Our ref: MP07_0143-PA-31

Kiara Crook
Environment and Compliance Superintendent
Tarago Operations Pty Ltd
507 Collector Road
Tarago, NSW, 2580

13/10/2025

Woodlawn Copper Mine – Extraction Plan

Dear Ms. Crook

Thank you for submitting the Extraction Plan in accordance with Condition 4, Schedule 3 of the consent for the Woodlawn Copper Mine (MP07_0143). I also acknowledge your response to the Department's review comments and request for additional information.

I note the Extraction Plan contains the information required by the conditions of approval.

Accordingly, as nominee of the Planning Secretary, I approve the revised Extraction Plan (Rev, 11, September 2025).

You are reminded that if there are any inconsistencies between the Plan and the conditions of approval, the conditions prevail.

Please ensure you make the document publicly available on the project website at the earliest convenience.

If you wish to discuss the matter further, please contact Charissa Pillay on 0299955944.

Yours sincerely

Stephen O'Donoghue
Director
Resource Assessments

As nominee of the Planning Secretary

MINE EXTRACTION PLAN

(and subsidence monitoring program)

Woodlawn Zinc Copper Project

Document Review/Change History

Date	Summary of review and changes	Revision No.	Authors Drafted by	Authors Reviewed by
03/04/2017	First edition	1	DF	AL
11/04/2017	Internal review	2	RB	AL
31/07/2017	Issue to DPE	3	RB	AL
27/03/2018	Update with DPE advice	4	RB	AL
07/05/2018	Issue to DPE	5	RB	AL
06/11/2018	2018 update	6	RB	AL
30/07/2019	Update with DPE comments	7	RB	AL
29/08/2019	Amended with DPE comments	8	RB	AL
12/06/2024	Company update, add management plan approval to appendix	9	CT	CT
18/04/2025	Updates for submission to major projects portal	10	RW, NC, CT	RB
24/09/2025	Plan updated in response to DPHI RFI (MP07_0143-PA-28) and re-submitted to the major projects portal	11	RW, NC, CT, KC, RB	RW

Glossary

Acronym	Definition	Acronym	Definition
CCC	Community Consultation Committee	MBT	Mechanical Biological Treatment
DEVELOP	Develop Global Limited	MEMP	Mine Extraction Management Plan
DPE	Department of Planning and Environment now DPHI	mm	Millimetres
DPHI	Department of Planning, Housing and Infrastructure	OEH	NSW Office of Environment and Heritage
DSNSW	Dam Safety New South Wales	Project	Woodlawn Zinc-Copper mine
EA	Environmental Assessment	PHMP	Principal Hazard Management Plan
ED	Evaporation Dam	SMP	Subsidence Management Plan
EMS	Environmental Management Strategy	SML	Special Mining Lease
EPA	Environment Protection Authority	TARP	Trigger Action Response Plan
EPL	Environmental Protection Licence	TDN	Tailings Dam North
GSI	Geological Strength Index	TDS	Tailings Dam South
Infigen	Woodlawn Windfarm now owned by Iberdrola Australia	TDW	Tailings Dam West
km	Kilometres	tpa	Tonnes per annum
LOM	Life of Mine	TSF4	Tailings Storage Facility 4
m	Metres	UCS	Uniaxial Compressive Strength

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1. INTRODUCTION

1.1. Background

The Woodlawn Zinc-Copper mine (the Project) is located approximately 7 km northwest of Tarago in New South Wales (NSW) within Special (Crown and Private Land) Mining Lease 20 (SML20) as shown in Plan 1, Appendix 1. The original Woodlawn mine operated from 1978 to 1998 and processed 13.8Mt of ore from the Woodlawn open pit, underground and minor satellite deposits. Following its prolonged closure, the Project was acquired by ASX-listed Heron Resources who secured Project Approval in July 2013 following the public exhibition of the Projects Environmental Assessment (EA). Heron completed the construction of the project and developed the new underground mine in accordance with the Project Approval before it was put on care and maintenance in March 2020. Heron was placed in administration in July 2021. Develop Global Limited (DEVELOP) completed its acquisition of the Project in May 2022 and Tarago Operations Pty Limited which holds SML 20 and (EPL) 20821. Complete extraction and processing operations were restarted in March 2025 with the first produced concentrate leaving site in April 2025. Veolia operates an eco-precinct, including a licensed landfill, within SML20 but separated from the project and has separate EPL's as shown in Plan 1, Appendix 1.

The Project was described by the original Project Approval and subsequent modifications. With the construction phase of the project now complete, this version of the Mine Extraction Management Plan (MEMP) provides updates for the site and project going forward.

This MEMP forms one component of the of the Projects overall Environmental Management Strategy (EMS). The EMS includes a number of commitments and component management plans which together form the basis for the ongoing operation of the Project. The EMS and associated management plans will be updated as required to reflect any changes to the Project.

1.2. Scope and objectives

The purpose of this MEMP is to document the control measures and management initiatives being implemented during the extraction of ore and development of associated underground access roadways. The overall objectives for the MEMP are to:

- Implement the commitments made in the EA including specific conditions of approval and the Statement of Commitments in relation to the underground mining operation.
- Ensure compliance with relevant legislation.
- Manage subsidence risks associated with the mine extraction.
- Provide for continuous improvement in environmental performance.
- Provide a mechanism to identify and correct areas of non-compliance.

This plan has been prepared and reviewed by the endorsed expert, Rhys Watkins (RW) as per the document review/change history table on the front cover who was approved by the department on 14th January 2025 (MP07_0143-PA-23).

1.3. Consultation

Government stakeholders, Infigen (now Iberdrola Australia) and Veolia were specifically consulted during the preparation of the original MEMP in 2017 and is retained in previous versions of this document. Given the time that has elapsed and changes to the structure of this MEMP the consultation log in Appendix 2 has been re-started and will continue to be updated as required during the ongoing operation of the Project. The MEMP was originally approved in 2018 (Appendix 3).

As the mine plan does not extend outside the surface infrastructure and land holdings, no public infrastructure or private land holdings are affected. Consultation with public utilities and service providers was therefore not necessary nor any specific consultation with private land owners surrounding SML20. Veolia owns all the land within and adjacent to the mining lease.

1.3.1. Interaction with Veolia

A cooperation agreement exists between both the operators of the mine and bioreactor which guides the management of operational impacts including mine extraction. The agreement also acknowledges that each party is entitled to carry out their activities in each respective area of operations which may cause nuisance. DEVELOP also acknowledges there may be additional obligations to Veolia and the protection of the void as detailed in this agreement which may not be included in this MEMP.

1.4. Legislative requirements

The Project is governed by the following:

- Project Approval: as issued in 2013 and amended in 2016 and 2017. Document ID: 07_0143MOD2
- Environment Protection License (EPL): 20821 as issued by the NSW Environmental Protection Agency (EPA)
- Special Mining Lease (SML): 20
- Extraction Plan Guidelines (October 2022) Department of Planning and Environment.

1.5. Project approval requirements

This MEMP has been developed in accordance with the Project Approval environmental commitments which are listed in Table 1-1 which includes a reference to where each of the conditions are addressed. Operationally relevant statement of commitments made during the PA have also been included in Table 1-1.

MEMP forms part of a consolidated process replacing the Subsidence Management Plan (SMP) process formally administered solely by NSW Department of Industry, Division of Resources and Energy (now NSW Resources Regulator). The new process integrates the requirements of both the SMP process and NSW Planning and Environment (DPE) MEMP process as described in their 2022 Extraction Plan Guidelines.

As these guidelines were developed for underground coal mining, they are largely not relevant to the Project with Woodlawn being a metalliferous underground mine. Despite this, and under previous advice of DPE in the initial approval of this plan, this MEMP follows these guidelines as far as practicable.

Following DPE's initial review of the draft MEMP, additional information has been included on the proposed underground mining systems to be employed which were not available during the preparation of the 2012 EA for the project. This information is contained in a separate Subsidence Impact Assessment provided as Appendix 4.

Table 1-1 Consent conditions relating to the MEMP

Condition ID	Condition description	Where Addressed
Schedule 3 Condition 3	The proponent shall ensure that: (a) there is no measurable subsidence caused by underground mining beneath the Woodlawn Landfill, tailings dams, and evaporations dams on the site;	Section 3.5 & 5
	(b) apart from the access decline, no underground mining is undertaken within 200 m of the perimeter of the Woodlawn Landfill;	Sections 3.2 & 5.3
	(c) remnant underground voids are long term stable to prevent subsidence; and	Sections 4.1 & 5
	(d) material used to backfill underground voids is physically and chemically stable and non-polluting.	Section 2.2.1 & Section 6
Schedule 3 Condition 4	The Proponent shall prepare and implement an Extraction Plan for all underground mining at the Woodlawn Mine, to the satisfaction of the Secretary. Each Extraction Plan must	This Plan
	(a) be prepared by suitably qualified and experienced persons whose appointment has been endorsed by the Secretary	Appendix 2
	(b) be approved by the Secretary before the Proponent carries out any underground mining (excluding construction of the underground access decline) at the Woodlawn Mine that is covered by the MEMP	Appendix 3
	(c) include detailed plans of existing and proposed underground workings and any associated surface development	Appendix 1
	(d) describe in detail the performance indicators and the actions that would be undertaken to ensure compliance with the performance measures in Condition 3 above, and manage or remediate any impacts and/or environmental consequences to meet the rehabilitation objectives in Condition 6 below; and	Sections 4.1
	(e) include a Subsidence Monitoring Program to assist with the management of the risks associated with subsidence, which validates the subsidence predictions, analyses the relationship between the predicted and resulting subsidence effects, and informs contingency planning and the adaptive management process in the underground workings.	Section 5
	The Proponent shall pay all reasonable costs incurred by the Department to engage suitably qualified, experienced and independent experts to review the adequacy of any aspect of an Extraction Plan. Notes: In accordance with Condition 13 of Schedule 2, the preparation and implementation of Extraction Plans may be staged, with each plan covering a defined area of underground workings. In addition, these plans are only required to contain management plans that are relevant to the specific underground workings that are being carried out.	Section 5.1
Schedule 3 Condition 6	The Proponent shall rehabilitate the site to the satisfaction of the Secretary. This rehabilitation must be generally consistent with the proposed rehabilitation plan described in the EA (and reproduced in Appendix 4), and comply with the rehabilitation objectives in Table 2.	Rehabilitation Management Plan

Condition ID	Condition description	Where Addressed
	Table 2: Rehabilitation Objectives **Feature** / **Objectives** Underground workings: • No measurable subsidence effects on the Woodlawn Landfill, evaporation dams and tailings dams on the site	Section 5.5
Schedule 3 Condition 5	The Proponent shall commission a suitably qualified expert, whose appointment has been endorsed by the Secretary to: a) carry out trials and testing to clarify the physical and leaching characteristics of the paste fill;	Section 6.1 Appendix 2
	b) prepare a program for the ongoing testing of the paste fill to ensure it meets the performance measures in Condition 3 above; and	Section 6.2 Appendix 6
	c) prepare a report on the findings of trials and testing, and submit the report to the Secretary for approval prior to the commencement of underground mining operations on the site (excluding construction of the underground access decline).	Completed, refer to Section 6.1
Schedule 6 Condition 3	The Proponent shall ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include: (a) a description of: • the relevant statutory requirements (including any relevant approval, licence or lease conditions); • any relevant limits or performance measures/criteria;# • the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures;#	Section 1.4 Section 5.6 & Appendix 6
	(b) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	Section 5 & Appendix 6
	(c) a program to monitor and report on the: • impacts and environmental performance of the project;# • effectiveness of any management measures (see b above);#	Section 5, Section 7.2 & Appendix 6
	(d) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;	Section 5.6 & Appendix 6
	(e) a protocol for managing and reporting any: • incidents and complaints; • non-compliances with statutory requirements and exceedances of the impact assessment criteria and/or performance criteria; and#	Section 7
	(f) a protocol for periodic review of the plan.	Section 7.5

Condition ID	Condition description	Where Addressed
Statement of Commitments Item 4A	The following would be undertaken during the underground construction and operation to minimise underground mining impacts: • development of access to the underground workings via a new surface portal and decline well away from the existing Woodlawn Bioreactor (Veolia) operations • backfilling of those pre-existing underground mining voids deemed important for regional stability, ahead of mining requirements • commencement of mining using either mechanised stope and fill, cut and fill or equivalent tight backfilling mining method. • Develop Global Limited (DEVELOP) shall not process more than 1.5 million tonnes of tailings and/or ore on site in a calendar year or transport more than 150,000 tpa of concentrate from the site in a calendar year • implementation of an agreed ‘mining exclusion zone’ based on mutually agreed geotechnical advice, from the base of the open pit void to protect Veolia’s operations from underground mining impacts (such as subsidence) and other mining operations.	
Statement of Commitments Item 4B	A geotechnical works program would be undertaken as part of the development of the detailed mine design for the underground and would include: • detailed geotechnical analysis to confirm results of preliminary investigations, including: ○ complex three dimensional geometry of the mine ○ major geological faults ○ realistic strain-softening dilatant material behaviour ○ backfilling ○ life-of-mine mining sequence for development and stoping ○ pore-water pressure effects • preparation of trigger action response plans (TARPs) which include details on proposed monitoring programs • preparation of a voids management plan preparation of a slope stability management plan, if required in collaboration with Veolia.	Completed in Feasibility Study

1.5.1. Dam Safety NSW

The project is located within a mining notification area specified by Dam Safety NSW (DSNSW) due to the presence of declared dams. Approval has been granted in April 2017 for:

- Woodlawn-1: underground mining beneath Woodlawn Evaporation Dam 1.
- Woodlawn-2: hydraulic mining within Woodlawn Tailings Dam South, North and West.

The approval for both areas is valid until 30/06/2025 and requires observance of monitoring and conditions. DEVELOP is currently progressing with an extension to this approval and associated monitoring conditions.

1.6. Plans/figures

Plans associated with this MEMP are provided in Appendix 1. The MEMP guidelines provide for a series of 7 plans. The defined scope of these plans has been designed for long wall coal mines, that is, large-scale two-dimensional plans showing typical coal seam geology and mine plan geometry. The plans are designed to cover large land masses with multiple potential overlying land uses.

It is not possible to prepare these plans for the Woodlawn resource which is a 3-dimensional subvertical resource with a limited surface expression. Plans of this are included in Appendix 1.

1.7. Key personnel and responsibilities

Management responsibility for the MEMP is summarised in Table 1-1.

Table 1-2 Management Responsibilities

Position	Responsibility
General Manager	Overall responsibility for the operation of the Project
Underground Manager	Mine Planning and Design
Environmental and Compliance Superintendent	On site environmental management including the completion of environmental management and compliance

2. DEVELOPMENT OF THE EXTRACTION PLAN

2.1. History of the Woodlawn mine

Mining at Woodlawn Mine began in 1978 with the extraction of ore to produce copper, lead and zinc concentrates. Both open cut and underground mining techniques were employed during the 20 years of continuous operation until March 1998, when the mine prematurely closed due to failure of the operator Denehurst Ltd. At the cessation of operations, the site was not fully rehabilitated and the landscape remains highly disturbed, including the surface area above the existing and proposed mine workings. Waste rock was used as backfill for each stope. At the time of closure, 5.2 Million tonnes of ore had been extracted from the underground resource leaving a substantial remaining unrecovered resource estimated to be greater than 4 million tonnes.

The complexities of the site and its legacy rehabilitation liability proved difficult for the Administrators of Denehurst to sell the asset. The site was sold to Collex (now Veolia) for the purposes of using the void as a putrescible landfill while the remaining underground resource and data assets covered by SML20 was sold to Tri Origin (now DEVELOP).

Veolia now operates the putrescible waste landfill in the former open cut void (volume of 25 Million cubic meters), referred to as the Bioreactor. Landfill operations began in 2004 and Veolia is permitted to receive a set quantity of waste per year, mostly by rail to the Crisps Creek terminal south of Tarago. The original underground workings were accessed from the open pit and lie beneath the west wall. Prior to the commencement of Veolia's operations, the decline portals were backfilled, and concrete bulkheads were constructed inside each decline. These portals have since been covered beneath the surface of the bioreactor.

In 2005, Infigen Energy Limited secured approval for the Woodlawn Windfarm, which includes 23 turbines, 11 of which are located on the southern ridgeline within SML20. The wind turbines are not underlain by any existing or proposed future underground mine workings. Consideration of vibration impacts for this infrastructure is included in the Blast Management Plan.

In 2006 a prefeasibility study into the reopening the underground mine and retreatment of the three existing tailings dams was completed which demonstrated that the Project was viable. This led to the preparation of an Environmental Assessment (EA) being completed in April 2012 with approval being granted in July 2013.

2.2. Project background

The target ore lenses are hosted in a deep felsic volcanic deposit which plunges sub vertically below the original open cut to a depth of over 800m below the original open cut pit floor. The surface expression of the workings does not extend beyond the boundary of the surface infrastructure as shown on Plan 1, Appendix 1. The surface features above the workings are listed in Section 2.3. There are no aspects of the biophysical or cultural heritage environment remaining above the mine workings. There is also no privately owned land or public infrastructure located above the mine workings. As the underground workings lie only beneath a portion of ED1, ED3 and the Bioreactor, this MEMP centres on the stability of these structures.

2.2.1. Mining method and backfill

The mining method uses underhand and overhand stoping techniques with backfill for stability and subsidence control. The use of paste fill and its strength is further detailed in the Paste Fill Management Plan. Other backfill methods, such as the use of rock and cemented rock will also be employed to satisfy geotechnical requirements. Environmental considerations for this material are included in the Paste Fill Management Plan and Waste Rock Management Plan. As a result of backfill use and mining sequencing there will be no changes to surface stability, gradient, drainage patterns or any other aspect of the water management system. As documented in the water management plan, groundwater which passes through the rock matrix into the mine and is subsequently pumped out of the mine will be tested in order to provide assurance that it is non-polluting. Physical stability is achieved through conducting a series of strength tests on the material placed underground.

The mining methods used for the Project are designed to maintain local ground stability while maximising the extraction of the high-grade ore resource. Surface movement is anticipated to be less than the ability to be measured by normal survey techniques and will satisfy the primary performance criteria specified in the Project Approval.

2.3. Development of the mine plan

The original mine plan developed by Heron Resources focussed around an early re-entry to historic workings strategy. The current mine plan delays the interaction with the flooded mine workings by focussing on a series of recent and historic discoveries to underpin the economics of the revised mine plan. Dewatering activities will still be required; however, the mine plan will re-align access roads to access and extract the ore without having to enter historical mine workings. This can be achieved with only a minor change to underground access roads. The overall mine plan, its lateral and depth extents, ore extraction areas and surface expression remain unchanged. Similarly the extraction and processing limits as per the project approval remain: i.e DEVELOP shall not process more than 1.5 million tonnes of tailings and/or ore on site in a calendar year or transport more than 150,000 tpa of concentrate from the site in a calendar year

The land above the existing and proposed workings is identified on Plan 1, Appendix 1 and includes:

- Box cut and mine entry.
- Open cut void now used to emplace putrescible waste and extract gas for energy production operated by Veolia, referred to as the Bioreactor.
- Evaporation Dam 1 (ED1) operated by Veolia for water storage and evaporation.
- Evaporation Dam 3 (ED3) operated by Veolia for untreated and treated leachate from the Bioreactor.
- Paste Plant and associated infrastructure and hardstand areas operated by DEVELOP.
- Mine Services Area including sheds, workshops and diesel storage used for vehicle and plant maintenance activities operated by DEVELOP.
- Rehabilitated Waste Rock Dump (associated with the pre-2000's mine) located to the south.
- Several internal private roads used for access to the site.

The surface area surrounding the underground workings include the following:

- Some small areas of undeveloped land with sparse vegetation and trees.
- ED2 to the north west.
- Veolia's leachate treatment plant.
- Veolia's Mechanical Biological Treatment (MBT) Plant and compost holding area to the west.
- The new processing plant and Tailings Storage facility located to the east.

The nearest privately owned land is located approximately 1.5 km to the south west while the nearest private residence is located approximately 3.3 km also to the south west The nearest public infrastructure is the Collector Road to the north of the mine workings.

3. OVERVIEW

3.1. Outline of site facilitates

The site has a long history of mining related disturbance. As shown on Plan 1, Appendix 1 these include:

- The original open cut void now used as a landfill and Bioreactor. The underground workings lie beneath a portion of this void.
- Historical tailings produced from the pre 2000's mine and stored in dams.
- Three evaporation dams used to store and evaporate water. Referred to as ED 1, 2 and 3, the underground workings lie beneath a portion of ED1 and ED3 only.
- The rehabilitated waste rock dump from the pre-2000's mine operation. This is located to the south of the new mine entry and will be unaffected by the underground workings.
- The pre 2000's mines processing plant area. The original infrastructure has been removed and is now used by Veolia.
- Various surface infrastructure, roads, rock emplacements and buildings. No buildings will be undermined including Veolia's MBT Plant. Only a small section of internal haul road occurs directly above the mine workings.

The processing plant, ore stockpile, tailings dam (TSF4), mine entry, haul road and supporting infrastructure have now been constructed.

The existing and future underground workings covered by this MEMP do not extend beyond the current disturbed site and infrastructure. No privately owned property will be impacted by existing or proposed workings (other than operated by DEVELOP and owned by Veolia).

The key issues in relation to the proposed mining operation will be maintaining stability of the Bioreactor and dam structures on site. To achieve this, the extraction method and mining sequence incorporates backfill including cemented paste to fill and stabilise voids as geotechnically required.

3.2. Mine planning and design

This section provides a general summary of the plan with emphasis on matters related to subsidence.

The Woodlawn underground resource is located in a volcanic intrusion located below and to the northwest of the original open pit excavation. The target sulphide mineralisation contains zinc, copper, lead, gold and silver in economic concentration. The ore is present in multiple lenses which dip steeply in a northwest orientation. Some lenses extend to depths greater than 800 m below surface.

The underground mine involves the development of a new access decline located on the western side of the open pit excavation. This decline provides access primarily to new areas that were identified from exploration activities, whilst also providing access to areas that were previously mined (remnant resources).

Ore is extracted utilising overhand and underhand stoping techniques with backfill including paste. The engineered nature of paste fill makes the stoping operations more reliable and systematic, with the length of open voids controlled to ensure stability. This in turn limits any surface movement as there is no uncontrolled caving of overlying strata as is typical with coal mining operations.

In terms of subsidence, the equivalent in underground coal mining would be first workings in a bord and pillar operation but with the bords (internal roadways) being progressively filled with paste shortly after they are developed. In this situation, the minor surface movement that could theoretically be estimated is considered well within natural background movement. This is generally considered to be plus or minus 20 mm.

At Woodlawn, there will be no subsidence caused by rock mass caving as occurs with pillar extraction or longwall coal operations. It will essentially be the same, though more stable, than a first workings bord and pillar operation.

3.2.1. Mine Plan

Key features of the underground mine are:

- A mine decline from a box cut adjacent to the Bioreactor;
- Vertical and horizontal development to construct access to the ore lenses and ensure the safety of underground workers;
- Rehabilitation of existing workings when access is required involving installation of additional new ground support and to meet current geotechnical design standards;
- Longhole stoping to extract ore; and
- Backfilling of stope voids with paste fill.

The vertical extent of existing and proposed stopes is shown in Plan 3, Appendix 1. The northwest dip of the orebodies results in increasing depth of the lenses beneath ED1. While there are some proposed stopes around 150m below the southeast shore of ED1, beneath the floor of ED1 the proposed stopes are generally greater than 350m. There are no stopes (the green colour in Plan 3) within 200 m of the bioreactor. Development (or 'Dev) has shown on Plan 3 is defined as the access decline which is exempt from the 200 m exclusion described in Schedule 3, Condition 3. The old workings (the brown) are existing and are related to the mining that occurred prior to the current Project Approval.

The integrity of ED1 is monitored by DEVELOP in accordance with the Dam Safety NSW approval to mine underneath this dam. This includes vibration monitoring which is detailed in the Blast Management Plan.

The Life of Mine (LOM) planned and existing workings are shown on Plan 2 and Plan 3 in Appendix 1.

3.2.2. New decline and level development

The development of a decline from the box cut provides access to Kate Lens and the other delineated ore bodies which exist adjacent to and beneath the old (pre 2000's) mine workings. Additional new development and the rehabilitation of some of the existing decline will be used to provide access to other stoping areas. Under the current mine plan, access to the existing decline has been delayed to allow time for the dewatering of the workings to occur.

3.2.3. Mine Bulkheads

Additional new permanent and purpose-built bulkheads that conform to design recommendations may be installed where required in order to seal or block declines where required for mining sequence or for safety.

3.2.4. Ground Support Parameters

Geotechnical investigations covering the mine plan were initially undertaken by Beck Engineering which was based on both pre-existing mining knowledge and additional drilling data obtained since the mine closed. This work was expanded and refined by Heron.

Heron completed a specific geotechnical drilling program to determine mining conditions in new resource areas as well as anticipated decline and access development conditions. Specific testing was undertaken on each rock mass including Uniaxial Compressive Strength (UCS), Geological Strength Index (GSI), Density, Plastic Strain as well as a number of strength, cohesion and friction testing in order to accurately define rock behaviour, necessary support levels and potential overlying strata deformation characteristics. This data was used both in mine planning and assessment of potential impacts of blasting and subsidence on the Bioreactor.

In addition to rock mass units, several faults were identified which were also tested along with contact zones which interact with the planned mine workings. This information has been included in the assessment of subsidence potential.

3.2.5. Extraction Methods

In hard rock mining, the extraction of ore is described as stoping, and the place this occurs is known as a stope. This is equivalent to the “second workings” in coal mining however unlike longwall coal mining, there is no uncontrolled caving of the strata above the stope.

Typically, the lenses are moderately to steeply dipping, and primary access consists of decline ramps from which lateral drives are developed into the ore lenses. Once access development is completed the ore is mined, primarily using longhole stoping techniques.

Longhole stoping involves the drilling of a series of holes up to 25 metres in length in a ring pattern. These holes are then fired with explosives to break the ore. Remotely controlled loaders then remove the broken ore, which is loaded into 50 tonne capacity trucks and hauled to the surface.

Ore will be extracted and mined using both “underhand” (Figure 3-1) and “overhand”. (Figure 3-2). This means that the stopes are mined below or above previously mined stopes that have been backfilled with a geotechnically suitable material. The implementation of this system allows mining simultaneously over several levels with stopes sequenced in each level.

Figure 3-1 Underhand (top-down) longhole stoping with backfill mining method schematic

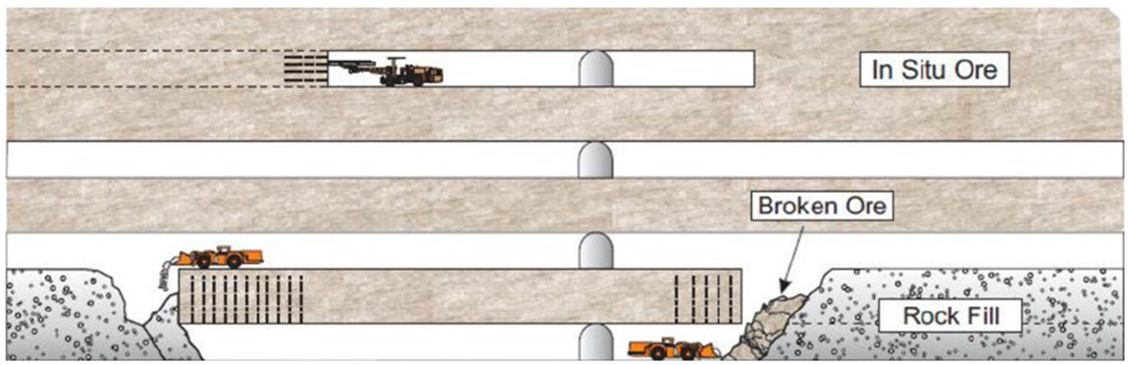


Figure 3-2 Overhand (bottom-up) longhole stoping with backfill mining method schematic

3.3. Mechanics of potential subsidence

There are three mechanisms for potential subsidence at the Woodlawn mine. The main source relates to mine dewatering. As this movement is not caused by underground extraction it is not subject to Condition 3 of Schedule 3 of the Project Approval which states that "there should be no measurable subsidence caused by underground mining beneath the Woodlawn Landfill, tailings dams, and evaporations dams on the site". The removal of water contained within the workings is not considered "underground mining." It is also considered extremely unlikely that removal of water from the old workings would cause any measurable surface subsidence. This is due mainly to historic water levels in the old workings and the combination of waste fill in the historic void combined with rock failure swell factors.

The second mechanism includes the potential for subsidence resulting from ore extraction. Although this is possible due to plastic deformation of the insitu rock mass above the stopes, it is largely theoretical and highly unlikely to be differentiated from normal surface movements resulting from natural heating and cooling of the surface strata. The calculated void required to induce a failure related to subsidence such as this is almost 10x the largest void that will be created in the Woodlawn underground. Stope sizes are selected based on geotechnical stability characteristics and a catastrophic failure (however unlikely) would not result in a measurable impression on the surface. This is further mitigated by the mining sequence which utilises back fill material to stabilise voids.

The third method could arise through catastrophic failure of strata above the stope. This is called "chimney failure". These mechanisms are further discussed in Section 3.3.3.

3.3.1. Mine dewatering

The pre 2000's or "old" mine workings have filled with water since mining was stopped in the 1990's. Access to the old workings is therefore dependent on removing this water. DEVELOP has estimated that approximately 1.4 million cubic metres of water will be pumped from these old workings to sufficiently dewater them. The strategy and associated approvals for this is detailed in the Water Management Plan and will likely take several years to complete. Therefore, until this is able to be completed the mine plan will initially focus on development and mining outside of this area.

Dewatering of the new workings will continue to occur. Historically, the underground mine was described as dry, and groundwater inflows are expected to be less than 345 cubic metres per day.

The subsidence prediction completed by Beck suggested that the far field effects of mine dewatering may have the greatest theoretical effect on subsidence in the area adjacent the proposed underground workings.

3.3.2. Subsidence relating to ore extraction

As discussed previously, the subsidence predicted from the extraction of ore at the Woodlawn mine is mitigated by the backfilling of stope voids with geotechnically suitable backfill. This will have the effect of confining but not eliminating deformation and the potential for subsidence at surface.

It is important to note that no significant subsidence effects were documented during or since the extraction that occurred throughout historic mining operations, despite the existence of stope voids that were not backfilled prior to the closure of the old pre 2000's mine.

3.3.3. Chimney failure

The third mechanism for potential subsidence is localised in the area of impact and has not been modelled. A chimney failure can only occur during the catastrophic failure of the rockmass above a stope void and requires the presence of a geological structure combined with a weak rockmass to propagate. Under the right conditions the chimney can continue to propagate until the original void has been filled by the collapsing material. With this in mind, the distance of the proposed stoping areas to surface the size of the void required is far larger than those being proposed as part of this mine plan.

The conditions for a chimney failure are known to exist in some areas with many pervasive faults and the presence of talc-chlorite rocks documented in drilling data and geological mapping of development drives in the historic operation. This type of localised failure occurred infrequently during the historic operation but did not propagate to the surface.

The stope design process that DEVELOP has implemented includes geological mapping of the rockmass and detailed analysis to provide the critical stope design parameters. Also, the systematic use of geotechnically suitable backfill is a significant mitigating element in the proposed stoping methods. In addition to the exclusion distance to be maintained from the bioreactor pit.

It is with the above in mind that although the prospect of a chimney failure is accepted, there is no physical way for it to manifest to a surface induced defamation event due to void and distance to surface parameters.

3.4. Subsidence prediction methods

A subsidence impact assessment has been prepared by Cross-Cut Consulting Pty Ltd in 2018 which is contained in full in Appendix 4 and summarised in the following sections. Deformation effects were evaluated using a mine-scale 3D finite element model that included all existing and planned underground excavations, the open pit and the complete geological and structural models that were available at the time of the modelling (January 2016). Beck Engineering applied a strain-softening dilatant material model for the rockmass and structures and hydromechanical coupling to capture pore water pressure effects. The model constitutive assumptions govern how stress, strain and pore water pressure interactions evolve over time in the simulation.

The finite element model was solved using Abaqus Explicit software. The solution to the governing numerical equations provided an estimate of the magnitude of stress, strain and pore water pressure.

To bracket expected outcomes for risk assessment purposes, an average set and a weak set of material properties were used. The weak case permits appreciation of outcomes with a lower probability, so that the effectiveness of the control measures can be evaluated, and guides the trigger and response plan, while the average case can be used for base-case assessment.

3.5. Subsidence predictions

Subsidence refers to the movement of the surface at any one point and can be described as vertical displacement, tilt, tensile and compressive strain and curvature. Vertical movement is generally expressed in units of millimetres. Tilt is the change in the slope of the ground as a result of differential subsidence and is calculated as the change in subsidence between two points divided by the distance between these points. Tilt is usually expressed as millimetres per metre.

Curvature is the change in tilt between two adjacent sections of the tilt profile and provides the rate of change in tilt. It is expressed as the inverse of the radius of curvature in kilometres. Strain is the relative differential horizontal movements of the ground and is calculated by the horizontal distance between them. Strain can be expressed as compressive which is where the distance between the points decreases or tensile strain where the distance between the two points increases. Strain is usually described as millimetres per metre.

These parameters have been developed largely to describe underground longwall mining and the norm is to develop models which show incremental changes over multiple longwall panels. The Woodlawn mine design does not lend itself to this form of subsidence calculations. This is because the surface extent of the proposed new workings is extremely small and consists of individual excavations which are fully supported by back fill material. These supported excavations extend sub vertically rather than laterally as occurs with coal mining.

Another differentiating factor at Woodlawn is that surface deformation does not occur due to the strata caving as is the case with longwall coal mining. The stope dimensions are maintained to ensure short term stability and once ore has been extracted the stope is completely backfilled which provides permanent stability. While deformation of the rock mass around the stoped areas will theoretically occur, the deformation is constrained by the very low compressibility of the backfill.

It is expected that due to the geometry and the mining methods employed at Woodlawn, the deformations associated with ore extraction will be minor and unlikely to be measurable.

Subsidence effects are theoretically more likely to be a result of the far field effects of mine dewatering.

The dewatering of the historic mine workings will become necessary to access some of the historically mined orebodies. As the workings are progressively dewatered, the surrounding water table will be drawn down in a cone of depression that will progressively increase in area as the mine is dewatered.

The extraction of groundwater can result in the compaction of the aquifers within the area of influence around the mining operation, which may be outside the plan surface footprint of the mine workings. These are referred to far field surface movement but not related to actual mining. Monitoring of dewatering effects on the surrounding groundwater table is included in the monitoring program detailed in the water management plan. It should be stressed that surface movement due to changes in groundwater saturation is small and is generally considered part of natural background surface movement.

Subsidence predictions were made for the area covering the open pit and the evaporation ponds by Beck Engineering for the Woodlawn underground feasibility study (Beck Engineering, 2017).

The forecast displacements magnitudes, denoted by Umax in Figure 3-3, were estimated to be up to a maximum of 130mm directly above the underground workings. The estimated displacement over ED1 was no more than 50mm. This forecast deformation field is a mostly far-field response to dewatering, with less effect due to the planned mining excavations themselves. The forecast displacements were conservatively high and in practice lower displacement magnitudes, in the order of +/-20mm, would be expected.

It is anticipated that actual subsidence levels caused by extraction of ore would be less than effectively measurable. This is largely a result of natural variations caused by daily and seasonal temperature variations and natural changes in groundwater pressure which cannot be removed from current monitoring techniques.

It is essential to recognise that ED1 has already been subject to pre-2000's underground mining without noticeable deformation or other subsidence related impacts.. As future mining will generally occur at a greater depth beneath ED1, it is expected that the surface impacts will be similar to the effects of previous underground mining which are also comparable to natural variations.

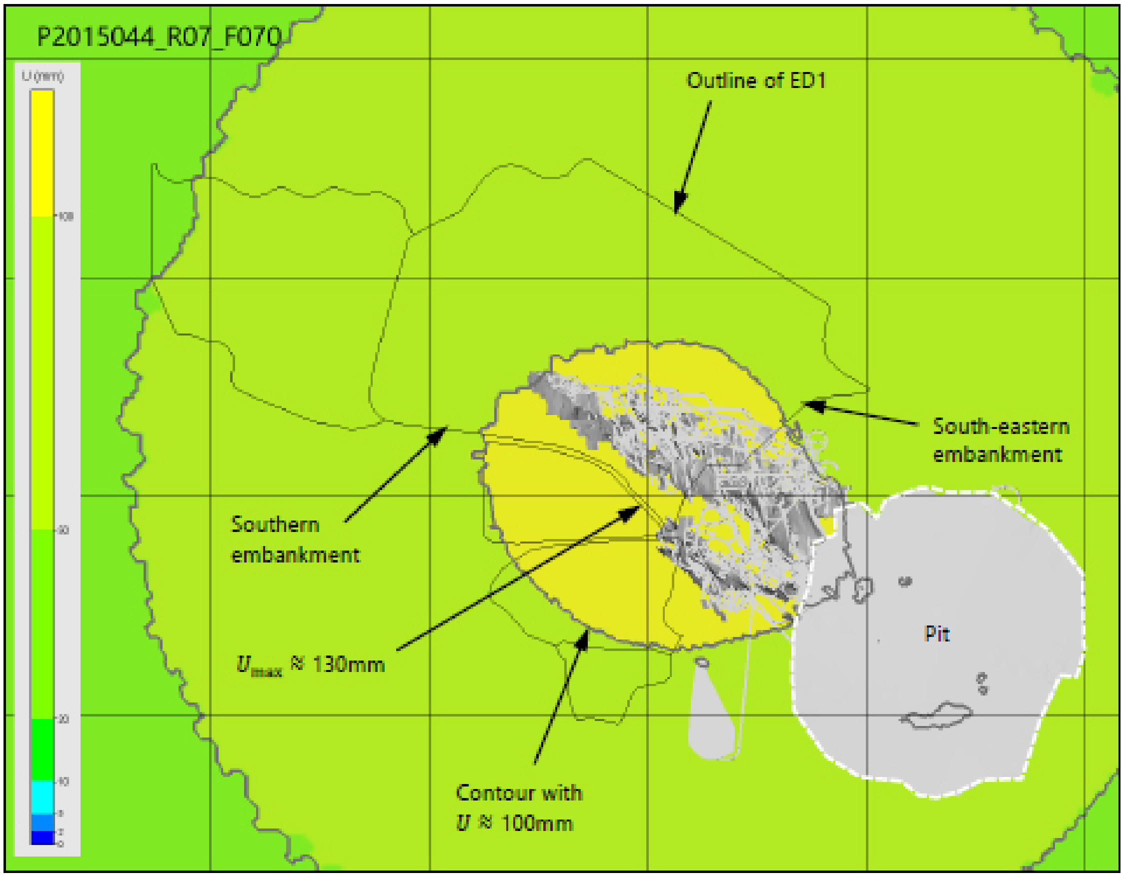


Figure 3-3 Deformation modelling

Figure 3-4 shows modelled plastic strain associated with future underground mining. This shows small localised additional strains of ~0.25% near ED1. This strain is associated with modelled lithology contact.

For the open pit housing the Bioreactor, the modelling results also show that the risks are low. At the end of underground mining, forecast stoping induced displacement magnitudes in the pit slopes are less than about 100mm, even for the worst-case scenario. The forecast deformation is a mainly elastic response to underground mining, dewatering and progressive waste filling the Bioreactor, with a dominant vertical downwards component. In terms of slope stability, 100mm of movement over a slope of this size is not considered to be critical or problematic.

It was concluded that the mine plan, with control measures in place, is sound as far as management of induced deformation of the pit is concerned. The induced deformation is unlikely to lead to slope instability at any relevant scale and the proposed control measures would be effective in ensuring unexpected adverse outcomes are identified before they grow to unacceptable levels.

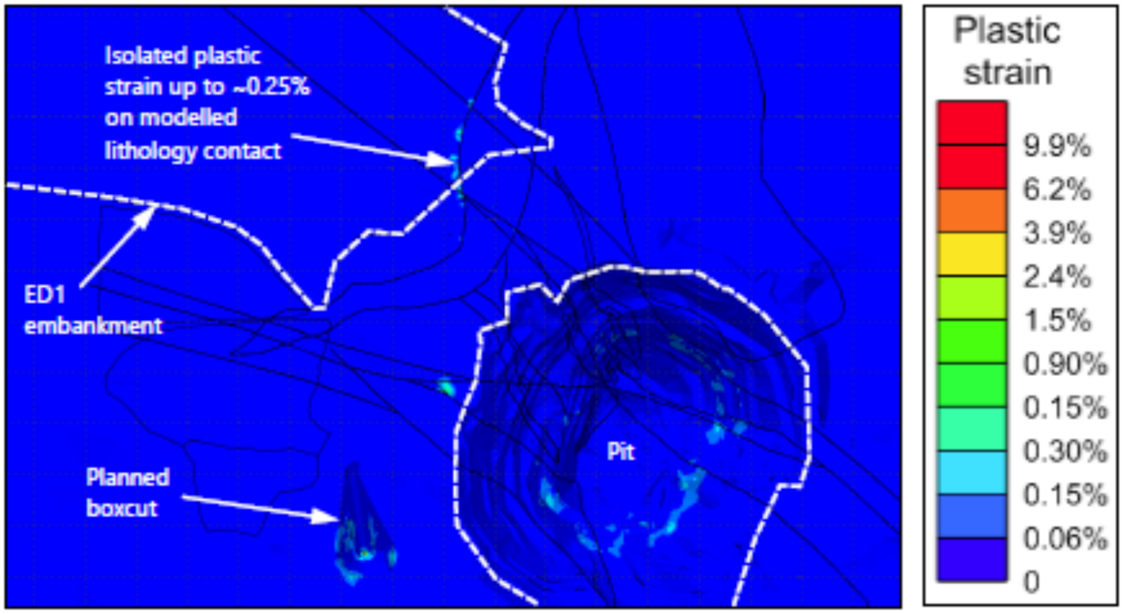


Figure 3-4 **Plan of forecast incremental damage associated with future underground mining**

3.5.1. Subsidence observations to date

It is noted that no indications or reports of subsidence (underground or at surface) has been reported at Woodlawn in the new mine workings which where were started by the previous operator in ~ 2019. This includes visual observations and stability surveying of the ED1 wall. The underground operations have also been progressing since 2022 under DEVELOP with no underground indications that would indicate compromised stability being caused by the mine. To date the new mine remains separate from the "old mine" which sits beneath the now Veolia bioreactor and is known to be filled with water. DEVELOP have not entered or connected the old mine to the new mine due to this water presence and maintain an exclusion zone from the inferred base of the bioreactor (further discussed and identified in Section 4).

3.6. Subsidence impacts and environmental consequences

The area of influence of the predicted subsidence is within the footprint of the existing mine. The magnitude of subsidence is predicted under the worst-case scenario to be similar to that experience in the pre 2000's underground mining operation which did not result in surface damage requiring rectification or remediation. The predicted subsidence is not anticipated to have any significant impact on surface infrastructure, which is supported by the history of mining at the site. The predictions are conservative and relate to minor modelled movement resulting largely from dewatering and permanently supported stope excavations. No traditional "caving" will be undertaken and all extraction voids will backfilled to provide geotechnical suitable stability.

As predictions relate to dewatering activities of the old workings which is not currently occurring surface monitoring is limited to visual observations at this stage. Additional monitoring through surface surveying techniques will occur if/when dewatering activities of this feature occur. This is further detailed in Section 5.4.

The environmental consequences associated with the mine are expected to be consistent with those presented in the 2012 EA.

4. MANAGEMENT PLANNING

4.1. Performance objectives

The previous sections have described the background to the formulation of the mine plan which is the subject of this MEMP. Although the original EA did not include this detail, the Project Approval was issued with performance objectives based on the broad concept of the minimisation of subsidence impacts on the overlying mine infrastructure. These performance objectives, as stated in Schedule 3 Condition 3 are as follows:

The Proponent shall ensure that:

- (a) there is no measurable subsidence caused by underground mining beneath the Woodlawn Landfill, tailings dams, and evaporations dams on the site;
- (b) apart from the access decline, no underground mining is undertaken within 200 m of the perimeter of the Woodlawn Landfill;
- (c) remnant underground voids are long term stable to prevent subsidence; and
- (d) material used to backfill underground voids is physically and chemically stable and non-polluting.

The primary performance indicators for the project in relation to subsidence and geotechnical stability are:

- Do not contribute to any instability of the Bioreactor including floor, highwalls, benches, gas collection and water recirculation systems. All monitoring activities associated with the Bioreactor are undertaken by Veolia.
- Do not contribute to any instability of dam structures above the underground workings. The proposed monitoring and verification program is described in Sections 5.4 and 5.5.
- Do not contribute to any instability of any buildings or other structures and facilities located above the mine workings.
- Ensure compliance with the DSNSW approval to mine underneath ED1.

How the performance indicators are monitored is detailed in Section 5.4 and Section 5.5.

4.2. Overview

This section provides details of the six component EMPs required by DPE's MEMP Guidelines. The following points should be noted:

- The existing landform above the underground workings is highly disturbed but contains approved water management structures and drainage systems.
- There are no rehabilitation activities proposed above the underground workings for the life of the mine as these structures are required to support both Veolia's Bioreactor and the mining operation.
- There are significant surface infrastructure above and surrounding the mine workings which are critical to the ongoing operation of the Bioreactor including the batter slopes of the original open cut and a portion of ED1 and ED3. There are also newly constructed infrastructure owned by DEVELOP such as access roads, workshops, the paste plant and associated hardstand areas.
- There are no Aboriginal or European heritage aspects remaining.

- There are limited public safety issues as the entire site is privately owned and has well established secure facilities.

DEVELOP operates in accordance with an EMS and associated environmental management plans which provide specific performance measures, details of monitoring activities to determine compliance and management responses that may be necessary to correct the environmental performance of the operation. The plans relevant to this MEMP are the Water Management Plan, Waste Rock Management Plan, Paste Fill Management Plan and Rehabilitation Management Plan.

The determination of potential impacts due to underground mining was subject to a risk assessment which is summarised below.

4.3. Principal hazard management plan

The framework for the prevention, detection and control of ground instability and subsidence is subsequently identified in one of the projects Principal Hazard Management Plans (PHMP). The Mine Ground Instability & Subsidence PHMP identifies the system framework for prevention, detection and control of Ground Instability and Subsidence by ensuring the appropriate processes and systems are in place to maintain the risk to a minimum.

The PHMP details the series of risk assessments completed in 2018 to assess the ground instability risk profile at Woodlawn Mine. These were subsequently reviewed as part of the site Broad Brush Risk Assessment in April 2018, and again in March 2023 as part of site preparations to restart underground operations.

The PHMP is reviewed at least every three years or when there is a change of method or when a significant relevant incident has occurred in order to determine whether the controls continue to be suitable, consistent with current good practice and effective in managing the risks associated with the principal hazard. Updates and reviews from the PHMP are subsequently used to update this management plan where required.

4.3.1. Risk assessment

There are two main areas where ground movement due to the extraction of ore can present risk: damage to surface features and the safety of site personnel. Underground mining activities are covered by separate legislative requirements for mine site health and safety. These issues are dealt with separately by the Mines Inspectorate and are not covered in detail within this MEMP. Damage to surface features however is covered in detail.

There are no natural topographic features above or near the existing or proposed mine workings. This includes swamps, creeks, waterways or ecological sensitive environments. No privately owned land, including residences will be impacted by the proposed underground mining nor will there be any impact on public infrastructure such as roads or power lines. The existing and proposed mine workings do not extend beneath or near the existing wind turbines operated by Infigen (now Iberdrola Australia) and are well outside the 200 m exclusion distance required under the consent and cooperation deed.

The land above the proposed mine workings underlies only pre-existing mine infrastructure and land holdings. The interaction between the mine operation and Veolia controlled structures become the main areas of risk management to be addressed.

4.3.2. Environmental Risk Management

The identified risks have been assessed in terms of the risk categories listed in Table 4-3.

Table 4-3: Risk Categories

Risk category	Description
A	May have medium to high impact and requires further investigation to determine level of potential impact and to identify appropriate measures to manage and mitigate the impact.
B	May have low to medium impact; however, environmental impacts can be reduced to acceptable levels through use of standard or identified management measures.
C	Will have low impact and standard measures can be used to manage the impact.

Issues with an identified initial Risk Category 'A' were subsequently treated as 'key issues' for the EA and include surface water and groundwater. These issues were addressed in detail in the EA and were subject to conditions to the Project Approval. With the incorporation of management and mitigation measures, risk levels for each category were reduced to either "B" or "C" class.

4.3.3. Specific risks relating to surface features

An updated risk assessment was undertaken following the finalisation of the Subsidence Impact Assessment provided in Appendix 4. The final risk rankings are presented in Table 4-4.

Surface impacts from mining are most easily monitored for as subsidence. However, vibration monitoring program also provides a mechanism of detecting mining impacts through blasting and tracking or correlating changes over the mine's life. The vibration monitoring program is detailed in the Blasting Management Plan.

Table 4-4: Risk Assessment of Underground Mining

Risk Aspect	Cause and Impact	Existing Controls	Risk Category	Further Treatment Options if Necessary
Damage to Bioreactor from mining.	Cracking causing leakage	Use of backfill Extraction design to minimise surface movement Provision of a 200 m exclusion buffer	Moderate	Increase extraction buffer around Bioreactor
Damage to dams	Cracking causing leakage	Use of backfill Extraction design to minimise surface movement and be adapted depending on results of monitoring data and visual inspections	Low	Nil required unless monitoring suggests impacts are occurring
Structure damage MBT Plant	Building damage	Mine Plan does not extend beneath any MBT structures	Low	Nil

Risk Aspect	Cause and Impact	Existing Controls	Risk Category	Further Treatment Options if Necessary
		Extraction design to minimise surface movement and be adapted depending on results of monitoring data and visual inspections		
Roads and Infrastructure	Surface cracking	Subsidence predicted less than 150mm and no surface cracking anticipated	Low	Nil
Soils and Erosion	Surface cracking Decreased slope stability	Use of backfill Extraction design to minimise surface movement and be adapted depending on results of monitoring data and visual inspections	Low	Nil
Biophysical Environment	Nil: Highly disturbed			
Heritage Environment	Nil: Highly disturbed			

The underground mine plan does not extend to any private land holders. The proposed underground mining method reinforces the existing mine access drives and back fills any significant voids which will increase the stability of the underground mine, relative to current conditions. The extraction method includes the progressive filling of stopes with backfill which greatly enhances stability and minimises surface movement. As per the mining sequence no underground voids are left as “remnant,” all extraction voids created by DEVELOP are promptly backfilled to facilitate the next extraction area. The underground access roads (which are approximately 5 x 5 m at their largest) will be backfilled upon the conclusion of operations.

The underground mine also includes an exclusion zone of 200 m around the existing open cut to further mitigate against any potential connectivity that could result in leachate or gas flows into the underground mine or other impacts to the surface infrastructure as a result of underground mining. Works within the exclusion area may still be completed but will be with agreement of Veolia in accordance with the co-operation deed.

Ongoing investigations and monitoring will be undertaken throughout the life of the mine, to assess and mitigate against potential underground mining impacts as necessary. As described above, the use of back fill including paste in underground extraction areas will remove the potential for measurable surface subsidence to occur.

4.4. Water management plan

The subsidence assessment identified that minor movement may occur due to the dewatering of the flooded workings in the vicinity of ED1 and ED3. This movement will be within normal background movement of +/- 20 mm. Environmental considerations of dewatering are considered in the Water Management Plan but the following is of note in reference to the water management plan and subsidence:

- No natural streams or water bodies exist above the mine workings.
- There are no groundwater dependent ecosystems in the vicinity of the mine workings.
- Regular monitoring of water levels occurs throughout the mining lease in accordance with regulatory approval and objectives in the water management plan.
- There are no private groundwater users within SML20.

4.5. Land management

Land management issues are contained in the Vegetation and Rehabilitation Management Plans. It should be noted that given the overlap with existing management plans and the minimal nature of potential subsidence impacts which require no additional controls or management provisions. DEVELOP will not be formalising a separate Land Management Plan. The following is of note in reference to land management and subsidence:

- Mining underneath a declared dam (ED1) and in the vicinity of a declared dam is approved by Dam NSW and subjected to specific monitoring and reporting requirements.
- All land above the current and future underground workings is under the control and/or ownership of either DEVELOP (through its fully owned subsidiary Tarago Operations Pty Limited) and Veolia Environmental Services. Iberdrola Australia owns the Woodlawn Windfarm on land to the south of the Bioreactor and will not be affected by the underground mine.
- Protection of the Bioreactor forms part of the Cooperation Agreement with Veolia and is considered as part of the risk assessment (refer to Section 4). Veolia is responsible for all stability measurements and geotechnical assessments within the Bioreactor including walls, floor, waste emplacement and associated roads, dams, pipes and pumping infrastructure.
- Implementation of a subsidence monitoring program which assists with the management of specific identified risks. This is included in Section 5.
- As the mine entry lies within the existing pollution control system for the mine and no remaining soils exist, no specific soil or water management provisions are necessary to be included in this MEMP.
- There are no biodiversity management provisions that relate to mine subsidence or the underground mining operation. Biodiversity performance measures are detailed in the Vegetation Management Plan.
- There are no areas of Aboriginal or Natural Heritage which will be impacted by the entire Woodlawn Mine Project. The approved Heritage Management Plan does however provide appropriate management, conservation and protection of both Aboriginal and non-Aboriginal heritage items identified on the site should any items of significance be discovered.
- Dams on site are used to manage water with further details on their construction and management included within the Dam Safety Management System and underlying documents.
- The underground extraction area lies wholly within the Woodlawn Mine and Bioreactor facility. The site is fenced and security provisions are in place. Only authorised personnel and contractors are permitted to access the site.

5. SUBSIDENCE MONITORING PROGRAM

5.1. Objectives

Condition 4(e) of Schedule 3 of the Project Approval requires a subsidence monitoring program to be developed which assists with the management of the risks associated with subsidence, which validates the subsidence predictions, analyses the relationship between the predicted and resulting subsidence effects, and informs contingency planning and the adaptive management process in the underground workings. It is noted that this condition also includes a requirement for DEVELOP to pay all reasonable costs incurred by the Department to engage suitably qualified, experienced and independent experts to review the adequacy of any aspect of an Extraction Plan.

The subsidence monitoring program is described in the following sections. The program is based on the low predicted subsidence levels but also includes contingencies if greater subsidence levels are measured.

DEVELOP acknowledges there may also be obligations to Veolia as detailed in the Cooperation Deed between both parties. These are not detailed in the MEMP.

5.2. Dam Safety NSW

Approval to mine under ED1 is required by DSNSW (previously Dam Safety Committee) and is currently approved subject to the monitoring and reporting as detailed in this approval.

5.3. Subsidence management strategies

DEVELOP adopts the observational approach to the design and operation of the Woodlawn underground mine. This is a key control measure for managing the impacts of underground mining. The observational method for geotechnical risk management involves progressing from a conservative starting position, under the control of measurements and observations designed to test and refine the design assumptions and further characterise the risk. If a forecast tolerance is exceeded, an unexpected event occurs or an unexpected geotechnical feature is encountered, then the plan is modified, according to the actual conditions, to maintain an acceptable risk profile. This approach is firmly embedded and widely accepted in worldwide geotechnical practice.

The primary management strategy is mine planning and sequencing including the adequate design of stopes and the use of geotechnically suitable backfill. This provides stability for both mine safety and minimisation of surface subsidence. The 200 m exclusion zone around the Bioreactor is an additional management strategy which forms part of the cooperation agreement with Veolia. The exclusion zone limits the mining activity in this area to mine access, the rehabilitation of existing declines and drives and the backfilling of any significant voids that remain from the previous mining operation.

The only real risk of measurable subsidence occurring is through unplanned strata failure. To manage the risk associated with stope collapse and chimneying of the failure:

- DEVELOP uses underhand and overhand stoping with back fill. This method reduces the potential for stope collapse and chimneying because stoping proceeds below an engineered material (paste fill) or in situ crown pillar for underhand and minimises stress and dilution in overhand due to minimal void opening for overhand.
- Design of stopes to dimensions that are likely to remain stable. Stopes are designed according to the actual ground conditions and site-specific experience accumulated to that date.

- Contingency plans to rapidly fill any stope that does collapse or start chimneying.

A summary of the subsidence management controls and implications is provided in Table 5-5.

Table 5-5 Subsidence impacts and minimisation summary

Aspect	Impact Minimisation and Management
Cliffs and Natural topographic features	There are no cliffs or natural topographic features within the underground mine plan
Natural steep slopes	No natural steep slopes occur within the mining area
Swamps and natural water bodies	No natural swamps or other natural water bodies exist within the mine plan
Natural creeks and waterways	No natural creeks or waterways exist above the proposed underground workings
Permanent flowing creeks	No mining occurs beneath Crisps Creek Monitoring program in place which includes specific surface and groundwater TARPs
Ecological sensitive areas	No mining occurs beneath any natural vegetation community
Groundwater	Performance measures and monitoring program in place for paste fill activities Groundwater monitoring program and performance measures in place
Aboriginal Places and Sites	No mining occurs beneath or near any known Aboriginal Places or sites
Public Roads and Infrastructure	Mine plan does not extend beneath Collector Road
Private property and residences	Mine plan does not extend beneath privately owned land or residential dwellings
Infigen owned wind turbines	Mine plan does not extend beneath any infrastructure owned or operated by Infigen (now Iberdrola Australia)
Bioreactor facility	Subsidence protection measures including 200 m exclusion zone to avoid impacts on the Bioreactor. Subsidence monitoring will continue to be undertaken by Veolia within Bioreactor
Leachate inflow to mine workings	Identification and sealing of leakage points where accessible. Groundwater monitoring to include leachate detection
Evaporation Dams	Subsidence predictions confirm that no measurable surface movement beyond normal background movement will occur. Subsidence monitoring is occurring on ED1 dam in accordance with the DSNSW approval.
MBT Plant	Mine plan does not extend beneath the MBT Plant. Subsidence predictions confirm that no measurable surface movement beyond normal background movement will occur
Internal roads and hardstand	Subsidence predictions confirm that no measurable surface movement beyond normal background movement will occur
Tailings Dams	No mining to occur beneath the existing tailings dams or Tailings Storage Facility 4. Monitoring of TSF4, as the mines closest tailings dam, occurs in accordance with DSNSW guidelines and the dams Operation and Maintenance Plan.
New Processing Infrastructure	No mining to occur beneath the new processing plant infrastructure

5.4. Monitoring

A further measure of protection is provided by DEVELOP's monitoring program, which comprises of the following monitoring types:

- Subsidence: All declared dams on site are monitoring for movement including subsidence in accordance with DSNSW and each dams Operation and Maintenance Plan. Surveying techniques and drone technology will be used to determine movement.
- Visual inspections: Report on any detected ground movement, deformation or surface cracking.
- Vibration monitoring: monitors are established at key locations and infrastructure as detailed in the Blast Management Plan.
- Stope monitoring: Visual assessments by underground operators, supervisors and technical staff, and remote void surveys using laser scanners (cavity monitoring system) to identify collapse and/or chimneying.
- Survey: Similar to subsidence monitoring which is completed at the dams additional fixed locations can be established in suitable areas above the active mining workings. These prisms are installed to concreted points which facilitates millimetre accuracy of the height. Subsequent measurements can then be compared to previous measurements and the baseline to determine if subsidence is occurring. As the mine is located underneath Veolia's operational area suitable permissions are required prior to implementing this monitoring technique. As discussed in Section 3.6 this is not considered necessary until such time that dewatering activities occur at such time this management plan will be updated with the additional details.

Table 5-6 Subsidence monitoring summary

Monitoring type	Location	Frequency	Trigger, Action Response Plan
Subsidence	ED2, TDS, TDN, TDW, TSF4	In accordance with operation and maintenance plans for each dam, ranges between tri-weekly to monthly depending on the dam and associated alert level.	Refer to Table 5-7
Visual	TDW, TDS, TSF4, ED2	In accordance with operation and maintenance plans for each dam, ranges between tri-weekly to monthly depending on the dam and associated alert level.	Refer to each dams operational and maintenance plan: ED2 (ENW-101-PL), TDN (ENW-102-PL), TDS (ENW-103-PL), TDW (ENW-104-PL), TSF4 (ENW-105-PL)
	ED1	As per DSNSW approval, currently yearly, however survey monitoring is required quarterly.	Refer to Appendix 5 DSNSW Approval to Mine Monitoring Plan
Vibration	As per blast management plan, typically located at ED1 and the void wall	Constant	Refer to Blast Management Plan (ENW-015-PL)

Monitoring type	Location	Frequency	Trigger, Action Response Plan
Stope monitoring	Underground	As required, typically after every stope is fired	Refer to Table 5-7
Survey	At fixed locations above the mine workings	To be confirmed with Veolia prior to dewatering activities being undertaken	Not yet drafted, to be included in this plan when required.

5.5. Subsidence Effects Monitoring Program

The subsidence monitoring program is multifaceted and covers 3-dimensional survey of critical infrastructure above the workings, nominated areas outside the expected extent of subsidence movement as well as surface water, groundwater and subsidence.

There are constraints to the measurement of subsidence at the site. These include the anticipated levels being below the accuracy of available survey methods and normal background movement caused by normal daily heating and cooling of surfaces. The survey work is also constrained by the type of infrastructure above the mine workings, such as evaporation dams with varying water levels, internal access roads and services which constantly change due to maintenance grading, resurfacing and replacement.

5.6. Trigger action response plan

The Trigger Action Response Plan (TARP) covering the underground extraction phase of the project has been designed specifically for surface infrastructure and facilities controlled by either Veolia or DEVELOP. The trigger values, shown in Table 5-7 have been based on current 3D modelling of displacements and surface movement.

Although the TARPs consider greater amounts of subsidence, the expectation based on the use of backfill is that there will be minimal subsidence arising which would be beyond the capability of accurate survey. It is also not anticipated that there will be any measurable surface damage arising from underground activities including dewatering the workings and subsequent ore extraction.

Table 5-7 Subsidence management TARPs

Event level	Trigger	Action
Level 1	0 to 50 mm displacement measured at bioreactor (open cut highwall reported by Veolia) and/or dam walls	Within background range, no actions required
Level 1	Stope monitoring confirms void is as expected/as per design	Within expectations, no actions required
Level 2	50 to 150 mm displacement measured at bioreactor (open cut highwall reported by Veolia) and/or dam walls	Within tolerance range, re-confirm data and continue monitoring program
Level 2	Stope monitoring indicates void is greater than or not behaving as expected	Increase monitoring, prioritise backfilling sequencing.
Level 3	150 to 200 mm displacement measured at bioreactor (open cut highwall reported by Veolia) and/or dam walls	Determine specific levels of strain and tilt, assess risk of instability of high wall faces and benches, check of any visible signs of cracking or leakage
Level 3	Stope monitoring indicates void is self-mining (growing)	Backfill immediately as soon as it is safely possible
Level 4	> 200 mm displacement measured at bioreactor (open cut highwall reported by Veolia) and/or dam walls	Obtain independent geotechnical advice. Implement any specific mitigation works advised by geotechnical consultant in consultation with Veolia

Other TARPs related to mining and extraction are included in additional management plans including:

- Water Management Plan for water quality and water levels
- Paste Fill Management Plan (included in Appendix 6) for quality control and testing for the paste material itself including leachability.
- Blast Management plan for blast limits and corresponding actions

6. PASTE FILL

6.1. Background

The testing and evaluation process for the use of paste fill at Woodlawn commenced in 2007 using facsimile paste produced in a laboratory. The first analysis was produced by AMC Consultants in 2008 which concentrated on physical parameters, strength requirements and backfill systems. This work was expanded between 2014 to 2016 by Outotec Consultants which included paste permeability, long term chemical and physical stability and laboratory simulations.

The results of the trials and testing as compiled into a report referred to as the Paste Fill Management Plan which was subsequently approved in 2019 (refer to Appendix 3) in accordance with Schedule 3 Condition 5c.

In 2024 DEVELOP engaged Quattro Engineering Pty Ltd (Cody Tennant) as the endorsed suitably qualified expert (refer to Appendix 2) in the recommissioning of the paste plant and associated works as summarised in Section 6.2. Endorsement of the experts was received on 14th January 2025 (MP07_0143-PA-23).

6.2. Paste plant recommissioning and associated trials

Through a series of trials and testing (Schedule 3, Condition 5(a)) Quattro confirmed the paste mix, underground delivery network and developed a Quality Assurance and Quality Control system that will ensure that:

- the paste fill system used to fill underground mining voids remains physically and chemically stable and non-polluting (Schedule 3, Condition 3(d))
- paste filled voids will be long term stable to prevent subsidence (Schedule 3, Condition 3(c))
- There is a program to ensure it meets the performance measures above (Schedule 3, Condition 5(b)

The paste fill management plan was subsequently updated and is presented in Appendix 6.

The ongoing testing program centres around quality assurance and quality control (QA/QC) procedures, long term leaching studies as well as in-situ monitoring of pore pressure to confirm the cured paste maintains a permeability rate of less than 1×10^{-9} m/s. In practice, paste to be used at Woodlawn will have a very fine pore structure with inherent low porosity when cured. Overall permeability is anticipated to be similar to other cemented materials which typically have permeabilities in the order of 1×10^{-11} m/s.

To put this into perspective, once a stope is filled with cured paste, water will take approximately 30 years to saturate 1 m of material, or around 300 years to fully saturate a typical stope. Only when fully saturated is there the potential for leaching to occur but only minerals that are soluble in neutral to moderately alkaline pH can potentially be released. This excludes all the metals of concern including zinc, copper, lead, Iron and most sulphate compounds. Although testing will continue, the results to date show that the paste will remain environmentally benign and non-polluting over the long term.

7. COMMUNICATION, REPORTING AND REVIEWS

7.1. Communication

Effective communication with government agencies, the workforce and the community are important features of the overall Environmental Management Strategy for Woodlawn mine and therefore a key component of each environmental Management Plan.

DEVELOP is committed to consulting with the wider community and strives to achieve a high standard of community awareness and communication. A Community Consultation Committee (CCC) was established in 2015 as part of the construction phase of the Project and continues to meet regularly to discuss the Project. Further detail regarding stakeholder liaison in included in the Project EMS.

7.2. Reporting

All environmental monitoring requirements specified in EPA licences and approvals are undertaken and the data maintained on site in data management systems. Copies are provided for internal review as required by the General Manager. A summary of the data is provided to regulatory authorities as required by statutory approvals. Other data collected as part of projects or auditing procedures are reported internally in accordance with the Environmental Management Strategy verification procedures.

In accordance with Project Approval Schedule 6 Condition 4 an Annual Review will be prepared in accordance with the Department of Planning *Post Approval requirements for state significant mining development Annual Review Guideline* dated October 2015 (or more recent edition if appropriate). A copy of the Annual Review will be made available on the DEVELOP web site as follows: http://develop.com.au/Woodlawn-sustainability/

Monitoring data required by the EPL will be reported on the company's web page in accordance with EPA requirements for public disclosure, and as per Schedule 6 Condition 11 of the Project Approval http://develop.com.au/Woodlawn-sustainability/.

7.3. Complaints

Operational related complaints may be received:

- Directly via the Community Hotline (available 24/7): 1800 371 124
- Directly via the website: https://www.develop.com.au/contact-us/
- Directly via the CCC
- Indirectly via government agencies

The Environmental Management System includes more detail on the complaints management procedure. A complaints register is updated monthly and is publicly available on the DEVELOP website.

7.4. Incident reporting

All reasonable and feasible avoidance and mitigation measures are employed to ensure that mining does not cause any measurable subsidence. If subsidence is detected and attributable to the project, it will be reported to the EPA and DPHI within 24 hours of the completion of the investigation. A detailed report will be subsequently provided within 7 days. Corrective and/or preventative actions will be assigned to relevant Company personnel. Actions will be communicated internally through planning meetings and toolbox talks and outstanding actions will be monitored for their effectiveness upon completion. A copy of the investigation report and regular updates on the status of the identified corrective and/or preventative actions will be provided to the relevant government agencies and, if required, the complainant.

7.5. Review and continuous improvement

The MEMP and associated paste fill management plan will be reviewed and updated annually or in the case of a significant operational change. The review will include an assessment of the effectiveness of control measures and performance against the Plan's objectives. The objectives of a review are to:

- Maintain compliance with statutory requirements.
- Identify opportunities for improvement in the management plan.
- Incorporate community considerations.

The MEMP review will include:

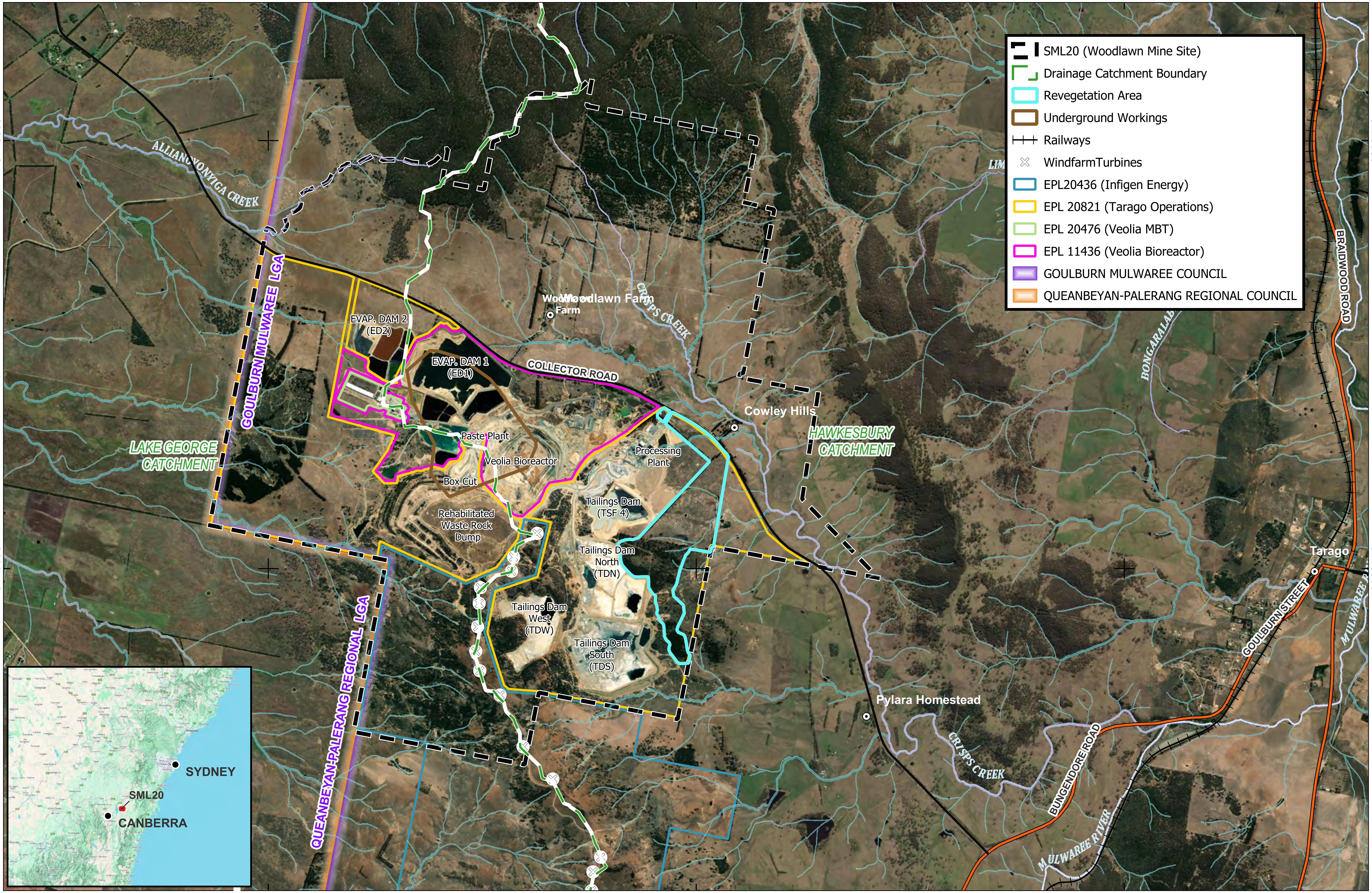
- This document.
- Legislation, approval, license changes.
- Community complaints and enquiries.

As per Schedule 6 Condition 5, DEVELOP will review, and if necessary, revise the MEMP within 3 months of:

- the submission of an annual review;
- the submission of an incident report;
- the submission of an audit report; or
- any modification to the conditions of this approval.

Where the review leads to revisions in the MEMP, then within 4 weeks of the review the revised document will be submitted to the Secretary for approval.

Appendix 1 Plans



1 2 km

Scale: 1:32,000 MGA94 (Zone 55)

VTX-JOB-0473-MAP-02

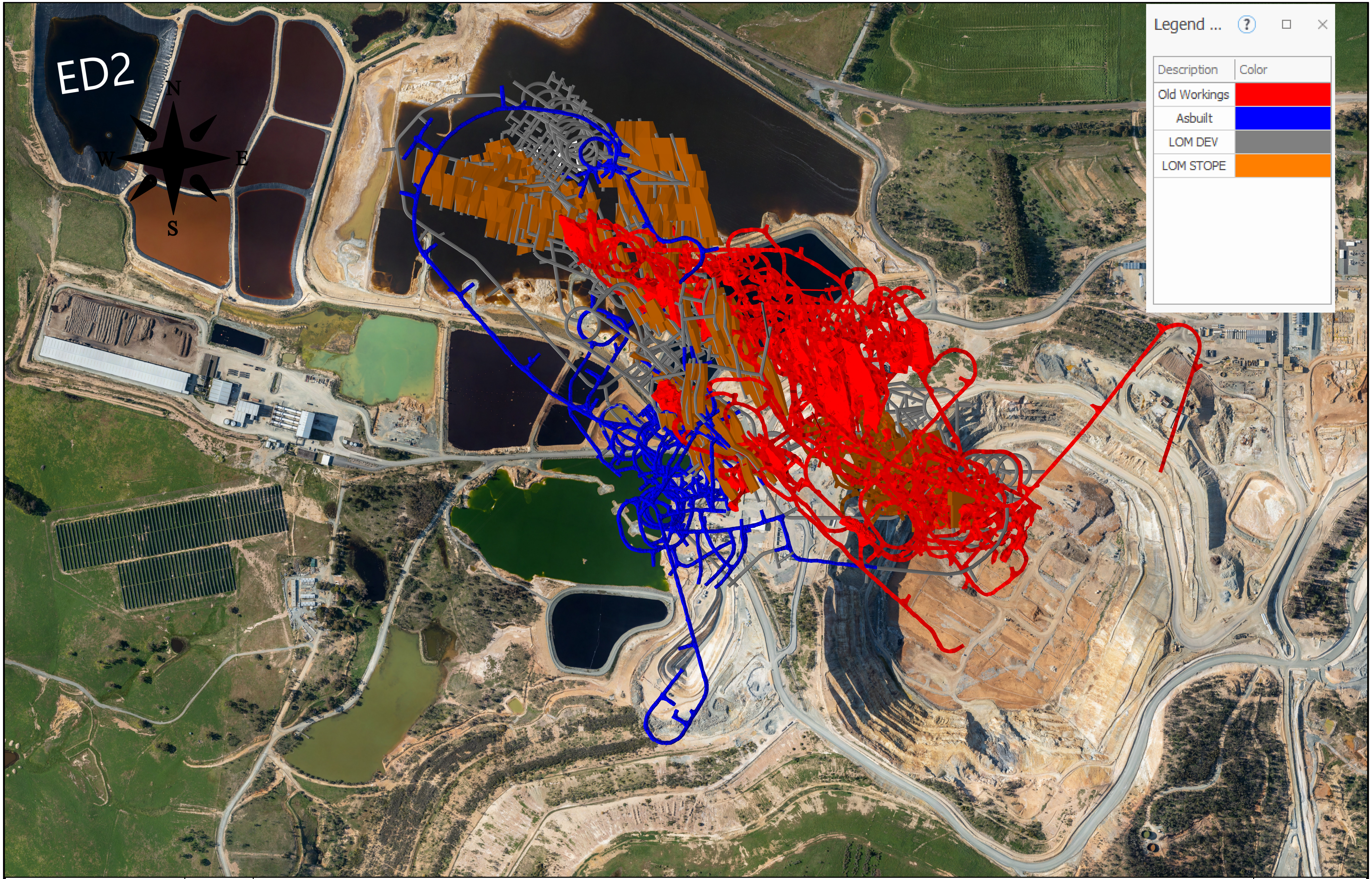
Date: 2025-6-26 | Rev: 02 | @A3

DEVELOP

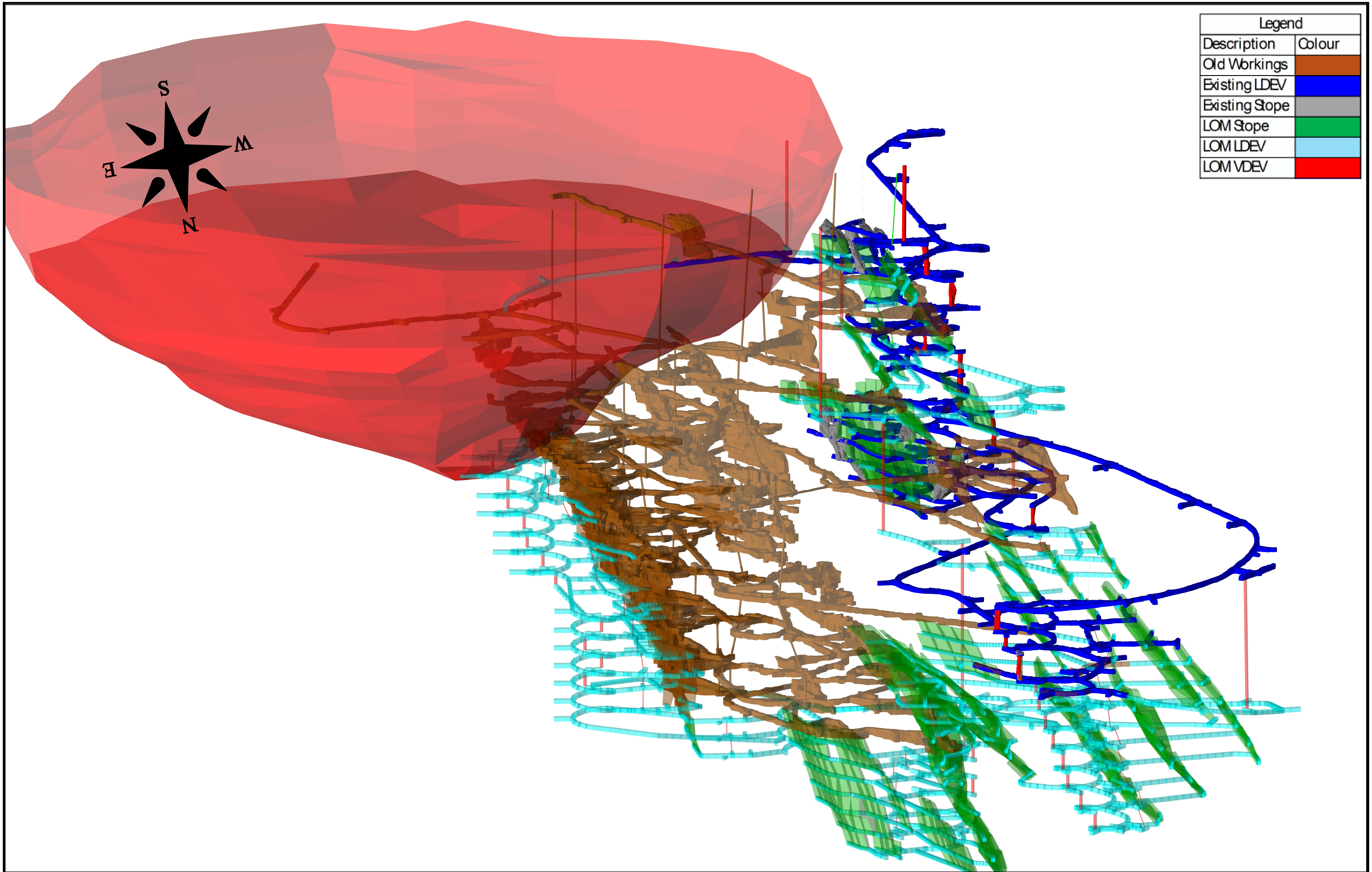
Author: C Hobbs | Requested By: K Crook

WOODLAWN ZINC COPPER PROJECT

Site Plan



18/04/2025		Woodlawn Copper and Zinc Mine	1:5000
		Existing & Planned Mine Workings - Surface View	



05/09/2025		Woodlawn Copper and Zinc Mine	1:4000
		Existing and Planned Workings -Isometric View with 200m Pit Exclusion	

Appendix 2 Consultation Log – MEMP

Date	Form / Agency	Comments and Outcomes	Response/how addressed
14/01/2025	DPHI	Letter received via the major projects portal (MP07_0143-PA-23) that endorsed experts are approved by the secretary.	None required
18/12/2024	DPHI	Letter for approval request of endorsed persons submitted via the major projects portal for Water, Mine Extraction and Paste Fill Management Plans.	Response received
17/12/2024	Iberdrola	Briefing the Iberdrola representative for the Capital Renewable Energy Precinct	Copy of presentation sent. No comments requiring action.
17/12/2024	Veolia	Briefing Woodlawn Veolia environment manager on project re-start and updates being proposed for management plans.	Copy of presentation sent. Draft plans which require consultation under the approval (blast and water) to be sent once drafted.
9/12/2024	Online meeting with EPA Queanbeyan	Briefing with EPA to outline updates being proposed for management plans. Included: air quality, water, noise, waste rock and rehabilitation.	No comments / noted. Recommendation to re-engage with EPA if technical input or advice is required for any of the plans at any point.
15/11/2024	DPHI	Briefing DPHI on complex site historical context and re-start timeline with high level discussion on timing and process of management plan submission and approval.	Agreed with approach to re-draft and re-submit management plans.
30/03/2017	Email from EPA with final EPL 20821	Final EPL issued to Heron Resources	Noted
15/03/2017	Email from EPA re EPL	Updated Woodlawn Mine EPL for comment	Various emails and calls to finalise EPL and attachments
20/10/2016	Letter from EPA re draft EPL	Provision of second draft EPL 20821 for the Heron operation	Noted
12/10/2016	Letter to DPE re additional Experts	Letter from Heron Resources requesting approval of additional experts engaged in management plan preparation	Noted and approved by DPE
12/10/2016	Email from EPA re licence application	First draft EPL provided for comment with request for additional plans	6 emails to and from EPA and various phone calls in relation to comments on draft EPL
10/08/2016	EPL Application to EPA	Application for new EPL covering Woodlawn Mine construction and operation	Noted

Date	Form / Agency	Comments and Outcomes	Response/how addressed
9/03/2016	Meeting with Community Consultation Committee	Presentation to Woodlawn Community Consultation Committee which included overview of project, monitoring program, construction program, workforce numbers, exploration and environmental management plan preparation and content.	Draft EMPs provided on web page for download by committee members
13/10/2014	Meeting with EPA and OEH Queanbeyan Office	General project briefing, need for EPL separation with Veolia EPL, monitoring conditions, lack of archaeology sites and impact, need to define vegetation offset area and outcomes	Ongoing negotiation with EPA in relation to licensing requirements
9/10/2014	Email to Sandie Jones OEH	Copy of Planning Approval and plans of development area	Noted
18/09/2014	Site meeting with DRE	General briefing and site inspection, outline of Management Plans, finalised scope of MOP, Need for rehabilitation trials, standard environmental management provisions, control of acid generation	Noted
11/09/2014	Letter to DPE (Department of Planning and Environment)	Seeking approval of Experts engaged in relevant management Plan	Approval provided
23/07/2014	Meeting with Goulburn City Council	General Management and Planning Manager, general briefing no specific feedback	Noted
7/07/2014	Letter from Trade and Investment	Requested meeting and briefing on site and staged approach to preparation and approval of management plans	On site meeting held
3/07/2014	Initial consultation letter to: • NSW Trade and Investment • Environment Protection Authority • NSW Office of Water • Sydney Catchment Authority • Office of Environment and Heritage • Department of Planning and Environment (DPE)	These letters were the initial consultation and sought specific advice from each agency according to the respective relevant management plan.	None required
19/01/2014	Email to Fran Kelly and James Caddey SCA	Copy of Woodlawn EMS provided, Project Approval, and Construction Environmental Management Plan (EMP)	None required

Appendix 3 Plan Approval

NSW GOVERNMENT | Planning, Industry & Environment

Resource and Energy Assessments
Contact: Leesa Johnston
Phone: 8289 6861
Email: leesa.johnston@planning.nsw.gov.au

Mr Andrew Lawry
Chief Operating Officer
Heron Resources Limited
WOODLAWN MINE PROJECT

By email to: ALawry@HeronResources.com.au

Dear Mr Lawry

Woodlawn Mine Project (07_0143) - Approval of Extraction Plan

I refer to your submission dated 2 August 2019 seeking the Secretary's review and approval of the Extraction Plan for the Woodlawn Mine Project.

The Department has reviewed the Heron Resources Limited Woodlawn Zinc – Copper Project Extraction Plan (Revision 7, dated 30 July 2019).

The Department is satisfied that the Extraction Plan address the requirements of condition 4, Schedule 3 of Project Approval 07_0143.

Accordingly, the Secretary has approved the Extraction Plan. Please ensure that a copy of the approved plan and a link to the 3D drawing of the extraction footprint is placed on your website as soon as possible.

If you require further information, please contact Leesa Johnston on 8289 6861 or by email to leesa.johnston@planning.nsw.gov.au.

Yours sincerely

29/8/19

Steve O'Donoghue
Director
Resource and Energy Assessments
as nominee of the Secretary

Planning, Industry & Environment

Resource and Energy Assessments
Contact: Leesa Johnston
Phone: 8289 6861
Email: leesa.johnston@planning.nsw.gov.au

Mr Andrew Lawry
Chief Operating Officer
Heron Resources Limited
WOODLAWN MINE PROJECT

By email to: ALawry@HeronResources.com.au

Dear Mr Lawry

Woodlawn Mine Project (07_0143) – Approval Paste Fill Management Plan

I refer to your email dated 21 July 2019 seeking the Secretary's review and approval of the *Heron Resources Limited Woodlawn Zinc – Copper Project Paste Fill Management Plan* (Revision 7, dated 19 July 2019).

The Department has carefully reviewed the *Heron Resources Limited Woodlawn Zinc – Copper Project Paste Fill Management Plan* (Revision 7, dated 19 July 2019) and is satisfied that the Plan address the requirements of condition 5, Schedule 3 of Project Approval 07_0143.

Accordingly, the Secretary approves the *Heron Resources Limited Woodlawn Zinc – Copper Project Paste Fill Management Plan* (Revision 7, dated 19 July 2019).

Please ensure that a copy of Plan is placed on your website as soon as possible.

If you require further information, please contact Leesa Johnston on 8289 6861 or by email to leesa.johnston@planning.nsw.gov.au.

Yours sincerely

30/8/19

Steve O'Donoghue
Director
Resource Assessments
as nominee of the Secretary

Appendix 4 Subsidence Impact Assessment

Heron Resource Limited

Subsidence Predictions and Impact Assessment in support of the Extraction Plan for the Woodlawn Underground Mine

February 2018

Authors:

Declan Franzmann B. Eng. (Mining), FAusIMM(CP)

Crosscut Consulting

Citraen Pty. Limited

ACN 006 972 907

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1.0 EXECUTIVE SUMMARY

Heron Resources Limited is developing the Woodlawn Mine to exploit the Lead, Zinc, Copper, Gold and Silver mineralisation that comprise the resource base. There are two areas that mining will focus:

1. The polymetallic resource contained within the historic tailings storage facilities (TSF) that were the residue of earlier processing operations between 1978 and 1998; and
2. The insitu, high grade polymetallic resource that will be extracted using modern underground mining techniques and processed concurrently with the TSF resource.

This report provides data on the mine geometry, mining methods and other factors that will influence strata behaviour, details of surface features and potential impacts on these features.

Generally, an extraction plan and subsidence assessment are completed for longwall coal mines where the system of mining involves the extraction of the coal seam, which is typically between 2 and 5 metres thick, 150 to 300 metres wide and 1,000 to 3,500 metres long. This results in the collapse of the roof above the coal seam which in turn may lead to the wide spread subsidence of the natural surface above the mine.

The mining methods chosen for the Woodlawn Mine is based on longhole open stoping. Ore is extracted in stopes that typically measure 5 to 10 metres wide, 20 metres high by 20 metres long. Once the ore has been extracted the void is backfilled using tailings material from the mineral processing operation, typically combined with cement. The aim is to extract the ore without causing the collapse of the surrounding rock mass. Once the cement has had sufficient time to cure and develop strength, the adjacent stope can be mined.

The geometry of the ore bodies that comprise the Woodlawn Mine are discrete and have limited width (from 2 to 20 metres) and strike length (less than 100 metres). They are generally steeply dipping at more than 55° (from horizontal) and may have considerable vertical extent (+300 metres). As the mining plan progresses over time, the depth of mining below the surface increases quickly.

The rigorous application of the proposed mining method, the tight filling of mined stopes and the natural orebody geometry at Woodlawn mean that the impact of subsidence on surface features is likely to be negligible in magnitude and the total area influenced by potential subsidence effects.

This report describes the mining processes, describes the natural and built features that may be susceptible to the impact of subsidence and provides an estimate of subsidence parameters.

The surface area above the underground workings is contained within the mine operational area of mining lease SML20 and presents no risk to private landholders, natural drainage lines, public infrastructure or dwellings. The only surface features above or near the workings consist of existing mine infrastructure, dams, internal roads and Veolia's Bioreactor.

2.0 INTRODUCTION

2.1 BACKGROUND

This Subsidence Impact Assessment has been prepared by Crosscut Consulting for Heron Resources Limited (Heron) in support of the Extraction Plan required by Condition 4 of Schedule 3 of Project Approval 07_0143MOD 1.

This Subsidence Impact Assessment supports the Woodlawn Mine Extraction Plan. It provides data on the mine geometry, factors that will influence rock mass behaviour, details of surface features and potential impacts on these features.

The technical nomenclature used in this report is typical for underground metalliferous mining in Australia. Where this is different to that used in underground coal mining, the equivalent or closest coal mining terminology is included in brackets after the term.

The Woodlawn mine was historically mined in two phases: as an open pit mine by CRA from 1978 and then subsequently as an underground mine by Denehurst Limited from 1987 until the mine closed in 1998. The open pit was re-purposed by Veolia and the Woodlawn Bioreactor currently manages around 20% of Sydney's putrescible waste and taps the landfill gas emissions for power generation.

During the previous period of underground mining a total of 5.8 million tonnes of ore was extracted using predominantly cut and fill stoping techniques which utilised unconsolidated mullock as backfill. The underground mine workings were barricaded at the cessation of mining, and the workings gradually filled with water.

2.2 GEOLOGY

The Woodlawn deposit occurs in Silurian felsic volcanic rocks, volcanogenic sediments and carbonaceous shales intruded by doleritic sills. It is part of the suite of volcanic-hosted massive sulphide (VMS) deposits formed along the eastern coast of Australia in the Paleozoic (240 - 540 Ma) (Gemmell et al., 1998).

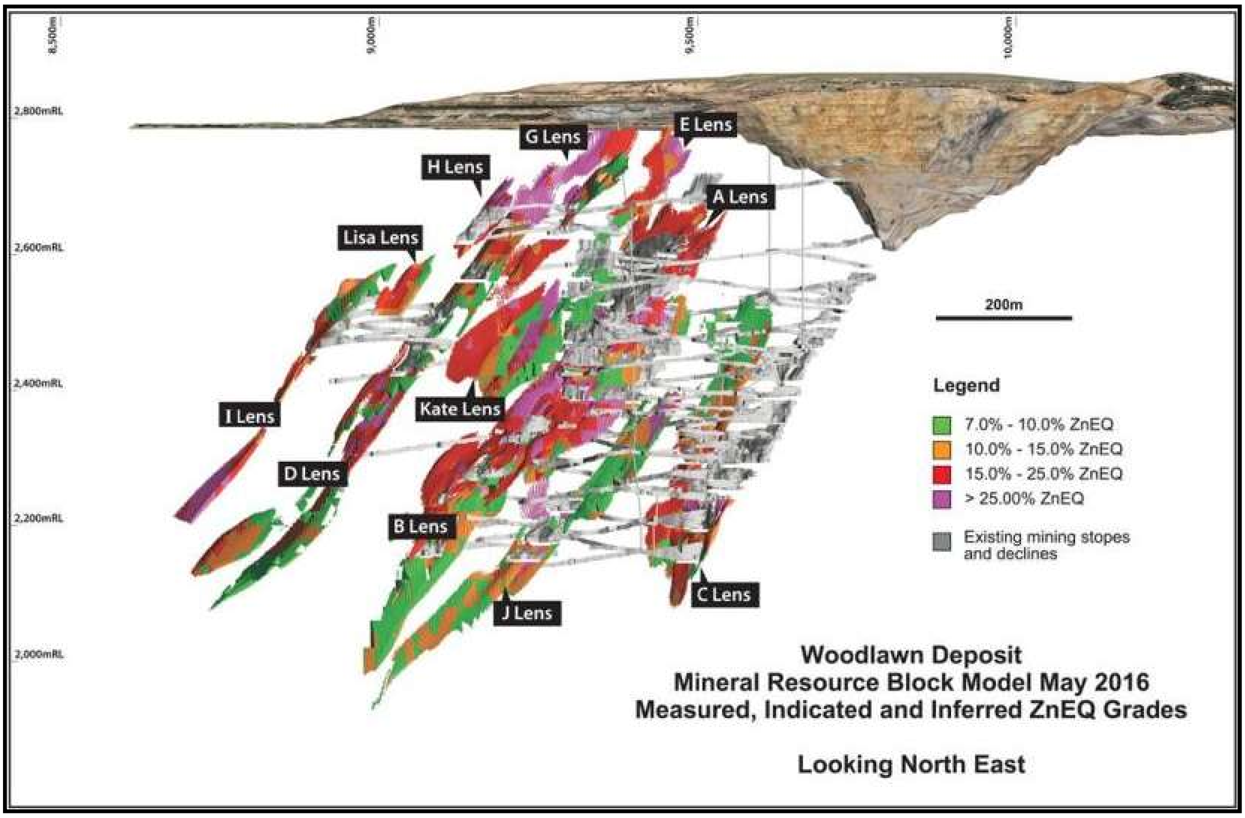
VMS deposits tend to form in back-arc and inter-arc volcanic basins in proximity to rift faults and host rocks range in composition from rhyolite-andesite to basalt. Rhyolitic rocks are the most common on the footwall, while sediments and/or mafic volcanic rocks are the most common hanging wall types.

The Woodlawn deposit is hosted by regionally metamorphosed (greenschist facies) fine and coarse grained felsic volcanic - pyroclastic rocks, volcanogenic sedimentary rocks and carbonaceous shale, informally known as the Woodlawn Group. In the latter stages of deposition, dolerite sills intruded the rocks now situated above and below the Woodlawn deposit. Dolerite sills comprise 50% to 60% of hangingwall rock. Many of the volcanoclastic rocks at Woodlawn are laminated, quartz sericite bearing tuffaceous shale and chloritic-talc schist. Volcanic units interfinger the shales and exhibit complex and rapid facies changes. Certain volcanic units have been identified as being associated with ore and most of the lenses are in some way in contact with these units.

The mine sequence is folded into an overturned, isoclinal syncline. The Woodlawn deposit occurs on the eastern limb of the syncline. The syncline axis plunges at about 60 degrees to the north-northwest. The axial plane dips at about 60 degrees to the west and is paralleled by a strong slatey cleavage or more intense schistosity throughout the mine sequence.

The mineralisation is strictly within "lens" shaped lodes, sub-parallel to each other, and occurring in a repetitious geometry. The deposits occur in twelve main lenses (named A to L) and numerous but smaller sub lenses. These lenses contain economic concentration of lead, zinc, copper gold and silver. Figure 2.1 illustrates the general sectional arrangement of the lenses.

Figure 2.1 – Woodlawn ore lenses (looking north east)

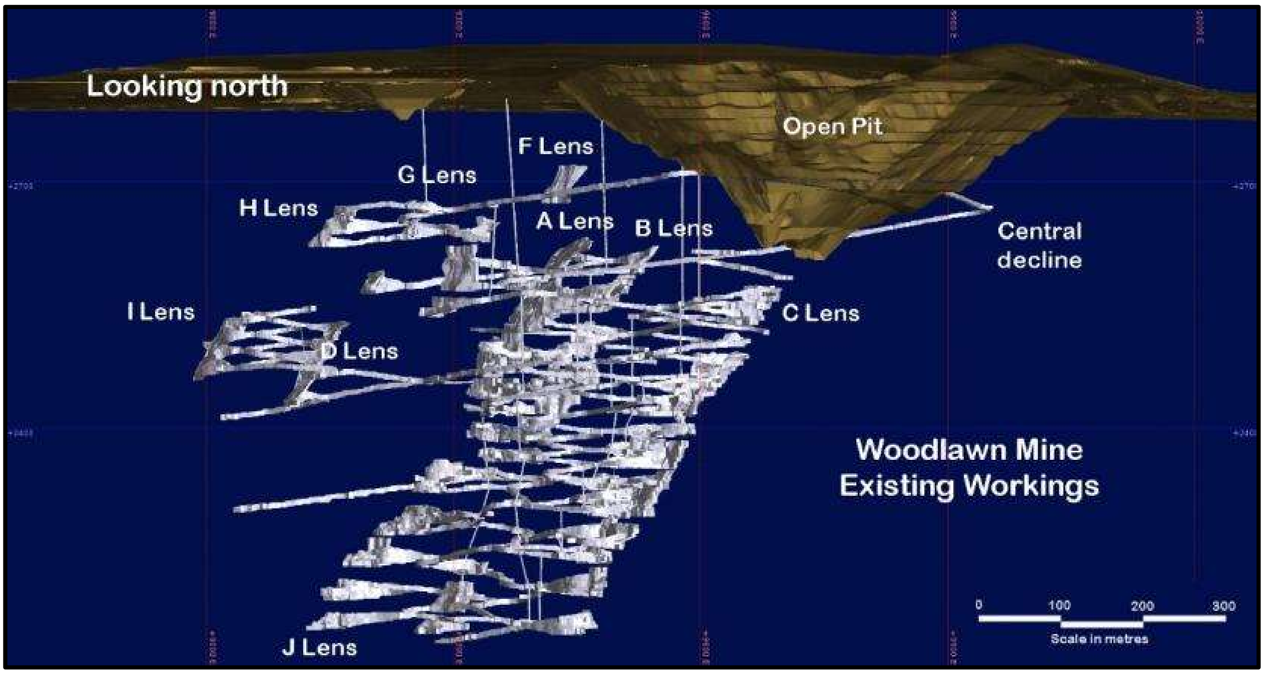


The individual massive sulphide lenses are strongly anisotropic with a short strike length of between 40 and 180m (roughly north-south), thickness of between 2 and 15m (roughly east-west) and a down plunge extent of 300 to more than 800m.

2.3 EXISTING WOODLAWN UNDERGROUND MINE

The Woodlawn underground mine commenced operation in 1986. The mine was accessed from two portals located within the open pit and four air shafts develop from the pit and surface. Ore extraction was predominantly focused on A, B and C lenses as shown in Figure 2.2.

Figure 2.2 - Original open pit and underground workings



The original decline portals within the pit were sealed by Veolia as part of the Bioreactor development and the shafts were backfilled as part of the mine closure.

Heron has spent considerable time collating the survey data from hard copy plans and anecdotal evidence from interviews with previous mine employees to create a detailed mine void model. This model is shown in Figure 2.2 and has been used for detailed mine design.

Historic underground mining predominantly used cut and fill mining methods with unconsolidated waste rock used as backfill. While most of the stoped areas were backfilled, there remains some open stopes and the final lift of cut and fill stopes that were not filled. The volume of unfilled voids remaining in the mine required to be filled was estimated in the Feasibility Study to be 137,000 cubic metres. Heron plans to systematically fill these areas once access to each is achieved to enhance local stability.

Part of Heron's fill plan involves backfilling of the existing voids below the crown pillar that separates the open pit and the underground workings. Heron has undertaken a program of drilling to test the crown pillar and surrounding voids. The drilling confirms there has been no propagation of the existing mine voids and these areas will be prioritised for filling soon after commissioning of the paste fill plant

2.4 PROPOSED EXTRACTION AREA

The proposed extraction area lies largely within the footprint of the original underground mine workings, extending from approximately 100m below surface to around 600m below surface. As most of the shallower lenses were extracted in the previous mining operation, the average depth of the proposed stopes is around 450m below surface.

The surface expression of the new workings is approximately 16 ha, as shown on Figure 2.3. This aerial photograph shows the existing and proposed underground workings superimposed over the topography. The area immediately above the proposed workings is completely disturbed.

Figure 2.3 - Surface and expression of underground workings

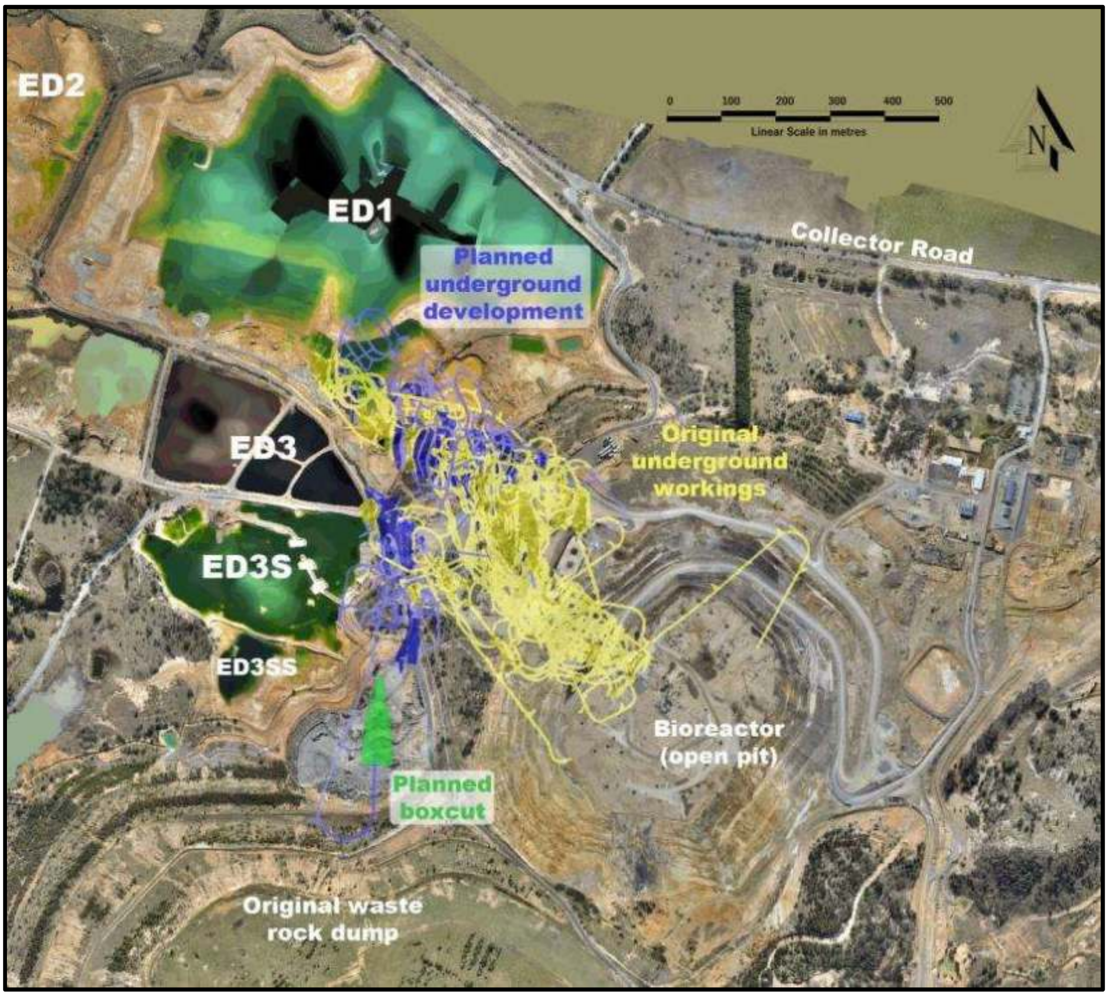
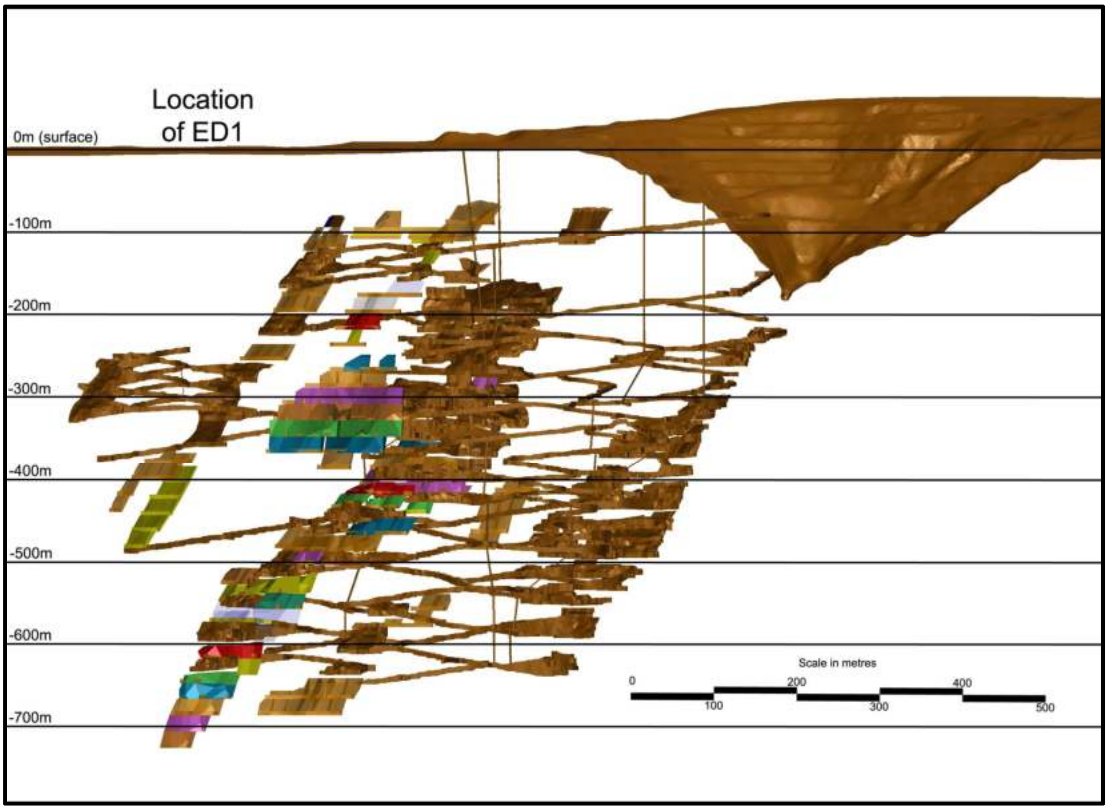


Figure 2.4 – Section of mine workings looking 30° from north



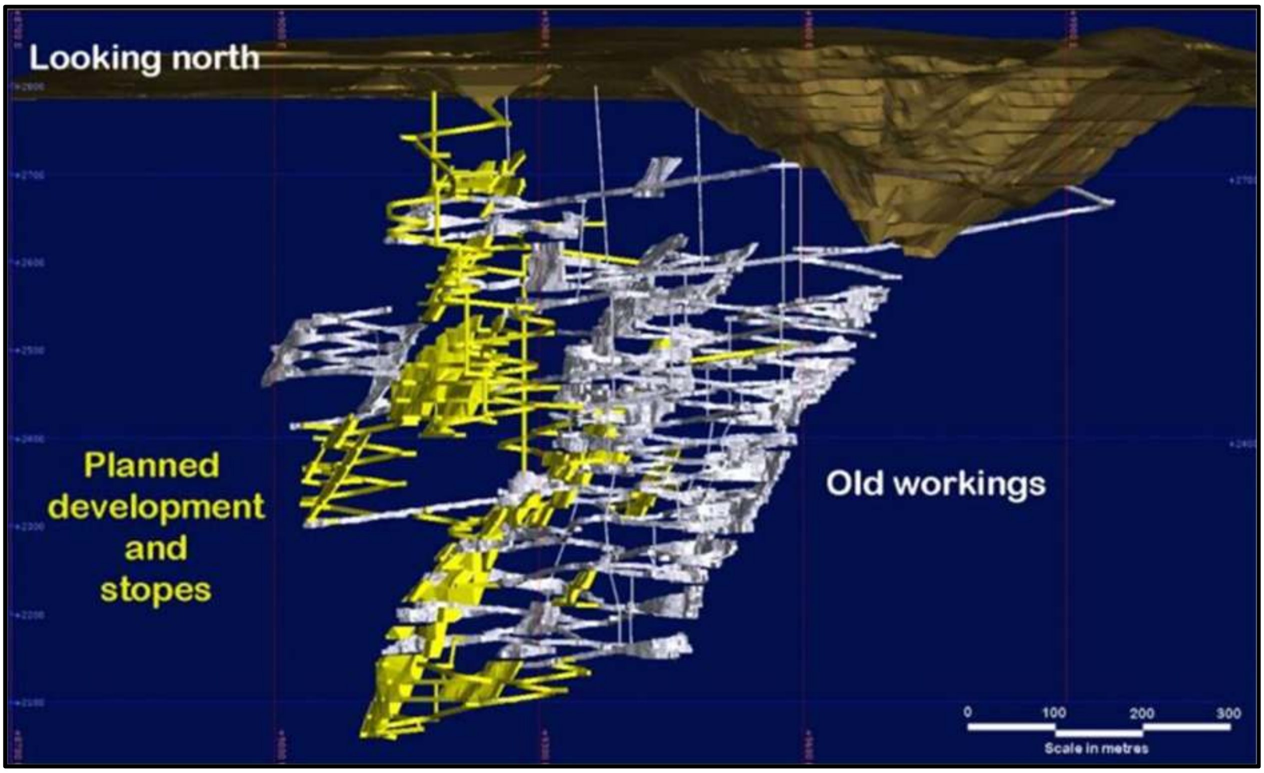
2.5 MINE PLAN

Key features of the underground mine are:

- A new mine decline from a box cut adjacent to the Bioreactor;
- Rehabilitation of existing workings involving installation of additional new ground support and to meet current geotechnical design standards;
- Development of new vertical and horizontal drives to access the ore lenses;
- Longhole stoping to extract ore; and
- Backfilling of stope voids with paste fill.

The vertical extent of existing and proposed stopes is shown in Figure 2.4. The north west dip of the orebodies results in increasing depth of the lenses beneath Evaporation Dam #1 (ED1). While there are some proposed stopes around 100m below the south east shore of ED1, beneath the floor of ED1 the proposed stopes are generally greater than 250m.

Figure 2.5 – Location of planned workings



2.6 EXISTING MINE WORKINGS

The existing workings for the Woodlawn mine primarily access A, B and C Lenses. The original mine was accessed by two declines from within the open cut with several shafts from within and external to the open pit. The decline portals have been plugged and all the shafts backfilled. Heron plans to develop a new decline system from surface to provide primary access into the mine. The new mine design, where practical, also aims to rehabilitate the existing mine workings to access the remaining Woodlawn orebodies.

The significant interactions between the old workings and the new mine development are:

- Dewatering of the old workings which will significantly improve stability of the open pit walls but may have a far field subsidence effect (discussed in Section 3.0);

- Rehabilitation of old mine declines, access drives and vertical development, which will generally improve the integrity of these areas to provide safe access for men and machinery; and
- Backfilling of any significant existing voids encountered. This will significantly improve local ground stability and will assist to prevent the collapse of any unfilled areas of the historic workings. This action will reduce the potential for localised subsidence effects associated with the historic workings.

Figure 2.5 shows the relative disposition of the planned mine workings compared to the existing development and stopes. The general focus of the mining operation is in the west and deeper areas where there will be less interaction with the historic mine workings. Planned stoping around the historic workings will provide around 25% of the underground production plan.

2.7 EXLUSION ZONE

The cooperation agreement with Veolia provides and exclusion zone of 200m from the surveyed limits of the open pit void. This limits the mining activity in this area to mine access, the rehabilitation of existing declines and drives and the backfilling of any significant voids that remain from the previous mining operation.

2.8 BOX CUT AND PORTAL

The location of the boxcut and portal are shown on Figure 2.3. This area was used by Veolia to progressively recover and use a dolerite stockpile for general construction activities within its operations.

Figure 2.3 also shows a plan view of the surface extent of the existing and planned future workings. This demonstrates the limited surface expression of the workings and the lack of natural features.

The box cut will be excavated by conventional open pit mining methods to a depth of approximately 35m below the original surface, removing a volume of approximately 184,000 m3 of material.

The box cut excavation is anticipated to take approximately three months to complete, with blasting to occur once per day between the hours of 9.00am to 5.00pm, Monday to Fridays. Blasting procedures and protocols are detailed in Herons Blast Management Plan.

2.9 ACCESS DEVELOPMENT

The mine design relies on the development of a new decline system with associated level drives, raises and shafts to provide access to the ore lenses. Additionally, some of the existing underground mine workings will also be rehabilitated and re-supported. The planned access development (known as first workings coal miming nomenclature) comprise the following items:

- Boxcut to provide a stable position to commence decline development;
- New decline and level development;
- New ventilation and escape way raises;
- New bulkheads to isolate the mine and landfill operations;
- Rehabilitated decline and level development; and

- Rehabilitated ventilation and escape way raises.

2.9.1 Decline and Level Development

New development and the rehabilitation of some of the existing decline will be used to provide access to stoping areas. The general layout of the new decline and level development is provided in Figure 2.5.

The new decline will initially intersect the existing workings at 2670mRL (approximately 130m below surface), and additional access points will be developed at depth. The existing decline system will be refurbished and used to access the other underground workings, including the ore reserves left after the mine closed in 1998. New decline and level development will be used to access new ore reserves identified by Heron.

Drive sizes vary depending on operational requirements, and Table 2.1 details typical planned size of access development.

Table 2.1 - Lateral Development Design Profiles

Description	Profile (mH x mW)
Decline	Arched 5.5 x 5.5
Level Accesses	Arched 5.5 x 5.0
Waste Drives	Arched 5.0 x 5.5
Ore Drives	Square 4.5 x 4.5
Ore Drive (Kate Lens)	Square 5.0 x 5.0
Return Air Access	Square 5.0 x 5.0
Egress Access	Square 5.0 x 5.0
Stockpiles	Square 5.0 x 5.0
Sump	Square 4.0 x 4.0
Return Airway Raise (vertical)	3 m diameter
Escapeway raise (sub vertical)	1.5 m diameter
Existing raises (refurbished)	2.4m diameter

2.9.2 Rehabilitation of Declines and Level Development

The mine plan includes the rehabilitation of areas of the existing workings. These workings are typically between 5 and 6 metres wide and of similar height. Rehabilitation involves the installation of surface support and rock reinforcement similar to that required for new development. While the present condition of the old workings is unknown, Heron anticipates that most of the workings will be in reasonable condition even though they have been abandoned since 1998. It is expected that the ground support will have corroded and require replacement. Ground support from this period no longer conforms to today's practices and regardless of condition will be replaced.

2.9.3 Vertical Development

The vertical development design includes:

- Exhaust ventilation raises to the surface from the lower sections of the declines, the typical size for the raises is planned to be 3 to 4m in diameter.
- Emergency egress system has also been designed at 1.8m diameter which will also be used as a fresh air intake.

2.9.4 Mine Bulkheads

The historic mine development consisted of two access declines from the open pit. The new mine plan includes the construction of bulkheads designed to permanently separate the bioreactor and the new mining operation.

A detailed construction methodology is currently being prepared as part of a detailed mine re-entry plan including the opportunity of remote installation of these bulkheads.

2.9.5 Ground Support Parameters

Geotechnical investigations covering the feasibility study and mine plan were undertaken by Beck Engineering which was based on both pre-existing mining knowledge and additional drilling data obtained since the mine closed. This work was expanded and refined by Heron Resources. A specific geotechnical drilling program was undertaken to determine mining conditions in new resource areas as well as anticipated decline and access development conditions. Significant historical information is available from the details records kept by the previous mine operator.

Specific testing was undertaken on each rock mass including Uniaxial Compressive Strength (UCS), Geological Strength Index (GSI), Density, Plastic Strain as well as several strength, cohesion and friction testing to accurately define rock behaviour, necessary support levels and potential overlying strata deformation characteristics. This data was used both in mine planning and assessment of the potential blasting impacts and subsidence on the Bioreactor.

In addition to rock mass units, several faults were identified which were also tested along with contact zones which interact with the planned mine workings. A summary of the results of this work is provided in Table 2.1 - Lateral Development Design Profiles

.

Table 2.2 - Rock Type Parameters

Domain	Code	Density (kg/m^3	UCS (MPa)	GSI
Felsic Volcanics	FVOL	2,700	75	55
Dolerite	DLRT	2,966	150	70
Massive Sulphide	MS	4,000	140	60
Black Shale	BSHALE	2,600	30	55
Talc-schist	TALCSCH	2,700	30	45
Weathered	WEATH	2,500	20	55
Northern Fault Zone	NFZ	2,700	75	45
544F Northern Fault Zone	544F	2,700	35	40
750 Fault Zone	750F	2,700	35	40
790/795 Fault Zone	790F-795F	2,700	35	40
430F South Fault	430F	2,700	35	40
433F E Central Fault	433F	2,700	35	40
580F No Name Fault	580F	2,700	35	40
751F	751F	2,700	35	40
760F	760F	2,700	20	30
Dolerite Contacts	DOLCONT	2,700	35	40

Rock reinforcement and surface support regimes have been designed on the expected rockmass conditions, and Table 2.3 sets out the expected ground support requirements for various development types. Once mining commences, these support regimes will be optimised to suit specific situations and conditions encountered.

Table 2.3 - Development Support Systems

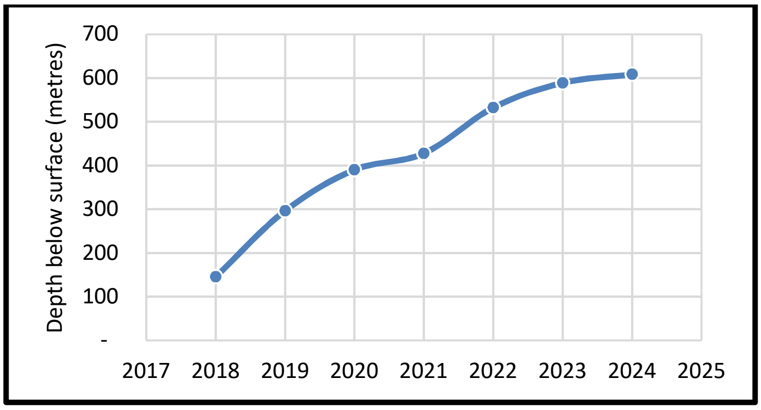
Drive Type	Conditions	Row Spacing (m)	Resin Bolts		Split Set	Mesh Sheets	Cable Bolts 6.0 m	Shotcrete	
			3.0m	2.4m				mm	m^2/m
Rehabilitation	Typical	1.5	3	4	4			75	14.6
	Adverse	1.23	5	6	4	7		75	14.6
Decline	Typical	1.23		7	2			75	13.4
	Adverse	1.23	3	6	4	6		75	13.4
Stockpiles and airways	Typical	1.23		5	4			75	12.8
	Adverse	1.23		9	4	6		50	12,8
Sumps	Typical	1.23		3	4			75	9.8
	Adverse	1.23		5	6	5		50	9.8
Level Accesses	Typical	1.23		6	4	9			
	Adverse	1.23		9	4	6		50	12.4
Ore Drives	Typical	1.23		7	6	6			
	Adverse	1.23		7	6	6		50	11.3
Ore Drives - Kate Lens	Typical	1.23		9	4	6			
	Adverse	1.23		9	6	6		50	12.8
Drift and Fill Development	Typical	0.93		6	7	6	1.25	50	12.8

The systems of support are designed to be serviceable for the life of the underground mine and maintain safe access into the mine for 5 to 10 years. All ground support systems degrade over time, and Heron plans to maintain a system to monitor performance and provide replacement ground support when required.

2.9.6 Mine Geometry and Depth

The geometry of the orebodies and subsequent mine workings are most significant in the mitigation of the potential for surface disturbance. The orebodies are steeply dipping at 60 to 70 degrees from horizontal. The resource has been partially exploited in the previous mining operation and the new mining areas are largely within the historic mine footprint, although focussed on the deeper resource. These factors mean that as the mine is redeveloped the depth of mining operations quickly increases. Figure 2.6 shows the average depth of mining in each year of operation. In 2018 the average depth of mining activity is 145m below the surface. In 2019 it is 300m below surface. Generally, the greater the depth of extraction the lower the potential impact on surface infrastructure.

Figure 2.6 - Annual depth of mining operations



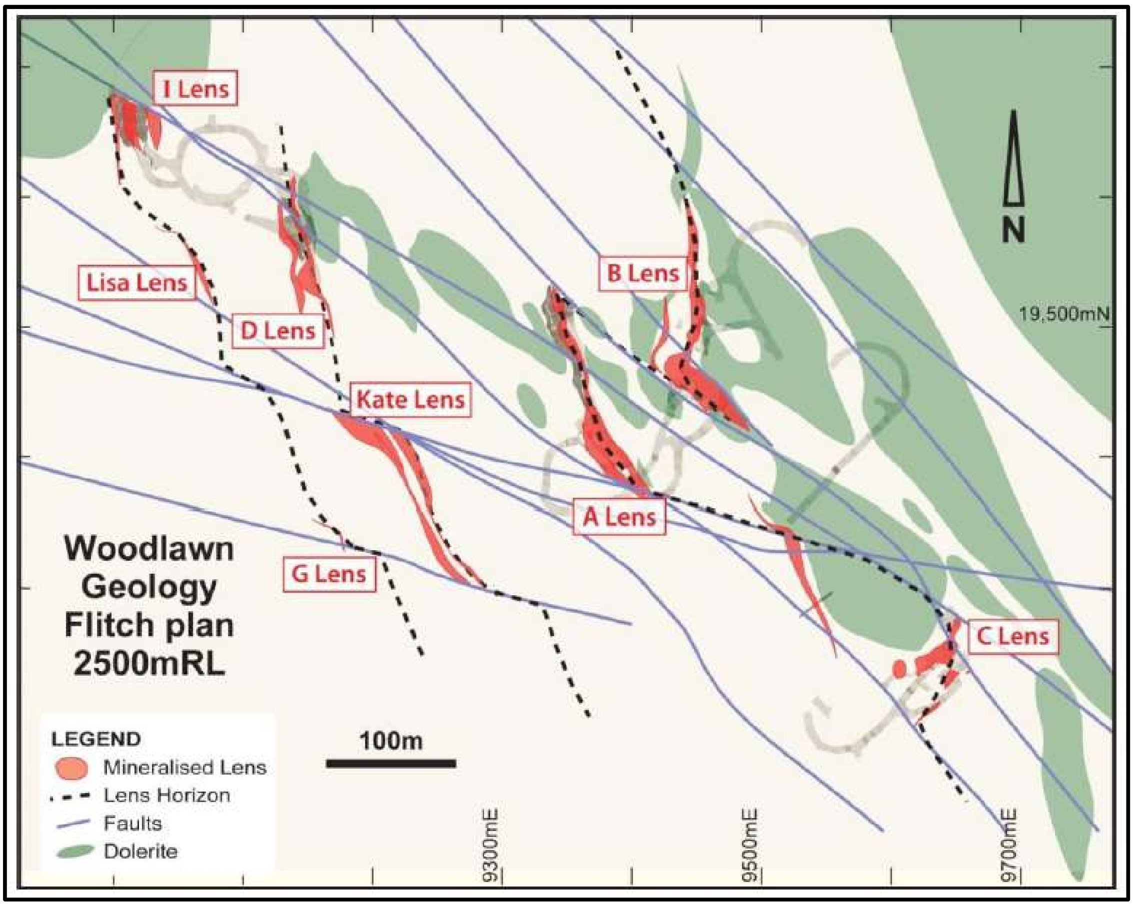
The other important aspect of steeply dipping orebodies is that it limits the overall footprint of potential surface disturbance as the vertical dimension is more important to resource tonnage.

2.9.7 Geotechnical Characteristics of Country Rock at the Woodlawn Mine

In general, the geotechnical description of the rock mass quality at Woodlawn typically are considered to range from fair to poor. There is a significant body of experience that was gain in mining at Woodlawn over a 20-year period from 1978 until 1998 and the stratigraphy and structural geology are well understood.

The country rock is typically felsic volcanics, dolerite and talc chlorite altered zones associated with the massive sulphide mineralisation. Figure 2.7 illustrates a typical plan view of the site geology, and the interaction between rock types and significant faults.

Figure 2.7 - Simplified Geology



Beck Engineering Pty Ltd (Beck) summarised the rockmass conditions in Table 2.4. These are based on Beck's evaluation of Heron's geotechnical logging data, previous logging and geotechnical assessments and the interpretation of conditions recorded on the mine plans and recounted by former Woodlawn staff.

Table 2.4: Summary of Rockmass Conditions (Beck)

Domain		**σ_c (MPa)**	***E* (GPa)**	***Q'***	**Description of rockmass quality**
Felsic volcanics in Kate Lens	Unfaulted	53	46	6.0	Fair
	Faulted	53	46	2.4	Poor
Felsic volcanics elsewhere	Unfaulted	53	46	4.0	Poor to Fair
	Faulted	53	46	2.0	Poor
Ore	Unfaulted	150 to 200	97	14	Good
	Faulted	50 to 100	97	4.5	Fair
Dolerite	Unfaulted	190	75	30	Good
	Faulted	190	75	2.0	Poor
Talc-chlorite altered zones	No geotechnical data is available for the talc-chlorite altered zones. The following assumptions can be applied: • Reduce σ_c by 50%. • Reduce *E* by 75%. • Reduce *Q'* by 75%.				

The data indicate that the host felsic volcanics is a poor to fair quality rockmass, except in the faults and where affected by talc-chlorite alteration. This is confirmed by the description of conditions and general ground support practices from previous Woodlawn staff, which give the overall impression of poor to fair conditions in the felsic volcanics.

Ground conditions in the faults and the talc-chlorite altered zones are certainly poorer. These conditions impacted on stope stability and were documented during the previous mining operation. Stope stability was compounded by the overhand cut and fill mining method utilised and certain operating practices.

The ore itself is a fair to good quality rockmass except in the faults and where affected by talc-chlorite alteration. The good quality of the ore is evident from the development mapping, which show some wide back spans (up to 18m) were not affected by faults or alteration.

2.9.8 Geological Structures and Characteristics

The Woodlawn deposit is transected by several major faults. The major faults are often associated with poor ground conditions, particularly where there is talc-chlorite alteration in A, B, C and J lenses. In these locations the footwall is most intensely altered.

The talc chlorite alteration associated with the major faulting was historically the most problematic ground to deal with. It is important to note that the historic underground mine predated the rigorous geotechnical systems, sophisticated ground support consumables and modern stoping techniques that Heron plan to implement. Falls of ground resulted in the abandonment of mining in a number of areas.

Figure 2.8 and Figure 2.9 illustrate some of the major faults that were encountered in the previous mining operation and exploration drilling.

Figure 2.8 - Perspective view showing northern fault zone

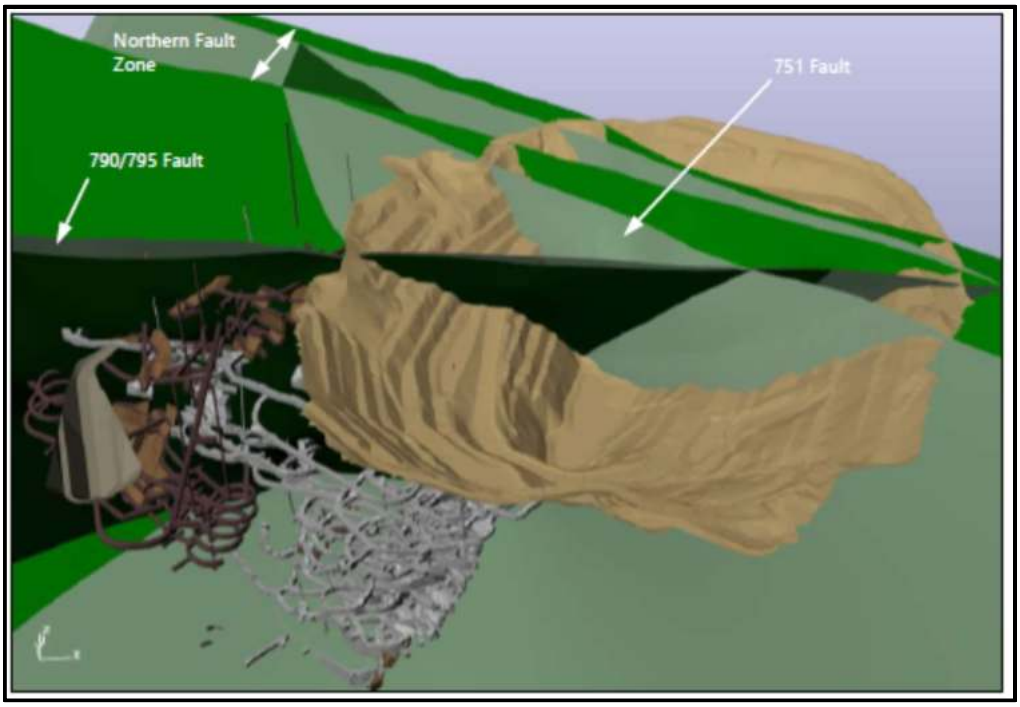
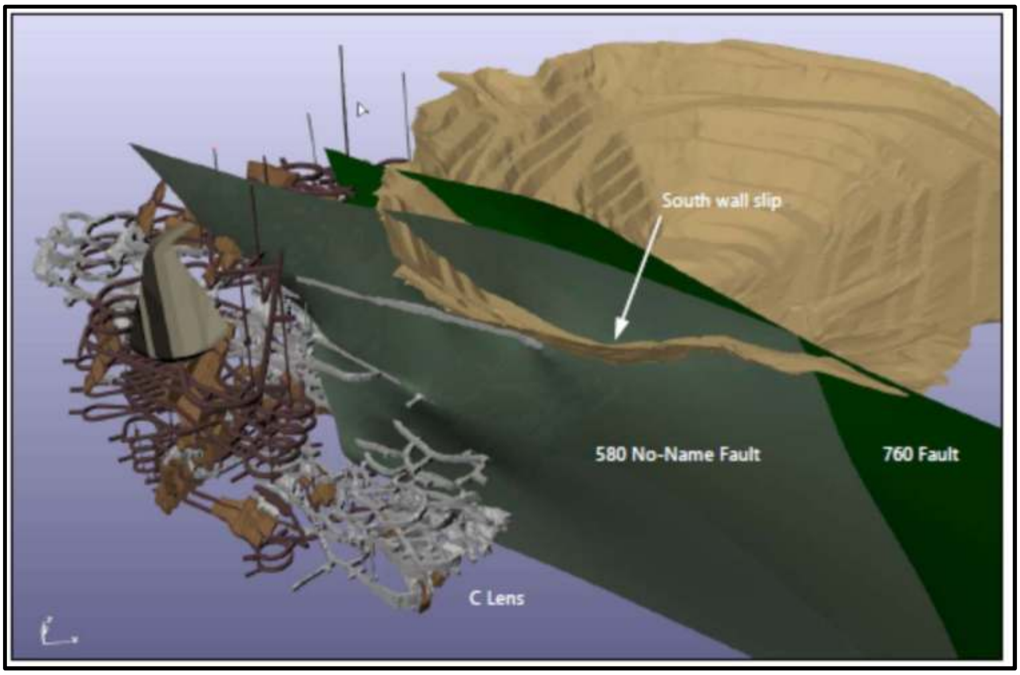


Figure 2.9 - Perspective view showing southern fault zone



The northern fault zone contains several structures, which are shown in Figure 2.8. Although this fault zone is certainly significant geologically, the available records indicate that conditions within the fault zone are not particularly adverse, except where associated with talc-chlorite alteration.

Figure 2.9 shows the general location of the 760 Fault. This fault, together with the 580 No-name Fault are responsible for the slip on the southern pit slope. The 760 Fault is discrete as mapped within the pit.

These represent the most significant faults, although others may be encountered within the new mine development.

2.10 EXTRACTION METHODS

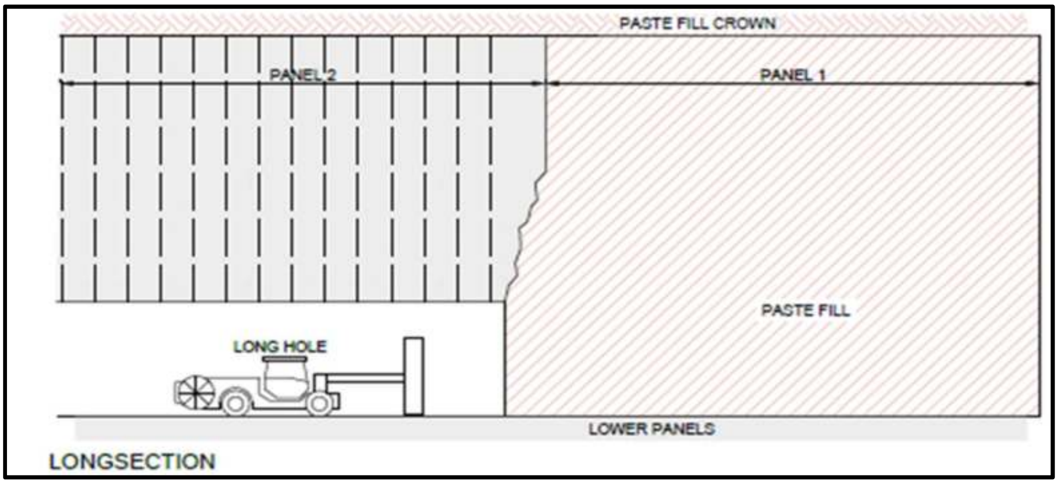
In hard rock mining, the extraction of ore is described as stoping, and the place this occurs is known as a stope. This is equivalent to the "second workings" in longwall coal mining nomenclature.

Typically, the lenses are steeply dipping, and primary access consists of decline ramps from which lateral drives are developed into the ore lenses. Once access development is completed the ore is mined, primarily using longhole stoping techniques.

Longhole stoping involves the drilling of a series of holes up to 25 metres in length in a ring pattern. These holes are then fired with explosives to break the ore. Remotely controlled loaders then remove the broken ore, which is loaded into 50 tonne capacity trucks and hauled to surface.

The planned extraction is intended to be mined "underhand". This means that the stopes are mined below previously mined stopes that have been backfilled with an engineered material consisting of the tailings from ore processing combined with cement and fly ash (or a similar pozzolanic material). A generalised stope cross section is provided in Figure 2.10.

Figure 2.10 - Underhand Open Stoping Mining Method



The use of the tailings stream requires dewatering of the tailings to produce a "paste". The binder is then added to the paste in sufficient quantity to achieve the required strength and cohesion parameters. The engineered nature of paste fill makes the stoping operations more reliable and systematic, with the size of open voids controlled to ensure stability and safety.

The use of cemented paste fill offers many of advantages in the extraction sequence:

- Maximises the volume of ore extracted as stopes are always buttressed by cemented paste fill;
- Allows an optimal approach to managing induced stress around mined areas;
- Provides a homogeneous stope back (roof) that behaves more predictably as the ore is excavated;
- allows the size of open voids to be managed and optimised; and
- all stopes are completely backfilled prior to mine closure, which in turn limits the magnitude of ground movement adjacent to the stope.

Stopes will be typically 20m high, between 10 and 20m along strike and the width of the orebody (4 to +/- 20m).

The production cycle for a typical stope is typically:

- Mine ore drives at regular level spacing (20m).
- Mine top level stopes on retreat sequence (toward access) placing paste fill in each stope.
- Mine stopes in level below when paste has had adequate curing time.
- Continue sequence for each level below.

The implementation of this system may allow mining simultaneously over several levels with stopes sequenced in-echelon.

2.10.1 Stope Design

The stope design process uses rock quality data and geological mapping to predict the rock strength and structural influences for every stope design. The underlying premise in the process is to maintain the stope in a stable condition over the active life of the stope. This allows the safe and efficient extraction of ore and reduces the impact of dilution which can impact on the profitability of mining and processing ore from a given stope. The modelling of these key parameters allows the calculation of a hydraulic radius for each surface (hangingwall, footwall and backs) of a stope with a probabilistic approach to managing the stability of the stope. Table 2.5 summarises the hydraulic radius used for stope design in the Woodlawn Feasibility Study. These parameters are likely to be conservative and will be optimised with the experience gained in every new stope and the conditions encountered.

Table 2.5 – Feasibility study stope design parameters

Area		Design rH	Indicative ELOS	
			HW	FW
A, B, C and J lenses (indicated resources)	Talc-chlorite altered zones	~3.0m	1.0m	0.5m
	Faulted zones	~3.5m	1.0m	0.5m
	Other remnants (except faults & altered zones)	~3.5m	1.0m	0.5m
	Extensions (except faults & altered zones)	~5.0m	0.5m	0.25m
D Lens (indicated resources)		6.0m	0.5m	0.25m
Upper E Lens (indicated resources)	<15m from 790 and 795 faults	3.5m	1.0m	0.5m
	>15m from 790 and 795 faults	6.0m	0.5m	0.25m
G Lens (indicated resources)		3.5m	1.0m	0.5m
H Lens (indicated resources)		3.5m	1.0m	0.5m
Kate Lens (indicated resources)	<15m from 790 and 795 faults	3.5m	1.0m	0.5m
	>15m from 790 and 795 faults	6.0m	0.5m	0.25m
Inferred resources in D & I lenses	<15m from major faults	~3.5m	1.0m	0.5m
	>15m from major faults	~5.0m	0.5m	0.25m

3.0 SUBSIDENCE

Subsidence refers to the movement of the surface at any one point and can be described as vertical displacement, tilt, tensile and compressive strain and curvature. Vertical movement is generally expressed in units of millimetres. Tilt is the change in the slope of the ground as a result of differential subsidence and is calculated as the change in subsidence between two points divided by the distance between these points. Tilt is usually expressed as millimetres per metre.

Curvature is the change in tilt between two adjacent sections of the tilt profile and provides the rate of change in tilt. It is expressed as the inverse of the radius of curvature in kilometres. Strain is the relative differential horizontal movements of the ground and is calculated by the horizontal distance between them. Strain can be expressed as compressive which is where the distance between the points decreases or tensile strain where the distance between the two points increases. Strain is usually described as millimetres per metre.

These parameters have been developed largely to describe underground longwall mining and the norm is to develop models which show incremental changes over multiple longwall panels. The Woodlawn mine design does not lend itself to this form of subsidence calculations. This is because the surface extent of the proposed new workings are relatively small individual excavations, and the workings deeper compared to longwall mining.

Another differentiating factor at Woodlawn is that surface deformation does not occur due to the strata caving as is the case with longwall coal mining. The stopes dimensions are maintained to ensure short term stability and once ore has been extracted the stope is completely backfilled which provides permanent stability. While deformation of the rockmass around the stoped areas will occur, the deformation is constrained by the compressibility of the backfill.

It is expected that due to the geometry and the mining methods planned to be employed at Woodlawn, the deformations associated with ore extraction will be relatively minor. Subsidence effects are more likely to be a result of the far field effects of mine dewatering.

The dewatering of the historic mine workings is necessary to access the orebodies. As the workings are progressively dewatered, the surrounding water table will be drawn down in a cone of depression that will progressively increase in area as the mine is dewatered. The cone of groundwater depression may extend outside the plan footprint of the mine workings.

The extraction of groundwater can result in the compaction of the aquifers within the area of influence around the mining operation, which may be outside the plan surface footprint of the mine workings. These are referred to far field subsidence effects.

3.1 SUBSIDENCE AREA DEFINITION

The underground mining area is shown on Figure 2.3. The area of influence of potential subsidence includes the Bioreactor and extends west to include the areas covered by ED3 and ED1. All land above the existing and proposed underground mine workings are fully contained within the mine site and the Veolia Bioreactor facility.

Figure 3.1 illustrates the entire mine site, with the proposed plant site and TSF 4 shown in the foreground, and older TSF, evaporation ponds and bioreactor clearly identified.

Figure 3.1 – Site Layout look to the south southwest

3.2 SUBSIDENCE PREDICTIONS

Subsidence predictions were made for the area covering the open pit and the evaporation ponds by Beck Engineering for the Woodlawn underground feasibility study (Beck Engineering, 2017).

The forecast displacements magnitudes, denoted by U_{max} in Figure 3.2, were estimated to be up to a maximum of 130mm directly above the underground workings. The estimated displacement over greater area of ED1 was no more than 50mm. This forecast deformation field is a mostly far-field response to dewatering associated with underground mining, with less effect due to the planned mining excavations themselves. The forecast displacements were conservatively high and in practice lower displacement magnitudes would be expected.

It is anticipated that actual subsidence levels caused by extraction of ore would be less than effectively measurable. This is largely a result of natural variations caused by daily and seasonal temperature variations and mine dewatering.

It is essential to recognise that ED1 has already experienced minor deformation associated with previous underground mining and that future underground mining will induce similar levels of deformation. It is therefore expected that the surface impacts of future underground mining will be similar to the effects of previous underground mining which are also comparable to natural variations.

Figure 3.2 - Deformation Modelling

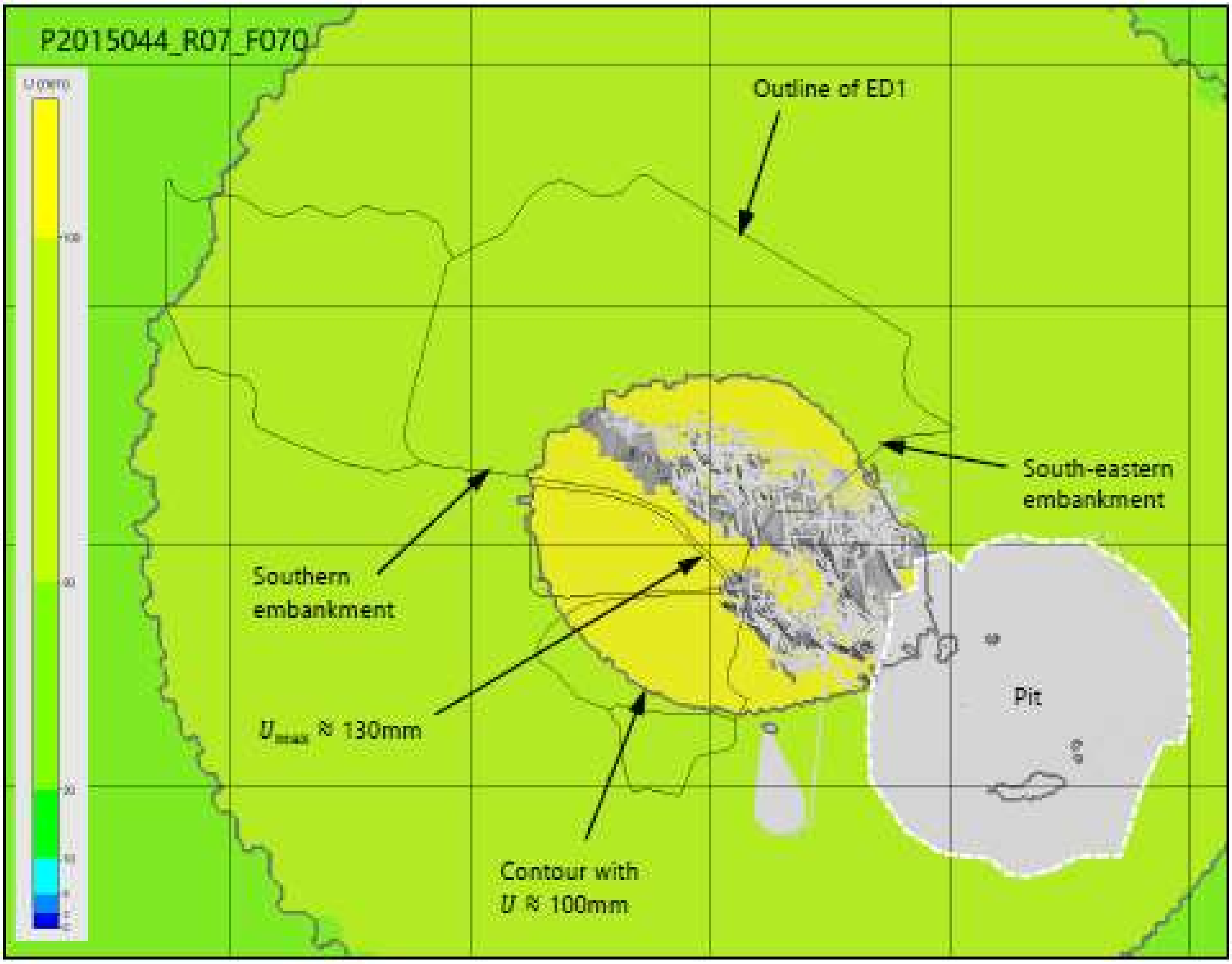


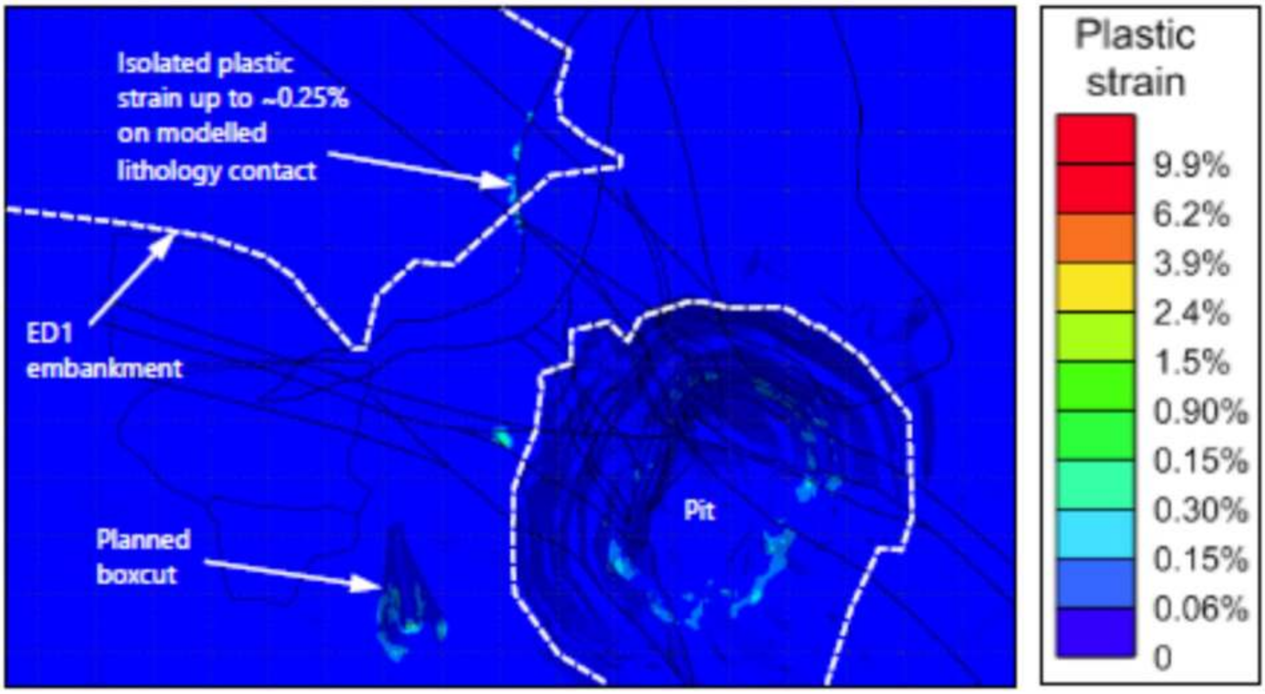
Figure 3.3 shows modelled plastic strain associated with future underground mining. This shows small localised additional strains of ~0.25% near ED1. This strain is associated with modelled lithology contact.

For the open pit the results also show that the risks are low. At the end of underground mining (in 2024), forecast stoping induced displacement magnitudes in the pit slopes are less than about 100mm, even for the weak case. The forecast deformation is a mainly elastic response to underground mining, dewatering and filling the Bioreactor, with a dominant vertical downwards component. In terms of slope stability, 100mm of movement over a slope of this size is not considered to be critical or problematic.

It was concluded that the mining plan, with control measures in place, is sound as far as management of induced deformation of the pit is concerned. The induced deformation is unlikely to lead to slope instability at any relevant scale and the proposed control measures would be effective in ensuring unexpected adverse outcomes are identified before they grow to unacceptable levels.

Additionally, the stability of the open pit slopes will significantly benefit from the dewatering of the underground mine.

Figure 3.3 – Plan of forecast incremental damage associated with future underground mining



3.3 MECHANICS OF POTENTIAL SUBSIDENCE

There are three potential mechanisms for potential subsidence for the proposed Woodlawn underground mining operation, relating to mine dewatering, subsidence resulting from ore extraction and localized subsidence resulting from stope collapse combined with a "chimney" failure.

3.3.1 Mine Dewatering

Establishment of the underground mining operation requires the dewatering of the historic mine workings. Heron has estimated that approximately 1.4 million cubic metres will be pumped from the mine during the dewatering of the historic workings. Historically, the underground mine was described as dry, and groundwater inflows are expected to be less the 345 cubic metres per day.

The subsidence prediction completed by Beck suggested that the far field effects of mine dewatering may have the greatest effect on subsidence in the area adjacent the proposed underground workings.

3.3.2 Subsidence relating to ore extraction

As discussed previously, the subsidence predicted from the extraction of ore at the Woodlawn mine is mitigated by the backfilling of stope voids with paste fill. This will have the effect of confining, but not eliminating deformation and the potential for subsidence at surface.

It is important to note that no significant subsidence effects were documented during or since the extraction that occurred throughout historic mining operations, despite the existence of stope voids that were not backfilled prior to the closure of the mine.

3.3.3 Chimney Failure

The third mechanism for potential subsidence is localised in the area of impact and has not been modelled. A chimney failure can only occur during the catastrophic failure of the rockmass above a stope void and requires the presence of a geological structure combined with a weak rockmass to propagate. Under the right conditions the chimney can continue to propagate until the original void has been filled by the collapsing material.

While the conditions for a chimney failure are known to exist in some areas with many pervasive faults and the presence of talc-chlorite rocks documented in drilling data and geological mapping of development drives in the historic operation. This type of localised failure did occur during the historic operation but did not propagated to the surface.

The stope design process that Heron plans to implement will include geological mapping of the rockmass and detailed analysis to provide the critical stope design parameters. Also, the systematic use of paste fill is a significant mitigating element in the proposed stoping methods.

4.0 IDENTIFICATION OF SURFACE FEATURES

The underground extraction will extend sub vertically to a depth of approximately 700 m below the level of the natural surface. The mine plan does not extend beyond the site boundaries and is completely within the boundaries of SML20. The surface area beneath which underground mining activity occurs covers a total of 25 hectares and is shown in Figure 2.3. This section describes the existing site features for the purposes of impact assessment

4.1 SURFACE FEATURES POTENTIALLY IMPACTED

4.1.1 Natural Features

There are no natural features remaining above the mine area. All areas are disturbed by a long history of mining related activities and the subsequent operation of Veolia's bioreactor.

4.1.2 Built Features

Built features above the mine workings were originally constructed as part of the mining operation although some are now utilised by Veolia as part of the Bioreactor. An inventory of items located above the mine workings are listed below and shown on Figure 3.1.

- The original open cut void now used as a landfill and Bioreactor.
- Evaporation Dam 1.
- Evaporation Dam 3.
- Access roads between the Bioreactor and evaporation dams.

The existing and future underground workings do not extend beyond the current disturbed site and infrastructure. No privately-owned property will be impacted by existing or proposed workings (other than owned by Heron and Veolia).

Evaporation Dams

As a non-discharge site, evaporation dams were constructed at Woodlawn to manage the volumes of water used underground and in processing the ore in addition as a buffer to rainfall events. Three dams remain on site, covering an area of approximately 100ha.

Figure 4.1 - Evaporation Dam 1

The volume of water stored in the evaporation dams fluctuate according to rainfall but as they have been designed to store excess water from the mining operation which has not occurred since 1998, the dams' water levels have remained relatively low. ED3 forms part of the water management system for the Bioreactor facility and is not used by Heron. The remaining two evaporation dams, ED1 and ED2, will be used for the ongoing mining operation.

ED1 was constructed in 1987 to increase the Woodlawn Mine's capacity to manage the site water balance and as necessary evaporate excess water. It was used for that purpose until the mine ceased operations and capping of the spoil piles was completed in the late 1990s. ED1 has a capacity of approximately 1,347 megalitres (ML).

ED2 was constructed in mid-1989 to increase the mine's capacity to evaporate site water runoff. It was used for that purpose until the mine ceased operations and capping of the waste emplacements was completed in the late 1990s. ED2 has a capacity of approximately 846 ML.

ED1 and ED2 are Prescribed Dams under the Dams Safety Act. Both dams have been the subject of formal surveillance reporting since 1997 with the most recent report being completed in June 2015.

Notification Plans showing mining of the tailings dams and underground mining areas were lodged with the Dam Safety Committee (DSC) in April 2017 following the DSC endorsement of both the underground mining and hydraulic mining at Woodlawn on 5 April 2017. Liaison with the DSC will continue as required during the mining operations.

The management of these dams will require the systematic surveying and monitoring for any subsidence effects, particularly the northern embankment of ED1. Heron will establish suitable monitoring regimes and will seek expert advice from an independent dam engineer.

Old Pit Void (Bioreactor)

A large void with a volume of 25 million cubic meters was formed during open cut mining operations between 1978 and 1987. This void is now operated by Veolia as a bioreactor and accepts around 20% of the putrescible waste generated in Sydney, as shown in Figure 4.2. The gas harvested in is operation generates up to 7MW of electrical power.

The original underground workings were accessed from the open pit and lie beneath the west wall. Prior to the commencement of Veolia's operations, the decline portals were backfilled, and concrete bulkheads were constructed inside each decline. These portals have since been covered beneath the surface of the bioreactor.

Figure 4.2 - Open Cut Mine Void Operated by Veolia as a Bioreactor (looking south)

Systematic measurements of blast vibration and surveying of pit slopes will be undertaken by Heron to monitor the effects of the proposed underground mining operation. These responsibilities are set out in the Cooperation Deed between Veolia and Heron, and other documentation.

4.2 SURFACE FEATURES NOT IMPACTED

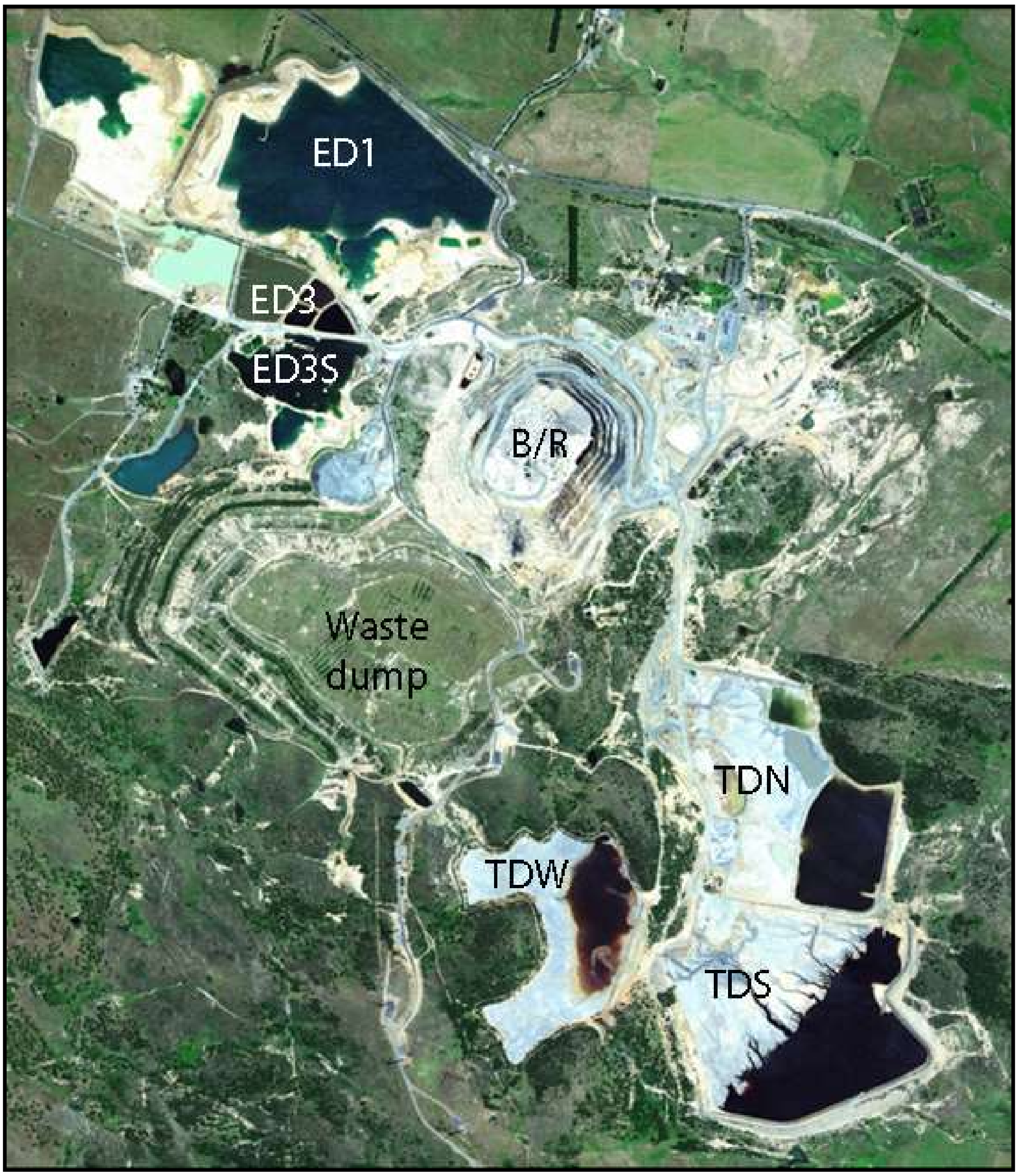
The key issues in relation to the proposed mining operation will be to ensure the integrity of the Bioreactor and dam structures on site. To achieve this, the extraction method will incorporate cemented paste backfill of existing and new voids rather than the previous method of using loose fill.

The existing and future underground workings do not underlie any land outside the existing disturbed footprint of the mine site. There are no aspects of the biophysical environment remaining above the mine workings and no public infrastructure or cultural heritage items will be impacted.

4.2.1 Surrounding Features

The Woodlawn site previously operated as the Woodlawn Mine, producing copper, lead and zinc concentrate for twenty years. Most of the site currently remains in a disturbed condition because of the previous mining activities. The site consists of the main elements described in the following sections.

Figure 4.3 – Aerial photo of total site



4.2.2 Tailings Dams

Tailings are the finely ground and saturated waste material created from the processing of the ore. The mine site contains three tailings dams (North, South and West), with a combined total of 11.65 Mt of tailings, covering an area of over 110 hectares (ha) (92 ha of tailings surface area) as shown in Figure 4.3.

Figure 4.4 - Tailings Dam South

Woodlawn tailings are reactive and oxidised producing an acid environment. In an acid environment, the high metal content of the tailings is released resulting in a hostile environment for plant growth. Although the tailings remain fully contained within purpose-built impoundments designed for long term storage, oxidation reactions will continue while the tailings surface is exposed to the atmosphere. Therefore, a simple surface treatment such as undertaken on the Hickory's Paddock or the main Waste Rock Dump will be unlikely to provide a long-term rehabilitation solution without isolation of the surface growing medium from the underlying tailings or sulphide ore.

The original tailings impoundment, Tailings Dam North (TDN) was constructed in 1979. The early presence of water over the tailings resulted in the formation of steep slopes below water level preventing tailings from spreading to the centre of the dam, thus limiting the expected in situ bulk density. As a result, earth fill embankments within the basin were constructed.

Tailings Dam South (TDS), shown on Figure 4.4 above, was commissioned in August 1980 initially as a water storage pond, with a capacity of 2.39 Million m^3 providing for over 4 years of additional tailings capacity. There were two additional lifts added in 1985 and 1988 to increase the storage capacity.

Tailings Dam West (TDW), shown on Figure 4.5, was constructed in a single stage in 1990 after underground operations began. The dam contains an upstream impermeable plastic membrane.

Figure 4.5 - West Tailings Dam

All three tailings dams remain un-rehabilitated and will be subject to retreatment as part of the Heron Project. The existing and future underground workings do not lie beneath these structures.

4.2.3 Original Plant Area/Loadout Facility

This area lies within Veolia's Area of Operations and is not part of Heron's project or operating area. The area previously contained all the grinding and processing plant areas, workshops and the concentrate loadout facilities for the previous mining operation and covers an area of approximately 30ha. All the plant and equipment contained in this area were sold at auction in October 1998 and have now been removed from the site. The existing and future underground workings do not lie beneath this area.

4.2.4 Hickory's Paddock

Hickory's Paddock is located east of the plant area and covers an area of approximately 30ha. Historically, the paddock has exhibited various degrees of soil degradation and scalding as a result of the previous mining and processing operations as well as general ore body effects from the original surface outcrop. Denehurst, while still operating the mine, carried out bio solids application on the Hickory's Paddock with some success. However, the paddock will now be redeveloped to house the new infrastructure and separate access road to the site. No further rehabilitation works are proposed until all mining has ceased and the new infrastructure developed by Heron has been removed.

The Hickory's Paddock site will be used for the new processing facility and is not located in an area of existing or propose future underground mining.

Figure 4.6 - Hickory's Paddock

4.2.5 Rehabilitated Waste Rock Emplacement

The waste rock emplacement covers an area of approximately 92ha and contains 70Mt of waste rock material extracted from the open cut. The dump has been fully rehabilitated using a compacted clay seal to eliminate water infiltration and then revegetated. Bio solids were successfully applied to the rehabilitated waste rock emplacement in 1998 as part of the rehabilitation program which was successful.

Acid water management continues and is the responsibility of Heron as well as ongoing vegetation management of the emplacement. At present, acid water is pumped from a collection dam (the Rehabilitated Waste Rock Dam; Figure 4.7) into ED 1 on an as required basis. A permanent self-sustaining acid water collection and disposal system will be developed by Heron.

The vegetation cover over the Rehabilitated Waste Rock Dump has survived severe drought conditions in the recent past and on this basis should respond well with minor fertiliser treatment and improved rainfall. Monitoring and assessment of the vegetation is planned as part of the ongoing rehabilitation monitoring program.

A small portion of the northern side of the Rehabilitated Waste Rock Emplacement lies above the proposed new decline. No ore extraction or stoping will occur in this area and the main decline has been designed to be permanently stable.

Figure 4.7 - Runoff Dam at Base of Rehabilitated Waste Rock Dump

During 2007 and 2008, trials into slope stabilisation were carried out and investigations into suitable practices were explored with a combination of practices adopted. Soil Co Pty Ltd was commissioned to spread a compost material that is beneficial to erosion management and organics to small areas of identified erosion.

Along with a pasture mix, lime was added to neutralise pH. A compost/seed mix, which incorporated a tackifier to lock the compost particles and provide a growing medium for the seed, was spread on the steeper slopes of the waste rock dump. The stabilisation of the susceptible areas has shown that the erosion control measures are beneficial to this area.

4.2.6 Other Disturbed Areas

Other disturbed areas within Heron's area of control include the previous tailings re-treatment area, stockpiles, drainage lines and borrow pits. Some of this material will be used for fill and general construction purposes during the establishment of the new processing plant as well as within the rehabilitation program for the tailings dams once completed. Any remaining material will be shaped and rehabilitated in situ. Borrow areas will be kept to a minimum, with most of clay being sourced from the plant and tails dam area footprint.

It is the intention to use bio solids or compost produced by Veolia as a surface treatment for other nominated disturbed areas around the mine site. There is however the potential to use other organic materials for subsurface treatments to reduce acid generation based on the outcome of the trials. These areas will include the Evaporation Dams, the remaining section of the Hickory's Paddock and Waste Rock Emplacement.

4.3 PREDICTION METHODS

Deformation effects were evaluated using a mine-scale 3D finite element model that included all existing and planned underground excavations, the open pit and the complete geological and structural models that were available at the time of the modelling (January 2016). Beck Engineering applied a strain-softening dilatant material model for the rockmass and structures and hydromechanical coupling to capture pore water pressure effects. The model constitutive assumptions govern how stress, strain and pore water pressure interactions evolve over time in the simulation.

The finite element model was solved by the commercially available Abaqus Explicit solver software. The solution to the governing numerical equations provided an estimate of the magnitude of stress, strain and pore water pressure.

To bracket expected outcomes for risk assessment purposes, an average set and a weak set of material properties were used. The weak case permits appreciation of outcomes with a lower probability, so that the effectiveness of our control measures can be evaluated, and guides the trigger and response plan, while the average case can be used for base-case planning.

4.4 SUBSIDENCE IMPACTS AND ENVIRONMENTAL CONSEQUENCES

The area of influence of the predicted subsidence is within the footprint of the existing mine. The magnitude of subsidence is predicted to be like that experience in the previous underground mining operation. The predicted subsidence is not anticipated to have any significant impact on surface infrastructure, which is supported by the history of mining at the site. The predictions are conservative and relate to minor modelled movement resulting largely from groundwater dewatering. The proposed mining methods are design for geotechnical stability and all extraction voids will backfilled with paste to provide permanent stability.

The environmental consequences associated with the mine are expected to be consistent with those presented in the Environmental Assessment. Therefore, a detailed review of environmental consequences has not been conducted for this Extraction Plan.

4.5 SUBSIDENCE MANAGEMENT AND PROTECTION

Heron plans to adopt the observational approach to the design and operation of the Woodlawn underground mine. This is a key control measure for managing the impacts of underground mining. The observational method for geotechnical risk management involves progressing from a conservative starting position, under the control of measurements and observations designed to test and refine the design assumptions and further characterise the risk. If a forecast tolerance is exceeded, an unexpected event occurs, or an unexpected geotechnical feature is encountered, then the plan is modified, according to the actual conditions, to maintain an acceptable risk profile. This approach is firmly embedded and widely accepted in worldwide geotechnical practice.

To manage the risk associated with stope collapse and chimneying of the failure:

- Heron plans to use underhand stoping with cemented paste fill for most of the future stopes. This method reduces the potential for stope collapse and chimneying because stoping proceeds below an engineered material (paste fill).

- Design of stopes to dimensions that are likely to remain stable. Stopes would be designed according to the actual ground conditions and site-specific experience accumulated to that date.
- Contingency plans to rapidly fill any stope that does exhibit geotechnical instability.

A further measure of protection is provided by Heron's monitoring program, which will comprise:

- Continuing inspections of surface infrastructure and routine surveillance inspections. These would cover the same points as the surveillance report required by the NSW Dam Safety Committee and would reduce the surveillance interval to 15 months.
- Additional monthly inspections when the water level of ED1 is within 0.3m of the minimum freeboard.
- Periodic surveys to measure deformation of the ED1 embankment.
- Blast vibration monitoring at the ED1 embankment.
- Monitoring of stopes to identify geotechnical instability if it does occur. This monitoring would include visual assessments of underground operators, supervisors and technical staff, and remote void surveys using laser scanners. These are routine activities in underground mines.
- Continue pit slope monitoring, including periodic visual inspections, prism surveys and water pressure measurements.
- Undertake periodic reviews of pit performance by suitably experienced engineers with a good understanding of potential interactions between pits and underground mines.

5.0 SUMMARY ASSESSMENT

The underground mine plan does not extend outside land owned by the operation. The proposed underground mining method has incorporated additional subsidence controls and protection methods that will reinforce the existing mine accesses and increase the stability of the mine workings.

The mine plan also includes an exclusion zone around the existing open cut to further mitigate against any potential connectivity that could result in increased water, leachate or gas flows into the underground mine or other impacts to the surface infrastructure as a result of underground mining. Heron will be undertaking some works within the exclusion zone with the agreement of Veolia. These works will be designed to improve long term stability. The existing mine void liner coupled with additional bulkhead construction will provide a robust barrier against future leakage.

Ongoing investigations and monitoring will be undertaken throughout the life of the mine, to assess and mitigate against potential underground mining impacts as necessary. As described in this Extraction Plan, the use of tight fill in underground extraction areas will remove the potential for surface subsidence to occur.

5.1 Key Environmental Aspects - Impact Minimisation and Management

A summary of the subsidence management controls and implications is provided in Table 5.1.

Table 5.1: Subsidence Impacts and Minimisation Summary

Aspect	Impact Minimisation and Management
Cliffs and Natural topographic features	There are no cliffs or natural topographic features within the underground mine plan
Natural steep slopes	No natural steep slopes occur within the mining area
Swamps and natural water bodies	No natural swamps or other natural water bodies exist within the mine plan
Natural creeks and waterways	No natural creeks or waterways exist above the proposed underground workings
Permanent flowing creeks	No mining occurs beneath Crisps Creek
Ecological sensitive areas	No mining occurs beneath any natural vegetation community
Aboriginal Places and Sites	No mining occurs beneath or near any known Aboriginal Places or sites
Public Roads and Infrastructure	Mine plan does not extend beneath Collector Road
Private property and residences	Mine plan does not extend beneath privately owned land or residential dwellings
Infigen owned wind turbines	Mine plan does not extend beneath any infrastructure owned or operated by Infigen
Bioreactor facility	Subsidence protection measures will be employed to avoid impacts on the Bioreactor
Leachate inflow to mine workings	Identification and sealing of leakage points. Groundwater monitoring to include leachate detection
Evaporation Dams	Subsidence predictions indicate that no measurable surface movement will occur
Mechanical Biological Treatment Plant	Subsidence predictions indicate that no measurable surface movement will occur
Internal roads and hardstand	Subsidence predictions indicate that no measurable surface movement will occur

5.2 Environmental Monitoring

Heron Resources has developed an environmental monitoring program covering both the construction and operational phases. The monitoring program covers air quality, surface water, groundwater and subsidence. Monitoring activities relevant to underground mining and subsidence will include:

- Survey control GPS monitoring stations located at each evaporation dam wall. Data collected quarterly commencing one month before stope development.
- Survey control GPS monitoring stations located within the Bioreactor in consultation with Veolia. Data collected quarterly commencing one month before stope development.
- Groundwater monitoring around each evaporation dam with samples collected quarterly. Samples analysed for leachate indicators including Ammonia and Total Organic Carbon.
- Monitoring of water inflows into the mine workings to determine source.

Environmental inspections of the surface features above the underground mining area will occur monthly. The inspections will report on any detected ground movement, deformation or surface cracking. Any indicators of surface movement will be investigated. Normal reporting requirements for underground mining activities will occur. These will include:

- Records of extraction tonnage;
- Monthly survey of development and stopes;
- Records of paste fill activities, areas and volumes;
- Records of all unplanned movements including rock mass, footwall and hanging wall stability;
- Records of roadway stability including bolting and meshing activities.

All surface and underground inspections will be recorded and remedial action with responsibilities and timeframes noted.

6.0 BIBLIOGRAPHY

Evaluation of Potential Mining Impacts on Evaporation Dam 1 at Woodlawn, Beck Engineering Pty Ltd, 23 January 2017;

Feasibility Study (Technical Report (NI43-101) Feasibility Study for the Woodlawn Project, New South Wales, Australia. SRK Consulting (Australasia) Pty Ltd, 19 July 2016;

Environmental Assessment dated April 2012 and associated documentation prepared to support the application for Project approval;

Project Approval 07_0143 (granted under Section 75J Environmental Planning & Assessment Act 1979, 4 July 2013);

Modification to Project Approval (07_0143MOD1, 22 April 2016);

Mining Operations Plan (August 2015);

Veolia Cooperation Agreement (29 March 2017);

EPL 20821 (29 March 2017);

Heron's Safety Management Plan (SMP).

Appendix 5 DSNSW Approval to Mine Monitoring Plan

DEVELOP

DSNSW approval to mine management plan

Woodlawn Copper Zinc Project

Document Review/Change History

Date	Review Change Summary Created, Reviewed, Changed or Obsolete	Revision No.	Authors	
			Reviewed by	Approved by
31/07/2024	Document created in preparation for recommencing mining	1	KC	KC
25/08/2025	Document updated with modified conditions, extended approval and to acknowledge Woodlawn-3	2	KC	KC

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Figures

Appendices

1. INTRODUCTION

1.1. Background

The Woodlawn Copper-Zinc mine (the Project) is located approximately 7 km northwest of Tarago in New South Wales (NSW). The original Woodlawn mine operated from 1978 to 1998 and processed 13.8Mt of ore from the Woodlawn open pit, underground and minor satellite deposits. Veolia subsequently acquired the site and now operates the putrescible waste landfill in the former open cut void, referred to as the Bioreactor. Landfill operations began in 2004.

Work was done by numerous companies to complete further mining within the existing mining lease area which culminated in Heron Resources securing Project Approval in 2013. Tarago Operations (a fully owned subsidiary of Heron Resources at the time) developed the underground mine and processing plant in accordance with the Project Approval before it was put into care and maintenance in March 2020 and administration in July 2021.

Develop Global Limited (DEVELOP) completed its acquisition of the Project and Tarago Operations Pty Limited in May 2022 and is working to recommence the project in accordance with the original Project Approval. While Evaporation Dam 1 (ED1) was originally constructed for the original (pre-2000’s) mine, it is now exclusively used and managed by Veolia for the bioreactor and associated operations.

1.2. Approval to mine under ED1: Woodlawn-1

Approval to mine under ED1 is required by DSNSW (previously Dam Safety Committee) and was approved in April 2017. An extension to this approval was granted in July 2025 with the expanded area covered by Woodlawn-3. The approval and conditions are attached in Appendix 1 and also summarised succinctly in **Error! Reference source not found.**. The current approval is until 30 June 2040. This monitoring plan has been drafted to:

- Ensure compliance with the approval.
- Specify the roles of DEVELOP as the approval holder and Veolia as the dam owner.
- Specify the reporting requirements and timeline.

1.3. Approval to hydraulicly mine within Tailings Dam South: Woodlawn-2

Approval to hydraulically mine within Tailings Dam South (TDS) is required by DSNSW (previously Dam Safety Committee) and was approved in April 2017 subject to the conditions stipulated in **Error! Reference source not found.**. The current approval expired 30 June 2025, however, DSNSW advise in July 2025 specifies that this can be reactivated following a suitable request.

1.4. Reviews and updates

This plan is required to be reviewed annually.

2. MONITORING

2.1. Crest subsidence

15 survey pegs have been re-installed at the top of the embankment of ED1 by Develop at no more than 50 m apart. These are monitored from a pillar located adjacent to the DEVELOP maintenance workshop which facilitates visual observation of all pegs from this single point. Surveying is completed of this at required intervals and compared to previous measurements. DEVELOP is investigating alternative methods that will meet subsidence monitoring

requirements such as the use of drones and satellite. This will be referred to in subsequent monitoring plans.

2.2. Vibration

A vibration monitor has been installed on ED1 as per **Figure 2-1**. The location is adjacent to the ED1 wall between the wall and spillway as below pictures indicatively represent. Input from Veolia, as the dam owner, was received to the placement of this.

Figure 2-1 Installed ED1 blast monitor location

The monitor will be powered by either batteries or a solar panel and regular manual download will occur during inspections (refer to Section 2.3). Any events triggered on the monitor will be compared to DEVELOPs internal blast records to decide whether they are mining related. Results will be reported in monitoring report (refer to Section 3.4).

2.3. Safety inspections

Veolia, as the dam owner, was contacted for input into Version 1 of this plan. To-date, they have been unable to commit to sharing any monitoring data from their obligatory inspections as dam owner. In lieu of this data DEVELOP has developed an inspection checklist which considers the approval and factors within DEVELOPs control and dam knowledge. This checklist is presented in Section 4. Results of these inspections will be presented in the monitoring reports (refer to Section 3.4). Currently, only visual inspections are proposed with the assumption that the dam owner will notify DEVELOP if there are any other relevant changes to the dam for other aspects which are monitored for. DEVELOP will consider these observations in alignment with the other collected data.

2.4. Seepage monitoring plan

The dam owner will notify DEVELOP if there are any other relevant changes to seepage of the dam which require investigation.

2.5. Dam engineer inspection

The dam will be inspected by a suitable dams engineer if peak particle velocities as a result of mining exceed 50mm/s at the vibration monitor. It is proposed to liaise with Veolia as the dam owner and utilise their engaged dams engineer for this.

3. REPORTING

3.1. Background

Reporting requirements and frequency are specified in the approval (refer to Appendix 1) and are further detailed in subsequent sections depending on the timing of reporting being:

- Once-off
- Immediate
- Quarterly
- Annually

Reports will be sent to mining@damsafety.nsw.gov.au with the subject either Woodlawn-1 or Woodlawn-2. In the case of Woodlawn-1 the dam owner liaison officer for ED1 will also be included.

3.2. Once off

The following are required to be reported to DSNSW:

- Management plan: this plan submitted concurrently with the notification of re-commencement of mining
- Appointment of a liaison officer: already in effect

3.3. Immediate notification

The following instances require immediate notification to DSNSW.

- If peak particle velocities as a result of mining exceed 50 mm/s at the vibration monitoring location.
- If changes in the seepage from ED1 are considered to be significant.

DEVELOP will be relying on the dam owner to monitor for and assess seepage with any changes considered significant and blast monitoring related to be passed on for subsequent DSNSW notification if required

3.4. Quarterly report

During mining operations a regular report will be sent which will include:

- Statement of compliance with the required conditions
- Vibration monitoring results
- Any inspection records within the reporting period
- Results of crest subsidence monitoring

Quarterly reporting is specified to align with the subsidence monitoring. Therefore, the reporting period will be triggered when a new subsidence survey has been completed and the results processed.

3.5. Annual Report

DEVELOP authors an annual review each year which covers the period 1 July to 30 June and will include total ore extracted as well as other relevant information and numbers from the mining activity. Once approved by the department of planning the report will be available on DEVELOPs website for DSNSW to view. Updates as to the status of this document will be included in the monthly reports.

Table 3-1: Woodlawn-1 (ED1/underground mining) DSNSW monitoring and reporting requirements

Condition ID	Monitoring / Reporting Type	Frequency	Description	Due date
ANN D/22.1	Liaison officer appointed	Once off	Liaison officer appointed	As soon as possible
ANN D/3.1	Notification of mining	Once off	Notification of commencement of mining	Within 7 days of the commencement of mining
ANN D/17	Management plan	Once off, reviewed annually	Monitoring management plan to the satisfaction of the Committee	As soon as possible
			Review of monitoring management plan	By August 31
ANN D/14.2 ANN D/14.3	Vibration monitoring	Once off	Vibration monitoring program – DSC to be informed	As soon as possible
		Per blast Monthly	Monitor vibrations on embankment Reports on results of vibration monitoring	-
ANN D/14.5	Inspection of the dam by a suitable dams engineer	Once off	If peak particle velocities as a results of mining exceed 50mm/s at any point on ED1	As directed by DSNSW
ANN D1/3 ANN D1/3 ANN D1/3.3	Seepage monitoring	Once off	Seepage monitoring plan	As soon as possible
		Monthly	Monitor seepage from the dams Reports on monitoring seepage	-
		Once off	Notification if seepage changes significantly	Immediately
ANN D1/4	Subsidence monitoring	3 monthly	Results of crest subsidence monitoring	Within 1 month of subsidence survey
ANN D1/2.1 ANN D1/2.2	Inspections	Yearly	Inspection of dams Reports on inspection of dam	-
ANN D/20	Statement of compliance	Monthly	Statement of compliance with the required conditions	Monthly
ANN D/19	Statistics reports	Annually	Statistics report for year ended 30 June	By August 31 for results for year ended 30 June

4. INSPECTION RECORD

Evaporation Dam 1 (ED1) – Inspection Checklist			
Inspected by:__________________________		**Date:**____________________	
Checks		**Checked**	**Comments**
1.	Crest and embankment– check for cracking, slumping, erosion, vegetation or other damage		
2.	Upstream and downstream face of embankment		
3.	Visible portions of foundations and abutments		
4.	Environment downstream of embankment – check seepage, wet areas, salt crusts, boggy ground, erosion		
5.	Access roads – check for damage, erosion, slumping, wet weather access		
6.	Water surface – check for signs of leaks - whirlpools other signs of impending failure		
7.	Subsidence monitoring star pickets – check network is intact and un-damaged		
8.	Vibration monitoring – check enclosure is intact/undisturbed. Complete download of data and replace batteries if required.		
9.	Anything else to note?		

Appendix 1 Woodlawn-1 (ext) Approval

16 July 2025

Kiara Crook
Environment and Compliance Superintendent
Tarago Operations Pty Ltd – Woodlawn Mines

Re: Tarago Operations Pty Ltd proposal to mine within the Woodlawn Notification Area: Woodlawn-3

Dear Ms Crook,

I refer to a letter received from Dams Safety NSW received 13 May 2025 wherein recommendations have been received pursuant to mining within the Woodlawn Notification Area.

The proposal is to conduct underground mining beneath Woodlawn ED1 dam within the Woodlawn Notification Area, designated at Woodlawn-3 by Dams Safety NSW.

Special Condition 9 'Prescribed Dam' of Special (Crown and Private Lands) Lease No 20, approved on 15 August 2013, and by virtue of the delegated authority from the Minister pursuant to the provisions of Section 363(1) of the Mining Act 1992, I hereby conditionally approve the extension of underground mining beneath the Woodlawn Evaporation #1 Dam within the Woodlawn Notification Area designated as Woodlawn-3, as shown on the attached approval plan SML 20 Woodlawn and duly endorsed by Dams Safety NSW on 13 May 2025.

This approval is subject to the observance of the conditions endorsed by Dam Safety NSW on 13 May 2025, such that:

1. Area of underground Mining, dated 6 May 2025 being approved, subject to conditions 1, 2, 3, 4, 5, 6, 8, 10, 16, 18, 21, 22, 25 and 26 of the attached Annexure D. The approval for the expanded area will be Woodlawn 3.

If you require any further information on this matter please contact Anthony Margetts, Chief Inspector on 1300 814 609.

Sincerely

Anthony Margetts
Chief Inspector of Mines
By delegation from the Minister, Department of Primary Industries and Regional Development

Dams Safety

Anthony Margetts
Chief Inspector
Resources Regulator
PO Box 344
Hunter Region Mail Centre NSW 2310

Our ref: 10.123.188/154

Your ref:

Develop's application to extend period of mining under **Woodlawn -1 (10.123.188)**
& extend Woodlawn Mine **Woodlawn – 3 (10.123.154)**

This letter contains Dams Safety NSW's recommendations in respect of an application by Develop (attached) to extend the time on the Woodlawn1 approval (attached) and extend the area mine area within Woodlawn Notification Area bringing it closer to Woodlawn ED1 Dam (see plan attached). Woodlawn ED1 is a dam of High C consequence. Since the 2017 Woodlawn 1 approval ED1 has changed from being owned by the Mine to being owned by Veolia Environmental Services. Elements of dam monitoring including dam inspections, seepage monitoring and piezometer readings are now undertaken by the dam owner and are not the responsibility of the mine.

1. Dam Safety NSW's endorses a time extension on Woodlawn 1 from the existing 30 June 2025 until 30 June 2040 with removal of the above mentioned monitoring requirements. This is reflected in the attached Woodlawn 1 extension recommendations.

2. At this stage we are awaiting an assessment of the impact of the proposed extended mining area on ED1 to endorse extraction. Development workings in the proposed extended mining area should not pose a risk to the dam and consequently development workings in the proposed extended mining area are endorsed. Recommended monitoring requirements are as for Woodlawn 1 extension but as the area endorsed lies outside of the currently approved area this has to be treated as a separate application and becomes Woodlawn 3.

Recommendations

These, then, are the Dams Safety NSW's recommendation to the Minister in respect of the application.

That Mining within the currently approved area under Woodlawn 1 ext (attached) be extended until 30 June 2040 with development workings delineated in plum on the approved plan SML20 Woodlawn –

Postal: Dams Safety NSW
Locked Bag 5123
Parramatta NSW 2124
Australia

Address:
Level 30, 4 Parramatta Square
12 Darcy Street
Parramatta NSW 2150

Phone: (02) 9842 8073
http: www.damsafety.nsw.gov.au
email: info@damsafety.nsw.gov.au

ABN 55 079 703 705

Area of underground Mining, dated 6 May 2025 being approved, subject to conditions 1, 2, 3, 4, 5, 6, 8, 10, 16, 18, 21, 22, 25 and 26 of the attached Annexure D. The approval for the expanded area will be Woodlawn 3.

Annexure E is referenced by various conditions in Annexure D.

If you have further enquiries regarding this matter please contact Heather Middleton on 0428 288 391.

Yours faithfully,

For Chris Salkovic
Chief Executive Officer Dams Safety NSW

New South Wales Government

Dams Safety NSW

A N N E X U R E "D"

STANDARD MINING CONDITIONS

The conditions are laid out as follows:

- Annexure D*x* (D, D1, etc) specify what is required to be done by the applicant, and what the Dam Safety NSW may do following certain triggers;
- Annexure E specifies the frequencies of monitoring and report, and the format of reports. That is, it provides details of the deliverables required by the approval;
- Other Annexures may specify additional details, for example Annexure B describes what should be recorded on geological plans.

In Annexure D*x* the section often includes a preamble. These may contain guidance as to how to satisfy a condition, or the background to a condition, but are not conditions in themselves. The conditions look like the following paragraph:

Annexure D Condition 0.0: This is a condition; you must comply with it.

Section I. GENERAL REQUIREMENTS

The following general conditions apply to the **Woodlawn 1 Extension**.

There is considerable scope for the Dams Safety NSW to modify the frequency of reporting and monitoring, and the format of reporting, during the life of approval. This is important as it allows the level of monitoring to be increased or decreased according to the risk perceived by Dams Safety NSW. This section sets out a hierarchy within the approvals:

1. Annexure E;
2. a specified management plan;
3. Annexure D.

That is, any frequency specified in Annexure D is overridden by frequencies specified in a management plan or in Annexure E.

Dams Safety NSW prefers applicants to prepare monitoring proposals in the first instance. Often these will become endorsed by being included as a reference in Annexure E. Annexure E will be re-issued by Dams Safety NSW when there is a change to monitoring.

Annexure D Condition 1.1: The:

- **Frequency of monitoring;**
- **Frequency of reporting; and**
- **Format of reporting;**

For any condition hereunder will be as stated in Annexure E or, where no statement is provided in Annexure E, as stated in the relevant "Management Plan" as specified in Annexure E, or, where no Plan is specified in Annexure E or where the Plan makes no statement, as specified in the condition hereunder.

Annexure D Condition 1.2: Dams Safety NSW may modify the content of Annexure E, any associated Management Plan, or the frequency of monitoring or reporting or the format of reporting for any condition hereunder from time to time.

Annexure D Condition 1.3: Where Dams Safety NSW has modified the conditions as per Condition 1.2 and has advised the liaison officer appointed under Condition 5 in writing those modified conditions replace any conditions hereunder and shall have the same effect as if they were part of the approval.

Annexure D Condition 1.4: The Mine shall arrange for Dams Safety NSW staff to inspect the workings from time to time when required by the Dams Safety NSW, and in particular when any significant features are encountered in the workings.

Section II DAMS SAFTEY NSW'S EMERGENCY POWERSs

Annexure D Condition 2.1: The Minister, on notice from Dams Safety NSW, may at any time or times suspend for a period of time, cancel, alter, omit from or add to this consent or the conditions of this consent.

Annexure D Condition 2.2: Regardless of the content of any management plan, Dams Safety NSW may require by notice in writing the Mine to:

- **Cease any or all mining at the subject area until such time as Dams Safety NSW agrees that mining may recommence;**
- **Undertake investigations as specified by Dams Safety NSW; and/or Undertake remedial works as specified by Dams Safety NSW.**

SECTION III OWNERSHIP OF PRESCRIBED DAM

Woodlawn Evaporation Dam # 1 is owned by Veolia Environmental Services (Australia) Pty Ltd. The contact is Raymond Choy Veolia's Environment Manager. Ramond's contact details are: email raymond.choy@veolia.com phone 0472 571 387. To ensure mining is not adversely impacting the Dam it is important that there is good communication between the Mine and the Dam Owner. The Dam owner is responsible for routine inspections and seepage monitoring of the dam and should communicate any findings of note or concern with the Mine and Dams Safety NSW. The Mine is responsible for monitoring blast vibrations on the embankment and conducting movement monitoring of the Dam. The mine will provide the Dam owner and Dams Safety NSW with blast vibration and movement monitoring results at intervals in Annexure E or immediately if exceedances occur. The organisations will cooperate to ensure extraction is not adversely impacting the dam.

Annexure D Condition 3.1: **Develop and Veolia Environmental Services (Australia) Pty Ltd will liaise to ensure that extraction is not adversely impacting the dam.**

Section IV. CORRESPONDENCE WITH DAMS SAFETY NSW

Annexure D Condition 4.1: **All correspondence with Dams Safety NSW in regard to this approval shall be clearly labelled Woodlawn – 1(ext).**

Annexure D Condition 4.2: **Reports required under the Woodlawn – 1 (ext) consent shall be sent to:**

The Chief Executive Officer
Dams Safety NSW
Floor 30, 4 Parramatta Square,
12 Darcy Street,
Parramatta N.S.W. 2150

Locked Bag 5123
Parramatta N.S.W. 2124

Phone: (02) 9842 8073

Email: *mining@damsafety.nsw.gov.au*

SECTION V LIAISON OFFICER

Effective coordination and management of the monitoring programs is essential. To this end Dams Safety NSW believes that a person should be nominated as a "liaison officer". Their responsibilities will include:

- Providing a point of contact for Dams Safety NSW,
- Ensuring compliance with the monitoring conditions,
- Coordinating the supply of monitoring data to Dams Safety NSW, and
- Ensuring that Dams Safety NSW is kept up to date of the progress of mining.

Annexure D Condition 5.1: **The Mine shall appoint a suitably qualified and experienced person, acceptable to Dams Safety NSW, as a liaison officer for the period when there is active mining in the notification area and for an additional period afterwards as determined by Dams Safety NSW.**

Section VI. VARIATIONS

Annexure D Condition 6.1: **From time to time the Mine may desire to alter the approved mining within the notification area in a minor way (termed a "minor variation"). Types of minor variations include such things as changes to blast vibration limits,**

alterations to development roads within an already approved mine plan etc. Applications for minor variations to existing approvals shall be made to the Chief Inspector of Mines, who will refer the application to Dams Safety NSW.

If the Mine is seeking to change the area, extent or location of mining (ie the mine plan) then a new full application with supporting documentation needs to be submitted. A letter of application and supporting documentation should be sent to the Chief Inspector of Mines, who will refer the application to Dams Safety NSW.

Annexure D Condition 6.2: Dams Safety NSW requires all proposed variations, even small variations, be referred to it (via the Chief Inspector) for its consideration. To expedite the approval process where the proposed variation is urgent and very minor, Dams Safety NSW staff will give a decision by phone, fax, or email to the Mine, and inform the Chief Inspector of their decision. The Mine will then approach the Chief Inspector for formal approval or otherwise, with both parties aware of the Dams Safety NSW's decision. This procedure should only be followed in urgent situations.

Annexure D Condition 6.3: The usual procedure is to submit a written application, with appropriate supporting documentation, to the Chief Inspector of Mines, who will then forward this to Dams Safety NSW for its consideration. The Mine should also send a copy of the application to the Dams Safety NSW so that it may begin processing it. This will allow for a quick reply.

Where the variation is sufficiently extensive (as determined by Dams Safety NSW) the Mine will be required to submit a full application to Mine within the notification area.

Annexure D Condition 6.4: The Chief Inspector of Mines shall not approve any minor variation unless an endorsement by Dams Safety NSW has been received.

Section VII NOTIFICATION OF COMMENCEMENT OF MINING

This section does not apply to the Woodlawn 1 ext mining consent

SECTION VIII MONITORING MANAGEMENT PLANS

Where several monitoring programs are required under an approval Dams Safety NSW requires that a Management Plan be developed for these programs. The plan will specify at least:

- What is required to be done and when,
- What is required to be delivered and when, and
- Who is responsible for each task.

In certain circumstances it may be appropriate for the plan to incorporate other aspects, for example appropriate levels of training, the format of reports, or regular feedback from Dams Safety NSW.

Annexure D Condition 8.1: The Mine shall prepare a Management Plan encompassing all of the monitoring programs required by Dams Safety NSW.

Annexure D Condition 8.2: The plan required above is to be submitted to Dams Safety NSW for its approval as soon as possible.

Annexure D Condition 8.3: **The plan required above shall be reviewed by the Mine at intervals as specified in Annexure E. The review process shall include forwarding a copy of the plan to Dams Safety NSW with a request for comments.**

SECTION IX MONITORING, REPORTING AND EXTRACTION SCHEDULE

This section does not apply to the Woodlawn 1 (ext) mining consent

SECTION X REPORTS ON THE LOCATION OF THE FACE

This section does not apply to the Woodlawn 1 (ext) mining consent

Section XI SURFACE GEOLOGY/TOPOGRAPHY

This section does not apply to the Woodlawn 1 (ext) mining consent

Section XII INSPECTION OF WORKINGS

This section does not apply to the Woodlawn 1 (ext) mining consent

Section XIII SEAM LEVEL GEOLOGICAL FEATURES

This section does not apply to the Woodlawn 1 (ext) mining consent

Section XIV WATER MONITORING

This section does not apply to the Woodlawn 1 (ext) mining consent

Section XV EMERGENCY WATER CONDITIONS

This section does not apply to the Woodlawn 1 (ext) mining consent

Section XVI. SUBSIDENCE AND STRAIN MONITORING

Annexure D1 Condition 16.1: **The Mine shall develop a program of subsidence monitoring of settlement points, established along the embankment crest of the Evaporation # 1 Dam at intervals not greater than 50m, to a standard acceptable to their dams engineer.**

Annexure D1 Condition 16.2: **The Mine shall submit a report on the subsidence results including graphed subsidence data at intervals and in a format as specified in Annexure E.**

Section XVII INSPECTION OF DAM

This section does not apply to the Woodlawn 1 (ext) mining consent

Section XVIII SEEPAGE MONITORING

This section does not apply to the Woodlawn 1 (ext) mining consent

Section XIX PIEZOMETER MONITORING

This section does not apply to the Woodlawn 1 (ext) mining consent

Section XX. MOVEMENT MONITORING

This section does not apply to the Woodlawn 1 (ext) mining consent

Section XXI VIBRATION MONITORING

Where Dams Safety NSW considers that a mining application will generate significant ground vibrations, for example as a result of blasting in an open cut, then the Dams Safety NSW may specify a peak particle velocity limit at critical structures. Vibration monitoring will normally be required to ensure that this limit is not exceeded.

Annexure D Condition 21.1: The Mine will develop and implement a program to monitor particle velocities generated by mining at sites on the Woodlawn Evaporation #1 Dam prior to mining.

Annexure D Condition 21.2: The Mine shall ensure that peak particle velocities generated as a result of mining will not exceed 50 mm/s at any point on Woodlawn Evaporation #1 Dam embankment.

Annexure D Condition 21.3: Written reports on the results of the monitoring outlined in the above condition 21.1 shall be submitted to Dam Safety NSW at intervals as specified in Annexure E.

Annexure D Condition 21.4: Dam Safety NSW will be informed immediately if peak particle velocities (PPV), as a result of mining at any point on Woodlawn Evaporation #1 Dam, exceed 50mm/s.

Annexure D Condition 21.5: If peak particle velocities exceed the limits set in the above condition 21.4, then a full inspection of ED1 will be undertaken by a dam specialist within 72 hours.

Section XXII COMPLIANCE REPORT

Where several monitoring programs are required under an approval it is time consuming to check for the compliance with the conditions. As it is the Mine's responsibility to maintain compliance with the conditions Dams Safety NSW's believes that the Mine is the appropriate organisation to undertake the bulk of this role.

Annexure D Condition 22:1 The Mine shall submit a statement of its compliance with the required conditions at intervals as specified in Annexure E.

SECTION XXIII CONTINGENCY PLANS

This section does not apply to the Woodlawn 1 (ext) mining consent

SECTION XXIV CLOSURE REQUIREMENTS

This section does not apply to the Woodlawn 1 (ext) mining consent

Section XXV COMPLETION OF MONITORING

Annexure D Condition 25.1: Regardless of the status of mining or location of the active face, all monitoring and reporting shall continue as specified until Dams Safety NSW considers that it is no longer required, or that the frequency of the monitoring can be altered. The Mine may apply to Dams Safety NSW for

modification to the frequency of monitoring, or for the discontinuance of monitoring

SECTION XXVI CESSATION OF THIS APPROVAL

Annexure D Condition 26.1: No mining shall be undertaken in the approved area after 30 June 2040 unless such date is extended by Dams Safety NSW.

END OF ANNEXURE D

Annexure E

Frequency of Monitoring and Reporting
Format Statement
Table of deliverables **WOODLAWN_1 – APPROVAL** **(REISSUED MAY 2025)**

Frequency of Monitoring	Frequency of reporting	Condition	Deliverable Description	Due Date	Management Plan
	One off	ANN D/22.1	Liaison officer appointed	As soon as possible	
	One off	ANN D/3.1	Notification of commencement of mining	Within 7 days of commencement	
	One off	ANN D/17	Monitoring Management Plan to the satisfaction of the Committee	As soon as possible	Reviewed annually
	One off	ANN D/14.2	Vibration monitoring program – DSC to be informed	As soon as possible	
	One off	ANN D1/3	Seepage monitoring plan	As soon as possible	
3 monthly	3 monthly	ANN D1/4	Results of crest subsidence monitoring	Within 1 month of subsidence survey	
Per blast	Monthly	ANN D/ 14.3	Monitor vibrations on embankment		
	Monthly	ANN D/ 14.3	Reports on results of vibration monitoring		
Monthly	Monthly	ANN D1/3	Monitor seepage from the dams		
	Monthly	ANN D1/3	Reports on mosnitoring seepage		

Yearly	Yearly	ANN D1/2.1	Inspection of dams		
Yearly	Yearly	ANN D1/ 2	Reports on inspection of dam		
	Monthly	ANN D/ 20	Compliance statement		
	Annually	ANN D/ 17	Review of Monitoring Management Plan	By August 31	
	Annually	ANN D/ 19	Statistics report for year ended 30 June	By July 31	
As required		ANN D/ 14.4	Notification if PPV exceeds 50 mm/s for ED1	Immediately	
As required		ANN D1/ 3.3	Notification if seepage changes significantly	Immediately	

THIS APPROVAL CEASES 30/06/2025

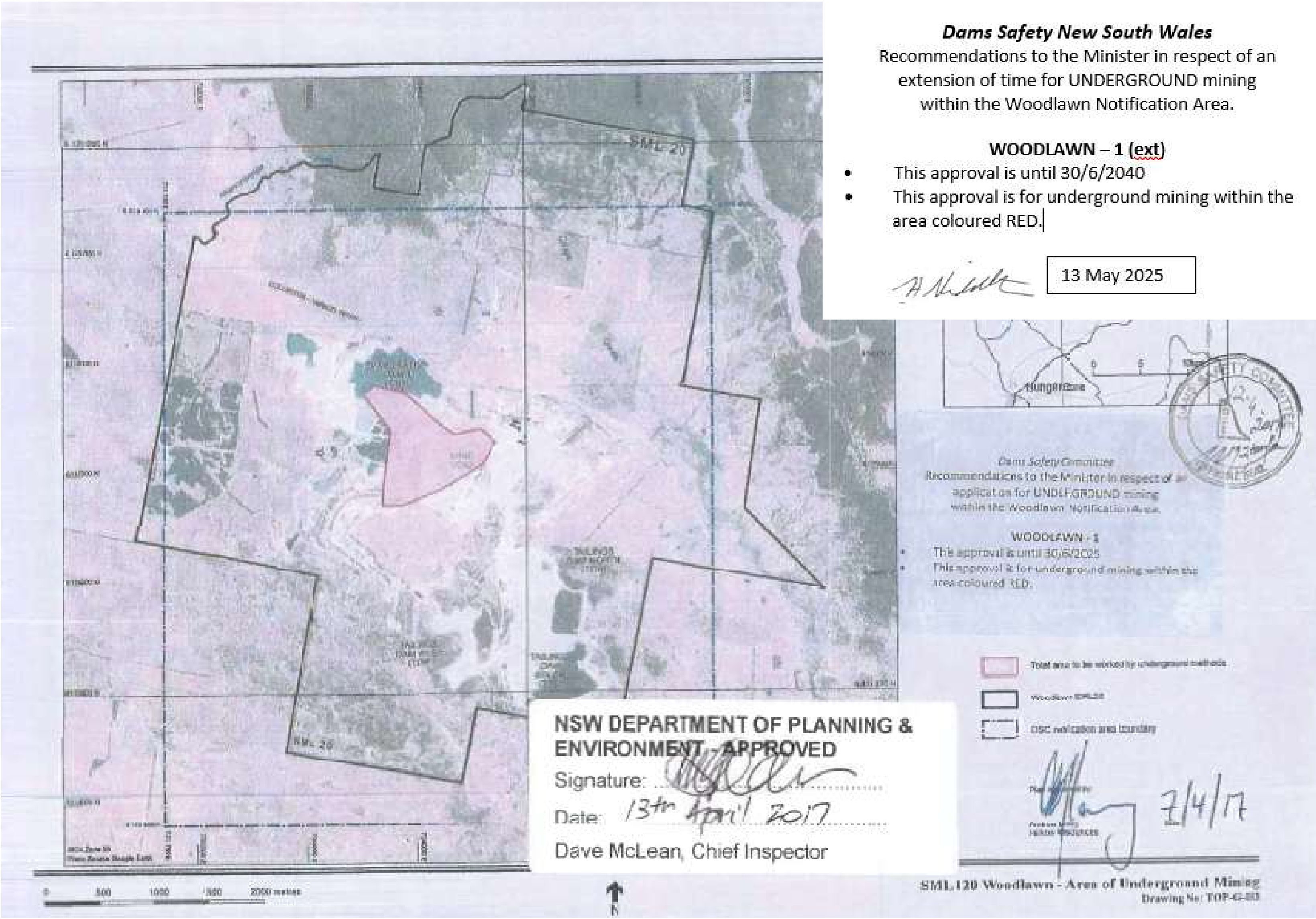
Dams Safety New South Wales

Recommendations to the Minister in respect of an extension of time for UNDERGROUND mining within the Woodlawn Notification Area.

WOODLAWN – 1 (ext)

- This approval is until 30/6/2040
- This approval is for underground mining within the area coloured RED.

13 May 2025

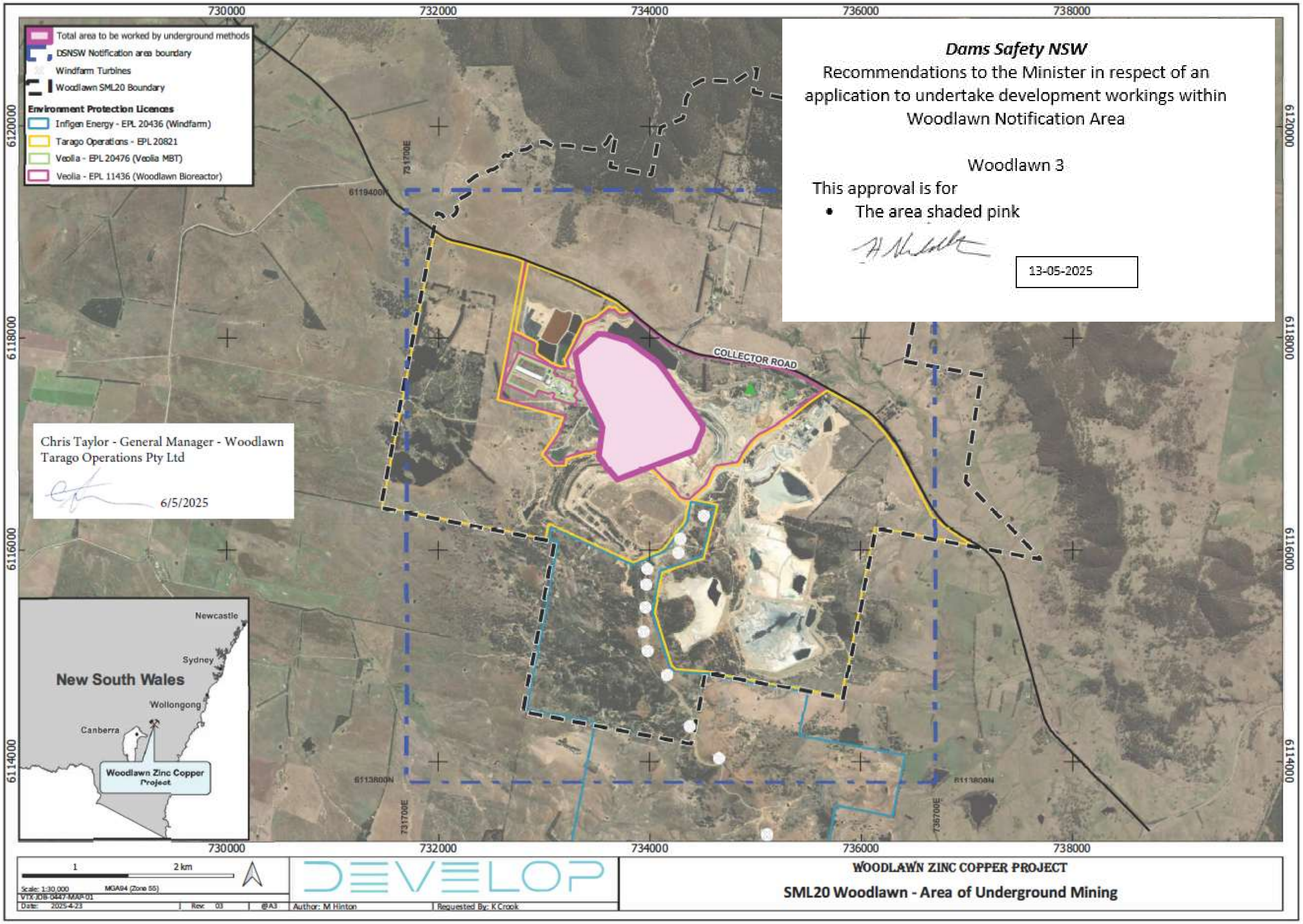


NSW DEPARTMENT OF PLANNING & ENVIRONMENT - APPROVED

Signature: ....

Date: 13th April 2017

Dave McLean, Chief Inspector


Dams Safety NSW
Recommendations to the Minister in respect of an application to undertake development workings within Woodlawn Notification Area
Woodlawn 3
This approval is for
• The area shaded pink
13-05-2025
Chris Taylor - General Manager - Woodlawn Tarago Operations Pty Ltd
6/5/2025
Total area to be worked by underground methods
DSNSW Notification area boundary
Windfarm Turbines
Woodlawn SML20 Boundary
Environment Protection Licences
Infigen Energy - EPL 20436 (Windfarm)
Tarago Operations - EPL 20821
Veolia - EPL 20476 (Veolia MBT)
Veolia - EPL 11436 (Woodlawn Bioreactor)
COLLECTOR ROAD
730000
732000
734000
736000
738000
6120000
6118000
6116000
6114000
New South Wales
Newcastle
Sydney
Wollongong
Canberra
Woodlawn Zinc Copper Project
Scale: 1:30,000
MGA94 (Zone 55)
Date: 2025-4-23
Rev: 03
@A3
Author: M Hinton
Requested By: K Crook
DEVELOP
WOODLAWN ZINC COPPER PROJECT
SML20 Woodlawn - Area of Underground Mining

Appendix 6 Paste Fill Management Plan

Paste Fill Management Plan

Woodlawn Copper Zinc Project

Document Review/Change History

Date	Summary of review and changes	Revision No.	Authors	
			Drafted by	Reviewed by
30/06/2018	Internal review	1	RB	AL
17/07/2018	Comments and updates	2	RB	AL
09/08/2018	Submission to DPE	3	RB	AL
06/11/2018	2018 update	4	RB	AL
01/04/2019	DPE comments	5	RB	AL
27/06/2019	Internal review	6	RB	AL
19/07/2019	Issued	7	RB	AL
23/05/2024	Amend company details, refine plan, updates following revised company strategy	8	KC	KC
21/09/2025	Updated plan following finalisation and review of Quattro documentation for attachment to the mine extraction plan	9	RB	KC

Glossary

Acronym	Definition
ANC	Acid Neutralising Capacity
ANZECC	Australian and New Zealand Environment and Conservation Council
DEVELOP	Develop Global Limited
DPE	Department of Planning and Environment
DPI	Department of Primary Industries
EA	Environmental Assessment
EMS	Environmental Management Strategy
EPA	Environment Protection Authority
EPL	Environmental Protection Licence
Heron	Heron Resources Limited
LH Cement	Low Heat Cement
NAF	Non-Acid Forming
NAG	Net-Acid Generation
NAP	Net Acid Production
NAPP	Net Acid Production Potential
NSW	New South Wales
PAF	Potentially Acid Forming
Project	Woodlawn Zinc-Copper Mine
PFMP	Paste Fill Management Plan
PSD	Particle Size Distribution
SCC	Specific Contaminant Concentration
SML20	Special Mining Lease 20
SSTV	Site Specific Trigger Values
Stope	Void created by the removal of ore
TARP	Trigger Action Response Plan
TCLP	Toxicity characteristic leaching procedure
UCS	Unconfined Compressive Strength

Contents

TABLES

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Appendices

1. INTRODUCTION

1.1. Background

The Woodlawn Zinc-Copper mine (the Project) is located approximately 7 km northwest of Tarago in New South Wales (NSW) within Special (Crown and Private Land) Mining Lease no. 20 (SML20) as shown in Plan 1, Appendix 1. The original Woodlawn mine operated from 1978 to 1998 and processed 13.8Mt of ore from the Woodlawn open pit, underground and minor satellite deposits. Following its prolonged closure, the Project was acquired by ASX-listed Heron Resources who secured Project Approval in July 2013 following the public exhibition of the Projects Environmental Assessment (EA). Heron completed the construction of the project and developed the new underground mine in accordance with the Project Approval before it was put on care and maintenance in March 2020. Heron was placed in administration in July 2021. Develop Global Limited (DEVELOP) completed its acquisition of the Project in May 2022 and Tarago Operations Pty Limited which holds Special Mining Lease (SML) 20 and (EPL) 20821. Veolia operates an eco-precinct, including a licensed landfill, within SML20 but separated from the project and has separate EPL's as shown in Plan 1, Appendix 1.

This Paste Fill Management Plan (PFMP) supports the conditions and commitments in the Mine Extraction Management Plan (MEMP) to which this plan is attached to and should be read in conjunction with.

The underground extraction method requires the use of backfill to fill and stabilise the voids created by the extraction of the target ore. These areas are referred to as stopes and have historically been filled with surrounding rock. Greater stability and therefore higher safety are achieved by filling the voids with cemented grout (referred to as paste) pumped from the surface. The paste is produced by mixing tailings from the ore processing circuit with cement binder This technique is considered current best practice but also has environmental benefits as it fixes any remaining metals within a cemented matrix with very low permeability. It also reduces the reliance on surface disposal of tailings which require specialist treatment to permanently rehabilitate.

The PFMP has been progressively updated as data is received on paste quality, strength and delivery mechanisms. The original plan was a standalone document approved by the then Department of Planning, Planning, Industry and Environment in August 2019 which was based on using available tailings from the legacy dams to produce a simulated paste for testing. That version of the PFMP specifically satisfied Condition 5(c) of Schedule 3 which was approved prior to the use of paste in the underground mine. It therefore needed to use a facsimile paste derived from existing on-site tailings as being the closest approximation to tailings produced from the new processing plant. This was deemed to be a conservative approach as the existing tailings material contains recoverable metals whereas fresh tailings produced from the new processing plant has a much-reduced metal concentration.

The purpose of this version of the PFMP is to provide a general update on paste management as the operation has transitioned from construction and recommissioning to operational status. The initial results have also been augmented by a range of additional studies based on tailings produced from the new processing plant. This work has shown that the paste used underground will be stable and largely impervious to the movement of water.

The ongoing testing program centres around quality assurance and quality control (QA/QC) procedures, long term leaching studies as well as in-situ monitoring of pore pressure to confirm the cured paste maintains a permeability rate of less than 1×10^{-9} m/s. In practice, paste to be used at Woodlawn will have a very fine pore structure with inherent low porosity when cured.

Overall permeability is anticipated to be similar to other cemented materials which typically have permeabilities in the order of 1 x 10^{-11} m/s.

To put this into perspective, once a stope is filled with cured paste, water will take approximately 30 years to saturate 1 m of material, or around 300 years to fully saturate a typical stope. Only when fully saturated is there the potential for leaching to occur but only minerals that are soluble in neutral to moderately alkaline pH can potentially be released. This excludes all the metals of concern including zinc, copper, lead, iron and most sulphate compounds. Although testing will continue, the results to date show that the paste will remain environmentally benign and non-polluting over the long term.

1.2. Scope and objectives

Condition 3 of Schedule 3 and Condition 5 of Schedule 4 of the approval requires that the paste filling of underground voids is undertaken in an environmentally responsible manner. Specifically, the paste is required to be chemically stable and non-polluting. The objectives of this PFMP are to present:

- The results of testing and material trials completed.
- The details of the paste filling manufacture and underground delivery system.
- Long term geotechnical stability of paste fill to minimise subsidence.
- Data of physical and chemical properties of the paste.
- Details of the program for ongoing testing and verification.

This plan outlines how paste is used and managed based on aspects that relate to the requirements as specified by the Project Approval. Additional occupational health and safety issues are dealt separately within DEVELOPs Safety Management System.

The PFMP was originally approved in August 2019 (Appendix 2).

1.3. Legislative requirements

Legislation relevant to paste management includes:

- Protection of the Environment Operations Act 1997 (POEO Act)
- Environmental Planning and Assessment Act 1979
- Protection of the Environment Legislation Amendment Act 2011
- Mining Act 1992

The Project is governed by the following:

- Project Approval: as issued in 2013, and amended in 2016 and 2017. Document ID: 07_0143MOD2
- Environment Protection License (EPL): 20821 as issued by the NSW Environment Protection Agency (EPA)
- Special Mining Lease (SML): 20

2. PASTE FILL OPERATION

2.1. Paste fill practical significance

Cement paste backfill was determined to be the most appropriate method for both stope stability and long-term environmental management of new tailings produced at Woodlawn. The process involves diverting tailings produced from the processing of ore from surface disposal in traditional dam structures to the generation of cemented paste for use underground to stabilise both previously mined underground voids and new voids created by the extraction of stopes. It offers multiple technical, economic and environment benefits and formed part of the mining method approved under Project Approval 07_0143 MOD2.

Paste backfill allows a large proportion of tailings to be disposed underground and it currently represents best practice in underground metalliferous mining. The process reduces the volume of tailings needing surface storage which in turn reduces rehabilitation costs and ongoing environmental liability associated with surface tailings dams.

The paste is formed by mixing fine processing waste referred to as tailings with cement (binder) and lime which can be delivered to the underground workings via pipeline. The paste is thick but can be pumped as well as fed by gravity from the surface. Transport via pipeline has operating benefits as well as improved safety compared with conventional stope filling with rock. A completed paste filled void is more stable than a rock filled void and minimises the potential for surface subsidence.

Most of the processed water can be recovered by filtration and thickening of the tailings prior to formulating the paste. The very low permeability and high saturation rates of the paste material prevents pore water leakage and minimises underground water seepage. Once cured, permeability is at least the same as typical concrete which will reduce acid generation through the inhibition of oxygen diffusion and by increasing the acid neutralisation potential via cement addition. The cement content also increases strength gains as well as improving ore extraction volumes through the substitution and recovery of ore from pillars.

Paste fill is a rapid operation in comparison to conventional rock backfilling. It condenses the mining cycle period and provides significant strength gains within the underground workings. It is more expensive than traditional methods but is suitable at Woodlawn given the nature of the ore lenses which are relatively thin and steeply dipping but are of very high quality.

The method is also highly versatile with a high vertical filling capacity enabling variable stope designs using drift and fill mining methods to cater for the nature of the ore lenses at Woodlawn. It is also referred to as “tight filling” as it allows the fill to be placed close to the stope back which minimises the gap for further support or filling.

2.2. Project paste filling operations

This section outlines the paste filling operation in sufficient detail to allow an understanding of the proposed management initiatives and ongoing test work required at Woodlawn. These aspects are described in Sections 2 and 3.

Historic underground mining at Woodlawn predominantly used cut and fill mining methods with unconsolidated waste rock used as backfill. DEVELOP has determined that tight backfilling using paste fill will provide a safer and more environmentally responsible method of ore extraction. The use of cemented paste fill offers many of advantages in the extraction sequence, including:

- Maximises the volume of ore extracted as stopes are always buttressed by cemented paste fill;
- Allows an optimal approach to managing induced stress around mined areas;
- Provides a homogeneous stope back (roof) that behaves more predictably as the ore is excavated;
- Allows the size of open voids to be managed and optimised; and
- All stopes are completely backfilled prior to mine closure, which in turn limits the magnitude of ground movement adjacent to the stope.

An overview of the locations for paste fill is provided in Figure 1. This is a vertical cross section of the workings below the Bioreactor. The vertical blue and horizontal green lines represent pipelines that will carry paste from the surface.

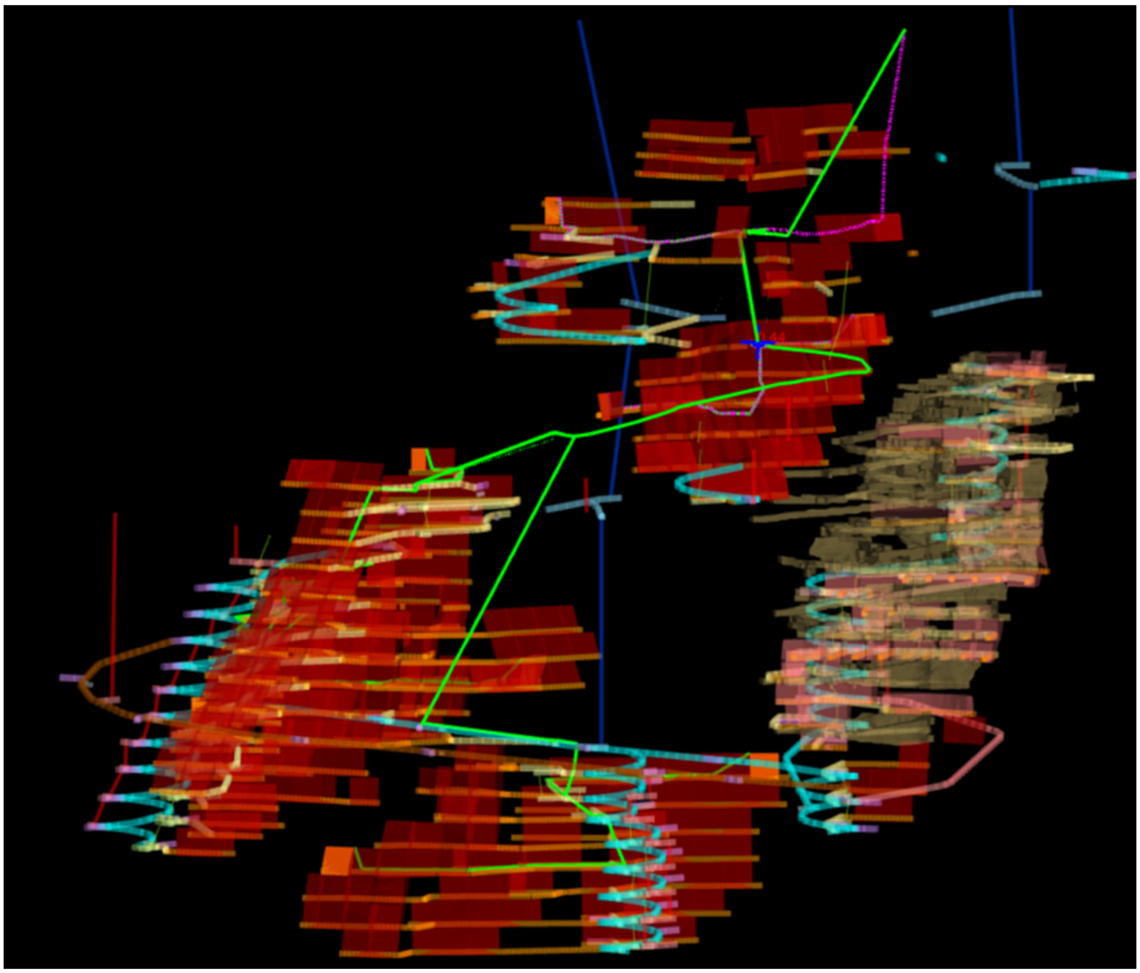

Figure 1 Proposed Paste Reticulation (source: Quaatri reticulation design report)

2.3. Paste manufacture

The Paste Plant has the capacity to manufacture approximately 180,000 m^3 of paste per annum at a rate of 45 m^3/hour. Paste fill is composed of a mix of tailings, cement and water. Current testing, provided in Section 3, indicates that 5% binder content generates the desired strength and curing time. It is possible that the addition of lime or similar additives may be needed from time to time to ensure long term stability and to facilitate flowability of the paste.

The addition of lime also raises the pH of the paste which provides additional protection against soluble metals being generated.

The tailings will be sourced from the new processing facility which will produce a coarser material with much lower metal content than the existing tailings currently stored in the tailings dams on site. The paste is produced at a separate Paste Plant located adjacent to the mine entry (Plan 1, Appendix 1) and delivered underground via pipeline. The tailings is pumped to the Paste Plant from the processing plant in a slurry form via a pipeline.

DEVELOP plans to complete additional testing of the tailings following recommissioning and subsequent production of more representative tailings.

2.4. Underground paste filling

Paste will predominantly be used to fill new voids created by the underground mining operation. However, it may be suitable to use paste in other areas of the underground operation mined either by Heron more recently or the historical mining operations. Filling historical voids, declines or areas where rock backfill has been used with paste would enhance local stability. The following figure outline the typical filling methods for the Kate Lense.

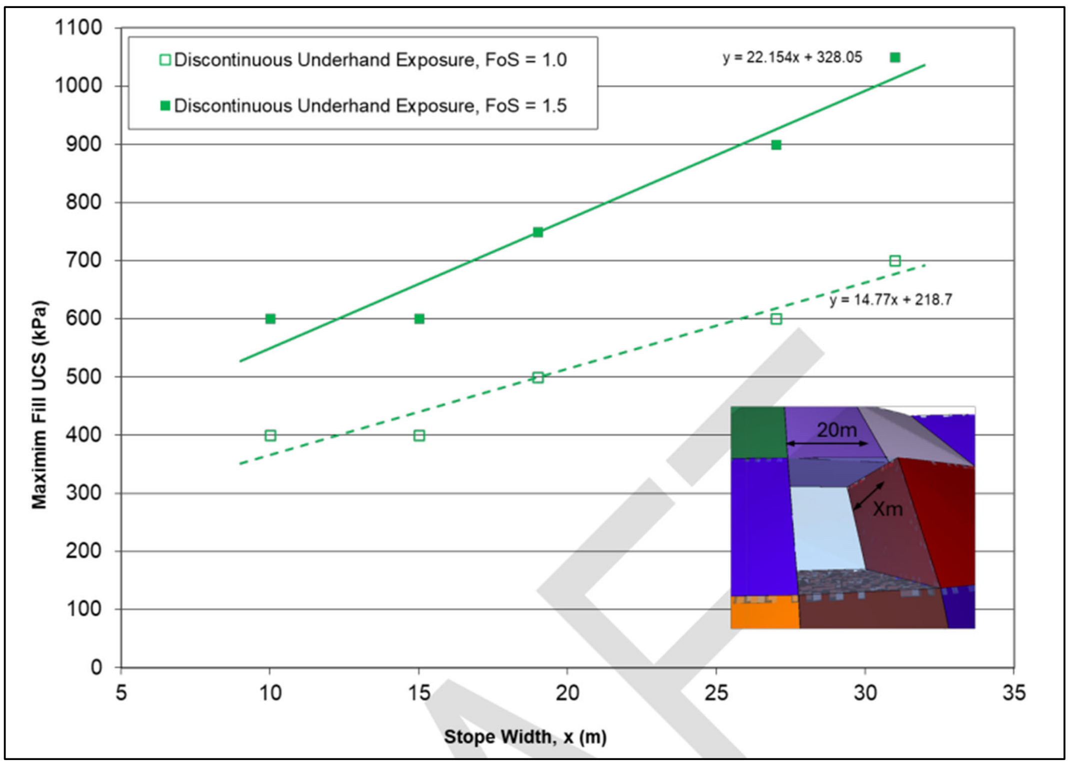

Figure 2- Kate Lens Simultaneous Underhand and Vertical

2.5. Paste mineralogy and composition

Tailings mineralogy influences paste fill water retention, settling characteristics, strength and abrasive action. For example, clay, mica and sericite impact water retention, while silicate such as quartz are abrasive and are known to wear out pipeline systems. Additionally, sulphide including pyrite decreases strength. Higher temperatures, specific surface areas and availability of oxygen increases sulphide oxidation.

The paste fill systems will have two sulphate sources:

- The most substantial amount originates from the tailings, particularly in the form of pyrite; and #
- Sulphate can be found in the cement used in the paste in the form of gypsum or anhydrite.

The extent of the impact of sulphate on the paste fill strength is dependent on the cement composition and percentage content, sulphate concentration and curing time. The early strength of the paste can be enhanced by small amounts of sulphate less than 2000ppm, caused by precipitates of secondary hydration products filling the void and increasing strength. Although the benefits reduce with increased sulphate concentration, once cured, the sulphate level becomes less important from a strength perspective but still important from an environmental perspective. These aspects are currently being subjected to long term testing by Quattro Pty Ltd.

The leachate quality, that is, the quality of water which passes through the paste within a filled void underground is a function of the permeability of the paste, oxygen levels, metal concentration and chemical reactions which may reduce pH which in turn may release metals. These reactions occur naturally within groundwater systems including water passing through the sulphide ore body prior to mining. Groundwater quality often reflects host rock geology with more detail on this as applicable to the project detailed in the Water Management Plan.

Similarly, the volume of leachate which can pass through the cured paste is a function of available pore space and permeability, or connectivity between pores. In order to maximise strength, pore space has been minimised by the use of fine grained tailings, which in turn significantly reduces permeability when combined with cement. The design of the paste mix seeks to minimise pore space by achieving a maximum available strength and durability.

The test work undertaken to date is provided in Section 3. The results show that the permeability of the cured paste will be greater than 1×10^{-9} m/s, which is equivalent to the permeability of an HDPE plastic liner used to line dams that are required to protect groundwater from the surface storage of contaminated wastes.

The Paste Plant has the flexibility to deal with different physical and chemical parameters to achieve the required mixture for each design task. Although variations to the paste mixture will be required over the life of the operation, an over-riding consideration is that the paste filling maintains long term stability and remains environmentally benign and non-polluting.

3. PASTE FILL MANAGEMENT

3.1. Planning and design, quality assurance management

In 2024 DEVELOP engaged Quattro Engineering Pty Ltd to confirm the paste mix, underground delivery network and to develop a Quality Assurance and Quality Control system that will ensure that the paste fill system used to fill underground mining voids remains physically and chemically stable and non-polluting in accordance with Condition 3(d) of Schedule 3 of the Project Approval. Quattro was also involved in the recommission of the Paste Plant including design review and various paste testing work. DEVELOP is also committed to ensuring that all paste filled voids will be long term stable to prevent subsidence in accordance with Condition 3(c). To achieve this, DEVELOP, through advice from Quattro, has determined:

- The optimal particle size distribution (PSD) and solids content to maximise paste flowability for complete and tight filling of stopes to achieve the desired strength capability, particularly during blasts and stope extraction.
- The optimal binder (cement) content to ensure sufficient paste strength and necessary pour-rest cycles and curing times. This work will continue as part of the QA/QC process.
- The ongoing QA/QC testing procedures that will ensure sufficient cement content for strength with ongoing quality control procedures will eliminate the risk of liquefaction of the paste underground.
- The optimal pulp density to minimise the water flow underground, but also ensuring there is enough for paste flowability through pipes.
- Paste specification yield stress and slump (i.e. pumpability and flowability respectively) will be within an acceptable range, based on ongoing operational QA/QC test work.
- Paste composition and water chemistry that will form part of the operational QA/QC system to avoid the potential for acid generation or undesirable mineral releases into the groundwater as described in Section 5.1.
- Design of the fill reticulation system that will be undertaken by suitably qualified and experienced persons.

3.2. Staff operational management

DEVELOP will ensure that all operators involved in the delivery and filling of voids will be subject to competence training. This training will include the provisions of the Project Approval in relation to paste and the potential groundwater issues. Quattro has produced several training related documents including:

- Paste Reticulation Design Report
- Maintenance Procedure
- Paste Filling Checklist
- Paste Mix Design
- Paste Test Work Report
- Paste Exposure and Mix Design Procedure
- Paste Plant Operating and Training Manual
- Paste Fill QA/QC monitoring regime

- Bulkhead Failure TARP
- Paste Fill Strength TARP
- Paste Fill Operating Rules covering exclusion zones, standoff distance, paste runner checklist, pre-flush procedures and document controls.

Training documentation and records are stored on the INX software/database which cover the ongoing management of the paste filling operation.

3.3. Environmental hazard and risk management

The use of paste fill has been subjected to detailed risk assessment processes since 2016. Specific risk assessments were undertaken in July 2022 and April 2025 covering the current paste fill operation. The latest risk assessment included the manufacture and delivery systems, QA/QC procedures for manufacture and the management of paste in the underground workings. The main environmental hazard associated with paste filling is the potential for oxidation to occur within the paste over time coupled with high permeability.

Testing of the paste in terms of quality and permeability suggests that the risk of leachate occurring is very low and the risk of poor-quality leachate is even lower. For permeability to increase requires a failure of the paste manufacturing process which would result in a safety hazard in the underground workings. Systems will be employed to ensure that paste strength, and therefore permeability, remain at optimal levels. To address this potential hazard, the following risk management activities will be undertaken:

- Paste fill mix design has been completed in accordance with the Paste Test Work Report, Exposure and Mix Design Procedure. This work is at an advanced stage and will be integral to the QA/QC system.
- Reticulation Design has been completed for the initial areas subject to paste filling as per the Reticulation Design report, Reticulation Design procedures, and Paste Reticulation Modelling Template. The reticulation design will be expanded for each new area of paste filling.
- Initial testing of the final paste produced from the onsite paste plant using tailings produced from the new processing plant as outlined in Sections 3.4 and 5.1. This work is subject to ongoing testing as part of the QA/QC system.
- The QA/QC system includes TARPs covering Paste Fill Monitoring, Paste Fill Specification, Barricade and Containment Zone, Reticulation Blockage and Failure and Power Outage.

Modifications to the paste mix or stope filling design and methods may occur over time as a result of the risk management activities noted above. These changes may include the use of additives such as lime or other alkaline minerals, cement content or other binders and coagulants. These are typically used in other cemented products to increase or decrease curing time, improve flowability or increase strength. Other management activities will include:

- Maintain adequate drainage provisions to collect seepage from paste filling sites.
- Remove drainage water from the paste and return to the surface for recycling.
- Installation of vibrating wire piezometers to monitor pore pressure and confirm that water does not build up in paste filled stopes.
- Confirm water pressure or vibration from blasting does not impact on paste fill and in particular during curing.

- Include a water balance within the QA/QC system as a check on residual moisture content.
- Determine the water-mass balance to monitor potential water build-up. This can help identify potential liquefaction and egress of fill into the workings.
- Provide adequate exclusion zones and containment bunds to physically separate operators from exposure to hazards associated with paste fill activities.

3.4. Paste monitoring and assessment

In accordance with Condition 5(b) of Schedule 4 of the Project Approval, ongoing testing and assessment of the paste will be undertaken. The testing and monitoring program are described in Section 4 and will include long term leachate testing of paste, static testing of paste (Net Acid Production) as required by the QA/QC system and ongoing testing of strength, permeability and surface movement above extraction areas.

To assess the ongoing compliance with Condition 3(d) of Schedule 3 of the Consent, that is, that the paste remain physically and chemically stable and non-polluting, the monitoring program described in Section 4 includes:

- Quality Assurance testing (daily covering paste fill moisture and slump testing).
- Strength testing (weekly on average at full production).
- Leach testing (current round and then if paste mix is varied).
- Static testing of paste (annually or if paste mix is varied).
- Testing of underground water (according to current program).
- Testing of groundwater quality in surrounding monitoring bores (according to current program).

The monitoring program is intended to be a dynamic and flexible process designed to obtain data to confirm that the paste remains physically and chemically stable and non-polluting. This may require modification and adaption over time to remain practicable and beneficial. Section 5.2 describes the Trigger Action Response Plan (TARPs) which incorporates the monitoring regime and describes any specific actions needed to maintain compliance with the development consent.

4. PASTE FILL TESTING AND ANALYSIS

4.1. Background

This section provides the results of test work undertaken to date. It should be noted, that the trials and testing requirements specified in Schedule 4, Condition 5(c) of the Project Approval were satisfied by the testing results contained in the 2019 PFMP which was approved by the then Department of Planning, Industry and Environment on 30/8/19, refer Appendix 3. The testing has continued, with the more recent results obtained from paste produced from the new paste plant using tailings derived from the new processing plant, rather than facsimile paste produced in a laboratory using tailings contained in existing surface dams on site.

The ongoing monitoring program described in Section 5 is designed around the QA/QC system which is necessary to ensure that safety is not compromised within the mine, particularly as the paste is used to support the overlying strata when mining below or adjacent to an extracted ore body (stope) and to ensure the material remains stable and non-polluting.

The testing and evaluation process for the use of paste fill at Woodlawn commenced in 2007 using facsimile paste produced in a laboratory. The first analysis was produced by AMC Consultants in 2008 which concentrated on physical parameters, strength requirements and backfill systems. This work was expanded between 2014 to 2016 by Outotec Consultants which included paste permeability, long term chemical and physical stability and laboratory simulations.

Further work including the development of the ongoing QA/QC system was undertaken by Quattro Project Engineering between 2024 and 2025 (and ongoing) as DEVELOP re-commissioned the ore processing plant and paste plant. This work included verification of the original paste plant design, analysis of the tailings circuit and paste mix. Quattro and their design specialist Geotechnica, also completed the bulkhead design, paste reticulation design and stope filling exposure and stability modelling. The strength and stability performance of paste fill exposures was determined using a rigorous three-dimensional numerical modelling approach.

In order to satisfactorily answer the key questions posed in Condition 3 of Schedule 3 of the Project Approval, that is, that the paste provides long term stability, is physically and chemically stable and non-polluting, the following categories have been examined:

- Chemical composition including the tailings and water components.
- Physical parameters of the paste including strength, curing time, rheology and final permeability.
- Leachate quality and potential for future chemical instability.

A summary of the test results is provided in the following sections. The necessary ongoing test work and evaluation studies which form part of the QA/QC system are detailed in Section 5.1.

4.2. Chemical composition

Table 4-1 provides the analysis of the current tailings produced from the new processing plant. The tailings are produced from two different circuits within the plant, a Copper Circuit and a separate Poly-Metal Circuit. Both circuits are joined before pumping to the paste plant. The analyses show that the dominant components are pyrite, quartz and chlorite.

Table 4-1 also shows an analysis of the existing surface tailings material and the original bench tested sample for comparison. There are a few minor differences between the older tailings and the tailings produced from the current processing plant but overall they are very similar. The current plant tailings have lower quartz (silicon dioxide), gypsum (calcium sulphate), albite (sodium aluminium silicate) and Marcasite (iron sulphide) but slightly higher talc (magnesium silicate) and Pyrite. Marcasite and pyrite are both iron sulfide minerals however have different crystal structures. Pyrite is generally a more stable mineral structure. The Poly-Metal circuit currently produces a higher sphalerite (zinc sulphide) mineral waste but this will reduce as processing efficiency improves.

It is expected that tailings produced in a modern processing plant will be finer and have a lower metal concentration compared to these test results. Using this material to simulate paste performance both physically and chemically is considered conservative but appropriate at this stage.

Although pyrite can provide early age paste strength, it is a source of sulphur which can generate acidity and release of metals from the cured paste matrix over time. The rheological characteristics of tailings are reduced due to the presence of chlorite. In terms of the primary chemical components of the tailings, pyrite is higher in ground surface tailings than full tailings, whereas quartz and chlorite are both noted as lower in the full tailings tested in 2016.

Table 4-1 Mineralogy of tailings used in test work (percent)

Phase	Existing Surface Tailings	Bench Test Trial Tailings (2016)	New Tailings from Plant (Copper Circuit 2024)	New Tailings from Plant (Poly Metal Circuit 2024)
Pyrite	47.5	34.7	55.5	51.5
Quartz	26.3	36.5	12.6	4.7
Chlorite	11.2	22.8	12.0	2.9
Gypsum	3.1	0.0	1.9	0.0
Talc	3.1	0.7	6.6	6.7
Phlogopite	2.8	0.0	0.0	0.0
Albite	2.5	1.8	0.0	0.0
Marcasite	1.4	0.0	0.0	0.0
Chalcopyrite	0.9	0.0	1.5	2.1
Sphalerite	0.4	0.0	0.8	21.7
Tetrahedrite	0.4	0.0	0.0	0.0
Galena	0.2	0.0	0.0	0.2
Siderite	0.2	0.0	0.0	0.0
Pyrrhotite	0.0	0.3	0.0	0.0
Muscovite	0.0	2.6	0.0	0.0
Jarosite	0.0	0.3	0.1	0.0

The chemical composition of tailings used in paste also influences the strength, stability and overall performance of paste mixes. Complete characterisation of tailings material was also undertaken. In Table 4-2, the total metals aluminium, calcium and magnesium have concentrations over 10,000mg/kg and iron and sulphur both above 151000mg/kg. The metals antimony, beryllium, molybdenum and thallium have low concentrations all below 5mg/kg. The final pH of the tailings was 5.3, which is deemed within a normal range for soils.

The elevated levels of iron and aluminium do not present either strength or permeability concerns as both are usually at high concentrations in concrete products. The elevated sulphur content however would require greater binder use (cement addition) to achieve the required paste strength. This in turn however reduces the potential for long term oxidation to occur due to the neutralisation effect of the binder.

Table 4-2 Woodlawn existing tailings mix total metal concentration

Compound	Unit	Laboratory Facsimile 2016	Actual Tailings 2025
Moisture content (dried @103 °C)	%	33.7	-
Aluminium	mg/kg	21500	19,700
Antimony	mg/kg	<5	<5
Arsenic	mg/kg	334	151
Barium	mg/kg	30	8
Beryllium	mg/kg	<1	<0.1
Boron	mg/kg	<50	<20
Cadmium	mg/kg	10	8
Chromium	mg/kg	28	28
Cobalt	mg/kg	26	25
Copper	mg/kg	858	1330
Iron	mg/kg	151000	246000
Lead	mg/kg	3510	459
Manganese	mg/kg	924	27100
Molybdenum	mg/kg	<2	7
Nickel	mg/kg	17	11
Selenium	mg/kg	25	44
Silver	mg/kg	10	2
Strontium	mg/kg	10	-
Tin	mg/kg	16	6
Vanadium	mg/kg	30	28
Zinc	mg/kg	2040	2390
Calcium	mg/kg	14700	2360
Magnesium	mg/kg	31300	27100
Sodium	mg/kg	580	149
Potassium	mg/kg	1270	1930

Compound	Unit	Laboratory Facsimile 2016	Actual Tailings 2025
Sulfur as S	mg/kg	151000	-
Phosphorous	mg/kg	290	326
Titanium	mg/kg	420	-
Thallium	mg/kg	<5	-

The chemical composition of the mixing water can also influence the mechanical behaviour of the paste fill but does not necessarily influence long term environmental performance. There is a wide range of water quality available on site but during the operating phase of the project, water will be available from the existing raw water circuit supplemented by process water where suitable and required.

Table 4-3 shows the chemical analysis used in the Outotec 2015 assessment compared to the water used in the more recent paste trials. In future, water used in the paste will be blended to achieve the required water quality for paste production. By using different water qualities in the test work enabled a comparison of binder and lime costs compared with additional up front water treatment. It also provided data on the leachate potential of sulphate rich paste.

Table 4-3 Mixing water quality assessment results

Analyte	Units	Outotec 2015	Current Test work 2024
Ca	mg/L	555	507
Cl	mg/L	284	391
Electrical Conductivity	µScm	20700	11500
Fe	mg/L	1770	<0.05
K	mg/L	<10	2
Mg	mg/L	2520	1780
Na	mg/L	551	695
SO4	mg/L	24800	8660
Total Solids in suspension	mg/L	<5	<5
TDS	mg/L	44200	13200
Turbidity	NTU	7.0	0.7
pH	pH unit	2.29	6.74

4.3. Rheological (flow) test results

Rheology testing determines the plastic flow characteristics of the paste. Put simply, if the paste is too thick it will not be able to be delivered to the required locations underground and may set too quickly while conversely if the paste is too thin the curing time increases, potential for slumping increases and durability decreases. Strength and permeability characteristics are directly related to rheological factors. Achieving the correct mix is a balance between required engineering characteristics (short term strength, curing time and flowability) and environmental factors (long term strength, permeability, chemical stability and water quality). These factors are not mutually exclusive as the following results demonstrate.

Rheology testing was undertaken on three laboratory simulated tailings materials using a vane rheometer. The first sample was classed as a fresh full stream tailings sample. Results demonstrated the benefits of a 5% binder content, however the use of lime also improves rheology. It is possible that this can be explained by the residual flocculant having a similar influence on the binder and preventing flow. As shown in Figure 2, the addition of small amounts of hydrated lime reduces the solids concentration by up to 2.5%.

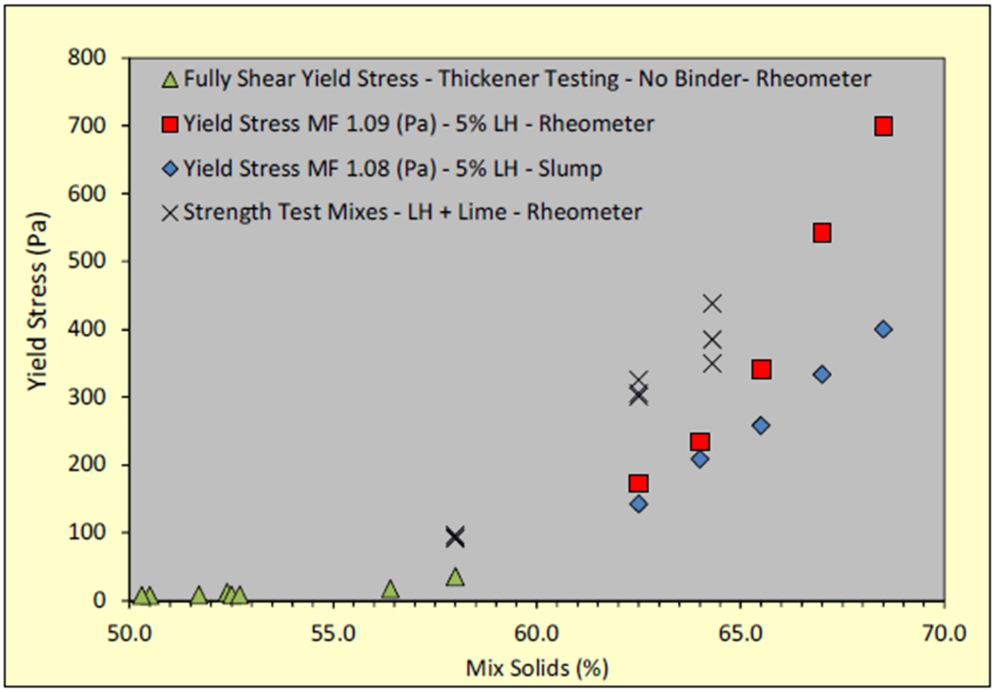

Figure 2 Rheological behavior of full stream Woodlawn paste

The second paste option (deslimed tailings) rheology was tested using the cyclone underflow samples to determine the material grading that would generate the highest density and thus highest strength/lowest permeability paste. The purpose of desliming the tailings is to increase the solids concentration by approximately 10%. Desliming was done in the laboratory and represents the removal of a portion of the colloidal clays.

The use of aggregates did not result in the required paste strength and would have an increased abrasive force on the reticulation network without any engineering or environmental benefits.

The testing has shown that the use of tailings produced from the new processing plant can achieve a workable paste mix that can be delivered to the underground stopes using gravity fed pipelines from the surface paste plant. The current paste mix design has a minimum solids content of 46%, a binder content of 5% and a minimum lime dosage of 0.75 kg/m^3. This provides a minimum fill stress of >1,000 kPa.

4.4. Cemented strength testing

Following on from the rheology testing, the current paste mix was determined via curing and strength assessments. The cemented strength of paste is a function of:

- chemical composition of the tailings, binder percentage and mix water quality;
- particle size distribution, in particular the content of fines;
- particle shape;
- binder content;
- percentage moisture; and
- specific gravity.

The curing time, often referred to as hydration, is also influenced by the above factors but also the moisture content and various chemical reactions. Additives can be used to either speed up or slow down hydration.

For Woodlawn, the mining sequence and development program would require curing times of less than 28 days for full strength and preferable in the order of 14 days depending on the specific purpose of the paste at any one time.

The full-strength requirements are listed in Table 4-5 and Table 4-4. These are based on known geological conditions for both new and existing mine workings.

Table 4-4 Estimated Paste Fill Strength Requirements

Region	Portion of total paste fill (%)	14 day strength requirement (kPa)	28 day strength requirement (kPa)
Kate Lens (Transverse stoping)	20	280	2600
	7	280	280
Kate Lens (Longitudinal retreat)	9	140	1500
	9	140	140
Drift and Fill with Half Uphole Retreat	19	400	400
Underhand Longhole Uphole Retreat Stoping	15	140	140

The required strength and curing times may differ for other mining activities, particularly filling old rock filled stopes where access above or below is not required in the short term. A summary of the test results for each paste mix is provided in Table 4-5.

Table 4-5 Cemented Strength Test Results

	Option	Material Source	Low Heat Cement (LH Cement)		Hydrated Lime		Mix solids content (%)	Unconfined Compression Strength (UCS (kPa))			Paste Density (t/m3)	Sat. (%)
			Portion by weight (%)	Mass per unit volume (kg/m3)	Portion by weight (%)	Mass per unit volume (kg/m3)		7d	14d	28d	1.07	100
1	1	Full Stream Tails	3.0	31.3	0.43	5.1	58	1	62	104	1.01	95
2	1	Full Stream Tails	5.0	47.7	0.38	3.8	58	50	235	365	1.03	97
3	1	Full Stream Tails	10.0	97.8	0.28	3.0	58	217	597	1199	1.19	97
4	1	Full Stream Tails	3.0	34.3	0.32	3.7	64.3	28	156	275	1.20	97
5	1	Full Stream Tails	5.0	57.8	0.16	1.9	64.3	181	-	766	1.19	95
6	1	Full Stream Tails	10.0	114.5	0.05	0.6	64.3	476	-	2242	1.14	98
7	1	Full Stream Tails	3.0	33.1	0.27	3.1	62.5	62	-	193	1.13	98
8	1	Full Stream Tails	5.0	54.9	0.26	2.9	62.5	236	468	606	1.14	97
9	1	Full Stream Tails	10.0	87.1	0.15	1.7	62.5	592	-	1862	1.81	100
10	2A	Des Tails (R2)	3.0	52.4	0.20		76.2	392	-	870	1.84	100
11	2A	Des Tails (R2)	5.0	87.1	0.13		76.2	802	153	1996	1.83	100
12	2A	Des Tails (R2)	10.0	173.2	0.24		76.2	2926	-	5031	1.85	100
13	2A	Des Tails (R2)	5.0	88.3	0.24		77.0	940	-	2122	1.77	100
14	2A	Des Tails (R2)	5.0	84.3	0.00		75.0	552	-	1536	1.64	100
15	2B	85% Des Tails (R2) : 15% Full Tails	5.0	77.6	0.08		72.5	796	-	1507	1.67	100

	Option	Material Source	Low Heat Cement (LH Cement)		Hydrated Lime		Mix solids content (%)	Unconfined Compression Strength (UCS (kPa))			Paste Density (t/m3)	Sat. (%)
			Portion by weight (%)	Mass per unit volume (kg/m3)	Portion by weight (%)	Mass per unit volume (kg/m3)		7d	14d	28d	1.07	100
16	2B	85% Des Tails (R2) : 15% Full Tails	3.0	48.3	0.16		74.0	322	-	877	1.67	100
17	2B	85% Des Tails (R2) : 15% Full Tails	5.0	80.3	0.11		74.0	817	134	1707	1.66	100
18	2B	85% Des Tails (R2) : 15% Full Tails	10.0	158.8	0.03		74.0	2488	-	4480	1.72	100
19	2B	85% Des Tails (R2) : 15% Full Tails	3.0	49.9	0.12		75.5	420	722	967	1.71	100
20	2B	85% Des Tails (R2) : 15% Full Tails	5.0	82.2	0.04		75.5	800	128	1761	1.71	100
21	2B	85% Des Tails (R2) : 15% Full Tails	10.0	241.8	0.62		75.5	2564	365	4634	1.72	100
22	3	80% Full Tails: 20% -10mm Agg	3.0	58.1			68.0	87	205	292	1.32	97
23	3	80% Full Tails: 20% -10mm Agg	5.0				68.0	431	-	897	1.30	98
24	3	80% Full Tails: 20% -10mm Agg	5.0	64.6			67.0	324	-	-	1.29	100
25	3	80% Full Tails: 20% -10mm Agg	3.9	55.8			70.5	244	-	611	1.42	98

The strength development rate of the paste fill was also modified by the addition of hydrated lime at various concentrations. Although no gypsum was added during the trials, it could be used in future to slow the curing time if this was considered necessary. The trials demonstrated that the use of aggregates within the paste did not enhance final strength and will therefore not be used at Woodlawn.

The strength testing showed that although deslimed tailings (which have the very fine clays removed) provided the greatest strength, most of tailings stream options provided sufficient strength to achieve the proposed extraction methodology. The testing also found that each paste option would provide significant additional surface stability compared with the original mining method of using loose rock fill.

The results also show that strength is dramatically increased with increased cement content. A corresponding reduction in curing times also occurred with increased cement content. This was expected but as the higher strength and/or reduced curing times is only needed in certain circumstances, the Paste Plant operation will remain flexible to deliver the optimal paste quality for its intended purpose within the mine.

4.5. Binder requirements

As cement represents a significant component of the operating costs of the Paste Plant, developing the optimal paste mix is important for the overall operation. The test work has shown that generally a 5% cement addition provides sufficient strength and curing time. Variations will occur and may include a higher or lower percentage of binder depending on the required duty. Tests using the four paste options are summarised in Figure 3.

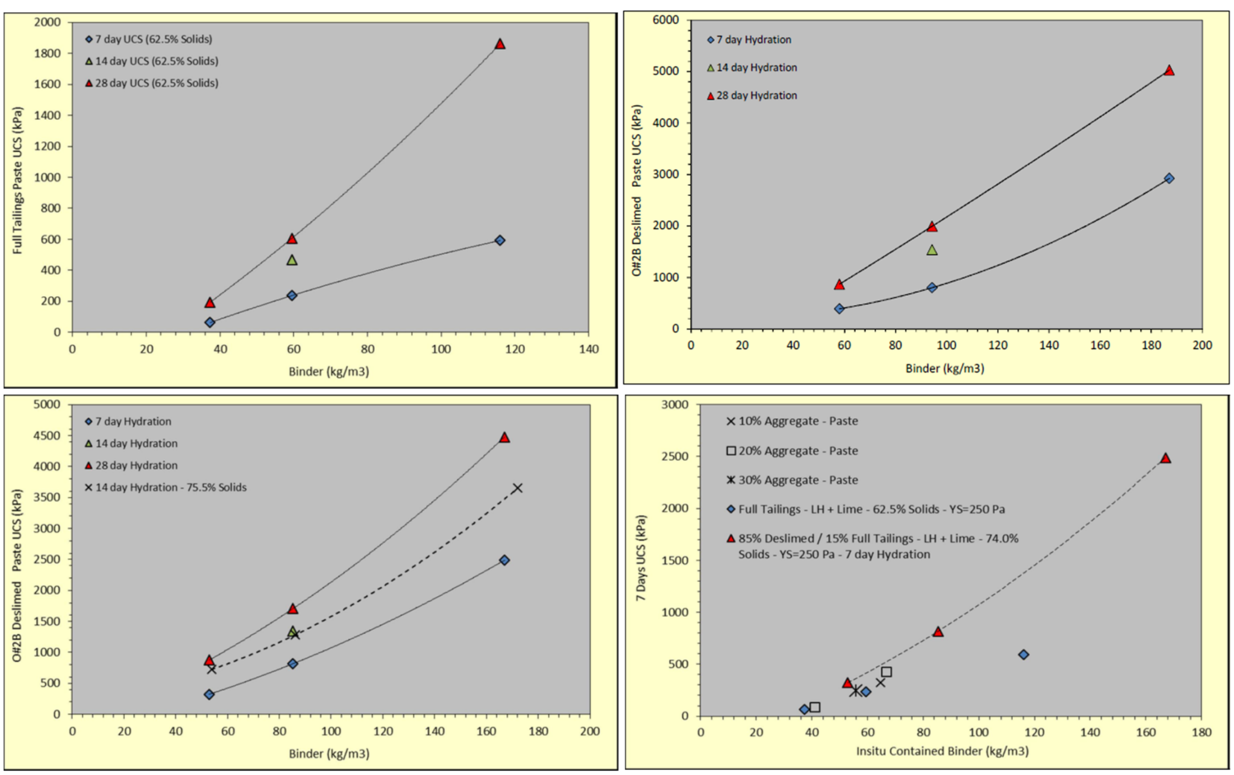

Figure 3. In situ contained binder Vs strength for Option 1, 2A, 2B, 3 at hydration times of 7, 14 and 28 days

The results show differing strength characteristics over time for each paste mix. These paste mixes differed in density, cement content and particle distribution. The results showed that all mixes could be utilised at Woodlawn with the exception of the aggregate option. The main variable to achieve the required strength and curing time will be cement content.

4.6. Paste stability

An important factor in determining the potential impacts on groundwater of the paste in the underground workings is its long term stability. This is a function of its permeability and future pH. The initial pH of the paste produced by the Woodlawn Paste Plant is greater than pH 12.0. This forms part of the QA/QC testing regime. This pH will be achieved by lime dosing, which is currently in the order of 0.75 kg/t but will vary as required in the ongoing operation.

There is a significant body of research on the reasons for concrete degradation over time. Maintaining an alkaline pH ensures that metal species do not mobilise in water and that any reinforcement, such as steel contained in the concrete, oxidises. This process is not relevant to the Woodlawn paste as no reinforcement is necessary. The paste will be uniform throughout the mining void.

The curing process will create calcium hydroxide as a natural by-product of the cement hydration process. Under normal use, concrete undergoes the process of carbonation which is where atmospheric carbon dioxide reacts with the surface of the cement turning calcium hydroxide into calcium carbonate. This process generally reduces the surface alkalinity from pH 12 to pH 9. This is still sufficient to prevent the mobilisation of metals. However, an important factor with the paste used underground as a tight fill is that normal atmosphere is limited once the stope is filled. This process will further reduce the potential oxidation process.

When fully exposed to atmosphere, concrete products can have a design life of over 100 years. The main form of degradation is the loss of strength to below that required for the design task, such as piers used to support buildings and bridges. When used in a confined space such as mining stopes which require much reduced overall strength characteristics and with the lack of atmospheric exposure, the design life would be measured in thousands of years.

4.7. Permeability

The fine particle size of the tailings used in the Paste Plant minimises the porosity and permeability of the material within the stopes as well as increases overall strength. This in turn reduces the potential for water movement through the material. The particle shape is also angular and with a relatively high specific gravity.

Results to date shows that the Woodlawn cemented paste backfill, using a 5% binder content, has a permeability between 1×10^{-10} m/s and 2.0×10^{-8} m/s. By comparison, the permeability required for the tailings dam liner is 1×10^{-9} m/s for a total thickness of 900mm. This very low permeability over a thickness of less than one metre is generally used as the permeability standard for dam liners to prevent contamination from entering the groundwater system. Given that the paste filled stopes will generally be thicker than 20 m, the anticipated permeability value will be an effective barrier to groundwater movement.

To put this into perspective, once a stope is filled with cured paste, water will take approximately 30 years to saturate 1 m of material, or around 300 years to fully saturate a typical stope. Only when fully saturated is there the potential for leaching to occur but only minerals that are soluble in neutral to moderately alkaline pH can potentially be released. This excludes all the metals of concern including Zinc, Copper, Lead, Iron and most sulphate compounds. Although testing will continue, the results to date show that the paste will remain environmentally benign and non-polluting over the long term.

4.8. Leachate quality

The final issue raised by Condition 5 of the Project Approval is that the paste material is chemically stable and non-polluting. Although this is governed by permeability, that is, the ability of the material to leach anything, further testing was carried out to determine what would happen if over time, the paste lost its internal cemented structure and became permeable. In theory this is possible if taking the position of determining potential impacts in-perpetuity. Toxicity Characteristic Leaching Procedure (TCLP) was undertaken on the paste to determine indefinite period potential impacts. This test procedure is a soil/solid sample extraction method for chemical analysis employed as an analytical method to simulate leaching.

To allow water to move through the paste material, it is first crushed to remove the cementitious bonds which increases pore space to allow water under pressure to move through the material. In practice, this would only occur after complete natural failure of the concreted material which would be measured in thousands of years.

As described in Section 4.2, the QA/QC system requires ongoing testing of the paste throughout its operation. These tests centre on permeability and strength which are necessary to preclude water infiltration into the paste, however some additional environmental tests will include standard tests for Net Acid Generation (NAG) and Kinetic testing. The kinetic testing will follow the Leaching Environmental Assessment Framework (LEAF) system, the results of which will provide the basis for estimating leaching rates under specified release conditions unique to the Woodlawn Mine. The NAG testing will determine if the paste has the potential to become acid generating over time and will generally be used if the paste mix is modified in future. It will not be necessary to undertake these tests on a regular basis, but rather only if the paste mix constituents are changed.

A key factor is pH. The higher the alkalinity of the material, the lower the risk of leaching soluble metals. NAG testing in conjunction with Kinetic testing using leach columns can determine the long term physical and chemical stability of the paste, even in the event that the material loses its cementitious structure and becomes permeable. Section 5.2 lists the corrective measures to be employed based on ongoing test results to ensure that the paste used underground will remain physically and chemically stable and non-polluting.

The results of the latest round of testing compared with the original results are shown in Table 4-6. The first set of results are derived from the original testing using material generated in a laboratory for the purposes of simulating paste using existing on site tailings as required by Schedule 4, Condition 5(c) of the Project Approval. The second set shows the results using tailings produced from the new processing plant. Although there are no specific guidelines for the use of concrete products either above or below ground, the results are compared to the current NSW Waste Classification Guidelines.

The Waste Classification Guidelines are only relevant in that it demonstrates that the material is suitable for use in an underground environment as it can be disposed and covered in a licensed waste disposal facility. Its very low permeability would also make it ideal to use as a liner for dams and voids used in waste disposal to prevent contaminated leachate entering groundwater systems.

It is also known that groundwater in the surrounding the mine already has elevated metals given the nature of the geology. These concentrations are known to exceed the leachable concentrations for paste produced from the paste plant. This is a result of groundwater currently moving through ore lenses with significant metal content. The removal of these lenses and replacement with paste with significantly lower metal content provides the potential for long term improvement in groundwater quality. The improvement will, however, be minor given the naturally high level of metal concentrations in the surrounding rock strata which will not be mined.

Ongoing testing, as outlined in Section 5.1 is proposed to ensure the paste remains chemically stable and non-polluting over the long term. Additional testing will be undertaken as part of the QA/QC system for the ongoing operation of the paste plant. The testing undertaken to date has however provided a baseline conservative assessment which has demonstrated that the paste will be permanently stable and non-polluting.

Table 4-6 Paste Leachate Testing

Parameter	2016 Facsimile Paste mg/kg	2025 Actual Paste mg/kg	Leachable Concentration (TCLP) mg/L	General Solid Waste Specific Contamination Concentration mg/kg
Lead	3510	459	46	1500
Molybdenum	2	7	0.002	1000
Nickel	17	8	0.028	1050
Selenium	25	44	0.01	50
Silver	10	4	0.001	180
Arsenic	334	174	0.01	500
Beryllium	1	<1	0.002	100
Cadmium	10	8	0.21	100
Chromium	28	28	0.004	1900
Aluminium	21500	19,700	1.44	N/A
Copper	858	1330	4.84	N/A
Manganese	924	27100	3.08	N/A
Zinc	2040	2390	13.9	N/A
Iron	151000	246000	0.17	N/A

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5. MONITORING AND VERIFICATION

5.1. Paste monitoring

Paste monitoring forms part of the ongoing QA/QC system and consists of:

- Quality Assurance testing (daily covering paste fill moisture and slump testing).
- Strength testing (weekly on average at full production).
- Leach testing (current round and then if paste mix is varied).
- Static testing of paste (annually or if paste mix is varied).
- Testing of underground water (according to current program).
- Testing of groundwater quality in surrounding monitoring bores (according to current program).

Paste behaviour, including total stress and pore water pressure, pore space and permeability will also be confirmed using:

- Vibrating wire piezometers and total earth pressure cell located greater than 1m from the floor to measure total stress perpendicular to the barricade;
- Vibrating wire piezometers to measure pore pressure; and
- A thermistor to measure internal fill mass temperature.

Once confirmed, there is no need to undertake further testing of paste behaviour as the data will be translatable to other filled stopes. Ongoing testing will then centre on the QA/QC system only.

As the mining process will be removing metals from the extraction area it would not be possible for the natural groundwater to increase in metal concentration. The existing groundwater monitoring program undertaken in accordance with the Environment Protection Licence will continue as is, however may be reduced in future based on the outcomes of the paste monitoring.

Further details of the ongoing testing procedures are described in the following sections.

5.1.1. Net Acid Generation (NAG)

NAG, also referred to as Net Acid Production (NAP) is a static method using hydrogen peroxide to oxidise any sulphides present in the sample. The acid produced from the oxidation reaction may subsequently be partially or totally consumed by acid neutralising components of the sample. Any remaining acidity is determined by back titration to both pH 4.5 and pH 7.0 and reported as NAG. It is expressed in kg H_2SO_4 equivalent per tonne. This is the main test to be performed on both the waste rock within the mine and the paste delivered to completed stopes. This test determines whether a particular material is classified as Potentially Acid Forming (PAF) or Non-Acid Forming (NAF).

5.1.2. Kinetic testing

Leaching Environmental Assessment Framework (LEAF) is a kinetic leaching evaluation system designed to provide a consistent approach to estimating the release of constituents of potential concern from a wide range of solid materials through waterborne pathways. It is designed to simulate field weathering conditions to provide information on a range of issues including sulphide reactivity, oxidation kinetics, metal solubility and the leaching behaviour of the test materials. Kinetic testing is used to compliment environmental geochemical investigations on mine rock and waste materials and are used to determine drainage chemistry.

The test sample is leached in a tank vessel with periodic renewal of the leaching solution at 9 specified intervals ranging from 2 hours to 23 days, for a total cumulative leaching time of 63 days. The volume of leachant used is based on a liquid-to-(exposed) surface area ratio (L/A) of 9:1. The dimensions of the monolith to be used at Woodlawn, based on advice from ALS Laboratories, are 38mm diameter x 70mm length, permitting a standard 1L leaching vessel to be used. The eluates at each interval are analysed for physical properties and constituent concentrations specifically tailored for Woodlawn and include target metal species. This data can be used to plot both interval flux and cumulative mass release as a function of cumulative leaching time. This data can then be compared with the actual volume of water that will pass through the paste based on its permeability and give a result in litres per 100 years.

Previous leach methods have been completed and although the results confirm the leachate quality, the LEAF method will be used to calculate actual volumes of leachate passing through the cured paste. Based on data to date, this is likely to be extremely small given the extremely low permeability of the paste.

Kinetic testing will be performed once on the cured paste from the new plant as a cross check on earlier leachate testing. After this is completed, it will only be necessary to repeat the test if the paste mix constituents change, for example if there is a change in binder type or other additives.

5.1.3. General water chemistry testing

Monitoring of surface water and groundwater is undertaken as part of the water management plan. This data is used to determine whether mine activities are causing adverse impacts upon the surrounding environment, including groundwater system. The groundwater monitoring program covers general physical parameters such as pH, conductivity, cations and anions as well as a range of metals which are typical of the Woodlawn volcanics. The data is used to provide a first indicator of the presence of additional acid formation over and above the influence of natural geological conditions.

It is difficult to determine the effects of mining on acidity and metal concentrations in areas naturally influenced by the sulphide volcanics which can mask the presence of additional mine related sources of acidity and metal rich drainage. However, given that the paste fill process essentially replaces a metal rich ore with a benign concrete paste, it would not be possible for the paste fill process to increase the concentration of metals in the groundwater system.

5.1.4. Testing program and schedule

The monitoring program covering the QA/QC testing commenced following the commissioning of the Paste Plant. Longer team kinetic and engineering strength testing is currently underway. The following schedule of monitoring will occur:

- Quality assurance testing of the paste will be carried out on a daily basis. This testing may include particle size distribution, consistency, pH, density and Rheology.
- Strength testing of the paste will occur at least weekly or as required for quality assurance purposes. Results are provided in 7 day and 14 day periods.
- Regular testing of the water pumped from the underground workings.

- Initial NAG and Kinetic Leach testing of paste produced from the paste plant. The results will be used to vary the mix if required after which the test is only required if the paste constituents change.

This Paste Fill Management Plan will be updated as necessary to incorporate the results of any future testing.

5.2. Mitigation and preventative measures

Despite the expectation that the paste will have a slight positive impact on groundwater quality within the mine, DEVELOP will monitor the quality of the paste and groundwater quality within the mine workings by testing the dewatering system. Additional NAG testing can be completed on the paste to determine if the paste is PAF. If the NAG testing shows that the paste is moderately PAF or above, then additives may be required such as lime to lower the NAG value.

There are engineering imperatives to ensure that the paste remains chemically stable and non-polluting. The proposed QA/QC testing within the paste plant will ensure that strength and therefore permeability, remain at optimal levels.

5.2.1. Trigger, Action and Response Plan

As there are no statutory guidelines for the use of cemented material either above or below ground, triggers have been set on the basis of the QA/QC system. The following Trigger Action Response Plan has been developed in relation to paste fill.

Table 5-7 Paste Fill Trigger Action Response Plan

Component	Parameter	Trigger	Action
Paste Strength	14 day strength	>150 kPa	No action, continue monitoring
		<150 kPa	Increase binder content to reach strength requirement
	Friction loss	5kPa/m to 8kPa/m	No action, continue monitoring
		<5kPa/m or > 8kPa/m	Modify solids up or down as required
	Density	Outside optimal range	Adjust paste solids up or down as required
Paste quality	Acid generation	NAG pH >4.5	Non-acid forming, no further testing required unless paste constituents change
		NAG pH <4.5	Potentially acid forming, increase cement and/or lime to paste mix to meet NAG criteria

In summary, the corrective measures that are available under this Paste Fill management plan centre around the permeability and leachability of the paste. The most effective way to improve these characteristics is to increase the binder content of the paste. Other measures can include the introduction of alkaline materials which can include PAF materials on site or new alkalis such as lime. As the current paste pH is above 12, and the long term pH is unlikely to fall below 8 being the pH of the oxidised product from the paste (Calcium Carbonate), there is limited scope for acid generation and associated metal mobility in the long term. The monitoring program will however be designed to verify this prediction.

Appendix 1 Plans

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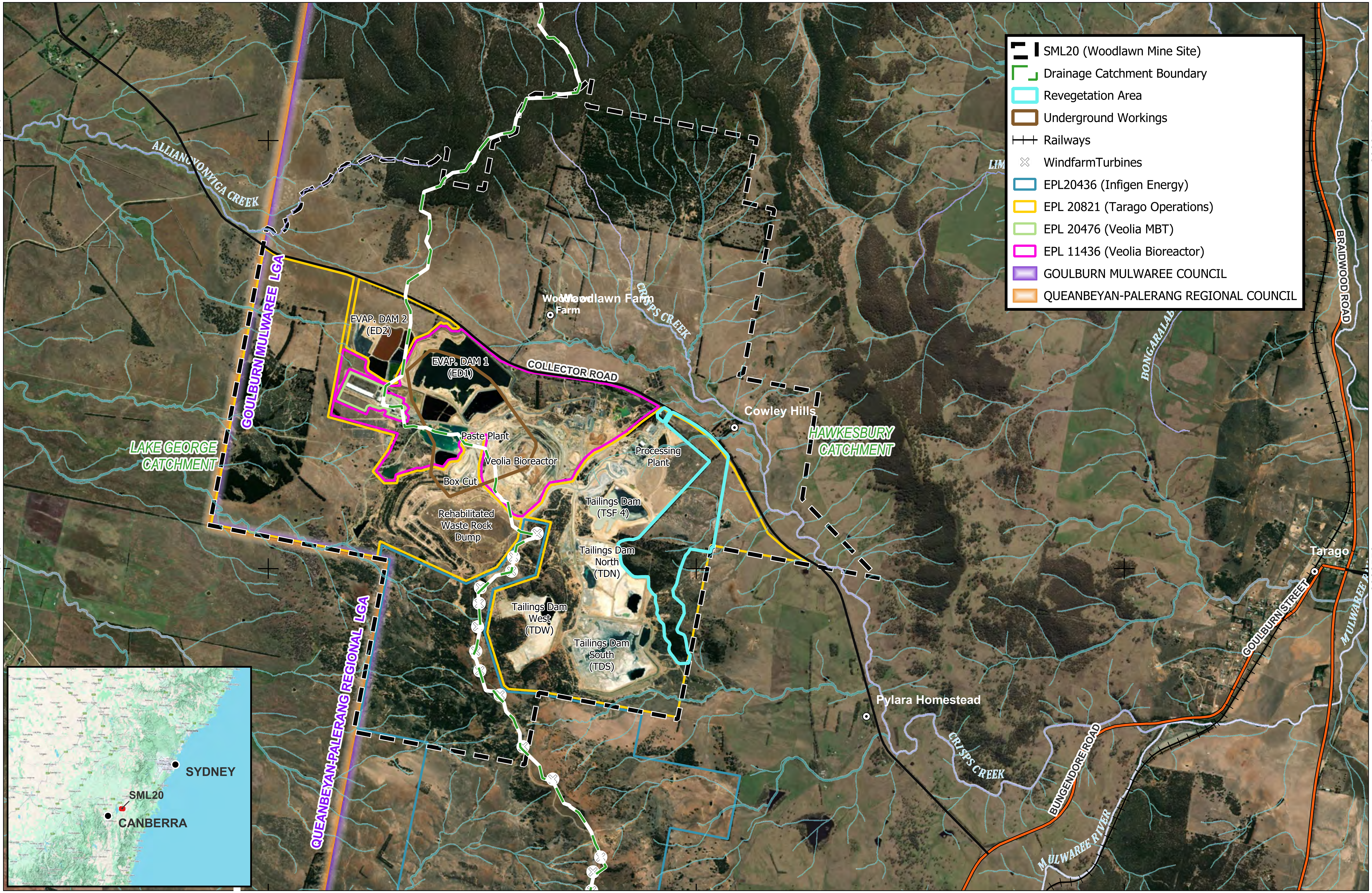

1 2 km Scale: 1:32,000 MGA94 (Zone 55) VTX-JOB-0473-MAP-02 Date: 2025-6-26 Rev: 02 @A3	DEVELOP Author: C Hobbs Requested By: K Crook	WOODLAWN ZINC COPPER PROJECT **Site Plan**

Appendix 2 Plan Approval

Planning, Industry & Environment

Resource and Energy Assessments
Contact: Leesa Johnston
Phone: 8289 6861
Email: leesa.johnston@planning.nsw.gov.au

Mr Andrew Lawry
Chief Operating Officer
Heron Resources Limited
WOODLAWN MINE PROJECT

By email to: ALawry@HeronResources.com.au

Dear Mr Lawry

Woodlawn Mine Project (07_0143) – Approval Paste Fill Management Plan

I refer to your email dated 21 July 2019 seeking the Secretary's review and approval of the *Heron Resources Limited Woodlawn Zinc – Copper Project Paste Fill Management Plan* (Revision 7, dated 19 July 2019).

The Department has carefully reviewed the *Heron Resources Limited Woodlawn Zinc – Copper Project Paste Fill Management Plan* (Revision 7, dated 19 July 2019) and is satisfied that the Plan address the requirements of condition 5, Schedule 3 of Project Approval 07_0143.

Accordingly, the Secretary approves the *Heron Resources Limited Woodlawn Zinc – Copper Project Paste Fill Management Plan* (Revision 7, dated 19 July 2019).

Please ensure that a copy of Plan is placed on your website as soon as possible.

If you require further information, please contact Leesa Johnston on 8289 6861 or by email to leesa.johnston@planning.nsw.gov.au.

Yours sincerely

30/8/19

Steve O'Donoghue
Director
Resource Assessments
as nominee of the Secretary