From: BDC Lgoima
To: [redacted]
Subject: Official Information Request for Stockton Mine Monitoring - RC Compliance Ref: OIA 121/24
Date: Thursday, 7 November 2024 10:28:03 am
Attachments: 2022 AP File Note.pdf
Cypress Road Construction Consent Boundary Breach April 2024 .pdf
FY22 Cypress Environmental Monitoring Report.pdf
Fwd Memorandum Subsidence in Cypress Mining Area.msg

Dear [redacted]

We refer to your official information request dated 2 October 2024.

We asked you on 10 October to refine your original request (due to a significant amount of information being sought). You refined your request as follows:

Could I please narrow it to all documents relating to the breach of any consent or consent conditions by the Bathurst Resources Stockton mine since 2018?

The information you have requested is attached.

You have the right to seek an investigation and review by the Ombudsman of this decision. Information about how to make a complaint is available at www.ombudsman.parliament.nz or freephone 0800 802 602.

If you wish to discuss this decision with us, please feel free to contact the Buller District Council by return email to lgoima@bdc.govt.nz.

Please note that it is our policy to proactively release our responses to official information requests where possible. Our response to your request may be published at https://bullerdc.govt.nz/district-council/your-council/request-for-official-information/responses-to-lgoima-requests/ with your personal information removed.

Kind regards

Michael Aitken | Acting Group Manager Regulatory Services
Email Michael.Aitken@bdc.govt.nz

Buller District Council | Phone 0800 807 239 | bullerdc.govt.nz
PO Box 21 | Westport 7866

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BULLER
DISTRICT COUNCIL
Te Kaunihera O Kawatiri
Let's talk
Reserves Management survey
Help shape the future of our reserves
Complete survey online

PLANNING DEPARTMENT FILE NOTE

From:	Rebecca Inwood
Date:	24th August 2022
File Ref:	RC030164
Phone/Visit:	Site visit
Subject:	Annual Work Plan 1 April 2022 – 31 March 2023 (RY23)

The site visit was undertaken with Sam Taylor for Bathurst.

Excavation of the full extent of the northern box cut has been completed out to Strip 7. At the time of the site visit, development of the pushbacks had also extended to Strip 7, with operations concentrated in strips 3, 4 and 5 of the pushbacks and an access ramp to the pushbacks developed in strip 6. Overburden has been removed to the Northern ELFs as per the material classification schedule.

Permanent back fill of the north box cut pit commenced in RY21. Strip 0 in the north end of the pit was backfilled to 695mRL and involved an 8m bund of compacted PAF material around the permitter of the pit and 2m lifts of compacted PAF material and has been tested to ensure the required compaction has been achieved. All backfilled PAF material had aglime mixed in at the required rate of 8kg/tonne.

For RY23, development focuses on removing remnant coal from strip 7 in the box cut and strips 1 and 2 of the pushbacks. A small volume of remnant coal remaining in Strips 1 and 2 of the boxcut will also be recovered. Recovery of this coal has been delayed due to the need to stabilise the highwalls above and as a consequence backfilling of the pit has also been delayed. Once the remnant coal has been recovered this will allow a steady state of mining with continuous backfilling of the pit.

Tussock and herbfield recovery has utilised the available storage areas with 13.88ha of stored vegetation. Sam advised that minimal VDT is expected to be recovered from now on due to mine development moving into steeper slopes and forested areas which is not amenable to VDT. However, some material may be recoverable from development of the Southern pit access road and water management facilities (forms part of RY23 activities) which may need to be temporarily stored at Stockton. While provision has been made for a new soil storage area to the south of the PAF ELF this will quarantine further sandstone pavement and the area has a number of gullies so the preference is to avoid using this site. Once a steady state of mining proceeds and backfilling of the pit occurs this will provide room for stockpiling of material on backfill areas.

Water management still comprises the LDP2 dosing St Pats dam to provide pH corrections to the pit and N-ELF PAF discharges. Once the McCabe's sump is complete (expected within the next couple of months), dosed discharge will be to the McCabe's sump with final discharge into Fly Creek. The new treatment system will include smaller sumps to collect sludge. These sumps will be accessible by excavators to remove accumulated material (this is not possible for St Pats Dam or the Mangatini Sump).

During RY22 it was discovered that under-dosing with aglime had been occurring to PAF material and that the required 8kg/tonne had not been applied. Sam advised that this was largely a result of different sized mining equipment being utilised e.g. trucks. To correct this,

additional lime will be added to the N-ELF PAF dump.

Development of the southern box cut is to commence with access and water management infrastructure to be installed. The south pit is expected to produce significant volumes of PAF material with several options being considered for management of this material including an ex-pit overburden dump that would be capped and left in perpetuity, disposal to the northern pit or within Stockton Mine. There is still a shortfall of dumping space for PAF material in the long term and this remains a focus for mine planning. Any new external ELF would also be subject to consenting.

The Annual Compliance Monitoring Report for Cypress was also supplied, covering the period 1 April 2021 to 31st March 2022. Issues of note for district responsibilities relate to dust exceedances off the haul road during Jan 2022. In response to this, BT Mining have installed cameras for real time monitoring of the haul road that will ensure the water cart is promptly utilised when dust becomes evident. The other point of note is that there is an on-going trend of weeds within the herb/tussock storage material that needs constant attention. Sam advised that given the importance of this vegetation to achieve the rehabilitation goals, careful attention is being given to management of weeds and this has involved removal by hand rather than spraying which can result in unintended plant deaths.

Due to other commitments, I missed the PRP visit which occurred 25-27 July 2022. Sophie Pape (geochemical expert) also missed the site visit due to contracting covid. In discussions with Chris Barnes, he advised that the other two experts appeared to be happy with how mine development was proceeding with the main issue being management of PAF material as activities progress into the southern pit area but there are options available for dealing with this.

Planted area below Pushback 0 of around 0.5ha. This is the only rehab completed to date due to the active work areas.

View of the northern box cut and pushbacks above.

Attention:
Chris Barnes
Manager Compliance
The West Coast Regional Council
388 Main South Road
Paroa
PO Box 66
Greymouth

Rebecca Inwood
Resource Management Planner
Buller District Council
PO Box 21
Westport 7866

From:
Barry Walker
Environment and Community Manager
Bathurst Resources Ltd
Stockton

Distribution:
Fiona Bartier – General Manager Health Safety Environment & Community, Bathurst Resources Ltd
Barry Walker – Environment and Community Manager, Bathurst Resources Ltd
Tom Lucas – Technical Services Manager
Phil Lindsay – Environmental Manager Bathurst Resources Ltd
Ian Harvey – GM Export Operations, Bathurst Resources Ltd
Bathurst Resources Ltd File copy

Memorandum

Notification # STK ENV #161
Date **26th** April 2024
Site Stockton
Location Cypress South Pit

Notification Details
Bathurst Resources holds Resource Consents RC03175 (WCRC) and RC03164 (BDC) to undertake coal mining in the Cypress Mining Area, within the consent boundary identified as 'Figure 2.1A_Revised Cypress Mine Layout', outlined in the Assessment of Environmental Effects dated 9 March 2011. An unintended and unforeseen minor operational consent boundary breach occurred on 21 March 2024.

Related Explanation/Information:

- The current construction of the Cypress South access road is through a historic slip with underlying Kaiata mudstone. The material that is required to be moved is incompetent and is proving to be extremely challenging to make operational progress through. The area is prone to slips.
- On the 21st of March a digger operating well within the consent boundary was constructing a

bund for a temporary water management sump as per engineer designs. Current road construction includes the placement of temporary sumps to avoid compromising waterways and upon final road design will be replaced by more permanent structures. The material that the digger was sitting on flowed out from under the digger in slow motion, leaving the digger in place. The slip transported a 'raft' of vegetation and the consent boundary peg with it, leaving all intact and slightly beyond the consent boundary (some 6m north-west of the true consent boundary).

- Refer to Figures 1 and 2 below for location of the failure outside of the consent boundary.

- Digger activity was well within the consent boundary. No intentional nor unnecessary risks were undertaken and hence were in keeping with consent conditions A1.2 and A1.3. The landslide could not have been foreseen.

- Works ceased immediately as per Bathurst health and safety and environmental compliance priorities and protocols.

Figure 1: Red line is consent boundary. + is consent boundary peg, original and moved. Yellow line marks slip extent.

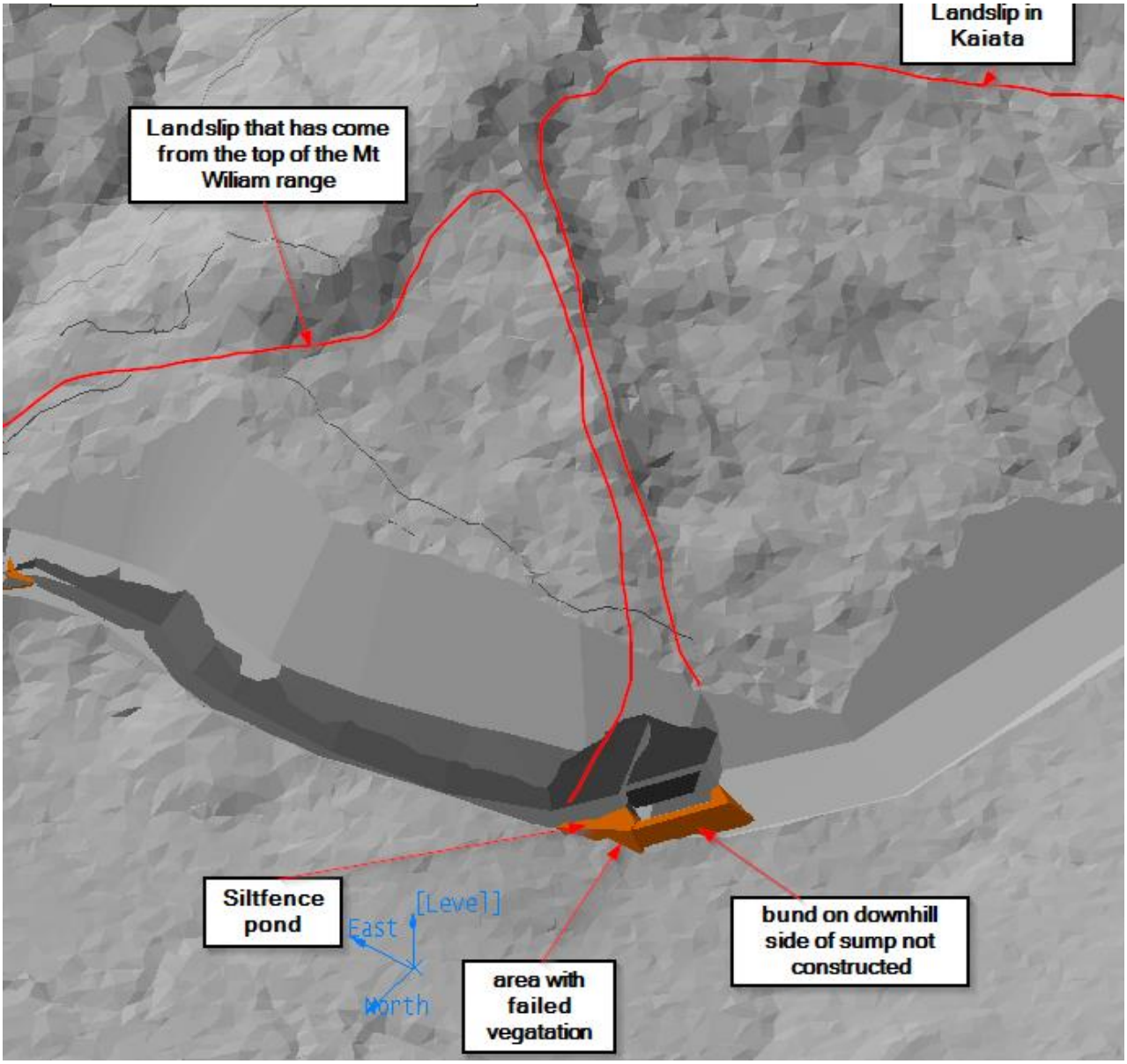

Figure 2: Location of the failure outside of the consent boundary.

- During geotechnical inspections on the day of the incident, it was confirmed that when the vegetation was disturbed the topsoil layer of clay slumped, and therefore has restricted the ability for further digger activity for bund construction.

- Immediate work was undertaken to revise work activity plans to a safer position by removing the need for a bund by pushing into the hillside at a reduced angle. A new plan was issued to contractors on 2nd April with clear instructions to ensure the safe execution of the revised plan, adhering to all relevant site operating standards and environmental controls with an immediate 'If in doubt, stop work' clause and communication with the Technical Team. Exclusion zones were loaded into all machines for reference and consultation. This is in keeping with consent conditions A1.2 and A1.3.

- While the above ceasing of works and revision of activity plans were undertaken at the time of the incident, and despite Technical Service and Environment and Community Team personnel inspections at that time, the true nature of the consent boundary breach was not recognised due

to the intact movement of the "raft" of vegetation and the consent boundary marker (orange pole) remaining standing.

- A drone survey from the 4th April was transposed by the water engineer onto water designs first picked up the extent of the slip and potential consent boundary encroachment. A subsequent site visit undertaken on 12th April by Geotechnical Service and Environment and Community Team staff confirmed slip movement across the consent boundary.

- The disturbance as it stands is a bow-wave of topsoil and vegetation debris with the consent boundary marker still standing in-situ (as per figure 1). There is a pile of weathered rock and silt material behind this vegetation (Figure 1 yellow line) which has extended past the consent boundary.

- Refer to site investigation images below (12th April 2024).

Figure 3: Looking north to south across the leading edge of the slip debris with the consent boundary marker clearly visible.

Figure 4: Weathered rock/mud backed-up behind the leading edge of the slip.

- There has been no activity to remediate the slip area outside of the council boundary. This decision has been made to avoid releasing more slip material downslope and compromise sediment controls and subsequent effects on waterways. This aligns with Consent condition A11.2 which outlines what the Construction and Earthworks Management Plan shall provide for.

- The intent is to re-mark the true consent boundary, but to leave the slip material where it currently sits to avoid releasing more sediment downslope. Once settled, VDT or soil/slash will be placed on exposed ground to revegetate the area.

- In referring to Figure 1, for context and a useful comparison with respect to this incident, the level of disturbance is similar in nature to controlled exploration drilling as permitted within the Upper Waimangaroa Mining Permit (MP41-515) and associated approvals outside of the consent boundary.

- The breach of the consent boundary at the point in time (21st March) was not recognised due to the nature of the slip still maintaining integrity of marker peg and vegetation, and despite a number of site inspections, the breach remained unseen. Bathurst acknowledges the time taken to identify the boundary incursion and in notifying council.

- In addition to immediate cessation of works, a revised plan of works and repegging of the true consent boundary, the Environment and Community team will continue as per consent and normal best practice to monitor Cypress South Break-in works. The internal investigation confirmed that the Technical Services Engineers and Operational Team are well conversant of the Consent Boundary, Boundary Effects Management Plan. All due care is planned for and executed.

From: Rebecca Inwood
To: Carissa du Plessis
Subject: Fwd: Memorandum: Subsidence in Cypress Mining Area
Date: Friday, 25 October 2024 4:43:02 pm
Attachments: image006.png

---------- Original Message ----------
From: Sam Taylor <Sam.Taylor@bathurst.co.nz>
To: "colinh@wcrc.govt.nz" <colinh@wcrc.govt.nz>, Chris Barnes <chrisb@wcrc.govt.nz>, Rebecca Inwood <inhill@xtra.co.nz>
CC: Barry Walker <barry.walker@bathurst.co.nz>
Date: 10/01/2020 13:57 NZDT
Subject: Memorandum: Subsidence in Cypress Mining Area

Good afternoon,

During routine geotechnical inspections on Friday 13th December 2019, an area of slumping was identified east of the Cypress Pit on the flanks of Mt William Range. This slumping has occurred due to a geotechnical failure of the hillslope and has created a visible failure scarp approximately 106-109m east of the operational mining area, running roughly parallel with the consent boundary.

A detailed survey of the hillslope failure has since been conducted including a drone flyover and GPS mark-out of the failure scarp and visible surface cracking. This survey has confirmed the failure scarp extends approximately 8 metres outside of the consented area for Cypress Mining Operations, and is the result of slumping extending along both sides of the consent boundary. However, the scarp and associated disturbance remain below the ridgeline of Mt William, preserving the ridge crest in accordance with Cypress consent condition C44 and as such, no breach of consent conditions has occurred to-date. This email is for your information.

Slumping of the hillslope covering 171.6m^2 has occurred outside of the Consent Boundary is currently being monitored by BT Mining for safety and environmental considerations while mining progresses in the Cypress Pit below and to the west, within the Cypress Consent Boundary.

Approximate location of the failure outside of the consent boundary is shown in the figures below:

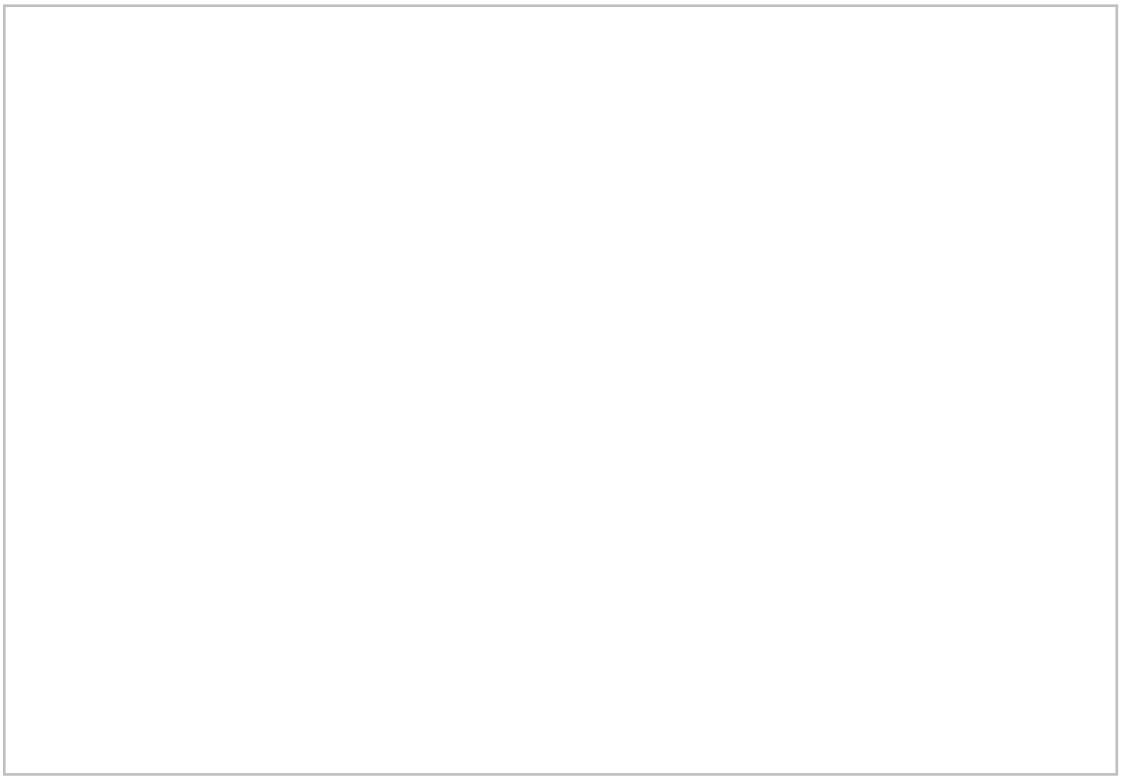

Figure 1: Cypress North Mining Area including failure highlighted above ‘Strip Zero’.

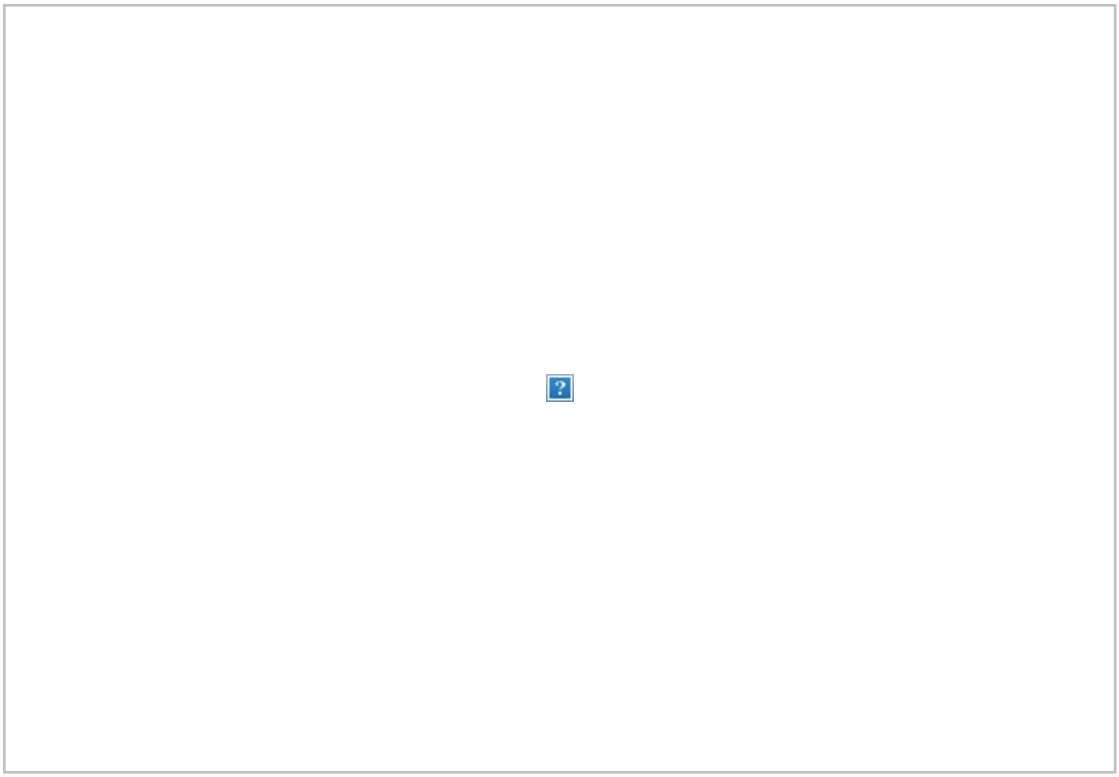

Figure 2: Hillslope Failure Scarp and Proximity to the Cypress Consent Boundary

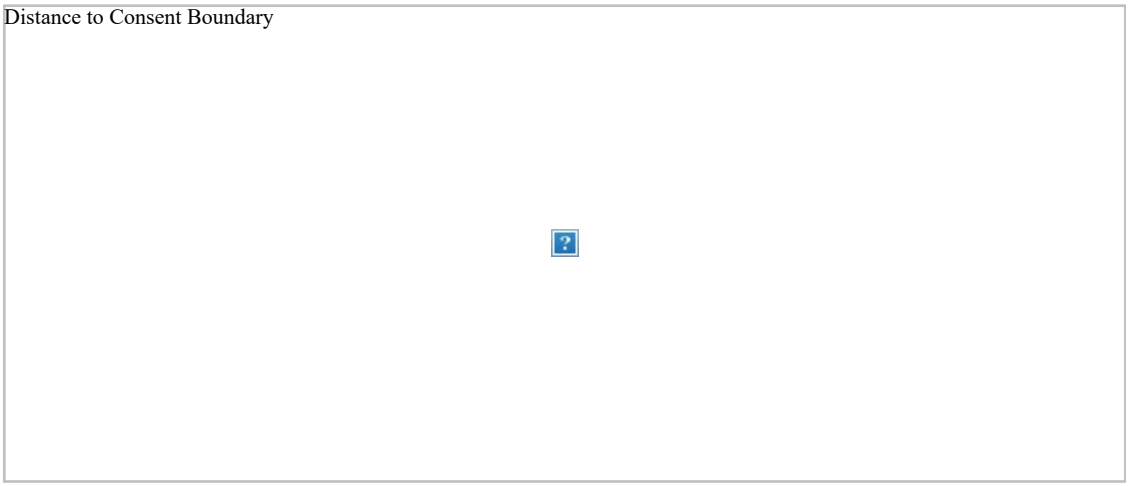

Figure 3: Approximate Distance between Mined Highwall and Failure Scarp at Consent Boundary

Figure 4: Approximate Area of Disturbance Due to Slumping Outside Consent Boundary

Figure 5: Approximate Distance between Hillslope Failure and Mt William Ridgeline Crest (based on topomap estimate of crest).

The disturbance resulting from this slumping of the hillslope has had minimal effect on the environment to-date and as shown in drone footage above has not affected the ridgeline of Mt William Range. We will continue to monitor the area and expect further subsidence of this weakened landform to cease as the Cypress North Pushback is backfilled later this year which will effectively buttress the toe of the slope.

If you require any further information please contact myself or Barry Walker in the first instance.

Regards,

Sam Taylor

Environmental Rehabilitation & Consents Superintendent

T: +64 3 788 9789 | M: +64 21 190 9953 | F: | E: Sam.Taylor@bathurst.co.nz

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E-mail: inhill@xtra.co.nz | Mobile: 027 2557306




CYPRESS MINE

ENVIRONMENTAL MONITORING REPORT

1 April 2021 – 31 March 2022

ISSUED May 2022

BATHURST RESOURCES LIMITED

TABLE OF CONTENTS

FIGURES

TABLES

1. Introduction

This is the thirteenth Cypress Environmental Monitoring Report, provided under condition A17 of the Cypress Mine resource consents. The report is structured according to condition A17.3 of resource consents RC03175 and RC03164.

The Cypress resource consents were activated in March 2009, deactivated in April 2010 and reactivated in May 2011. Work commenced on the light vehicle access road, St Pat's Dam and the haul road in March 2011. During 2012-2013 St Pat's Dam refurbishment, the diversion weir and diversion of the St Patrick Stream and the haul road major stream crossings were completed. Northern ELF development also commenced as well as an expansion of the 700 ELF and development of the tussock storage area at McCabe's ELF.

As a result of the economic downturn and reduced coal prices, Solid Energy commenced mining a smaller north pit, the Cypress north box cut (CNBC) in FY14. The cleared mining footprint extended up to Strip 5 of the CNBC until 2017, and in 2017-2018 (FY18) vegetation stripping was extended into part of the boxcut Strip 6 (for drilling only) and Stage 1 of the Cypress North Pushback Area (CNPB). FY19 saw development expand into Stage 2 of the Pushback while mining continued in the Box Cut (CNBC). FY20 mining progressed into Strip 6-7 of the Box Cut and north into Box Cut Strip 0, with additional development in Pushback Stage 3.

FY21 saw the development of Pushback Stages 4-5 including the formation of highwalls as overburden stripping commenced in these areas. Tree felling was also completed in Pushback Stage 6 ready for soil/slash removal. A ramp was created to provide access into Strip 7 of the Box Cut where coal removal is currently underway. This is the southernmost extent of the Box Cut footprint.

FY22 development consisted of soil/slash removal and overburden stripping in Pushback Stage 6, as well as tree felling and formation of an access track into Pushback Stage 7. As of the end of FY22 (March 2022), soil and slash removal from Pushback Stage 7 had not yet commenced. Total cleared area in Cypress Pit is now approximately 40 hectares (excluding out of pit dumps and arterial roads) and future development will focus on Stage 8-9 Pushback areas and developing access to the consented Cypress South Pit. Coal winning from the main CNBC and pushback (CNPB) is expected to remain constrained by geotechnical instability of the eastern highwall and removal of in-pit water following high-rainfall events.

2. Details of all environmental monitoring undertaken

The Cypress monitoring regime is outlined in the Cypress Environmental Monitoring Plan (Table 1). The following monitoring activity was undertaken within the period 1 April 2021 - 31 March 2022.

Under WCRC conditions of RC03175

Parameter	Condition	Section
• surface water quality	B8.7, B8.8, B8.11	3.1
• pit sump discharge flow and quality to St Pat's Dam to manage mass loadings	B8.18a, B18b, B18c	3.1
• groundwater monitoring	B1.10 k and l	3.2
• dust deposition monitoring	B2.2, B2.3, B2.4-	3.3
• vegetation survey of red tussock and herbfield	B2.5	3.4
• aquatic invertebrate and periphyton monitoring	B8.13, B8.14	3.5
• Overburden Placement and Backfilling of Pits	B9.13 to B9.17	3.8
• volume of water abstracted for dust suppression, quality in relation to locations where spray could affect vegetation	B11	3.6
• independent water monitoring	B8.5A, B8.5B	3.7

Under BDC conditions of RC03164

• ground vibration monitoring (from blasting activities)	C18-C21	3.9
• noise	C26, C27	3.10
• weed control and monitoring	A7.11a	3.11
• snail search, collection and relocation activity		3.12
• great spotted kiwi monitoring		3.13
• predator control and monitoring		3.14

3. Summarise all the data collected, as required under the Environmental Monitoring Plan and any other condition of these consents

3.1 Discharge and receiving water monitoring and limits

3.1.1 Relevant Conditions

B8.7 The Consent Holder shall undertake a water quality monitoring programme of the discharges and receiving waters in accordance with the table below.

(a) Monitoring Programme

Parameter	Frequency	Monitoring Locations
Turbidity	Continuous	8W telemetry
Turbidity	Daily#	8W
Conductivity	Continuous	8W telemetry
pH	Continuous	8W telemetry
Calcium Magnesium	Weekly *	8W
Acidity	Daily#	8W
Metals • Dissolved Iron • Dissolved Aluminium • Dissolved Zinc • Dissolved Nickel • Dissolved Cadmium • Dissolved Lead	See Condition B8.9a	8W
Dissolved Nickel Dissolved Cadmium Dissolved Lead Conductivity pH Turbidity TSS	Annual until South Pit stripping commences, then sampling shall be undertaken monthly	6W 7W
Stream Flow Rate	Continuous	8W

Notes to Table:

* After 12 months, the Consent Authority may authorise the frequency of monitoring to decrease to no less frequently than monthly.

Daily is defined as manual sampling to be conducted Monday to Friday, except on public holidays and randomly on three separate days during a calendar year on either Saturday, Sunday or a public holiday as chosen by the Consent Authority and notified to the Consent Holder not less than 5 days prior to the day of monitoring.

B8.8 St Pat's Dam discharge shall be monitored prior to the discharge entering St Patrick Stream (monitoring site SPD (now SPDU)). Monitoring site 8W, where both telemetered and grab sample data are obtained, is located in St Patrick Stream just downstream of the point at which the clean water diversion from upper St Patrick Stream enters St Patrick Stream below St Pat's Dam at or about map reference NZMG E2418095 N5945343.

B8.9 The discharge into St Patrick Stream from St Pat's Dam and from the stormwater diversion discharges shall not cause the limits listed in table below to be exceeded at monitoring site 8W:

(a) Receiving Waters Compliance Limits (at monitoring Site 8W)

Parameter	Compliance Limits
Turbidity	25 NTU – 30 day rolling median
pH	≥4.0 – 90 day ~~90th~~ 10th percentile
	<3.6*
Acidity	>14g/m^3*
Dissolved Iron	5 g/m$^{3\#}$
Dissolved Aluminium (Al)	1 g/m$^{3\#}$
Dissolved Zinc (Zn)	0.15 g/m$^{3\#\wedge}$
Dissolved Nickel (Ni)	0.05 to 0.15 g/m$^{3\#\wedge}$
Dissolved Cadmium (Cd)	0.00018 to 0.003 g/m$^{3\#\wedge}$
Dissolved Lead (Pb)	0.001 to 0.005 g/m$^{3\#\wedge}$

Notes to Table

* Based on daily sampling, as defined in Notes to Table # of Condition B8.7, if pH is <3.6 and the acidity is >14 g/m^3, the Consent Holder shall take one sample each day for the following four days on which manual daily samples are taken. These samples should be analysed for dissolved metals: aluminium, iron, zinc, nickel, cadmium and lead. If the four day average of the samples undertaken exceeds the relevant criteria in Table B8.9a, that criteria shall be deemed to have been exceeded.

\# Additional monitoring data, specifically conductivity, can be used as a tool to cross check the validity of any metal exceedance.

^ Ecotoxicology site specific trigger value at hardness of 2.4 g/m^3. If hardness adjustments are made, the hardness-dependent algorithms in table 3.4.3 in ANZECC (2000) should be used.

B8.11 In addition to the monitoring at site 8W, monitoring for conductivity, turbidity, dissolved nickel, cadmium, lead and pH shall also be undertaken at sites 6W (Waimangaroa River - Byrne Creek, at or about map reference NZMS 260 L29:166-428) and 7W (Cypress Stream, at or about map reference NZMS 260 L29:172-437) to ensure that mining activities in the catchments are having no measurable effect on water quality (see monitoring programme table above). The monitoring shall be described in the Water Management Plan, prepared in accordance with condition B1.9.

3.1.2 Monitoring Sites

The consented monitoring site locations are shown in Figure 3.1.1. Note that the site SPDU replaces SPD, which is the site specified in condition B8.8. The new location is necessary to allow sampling prior to the mixing with the piped diversion water.

In addition to the monitoring sites specified in the consent conditions, CS01 and 7W (in Cypress Stream) are monitored continually for pH and turbidity, and sampled weekly. Recent continuous turbidity measurement has been instigated in Byrne Creek, which enters Cypress Stream downstream of 6W.

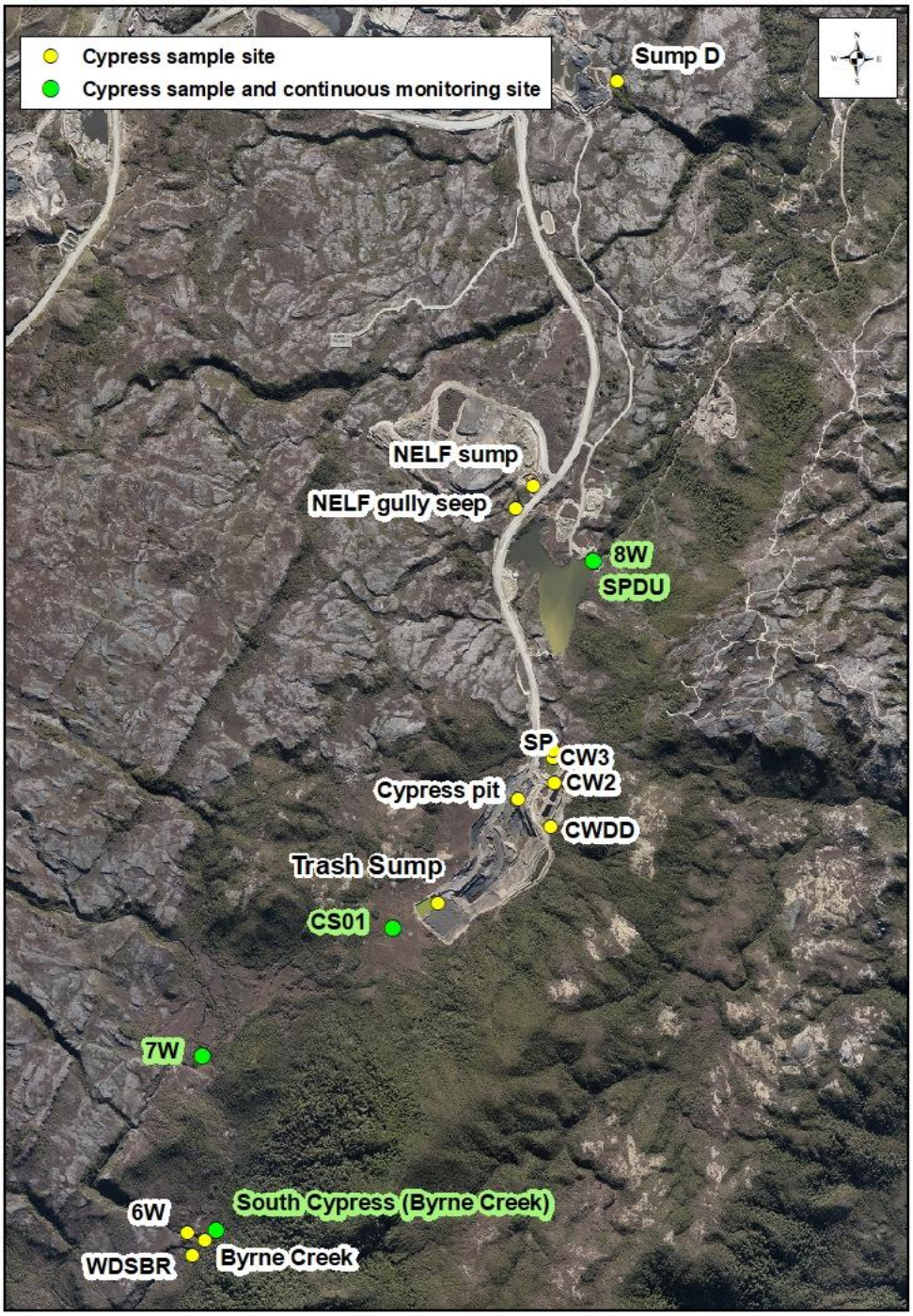


Figure 3.1.1: Surface water quality monitoring sites within the Cypress mining area.

3.1.3 8W Results

Monitoring at 8W was undertaken as per that detailed in B8.7. Results, with respect to conditions stipulated in B8.9, are presented below.

As per condition B8.8, the treated water in St Pat's Dam has been monitored at site SPDU, prior to discharge into old Fly Creek underground mine workings (via the diversion pipeline).

Continuous pH , turbidity and conductivity sampling

Throughout 2021/2022 pH, turbidity and conductivity were monitored continuously (10 minute recording interval) and telemetered back to Stockton offices. Below are summary plots of the data captured for 2021/22 (Figures 3.1.2, 3.1.3 and 3.1.4). Turbidity units are Nephelometric Turbidity Units (NTU).

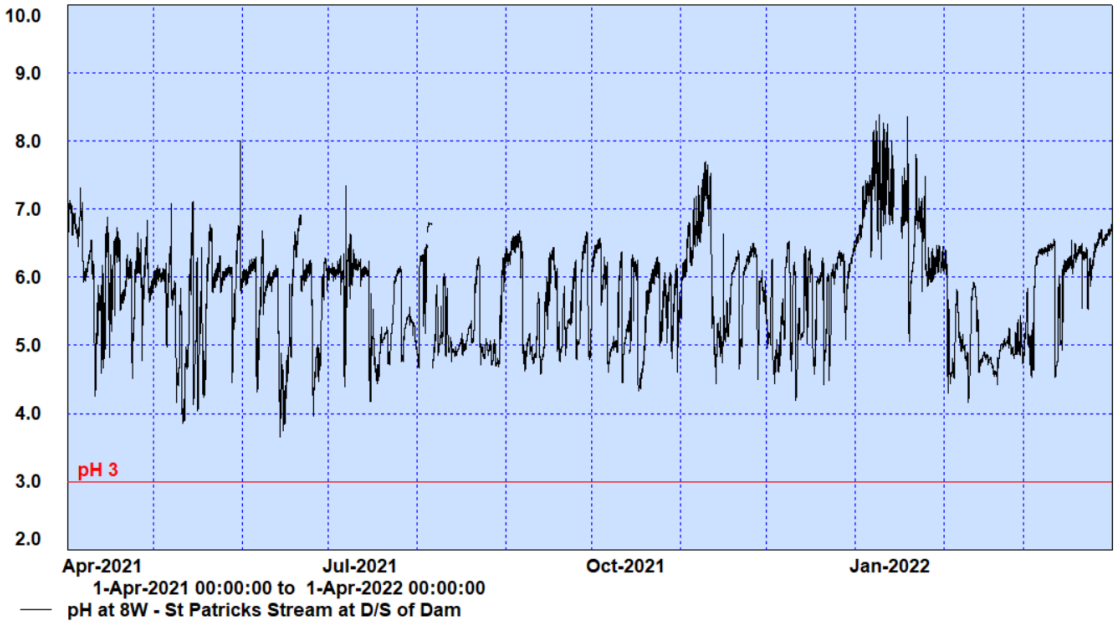


Figure 3.1.2: 8W sensor pH, 1 April 2021 – 31 March 2022.

The quality of the St Pats dam water has been greatly improved with water treatment beginning July 2020; so that pH at 8W was > 3 100% of the time for RY2021/22, (and > 4.5 97.5% of the time)

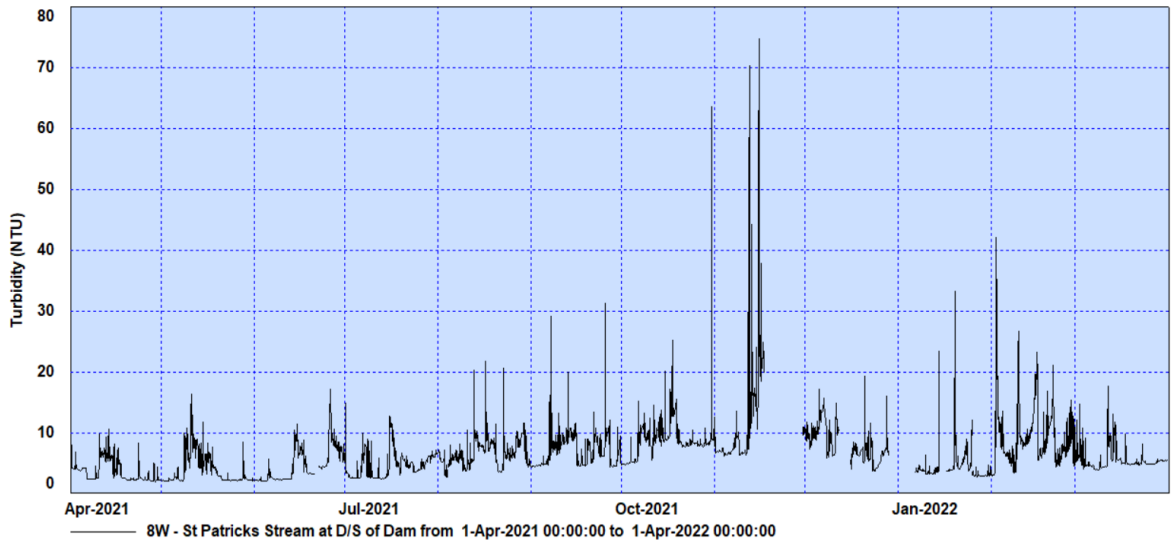


Figure 3.1.3: 8W sensor turbidity, 1 April 2021 – 31 March 2022.

(Note: Steps in data relate both to sensor cleaning, and localised algae growth in sensor pool being flushed by high flow events. That which is obviously erroneous, on the basis of sampled turbidity and cleaning register entries, is removed from archive)

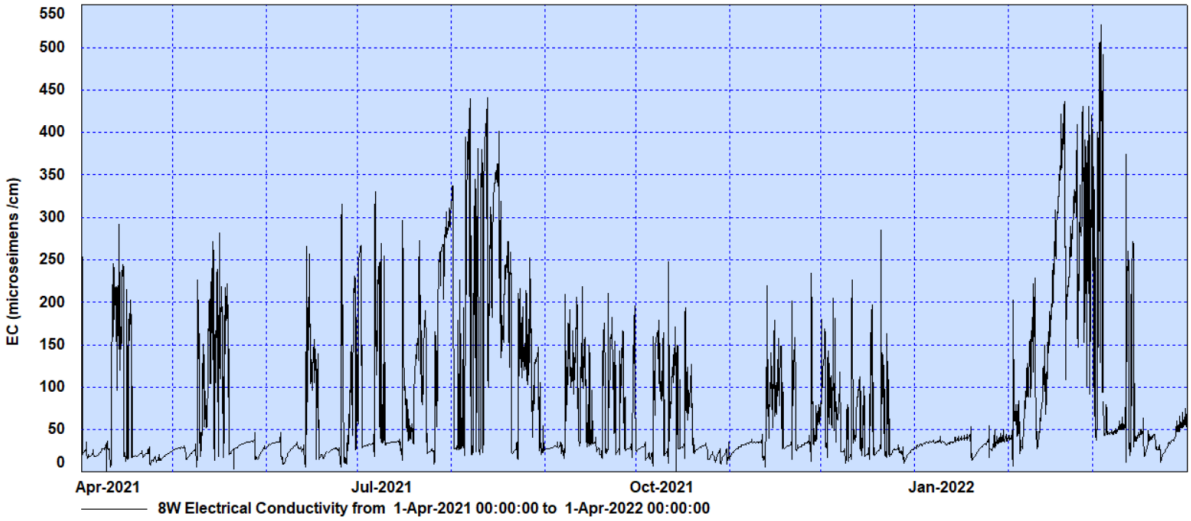


Figure 3.1.4: 8W sensor conductivity, 1 April 2020 – 31 March 2021.

Periods of elevated readings coincide with dam spilling.

Daily turbidity and pH sampling:

Under resource consent RC03175v7/8, compliance with the turbidity 30 day rolling median (DRM) at 8W was maintained throughout the reporting period (RY22), as seen in Figure 3.1.5. The median 30 DRM turbidity for FY22 was 1.1 NTU.

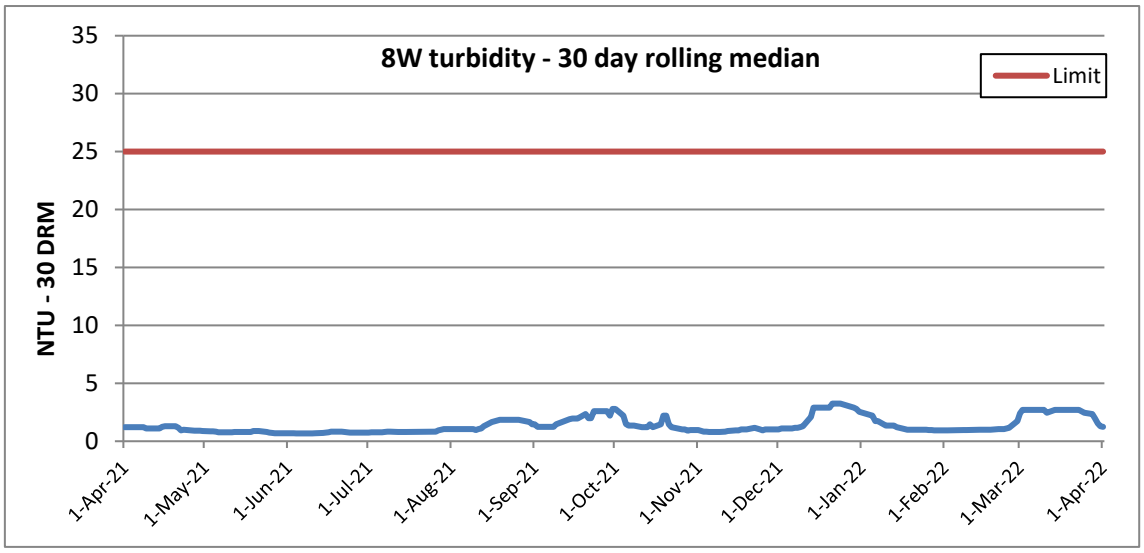


Figure 3.1.5: 8W 30 DRM turbidity, 1 April 2021 – 31 March 2022.

Figures 3.1.6 and 3.1.7 present the daily pH and Acidity (7) sample results for 2021/22 reporting year. Sampled pH did not fall below 3.6 during the reporting year, so no metals sampling in relation to this condition (B8.9) was required.

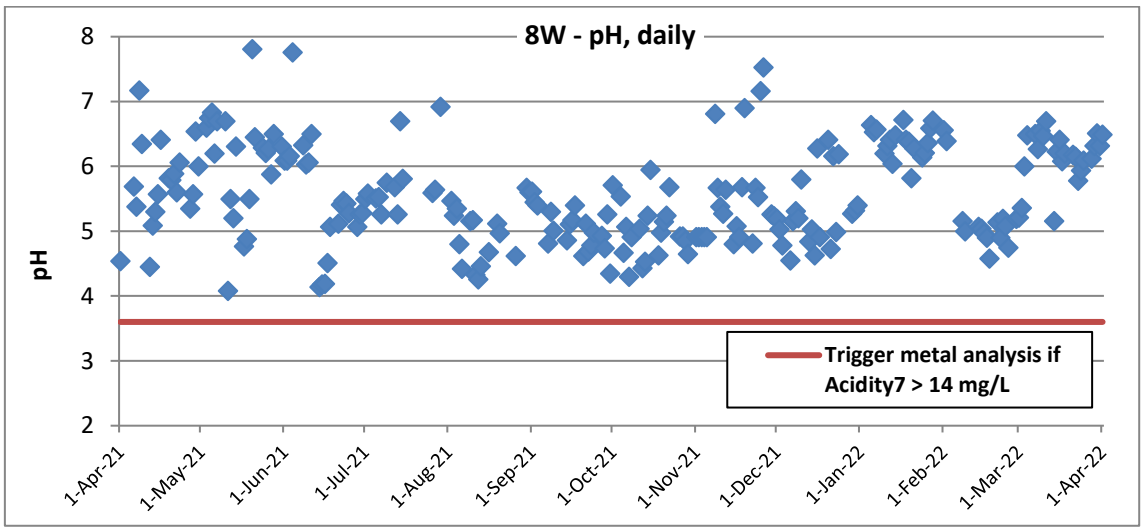


Figure 3.1.6: 8W daily pH, 1 April 2021 – 31 March 2022

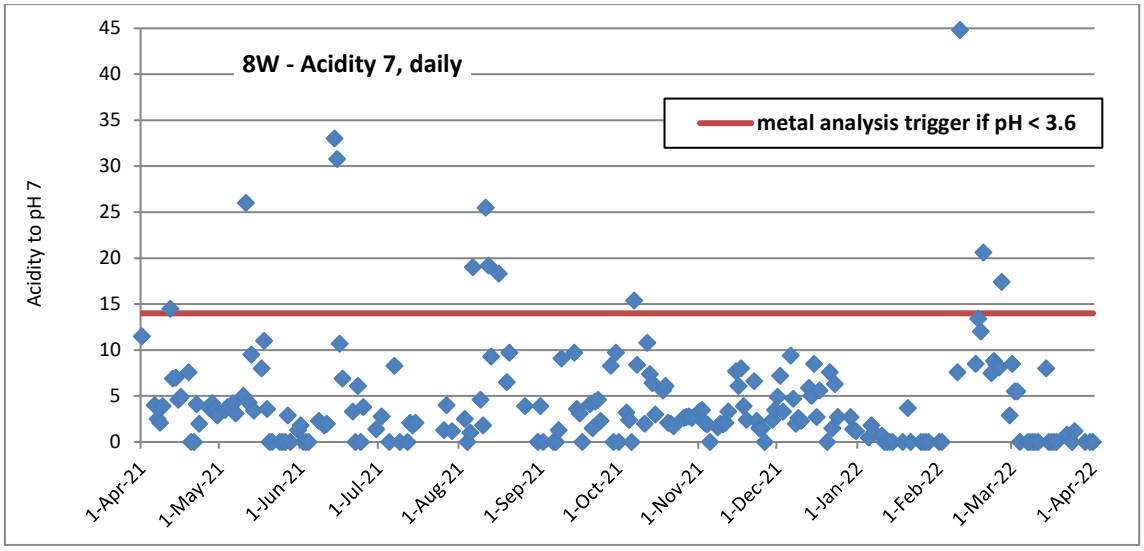


Figure 3.1.7: 8W daily acidity, 1 April 2021 – 31 March 2022

Figure 3.1.8 below shows the 90 day **10th** percentile pH for 8W, for the reporting year. This is in lieu of the 90 day 90th percentile as detailed in B8.9(a) – "Receiving Water Compliance Limits". It is recognised that as the intent of the condition is to put limits around the most acidic water passing by 8W. In terms of pH that it is the 10th percentile value (that value which is not exceeded 10% of the time), not the 90th percentile value.

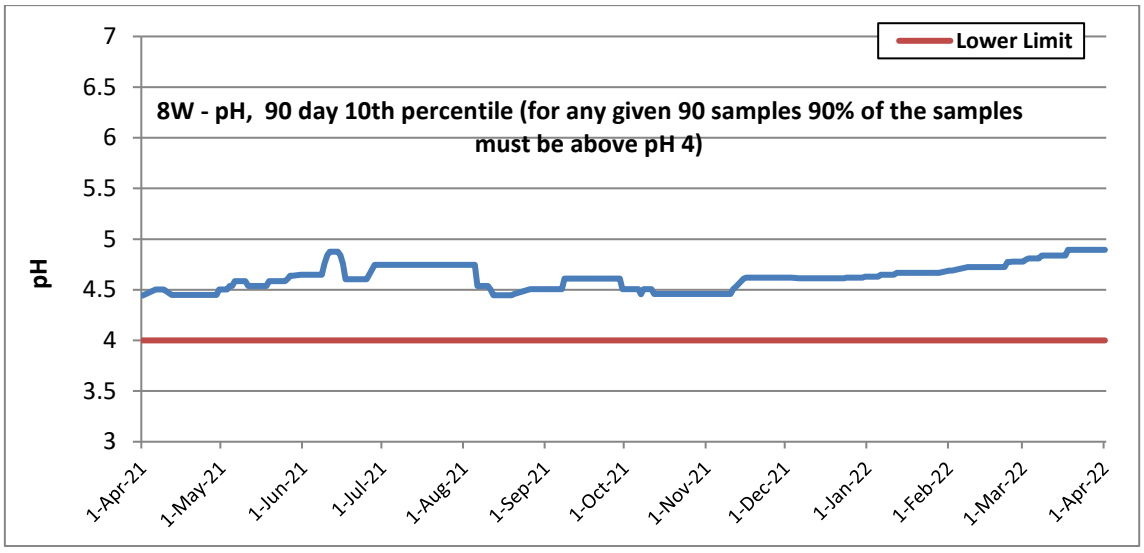


Figure 3.1.8: 8W 90 day ~~90th~~ (10th) percentile pH, 1 April 2021 – 31 March 2022

3.1.4 SPDU Sampling Results

As per condition B8.8, the treated water in St Pat's Dam has been monitored at site SPDU, prior to discharge into old Fly Creek underground mine workings. 2021/22 sample results for pH, acidity, dissolved aluminium, and total suspended solids are presented in Figures 3.1.9 to 3.1.12 below. As per peer review recommendation – dam water levels and periods of dam spill to St Patricks Steam are also presented in Figures 3.1.13 (full range) and 3.1.14 (partial range). Above average rainfall for the reporting period (5977mm, where the mean annual rainfall for Cypress is around 5100mm) accounts for the more frequent dam spilling over RY2022.

Treatment reagent information such as type, concentration, daily and annual quantities used, are available on request.

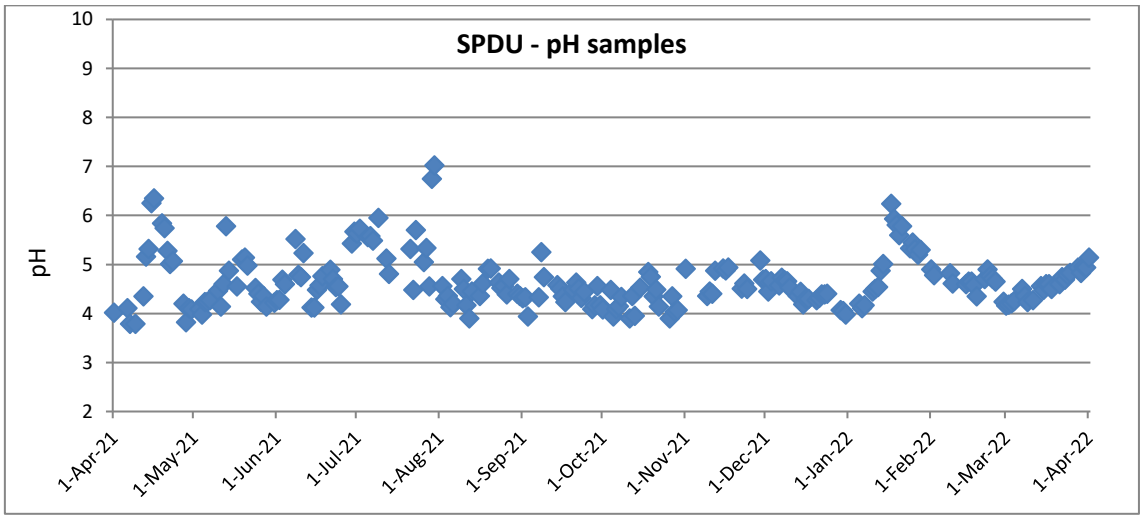


Figure 3.1.9: SPDU pH samples, 1 April 2021 – 31 March 2022

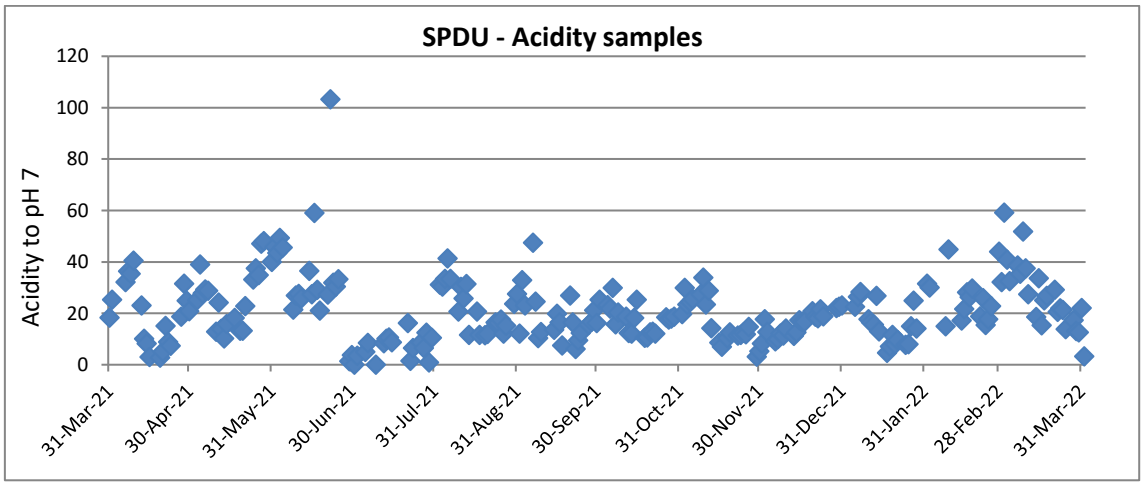


Figure 3.1.10: SPDU Acidity samples, 1 April 2021 – 31 March 2022

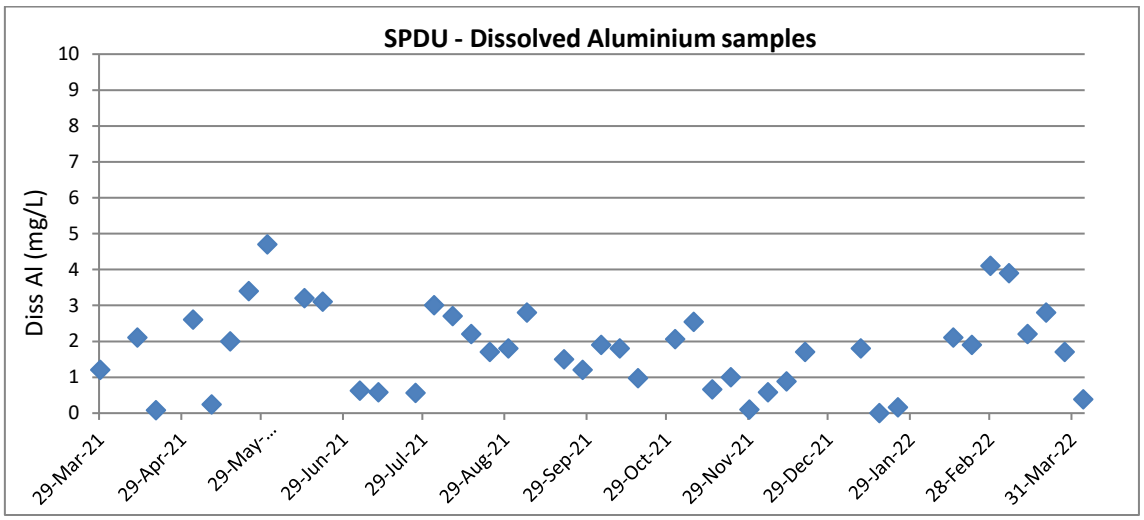


Figure 3.1.11: SPDU Dissolved Aluminium samples, 1 April 2021 – 31 March 2022

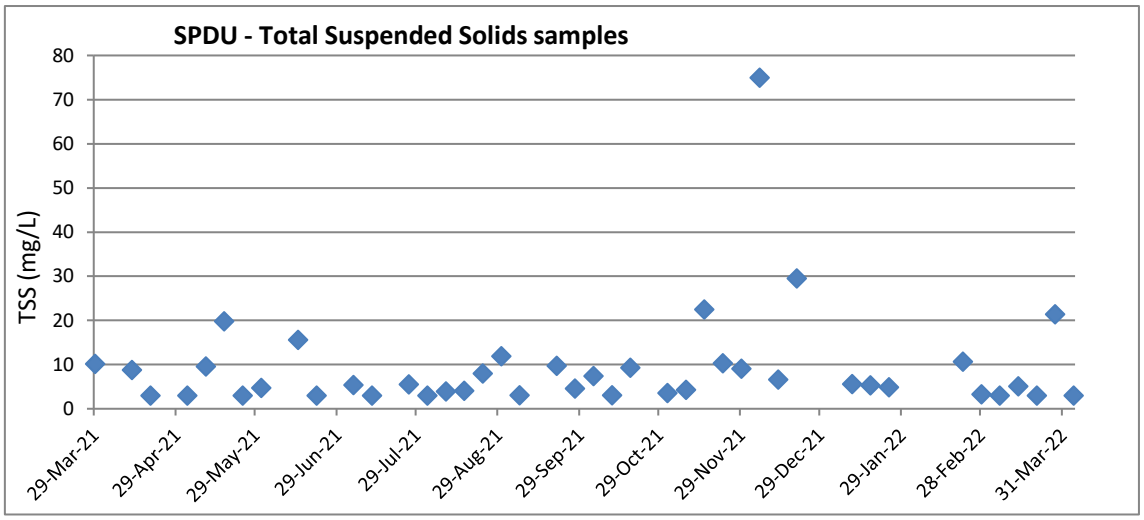


Figure 3.1.12: SPDU Total Suspended Solids samples, 1 April 2021 – 31 March 2022

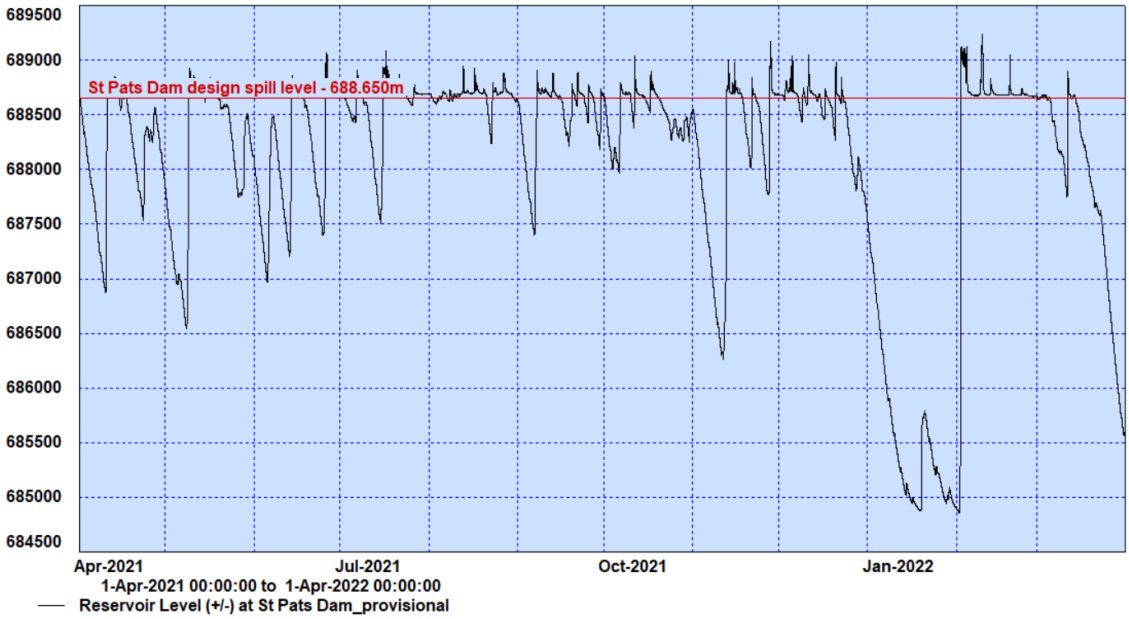


Figure 3.1.13: St Pats Dam water levels; full range. 1 April 2021 – 31 March 2022

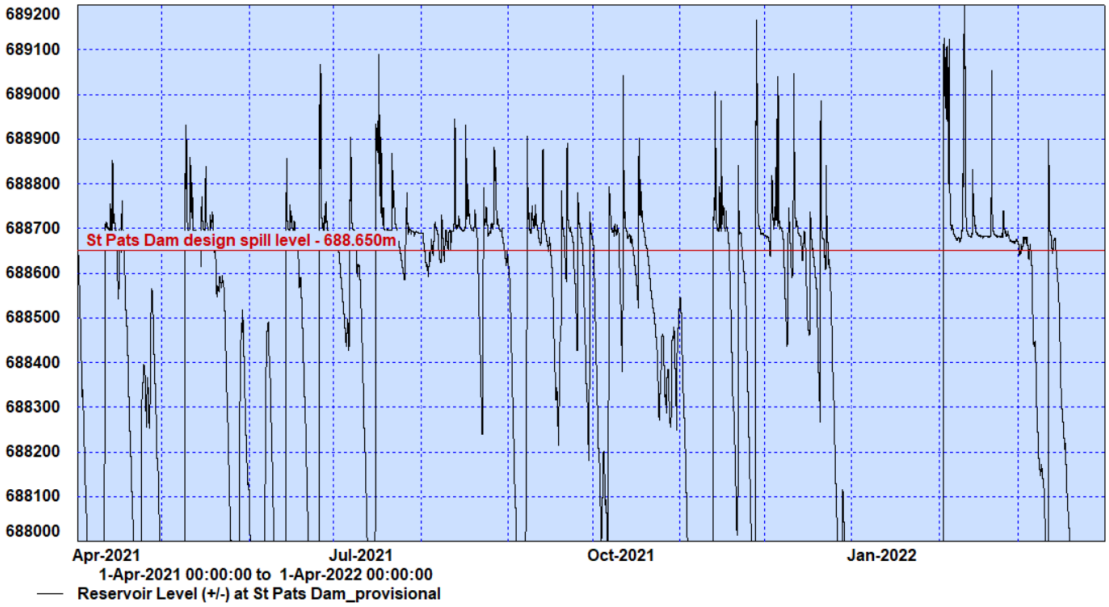


Figure 3.1.14: St Pats Dam water levels; partial range. 1 April 2021 – 31 March 2022

3.1.5 6W and 7W data

Sites 6W and 7W in the Waimangaroa River and Cypress Stream, respectively, were monitored during the reporting period, as per condition B8.11.

No mine-affected water is discharged to Cypress Stream, as it is directed to and treated through the sump and St Pat's Dam system. It has received discharge from the Cypress southern cleanwater diversion since 2020, but the data obtained at 7W during the reporting period (Table 3.1.1) continues to reflect the baseline data presented within the Assessment of Environmental Effects (December 2003), demonstrating that Cypress Stream has not been adversely impacted by Cypress Mine operations. Elevated metal levels (Fe, Ni and Zn) at 7W are noted in late Febraury and March. These were samples taken during a low flow periods in the lee of exceptionally high, unprecedented, rainfall. 1400mm of rain fell in the first 13 days of February, where the long-term average rainfall for February is 342mm. Following these storms natural soil/subsoil leachate and groundwater seepage in the catchment would have been very high. Since the elevated metals correspond with pH in the circumneutral range then the elevated metals are not related to acid mine drainage inputs, and must relate to natural leachate and seepage processes. The metals were within the receiving waters compliance criteria to protect stream ecology, that are defined at Site 8W (Condition B8.9 (a)).

Site 6W on the Waimangaroa mainstem is downstream of Herbert and Whirlwind Streams. These tributaries contain mine affected water sourced from the Stockton mine development and the historic acid mine drainage. The higher sampled acidities and metal concentrations at this site are not associated with Cypress Mine operations.

Table 3.1.2: 6W & 7W monitoring results for FY22.

Site	Date	pH	Acidity 7*	Diss Al*	Diss Cd*	Diss Fe*	Diss Pb*	Diss Ni*	Diss Zn*
6W	Min detectable level				0.0001	0.071	0.005	0.0017	0.0079
	22/04/2021	5.73	4.7	0.21	<0.0001	0.2	<0.005	<0.0017	<0.0079
	3/05/2021	4.52	25	3.6	0.0004	0.093	<0.005	0.023	0.077
	21/06/2021	4.61	16.8	4	0.0002	0.98	<0.005	0.02	0.058
	14/07/2021	4.53	24.8	3.7	0.0003	0.093	<0.005	0.026	0.081
	6/09/2021	4.87	43.3	3.4	0.0003	0.17	<0.005	0.023	0.078
	19/10/2021		16.7	1.36	<0.0001	0.063	<0.005	0.011	0.038
	1/11/2021	4.47	11.6	2.32	<0.0001	2.71	<0.005	0.01	0.06
	7/12/2021	5.56	10.6	0.15	0.0007	0.13	<0.005	0.091	0.34
	19/01/2022	4.24	35.2	4.7	0.0005	0.17	<0.005	0.036	0.12
	3/03/2022	4.11	40	5.6	0.0004	0.71	<0.005	0.040	0.13

Site	Date	pH	Acidity 7*	Diss Al*	Diss Cd*	Diss Fe*	Diss Pb*	Diss Ni*	Diss Zn*
7W	Min detectable level				0.0001	0.071	0.005	0.0017	0.0079
	12/04/2021	5.32	5.9	0.29	<0.0001	0.33	<0.005	0.003	<0.0079
	22/04/2021	4.42	20	2.3		0.1			
	3/05/2021	7.01	2.7	0.12	<0.0001	0.15	<0.005	<0.0017	<0.0079
	10/05/2021	6.21	6.2	0.29		0.25			
	17/05/2021	6.69	4.2	0.26		0.28			
	24/05/2021	6.11	0	0.18		0.2			
	31/05/2021	6.38	1.7	0.17		0.17			
	21/06/2021	5.71	0	0.25	<0.0001	0.24	<0.005	<0.0017	<0.0079
	8/07/2021	7.53		0.15	<0.0001	0.15	<0.005	<0.0017	<0.0079
	14/07/2021	7.95		0.11		0.12			
	26/07/2021	6.54	3.2	0.48		0.3			
	2/08/2021	5.08		0.11	<0.0001	0.11	<0.005	<0.0017	0.019
	9/08/2021	5.07		0.16		0.15			
	16/08/2021	5.18		0.13		0.18			
	19/08/2021	6.18 lab	2.3	0.28		0.18			
	23/08/2021	5.38	3.2	0.1		0.1			
	30/08/2021	5.88		0.15		0.19			
	6/09/2021	7.68	0	0.103	<0.0001	0.13	<0.005	<0.0017	<0.0079
	20/09/2021	5.7	2.8	0.19		0.13			
	27/09/2021	5.08	4.5	0.13		0.16			
	4/10/2021	5.32	6	0.22	<0.0001	0.19	<0.005	<0.0017	<0.0079
	11/10/2021	5.29	2	0.16		0.2			
	21/10/2021	5.35	2.9	0.529		0.336			
	1/11/2021	5.54	3.6	1.5	<0.0001	0.121	<0.005	0.011	0.036
	8/11/2021			0.098		0.163			
	15/11/2021	5.41	4.1	0.19		0.17			
	22/11/2021	5.86	3.3	0.16		0.12			
	29/11/2021	5.03	3.7	0.26		0.22			
	6/12/2021	5.08	4.7	0.21	<0.0001	0.23	<0.005	<0.0017	<0.0079
	13/12/2021	5.01	4.3	0.28		0.39			
	20/12/2021	6.41	1.5	0.21		0.27			
	10/01/2022	5.96	1.2	0.11	<0.0001	0.21	<0.005	<0.0017	<0.0079
	17/01/2022	6.54	2	0.1		0.19			
	24/01/2022	6.15	1.5	0.069		0.19			
	21/02/2022	5.9	0	0.29	<0.0001	0.36	<0.005	<0.0017	<0.0079
	28/02/2022	6.19	0	0.14		0.2			
	7/03/2022	6.21	0	0.81	<0.0001	0.45	<0.005	0.0035	0.022
	14/03/2022	6.04	4.7	0.13		0.21			
	21/03/2022	6.08		0.1		0.17			
	28/03/2022	6.05		0.11		0.17			

Telemetered water-level sensors were also installed in Cypress Stream at site “CS01” in April 2016 (see Figure 3.1.1). This is not a consent requirement, but was undertaken to get “baseline data prior to any changes to the south catchment, and also to confirm (the mine) is not letting any mine water enter Cypress stream” (pers. comm. Jodi Murray, Stockton Water engineer). Figure 3.1.14 shows the turbidity, pH and acidity recorded at the telemetered site. The turbidity data was fraught with spikes for the reporting period (interference by koura - observed regularly at the site – see Figure 3.1.15). Therefore for this reporting period just the sampled turbidity at CS01 is presented.

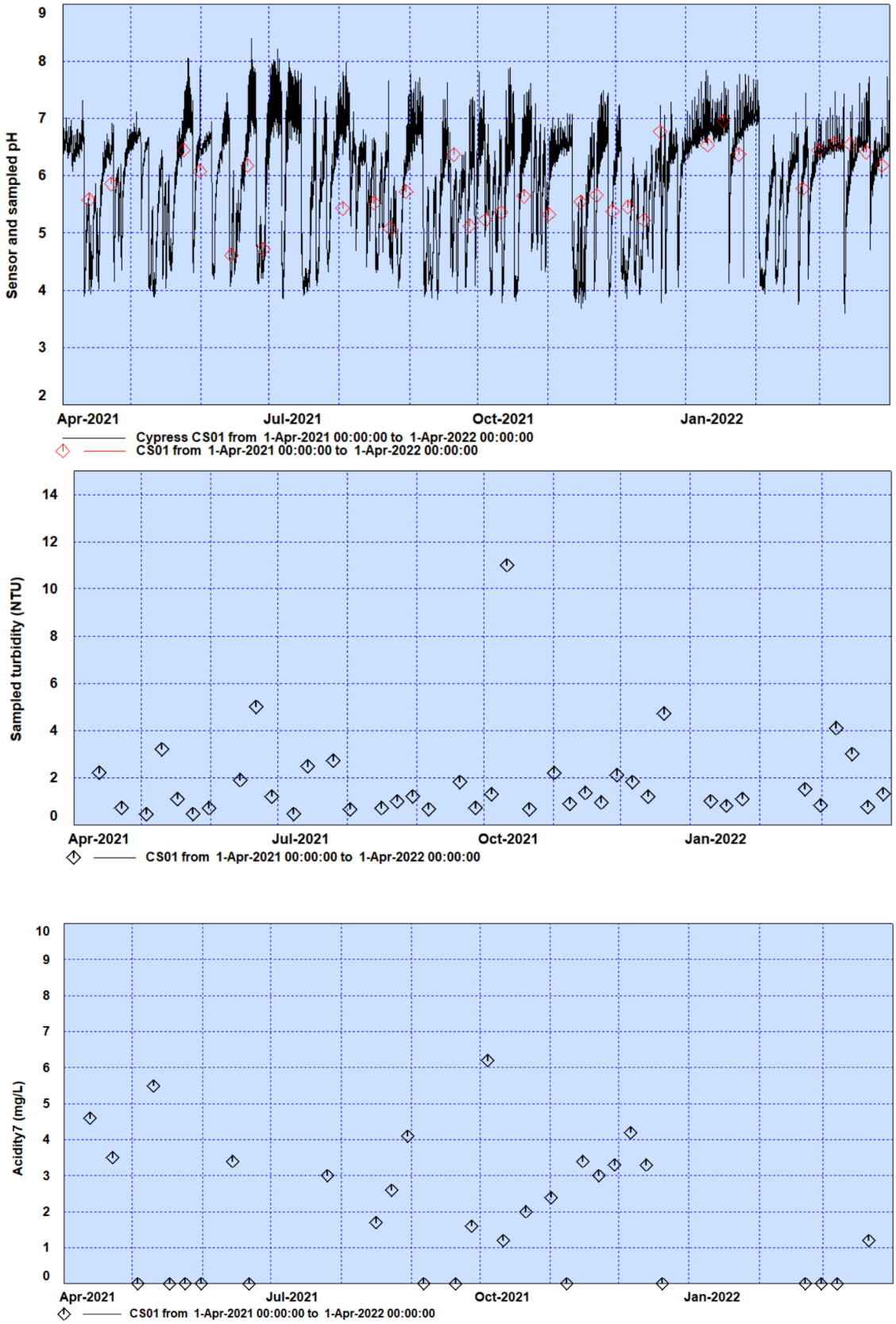


Figure 3.1.14: Cypress Stream (CS01) pH, and sampled turbidity and acidity

Figure 3.1.15: Koura within casing of water quality instruments at 7W – 7 April 2022

3.1.6 Pit sump discharge monitoring

Relevant conditions

B8.18 Pit sump pump/s shall be operated in order that the water management system functions correctly. The Consent Holder shall:

a. continuously record the pit sump flow; and

b. monitor the pit sump discharge in order to assist with managing the chemistry of the discharge authorised by this consent, with particular regard to identifying specific water treatment or water management needs and the management of metal mass loadings.

c. manage the pit sump water discharge to avoid, where practicable, batch discharges to St Patrick Stream containing high mass loading of contaminants at all times.

Results

The water from Cypress pit is pumped directly to St Pats Dam. From the St Patrick's dam it is decanted and gravity piped to old Fly Creek workings. Spill over the dam wall does occur during times of high rainfall.

The pit sump discharge has been monitored, as per conditions B8.18a and B8.18b, to ensure that the most effective alkaline reagent dosing is used to treat mine-affected water.

Records of the pit pumped flow are maintained (condition B8.18a); and weekly water samples are taken from Cypress Pit (being representative of the pumped water), condition B8.18b.

B8.18a: The Cypress Pit pumped a total of 4,422,060 m3 of water over 5340 hours (8100 total pump hours) from 1/4/2021 to 31/3/2022. The pumps typically operated at flows of 100-200 L/s; with an average individual flow of 152 L/s, or average combined flow of 230 L/s. Total volume moved averaged 140 L/s continuous flow.

B8.18b: The Cypress Pit comprises 2 pits of differing water chemistry, with the newer Strip 5 containing more acidic water than Strip 2 (commonly referred to as "Cypress Pit"). These pits were joined by a French drain; however, this has blocked over time, and the pits are currently being pumped separately.
The split according to the pumping hours above is 60% from Strip 2 pit and 40% Strip 5 Pit. 2021/22 sample results from Strip 2 ("Cypress Pit") and Strip 5 for pH and "Acidity to pH7" are presented in Figures 3.1.15 to 3.1.18 below.

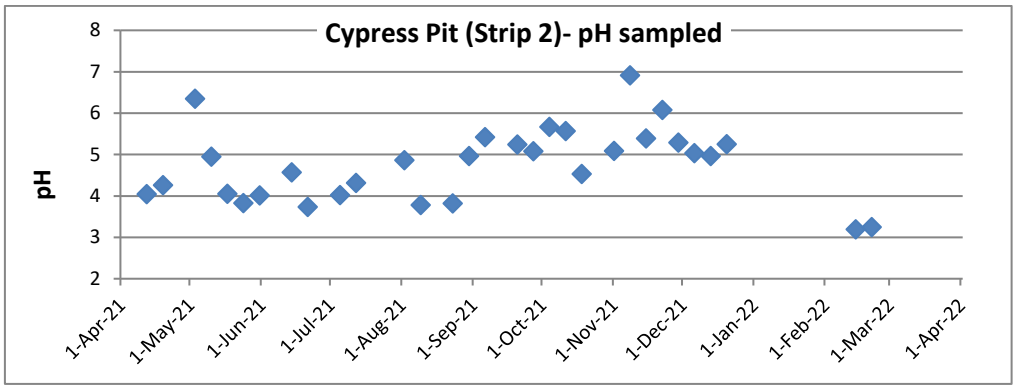


Figure 3.1.15: Cypress Pit Strip 2, pH, 1 April 2021 – 31 March 2022

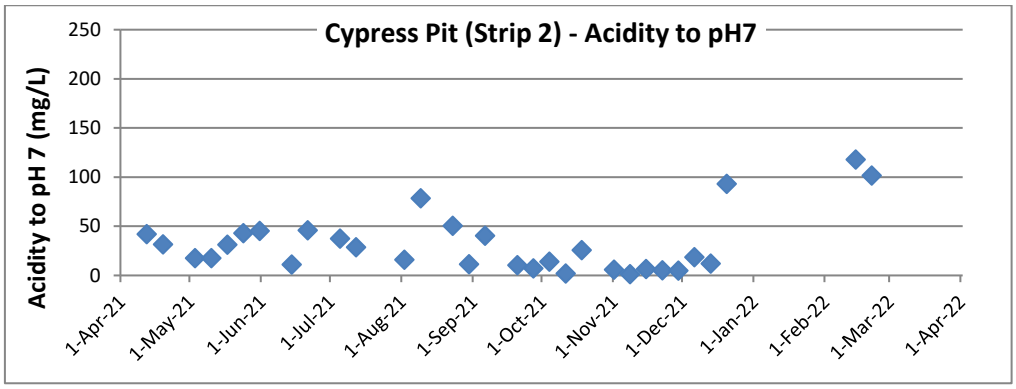


Figure 3.1.16: Cypress Pit Strip 2, Acidity7, 1 April 2021 – 31 March 2022

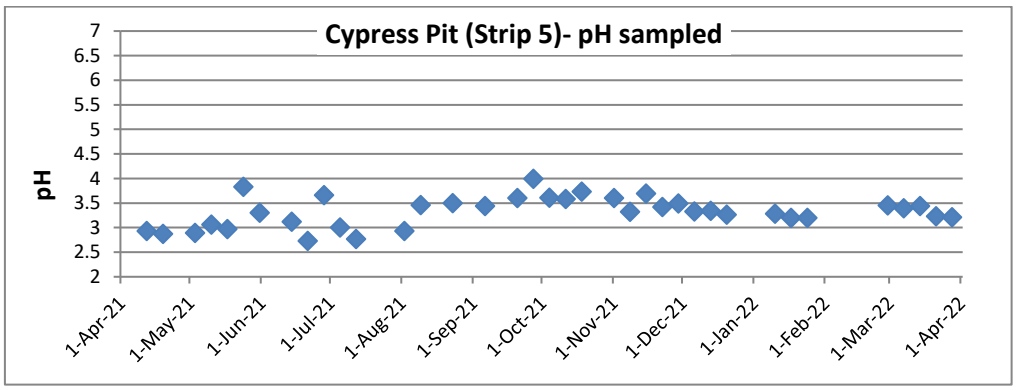


Figure 3.1.17: Cypress Pit Strip 5, pH, 1 April 2021 – 31 March 2022

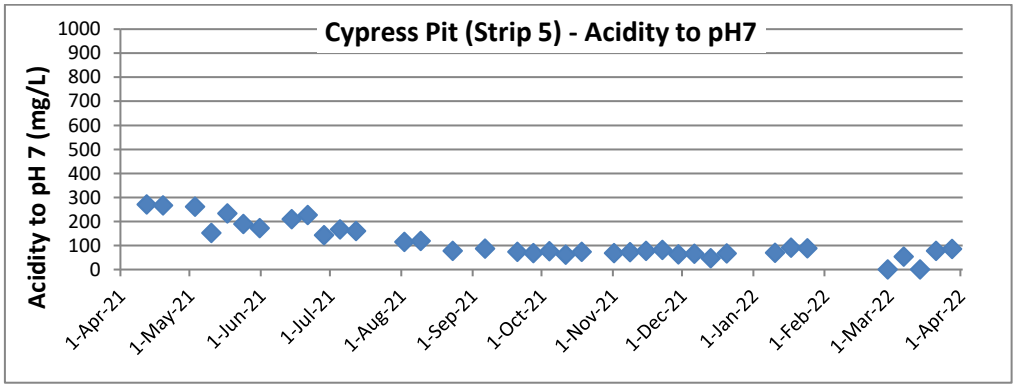


Figure 3.1.18: Cypress Pit Strip 5, Acidity7, 1 April 2021 – 31 March 2022

3.2 Groundwater monitoring

Relevant Conditions

B1.10 The Water Management Plan shall, as a minimum, address the following matters:

k. The location of groundwater monitoring sites, monitoring frequency and compliance limits to assess the effects of discharges from the Cypress Mine and from the Webb Pit on groundwater.

l. The proposed installation and monitoring of wells around the north pit and the south pit.

Results

Groundwater movement in the north pit is to the north and hence the existing groundwater bore 1523, shown in Figure 3.2.2, drilled in 1999 has been monitored in 1999, 2009, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021 and 2022 The results of monitoring in the reporting year to 31 March 2022 are presented in Table 3.2.1.

The results of the annual survey of groundwater quality in borehole 1523 indicate no significant water quality impact issues from Cypress mining activity. The following parameters were analysed: pH, acidity, electrical conductivity, dissolved aluminium, iron, nickel, zinc, cadmium and lead.
Water levels in bore 1523 were recorded and range between 4.0 and 6.4 m below ground level (ground level 693.301 m). Results from the reporting year are similar to water levels recorded previously.

Table 3.2.1: Groundwater monitoring results from borehole 1523 to date.
Metal concentrations reported are dissolved.

Date	pH	EC µS/cm	Al g/m³	Fe g/m³	Ni g/m³	Zn g/m³	Cd g/m³	Pb g/m³
10/01/2022	**6.63**	**424.9**	**<0.0059**	<0.071	**0.0017**	<0.0079	<0.0001	<0.005
12/08/2021	**6.98**	**178**	**0.01**	0.088	**0.0017**	<0.0079	<0.0001	<0.005
25/02/2021	**ND**	**162.8**	**0.01**	<0.071	**0.0023**	<0.0079	<0.0001	<0.005
16/09/2020	**6.93**	**166.3**	**0.011**	<0.071	**0.032**	0.031	<0.0001	<0.005
23/03/2020	**5.6**	**260**	**0.045**	<0.071	**0.023**	<0.0079	<0.0001	<0.005
26/11/2019	**6.9**	**195**	**0.0092**	<0.071	**0.0052**	<0.0079	<0.0001	<0.005
29/08/2019	**6.9**	**ND**	**0.019**	<0.071	**<0.0017**	<0.0079	<0.0001	<0.005
31/05/2019	**6.8**	**ND**	**0.17**	<0.071	**<0.0017**	**0.013**	<0.0001	<0.005
6/03/2019	5.5	180	0.055	<0.071	<0.0017	<0.0079	<0.0001	<0.005
26/11/2018	6	ND	0.2	0.11	<0.0017	0.012	<0.0001	<0.005
31/08/2018	6.7	99	0.12	0.1	<0.0017	0.0079	0.0001	<0.005
4/05/2018	6.4	84	0.54	0.22	0.0036	0.011	0.0001	<0.005
9/11/2017	6.9	59	0.28	0.13	0.0019	0.011	0.0001	<0.005
11/08/2017	6.4	38	0.042	<0.071	0.0021	0.0079	0.001	<0.005
20/04/2017	4.5	49	1.2	0.36	0.0037	0.0079	<0.00005	0.046
4/04/2016	5.9	130	0.024	<0.071	0.075	0.027	<0.00005	0.036
3/05/2015	6.6	126	0.011	<0.071	<0.0017	0.012	<0.00005	0.0053
8/04/2014	6.9	87	0.022	<0.071	0.0041	0.097	<0.00005	0.00066
17/06/2009	7.1	186	<0.003	<0.02	<0.0005	0.0027	<0.00005	ND
3/06/1999	6.7	ND	<0.02	0.11	ND	0.019	<0.00005	ND

At the end of the reporting period, 31 March 2022, there was approximately 850,479 lcm of backfill in total in Cypress pit, with 59,736 lcm placed and 4,228 lcm removed during the reporting year. This backfill is well compacted and forms roads, ramps, pump platforms and bunds, as well as permanent backfill in strip 0 and cleanwater drain bench. All PAF backfill (both temporary and permanent) has an amendment of >8 kg limestone per tonne of backfill to neutralise and minimise acid production.

All permanent PAF backfilled into the pit is below 697 mRL. The NAF placed in the backfill was above 697 mRL and forms the cleanwater drain bench and sump.

	PAF	NAF	Total
lcm	171,951	119,002	290,953

Acid loads from the Cypress pit are relatively moderate, 295 tonnes/year, mean <1 tonne per day, decreasing by over half on RY21 (for comparison Stockton mine produced over 10,000 tonnes of acid in FY20).

Figure 3.2.1 indicates that pit water chemistry improved markedly in FY20 and this improvement has been consistent throughout FY21 and continued to improve in FY22. The 2 pits in the Cypress box cut have markedly different acidities (to pH7), strip 2 average 31 mg/L and strip 5 average 120 mg/L. This is due to clean water being diverted to the strip 2 pit until Nov 2021 when repairs were completed on the clean water drain as well as limited mining in the strip 2 pit area during FY22.

The clean water diverted to pit has decreased the acidity and increased the pumped volume for treatment. The pumped pit flows increased from 66 l/s (RY19), 110 l/s (RY20), 114 l/s (RY21) to 140 l/s in RY22. Hence acid loads from Cypress pit increased from 417 tonnes in RY19 to 694 tonnes in RY20 and remained constant in FY21 at 690 tonnes**.** However, for RY22 the acid load has decreased by over half compared to the previous year to 295 tonnes.

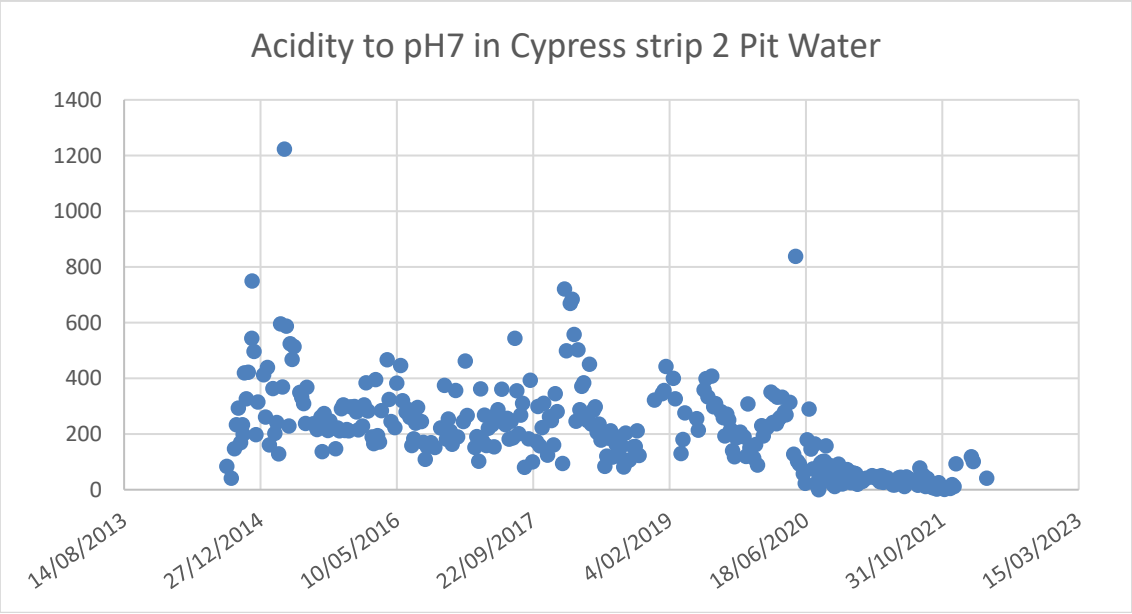


Figure 3.2.1: Acidity in Cypress Pit water 2017 to 2022

Table 3.2.2 indicates that the mean rate that pit water (groundwater and stormwater) is pumped to St Patrick's reservoir is approximately 140 l/s (FY22) and at these rates it will take less than 6 months to saturate the pit backfill to 697 m amsl if pumps were switched off.

Time to saturation of PAF rock is important as saturation will reduce acid production

Table 3.2.2: Estimated time for groundwater and surface water to backfill pit.

Items	end FY21
Cypress Pit Volume (m3)	1,954,538
Pit Inflow Rates from mean pumping (l/s)	140
Backfilled Volume to Fill with Water (m3)	977,269
Time(days)to fill backfill to saturated level	81

Groundwater Monitoring Plan

The objective of the groundwater monitoring network is to provide a robust groundwater dataset for Cypress. This is to provide data for the groundwater model and to validate mine closure scenarios.

A network of 16 screened section open standpipe monitoring sites and 17 vibrating wire piezometers was installed or re-instated around Cypress north and the bridge area in 2019 with 4 of these (4180, 4167, 7087 and 6873) since being mined out (Figure 3.2.2).

In 2020 and 2021 two engineered landform open standpipes have been added to the weekly monitoring program on the Northern PAF ELF and Mt Fred Quarry ELF.

In 2021 an existing drillhole in Cypress South, 3589, had a vibrating wire piezometer installed and was added to the weekly dipping monitoring. A further 8 drillholes are being drilled in RY23 with a combination of vibrating wire piezometers and screened section open standpipes being installed.

Open standpipes are dipped weekly for water level and initially sampled periodically which has since been made quarterly for water quality. The following parameters are analysed: pH, acidity, electrical conductivity, dissolved aluminium, iron, nickel, zinc, cadmium, lead, calcium and manganese (Table 3.2.3). Vibrating wire piezometers are downloaded quarterly.

Hydraulic parameters have been calculated for the Kaiata Mudstone from environmental drillholes and core collected from the Northern PAF ELF and Mt Fred Quarry ELF. The Kaiata Mudstone is a major acid forming component of the backfill material for the Cypress North boxcut and pushback and has been shown to compact to between 10^{-7} to 10^{-9} m/s. The analyses of drillhole and core data included triaxial permeability and geophysical parameters.

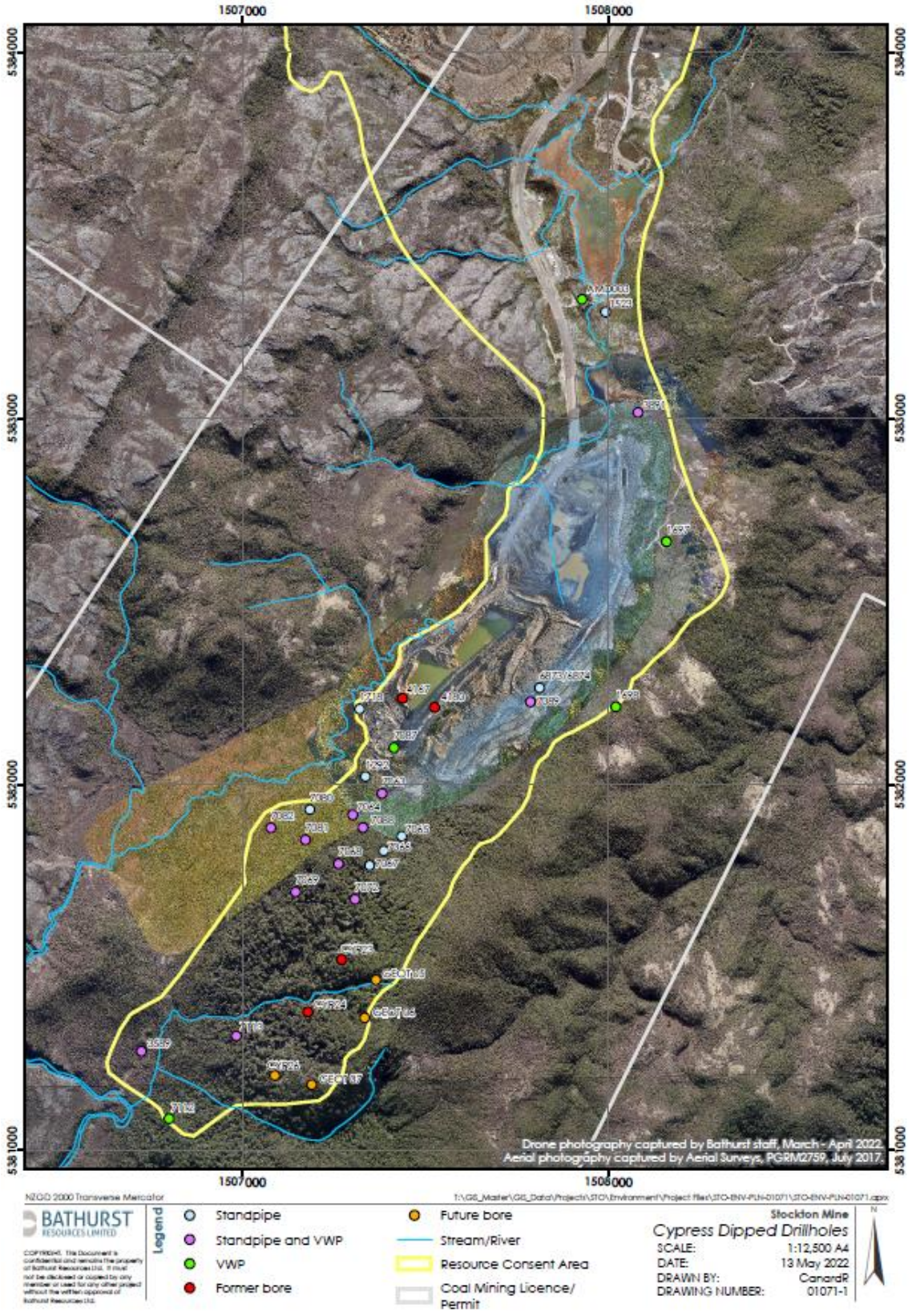


Figure 3.2.2: Groundwater Quality Bores

Table 3.2.3: Groundwater Quality for bores drilled in FY21.

Bore	Date	Piezometric	Recorded range	pH	EC	Acidity	Al	Fe	Cd	Ni	Pb	Zn	Ca	Mg	SO4
3891	26/09/2019	697.74	697.21 – 699.84	7.1	63	6	0.082	0.18	<0.0001	0.002	<0.005	0.063	3.7	1.1	5.26
3891	16/10/2019	698.06		7.1	41	15	0.59	0.41	<0.0001	0.004	<0.005	0.078	2.4	1.5	2.24
3891	09/09/2020	698.33		5.9	52	38	0.035	<0.071	<0.0001	0.056	0.041	0.22	3.2	0.83	15
3891	25/11/2021	698.71		5.4	59		0.61	0.33	<0.0001	0.11	0.028	0.18	4.3	1.2	13
3891	14/03/2022			6.2	60	33	0.045	<0.071	<0.0001	0.110	0.190	0.130	3.7	0.81	11
6873	8/05/2019	742.97	743.61 - 742.89	4.9	76	33	0.29	0.54	<0.0001	0.008	<0.005	0.059	9.4	1	22.7
6873*	21/06/2019			5.5	85	24	0.26	0.41	<0.0001	0.007	<0.005	0.057	10	0.93	22.2
6873*	14/11/2019	743.48		6.6	250	40	0.043	1.6	<0.0001	<0.0017	<0.005	0.009	39	1.8	2.96
6873*	10/02/2020	743.21		8.3	190	<5	0.079	2.8	<0.0001	0.006	0.009	<0.0079	30	1.5	2.94
6873*	20/03/2020	743.12		7.1	260	25	0.081	2.8	<0.0001	<0.0017	0.008	0.008	41	2.1	2.56
6873*	16/11/2020	743.26		6.8	310	20	0.078	1.2	<0.0001	0.003	0.009	<0.0079	54	2.7	1.7
6874*	8/05/2019	733.35		4.9	76	33	0.29	0.54	<0.0001	0.008	<0.005	0.059	9.4	1	22.7
6874*	17/09/2019			6.7	130	22	0.13	0.32	<0.0001	0.002	<0.005	0.008	16	1.2	15.4
6874*	10/10/2019			6.8	100	17	0.129	0.2	<0.0002	0.002	<0.005	0.011	13.3	1.01	17.4
1292	8/05/2019	704.19	702.58 – 707.37	4.1	27	53	0.095		<0.0001	0.004	<0.005	0.011	<0.57	0.3	1.5
1292	21/06/2019			4.9	26	19	0.26	0.25	<0.0001	0.002	<0.005	0.009	<0.57	0.28	<0.5
1292	17/09/2019	707.03		5.0	19	7	0.091	<0.071	<0.0001	<0.0017	<0.005	<0.0079	<0.57	0.17	0.68
1292	10/10/2019	706.91		5.1	17	10	0.131	0.26	<0.0002	<0.001	<0.001	0.005	0.2	0.11	0.55
1292	14/11/2019	707.13		5.0	23	8	0.12	0.096	<0.0001	<0.0017	<0.005	<0.0079	<0.57	0.24	0.79
1292	24/02/2020	702.85		9.4	20	<5	0.19	0.69	<0.0001	<0.0017	<0.005	<0.0079	2.6	0.17	0.81
1292	16/11/2020	703.76		6.4	14	13	0.20	0.39	<0.0001	0.002	0.021	0.010	<0.57	0.13	0.81
1292	05/05/2021	703.61		5.2	20	<5	0.26	0.34	<0.0001	0.006	0.008	0.012	<0.57	0.22	11
1292	03/06/2021	703.48		7.2	19	9	0.2	0.33	<0.0001	0.003	0.035	0.015	<0.57	0.22	31
1292	01/07/2021	704.03		5.8	19	<5	0.2	0.2	<0.0001	0.002	0.18	<0.0079	0.8	0.27	11
1292	29/09/2021	704.11		4.8	30	<5	0.16	0.17	<0.0001	<0.0017	0.069	0.009	<0.57	0.38	39
1292	27/10/2021	706.7		4.6	63	11	0.32	0.2	<0.0001	<0.005	0.1	<0.005	0.29	0.26	0.38
1292	03/12/2021	706.99		5.2	14	5	0.28	0.21	<0.0001	<0.0017	0.31	0.012	<0.57	0.19	1.5
1292	14/03/2022			7.4	18	<5	0.14	0.37	<0.0001	0.004	0.1	0.013	0.8	0.24	1.2
1718***	21/06/2019			5.9	31	25	0.034	0.23	<0.0001	<0.0017	<0.005	<0.0079	2.3	0.48	<0.5
1718	17/09/2019	695.62	696.81 - dry	5.8	46	49	0.009	0.077	<0.0001	<0.0017	<0.005	<0.0079	4.3	0.68	0.5
1718	10/10/2019	695.59		6.5	45	41	0.035	0.08	<0.0002	<0.0005	<0.005	0.005	4.4	0.66	0.49
1718	14/11/2019	695.34		6.2	47	62	0.021	0.087	<0.0001	<0.0017	<0.005	<0.0079	4.9	0.72	0.67
7087**	24/02/2020	698.96	698.96 - 697.77	>12	3800	<5	0.32	0.081	<0.0001	0.003	0.063	<0.0079	284	<0.022	14.5
4167**	21/06/2019		630.98 - 625.27	3.4	456	63	1.2	3.2	0.0001	0.011	<0.005	0.11	33	6	175
4180**	21/06/2019		618.47 - 628.93	4.6	136	21	0.77	0.091	0.0002	0.03	<0.005	0.082	11	2.5	21
7063	24/02/2020	705.93	707.60 - 705.61	9.7	210	<5	0.061	0.12	<0.0001	0.003	0.005	<0.0079	27	0.96	10.5
7063	05/05/2021	705.41	704.02 – 707.96	6.2	96	48	0.01	0.49	<0.0001	0.093	<0.005	0.013	11	1.8	3.4
7063	03/06/2021	706.26		7.4	100	50	0.027	0.84	<0.0001	0.025	0.01	0.022	10	2.2	3
7063	01/07/2021	706.54		6.9	98		0.026	0.088	<0.0001	0.019	0.007	0.021	11	2.1	7.5

7063	27/10/2021	706.35		6.1	88		0.24	<0.071	<0.0001	0.012	<0.005	0.011	8.9	2.7	2.5
7063	1/11/2021			6.3	88	39	0.007	0.013	<0.0001	0.021	<0.005	0.03	9.8	2.43	3
7063	3/12/2021	706.08		6.3	94	37	<0.005	<0.071	0.0005	0.13	<0.005	0.016	8.1	2.6	2.4
7063	14/03/2022			6.6	100	0.033	<0.071	0.033	<0.0001	0.064	<0.005	0.081	8.8	2.1	2.6
7064***	24/02/2020	710.89	711.17 - 709.17	11.8	1800	<5	0.75	0.21	<0.0001	<0.0017	0.016	<0.0079	144	0.08	12.3
7065	8/12/2021	700.18	697.90 – 702.35	6.8	360	43	<0.005	3.5	<0.0001	0.041	<0.005	0.042	66	1.3	7.3
7065	14/03/2022			7.0	330	6	0.034	1.2	<0.0001	0.03	<0.005	<0.0079	39	2.3	4.4
7067	18/02/2020	705.69	706.79 - 705.44	>12	9300	<5	0.23	<0.071	<0.0001	<0.0017	0.96	<0.0079	851	<0.022	0.68
7068	1/07/2021	735.72			43		0.4	0.29	<0.0001	0.003	0.052	0.009	7.3	0.37	12
7068	27/10/2021	735.77		5.6	350		0.027	0.7	<0.0001	0.005	0.05	0.052	3.8	0.4	9.6
7068	03/12/2021	735.82		6.1	35	14	0.34	0.24	0.0003	0.004	0.031	0.021	3.1	0.39	4
7068	14/03/2022			6.3	64	29	0.150	0.130	<0.0001	0.006	0.007	0.022	4.6	0.46	2.3
7069	10/02/2020	702.62	703.60 - 702.55	7.4	140	<5	0.047	<0.071	<0.0001	<0.0017	<0.005	<0.0079	26	1.18	
7069	23/06/2021	702.47		7.6	130		0.042	0.15	<0.0001	0.005	0.01	<0.0079	23	0.42	3
7069	15/09/2021	702.57		7.8	140		0.023	<0.071	<0.0001	0.011	0.18	0.025	54	3.8	3.1
7069	14/03/2022			7.2	210	<5	0.140	0.370	<0.0001	0.003	<0.005	<0.0079	11	0.86	19
7072	10/02/2020	735.03	738.60 - 734.57	11.7	1500	<5	0.11	<0.071	<0.0001	<0.0017	0.35	<0.0079	86	<0.022	7.02
7080	10/02/2020	697.46	697.89 - 697.32	7.2	220	<5	1.4	1.2	<0.0001	0.002	0.019	<0.0079	8.7	0.58	34.3
7080	16/11/2020	698.82		7.4	200	<5	0.043	1.7	<0.0001	0.008	0.023	0.011	19	1.7	1.0
7080	05/05/2021	697.79		7.2	190	<5	0.036	3.8	<0.0001	0.008	0.45	0.009	20	2	1.9
7080	23/06/2021	697.94		7.3	190		0.016	3.5	<0.0001	0.006	0.018	0.012	19	2	4.5
7080	15/09/2021	695.70		7.2	180		0.75	3.6	<0.0001	0.017	0.011	0.035	22	2.8	43
7080	20/10/2021	697.82		7.4	170	<5	0.011	0.62	<0.0001	0.006	<0.02	0.01	19.5	1.9	0.52
7080	25/11/2021	697.94		6.7	180		0.021	0.34	<0.0001	0.009	<0.005	0.013	18	2	0.69
7081	10/02/2020	705.04	708.39 - 705.04	7.1	340	<5	0.026	<0.071	<0.0001	<0.0017	<0.005	0.022	53	3.4	12.4
7081	16/11/2020	708.12		7.2	330	<5	0.013	<0.071	<0.0001	0.009	<0.005	0.012	59	4.5	12
7081	28/04/2021	707.63		6.23	320		0.018	<0.071	<0.0001	0.026	0.1	0.0118	57	4.3	12
7081	03/06/2021	707.66		7.5	320	<5	0.032	<0.071	<0.0001	0.007	0.016	0.012	54	3.9	9.6
7081	23/06/2021	707.68		7.1	330		0.037	<0.071	<0.0001	0.007	0.021	0.018	54	4.4	18
7081	15/09/2021	708.29		7.6	320		0.017	0.081	<0.0001	0.005	0.021	<0.0079	22	0.45	12
7081	20/10/2021	708.32		7.6	290	<5	0.02	0.024	<0.0001	0.012	0.03	0.03	50.2	3.53	11
7081	25/11/2021	708.04		7.0	330		0.013	<0.071	<0.0001	0.013	0.028	0.022	51	3.9	15
7081	14/03/2022			7.7	610	<5	0.061	<0.071	<0.0001	0.039	0.140	0.0045	52	3.6	9.7

* 6873 replaces 6874 and have now been mined out

** 4167, 4180 and 7087 have now been mined out

*** 1718 and 7064 are dry

3.3 Dust deposition monitoring

Relevant Conditions

B2.2 The Consent Holder shall operate mining and associated processes and other operations in such a manner so as to ensure that emission of dust is reduced to a practicable minimum, and in any case, does not result in deposited particulate greater than 4 grams per square metre per 30 day period (as measured by deposit gauges) beyond the boundary of the Consent Holder's land. A minimum of 6 deposit gauges shall be located as follows:

i. Two gauges within Happy Valley adjacent to the red tussock area (one at the southern end and one at the northern end), approximately 25 metres from the edge of the mine footprint;

ii. One gauge within 100 metres of the haul road adjacent to the office area and another within 100 metres of the overburden area;

iii. Two gauges within 100 metres of the haul road between the overburden area and the Stockton mine disposal area.

The location of the deposit gauges referred to in (ii) and (iii) above, shall take into consideration the prevailing wind direction, wind velocities and topography.

B2.3 Dust deposition monitoring shall be carried out as set out in ISO/DIS 4222.2 Air Quality — Measurement of Atmospheric Dustfall or equivalent method.

B2.4 When operations commence, the deposit gauges shall be monitored weekly for the first three months or for a longer period until the monitoring results show that dust suppression is effective. Once a record exists demonstrating that dust deposition is within the consent limit, monitoring shall be carried out monthly.

Results

Dust monitoring was carried out during the reporting period as per Conditions B2.2 to B2.4. Locations of the deposition gauges are shown in Figure 3.3.1.

The results of the dust monitoring in FY21/22 are provided in Table 3.3.1. Compliance with < 4 g/m² over 30 days (equivalent) was maintained in all instances apart from January 2022. Following an unprecedented dry spell, with only 113 mm of rainfall falling at Cypress gauge for the 30 days preceding the sample (29th December to 27th January) Cypress Office and Plover Stream January 2022 samples produced total dust accumulations 6.1 and 5.6 g/m^2, respectively. Samples were further analysed and these figures were reduced to **5.49 and 5.32 g/m²** once organic (non-mine related) component was deducted. This signalled a non compliant situation. Council were notified as soon as results were through and re-analysed. It was acknowledged that insufficient haul road watering during 6 dry days resulted in the non-compliance. In response controls and guidelines within the Cypress Dust management Plan were revisited, and toolbox talks were held with operators to reinforce dust management

awareness and procedure. BT Mining have also ordered a camera to be installed with a view of the Cypress Haul Road, to feed back real-time data to the dispatch office and allow continuous monitoring of dust. The camera hardware has been ordered and our intention is to install it on the Mt William Tower which overlooks the Cypress Hall Roads as well as Cypress Mining Pits.

Table 3.3.1: Dust deposition results for each site in the Cypress mining area in g/m^2.

	Dust Deposition Readings per Site (grams/m^2 - 30 day equivalent)					
	South Cypress (B2.2 i)	**North Cypress (B2.2 i)**	**Cypress Office (B2.2 ii)**	**Northern ELF (B2.2 ii)**	**Plover Stream (B2.2 iii)**	**Coles Way (B2.2 iii)**
30/04/2021	0.266	0.117	0.317	0.126	0.168	0.203
31/05/2021	0.11	0.09	0.16	0.11	0.18	0.13
30/06/2021	0.22	0.07	0.25	0.13	0.18	0.19
30/07/2021	0.353	0.296	0.167	0.278	0.29	0.111
30/08/2021	0.021	0.012	0.065	0.043	0.091	0.044
30/09/2021	0.206	0.143	0.107	0.096	0.096	0.12
29/10/2021	0.29	0.42	1.9	0.34	0.41	1.2
30/11/2021	0.437	0.439	1.609	0.457	2.204	1.276
31/12/2021	0.16	0.086	0.668		0.616	0.221
28/01/2022	0.96	2	**6.1 (*5.49)**		**5.6 (*5.32)**	1.6
28/02/2022	0.12	0.51	2.2	0.92	1.6	0.34
29/03/2022	0.39	1.3	2.6		1.9	1.1

* (bracketed value is the mine-related dust result, once organic component removed)

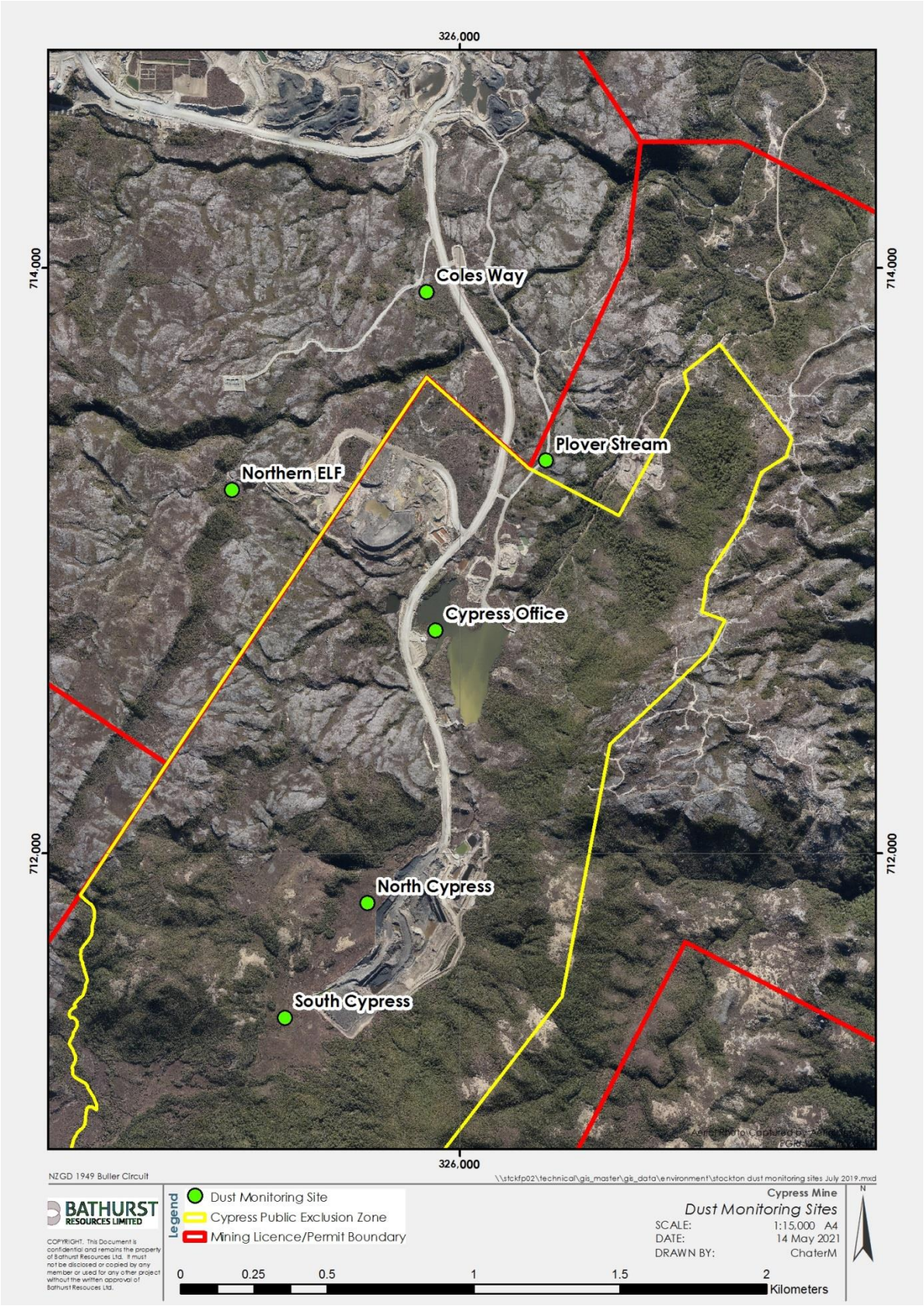


Figure 3.3.1 Cypress dust monitoring locations.

3.4 Monitoring of Vegetation

3.4.1 Survey of red tussock and herbfield

Relevant Conditions

B1.12

f. Describe the proposed monitoring of the water quality in Cypress Stream and of the riparian and surrounding vegetation, to ensure that the stream and vegetation health are not adversely affected by the adjacent mining activities;

B2.5 A vegetation survey of the red tussock and herbfield shall be undertaken annually, preferably during a 'drier' period.

Aim of monitoring

The aim of the survey is to determine whether the dust suppression and the consent limit for dust deposition are effective and whether dust affects the health of vegetation outside the mine footprint.

Due to revised reporting dates for the AEMR, the tussock monitoring results reported here generally date from the previous reporting year as the latest results are not yet published at the time of writing the AEMR. However, due to ongoing Covid disruption and a large workload increase for ecologists following introduction of the 2020 National Freshwater Regulations, the March 2021 tussock monitoring results are still being written-up and are expected to be published in June 2022. Results for FY21 and FY22 will be presented in the FY23 AEMR. For now, the summary of the most recent available Tussock Monitoring Data (FY20) is included below. Reports for tussock Plots and tussock storage transects are available on request.

Results for Red Tussock & Herbfield Background Plots

Between 2019 and 2020 the number of species present (species diversity) increased in 5 plots, stayed static in 3 plots and decreased in the remaining 12 plots. Plot 19 was removed by mining and replaced by Plot 19A in 2019 which now has two years of confirmed data and 2021 data still being processed. Plot 19A showed a slight decrease in species diversity from 24 to 22 species between 2019-2020.

Average number of species per plot peaked in 2019 at nearly 20 species/plot, before declining slightly in 2020 to just over 18 species/plot.

Between 2010 and 2020 the number of species present increased in eight plots, decreased in four plots and was constant in seven plots (Plots 19 and 19A were excluded from this analysis). In 2010 the average number of species per plot was 16.9 (s.e. = 1.48, n=20), whilst in 2020 it had increased to 18.2 (s.e.=1.95, n=20), down from an average of 19.9 (s.e. = 1.74, n=20) in 2019. There is no indication that diversity in the plots is changing significantly.

The average vegetation cover declined from 95.3% (standard error=2.32, n=20) to 81.9% (standard error=3.21, n=20) between 2010 and 2018. Since 2018 the percentage vegetation

cover has been increasing ((to 85.95% in 2019 (standard error=3.15, n=20) and 91% in 2020 (standard error=1.95, n=20)).

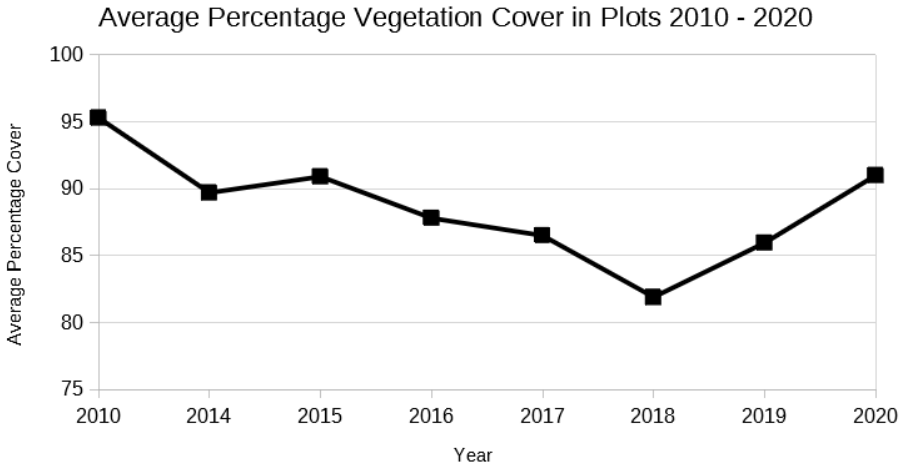


Figure 3.4.1 Average percentage vegetation cover in Plots 2010 - 2020

This pattern of change in the average vegetation cover over time is reflected in the average percentage cover of dead vegetation, which increased from 0.75% (standard error 0.56, n=20) in 2010 to 15.01% (standard error=3.24, n=20) in 2018, before declining to 9% (standard error=2.8, n=20) in 2020, as shown in Figure 3.4.2.

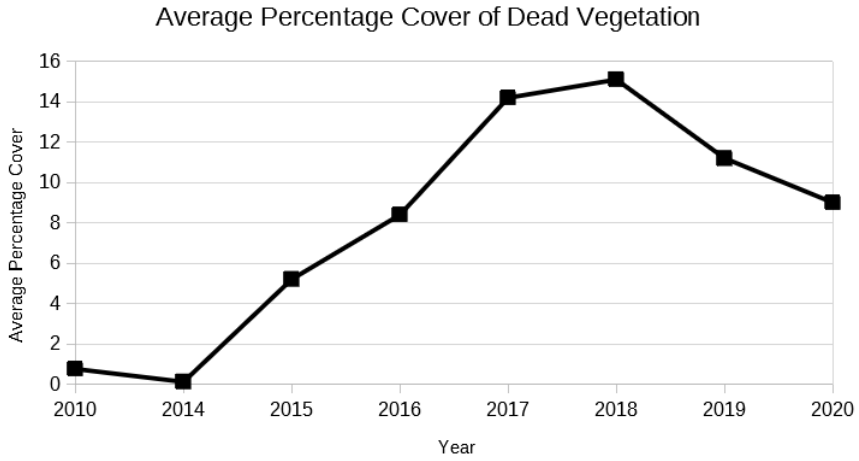


Figure 3.4.2 Average percentage cover of dead vegetation in Plots 2010 – 2020

Prior to 2017 there were many plots within which an increase in dead vegetation / decrease in percentage cover of vegetation since 2010 had occurred. This was the case whether or not mining had occurred close enough to the plot to have the potential to affect local surface water hydrology. Since 2018 the average amount of dead vegetation cover has been decreasing again, but is yet to reach the very low levels of 2010 as shown in Figure 3.4.2.

The percentage of bare ground is generally low and stable in the plots described here. Between 2010 and 2020 four plots showed an increase in the percentage of bare earth, five showed a decrease and ten remained constant (n=19, excluding Plot 19a).

Cypress Stream continued to flow throughout the surveys undertaken until 2018, but was dry in 2019. These variations in vegetation cover may reflect natural variation (e.g. due to frost or snow damage) and plots with large losses in live vegetation are generally recovering over time. Large changes in vegetation cover between years (both increases and decreases) are not uncommon and decreases in vegetation cover can be replaced within a year or two , but more typically take longer for cover to be restored. These changes appear to be natural rather than an outcome of mining nearby.

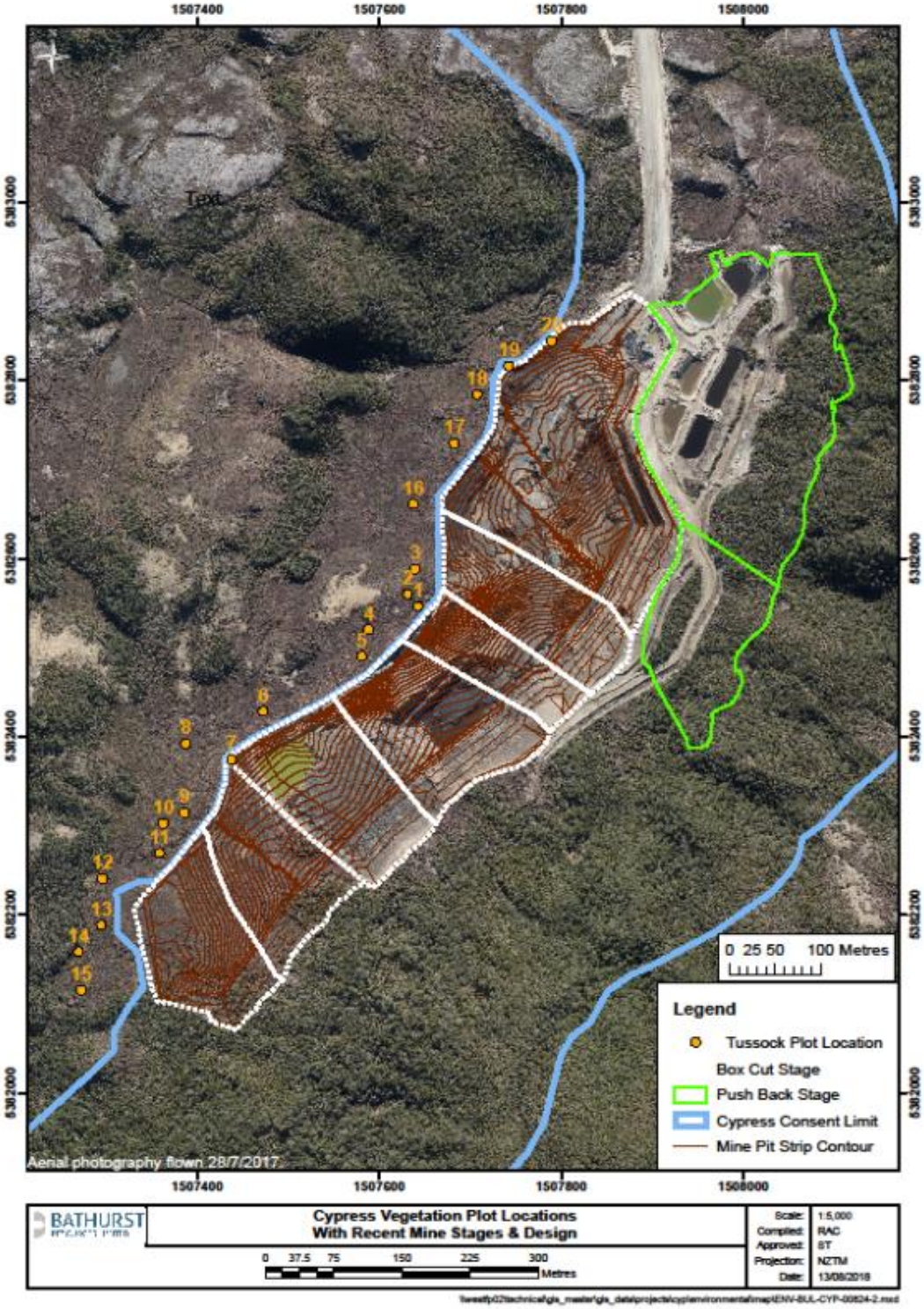


Figure 3.4.3 Cypress Vegetation Plot Locations

3.4.2 VDT storage monitoring transects

The transfer of vegetation by vegetation direct transfer ('vdt') from the north pit area of the Cypress mining area to an intermediate storage area commenced in 2013. This was to comply with condition 14.4 c (iii) of the conditions of consent of RC03164 and RC03175 which requires the following:

> The direct transfer of at least twelve hectares of red tussock wetland communities from Happy Valley to an intermediate site. The red tussock wetland communities shall be maintained on the intermediate site and then relocated into the rehabilitated red tussock area identified in condition A14.1 e.

Storage areas were created on the top of the McCabe's overburden storage area and in locations around the ELF area north of the pits, around St Pat's Dam (700 ELF) as shown in Figure 3.4.2. The McCabe's, 700 ELF and N-ELF storage areas were constructed as per the document "Tussock Pad Construction Methodology - Kaipara Limited" (appended to the full report) to a 1% grade.

Transect surveys commenced in March 2015 when the total area covered by stored vdt was 12.5 ha. A second survey was carried out in September 2016 allowing 18 months between surveys. A third survey was carried out in March 2017 and a subsequent re-survey done in early 2018. The most recent tussock surveys were completed in March of 2020 and 2021 respectively. Results from the March 2020 survey are discussed here. March 2021 survey results will be presented in the next AEMR.

Methods

Tussock VDT (Vegetation Direct Transfer) has been used extensively onsite to relocate tussock to areas near Cypress for long-term storage and subsequent use in rehabilitation. Transects have been used to monitor tussock health in these storage areas.

Transects were located at random, to provide coverage of both tussock and herbfield vegetation in all storage areas. There was no "selection" of locations other than picking a spot on the external bund, walking 30 m into the vdt and placing the first marker pole.

Transects are 30 m long, permanently marked at each end and at 0 m, 10 m, 20 m and 30 m. plots are 2 m by 1 m, laid across the transect line (1 m^2 on each side of the line) at 0-1 m, 10-11 m, 20-21 m and 29-30 m (the latter to allow use of a 30 m tape measure).

The survey includes the following for each plot:

- % cover of vegetation including live and dead vegetation.
- % cover of dead vegetation
- % cover of bare ground
- 'Hummockyness' on a scale of 1(level) to 5 (very uneven and hummocky)
- Height of the tallest individual plant.
- % cover of each species present in the plot estimated by eye.
- Presence of any species <1% cover recorded as x on the field sheets.

Photographs were taken of each transect looking from the marker position at 0 m towards the 30 m marker, and across each plot taken from the left had side (left when looking from 0 to 30 m).

Results for Tussock VDT Transects

The overall appearance of the vdt areas as seen from the start of each transect (in Appendix 2) is superficially consistent between the years, taking into account the different seasons and time of day. In 2019 it was noted that herbaceous annual weeds and grasses were colonising areas of bare soil or tracks, particularly near Transect 7, where the sods appeared to be poorly aligned. The weeds present included exotic herbs (such as *Leontodon taraxicoides*), grasses (such as browntop (*Agrostis capillaris*) and Yorkshire fog (*Holcus lanatus*)) and rushes (*Juncus* spp.). Weed control was recommended to address this issue. In 2020 some weed control had obviously been undertaken, but the coverage was incomplete and those weed species were still commonly encountered, particularly near Transect 7, but throughout the tussock storage areas to varying degrees. In addition to exotic colonisers, the native ferns *Paesia scaberula* and *Histiopteris incisa*, which are not commonly encountered in tussock grassland, were also establishing along the transects and outside the plots in similar areas (i.e. where there is bare soil) in 2019. These ferns do not appear to be spreading at the expense of other vegetation, but this situation should be monitored to ensure these species don't come to dominate the stored vegetation in future.

The closure criteria in the Cypress consents specify a small percentage of exotic species to achieve closure (less than or equal to 5% exotic plant cover in the red tussock wetland communities) which affirms the importance of ongoing weed control in the vdt areas to maintain indigenous dominance when this vdt is returned to the Cypress landform. In 2020 the 5% threshold was exceeded at four of the 32 plots (12.5%). Effective weed control will need to be maintained at the tussock storage areas if there is any chance of achieving closure using the stored tussock grassland for vdt.

Diligent weed control to date has ensured that the number of exotic species in the plots remains low, however exotic species are present, the records are widespread across the storage areas, new records have occurred over time and the average number of weeds per plot is slowly increasing. The main species of concern are exotic rushes, particularly *Juncus acuminatus* (sharp-fruited rush), but also *J. bulbosus* and *J. canadensis*. The native species *J. edgariae* was also recorded in Plot 3 on Transect 7 (where it exceeded 5%) and Plot 3 on Transect 8 in 2020. *J. edgariae* is not typical of undisturbed tussock grassland and we recommend its removal as well in order to prevent it coming to dominate.

The transects have now been surveyed six times, with five surveys undertaken in late summer / autumn (March 2015 and 2017 – 2020) and one in September (2016). The September survey is useful in that it highlights the winter habit of the various species, confirming that a consistent result across the seasons is unlikely to be obtained in vegetation surveys irrespective of effort, due to the amount of seasonal die-back and the cryptic nature of some of the small plants when not flowering. Comparing the plots between 2015 and 2020 it is evident that the vdt areas remain generally healthy, but that invasion by weeds and native tree and rush species will need to be managed consistently and effectively to maintain the vdt sods as tussock grassland for eventual use in rehabilitation.

Reports containing the March 2021 and March 2022 transect data and photographs are currently in progress and a summary will be available in the coming months.

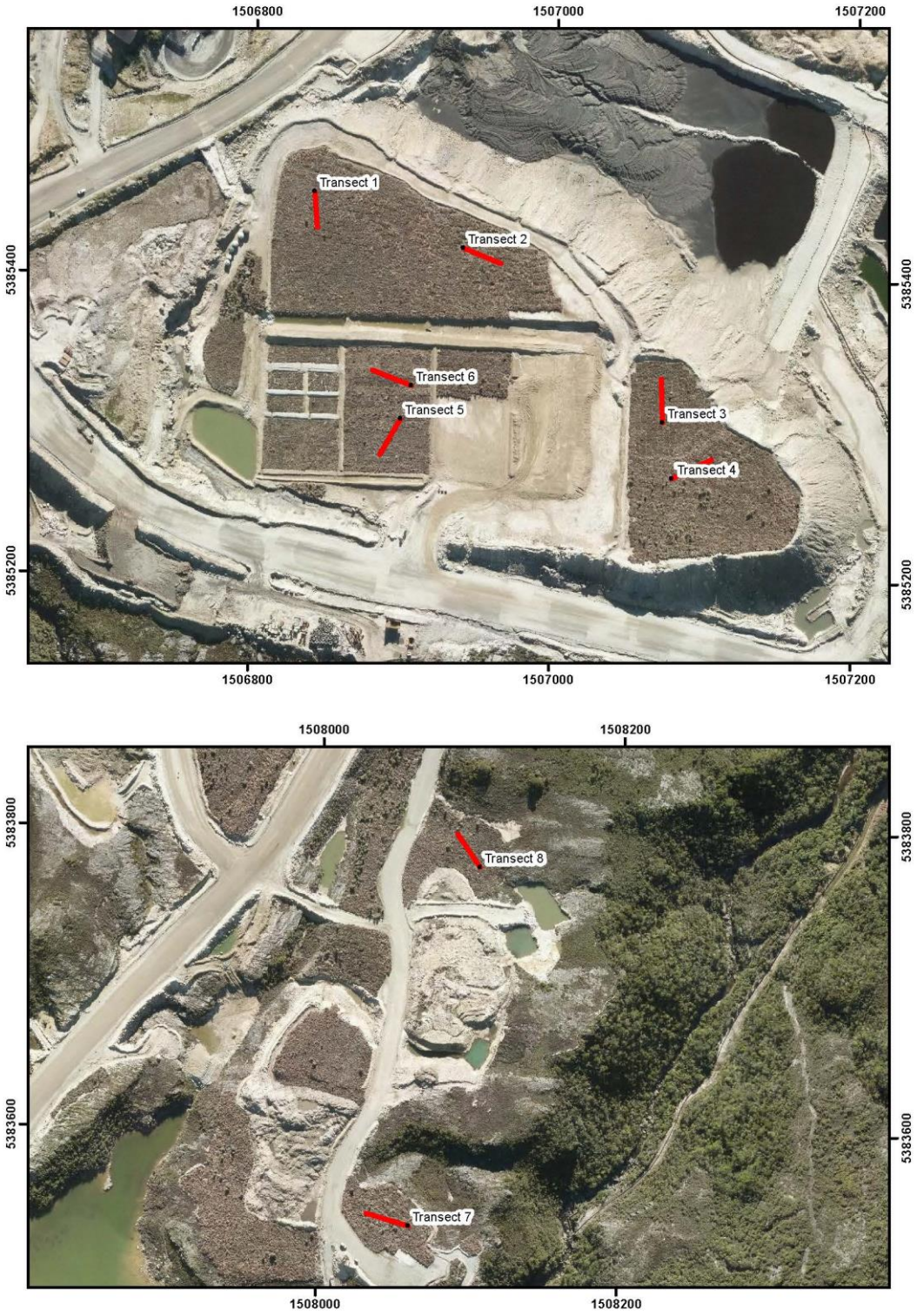


Figure 3.4.4 Location of transects on vdt storage areas.

3.5 Aquatic invertebrate and periphyton monitoring

Relevant Conditions

B8.13 Aquatic invertebrate and periphyton monitoring (including bryophytes) shall be undertaken at least once annually in late summer-autumn at the following locations:

a. A site on St Patrick Stream, in the vicinity of site 8W (Site 1).

b. At two sites upstream of St Pat's Dam on St Patrick Stream, one between the north pit and St Pat's Dam (Site 2) and one upstream of all mining activities (Site 3).

c. A site on Cypress Stream, in the vicinity of site 7W (Site 4).

d. At a site in the Waimangaroa River, approximately 200m downstream of all diversions around the south pit (Site 5).

B8.14 Invertebrates and periphyton monitoring under condition B8.13 shall consist of periphyton thickness and percentage cover, bryophyte species present, macro-invertebrate taxa richness and relative abundance, Macro-invertebrate Community Index (MCI) and EPT scores. Monitoring shall be undertaken on a day on which there has been no rainfall for the preceding two days and no major flood event in the preceding two weeks. Wherever practicable, sites that have been sampled in the past shall be used.

Results

As required by resource consent conditions B8.13 and B8.14 (RC03175), a survey to monitor streams that flow from the Cypress valley was carried out on 1st of March 2022. Data relating to aquatic ecology was collected from five sites, following a pre-mining baseline survey completed in 2012, and follow up annual surveys in 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021 and now 2022. The 2022 results are summarised below. Please refer to "Cypress Mine Consent Compliance Stream Ecology Monitoring – March 2022" for full investigation details.

The 2022 survey for all five sites was carried out on 1st February 2022. Bio-monitoring assessments comprised macro-invertebrate investigations, as well as bryophyte and periphyton analyses. Standard methodologies were used, and all identification was undertaken by recognised experts, as with the previous surveys.

Dr Issie Barrett of University of Canterbury carried out the identification of bryophytes and Dr Duncan Gray identified the aquatic macroinvertebrates.

There had been no major freshes in the 5 days before the sampling took place and streams were in steady recession conditions on the 1st March 2022.

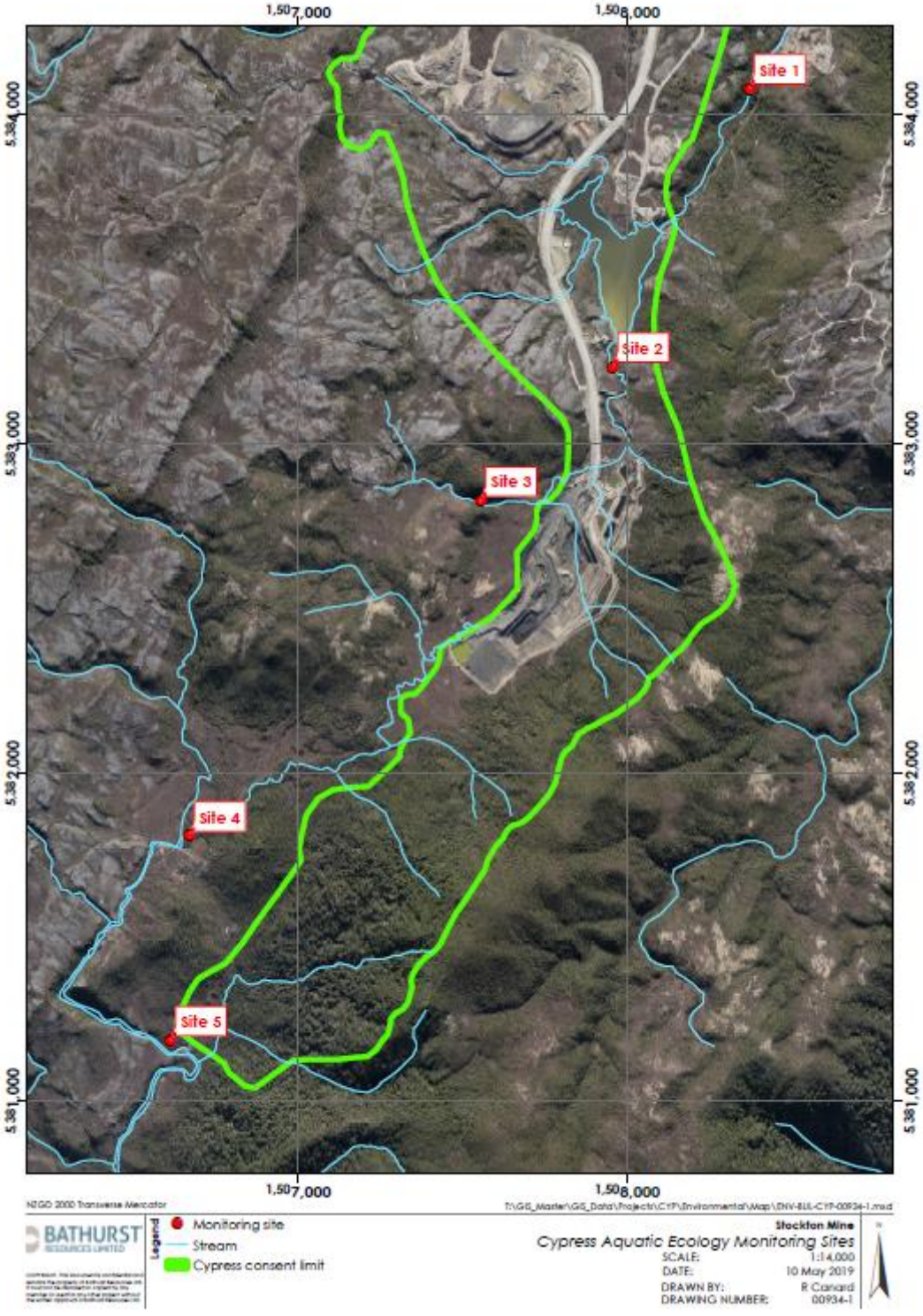


Figure 3.5.1: Locations of aquatic monitoring sites in relation to the Cypress consent boundary.

Periphyton

Table 3.5.1 below shows the periphyton score and the average percentage cover for each site. The full results for periphyton percentage cover can be viewed in Appendix 1.

Table 3.5.1: Periphyton scores and cover - sampled 1/3/2022

Site	1	2	3	4	5
Score	8.2	9.6	9.4	9.0	7.9
Cover %	51.2	36.2	41.2	34.6	23.2

The periphyton scores are in the very good range for all sites. Hence there is no evidence of enriched nutrient conditions at the sites.

Bryophytes

The abundance of species per site can be seen below in Figure 3.5.2. Figure 3.5.2 species richness results may not be directly comparable, as the identification was undertaken by different experts. However, in 2022 sites had bryophyte species richness within previous species richness range from the last 10 years of annual surveys. Site 1 had more species than was detected pre mining in 2012.

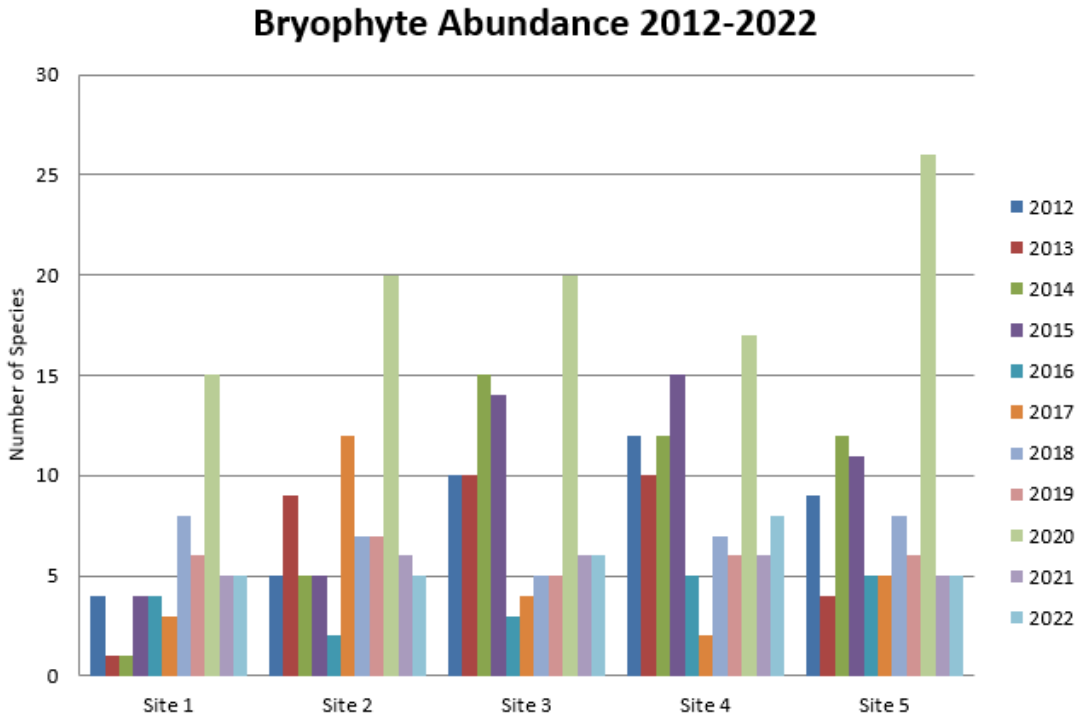


Figure 3.5.2: Bryophyte species abundance 2012 to 2022

Macroinvertebrates

Three measures of stream health using macro-invertebrates were utilised:

- Macro-invertebrate community index (MCI)
- Richness of Ephemeroptera, Plecoptera, and Trichoptera taxa (EPT)
- Relative Abundance

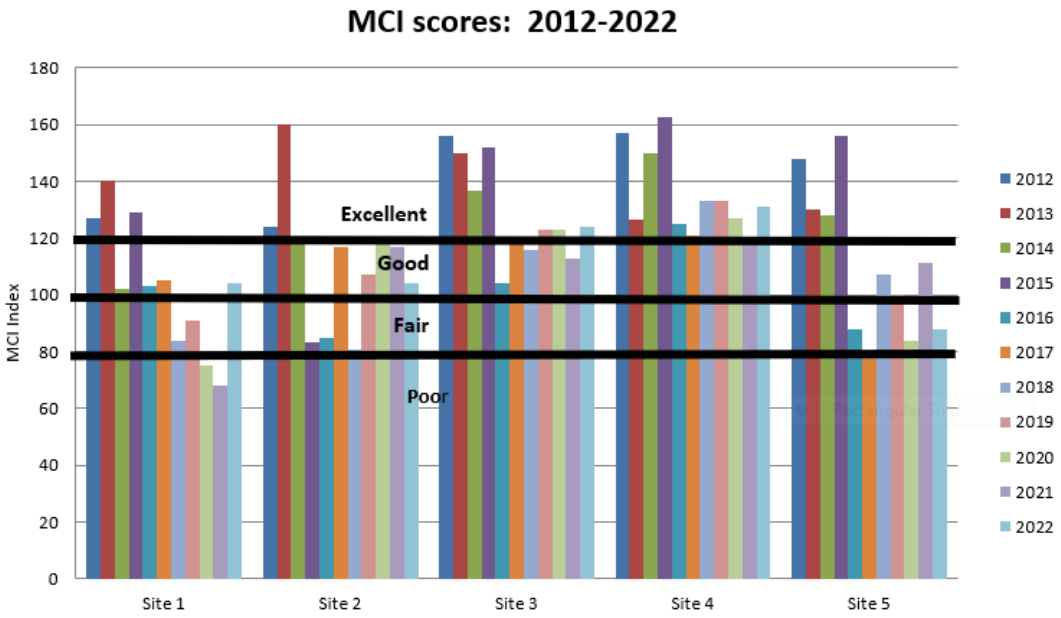


Figure 3.5.3: MCI Scores at each site

Based on the Stark & Maxted (2007) quality class in table below, in March 2022 Sites 1 and 2 are good quality; Sites 3 and 4 are excellent quality and Site 5 is fair quality. MCI scores for 2022 at Site 1 are best they have been in last 5 years and likely a result of optimised calcium oxide treatment of acid mine drainage in St Patricks' reservoir. Site 1 had abundant koura which indicates acidity levels at site 1 can sustain koura

Stark & Maxted (2007) quality class	MCI
Excellent	>119
Good	100-119
Fair	80-99
Poor	<80

As recommended Site 1 was also sampled in December 2021, as well as March 2022, for macroinvertebrates, to assess any seasonal changes. Results were relatively similar between the respective samples.

EPT Taxa Richness at sites 2, 3, 4 and 5 are similar to range in last 5 years (Figure 3.5.4). Site 1 EPT taxa abundance has been higher in the last 2 years likely due to the automated CaO doing/neutralisation treatment improving water quality at Site 1.

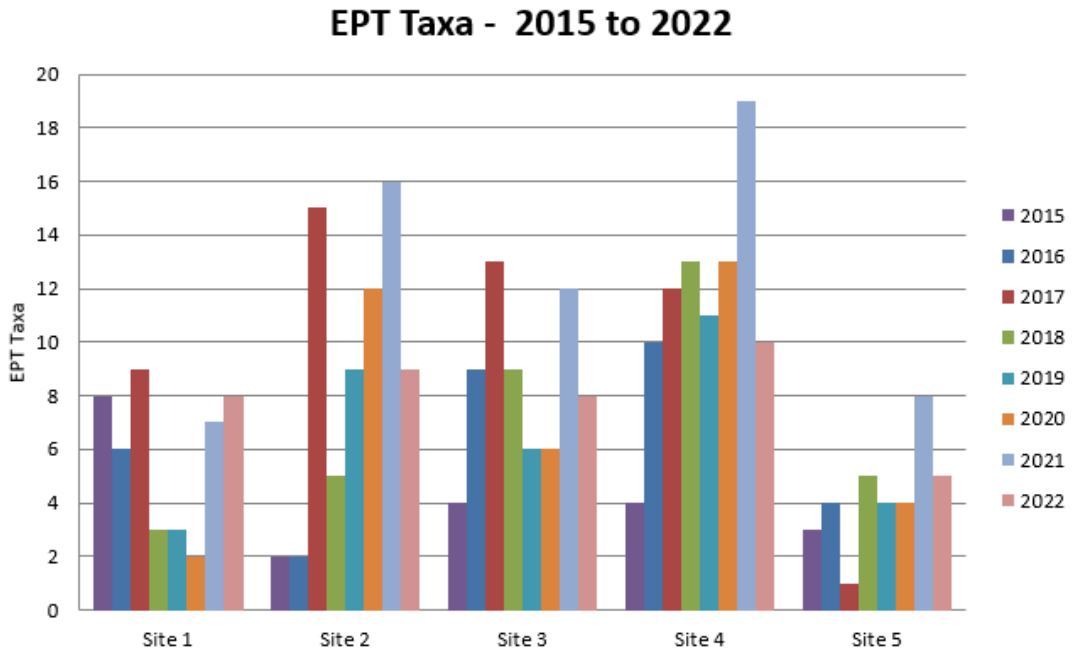


Figure 3.5.4: EPT taxa number at each site

The relative abundance of macroinvertebrates in table below for 1998, 2021 and 2022 surveys indicate that at Sites 2 and 4 the relative abundance ranges are similar in March 2022 to the baseline 1998 surveys. Abundances at Site 1 are lower in 2021 and 2022 surveys than in 1998. Abundances at Site 1 are higher in March 2022 than February 2021.

ABUNDANCE DATA- MACROINVERTEBRATES (individuals per m^2)

Sites	Macroinvertebrate Abundance -20/5/98	Macroinvertebrate Abundance -15/1/21	Macroinvertebrate Abundance -1/3/22
1	212 (142-168)	67 (38-102)	105 (11-172)
2	224 (123-422)	153 (51-204)	186 (118-226)
3	ND	223 (76-485)	167 (118-183)
4	332 (132-544)	364 (280-446)	196 (65-452)
5	ND	48 (0-89)	46 (32-65)

Water Quality at Sampling Sites

Table 3 and Table 4 indicate water quality monitored at the 5 sites synoptic with annual ecology stream sampling on 15/2/21 and 3/1/22. Metal and acid results are similar and all sites apart from Site 5 meet the Cypress water quality consent conditions for Site 8W (Site 1). As previously noted, Site 5 is adversely impacted by acid mine drainage from Stockton mine not from Cypress mine activity

Table 3.5.2: Water Quality- dissolved metals at Sites 1 to 5 on 1/3/2022- synoptic with ecology sampling

Site	pH	Acidity (mg/l)	Al (mg/l)	Fe (mg/l)	Cd (mg/l)	Ni (mg/l)	Zn (mg/l)	Pb (mg/l)
1	5.2	8	0.48	0.074	<0.0001	0.019	0.039	<0.005
2	6.2	8	0.080	0.11	0.0002	<0.0017	<0.0079	<0.005
3	6.8	<5	0.064	0.1	<0.0001	<0.0017	<0.0079	<0.005
4	7.3	<5	0.11	0.17	<0.0001	<0.0017	<0.0079	<0.005
5	4.5	47	3.8	0.17	0.0005	0.0005	0.031	0.041

Automatic Turbidity at Site 1 between 15/2/21 and 1/3/22 indicates maximum turbidity is 75 NTU and has a median of 5 NTU. There is no evidence of adverse turbidity impacts due to mine derived sediment.

Automatic pH at Site 1 between 15/2/21 and 1/3/22 indicates the low pH values (<3.6) when the St Patricks reservoir is spilling have been very infrequent due to the new automated calcium oxide dosing treatment from LDP2 water treatment plant .

Water samples are also taken daily at Site 1 (8W), and weekly at Sites 4 (6w) and 5 (7w). These sample results for RY22, along with continuous flow, pH, turbidity and water temperature data is logged at Site 1 (8W), are presented in Sections 3.1.3 and 3.1.5.

Summary

- Weather and climatic conditions in the area for the 10 days prior to the aquatic ecology sampling were adequate for macroinvertebrate sampling and assessment.
- Bryophytes richness at the sites in a similar range to last 10 years and to the baseline AEE 2002 results.
- The 1st March 2022 Macroinvertebrate MCI scores are excellent for sites 3 and 4 and good for sites 1 and 2 and fair for site 5. Results are within similar ranges for sites 1, 2, 3, 4 and 5 for the last 11 years. An improved MCI score at Site 1 reflects the change to automated calcium oxide dosing/neutralisation to St Patrick's reservoir, upstream of Site 1, that has been continuous in the reporting period.
- Periphyton at all sites, were in the very good range and there is no evidence of adverse impacts due to nutrient enrichment or mine derived sediments.

- In general, water quality at all 5 sites is similar to water quality measured in previous surveys.

- Site 1 is impacted with acidic spills from St Patrick's reservoir. However, it is noted that since BT Mining commissioned the LDP2 water treatment plant in August 2020 to treat Cypress AMD in St Patricks reservoir with calcium oxide, there has been a reduction in the frequency of acidic spills (>14.6 mg/l), and maximum acidity at Site 1, due to improved AMD treatment. Estimated time frame for LDP2 to be dosing to McCabes Sump is September 2022 which will further improve water quality in St Patrick's Stream, downstream of St Patrick's Reservoir, as impacted acidic water from St Patricks reservoir will be pumped directly to McCabes sump for treatment, hence spills to Site 1 will reduce.

3.6 Water abstraction for dust suppression

Relevant conditions

B11.2 The Consent Holder may take up to 100 litres per second from St Pat's Dam for dust suppression purposes.

B11.3 The Consent Holder shall monitor and record the volume of water abstracted under this suppression spray to reach vegetation.

Results

The pump is set to take 80 L/s to ensure compliance with condition B11.2. Pipes through which water abstracted are all 8 inches in diameter, with a maximum flow capacity of 100 L/s.

The piped flow from St Patrick's Dam for dust suppression purposes (via the Cypress Water tower) is monitored by a Khrone Electromagnetic flow meter, at ten minute interval. Water was abstracted from the St Patrick's Dam for dust suppression on the very odd occasion during the 2020/22 reporting period. Most of the time dust suppression water was taken from other sources. The maximum abstraction rate from St Patrick's Dam , as measured was 53 L/s.

In relation to the quality of water, section 3.1.4 provides the results of pH monitoring of the St Pat's Dam (from which dust suppression water is authorised to be pumped).

Water is applied to the road via a purpose-built water truck, designed to minimise the spraying of surfaces that do not require dust suppression - such as vegetation along road edges (to avoid unnecessary wasting of water and limit the number of trips required). Windrows along each side of the haul road serve to contain any dust suppression spray from drifting over vegetation. The haul road in the North Pit is below the natural surface so dust and water spray remain in-pit. The opportunity for dust suppression water to affect that vegetation is very limited.

3.7 Independent water monitoring

Relevant conditions

B8.5 The collection, analysis and presentation preservation of all samples collected in accordance with these conditions (excluding aquatic ecology monitoring) shall be undertaken using standard methods for the Examination of Water and Wastewater (18th Ed. 1992) APHA, AWWA and WEF, or equivalent or superseding methods.

B8.5A The monitoring required by these conditions shall be undertaken by EITHER an independent contractor, OR an appropriately qualified person(s) employed by the Consent Holder, with the exception that an additional set of samples shall be collected by an appropriately qualified independent contractor who shall not be a director or employee of the Consent Holder on three separate occasions in the first year of operational monitoring; two separate occasions in the second year of operational monitoring and then once per annum unless a marked difference is found between the Consent Holder's samples and the external samples; OR by automated sampling methods where these are able to be applied.

B8.5B The Consent Holder shall invite one representative of the community (appointed by those present at any Community Liaison Meeting convened under Condition A19.1) to accompany the qualified person(s) and/or contractors referred to in Condition B8.5A when undertaking any manual sampling required by these conditions.

Results

Water monitoring at Cypress is currently carried out by an independent contractor, MBC Environmental Limited. Regular reviews of telemetric data against manual samples are done. Samples are analysed by SGS Laboratories.

A community representative observed water sampling on 17.01.2022

3.8 Overburden Placement and Backfilling of Pits

Relevant conditions

Monitoring:

B9.13 The Consent Holder shall undertake a sampling and monitoring programme on a monthly basis to verify overburden placement area geochemistry.

B9.14A The consent holder shall undertake a sampling and monitoring programme at a monitoring point to be established within 100 metres of New Zealand map Grid 5948512:2415895 at six-monthly intervals, in the event that Cypress overburden is deposited in the Webb Pit, to verify that groundwater down gradient of the Webb Pit is unaffected by the deposition of overburden within the Webb Pit.

B9.14B The Consent Holder shall sample the Twin Stream at NZMS 141515 six-monthly, in the event the Cypress overburden is deposited into the Webb Pit.

B9.15 The Consent Holder shall undertake a sampling and monitoring programme to verify the following at a frequency in accordance with the specifications included in the Geochemistry and Overburden Management Plan:

a. Moisture and air void characteristics of the low permeability areas of the overburden placement areas;
b. Oxygen concentration profiles.

B9.16 The collection, analysis and presentation of all samples collected in accordance with these conditions shall be undertaken using standard methods for Examination of Water and Waste Water (18th. Ed. 1992) APHA, AWWA, WEF, or equivalent or superseding methods.

Reporting:

B9.17 In addition to the reporting requirements in accordance with condition 17 of these consents, the Consent Holder shall report on the results of the following:

a. The monitoring programme in accordance with condition 9.13 to 9.15;

b. The slope of phreatic surface in the backfilled north and south pits.

Results

B9.13

Sampling and monitoring is undertaken as it is required in accordance with the Geochemistry and Overburden Management plan, summarised in Table 3.8.1. Monthly sampling has no added value as the sampling program being completed is much more comprehensive and site specific.

Regular sampling is undertakne for 2 reasons in Cypress.

1. Inpit sampling
    a. this is to ensure the correct designation of material to the NAF or PAF dump
    b. sampling is undertaken in the active pit
2. Tiphead sampling –
    a. this is to determine the acid balance of the dump
    b. NAF tiphead sampling is undertaken at the tiphead on the NAF dump
    c. PAF tiphead sampling in undertaken in the mining pit. This is because aglime is added to the material before it is dumped on the tiphead so it will be artificially elevated in ANC and not give an accurate result for the PAF material

Table 3.8.1: Cypress AMD sampling regime

Inpit sampling (Kaiata)	Sampling rate	Location of sampling	Sampling type	Treatment of material
Below lower NAPP surface	No sampling			Moved to PAF waste rock dump Aglime added at 8kg/ tonne WR
Between the lower and upper NAPP surfaces	1 sample per 2500 bcm	Sampled inpit if possible, but this is not likely.	NAPP	
Above Upper NAPP surface	No sampling			Moved to PAF waste rock dump Aglime added at 8kg/ tonne WR

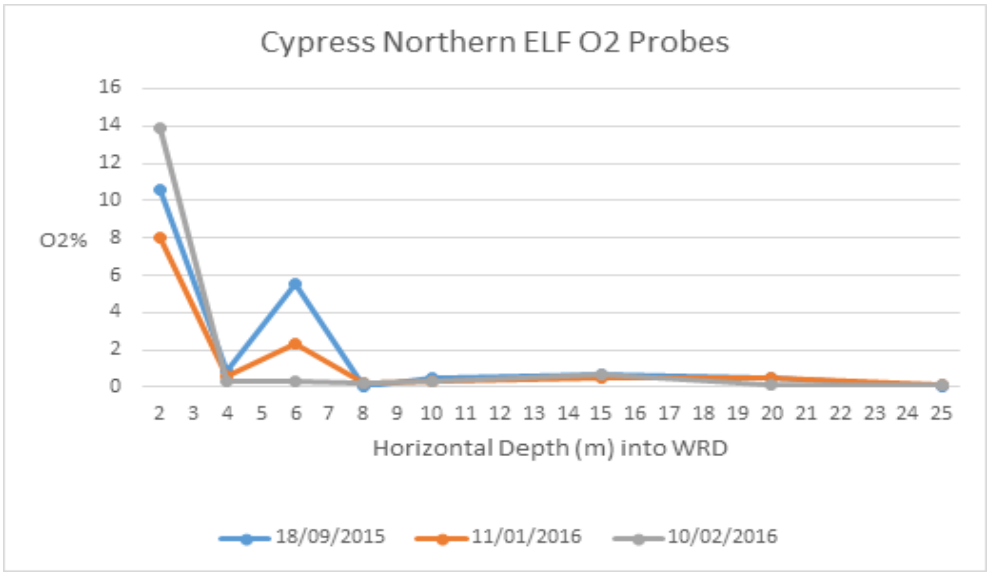
Tiphead sampling (all overburden)	Sampling rate	Location of sampling	Sampling type
PAF dump (includes BCM, Kaiata and interburden)	1 sample per 10,000 bcm	Sampled in pit (since aglime addition – Nov 2018)	NAPP
NAF dump (includes granite, basement and Kaiata)	1 sample per 2,500 bcm	Sampled at the tiphead	NAPP

B9.14A and B9.14B :

These conditions are not relevant for the reporting period to 31 March 2022 as there has been no dumping in Webb pit from Cypress.

B9.15

The Northern ELF horizontal oxygen probes installed in FY16 show that the dump has essentially sealed from a depth of 4 m from the batter surface (James Pope CRL). Vertical oxygen probes installed in the running surface in FY19 show that the Northern ELF has essentially sealed from between 0.5 and 1.5 m from the surface. Horizontal oxygen probes have been installed in strip 0 of the Cypress pit backfill and are waiting on access to sample these.



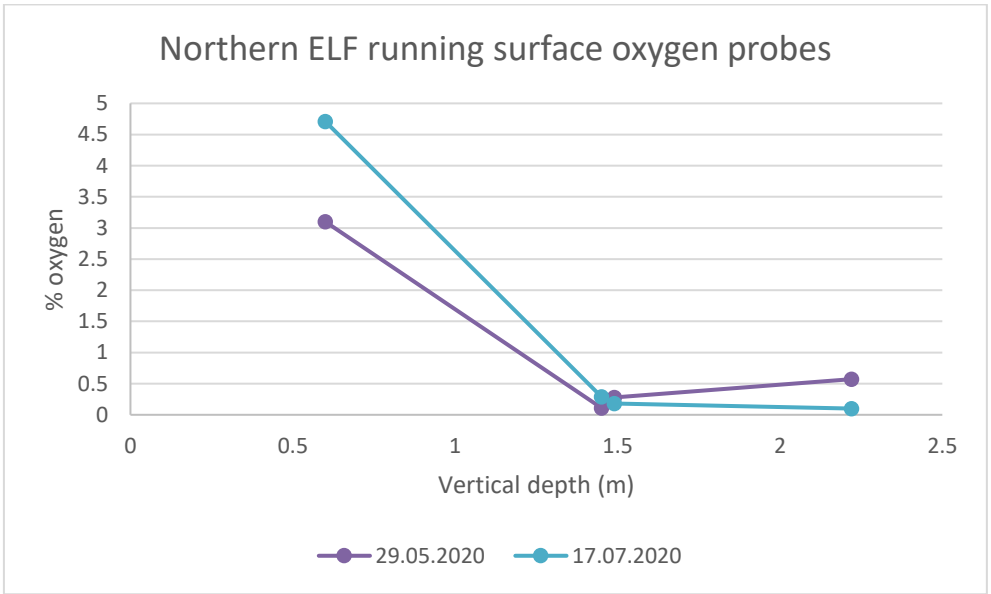


Figure 3.8.1: NELF oxygen probe data from horizontal probes in FY16 and vertical oxygen probes into the running surface of the Northern ELF

B9.16:

Condition is understood and adhered to

B9.17:

GHD have been engaged by BT Mining to undertake a groundwater model. The north pit groundwater model is complete and data collection is currently being undertake for the south pit model. Monitoring for refinement and validation in ongoing for the network of 15 vibrating wire piezometers and 17 open standpipe monitoring sites with additional vibrating wire piezometers being added to the system in RY23 for the south pit model. (see section 3.2 Groundwater Monitoring). These are currently being monitored for both water levels and geochemical parameters to provide the data for a groundwater model which will address the phreatic surface.

2020 Peer review panel recommendation:
"Provide more detailed assessment of geochemical monitoring data (including range and additional statistics for key parameters) for both the PAF and NAF dumps as part of future Environmental Monitoring Reports."

Table 3.8.2: Geochemical monitoring summary - Cypress overburden

	NELF PAF %S	NELF PAF NAPP	NELF NAF %S	NELF NAF NAPP	NNELF NAF %S	NNELF NAF NAPP
No. samples	312 (NAPP)	312 (NAPP)	105	105	115	115
No. samples NAPP >0	223	223	15	15	6	6
High	4.1	122	1.74	45	1.84	30
Low	0.019	-364	<0.005	-28	0.006	-60
Average	1.816	25	0.200	-6	0.462	-19
Median	1.730	26	0.087	-7	0.125	-16

There are 110 NELF PAF samples which were exclusively analysed using NAG and paste pH and 118 samples that have been analysed for both NAPP and NAG and paste pH.

3.9 Ground vibration monitoring

Relevant conditions

C16. A programme of blasting times shall be notified publicly by way of notice erected at the road entrance to the mine area and by circular or public advertisement to local residents, DOC, West Coast Regional Council and the Buller District Council prior to any such blasting taking place and at regular intervals not exceeding twelve months thereafter. Changes to the blasting programme shall be notified at least three days prior to implementation.

C17. Blasting shall be restricted to the hours between half an hour after sunrise to half an hour before sunset.

C18. Details of all blasts shall be entered into a record book kept for that purpose and shall be available to the Buller District Council on request.

C19. The peak overall sound pressure level due to air blast shall not exceed 128dB linear unweighted measured at any private residence not owned by the Consent Holder.

C20. Ground vibration levels measured at any residence not owned by the Consent Holder shall not exceed **10mm per second peak particle velocity** measured in the frequency range of 3 hertz to 20 hertz, thereafter NZS 4403 Code of Practice for the Storage, Handling and Use of Explosives or any other Codes of Practice which may from time to time be current shall apply.

C21. The Consent Holder shall monitor blasting activities. Monitoring sites shall be located at the boundary between the Stockton CML and the Cypress MP area.

C22. The Consent Holder shall monitor blasting at three monthly intervals for at least 12 months following the commissioning of the open pits. In the event of the above monitoring indicating compliance with the conditions, the frequency of monitoring will change from three monthly to six monthly periods.

Results

Cypress blasting times are notified on the road entrance to Stockton Mining Area and on general signage warning of blasting at the edge of the Cypress Operational Exclusion Zone. The Westport News newspaper is also contacted annually by the Stockton Environment Team to place an annual blasting notification to the general public. This advert is published in July of each year. Blasting warning signs are also present on the Stockton Coal Mining Licence Boundary and Cypress Public Exclusion Zone Boundary to warn the general public. All blast records are kept electronically for future reference and no blasting occurs within half an hour of sunrise or sunset.

Ground vibration and sound pressure monitoring were undertaken for a blast fired in Cypress on 1st April 2022. Monitoring was undertaken at the Geomoss hutt well inside the pit boundary. (See Table 3.9.1).

Table 3.9.1: Ground Vibration Monitoring Results

Summary Cypress Total Station Monitor, blast results			
	Blast 1/04/2022 (log at 12:00:50)	**Compliance Limit**	**Compliant**
Max. PPV	5.969 mm/s	10 mm/s	YES
Max. Transverse Reading	0.015 mm/s		
Max. Vertical Reading	0.023 mm/s		
Max. Longitudinal Reading	0.044 mm/s		
Max. PSPL (airblast in dBL)	134.2	128 dB	*see comments

* The blast was monitored at the Geomoss hutt well inside the Cypress pit boundary.

The 128 dB limit is for reference at the nearest residence which would be quite a distance away in Millerton. Thus the perceived airblast there would have been far less than the recorded actual.

3.10 Noise

Relevant conditions

C26. Subject to the express provisions of this condition the noise level shall be measured and assessed in accordance with the requirements of New Zealand Standards NZS 6801:1991 Measurement of Sound and NZS 6802:1991 Assessment of Environmental Sound. In particular, the provisions of NZS 6802:1991, 5dB corrections for noise with special audible characteristics will apply to noise measurements and assessments.

C27. The L_{10} level as measured at or within any residentially zoned boundary of a property not owned by the Consent Holder, or the notional boundary of any existing dwelling not owned by the Consent Holder, shall not exceed the following limits, except by mutual agreement:

Monday-Saturday 7.00am to 9.00pm	50 dBA L_{10}
All other times	45 dBA L_{10}
	70 dBA $L_{(max)}$

Results

Noise is monitored on a monthly basis at four locations as shown on Figure 3.9.1, and monthly noise monitoring data is available upon request.

No noise monitoring at NM-JF and NM-KF was undertaken for FY12022, due to the opening of a quarry in near vicinity to this site (constant noise). However, it was ascertained that NM-M1 and NM-M2 in Millerton township are actually in closest proximity to mining activity in Cypress (and Stockton Mine), and so the 2 sites fulfil the requirements of C27.

NM-JF and in NM-KF remain on the map for this reporting year, for reference.

For NM-M1 and NM-M2, compliance with noise standards was maintained. There were two cases where 50 dBA L_{10} was marginally exceeded during RY2022. This was on 29 July 2021, and 14 January 2022. The former exceedance was identified as flowing water, with streams running quite high. The latter exceedance was an unknown sound spike, but not thought to have originated from mining activity. There was a small digger operating in Millerton township at the time.

Due to the location of the site activities being a distance from any residential properties, and the blasting control measures in place, mine related noise has not been an issue over the past 12 months. There have been no complaints in relation to noise or blasting

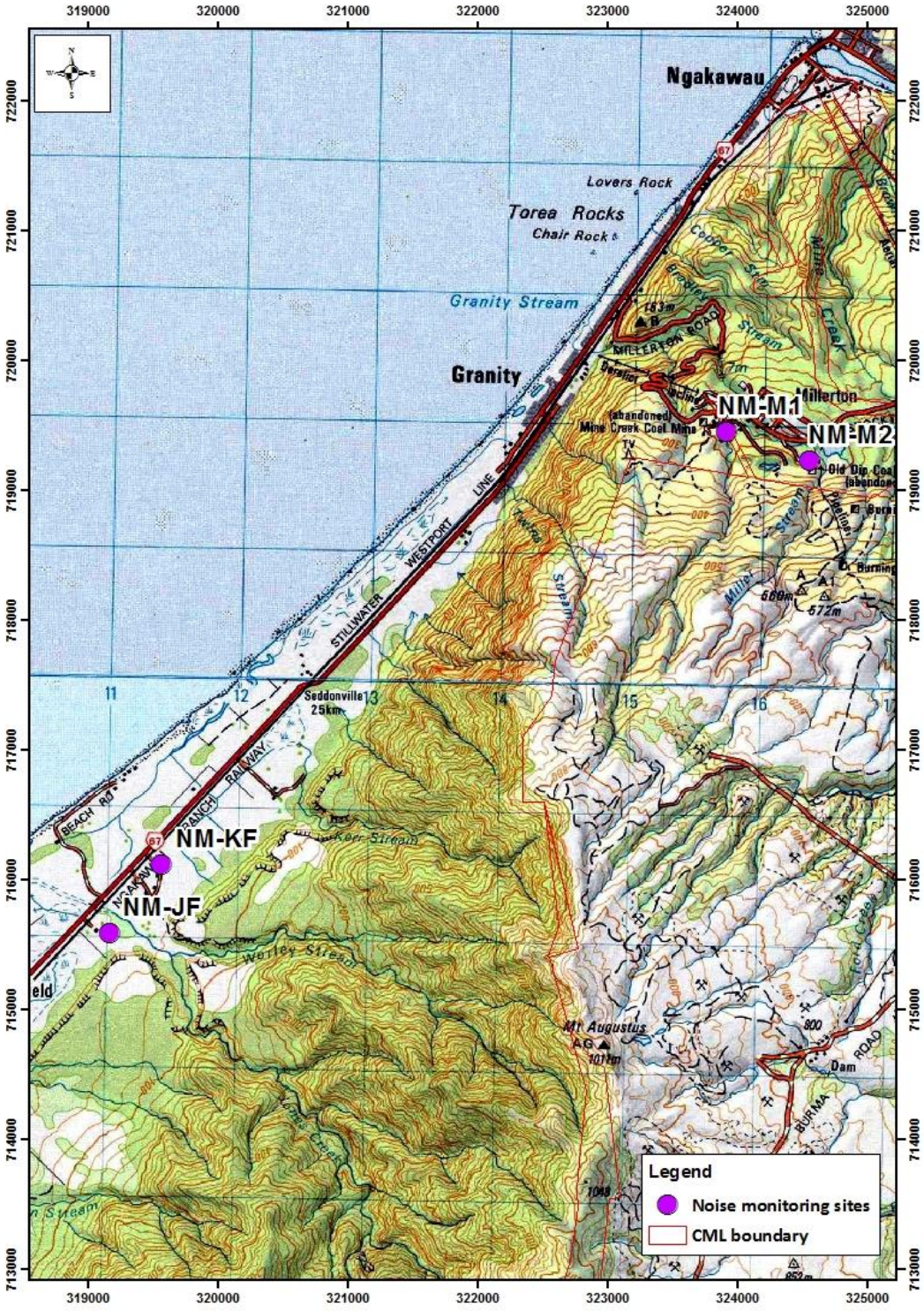


Figure 3.10.1: Noise monitoring locations on the Stockton Plateau and coastal plain.

3.11 Weed monitoring and control

Relevant conditions

A14.4 The Rehabilitation Management Plan shall, as a minimum, address the following:

f. Identification of the key weed and pest species and the management principles adopted in the mine planning stages with respect to weed and pest control, and the risks and contingency measures in relation to weeds and pests including the means by which earthmoving machinery and equipment (including vehicles used in rehabilitation at the mine site) will be cleaned prior to their removal from the Stockton plateau mining areas.

g. The means by which weeds will be controlled and closure targets for weeds met during all stages of mine life, with particular reference to gorse, Juncus squarrosus and other weed species.

Results

Weed control and monitoring has proceeded as per the Weed Management Plan, prepared to address Rehabilitation Management Plan requirements.

The Cypress area is divided into zones according to the risk of weed establishment. This enables coverage of highest risk areas. The weed free zone (WFZ) comprises the Cypress consented footprint and the remainder of Happy Valley that is not within the consented footprint.

Annually (usually in August/September) 50 m spaced apart transect lines are walked throughout the weed free zone (WFZ) (Refer to Figure 3.10.1). **T**he WFZ is systematically covered once per year and weeds are sprayed as encountered. ***'RoundUp Transorb™'*** is used at label rates for all Juncus species. Spray is administered using an adjustable round cone spray tip and 15 litre knapsack sprayers. Red Enviro-Dye is added to the spray mix to prevent double up spraying. Spraying is recorded on a daily spray record that includes map of treated area, chemicals used and volume, weather conditions and general comments.

Key weed risk areas from recent weed reviews and annual tussock monitoring identified that control of exotic rushes and sedges needed to be stepped up in the Cypress tussock storage pads (within the Stockton CML) and undisturbed tussock west of the Cypress mining operation. Annual campaigns to combat weeds in these tussock wetland areas (both natural Tussock and VDT Tussock in storage) have occurred annually since at least FY15. Additional emphasis has been placed on weed control in parts of Happy Valley that have not yet been disturbed but in which various exotic rush and sedge species have been identified. Particular focus has been on weed control adjacent to walking tracks to minimise spread.

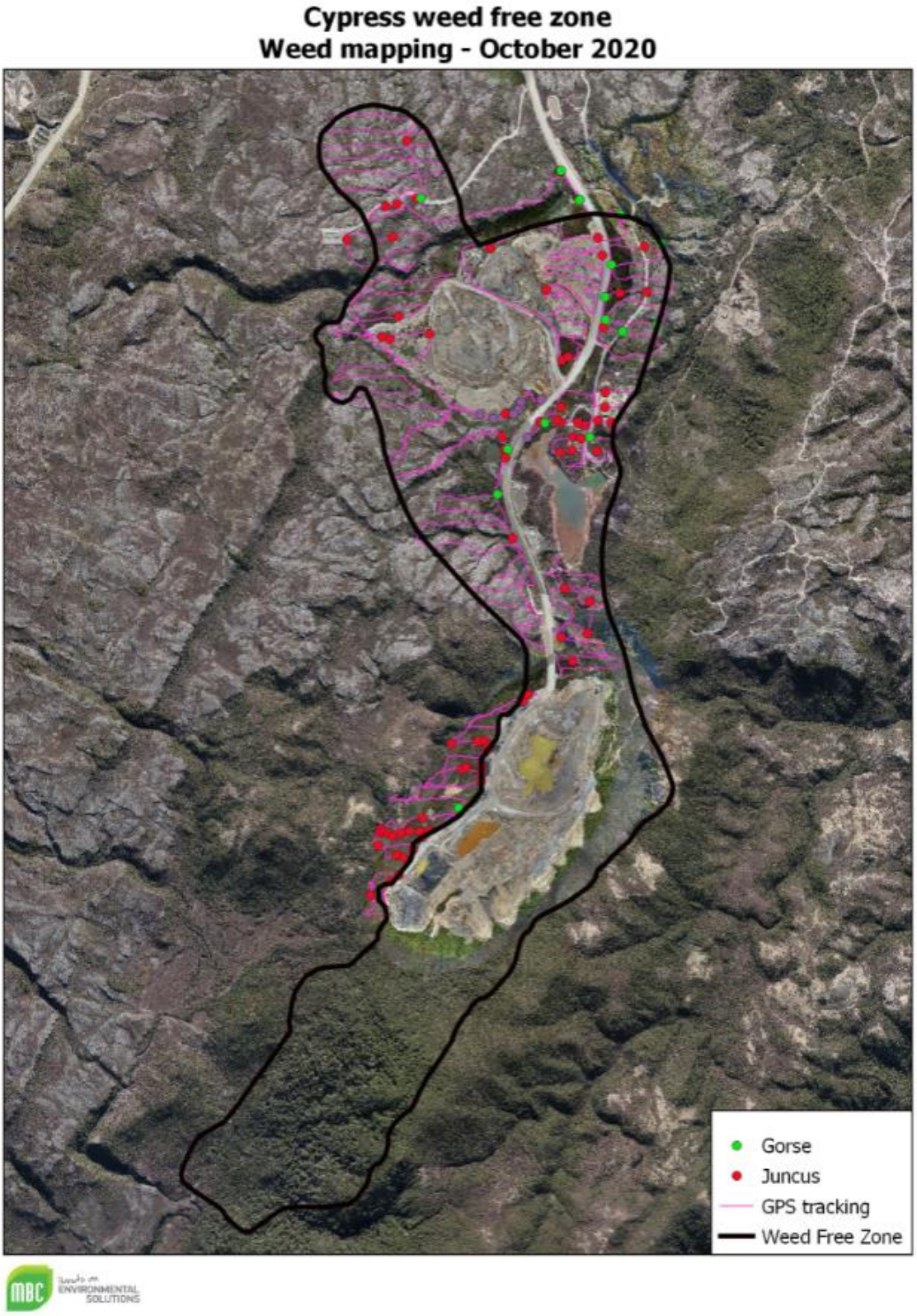


Figure 3.11.1: Weed Map – as at October 2020 (last survey).

Weed control was carried out in the Cypress WFZ and also the Cypress Tussock Storage Areas between June-September 2021 to address weeds encountered during the previous 2020 survey as shown on Figure 3.11.1 above. Due to constraints on contract labour resources, it was decided that effort should be put into weed control rather than weed surveys in FY22 and therefore an updated weed map was not created, however over 820 hours of contract labour

was spent on a concerted campaign to eliminate exotic Juncus species from the WFZ and other Cypress Tussock Storage Areas at McCabe's Tussock Pad.

A Weed survey of the WFZ will be re-instated in FY23 to monitor the effectiveness of the FY22 weed eradication campaign with a focus on Juncus as other weed species in Cypress (e.g. gorse) are scarce.

During the weed survey of the WFZ, the mapping transects are not shared with the staff undertaking control to avoid bias occurring and ensure full searches are undertaken during the field work

3.12 Snail search, collection and relocation activity

Relevant conditions

C36. Prior to undertaking any activities authorised by these consents, the Consent Holder shall undertake a study which has the objective of removing as many *Powelliphanta* as practicable from the proposed mining development area prior to mining and relocating them (having regard to the genetic integrity of the *Powelliphanta* population in the receiving area) into the snail enhancement area, as referred to in condition C39b.

Monitoring carried out under the above conditions is specified in the Powelliphanta Management Plan required by condition C37. It includes search and collection of live snails in advance of stripping operations, and monitoring of long-term monitoring plots at locations within the Upper Waimangaroa valley that are not within the mining footprint.

Results

Following vegetation clearance in Strip 5 there was a lull in development of new mining areas and hence no new snail searches between FY16-FY17. Some stripping of vegetation occurred in 2017-2018 (FY18) to create drill tracks in Strip 6 and develop the Cypress North Push-Back (CNPB). In FY19, vegetation clearance in Cypress focussed on the development of CNPB-Stage 2, and the construction of water management infrastructure including cleanwater diversion drains and relocation of pumps and pipelines. Searches and relocation of *Powelliphanta patrickensis* occurred prior to disturbance in these areas, and a follow-up search of CNBC-Strip 6 was done to cover areas adjacent to cleared drill tracks while it was opportune. Few snails were captured in the 2018-2019 reporting year as development moved into forested areas where capture rates have historically been lower. Development of Cypress in FY20 centred on Cypress Pushback (CNPB) Stage 3 and Strip 6+7 of the box cut (CNBC). Most of the CNBC tussock was taken as VDT and therefore not searched as snails remained in-situ.

FY21 pit development consisted of wildlife searches and subsequent tree felling, soil and vegetation removal as mining moved south into CNPB Stages 4-6. Pushback highwalls in these stages are now largely completed with permanent benches formed on the upper levels. In FY21, Snail capture rates again remained low in the pushback pre-clearance searches, possibly due to unfavourable habitat for snails in this area, but more likely due to predation pressure by forest dwelling predators and difficulty searching these areas. A 1080 poison campaign was conducted by DOC in FY21 to reduce predator numbers following the 2019/2020 beech mast event and subsequent predator increase as a result of this increase in food availability. Post-1080 monitoring indicates a good knock-down on predator numbers which has continued to supress rats and stoats into FY22.

FY22 development was generally focussed on existing disturbed areas in the pushback with coal winning targeting lower areas of the box-cut, however Dec2021 saw another block of forest cut down from CNPB-Stage 7, ready for soil/vegetation stripping and subsequent mining. As of March 2022 this soil and vegetation (slash) in CNPB-Stage 7 was still in situ and is awaiting recovery using mining equipment in FY23.

Cumulative totals have been updated from the 2021 report (Table 3.12.1).

Table 3.12.1: Snail, egg and shell captures 2013-2022.

	2013-2014	2014-2015	2017-2018	2018-2019*	2019-2020	2020-2021	2021-2022	Totals
Area searched	22.89	17.39	9.89	2.49	9.96	3.48	3.34	69.44
Search effort	1469.86	354.2	154.5	73	540	279	31.3	2,622.86
#live snails	858	223	56	8	31	1	0	1,177
# shells*	1012	330	115	110	589	52	7	2,215
#eggs / masses	186	-	-	-	1	-	-	187

Note: this table does not include data from routine surveys of Long-Term Monitoring (LTM) Snail Plots, only pre-clearance searches prior to area disturbance.
*Reporting Year change from year ending 30th June to year ending 31st March.

Figure 3.12.1: Snail search areas completed in the Cypress Pushback CNPB-Stage 7 in FY22.

Searches in the long-term monitoring plots (LTM plots)

Eight long term monitoring plots were set up in 2010, and surveys have been carried out as shown in Table 3.11.2. Results to date were reported in 2016. All plots have now been searched at least three times or more (with the exception of Plot#6). The next round of five-yearly monitoring will take place in 2025-2026 in Plots 3, 4, 5 and 6.

Table 3.12.2: LTM monitoring programme

Plot	1	2	3	4	5	6	7	8
2010-11	Baseline	baseline	baseline	baseline				
2011-12	Survey 2	Survey2	Survey 2	Survey2				
2012-13							baseline	baseline
2013-14			Survey 3	Survey3	baseline			
2014-15	Survey 3	Survey3			Survey 2	baseline	Survey 2	Survey2
2019-20			Survey4	Survey4	Survey 3	Survey 3		
2020-21	Survey 4	Survey4					Survey 3	Survey 3
2025-26			Survey5	Survey5	Survey4	Survey4		
2026-27	Survey 5	Survey 5					Survey 4	Survey 4

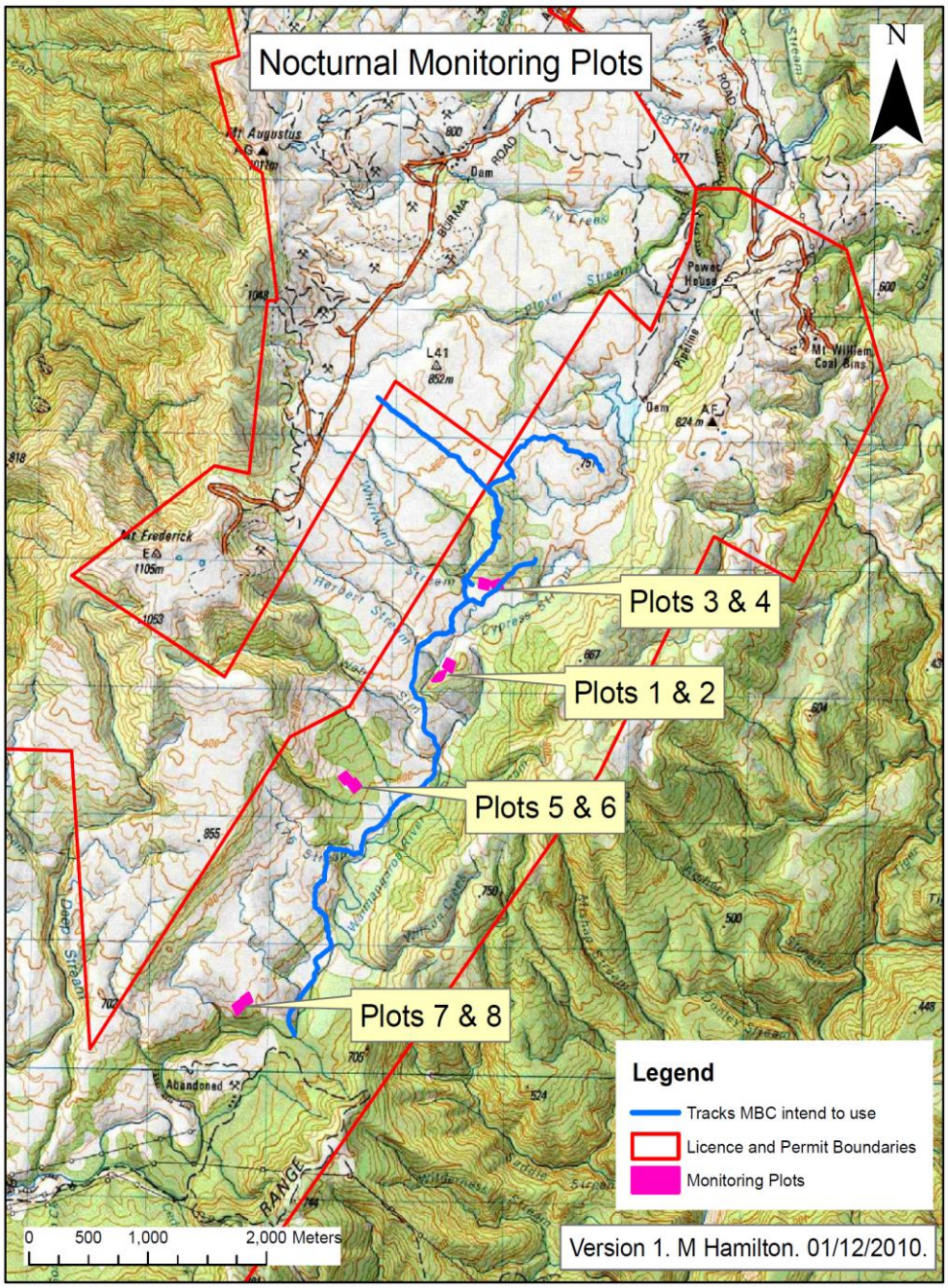


Figure 3.12.2: *Powelliphanta patrickensis* long-term monitoring plot locations.

Cause of death at release sites Whirlwind A and B

Table 3.11.3 shows the cause of death for the shells that have been found in a search of the release sites (Whirlwind A and B) in FY19. This was only a search for snail shells to determine predation rates in the release sites. Only three tagged snails were found to be predated, the rest of the predated snails (untagged) were likely from the background population in the area. Results showed that Weka are the main predator of snails in the release sites (obvious by leaf litter / bush floor disturbance and damage to snail shells). Weka were the main predator on snails in FY21 as in previous years.

Table 3.12.3: Cypress – Whirlwind Rise Release – Shell Survey

WWA – release of tagged snails from Strip 6, Strip 7 and Pushback
WWB – Control plot

Shell number	Easting	Northing	Tag	Shell Diameter	Cause of death
WWA					
WWA_SH01_140818	1507332	5382328	No	35.15	Weka
WWA_SH02_140818	1507327	5382327	No	27.31	Weka
WWA_SH03_140818	1507324	5382333	E505/506	38.53	Weka
WWA_SH04_140818	1507329	5382331	No	35.39	Weka
WWA_SH05_140818	1507322	5382332	No	34.8	Weka
WWA_SH06_140818	1507322	5382335	No	35.94	Weka
WWA_SH07_140818	1507321	5382333	No	34	Weka
WWA_SH08_140818	1507317	5382336	No	33.2	Weka
WWA_SH09_140818	1507311	5382342	No	38.5	Weka
WWA_SH10_140818	1507323	5382338	No	43.9	Weka
WWA_SH11_140818	1507329	5382344	No	32.7	Natural
WWA_SH12_140818	1507323	5382343	No	32	Squashed
WWA_SH13_140818	1507311	5382346	No	35.6	Natural
WWA_SH14_140818	1507310	5382349	No	34.4	Weka
WWA_SH15_140818	1507312	5382351	E459/460	37.14	Weka
WWA_SH16_140818	1507320	5382350	No	39	Squashed
WWA_SH17_140818	1507318	5382351	E261/262	40.61	Weka
WWA_SH18_140818	1507322	5382346	No	38.85	Natural
WWA_SH19_140818	1507323	5382353	No	37.8	Weka
WWA_SH20_140818	1507334	5382352	No	31.5	Unknown
WWB					
WWB_SH01_140818	1507293	5382413	N/A	31.3	Weka
WWB_SH02_140818	1507298	5382424	N/A	36	Weka

Translocation trial

In June 2017 a new translocation trial was commenced. The trial replaces the translocation originally intended for the long-term monitoring (LTM) plots to investigate the effect of translocation on both the translocated snails and the original population (as reported in the FY16 Cypress Environmental Monitoring Report).

Two 30 m x 30 m plots were marked out in June 2017 and the existing population was estimated based on surveys of two 10 m x 10 m plots directly adjacent to each of the 30 x 30 m plots. Three live snails were found in each of the 10 x 10 m plots, equivalent to 300 snails per ha.

Calculations of the number of snails expected to be found in the 30 x 30 m plots were made based on the numbers found in the most similar of the 70 m x 70 m LTM plots (Plots 3 and 4 on the southern edge of Whirlwind Rise shown in Table 13.11.3 - from McKenzie's 2013).

Table 3.12.4: LTM plot 3 and 4 snail captured and abundance estimates

LTM plot	Survey year	Dates	# nights	#snails captured	Model average abundance estimates	Correction factor (column 6/5)
3	0	24.4.10-18.5.10	4	78	313 (85)	4.0
	1	6.12.10-8.2.11	6	86	269 (36)	3.1
	2	28.11.13-25.3.14	7	143	298 (45	2.2
4	0	26.4.10-19.5.10	4	93	431 (117)	4.6
	1	13.12.10-19.1.11	4	111	492 (76)	4.4
	2	29.1.13-19.3.14	5	218	521(99)	2.4

A correction factor of 3 was selected, giving a density of approximately 900 snails /ha. Thus an estimated 81 snails are present in each 30 x 30 m plot.
The natural snail population is highest in tussock-shrub land on the margins of Happy Valley. Snail numbers from previous collection areas in those margins in 2014-15 ranged from 181/ha to 452/ha). In FY18, Strip 6 and Strip 7 of Cypress Pit were searched which include approximately 1.39 ha of good snail habitat along the forest margin. Sufficient snails were found to increase the population in the translocation plot by 69% (i.e., by the addition of 56 snails to one of the two translocation trial plots). This was a slight change from the original trial design of two 40m x40m plots requiring 72 additional snails to be translocated to the non-control plot. The reason for this was snail numbers found were low, and it was deemed to be a better outcome to reduce the plot size rather than translocate snails from areas outside the mining footprint, solely for the benefit of a trial.

The translocated snails have been tagged and the plots were intended to be surveyed in Summer 2019/2020 however COVID-19 lockdown restrictions meant only 1 night of search effort was able to be completed before Stockton was shutdown to all non-essential personnel. A minimum of 5 nights nocturnal searching is planned in each plot during a summer campaign, in order to gather statistically meaningful data. A successful search campaign was conducted in the two Whirlwind Translocation Trail plots (A & B) in summer FY21, approximately 24 months since the translocation trial plots received the target number of translocated snails for the trial to be scientifically valid.

Snail Densities were low in both plots with considerable variation in numbers found between search nights. The last search of the season occurred in mid-May 2021 and although conditions met temperature and moisture criteria for searching, only 2 snails were found in both Whirlwind plots compared with 12 snails in the McCabe's Tussock Pad. It is thought that cold, frosty temperatures the week prior may have sent most of the snails into dormancy. Consultation will be carried out between Bathurst and Department of Conservation as to whether further counts will be done, based on FY21 results and snail recapture success. The next summer campaign is scheduled for 2025-2026 as indicated in Table 3.12.2.

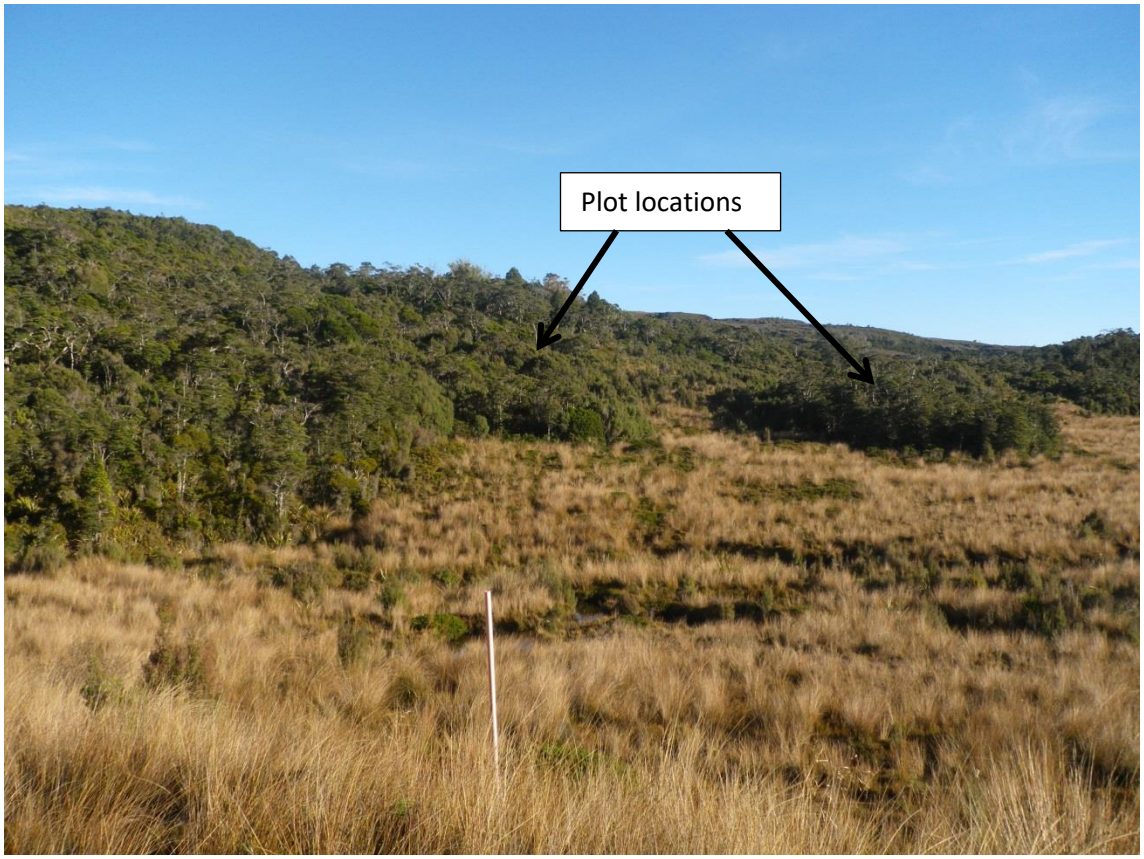


Figure 3.12.3: Translocation trial area showing approximate plot locations.

3.13 Great spotted kiwi monitoring

Relevant conditions

C32. The Consent Holder shall undertake a programme of great spotted kiwi management which shall have two objectives:

a. To minimise the effects from mining activities on great spotted kiwi living within or immediately alongside Cypress Mine; and

b. To enhance the survival rates of great spotted kiwi within the treatment area shown on **Attachment 3 Second Revision**, dated 8/07/2014, while mining operations are in progress (subject to the one year delay allowed by Condition 39(a)), and for a period of 20 years, plus the extended period referred to in Condition C39(a), following cessation of coal extraction from the site.

C33. A Kiwi Management Plan shall be prepared in consultation with the Department of Conservation and Te Runanga o Ngati Waewae, which sets out the practices and procedures to be adopted to ensure compliance with the conditions of this consent.

C34. The plan shall, as a minimum, address the following:

a. The options for the management of kiwi present within the mine site, including but not limited to: (i) the monitoring/tracking of kiwi within the site and surrounds (ii) management of birds within the vicinity of the site should the decision be taken to leave them there (iii) the capture and/or removal of those birds within the proposed mine area and surrounds should the decision be made to remove them from the site; and (iv) the management and destination of captured birds should the decision be made to remove the birds from the site and surrounds

b. The mechanism for determining which of the options addressed under a. above is expected to hold the best outcome for kiwi.

c. Kiwi habitat enhancement measures to be carried out within the pit during rehabilitation (for example, construction measures to integrate the highwall benches with adjacent forest).

d. Contingencies to review the size of the predator control area or implement protective rearing in the event that management targets are not achieved.

e. The monitoring that will be undertaken to assess progress towards the objectives of the management plan.

Results

Monitoring has been carried out as described by the Kiwi Management Plan prepared under the above conditions. Following a review of onsite kiwi monitoring (as reported in the 2015 Environmental Monitoring Report) and consultation with DOC, there have been some revisions to the Kiwi Management Plan which was most recently updated and submitted to DOC in July 2018. Further correspondence was received from DOC in January 2019 seeking a summary of changes to the 2018 Kiwi Management Plan when compared with the previously approved 2014 plan. Bathurst received final signoff from DOC on this plan in FY20.

Currently the mining activities at Cypress are in Happy Valley and the Cypress North Pushback (CNPB) on the slopes of the Mt William Range. Vegetation removal 'stripping' was completed as far south as Strip 7 of the box-cut (CNBC) in FY21, and development of the pushback (CNPB) extended to Stage 7 which included felling trees in FY22 however remaining soil/vegetation was left in-situ for recovery in FY23 (see Figure 3.13.1 below).

Cleanwater diversion drains were extended south, along the eastern side of the Pushback highwalls (Western flanks of Mt William Range), while existing cleanwater diversion drains taking water north became ineffective due to geotechnical instability of the highwall causing slumping of these drains. The aforementioned FY21 development remained in the range of kiwis Bravo and Philippa. Bravo was carrying a transmitter in FY21 which aided in pinpointing his whereabouts, however a sad development was that Bravo's partner Phillipa was found dead in July 2020 and appeared to have been predated. A new female kiwi (Isla) has since moved into this territory and may have partnered-up with Bravo.

In summer 2022, BT Mining managed to recapture and fix transmitters to the following kiwi:

- Willy and his partner Jo
- Bravo and his new partner Isla
- Di and Tane who are a known pair in Cypress South, and a chick "Rimu" suspected to be theirs was also located and had a transmittter affixed however it appears this chick was subsequently predated in April 2022

With three pairs of kiwi now electronically monitored by BT mining in Cypress Mining Area, we are in a good position to tack their whereabouts over the coming year.

During vegetation stripping transmitter checks were carried out daily to confirm if kiwi were present near the mining area.

Stripping southern areas of the Cypress North Push Back (CNPB) throughout 2018-2021 has encroached on the territory of Jo and Willy, Bravo and Isla. These birds were captured in 2022 and had transmitters changed and are due for recapture in FY23. Daily transmitter checks have been occurring while CNPB stripping occurs in the breeding season (June-December) and no birds have needed to be shepherded out of the area. It is unknown if any of these birds other than Di and Tane had breeding success in FY22.

Coal winning in FY23 will continue in Strip 7 of the CNBC, at the southern end of the current box cut. Mining is also progressing into the Pushback Stage 7 (CNPB-S7) and may include some preliminary tree felling and soil removal to establish access to Cypress South Pit. Geotechnical instability remains a challenge in the highwall areas however now that highwall benches and batters are largely completed to their final design, minimal new disturbance will be occurring west of the pit. Any new stripping in Cypress South will trigger listening surveys for great spotted kiwi whose territory are affected. New stripping is projected to occur on the access road to the consented Cypress South Pit and also for Pushback Stage 8 and may both areas will have water controls established as part of this initial clearance work.

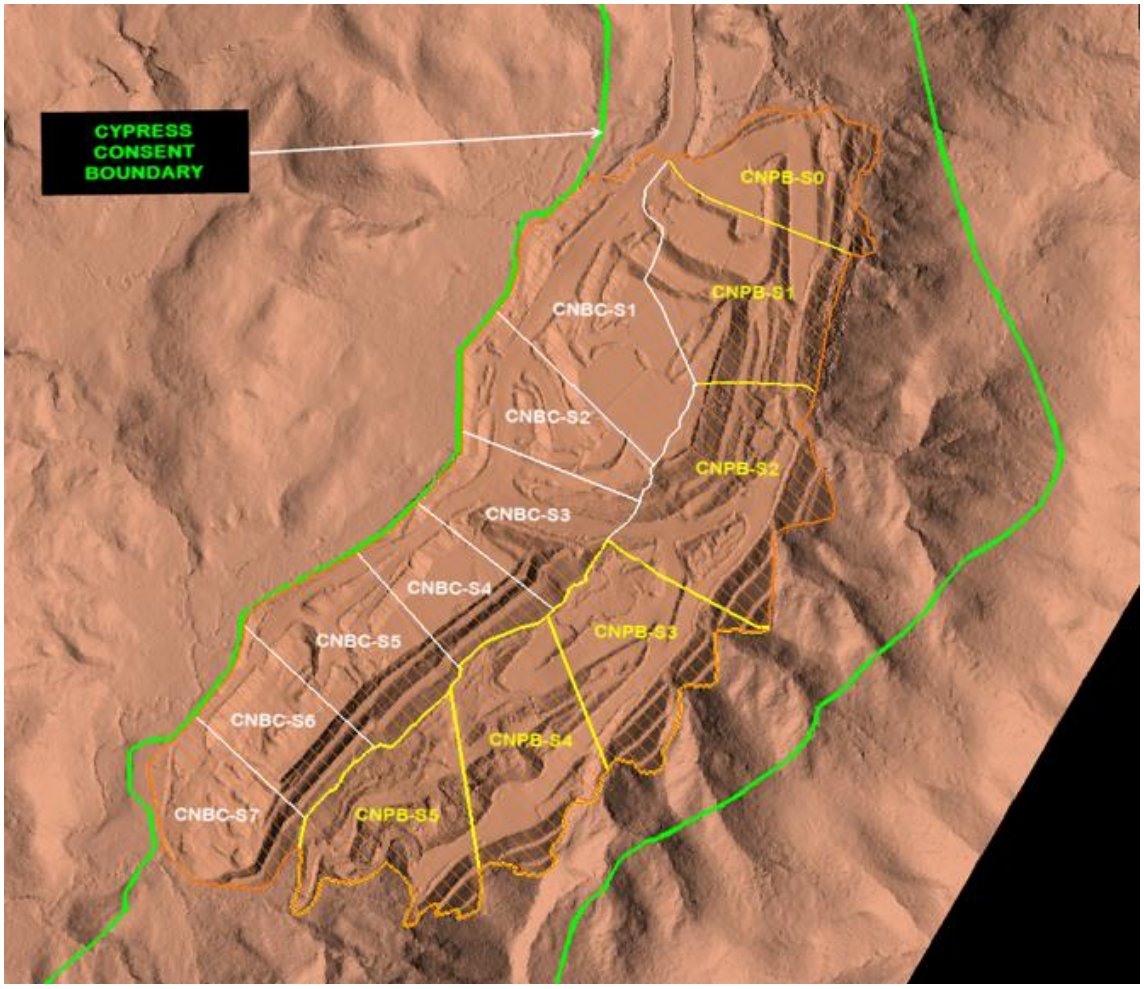


Figure 3.13.1: Stage / strip plan of CNBC. Vegetation removal extended to CNBC-Strip 7 and CNPB -Strip 6 in FY21. Tree felling was completed in Pushback Strip 7 in FY22 however as of 31st March (end of reporting year) this soil and vegetation in CNPB-Strip 7 was still in-situ and was scheduled for recovery in FY23.

Where transmitter checks identify immediate danger to any bird from the mining operations, attempts will be made to shepherd the bird(s) to a safe area.

Transmitter codes suggested that there may have been a nesting attempt by Willy and Jo, north-west of the mining footprint on Mt William Range once gain and Bravo and Isla also had some transmitter codes indicating a nesting attempt, however both pairs seemed to abandon their nests during the breeding season and it is suspected that a predator (i.e. stoat) has predated the egg or chick and the parents have fled.

Eggs will be uplifted from nests that are directly threatened with mining in the coming year however breeding pairs are likely to nest away from mining disturbance so an uplift is unlikely.

Kiwi night listening

A Kiwi night listening survey was carried out in January 2022 in the Cypress Pit to determine the proximity of kiwi to future mining areas. The recently updated Kiwi Practitioner Manual (2017) identifies Nov – Mar as the time of year Great Spotted Kiwi are most likely to call however numerous calls are often heard outside of these months by mining personnel in the

Cypress area at night. Juveniles can be expected to move through the ranges of the other birds. The birds to the south will continue to be monitored as mining moves to the south in later years. It is encouraging to note that multiple kiwi are still present and that several unknown birds were identified in FY22. The maps below show the territory mapping results (John McLennan's work) (Figure 3.12.2) and the results of the listening survey carried out in January 2022 (Figure 3.12.3) The dotted lines on the first map mark the location of the second map.

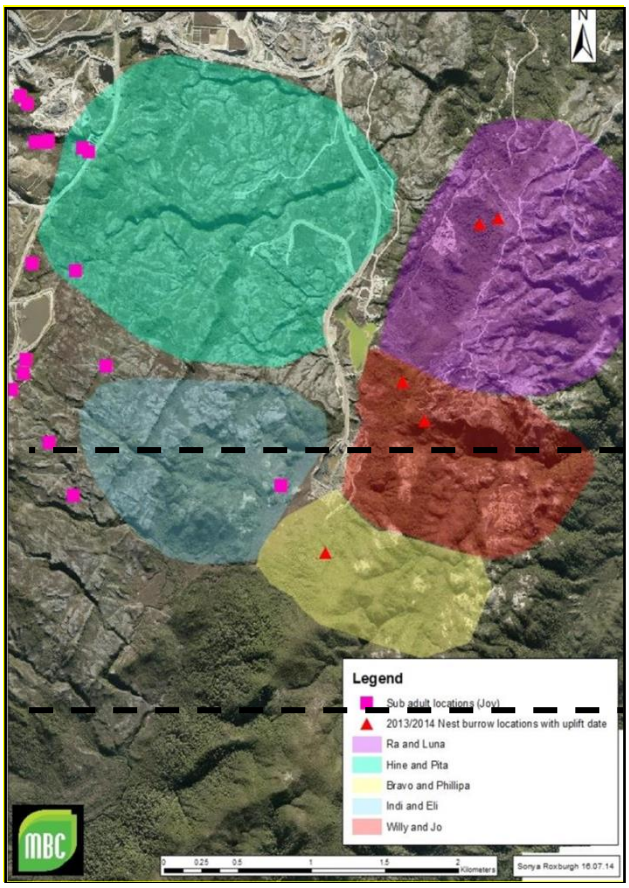


Figure 3.13.2: Great spotted kiwi territories in the Cypress area 2015 (J McLennan).

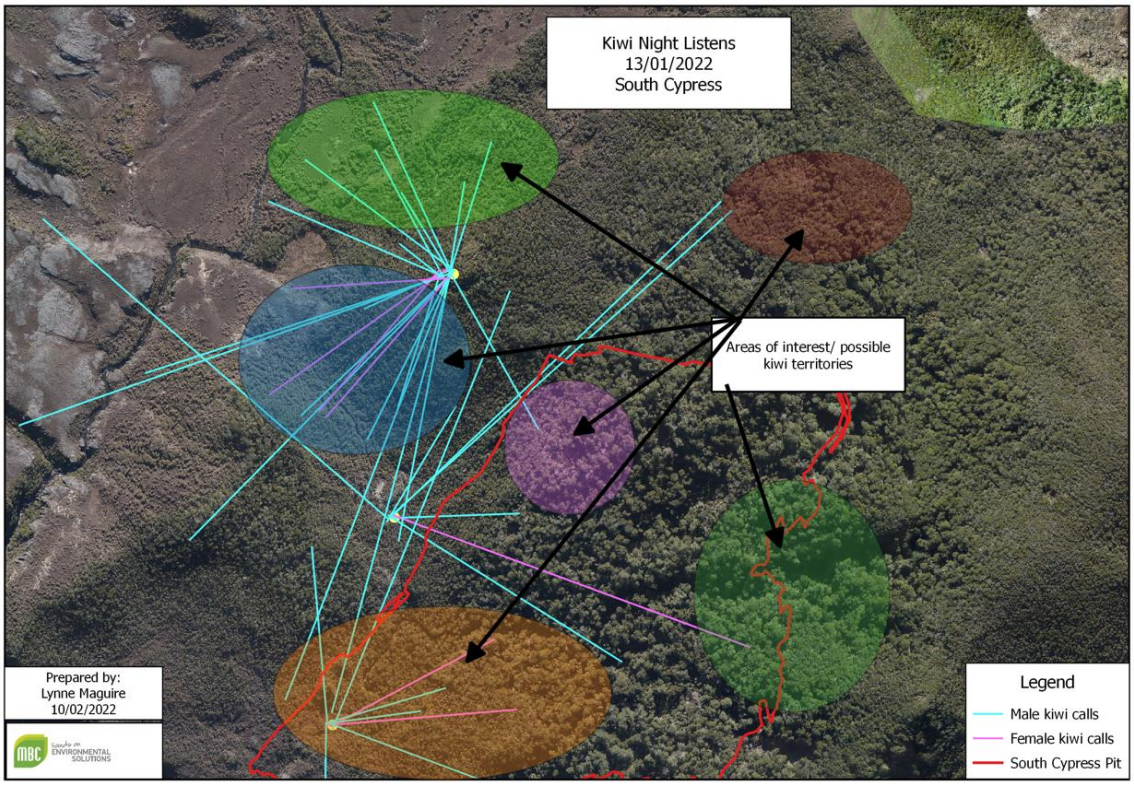


Figure 3.13.3: Kiwi Territories Mapped in January 2021.

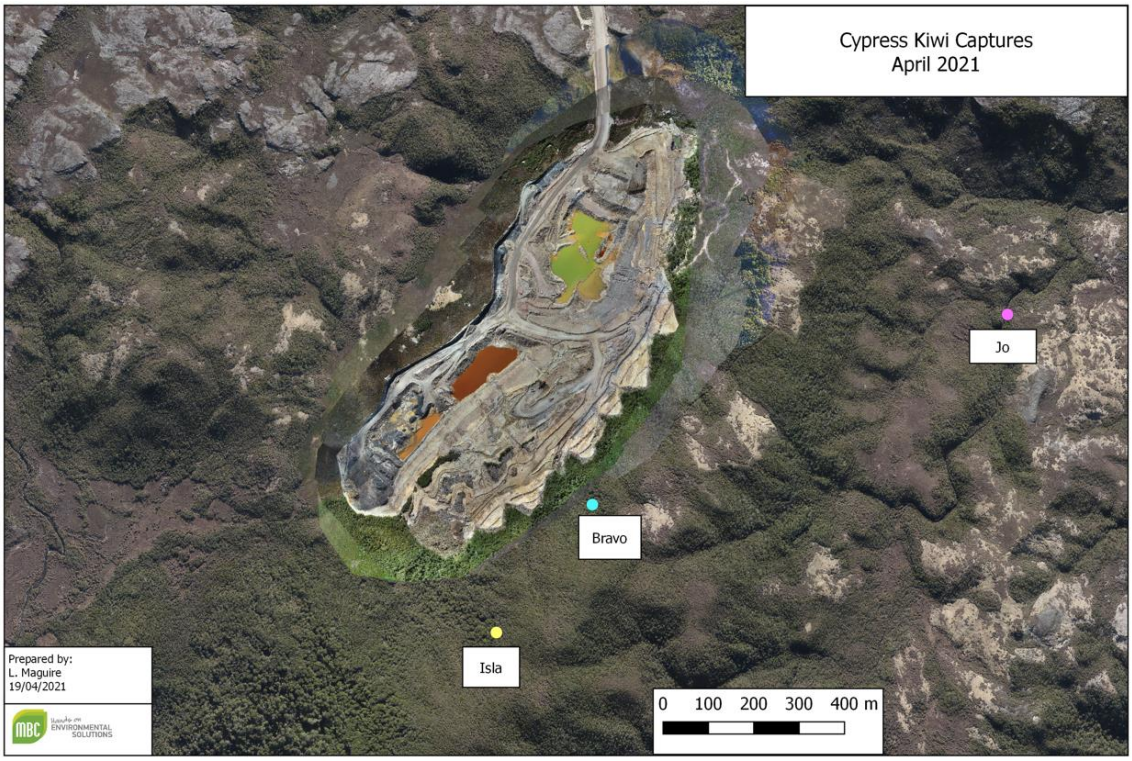


Figure 3.13.4: Kiwi Captures to facilitate transmitter changes April 2021.

Oparara Kiwi Treatment Area (the Cypress offset)

As well as the requirements of the Wildlife Act permits and the Cypress resource consent conditions, the Oparara KTA is controlled by an Agreement between DOC and Bathurst and a Management Agreement between the two parties.

- Baseline monitoring of kiwi and small forest birds was carried out in 2015.
- A full system and traps over a network of tracks that runs for 75 km within the KTA has been set up.
- 1080 was dropped over the area in September 2016 as part of DOC's Battle for the Birds campaign.
- A tracking tunnel survey was carried out in November 2016.
- Trapping and poisoning re-commenced in April 2017 after the 6 month stand down period following the 1080 drop. All traps and bait stations were inspected and cleared of dead animals a month before the regular monthly rounds began.
- Trapping continued throughout FY19. As of February 2019, there are 1215 traps and 1788 bait stations in the Oparara Kiwi Treatment Area, checked monthly.

- 1080 campaign conducted by DOC in response to beech mast event Autumn 2019. Prefeed was 2-4 Nov 2019, Toxic baits dropped 21-22 Nov 2019 (but Oparara portion of the block sown on the 21st).
- 1080 concentration 0.15% - 6 gm baits (toxic and prefeed).
- Sowing rate toxic and prefeed 2kg/ha (sown at 1kg/ha overlapped 50%)
- Large reduction in rats in 2020 compared with 2019 Beech mast year
- Increase in Mustelids (Stoats and Weasels) in 2020, likely to be feeding on rats
- Indications are in 2021 that rat and stoat numbers remain low following 2019 1080 poison campaign
- 2022 annual summary of predator numbers indicated a slight increase in rats & stoats leading into winter however these numbers are expected to drop over the colder months when food is scarce.

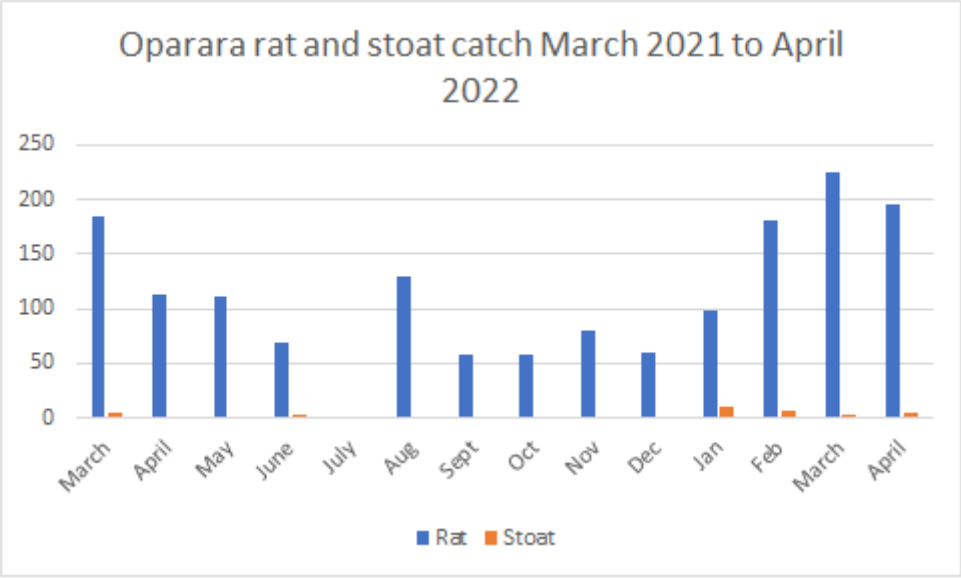


Figure 3.13.5: LTM plot 3 and 4 snail captured and abundance estimates

3.14 Predator Control

Relevant conditions

C40. A Predator Control Plan shall be prepared in consultation with the Department of Conservation which sets out the practices and procedures to be adopted to ensure compliance with the conditions of this consent and to ensure that all aspects of great spotted kiwi and *Powelliphanta* "patrickensis" management and habitat enhancement are carried out in and integrated manner and at the necessary stage of mining to maximise the benefits of the programme for both species. The plan shall ensure that flexibility is retained in relation to the use of predator control methods such as poisons and other enhancements components to ensure the best practice methods are adopted to achieve the required outcomes.

C41. The plan shall, as a minimum, provide for the following:

a. The control of predators on kiwi, principally stoat and possum, within the great spotted kiwi predator control area shown on ~~revised~~ **Attachment 3** **Second Revision**, dated 8/07/2014**,** ~~dated 6 April 2011~~. Flexibility shall be retained in relation to the methods adopted to achieve the required outcome, such as but not limited to, the final location and boundaries of the great spotted kiwi predator control area.

b. The control of predators within the mine site, including the rehabilitated areas and the 400 metre buffer surrounding the mine site.

c. The means by which the Consent Holder shall control rats (and, if necessary, thrush), and shall endeavour to reduce possums in the expanded snail enhancement area shown on revised **Attachment 4** dated 6 April 2011 to barely detectable levels.

d. A 1080 intervention response (or other control agent determined in consultation with the Department of Conservation) to be undertaken by the Consent Holder in years with a predicted highly increased rat abundance, as indicated by Department of Conservation standard tracking tunnel indices and current best practice for rat control.

e. An intervention density of greater than or equal to 3% mean Residual Trap Catch index for possums with not more than any two lines being greater than 10% RTC before aerial 1080 application (or other control agent determined in consultation with the Department of Conservation) shall occur across the expanded snail enhancement area shown on Revised **Attachment 4**, dated 6 April 2011. The RTC method is that set out in Possum Population Monitoring using the Trap-Catch Method National Control Agencies April 2004, or any subsequent updated version of this document.

f. Specifications for monitoring to ensure the Consent Holder is able to demonstrate compliance with the requirements of conditions of C39-41 and the Predator Management Plan.

Results

Northern snail release area

Due to reporting dates for the AEMR no longer aligning with the annual trapping campaign, predator control results for FY22 were not available for this report. Trapping results for FY22 will be available in June 2022 and will be available on request or reported in the next AEMR. A summary of the previous FY21 trapping results is given below for the period April 2020-March 2021:

Seven monthly trap services of rodent and possum traps around the northern snail release area (little Whirlwind Rise) are carried out annually (no monitoring in December or January over the Christmas period).

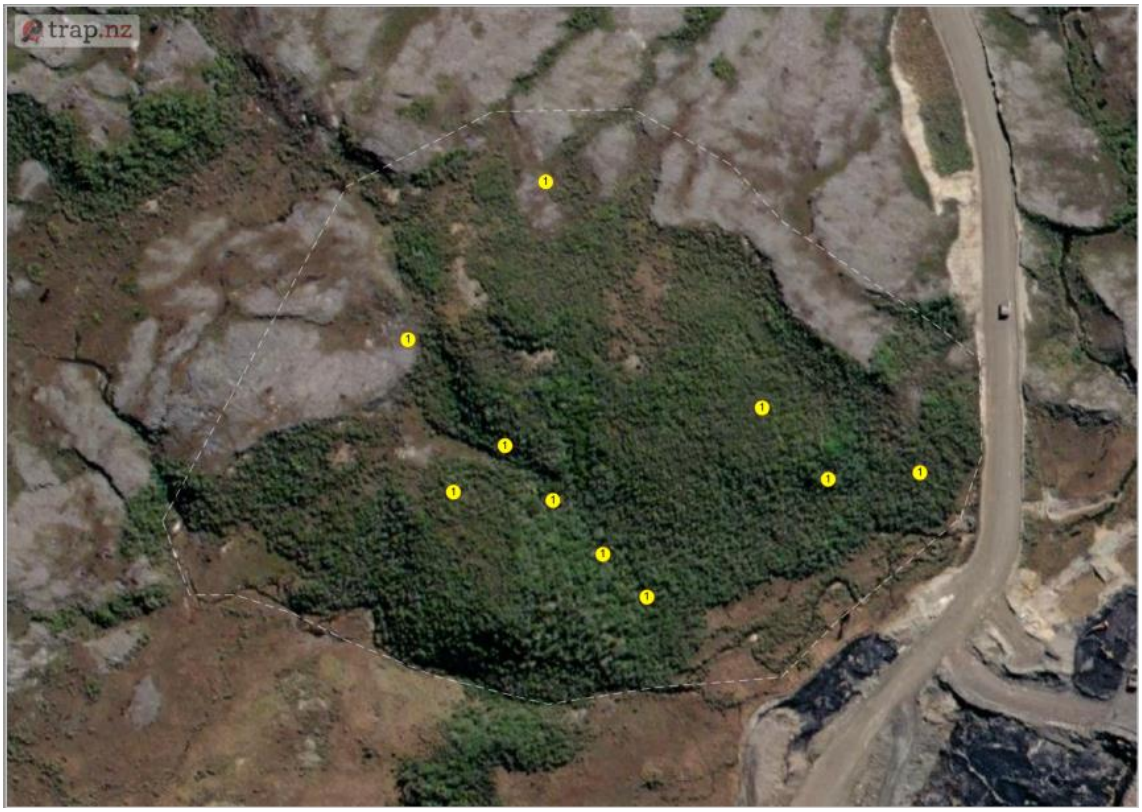


Figure 3.14.1: Predator control capture locations in Cypress north snail release area.

Rodent monitoring

Two monitoring rounds were carried out in the snail enhancement area (SEA) in FY22 to meet the predator monitoring obligations for a non-seed masting year, with tracking tunnel results shown on Figures 3.14.4 - 3.14.5 below.

Feedback from DOC Kawatiri (Buller) Office has been that regional rodent numbers are still supressed following the large-scale 1080 control operation in October 2020, although predator

numbers will be monitored closely to understand if trigger points are being reached to engage in more predator control. The August/Feb rodent monitoring cycle in non-seed mast years will continue I the interim.

Rat numbers were again low in September 2021 and March 2022, and are thought to be remaining supressed from the 1080 control programme in 2020 and a subsequent elevation in stoat numbers which now seems to have dissipated.

Unusually, rodent numbers have dropped significantly from Summer 2020/2021, although there has been a small increase in rodent numbers since September 2021 monitoring, with rat tracking sitting at 4%. Mice, although not shown on this report are more present than usual in the S.E.A (currently 5% tracking). Recent monitoring at Denniston had rat at 3% and mice at 14% tracking. There's no requirement in the Cypress Predator Management Plan to control mice - but they will be having an impact on small inverts and lizards which may impact output monitoring of those species (if that occurs). Stoats were also detected on 3 lines which we would consider a low presence based on past monitoring results.

The number of nights the tracking cards were left out was increased from 1 night to 21 nights because rodent numbers are so low in these environments that we were often getting zero tracking rates on the 1-night method. Increasing the sampling nights to 21 at least gives presence/absence data, and Bathurst can then look at output monitoring (shell predation assessments) to decide if localized rodent control could be useful.

Advice from the MBC Pest Control Specialists is that any tracking under 50% using the 21-day method is considered very low density. Based on FY21 data - localized rodent control work is likely to still be needed but this will be confirmed by August monitoring results.

Possum monitoring

Possum monitoring was carried out in the SEA (Snail Enhancement Area) and WHEA (Wider Habitat Enhancement Area) in FY21, following the 1080 campaign in early October 2020. This monitoring is on a 2-year schedule outside of beech ‘masting’ years. Possum monitoring will cease for a year in FY22, although some localised trapping may occur to keep numbers down. The Wildlife Act permit specifies that controls must be carried out if a line exceeds 10% RTCI. Only two lines in the Cypress WHEA indicated possum RTCI above 10% and it would be prudent to undertake localized ground-based control around these known possum hot spots. BT Mining will initiate this trapping when resources are available in early FY23.

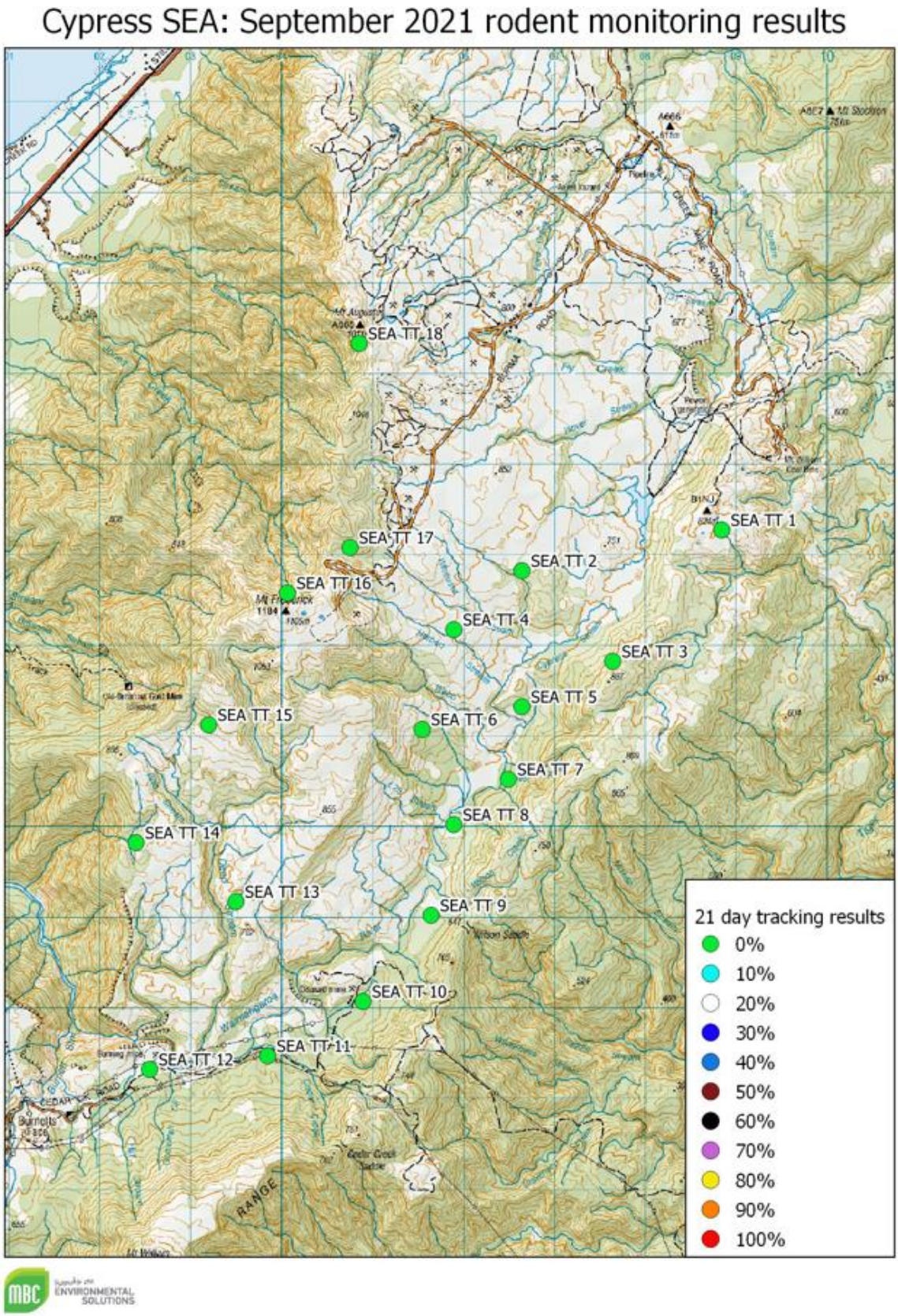


Figure 3.14.2: Rodent monitoring results from Cypress SEA – September 2021.

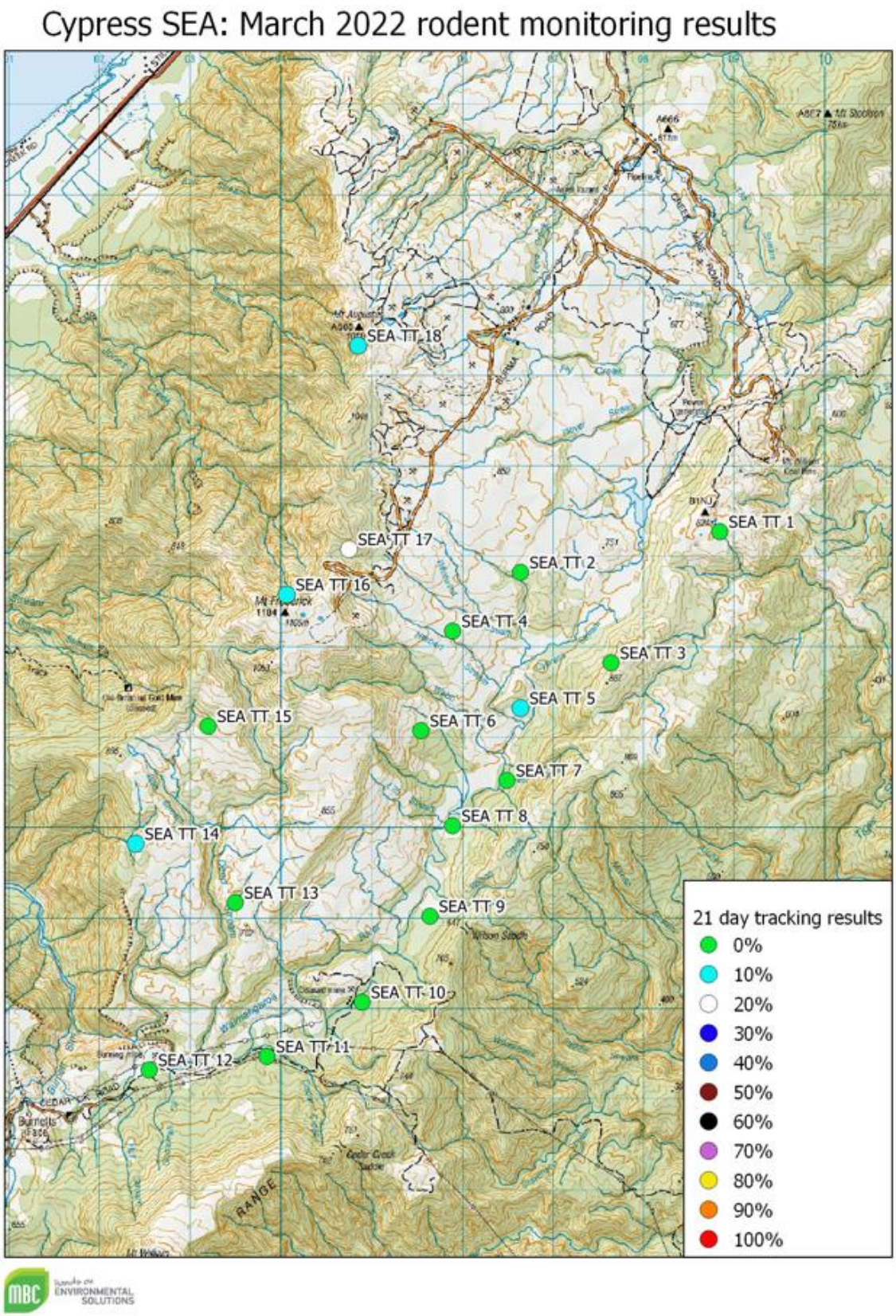


Figure 3.14.3: Rodent monitoring results from Cypress SEA – March 2022.

4. Highlight and discuss any important environmental trends

Environmental trends have been discussed throughout this report.

It is noteworthy here to highlight that Stockton Mine received 7677 mm rainfall for the 2022 reporting year – which is 2100 mm more than the average annual rainfall of 5549 mm (21 year average). 1434mm fell in the first 2 weeks of February which far surpassed any fortnightly rainfall up until this time. (The next largest recorded fortnightly rainfall (from records beginning 2008) was for the 14 days starting 27th November 2021 (821mm)).

In amongst this Stockton Mine also saw the driest January on record in January 2022 (113mm).

5. Compare results obtained over the reporting period with results that were predicted, during the pre-mining investigations, to occur and the results obtained from previous reporting periods.

Water monitoring results across the entire reporting period were within consented limits

In July 2020 LDP2 was commissioned and CaO dosing directly to St Pats Dam commenced; treating the Cypress pit and NELF runoff water. Once McCabes lower sump is completed, Cypress and NELF water will be pumped there, and LDP2 dosing will continue in McCabes.

The ongoing optimisation of CaO dosing direct to St Pats Dam has improved the spill water quality, and this is reflected in a reduction of periods at site 8W when pH<4. There has been no metals testing triggered due to spilling events at 8W since dosing to St Pats Dam started. The improvement in water quality has been reflected in the macroinvertebrate results of 2 surveys at site 8W during the reporting period, having good aquatic ecology quality MCI scores.

Other sites, not subject to consent conditions, adjacent to the Cypress Mine (in Cypress Stream and the Waimangaroa River) have showed no decline in water quality as a result of Cypress Mining activity.

Pre-clearance wildlife searches continued ahead of mine development in the 2021-2022 reporting year, however due to pit development largely moving into forested areas and unfavourable snail habitat, encounters with live snails during diurnal searches have largely ceased. Survey of dead snails (shells only) in this period again showed weka to be the main predator of snails in the release sites.

Nocturnal Long-term monitoring (LTM) surveys of the Cypress snail plots were not due to be performed in FY22 and there is now a hiatus in LTM Plot monitoring until the next scheduled summer searches in 2025-2026. Mixed results have been recorded to-date due to low densities of snails in these plots reducing snail recapture rates and subsequently reducing data confidence. A data review is underway of LTM Plot data to establish if search frequency and

mark-recapture rates are sufficient to draw meaningful conclusions on the P.patrickensis snail populations.

Kiwi continue to be monitored to meet the objectives of the Kiwi Management Plan. Current stripping is in the territories of known kiwis Bravo and Philippa, and pushing south into territory held by another pair -Di and Tane. A new female 'Isla' appears to have moved into the territory previously held by Phillipa (deceased) and Isla has been caught and fitted with a transmitter to monitor her whereabouts along with three other resident Kiwi -Bravo, Willy and Jo. Mining in the Cypress North Push Back (CNPB) throughout 2021-2022 has also encroached on the territory of Jo and Willy although their transmitter data shows they remain unfazed by mining and are often detected close to the pit edge, or further east of the Mt William Range. Daily transmitter checks have been occurring if CNPB vegetation stripping occurs during the breeding season, and no birds have needed to be shepherded out of the area. There was limited new stripping undertaken in the Cypress Pushback (CNPB) during kiwi breeding season over FY22, and nesting attempts were possible base on transmitter codes, however breeding pairs have generally fled their nest mid-way through the season, most likely as the result of an interaction with a predator. FY22 kiwi captures were also performed South of the current operational Cypress Pit in readiness for further development in Cypress South in FY23. Transmitters were fixed to a known pair (Di and Tane) and also their chick (Rimu), however unfortunately their chick was found predated in April 2022.

6. Report and discuss any operational difficulties, changes or improvements which would result in a notable variation of water quality or volume discharged

Weather events have been a significant challenge to mining Cypress in the reporting period. Three significant flood events, record February rainfall, record annual rainfall and record rain intensities have all featured. Considerable volumes of pumped water have been required to maintain operational targets. January 2022 was the driest January on record.

The Cypress North Push Back Clean Water Highwall Drain (CNPB CWHD) was reinstated in RY22. During construction, water was directed into the pit until it was complete, at which point testing was undertaken to ensure water quality was to an acceptable standard, and it was then directed in St Patrick's Stream. This work has significantly improved management of water within the Cypress pits.

In June 2020 it was identified that spillover water from St Pat's Stream was flowing over the Western Highwall of Cypress Pit during high flows, effectively sending clean water into the pit. This was due to water from St Pat's Stream backing up during flood events. The solution to this was to engage MBC contractors to build a temporary barrier to peak flows in St Pat's stream, confining it to the main channel flowing north, and preventing water from backing up the east flowing tributary and spilling over the highwall. This flood barrier has seen additional pressure with repeated high flows and was periodically breached in FY22 causing scouring of the western highwall, drainage of the adjacent wetland and operational problems by causing flooding in the pit. A solution using a larger earthen bund along the western edge of Cypress North Pit was designed and implemented in May 2022 and should now contain St Patrick's stream flows to the Tussock Wetland during significant rain events.

7. Report and discuss any difficulties in compliance with, any breaches of the conditions of the consent and the measures adopted to rectify problems

As detailed in Section 3.3 there was non-compliant dust generation in the 30 days up until 28th January 2022. Samples collected at Cypress Office and Plover Steam on this day had mineral content exceeding 4 g/m^2 (5.49 and 5.32 g/m^2 respectively). As detailed in the notification to Council, there was unprecedented low rainfall for January 2022, and despite rigorous dust suppression throughout most of January, there were 6 days while operations were working in the Cypress Mine area during which dust suppression on major haul roads was insufficient.

In response to this breach of conditions, controls and guidelines within the Cypress Dust Management Plan were revisited; and toolbox talks were held with operators to reinforce dust management awareness and procedure. BT Mining have ordered a camera to be installed with a view of the Cypress Haul Road, to feed back real-time data to the dispatch office and allow continuous monitoring of dust.

Water management, overburden storage and geotechnical failures of the eastern highwall remain challenges, and are being closely managed.

8. List any maintenance works needed, proposed or undertaken to ensure compliance with the conditions of the consent or to facilitate operations

Routine inspections and follow up maintenance of ponds, sumps and drains that form part of the water management infrastructure continues via scheduled inspections of key structures, and twice daily Cypress Supervisor work inspections. Routine highwall inspections have also continued via both visual inspections by a suitably qualified person and by Geomos - real-time deformation monitoring.

A large failure above Pushback stage 1 and 2 has caused a scarp to propagate outside of the consent boundary toward the Mt William Ridgeline. This movement has not progressed further partly helped by the backfilling of the pit shoring up the toe. Cleanwater drains compromised by this failure have now been reinstated and run along the eastern highwall, taking cleanwater north into St Patrick's Stream.

As discussed in Section 7, The Cypress Western Wall has been breached during flood events. Remediation work including buttressing up against the stream has been undertaken.

There has been an additional telemetry site added to the telemetry system in Byrne Creek in South Cypress which monitors turbidity. The communications for the Byrne Creek site is via satellite. We have also started weekly sampling at Byrne Creek telemetry site and in the Waimangaroa River approximately 50 m downstream from the confluence with Byrne Stream

9. Outline any changes to the monitoring programme that may be required to allow compliance to be determined

Monitoring of Cypress AMD impacted flows from in-pit sumps and the Northern Engineered landform is ongoing and adaptive to changes and the requirements of the mine to ensure compliance. Daily and weekly sample testing for long term monitoring is ongoing, and sites are added or withdrawn as appropriate. Monitoring of water quality in newly cut clean water drains, that form part of the Cypress push back, occurs during and post construction, to ensure that outcome water quality is of appropriate standard. Highwalls are monitored visually and via drone footage on a regular basis.

Weekly sample monitoring of Byrne Creek and Waimangaroa downstream of Byrne Creek started. As detailed in Section 8 remote turbidity monitoring has been initiated in Byrne Creek, downstream of drilling operations. Data conveyance is via ioSphere's latest Swarm IoT gateway. Future use looks promising.

It is proposed that macroinvertebrate samples at stream ecology Site 1 (8W) are continued to be undertaken twice a year, rather than annually. This will provide more clarity on macroinvertebrate health by reducing the sampling bias that results from macroinvertebrate larval emergence and post flood recolonisation events