIS

The following management measures were proposed in the EIS:

- Pre-clearance devil and quoll den surveys will be completed prior to any vegetation clearance to ensure no breeding habitats are disturbed.
- A targeted Grey Goshawk nest survey will be conducted within suitable habitat within the impact area prior to disturbance works.
- A targeted survey for tateid snails will be conducted within the identified creek south of the East Mill Dump.
- Appropriate weed and plant pathogen hygiene management measures will be implemented in line with current site practices.

### Public and agency comment

The following comment was received from Conservation Assessments and Wildlife Management Branch, Natural & Cultural Heritage Division:

- Based on the information provided, it is considered that there are no threatened flora or threatened vegetation communities likely to occur within the proposed works area.
- Pre-clearance devil and quoll den surveys are supported. These should be carried out in accordance with the *Survey Guidelines and Management Advice for Development Proposals that may impact on the Tasmanian Devil (Sarcophilus harrisii)*. Any dens that cannot be avoided will require a permit to take under the *Nature Conservation Act 2002*.
- A number of threatened snail species are likely to be found in the Savage River Mine area, including the Hydrobiid Snail (Bowry Creek) (*Beddomeia bowryensis*), Savage River Mine Freshwater Snail (*Beddomeia trochiformis*), Heazlewood River Hydrobiid Snail (*Phrantela marginata*) and the Hulls Freshwater Snail (*Beddomeia hullii*). Given that the known distribution of these species extends beyond the boundary of the proposed mine, it is considered that the proposal is unlikely to cause significant impacts to these species.
- A targeted survey for *Beddomeia bowryensis* and *Beddomeia trochiformis* within suitable creek habitat south of the East Mill Dump is supported.

- A Grey Goshawk (*Accipiter novaehollandiae*) nest has previously been located within 6 km of the proposed mining area. A pre-clearance survey of potential habitat for grey goshawk is supported.
- The survey as part of the Natural Values Assessment (Appendix J) found two plant species *Rubus fruticosus* (blackberry) and *Cortaderia sp.* (pampas grass) that are declared weeds under the *Weed Management Act 1999*. Weed and hygiene management measures should be undertaken in accordance with the [Weed and Disease Planning Hygiene Guidelines – Preventing the spread of weeds and diseases in Tasmania](#).

## Evaluation

The Spotted-tailed Quoll and Tasmanian Devil are mobile species with large territories. It is expected that the ranges of these species will overlap with part of the proposed disturbance footprint, and that any individuals effected will adjust accordingly. Given the large extent of contiguous habitat available within the wider area, it is considered that the loss of 57.67 ha of potential foraging and denning habitat is unlikely to be significant with regard to the sustainability of the species in the local region.

Whilst it is agreed that the environment within the disturbance footprint is not likely to contain high value denning habitat, the existence of dens cannot be ruled out. The proponents undertaking to conduct a pre-clearance survey for Spotted-tailed Quoll and Tasmanian Devil dens prior to any land clearance is considered appropriate and is required by condition **FFI**.

As advised by CAS, the surveys are required to be undertaken in accordance with the *Survey Guidelines and Management Advice for Development Proposals that may impact on the Tasmanian Devil (Sarcophilus harrisii)*.

In the event that a den is located, condition **FFI** requires that the Director be notified upon completion of the survey. CAS must be contacted for advice with regard to the decommissioning of any den.

The proposal will not increase the risk of road kill off the mine site, and as the proposal is largely being undertaken within current operating procedures, there will be no significant increase in risk on site.

Approximately 4.49 ha of potential foraging and nesting habitat for the Grey Goshawk has been identified. While no nests or individuals were recorded during the survey (Appendix J), a nest has previously been recorded in the local area. The proposed pre-clearance survey of the area identified as potential habitat in Appendix J is supported and required by condition **FF2**. If a nest is discovered in the proposed impact area, and cannot be avoided, a permit to take will be required under the NC Act. Condition **FF2** also requires that the Director be notified upon completion of the survey should a nest be identified.

Given the known distribution of *Beddomeia bowryensis* and *Beddomeia trochiformis* extends beyond the boundary of the proposed mine, CAS considers that the proposal is unlikely to cause significant impacts to these species should they be identified to occur within the creek line in the southern area of the East Mill Dump (see Figure 70 of the EIS). A targeted survey for these species in this area is nevertheless supported. A report of the survey findings will be provided in the Annual Environmental Review (**G6**).

The proponent's conclusion that the potential Masked Owl habitat within the East Mill Dump is suboptimal, and that the species is unlikely to occur in the area, is supported. Conservation

Assessments and Wildlife Management Branch, Natural & Cultural Heritage Division, has also indicated that it considers it unlikely that the species occurs on site.

Two plant species declared as weeds under the *Weed Management Act 1999*; *Rubus fruticosus* (blackberry) and *Cortaderia sp.* (pampas grass) have been recorded on site. According to the EIS, the current EPNs for the site (EPN 248/2, 7984/1, 8748/4, 8994/1, 10006/2,) require procedures be established to reduce the risk of introduction and spread of plant pathogens such as *Phytophthora cinnamomi*, and declared weeds.

The current EPNs for the mine site however do not impose any requirements for the management of *Phytophthora cinnamomi* and or declared weeds<sup>6</sup>. While there is a requirement stipulated in Permit PCE 8808(r2) (Condition FF4), this permit only pertains to the development, and the land area, of the South Deposit Tailing Storage Facility, and references a now outdated set of *Phytophthora cinnamomi* and weed management guidelines.

The EIS nevertheless indicates that appropriate weed and hygiene management measures will be implemented in line with current site practices. To ensure these procedures are in line with the current Weed and Disease Planning Hygiene Guidelines (Weed and Disease Planning Hygiene Guidelines-Preventing the spread of weeds and disease in Tasmania, 2015), condition **FF3** is imposed.

### Conclusion

The proponent will be required to comply with the following conditions:

- FF1 Tasmanian Devil and Spotted-tailed Quoll survey**
- FF2 Grey Goshawk nest survey**
- FF3 Machinery washdown**

<sup>6</sup> Note, condition 13 of EPN 248/2 requires hygiene procedures relevant to *Phytophthora cinnamomi* to be implemented when entering the pipeline maintenance track.

<b>Issue 2: Air emissions</b>
<b>Description of potential impacts</b>
<p>According to the EIS, air quality impacts are limited to those related to dust generation, with the proposed expansion consistent with the nature and level of dust generation currently occurring on site.</p> <p>The EIS considers that plant life around the mine is sufficiently clear of active areas, and in combination with the consistent rainfall (mean annual of 1,961 mm and lowest monthly average of 79 mm), impacts to vegetation as a result of dust accumulation are unlikely.</p> <p>Residents at Savage River are in excess of 2 km from the mine and also unlikely to be impacted by dust generated from the proposed works.</p> <p>The only truck movements associated with the works are internal to the site.</p>
<b>Management measures proposed in the EIS</b>
No specific management measures were proposed in the EIS.
<b>Public and agency comment</b>
No comment was received.
<b>Evaluation</b>
<p>The mine is situated 45 km off the Murchison Highway. The nearest localities are Corinna, 17.5 km to the south, and Waratah, 38 km to the north-east. Worker accommodation is located in the Savage River township, approximately 2.3 km from the mine.</p> <p>During dry windy weather there is the potential for the generation of dust plumes. Standard condition <b>AI</b> will ensure that dust emissions are controlled to the extent necessary to prevent environmental nuisance. Given the relatively isolated nature of the mine, no other requirements are imposed.</p>
<b>Conclusion</b>
<p>The proponent will be required to comply with the following conditions:</p> <p><b>AI Control of dust emissions</b></p>

<b>Issue 3: Noise</b>
<b>Description of potential impacts</b>
<p>Noise generating activities on site will include:</p> <ul style="list-style-type: none"> <li>• Extraction via truck and shovel operation;</li> <li>• On site material transportation by trucks;</li> <li>• Use of front-end loaders;</li> <li>• Operation of the gyratory crushers;</li> <li>• Transport of crushed ore to the concentrator stockpile via overland conveyor; and</li> <li>• Pumping of slurry to Port Latta via an overland pipeline.</li> </ul> <p>According to the EIS, the proposed expansion is not expected to increase noise at the mine site accommodation above current levels.</p> <p>The EIS notes that the required attenuation zone for open cut mines under the adopted State Planning provisions of the Tasmanian Planning Scheme is 2 km. It further notes that employees on site are protected by adopted health and safety measures and operational safeguards.</p>
<b>Management measures proposed in EIS</b>
No specific management measures were proposed in the EIS.
<b>Public and agency comment</b>
No comment was received.
<b>Evaluation</b>
<p>Given the relatively isolated nature of the mine, issues arising from noise on the mine site are unlikely to occur.</p> <p>Regulatory controls are not required.</p>
<b>Conclusion</b>
Regulatory controls in relation to noise are not required.

<b>Issue 4: Environmentally hazardous materials</b>
<b>Description of potential impacts</b>
According to the EIS, all dangerous or hazardous goods are stored in accordance with Australian standards and approved operational systems. No change to these systems will be required as a result of the proposed Centre Pit expansion.
<b>Management measures proposed in EIS</b>
No specific management measures were proposed in the EIS.
<b>Public and agency comment</b>
No comment was received.
<b>Evaluation</b>
<p>Condition 43 of EPN 248/2 requires that all potentially hazardous goods are stored in accordance with the relevant Australian standards. Condition 44 requires that Hazardous materials storage comply with the <i>Dangerous Goods Act 1976</i> and <i>Regulations 1993</i>.</p> <p>To ensure environmentally hazardous materials, such as fuel and oil, are stored and handled in accordance with up to date best practice, conditions <b>H1</b> and <b>H2</b> are required. <b>H3</b> requires spill kits appropriate for the types and volumes of material handled at the mine site be kept on site at appropriate locations.</p> <p>Should refuelling occur within the pit, these conditions will ensure it is undertaken appropriately and sufficient safeguards are in place.</p>
<b>Conclusion</b>
<p>The proponent will be required to comply with the following conditions:</p> <p><b>H1 Storage and handling of hazardous materials</b>  <b>H2 Hazardous materials (&lt;250 litres)</b>  <b>H3 Spill kits</b></p>

Issue 5: Decommissioning and rehabilitation
<p><b>Description of potential impacts</b></p>
<p>The EIS provides a summary outline of the rehabilitation and closure of Centre Pit and the associated waste rock dumps, noting that the proposed Centre Pit expansion will form part of the ongoing operation and final rehabilitation and closure of the whole mine site.</p> <p>The EIS outlines several options for the closure and management of the Centre Pit void, including:</p> <ul style="list-style-type: none"> <li>• Allowing the pit to flood.</li> <li>• Continue mining of Centre Pit by underground means</li> <li>• Backfilling the pit with waste</li> <li>• Backfilling the pit with tailings</li> </ul> <p>The option chosen will be determined by the strategic position of Grange, accounting for resources and opportunities at the mine closer to the time of closure.</p> <p>The following will also be undertaken to rehabilitate infrastructure associated with the pit:</p> <ul style="list-style-type: none"> <li>• Maintenance on drains, roadways and erosion control structures around pit</li> <li>• Maintenance of berms around pit; and</li> <li>• Provision of warning signs around pit.</li> </ul> <p>Table 38 details the proposed rehabilitation principles for the waste rock dumps, including:</p> <ul style="list-style-type: none"> <li>• Clay capping and A type armouring of any remaining dump faces;</li> <li>• Maintenance of drains, erosion control structures and berms around dump edges; and</li> <li>• Some revegetation on strips near dump edges.</li> </ul> <p>Table 38 outlines specific water management measures that may be implemented for each dump on closure.</p>
<p><b>Management measures proposed in EIS</b></p>
<p>No specific management measures were proposed in the EIS.</p>
<p><b>Public and agency comment</b></p>
<p>No comment was received.</p>
<p><b>Evaluation</b></p>
<p>Conditions 19 and 20 of EPN 248/2 requires review and revision of the operating Environmental Rehabilitation Plan (ERP), and implementation of the approved ERP following permanent cessation of operations. Condition 7 requires notification of any permanent cessation.</p> <p>The rehabilitation and closure of Centre Pit and associated waste rock dumps will form part of the final rehabilitation and closure of the mine site and will be captured by current conditions 19 and 20 of EPN 248/2.</p> <p>Should Grange temporarily suspend operations, condition <b>DCI</b> will ensure that the land is managed appropriately, and a Care and Maintenance Plan is submitted.</p>

## Conclusion

The proponent will be required to comply with the following conditions:

**DCI** Temporary suspension of activity

## 8 Issues not assessed by the Board

The following issues, raised during the assessment process, not the Board’s responsibility under the EMPC Act, or are issues which are more appropriately addressed by another regulatory agency:

### I. Heritage

<b>Issue I: Heritage</b>
<b>Description of potential impacts</b>
<p>A historical heritage assessment was undertaken by Austral Tasmania (Appendix H). Through a process of historical research and review of previous assessments, the report concludes that there is low potential for significant historic heritage sites or features to be present within the study area. Areas of late nineteenth, early twentieth century iron ore exploration and mining now largely coincide with the Savage River Central Pit area, which would have destroyed any evidence of historic mining activity in this location.</p> <p>Appendix H also recommends that The Unanticipated Discovery Plan for managing Aboriginal heritage (Appendix I), should form part of the project specifications.</p>
<b>Management measures proposed in EIS</b>
No specific management measures were proposed.
<b>Public and agency comment</b>
<p>Aboriginal Heritage Tasmania (AHT) has completed a search of the Aboriginal Heritage Register and provided the following comment:</p> <p>AHT confirms that an Aboriginal Heritage Property Search (PS0049639) was conducted for the property in 2019 and no registered Aboriginal heritage was identified, as described in the heritage assessment report prepared by Austral Tasmania. Please note, in subsequent correspondence with Grange Minerals AHT recommended that they renew their Property Search as searches are only valid for six months.</p> <p>Provided the proponent adheres to the Unanticipated Discovery Plan (UDP) should any Aboriginal heritage be suspected during works, AHT has no objection to the project proceeding.</p>
<b>Evaluation</b>
The proponent will be made aware of their obligations under the <i>Aboriginal Relics Act 1975</i> (Legal Obligations <b>LOI</b> ).
<b>Conclusion</b>
The proponent is required to comply with the <i>Aboriginal Relics Act 1975</i> (Legal Obligations <b>LOI</b> ).

## 9 Report Conclusions

This assessment has been based on the information provided by the proponent, Grange Resources (Tasmania) Pty Ltd, in the case for assessment (the EIS).

This report incorporates specialist advice provided by EPA Tasmania scientific specialists and regulatory staff, other Divisions of DPIPWE and other government agencies.

It is concluded that:

1. the RMPS and EMPCS objectives have been duly and properly pursued in the assessment of the proposal;
2. the assessment of the proposal has been undertaken in accordance with the Environmental Impact Assessment Principles; and
3. the proposal is capable of being managed in an environmentally acceptable manner such that it is unlikely that the RMPS and EMPCS objectives would be compromised, provided that the environment protection notice (EPN No. 10364/1) appended to this report is issued and served and its requirements are duly complied with.

## I0 Report Approval

**Environmental Assessment Report and conclusions, including environmental conditions, adopted:**



Andrew Paul

**CHAIRPERSON**

**BOARD OF THE ENVIRONMENT PROTECTION AUTHORITY**

Meeting date: 22<sup>nd</sup> April 2021

---

## 11 References

Pitt & Sherry (2020); *Centre Pit Expansion, Savage River Mine, Environmental Impact Statement*, prepared for Grange Resources (Tasmania) Pty Ltd.

---

## 12 Appendices

Appendix 1 Table of Management Measures

Appendix 2 Environment Protection Notice No. 10364/1

## Appendix I – Management Measures

**Table I: EIS Management Measures (Table 39 of the EIS)**

	<b>Management measures</b>	<b>Timing for implementation</b>	<b>EIS section</b>
1	Establishment of water quality monitoring program as outlined in the report by Koehnken and Ray	Prior to dewatering of CPS	6.2.6
2	Waste rock will be managed in accordance with the current Waste Rock Management Plan	Throughout operation	6.5.5
3	Monitoring of rock dumps is conducted in accordance with the Waste Rock Management Plan	Throughout operation	6.5.13
4	Pre-clearance survey for denning habitats for Tasmanian devil and spotted-tailed quoll	Prior to vegetation clearance	6.7.11
5	Pre-clearance survey for potential habitat for grey goshawk	Prior to vegetation clearance	6.7.11
6	Permit to take as required	Prior to vegetation clearance	6.7.11
7	Appropriate weed and hygiene management measures will be implemented in line with current OMS	Throughout operation	6.7.11

---

## Appendix 2 – Environment Protection Notice No. I0364/I



## **ENVIRONMENT PROTECTION NOTICE No. 10364/1**

---

Issued under the *Environmental Management and Pollution Control Act 1994*

Issued to: **GRANGE RESOURCES (TASMANIA) PTY LTD**  
**ACN 073 634 581**  
**34A ALEXANDER STREET**  
**BURNIE TAS 7320**

Environmentally Relevant Activity: **The operation of a mine and mineral works (ACTIVITY TYPE: Mineral Works)**  
**SAVAGE RIVER MINE,**  
**SAVAGE RIVER TAS 7321**

### **GROUND**

I, Wes Ford, Director, Environment Protection Authority, being satisfied in accordance with section 44(1)(a) of the *Environmental Management and Pollution Control Act 1994* (EMPCA) that in relation to the above-mentioned environmentally relevant activity that serious or material environmental harm or environmental nuisance is being, or is likely to be, caused hereby issue this environment protection notice to the above-mentioned person as the person responsible for the activity.

### **PARTICULARS**

The particulars of the grounds upon which this notice is issued are:

- 1** The above activity, being an environmentally relevant activity which does not require a land use permit, was required to be referred to the EPA under Section 27 of the EMPCA for environmental impact assessment. Having completed its assessment, the Board of the EPA has caused the Director to issue this environment protection notice containing conditions and restrictions which the Board requires to apply to the activity.

## DEFINITIONS

Unless the contrary appears, words and expressions used in this Notice have the meaning given to them in Schedule 1 of this Notice and in the EMPCA. If there is any inconsistency between a definition in the EMPCA and a definition in this Notice, the EMPCA prevails to the extent of the inconsistency.

## REQUIREMENTS

The person responsible for the activity must comply with the conditions as set out in Schedule 2 of this Notice.

## INFORMATION

Attention is drawn to **Schedule 3**, which contains important additional information.

## PENALTIES

If a person bound by an environment protection notice contravenes a requirement of the notice, that person is guilty of an offence and is liable on summary conviction to a penalty not exceeding 1000 penalty units in the case of a body corporate or 500 penalty units in any other case (at the time of issuance of this Notice one penalty unit is equal to \$172.00).

## NOTICE TAKES EFFECT

**This notice takes effect on the date on which it is served upon you.**

## APPEAL RIGHTS

You may appeal to the Appeal Tribunal against this notice, or against any requirement contained in the notice, within 14 days from the date on which the notice is served on you. The Appeal Tribunal contact details are:

The Chairperson  
Resource Management and Planning Appeal Tribunal  
GPO Box 2036  
Hobart TAS 7001

Phone: (03) 6165 6794  
Email: [rmpat@justice.tas.gov.au](mailto:rmpat@justice.tas.gov.au)

Signed: \_\_\_\_\_



DIRECTOR, ENVIRONMENT PROTECTION AUTHORITY

Date: \_\_\_\_\_

22 April 2021

## Table Of Contents

Schedule 1: Definitions.....	5
Schedule 2: Conditions.....	8
Maximum Quantities.....	8
Q1 Regulatory limits .....	8
General.....	8
G1 Access to and awareness of conditions and associated documents.....	8
G2 Incident response.....	8
G3 No changes without approval.....	8
G4 Change of responsibility.....	8
G5 Change of ownership.....	8
G6 Annual Environmental Review.....	8
G7 Notification of works.....	9
G8 Centre Pit mining.....	9
Atmospheric.....	10
A1 Control of dust emissions.....	10
Decommissioning And Rehabilitation.....	10
DC1 Temporary suspension of activity.....	10
Effluent Management.....	10
EM1 Centre Pit dewatering flow rate.....	10
EM2 Centre Pit water management.....	11
EM3 Centre Pit dewatering investigation trigger levels for Centre Pit North pond.....	11
EM4 Centre Pit dewatering investigation trigger levels for South Lens Outflow 11	
EM5 Centre Pit dewatering investigation trigger levels for Savage River below Southwest Rock Dump (SRbSWRD).....	12
EM6 CPN pond water level.....	13
EM7 Seepage reporting.....	13
Flora And Fauna.....	13
FF1 Tasmanian devil and spotted-tailed quoll survey.....	13
FF2 Grey Goshawk nest survey .....	13
FF3 Machinery washdown.....	14
Hazardous Substances.....	14
H1 Storage and handling of hazardous materials.....	14
H2 Hazardous materials (< 250 litres).....	14
H3 Spill kits.....	15
Monitoring.....	15
M1 Water quality monitoring requirements.....	15
M2 Samples and measurements for monitoring purposes.....	15
M3 Monitoring reporting and record keeping.....	15
Waste Management.....	16
WM1 Waste Rock Management Plan.....	16
WM2 Waste rock dump monitoring .....	16
WM3 B Dump and Southern Dump complex.....	16
WM4 Waste material for construction of the MCTD and ETD buttress.....	16
Schedule 3: Information.....	17
Legal Obligations.....	17
LO1 Aboriginal relics requirements.....	17
LO2 EMPCA.....	17
LO3 Storage and handling of dangerous goods, explosives and dangerous	

substances..... 17

Other Information..... 17

    OI1 Waste management hierarchy..... 17

    OI2 Notification of incidents under section 32 of EMPCA ..... 17

***Attachments***

Attachment 1: Mining stages (modified: 23/03/2021 14:17)..... 1 page

Attachment 2: Waste Rock Dump Locations (modified: 23/03/2021 14:18)..... 1 page

Attachment 3: Map showing location of surface water monitoring sites (modified: 23/03/2021 14:23)..... 1 page

Attachment 4: The Land (modified: 23/03/2021 14:38)..... 1 page

Attachment 5: Buffer Between CP and Savage River (modified: 17/03/2021 14:17)..... 1 page

Attachment 6: Grey Goshawk (modified: 23/03/2021 14:16)..... 1 page

Attachment 7: Surface water monitoring (modified: 23/03/2021 11:42)..... 2 pages

## Schedule 1: Definitions

**Aboriginal Relic** has the meaning described in section 2(3) of the *Aboriginal Heritage Act 1975*.

**Activity** means any environmentally relevant activity (as defined in Section 3 of EMPCA) to which this document relates, and includes more than one such activity.

**Centre Pit** means the area of mining defined by the mining of stages 1, 2 and 3 at Attachment 1.

**Centre Pit dewatering** means the dewatering of Centre Pit South and any subsequent dewatering of Centre Pit undertaken as ongoing pump out of mine waters during mining stages 1, 2 or 3.

**Centre Pit Dump** means the waste rock dump delineated at Attachment 2.

**Centre Pit North Pond** means the pond identified at Attachment 3.

**Centre Pit South** means the pit containing water identified at Attachment 3.

**dewatering of Centre Pit South** means the pumping out of the water held within Centre Pit South at the time of issue of these conditions, and as identified at Attachment 2. The completion of dewatering of Centre Pit South will be deemed to have occurred when the water level within Centre Pit South is at 70 m RL.

**dewatering tank** means the water storage tank delineated at Attachment 3.

**Director** means the Director, Environment Protection Authority holding office under Section 18 of EMPCA and includes a delegate or person authorised in writing by the Director to exercise a power or function on the Director's behalf.

**East Mill Dump** means the waste rock dump delineated at Attachment 2.

**EMPCA** means the *Environmental Management and Pollution Control Act 1994*.

**Environmental Harm** and **Material Environmental Harm** and **Serious Environmental Harm** each have the meanings ascribed to them in Section 5 of EMPCA.

**Environmental Nuisance** and **Pollutant** each have the meanings ascribed to them in Section 3 of EMPCA.

**Environmentally Hazardous Material** means any substance or mixture of substances of a nature or held in quantities which present a reasonably foreseeable risk of causing serious or material environmental harm if released to the environment and includes fuels, oils, waste and chemicals but excludes sewage.

**ETD buttress** means Emergency Tailings Dam buttress shown at Attachment 2.

**MCTD buttress** means Main Creek Tailings Dam buttress shown at Attachment 2.

**PAF waste rock** means potentially acid forming waste rock defined as Type D material.

**Person Responsible** is any person who is or was responsible for the environmentally relevant activity to which this document relates and includes the officers, employees, contractors, joint venture partners and agents of that person, and includes a body corporate.

**Pollutant** has the meaning ascribed to it in Section 3 of EMPCA.

**Reporting Period** means the financial year.

**Savage River above Pump Station (SRaPS)** means the water quality monitoring point on the Savage River identified at Attachment 3.

**Savage River below Southwest Rock Dump (SRbSWRD)** means the water quality monitoring point on the Savage River identified at Attachment 3.

**Savage River Flood Levee** means the flood levee as described in Section 5.2.11 of the Environmental Impact Statement entitled, *Centre Pit Expansion, Savage River Mine, Tasmania, Environmental Impact Statement*, Rev 04, prepared by Pitt&Sherry, dated 14 December 2020.

**South Lens Outflow (SLO)** means the water quality monitoring point at the South Lens outflow identified at Attachment 3.

**Stage 1** means the first stage of the mining of Centre Pit, delineated at Attachment 1.

**Stage 2** means the second stage of the mining of Centre Pit, delineated at Attachment 1.

**Stage 3** means the third stage of the mining of Centre Pit, delineated at Attachment 1.

**The Land** means the land on which the activity to which this document relates may be carried out, and includes: buildings and other structures permanently fixed to the land, any part of the land covered with water, and any water covering the land. The Land falls within the area defined by:

- 1 Mining Leases: 2M/2001, 14M/2007, 11M/2008, and 4M/2019; and
- 2 as further delineated at Attachment 4.

**Type A** material means only the waste rock type defined as Type A in Section 2.2 of the document entitled *EMS-04 Waste Rock Management Plan*, found at Appendix B of *Centre Pit Expansion, Savage River Mine, Tasmania, Environmental Impact Statement*, Rev 04, prepared by Pitt&Sherry, dated 14 December 2020.

**Type B** material means only the waste rock type defined as Type B in Section 2.2 of the document entitled *EMS-04 Waste Rock Management Plan*, found at Appendix B of *Centre Pit Expansion, Savage River Mine, Tasmania, Environmental Impact Statement*, Rev 04, prepared by Pitt&Sherry, dated 14 December 2020.

**Type D** material means only the waste rock type defined as Type D in Section 2.2 of the document entitled *EMS-04 Waste Rock Management Plan*, found at Appendix B of *Centre Pit Expansion, Savage River Mine, Tasmania, Environmental Impact Statement*, Rev 04, prepared by Pitt&Sherry, dated 14 December 2020.

**Waste Rock Management Plan** means the document entitled *EMS-04 Waste Rock Management Plan*, found at Appendix B of *Centre Pit Expansion, Savage River Mine, Tasmania, Environmental Impact Statement*, Rev 04, prepared by Pitt&Sherry, dated 14 December 2020, including any amendment to or substitution of that Plan.

**Wastewater** means spent or used water (whether from industrial or domestic sources) containing a pollutant and includes stormwater which becomes mixed with wastewater.

**Weed And Disease Guidelines** means the document titled *Weed and Disease Planning and Hygiene Guidelines - Preventing the spread of weeds and diseases in Tasmania*, by the Department of Primary Industries, Parks, Water and Environment, dated March 2015, and any amendment to or substitution of this document.

## Schedule 2: Conditions

### Maximum Quantities

#### **Q1 Regulatory limits**

- 1 The activity must not exceed the following limits :
  - 1.1 3,000,000 tonnes per year of raw material.

### General

#### **G1 Access to and awareness of conditions and associated documents**

A copy of these conditions and any associated documents referred to in these conditions must be held in a location that is known to and accessible to the person responsible for the activity. The person responsible for the activity must ensure that all persons who are responsible for undertaking work on The Land, including contractors and sub-contractors, are familiar with these conditions to the extent relevant to their work.

#### **G2 Incident response**

If an incident causing or threatening environmental nuisance, serious environmental harm or material environmental harm from pollution occurs in the course of the activity, then the person responsible for the activity must immediately take all reasonable and practicable action to minimise any adverse environmental effects from the incident.

#### **G3 No changes without approval**

- 1 The following changes, if they may cause or increase the emission of a pollutant which may cause material or serious environmental harm or environmental nuisance, must only take place in relation to the activity if such changes have been approved in writing by the EPA Board following its assessment of an application for a permit under the *Land Use Planning and Approvals Act 1993*, or approved in writing by the Director:
  - 1.1 a change to a process used in the course of carrying out the activity; or
  - 1.2 the construction, installation, alteration or removal of any structure or equipment used in the course of carrying out the activity; or
  - 1.3 a change in the quantity or characteristics of materials used in the course of carrying out the activity.

#### **G4 Change of responsibility**

If the person responsible for the activity intends to cease to be responsible for the activity, that person must notify the Director in writing of the full particulars of any person succeeding him or her as the person responsible for the activity, before such cessation.

#### **G5 Change of ownership**

If the owner of The Land upon which the activity is carried out changes or is to change, then, as soon as reasonably practicable but no later than 30 days after becoming aware of the change or intended change in the ownership of The Land, the person responsible must notify the Director in writing of the change or intended change of ownership.

#### **G6 Annual Environmental Review**

- 1 Unless otherwise specified in writing by the Director, a publicly available Annual Environmental Review for the activity must be submitted to the Director each year within three months of the end of the reporting period. Without limitation, each Annual Environmental Review must include the following information:

- 1.1 a statement by the General Manager, Chief Executive Officer or equivalent for the activity acknowledging the contents of the Annual Environmental Review;
- 1.2 subject to the *Personal Information Protection Act 2004*, a list of all complaints received from the public during the reporting period concerning actual or potential environmental harm or environmental nuisance caused by the activity and a description of any actions taken as a result of those complaints;
- 1.3 details of environment-related procedural or process changes that have been implemented during the reporting period;
- 1.4 a summary of the amounts (tonnes or litres) of both solid and liquid wastes produced and treatment methods implemented during the reporting period. Initiatives or programs planned to avoid, minimise, re-use, or recycle such wastes over the next reporting period should be detailed;
- 1.5 details of all non-trivial environmental incidents and/or incidents of non compliance with these conditions that occurred during the reporting period, and any mitigative or preventative actions that have resulted from such incidents;
- 1.6 a summary of the monitoring data and record keeping required by these conditions. This information should be presented in graphical form where possible, including comparison with the results of at least the preceding reporting period. Special causes and system changes that have impacted on the parameters monitored must be noted. Explanation of significant deviations between actual results and any predictions made in previous reports must be provided;
- 1.7 identification of breaches of limits specified in these conditions and significant variations from predicted results contained in any relevant DPEMP or EMP, an explanation of why each identified breach of specified limits or variation from predictions occurred and details of the actions taken in response to each identified breach of limits or variance from predictions;
- 1.8 a list of any issues, not discussed elsewhere in the report, that must be addressed to improve compliance with these conditions, and the actions that are proposed to address any such issues;
- 1.9 a summary of fulfilment of environmental commitments made for the reporting period. This summary must include indication of results of the actions implemented and explanation of any failures to achieve such commitments; and
- 1.10 a summary of any community consultation and communication undertaken during the reporting period.

## **G7 Notification of works**

- 1 The Director must be notified in writing at least 14 days before the commencement of the following activities:
  - 1.1 dewatering of Centre Pit South;
  - 1.2 mining of Stage 1;
  - 1.3 mining of Stage 2; and
  - 1.4 mining of Stage 3.
- 2 The Director must be notified in writing within 14 days of the completion of:
  - 2.1 dewatering of Centre Pit South; and
  - 2.2 Savage River Flood Levee.

## **G8 Centre Pit mining**

- 1 Unless otherwise approved in writing by the Director, one month prior to the commencement of mining of stage 2, a Mining Stage 2 Report must be submitted to the Director for approval. The report must contain the following information:

- 1.1 the final design of the pit for stage 2 mining, showing a set back between the pit shell and B Dump; and
- 1.2 the outcomes from any geotechnical investigations and slope stability monitoring and analysis carried out in relation to the stability of the stage 2 pit walls.
- 2 Unless otherwise approved in writing by the Director, one month prior to the commencement of mining of stage 3, a Mining Stage 3 Report must be submitted to the Director for approval. The report must contain the following information:
  - 2.1 the final design of the pit for stage 3 mining;
  - 2.2 the final design and construction method for the Savage River Flood Levee; and
  - 2.3 the outcomes from any geotechnical investigations and slope stability monitoring and analysis carried out in relation to the stability of the stage 3 pit walls and foundations for the Savage River Flood Levee.
- 3 The person responsible must not mine stage 3 below RL 113 m before the Savage River Flood Levee has been constructed.
- 4 Unless otherwise approved in writing by the Director, a buffer of 28 m must be maintained between the Centre Pit wall and Savage River measured at 106mRL, as shown at Attachment 5.

### **Atmospheric**

#### **A1 Control of dust emissions**

Dust emissions from The Land must be controlled to the extent necessary to prevent environmental nuisance beyond the boundary of The Land.

### **Decommissioning And Rehabilitation**

#### **DC1 Temporary suspension of activity**

- 1 Within 30 days of becoming aware of any event or decision which is likely to give rise to the temporary suspension of the activity, the person responsible for the activity must notify the Director in writing of that event or decision. The notice must specify the date upon which the activity is expected to suspend or has suspended.
- 2 During temporary suspension of the activity:
  - 2.1 The Land must be managed and monitored by the person responsible for the activity to ensure that emissions from The Land do not cause serious environmental harm, material environmental harm or environmental nuisance; and
  - 2.2 If required by the Director a Care and Maintenance Plan for the activity must be submitted, by a date specified in writing by the Director, for approval. The person responsible must implement the approved Care and Maintenance Plan, as may be amended from time to time with written approval of the Director.
- 3 Unless otherwise approved in writing by the Director, if the activity on The Land has substantially ceased for 2 years or more, rehabilitation of The Land must be carried out in accordance with the requirements of these conditions as if the activity has permanently ceased.

### **Effluent Management**

#### **EM1 Centre Pit dewatering flow rate**

- 1 Unless otherwise approved in writing by the Director:
  - 1.1 The pumping rate from Centre Pit to South Lens via the dewatering tank must not exceed 100 L/sec when flow measured at Savage River above Pump Station (SRaPS) is less than 1.5 m<sup>3</sup>/s.

- 1.2** When flow measured at SRaPS is equal to or greater than 1.5 m<sup>3</sup>/s, the maximum pumping rate from Centre Pit to South Lens via the dewatering tank is to be determined by the following calculation:
- 1.2.1** Maximum pumping rate (L/sec) = (Flow measurement in Savage River at SRaPS in cumecs x 1000 x 1.85 x 0.57) / ((0.0189 x Centre Pit sulphate concentration in mg/L) - 2.6415); and
- 1.3** Notwithstanding clause 1.2, the maximum pumping rate must not exceed 500 L/sec.
- 1.4** The 15 minute interval telemetered flow measurement at SRaPS is to be used to recalculate the maximum pumping rate at 12 hourly intervals.
- 1.5** Should the actual pumping rate from Centre Pit exceed the maximum pumping rate then an adjustment must be made to the pumping rate as soon as reasonably practicable. The Director must be notified of the details and duration of each such exceedance via a written report to be submitted monthly.
- 1.6** Where the sulphate concentration cannot be reasonably ascertained it must be predicted from the linear relationship; Sulphate in mg/L = (0.3424 x Conductivity in microsiemens per cm) - 14.935.

## **EM2 Centre Pit water management**

Unless otherwise approved in writing by the Director, Centre Pit water can only be discharged to Savage River via South Lens.

## **EM3 Centre Pit dewatering investigation trigger levels for Centre Pit North pond**

- 1** Unless otherwise approved in writing by the Director, if concentrations of parameters in Column 1 of the Table of Centre Pit North Pond Investigation Trigger Levels exceed the levels in Column 3, then the following actions must be undertaken:
- 1.1** the Director must be advised in writing as soon as practicable of the exceedance;
- 1.2** an investigation into the possible causes must be conducted and a report summarising the outcomes of the investigation and management actions taken in response to the exceedance submitted to the Director within one month, and reported in the Annual Environmental Review.
- 1.3** monitoring at Centre Pit North Pond and South Lens Outflow must be increased to 2 per week until concentrations of parameters in Column 1 of the Table of Centre Pit North Pond Investigation Trigger Levels fall below the levels in Column 3.
- 2** Table of Centre Pit North Pond Investigation Trigger Levels

<b>Parameter</b>	<b>Unit of measurement</b>	<b>Investigation trigger level</b>
Copper (total)	µg/L	230
Nickel (total)	µg/L	222
Cobalt	µg/L	282
Zinc	µg/L	74
EC	µS/cm	2758

## **EM4 Centre Pit dewatering investigation trigger levels for South Lens Outflow**

- 1** Unless otherwise approved in writing by the Director, if concentrations of parameters in Column 1 of the Table of South Lens Outflow Investigation Trigger Levels exceed the levels in Column 3, then the following actions must be undertaken:

- 1.1 the Director must be advised in writing as soon as practicable of the exceedance;
- 1.2 an investigation into the possible causes must be conducted and a report summarising the outcomes of the investigation and management actions taken in response to the exceedance submitted to the Director within one month, and reported in the Annual Environmental Review;
- 1.3 the pump rate as determined by these conditions must be decreased by 100 L/s for a period of a week; and
- 1.4 monitoring at Centre Pit North Pond and South Lens Outflow must be increased to 2 per week until concentrations of parameters in Column 1 of the Table of South Lens Discharge Investigation Trigger Levels fall below the levels in Column 3.

## 2 Table of South Lens Outflow Investigation Trigger Levels

Parameter	Unit of measurement	Investigation trigger level
Copper (total)	µg/L	76
Nickel (total)	µg/L	129
Cobalt	µg/L	173
Zinc	µg/L	35
EC	µS/cm	1815

### EM5 Centre Pit dewatering investigation trigger levels for Savage River below Southwest Rock Dump (SRbSWRD)

- 1 Unless otherwise approved in writing by the Director, if concentrations of parameters in Column 1 of the Table of Savage River at SRbSWRD Investigation Trigger Levels exceed the levels in Column 3, then the following actions must be undertaken:
  - 1.1 The Director must be advised in writing as soon as practicable of the exceedance;
  - 1.2 an investigation into the possible causes must be conducted and a report summarising the outcomes of the investigation and management actions taken in response to the exceedance submitted to the Director within one month, and reported in the Annual Environmental Review;
  - 1.3 the pump rate as determined by these conditions must be decreased by 100 L/s for a period of a week; and
  - 1.4 monitoring at South Lens Outflow must be increased to 2 per week until concentrations of parameters in Column 1 of the Table of South Lens Discharge Investigation Trigger Levels fall below the levels in Column 3.
- 2 Table of Savage River at SRbSWRD Investigation Trigger Levels

Parameter	Unit of measurement	Investigation trigger level
Copper (total)	µg/L	26
Nickel (total)	µg/L	25
Cobalt	µg/L	28
Zinc	µg/L	10
EC	µS/cm	788

**EM6 CPN pond water level**

The Director must be advised in writing as soon as practicable when the water level of the CPN pond decreases below RL 109 m.

**EM7 Seepage reporting**

Any new seepage detected on The Land that has the potential to cause environmental harm must be reported to the Director within 48 hours of the detection of the seepage. The report must include details of the location of the seepage and action that will be taken to monitor it.

**Flora And Fauna****FF1 Tasmanian devil and spotted-tailed quoll survey**

- 1** No more than 30 days prior to the commencement of any vegetation clearance on The Land, or by a date specified in writing by the Director:
  - 1.1** a survey of the area to be disturbed for Tasmanian Devil (*Sarcophilus harrisii*) and Spotted-tailed Quoll (*Dasyurus maculatus*) habitat must be conducted in accordance with the 'Guidelines for Natural Values Surveys - Terrestrial Development Proposals, prepared by the Natural and Cultural Heritage Division of the Department of Primary Industries, Parks, Water and Environment (2015), and specifically for Tasmanian Devils, the *Survey Guidelines and Management Advice for Development Proposals that may impact on the Tasmanian Devil (Sarcophilus harrisii) - A supplement to the 'Guidelines for Natural Values Surveys - Terrestrial Development Proposals*, prepared by the Natural and Cultural Heritage Division of the Department of Primary Industries, Parks, Water and Environment (2015), or any subsequent revisions of these documents.
  - 1.2** the person(s) conducting the survey must be appropriately qualified in the identification of these species and their habitat;
  - 1.3** a report outlining the findings of the survey must be submitted to the Director for approval prior to the commencement of vegetation clearance; and
  - 1.4** if any Tasmanian Devil and/or Spotted-tailed Quoll den will be adversely impacted by the activity, this must be brought to the attention of the Director immediately upon completion of the survey, and a proposal for management actions submitted to the Director for approval, prior to any impacts occurring.

**FF2 Grey Goshawk nest survey**

- 1** If vegetation clearance is to occur on The Land in areas identified as Grey Goshawk habitat at Attachment 6 of these conditions, then no more than 30 days prior to the commencement of any vegetation clearance, or by a date specified in writing by the Director:
  - 1.1** a survey of the area to be disturbed for nests of the Grey Goshawk (*Accipiter novaehollandiae*) must be conducted by a person or persons appropriately qualified in the identification of this species and its habitat;
  - 1.2** a report outlining the findings of the survey must be submitted to the Director for approval prior to the commencement of vegetation clearance; and
  - 1.3** if any Grey Goshawk nest will be adversely impacted by the activity, this must be brought to the attention of the Director immediately upon completion of the survey, and a proposal for management actions submitted to the Director for approval, prior to any impacts occurring.

**FF3 Machinery washdown**

Prior to entering The Land, machinery must be washed in accordance with the Weed and Disease Guidelines, or any subsequent revisions of that document.

**Hazardous Substances****H1 Storage and handling of hazardous materials**

- 1** Unless otherwise approved in writing by the Director, all environmentally hazardous materials, including chemicals, fuels, and oils, stored on The Land in volumes exceeding 250 litres must be stored and handled in accordance with the following:
  - 1.1** Any storage facility must be contained within a spill collection bund with a net capacity of whichever is the greater of the following:
    - 1.1.1** at least 110% of the combined volume of any interconnected vessels within that bund; or
    - 1.1.2** at least 110% of the volume of the largest storage vessel; or
    - 1.1.3** at least 25% of the total volume of all vessels stored in that spill collection bund; or
    - 1.1.4** the capacity of the largest tank plus the output of any firewater system over a twenty minute period.
  - 1.2** All activities that involve a significant risk of spillages, including the loading and unloading of bulk materials, must take place in a bunded containment area or on a transport vehicle loading apron.
  - 1.3** Bunded containment areas and transport vehicle loading aprons must:
    - 1.3.1** be made of materials that are impervious to any environmentally hazardous material stored within the bund;
    - 1.3.2** be graded or drained to a sump to allow recovery of liquids;
    - 1.3.3** be chemically resistant to the chemicals stored or transferred;
    - 1.3.4** be designed and managed such that any leakage or spillage is contained within the bunded area (including where such leakage emanates vertically higher than the bund wall);
    - 1.3.5** be designed and managed such that the transfer of materials is adequately controlled by valves, pumps and meters and other equipment wherever practical. The equipment must be adequately protected (for example, with bollards) and contained in an area designed to permit recovery of any released chemicals;
    - 1.3.6** be designed such that chemicals which may react dangerously if they come into contact have measures in place to prevent mixing; and
    - 1.3.7** be managed such that the capacity of the bund is maintained at all times (for example, by regular inspections and removal of obstructions).

**H2 Hazardous materials (< 250 litres)**

- 1** Unless otherwise approved in writing by the Director, each environmentally hazardous material, including chemicals, fuels and oils, stored on The Land in discrete volumes not exceeding 250 litres, but not including discrete volumes of 25 litres or less, must be stored within bunded containment areas or spill trays which are designed and maintained to contain at least 110% of the volume of the largest container.
- 2** Bunded containment areas and spill trays must be made of materials that are impervious to any environmentally hazardous materials stored within the bund or spill tray.

**H3 Spill kits**

Spill kits appropriate for the types and volumes of materials handled on The Land must be kept in appropriate locations and maintained in a functional condition to assist with the containment of spilt environmentally hazardous materials.

**Monitoring****M1 Water quality monitoring requirements**

- 1 Unless otherwise specified in writing by the Director, water quality monitoring must be undertaken in accordance with the Table of Surface Water Monitoring at Attachment 7, as follows:
  - 1.1 the items numbered in Column 1 must be sampled or tested at the locations listed in Column 2, for the parameters listed in Column 3, in the units listed in Column 4 at the frequencies listed in Column 5, using the techniques listed in Column 6; and
  - 1.2 resultant monitoring data must be reported to the Director in accordance with the requirements set out in Column 7.

**M2 Samples and measurements for monitoring purposes**

- 1 Any sample or measurement required under these conditions must be taken and processed in accordance with the following:
  - 1.1 sampling and measuring must be undertaken by a person with training, experience, and knowledge of the appropriate procedure;
  - 1.2 the integrity of samples must be maintained prior to delivery to a testing facility;
  - 1.3 sample analysis must be conducted by a testing facility accredited by the National Association of Testing Authorities (NATA), or a testing facility approved in writing by the Director, for the specified test;
  - 1.4 details of methods employed in taking samples and measurements and results of sample analysis, and measurements must be retained for at least three (3) years after the date of collection; and
  - 1.5 sampling and measurement equipment must be maintained and operated in accordance with manufacturer's specifications and records of maintenance must be retained for at least three (3) years.

**M3 Monitoring reporting and record keeping**

- 1 Unless otherwise specified in writing by the Director, a Monthly Monitoring Report, in an electronic format approved by the Director, must be submitted to the Director by the 28<sup>th</sup> day of the following month. As a minimum, the Monthly Monitoring Report must include the following information:
  - 1.1 the laboratories at which sample analyses were carried out;
  - 1.2 contact details for a person responsible for managing monitoring programs;
  - 1.3 summary statistics of all monitoring results;
  - 1.4 time-series graphs of EC results from the Dewatering Tank, Centre Pit North Pond, South Lens Outflow, Savage River above Pump Station, and Savage River below Southwest Rock Dump monitoring locations;
  - 1.5 time-series graphs of flow from the Dewatering Tank, Centre Pit North Pond, and South Lens Outflow monitoring locations, and flow at Savage River above Pump Station and Savage River below Southwest Rock Dump monitoring locations;
  - 1.6 detail of each investigation trigger level exceedance; and

- 1.7 summary of management actions undertaken in response to each investigation trigger level exceedance.
- 2 A record of all Monthly Monitoring Reports submitted to the Director must be maintained and copies of all test reports referenced to the relevant Monthly Monitoring Reports kept for a minimum period of three (3) years.

## **Waste Management**

### **WM1 Waste Rock Management Plan**

- 1 Unless otherwise approved in writing by the Director, the management of waste rock on The Land must be undertaken in accordance with the Waste Rock Management Plan, including any amendment to or substitution of that Plan.
- 2 Unless otherwise approved in writing by the Director, all PAF waste rock excavated from Centre Pit, must be encapsulated in a dedicated PAF cell constructed as follows:
  - 2.1 with a compacted clay base at least 5 metres thick;
  - 2.2 with a clay bund around all sides at least 5 metres thick;
  - 2.3 with a compacted clay cover at least 5 metres thick; and
  - 2.4 with a layer of A type waste rock at least 5 metres thick on top of the cell.
- 3 Unless otherwise approved in writing by the Director, all Centre Pit North backfill material excavated from Centre Pit must be managed as though it were PAF.

### **WM2 Waste rock dump monitoring**

- 1 Pore oxygen gas and temperature monitoring arrays must be installed in Centre Pit Dump and East Mill Dump to the satisfaction of the Director.
  - 1.1 The location of the monitoring arrays and results of oxygen gas and temperature monitoring must be reported in the Annual Environmental Review.

### **WM3 B Dump and Southern Dump complex**

Unless otherwise approved in writing by the Director, there must be no cut back into the B Dump and Southern Dump rock faces, and any work undertaken on or in the vicinity of the B Dump and Southern Dump complex must not impact the geotechnical stability of the dumps.

### **WM4 Waste material for construction of the MCTD and ETD buttress**

Unless otherwise approved in writing by the Director, no material other than Type A or Type B may be used for the construction of the MCTD buttress and ETD buttress.

## Schedule 3: Information

### Legal Obligations

#### **LO1 Aboriginal relics requirements**

- 1 Aboriginal relics, objects, sites, places and human remains regardless of whether they are located on public or private land, are protected under the *Aboriginal Heritage Act 1975*.
- 2 Unanticipated discoveries of Aboriginal heritage must be reported to Aboriginal Heritage Tasmania on **1300 487 045** as soon as possible.

#### **LO2 EMPCA**

The activity must be conducted in accordance with the requirements of the *Environmental Management and Pollution Control Act 1994* and Regulations thereunder. The conditions of this document must not be construed as an exemption from any of those requirements.

#### **LO3 Storage and handling of dangerous goods, explosives and dangerous substances**

- 1 The storage, handling and transport of dangerous goods, explosives and dangerous substances must comply with the requirements of relevant State Acts and any regulations thereunder, including:
  - 1.1 *Work Health and Safety Act 2012* and subordinate regulations;
  - 1.2 *Explosives Act 2012* and subordinate regulations; and
  - 1.3 *Dangerous Goods (Road and Rail Transport) Act 2010* and subordinate regulations.

### Other Information

#### **OI1 Waste management hierarchy**

- 1 Wastes should be managed in accordance with the following hierarchy of waste management:
  - 1.1 waste should be minimised, that is, the generation of waste must be reduced to the maximum extent that is reasonable and practicable, having regard to best practice environmental management;
  - 1.2 waste should be re-used or recycled to the maximum extent that is practicable; and
  - 1.3 waste that cannot be re-used or recycled must be disposed of at a waste depot site or treatment facility that has been approved in writing by the relevant planning authority or the Director to receive such waste, or otherwise in a manner approved in writing by the Director.

#### **OI2 Notification of incidents under section 32 of EMPCA**

Where a person is required by section 32 of EMPCA to notify the Director of the release of a pollutant, the Director can be notified by telephoning **1800 005 171** (a 24-hour emergency telephone number).

# Attachment 1

## Mining Stages

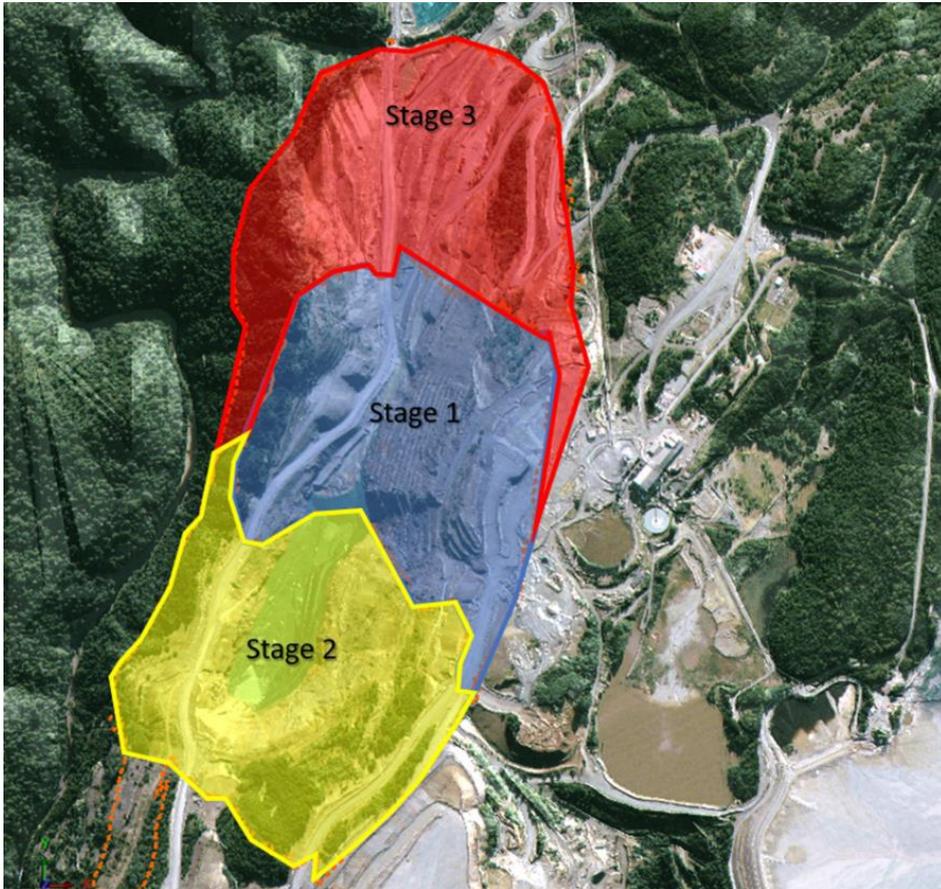


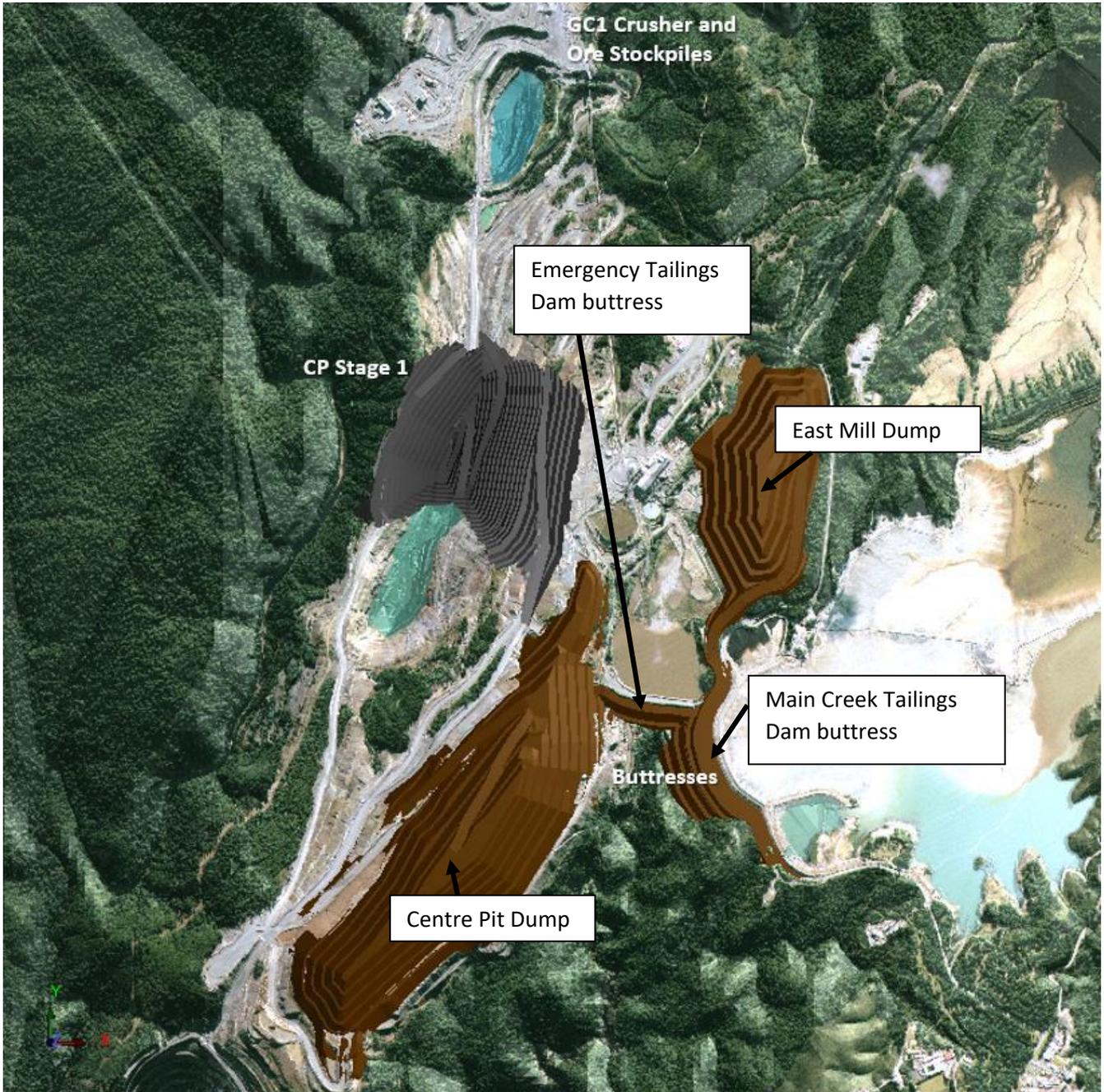
Figure 1 Mining stages 1, 2 and 3. Note, the area identified in figure 2 below does not form a part of mining stage 1 or 3.



Figure 2 The area highlighted in yellow represents the area of pre-stripping works approved by the EPA Director on 7 October 2019.

# Attachment 2

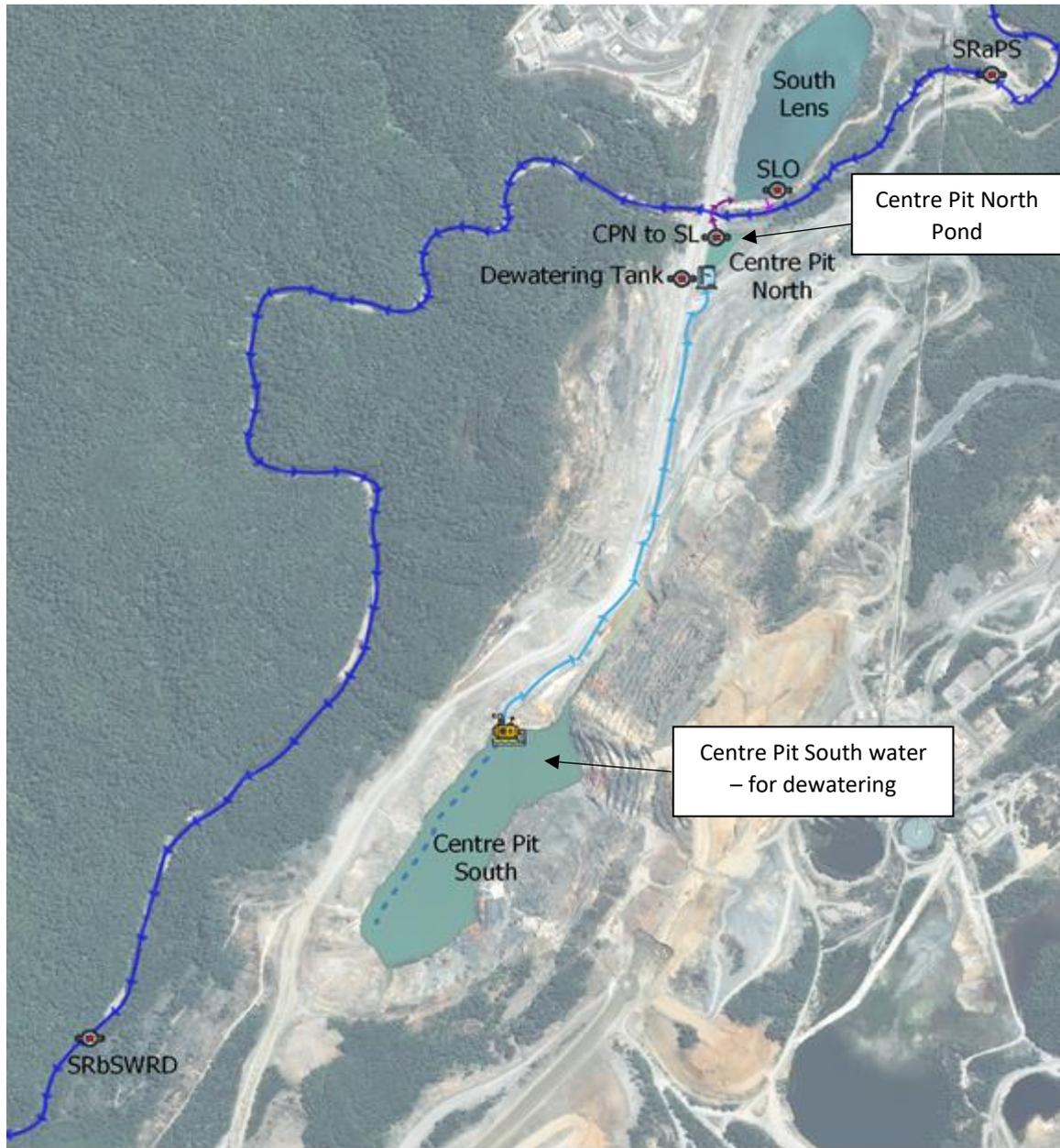
## Waste Rock Dump Locations



# Attachment 3

## Map showing location of surface water monitoring sites

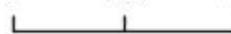
SRaPS (Savage River above Pump Station), SLO (South Lens Outflow), Centre Pit North (CPN) pond discharge, Dewatering Tank, SRbSWRD (Savage River below South-West Rock Dump)



### Legend

- |   |                           |   |                    |
|---|---------------------------|---|--------------------|
|  | Dewatering Pump           |  | Dewatering Pipe    |
|  | Dewatering Tank           |  | South Lens Outflow |
|  | ADMS Monitoring Stations  |  | CPN to South Lens  |
|  | Dewatering Pipe Extension |  | Savage River       |

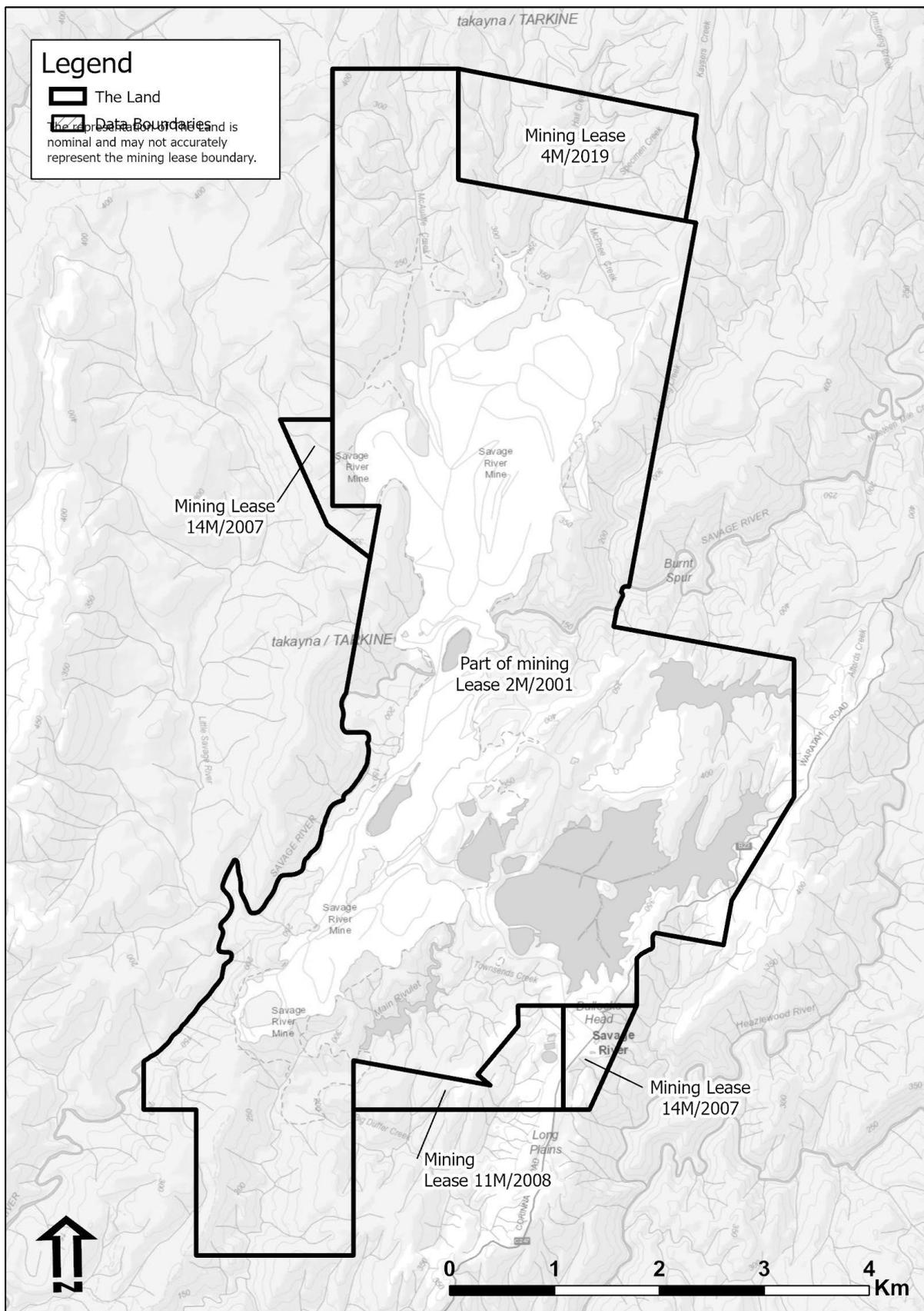
0 200 400 m



# Attachment 4

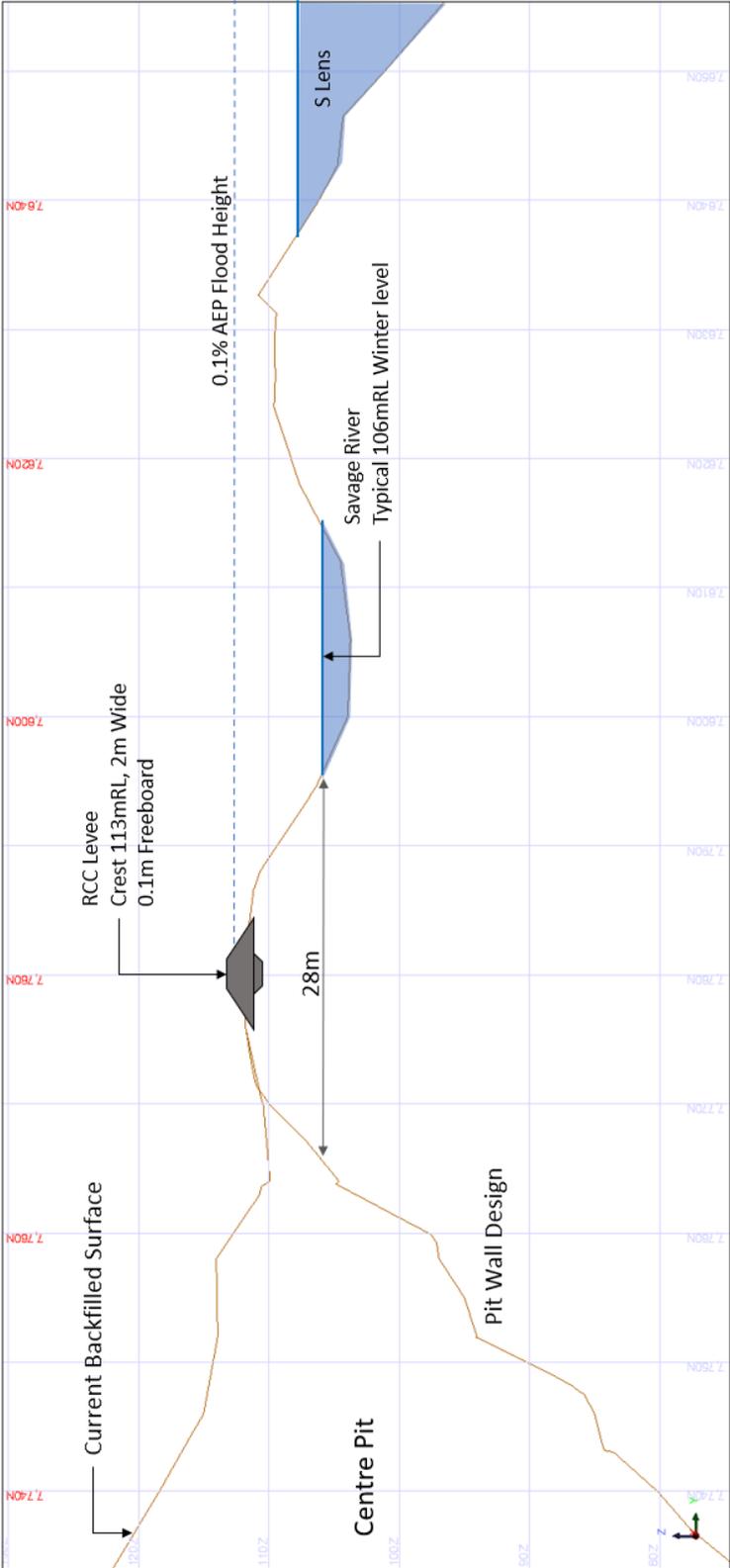
## The Land

(Mining Leases 4M/2019, 14M/2007, 2M/2001, 11M/2008)



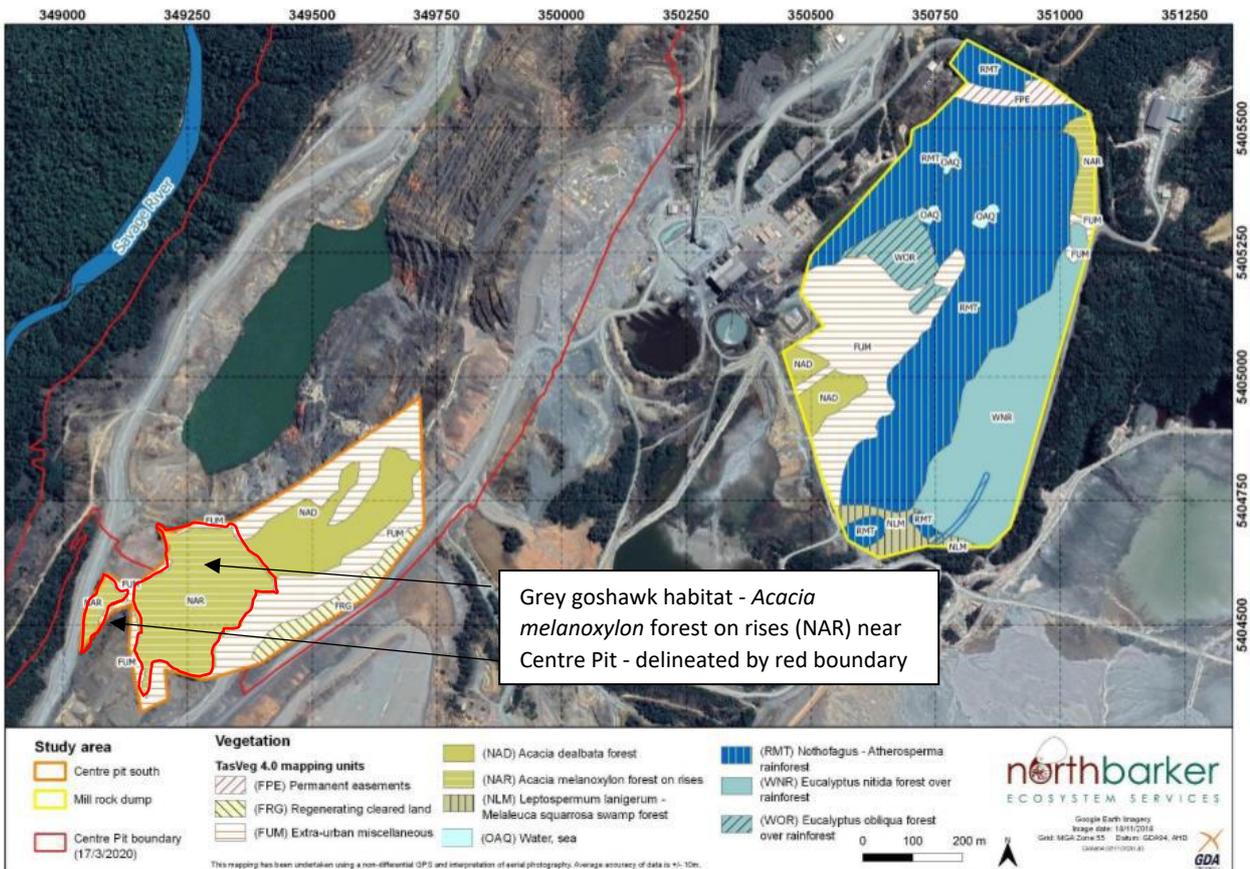
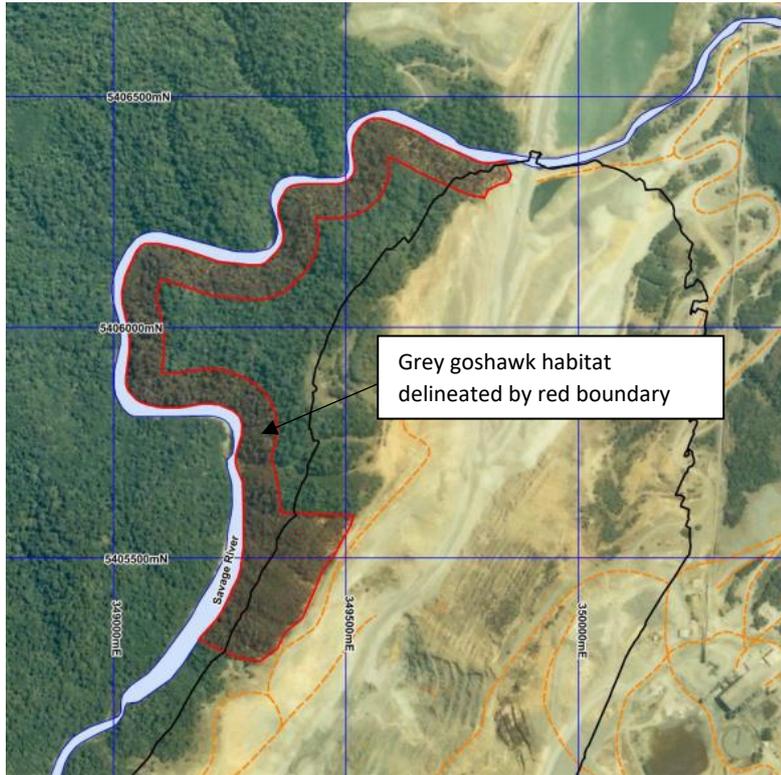
# Attachment 5

## Buffer between Centre Pit northern wall and Savage River



# Attachment 6

## Grey goshawk habitat



## Attachment 7

**Table of surface water monitoring (location of sites shown at Attachment 3)**

Column 1 Item No.	Column 2 Location	Column 3 Parameters	Column 4 Units	Column 5 Frequency	Column 6 Technique	Column 7 Reporting
1	Dewatering tank (‘Dewatering Tank’ shown at Attachment 3)	TSS, alkalinity, acidity, sulphate, total and dissolved metals (Al, As, B, Cd, Co, Cr, Cu, Fe, Hg, Mn, Mo, Ni, Pb, Se, Zn), cations (Ca, Mg, Na, K), anions (F, Cl)	mg/L	Weekly except twice per week for the first 3 weeks from commencement of CPS dewatering	Grab sample for laboratory analysis of all parameters. Cu and Ni analyses also completed on site.	Weekly via email.
		pH, conductivity, turbidity, flow	pH units, µS/cm, FTU, m/s	12 hourly	Online continuous	Weekly via email.
2	CPN pond discharge (‘CPN to SL’ shown at Attachment 3)	TSS, alkalinity, acidity, sulphate, total and dissolved metals (Al, As, B, Cd, Co, Cr, Cu, Fe, Hg, Mn, Mo, Ni, Pb, Se, Zn), cations (Ca, Mg, Na, K), anions (F, Cl)	mg/L	Weekly except twice per week for the first 3 weeks from commencement of CPS dewatering	Grab sample for laboratory analysis of all parameters. Cu and Ni analyses also completed on site.	Weekly via email.
		pH, conductivity, turbidity, flow	pH units, µS/cm, FTU, m/s	12 hourly	Online continuous	Weekly via email.
3	South Lens Outflow (‘SLO’ shown at Attachment 3)	TSS, alkalinity, acidity, sulphate, total and dissolved metals (Al, As, B, Cd, Co, Cr, Cu, Fe, Hg, Mn, Mo, Ni, Pb, Se, Zn), cations (Ca, Mg, Na, K), anions (F, Cl)	mg/L	Weekly except twice per week for the first 3 weeks from commencement of CPS dewatering	Grab sample for laboratory analysis of all parameters. Cu and Ni analyses also completed on site.	Weekly via email.
		pH, conductivity, turbidity, flow	pH units, µS/cm, FTU, m/s	12 hourly	Online continuous	Weekly via email.

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
Item No.	Location	Parameters	Units	Frequency	Technique	Reporting
4	Savage River at Pump Station ('SRaPS' shown at Attachment 3)	TSS, alkalinity, acidity, sulphate, total and dissolved metals (Al, As, B, Cd, Co, Cr, Cu, Fe, Hg, Mn, Mo, Ni, Pb, Se, Zn), cations (Ca, Mg, Na, K), anions (F, Cl)	mg/L	Weekly except twice per week for the first 3 weeks from commencement of CPS dewatering	Grab sample for laboratory analysis of all parameters. Cu and Ni analyses also completed on site.	Weekly via email.
		pH, conductivity, turbidity, flow	pH units, $\mu\text{S}/\text{cm}$ , FTU, m/s	12 hourly	Online continuous	Weekly via email.
5	Savage River below South-West Rock Dump ('SRbSWRD' shown at Attachment 3)	TSS, alkalinity, acidity, sulphate, total and dissolved metals (Al, As, B, Cd, Co, Cr, Cu, Fe, Hg, Mn, Mo, Ni, Pb, Se, Zn), cations (Ca, Mg, Na, K), anions (F, Cl)	mg/L	Weekly except twice per week for the first 3 weeks from commencement of CPS dewatering	Grab sample for laboratory analysis of all parameters. Cu and Ni analyses also completed on site.	Weekly via email.
		pH, conductivity, turbidity, flow	pH units, $\mu\text{S}/\text{cm}$ , FTU, m/s	12 hourly	Online continuous	



ENVIRONMENT PROTECTION AUTHORITY