BATHURST
RESOURCES LIMITED

Stockton Mine
Acid and Metalliferous Drainage (AMD) Environment Management Plan

STO-ENV-PLN-016

July 2026

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Glossary of Terms and Abbreviations

Term/Abbreviation	Definition
AEMR	Annual Environmental Management Report
AMD	Acid and metalliferous drainage
AWP	Annual Work Plan
ANC	Acid neutralising capacity. A measure of the acid neutralising potential of overburden determined by laboratory test and acidic titration.
BCM	Brunner Coal Measures
Betterment	The definition of 'Betterment' in the context of the BPCP is: *The term betterment has been applied to rivers in New Zealand (i.e. Waikato River) that have experienced long term anthropogenic contamination. It is recognised that managed improvement will take 3 generations (80-100 years) and require a collective, sustained, and sustainable effort between stakeholders.* *Betterment is the process of active and progressive improvement of river health over the long-term.* *The betterment pathway for a given waterbody is marked by a combination of discrete events and long-term decay in AMD sources. Performance monitoring is used to track short- to medium-term water quality improvements along the betterment pathway. These improvements are site / project specific but contribute to overall long-term recovery.* Betterment requires that water management activities have a positive contribution to ongoing long-term water quality improvement, rather than merely avoiding or mitigating adverse impacts. The long-term goal is for aquatic ecosystem to be compositionally and functionally returned to their natural or near natural state and mahinga kai will be suitable to gather.
BPCP	Buller Plateau Continuation Project
CaO	Calcium Oxide – acid neutralising agent
CFSF	Coal Fines Storage Facility
DGV	Default guideline values
DOC	Disolved Organic Carbon
EC	Electrical conductivity
ELF	Engineered Landform
ESE	Escarpment Extension
FTAA	Fast-track Approvals Act 2024
IANZ	International Accreditation New Zealand
LDP1	Lime Dosing Plant 1 (Mangatini Catchment)
LDP2	Lime Dosing Plant 2 (McCabes Catchment)
LDS	Low Density Sludge
LINZ	Land Information New Zealand

Term/Abbreviation	Definition
MFS	Mount Frederick South
MP	Mining Permit
MPA	Maximum Potential Acidity. A measure of the acid forming potential of overburden calculated from Total Sulphur content.
NAF	Non-acid forming. Classification of a material based on its potential to produce acidity.
NAG	Net acid generation. A laboratory measure of a samples potential to produce acidity, with sulphide oxidation accelerated by hydrogen peroxide.
NAPP	Net acid producing potential. A calculation of a samples potential to produce acidity (calculated as NAPP = MPA – ANC)
PAF	Potentially acid forming. Classification of a material based on it's potential to produce acidity. All BCM material at Stockton is considered PAF.
Performance monitoring	Monitoring the performance of water and AMD management. Can be measured against betterment reference values.
QA/QC	Quality Assurance /Quality Control
RFI	Request for Information
The Project	The Buller Plateau Continuation Project
TSS	Total Suspended Solids
Treatment - Active	Active treatment refers to technologies requiring ongoing human operations; routine/continuous reagent addition, regular maintenance, and monitoring based on external sources of energy (electrical power) using infrastructure and engineered systems. Active treatment systems used at Stockton Mine are primarily the lime dosing plants, which utilise processes including aeration, lime dosing/acidity neutralization, pH adjustment, metal precipitation, metals removal, and sludge management.
Treatment - Passive	Passive treatment refers to processes that do not require regular human intervention, routine/continuous reagent addition, or regular maintenance. Passive treatment systems at Stockton utilise natural construction materials, (e.g., granite bunds), natural reactive materials (e.g., limestone, mussel shells) and promote natural chemical and biological acidity neutralisation processes. Passive treatment systems use gravity flow for water movement. Periodic maintenance is required to either remove sludge or replenish natural reactive materials for effective treatment.
Water Infrastructure	Water management structures e.g., sumps, pumps, drains, dams, ponds, pipelines and monitoring equipment.
UWHR	Upper Waimangaroa Haul Road (a Project sub-area).

1. Introduction

1.1 Plan Purpose and Scope

Bathurst Resources Limited (Bathurst), including its subsidiary companies BT Mining Ltd, Bathurst Coal Ltd, and Buller Coal Ltd are seeking approvals through the Fast-track Approvals Act 2024 (**FTAA**) for the Buller Plateaux Continuation Project (**BPCP**) (also referred to as the 'Project'). The Project is located on the Stockton Plateau and the Denniston Plateau (collectively referred to as the Buller Plateau), approximately 15 - 20 kilometres (km) northeast of Westport on the West Coast of the South Island.

The BPCP includes the continuation and spatial extension of existing operations at the Stockton Mine, reconsenting the existing infrastructure and mining activities at the Stockton Mine, and will involve coal extraction across multiple operational areas (referred to as "sub-areas") on the Stockton and Denniston Plateau which include Stockton, Mount Frederick South (**MFS**) and Escarpment Extension **(ESE**), all linked by the Upper Waimangaroa Haul Road (**UWHR**). This will enable access to additional coal mining areas across the Buller Plateau and continuation of current Acid and Metalliferous Drainage (**AMD**) management activities (including final landform rehabilitation and AMD treatment) post 2027.

Mining activities include coal extraction, overburden removal, material placement, rehabilitation works, coal transportation and routine maintenance of haul roads and infrastructure. Activities also include treatment of AMD by alkaline dosing and management of AMD sludge.

AMD associated with the ESE, MFS, and UWHR sub-areas will be managed under two separate management plans, specifically:

- The BPCP AMD Water Management Plan (BPCP-ENV-PLN-010); and
- The BPCP AMD Engineered Landform Management Plan (BPCP-ENV-PLN-011).

AMD associated with Cypress Mine activities is also managed under a separate regulatory regime. However, it is noted that Cypress Mine AMD reports to St Patrick Stream (either via St Patrick Reservoir or pumped to McCabes for treatment). This Stockton Mine AMD Environment Management Plan (STO-PLN-ENV-016) and the Stockton Mine Environmental Water Management Plan (STO-ENV-PLN-013) cover these aspects.

This AMD Environment Management Plan (STO-ENV-PLN-016), referred to as "this Plan", forms part of the Stockton Mine Environmental Management Planning framework under the BPCP, is implemented as a requirement of **Condition WAT13**, and addresses water and AMD management related consent conditions. It sits within a hierarchy of Stockton focused planning documents and procedures that each have a distinct purpose and scope (refer to **Figure 1**). This hierarchy also includes:

- The Stockton Mine Environmental Water Management Plan (STO-ENV-PLN-013), which is implemented as a requirement of **Condition WAT12** and contains references to water management consent conditions;
- The Water Infrastructure Design Plan (BPCP-ENV-PLN-012), which is implemented as a requirement of **Condition ERO3** and contains design guidelines for water management infrastructure;

- The Erosion and Sediment Control Plan for Land Disturbance Activities (BPCP-ENV-PLN-013) which is implemented as a requirement of **Condition ERO4** and contains references to erosion and sediment control consent conditions; and
- The series of Mangatini, McCabes, and MW16 Sump Management plans that are implemented as requirements of **Conditions WAT14, WAT15, and WAT16**, and describe the AMD treatment process and sludge management.

This Plan relates to AMD generated from Stockton mining operations and historic legacy AMD effects. AMD is the greatest environmental liability present at Stockton Mine. Based on current methods of control and treatment, legacy AMD not only represents the most expensive environmental liability facing the site but is likely to require the greatest timeframe (>80 years) to treat and/or restore to meet sustaining mahinga kai values as described in the Crown long term Stockton Mine AMD Management Project (Tregaskis Brown 2024). This Plan outlines the objectives, risks, management controls, responsibilities, and training requirements to effectively manage Stockton AMD impacts post 2027 and into the future.

The proposed Stockton sub-area within the overall Project land use consent boundary is shown in **Figure 2** and will be covered by a single new Mining Permit (**MP**) (once approved under the FTAA) with various approvals and Land Access Arrangements to support operations within the MP.

This Plan is applicable to the proposed Stockton sub-area and all associated employees and contractors within development, construction, operational, and rehabilitation phases.

Design details (e.g., pipeline specifications, diversion channel sizing, pit sump sizing for sedimentation, pit sump and pump live storage / float switch configuration, etc.) for water and AMD management infrastructure are not provided in this plan directly. These water management infrastructure design details are provided in the:

- Water Infrastructure Design Plan (BPCP-ENV-PLN-012, where water reports to management infrastructure within the mine); and
- Erosion and Sediment Control Plan for Land Disturbance Activities (BPCP-ENV-PLN-013, where runoff / sump discharge reports directly to the receiving waterway).

The infrastructure design process uses a risk rating (Low, medium, or high-risk structures) and structure permanence (temporary versus permanent) to determine the appropriate average recurrence interval (ARI) for design adequacy. These plans are referenced as required throughout this Plan.

1.2 Millerton Block Water and AMD Management Plan

The majority of BPCP mining activities within the Stockton sub-area are scheduled to occur within the Millerton Block. A Millerton Block specific Water and AMD Management Plan (STO-ENV-PLN-027) has been developed as a separate sub plan as per **Condition WAT13 (Advice Note)**.

The Millerton Block specific document describes in a greater level of detail AMD management, particularly around final landform design and changes in AMD management / treatment through the key Millerton Block Project phases.

Conversely, this Plan (i.e., Stockton Mine AMD Environment Management Plan STO-ENV-PLN-016) provides overarching monitoring and reporting requirements (including Millerton Block requirements which are only lightly referenced in STO-ENV-PLN-027). This is because the Millerton Block monitoring and reporting needs to be considered as part of the overall Stockton sub-area, as effects on the Lower Ngākawau River / Estuary from St Patrick Stream, Mangatini Stream, and some Millerton Block sub-catchments are cumulative.

This approach is also appropriate as the:

- Millerton Block AMD will largely be treated at the Mangatini Treatment System (until alkaline dosing in MW16 Sump commences in 2047),
- AMD discharged through the Mine Creek sub-catchment of Millerton Block effects lower Ngākawau River water quality (along with Mangatini and St Patrick discharges); and
- Long term ecological recovery will be periodically reviewed across all Stockton Mine sub-catchments as part of the same 6-yearly process (described in Instream (2026a)).

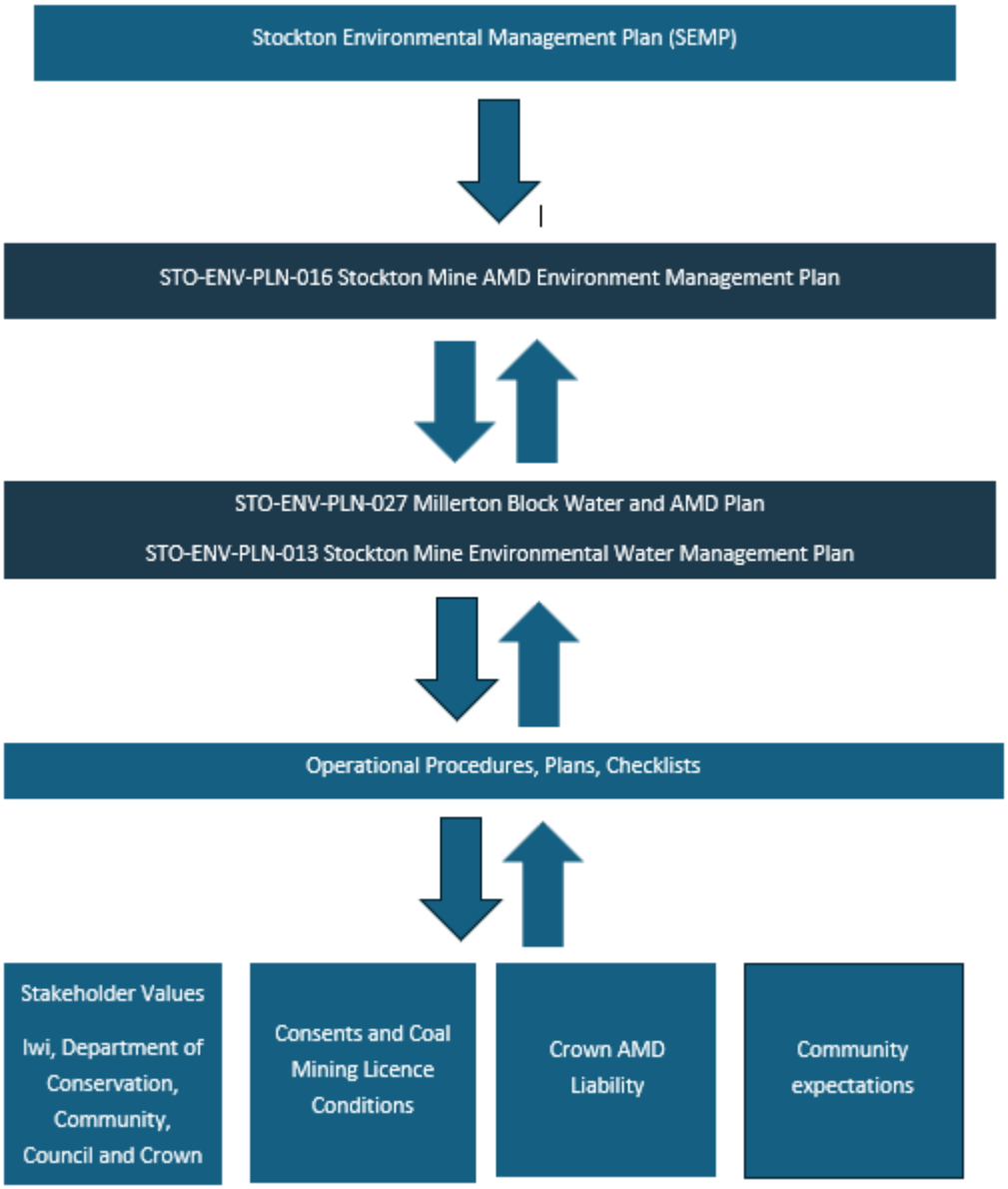


Figure 1: Stockton Mine Environmental Management Planning – AMD Management

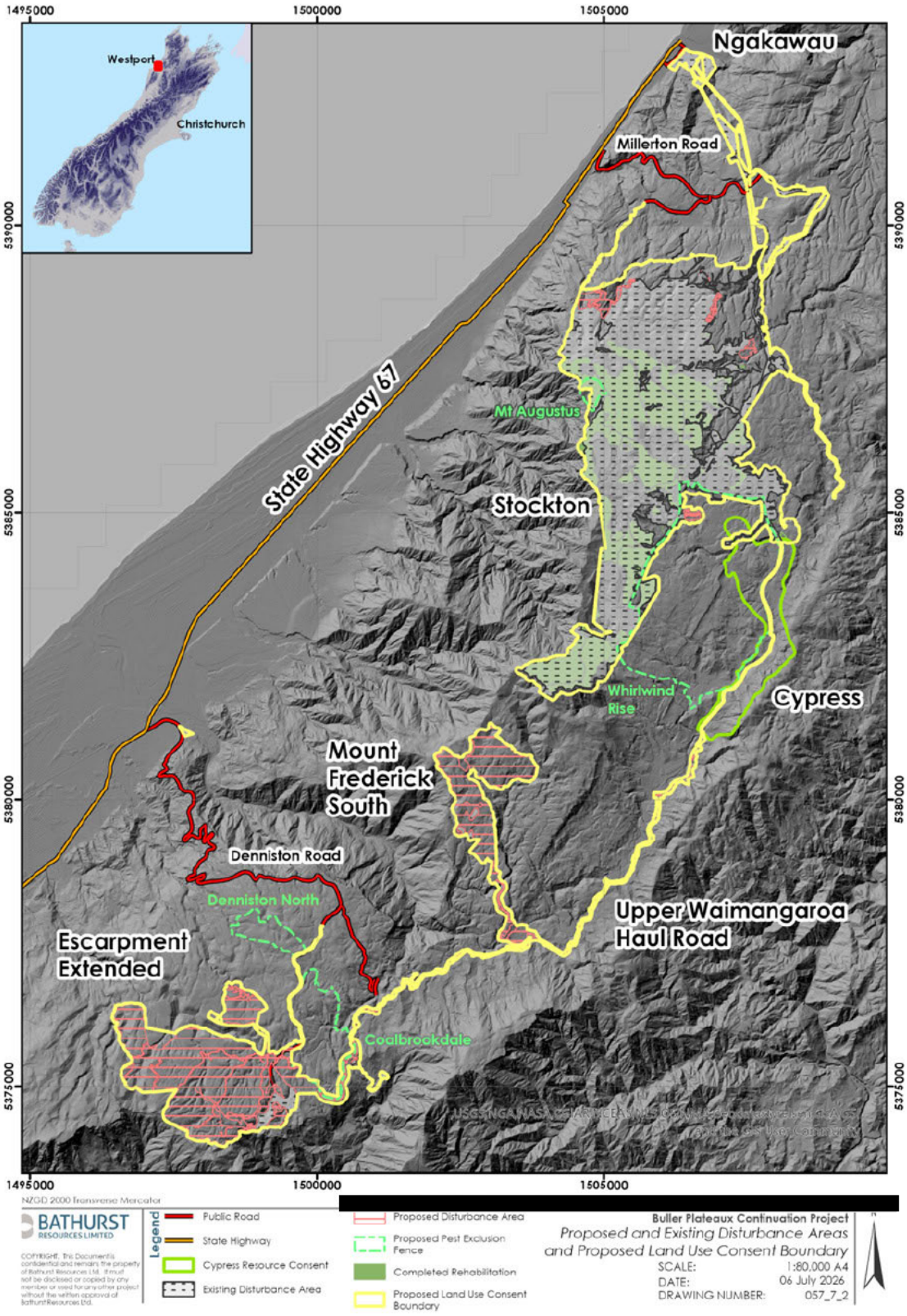


Figure 2: Proposed and Existing Disturbance Areas and Proposed Land Use Consent Boundary for the Project

2. Objectives

The objectives of this Plan are to describe and then implement controls that achieve requirements of the relevant conditions of the approvals, and:

- Ensure that AMD is identified, prevented, minimised, and/or treated to minimise associated environmental impacts, reduce ongoing environmental liabilities, and to ensure that statutory and non-statutory discharge limits and criteria are achieved.
- Ensure infrastructure is appropriately designed and fit for purpose, covering design needs in the short term, long term and for permanent landforms / closure.
- Ensure an adaptive management approach is facilitated, within the conditions of approval framework, to manage environmental uncertainty associated with water and AMD to reflect new information as it becomes available or identified hazards and risks, over the management phase timeframe. This will inform ongoing effectiveness, prevention and mitigation, need for investigation of management responses/measures, monitoring and reporting.
- Ensure that any corrective action and response meets regulatory requirements, including, as may be required by or within the approval framework, consideration of adaptive management processes that respond to operational, environmental, monitoring and climatic variances overtime.
- Assist in achieving internal Environmental Policy through positive mitigation and restoration of impacted ecosystems.
- Ensure relevant personnel (staff and contractors) are appropriately informed, inducted and trained across relevant AMD management procedures.

3. Stockton Overview

3.1 Environmental Setting

3.1.1 Location

Stockton is the largest opencast mine in New Zealand located on the West Coast, approximately 20km north-east of Westport. The mine delivers high-quality steelmaking coal for export.

Stockton lies in the headwater catchments of the Ngākawau and Waimangaroa Rivers. The elevation of the mine ranges from 400m to 1,100m above sea level.

Stockton Mine is characterised by a number of active coal mining areas, historic overburden dumps, Engineered Landforms (**ELF**), coal stockpiles, topsoil stockpiles, highwalls, water and general infrastructure areas, rehabilitated areas and undisturbed areas. Work areas past and present are connected by haul roads, minor roads and tracks. A significant feature is a complex array of water management infrastructure, including large sumps, coal fines storage structures, dams, extensive drainage structures and a considerable network of pumps and pipelines.

3.1.2 Geology

Overburden at Stockton Mine is a sequence of inter-layered sandstones, mudstones and intermediate units comprising the Brunner Coal Measures **(BCM**) and Kaiata mudstone. These units vary in their pyrite (sulphur) content and therefore acid-forming potential. Coarse white sandstones typical of the Mt Frederick area have lower concentrations of pyrite. Mudstone, bioturbated sandstones, laminated fine mudstones/sandstones and carbonaceous shales typical of the Webb, Mangatini, Rockies and Millerton areas have a higher pyrite content and are generally considered potentially acid forming (**PAF**). The distribution of Total Sulphur content in tiphead samples collected across the site is shown in **Figure 3.** AMD from these areas is managed as described in **Section 6**. The dominant rock type that is currently being worked at Stockton Mine is BCM. No non-acid forming (**NAF**) units have been noted in the BCM tested. Operationally, all BCM at Stockton is classified as PAF and managed as a homogenous unit from an AMD perspective.

3.1.3 AMD

3.1.3.1 AMD generation

Whilst AMD naturally occurs on the Stockton Plateau, the severity of AMD has been significantly increased by the disturbance of PAF overburden material. Such disturbance includes a range of activities including, but not limited to, historic underground mining, blasting, ancillary earthworks, overburden removal (to access coal), overburden disposal and re-disturbance/rehandle of overburden (PAF rock). These activities influence both surface and ground water quality in these areas. Approximately 500 million tonnes of BCM waste rock has been disturbed by opencast (since 1950-current) and underground mining (1890-1969). Approximately 80% of the AMD currently generated on the Plateau is associated with historical mining activities[1].

AMD at Stockton is primarily the result of a chemical reaction (oxidation) of a sulphide mineral (pyrite) present in the overburden. As shown in the equation below, oxygen and water must be present for the oxidation of pyrite to occur (i.e. for AMD to form).

FeS_2 (pyrite) + 7/2 H_2O (water) + 15/4 O_2 (oxygen) → $Fe(OH)_3$ + 2H_2SO_4 (sulphuric acid)

Further secondary geochemical reactions lead to oxidation and dissolution of other sulphide and non-sulphide minerals resulting in additional acidity generation and dissolution of other elements and compounds (including aluminium, nickel, zinc, sulphate, etc).

Due to the nature of the dipping stratigraphy, shallow coal seams, and low groundwater table at Stockton Mine, there is limited capacity for permanent waste rock storage in a saturated state in backfilled pits or sumps.

The approach to minimise AMD production at Stockton has been to shape ELFs to a <20-degree final landform slope angle, placement of a NAF capping layer with 400 mm of dozer compacted weathered granite, and a minimum 200 mm of topsoil to minimise water and oxygen ingress into PAF material. This method reduces acidity production by approximately 50% over the 10 years following final landform

[1] Refer Acid Mine Drainage, History of AMD Management and Proposed Future Management. Januaury 2026 (BRL 2026c) Refer Conceptual Mine Closure Strategy. March 2026 (BPCP 2026a)

rehabilitation, with a further long-term decrease of 0.62%/year (Gandy and Younger 2007, Okane Consultants 2015).

3.1.3.2 AMD Management

Major surface and seepage AMD from around Stockton Mine is captured in open channels and sumps and treated/neutralised with calcium oxide (**CaO**) dosing to reduce effects on downstream surface water and groundwater.

There are two lime dosing plants (**LDP1 and LDP2**) which are located in Mangatini and St Patrick catchments, respectively. Acidity in the AMD is neutralised by lime dosing which results in formation of insoluble iron and aluminium rich precipitates. After lime dosing, up to ~70th percentile flows report to large sumps (Mangatini Sump and McCabes Sump for Mangatini and St Patrick catchments, respectively) where precipitates settle out of suspension forming a Low Density Sludge (LDS) product, which has a solids content of ~ 2 wt%. During high flow periods (greater than ~70th percentile flows) the lime dosed AMD bypasses the sumps (without sedimentation treatment).

The treated water is discharged to Mangatini and St Patrick Streams from Mangatini and McCabes Sumps, respectively. The LDS collected in Mangatini Sump (downstream of LDP1 dosing point) is discharged to the Mangatini Stream via a controlled consented decant discharge process during high flow (during >70th percentile flow events (e.g., floods)) or regularly removed via pumping and dewatered to form an AMD sludge product with ~10% solids content. AMD sludge is disposed in ELFs, as described in the Mangatini Sump Management Plan (GHD 2018; GHD 2024 update).

LDS produced through LDP2 lime dosing is captured in McCabes Sump. Sufficient volumes of LDS in McCabes Sump have not yet accumulated to require management. The Stockton Operational AMD Sludge Management Report (BRL 2025) proposes future McCabes Sump AMD sludge management by LDS removal via pumping, dewatering, and disposal in ELFs. Decant discharge of LDS to St Patrick Stream is not a consented LDS management option, nor is it planned to be developed as an LDS management option.

While most overburden at Stockton is PAF BCM, there are other lithologies/rock types mined at Stockton. Some greywacke and granites at Stockton Mine have been identified as NAF and are quarried for roading and capping material and may be used at other BPCP sub-areas for purposes including civil construction, final landform construction, haul road maintenance, water management infrastructure establishment and maintenance. Burnt BCM (overburden affected by fires in historic underground workings and referred to as 'Red Rock') has also been identified as being a low acid producing material and has been used on roads. A small amount of PAF Kaiata mudstone was also mined in the No. 2 South highwall and this material was carefully backfilled to Mt Frederick Quarry utilising alkaline amendment, traffic compaction, and capped with a sealing layer of granite. The historic No.2 North Dam was also backfilled with Kaiata Mudstone from No.2 South Mining Area and capped with a sealing layer of granite.

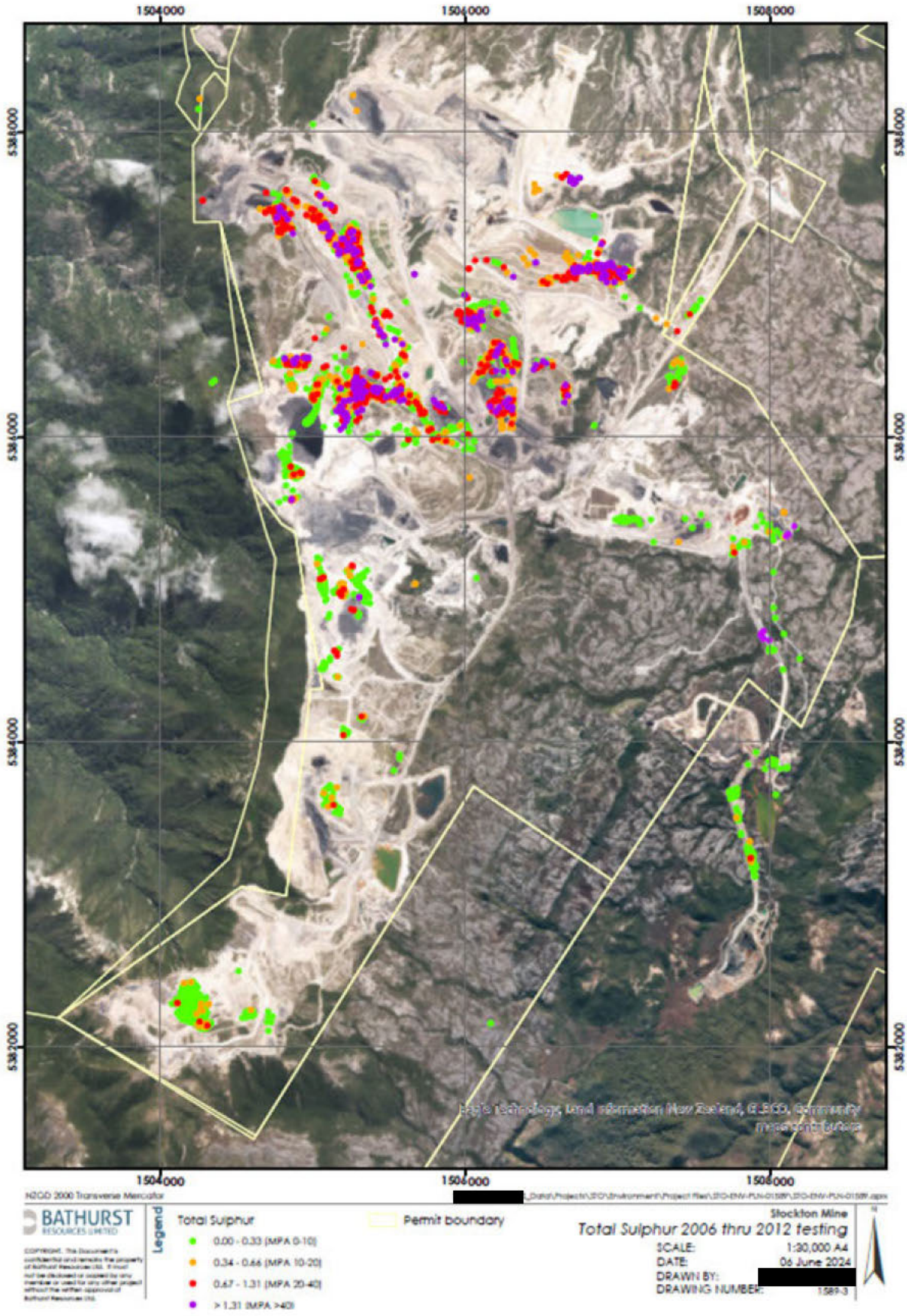


Figure 3: Overburden Total Sulphur Content Distribution at Stockton

4. Statutory Requirements

4.1 Legal Framework

The BPCP, including the Stockton sub-area, will include mining activities, land access, environmental management, and rehabilitation outcomes across the Project area. The statutory controls and consent conditions applicable to the different sub-areas will define the conditions that must be satisfied prior to closure completion and tenure relinquishment. (Conceptual Mine Closure Strategy (BPCP 2026a)).

Whilst the Stockton sub-area forms part of the BPCP, discharges due to historic mining activities and existing arrangements specific to Stockton Mine (through established AMD commitments between Bathurst and the Crown), form the basis of the Stockton regulatory and planning framework. These define ongoing planning, infrastructure, treatment, and monitoring required under the BPCP and in the transition toward closure and post closure.

This Plan (and associated Stockton procedures, plans, etc, as listed throughout and italicised below[2]) will, as required, be updated to reflect BPCP obligations if approved under the FTAA. A summary of relevant consent condition requirements and reference to the section where they are addressed in this Plan is provided in **Table 1**. The full wording of these consent conditions is also provided in **Attachment A.**

Table 1: Relevant consent conditions and reference to description in Plan

Condition Number	Description	Reference in Plan

Consent conditions will be inserted upon issue of the final decision.

4.2 Other Guidance

- Bathurst Resources Limited Environmental Policy.
- Agreed Crown Liability for Stockton acid and metalliferous drainage including terminal payment for long-term management of BT Acid and Metalliferous Drainage Liability (Refer History of AMD Management and Proposed Future Management (BRL 2026a)).
- Stockton Operational AMD Sludge Management Report (BRL 2025).
- Buller Plateau Aquatic Ecology: history, thresholds and long-term management. (Instream 2026a).
- STO-ENV-PRO-031 Rehabilitation Stages and Planning Procedure.
- STO-TEC-FRM-087 Dig/Dump Planning Checklist - Sign Off.

[2] As italicised, listed Stockton plans, operating procedures, standard operational procedures and other applicable checklists or guidance will be updated, as required, pending FTAA approval to reflect BPCP obligations.

- STO-MIN-SOP-069 Dumps, Stockpiles and Hoppers Standard Operating Procedure.
- Mangatini Sump Management Plan (GHD 2018).
- Mangatini Sump Management Plan – Council Update (GHD 2024).
- Community Expectations around water quality and quantity.

5. Stakeholder Consultation

A draft of this management plan was supplied to relevant regulators as part of the FTAA pre-consultation engagement.

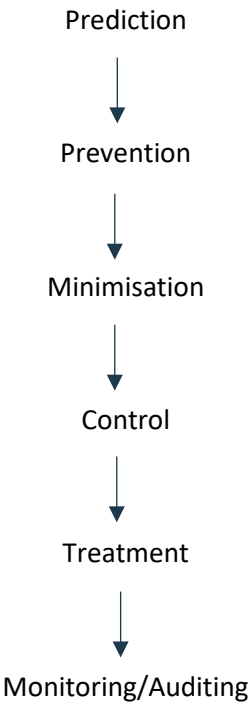
The stakeholder consultation regarding associated technical reports and this management plan has been summarised in the Stakeholder Consultation section of the BPCP FTAA main application.

Once this management plan is approved, this section will document all future stakeholder engagement undertaken for subsequent versions.

6. Management Approach

6.1 Key steps of AMD management

A structured AMD management approach is used at the Stockton Mine which will continue for the BPCP. The hierarchy for effective AMD management at Stockton is:



A general description of what these six management approaches / steps entail is provided in the following sections.

6.1.1 Prediction

Prediction of AMD is critical to understanding the potential for and longevity of AMD impacts and enables the development of an AMD strategy. Prediction is generally facilitated by a combination of geochemical analysis of available drill core samples to quantify AMD potential prior to mining or tip head sampling to quantify AMD potential of material as it is disturbed. A risk based classification scheme is used to classify materials based on the results of geochemical analysis and to develop an AMD model. The output from the AMD model in turn facilitates effective mine planning such that the location of AMD producing overburden is anticipated and planned for in the materials management during mining. Project specific AMD prediction methods are developed based on local geological and geochemical conditions.

6.1.2 Prevention

The **prevention** of AMD is achieved by preventing the interaction of the principal constituents of the AMD production process (e.g., sulphide minerals such as pyrite), with oxygen and water. Low pore gas oxygen concentrations inside ELFs effectively prevent the sulphide oxidation process from occurring, thereby preventing AMD generation.

6.1.3 Minimisation

Where prevention is not possible, the objective is to **minimise** the oxidation of sulphide minerals and the mobilisation of AMD by water running off or seeping through ELFs. AMD mobilisation may be minimised by the selective placement of PAF rock within the ELF; addition of alkaline products during ELF construction to neutralise acidity; and creation of low permeability layers within landform designs as a barrier against water and oxygen ingress (e.g., truck compaction of ELF lifts, incorporation of low permeability layers in final rehabilitation surfaces / cover systems).

6.1.4 Control

AMD discharging from ELFs will be **controlled** to prevent the release of AMD influenced water to sensitive waterbodies. Control is achieved by engineered drainage systems for collection of leachate and runoff and the construction of AMD sumps to capture mine influenced water for treatment. AMD is then transferred from sumps by engineered spillways or pumps as required, e.g., pumped to treatment systems.

6.1.5 Treatment

Residual AMD produced through the mining process may require **treatment** prior to discharge to the receiving environment. Treatment will be by means of proven active and passive methods both during the operational phase of the mine and post closure, if required. The treatment process includes management of byproducts such as LDS and AMD sludge.

6.1.6 Monitoring/Auditing

Monitoring performance of AMD management measures is necessary to ensure design controls are effective. This primarily involves monitoring water quality (e.g., pH, electrical conductivity (EC), and acidity/metal concentrations) of seepages, drains, and waterbodies downstream of ELFs or sumps/streams in catchments affected by AMD, including those that have been treated by alkaline dosing. Other performance monitoring includes measurement of pore gas oxygen concentrations in capped PAF rock ELFs to measure the effectiveness of AMD prevention/minimisation systems.

6.2 Risk Assessments

BRL uses a risk-based approach to minimise potential AMD effects on the environment. This approach recognises an adaptive risk management framework that reduces uncertainty, supports informed decision-making, and remains responsive to evolving operational, regulatory, and environmental conditions. It enables proportionate preventative or mitigation strategies/measures to be incorporated into operations, infrastructure design, environmental effects treatment, monitoring and reporting, mine modelling, forecasting, scheduling, and planning.

Broad-Brush Risk Assessment (**BBRA**) for Environment and Community are completed on a regular basis[3] or following:

- a major environmental incident,
- changes to the mining operation which may introduce new hazards or reduce effectiveness of existing controls, or
- assessment of management measures and monitoring design in response to measured data through the adaptive management process.

Collectively BBRAs have informed current operations and BPCP AMD management design and implementation. AMD risks feature prominently within the BBRA and are reflected in this Plan.

BBRA engage a range of expertise, assessing the outcomes, and determining preventative or mitigative measures and categorising the risk control effectiveness in each phase of the operation for Stockton, the objectives of which are to:

- Identify key risks to better understand environment and community risks as they effect the mining operations and transition to closure.
- Review and identify existing controls, including those considered critical controls.
- Assess the effectiveness of existing controls and identify opportunities for control improvement.
- Develop an Action Plan to implement new controls and address controls requiring improvement.
- Collaboration on ideas and group consensus.

[3] Environment and Community Risk Report, Stockton Mine – BTM03-006 v1.0_7 February 2024

6.2.1 AMD Risks

AMD management has a number of inherent risks due to the variability of sulphide mineral (pyrite) distribution throughout overburden. The consequences of poor AMD management on downstream surface and ground water are potentially significant due to the large volumes of material disturbed by mining and the relatively long duration of potential impacts. Identified risks include:

- Poor or incorrect characterisation of overburden materials resulting in inappropriate overburden management, unplanned AMD generation, and additional treatment/management requirements.
- AMD **prevention measures** are inadequate or fail, resulting in excessive AMD loads, increased treatment costs, and potential exceedance of AMD treatment capacity.
- AMD **minimisation measures** are inadequate or fail, resulting in excessive AMD loads, increased treatment costs, and potential exceedance of AMD treatment capacity.
- Controls to prevent the release of AMD influenced water are inadequate or fail.
- Controls to segregate AMD and clean water fail, resulting in unplanned discharge of AMD, impacts to downstream catchments, excessive AMD loads / volumes, increased treatment costs and exceedance of treatment capacity.
- AMD treatment method or capacity is insufficient to meet requirements, resulting in increased treatment costs and complexity. This could result in residual contaminant concentrations in treated AMD still exceeding compliance limits/environmental objectives. Undersized treatment systems could result in unexpected reagent costs and accumulation of treatment by-product (i.e., LDS / AMD sludge), causing additional cost and removal complexity to BT Mining Limited and/or the Crown at Mine Closure.
- Non-compliance with Resource Consents, Coal Mining Licence Conditions and/or Stakeholder expectations resulting in legal and compliance costs, increased Regulator and/or Stakeholder scrutiny.
- Ineffective management of Stockton AMD resulting in an increase to residual AMD liability at mine closure and increased terminal payment for BRL (Crown Indemnity Agreement).

The following AMD controls and mitigation measures recognise these risks and provide some additional resilience to manage unforeseen scenarios / events. Such measures also recognise evaluation through an adaptive management process where monitoring and reporting creates a continuous feedback loop assessing management measures in response to measured data and evolving management practices.

An adaptive management approach for effective treatment of AMD will also be employed over the life of the BPCP and beyond. Information from monitoring, routine inspections, and incident responses will be reviewed to identify opportunities for improvement. Where necessary, the design methodology (described in **Section 7.2**) may be refined or adjusted. This may include but is not limited to:

- Observed trends and incremental changes in the state of surface and groundwater water quality and aquatic ecosystems over time;
- Ability to meet ecological recovery or water quality improvement / betterment reference values;

- Minimising the duration of water diversion between catchments (e.g., minimising pumping rates and pumping costs);
- Technological advances;
- Community complaints or stakeholder feedback;
- Changes in the regulatory environment;
- Identified non-compliance or emerging risks; or
- Investigations into water management responses (as lead by and contributed to by responsible personnel as per **Table 10**) as part of the adaptive management process.

It is expected that a wide range of alternative scenarios / adaptive management responses could be addressed using existing (or scheduled for construction) AMD management infrastructure. This could include extending the duration of AMD treatment, increasing the level of treatment, and / or increasing the number of AMD sources / tributaries being treated.

6.3 AMD Controls and Mitigation Measures

6.3.1 Manage Overburden and ELF Construction

Where possible, AMD flows will be segregated from clean water runoff flows to reduce the volume of water requiring treatment and diversion of water between catchments / sub-catchments. Cleanwater and Stormwater management are discussed in the Stockton Mine Environmental Water Management Plan (STO-ENV-PLN-013).

All BCM overburden at Stockton Mine is conservatively considered PAF and stored in ELFs. This is because the natural acid neutralising capacity (**ANC**) of BCM rock is considered negligible. As such, the detailed AMD modelling and development of selective mining processes required to allow for segregation of different acid forming units is not currently being undertaken at Stockton. However, tiphead sampling is used to track sulphur content of overburden materials which will allow for quantification of AMD potential in future, if required.

The length of time that PAF overburden is left shot, fractured and/or disturbed before being excavated, disposed, and capped is minimised wherever possible. This is recognised as part of the mine planning and fleet scheduling processes.

Overburden disposal sites are prepared to ensure that minimal underflow/throughflow of water into ELFs occurs. Landform surfaces are also designed to divert surface flows away from stored PAF material (e.g., water shedding) using roadside drains and/or bench drainage on ELF faces and slightly graded plateau surfaces. This design approach aims to minimise net percolation / seepage volumes in the ELF and therefore minimise AMD reporting as toe seepage or to groundwater. Cut-off drains and sumps are installed to capture AMD flows and control/divert AMD impacted water to treatment infrastructure (consent conditions defined in the Stockton Mine Environmental Water Management Plan (STO-ENV-PLN-013)). Locating these sumps at low points in disturbed areas ensures the majority of AMD in ELF surface runoff and seepage is captured, reducing effects on downstream surface water and groundwater.

ELFs should be constructed using a bottom-up construction sequence with material pushed from tiphead lifts 2 – 5m in height, though exceptions may be required for effective mine design, including for forming access or filling sub optimal areas. Construction traffic compaction of each lift will ensure the permeability of the ELF is minimised, reducing the flux of oxygen (and water) through successive lifts within the ELFs. ELFs are constructed with batter faces to the natural angle of repose (~37°) and leaving an 8-10 m wide perimeter drainage bench between lifts at vertical intervals of 5-15m up the landform.

Alkaline amendments (e.g., aglime) are used periodically in ELF construction to create alkaline capping or base layers. When used in the capping layer this results in alkaline leachate flowing through the capping layer into the underlying stored PAF material, which will reduce acidity mobilisation. When used in the base layer the alkaline amendments will partially neutralise acidity in basal seepages within the ELF.

ELFs are reshaped to stable final landform (typically an 18° to 20° slope), including dozer compaction. This minimises the duration that uncompacted ELF batter faces are exposed to oxygen which reduces the amount of sulphide oxidation that occurs. Dozer compaction also decreases batter face surface permeability resulting in a reduction in oxygen and water movement into the ELF.

After reshaping, PAF overburden is covered with a 400 mm thick NAF layer, primarily track rolled weathered granite, to form a low permeability capping layer as quickly as possible. The granite capping layer is used to seal final landform batter faces, further reducing oxygen and water movement into the ELF. This has the added benefit of assisting progressive rehabilitation.

A minimum 200 mm topsoil layer is placed on the NAF capping layer in preparation for planting. This layer supports revegetation of the final landform surface to minimise erosion and create a stable landform. Short term soil stabilisation is provided by hydroseeding with brown top grass, followed by planting with native species to provide long term stabilisation.

This overburden management approach applies to all waste rock materials stored at Stockton mine, regardless of whether they are sourced from within the Stockton Sub-area (including Cypress or the UWHR).

A summary of key ELF design features and design opportunities is provided in **Table 2**. These factors are considered when developing specific landform designs and associated water and AMD management strategies. These designs are converted to digital dig, dump, and civil plans that are loaded into earthmoving equipment and used to guide construction. These plans are a record of design which can be reviewed along with sign-off as part of construction management.

Table 2: ELF design features and design opportunities

Design Feature	Design Opportunities
Foundation Preparation and Earthworks	• Inspection / mapping of the ELF footprint to ensure there are no direct flow pathways to underground workings, such that ELF seepage could discharge via old workings to the natural environment or contribute to groundwater AMD. Potential pathways should be assessed and sealed to prevent seepage loss to the receiving environment, if required. • Construction of sub-surface drains to collect and convey seepage waters to water management infrastructure.
Water Management	• Overburden disposal sites should be prepared to ensure that minimal underflow/throughflow of water into ELFs occurs.

Design Feature	Design Opportunities
	• Mine planning should include clean water diversion to minimise water / rock interactions to reduce water treatment volumes. • Cut-off drains and sumps should be installed to capture and divert water to appropriate management infrastructure (e.g., clean water diversion / discharge to natural streams, storm water to sedimentation sumps, AMD to treatment infrastructure, etc.). • Landform surfaces should be designed to divert surface flows away from stored PAF material (i.e., promote water shedding and prevent ponding) using roadside drains and/or bench drainage on ELF faces and slightly graded plateau surfaces. • Where possible final landform Sumps should be constructed in topographical low points to enable capture of runoff from the disturbed footprint for treatment or controlled discharge via engineered spillways. • Water management measures are discussed further in Stockton Mine Environmental Water Management Plan (STO-ENV-PLN-013)
Materials Management	• All BCM overburden at Stockton Mine is conservatively considered PAF and stored in ELFs. This is because the natural ANC of BCM in the Stockton sub-area rock is considered negligible. • Operational dig and dump plans should be used to ensure materials are transported to the correct location and landforms are constructed to designs. • Tiphead sampling should be used to track sulphur content of overburden materials. • The length of time that PAF overburden is left shot, fractured and/or disturbed before being excavated, disposed, and capped should be minimised wherever possible. This should be recognised as part of the mine planning and fleet scheduling processes. • ELFs should be reshaped to stable final landform (typically an 18 to 20 degree slope) as operations allow (including dozer compaction) to minimise the duration that uncompacted ELF batter faces are exposed to oxygen. • Weathered granite and topsoil resources at Stockton Mine are identified and quantified to enable appropriate scheduling for rehabilitation.
Lift Height / construction	• ELFs should be constructed using a bottom-up construction sequence with material pushed from tiphead lifts 2 – 5m in height. • Construction traffic compaction of each lift will ensure the permeability of the ELFs is minimised. • ELFs are constructed with batter faces to the natural angle of repose (~37°) and leaving an 8-10 m wide perimeter drainage bench between lifts at vertical intervals of 5-15 m up the landform. • The area of the ELF footprint should be minimised to reduce the total landform surface catchment area and minimise seepage volumes.
Encapsulation	• The 0.4 m (thickness) layer of track rolled weathered granite component of the cover system provides a continuous cap over PAF materials before soil placement.
Geochemical controls	• The Lift construction process is intended to ensure the internal permeability of the ELFs is minimised, thus reducing the flux of oxygen and water through successive lifts within the ELFs. • Dozer compaction during reshaping decreases the disturbed batter face surface permeability resulting in a reduction in oxygen and water movement into the ELF. • The granite capping layer is used to seal final landform batter faces, further reducing oxygen and water movement into the ELF. • Alkaline amendments could be used in specific circumstances to manage AMD.
Geotechnical stability	• Long term geotechnical stability is achieved by reshaping the final landform to overall design slope of 18 to 20 degrees. Stability is required to ensure that PAF materials are

Design Feature	Design Opportunities
	not exposed (which could lead to AMD production), maintain functional water management infrastructure, and provide a safe landform.
Cover system	• After reshaping to the final landform profile, PAF overburden is covered with a 400 mm thick NAF rock (primarily weathered granite) Capping layer, which is track rolled to minimise permeability, reducing the flux of oxygen and water into the ELF. • A minimum 200 mm topsoil layer is placed on the NAF Capping layer in preparation for planting. This layer supports revegetation of the final landform surface to minimise erosion and create a stable landform surface. • Short term soil stabilisation is provided by hydroseeding with brown top grass, followed by planting with native species to provide long term stabilisation.
Progressive Rehabilitation	• Progressive Rehabilitation should be promoted to minimise the duration between initial material disturbance and permanent storage beneath a revegetated cover system to minimise sulphide oxidation, net percolation, and stored oxidation product accumulation. • Progressive rehabilitation should also provide a more consistent workload for rehabilitation crews and plant suppliers and enable long term rehabilitation schedules to be managed.
Performance monitoring	• Continuous monitoring of downstream conductivity and turbidity should be used as an indicator of Total Suspended Solids (TSS) / AMD management effectiveness. • Interpretation of water quality, flow rate, and contaminant load monitoring should be used as key performance indicators at a landform scale and long-term water quality forecasting. • Targeted monitoring of specific seepages or AMD collection drains including long term trend analysis enables improved long term water quality forecasting. • Measurement of changes in pore gas oxygen concentrations with depth in capped PAF rock ELFs to measure the effectiveness of AMD prevention/minimisation systems. • Tiphead sampling is used to quantify the total sulphur content of material stored in ELFs. • Aerial survey should be used for as-built surface confirmation and to monitor / track any changes in surface profile / elevation over time.
Sign-off	• The Rehabilitation Asbuilt Checklist (STO-ENV-PRO-031.01)[4] includes a bulk earthworks section for signoff by the 'Rehabilitation Engineer' which covers: - Slope length, slope angle, bench width, etc.; - Asbuilt surveys; and - Establishment of long-term monitoring reference points.

6.3.2 AMD Treatment

Residual AMD produced through the mining process may require treatment prior to discharge to the receiving environment. Treatment will be by means of proven active and passive methods both during the operational phase of the mine and post closure, if required. The treatment process includes management of byproducts such as LDS and AMD sludge.

No new passive treatment systems are proposed under the BPCP, with the existing Whirlwind MSR remaining the only operational passive AMD treatment system at Stockton. Ongoing operation of MSR

[4] Note listed Stockton operating procedures, standard operational procedures and other applicable checklists or guidance will be updated, as required, pending FTAA approval to reflect BPCP obligations.

is subject to the requirements of **Condition TRE1** and **Conditions STO1 and STO2** around stockpiling mussel shells.

Active water treatment is used widely across Stockton Mine, using a range of chemicals as described in **Condition TRE3 to TRE5**.

Currently, AMD is treated by dosing with acidity neutralising agents (e.g., Calcium oxide (CaO)), typically directly to AMD collection drains to ensure adequate mixing. There are two lime dosing plants at Stockton, which are located in Mangatini (LDP1) and St Patrick / McCabes (LDP2) catchments. AMD treatment capacity is scalable, with the lime dosing rate of both lime dosing plants able to increase or decrease as acidity loads change and evolve.

The collective term 'Mangatini Treatment System' includes all associated AMD collection, alkaline dosing, LDS / AMD sludge capture sumps, and treated water discharge infrastructure. All Mangatini Catchment AMD is dosed by lime slurry to neutralise acidity. Dosed AMD reports to Mangatini Sump during < ~70th percentile flow conditions for sedimentation / capture of LDS, with supernatant water discharged to Mangatini Stream via Mangatini Decants. All flows bypass the Sump during > 70th percentile flow conditions. LDS captured in Mangatini Sump may also be discharged via Decants to Mangatini Stream during >70th percentile flow conditions, as described in **Condition DIS6**.

The collective term 'McCabes Treatment System' includes all associated AMD collection, alkaline dosing, LDS / AMD sludge capture sumps, and treated water discharge infrastructure. Three AMD streams currently report to the McCabes Treatment System, including:

- AMD pumped from Cypress to McCabes for treatment;
- AMD runoff from the McCabes catchment; and
- AMD diverted from Fly Creek (via a weir and pipeline as described in **Condition DIV1**) to McCabes for treatment. The diversion pipeline is sized to transfer up to 70th percentile Fly Creek flows to McCabes for treatment. Flows exceeding the >70th percentile pipeline capacity are spilled over the Fly Creek Weir without treatment and report to St Patrick Stream.

All AMD reporting to the McCabes Treatment System is currently dosed with lime slurry to neutralise acidity. Downstream of the dosing point, an inlet culvert (sized to convey up to the ~70th percentile McCabes Treatment System flow rate) controls the flow rate entering McCabes Sump such that:

- During low to moderate flow conditions (< ~70th percentile flows) all dosed AMD is diverted into McCabes Sump for sedimentation; and
- During high flow conditions the proportion of flow exceeding the > 70th percentile bypasses McCabes sump and discharges to St Patrick Stream without sedimentation / LDS capture.

Decant discharge of LDS from McCabes Sump to St Patrick Stream is not a consented LDS management option, nor is it planned to be developed as an LDS management option.

Future modifications to McCabes Treatment System include Cypress acidity loads ceasing treatment at McCabes and diversion of Plover Stream AMD (up to 70th percentile flows) to McCabes for treatment, both scheduled to occur in 2034.

The AMD treatment discharge pH target is 5 to 5.5 at both Mangatini and McCabes Treatment Systems, which typically requires dosing to pH 6.5 at the Sump inlets. This is sufficient for neutralisation of the majority of acidity (e.g., > 90% median annual acidity concentration reduction between MGIU and S14C through the Mangatini Treatment System (BRL 2026c)) and the removal of major acid soluble contaminants iron (Fe) and aluminium (Al). AMD treatment also results in the partial removal of other contaminants including nickel (Ni) and zinc (Zn) primarily by co-precipitation/adsorption to Fe and Al precipitates.

The series of Mangatini, McCabes, and MW16 Sump Management plans that are implemented as requirements of **Conditions WAT14, WAT15, and WAT16** further describe the AMD treatment process and sludge management of these treatment systems.

Long-term monitoring of open channel, seeps, groundwater, highwall, and coal floor AMD is used to identify trends in contaminant concentrations and loads, to predict long term acid loads, and therefore determine the duration of treatment required.

Further operational details and LDS / AMD Sludge management requirements are discussed in the Mangatini Sump Management Plan (GHD 2018, GHD 2024), the Stockton Operational AMD Sludge Management Report (BRL 2025), and the Millerton Block Water and AMD Management Plan (STO-ENV-PLN-027).

6.3.3 Telemetered Alert Notifications

BRL use an extensive real-time telemetered water quality and flow rate monitoring network to provide alerts if compliance limits or internal environmental management triggers are approached in potentially AMD impacted streams. These alerts are used to identify:

- Water quality parameters (e.g., pH, turbidity) which are nearing pre-defined levels of concern; and
- Water levels in sumps where a spill / uncontrolled discharge event could occur.

6.4 Transition to Mine Closure- Stockton

The transition to mine closure under the BPCP is important to recognise. Operational and ongoing management decisions and introduced monitoring and reporting frameworks proposed under the BPCP will inform AMD management long term.

AMD management across Stockton is complex and challenging due to the terrain and climate andinvolves managing the effects of historic / legacy underground mining activities and contemporary opencast mining activities. Bathurst employs a range of methods to treat AMD from both historic and contemporary sources. Existing passive and active treatments include lime dosing, sediment settling facilities and mussel shell reactors. Excavation of underground workings, diversion and treatment of contaminated water, weathered granite capping, and revegetation are also employed by the mine to reduce AMD.

Bound by two agreements between Bathurst and the Crown, which recognise the long history of mining at the site, acknowledge legacy environmental impacts, and the advanced stage of the operation in the mine lifecycle, the closure at Stockton Mine will occur within a distinct regulatory and planning

framework[5].

Due to the legacy mining disturbance, and these commitments, Stockton Mine will require active AMD treatment for decades post-closure. The BPCP and its proposed water and AMD management and monitoring design (discussed in **Section 7.2**) will continue to help reduce legacy and contemporary AMD impacts and support the 80-year recovery plan for aquatic ecosystems / sustaining mahinga kai.

Monitoring and reporting under the BPCP will introduce a design that involves improvement of future waterway quality that will contribute to the realisation of the long-term goal of aquatic ecosystems, recovery and mahinga kai being suitable to gather (approximately 80 years or 3 generations).

The success of this approach (to support the 80-year recovery plan for aquatic ecosystems / sustaining mahinga kai) will require current operational and ongoing active treatment and LDS management, and a transition to, and implementation of, introduced monitoring and reporting design.

Treatment systems will remain in place and be maintained for several decades, or until AMD loadings decrease to levels that are considered environmentally acceptable.

The remaining infrastructure to enable ongoing AMD treatment across areas affected by Stockton historic and contemporary mining will include:

- Millerton Block AMD treatment in MW16 Sump via LDP1 slurry dosing pipeline.
- Lower Millerton Block, capturing underground workings utilising LINZ infrastructure (at a conceptual stage, to be further developed and permitted by LINZ)
- Mangatini catchment via LDP1 and the Mangatini Treatment System.
- St Patrick catchment via LDP2 and the McCabes Treatment System.

The above, as Stockton moves toward mine closure and post mine closure, will be a significant consideration for closure scheduling and planning to support the pathway for long-term AMD treatment. This Plan (and associated Stockton procedures and plans) will be updated, as required, to reflect BPCP obligations if approved under the FTAA, including the confirmed monitoring and reporting design.

7. Monitoring

An adaptive approach to managing AMD at Stockton Mine will continue to be used. The processes driving AMD trends at Stockton Mine are complex and effective monitoring is important to demonstrate the effects of different water and AMD management strategies and optimise management approaches. This includes utilisation of an extensive historic monitoring database that predates the BPCP.

This monitoring section is separated into:

[5] The two agreements are the Deed of Indemnity, which assigns historic non- AMD landform rehabilitation to the Crown, and the Deed of Commitment, which transfers historic AMD liabilities to the Crown while assigning Bathurst responsibility for AMD generated post-2017. Bathurst remains responsible for all new disturbance secured through bonds and overseen by annual rehabilitation and work plans (BPCP 2026a).

- A description of routine operational measures which cover the full range of monitoring activities used to assist both day-to-day site management and collect datasets required for performance and compliance monitoring; and
- A description of BPCP specific compliance and performance monitoring datasets and data interpretation, which is focussed on long term water quality improvement and includes non-routine monitoring such as ecological surveys and sediment sampling.

This section covers more than 45 compliance conditions related to Stockton water and AMD management, with further details specified in Schedule A. The specific conditions addressed by each subsection have not all been identified to maintain readability. However, **Table 1** identifies the section where each consent condition is addressed.

7.1 Operational Monitoring Measures

Stockton Mine operational AMD monitoring covers measures to assist day-to-day site management of water and AMD to support mining operations but also provides the routine monitoring datasets used to meet regulatory requirements (described further in **Section 7.2**) and community expectations.

7.1.1 Climate Monitoring

Climate datasets will be used for optimising operational management and are required by **Condition MON1**. These datasets are described in the Stockton Mine Environmental Water Management Sub Plan (STO-ENV-PLN-013) and include:

- Short term climate forecasting to enable pre-event planning, such as pumping down pit sumps to maximise storage potential; and
- Real-time (communication by telemetry) continuous recording of temperature, pressure, rainfall, etc.

7.1.2 Surface Water Quality and Flow Rate

Operational water quality and flow rate monitoring will be performed via a suite of surface water monitoring sites (**Figure 4**), including:

- Real-time (communication by telemetry) continuous water monitoring sensor measurements of parameters (e.g., pH, conductivity, turbidity, flow rate, sump water level). Some of these real-time datasets are linked to a pre-set trigger alarm system. Continuous sensor monitoring will be used at sites including:
    - St Patrick sites (including S16);
    - Mangatini Stream sites (including S14C, S14B);
    - Millerton Block sites (including T1, S25, S24A, S23, S6, MC1); and
    - Key Ngākawau River sites (including NR / NR2[6]).

[6] Original Site NR was destroyed by a landslide and is no longer accessible. NR2 is the replacement monitoring site on the true right of the Ngākawau River and is recognised by consent authorities.

- Routine Manual Daily/Weekly/Monthly/Annually (periodicity as defined in **Condition WAT1**) field sampling is conducted by a dedicated Stockton Water Sampling Technician (STO-ENV PRO-032 Water Sampling Procedure (a requirement of **Condition MON3**)). This sampling will be carried out for both internal and external (e.g., Resource Consent) reporting purposes. Water quality samples are collected and sent to an external International Accreditation New Zealand (IANZ) accredited laboratory for analysis (a requirement of **Condition MON4**). AMD impacted catchments at Stockton included in routine monitoring will be:
    - Herbert Stream
    - Whirlwind Stream
    - St Patrick's Stream
    - Fly Creek
    - Plover Stream
    - Rudolf Creek
    - Twins Stream
    - Granity Stream
    - Miller Creek
    - Mine Creek
    - Mangatini Stream
    - Ngākawau River (including Lower Ngākawau River / Estuary)

Water quality monitoring suites vary for different sites depending on specific operational monitoring requirements. Two broad monitoring suites will be used for most surface monitoring sites and are listed as follows:

The basic surface water quality monitoring suite, which includes:

- pH
- Electrical Conductivity
- Acidity
- Sulphate
- Dissolved Aluminium (Al)
- Dissolved Zinc (Zn)
- Turbidity
- Total Suspended Solids

The comprehensive surface water quality monitoring suite, which includes:

- pH
- Electrical Conductivity
- Acidity
- Sulphate
- Dissolved Aluminium (Al)
- Dissolved zinc (Zn)
- Dissolved iron (Fe)

- Dissolved nickel (Ni)
- Dissolved copper (Cu)
- Dissolved cobalt (Co)
- Dissolved cadmium (Cd)
- Dissolved chromium (Cr)
- Dissolved manganese (Mn)
- Calcium (Ca)
- Magnesium (Mg)
- Dissolved Organic Carbon (DOC)
- Turbidity
- Total Suspended Solids

The parameters included in these suites (for operational monitoring purposes) may be changed as required for adaptive management.

7.1.3 Groundwater monitoring

Groundwater monitoring will be undertaken to understand the quality and quantity of impacts of the BPCP on groundwater and hydraulically connected surface water. This monitoring will be targeted downgradient of key infrastructure (ELF's, AMD sumps, Coal Fines Storage Facility (CFSF), and historic underground workings). Operational groundwater monitoring will be performed via a suite of groundwater bores and seepage monitoring sites, including:

- Monitoring at existing and new sites within key AMD affected catchments (described in GHD 2026, **Section 7.2.2.6**, and **Appendix 2**), including:
  - St Patrick;
  - Mangatini
  - Millerton Block;
  - Upper Waimangaroa
- Groundwater sampling for water quality analysis (of monitoring bores and /or emergence seepages), to be undertaken at a quarterly frequency.
- Measurement of groundwater levels in monitoring bores:
  - Manually at the time of quarterly sample collection; or
  - Continuously using loggers for selected bores.

Routine groundwater monitoring is conducted by Stockton personnel and / or contractors. This sampling will be carried out for both internal and external (e.g., Resource Consent) reporting purposes. Water quality samples are collected and sent to an external International Accreditation New Zealand (IANZ) accredited laboratory for analysis.

The groundwater quality monitoring suite may vary for different sites depending on specific operational monitoring requirements. The broad groundwater monitoring suite includes:

- The basic AMD monitoring suite:

- pH
- Electrical Conductivity
- Acidity
- Sulphate
- Dissolved Aluminium (Al)
- Dissolved Zinc (Zn)
- Turbidity
- Total Suspended Solids

- An additional major ions suite and nutrients:
  - Dissolved Calcium (Ca), Magnesium (Mg), Sodium (Na), Potassium (K), Bicarbonate ($HC0_3$), Chloride (Cl), Nitrate-N, Ammoniacal-N.

7.1.4 Non-routine operational monitoring

The following monitoring will be undertaken on an as required basis:

- Visual inspections of water bodies as part of daily operations by environmental and operational staff.
- Ad-hoc compliance monitoring by regulators.
- Weekly/Monthly Infrastructure and Pond Inspections (STO-ENV-SOP-065 V2.0 Water Management Infrastructure and Pond Inspection Standard Operating Procedure).
- Data collation and verification by external hydrologist.

7.1.5 AMD Tiphead Sampling

Tip head rock sampling is undertaken at Stockton Mine to quantify the total sulphur content of material stored in ELFs. Tip head samples are collected by Environmental staff on an ad-hoc basis across the landform or overburden for a representative distribution of samples.

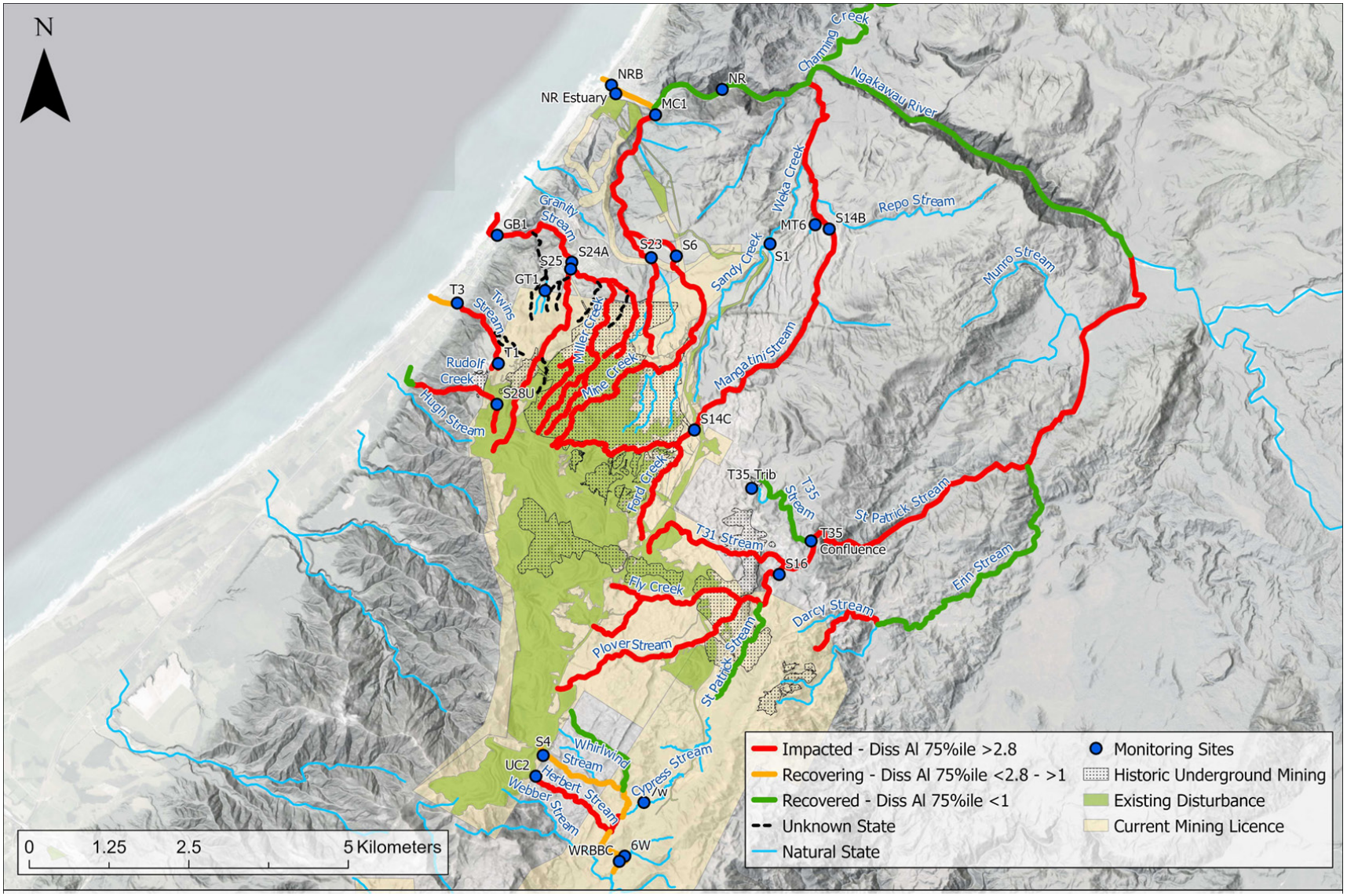


Figure 4: Stockton Water Monitoring Sites and current (2025) state (Instream 2026a)

7.2 BPCP AMD monitoring

The BPCP will introduce a long-term monitoring and reporting design as part of the consenting process that will focus on betterment/improvement of future waterway quality that will contribute to the realisation of the long-term goal of aquatic ecosystem recovery and mahinga kai being suitable to gather. Established operational monitoring measures (described in **Section 7.1**) will be expanded where required to cover this new design and provide the routine surface and ground water monitoring components of datasets required to meet consent commitments. Other aspects of non-routine monitoring (e.g., sediment sampling, ecological monitoring) will be conducted as defined in **Section 7.2.2.**

The monitoring design is to facilitate a shift over time from an improvement management approach (for water quality) in waterways through four states (or classification) from lowest to highest, **1) Impacted, 2) Recovering, 3) Recovered, or 4) Mahinga kai.** These four states describe waterway quality and aquatic ecosystem health (Instream 2026a). Under the BPCP, monitoring at Stockton will follow an adaptive monitoring design across the four states of stream recovery.

Subject to FTAA approval, this Plan (and associated procedures) will be updated to reflect BPCP obligations, including the confirmed monitoring and reporting design (as outlined below).

This section is structured to:

- Define the monitoring design for key BPCP sites, which is dependent on the ecological 'state' of each stream / monitoring site; and
- Summarise monitoring consent commitments relevant to the BPCP and provide context for data interpretation.

To align with 'Betterment / improvement of future water quality' objective, every six years there will be a review of the water quality compliance criteria in the light of the stage and extent of operations at Stockton. This review would address the topic of incrementally greater stringency in compliance limits, most particularly following the completion of coal extraction and formation of final landforms, and secondly the completion of site rehabilitation. The 6-yearly review would consider all monitoring datasets collected in the intervening period.

7.2.1 Waterway State Dependent Monitoring Design

The gradient of stream recovery will fall into one of four states already listed. Each state has a water quality and ecology classification threshold, and this will determine the suite of AMD indicators to be monitored, the periodicity of monitoring and ecological thresholds (summarised in **Table 3**). Instream (2026a) state that the assessment of EPT richness should be based on the AMDI species list because the thresholds were derived from comparisons of AMDI to EPT (Gray & Harding 2012; **Appendix 1**).

Water quality monitoring across impacted, recovering, recovered and mahinga kai states will increase the frequency of analysis using the comprehensive suite of AMD indicators (**Section 7.1.2**) to accumulate information on the occurrence of all toxic elements and modifying factors. Additional non-water quality monitoring assessments will apply to mahinga kai streams (e.g., tissue sampling of mahinga kai species).

Incremental changes in water quality and ecology will be tracked over time through the monitoring and reporting process, with periodic review against the four impact state thresholds to determine whether there is an improvement in the waterway state. **Table 3** outlines the adaptive monitoring design proposed by Instream (2026a). Periodic (annual) review will also involve an assessment of water quality at both routine and remote ecological monitoring sites (locations shown on **Figure 5**) for classification, including:

(1) Monthly water quality monitoring for 'Routine' sites;

(2) Annual water quality monitoring for 'Remote' sites; and

(3) An assessment of the likely annual 75th percentile Al concentration for each site.

This process will determine the 'state' of each site (from a water quality classification perspective) and associated water quality and ecological monitoring requirements.

Additional information may be required for each 6-yearly review to ensure the estimates of annual 75th percentile Al concentration dilution relationships provide a representative assessment of water quality. This may involve additional grab sampling, targeted campaign monitoring, installation of temporary continuous monitoring devices, and dilution / geochemical modelling. The current 'state' of monitoring sites is defined in **Table 8** and **Figure 4**.

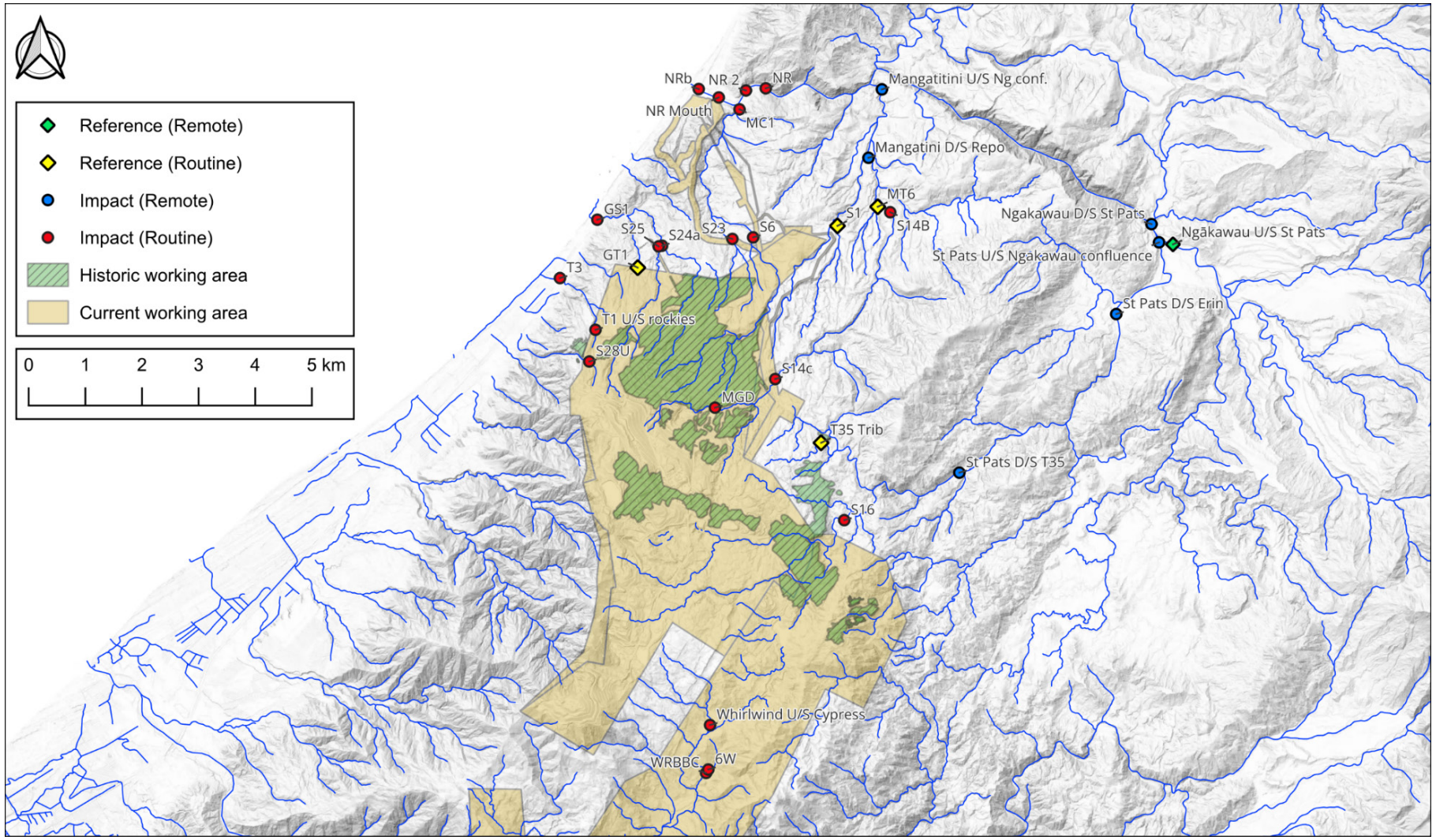
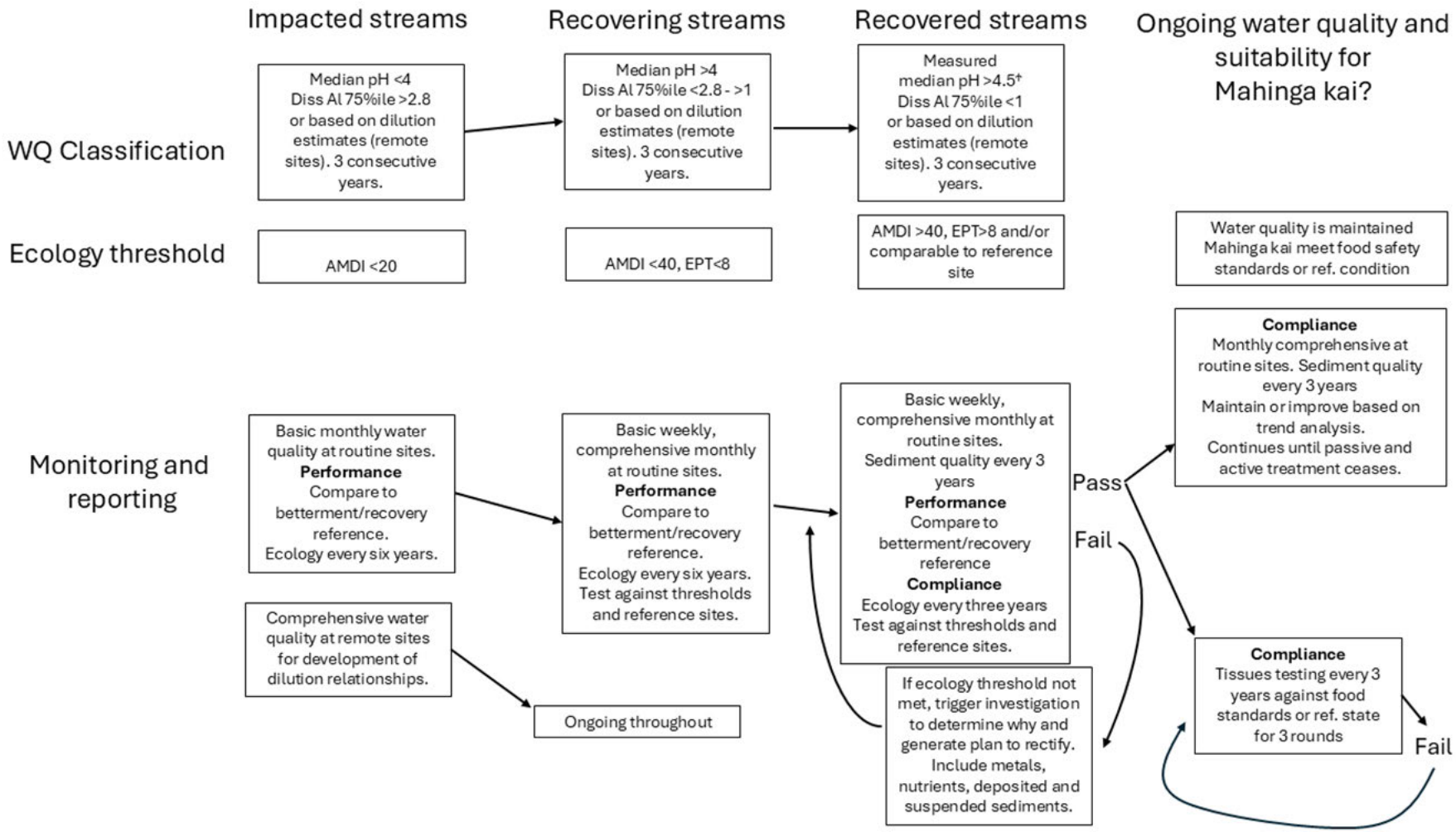


Figure 5: Proposed sites for current state and ongoing longitudinal sampling in rivers and streams associated with the BPCP. Note additional sites are proposed by ESNZ and RMA sciences.

Table 3: Adaptive Monitoring Design (Instream 2026a)



7.2.2 Consent Monitoring Commitments and Data Interpretation

A range of consent monitoring commitments are proposed under the BPCP to effectively demonstrate appropriate AMD management and progress towards ecological recovery / mahinga kai objectives.

Monitoring will be classified as one of three types, **1) Compliance, 2) Performance, or 3) Reference**. Some individual sites require measurement and reporting of monitoring datasets against both compliance limits and performance or reference values and trends.

This classification system will apply to waterways ranging from natural water quality to AMD impacted states. These will be monitored with basic and comprehensive suites of AMD indicators (defined in **Section 7.1.2**) guided by the existing water quality and ecological state (as per Instream (2026a)).

Part of the consent water quality monitoring dataset will be used for quantitative comparisons against:

- Consent compliance limits, which will be applied to a subset of compliance parameters at key compliance sites (Defined in **Section 7.2.2.1**);
- Modelled water quality ecological recovery trajectory values, which will be applied to a subset of performance monitoring datasets (specifically annual median and 75th percentile Al concentration at S16 and S14B, defined in **Section 7.2.2.2**); and
- Modelled betterment reference values, which will be applied to a subset of performance monitoring datasets (specifically median annual Al concentration at T1, S25, S24A, and MC1, defined in **Section 7.2.2.2**).

General surface water Performance monitoring data (Defined in **Section 7.2.2.2**) will otherwise be tracked to show long term changes in water quality, as a pathway to ecological recovery but without being compared against quantitative limits. This will be complemented by groundwater Performance monitoring (Defined in **Section 7.2.2.3**) data to track changes in monitoring bore and seepage / historic underground workings water quality over time.

Reference sites (sites in a natural state and not impacted by mining) will act as an important data set to ensure that any changes in monitored effects (including where quantitative compliance and performance limits / values are affected) are the result of changes due to the mining activity, rather than broader local variation in all streams, for example the effects of a long dry period (GHD 2026 and Instream 2026a).

7.2.2.1 Compliance criteria

Compliance criteria are proposed for a subset of water quality monitoring sites at Stockton Mine. The lower Ngākawau River provides a migratory pathway to its headwater streams but has impaired water quality due to AMD and treatment residues. At sites draining the Stockton Mine that report to the lower Ngākawau River it is important to manage water quality to support ecological values to enable the migratory pathway. Compliance criteria are proposed for these tributaries reporting to the Lower Ngākawau River, including St Patrick Stream, Mangatini Stream, and Mine Creek.

The compliance statistics in **Table 4** are variously intended to either:

- Maintain water quality within ecological thresholds where those can be met; or
- In a state considered to be indicative of the likely future condition under proposed mine management based on a suitable benchmarking period

Annual percentile and median values inform annual reporting, while rolling medians trigger a more immediate response.

Table 4 outlines the sampling regime and assessment criteria for the compliance and reference sites used to assess compliance. Monitoring site locations are shown in **Figure 4.**

Table 4: Water quality monitoring regime and compliance statistics for sites draining the Stockton Mine

Site details	Sampling regime	Analyte	Annual 5TH percentile	Rolling Annual median	Annual upper percentile	Rolling median
Ngākawau River **NR2**Ω	Daily weekday	Turbidity (NTU)	-	< 10.0 ‡	<48.0 (95th) ‡	<25 (15 samples)*
		Dissolved aluminium (mg/L)	-	-	<1 (75th) §	<1 mg/L (15 samples) §
		pH	>4.5§	-	<7.5 (95th)*	>4.5 & < 7.5 (15 samples) §*
	Weekly	Nitrate N (mg/L)	-	<2.40	<3.5 (95th)	-
	Weekly	Ammoniacal N (mg/L) ¥	-	<0.69 assuming a pH of 6	<1.1 (95th) assuming a pH of 6	-
NR2Ω – LDS discharge	Continuous	Turbidity	a) Adhere to the operating regime and monitoring procedures set out in the Mangatini Sump Management Plan; and b) Comply with the turbidity limits as set out in Table 1. Table 1: Flow conditions at S14B and turbidity at NR2 during LDS discharge Flow Percentile band (%) / Flow rates S14B (m^3/s) / LDS discharge to stream / Turbidity averaged over 8 hours NR Two (NTU) 95+ / 7.349+ / Yes / n/a 90–95 / 3.373 to 7.349 / Yes / 100 80–90 / 1.672 to 3.373 / Yes / 50 70–80 / 1.139 to 1.672 / Yes / 25 0–70 / 0 to 1.139 / No / 25			
Mangatini Stream **S14B**	Daily weekday	pH	>4.0‡	-	<7 (95th)*	>4 & < 7 (15 samples)*‡
Mine Creek **MC1**	Daily weekday	Turbidity (NTU)	-	-	-	<25.0 (15 samples)*

Site details	Sampling regime	Analyte	Annual 5TH percentile	Rolling Annual median	Annual upper percentile	Rolling median
St. Patrick **S16**	Daily weekday	Dissolved aluminium (mg/L)	-	<5‡	<8 (95th) ‡	<8 (15-samples) ‡
		pH	>3.4‡	-	<7 (95th)*‡	>3.4 & < 7 (15 samples) *‡
		Turbidity (NTU)		<6.9‡	<44 (95th) ‡	<24 (15-samples) *‡
Twins Stream **T1**	Weekly	Dissolved aluminium (mg/L)	-	<28‡	-	-
		Turbidity (NTU)	-	-	-	<25.0 (15 samples)*
Rudolph Stream **S28U**	Weekly	Turbidity (NTU)	-	-	-	<25.0 (15 samples)
		Dissolved aluminium (mg/L)	-	30‡	-	-
Granity Stream **S25**	Daily weekday	Turbidity	-	-	-	<25 (15 sample)*
Miller Stream **S24a**	Daily weekday	Turbidity	-	-	-	<25 (15 sample)*
MT6, GT1, T35 Trib, S1 **Reference sites**	Monthly	Dissolved aluminium and iron, pH, EC, Ammoniacal-N, Nitrate-N	Context for to 6-yearly review			

*Source: Instream 2026a. Note: a >1 in 10 year flood events should be excluded for annual statistics for turbidity (i)*Indicates an ecologically based limit for the protection of biota or indicative of the natural state of the waterway; (ii) ‡ site-specific value based on monitoring data. Limits are based on expected performance of treatment and water management systems within the constraints of the benchmarking period; (iii) § Ecological recovery water quality target (Exec. Summary Table 1). (iv) ¥Ammoniacal N should be corrected for pH and be less than the national bottom line listed in National Policy Statement – Freshwater Management (MfE 2020). Annual median compliance assessment and pH correction as detailed by MfE (2018). (v) Ω Site NR2 is subject to seawater intrusion – tide affected samples to be excluded from analysis.*

7.2.2.2 Performance monitoring

Performance monitoring is proposed to track long term water quality at Stockton Mine and will be important for adaptive management. Performance monitoring results will confirm the effectiveness of water management controls and trigger investigations if results depart from expected recovery trends (as part of adaptive management).

While performance data is reported and discussed as part of site compliance reporting, in general there are no specific water quality limits or targets associated with the performance monitoring datasets (exceptions discussed in following Sections).

Once performance monitoring indicates that waterways have reached "recovered" status based on water quality, compliance limits should be developed that reflect water quality protection guidelines and ecological thresholds, and subsequently mahinga kai values. The six yearly review is envisaged to assess any change in water way status and instigate additional monitoring or compliance requirements on that basis. Sites that achieve water quality recovered status are to begin comparison against 80%

Level of Protection toxicity guidelines values of Hickey (2026a) and develop water quality and ecology compliance thresholds. Sampling will be either the basic or comprehensive suite of analytes plus any additional analytes listed in **Table 5**.

Table 5 outlines the sampling regime and analytes to be covered by performance monitoring. This table is subject to revision at each six yearly review at the discretion of the regulatory authority (see **Section 9.3**).

Table 5: Water quality monitoring regime for Performance sites draining the Stockton Mine

Site details	Sampling regime	Suitable reference site	Analytes
Ngākawau River **NRB**	Daily weekday		Dissolved aluminium and iron, pH, EC, turbidity
	Weekly (comprehensive suite)		*¥ Ammoniacal-N, Nitrate-N, turbidity Dissolved aluminium (Al), EC, pH, Dissolved zinc (Zn), Dissolved iron (Fe), Dissolved nickel (Ni), Dissolved copper (Cu), Dissolved cobalt (Co), Dissolved cadmium (Cd), Dissolved chromium (Cr), Dissolved manganese (Mn), Calcium (Ca), Magnesium (Mg), Dissolved Organic Carbon (DNPOC) for comparison to bioavailability guidelines developed by Hickey (2026a).
Ngākawau River **NR2** Ω	Weekly (comprehensive suite)	Ngākawau River US of St. Patricks Stream	*Dissolved aluminium (Al), EC, pH, Dissolved zinc (Zn), Dissolved iron (Fe), Dissolved nickel (Ni), Dissolved copper (Cu), Dissolved cobalt (Co), Dissolved cadmium (Cd), Dissolved chromium (Cr), Dissolved manganese (Mn), Calcium (Ca), Magnesium (Mg), Dissolved Organic Carbon (DNPOC) for comparison of metal concentrations to bioavailability guidelines developed by Hickey (2026a)
Mangatini Stream **S14B**	Daily weekday	S1, MT6 and T35 Trib	Dissolved aluminium, turbidity, pH
	Weekly (basic suite)		Dissolved iron, EC, Ammoniacal-N, Nitrate-N
	Continuous – during LDS discharge event		pH, EC, turbidity
Mangatini Stream **MGD**è	Weekly (basic suite)	NA	Dissolved aluminium (mg/L)
Mine Creek **MC1**	Weekly (basic suite plus)	GT1	Dissolved aluminium and iron, pH, EC
	Monthly (basic suite)		Ammoniacal N, Nitrate-N
St. Patrick **S16**	Weekly (basic suite)	S1, MT6 and T35 Trib	Dissolved iron, EC, Ammoniacal N, Nitrate N
Twins Stream **T1**	Weekly (basic suite)	GT1	Dissolved Iron, pH, EC, Ammoniacal-N, Nitrate-N
Rudolph Stream **S28U**	Weekly (basic suite)	GT1	Dissolved Iron, pH, EC, Ammoniacal-N, Nitrate-N
Granity Stream **S25**	Monthly (basic suite)	GT1	Dissolved aluminium and iron, pH, EC, Ammoniacal-N, Nitrate-N
Miller Stream **S24a**	Monthly (basic suite)	GT1	Dissolved aluminium and iron, pH, EC, Ammoniacal-N, Nitrate-N
Whirlwind **S4**	Monthly (basic suite)	T35 Trib or Denniston site	Dissolved aluminium and iron, pH, EC, Ammoniacal-N, Nitrate-N, turbidity

Site details	Sampling regime	Suitable reference site	Analytes
Herbert **UC2**	Monthly (basic suite)	T35 Trib or Denniston site	Dissolved aluminium and iron, pH, EC, Ammoniacal-N, Nitrate-N, turbidity
MT6, GT1, T35 Trib, S1 – reference sites	Monthly (comprehensive suite)		Dissolved aluminium and iron, pH, EC, Ammoniacal-N, Nitrate-N, turbidity

*Source: Instream 2026a. Notes: (i) Ω Site NR2 is subject to seawater intrusion and backing up of Mine Creek water. Tide affected samples to be excluded. *Comprehensive water quality suite at trace detection limits. ¥ Assessment of water quality against freshwater guidelines is only suitable when salinity <0.5 ppt. è Site MGD is a discharge to the Mangatini Stream rather than the stream itself.*

BRL will continue daily sampling at S14C including dissolved Al analysis while water quality benchmarking data collection at S14B occurs. Water quality monitoring at S14C may cease once 500 daily grab samples are collected at S14B, in accordance with **Condition MON18.**

7.2.2.3 Groundwater monitoring

The groundwater monitoring strategy for BPCP will focus on groundwater interaction with waterways, with the majority of groundwater monitoring used to assess AMD management performance (as opposed to measurement against specific compliance criteria). This includes continuation of existing groundwater monitoring activities and installation of new monitoring bores / pore water sampling sites. The proposed groundwater monitoring programme is described by GHD (2026), with recommendations provided in Appendix 2. The installation of new groundwater monitoring sites and monitoring requirements are described in **Conditions GRO4 to GRO6.**

7.2.2.4 Ecological recovery trajectory / Betterment reference values

BRL (2026b) have developed forecasts (using AMD modelling) of long-term water quality at key sites in AMD impacted catchments. This includes:

- Forecasting an Al concentration recovery trajectory at key St Patrick (S16) and Mangatini (S14B) catchment sites, where water quality improvements sufficient for ecological recovery are possible within the 80-year period under the BPCP; and
- Forecasting Al concentration betterment reference values for waterbodies draining Millerton Block (specifically at sites T1, S25, S24A, and MC1), where additional AMD management infrastructure (i.e., additional to what is proposed in the BPCP) would be required for ecological recovery.

The 6-yearly forecast Al concentration values (commencing 2027) have been extracted from the AMD models developed for Millerton Block (BRL 2026b) and Mangatini / St Patrick Catchment (BRL 2026c). A subset of the water quality performance monitoring dataset will be compared against these forecast recovery trajectory / betterment reference values to track long term progress **(Table 6)** and will be used to validate AMD modelling. Quantitative betterment targets are not applied to performance reporting for any other sites or parameters.

It is important to note, that the modelled/forecast Al concentrations in **Table 6** may change over time and are presented here as a reference only to be used for comparative purposes and model update/review requirements. Comparison to future predictions over the course of the consent should

be made to the most recent iteration of modelling. Grey shading in **Table 6** indicates recovering stream status.

Table 6: Ecological recovery / Betterment Al concentration forecasts for comparison with performance monitoring data

Project Year	Calendar year	Forecast annual median or 75th percentile Al concentration (mg/L)			
St Patrick / Mangatini Catchment – Recovery Trajectory					
		S16 Annual Median	S16 Annual 75%ile	S14B Annual Median	S14B Annual 75%ile
Commenced	2027	3.0	3.6	3.5	5.4
6	2032	2.8	3.4	3.5	5.4
12	2038	1.9	2.4	2.9	4.5
18	2044	1.7	2.1	2.2	3.4
24	2050	1.5	1.9	1.2	1.8
30	2056	1.3	1.6	1.0	1.5
36	2062	1.3	1.6	0.9	1.4
42	2068	1.2	1.5	0.9	1.4
48	2074	1.2	1.5	0.8	1.3
54	2080	1.2	1.4	0.8	1.2
60	2086	1.1	1.4	0.8	1.2
66	2092	1.1	1.3	0.7	1.1
72	2098	1.0	1.3	0.7	1.1
78	2104	1.0	1.2	0.7	1.0
Millerton Block – Betterment reference values					
		T1 annual median	S25 annual median	S24A annual median	MC1 annual median
Commenced	2027*	20.0	6.5	33.6	14.2
6	2032*	19.3	6.3	32.6	13.8
12	2038	18.6	6.1	31.4	13.2
18	2044	18.0	5.9	30.2	12.8
24	2050	17.3	5.6	29.1	12.3
30	2056	16.7	5.4	28.1	11.8
36	2062	16.1	5.2	27.0	11.4
42	2068	15.5	5.0	26.0	11.0
48	2074	14.9	4.9	25.1	10.6
54	2080	14.4	4.7	24.2	10.2
60	2086	13.8	4.5	23.3	9.8
66	2092	13.3	4.3	22.4	9.5
72	2098	12.8	4.2	21.6	9.1
78	2104	12.4	4.0	20.8	8.8

** Note: Millerton Block water and AMD management strategies are not expected to meet betterment reference values during the Operational Phase – Achieving Betterment only applies from EOML (2033) onwards. It should be noted that betterment targets are subject to revision as a greater volume of data is amassed to refine predictive models. Comparison to future predictions over the course of the consent should be made to the most recent iteration of modelling.*

7.2.2.5 *Sediment quality monitoring*

Sediment quality monitoring is proposed to measure the effects of AMD on aquatic ecology in water quality recovered sites relative to reference sites, ecological data, and the ANZG (2018). The only site that currently qualifies for that assessment is NR on the lower Ngākawau River.

Reporting of sediment metal concentrations at site NR (or any other recovered status waterway) are proposed to be for performance purposes. However, because water quality recovered sites will be managed through compliance against ecology thresholds, any negative effect of sediment metals will be managed via that mechanism.

Performance reporting of sediment quality should compare to ANZG (2018) guidelines, reference condition and ecological monitoring results. Ecological recovery sediment monitoring (every three years) will be a compliance reporting requirement determined by the absence of a negative trend ion metal concentrations.

Table 7 outlines the sampling regime and assessment criteria for sites required to assess the AMD effect on sediment quality in Lower Ngākawau River. This table is subject to revision at each 6 yearly review at the discretion of the regulatory authority (see **Section 9.3**).

Table 7: Sediment quality sampling regime for the Ngākawau River for performance monitoring of the effects of the LDS high flow discharge to Mangatini River

Site details	Water quality status	Reporting type	Sampling regime	Focus[b]	Assessment thresholds
Ngākawau River U/S St. Patrick Conf.	Reference	Reference	Every 3 years – 2 samples true right bank (TRB) and true left bank (TLB)	Sediment Quality - Total recoverable Co, Cu, Fe, Mn, Zn, Al, Sb, Cr, Ni, Ag, Sn, As, Cd, Pb, Hg, Tl from <2mm and <63µm size fractions. Grain size distribution.	Comparison to ANZG (2018) DGV and GV-high in the context of reference state[c] and ecological data Performance reporting only
Ngākawau River NR	Recovered	Performance	Every 3 years - 2 samples TRB and TLB		

Source: Instream 2026a. Note: [b]Trace level chemical analysis. [c] As per https://www.waterquality.gov.au/anz-guidelines/guideline-values/default/sediment-quality-toxicants . DGV -default guideline value below which there is a low likelihood of ecological effects. GV-high (guideline value high) indicates a threshold above which there is a high likelihood of ecological effects.

It should be noted there are various sources of contaminants in streams draining the Stockton Plateau that may be manifest in sediments in the lower Ngākawau river. These include background geology, general AMD discharges (contemporary and historic) and the LDS discharge. To inform the relative influence of each source on the lower river, in particular the LDS which is a sediment discharge, it is recommended that an investigation is undertaken to attribute sediment metals to a source. This investigation would occur in the event that routine sediment monitoring results are deemed to be a limiting factor for ecological recovery.

A similar approach is recommended at any other water quality recovered site where sediment volume or quality is considered to be limiting ecological recovery and sediment source is uncertain.

Sediment metal source sampling should be contextualised with suitable reference sites, e.g. the Ngākawau River upstream of Mangatini and upstream of St Patricks Streams.

7.2.2.6 Ecological monitoring

Instream (2026a) propose periodic ecological monitoring to demonstrate long-term ecological change in AMD impacted streams draining the Stockton Mine and in the Lower Ngākawau River, as defined in **Table 8**. Instream (2026) tabulate ecological monitoring sites, current site status, sampling regime, focus (receptor species) and reporting thresholds.

Fish monitoring occurs at water quality recovering sites that are physically accessible to fish. Macroinvertebrate monitoring is to include specific methods to assess the abundance of koura (freshwater crayfish) where present. Reference sites to be monitored at the periodicity of the impact sites most frequently monitored, (e.g., Ngākawau River upstream of the St. Patrick confluence) is monitored every 3 years for comparison to NR2. Sampling may occur more regularly than prescribed to suit the rates of change in water quality at each site.

The methodology for Ecological monitoring is described in Section 5 of Instream (2026a) and Appendix 1. The Ngakawau River Mouth ecological survey will be conducted in general accordance with the methodology described in Instream (2026b).

Table 8: Ecological monitoring sites, current site status, sampling regime, focus and reporting thresholds

Site details	Water quality status	Accessibility	Reporting type	Sampling regime	Suitable reference sites	Focus	Reporting thresholds
Ngākawau River U/S St. Patrick Conf.	Reference site for NR2 and St. Patrick Stream	Remote	Reference	Every three years		Macroinvertebrates, fish, periphyton, bryophytes and habitat	NA
Ngākawau River Mouth	Recovering	Routine	Performance	Every three years[c]		Macroinvertebrates, fish periphyton and habitat	Compliance reporting, no ecologically significant degradation from baseline after attribution
Ngākawau River NR	Recovered	Routine	Compliance	Every three years	Ngākawau River U/S St. Patrick	Macroinvertebrates	Compliance reporting AMDI>40, EPT >8 and comparable to reference sites or regional species pool.
						Fish	Compliance reporting Diversity and abundance comparable to reference sites or regional species pool.
						Habitat (biophysical) including sediment deposition, sediment quality.	Context
Mangatini Stream U/S Ngākawau conf.	Recovering	Remote	Performance	Every six years	MT6	Macroinvertebrates, periphyton, bryophytes and habitat[b]	Performance reporting only
Mangatini Stream D/S/ Repo Stream	Recovering	Remote	Performance	Every six years	MT6	Macroinvertebrates, periphyton, bryophytes and habitat	Performance reporting only
Mangatini Stream S14B	Impacted	Routine	Performance	Every six years	MT6	Macroinvertebrates, periphyton, bryophytes and habitat	Performance reporting only
Mangatini Stream S14C	Impacted	Routine	Performance	Every six years	MT6	Macroinvertebrates, periphyton, bryophytes and habitat	Performance reporting only
St. Patrick Stream U/S Ngākawau conf.	Impacted	Remote	Performance	Every six years	S1, MT6 and T35 Trib	Macroinvertebrates, periphyton, bryophytes and habitat	Performance reporting only
St. Patrick Stream D/S Erin	Impacted	Remote	Performance	Every six years	S1, MT6 and T35 Trib	Macroinvertebrates, periphyton, bryophytes and habitat	Performance reporting only
St. Patrick Stream D/S T35	Impacted	Remote	Performance	Every six years	S1, MT6 and T35 Trib	Macroinvertebrates, periphyton, bryophytes and habitat	Performance reporting only
St. Patrick S16	Impacted	Routine	Performance	Every six years	S1, MT6 and T35 Trib	Macroinvertebrates, periphyton, bryophytes and habitat	Performance reporting only
Mine Creek MC1	Impacted	Routine	Performance	Every six years	GT1	Macroinvertebrates, periphyton, bryophytes and habitat	Performance reporting only

Site details	Water quality status	Accessibility	Reporting type	Sampling regime	Suitable reference sites	Focus	Reporting thresholds
Mine Creek S6	Impacted	Routine	Performance	Every six years	GT1	Macroinvertebrates, periphyton, bryophytes and habitat	Performance reporting only
Mine Creek S23	Impacted	Routine	Performance	Every six years	GT1	Macroinvertebrates, periphyton, bryophytes and habitat	Performance reporting only
Granity Stream GS1	Impacted	Routine	Performance	Every six years	GT1	Macroinvertebrates, periphyton, bryophytes and habitat	Performance reporting only
Granity Stream S25	Impacted	Routine	Performance	Every six years	GT1	Macroinvertebrates, periphyton, bryophytes and habitat	Performance reporting only
Granity Stream S24A	Impacted	Routine	Performance	Every six years	GT1	Macroinvertebrates, periphyton, bryophytes and habitat	Performance reporting only
Twins Stream T1	Impacted	Routine	Performance	Every six years	GT1	Macroinvertebrates, periphyton, bryophytes and habitat	Performance reporting only
Twins Stream T3	Impacted	Routine	Performance	Every six years	GT1	Macroinvertebrates, periphyton, bryophytes and habitat	Performance reporting only
Whirlwind U/S Cypress	Impacted	Routine	Performance	Every six years	T35 Trib or Denniston site	Macroinvertebrates, periphyton, bryophytes and habitat	Performance reporting only
WRBBC	Impacted	Routine	Performance	Every six years	T35 Trib or Denniston site	Macroinvertebrates, periphyton, bryophytes and habitat	Performance reporting only
6W	Impacted	Routine	Performance	Every six years	T35 Trib or Denniston site	Macroinvertebrates, periphyton, bryophytes and habitat	Performance reporting only
MT6, GT1, T35 Trib, S1	Reference sites for Mangatini and Millerton streams	Routine	Reference	Every six years	NA	Macroinvertebrates, periphyton, bryophytes and habitat	NA
Upper Ngākawau River fish survey	Reference	Remote	Compliance	Every three years[c]	NA	Fish	Maintenance of fish passage to the headwaters. Compliance reporting for site NRB in lieu of water quality compliance at that site.
St Patrick tributaries fish survey	Reference	Remote	Performance	Every six years	Upper Ngākawau River fish survey	Fish	Establishment of fish passage to the unimpacted tributaries

Source: Instream 2026a. Notes. [b]Fish monitoring to commence once waterway reaches recovered status at sites fish can physically access. [c] Upper Ngākawau fish survey is recommended to occur annually for the first six years of the permit due to various changes planned to water quality management in the Mine Creek and Ngākawau River catchments during that period. Thereafter, there is an option on review to shift to every three years. Ngākawau Mouth ecology survey to occur annually in lieu of water quality compliance at site NRB and in general accordance with the methodology described in Instream (2026b).

7.2.2.7 Mahinga kai monitoring

In streams that are considered water quality and ecology recovered (ecological thresholds met for three consecutive rounds) ecological monitoring may cease. However, bespoke (timed to coincide with a 12-month period prior to tissue sampling) comprehensive monthly water quality monitoring should occur to inform tissue testing of mahinga kai.

Mahinga kai and recreational harvest species should be agreed with local runanga and community. Tissue testing of mahinga kai is for the purpose of comparison of contaminant concentrations to food safety standards and reference stream conditions. Reference streams will be chosen based on the species present and impact streams for comparisons. Pass criteria are 3 consecutive rounds (on a 3-year repeat periodicity) of concentrations lower than the food safety standard or reference condition, whichever is the greater. A fail would result in an investigation analogous to step 4 in the monitoring of recovered streams. A plan to address the source of contamination and new timeframes should be agreed with the regulatory authority and monitoring continue.

Likely candidate species for testing are eel, mature galaxiids and kōura (freshwater crayfish).

The metals to be measured in mahinga kai tissue samples are Co, Cu, Fe, Mn, Zn, Al, Sb, Cr, Ni, Ag, Sn, As, Cd, Pb, Hg, Tl.

8. Quality Assurance and Quality Control

Bathurst will implement quality assurance and quality control (QA/QC) measures to support the accuracy, reliability, and consistency of monitoring undertaken for the Project. These include:

- Use of external IANZ accredited laboratories.
- Use of operational staff and third-party consultants to manage water quality data and maintenance and repair of real time water monitoring telemetry network.
- Training and inductions for environmental monitoring staff and operational supervisors.
- Frequent calibrations for monitoring equipment used in the field.
- Periodic servicing and maintenance of monitoring equipment and water treatment plant and infrastructure.
- Proactive operational issue resolution of monitoring equipment and water treatment plant and infrastructure.

9. Reporting Requirements

9.1 Internal Reporting

AMD internal reporting at Stockton will consist of:

- Reporting of relevant datasets provided to relevant operation teams to aid decision making, mine scheduling and planning. Internal stakeholders include Technical Services departments (Mining Engineers, Geologists, Mine Schedulers) and Operational Supervisors.

- Daily feedback on pump performance and water issues to the Daily Production Meeting.
- Weekly updates on water management aspects (e.g. 15 sample rolling median trends) to the Environmental Manager and Environmental Team via the Weekly Team Meeting.
- Weekly Mining Pit Review with Operations Teams.
- Bi-monthly water meetings with Technical and Operations Teams.
- Weekly updates on water management aspects to the Senior Management Team (SMT) Meetings.
- Monthly BT Mining Management Reports.
- Monthly Pump Meetings with Pump Crew, Fixed Plant and Mobile Plant Teams.

Feedback from monthly inspections and monitoring outcomes will be communicated to site personnel through toolbox talks or other appropriate forums as required to reinforce good practice and inform staff behaviour. Where required, additional inspections will be undertaken to verify the effectiveness of revised controls. Adaptive management processes will be considered, where required, to ensure appropriate management responses.

In addition to the above, under the BPCP, targeted interpretation of performance monitoring data may also be used for quantifying key milestones in AMD management. The results of these assessments will be communicated using internal memoranda.

Performance monitoring datasets may also be used to update wider management plans (e.g., Millerton Block Water and AMD Management Plan (STO-ENV-PLN-027)) and mine design plans (e.g., the Water Infrastructure Design Plan (BPCP-ENV-PLN-012)).

9.2 External Reporting

AMD external reporting at Stockton will consist of:

- Any discharge exceedances that may occur as a result of AMD impacts will be reported to regulators within 24 hours to meet **Condition REP3**.
- Annual Work Plans (AWP) provided to regulators showing disturbance liability, overburden volumes mined against planned and forecast for each financial year and detailing any other challenges including AMD issues that may arise each year. Any updates to mine plans and corresponding changes to water and AMD management is described in the AWP.
- Annual overview of AMD Management Plans for previous year and future year to Crown (LINZ) and councils for approvals.
- Monthly monitoring reports provided to regulators summarising compliance statistics (including rolling annual percentile statistics and 15-sample (trigger immediate response) values). Note, the scope of Monthly monitoring reports are limited to Compliance criteria described in Section 7.2.2.1). Monthly monitoring reports will be provided to the regulator by the end of the following month to meet **Condition REP2.**
- Annual Environmental Monitoring Reports (AEMR) provided to regulators and Ngāti Waewae that summarises the results and findings of all monitoring undertaken during the course of the

reporting year. The AEMR cycle would cover the hydrological year (1 July to 30 June) and be submitted by 31 August each year to meet **Condition REP1**. AEMR reporting would include:

  - Compliance criteria, particularly focussing on rolling annual percentile statistics (**Section 7.2.2.1**);
  - Performance water quality monitoring data analytes specified in **Section 7.2.2.2**, including comparison against forecast water quality recovery trajectory (S14B, S16) and betterment reference values (T1, S25, S24A, and MC1) (Section 7.2.2.4);
  - Groundwater monitoring data (collected quarterly as described in **Section 7.2.2.3**);
  - Estimate annual 75th percentile dissolved Al concentration and review the likely water quality state (as defined by 'WQ classification' criteria in **Table 3**) at routine and remote to define monitoring requirements for the following year.
  - An addendum including updated plans of any operating MSR (including the existing Whirlwind MSR) to meet **Condition TRE2**.

- Standalone reports would be provided to regulators, including:
  - Ecological monitoring data (during years when monitoring is undertaken as described in **Section 7.2.2.6**), including:
    - Ngakawau River Mouth annual ecology surveys; and
    - Upper Ngakawau River Fish surveys annually over first six years.
  - Sediment quality monitoring data, including comparison against sediment quality guideline values (during years when sediment sampling is undertaken as described in **Section 7.2.2.5**); and
  - Mahinga kai monitoring data (during years when monitoring is undertaken as described in **Section 7.2.2.7**).
- Results of Ngākawau River water quality and Fish Surveys reported to Community Stakeholders through Annual Community Meetings held in Ngākawau and Westport.
- Provision of AMD management datasets to a wider group of external contractors and consultants to support technical studies and assessment of environmental effects. This data sharing is generally a response to a specific request for information (RFI) from the third party.

Under the BPCP, AWP's as part of the monitoring and design will, in addition to the above, outline changes to forecast water quality and betterment/improvement.

9.3 Six-yearly water quality and ecology review

The BPCP will also introduce a six-yearly water quality and ecology review (Instream 2026a). The approval holder must undertake a Stockton Mine Waterways Review on a 6-yearly basis for the duration of this approval.

The first Stockton Mine Waterways Review must consider (but may not be limited to) all Stockton sub-area water quality and aquatic ecology Performance and compliance monitoring data collected in accordance with the conditions of this Approval, as well as the extent of the Mining and Mining-related

activities being undertaken within each catchment, during the period 1 July 2027 – 30 June 2033. Each subsequent review must in the same manner over the subsequent six-year period.

The objectives of the Stockton Mine Waterways Review are to:

a. Provide ongoing assessment of the long-term improvement to waterways impacted by AMD by collating and presenting monitoring trends across a lengthier available data record than that of the Annual Monitoring Report (**Condition REP1**);

b. Review the water quality recovery status (**Condition MON20**) at each of the Stockton monitoring sites;

c. Review the ecological recovery status (**Condition AQE10**) at each of the Stockton monitoring sites;

d. Determine if the outcome of (b) and/or (c) requires a change to the monitoring regime (as described in Stockton Mine AMD Environmental Management Plan) to be applied at any of the Stockton monitoring sites;

e. Make comparison with progress against ecological recovery trajectories at monitoring site S16 (St Patrick Stream) and monitoring site S14B (Mangatini Stream) and determine whether the comparison demonstrates that long term ecological recovery is on track;

f. Make comparison with progress against betterment reference values at monitoring site T1 (Twins Stream), S25 (Granity Stream), S24A (Miller Stream), and MC1 (Mine Creek) and determine whether the comparison demonstrates that betterment is on track;

g. Review and update the long term betterment and recovery forecast for Stockton waterways to take into account the latest monitoring data, mine planning and rehabilitation;

h. Provide an action plan to be implemented during the next 6-year period that seeks to address any 'not on track' discrepancy that may be identified through the determination required by (e) and/or (f);

i. Report on the implementation and effectiveness of any action plan that may have arisen as per (g) from the previous Stockton Mine Waterways Review;

j. Assess the water quality monitoring results for any Ecologically Recovered sites against the site-specific ecologically protective metal concentration criteria for an 80% level of protection (Schedule B) to add further refinement to the overall water quality recovery trajectory; and

k. Assess the results over time of any mahinga kai tissue testing undertaken at any Ecologically Recovered sites to inform broader consideration (in conjunction with Ngāti Waewae) of progress toward the long-term (three-generations) objective of restoring mahinga kai values to Stockton waterways.

Each Stockton Mine Waterways Review report must be independently reviewed by a suitably qualified aquatic ecologist and provided to the Approval Authority and Ngāti Waewae within 12 months of the last date to which the review period applies. Any action plan provided as per (h) requires certification by the Approval Authority prior to implementation.

9.4 Summary of Consent Monitoring and Reporting

A high level summary of consent monitoring and reporting is provided in **Table 9.**

Table 9: Summary of monitoring type and reporting

Monitoring type	Frequency	Reporting
Water quality – compliance	Daily / weekly / Monthly	Monthly report / AEMR
Water quality – performance	Daily / weekly / Monthly	AEMR
- Ecological recovery trajectory comparison	Yearly	AEMR
- Betterment Reference value comparison	Yearly	AEMR
- Remote site WQ estimates	Yearly	AEMR
Groundwater	Quarterly	AEMR
Sediment quality	3-yearly	3-yearly standalone report
Ecological monitoring	3-yearly*	3-yearly standalone report*
Mahinga kai	3-yearly (when triggered)	3-yearly standalone report (when triggered)

* Annual frequency for upper Ngakwau fish survey for first 6-years of consent, Annual frequency at NRB (in lieu of water quality compliance criteria), 3-yearly for recovered sites, and 6-yearly frequency for impacted and recovering sites.

10. Roles, Responsibilities, and Training

Stockton is committed to continual training and awareness of all staff, employees, and contractors at the Mine. Training and awareness procedures are an integral part of ensuring the full implementation of this Plan across all aspects of the Stockton site. Effective and regular communication at all levels reinforces the message that AMD management issues are taken seriously and factored into mine planning, engineering and implementation aspects.

10.1 Roles and Responsibilities

Implicit in the effective management of AMD at Stockton Mine is the allocation of responsibilities to key individuals. Details of roles and responsibilities associated with this management plan are provided in **Table 10**.

Table 10: Responsible Personnel and Tasks

Position	Accountable Task
Senior Site Executive/ General Manager	• Ensuring that achieving the objectives of this Plan is a core operating imperative. • Maintains oversight of operational performance. • Endorses significant management responses (as part of the adaptive management process) where required. • Managing risk when site standards cannot be met due to operational or technical constraints.
Technical Services Manager	• Ensuring that AMD management is implemented in accordance with mine plans, schedules and Work Instructions.
Mining Engineers	• Ensuring that AMD management (incl. water management) is factored into Mine Schedules, ELF Designs, and Dig Plans. • Contribute to investigations into water and AMD management responses (as part of the adaptive management process) where required.
Environment and Community Manager	• Development and maintenance of this Plan. • Ensure adequate resources are sought and provided by the business to achieve the objectives of this Plan. • Educating the workforce on the importance of AMD management. • Ensuring that AMD monitoring requirements are fulfilled. • Manages internal and external reporting obligations in accordance with this Plan. • Facilitate Broad Brush Risk Assessments covering critical water and AMD management and infrastructure design aspects for the business. • Lead investigations into water and AMD management responses (as part of the adaptive management process) where required.
Environment and Community Superintendent	• Ensure day-to-day operations are undertaken in accordance with the mitigation and management measures set out in this Plan. • Identify and respond to operational activities that may contribute to environmental effects.

Position	Accountable Task
	• Report any exceedances, incidents, or complaints to the Environmental Manager. • Implement corrective actions as directed. • Responsible for ensuring the instruction of workers (alongside Water Engineer), implementation and overseeing of the requirements of this Plan, including monitoring the effectiveness. • Maintain a documented record of any audits or inspections completed. • Ensure that staff and/or contractors that they supervise are suitably trained to follow processes outlined in this Plan and other documents as referenced. This includes a regular review of training requirements to ensure that each staff member/contractor is appropriately trained to carry out their duties. • Contribute to investigations into water and AMD management responses (as part of the adaptive management process) where required. • Liaise with 'Rehabilitation Engineer' to approve final landform rehabilitation.
Environmental Water Engineer	• Ensure that AMD control (water) infrastructure are designed and operating appropriately. • Ensuring the instruction of workers (alongside Environment and Community Superintendent), implementation and overseeing of the requirements of this Plan, including monitoring and review of the effectiveness. • Ensuring that the inspection, management of data, and development of work schedules for maintaining water infrastructure is undertaken. • Providing site representation and input in relation to mine projects. • Ensuring that monitoring and reporting obligations are fulfilled. • Maintain the database of water infrastructure with locations and design information. • Ensure that staff and/or contractors that they supervise are suitably trained to follow processes outlined in this Plan and other documents as referenced. This includes a regular review of training requirements to ensure that each staff member/contractor is appropriately trained to carry out their duties. • Contribute to investigations into water and AMD management responses (as part of the adaptive management process) where required.
AMD Scientist	• Supporting the Environmental Manager and Environmental Water Engineer (AMD) with AMD management. • Coordinating and managing AMD data collection. • Interpreting AMD datasets and developing AMD management systems/procedures. • Coordinating and maintaining an inventory of the delivery and deployment of acid neutralising materials such as limestone and other related products. • Auditing of AMD management implementation in the field. • Contribute to investigations into water and AMD management responses (as part of the adaptive management process) where required.

Position	Accountable Task
Water Sampling Technician	• Supporting the AMD Scientist and Environmental Water Engineer with AMD monitoring, investigation and reporting.
Contractors	• Contributing to achievement of the objectives of this Plan. • Ensure all their employees are fully trained and aware of relevant requirements of this Plan and associated procedures. • Reporting any issue that they perceive presents a risk to site performance and/or reputation. • Ensure compliance with all site regulations and engage in safe work practices.
All Workers	• Contributing to achievement of the objectives of this Plan in whatever way that relates to their role. • Reporting any AMD related issue that they perceive presents a risk to site performance and/or reputation. • Participate in inductions and toolbox talks relevant to the requirements of this Plan.

10.2 Training and Inductions

Environmental awareness training is included within the Mine Induction Package and induction process. Environmental training for operational staff and contractors in relevant procedures are undertaken as required. Training records are kept in an Online Training Log or equivalent system.

Ongoing environmental awareness training will be delivered through toolbox talks and other communication as required. All monitoring results will be assessed, and significant results or events will be raised for discussion via toolbox talks to encourage and remind staff on appropriate activities.

11. Management Plan Approval and Revision

Change Register

This AMD Environment Management Sub Plan is issued, revised, and amended under authorisation of the SSE.

A copy will be stored electronically with access available to all workers. The signed hard copy will be maintained in the site document library.

Reasons for making changes will be documented and recorded in the document management table, refer to **Table 11**. A copy of the original document and subsequent versions will be kept for records and marked as obsolete. Each new/updated version will be issued with a version number and date to eliminate obsolete documentation being used.

Table 11: Document Control

Document Management:			
Regulatory Approvals Authorities:			
Document Owner:			
Document Owner Name:			
Document Owner Approval Signature:			
Date:			
Document Approver:			
SSE Name:			
SSE Signature:			
Date Approved:			
Revision History:			
Date	**Version No.**	**Lead Author**	**Contributing Authors**
July 2026	1.0	[redacted]	
Version No.:	**Detail / Changes:**		
1.0			
Next Planned Review:			

12. References

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- Bathurst Resources Limited Stockton Mine Stakeholder Engagement Plan
- BPCP 2026a. Conceptual Mine Closure Strategy. March 2026
- BPCP-ENV-PLN-010. AMD Water Management Plan
- BPCP-ENV-PLN-011. AMD Engineered Landform Management Plan
- BPCP-ENV-PLN-012. Water Infrastructure Design Plan
- BRL 2025. Stockton Operational AMD Sludge Management Report. 2025.
- BRL 2026a. Acid Mine Drainage. History of AMD Management and Proposed Future Management. 2026.
- BRL 2026b. Millerton Water and AMD Management Report. 2026
- BRL 2026c. Stockton Mine 80-year Water Quality Forecast. 2026.
- Gandy and Younger 2007. Predictive Modelling of Waste Rock Leaching at Stockton Mine. Hydrogeochemical Engineering Research and Outreach Institute for Research on Environment and Sustainability Newcastle University, UK issued July 2007.
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- GHD, 2018. BT Mining Limited. Mangatini Sump Management Plan. Report for BT Mining Limited – Mangatini Sump Project, 5137163. June 2018.
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- Hickey, C. 2026. Buller Plateaux Continuation Project: Water quality protection guidelines. RMA Science Client Report for Bathurst Resources. 2026.
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- MfE (2018) A Guide to Attributes in Appendix 2 of the National Policy Statement for Freshwater Management (as amended 2017). p. 47. Ministry for the Environment, Wellington. https://environment.govt.nz/assets/Publications/Files/a-draft-guide-to-attributes.pdf
- O'Kane Consultants Ltd., 2015. Acid Mine Drainage Liabilities – Stockton and Cypress Operations. Technical report prepared for Solid Energy New Zealand Ltd. Report No. 949/01-01. Dated July 2015.

- STO-ENV-PLN-013 Stockton Mine Water Environmental Management Plan7
- STO-ENV-PLN-027 Millerton Block Water and AMD Management Plan
- STO-ENV-PRO-031 Revegetation Planning Procedure
- STO-MIN-SOP-069 Dumps, Stockpiles and Hoppers Standard Operating Procedure
- STO-FPL-SOP-093 Stockpile Sampling Procedure
- STO-TEC-FRM-087 Dig/Dump Mine Planning Checklist – Sign Off
- Stockton Mine Acid Mine Drainage Management Project- DRAFT Developing the assessment framework, longlist and shortlist of options, April 2023
- Tregaskis Brown and Tonkin + Taylor 2024. Stockton Mine AMD Management Project. Prepared for Te Tai Ōhanga – The Treasury, Version 2.2, dated 6 March 2024. https://treasury.govt.nz/publications/information-release/stockton-acid-mine-drainage

[7] As italicised, listed Stockton plans, operating procedures, standard operational procedures and other applicable checklists or guidance will be updated, as required, pending FTAA approval to reflect BPCP obligations.

Attachment A - Relevant Consent Conditions

Conditions will be inserted upon issue of the final decision.

Appendix 1 – Ecological monitoring methodology and EPT richness from Instream (2026a)

Ecological monitoring methods

Water quality should be sampled according to the appropriate National Environmental Monitoring Standard (NEMS) (Hicks, 2025; Milne, 2020). Those standards provide guidance for collection, processing and archiving of environmental data. Key considerations are the detection levels provided for various contaminants, particularly when considering trace elements at reference sites.

Macroinvertebrates shall be collected according to Milne (2022a). While quantitative sampling, using equipment such as the Surber sampler, is conventionally used for consent compliance monitoring there are a number of reasons why the NEMS kick net approach is preferred. Firstly, the biological metrics being used to infer ecological health in AMD affected streams are based on the presence or absence of species rather than their relative or absolute abundance. Accordingly, there is no increase in certainty to be gained from collecting quantitative data. Secondly, the streams draining Stockton Plateau are highly diverse in terms of physical habitat. Streams beds may be boulder bedrock, sand or organic material. There are no quantitative sampling techniques suitable for consistently sampling that range of substrate. Finally, the majority of previous sampling undertaken in AMD streams has used kick net methodology.

Routine fish community sampling will be undertaken using a single pass electric fishing technique encompassing the full range of habitats within a ~50 m reach. Fish will be identified, measured and returned to the water. However, due to the behaviour of species present and habitat diversity of many streams including overhung banks, bouldery substrates and woody debris electric fishing should be substituted with additional methods at a subset of sites. At large river sites, such as NR and those considered suitable for kōura spotlighting, trapping or hand searching (kōura only) should be undertaken.

Bryophyte sampling will occur at a sub-set of sites. Sampling will be carried out by hand picking each distinct moss species/form present within a 50 m reach. Samples will be placed in zip lock bags and chilled for transport to the laboratory.

Habitat characteristics can be assessed using an array of standard methods (Harding, 2009; Milne, 2022b). Key information to collect include the major drivers of macroinvertebrate communities including substrate, sedimentation, periphyton and flow heterogeneity. In AMD affected streams the occurrence and degree of precipitation is also likely to have a strong influence on aquatic communities. We suggest an assessment analogous to that used for periphyton (Biggs & Kilroy, 2000; Milne, 2022b) whereby the cover of precipitation is denoted by colour (e.g. orange or metallic) and thickness (thin mat/film (<0.5 mm, medium mat 0.5- 2 mm and thick mat >2 mm mats).

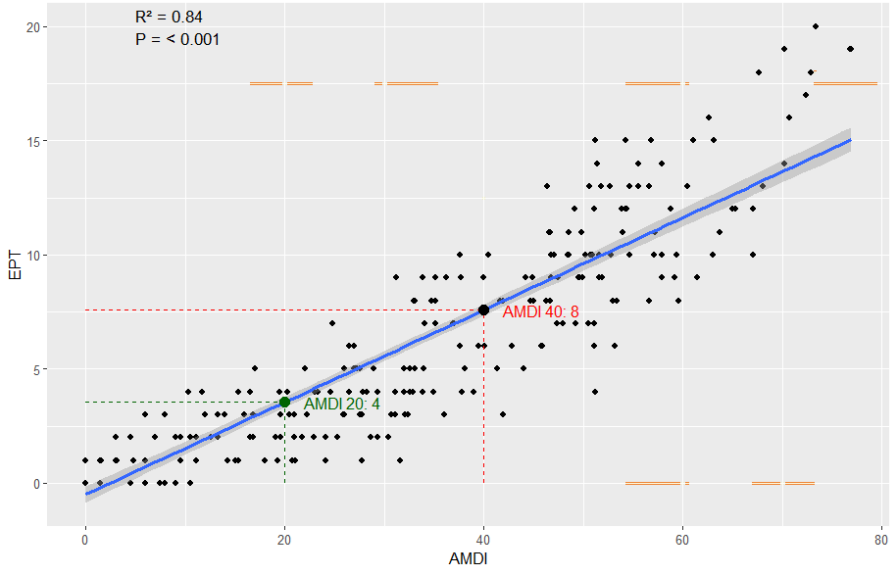
AMDI and EPT taxa list

AMDI and EPT are to be calculated using the taxa list in Gray and Harding (2012).

Taxon	AMDI Indicator Score	Taxon	AMDI Indicator Score
Ephemeroptera		**Trichoptera cont'd**	
Ameletopsis	6	Polyplectropus	4
Austroclima	4	Psilochorema	2
Coloburiscus	8	Pycnocentria	7
Deleatidium	6	Pycnocentrodes	0
Ichthybotus	10	Rakiura	7
Neozephlebia	3	Triplectides	6
Nesameletus	9	Zelolessica	3
Zephlebia	9	**Diptera**	
Plecoptera		Aphrophila	8
Austroperla	0	Austrosimulium	5
Cristaperla	9	Ceratopogonidae	5
Megaleptoperla	9	Chironomidae	0
Spaniocerca	4	Empididae	5
Spaniocercoides	1	Eriopterini	3
Stenoperla	7	Limonia	7
Taraperla	10	Paralimnophila	6
Zelandobius	0	Muscidae	0
Zelandoperla	4	**Coleoptera**	
Trichoptera		Hydora (Elmidae)	0
Alloecentrella	3	Zeahydora (Elmidae)	9
Hydropsychidae	5	Hydraenidae	5
Costachorema	9	Hydrophilidae	8
Helicopsyche	8	Ptilodactylidae	10
Hudsonema	6	Scirtidae	1
Hydrobiosella	7	**Other**	
Hydrobiosis	2	Archichauliodes	2
Hydrochorema	2	Oligochaeta	1
Oeconesus	2	Ostracoda	4
Olinga	10	Paraleptamphopus	3
Oxyethira	1	Paranethrops	10
Plectrocnemia	8	Potamopyrgus	10

Relationship between AMDI and EPT richness

The relationship between AMDI and EPT Richness used to generate EPT thresholds for ecological recovery. The analyses used a linear regression to predict EPT Richness. Predictions were rounded to the nearest whole number.



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Appendix 2. GHD (2026) proposed Groundwater Monitoring

Background

The existing groundwater monitoring data and current sites provide useful information on the current state of groundwater in some areas of Stockton. Future activities under the proposed BPCP will result in further changes to groundwater and hydraulically connected waterways.

It is recommended that the current hydrogeological monitoring be expanded to confirm the current predictions and to monitor the potential changes on groundwater from the BPCP and particularly hydraulically connected surface water. The Millerton Block is considered as the focus area where ongoing opencast mining and potential groundwater impacts on waterways are likely to be greatest.

Proposed monitoring and investigations

Details of the proposed groundwater monitoring investigations consistent with MFS and ESE (MWM, 20206a & b) are provided **Table A2.1**. The current water monitoring sites across the Stockton area are summarised in **Table A2.2**. The justification for the proposed groundwater monitoring sites is presented in **Figure A2.1**, and location information is summarised in **Table A2.3**. The proposed groundwater sampling details are provided **Table A2.4**.

Final details of the groundwater monitoring (sampling, location etc) will be confirmed as a condition of the granting of the BPCP. Most groundwater monitoring will be used to assess AMD management performance as opposed to measurement against specific compliance criteria.

As part of finalising the groundwater monitoring plan, a bore condition assessment and assessment of other groundwater monitoring sites will be undertaken to assess the status, condition and suitability for future monitoring. The final monitoring locations will also prioritise areas that will allow continued monitoring over the long-term, and minimise the number of sites being removed through operational activities.

The groundwater monitoring strategy for BPCP will focus on groundwater interaction with waterways and AMD impacts from the BCM (main acid-forming material) at / or near key discharges into waterways from seepages or historical underground workings and downgradient of potential contaminant sources in PAF waste rock, coal fines storage, water treatment sumps and pit floor run-off sites.

Sug testing of each new monitoring bore is proposed on completion (after development) to obtain site-specific hydraulic conductivity data for the Brunner Coal Measures / Kaita Mudstone and Basement. Slug testing is also proposed on existing monitoring bores that are assessed to be in reasonable condition. The extra hydraulic conductivity data will be important for any future groundwater modelling (analytical or numerical).

The final monitoring plan will also include flow and quality of key existing and future waste rock seepages.

Table A2.1 Proposed groundwater monitoring and investigations

Catchments	Monitoring site description	Groundwater monitoring type and analysis	Formation monitored	Reporting type	Monitored impacts from	Monitored impacts on	'Current' monitored or proposed 'new'
Millerton Block	Continue measurements from current monitoring bores with VWTs installed within historical underground workings down-gradient and within the Millerton opencast pit areas that still exist and are of suitable condition. Noting that some of these sites will likely be removed through future opencast mining.	Levels / possibly quality	BCM	Performance	Fire suppression discharges, pit dewatering, climatic influences, especially rainfall.	Groundwater interaction with Mine Creek, Miller Stream and Granity Stream.	Current
	T1 groundwater seepage into Twins Stream. Sampling as per proposed consent compliance limits under the BPCP for dissolved aluminium and turbidity (Instream, 2026).	Flow and quality	BCM	**Compliance**	AMD treatment activities and separation of potential impacts on Twins Stream from Rockies Mine.	Groundwater interaction with Twins Stream	Current
	Monitoring bore	Levels and quality	BCM	Performance	Dewatering associated with opencast mining, pit sumps and changes due to removal of underground workings.	Groundwater with a focus on potential impacts to Rockies Coal Mine	New
	Historical underground workings - DCA portal	Flow and quality	BCM	Performance	Fire suppression discharges, opencast mining and the underground workings	Mine Creek – receiving waterway	Current
	Paired monitoring bores located up-gradient and down-gradient of the proposed MW16 (AMD water treatment) Sump and Millerton ELF and in undisturbed material and providing background (reference) data up-gradient of historic workings and waste rock. The paired monitoring bores include one bore screened into the BCM and one into the Basement to monitor hydraulic connection and potential contaminant pathways between the two HSUs.	Levels and quality	Basement / BCM	Performance	MW16 Sump AMD seepage, Millerton ELF, groundwater flow, and underground workings cutoff, waste rock, underground workings and dewatering activities	Groundwater interaction with waterways including Mine Creek.	New
	Two monitoring bores located between Granity and Twins Streams. Quarterly monitoring for two years – followed by a review to assess the results and whether further monitoring is required. Note that the proposed location of these new bores is outside the Stockton mining area, so will be subject to landowner approval.	Levels and quality	Coastal sediments	Performance	Potential AMD seepage into groundwater from Twins ad Granity Streams.	Shallow (unconfined) groundwater	New
Mangatini	Bores adjacent and downgradient of Mangatini Sump.	Levels and quality	BCM	Performance	Seepage of AMD and LDS from the sump.	Groundwater	Current
	Existing bore STK7163 used to monitor groundwater impacts down-gradient of the proposed Webb ELF (used for disposal of Cypress PAF waste rock). This bore has been installed as part of Cypress consent RC03175, which requires that a sampling and monitoring programme be established. Additional monitoring downgradient of the Webb ELF using. paired monitoring bores; one to target the BCM and one to target Basement. Paired monitoring bores screening undisturbed material and providing background (reference) data up-gradient of historic workings and waste rock.	Levels and quality	Basement / BCM	**Compliance**	AMD from Cypress PAF waste rock material.	Groundwater	Current and New
	Monitoring bores and seepages.	Levels and quality	BCM	Performance	Current A18 CFSF.	Groundwater down-gradient of CFSFs and upgradient of Ford Creek	New
	Coal fines pore water, seepage quality and levels measured in VWPS.	Levels and quality	Coal Fines	Performance	CFSFs.	Groundwater	Current
St Patrick	Monitoring bores screened into to BCM and Basement to monitor hydraulic connection and potential contamination pathways. Paired monitoring bores screening undisturbed material and providing background (reference) data up-gradient of historic workings and waste rock.	Levels and quality	Basement / BCM	Performance	CFSFs.	Groundwater down-gradient of CFSFs and upgradient Fly Creek and T31 Stream	New
	Monitoring bores and seepages.	Levels and quality	BCM	Performance	New CFSFs	Groundwater up-gradient and down-gradient of CFSFs	New
	Coal fines pore water, seepage quality and levels measured in VWPS.	Levels and quality	Coal Fines	Performance	CFSFs.	Groundwater	Current
Upper Waimangaroa	Combined groundwater and surface water impacts at monitored at Upper Waimangaroa River monitoring site 6W.	Quality	-	Performance	Cumulative impacts from the Cypress and Stockon mining.	Upper Waimangaroa River	Current

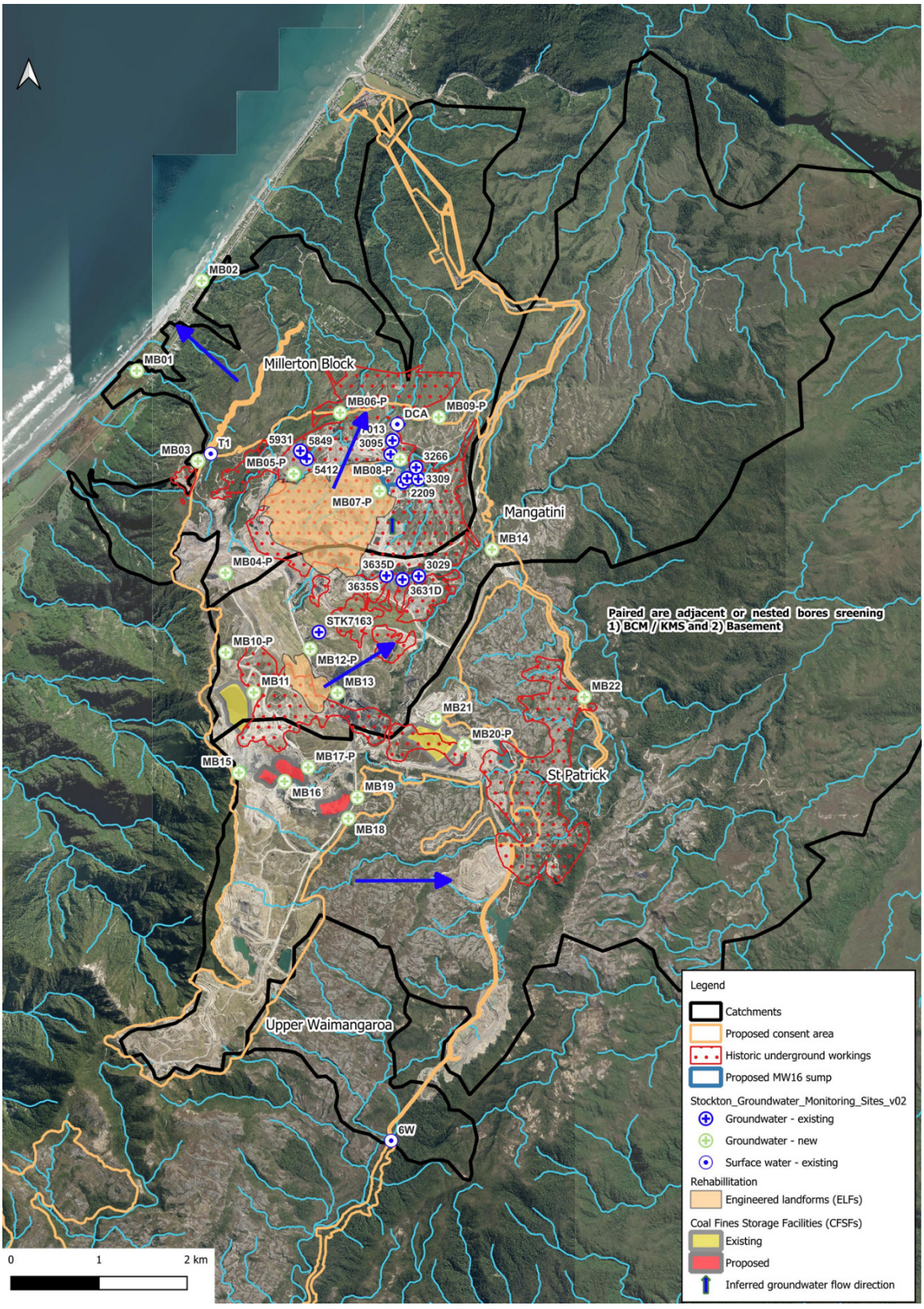

Figure A2.1 Proposed groundwater monitoring locations on the Stockton Plateau. New monitoring locations are indicative and some existing sites will be removed as a result of continued opencast mining.

Table A2.2 Current water monitoring location summary

ID	xNZTM	yNZTM	Source	Catchment	Monitoring type	Target Unit(s)
T1	1504670	5388917	Surface water	Millerton Block	Water course	GW discharge
6W	1506719	5381113	Surface water	Upper Wai.	Water course	GW discharge
DCA	1506789	5389252	Surface water	Millerton Block	Water course	GW discharge
STK7163	1505899	5386890	Groundwater	Mangatini	Single bore	BCM
3029	1507031	5387526	Groundwater	Mangatini	Single bore	Mangatini Sump
3631S	1506848	5387487	Groundwater	Mangatini	Single piezo	Mangatini Sump
3631D	1506848	5387487	Groundwater	Mangatini	Single piezo	Mangatini Sump
3635S	1506665	5387533	Groundwater	Mangatini	Single piezo	Mangatini Sump
3635D	1506665	5387533	Groundwater	Mangatini	Single piezo	Mangatini Sump
2209	1506855	5388595	Groundwater	Millerton Block	Single bore	Millerton Pit
2503	1506899	5388638	Groundwater	Millerton Block	Single bore	Millerton Pit
3309	1507027	5388630	Groundwater	Millerton Block	Single bore	Millerton Pit
3266	1507002	5388761	Groundwater	Millerton Block	Single bore	Millerton Pit
3095	1506713	5388910	Groundwater	Millerton Block	Single bore	Millerton Pit
7013	1506734	5389068	Groundwater	Millerton Block	Single bore	Millerton Pit
5412	1505760	5388859	Groundwater	Millerton Block	Single bore	Millerton Pit
5849	1505693	5388937	Groundwater	Millerton Block	Single bore	Millerton Pit
5931	1505687	5388951	Groundwater	Millerton Block	Single bore	Millerton Pit

Table A2.3 Proposed groundwater monitoring location summary

ID	xNZTM	yNZTM	Source	Catchment	Monitoring type	Target Unit(s)
MB01	1503830	5389860	Groundwater	Millerton Block	Single bore	Unconsolidated sediments
MB02	1504567	5390882	Groundwater	Millerton Block	Single bore	Unconsolidated sediments
MB03	1504524	5388833	Groundwater	Millerton Block	Single bore	BCM/KMS2
MB04	1504835	5387564	Groundwater	Millerton Block	Paired	BCM/KMS & Basement
MB05	1505611	5388688	Groundwater	Millerton Block	Paired	BCM/KMS & Basement
MB06	1506139	5389383	Groundwater	Millerton Block	Paired	BCM/KMS & Basement
MB07	1506586	5388492	Groundwater	Millerton Block	Paired	BCM/KMS & Basement
MB08	1506820	5388854	Groundwater	Millerton Block	Paired	BCM/KMS & Basement
MB09	1507259	5389332	Groundwater	Millerton Block	Paired	BCM/KMS & Basement
MB10	1504839	5386660	Groundwater	Mangatini	Paired	BCM/KMS & Basement
MB11	1505159	5386205	Groundwater	Mangatini	Single bore	BCM/KMS
MB12	1505798	5386699	Groundwater	Mangatini	Paired	BCM/KMS & Basement
MB13	1506109	5386200	Groundwater	Mangatini	Single bore	BCM/KMS
MB14	1507864	5387828	Groundwater	Mangatini	Single bore	BCM/KMS
MB15	1504989	5385293	Groundwater	St Patrick	Single bore	BCM/KMS
MB16	1505508	5385195	Groundwater	St Patrick	Single bore	BCM/KMS
MB17	1505777	5385353	Groundwater	St Patrick	Single bore	BCM/KMS
MB18	1506232	5384773	Groundwater	St Patrick	Single bore	BCM/KMS
MB19	1506335	5385012	Groundwater	St Patrick	Single bore	BCM/KMS
MB20	1507553	5385608	Groundwater	St Patrick	Paired	BCM/KMS & Basement
MB21	1507225	5385906	Groundwater	St Patrick	Single bore	BCM/KMS
MB22	1508912	5386153	Groundwater	St Patrick	Single bore	BCM/KMS

Notes:

1- Coastal groundwater

2- Rockies Coal Mine Bore

Table A2.4 Proposed groundwater monitoring details

Details	Description
Number of monitoring sites	As shown in Figure A2.1 and discussed in Table A2.1.
Screen targets	Screens will target intercepted structures (e.g., fracture zones) and/or bedding contacts (e.g., BCM and Basement contact).
Sampling frequency	Sampling frequency will be quarterly.
Sampling methodology	Manual and automated (with pressure transducers) groundwater level measurement. Low flow sampling methodology is the preferred method to obtain a representative sample where possible.
Sampling parameters	**Field:** Groundwater level (manual and from pressure transducers). pH, temperature, electrical conductivity, oxidation reduction potential, dissolved oxygen. Laboratory: **Laboratory:** pH Electrical Conductivity Alkalinity Acidity (to pH 8.3) Dissolved Aluminium Dissolved Zinc Dissolved Iron Dissolved Nickel Dissolved Copper Dissolved Cadmium Dissolved Manganese Dissolved Calcium Dissolved Magnesium Dissolved Organic Carbon Total Suspended Solids Turbidity
Quality Control sampling	One trip blank per sampling event. One duplicate sample per every 10-20 primary samples. One field blank per sampling event
Reporting requirements	Groundwater monitoring data collected will be reported in an annual water report alongside surface water monitoring.