



Waste Rock Management Plan

Woodlawn Zinc Copper Project

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Document :	ENW-010-PL	Issue Date	07/03/2026	Version#: 12 Rev1
Document Name	Waste Rock Management Plan	Review Date	07/03/2027	
Prepared by :	KC, HB, CV	Approved by:	KC	Page 1 of 29

Glossary

Acronym	Definition
ANC	Acid Neutralising Capacity
APP	Acid Producing Potential
CCC	Community Consultation Committee
DEVELOP	Develop Global Limited - Tarago Operations Pty Limited
DFAT	Department of Foreign Affairs and Trade
DPE	Department of Planning and Environment
DPHI	Department of Planning, Housing and Infrastructure
DPI- Water	Department of Primary Industries - Water
DRG	Division of Resources and Geosciences
EA	Environmental Assessment
EMS	Environmental Management Strategy
EPA	Environment Protection Authority
EPL	Environmental Protection Licence
NAF	Non-Acid Forming
NAG	Net-Acid Generation
NAP	Net Acid Production
NAPP	Net Acid Production Potential
NATA	National Association of Testing Authorities
NSW	New South Wales
PA	Project Approval
PAF	Potentially Acid Forming
PCD	Pollution Control Dam
Project	Woodlawn Copper-Zinc Mine
ROM	Run of Mine
SML20	Special Mining Lease 20
TARP	Trigger Action Response Plan
TSF4	Tailings Storage Facility 4
Veolia	Woodlawn Bioreactor
WMP	Water Management Plan
WRMP	Waste Rock Management Plan

Contents

1. Introduction	5
1.1. Background	5
1.2. Objectives and Outcomes	5
1.3. Consultation	6
1.4. Legislation	7
1.5. Guidelines and standards	7
1.6. Project approval	7
2. Geological Environment	10
2.1. General characterisation	10
2.2. Expected waste rock production	10
2.3. Testing results to date	10
3. Classification and Storage	11
3.1. Risk considerations	11
3.2. Storage	11
3.3. Geological model	11
3.4. Visual assessment	12
3.5. Storage and use	13
3.6. Treatment of PAF Waste Rock	13
4. Laboratory testing	14
4.1. Background and definitions	14
4.1.1. Acid Producing Potential (APP)	14
4.1.2. Acid Neutralising Capacity (ANC)	14
4.1.3. Net Acid Production Potential (NAPP)	14
4.1.4. Net Acid Generation (NAG)	14
4.1.5. Kinetic Testing	15
4.2. Procedure	15
5. Compliance and Assurance	16
5.1. Validation program	16
5.2. Water monitoring programs	16
5.2.1. Triggers	17
6. Communication, Reporting and Reviews	18
6.1. Communication	18
6.2. Reporting	18
6.3. Complaints	18
6.4. Incident reporting	19
6.5. Review and continuous improvement	19
7. References	20

Document :	ENW-010-PL	Issue Date	07/03/2026	Version#: 12 Rev1
Document Name	Waste Rock Management Plan	Review Date	07/03/2027	
Prepared by :	KC, HB, CV	Approved by:	KC	Page 3 of 29

TABLES

Table 1-1	Objectives and outcomes for waste rock management	6
Table 1-2	Consent Conditions Relating to waste management.....	8
Table 5-3	Geochemical classifications (DFAT 2016 based on AMIRA 2002).....	16

Appendices

Appendix 1	Plans
Appendix 2	Consultation log - WRMP
Appendix 3	Plan Approval

Document :	ENW-010-PL	Issue Date	07/03/2026	Version#: 12 Rev1
Document Name	Waste Rock Management Plan	Review Date	07/03/2027	
Prepared by :	KC, HB, CV	Approved by:	KC	Page 4 of 29

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 an 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. The project layout is included in Plan 2, Appendix 1.

Waste rock generation and management for the Project was previously described in detail in the Project EA (Parsons Brinkerhoff 2012). With the construction phase of the project, as approved by the original Project Approval and subsequent modifications now complete, this version of the Waste Rock Management Plan (WRMP) provides updates for the site and project going forward. It is important to note previous versions of this plan authored by Heron contained references to rehabilitation and management of historical waste rock and associated features associated with the former (pre 2000's mine). These aspects are considered in other management plans including water and rehabilitation. This plan, therefore, is for the management of waste rock from the new mine associated with the 2012 approval.

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

1.2. Objectives and Outcomes

The purpose of this WRMP is to document the control measures and management initiatives for waste rock produced by the Project. The overall objectives for the WRMP are to:

- Implement the commitments made in the EA including specific conditions of approval and the Statement of Commitments.
- Ensure compliance with relevant environmental legislation.
- Manage waste rock related risks associated with the Project.
- Provide a mechanism to adapt new measures throughout the ongoing operation to improve the management and identification of waste rock characteristics.
- Provide a mechanism to identify and correct areas of non-compliance.

Document :	ENW-010-PL	Issue Date	07/03/2026	Version#: 12 Rev1
Document Name	Waste Rock Management Plan	Review Date	07/03/2027	
Prepared by :	KC, HB, CV	Approved by:	KC	Page 5 of 29

The overriding objective is to prevent the escape of acid leachate from the stockpiled waste rock. Production of acid leachate from sulphide rich rock will continue to occur whenever the material is exposed to water and air. It occurs naturally when the ore body weathers near the surface but is accelerated when placed in above ground storages and emplacements. A key outcome of this WRMP is to minimise the formation of acid drainage on the surface. Table 3 lists the objectives and outcomes for the WRMP.

Table 1-1 Objectives and outcomes for waste rock management

Objective	Outcome
Procedures are developed to ensure that potential acid forming (PAF) waste rock is identified during ongoing underground mining operations and is stockpiled in the appropriate designed temporary potentially acid forming waste rock waste emplacement.	Identification of PAF material within the underground workings. Isolation of PAF material within the waste stream for separate handling, treatment and disposal.
Competence training will be implemented to ensure relevant employees and contractors manage PAF waste rock material appropriately.	Employees and contractors fully engaged in managing PAF waste rock material.
Ensure that the temporary waste rock emplacement is designed to contain and manage any potential acid rock drainage.	Drainage is contained within tailings dams. No offsite discharge. Impact on surface and groundwater is negligible.
Effective isolation and/or neutralisation of potential acid forming material in waste rock dumps	Impact on surface and groundwater is negligible.
Establish trigger levels for any material that has oxidised to the extent that it cannot be placed underground without impacting groundwater quality, and procedures for adequate capping and sealing of such material at the surface	Trigger levels established based on NAPP and NAG pH results

1.3. Consultation

This plan was originally drafted by Heron following consultation with government and non-government organisations. According to previous versions no comments were received on the plan prior to the preparation of version 5. DEVELOP has since revised the plan with additional consultation where required and applicable depending on the update. A consultation log is provided in which will be updated as required during the ongoing operation of the Project.

DEVELOP understands this plan was previously approved in 2019 as presented in Appendix 3, however, it appears as though the subject title incorrectly refers to the paste fill management plan. The detail of the letter does reference the Waste Rock Management Plan.

Document :	ENW-010-PL	Issue Date	07/03/2026	Version#: 12 Rev1
Document Name	Waste Rock Management Plan	Review Date	07/03/2027	
Prepared by :	KC, HB, CV	Approved by:	KC	Page 6 of 29

1.4. Legislation

Legislation relevant to waste rock management includes:

- Environmental Planning and Assessment Act 1979 (EP&A Act);
- Mining Act 1992;
- Contaminated Land Management Amendment Act 2008;
- Protection of the Environment Operations Act 1997 (POEO Act); and
- Waste Avoidance and Resource Recovery Act (2011).

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

1.5. Guidelines and standards

There are a range of guidelines and fact sheets regarding the management and testing of waste rock. The main guideline was produced by the Commonwealth Department of Industry, Tourism and Resources entitled Preventing Acid and Metalliferous Drainage – Leading Practice Sustainable Development Program, produced in 2016. The guidelines provide general information on the control systems as well as methods to achieve current best practice. The list of sources used in the preparation of this management plan are presented in Section 7 and have been referred to in the preparation of this plan where applicable.

1.6. Project approval

This WRMP has been developed in accordance with the Project Approval and Statement of Commitments. Table 1-2 outlines these including reference to where each of the conditions are addressed.

Document :	ENW-010-PL	Issue Date	07/03/2026	Version#: 12 Rev1
Document Name	Waste Rock Management Plan	Review Date	07/03/2027	
Prepared by :	KC, HB, CV	Approved by:	KC	Page 7 of 29

Table 1-2 Consent Conditions Relating to waste management

Condition	Description	Where Addressed
Schedule 4 Condition 19	The Proponent shall prepare and implement a Waste Rock Management Plan to the satisfaction of the Secretary. The plan must:	This Plan
	(a) be developed in consultation with Division of Resources and Geosciences (DRG), EPA and Department of Primary Industries - Water (DPI-Water);	Appendix 2#
	(b) be submitted for the approval of the Secretary prior to commencing underground mining operations;	Completed by Heron, refer to cover page
	(c) include a detailed description of the procedures to be implemented to monitor and manage potential acid forming material, including:	
	• testing for potentially acid forming (PAF) waste rock prior to it being brought to the surface;	Section 3.4
	• prioritising the relocation of PAF material to suitable underground locations prior to oxidation;	Section 3.5
	• using all reasonable and feasible measures to prevent waste rock emplaced underground from further oxidising or causing impacts on groundwater;	Section 3.5
Schedule 6, Condition 3	• trigger levels for any material that has oxidised to the extent that it cannot be placed underground without impacting groundwater quality, and procedures for adequate capping and sealing of such material at the surface;	Section 3.6 & Section 5
	• effective isolation and/or neutralisation of PAF material in waste rock dumps; and	Section 1.2 & Section 3
	(d) reflect the groundwater and surface water monitoring programs to monitor PAF waste rock and any leachate generated, including appropriately designed detection and response systems for acid generation	Section 5.2
	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);	Section 1.4, 1.5 & 1.6
	• any relevant limits or performance measures/criteria;	Section 5
	• 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 1.2

Condition	Description	Where Addressed
	(b) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	Section 3 & 4
	(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
	(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
	(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 6.4
	(f) a protocol for periodic review of the plan.	Section 6.5
Schedule 6, Condition 7	The Proponent shall notify the Secretary and any other relevant agencies of any incident associated with the project as soon as practicable after the Proponent becomes aware of the incident. Within seven days of the date of the incident, the Proponent shall provide the Secretary and any relevant agencies with a detailed report on the incident.	Section 6.4
Schedule 6, Condition 8	The Proponent shall provide regular reporting on the environmental performance of the project on its website, in accordance with the reporting arrangements in any approved plans of the conditions of this approval.	Section 6.2
Statement of Commitments Item 51 Soils & Waste	Waste rock would be progressively characterised for net acid generating potential, both through physical identification by geologists and laboratory analysis.	Section 3.4 & 4.2

2. GEOLOGICAL ENVIRONMENT

2.1. General characterisation

The target ore is hosted within a bedded volcanogenic massive sulphide deposit which is itself hosted within the Woodlawn Felsic Volcanics. The volcanics are flanked by sedimentary strata consisting of mudstone, pyritic black shale, sandstone, conglomerate and limestone. The package is intruded by dolerite sills and dykes associated with the overlying basalts and has been subject to low grade metamorphism. From an environmental perspective, the geological environment presents a highly complex mixture of acidic, neutral, alkaline, saline, non-saline, high and low sulphide and metal-bearing strata.

Rocks with high sulphide content particularly pyrite, and to a lesser extent, sphalerite, galena and chalcopyrite have the potential to form acidity when exposed to air and water. The associated metals that are present tend to mobilise as pH falls. The trigger usually is elevated sulphide, which also increases conductivity, but the salt is predominantly sulphate-based rather than the more typical sodium chloride.

Sulphide minerals such as pyrite (FeS_2), sphalerite (ZnS), galena (PbS) and chalcopyrite (CuFeS_2) are the main sources of Potentially Acid Forming (PAF) materials. The zinc, lead and copper-based minerals are the target minerals (or ore) for processing while pyrite is not.

2.2. Expected waste rock production

The rock mass surrounding the target ore contains gangue minerals. Gangue minerals are uneconomic and not targeted for processing. These consist of quartz, talc, chlorite and calcite, which are generally NAF but can include other minerals such as pyrite, which are PAF.

To access the ore, decline and drives, otherwise known as development, are constructed by advancing tunnel faces. This development is strategically placed in rock mass a safe distance from the orebody to maintain good ground conditions. The tunnels to access the ore then branch off the development and go towards, and eventually through, the orebody. The rock mass of these development tunnels often consists of gangue minerals until the orebody is reached. This material is mined with the waste rock containing the gangue minerals separated from the ore. The ore is subsequently processed through the processing plant. Once there are adequate tunnels which reach the ore body stopes are also advanced through the ore body and processed through the processing plant.

2.3. Testing results to date

There are minimal samples results acquired to date. The EA does not include any and no results have been located from the previous mining operator. DEVELOP has undertaken some collection of waste rock material which has been tested at a National Association of Testing Authorities (NATA) compliant laboratory. The results of this have validated the presence of both non-acid and acid-forming rock material as defined in Section 5. Further testing is proposed as the mine progresses as detailed in Section 4.

Document :	ENW-010-PL	Issue Date	07/03/2026	Version#: 12 Rev1
Document Name	Waste Rock Management Plan	Review Date	07/03/2027	
Prepared by :	KC, HB, CV	Approved by:	KC	Page 10 of 29

3. CLASSIFICATION AND STORAGE

3.1. Risk considerations

The Project is located on a legacy site which had already been significantly disturbed with PAF material in the form of rock and tailings already existing within the footprint. Risk management and ongoing monitoring of these areas is included in the Water Management Plan (WMP) with the rectification of these features detailed in the Rehabilitation Management Plan. Although these legacy aspects are not considered in this WRMP which details the new operation only, they are important to consider when determining the level of risk that new PAF material may pose on the site. Regarding risk, the following is also relevant to consider when devising management strategies for waste rock:

- There is a lack of sensitive receptors in the vicinity of operational areas of the project. This includes groundwater dependent ecosystems and groundwater users which are further discussed in the WMP.
- The geological conditions result in an absence of significant quantities of groundwater and limited permeability.
- The site in the past and ongoing (for both the mine and the Bioreactor) operates as a nil discharge site. This means there is an already established network of drains and diversion channels which ensures any water which contacts legacy or contaminated operational areas (mine or process water as defined in the WMP) remains on site in existing structures and clean water (as defined in the WMP) is diverted away.
- As detailed in the WMP there is a robust water monitoring program and response plan established with locations included to facilitate assurance that management strategies in regards to the management of waste rock are sufficient.
- The rock itself is considered to have the most potential for environmental risk due to the potential for acid formation and subsequent metal mobilisation.
- Being rock there is no additional air quality considerations to be considered beyond what is already documented in the Air Quality Management Plan (AQMP). The AQMP details the sites monitoring network and associated triggers.
- Given the potential risks of the material and uncertainty around defining a feature as “temporary” the storage of waste rock is considered to be fixed for the life of mine in line with Chapter 9 of the Environmental Assessment.

3.2. Storage

The waste rock emplacement area has been designed to ensure that seepage and rainfall runoff from this area is diverted into on-site storages and remains on-site. Therefore, the monitoring of drainage networks around the dump will be completed to ensure they are in-tact and functioning as expected by ensuring any contaminated water remains on site. NAF rock will be segregated from any PAF material so that the PAF rock can be encapsulated.

3.3. Geological model

Geological models will be developed from existing and planned underground drilling programs to identify sulphide bearing rocks within the designated underground mining area. These models are based on the lithology of the rock, alteration of the rock and geochemical assays of the rock through laboratory testing. From this model, the planning of expected volumes of PAF and Non -Acid Forming (NAF) material being brought to and temporarily stored on the surface can be forecasted and included in the long-term mining plan. The Woodlawn Mine

Document :	ENW-010-PL	Issue Date	07/03/2026	Version#: 12 Rev1
Document Name	Waste Rock Management Plan	Review Date	07/03/2027	
Prepared by :	KC, HB, CV	Approved by:	KC	Page 11 of 29

model is constantly evolving and being updated and refined as the mine life is extended, more drilling programs completed, and more data collected.

The geological model is the initial classification tool which facilitates underground rock to be designated as being either:

- Ore: material targeted for extraction and processing to recover metals. The ore generally consists of a mix of sphalerite (ZnS), galena (PbS) and chalcopyrite (CuFeS₂) which are potential acid forming sulphides.
- NAF: consists of most of the sedimentary strata including sandstone, conglomerate and limestone as well as igneous intrusions not associated with the sulphide ore body such as dolerite.
- PAF: All other material unless testing proves otherwise.

Although ore would be defined as PAF it is managed differently and is turned into a tailings waste rather than rock, therefore has been segregated for the purposes of this management plan.

The model assigning is relayed onto each shift sheet which identifies which stockpile designation the underground rock should be taken to. This process is moderated by geologists who ensure the classification of what is being mined underground is as expected by the model and re-classified if necessary. For the majority of the mine extraction area, there is likely that the only NAF rock to be encountered is dolerite which is visually identifiable when compared to all other rock types. As the mine develops, some access roadways may enter the sedimentary strata which flanks the sulphide ore body. These areas are also expected to be NAF and are easily identifiable visually. Therefore, experienced mine operators working underground can also visually identify and confirm NAF material. Visual assessment is therefore an important aspect at Woodlawn while a greater understanding of the rock types can be obtained through other testing methods, the results of which can subsequently be used to refine the classification process.

3.4. Visual assessment

Geologists and relevant mine operators will be trained to identify sulphide zones within the waste material. This process of visual inspection, supported by validation through sampling (refer to Section 4.1), will ensure that geologists and other key people will be familiar with the rock type characterisation techniques for identifying NAF and PAF waste material.

Waste rock awareness training will be a component of the competency-based site training program. All personnel involved in the identification and management of waste rock materials on site will receive specific training, including:

- Significance of acid mine drainage, its formation, controls and importance to the environmental management of the site both now and at final closure.
- Procedures for identifying and classifying PAF material.
- Awareness of monitoring requirements both on the surface and underground.
- Procedures for relocating and correct storage/placement of PAF materials.
- The importance of correctly identifying and segregating NAF materials.

Due to the geological environment and currently understood distribution of sulphides in any situations where the classification is or becomes uncertain it will be treated as PAF until otherwise confirmed via further testing.

Document :	ENW-010-PL	Issue Date	07/03/2026	Version#: 12 Rev1
Document Name	Waste Rock Management Plan	Review Date	07/03/2027	
Prepared by :	KC, HB, CV	Approved by:	KC	Page 12 of 29

Visual assessment occurs of the active underground areas and stockpiled ore/waste material daily.

3.5. Storage and use

There will be an ongoing need for rock material throughout the life of the project. This includes NAF and PAF where each is suitable. While initially PAF material generated will need to be brought to the surface for temporary stockpiling there will be opportunities to utilise this material underground in backfilling operations as the mine progresses. The first stage of the TSF4 dam wall was completed by Heron using NAF from the initial decline. The subsequent lifts will also require further NAF construction materials. Veolia also require material for use in their operations which reduces the reliance on stockpiling.

The mining plan includes the construction of areas underground that are delineated for use as stockpiles. PAF material will be prioritised to be stored in these stockpiles underground where space allows rather than being brought to the surface. This stockpiled material will be subsequently re-used to backfill voids where suitable. Further oxidation of PAF material placed underground will be prevented by encapsulating this material in cement or paste which minimises air entry. Backfill and paste use is further described in the mine extraction management plan.

Given the currently forecasted mine life it is anticipated, as documented in the EA that any storage on the surface would be temporary with all waste rock to be re-purposed or used to backfill the mine following closure. Further details on rehabilitation are contained in the Rehabilitation Management Plan.

As per the EA, any waste with PAF potentially that cannot be returned underground would be disposed of in the tailings dams or capped for latter rehabilitation.

3.6. Treatment of PAF Waste Rock

The use of paste fill as the predominant backfilling method for mining voids will significantly reduce acid generation potential in these areas of the mine. The production of paste is an effective treatment process. It involves combining the crushed rock waste with hydrated lime and cement which will raise the pH of the material to at least pH10. Unprocessed waste rock can be added to the paste if available which increases the strength of the cured paste.

The hydraulic conductivity of the cemented paste backfill will be between 1×10^{-8} to 1×10^{-10} m/s. This is a very low permeability value which is typically lower than the host sulphide volcanic strata which is often fractured. The paste filling process would therefore limit the normal flow of groundwater through the mined area and in turn reduce the natural formation of acidity. Paste fill and associated properties and management is further described in the mine extraction management plan.

Given the demand for paste over the life of the operation, it is anticipated that the majority of PAF material that needs to be brought to the surface will end up being used for paste manufacture. PAF material unsuitable for processing will be stored in the Waste Rock Emplacement or used in the tailings dams. As the tailings dams will always be a source of acid generation, the use of PAF material is suitable for this purpose. The rehabilitation methods for the tailings dams assume permanent separation between the tailings material and surface capping and growing media will be required.

Document :	ENW-010-PL	Issue Date	07/03/2026	Version#: 12 Rev1
Document Name	Waste Rock Management Plan	Review Date	07/03/2027	
Prepared by :	KC, HB, CV	Approved by:	KC	Page 13 of 29

4. LABORTOARY TESTING

4.1. Background and definitions

There is no single characterisation test that can be used to determine the acid-producing risk of waste rock, therefore, a range of tests will be used to assist in the monitoring and management of waste rock produced by the Project as detailed in the guide: Preventing Acid and Metalliferous Drainage (DFAT 2016). Laboratory testing will be used to accurately determine the classification of waste rock being produced by the Project. Common terms used when referring to waste rock laboratory testing and results are presented below.

4.1.1. Acid Producing Potential (APP)

APP is a measure of the total acid producing potential of a material, irrespective of whether that material may also have the potential to produce alkali. APP is determined from the analysis of total sulphur in the sample and is calculated assuming a total conversion of sulphur to sulfuric acid. APP is reported as kg H₂SO₄ per tonne. This test is quick and useful for an initial screening of acid potential.

4.1.2. Acid Neutralising Capacity (ANC)

ANC measures the capacity of a sample to neutralise any acid that is produced. In the ANC analysis a finely ground sample is reactive with a known amount of hydrochloric acid. The resultant solution is back titrated to pH 7.0 with sodium hydroxide to determine the amount of acid neutralised by the carbonates and other acid consuming minerals present in the original sample. ANC is reported by the laboratory as either Kg CaCO₃ or Kg H₂SO₄ equivalent per tonne. This test is useful when blending or co-disposal of acid forming materials with non-acid forming materials in order to achieve a non-acid forming final blend for disposal.

4.1.3. Net Acid Production Potential (NAPP)

NAPP gives a theoretical prediction of whether the acid production potential of a material is greater than its acid consumption capacity. The results are usually provided as either a positive or negative number. NAPP is a worst-case scenario test and is therefore useful for screening purposes. It tends to over predict the acid production potential because it does not differentiate between acid producing and non-acid producing forms of sulphur.

4.1.4. 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. NAG testing determines the balance between the acid producing and acid consuming components 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 H₂SO₄ equivalent per tonne. NAG results provide the acid rock drainage characteristics based on the complete oxidation of the sample's sulphide content (as well as ferrous iron from siderite dissolution). Acid that is produced by oxidation is consumed by carbonates and/or other acid consuming components of the material. The pH of the solution is measured (NAG pH). The acid remaining after the reaction is titrated with standardised NaOH to determine the net acid generated.

Document :	ENW-010-PL	Issue Date	07/03/2026	Version#: 12 Rev1
Document Name	Waste Rock Management Plan	Review Date	07/03/2027	
Prepared by :	KC, HB, CV	Approved by:	KC	Page 14 of 29

4.1.5. Kinetic Testing

Free draining kinetic leach columns are used to compliment environmental geochemical investigations on mine rock and waste materials and are used to determine drainage chemistry. Free draining leach columns 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.

4.2. Procedure

Samples collected will be analysed for NAPP, NAG testing (static testing), and kinetic testing. NAG and NAPP are the main tests that will determine whether a particular waste rock is classified as PAF or NAF. Kinetic tests will also be performed to quantify the rate at which the different waste types may begin to oxidise and to further analyse samples when the static test results are not definitive. As the dominant sulphide species at Woodlawn is pyrite, the rate of oxidation of the waste rock is expected to be rapid; however, given the likelihood that the PAF could be mixed with NAF that has acid-neutralising capacity (ANC), the actual rate could vary significantly. The kinetic test program will enable DEVELOP to determine the rate at which different PAF material types are likely to oxidise to make more appropriate management decisions.

The rate and frequency of testing is variable depending on the mining process and the generation of waste rock. Initially weekly testing is proposed during periods of peak waste generation, however, it is also anticipated that as more data is collected the process and testing regime will be optimised.

Document :	ENW-010-PL	Issue Date	07/03/2026	Version#: 12 Rev1
Document Name	Waste Rock Management Plan	Review Date	07/03/2027	
Prepared by :	KC, HB, CV	Approved by:	KC	Page 15 of 29

5. COMPLIANCE AND ASSURANCE

5.1. Validation program

Samples will be collected for laboratory validation. In all cases laboratory confirmation of the classification will require analysis for NAPP and NAG. Although the current model is insufficient to determine low capacity PAF and if there are any acid-consuming rock, the laboratory testing will aim to determine this in accordance with the Preventing Acid and Metalliferous Drainage guide (DFAT 2016) which is based on AMIRA (2002). Any laboratory samples classified as uncertain will subsequently be subjected to kinetic testing.

Table 5-3 Geochemical classifications (DFAT 2016 based on AMIRA 2002)

Primary geochemical material type	NAPP (KG H ₂ SO ₄ /T)	NAG pH
PAF	>10 ^a	<4.5
PAF – Low Capacity	0 – 10 ^a	<4.5
NAF	Negative	≥4.5
Acid-Consuming	Less than -100	≥4.5
Uncertain ^b	Positive	≥4.5
	Negative	<4.5

^a Site-specific but typically in the range 5-20
^b Further testing needed to confirm material classification

Table 5-3 details the potential classification of rock, that is, after it has oxidised. In order to determine actual acidity risks a pH 1:2 test will be completed in accordance with AMIRA (2002). If this test demonstrates the rock has not yet oxidised (i.e. it returns a neutral or alkaline pH value) it is suitable for relocation underground regardless of its PAF or NAF classification.

5.2. Water monitoring programs

Surface water and groundwater monitoring will be completed as per the WMP. Analytes with specific reference to acid generation monitoring include pH, EC, alkalinity, sulfate, chloride and selected metals. These analytes are included in the WMP for all groundwater and surface water sample locations. Baseline water quality data is also included in the monitoring plan as it is noted that the site already contains elevated readings due to the natural geology and past disturbances. Therefore, baseline groundwater bores and surface water sampling sites have been defined in the plan which remain unaffected and will act as key triggers when determining effective waste rock management on the site. This is discussed further in the WMP which includes triggers.

Water quality indicators related to the management of waste rock that would be investigated include:

- Decreasing alkalinity
- Declining pH
- Increase in soluble metals
- Increasing sulfate to alkalinity ratios
- Increasing sulfate to chloride ratios

5.2.1. Triggers

As further described in the water management plan the triggers adopted include:

- For sampling locations that have defined trigger levels: sampling results exceed trigger values over three consecutive monitoring rounds
- For sampling locations that do not have defined trigger levels: sampling results indicate a declining water quality trend (more than 20% change) over three consecutive monitoring rounds

In response a review of data and conditions will be completed including:

- Comparison of the results to historical sampling data
- Review of current climatic data considering the above
- Identification of any changes to internal project activities
- Review of sampling technique and equipment for any cross-contamination or integrity issues
- Check laboratory results to ensure correct analysis and chain of custody conformance
- Comparison and review of adjacent or upgradient locations especially the nearest identified sensitive receptor.
- Identification and interrogation of breadth of impacts (in terms of adjacent locations and number of analytes)
- Complete additional sampling rounds more frequently ensuring adequate data collection in terms of equipment, technique and laboratory procedures

Mitigation of any waste rock proved related impacts can be done via relocation of waste rock, installation or rectification of drainage lines or the use of alkaline material to create an immediate buffer.

Document :	ENW-010-PL	Issue Date	07/03/2026	Version#: 12 Rev1
Document Name	Waste Rock Management Plan	Review Date	07/03/2027	
Prepared by :	KC, HB, CV	Approved by:	KC	Page 17 of 29

6. COMMUNICATION, REPORTING AND REVIEWS

6.1. Communication

Effective communication with government agencies, the workforce and the community is an important feature of the overall Environmental Management Strategy for the 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 community awareness and communication standard. 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 is included in the Project EMS.

6.2. Reporting

All environmental monitoring requirements specified in EPA licences and approvals are undertaken, and the data is 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 is 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 each Annual Review is made available on the DEVELOP website as follows: <http://develop.com.au/Woodlawn-sustainability/>

Monitoring data required by the EPL is reported on the company's web page in accordance with EPA requirements for public disclosure, and as per Schedule 6, Condition 8 and Condition 11 of the Project Approval <http://develop.com.au/Woodlawn-sustainability/>.

6.3. Complaints

Community complaints on any aspects of the operation may be received:

- Directly via the website: <https://www.develop.com.au/contact-us/>
- Directly via email: admin.woodlawn@develop.com.au
- Directly via phone: 1800 371 124
- Directly via the CCC meetings
- Indirectly via government agencies

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

Document :	ENW-010-PL	Issue Date	07/03/2026	Version#: 12 Rev1
Document Name	Waste Rock Management Plan	Review Date	07/03/2027	
Prepared by :	KC, HB, CV	Approved by:	KC	Page 18 of 29

6.4. Incident reporting

All reasonable and feasible avoidance and mitigation measures are employed to ensure that waste rock is managed appropriately. In the event of an exceedance 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.

6.5. Review and continuous improvement

The WRMP 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 WRMP 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 WRMP 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 WRMP, then within 4 weeks of the review the revised document will be submitted to the Secretary for approval.

Document :	ENW-010-PL	Issue Date	07/03/2026	Version#: 12 Rev1
Document Name	Waste Rock Management Plan	Review Date	07/03/2027	
Prepared by :	KC, HB, CV	Approved by:	KC	Page 19 of 29

7. REFERENCES

AMIRA (2002). ARD Test Handbook: Project P387A: Prediction and kinetic control of acid mine drainage. AMIRA International Limited, Melbourne, Australia.

DFAT. (2016). Preventing Acid and Metalliferous Drainage. Manual in the Leading Practice Sustainable Development Program for the Mining Industry series. Canberra: Department of Foreign Industry and Trade.

Environmental Planning and Assessment Act 1979 (EP&A Act).

INAP. (2011). Global Acid Rock Drainage Guide (GARD Guide). (The International Network for Acid Prevention.) Retrieved from <http://www.inap.com.au/GARDGuide.htm>

Protection of the Environment Operations Act 1997 (POEO Act).

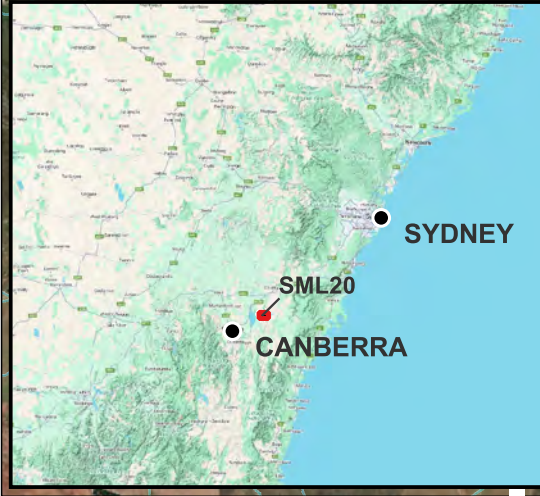
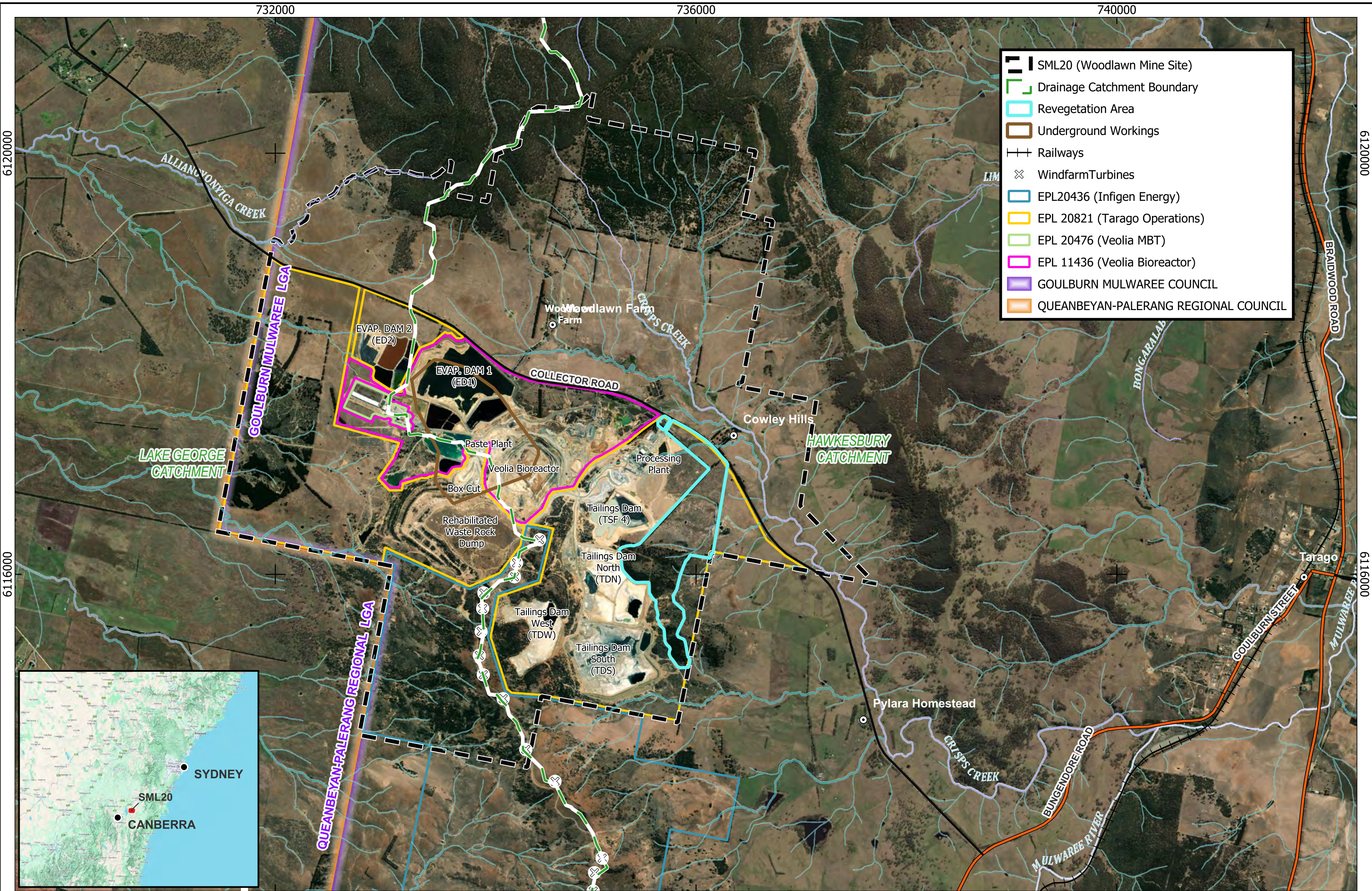
State and Environmental Planning Policy (Biodiversity and Conservation) 2021 incorporating the 2011 the Sydney Drinking Water Catchment SEPP

Australian and New Zealand Water Quality Guidelines (ANZECC 2000) as modified by the current Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG 2018)

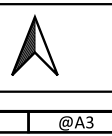
Preventing Acid and Metalliferous Drainage – Leading Practice Sustainable Development Program, 2016, Australian Government Department of Industry, Tourism and Resources.

Document :	ENW-010-PL	Issue Date	07/03/2026	Version#: 12 Rev1
Document Name	Waste Rock Management Plan	Review Date	07/03/2027	
Prepared by :	KC, HB, CV	Approved by:	KC	Page 20 of 29

Appendix 1 Plans



Scale: 1:32,000 MGA94 (Zone 55)
VTX-JOB-0473-MAP-02
Date: 2025-6-26



DEVELOP

Author: C Hobbs | Requested By: K Crook

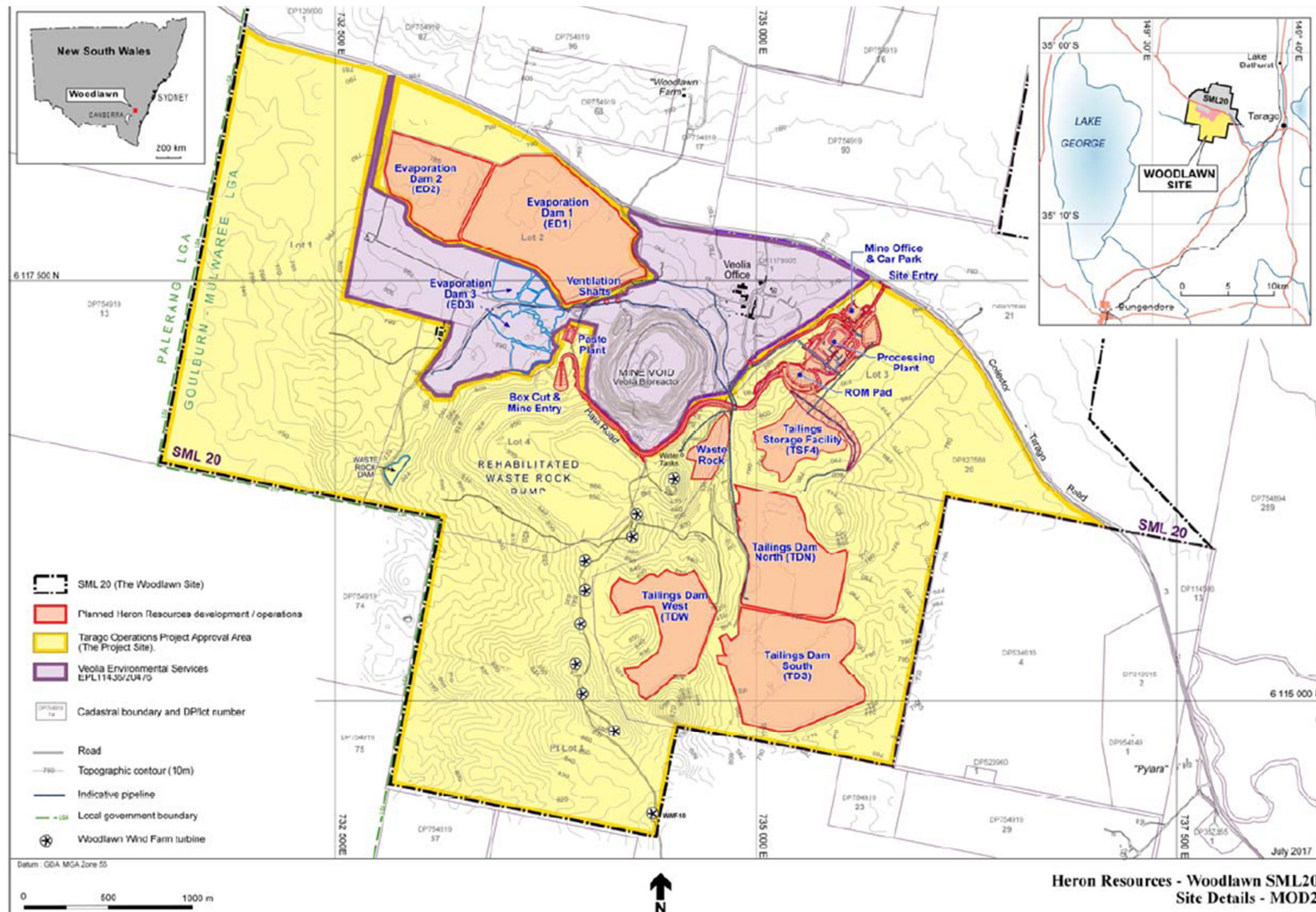
WOODLAWN ZINC COPPER PROJECT

Site Plan

DEVELOP

WOODLAWN MINE
Waste Rock Management Plan

Plan 1 Site location



Plan 2 Project layout (per Appendix 2 of MP07_0143)

Appendix 2 Consultation log - WRMP

Date	Form / Agency	Comments and Outcomes	Response/how addressed
23/10/2025	EPA	Consultation through major projects portal on V10. Response received 04/11/2025 (DOC25/908872-1) with comments on: - Potential interactions with leachate-contaminated water and blasting residue impacted water - Relationship to the RMP. - Detailed map and design for the final landform of the WRMP - Management of air quality impacts - Final landform design detail	Updates in response made to V11: - Line added to section 3.1: the rock itself is considered to have the most potential for environmental risk - The RMP is unable to be completed at the same time for this version. Comment will be considered for future updates. - Final landform is not relevant to the WRMP. New section added 3.2: storage - Line added to section 3.1: no additional air quality considerations beyond what is already included in the AQMP - Final landform is not relevant to the WRMP.
23/10/2025	WaterNSW	Consultation through major projects portal on V10. Response received 06/11/2025 (D2025/121592) with comments on: - Testing for PAF waste rock prior to it being brought to the surface - Prioritising the relocation of PAF material to suitable underground locations prior to oxidation AND Using all reasonable and feasible measures to prevent waste rock emplaced underground from further oxidising or causing impacts on groundwater - Trigger levels for any material that has oxidised to the extent that it cannot be placed underground without impacting groundwater quality, and procedures for adequate capping and sealing of such material at the surface - Effective isolation and/or neutralisation of PAF material in waste rock dump - Reflect Groundwater and Surface Water Monitoring programs to monitor PAF waste rock and any leachate generated, including appropriately designed	Updates in response made to V11: - Detail on rate and frequency added to section 4.2 and section 3.4 - Further detail added to section 3.5 - Additional detail added to section 5.1 - New section added 3.2: storage - New comment added to section 5.2

Date	Form / Agency	Comments and Outcomes	Response/how addressed
		detection and response systems for acid generation (covering monitoring methods, trigger levels and proposed management and/or treatment actions)	
23/10/2025	Resources Regulator	Consultation through major projects portal on V10. Response received 03/11/2025 (Ref MAAG0018222) citing that the Resources Regulator has no specific comments noting that the plan refers to the Rehabilitation Management Plan to manage the legacy aspects of the waste rock dump	No comments requiring action for the WRMP.
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.
10/05/2017	Comments from DPE	Table 5 Monitoring Parameters and Testing Frequency include testing parameters for waste rock prior to it being brought to the surface (as detailed in section 3.2). The plan states that waste rock may be stored in the Waste Rock Emplacement for up to 2 years. It is recommended that the plan include details of how the relocation of potential acid forming material from the Waste Rock Emplacement to suitable underground locations will be prioritised prior to oxidation. Confirm if other measures will be used in addition to blending to prevent waste rock emplaced underground from further oxidising. Provide trigger levels for any material that has oxidised to the extent that it cannot be placed underground without impacting groundwater quality, and procedures for adequate capping and sealing of such material at the surface. Discuss the frequent testing of parameters currently indicated as "sufficient for full characterisation", how the site geologist will determine that full characterisation has been achieved and what the frequency of testing will be following characterisation.	Comments addressed and management plan updated

Date	Form / Agency	Comments and Outcomes	Response/how addressed
		It is recommended that the requirements of Schedule 3 Condition 19 (d) be reflected in the plan. In particular: • trigger levels for the parameters tested in on-site leachate storages and management or treatment actions; • trigger levels in groundwater or downstream surface water to trigger incident reporting or management actions; • surface water and groundwater values (e.g. ecosystem, stock watering) in the water sources potentially impacted by the mine. • Proposed controls to contain leachate; • how proposed groundwater and surface water monitoring programs are designed to monitor the effectiveness of controls to contain leachate in leachate storages; • the status of historic contamination of groundwater (if any) and trends in groundwater quality in relation to leachate management.	
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
9/03/2016	Meeting with Community	Presentation to Woodlawn Community Consultation Committee which included overview of project, monitoring program, construction program, workforce	Draft EMPs provided on web page for download by committee members

Date	Form / Agency	Comments and Outcomes	Response/how addressed
	Consultation Committee	numbers, exploration and environmental management plan preparation and content.	
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
29/07/2014	Letter from NSW Office of Water	Comments provided on Waste Rock Management Plan and Rehabilitation Management Plan	Comments addressed and management plan updated
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	These letters were the initial consultation and sought specific advice from each agency according to the respective relevant management plan.	None required

Date	Form / Agency	Comments and Outcomes	Response/how addressed
	• NSW Office of Water • Sydney Catchment Authority • Office of Environment and Heritage • Department of Planning and Environment (DPE)		
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

Monday, 3 November 2025

Kiara Crook
kiara.crook@develop.com.au

Via: Major Projects Portal

Dear Kiara,

I refer to the Woodlawn Mine - Waste rock management plan submitted to the Resources Regulator on 23 October 2025 (MP07_0143-PA-34). The Resources Regulator has reviewed the request and has no specific comments, noting that Waste Rock Management Plan refers to the Rehabilitation Management Plan (RMP) to manage the legacy aspects of the waste rock dump. It is expected that the RMP is updated to capture any controls that are still relevant for the legacy issues with the waste rock dump. As a minimum this should include relevant Trigger Action Response Plans and testing/monitoring programs that relate to existing issues with the waste rock dump such as capping material failure and treatment of seepage water.

LIMITATIONS

It should be noted that the Resources Regulator does not provide any endorsement of the proposed rehabilitation methodologies presented in the plans provided. Under the conditions of a mining authorisation granted under the *Mining Act 1992*, the Resources Regulator requires the holder to adopt a risk-based approach to achieving the required rehabilitation outcomes.

The applicability of the controls to achieve effective and sustainable rehabilitation is to be determined based on site-specific risk assessments conducted by the authorisation holder. An authorisation holder may also be directed by the Resources Regulator to implement further risk control measures required to achieve effective rehabilitation outcomes during the life of the mine.

BACKGROUND

The Mining Act Inspectorate within the Resources Regulator undertake risk-based compliance and enforcement activities in relation to obligations under the *Mining Act 1992*. This includes undertaking

assessment and compliance activities in relation to mine rehabilitation activities and determination of security deposits.

CONTACT

Should you require any further information or clarification, please contact the Regulator on 1300 814 609 (Press Option 2 Press Option 5) or email nswresourcesregulator@service-now.com.

Yours sincerely,

A handwritten signature in black ink, appearing to be 'Matthew Newton', with a stylized, cursive script.

Matthew Newton

Principal Inspector Environment and Rehabilitation

Resources Regulator

Department of Planning, Housing, and Infrastructure
Locked Bag 5022
Parramatta NSW 2124

Uploaded via DPHI Major Projects Portal

**Post-approval Request for Advice - Woodlawn Mine - Waste Rock Management Plan
(MP07_0143-PA-34)**

Thank you for your referral to the NSW Environment Protection Authority ("**EPA**") on 23 October 2025, requesting comment on the post-approval submission of the Woodlawn Mine Waste Rock Dump ("**WR**") Management Plan.

The EPA has reviewed the Management Plan (October 2025) and provides the following comments for your consideration in **Appendix A**. Please be advised that the EPA does not approve or endorse management plans.

If you have any further questions about this matter, please contact Vanessa O'Keefe on (02) 6229 7032 or info@epa.nsw.gov.au.

Yours sincerely

A handwritten signature in blue ink that reads 'Janine Goodwin'.

04.11.2025

Janine Goodwin
Unit Head – Operations
Central West and Southern Coast & Tablelands

6 November 2025

Water NSW Ref: D2025/121592

Kiara Crook
Environment and Compliance Superintendent
Develop Global Limited
507 Collector Road
TARAGO NSW 2580

Subject: Woodlawn Mine (MP07_0143-PA-34) – Waste Rock Management Plan

Dear Ms Crook,

WaterNSW appreciates the opportunity to review the Woodlawn Mine Waste Rock Management Plan (WRMP – dated 23 October 2025), prepared to address requirements of Schedule 4, Condition 19 of the Woodlawn Mine development consent (MP 07_0143, approved July 2017).

Evaporation Dam 1 (ED1) and portions of Evaporation Dams 2 and 3, the Woodlawn Bioreactor and underground mine workings, Paste Plant, Tailings Dams and processing area are located within the declared Sydney catchment area. WaterNSW therefore has an interest in ensuring the Mine does not present a risk to water quality during operations, given its legislative function to protect and enhance the quality of water in the declared Sydney catchment area under s.7(1)(g) of the *Water NSW Act 2014*.

WaterNSW acknowledges that Woodlawn Mine is a legacy site, which had already been significantly disturbed with Potentially Acid Forming (PAF) material with historic rock and tailings existing within the footprint. Risk management and ongoing monitoring of these areas is included in the site's Water Management Plan (WMP) with remediation detailed in the Rehabilitation Management Plan. The WRMP notes that these legacy aspects are not considered in the WRMP, which details the new operation only.

WaterNSW remains concerned about potential contamination from the site, particularly regarding storage capacities and groundwater seepage with PAF material, and limited opportunities for reuse of "dirty" mine water on site. In light of this, WaterNSW considers the following should also be addressed in the WRMP as required in Condition 19 of the Woodlawn Mine development consent:

1. Testing for PAF waste rock prior to it being brought to the surface

Section 3.3 of the WRMP notes that visual inspections and validation sampling will be undertaken by geologists and relevant mine operators, trained to identify sulphide zones within the waste material. The WRMP does not include specific details as to the frequency for testing waste materials on site – this should be specified in the WRMP including the frequency for general testing (i.e. daily etc) and specific triggers that may warrant testing outside of regular testing.

**2. Prioritising the relocation of PAF material to suitable underground locations prior to oxidation
AND Using all reasonable and feasible measures to prevent waste rock emplaced underground
from further oxidising or causing impacts on groundwater**

Section 3.4 and 3.5 of the WRMP notes that the majority of PAF material brought to the surface will eventually be used to manufacture paste fill – predominantly used to backfill the mine void. Paste fill, which combines crushed rock waste with hydrated lime and cement, is proposed to significantly reduce acid generation potential in the underground mine by raising the pH to at least pH 10 and providing very low permeability, ultimately limiting the normal flow of groundwater through the mined area and reducing acidity.

The WRMP notes that the dominant sulphide species at Woodlawn is pyrite, which oxidises at a rapid rate. However, the WRMP has not considered prioritizing the relocation of PAF material to suitable underground locations prior to oxidation as required by Condition 19(C). Further, the WRMP does not provide any details, beside using the PAF material in paste fill, as to what measures will be taken to prevent waste rock emplaced underground from further oxidising or causing impacts on groundwater. The WRMP should be updated to:

- consider measures to prioritise the relocation of PAF material to suitable underground locations prior to oxidation and provide reasons why and when it is not achievable, and
- provide specific timeframes for relocation of PAF material to the surface, and also underground (as paste fill or other).

3. Trigger levels for any material that has oxidised to the extent that it cannot be placed underground without impacting groundwater quality, and procedures for adequate capping and sealing of such material at the surface

Section 5.1 of the WRMP outlines the validation program as per laboratory testing and section 5.2 notes that surface water and groundwater monitoring will be completed as per the WMP – including monitoring of the following water quality analytes specific to acid generation at all groundwater and surface water monitoring sites – pH, Electrical Conductivity (EC), alkalinity, sulfate, chloride and selected metals.

The WRMP does not specify suitable management of waste rock based on the classification results outlined in Table 5-3 of the WRMP. Specific trigger levels are not provided for material that has oxidised to the extent that it cannot be placed underground without impacting groundwater quality, and there are no procedures outlining adequate capping and sealing of such material at the surface. This needs to be addressed in the final WRMP.

4. Effective isolation and/or neutralisation of PAF material in waste rock dump

The WRMP does not specify how effective isolation and/or neutralisation of PAF material in the waste rock dump will be achieved. This needs to be addressed in the final WRMP.

5. Reflect Groundwater and Surface Water Monitoring programs to monitor PAF waste rock and any leachate generated, including appropriately designed detection and response systems for acid generation (covering monitoring methods, trigger levels and proposed management and/or treatment actions)

While the WRMP suggests that this is addressed in section 5.2 of the WRMP, more information should be provided to specify the surface and groundwater quality trigger levels. Section 6 of the WRMP briefly outlines communication, reporting and reviews including incident reporting. There are no specific details of detection and response systems for acid generation, trigger levels, nor proposed management and treatment action where the triggers are exceeded. This needs to be addressed in the final WRMP.

It is requested that Water NSW be listed as a stakeholder in any further consultation on the project, including further revisions to the WRMP. If you have any questions or wish to discuss any matter raised in this letter, please contact Nicole Wallwood via email at environmental.assessments@waternsw.com.au.

Yours sincerely



ALISON KNIHA
A/Catchment Protection Manager Transition

Appendix 3 Plan Approval



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 Waste Rock 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



29/8/19.

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