Northparkes Mines
A century of mining together

2020 Annual Review

CMOC | Northparkes

Document Details	
Name of Operation	CMOC-Northparkes Mines
Name of Operator	CMOC Mining Pty Ltd operating as CMOC Mining Services Pty Ltd
Development Consent/Project Approval Number	DC11_0060, as modified
Name of holder of development consent/Project Approval	CMOC Mining Pty Ltd
Mining Leases	ML1247, ML1367, ML1641, ML1743
Name of holder of mining lease	CMOC Mining Pty Ltd
Water Licence #	Refer to Table 4 Summary of Licences
Name of holder of water licence	CMOC Mining Pty Ltd
MOP Commencement Date	1st January 2020
MOP Completion Date	1st January 2022
Annual Review Commencement Date	1st January 2020
Annual Review Completion Date	31st December 2020
I, Hubert Lehman, certify that this audit report is a true and accurate record of the compliance status of CMOC-Northparkes Mines for the period 1st January 2020 to 31st December 2020 and that I am authorised to make this statement on behalf of CMOC Mining Pty Ltd.	
Name of authorised reporting officer	Hubert Lehman
Title of authorised reporting officer	Managing Director
Signature of authorised reporting officer	
Date	30 March 2021

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1. STATEMENT OF COMPLIANCE

In accordance with the *Post-approval requirements for State significant mining developments – Annual Review Guideline* (NSW Government, 2015) a statement of compliance has been prepared to document the status of compliance with Development Consent 11_0060 (as modified), mining leases and other relevant approvals at the end of the 2020 reporting period. Table 1 identifies any non-compliances that occurred during the reporting period for each statutory approval.

Table 1 Statement of Compliance

Were all conditions of the relevant approvals complied with?	
DA 11_0060	Yes
ML 1247	Yes
ML 1367	Yes
ML 1641	Yes
ML 1743	Yes
EPL 4784	Yes
EPBC 2013/6788	Yes
WAL43207, WAL43208, WAL34955, WAL32138, WAL32120, WAL32004, WAL31969, WAL31963, WAL31930, WAL31863, WAL31850	Yes

2. INTRODUCTION

2.1 Mine Contacts

Table 2 CMOC-Northparkes Mines Contacts

Position	Contact Name	Contact Number
Northparkes Hotline	Gabe Albert	02 6861 3000
Mill Control (24 Hrs)	-	02 6861 3167
Access Control	-	02 6861 3211
Environment and Farm Superintendent	Chris Higgins	02 6861 3265
People, Safety and Environment Manager	Stacey Kelly	02 6861 3495

2.2 Mine Operation Introduction and History

2.2.1 Location, History and Process Overview

CMOC-Northparkes Mines (Northparkes) is a copper-gold mine located 27 kilometres north-west of the town of Parkes in central west New South Wales, Australia (Figure 1). The Northparkes business continues to run under a joint venture arrangement with 80% interest with China Molybdenum Pty Ltd and the remaining 20 percent share owned by the Sumitomo Group.

The majority of Northparkes employees reside in the Parkes Shire, which has a population of approximately 15,000 residents. Parkes Shire is a diverse municipality centred in the town of Parkes. The largest industry is the retail industry, closely followed by the agricultural industry.

North Mining Limited originally received development consent for Northparkes operations in 1992, 15 years after the first onsite resource discovery. This approval was based on open cut mining of E22 and E27 and underground mining of E26 within the 'Mining Reserve' of 64.1 million tonnes (Mt).

Underground block cave mining commenced at Northparkes in October 1993 with the construction of the E26 underground block cave mine through the granting of development consent DA504/90. Northparkes commissioned its second block cave mine, E26 Lift 2 in 2004. In 2008, North Mining Limited commissioned an extension to the second block cave mine, E26 Lift 2 North (E26 Lift 2N). Mining operations at Northparkes focus on the extraction of a range of ore bodies based on a set of target mineral concentration limits.

Open cut mining commenced with the E27 pit in December 1993 and the E22 pit in January 1994. The gold-enriched oxide ore was processed through a separate carbon-in-pulp (CIP) gold circuit, including the use of cyanide for gold extraction, prior to the construction of the copper-gold sulphide processing circuits in 1995. Ore was then stockpiled for blending with E26 underground material. Open cut mining at Northparkes operated on a campaign basis determined by economic and environmental viability. Open cut mining ceased in October 2010 with the completion of the E22 open cut campaign. The CIP processing plant has been decommissioned from site, with cyanide no longer used in process circuits on site.

In February 2007, the NSW Minister for Planning granted PA06_0026 under Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act). This approval provided for the ongoing operation of the previously approved mining operations and facilities and the extension of underground block cave mining into the E48 ore body. This project was known as the E48 Project. After approval in 2007, North Mining Limited commenced construction of E48 Lift 1, its third major block cave mine. Initial production of E48 Lift 1 began in 2010 and forms part of the approved underground mining operations in conjunction with E26 Lift 2 and E26 Lift 2N.

In October 2009, approval was granted for two modifications to PA06_0026 under Section 75W of the EP&A Act. Section 75W modification 1 (Mod 1) provided for the construction of the Estcourt Tailings Storage Facility (TSF), a mine and mill upgrade to increase processing up to 8.5Mtpa and extension of mine life until 2025. Section 75W modification two (Mod 2) provided for the development of a 1200m^2 warehouse within the approved mine infrastructure area.

In 2012 North Mining Limited was granted approval for development of a block cave knowledge centre under Part 4 of the EP&A Act (DA 11092) from Parkes Shire Council (PSC).

In 2013, CMOC Mining Pty Ltd acquired Northparkes.

In July 2014, Project Approval was granted for PA11_0600 under section 75J of the EP&A Act for the Northparkes Extension Project (the Project). This approval PA11_0060 surrendered the Project Approval PA06_0026 and DA11092 in accordance with section 104A of the EP&A Act.

In 2019, Project Approval 11_0060 was gazetted as a State Significant Development under section 4 of the EP&A Act and is now referred to as Development Consent 11_0060.

A copy of the 2020 Northparkes Value Chain is provided as Figure 2. The value chain is a high-level model used to describe the process by which Northparkes receive raw materials, add value to the raw materials through various processes to create a finished product, and then sell that end product to customers. Northparkes conducts annual value-chain analysis by looking at every production step required to create a product and identifying ways to increase the efficiency of the chain. The overall goal is to deliver maximum value for the least possible total cost and impact, and create a competitive advantage.

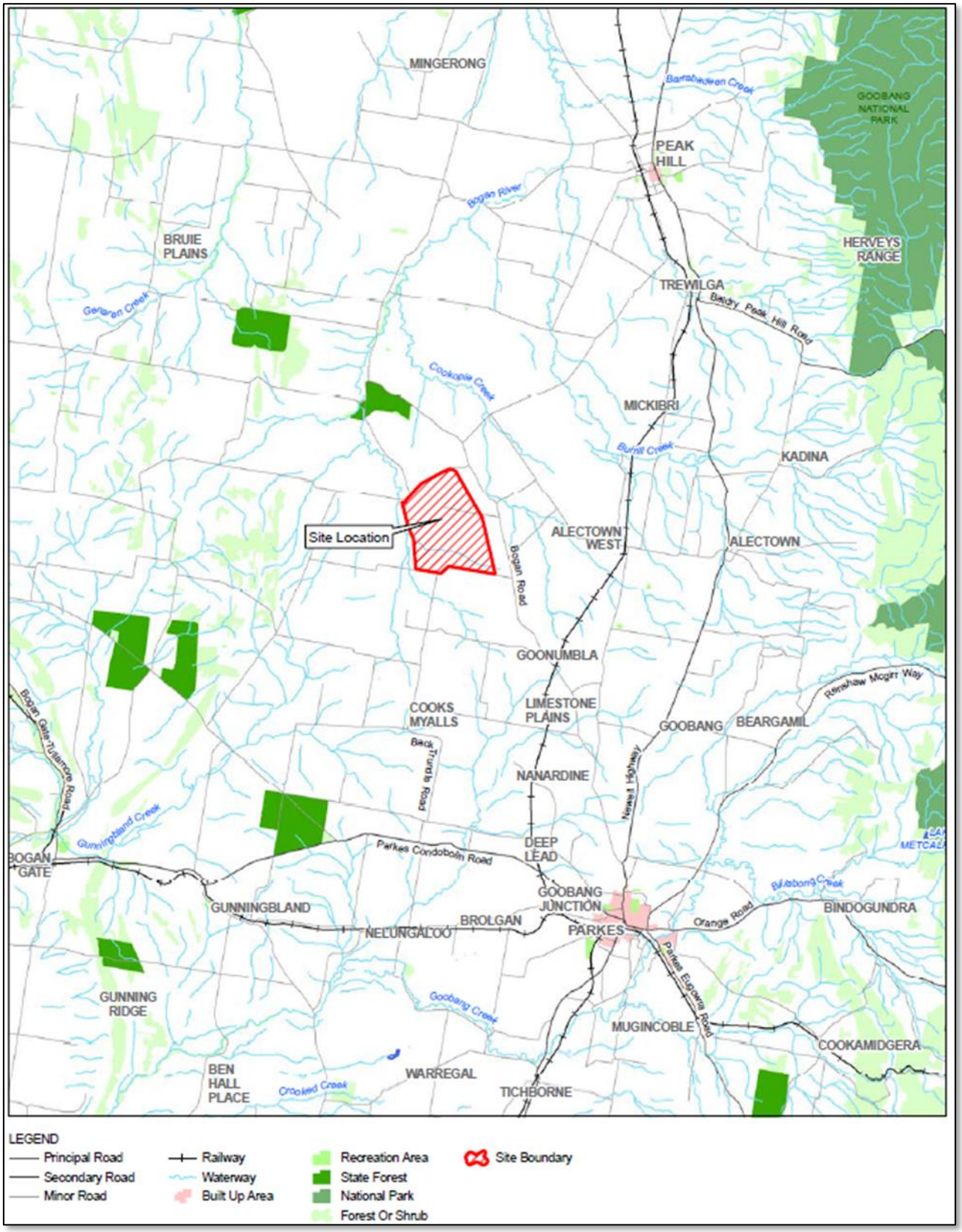


Figure 1 Project Locality Plan

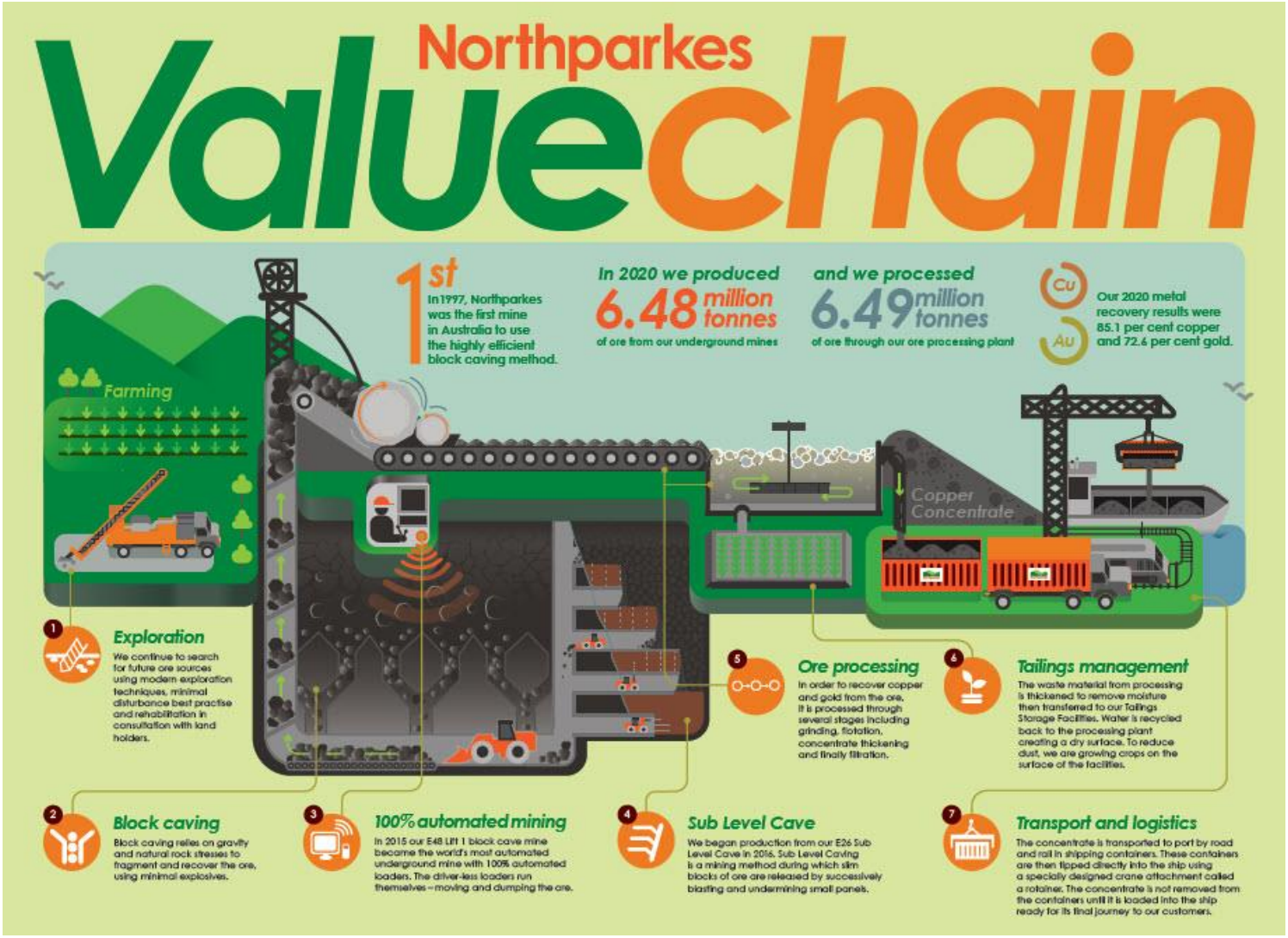


Figure 2 Northparkes 2020 Value Chain

2.2.2 Site Layout and Infrastructure

Surface infrastructure and operation layout is shown in Figure 3.

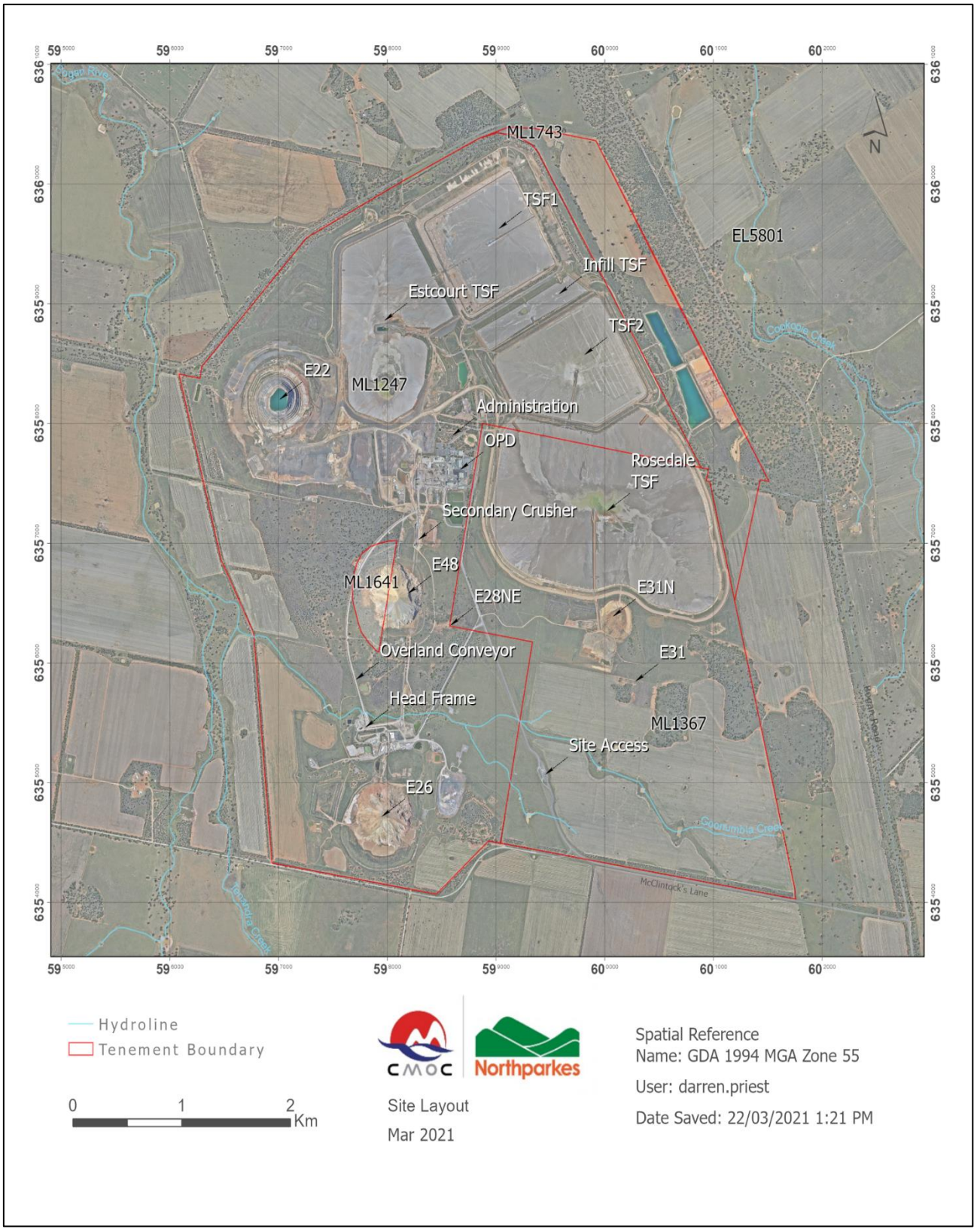


Figure 3 Surface Infrastructure and Operational Layout

The major components of the Northparkes onsite infrastructure and approved future operations includes:

- Continuation of approved underground block cave mining in the E48 and E26 ore bodies, and associated underground infrastructure
- Development of underground block caving in the E22 resource beneath the E22 open cut void
- Campaign open cut mining through development of five open cut resources including:
    - development of four small open cut pits E31, E31N, E28, E28N
    - E26 open cut which is located in an area of previous underground block cave subsidence (existing vertical extent of subsidence void is approximately 200 metres)
- Ongoing TSF disposal and raises including:
    - continuation of tailings disposal to TSF1, TSF2, Infill TSF and Estcourt TSF to an approved height of 28 metres
    - provision for additional raises on Estcourt TSF and Rosedale TSF to provide for an increased height up to approximately 28 metres above ground surface
    - the extension of the Infill TSF west to adjoin the Estcourt TSF
- Development of new waste dumps (overburden emplacement areas) for the management of open cut waste rock. Waste rock from open cut mining areas can be utilised in the development of TSF raises such as Rosedale TSF
- Continuation of approved ore processing infrastructure up to 8.5 Mtpa capacity, and road haulage of copper concentrate to local rail sidings
- Continued use of existing site infrastructure including administration buildings, workshop, internal access roads and service infrastructure
- Continued use of surface mining infrastructure including ventilation shafts, hoisting shaft and ore conveyors
- Continuation of existing approved water supply and management processes
- Continuation of approved mining operations until end of 2032 and
- Rehabilitation and closure of the will be carried out after the end of the operational life of the Project in accordance with relevant approvals.

2.3 Scope

This Annual Review provides a summary of actual operational and environmental management activities undertaken at Northparkes during the reporting period and provides a review against planned works, as described in the Mining Operations Plan (MOP), and predicted impacts documented in the Northparkes Mines Step Change Project Environmental Assessment (EA) (Umwelt, 2013). The Annual Review also covers community relations and addresses mine development and rehabilitation undertaken during the reporting period.

The report has been prepared to satisfy the conditions of the Development Consent 11_0060 (DC11_0060) (in particular Schedule 6, Condition 4) and Mining Leases (ML) 1247, 1367, 1641, 1743. Key requirements of these approvals are described in Table 3 Annual Review Requirements

The report has been prepared generally in accordance with the NSW Governments "*Annual Review Guideline*" October 2015 where practicable, as well as the relevant Northparkes reporting framework.

Northparkes recognises and respects the importance of stakeholders and considers positive relationships important to aid in continual improvement of its environmental management practice. This report is therefore provided to the following stakeholders:

- Department of Planning, Industry and Environment
- Resource Regulator, Department of Regional NSW
- Forestry Corporation of NSW
- NSW Environment Protection Agency (EPA)
- Peak Hill Local Aboriginal Land Council (PHLALC)
- Wiradjuri Council of Elders (WCE)
- Parkes Shire Council (PSC)
- Forbes Shire Council (FSC)
- Northparkes Community Consultative Committee and
- General public (available at http://www.northparkes.com/).

2.4 Annual Review Requirements

Table 3 Annual Review Requirements

Licence Approval or Guideline	Section Reference	Requirement	Reference in this Report
Development Consent 11_0060	Schedule 6, Condition 4	By the end of March each year, or as otherwise agreed by the Secretary, the Proponent shall review the Environmental performance of the project to the satisfaction of the Secretary. This review must: (a) describe the development that was carried out in the previous calendar year, and the development that is proposed to be carried out over the next year	Whole document
		(b) include a comprehensive review of the monitoring results and complaints records of the project over the previous calendar year, which includes a comparison of these results against the • the relevant statutory requirements, limits or performance measures/criteria • the monitoring results of previous years and • the relevant predictions in the EA	Section 4, Section 6, Section 7, Section 8.
		(c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance	Section 1, Section 11
		(d) identify any trends in the monitoring data over the life of the project	Section 4, Section 6, Section 7, Section 8.
		(e) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies and	Section 4, Section 6, Section 7, Section 8.
		(f) describe what measures will be implemented over the next year to improve the environmental performance of the project.	Section 12
	Schedule 3, Condition 38	The Proponent shall: (a) implement all reasonable and feasible measures to minimise the waste (including waste rock) generated by the project) (b) ensure that the waste generated by the project is appropriately stored, handled and disposed of and	Section 4

		(c) monitor and report on effectiveness of the waste minimisation and management measures in the Annual Review	
ML 1247 ML 1367 ML 1641 ML1742	Condition 3 (f)	The lease holder must prepare a Rehabilitation Report to the satisfaction of the Minister. The report must: i. provide a detailed review of the progress of rehabilitation against the performance measures and criteria established in the approved MOP ii. be submitted annually on the grant anniversary date (or at such times as agreed by the Minister) and iii. be prepared in accordance with any relevant annual reporting guidelines published on the Department's website.	Whole document

3. APPROVALS

3.1 Approvals, Leases and Licences

Table 4 summarises the key mining leases and approvals currently held by Northparkes which are relevant to the operations.

Table 4 Summary of Licences

Approval	Description	Issue Date
Project Approvals		
DC11_0060	Project Approval – Step Change Project (Mine Extension)	16/07/2014
DC11_0060 Mod 1	Modification to include Sub Level Cave Mining	16/5/2015
DC11_0060 Mod 2	Correct error in project boundary	31/3/2016
DC11_0060 Mod 3	Development and operation of E26 Lift 1 North	22/8/2017
DC11_0060 Mod 4	Changes to Ore Processing Infrastructure	06/09/2018
DC11_0060 Mod 5	Alternate road haulage route and new secondary crusher	30/09/2019
EPBC 2013/6788	EPBC Approval	13/02/2014
Council Approvals		
	PSC Approval for Road Train Access on Bogan Road	19/11/1999
Mining Leases		
ML 1247	Mining Lease (1629.6 Ha)	27/11/1991
ML 1367	Mining Lease (826.2 Ha)	21/03/1995
ML 1641	Mining Lease (24.4 Ha)	25/03/2010
ML 1743	Mining Lease (193.3 Ha)	01/09/2016
Exploration Leases		
EL 5800	Exploration Lease (12,130Ha)	08/01/2001
EL 5801	Exploration Lease (49,550 Ha)	08/01/2001
EL 5323	Exploration Lease (21,840 Ha)	18/07/1997
EL 8377	Exploration Lease (25,950 Ha)	12/06/2015
Environmental Protection Licences		
EPL 4784	Environmental Protection Licence	30/05/2001
Current variation	s.58 Licence variation to allow the licensee's exploration waste to be received at the premises.	22/05/2020
Dangerous Good and Explosives		
NDG029083	Acknowledgement of Notification of Hazardous Chemicals on Premises	09/04/2015
XSTR200036	Licence to Store Explosives	03/12/2018

XMNF200011	Licence to Manufacture Explosives	28/07/2019
5060895	Radiation Management Licence	10/11/2017
Heavy Vehicle Authorisation		
133827V6	Road Train Operation Permit	12/09/2020
Water Licences		
WAL43208	Water Access Licence - High Security	01/07/2020
WAL43207	Water Access Licence - General Security	01/07/2020
WAL34955	Water Access Entitlement	04/10/2012
WAL32138	Water Access Entitlement	14/09/2012
WAL32120	Water Access Entitlement	14/09/2012
WAL32004	Water Access Entitlement	14/09/2012
WAL31969	Water Access Entitlement	14/09/2012
WAL31963	Water Access Entitlement	14/09/2012
WAL31930	Water Access Entitlement	14/09/2012
WAL31863	Water Access Entitlement	14/09/2012
WAL31850	Water Access Entitlement	14/09/2012
Forestry Occupation Permits		
847	Limestone State Forest Occupation Permit	12/03/2019
Mining Operations Plan		
Current MOP	01/01/2020 – 01/01/2022 MOP Period	09/12/2019
MOP Amendment A	15/12/2020 – 01/01/2022 MOP Period	15/12/2020

3.2 Amendments during the Reporting Period

3.2.1 Development Consent

Development Consent 11_0060 (the Consent) was granted on 16 July 2014. Five modifications to the Consent have been granted since 2014 (dated 16/5/2015, 31/3/2016, 22/9/2017, 6/9/18 and 30/8/2019 respectively). The latest modification (Mod 5) was lodged for assessment under the Environmental Planning and Assessment Act 1979 (EP&A Act) in June 2019 and approval granted in August 2019. The modification proposed the use of an alternative road haulage route between the Northparkes Mine and the Parkes National Logistics Terminal until August 2020 and the construction of a new secondary crushing building in a different location to the previous approval. The alternate haulage route was required while the National Inland Rail project utilised the approved Northparkes rail siding at Goonumbla.

The Department of Planning, Industry and Environment was satisfied that the modification is of minimal environmental impact and that the development to which the consent as modified relates is substantially the same development as the development authorised by the consent (as last modified under Section 75W).

As a result of delays to the reopening of the Goonumbla Rail Siding, Northparkes requested (M11_0060-PA-1) and were approved for the extension of concentrate haulage to the Parkes Logistic Terminal until 31 December 2020.

3.2.2 Environmental Protection Licence

An Annual Return for the reporting period was submitted to the EPA on 24 July 2020 in accordance with requirements under Environment Protection Licence (EPL) 4784 Condition R1.5.

On 20 May 2020, Northparkes requested that Environment Protection Licence 4784 waste conditions be varied to allow the licensee's exploration waste to be received at the premises. Following a review of the information provided, the EPA approved the licence variation to allow "*Drilling mud and cuttings that have been generated by the licensee during exploration*" to be received at the premises.

4. OPERATIONS SUMMARY

4.1 Production Statistics

A summary of production figures for the 2019 and 2020 calendar years is provided in Table 5 below. Also shown are the predicted production figures for the 2021 reporting period.

Table 5 Production and waste rock summary

Material	Approved Limit	2019 Reporting Period	This Reporting Period	2021 Reporting Period (forecast)
Underground Ore Mined to ROM (Mt)	>0.5	6.22	6.00	6.20
Stockpiled Opencut Ore to ROM (Mt)	N/A	0.06	0.49	1.15
Ore Processed (Mt)	8.5	6.42	6.49	7.41
Waste Rock/Overburden (t)	N/A	158,661	196,450	4,500
Fine Reject (tailings) (Mt)	N/A	6.27	6.39	7.29
Saleable Product (t)	N/A	120,832	107,541	118,929

Mining operations within the 2020 reporting period remained below the limits specified in the Consent. Other conditions relevant to operating conditions are addressed throughout the report.

4.2 Mining and development

4.2.1 Open cut

Active open cut mining ceased in 2010. There were no open cut mining activities in the current reporting period.

4.2.2 Underground Operations

Underground mining activities are currently undertaken in ore body E48 using block caving methods and E26 using Sub Level Cave (SLC) methods. Block Caving is an underground hard rock mining method that involves undermining an ore body, allowing it to progressively collapse under its own weight (see Figure 4 Block Cave Mining Method

It is the underground version of open pit mining. SLC methods rely on the undercutting of an area of rock, and then gradual failure of the overlying rock due to gravity and stress, to minimise mining risk and supply production.

The operations at E26 orebody ceased in 2008 due to ingress of clay in the draw points. The E26 SLC was commissioned in 2016. The construction of E48 block cave mine was completed in 2010, with the first ore extracted from E48 Lift 1 block cave mine and is currently in production.

The E26 SLC project commenced construction in April 2015. The mine design aims to extract a remnant wedge of high-grade material adjacent to the E26 Lift 2 Block Cave. The SLC mining method involves construction of the sub level horizon followed by retreat drill and blast of that horizon. The broken material from blasting is recovered as the main source of production. The second sub level horizon is then constructed, as the top down process continues. The E26 SLC Mine consists of three sublevels approximately 20m apart. The first production ring in the E26 SLC was extracted in July 2016.

Automation (remote operation of underground load, haul and dump machinery) continued in the reporting period to maintain full automation of underground mine loaders. In mid-October 2015, Northparkes confirmed its position as the most automated underground mine in the world and achieved 100 percent automation of underground mine loaders.

In 2020 Northparkes continued with the development of the new Block Cave (E26 Lift 1 North). Construction started in January 2019 and by the end of 2020 approximately 6392 metres of new tunnels were developed. This new block cave is scheduled to start full production in 2023.

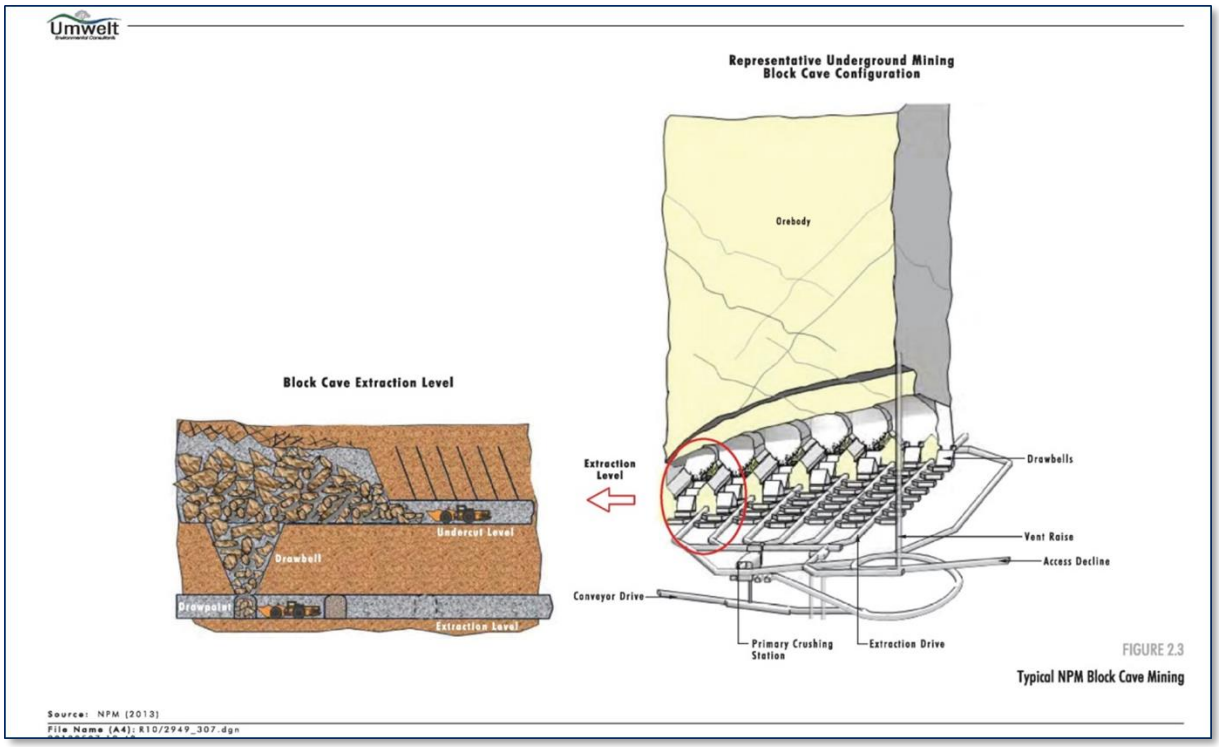


Figure 4 Block Cave Mining Method

4.2.3 Waste Rock

A total of 207,900 tonnes of waste rock from underground development was placed on E26 waste rock emplacement during the reporting period.

The underground waste was primarily from the E48 Ventilation Upgrade Project and the E26 L1N conveyor drive development. A small proportion was ore contaminated by ground support (steel mesh and shotcrete) that could not be effectively separated out. Approximately 82% of the waste material was hoisted via the shaft with the remaining trucked to the surface.

During a Targeted Assessment Program (TAP) by the resource regulator in November 2020, the E26 waste rock emplacement was observed to contain a notable amount of foreign material. This material was understood to be that trucked to the surface containing steel mesh and concrete. Northparkes undertook a clean-up of the area and are developing a document for the ongoing management of the emplacement.

4.3 Exploration and Resource Utilisation

Exploration and evaluation programs continued across ML1247 and ML1367 in the 2020 reporting period, as shown in Figure 5 Exploration and Evaluation Drilling Activities - NPM Mining Leases – 2020

No exploration activities were undertaken on ML1647 or ML1743 during the year. No non-compliances have been noted within the mining leases related to exploration or evaluation activities.

A total of 42 drill holes for 11,329.7m were completed for exploration and evaluation purposes during the reporting period. The drilling program comprised 18 combined Reverse Circulation (RC)/Diamond holes for a total of 7,703.5m (infilling the Lift 1 mineralisation at GRP314 Project), nine Diamond drill holes (including two wedged holes at E22) for a total of 2,918.6m of core (the majority of this core was drilled testing the deeper extensions to mineralisation at E22 and defining the extents of mineralisation at the E26 MJH mineralised zone) and 15 shorter Reverse Circulation percussion holes at small projects on the Mine Leases. Northparkes is committed to identifying and evaluating new ore bodies with the intention of extending mine life. In 2020, the evaluation involved the following works:

- Completion of diamond drill testing of the deeper extensions of the E22 mineralisation to inform extraction options for mining studies of that deposit.
- Diamond drilling of the initial holes in a definition drill program for the E26 MJH (Lift 2 East) mineralisation
- Diamond drilling of one pre-conditioning hole to enable cave propagation for the E26 Lift 1 Nth Project
- Diamond drilling to infill the drill spacing in the GRP314 Lift 1 resource block
- Percussion drilling to define potential surface extractive mineralisation at the E31 Deposit and to characterise mining conditions of that deposit and
- Percussion drilling to define potential surface extractive mineralisation at the E28NE Deposit and to characterise mining conditions of that deposit.

In addition to new drilling, final assay results were received from 28 holes drilled in the previous reporting period, which were either part of an ongoing project, or had assays pending. These holes were:

- Nine holes from the previously completed surface diamond drilling at E22 Deeps project
- One hole from the previously completed surface RC/Diamond drill program at GRP314 Lift 1
- Twelve holes from the previously completed surface diamond drill program at E28 North-East Project and
- One hole from the E31 Project area.

Additionally, cores from five previously completed but unassayed holes in the E28 open cut area were assayed to re-assess the presence of near-surface mineralisation in that area.

A close-spaced Ground Gravity survey covering areas of the mine leases was also completed in 2020.

For a number of project areas, revision of the Resource Models has been completed and four Revised Block Models were created during 2020 being E28 Project area, E31 project area, E22 Project and the E26 Project.

Exploration and evaluation activities will continue in the next reporting period (1/1/2021 to 31/12/2021 inclusive). The focus of these activities will be diamond and reverse circulation percussion drilling to evaluate near mine extensions as well as the drill testing of new and established targets derived from project generation onsite.

The proposed exploration comprises 15,300m of drilling (13,500m diamond drilling and 1,800m reverse circulation drilling) and will be focussed on three programs testing known mineralisation, being:

- Testing of the White Rock Quarry area (undrilled) and the E51 Prospect area (sparsely drilled) with a program of RC drillholes.
- Continuation of drill testing to infill the resource zone and define higher grades in the GRP314 deposit (Lift 1 position) following an update of the Block Model.
- Completion of underground drill testing the boundaries and extents of mineralisation at MJH (E26L2 East) followed by further drilling to infill the resource zone and define higher grades.

In addition, an Induced Polarisation (IP Line) geophysical survey is proposed, which will encompass sections of the southern portion of ML1247 and ML1367 as well as portions of the surrounding Exploration Licences.

Sterilisation drilling for the next proposed TSF location (Rocklands) is required and this work should also be completed within the next reporting period.

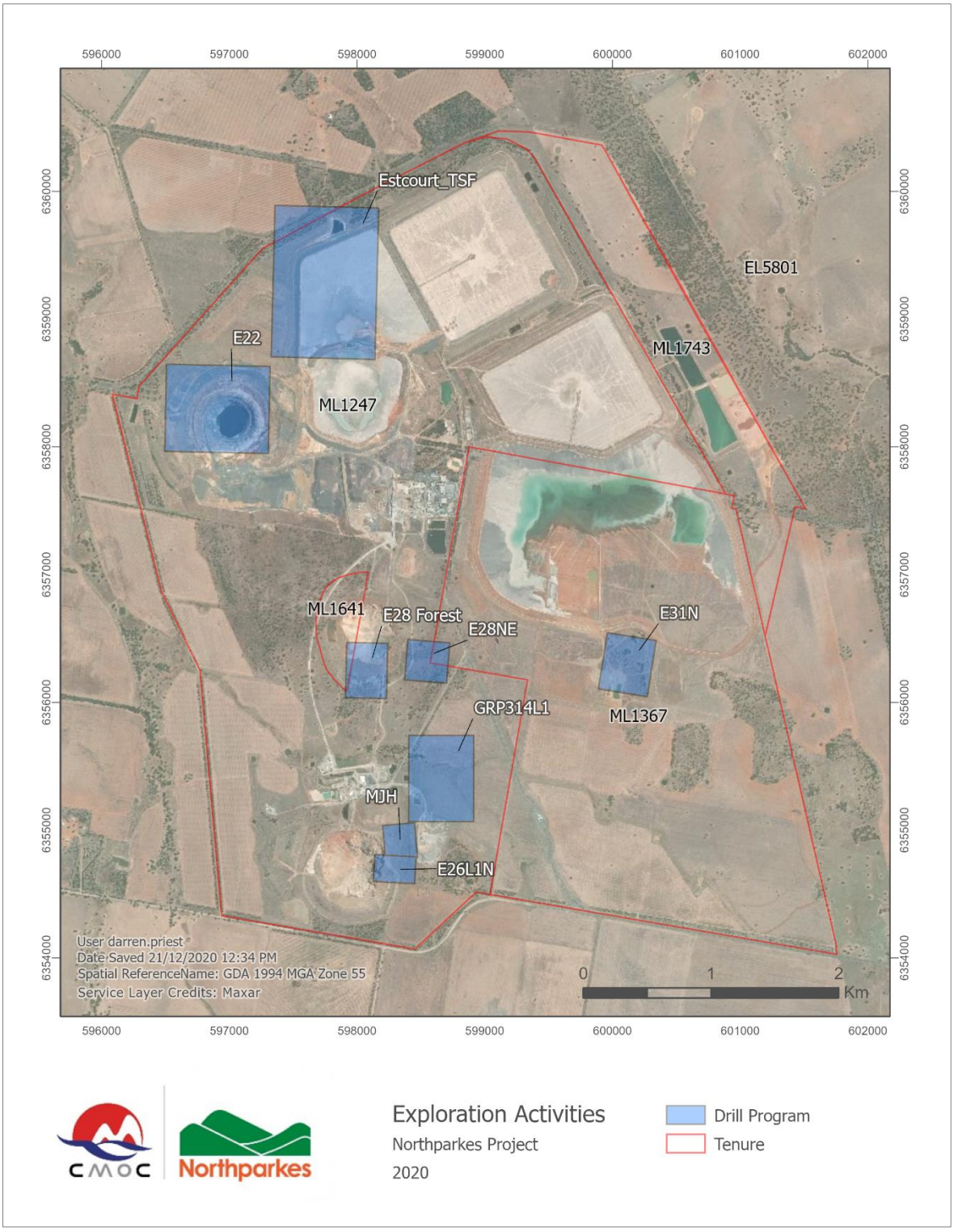


Figure 5 Exploration and Evaluation Drilling Activities - NPM Mining Leases – 2020

4.4 Ore processing

In 2020, a total of 6.49 Mt of sulphide ore was processed from the underground ore bodies and existing surface stockpiles (6.014 Mt underground and 0.479 Mt stockpiled ore). Copper-gold concentrate production totalled 107,541 tonnes (dry) and this product was predominantly sold to customers in China and Japan. Production for the past five years is presented in Table 6.

Ore processing includes several defined stages that include crushing, grinding, flotation and thickening. Following the secondary crushing of underground (primary crushed only) material, the grinding circuit comprises two parallel modules (Mod 1 and Mod 2), each incorporating a Semi Autogenous Grinding (SAG) mill, oversize pebble crushing, two stages of ball milling and froth flotation.

The flotation process produces a sulphide-rich concentrate containing copper and gold bearing minerals. Following on from flotation, the concentrate is first thickened through concentrate thickeners followed by the final dewatering stage through filters before the dewatered concentrate is transferred to the storage shed, ready for loading and transportation to the port.

The tailings component is pumped from the flotation stage to a tails thickener for dewatering from where it is then pumped to a TSF.

Construction of the new secondary crushing circuit began in 2020 involving a range of modifications and upgrades to each of the operating facilities to achieve a throughput rate of nominal 7.6Mtpa.

Table 6 Ore Processing Production

Year	Ore Milled (Mt)	Production Copper Concentrate (t)
2016	6.07	137,445
2017	6.51	132,063
2018	6.48	125,438
2019	6.42	120,832
2020	6.49	107,541

4.5 Tailings

In the reporting period, 6.38 million tonnes of tailings were deposited between Estcourt TSF and Rosedale TSF. A summary of the reporting period tailings distribution and TSF capacity consumed is provided in Table 7 below.

Table 7 Distribution and Capacity Consumed of Tailings Storage Facilities

Tailings Storage Facility	Distribution (%)	Capacity Consumed (Mt)
TSF1 Closure	0.00	0.00
TSF2	0.00	0.00
TSF Infill	0.00	0.00
Estcourt Stage 2	14.16	0.89
Rosedale Stage 2	85.84	5.49

A total of 119.3 Mt of tailings has been deposited at Northparkes operations to date. All tailings have been deposited within TSF1, TSF2, Estcourt, Rosedale TSF and the Infill TSF located approximately 2km from the processing plant. The tailings are sub-aerially deposited into the active TSF from the external embankments (excluding TSF1 Closure) and tailings and supernatant water runoff are contained and directed to the internal central decant towers.

All TSFs at Northparkes have been designed by an Engineer of Record to provide:

- Safe and permanent containment of all tailing's solids
- The recovery of free water for reuse within the processing plant
- Containment of all water under extreme rainfall conditions

- Maximised structural strength through the deposited tailings and
- Containment of all chemical residues.

Northparkes control measures for the management of tailings during construction and operation are implemented as per the Tailings Storage Facility Operation, Maintenance and Surveillance (OMS) Manual and the Emergency Management Tailings Storage Facility Procedure.

Each individual facility OMS manual was either updated or created to provide Operational staff with additional resources to safely manage the TSF's across site.

The site tailings strategy is regularly reviewed, with the most optimal disposal strategy utilised. The future tailings deposition strategy involves alternating deposition between the Estcourt TSF, Rosedale TSF, Infill TSF, TSF2 and TSF1 Closure to allow for periods of drying out prior to constructing new lifts on active TSF's.

During the reporting period barley was sown onto the TSF2 surface (80ha) to continue to mitigate dust lift off. This proved to be a successful project with a wetter than average year allowing for a good germination and plant establishment. The success of the planting will ensure effective dust control for an 18-month period.

During the 2020 period there were no tailings facility construction activities. Detailed design and geotechnical drilling for the Estcourt Stage 3 embankment raise was completed during the period.

4.5.1 Next Reporting Period

Construction of Estcourt Stage 3 commenced in January 2021 with completion set for September 2021. Estcourt Stage 3 consists of a downstream raise to the western embankment and upstream raise to the northern embankment, as well as relocating the existing decant to the northwest corner of the old E27 pit.

The total volume of tailings deposition for 2021 is forecast to be 7.26 Mt following the completion of site processing upgrades during 2020. The tailings will be deposited in Rosedale Stage 2 as a primary location before utilising Estcourt Stage 3 (following construction), TSF 1 Closure and TSF Infill.

Water conservation will continue to be a focus in 2021. Opportunities for water conservation initiatives in the space of water recovery will further be investigated. As in 2020, utilisation of water from the E22 Open Pit will continue as required.

Dust mitigation strategies will continue to be investigated and implemented across the business, with possibilities such as sowing TSF2 and chisel ploughing dust susceptible areas of TSFs considered.

4.6 Construction Activities during 2020

A summary of construction activities undertaken during the reporting period and their completion status is provided in Table 8.

Table 8 Summary of construction activities during the reporting period

Infrastructure	Commencement Date	Completion Date
Mine Infrastructure Area (MIA)		
E48 Ventilation Fan Upgrade Project	December 2017	September 2020
E26L1N Block Cave	January 2019	July 2022
Expansion Project	May 2019	Q2 2021
HV Infrastructure Upgrades	May 2019	Q1 2021

Tailings Storage Facilities (TSF)		
No construction activities were undertaken during the reporting period	-	-

4.6.1 Underground Ventilation Upgrade Project

In December 2017, Northparkes commenced a program to upgrade the underground ventilation infrastructure. The ventilation upgrade consists of two additional shafts, one intake and one exhaust. These shafts are approximately 5m in diameter and connect with the E48 underground block cave mine. The exhaust shaft vent consists of two surface ventilation fans, with the intake shaft not requiring any fans.

In 2019 the raise bore shafts were completed but due to rock falls damaging the integrity of part of the exhaust shaft a development incline was started to bypass the damaged region of the shaft. 828m of the 1702m incline was completed in 2019. Construction of the new vent fans are approximately 90% complete at the end of 2019.

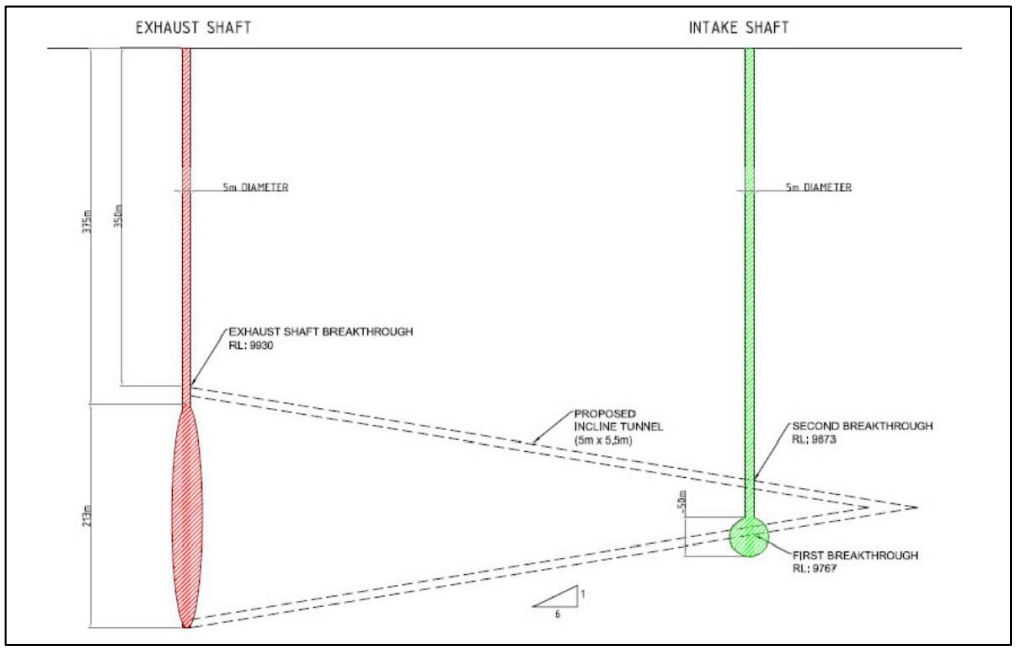


Figure 6 Vent project remediation plan – inline development

In 2020, the remaining 884 metres of incline development was successfully completed which was followed by shaft lining, underground infrastructure installation, system commissioning and handover. The vent system has been operating since August 2020.

4.6.2 E26L1N

E26L1N is a block cave extension, mining the porphyries to the north of the E26L1 and E26L2 caves. The E26L1N mine will produce ore from 2021 until 2033 adding to the life of mine plan. The project includes over 10,000m of lateral development, a new jaw gyratory crusher as well as two new conveyors.

In 2020 the mine lateral development target of 5,254m was surpassed with a total 6,392m achieved, and 10,070m project-to-date. Production drilling of 56,227m was achieved against a target of 44,921m for the year.

By end of Q1, the preconditioning of the ore body was completed ahead of schedule and under budget with additional scope delivered.

The material handling system (MHS) design packages were completed in Q2, followed by scopes and tendering for civil and structural construction contractors soon after. Construction of the MHS kicked-off in August 2020. Major long lead and procurement in 2020 included the new crusher and components which arrived in October, followed by a new production drill in December.

Fabrication of roadway panels, together with roadways installation and boxhole drilling all kicked-off in Q4.

4.6.3 Expansion Project

The project scope considers a range of modifications and upgrades to each of the operating facilities to achieve a throughput rate of nominal 7.6Mtpa.

Generally, primary crushed product is delivered from underground via a hoist to the surface and conveyed to an existing secondary crushing & screening building. The secondary crushing circuit is to be fed onto existing overland conveyor 123-CV006, which delivers ore to a new product feed conveyor to the new Secondary Crushing and Screening Circuit (commissioning to be complete in April 2021). The outcome of implementation of secondary crushing and screening facility is to present a P80 of 22mm to the OPD Stockpiles via 123-CV008, (previously P80 of 40mm).

The Ore Processing Facility was originally designed for 5Mtpa. Over a 24-year period, incremental improvements have increased production to a record level of 6.5Mtpa in 2017 and 2018 which has resulted in most equipment operating at maximum capacity.

In 2018, a Feasibility Study was completed to assess the option of increasing the production rate of the existing underground and surface material handling systems and ore processing equipment to achieve a nominal throughput rate of 7.6Mtpa.

In 2019 the Expansion project was approved in April with the team was fully resourced over the next five months. The processing increased throughput was initially planned to be completed in Q4 2020, but due to procurement constraints in 2020 commissioning of the new Surface Crusher Circuit was delayed until Q1 2021 and the hoisting system upgrade to be completed in Q4 2021.

Construction activities completed in 2020 included:

- Thickener feed well replacement
- Installation of two new Cyclone nests and all supporting structural steel
- Upgrade of SV09 Screen and all supporting infrastructure (pipe work, hoppers, pumps, structural steel and conveyor)
- Installation of nine new slurry pumps
- New Crushing circuits comprising of
- Two new buildings
- Installation of two new belt feeders
- One new screen installed
- Dust scrubber installation
- Three new conveyor belts and all supporting infrastructure
- New Switchroom and Transformers.

Surface Conveyor (CV025)

The installation of the new CV025 overland conveyor links the existing Open Pit Crusher System and the new Expansion Secondary Crusher circuit. The design change involves the modification of feed discharge from the original configuration, which has the ore reporting directly to the CV006 overland conveyor, to the new configuration where the feed then reports to the new secondary crushing circuit feed conveyor (CV022).

The objective of this design change is to remove any potential bottlenecking issues that would affect delivery of the 2021-2025 production plan. Following detail design construction was commenced on in October 2020, consisting of the following activities:

- Bulk earthworks
- Civil works including new sumps trestle footings and underpass bulk footings
- Construction and Installation of new conveyor trestles and gantries
- Installation of new conveyor belt
- Cut and splice of existing CV001 belt
- Conveyor drive supply and install
- Conveyor instrumentation
- Construction and installation of two underpasses.

4.6.4 Next Reporting Period

The major capital works to be undertaken during the next reporting period are:

- Estcourt TSF Stage 3 construction
- SP2 Feasibility Study and Execution
    - Procure and Install new Ball Mill
    - Electrical upgrades
    - Pump and pipe work upgrades
    - Significant amount of earthworks and civils
    - Re-purposing of ML05 to re-grind mill
    - Steel supply and construction
- Mining operations will focus on the development of the E26 L1N block cave whilst continuing to produce from both the E48 block cave and E26 sub-level cave.

5. ACTIONS REQUIRED FROM 2019 ANNUAL REVIEW

Each year, Northparkes hosts an Annual Review meeting for the relevant stakeholders, where the report for the previous reporting period is discussed in detail. The purpose of this meeting is to document any actions required as an outcome of the previous Annual Review, including any actions that have been undertaken and when those actions were complete.

In 2020 Northparkes did not hold an onsite meeting, although stakeholder groups and agencies were encouraged to provide comment to the submission. No feedback requiring action was received.

6. ENVIRONMENTAL MANAGEMENT AND PERFORMANCE

6.1 Environmental Management System

Northparkes has developed and implemented a Health, Safety and Environment Management System (HSEMS). The environmental related system components and policy are compliant with ISO14001. This system acts as a framework document to provide an overview of the environmental components of the HSEMS.

The Environment Management System (EMS) at Northparkes provides the strategic framework for environmental management and is managed by the onsite Environmental Team. The EMS:

- Outlines all relevant statutory leases, licences and approvals that apply to the Northparkes operations
- Details key plans, procedures, management plans and other documents that will be implemented to ensure compliance with all relevant leases, licences and approvals
- Describes the key processes that will be implemented to:
    - Communicate with community and government stakeholders
    - Manage community complaints
    - Resolve disputes and
    - Respond to non-compliance incidents and emergencies.
- Outlines Northparkes monitoring, reporting and auditing requirements
- Outlines relevant roles, responsibilities and accountabilities relevant to environment management for all Northparkes employees and contractors.
- During the reporting period, Northparkes maintained the EMS to the ISO14001:2015 standard. Northparkes also maintained its A1 risk rating under the EPA's risk based licencing scheme, the highest possible standard.

Northparkes has developed a suite of environmental management plans to guide environmental management at Northparkes. The plans have been developed in accordance with the EMS, the Consent and other statutory requirements. The revision status of approved key environmental management plans, as required by Schedule 6, Condition 3 of the Consent, is summarised in Table 9.

Table 9 Key Environmental Management Plans

Management Plan	Status
Biodiversity Offset Management Plan	Revision 7 - Revised 23 June 2020
Water Management Plan Surface Water Management Plan Groundwater Management Plan	Revision 10 - Currently under third party review Revision 5 - Currently under third party review Revision 5 - Currently under third party review
Pollution Incident Response Management Plan (PIRMP)	Revision 11 - Revised 12 December 2020
Air Quality Management Plan	Revision 19 - Currently under third party review
Noise Management Plan	Revision 16 - Revised 28 May 2020
Environmental Management Strategy	Revision 13 - Revised 25 August 2020
Blast Management Plan	Revision 4 - Revised 30 May 2020
Cultural Heritage Management Plan	Revision 9 - Revised 21 June 2020
Rehabilitation Management Plan	Revision 12 - Revised 25 June 2020

The PIRMP listed in Table 9 applies to all activities that have the potential to generate pollution incidents. These include, but are not limited to, water discharge events, and hazardous spills resulting in land or water contamination and fire hazards.

The PIRMP provides an overarching procedure to respond to pollution incidents at Northparkes. The aims therefore comprise:

- Outlining the response and notification requirements in the event of a pollution incident
- Provide clear definition of the roles and responsibilities for pollution incident responses and
- Facilitate compliance with the requirements of the Protection of the Environment Operations Act *1997* (POEO Act) and associated regulations.

The PIRMP was implemented throughout the reporting period, tested in December 2020, and revised accordingly.

6.2 Meteorology

The Consent (Schedule 3, Condition 18) requires a permanent meteorological station to be installed and maintained for the life of the Project. The station must comply with the requirements in the *Approved Methods for Sampling of Air Pollutants in New South Wales* guideline and be capable of continuous real-time measurement of stability class in accordance with the NSW Industrial Noise Policy, unless a suitable alternative is approved by the Secretary following consultation with the EPA.

As such, a meteorological monitoring station (MET) has been established to continuously measure and record wind speed, wind direction, temperature, solar radiation and rainfall at Northparkes.

The MET station provides real-time data to Northparkes employees and contractors. Meteorological data is used for assessing compliance, proactive dust and noise management, and for investigative and reporting requirements. The parameters recorded by the MET monitoring station and the method are outlined in Table 10.

Table 10 MET Monitoring Parameters

Parameter	Units	Frequency	Averaging period
Temperature at 2m	°C	Continuous	15 minute
Temperature at 10m	°C	Continuous	15 minute
Wind direction at 10m	°	Continuous	15 minute
Relative Humidity	%	Continuous	15 minute
Rainfall	mm/hr.	Continuous	1 hour
Solar radiation	W/m2	Continuous	15 minute

6.2.1 Temperature

Maximum, minimum and average temperatures are calculated daily from the 15 min intervals. Figure 7 shows average monthly temperature records for the reporting period (10m MET recordings). Compared to the long-term historical data, the average maximum temperatures were considerably higher for the months of January and November, recording +3.7°C and +2.3°C respectively. The average minimum temperature for January was also notably higher, recording +2.1°C. Significant lower temperatures were experienced for Februarys maximum average (-1.9°C) and Decembers minimum average(-2.1°C). All other periods were generally consistent with the previous reporting period, with results shown in Table 11 and Figure 7 below.

Table 11 Temperature averages for 2020 reporting period

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Maximum Temp	36.1	29.7	27.1	21.6	17.5	15.4	14.2	14.1	20	24.5	30	29.7
Variance from long-term data	3.7	-1.9	-1.4	-2.0	-1.1	0.5	0.2	-1.7	0.5	0.8	2.3	-1.0
Average Minimum Temp	19.9	17.5	14.6	9.7	5.5	3.9	2.8	2.7	5.6	9.4	13.1	13.8
Variance from long-term data	2.1	-0.1	-0.2	-1.0	-1.6	-1.0	-0.9	-1.7	-1.1	-0.4	0.0	-2.1

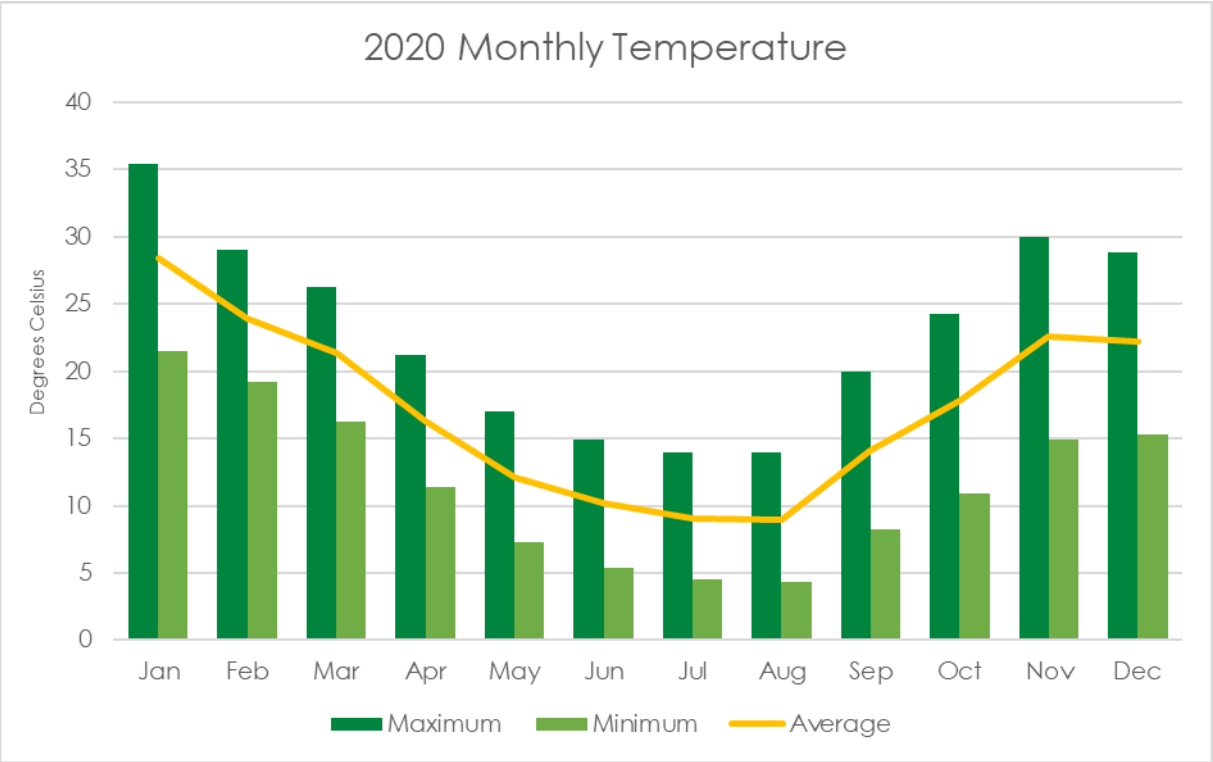


Figure 7 Monthly temperature records

6.2.2 *Rainfall*

A total rainfall of 643.3 mm was recorded at the MET monitoring station during the reporting period. Due to a number of instrumentation issues, unreliable data (January to May, inclusive) has been supplemented with results from the Parkes Airport weather station, located approximately 27km to the Southeast. Northparkes and Parkes Airport are located within the same rainfall belt, experiencing similar long-term averages however slightly higher at the airport. The total onsite rainfall for the period is estimated at 796.6mm and represents a 590.0mm (386%) increase from the previous reporting period. The rainfall received during the reporting period was 186.6mm above the long-term average for the region (610mm). A comparison of 2019 and 2020 rainfall is shown in Figure 8 below.

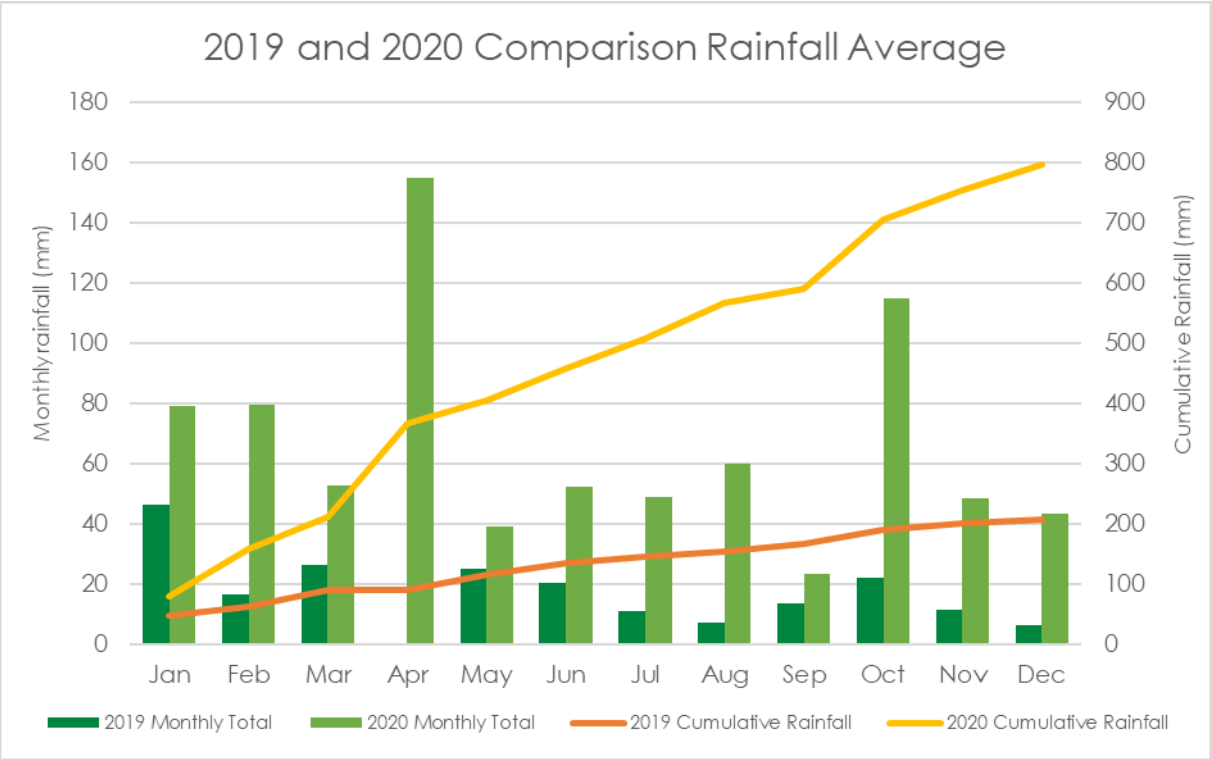


Figure 8 Comparison of 2019 and 2020 rainfall

***** (Parkes Airport data used from January to May 2020, inclusive)

6.2.3 Wind

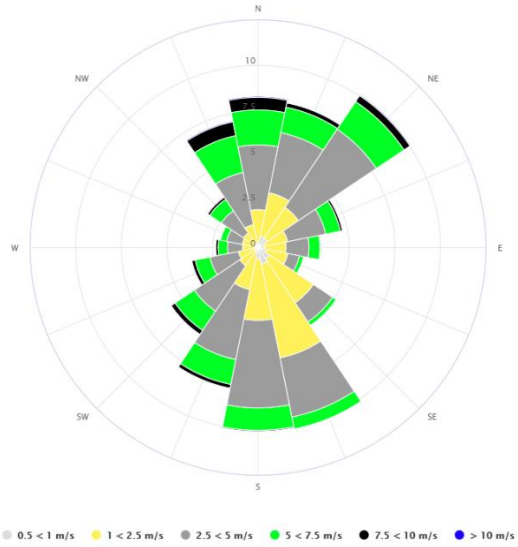
Wind speed and direction are important parameters for the preparation of blasting activities, investigating noise and dust events, and assessing cumulative impacts as a result of other operations in the region. Wind data for the 2020 reporting period are presented in Table 12 and the wind roses provided in Figure 9. Wind speed values are displayed as metres per second.

Table 12 Monthly wind direction percentages for 2020

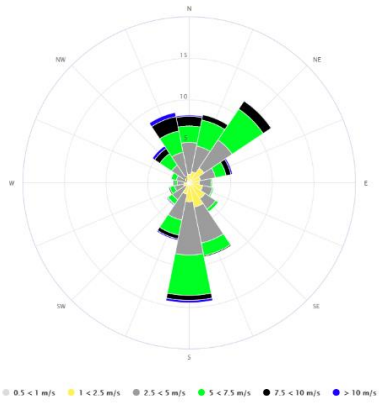
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
N (337.6° - 22.5°)	18	16	19	22	15	13	10	15	26	20	19	11
NE (22.6° - 67.5°)	21	20	33	13	10	17	13	11	24	20	23	13
E (67.6° - 112.5°)	6	9	9	4	5	5	4	3	5	8	9	23
SE (112.6° - 157.5°)	9	14	7	11	14	15	15	15	13	15	13	5
S (157.6° - 202.5°)	24	22	16	20	28	22	34	19	11	15	17	17
SW (202.6° - 247.5°)	7	8	6	12	15	16	16	18	6	9	9	20
W (247.6° - 292.5°)	4	4	3	5	4	6	3	11	6	4	3	8
NW (292.6° - 337.5°)	11	7	7	13	8	6	5	8	9	8	8	4

Analysis of data reveals that prevailing winds during the 2020 reporting period were predominantly from the North and South. Stronger winds during summer and spring periods were typically experienced from the North whilst Autumn and Winter were typically from the South. The prevailing wind conditions during this reporting period were consistent with the historical data as presented in the Step Change Environmental Assessment (EA), Umwelt 2013. Average wind speeds were generally consistent through the year recording 3.45m/s in H1 and 3.19m/s in H2.

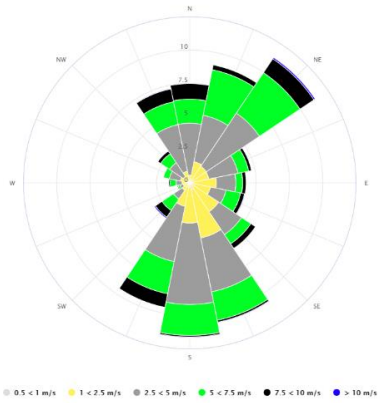
Annual 2020

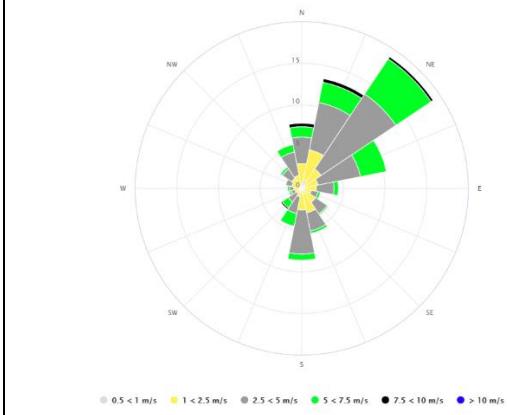
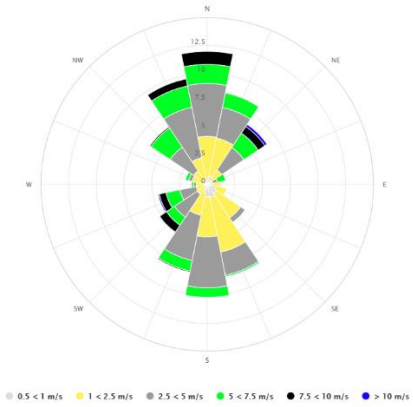
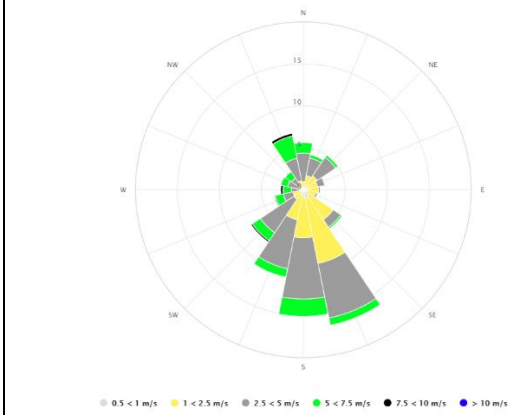
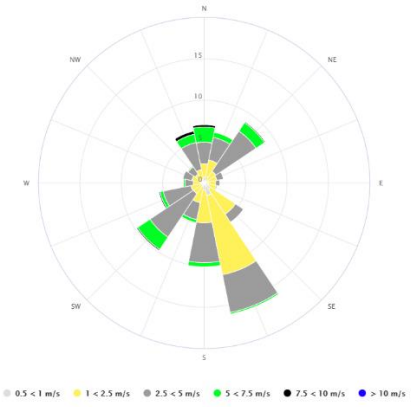
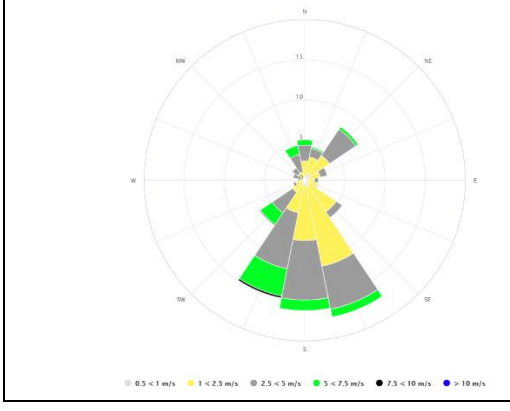
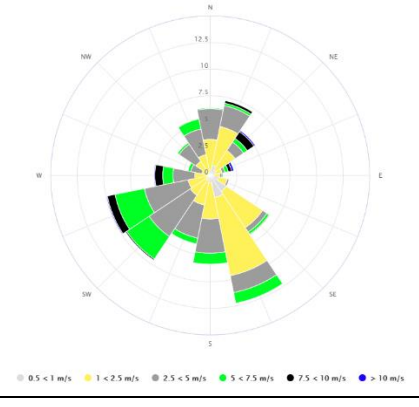


January 2020



February 2020



March 2020	April 2020
	
May 2020	**June 2020**
	
July 2020	**August 2020**
	

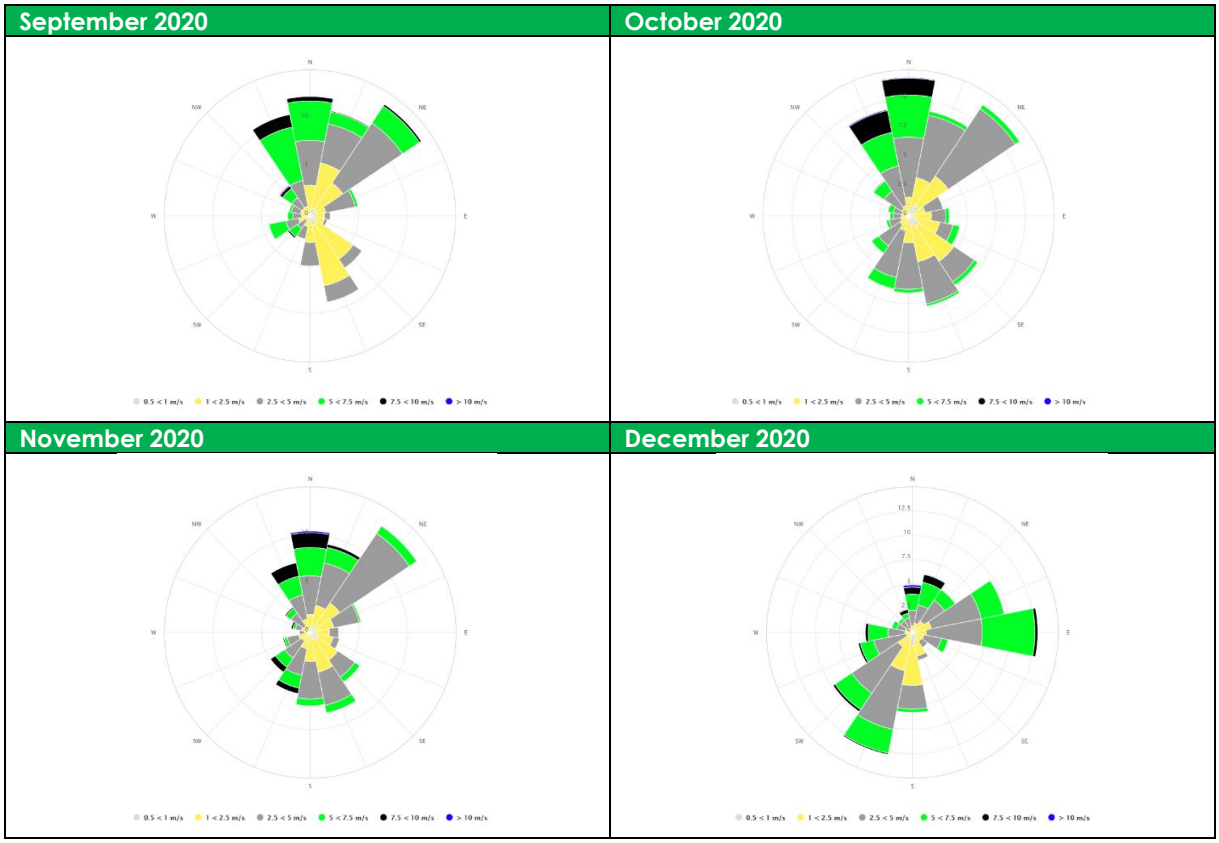


Figure 9 Monthly wind rose summary for 2020

6.2.4 Meteorology Improvements and Initiatives

Building on the work completed during the 2019 reporting period, CMOC continued to implement and refine the environmental database at Northparkes. This included ongoing utilisation of real-time meteorological data and weather forecasting to guide the implementation of reactive and proactive mitigation measures.

6.3 Air Quality

6.3.1 Air Quality Management

Air quality management is undertaken in accordance with the approved Air Quality Management Plan (AQMP). The AQMP outlines mitigation measures, required monitoring and provides clear definitions of the roles and responsibilities related to air quality and greenhouse gas management.

Through implementation of the AQMP, Northparkes executes a range of mitigation measures for air quality that have proved to be effective at managing dust impacts, demonstrated by maintaining compliance with criteria specified in the Consent. These will continue to be implemented throughout 2021. During the 2020 reporting period, mitigation measures included, but were not limited to, the following:

- Major works scheduled to undergo a risk assessment prior to commencing work
- Environmental inductions and training to ensure workforce awareness
- Purchase of equipment that meets relevant air emission standards
- Maintaining plant and machinery in good working order
- Maintaining haul roads in good condition
- Regular contact with local residents

- Weekly internal weather assessment
- Sealing high traffic roads, where possible
- Use of water carts on construction haul roads
- Scheduling of work with attention paid to adverse weather conditions and modifications made to the work program where necessary
- Implementation of best management practice to minimise the construction, operational and road air quality impacts of the operations
- An air quality management system that uses a combination of predictive meteorological forecasting and real-time weather monitoring data to guide the day-to-day planning of construction and mining operations, and the implementation of both proactive and reactive air quality mitigation measures to ensure compliance with the relevant conditions and approvals and
- A program of regular air quality monitoring of site operations to determine whether the operations are complying with the criteria set out in the Consent.

Northparkes implements a dust monitoring program to measure concentrations of depositional dust, Total Suspended Particulates (TSP) and Particulate Matter (PM10) in the vicinity of the Northparkes operations. Depositional dust monitoring provides an indication of levels of dust in the atmosphere measured in g/m²/month of insoluble matter. TSP monitoring measures the total of all particles suspended in air, utilising a High-Volume Air Sampler (HVAS). PM10 measures the concentration of particulate matter less than 10 microns in diameter, utilising real-time Beta-Attenuation Monitoring (BAM). Results from monitoring are discussed in Section 6.3.2.

The current dust monitoring program includes 11 depositional dust gauges, three HVAS's and three BAM's, details of which are provided in Table 13. A figure showing the location of each air quality monitoring site is provided in Appendix 1.

Table 13 Air Quality Monitoring Sites

Site ID	Type	Units	Frequency
Milpose	PM10 (BAM) and TSP (HVAS)	µg/m3	Continuously and Every 6 days
Hubberstone	PM10 (BAM) and TSP (HVAS)	µg/m3	Continuously and Every 6 days
Hillview	PM10 (BAM) and TSP (HVAS)	µg/m3	Continuously and Every 6 days
ND19	Deposited dust gauge	g/m2/month	Monthly
ND20	Deposited dust gauge	g/m2/month	Monthly
ND21	Deposited dust gauge	g/m2/month	Monthly
ND22	Deposited dust gauge	g/m2/month	Monthly
TDE	Deposited dust gauge	g/m2/month	Monthly
TDE5	Deposited dust gauge	g/m2/month	Monthly
TDN5	Deposited dust gauge	g/m2/month	Monthly
TDNE	Deposited dust gauge	g/m2/month	Monthly
TDS5	Deposited dust gauge	g/m2/month	Monthly
TDSW	Deposited dust gauge	g/m2/month	Monthly
TDW	Deposited dust gauge	g/m2/month	Monthly

6.3.2 *Air Quality Performance*

All dust samples are collected by trained staff and analysed by NATA certified laboratories. This work is carried out in accordance with relevant statutory and industry code standards. Monitoring equipment is maintained in accordance with manufacturer's specifications.

During the reporting period dust lift-off from the TSFs was managed through the implementation of a variety of different strategies. These strategies included the:

- Deposition of wet tailings on Estcourt and Rosedale TSFs,
- Sowing continued with approximately 80 hectares of the barley and native saltbush mix on TSF2.

The barley sowing of TSF2 was largely successful as a result of above average rainfall and provided effective dust mitigation during the period. The stubble will remain during the next reporting period though further initiatives are being explored to further improve the program.

Following the barley sowing on TSF2, a native saltbush mix was broadcast along transects of the facility. The saltbush mix germinated successfully and has started to colonise across the seeded areas. There is also significant evidence that previously planted tubestock are self-colonising portions of the tailings surface. Natural germination and succession have been occurring over a number of years, slowly working towards a functioning community.

PM_{10}

PM10 monitoring results for the 'Hubberstone' (Figure 10 and Figure 11), 'Milpose' (Figure 12 and Figure 13)and 'Hillview' (Figure 14 and Figure 15) monitoring locations, for the reporting period are displayed below. The criteria for exceedances (as nominated in the Consent) is >30 µg/m^3 for the annual average and >50 µg/m^3 for a 24-hour monitoring period.

Monitoring results for the three locations were under the air quality criteria stated in the Consent, with all outliers removed. During the reporting period, there were a total of thirty-eight 24hr periods at Milpose, forty-four 24hr periods at Hubberstone and nineteen 24hr periods at Hillview that recorded elevated particulate matter above the criteria stated in the Consent. Each of these readings triggered an internal investigation which determined that all elevated results were the result of non-mining influences. These included localised agricultural activities (sowing, harvesting and livestock management), bushfire smoke and the ongoing drought conditions resulting in reduced vegetation cover promoting dust lift off across the local district. The NSW Governments Regional Air Quality Monitoring Network (RAQMN) report outlines that combinations of little rainfall, minimal vegetation cover and bush fire smoke have resulted in increased levels of dust haze throughout the region during the first quarter of the reporting period. Following widespread rain in February, elevated results decreased significantly and are now in line with historical data.

The annual average PM10 levels recorded at all monitoring locations are within the predicted levels of the EA (20 µg/m^3).

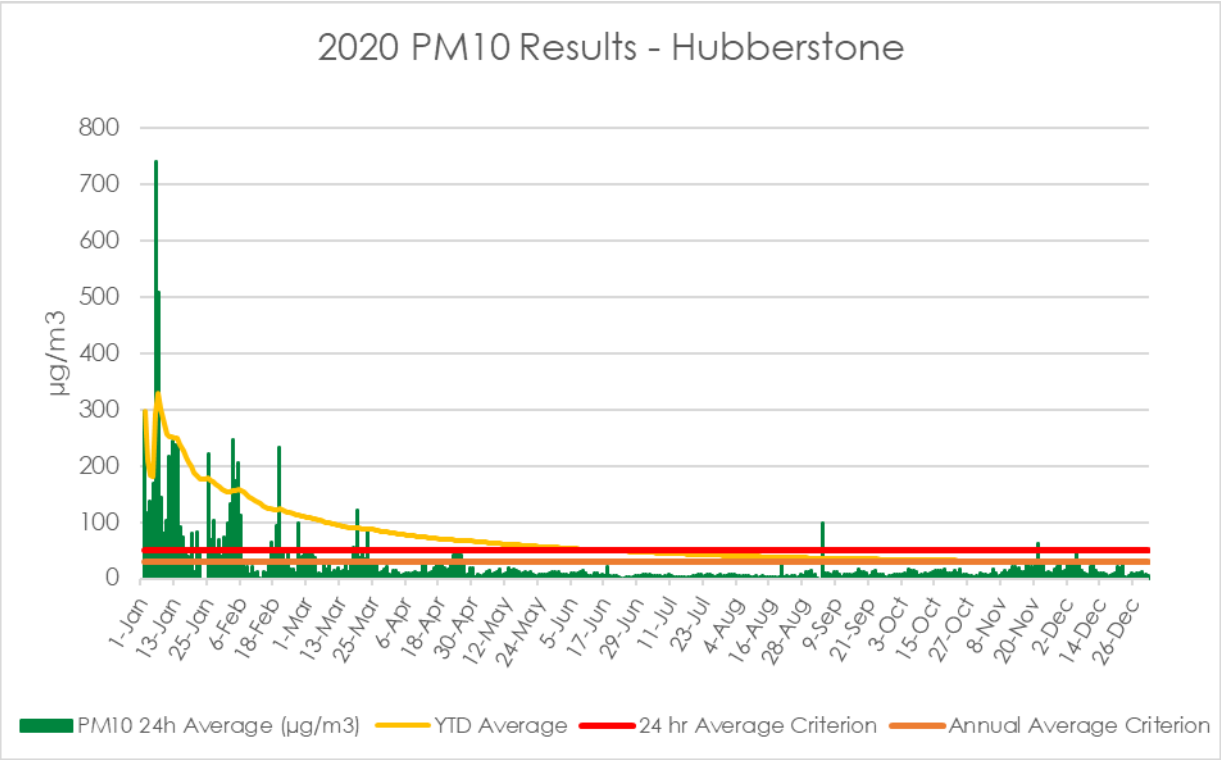


Figure 10 PM10 Monitoring results - Hubberstone

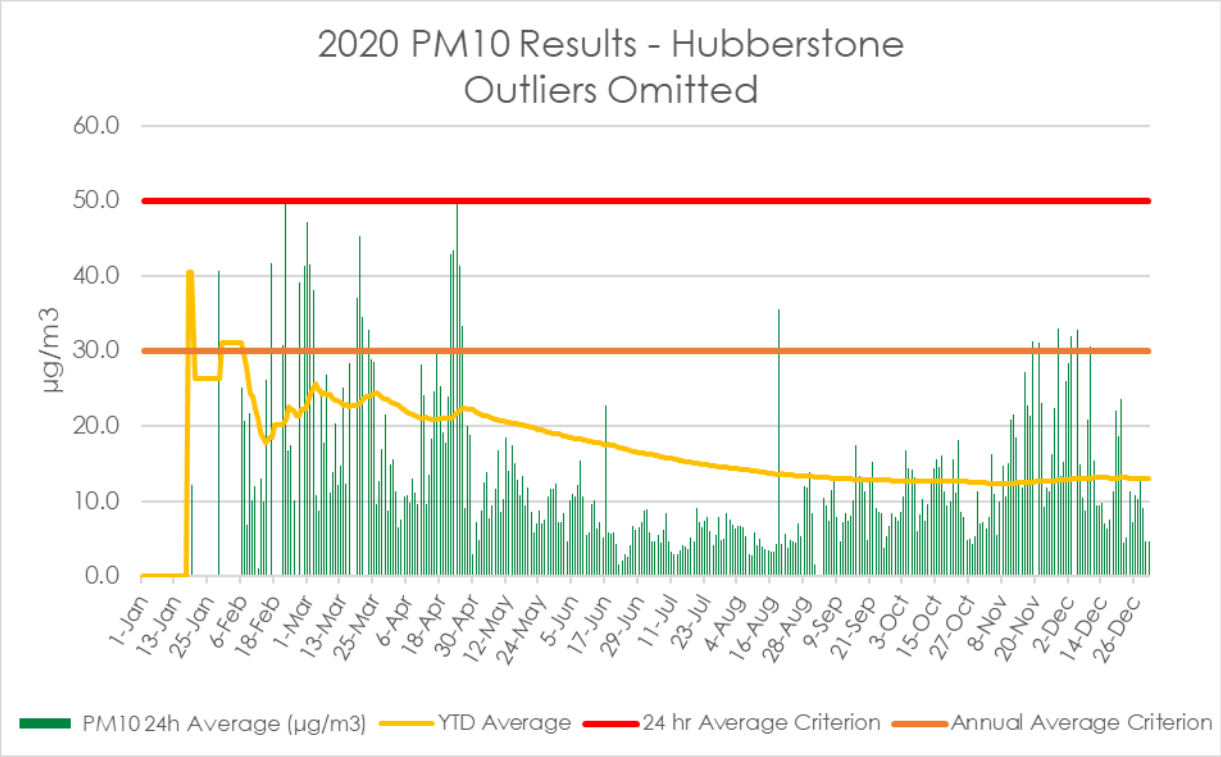


Figure 11 PM10 Monitoring results with outliers omitted - Hubberstone

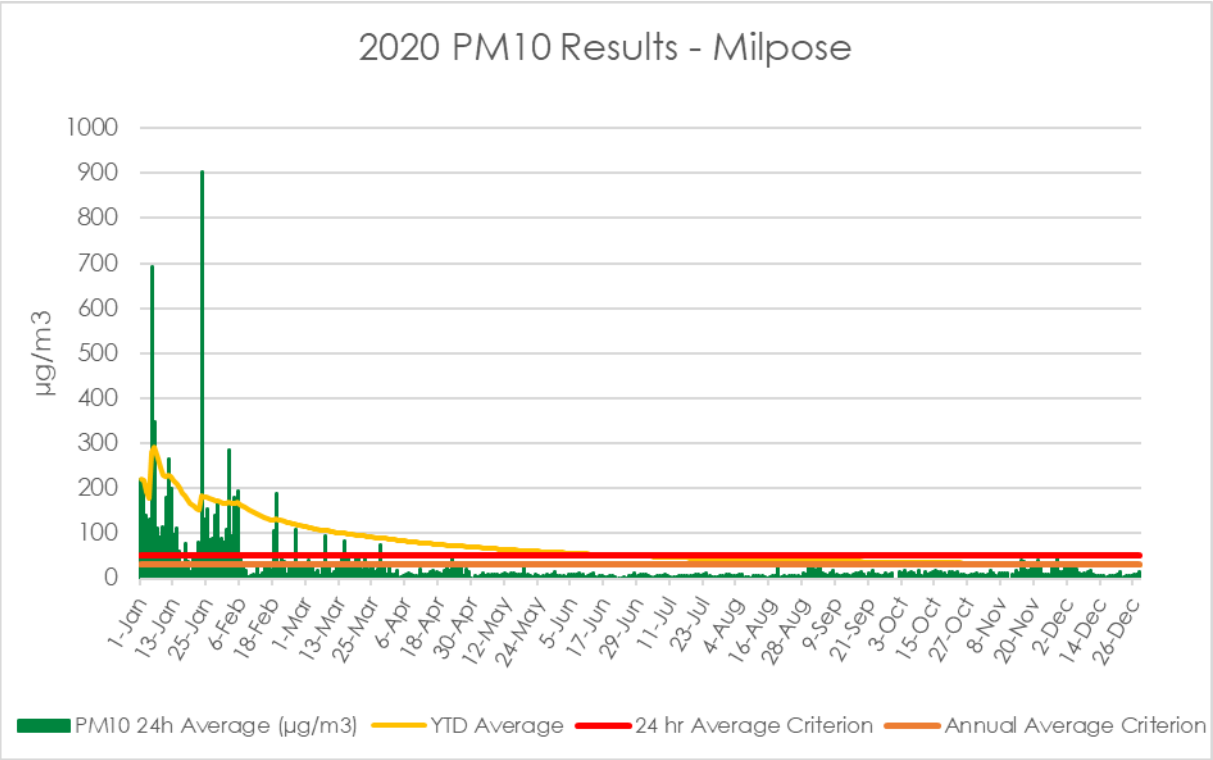


Figure 12 PM10 Monitoring Results – Milpose

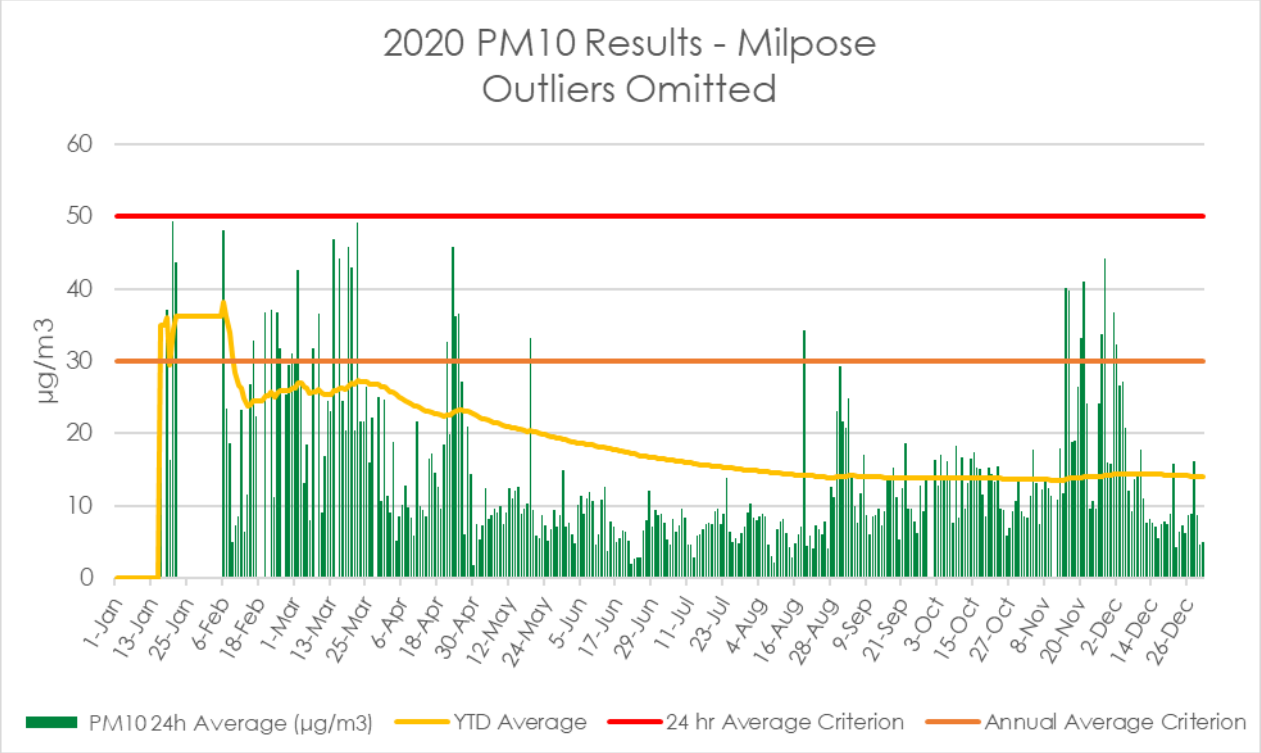


Figure 13 PM10 Monitoring results with outliers omitted – Milpose

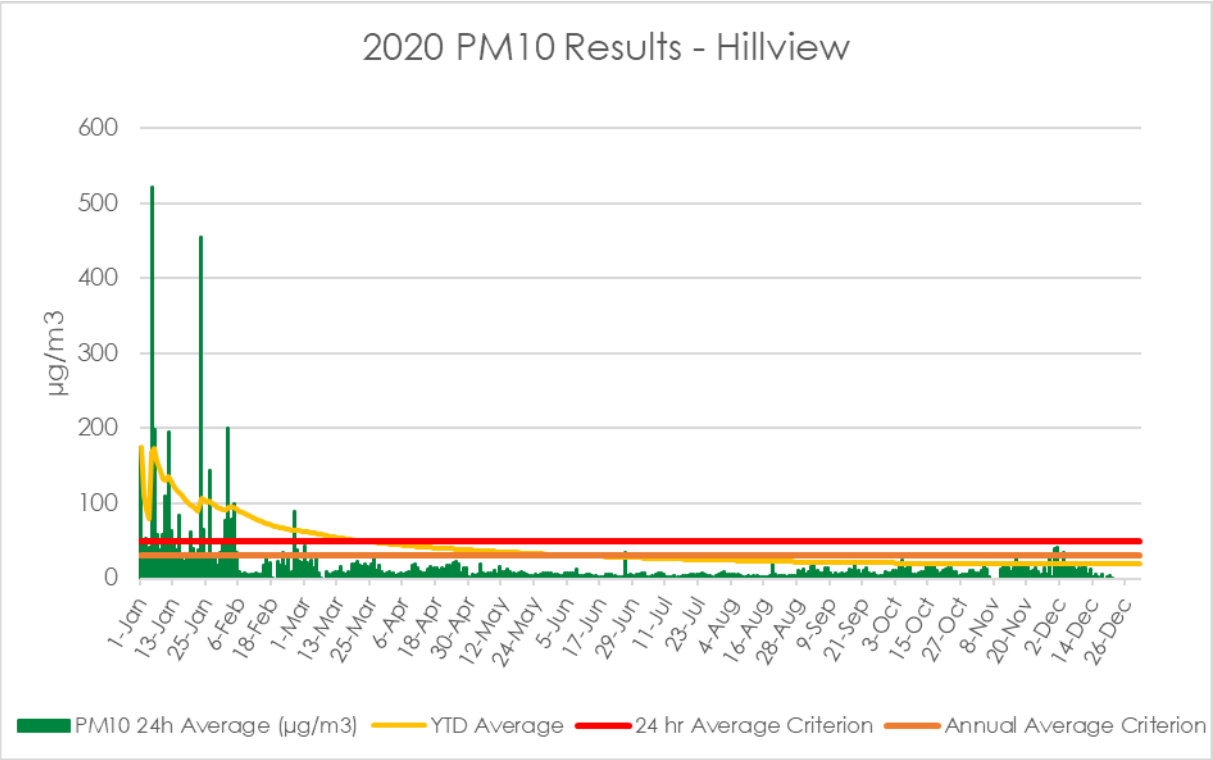


Figure 14 PM10 Monitoring Results – Hillview

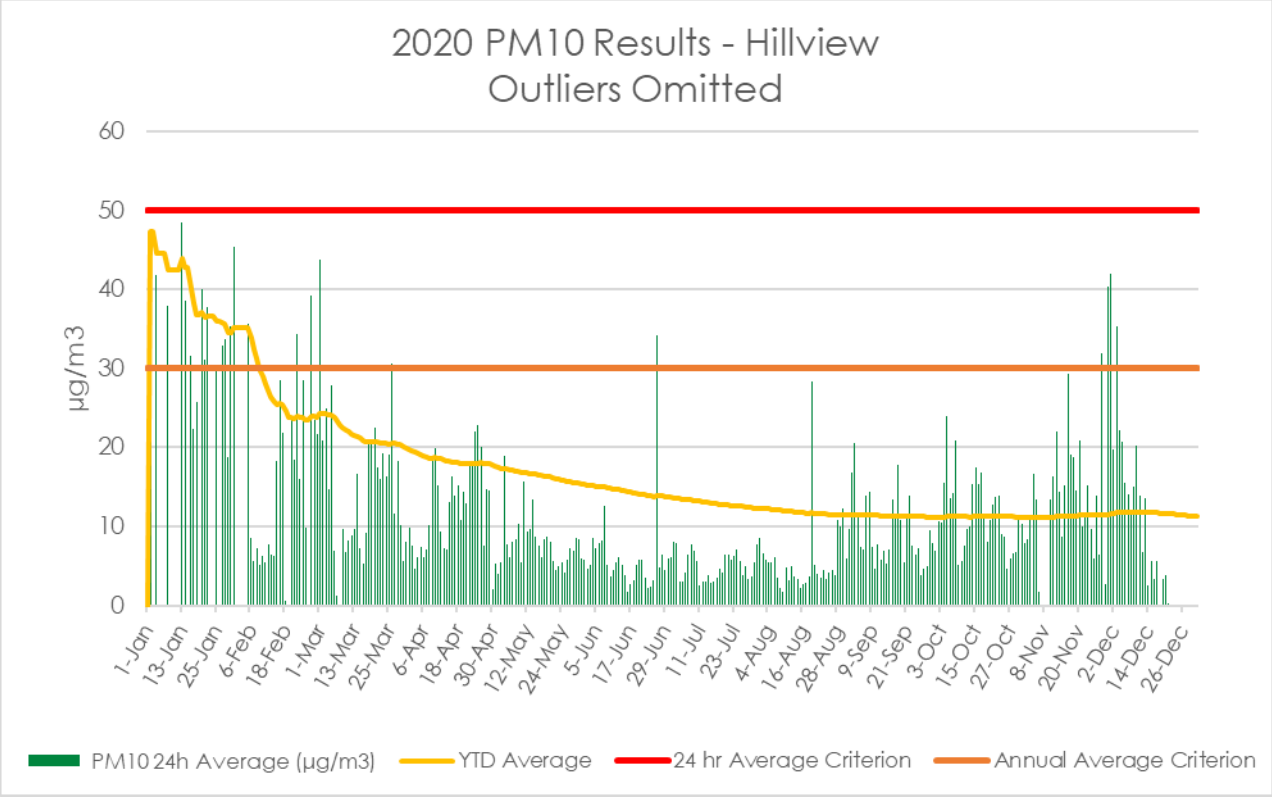


Figure 15 PM10 Monitoring results with outliers omitted – Hillview

Total Suspended Particulates (TSP)

TSP monitoring results for the 'Hubberstone' (Figure 16 and Figure 17), 'Milpose' (Figure 18 and Figure 19) and 'Hillview' (Figure 20 and Figure 21) monitoring locations for the reporting period are displayed below. All recorded dust levels were under the required criteria set by the Consent (90 µg/m³) for the 2020 monitoring period with outliers omitted. The annual average TSP dust levels recorded at all TSP monitoring locations are below the predicted levels within the EA (50 µg/m³). The combination of little rainfall, minimal vegetation cover and strong winds from the previous period resulted in elevated readings during the early months of January and February. Following widespread rainfall events, results at all locations are now in line with historical data.

The missing data for Hubberstone, Milpose and Hillview in Figure 16, Figure 18 and Figure 20, respectively, were the result of power supply issues to the monitoring unit.

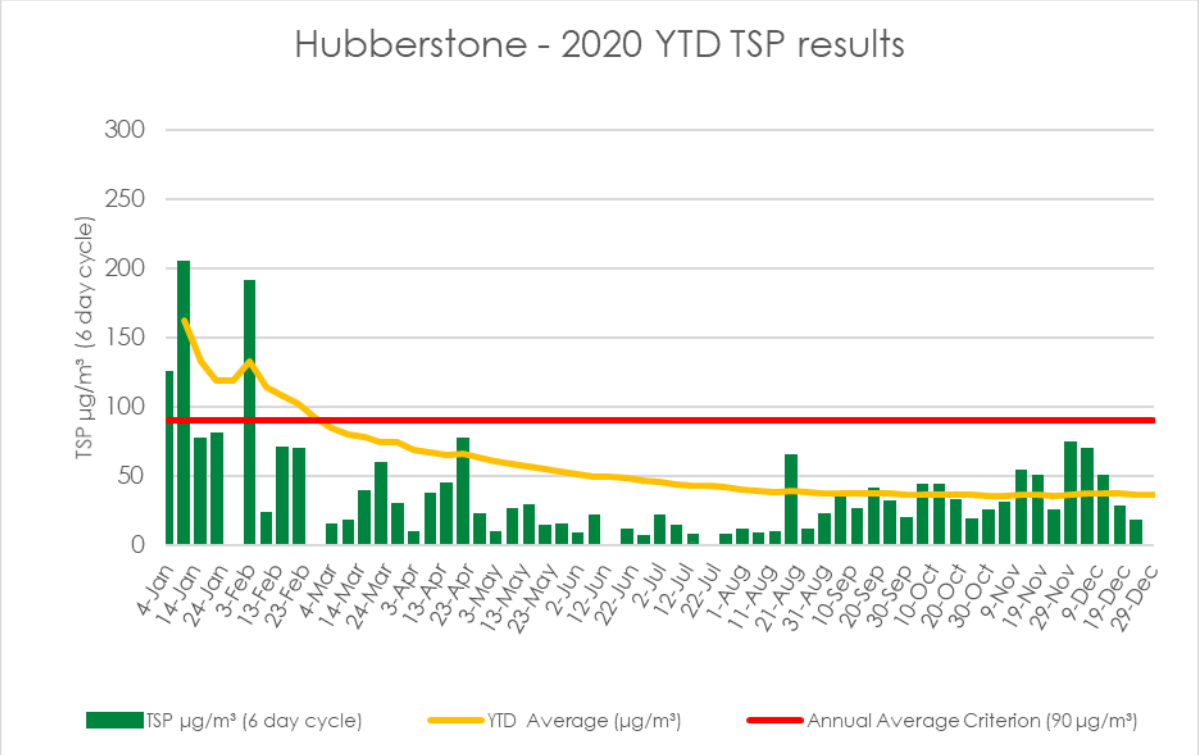


Figure 16 TSP Results for Hubberstone

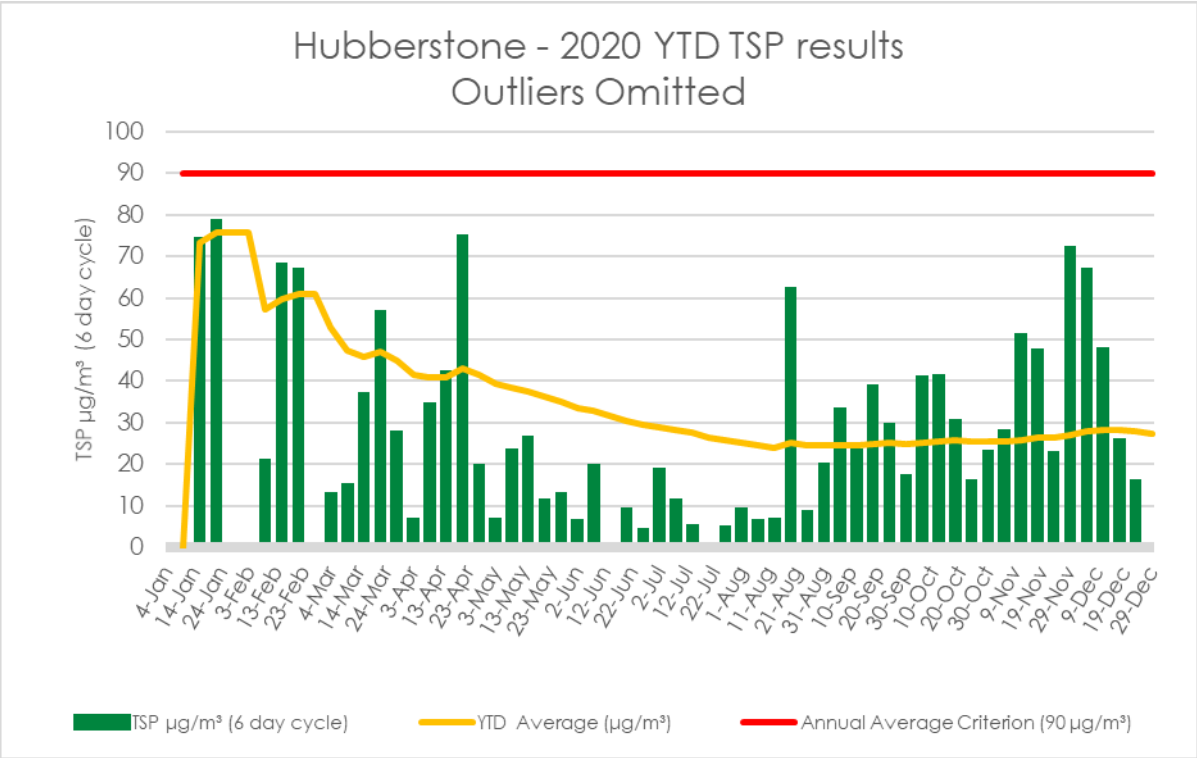


Figure 17 TSP Results for Hubberstone with outliers omitted

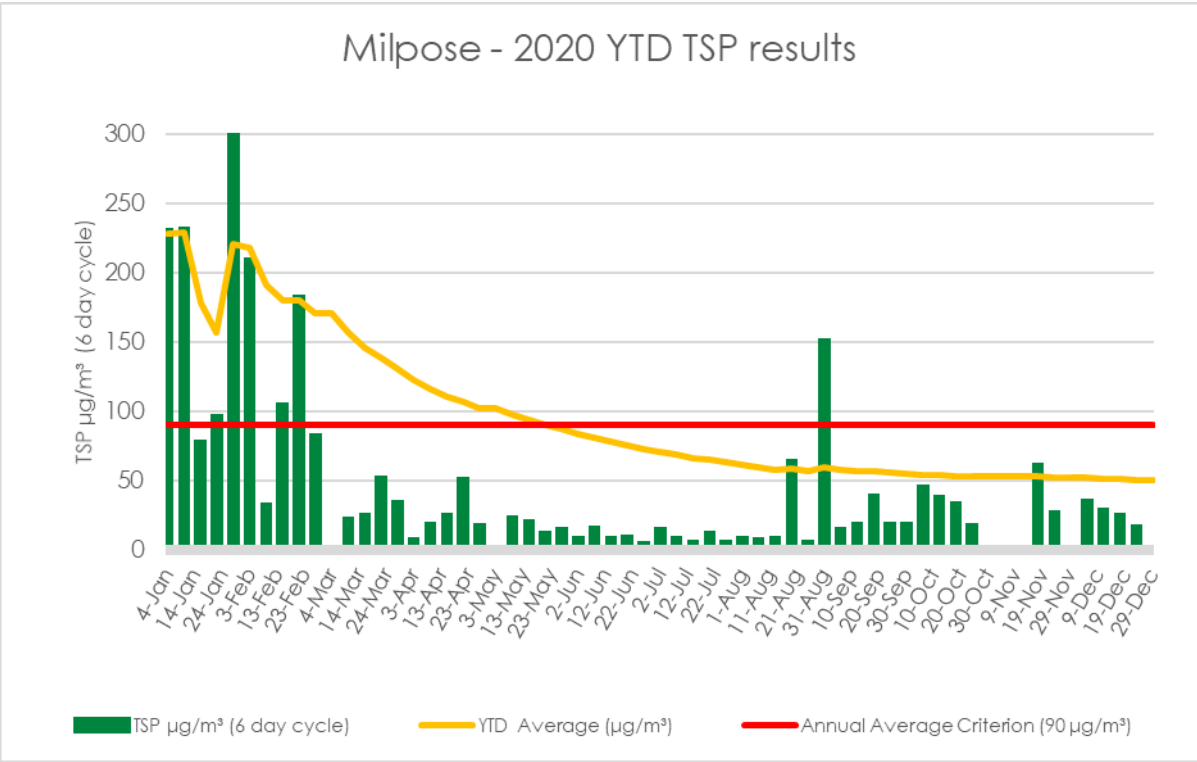


Figure 18 TSP Results for Milpose

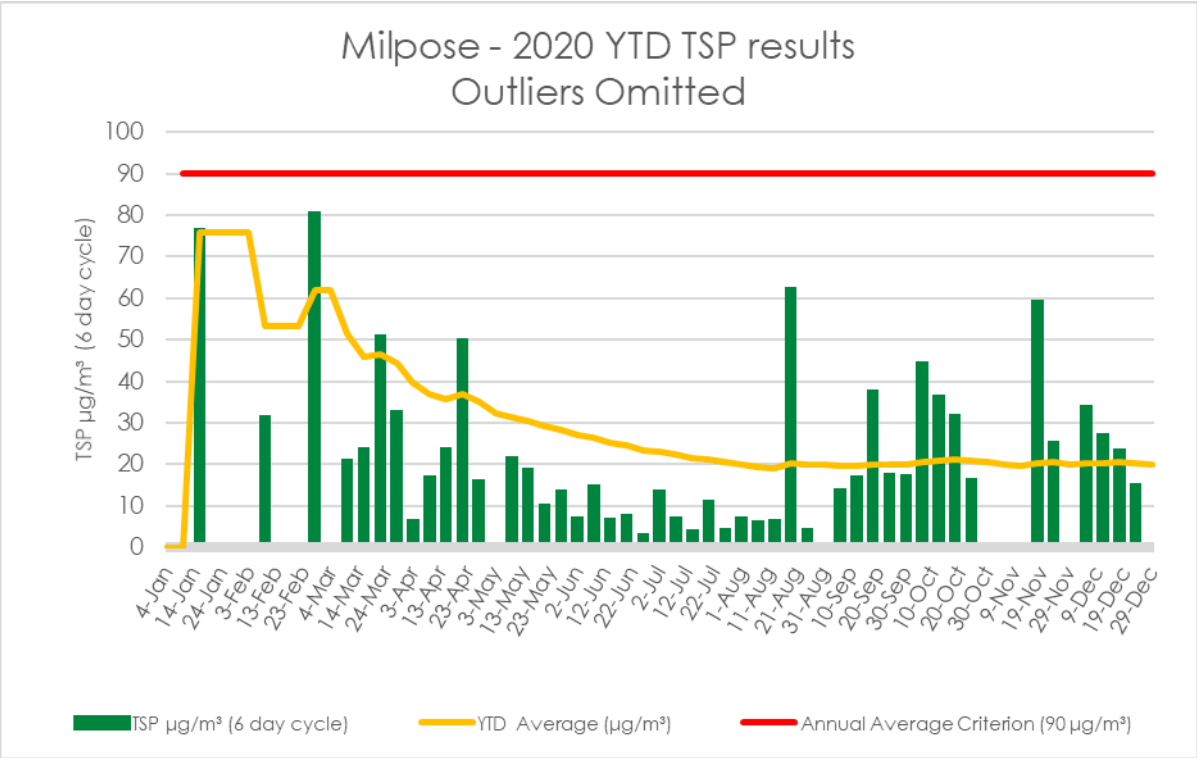


Figure 19 TSP Results for Milpose with outliers omitted

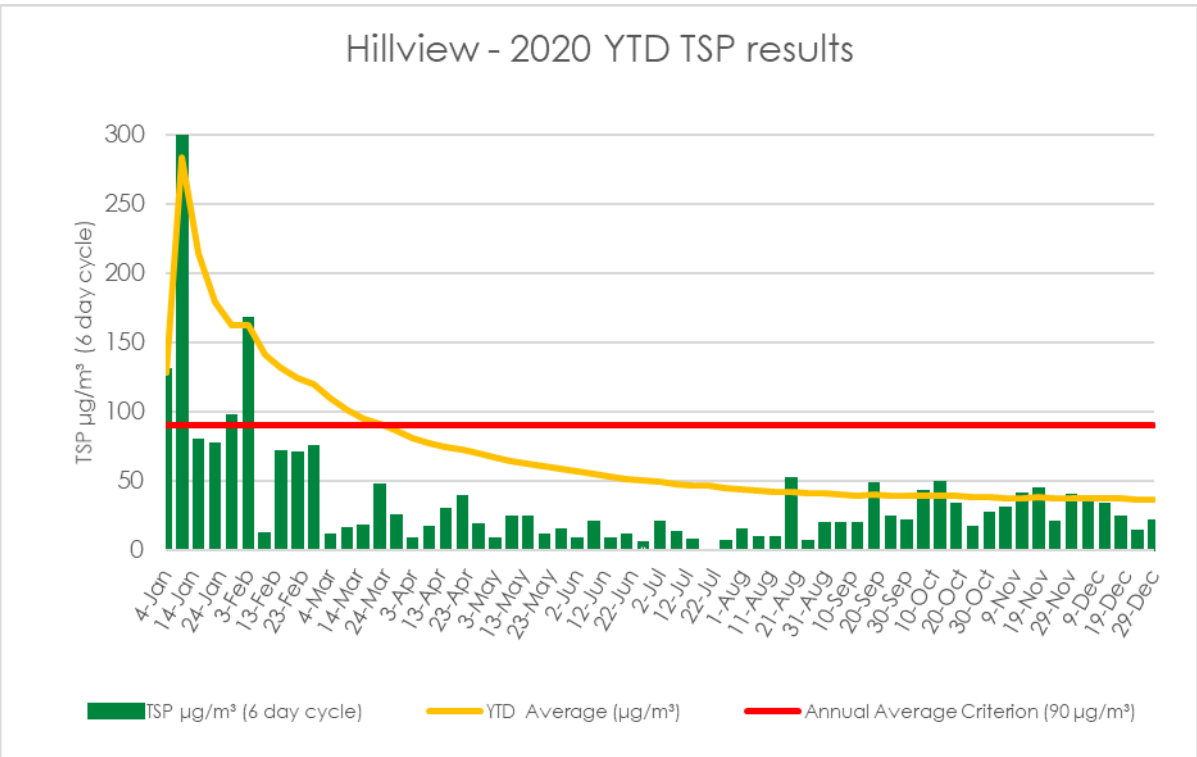


Figure 20 TSP Results for Hillview

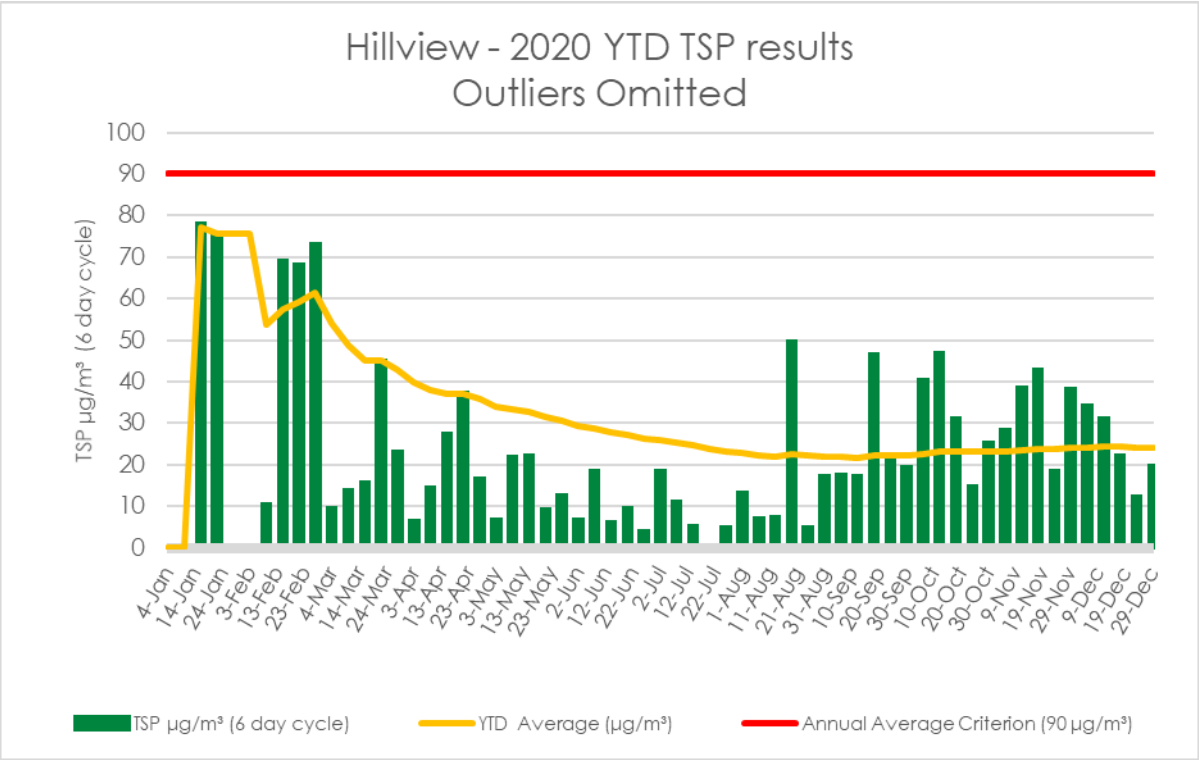


Figure 21 TSP Results for Hillview with outliers omitted

Depositional Dust

Depositional dust samples were analysed by a NATA accredited laboratory to determine sample contamination by naturally occurring impurities. Figure 22 presents the annual average results following laboratory analysis of all eleven dust gauges. The results indicate that all reportable depositional dust gauges remained below the annual average criterion of 4.0 g/m2 /month for the 2020 period.

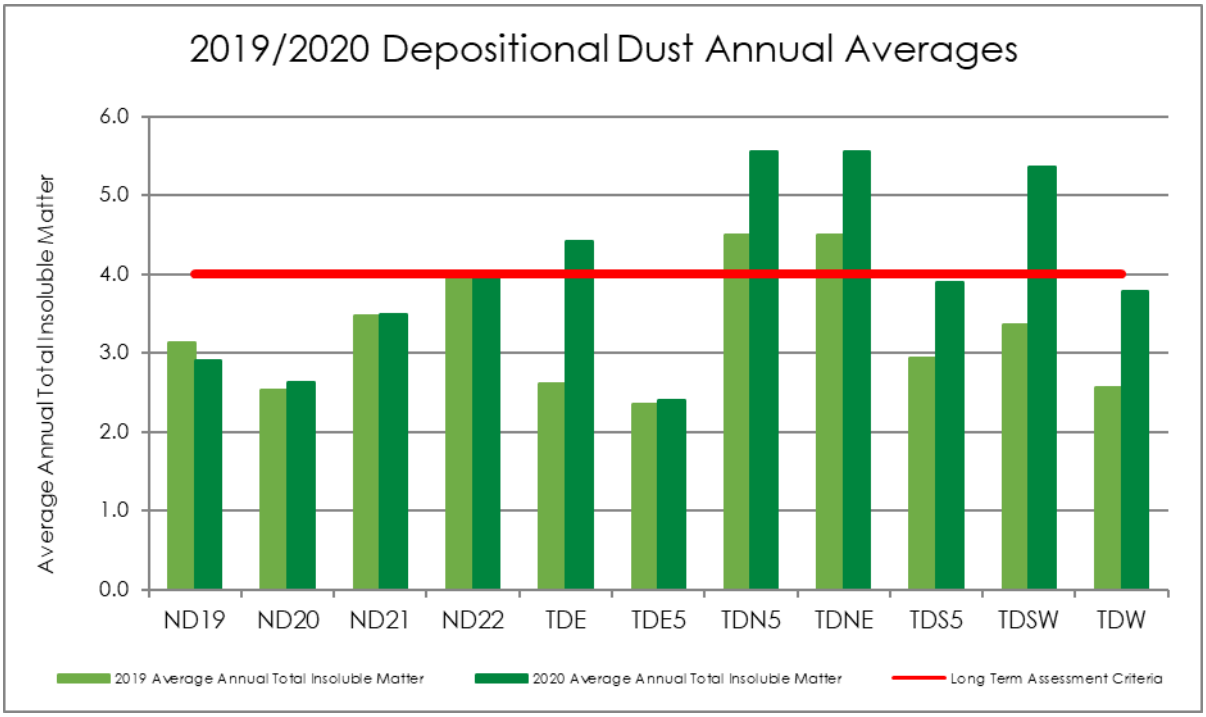


Figure 22 Depositional Dust Annual Averages

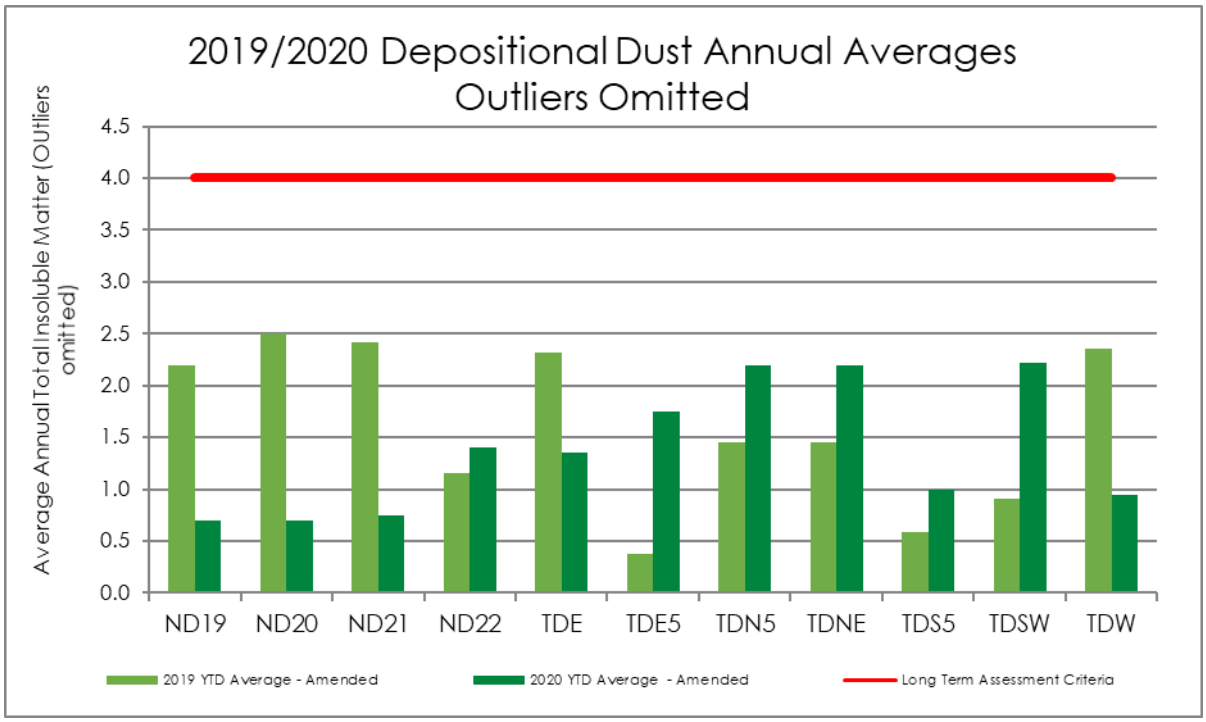


Figure 23 Depositional Dust Annual Averages with outliers removed

Depositional dust systems are often subject to contamination by naturally occurring impurities such as bird droppings, insects and vegetation or regularly impacted by local extraneous sources (such as farming activities, local dirt roads or large dust storms following lengthy drought periods). On thirty-five separate occasions over the reporting period, samples were deemed contaminated and removed from the data as outliers. Each reportable elevated result exceeding internal trigger levels is subject to an investigation. These investigations determined that all high readings were the result of localised agricultural activities (sowing, harvesting and livestock management) or the ongoing drought conditions promoting dust lift off across the local district.

All dust gauge results, with outliers removed, remain below the criteria specified in the Consent. Between 2013 and 2015, the rolling annual average of all gauges was on an upward trend. During 2015, the trend stabilised and then began trending downwards during 2016. Depositional dust levels during the 2018 and 2019 periods reported upward trending as a result of increasing drought conditions. During January and February of 2020, drought conditions were still heavily impacting recorded dust levels before widespread rainfall prompted results to return to that in line of long-term historical data.

6.3.3 Air Quality Improvements and Initiatives

During the period, Northparkes undertook an internal review of the depositional dust monitoring program to investigate possible improvement opportunities. A number of efficiencies were identified at several monitoring locations to improve the long-term effectiveness of the program. Locations that are consistently impacted by extraneous sources nearby are proposed to be removed or relocated. The review was provided to the EPA for comment before being submitted to the Department for approval in 2021.

Northparkes will look to employ a number of additional strategies for managing potential air quality impacts, these include:

- Investigating alternate sowing opportunities on inactive tailings facilities to provide ground cover and to reduce risk of dust lift off and
- Alternate tailings material deposition between the active TSFs, reducing exposed areas.

6.4 Noise

6.4.1 Noise Management

Operational noise is managed by Northparkes in accordance with the approved Noise Management Plan (NMP). The NMP covers all operational activities with the potential to generate noise at Northparkes. It details specific noise management and mitigation measures, outlines monitoring and reporting requirements and provides clear definition of the roles and responsibilities for noise management.

Control measures for the management of noise during construction, operation and decommissioning are essential in minimising noise impacts. The three main strategies used to identify reasonable and feasible noise control/mitigation strategies are:

- Controlling noise at the source
- Controlling the transmission of noise, and
- Controlling noise at the receiver.

Noise control measures at Northparkes are designed to comply with the Consent and the requirements of the *NSW Noise Policy for Industry (2017)*.

Operational control measures include:

- Northparkes has a private agreement in place with the owners of "Avondale" for the property to not be included in the monitoring program while it remains unoccupied
- Major works scheduled undergo a risk assessment prior to commencing work
- Environmental inductions and training to ensure workforce awareness
- Purchase of equipment that meets relevant noise emission standards
- Maintaining plant and machinery in good working order
- Maintaining haul roads in good condition
- Operating equipment in a manner that will minimise noise emissions
- Regular contact with local residents
- Modifications to surface ventilation fans
- Scheduling of work with attention paid to adverse weather conditions, particularly at night, and modifications made to the work program where necessary
- Implementation of best management practice to minimise the construction, operational and road noise of the operations
- A program of regular noise monitoring of site operations to determine whether the operations are complying with the criteria set out in the Consent. This monitoring will be undertaken as attended and real-time noise monitoring at surrounding receivers over the life of the mine and
- Additional targeted noise monitoring during construction activities, and whilst open cut mining operations occur during winter night time operations if required. This targeted monitoring program will include the use of real time monitoring and be undertaken to identify situations when meteorological conditions have the potential to exacerbate noise impact on neighbouring receivers. Appropriate noise mitigation measures will be implemented as required.

6.4.2 Noise Performance

Northparkes undertakes a noise monitoring program at five locations on privately owned properties outside the mining leases. The program consists of both operator-attended and unattended surveys at four of the nearest occupied residences, 'Hubberstone', 'Milpose', 'Lone Pine' and 'Hillview' (see Appendix 1). Attended monitoring is also undertaken at 'Adavale' which was added to the quarterly monitoring program in December 2020.

Noise measurements are undertaken in accordance with the requirements of the Consent, *AS 1055*, and the *NSW Noise Policy for Industry, 2017*. Northparkes engaged acoustic specialists to undertake attended noise monitoring on a quarterly basis at locations defined in the NMP to adequately assess the noise impacts related to Northparkes operations. All acoustic instrumentation is designed to comply with the requirements of *AS 1259.2* and carries current NATA or manufacturer calibration certificates.

Temperature inversions, when they occur, have the ability to increase noise levels by focusing sound waves. Temperature inversions occur predominantly at night during the winter months but can also occur as a result of low cloud cover. They are generally determined based on the occurrence of atmospheric stability classes, with moderate and strong inversions corresponding to atmospheric stability categories F and G respectively.

A total of 153 fifteen-minute LAeq attended noise surveys were undertaken during the reporting period. Of which, 144 (94%) were during favourable meteorological conditions, as stipulated in the Consent. The surveys undertaken during unfavourable meteorological conditions were excluded from assessment. The reasons for this included wind speed exceeding 5 m/s and assessment being undertaken during stability class of F or G.

Unattended noise monitoring was conducted continuously over the year at each monitoring location. This data was used to assess background ambient noise levels and do not have an applicable exceedance criterion.

Targeted noise assessments were also undertaken during the commissioning of the E48 vent system to ensure noise levels are in line with Consent conditions and those predicted in the EA. An independent assessment was undertaken to gain an understanding of the impact at nearby privately-owned residences from the new vent fan. Noise results were somewhat higher than previous results (but still lower than Consent criteria) at the Adavale monitoring location. Mitigative solutions to reduce noise have been implemented and are being further investigated to continue to reduce potential noise impact.

A summary of the attended noise monitoring results is provided in Table 14. This includes all quarterly monitoring conducted in 2020.

Table 14 Summary of Attended Noise Monitoring Results

Location		Day	Evening	Night	
		L_{Aeq}(15min)	L_{Aeq}(15min)	L_{Aeq}(15min)	L_{A1}(1min)
	Criteria dB (A)	**35**	**35**	**35**	**45**
Hubberstone	9-10 Mar	^	^	^	<35
	3-4 Jun	<25	*27	*25	<40
	25-26 Aug	<25	30	30	<40
	2-3 Dec	^	^	^	<35
Lone Pine	9-10 Mar	^	^	<25	<35
	3-4 Jun	^	*23	*26	<40
	25-26 Aug	^	27	26	<40
	2-3 Dec	^	<25	<30	<40

Milpose	9-10 Mar	^	<30	<25	<35
	3-4 Jun	^	*<20	*22	<40
	25-26 Aug	^	^	^	<40
	2-3 Dec	^	^	^	<40
Hillview	9-10 Mar	^	^	^	<35
	3-4 Jun	^	*^	*^	<40
	25-26 Aug	^	^	^	<40
	2-3 Dec	^	^	^	<40
Adavale	-	-	-	-	-
	-	-	-	-	-
	-	-	-	-	-
	2-3 Dec	^	<25	*34	<40

Note: Measurements represent total mine contribution by excluding impact noise from extraneous sources such as wind noise and fauna. As LA[1] results are not adjustable, this measurement is not representative of noise produced by the mine and should be disregarded. Results indicating a * have been recorded during a stability class of F or G and are not a true representation of the mine noise contribution.
^ Northparkes Inaudible.
~ Northparkes Slightly Audible
≠ Not measurable

Noise levels assessed as part of the monitoring program were within all operational noise criteria. They were also lower than the noise levels predicted in the EA (Umwelt, 2013), and did not exceed the sleep disturbance limit at night. Northparkes was successful in achieving the long-term intrusive noise goals during the 2020 reporting period.

All attended monitoring reports for the reporting period are available on the Northparkes webpage at: http://www.northparkes.com/news/#publications

6.4.3 Noise Improvements and Initiatives

Northparkes will continue to implement the operational controls in the approved NMP, including its quarterly attended noise monitoring program, to ensure compliance with the approved limits.

Additional mitigative solutions to alleviate the increased noise impact from the E48 vent fans are being investigated which will be implemented during the next reporting period.

Targeted noise surveys are scheduled to occur in 2021 during the commissioning of the new secondary crushing circuit and CV025 conveyor to ensure operations

6.5 Blasting

6.5.1 Blasting Management

Northparkes does not currently undertake surface blasting activities. Therefore, all associated management activities are not currently applicable. If surface mining activities resume, management and monitoring practices will be re-established.

6.5.2 Blasting Performance

Blast monitoring did not occur during the reporting period due to there being no surface blasting activities in 2020.

6.5.3 Blasting Improvements and Initiatives

The vibration monitoring program will be reviewed if operational changes occur.

6.6 Biodiversity and Ecology

6.6.1 Biodiversity and Ecology Management

Biodiversity impacts at Northparkes are managed in accordance with the approved Biodiversity Offset Management Plan (BOMP) and Vegetation Management Plan (VMP), collectively known as the Offset Management Documents (OMD). The OMD provides a framework for managing biodiversity values within the project boundary, Biodiversity Offset Areas (BOAs), and wider locality.

The OMD guides the implementation of offsetting commitments and manages potential risks to biodiversity as a result of operations at Northparkes. Specifically, the OMD aims to:

- Describe the measures (short, medium and long-term) to be implemented to manage remnant vegetation and habitat within the Project boundary and BOAs, including detailed performance and completion criteria
- Describes enhancement practices and procedures to be undertaken in accordance with commitments stipulated in the Voluntary Conservation Agreements (VCA) and BOMP
- Describe the practical management strategies to be implemented to:
    - manage impacts on flora and fauna
    - maximising salvage and beneficial use of resources in areas to be impacted for habitat enhancement
    - rehabilitate creeks, drainage lines and disturbed areas and
    - control weeds and pests.
- Ensure compliance with all legislative requirements, statutory approvals/licences and corporate responsibilities of Northparkes
- Describe biodiversity monitoring and reporting requirements and
- Provide details of the parties responsible for monitoring, reviewing, and implementing the OMD.

No impacts outside those predicted in the EA have occurred during the reporting period indicating the management strategies specified by the OMD implemented across the site are adequate to address potential impacts.

Northparkes has implemented a range of biodiversity monitoring activities since the commencement of operations, in addition to those studies completed for the EA.

Implementation of Kokoda VCA

The VCA for Kokoda was submitted in 2017, as per the Northparkes project approvals and was signed by Northparkes and the Office of Environment and Heritage (OEH) Executives in February 2018.

During the reporting period, Northparkes initiated the active revegetation component in accordance with the Voluntary Conservation Agreement. With the aim of restoring 37ha of degraded farming country to a Grey Box Grassy Woodland (GBGW) landscape, Northparkes engaged local employment through Skillset Landworks to plant 18,000 tubestock. Due to a state-wide shortage of available tubestock, the planting was successfully staged into two planting seasons where approximately half were planted in the 2020 period, with the remainder to be installed in 2021.

The planting area was deep ripped approximately 500mm along the contour, six months prior to the Spring planting. Each individual was planted with a combination of mycorrhiza, water crystals, tree tonic and native fertiliser. To prevent grazing and vegetation competition, 400mm coreflute guards and weed matting was placed around the installed plants. During the summer period, plants were followed up with ongoing maintenance to ensure adequate moisture and grazing pressures were alleviated.

Figure 24 Plant installed in April trial planting and Spring planting lines

Prior to the major planting in September, a trial planting involving 2,000 plants across four contrasting locations was established in an effort to combat herbivorous grazing. A variety of trees and shrubs were subject to three treatments the application of Sen-Tree browsing deterrent the application of eucalyptus oil, and the installation of 900mm coreflute guards. Following the planting, widespread rain was experienced throughout the region promoting an abundance of vegetation for macropods to graze. This reduced pressure heavily aided the tree to quickly establish with very little mortality recorded. There was no notable benefit of applying any of the deterring mechanisms.

6.6.2 Biodiversity and Ecology Performance Monitoring

During the reporting period Northparkes engaged external consultants to undertake rehabilitation monitoring at Kokoda and Estcourt Biodiversity Offset Sites. This program is guided by clearly defined, repeatable and consistent methodologies for monitoring changes in various aspects of ecosystem function, succession and long-term sustainability. The adopted monitoring methodology is a standard and simple procedure that can be easily replicated over any vegetation community or revegetation area. It includes a combination of Landscape Function Analysis (LFA) and flora diversity. For more details on rehabilitation monitoring undertaken in 2020, refer to the 2020 Kokoda Offset Monitoring Report and 2020 Estcourt Offset Monitoring Report, available via the Northparkes website at http://www.northparkes.com/news/#publications .

Kokoda Ecological Monitoring

A range of ecological field surveys were undertaken across Kokoda in 2020. These included:

- Floristic data using plot-based surveys
- Landscape Function Analysis (LFA) monitoring
- Targeted bird surveys in winter and spring
- Monitoring of kangaroo numbers
- Biometric vegetation surveys and
- Qualitative biannual inspections for weeds, pests and maintenance.

Floristic Data Using Plot-Based Surveys

A total of seventeen 20 x 20 metre permanent flora sampling sites (plots) were undertaken at Kokoda in 2020. The location of survey sites was selected to represent the different vegetation communities mapped by Umwelt in 2013 and were marked for ease of relocating for subsequent monitoring surveys (using a handheld global positioning system (GPS) and star pickets). Photographs were also taken at each site to help monitor changes over time.

During surveys, total floristic diversity was recorded in systematic increments within the monitoring plots, beginning at the start of the LFA vegetation transect in the 1 x 1 m sub-plot. Total shrub counts were made within the shaded 10 x 20 m subplots and mature tree counts and condition variables were made within the entire 20 x 20 m quadrat. For more information on the methodologies used to conduct the flora surveys, refer to the 2020 Kokoda Offset Monitoring Report.

Floristic plot-based survey at Kokoda in 2020 recorded 176 plant species including 50 non-native (exotic) species and 126 native species. No threatened flora species were detected in the flora plots during field surveys. Refer to the 2020 Kokoda Offset Monitoring Report for full information and data.

Key Performance Indicators (KPI's) were quantified by data obtained from replicated reference sites which were representative of the Grey Box Woodland CEEC and Dwyer's Red Gum woodland. All ecological performance indicators are quantified by range values measured from these reference sites which form both *upper* and *lower* KPI targets. The same ecological performance indicators are also measured in the revegetation/rehabilitation sites and these should equal or exceed these values, or at least demonstrate an increasing trend.

Table 15 below indicates the performance of the woodland revegetation monitoring sites against the proposed Primary Completion Performance Indicators. The selection of criteria has been presented in order of rehabilitation phases according to the ESG3 MOP guidelines. The range values of the ecological performance targets are amended annually. Revegetation sites meeting or exceeding the range values of their representative community type have been identified with a coloured box and have therefore been deemed to meet these primary completion performance targets this year. Hashed coloured boxes indicate they may be outside of the reference target ranges, but within acceptable agricultural limits.

The reference sites at Kokoda are typically degraded and of low quality which subsequently have provided low performance targets. In the Grey Box woodlands, there was limited abundance and diversity of the grassy understorey and there were limited shrubs. Subsequently the revegetation activities proposed should include a range of species known to occur within these communities and not just restricted to those occurring within the existing reference sites.

Landscape Function Analysis Monitoring

Landscape Function Analysis (LFA) monitoring was also undertaken at the seventeen permanent plots. LFA is a methodology used to assess key indicators of ecosystem function including landscape organisation and soil surface condition as measure of how well the landscape retains and uses vital resources. The indicators used quantify the utilisation of the vital landscape resources of water, topsoil, organic matter and perennial vegetation in space and time. Soil sampling was also undertaken at the plots.

For information on LFA monitoring undertaken at Kokoda during 2020, refer to Table 15 and the 2020 Kokoda Offset Monitoring Report.

Table 15 Performance of the Grey Box, Ironbark and Dwyers Red Gum woodland revegetation sites against primary completion performance indicators in 2020.

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Unit of measurement (*desirable)	DReveg 1	DReveg 2	DReveg 3	DWoodLQ	GBReveg 1	GBReveg 2	GBReveg 3	GBReveg 4	GBReveg 5	WBWood 1	IronWood 1
Performance indicators are quantified by the range of values obtained from replicated reference sites					2020										
Phase 2: Landform establishment and stability	Landform slope, gradient	Landform suitable for final land use and generally compatible with surrounding topography	Slope	< Degrees (18°)	4	3	4	3	5	4	3	4	3	3	4
	Active erosion	Areas of active erosion are limited	No. Rills/Gullies	No.	0	0	0	0	0	0	0	0	0	0	0
Phase 3: Growth medium development	Soil chemical, physical properties and amelioration	Soil properties are suitable for the establishment and maintenance of selected vegetation species	pH	pH (*5.6 - 7.3)	5.6	5.3	5.8	5.3	6.5	5.6	6.3	5.8	5.9	5.7	5.0
			Organic Matter	% (*>4.5)	3.5	3.8	2.7	5.5	3.3	5.0	3.3	2.0	2.3	3.3	4.7
			Phosphorous	ppm (*50)	4.2	7.2	3.4	7.2	8.7	6.1	5.5	6.7	5.1	4.8	4.8
Phase 4: Ecosystem & Land use Establishment	Landscape Function Analysis (LFA): Landform stability and organisation	Landform is stable and performing as it was designed to do	LFA Stability	%	71.5	69.9	77.8	71.0	76.6	71.0	72.6	72.7	75.0	65.1	67.5
			LFA Landscape organisation	%	100	86	100	100	100	100	100	99	100	100	100

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Unit of measurement (*desirable)	DReveg 1	DReveg 2	DReveg 3	DWoodLQ	GBReveg 1	GBReveg 2	GBReveg 3	GBReveg 4	GBReveg 5	WBWood 1	IronWood 1
	Vegetation diversity	Vegetation contains a diversity of species comparable to that of the local remnant vegetation	Diversity of shrubs and juvenile trees	species/area	2	3	1	1	1	0	4	0	0	6	5
				% population	100	100	100	100	100	0	100	0	0	100	100
			Exotic species richness	<No./area	19	14	17	22	20	9	22	20	24	21	6
	Vegetation density	Vegetation contains a density of species comparable to that of the local remnant vegetation	Density of shrubs and juvenile trees	No./area	8	3	1	8	1	0	9	0	0	7	76
	Ecosystem composition	The vegetation is comprised by a range of growth forms comparable to that of the local remnant vegetation	Trees	No./area	1	1	1	2	1	0	2	0	0	4	4
			Shrubs	No./area	1	2	0	0	0	0	2	0	0	3	2
			Herbs	No./area	29	25	28	43	33	27	30	32	38	43	30

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Unit of measurement (*desirable)	DReveg 1	DReveg 2	DReveg 3	DWoodLQ	GBReveg 1	GBReveg 2	GBReveg 3	GBReveg 4	GBReveg 5	WBWood 1	IronWood 1
Phase 5: Ecosystem & Land use Sustainability	**Landscape Function Analysis (LFA): Landform function and ecological performance**	Landform is ecologically functional and performing as it was designed to do	LFA Infiltration	%	41.5	31.1	48.1	58.1	48.6	40.7	43.9	43.5	44	51.8	49.7
			LFA Nutrient recycling	%	40.9	31.6	46.4	58.1	48.7	41.8	42	43	45.1	51.5	47.8
	Protective ground cover	Ground layer contains protective ground cover and habitat structure comparable with the local remnant vegetation	Perennial plant cover (< 0.5m)	%	16	25	64	7	21	40.5	31.5	46.5	30.5	16.5	9.5
			Total Ground Cover	%	98	80.5	100	100	98.5	97	100	96	99	99	98
	Native ground cover abundance	Native ground cover abundance is comparable to that of the local remnant vegetation	Percent ground cover provided by native vegetation <0.5m tall	%	58.2	80.4	64.2	67.2	38.5	77.5	52.1	54.3	34	43.8	92.6
	Ecosystem growth and natural recruitment	The vegetation is maturing and/or natural recruitment is occurring at rates similar to those of the local remnant vegetation	shrubs and juvenile trees 0 - 0.5m in height	No./area	1	1	1	6	1	0	9	0	0	5	45
			shrubs and juvenile trees 1.5 - 2m in height	No./area	2	0	0	0	0	0	0	0	0	0	1

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Unit of measurement (*desirable)	DReveg 1	DReveg 2	DReveg 3	DWoodLQ	GBReveg 1	GBReveg 2	GBReveg 3	GBReveg 4	GBReveg 5	WBWood 1	IronWood 1
	Ecosystem structure	The vegetation is developing in structure and complexity comparable to that of the local remnant vegetation	Foliage cover 0.5 - 2 m	% cover	0	0	0	0	0	0	0	0	2	2	0
			Foliage cover >6m	% cover	0	0	0	35	0	0	0	0	0	52	40
	Tree diversity	Vegetation contains a diversity of maturing tree and shrubs species comparable to that of the local remnant vegetation	Tree diversity	%	100	0	0	100	0	0	0	0	0	100	100
	Tree density	Vegetation contains a density of maturing tree and shrubs species comparable to that of the local remnant vegetation	Tree density	No./area	4	0	0	9	0	0	0	0	0	8	40
	Ecosystem health	The vegetation is in a condition comparable to that of the local remnant vegetation.	Live trees	% population	100	0	0	100	0	0	0	0	0	88	70
			Healthy trees	% population	100	0	0	0	0	0	0	0	0	25	3
			Flowers/fruit: Trees	% population	0	0	0	11.1	0	0	0	0	0	38	10

Targeted Bird Surveys

Targeted bird surveys were carried out at Kokoda in winter and spring 2020. Bird surveys were conducted at six sites across two days in winter and eleven sites across two days in spring. Surveys consisted of a two hectare area search for 20 minutes in suitable habitat within Kokoda on each day.

All bird surveys undertaken at Kokoda in 2020 were undertaken by a suitably qualified ecologist. Winter bird surveys targeted the Regent Honeyeater and Swift Parrot, and spring bird surveys targeted the Superb Parrot and eastern subspecies of the Grey-crowned Babbler. During targeted bird surveys, all birds seen (using binoculars) or heard (using diagnostic calls) were recorded. Targeted bird surveys were undertaken twice at each survey site each time in the early morning when birds are most active and vocal to maximise detectability. Any opportunistic bird species identified during surveys were also recorded.

During targeted bird surveys at Kokoda in 2020, a total of 42 bird species were recorded during winter and a total of 59 bird species during spring. Four of those species were identified as threatened and/or migratory under the *Biodiversity Conservation Act 2016* and *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). These include:

- Superb parrot (Polytelis swainsonii) (EPBC: V/ BC: V) - observed during spring survey
- Grey-crowned babbler (eastern sub-species) (Pomatostomus temporalis) (BC-V) - observed during winter and spring surveys
- Brown Treecreeper *(Climacteris picumnus victoriae)* (BC-V) observed during winter survey; and
- Speckled Warbler (*Chthonicola sagittata*) (BC-V) observed during winter and spring surveys.

The threatened species list was less than previous years in comparison. Species abundance was generally lower across spring and winter in 2020 in comparison to previous years. This could be attributed to recent rainfall in the region increasing the availability of feed resources outside of the site.

The grey-crowned babbler (centre) is a sedentary species therefore, these records are likely to indicate that populations of this species occur within Kokoda. However, the superb parrot (left) is a nomadic species and likely to only use the site for foraging during eucalypt flowering.

Figure 25 Superb Parrot, Grey-crowned babbler (eastern sub-species) & Speckled Warbler

Biometric Vegetation Surveys

Biometric vegetation surveys were undertaken at the Kokoda Biodiversity Offset Site in 2020 between the 13th and 15th of October to support Northparkes Voluntary Conservation Agreement (VCA). Results were found to be generally consistent with previous monitoring years. An increase in annual weeds was observed because of widespread rain during the reporting period.

Qualitative Biannual Inspections

Biannual inspections of the Kokoda Biodiversity Offset Site were undertaken on 15 April and 16 October 2020 and recorded the presence and locations of pests and weeds as well as outlined any maintenance activities that may require action.

During the April inspection, no feral pest species or weeds of concern were observed during the visit. Groundcover had significantly increased as a result of widespread rain though the district. Following the installation of the exclusion fence, the macropod grazing pressure was alleviated significantly and areas that were previously barren were now supporting sustainable groundcover.

During the October inspection, large amounts of natural regeneration were observed across the offset area as a result of subdued drought conditions. Some rabbit diggings were noted around the house although the conservation area remains absent of feral pest species. Spraying of the Tree of Heaven has been scheduled with no other weeds of concern detected.

Monitoring of the rabbit population continues with baiting programs to be implemented if required.

Opportunistic Flora and Fauna Monitoring

In 2019 prior to the erection of exclusion fence, a number of trial cameras were set up across Kokoda to opportunistically observe the range of potential feral animal species. The cameras were then again set up after the completion of the fencing to assess what species required ongoing management. Table 16 details the current presence of feral animal species from the trail cameras. Although the presence of cats and pigs have not been captured post fencing, it is possible they exist within offset area, but are yet to be photographed. Programs for the management of these feral pest species, mainly pigs and rabbits, will continue to be investigated during 2021.

Table 16 Presence of feral pest species

Feral Animal Species	Prior to Fencing	2020 Post Fencing
Rabbits	Yes	Yes
Cats	Yes	No
Dogs	No	No
Foxes	Yes	Yes
Pigs	Yes	No
Goats	Yes	No

Estcourt Ecological Monitoring

Floristic Data Using Plot-Based Surveys

A total of six 20 x 20 metre permanent flora sampling sites (plots) were undertaken at Estcourt in 2020. The location of survey sites was selected to represent the different vegetation communities mapped by GHD in 2010 and were marked for ease of relocating for subsequent monitoring surveys (using a handheld global positioning system (GPS) and star pickets). An additional monitoring point was established in 2012 to monitor an area subject to grass fire. Photographs were also taken at each site to help monitor changes over time.

During surveys, total floristic diversity was recorded in systematic increments within the monitoring plots, beginning at the start of the LFA vegetation transect in the 1 x 1 m sub-plot. Total shrub counts were made within the shaded 10 x 20 m subplots and mature tree counts and condition variables were made within the entire 20 x 20 m quadrat. For more information on the methodologies used to conduct the flora surveys, refer to the 2020 Estcourt Offset Monitoring Report.

Floristic plot-based survey at Estcourt in 2020 recorded 157 plant species including 48 non-native (exotic) species and 109 native species. No threatened flora species were detected in the flora plots during field surveys. Refer to the 2020 Estcourt Offset Monitoring Report for full information and data.

Landscape Function Analysis Monitoring

Landscape Function Analysis (LFA) monitoring was also undertaken at the six Estcourt permanent plots. LFA is a methodology used to assess key indicators of ecosystem function including landscape organisation and soil surface condition as measure of how well the landscape retains and uses vital resources. The indicators used quantify the utilisation of the vital landscape resources of water, topsoil, organic matter and perennial vegetation in space and time. Soil sampling was also undertaken at the plots.

For information on LFA monitoring undertaken at Estcourt, refer to Table 15 and the 2020 Estcourt Offset Monitoring Report.

Table 17 Performance of the EOA monitoring sites against primary performance indicators in 2020

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Unit of measurement	Woodland ecosystem range2020		EOA-01	EOA-02	EOA-03	EOA-04	EOA-05	EOA-06
Performance indicators are quantified by the range of values obtained from replicated reference sites					Lower	Upper	2020	2020	2020	2020	2020	2020
Phase 2: Landform establishment and stability	**Landform slope, gradient**	Landform suitable for final land use and generally compatible with surrounding topography	Slope	< Degrees (18°)	0	5	1	1	0	1	1	2
	Active erosion	Areas of active erosion are limited	No. Rills/Gullies	No.	0	0	0	0	0	0	0	0
Phase 3: Growth medium development	**Soil chemical, physical properties and amelioration**	Soil properties are suitable for the establishment and maintenance of selected vegetation species	pH	pH (5.6 - 7.3)	5.9	7.0	6.0	6.0	6.0	5.7	5.8	6.0
			Organic Matter	% (>4.5)	4.1	4.8	4.3	4.1	4.0	6.3	4.1	5.7
			Phosphorous	ppm (50)	12.4	19.7	26.5	23.2	6.9	9.1	8.7	9.0
Phase 4: Ecosystem & Land use Establishment	**Landscape Function Analysis (LFA): Landform stability and organisation**	Landform is stable and performing as it was designed to do	LFA Stability	%	65.5	79.3	71.0	70.5	75.3	77.3	76.5	75.8
			LFA Landscape organisation	%	100	100	100	100	100	100	100	100
	Vegetation diversity	Vegetation contains a diversity of species comparable to that of the local remnant vegetation	Diversity of shrubs and juvenile trees	species/area	1	6	1	1	1	2	2	1
				% population	100	100	100	100	100	100	100	100
			Exotic species richness	<No./area	15	27	18	17	17	16	18	15

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Unit of measurement	Woodland ecosystem range2020		EOA-01	EOA-02	EOA-03	EOA-04	EOA-05	EOA-06
	Vegetation density	Vegetation contains a density of species comparable to that of the local remnant vegetation	Density of shrubs and juvenile trees	No./area	39	173	48	46	8	9	28	8
	Ecosystem composition	The vegetation is comprised by a range of growth forms comparable to that of the local remnant vegetation	Trees	No./area	2	4	1	1	1	1	1	2
			Shrubs	No./area	0	4	0	0	0	1	1	0
			Herbs	No./area	32	46	17	16	31	34	36	38
Phase 5: Ecosystem & Landuse Sustainability	**Landscape Function Analysis (LFA): Landform function and ecological performance**	Landform is ecologically functional and performing as it was designed to do	LFA Infiltration	%	43.3	65.8	46.3	49	52.7	60.8	43.4	49.5
			LFA Nutrient recycling	%	44.3	65.0	43.2	47.8	52.7	55.2	45.5	47.4
	Protective ground cover	Ground layer contains protective ground cover and habitat structure comparable with the local remnant vegetation	Perennial plant cover (< 0.5m)	%	10	28	3	6	24	7	18	27
			Total Ground Cover	%	88	100	100	100	100	100	98	99.5
	Native ground cover abundance	Native ground cover abundance is comparable to that of the local remnant vegetation	Percent ground cover provided by native vegetation <0.5m tall	%	43.8	77.0	15.3	20.2	41.8	32.2	68.6	62.2
	Ecosystem growth and natural recruitment		shrubs and juvenile trees 0 - 0.5m in height	No./area	1	50	1	0	0	2	0	0

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Unit of measurement	Woodland ecosystem range2020		EOA-01	EOA-02	EOA-03	EOA-04	EOA-05	EOA-06
		The vegetation is maturing and/or natural recruitment is occurring at rates similar to the local remnant vegetation	shrubs and juvenile trees 1.5 - 2m in height	No./area	1	53	14	24	5	0	7	3
	Ecosystem structure	The vegetation is developing in structure and complexity comparable to that of the local remnant vegetation	Foliage cover 0.5 - 2 m	% cover	3	30	21	17.5	32.5	35	14.5	13
			Foliage cover >6m	% cover	8	38	0	0	0	25	12	4
	Tree diversity	Vegetation contains a diversity of maturing tree and shrubs species comparable to that of the local remnant vegetation	Tree diversity	%	100	100	0	0	0	100	100	100
	Tree density	Vegetation contains a density of maturing tree and shrubs species comparable to that of the local remnant vegetation	Tree density	No./area	6	22	0	0	0	22	5	22
	Ecosystem health	The vegetation is in a condition comparable to that of the local remnant vegetation.	Live trees	% population	83	100	0	0	0	59	60	68
			Healthy trees	>% population	0	36	0	0	0	23	20	9
			Flowers/fruit: Trees	% population	0	50	0	0	0	36	60	50

Pine Donkey Orchid Population Monitoring

Field inspections of the two populations of the pine donkey orchid (*Diuris tricolour*) (Figure 26) found within the Northparkes mining lease were carried out during September which targeted emerging and effloresced plants to coincide with the species flowering period. The density of *Diuris tricolor* individuals recorded at the two populations have varied significantly over the years, with the seasonal conditions and survey timing having a significant impact on the orchid populations, ground cover abundance and ease of identification. In 2017, exceptionally dry conditions resulted in individuals being stunted with most being 10-15cm in height. Some individuals had finished flowering, while others were in bud. In 2018, very dry conditions persisted throughout the year, however 31 mm and 29 mm of rain falling during August and September promoted the emergence of the orchids. Dry conditions and macropod predation during the 2019 flowering period led to zero individuals observed across both sites. During 2020, consistent rainfall throughout the year significantly aided in the emergence of plants in late September. The exclusion fence around the Limestone orchid site has also assisted in reducing the macropod grazing pressure.

Table 18 Number of Pine Donkey Orchids observed during surveys.

Population	2013	2014	2015	2016	2017	2018	2019	2020
Limestone Forest	N/A	69	143	485	37	494	0	770
Adavale Lane	N/A	130	38	603	37	52	0	180
Total	**947**	**199**	**181**	**1,088**	**74**	**546**	**0**	**950**

Figure 26 Pine Donkey Orchid (Diurus tricolour)

6.6.3 Biodiversity and Ecology Improvements and Initiatives

Northparkes has implemented a comprehensive biodiversity management and monitoring program, which will continue through the next reporting period to consistently track and inform Northparkes' performance in meeting biodiversity objectives.

Stage 2 Kokoda revegetation works will continue in 2021 with approximately 9,000 more individual tubestock planted within the active revegetation area. A component of direct seeding will also be undertaken in early Spring to achieve the targeted 400 stem per hectare.

6.7 Waste

6.7.1 Waste Management

The Consent, specifically Schedule 3 Condition 38, requires the following in regards to waste:

- Implement all reasonable and feasible measures to minimise waste generated by the Project
- Ensure waste generated by the Project is appropriately stored, handled and disposed of and
- Monitor and report on the effectiveness of waste minimisation and management measures in the Annual Review.

Northparkes Waste Management Plan covers aspects of waste management peripheral to mining activities, i.e. does not include production waste, such as coarse or fine reject. The Waste Management Plan was prepared in accordance with the objectives of the *Waste Avoidance and Resource Recovery Act 2007* and is based on the waste management hierarchy of avoid, reduce, reuse, recycle and dispose.

Waste management measures employed on site include:

- General waste from operations is disposed of at an appropriate licensed waste management facility
- Recyclable wastes are collected for recycling at an appropriate facility
- Contaminated soil is collected and transported to the on-site bioremediation area for treatment and eventual on-site disposal
- Scrap metal materials are separated onsite and collected by a recycling contractor for off-site recycling
- All waste oils and greases are segregated and stored appropriately until collection by a licensed waste contractor for appropriate offsite recycling/disposal
- Waste chemicals (including solvents) are segregated, stored appropriately and transported offsite by a licensed waste contractor for appropriate disposal
- Contaminated areas are bunded and water is reused within the process water circuit and
- Clean water surface water/runoff is diverted around mine facilities (where feasible).

6.7.2 Waste Performance

Northparkes tracks operational waste disposal for all key waste streams. All waste streams are stored in appropriate containers prior to disposal at licenced facilities.

This reporting period has seen a significant increase of waste compared to the 2019 reporting period. This can be attributed to the increased amount of consumables required for various construction projects being undertaken by Northparkes. There was also a heavy focus on recycling of scrap metal waste during the period.

Operational waste collection statistics for the 2020 reporting period is summarised in Table 19.

Table 19 Summary of Waste Disposal

Waste Stream	Tonnes
Hazardous recycled: empty drums oil filters oily water waste grease waste oil dust suppressant/resin/glue and fluorescent tubes.	207.1
Hazardous disposal: hydraulic hose medical/sanitary waste oily rags and used absorbent	27.3
Non-Hazardous recycled: co-mingled poly pipe	31.7

Waste Stream	Tonnes
Non-Hazardous disposal: mixed solid waste	241.0
Recycled metal	2,402.0
TOTAL	**2,909.1**

Northparkes and its contractors have continued to implement the waste management hierarchy. Wherever possible, waste materials are re-used on site in preference to direct disposal. Recycling of materials is also undertaken where possible to minimise waste. An example of reuse is the integration of an oil water separator at the wash bay, which minimises waste water and returns water to the water management system for re-use.

During the reporting period, Northparkes engaged a new waste contractor to manage its waste from the premises. This has been largely successful as specialised waste streams can be more thoroughly investigated for opportunities and improvements.

Site induction packages include waste awareness and Northparkes has included waste best practice in employee and contractor HSE sessions. Environmental inspections were undertaken by Northparkes throughout the reporting period with observations and non-conformances communicated as necessary to relevant contractors.

6.7.3 Bioremediation Areas

The bioremediation area was maintained and monitored during the reporting period, as listed in Table 20. Successful management of this bioremediation area has allowed for onsite treatment of contaminated material and subsequently reduced the need to transfer contaminated waste material offsite. The bioremediation area was active during the 2020 reporting period (refer to Table 20).

The materials retained in the bioremediation area are aerated and watered as required. A bioremediation agent was also applied to the material as necessary. The material will be tested in the 2021 reporting period for any residual hydrocarbons and contaminants before being deemed suitable for disposal.

Table 20 Summary of Bioremediation Activities

Initiated	Origin of Material	Description	Completion
2016	-	Construction of bioremediation area	2016
2016	Surge Dam (western cell)	The treatment of approximately 15,000m^3 of material from the western dam with Micro-Blaze formulation	2017
2019	Surge Dam (eastern cell)	The treatment of approximately 21,000m^3 of material from the eastern dam with Micro-Blaze formulation	Ongoing

6.7.4 Waste Improvements and Initiatives

Consistent with the implementation of the waste management hierarchy, Northparkes and its waste contractor continue to look for ways to re-use waste materials onsite in preference of direct disposal.

Overall waste disposal volumes are predicted to reduce in 2021 due to a decrease in civil construction activities.

6.8 Cultural Heritage

6.8.1 Cultural Heritage Management

The management, including identification, assessment and monitoring, of cultural heritage at Northparkes is undertaken in accordance with the Cultural Heritage Management Plan (CHMP).

The CHMP prescribes:

- The policies and practices for the preservation of sites during construction and operations
- Other facets of cultural heritage practices and conservation measures including salvage of sites as required and the practice of due diligence inspections
- Management of unanticipated Aboriginal objects and
- Other relevant cultural heritage considerations including consultation with the Aboriginal community.

Northparkes utilises a Site Disturbance Permit (SDP) approval system to manage the protection of heritage sites on the mining lease. This approval process applies to activities planned in undisturbed areas or previously rehabilitated areas. The area to be disturbed is compared to the Aboriginal cultural heritage sensitivity zones to determine the need for additional survey work or salvage work prior to starting the project.

6.8.2 Cultural Heritage Performance

In accordance with the CHMP, the Wiradjuri Executive Committee (WEC) met on a regular basis throughout the reporting period, with meetings held in June and October. The WEC is a consultation forum to enable appropriate review of the aboriginal heritage management practices at Northparkes and identify potential improvement opportunities from the community.

Works and initiatives undertaken by the WEC in the reporting period included:

- Feedback on selection of Northparkes Indigenous Scholarship recipients and encouragement of Indigenous employment
- Engagement with Skillset Landworks to promote indigenous employment as part of the Kokoda revegetation project
- Maintained the Indigenous workforce participation rates at 6% as part of the School2Work program which actively engages the community
- Commitments outlined in the 2020 work plans included: education, community engagement, business development and employment and training.

As part of Rockland TSF prefeasibility study, 36 test pits were excavated 24 on the mining lease and 12 on adjacent farming country. The 24 pits on the mining lease had been archaeologically assessed during the previous year, leaving the remaining 12 in Northparkes cropping paddocks. A Northparkes representative and Wiradjuri elder were present at time of excavation, assessing for possible heritage items/values within and around the disturbance footprint. A survey area of 20m x 20m was undertaken for each pit with one item being identified (discard artefact in Figure 24). The test pit was moved to avoid any possible disturbance and artefact fenced off to prevent access.

Figure 27 Discard artefact (2020) and ground-edge axe (2019)

6.8.3 Cultural Heritage Improvements and Initiatives

Work and initiatives planned for the WEC in the next reporting period include:

- Develop and complete 2021 work plans in the three identified areas: education, employment, and community engagement
- Support school to work programs including training and apprenticeships
- Develop initiatives to increase the percentage of Indigenous employees within the workforce
- Raise employee awareness and knowledge of Cultural Heritage through induction programs and sessions with employees.
- Improve community engagement through volunteer opportunities and
- Undertake a review of the current CHMP and implement an ongoing monitoring program for known registered sites.

7. WATER MANAGEMENT

Water management at Northparkes is undertaken in accordance with approved management plans, prepared generally in accordance with the Consent. The Water Management Plan (WMP) acts as the overarching document to govern water management at Northparkes. Approved subordinate plans supporting the WMP include:

- Surface Water Management Plan (SWMP)
- Groundwater Management Plan (GWMP) and
- Site Water Balance (SWB) report.

7.1 Surface Water

7.1.1 Surface Water Management

Surface water is managed in accordance with the SWMP and associated water management plans which conform to the Consent, licenses and other regulatory requirements of Northparkes.

The primary objectives of water management at Northparkes is to manage dirty and contaminated catchment runoff, divert clean water around operational areas of the mine and to collect and store water for use on site to minimise the dependence on external water supplies. A critical component of the water management system is to maintain zero discharge of contaminated water into the surrounding environment.

The water management strategy includes the separation of clean, dirty and contaminated water, categorised as follows:

- **Clean water** includes surface runoff from areas not affected by mining operations and includes runoff from undisturbed areas and rehabilitated areas and water supplied by external sources. The clean water system includes diversion drains and farm dams (FD) surrounding the active mining areas in order to capture and divert clean water away from areas disturbed by mining operations.
- **Dirty water** includes sediment-laden runoff from disturbed areas, including rehabilitated waste rock stockpile areas, TSF embankments and surface infrastructure areas that are not associated with mineralized ore. Runoff from these areas is collected in sediment ponds (SP) to allow sediment to fall out of suspension.

- **Contaminated water** includes water associated with mining, ore processing and tailings storage. Any potentially contaminated water is managed within retention ponds (RP), the Caloola Dams, E22 pit, surge dams and the process water dam to avoid discharge into surrounding watercourses and to maximise water reuse.

In accordance with the Consent, Northparkes maintains a Surface Water Balance (SWB) for effective management of water resources. The SWB details water use, water demand and water management, as well as the sources and security of water supply, including contingency for future reporting periods.

The following subsections describe surface water monitoring and environmental performance.

Surface Water Monitoring Program

Water quality monitoring is undertaken at Northparkes specifically within the three defined water management systems mentioned above.

Table 21 lists each monitoring location and their corresponding water management system.

Table 21 Surface Water Quality Monitoring Location Catchments

Clean water management system	Dirty water management system	Contaminated water management system
Upstream WC4. WC6, WC7, WC13, W14 **Downstream** WC1, WC2, WC3, WC5, WC11 WC12, WC15, WC16 **Farm Dams** FD04, FD05, FD06, FD07, FD11, FD12, FD16, FD18, FD25, FD26, FD27	SP03, SP10, SP15	RP01, RP02, RP03, RP04, RP05, RP06, RP07, RP08, RP09, RP12 RP13, RP15, RP16, RP19, RP20, RP21, RP22, RP23, RP24, RP25, RP26, RP27, RP28, RP32, RP33 Grease Trap 2, Process Water Dam, Surge Dam 1 and 2, Caloola South

The monitoring locations of watercourses and surface water storages are provided in Appendix 2.

Table 22 identifies the specific analytical suites undertaken for each of the different water management systems.

There were some dams within the water management system that are typically dry. These monitoring locations were identified to have insufficient or no water quality data available for assessment.

The monitoring of watercourse stability is required to manage the potential impact on the watercourse as a result to changes in the watercourses hydraulic operation. As part of the water quality monitoring in the watercourse locations, visual assessments are conducted to determine any visible instabilities. Records are made including comments regarding bed and bank condition. Photographs may also be taken to provide further information on the status of the watercourse.

Table 23 provides information on the watercourse stability monitoring program.

Table 22 Surface water monitoring program

Monitoring Locations	Frequency	Analytical Suite
Watercourses (clean water systems)	Quarterly	pH, EC, TSS, TDS, Cu, Na, K, Ca, Mg, Cl, SO_4, HCO_3, CO_3
Farm Dams (clean water systems)	Quarterly	pH, EC, TSS, TDS, Cu, NA, K, Ca, Mg, Cl, SO_4, HCO_3, CO_3
Sediment Ponds (dirty water management system)	Quarterly	pH, EC, TSS, TDS, Cu, NA, K, Ca, Mg, Cl, SO_4, HCO_3, CO_3

Retention Ponds and Process water system (contaminated water management system)	Quarterly	pH, EC, Cu
	Annual	pH, EC, TSS, TDS, Na, K, Ca, Mg, Cl, SO_4, HCO_3, CO_3, Al, As, Ba, Be, Cd, Co, Cu, Cr, Mo, Mn, Ni, Pb, Se, Th, U, Zn

Table 23 Watercourse stability monitoring program

Location	Frequency	Assessment Requirements
WC01, WC02, WC03, WC04, WC05, WC06, WC07, WC11, WC12, WC13, WC14, WC15, WC16	Quarterly, additional sampling following heavy rainfall events.	Visual assessment of channel form, presence of instabilities in watercourse banks or in crossing structure (bridge/culvert).

Northparkes uses a handheld multi-parameter water quality probe (pH, EC, temperature). All water quality samples requiring lab analysis are collected by a suitably qualified employee and sent to a NATA accredited laboratory for processing.

The existing monitoring program is subject to periodic review and as such will evolve with the continual development of Northparkes water management system.

Surface Water Quality Criteria

Surface water quality criteria use a two-stage water quality trigger system based on the statistical analysis of the existing available water quality data was reviewed in 2020. Following an internal review and approval by the Department, the trigger levels will be implemented across the various monitoring programs. Current water management plan Stage 1 and Stage 2 trigger values as well as livestock water quality guidelines were taken into consideration when developing the updated site relevant water quality trigger levels. The current trigger levels for surface water quality sites are detailed in Appendix C of the approved WMP.

7.1.2 Surface Water Performance

There were no non-compliances related to surface water management recorded during the reporting period. All storages show trends that are generally within historical ranges of all parameters. All quarterly monitoring events were carried out successfully and within the scheduled period.

Surface Water Quality

Samples were able to be taken at all locations during the monitoring period. Most surface water locations were deemed dry during the Q1 monitoring event but widespread rain through the remainder of the year enabled routine sampling to be undertaken. Due to the nature of the ephemeral streams, many water courses were dry at time of sampling throughout the monitoring period.

Copper levels were at or below the long-term averages for all retention and process water monitoring locations. The concentrations of copper throughout the reporting period is in line with or below the previous year and were in-line with long term averages. Significant changes in electrical conductivity occurred in sites PWD, RP03, RP07 and RP09, although they are still below the internal trigger values and in line with historical data. All other retention ponds and process water monitoring locations were consistent with long term averages.

The farm dams are located outside the mining lease within neighbouring properties, or adjacent to Northparkes' farming operations. The copper concentrations and electrical conductivity levels for farm dams generally remained stable and in-line with or below the long-term averages. The electrical conductivity for the reporting period was generally in-line with the long-term averages, except for FD04 which decreased significantly, although still in line with the long-term average. pH generally remained consistent with the previous reporting period and long-term data, except FD18 which had a notable decrease. These sites will be monitored closely during the next sampling period for any fluctuations.

All water courses had a single monitoring event or greater throughout the reporting period. Due to their ephemeral characteristics, not all water courses have sufficient flow at the time of the monitoring event. Still in line with the long-term data, WC12 had increased pH and electrical conductivity from the previous reporting period. All other water courses reported data in line with internal trigger values and historical data.

Northparkes will continue to monitor and assess local water courses to ensure there are no detrimental mine related impacts to the local environment.

The monitoring results were predominantly in line with or below historical data and representative of the regional freshwater quality characteristics. The monitoring results are available in Appendix 2.

7.1.3 Surface Water Improvements and Initiatives

Within the next reporting period there will be several initiatives regarding water management. Northparkes will work to streamline monitoring requirements and refine the site water model to reflect current and future operations.

An audit of Table 6, Condition 22 of DC11_0060, has been scheduled to occur in Q1 of the next reporting period. It aims to assess Northparkes compliance against the water management performance measures detailed in the approved operation conditions of the Consent.

7.2 Groundwater

7.2.1 Groundwater Management

Groundwater is managed in accordance with the approved GWMP. The GWMP provides a framework defining how Northparkes will assess, manage and mitigate impacts to the groundwater system. This particularly focuses on impacts to the shallow alluvial aquifer as a result of mining activities such as dewatering the open pit void and underground operations. The GWMP specifies impact assessment criteria and trigger levels to identify groundwater level and quality changes, and outlines Northparkes monitoring and reporting requirements for groundwater management.

Groundwater Monitoring Program

Northparkes groundwater monitoring program aims to identify any changes to the natural groundwater system as a result of mining operations and ensure compliance with the Consent. It focuses on potential impacts to environmental assets and groundwater users in the area surrounding Northparkes.

The monitoring program undertaken during the reporting period included:

- Quarterly monitoring of groundwater levels and
- Quarterly laboratory groundwater quality analysis.

During the reporting period the active groundwater monitoring network comprised 42 monitoring bores screened across different geographical areas, including 14 surrounding the open cut voids, 12 surrounding the tailing storage facilities, 11 associated with the underground operations and five regional bores on neighbouring properties. Monitoring details for these bores are listed in Table 24 and their respective locations are shown in Appendix 2.

Table 24 Groundwater monitoring program

Monitoring Locations	Frequency	Analytical Suite
TSF Bores, Open cut Bores, Underground Bores, Regional Bores	Quarterly	Water level, pH, EC, total dissolved solids, hydroxide alkalinity, carbonate alkalinity, bicarbonate alkalinity, total alkalinity, sulphate, chloride, calcium, magnesium, sodium, potassium, aluminium, antimony, arsenic, beryllium, barium, cadmium, chromium, cobalt, copper, lead, manganese, molybdenum, nickel, selenium, zinc, nitrate, strontium, thallium, thorium, uranium, iron and mercury.

Groundwater Quality Criteria

Northparkes engaged an independent consultant to conduct a review of trigger levels for groundwater levels and quality. The review was conducted to assist in providing more relevant trigger levels for the groundwater monitoring network. The trigger levels were developed to assist in identifying and appropriately managing potential groundwater impacts based on historical monitoring data available from the groundwater monitoring network. Northparkes has developed groundwater levels and quality criteria for each bore where there is sufficient data available.

Each bore has been set with Stage 1 and 2 trigger levels which correspond to Appendix D of the WMP. Applying individual trigger levels to bores provides Northparkes with a more accurate and representative range of the groundwater levels and quality of the bores. This enables more accurate interpretation of the monitoring data with respects to the Northparkes operation.

The trigger values for water level and quality for the groundwater monitoring sites are detailed in Appendix D of the WMP.

7.2.2 Groundwater Performance

There were no non-compliances related to groundwater management recorded during the reporting period. All bores show trends that are generally within historical ranges of all parameters. All quarterly monitoring events were carried out successfully and within the scheduled period.

Groundwater Quality

TSF Bores

The electrical conductivity of all bores had decreased significantly over the monitoring period. Although the results are in line with historical data and below the internal trigger values, each will be closely monitored next reporting period for observed changes. Ph and copper concentrations were all below the trigger values and similar to results recorded previously.

Open Cut Bores

Open cut monitoring bore MB11 was not sampled during the reporting period and hasn't been sampled since Q2 2016 due to it being dry. Likewise, foreign material at water level is preventing MB12 from being sampled (last sampled Q1 2018). Electrical conductivity had decreased across all sites, MB10, W23 and W24 showing the most significant change. The copper concentrations for all open cut bores were in line with the last reporting period and long-term averages. The pH concentrations remained consistent with previous years.

Underground Bores

All underground bores are generally in line with historical data and below internal trigger values. Electrical conductivity had decreased across many of the bores, P102, P139, P149 and MB20, and will be monitored closely through the next reporting period. pH had significantly increased at MB18 and significantly decreased at P102, but remain in line with historical data. Copper concentrate levels were in line with historical data.

Regional Bores

Regional ground water quality remained similar to the previous reporting period and in-line with the long-term averages. Groundwater pH, copper concentration and electrical conductivity at each regional bore were generally consistent with previous monitoring periods.

The groundwater monitoring results were predominantly in-line with historical long-term average data, and consistent with the EA predictions. The monitoring results are presented in Appendix 2.

Groundwater Levels

Quarterly monitoring of groundwater levels are undertaken by suitably qualified Northparkes personnel in accordance with the approved GWMP. Throughout 2020 and over the last 10 years, groundwater levels have displayed a consistent upward trend at all monitoring bores (Figure 28, Figure 29, Figure 30 & Figure 31), the cause of which is continuing to be investigated. Changes in rainfall over the past decade may also have effects on local water quality variability. Groundwater levels remained below internal trigger values set in the WMP.

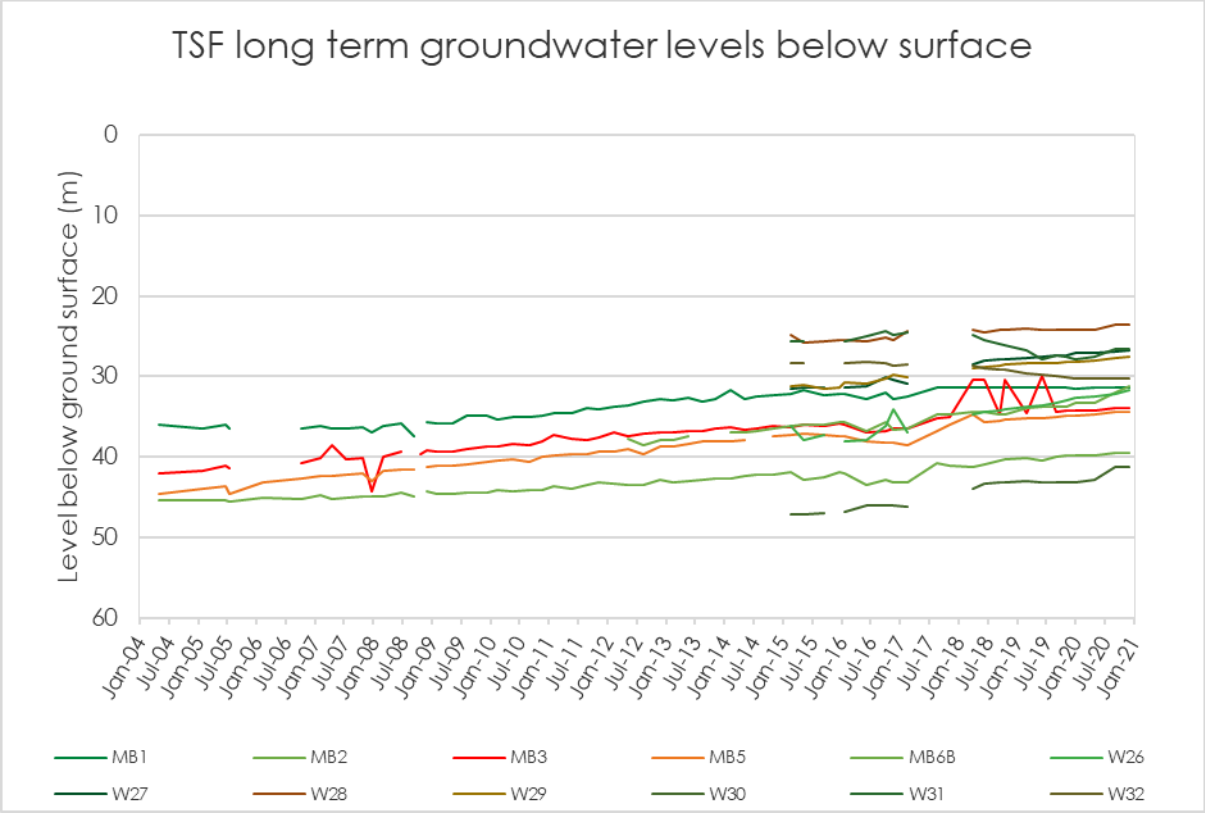


Figure 28 Long term groundwater levels for TSF bores

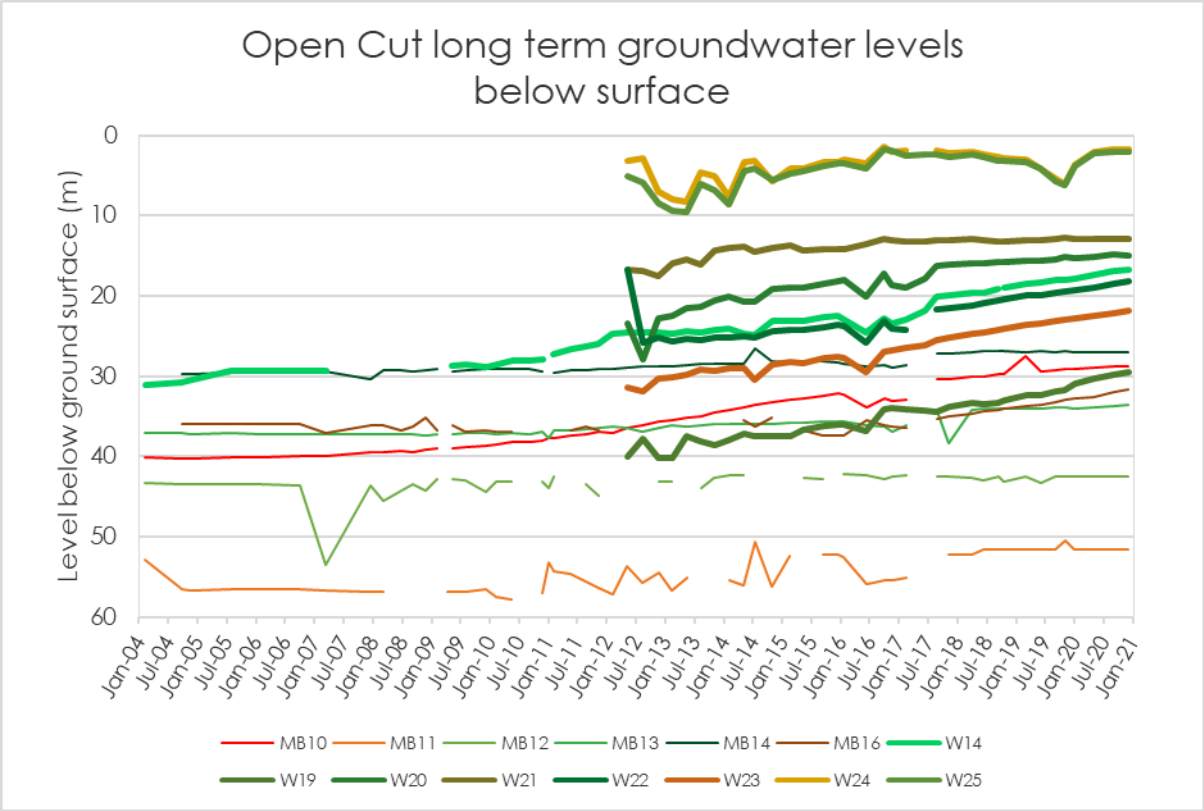


Figure 29 Long term groundwater levels for Open-cut bores

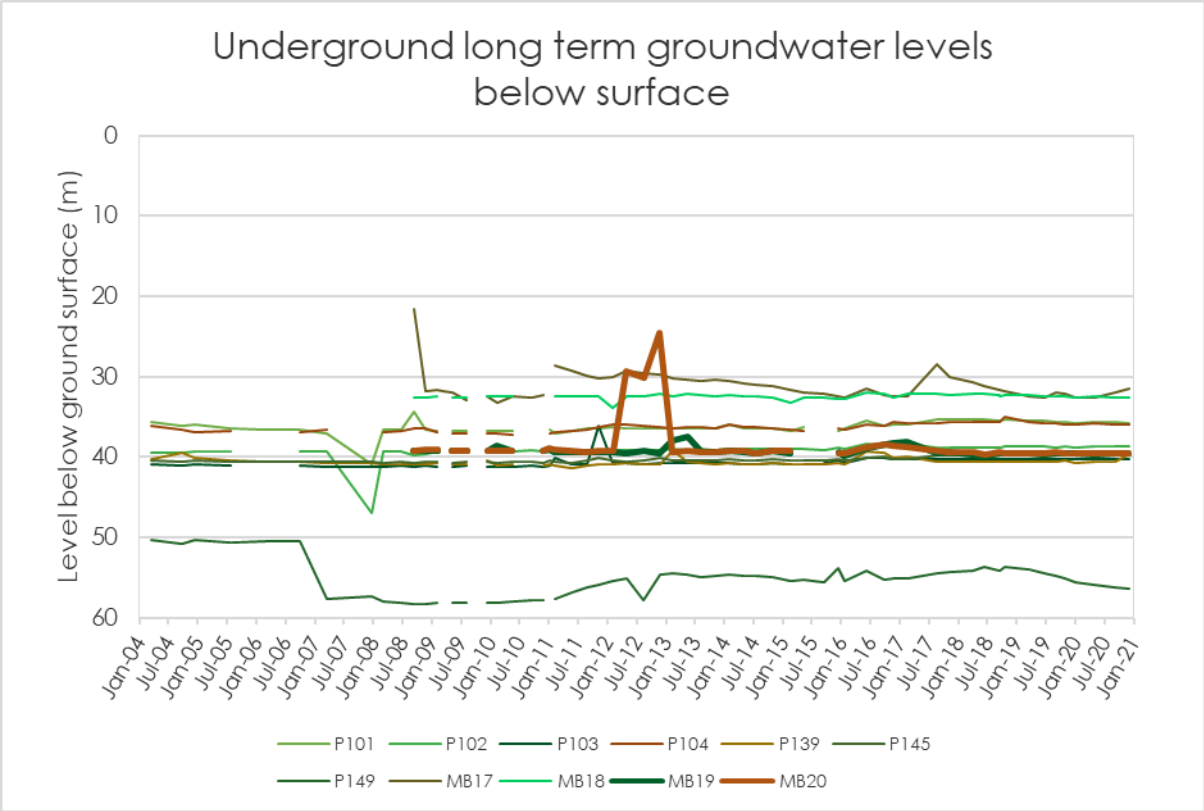


Figure 30 Long term groundwater levels for Underground bores

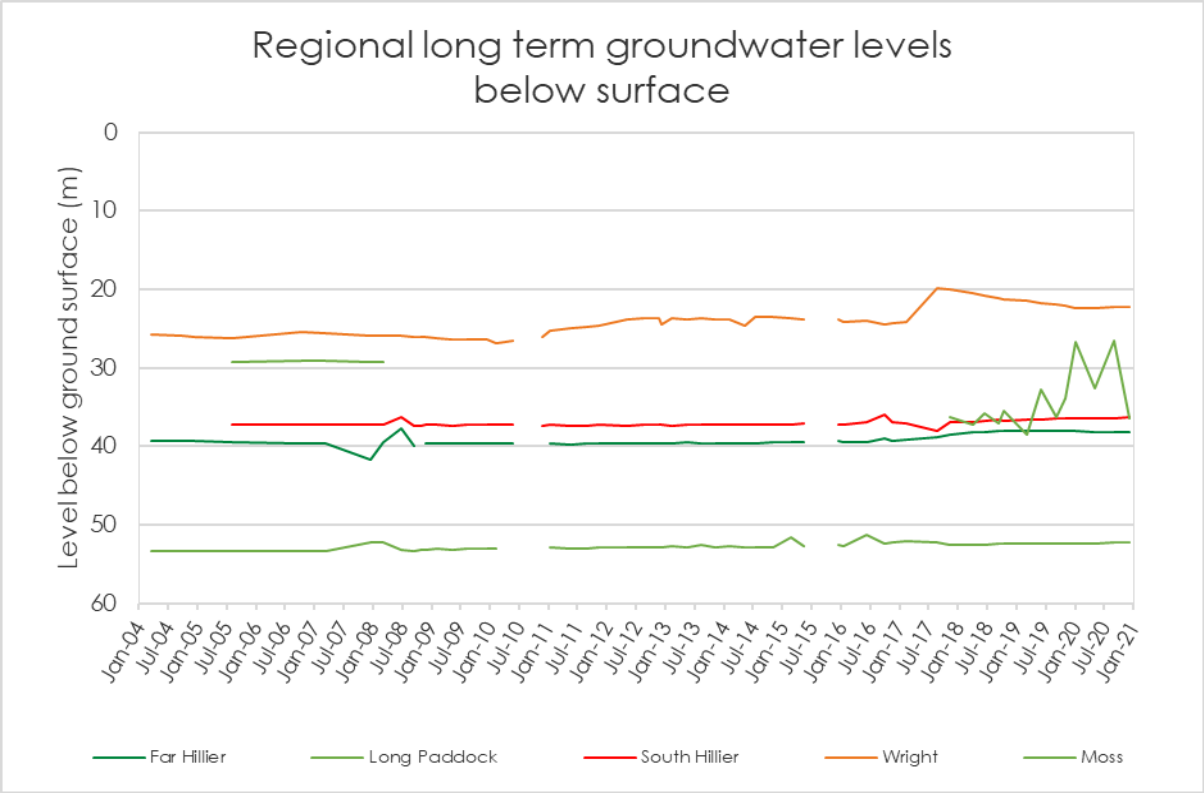


Figure 31 Long term groundwater levels for Regional bores

Improvements and Initiatives

A review is planned of the groundwater quality monitoring requirements as long-term trends continue to show no significant change since the inception of the project. Northparkes is proposing to revise the frequency of groundwater quality monitoring as quarterly monitoring is not showing any significant trends. Once reviewed, the WMP will be submitted to the Department for approval.

7.3 Water Balance

Northparkes has implemented a water model to capture water inputs, outputs and throughputs. The GoldSim model is used to incorporate the latest production data and future demands.

Results of the model are incorporated in internal management decisions and are communicated internally to the leadership team on an annual basis.

In reviewing the mine water balance for the reporting period, the following is of note:

- A total rainfall of 796.6mm was recorded at the onsite weather station during the reporting period. The rainfall received during the reporting period was 186.6mm above the long-term average for the region (610mm)
- The volume of freshwater imported to site was similar to the pervious reporting period (2221 ML in 2016, 1926 ML in 2017 and 2725 in 2018 and 3,009 in 2019). All water imported to site was from groundwater and surface water licence allocations owned by Northparkes or through a commercial arrangement with Parkes Shire Council, as shown in Table 27.
- There was a reduction in total water use compared to the previous reporting period with a decrease of approximately 8% from 5,881 ML in 2019 to 5,390 ML in 2020
- Improved water recovery from the tailing's thickener reduced the requirement for fresh/recycled water return to the plant

- Recycled water use decreased during this reporting period from 49% in the 2019 reporting period to 44% (2,872 ML in 2019 and 2,392 ML in 2020)

Details of Northparkes water balance for the reporting period are outlined in Table 25.

Table 25 Reporting period water balance

Water Balance	Total (ML)
Total Water Input	2,998
Recycled	2,392
Water Use	**5,390**

7.3.1 Surface Water Storage

Water is essential in the processing of ore through the concentrator to produce copper concentrate. Effective water management is therefore crucial to the long-term success of Northparkes operations. A summary of the major water storage volumes at the beginning of the four most recent reporting periods are provided in Table 26.

Table 26 Major Water Storages

Major Storage Volumes (ML)	01/01/2018	01/01/2019	01/01/2020	01/01/2021
Caloola North	76	118	0	326
Caloola South	163	124	0	427
E22 Void	1,800	1,464	533	575
Process Water Dam (PWD)	130	172	132	180
RP09	50	50	10	60
TOTAL	2,219	1,928	675	1,538

Water storage levels of all active sediment ponds, retention ponds and process water dams are monitored and recorded periodically. This allows for effective management of stored supplies in terms of consumption, avoidance of potential discharges and infrastructure planning.

Onsite water storages are heavily dictated by surface water inflows. Annual rainfall over the past decade has been following a decreasing trend (Figure 32) which puts further emphasise on the need to conserve and protect water resources. Northparkes continually look to optimise water use and investigate opportunities to operate more efficiently to manage water impact responsibly.

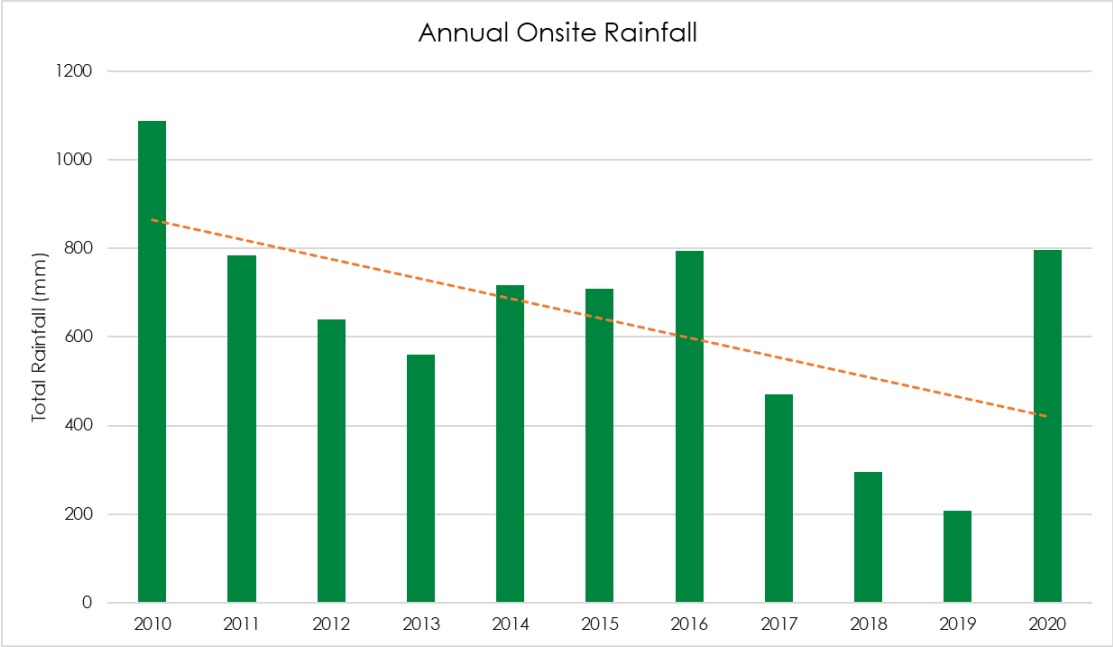


Figure 32 Annual rainfall at Northparkes mines (Note: Parkes airport rainfall data 2010 - 2015)

7.4 Water Supply

Northparkes sources water from numerous locations including imported water from various licences (see Table 4 Summary of Licences).

Water recycled from the on-site ore processing facility and tailings dam reclamation system is collected through existing on-site infrastructure.

Effective water management is crucial to the long-term success of Northparkes operations as it is essential in the processing of ore through the concentrator to produce copper concentrate. The water management system aims to efficiently and economically collect, store and re-use water onsite to minimise external water supply inputs and supplement supply during periods of high consumption.

In accordance with its licences and Consent, Northparkes:

- accesses groundwater from the Lachlan Alluvial Water Sources
- holds water entitlements for surface water extraction from the Lachlan River
- can trade additional water to make up shortfalls or sell any excess water in a reporting period and
- uses existing water entitlements to supplement demand.

The water supplied by Northparkes licenses for mining activities during the 2019/2020 water reporting period is detailed in Table 27.

Table 27 Northparkes 2019/2020 Mine Water Entitlements and Use

Water Licence	Water sharing plan, source and management zone	Licenced Volume (ML)	Passive take/ inflows	Active Pumping	Total
WAL43208	Lachlan River Water Sharing Plan Lachlan River Regulated River Water Source (High Security)	1305	0	No	0
WAL43207	Lachlan River Water Sharing Plan Lachlan River Regulated River Water Source (General Security)	3463	0	No	0
WAL34955	Lachlan River, Water Sharing Plan NSW Murray Darling Basin Fractured Rock Groundwater Sources	232	<10	No	<10
WAL32138	Lachlan River, Water Sharing Plan Lachlan Unregulated and Alluvial Water Sources	1110	0	No	0
WAL32120		1050	0	Yes	299.60
WAL32004		1600	0	Yes	1,178.85
WAL31969		1728	0	No	0
WAL31963		700	0	No	0
WAL31930		600	0	No	0
WAL31863		534	0	No	0
WAL31850		500	0	No	0

Core water demand during the 2020 reporting period was for ore processing. Small quantities of water were also required for dust suppression, vehicle wash down and potable water uses.

Table 28 outlines future estimated water volumes as described in the EA (Umwelt, 2013). Water demand predictions were initially provided in the EA and have remained unchanged through subsequent project modifications.

Table 28 Predicted Water Demand

Water Source	Current Approved Operations (ML)
External	4,350
Recycled	2,091
Surface Water Runoff	523
Groundwater	290
Total	7,254

8. REHABILITATION

Northparkes owns and manages approximately 10,500 ha of land within and surrounding the mine leases. This area supports a range of land uses including mining, exploration, crop production and habitat re-establishment.

Rehabilitation activities incorporate the entire landholding in order to enhance the regional landscape and native habitat values. The Rehabilitation Strategy is described in Sections 2.0 and 3.0 of Appendix 4 of the EA. The State and Federal approvals both state that the rehabilitation of Northparkes must be consistent with the Rehabilitation Strategy (i.e. Schedule 3, Condition 39 of DC11_0060). The MOP summarises the key elements of the Rehabilitation Strategy as well as providing a description of activities and mine landform. As discussed within the 2020 to 2022 MOP, there are limited opportunities for progressive rehabilitation, however activities were carried out in accordance with the MOP.

The Rehabilitation Management Plan (RMP) was prepared to guide the ongoing management of the sites progressive rehabilitation as to ensure that it is integrated with the surrounding Northparkes owned land and is managed with a view to enhancing the regional landscape and native habitats.

8.1 Post Mining Land Use

Northparkes is committed to developing a stable landform that is capable of supporting sustainable ecosystems and enables sustainable land use after the completion of mining operations at Northparkes.

The agreed final land use as stated in the project Consent includes the following:

- Agricultural land use
- Native vegetation re-establishment and conservation
- Restricted land use and
- Limestone State Forest.

8.2 Northparkes Farms and Adjacent Vegetation

Agricultural land around Northparkes is used primarily for crop farming in combination with native vegetation communities. Since acquiring the agricultural holdings, Northparkes has placed considerable emphasis upon sustainable agricultural practices to minimise off-site impacts including:

- Removal of stock to minimise impacts to soil and vegetation
- Conservation tillage practices and
- Soil conservation works (including stubble retention).

Wherever possible, Northparkes has maintained remnant vegetation within its landholdings. An important component of the rehabilitation strategy is the development and implementation of revegetation plans that link the significant areas of remnant vegetation with wildlife corridors and enhance ecological value.

Land management aspects are monitored on a continuous basis across the mining lease and farms through inspections conducted by the Environment and Farms team. These aspects include vegetation clearing activities, topsoil management and invasive weed and animal pest mitigation.

Scheduled inspections (known as Zero Harm Operations Walks (ZHOWs)) of areas within and surrounding the Northparkes mining lease, including the farms, are undertaken either on a quarterly or biannual basis. ZHOWs assess aspects of land management, soils, water and dust.

8.3 TSF1 Final Landform

During 2019, discharge of tailings using the central discharge method was undertaken to assist the final formation of TSF1. This method creates a self-draining final landform that assists with closure of the facility. The central discharge requires the discharged of tailings in thin layers to enable drying. As such, the tailings discharge will continue to occur over several years. There was no deposition of tailings on TSF1 during the reporting period.

8.4 Research and Rehabilitation Trials

8.4.1 TSF1 Trial Plots

Since 2008, the Centre for Mined Land Rehabilitation (CMLR) has carried out a range of rehabilitation studies in association with the TSFs. The field trials, involving four trial plots of 20m X 20m within the southwest corner of TSF1, have different levels and layers of cover over the tailings, have continued through 2020.

Table 29 TSF1 Capping trial design specifications

Design	Plot A	Plot B	Plot C	Plot D
	No specific cover	Shallow cover	Shallow cover with capillary break	Standard cover
Topsoil [m]	0.1	0.1	0.1	0.1
Waste rock [m]	--	0.4	0.4	0.9
Capillary break [m]	--	--	0.3	--
Total trial depth [m]	0.1	0.5	0.8	1

The research trials demonstrated that the tailings generally contain low concentrations of sulphide bearing minerals and some residual metals from processing such as copper. Physically, they are characterised by relatively low hydraulic conductivity and small percentage of continuous macro-pores, which has limited free drainage but shows crack development close to the surface.

The following criteria for an optimal cover design informed the decision for the field trial plots:

- Avoidance of deep drainage
- Sufficient depth of soil for plant growth
- Storage of precipitation and
- Prevention of upward salt movement.

The critical design criteria based on the findings of the previous studies were summarised as depth of cover and depth of topsoil. Modelling of the water balance for various cover design scenarios showed that for the climatic conditions of Northparkes, the contribution of vegetation to extract moisture from the cover could greatly improve the performance (i.e. reduces the risk of deep drainage). The maximum depth from which upward water flow caused by evaporation has been derived from modelling is approximately 1.8 to 2m. This depth would ensure avoidance of surface salt accumulation. In case of shortcomings of topsoil or other fine textured material, upward flow from a saline subsurface layer can be interrupted by a capillary break layer, consisting of coarse competent rock, which would allow a reduction of the cover thickness.

During the 2019 and the 2020 reporting periods ecologists assessed the range of species established within the trial plots and how each species contributed to ground cover. These assessments are being used to determine which species naturally colonise each trial plot and how the species change as succession occurs. The outcomes from the annual assessments will inform the rehabilitation approach for the TSFs.

The differences between groundcover percentage and species diversity between each plot across the 2019 and 2020 reporting years is shown within Figure 33 TSF trial plot groundcover and species diversity

Plot A continued to maintain the highest percentage of groundcover and higher species diversity. Plots C and D increased in both groundcover percentage and species diversity between 2019 and 2020. Plot B declined in groundcover percentage however increased in species diversity.

With the 2020 rainfall being significantly more than the preceding drought years the increased species diversity across the plots is expected. The groundcover and species diversity assessment will continue into the next reporting period to see how the plots progress.

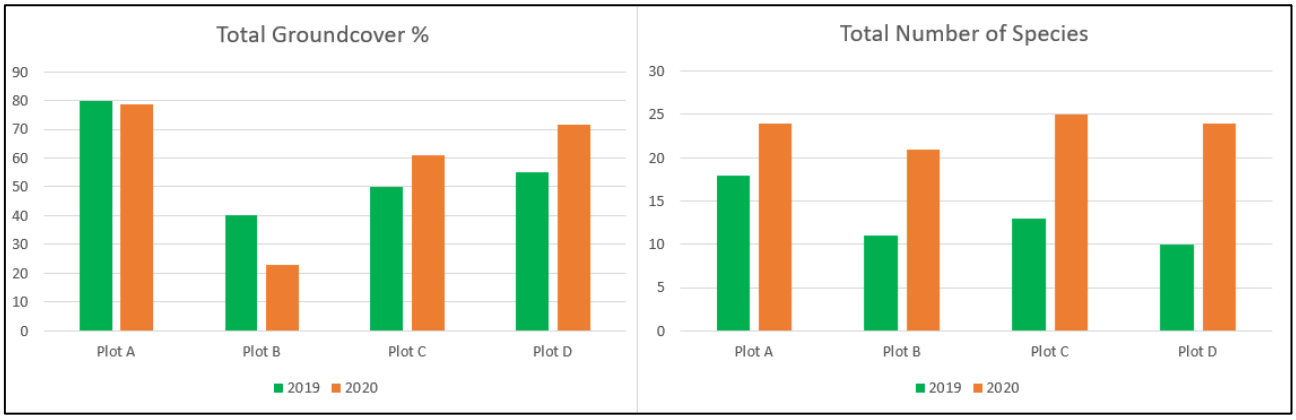


Figure 33 TSF trial plot groundcover and species diversity

8.4.2 TSF2 Direct Revegetation

Since 2015, a range of projects on the existing TSFs to reduce potential dust lift off have been undertaken. The establishment of vegetation directly into tailings has not only proven to be an effective dust control strategy but has demonstrated vegetation establishment directly within the saline tailings surface is possible.

During May 2020, the majority of the TSF2 tailings beach was sown to barley. With a wetter than average year the germination rates and plant establishment were successful in reducing dust. The cover provided by the barley stubble will ensure effective dust control for the 2021 reporting period.

Figure 34 2020 barley planting on TSF2

Over the past five years, local native salt bush and blue bush species have colonised TSF2 and continue to provide ongoing dust management. The ongoing success of vegetation species to establish directly in the TSF2 tailings has initiated a multi-year study into the potential for the tailings material to be used as a growth medium for long term rehabilitation.

As part of the broader research, in December 2020 Landloch carried out an assessment of the tailings within the south east corner of TSF2. The focus was to determine the differences between the bare tailings with no vegetation, tailings which has had multiple barley crops and tailings which received significant volumes of nitro humus in 2016.

The results from the Landloch study determined the soil analysis indicate that establishing a barley cover crop improves the quality of tailings material for future rehabilitation works by:

- Lowering salinity and chloride concentrations int eh surface layers by increased leaching. This increases the potential for the tailings to be used as a growth medium, or, at a minimum, increases the effective root zone for vegetation if another growth medium is placed over the in-situ tailings and
- Increasing availability of phosphorus.

The addition of litter or organic matter such as nitro humus, appears to:

- Increase leaching of chloride from the surface
- Increase soil nitrogen and
- Increases organic carbon content.

The Landloch report supports the broader research being undertaken by Northparkes into the progression of the tailing's material towards a growth medium.

During 2020, a mix of native salt bush and blue bush species were sown in strips across TSF2 (Figure 35), which has accelerated the native vegetation cover across the tailings. The species mix consisted of Oldman Saltbush, Creeping Saltbush, Climbing Saltbush, Ruby Saltbush, Yanga Bush, Small-leaf Bluebush. The groundcover percentage within the strips of native species increased significantly during the reporting period.

Figure 35 Bluebush and saltbush established directly within the TSF2 tailings (February 2021)

During the reporting period an ecologist recorded the range of species that have established within TSF2. The report stated that of the 15 different species identified, the Creeping Saltbush, Sclerolaena spp. and Yanga Bush were all observed growing well.

8.4.3 Material Resource Assessment

As detailed in the MOP, Northparkes initiated a materials resource assessment to better understand the quantity and quality of stockpiled material required for closure. The defined scope for the project details a moderate intensity sampling event of the various onsite stockpiles (topsoil, subsoil and waste rock), assessing their chemical and growth characteristics as a closure resource. Northparkes have engaged a third party to undertake the study which will be undertaken in the next reporting period.

8.5 Rehabilitation Status

The areas rehabilitated to date includes the E26 Oxide Dump, E26 Lift 1 Mullock Dump and waste rock dumps surrounding the E22 pit. None of these rehabilitation areas on site have been signed-off by the appropriate regulatory authority to date.

In 2009, DnA Environmental established a total of 19 monitoring sites which included four mixed woodland and three native grassland reference sites. These monitoring sites are assessed on a three-year basis, with monitoring being carried out in 2020 reporting period. The previous monitoring results from 2017 were included in previous Annual Reviews.

All reference sites have been subjected to some prior form of disturbance, in particular clearing, logging and grazing and some sites were likely to be older regrowth. Exotic annual grasses and a range of other agricultural weeds such were also common.

The 12 rehabilitation monitoring sites were a combination of mixed native woodland and grasslands communities which occurred on various waste emplacements (E22, E26, E27) and on the sides of TSF1 and TSF2. Some sites were also established in revegetation areas located around the farming properties (Kundibah, Beechmore and Altona) as well in the Limestone Forest Offset (LFO) areas. Separate monitoring reports have been prepared to record ecological changes occurring in the Estcourt and Kokoda Offset Areas. The monitoring sites were chosen based on their final land use/vegetation community type and year of establishment and were considered to be representative of the rehabilitation area as a whole.

The rehabilitation status at the end of the 2020 reporting period are in line with the 2020-2022 MOP schedule. The detail within Table 30 aligns with the details within the 2020-2022 MOP.

The TSF1 external batters and tailings beach landform represent the 102ha of land being prepared for rehabilitation within Table 30. Erosion of the TSF1 external batter was identified during the reporting period. Initial works to fix the erosion were completed with broader preventative works planned for the 2021 reporting period.

There was no change in the disturbance or rehabilitation status during the 2020 reporting period. During the 2021 reporting period the Estcourt TSF final embankment raise will occur creating the final landform. A portion of the E22 waste rock emplacement will be used to source construction material for Estcourt TSF construction. These two activities will alter the rehabilitation status areas within the next reporting period, as detailed within MOP Amendment A.

There are no current or foreseeable issues that may affect the ability to successfully rehabilitate the site. Table 30 and Figure 36 provides the status of disturbance and rehabilitation as per '*Table 8*' of the guidelines.

Table 30 Rehabilitation Status

Mine Area Type	2019 Reporting Period (actual)	2020 Reporting Period (Actual)	2021 Reporting Period (forecast)
Total Mine Footprint	1,145	1,145	1,160
Total active disturbance	876	876	865
Land being prepared for rehabilitation	102	102	144
Land under active rehabilitation	163	163	151
Completed Rehabilitation	0	0	0

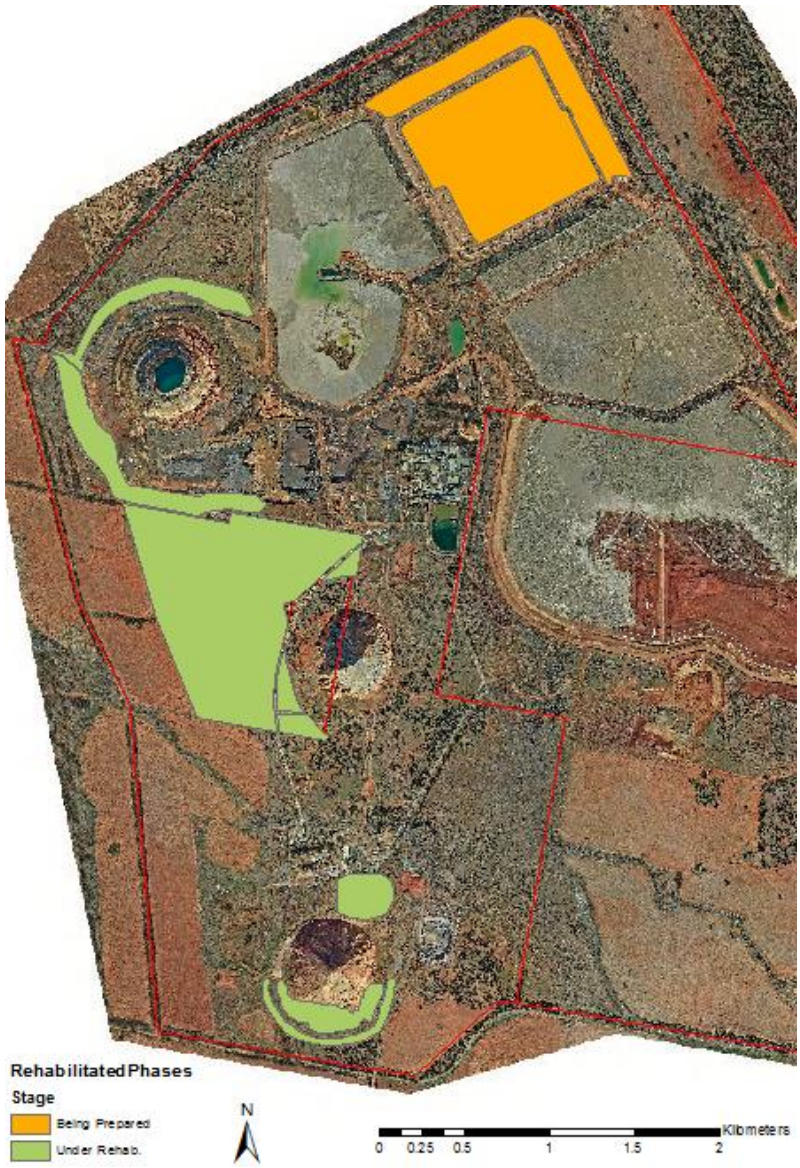


Figure 36 Current status of mining and rehabilitation at the end of the reporting period

8.6 Rehabilitation Actions for the next Reporting Period

As per the commitments within the current MOP period, the following rehabilitation activities will be carried out:

- The ongoing monitoring of the established tailings cover trial plots on TSF1 will continue, which is detailed within Section 8.4.1
- Continued research into the vegetation established directly into the tailings, which is detailed within Section 8.4.2 and
- Undertaking the sampling event and chemical analysis of the various stockpiles for the materials research project (8.4.3)
- Erosion repairs for the outside batter of TSF1 will continue into the next reporting period.
- Creation of the final landform for the Estcourt TSF embankments
- The rehabilitation phase will change for the portion of the E22 waste rock emplacement where material is being sourced for Estcourt TSF construction.

9. COMMUNITY RELATIONS

9.1 Reporting Period Summary

The Northparkes Stakeholder Communications Management Plan (the Plan) guides Northparkes relationship with the community in which it is licensed to operate. The Plan aims to address the various and, at times, diverse needs of Northparkes stakeholders: employees, community and government.

During 2020, despite the challenges of COVID-19, Northparkes:

- Expanded stakeholder relationships
- Worked closely with the community and proactively participated in community initiatives
- Invested in the future of the community through community contributions, strategic partnerships, and scholarship programs
- Provided in-kind support to community groups throughout the Central West via its award-winning Volunteer Leave Program
- Recognised the importance of positive relations with its community and takes this into account in the operation of its business and the decisions made.

Figure 37 Local sporting group receiving sponsorship from Parkes Sports Grants Program

9.2 Community Engagement

Northparkes engages directly and regularly with the local community to both understand community issues and to keep the community updated about activities relating to the operations at Northparkes.

The Northparkes Community Consultative Committee (CCC) was established in 2006. The CCC provides an open forum to discuss any issues relating to Northparkes and its impact on the local community. The CCC comprises an independent chairperson, several local council and community members and Northparkes personnel. Two meetings were held in the reporting period in July and November 2020. No significant issues were raised during the meetings held with the community during the reporting period.

Northparkes respects the need for regular communication with its nearby neighbours. Neighbours meetings are typically held with Northparkes closest neighbours biannually to provide consultation and feedback in regard to mining activities.

No neighbours meeting was held during the period due to COVID-19 restrictions. Next meeting has been scheduled for March 2021.

In Q2 2020, Northparkes distributed its annual Northparkes Report (previously known as the Sustainable Development Report) to key stakeholders. This report was also shared on the website, social platforms and made available to all employees.

The Northparkes Facebook page was used actively as a two-way communication channel by both Northparkes and the community in 2020. The page now has over 3,000 followers.

9.3 Contributions and Achievements

In line with its commitment to support a sustainable community, Northparkes has an investment program to manage financial support for local community events, committees and schools. This program encompasses a small number of carefully considered donations, the Northparkes Community Investment Program and the partnership programs. An independent sub-committee helps Northparkes make decisions regarding sponsorship requests from the local community, as part of the Northparkes Community Investment Program.

In 2020, Northparkes continued to provide financial assistance to local organisations that deliver benefits to the community investing in various sporting, educational, cultural, industry, environmental and agricultural programs.

The major initiatives in the current reporting period included:

- Funding a Grants Officer Program in conjunction with Parkes Shire Council
- Funding for an Aboriginal project officer in conjunction with Parkes Shire Council
- A Sports Grant Program with the Parkes Shire Council
- Supporting education through the Parkes Life Education Program
- A community equipment pool scheme which provides community groups access to equipment such as marquees, a blow-up TV screen, a PA system, eskies etc. for use free of charge.

Please note a number of community related initiatives were cancelled and or postponed due to COVID-19.

9.4 Complaints

9.4.1 Management of Complaints

Northparkes has a process for receiving, investigating, responding and reporting complaints received from community members. 24-hour external telephone lines are in place to allow the public to raise community concerns. These contact numbers are advertised on the website (www.northparkes.com).

Registered neighbours received via post an updated magnetised contact list including all relevant contact numbers of Northparkes personnel.

The website provides information about all aspects operations and has the capacity for the community to submit enquiries, concerns or complaints via e-mail direct to the Community and External Relations Advisor.

All complaints received across site are referred to the Community and External Relations Advisor, and are then responded to in a professional and timely manner. All complaints are recorded, with the outcomes of investigation findings and corrective actions communicated to the relevant personnel and reported in the Annual Review and the annual Northparkes Report.

Northparkes maintained its dust risk notification communication strategy in 2020. The Northparkes Environment team distributes a weekly weather report, internally. If there is a high-risk dust day, the Community and External Relations Advisor sends an advance text message to any neighbour who may be affected. The message includes information about the expected high-risk day and any mitigating actions Northparkes plans to take, as well as the invitation to call the Community and External Relations Advisor if people have concerns or questions.

9.4.2 Registered Community Complaints

During the reporting period, zero complaints from the community were received. The previous 2 complaints were both related to driving behaviours and were during the 2019 and 2017 reporting periods.

The complainant was very happy with the timeliness and response to the matter by Northparkes. Monthly summaries of complaints are made publicly available on the website at: http://www.northparkes.com/news/#community-reports

Northparkes was not advised of any complaints to a regulator during the reporting period.

9.5 Workforce Profile

Wherever possible, local personnel are employed by Northparkes and its contractors. The team consists of 469 staff, with majority locally based. A breakdown of the local government areas where employees reside is presented in Table 31.

Table 31 Residential Locality of Northparkes Employees

Locality	Northparkes Employee Residency (%)
Parkes	66%
Forbes	13%
Dubbo	2%
Orange	2%
Peak Hill	3%
Other	13%

10. INDEPENDENT AUDIT

As required by Schedule 6, Condition 9 and 10 of DC11_0060, Northparkes are required to undertake an independent environmental audit every three years. The last independent audit was carried out within the 2018 reporting period. The next independent audit is scheduled for 2021.

11. INCIDENTS AND NON-COMPLIANCES

11.1 Non-compliances during the reporting period

As stated within Section 1, there were zero noncompliance's recorded during the 2020 reporting period.

11.2 Summary Environmental Incidents

During 2020 there were 34 internal incidents with an environmental component reported across different event types and event outcomes. The details of incidents, likely causes, actions to date and additional proposed measures were uploaded into the risk management system (known as RMSS) in accordance with reporting procedures. The separation between near misses and incidents is detailed within Table 32.

Table 32 Environmental Hazards and Incidents in 2020

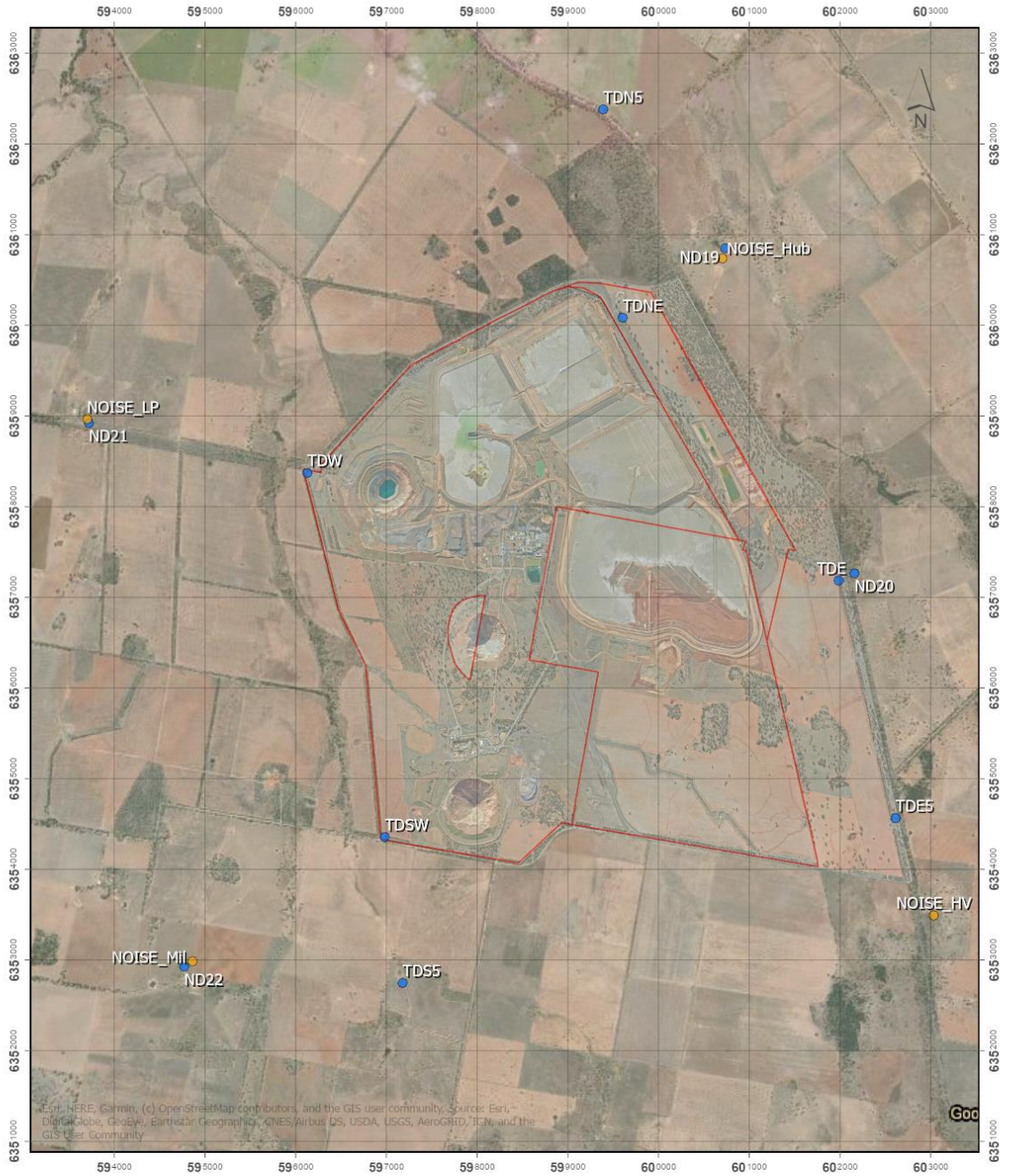
Event Type	Number
Damage/Report Only	4
Hazards	10
Incident Near Miss	2
Incident Actual	18
Total	**34**

12. ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

Activities proposed for the next reporting period include:

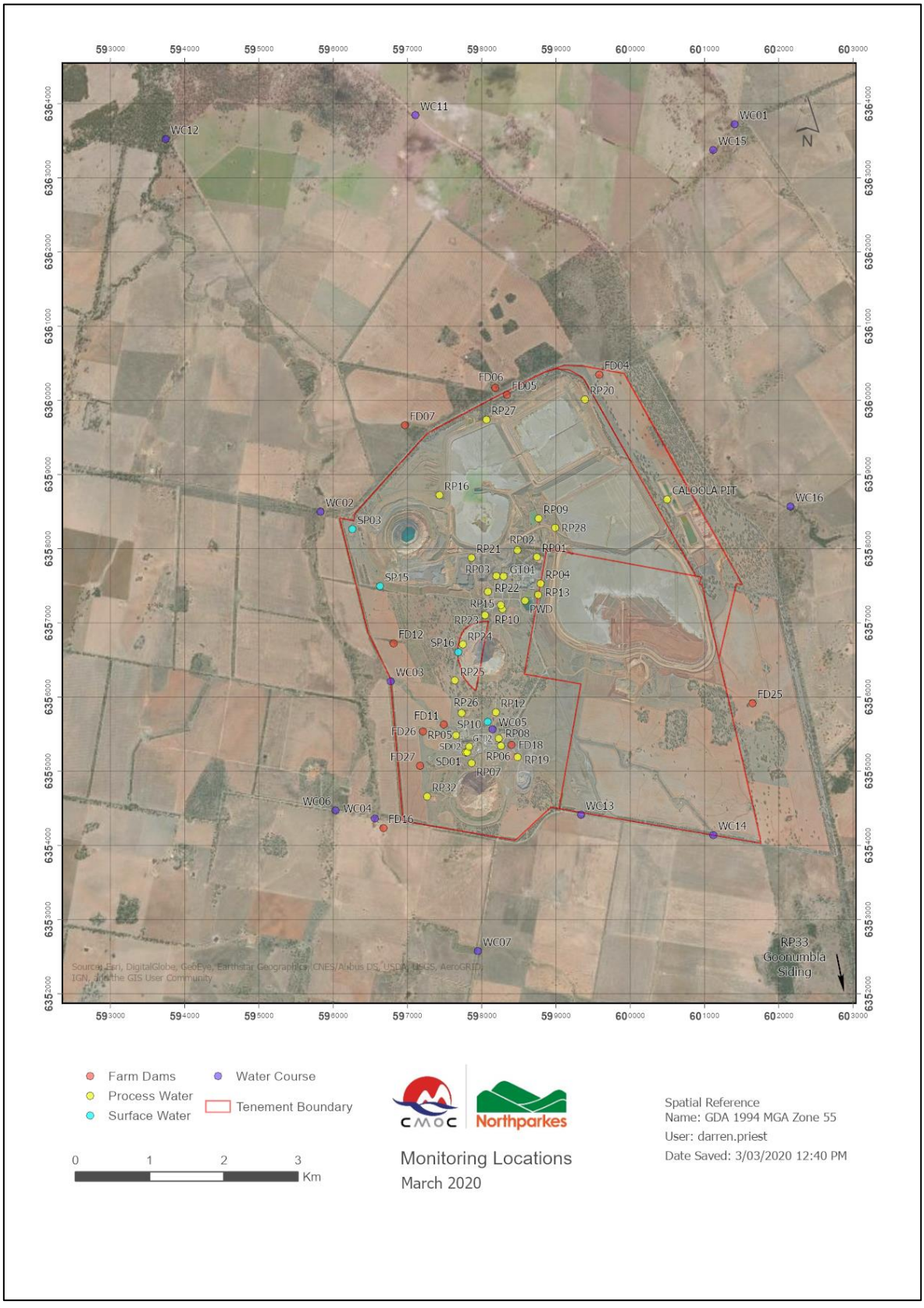
- Review and revision of various Environmental Management Plans with a focus on:
  - Continue with review and approval of water monitoring assessment aimed to improve the efficiency of field monitoring and removing unnecessary monitoring sites from the monitoring schedule and
  - Continue with review and approval of the regional air quality monitoring network, to remove those monitoring locations that are impacted by extraneous sources.
- Continue E26L1N development
- Continue Secondary crusher construction and commissioning
- Undertake targeted environmental monitoring
- Continue the research projects aimed at materials assessment and tailings closure covers and
- Continuing to implement the requirement of VCA with the Kokoda Offset plantings.

APPENDIX 1 DUST AND NOISE MONITORING LOCATIONS

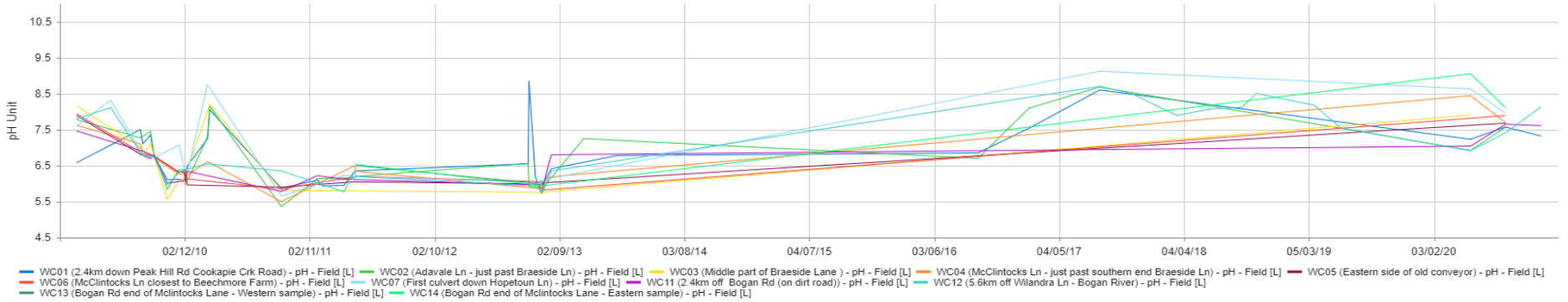


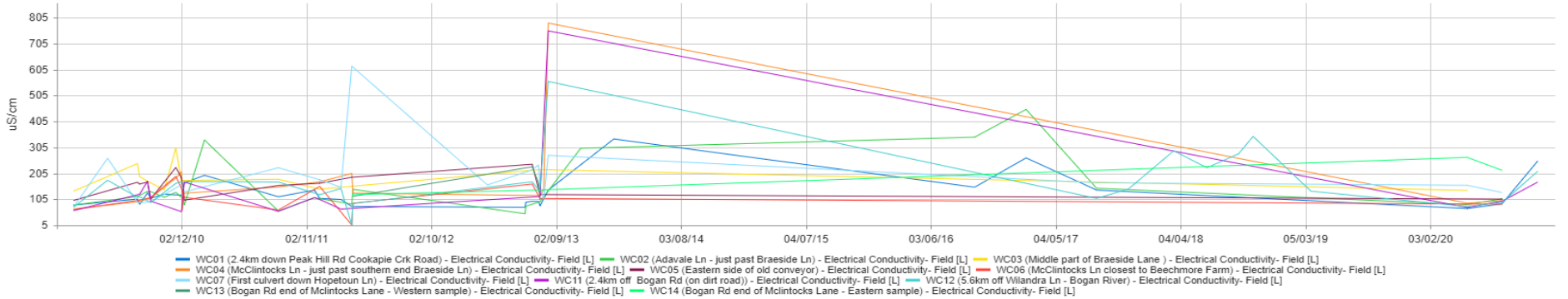
APPENDIX 2 WATER MONITORING

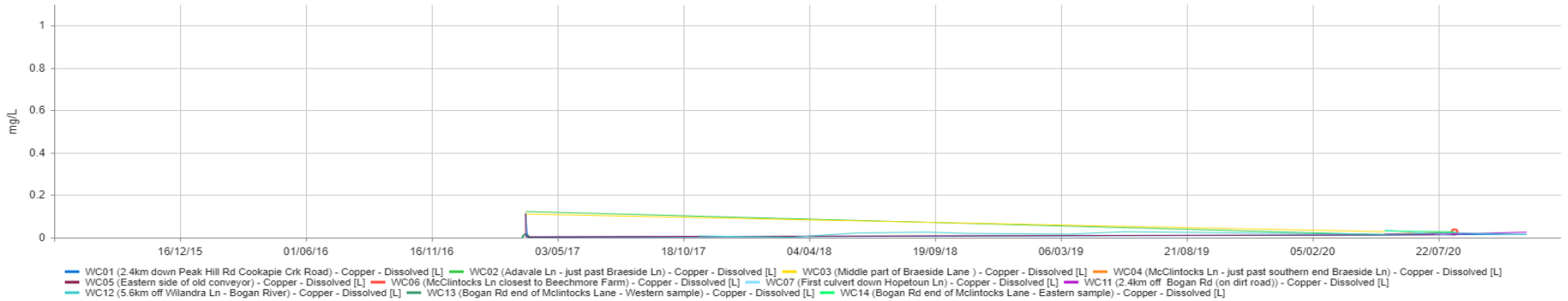
Surface water monitoring locations



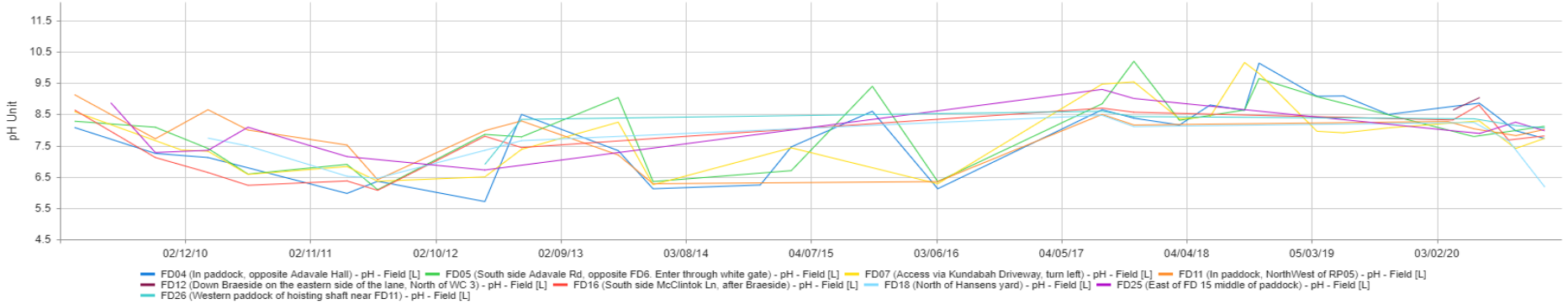
Surface water monitoring results – Water Course pH, electrical conductivity and copper

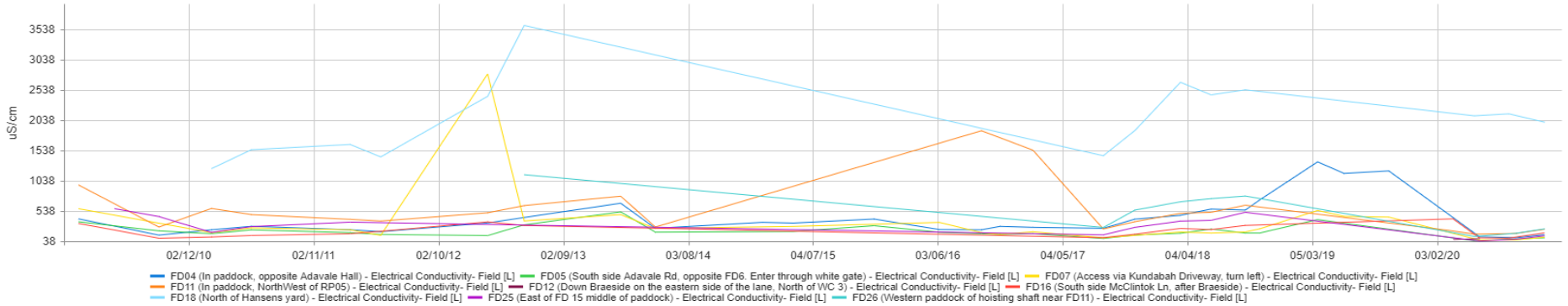


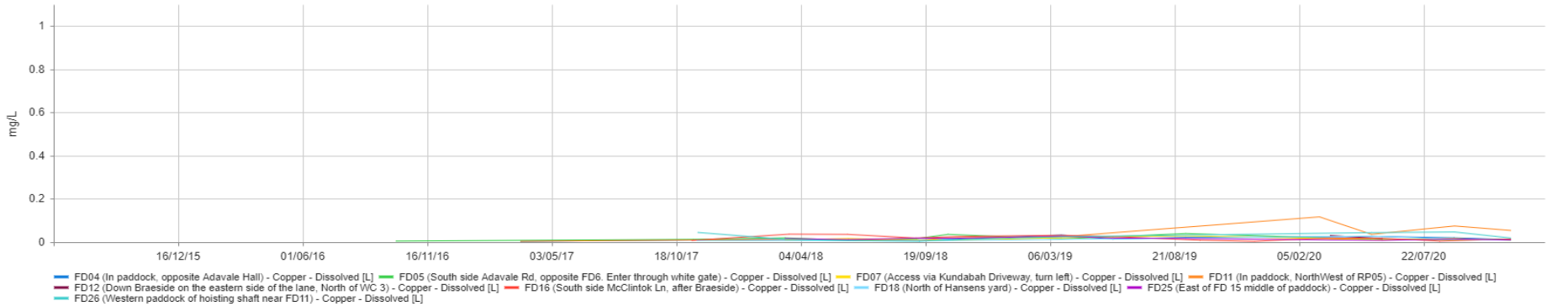




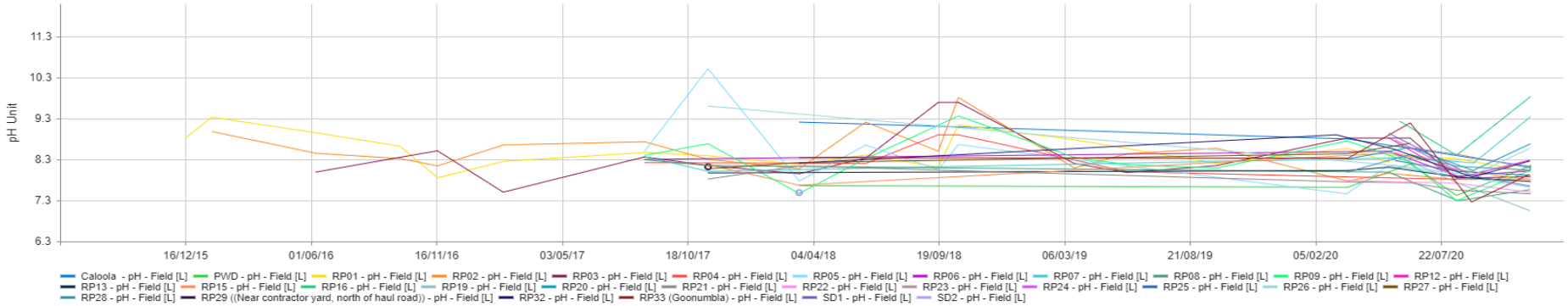
Surface water monitoring results – Farm dams pH, electrical conductivity and copper

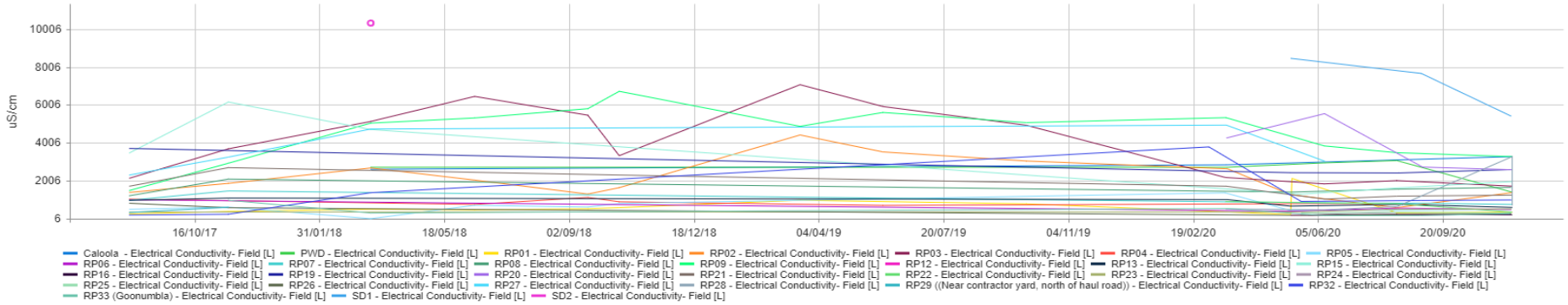


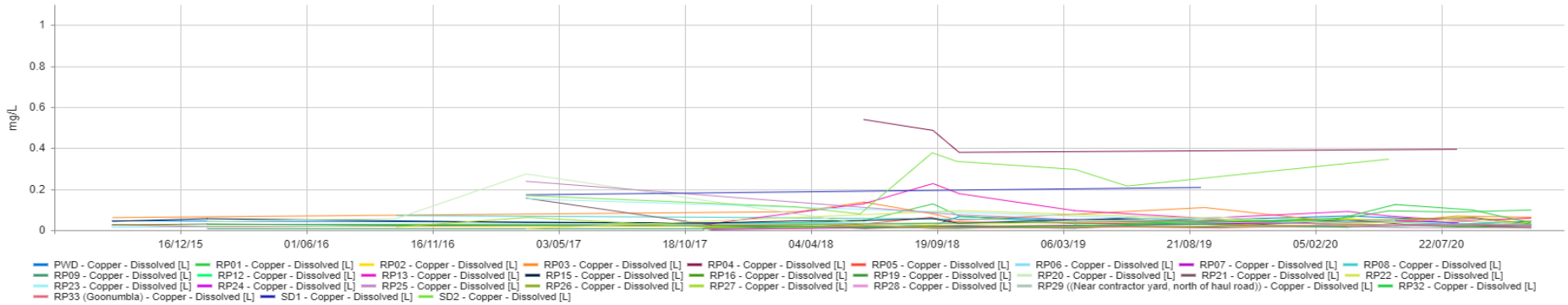




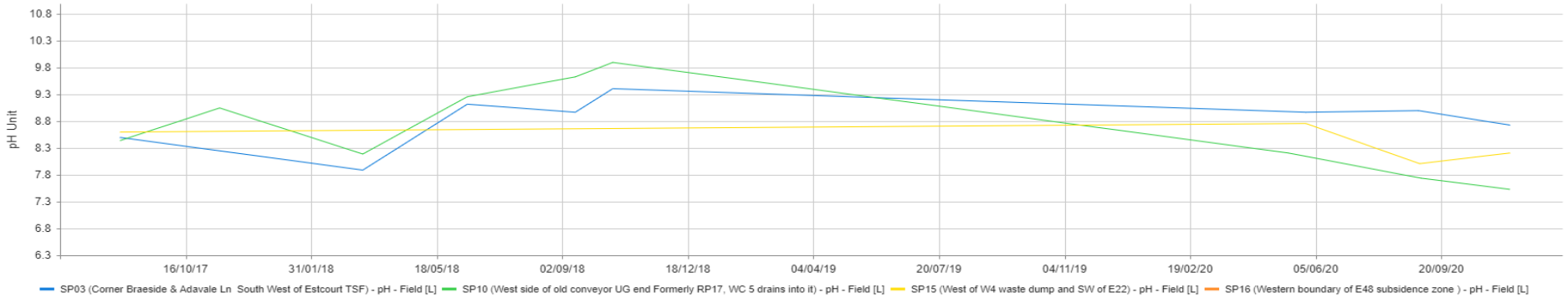
Surface water monitoring results – Retention ponds pH, electrical conductivity and copper

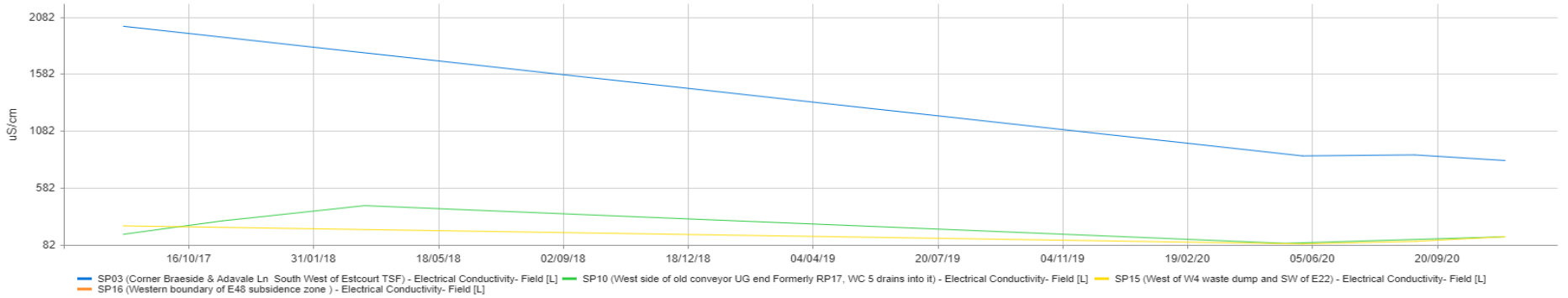


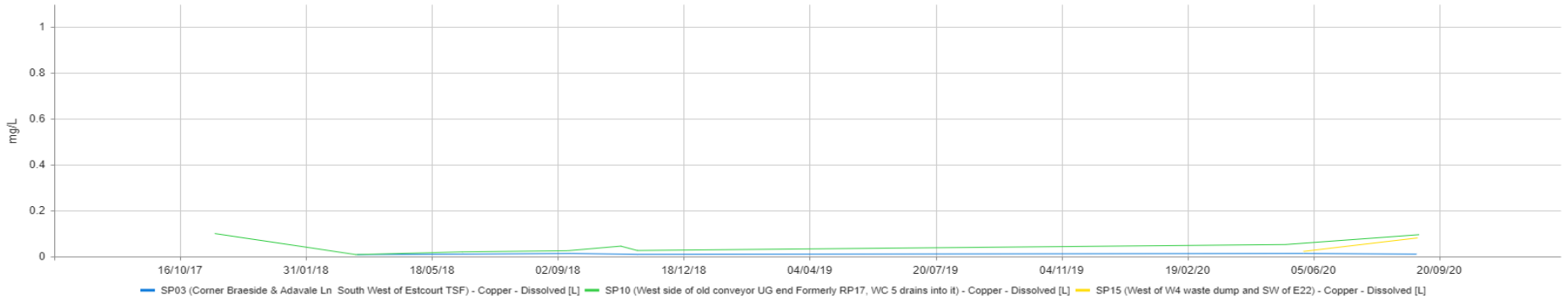




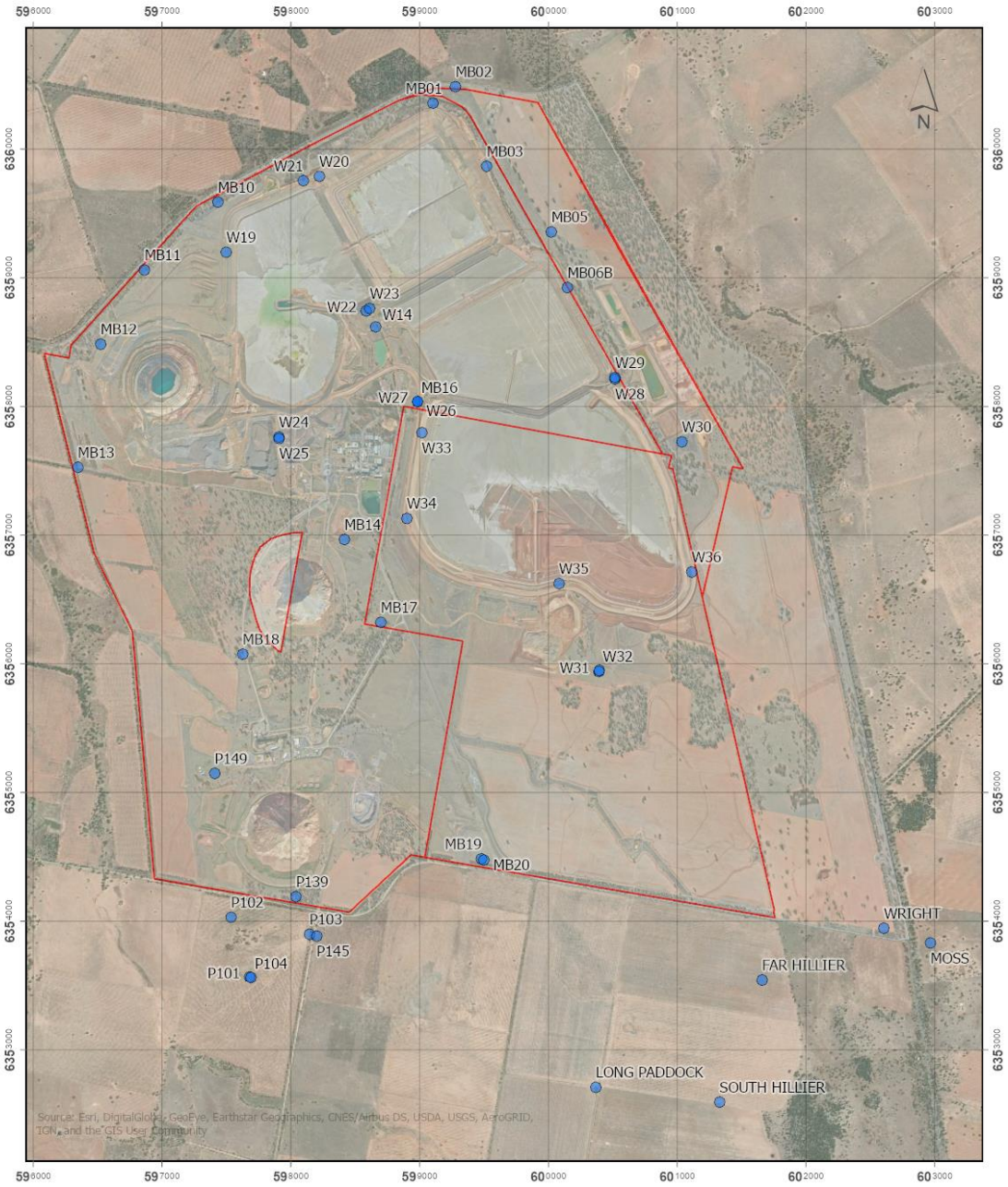
Surface water monitoring results – Sediment ponds pH, electrical conductivity and copper



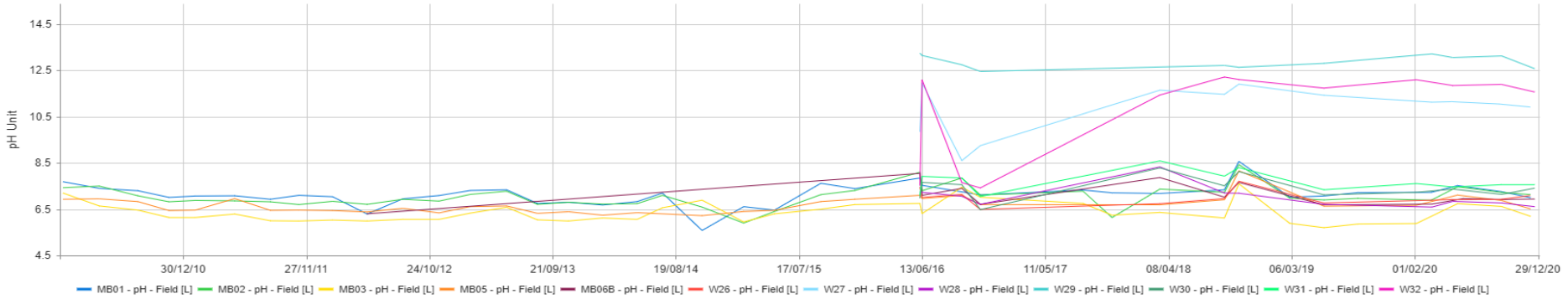


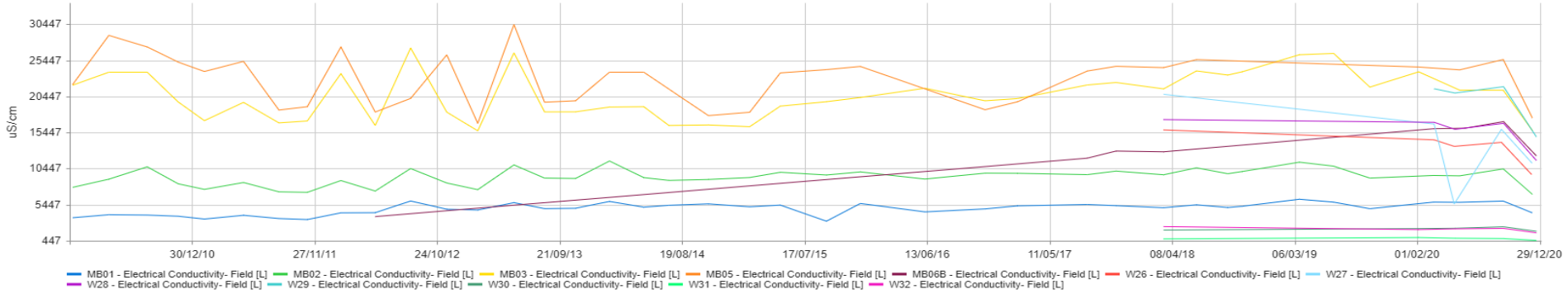


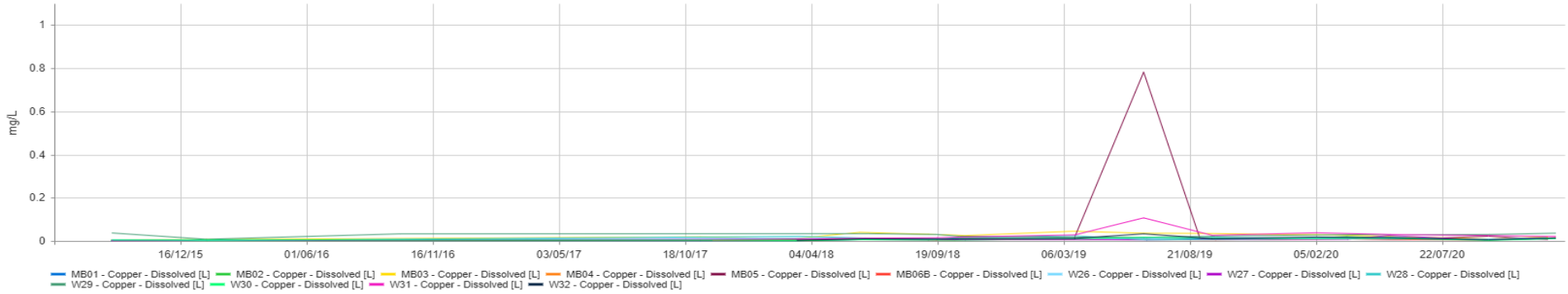
Ground water monitoring locations



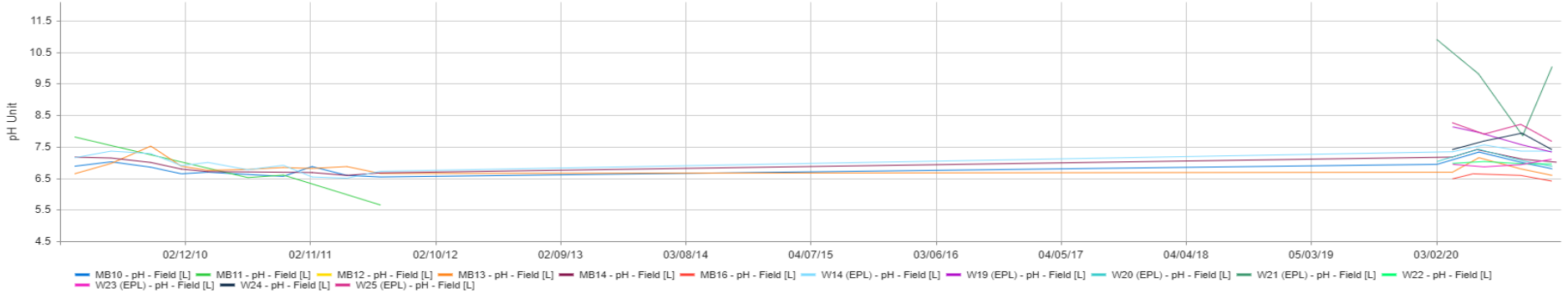
Ground water monitoring results – TSF bores pH, electrical conductivity and copper

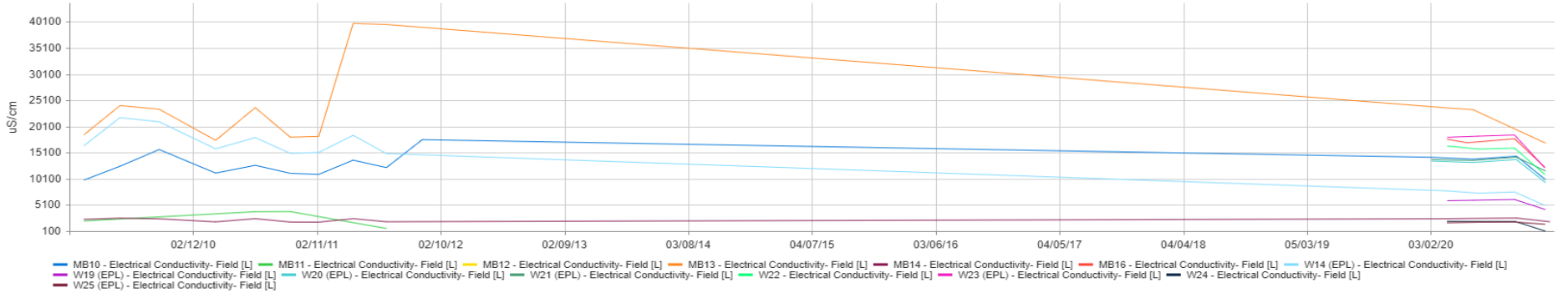


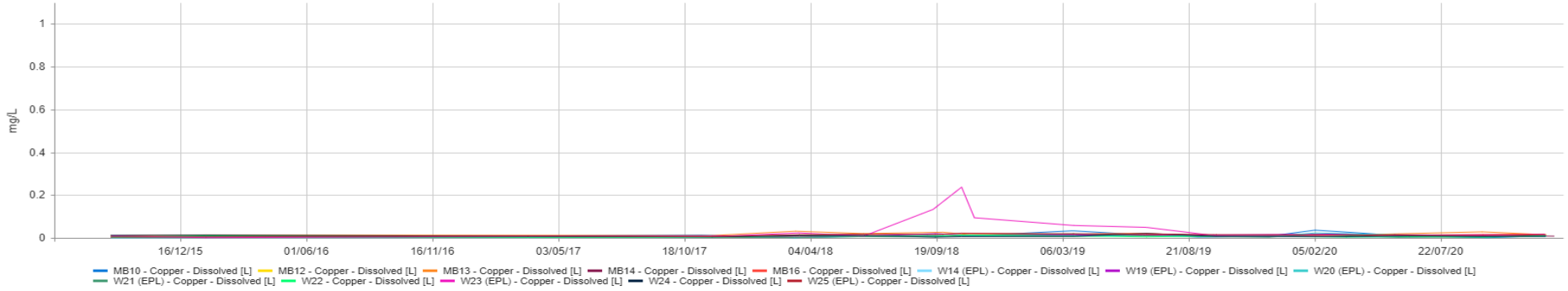




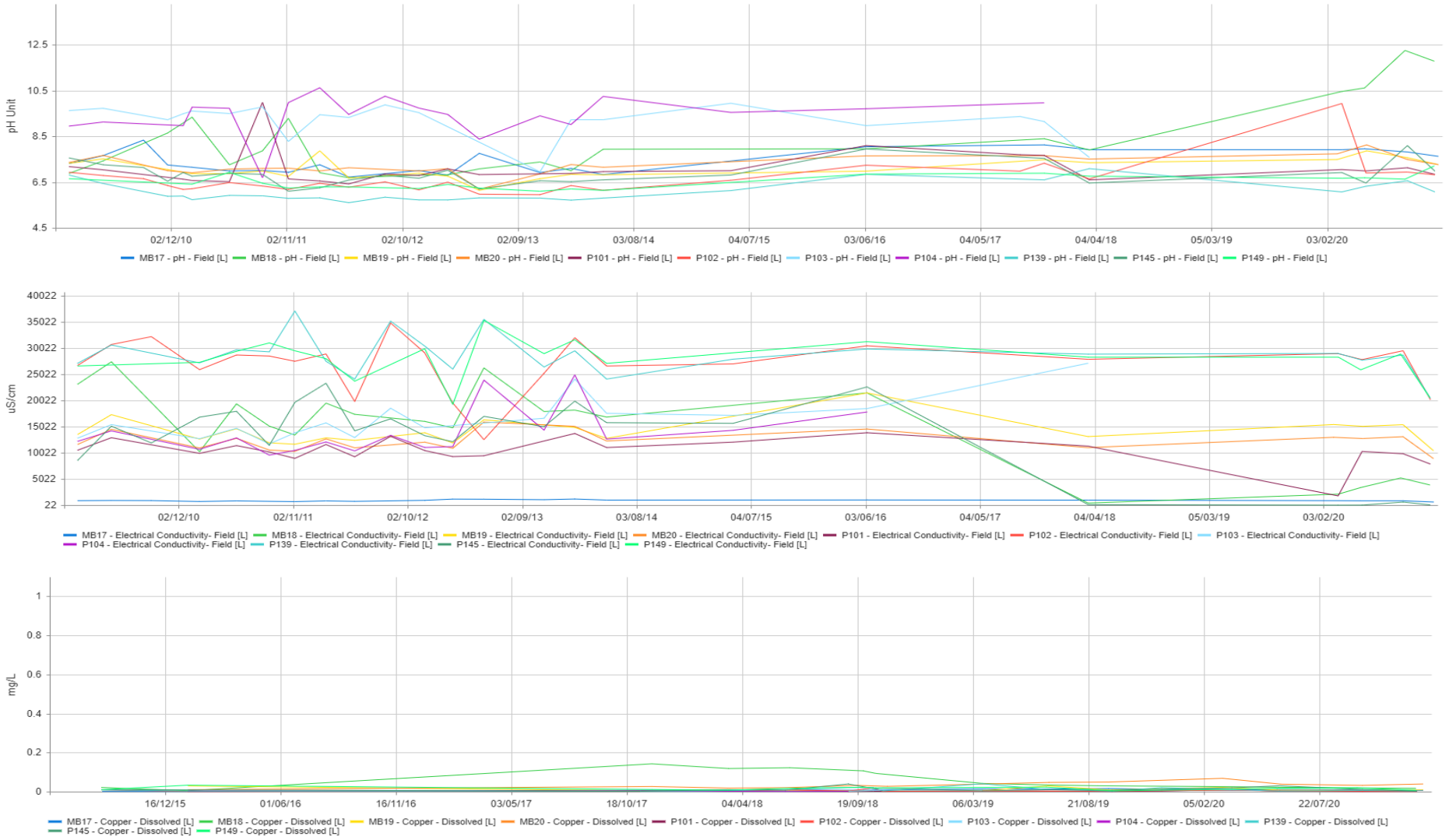
Ground water monitoring results – Open cut bores pH, electrical conductivity and copper







Ground water monitoring results – Underground bores pH, electrical conductivity and copper



Ground water monitoring results – Regional bores pH, electrical conductivity and copper