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CMOC-Northparkes Mines
2017 Annual Review

January 2017 – December 2017

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	PA 11_0060, as modified
Name of holder of development consent/Project Approval	CMOC Mining Pty Ltd
Mining Leases	ML 1247, ML 1367 ML1641, ML1743
Name of holder of mining lease	CMOC Mining Pty Ltd
Water Licence #	Refer to Table 5
Name of holder of water licence	CMOC Mining Pty Ltd
MOP Commencement Date	1st January 2015
MOP Completion Date	1st January 2020
Annual Review Commencement Date	1st January 2016
Annual Review Completion Date	31st December 2016
I, James Fowler, certify that this audit report is a true and accurate record of the compliance status of CMOC-Northparkes Mines for the period 1st January 2017 to 31st December 2017 and that I am authorised to make this statement on behalf of CMOC Mining Pty Ltd.	
Name of authorised reporting officer	James Fowler
Title of authorised reporting officer	Managing Director
Signature of authorised reporting officer	
Date	29 March 2018

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1. STATEMENT OF COMPLIANCE

In accordance with the requirements of 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 the Project Approval 11_0060 (including Statement of Commitments), mining leases and other relevant approvals at the end of the 2017 reporting period. Table 1 identifies any non-compliances that occurred during the reporting period for each statutory approval. Where non-compliances have been identified, these are further detailed in Table 2. Non-compliances have been colour-coded in accordance with the descriptions provided in the *Annual Review Guideline*.

Table 1 Statement of Compliance

Were all conditions of the relevant approvals complied with?	
PA 11_0060	No
ML 1247	Yes
ML 1367	Yes
ML 1641	Yes
ML 1743	Yes
EL 5800	Yes
EL 5801	Yes
EL 5323	Yes
EPL 4784	No
EPBC 2013/6788	Yes
WAL9995, WAL8241, WAL7866, WAL34955, WAL32138, WAL32120, WAL32004, WAL31969, WAL31963, WAL31930, WAL31863, WAL31850, WAL21471, WAL21466, WAL1698, WAL13108, WAL10082	Yes

Table 2 Non-Compliances

Relevant Approval	Condition No.	Condition Description	Compliance Status	Comment	Where addressed
EPL 4784	Condition O1 and O2	East Surge Dam Overflow	Non-compliant	An internal investigation and water sampling was conducted. A report was filed to the EPA on the 6th April.	Section 11
PA 11_0060	Schedule 3, Condition 27	Security of Biodiversity Offset	Administrative Non-Compliant	The VCA has been signed by executives at CMOC and the OEH. Pending registration with the NSW Biodiversity Conservation Trust.	Section 11

2. INTRODUCTION

2.1 Mine Contacts

Table 3 CMOC-Northparkes Mines Contacts

Position	Contact Name	Contact Number
Northparkes Hotline	Ali Creith	02 6861 3000
Mill Control (24 Hrs)	-	02 6861 3167
Access Control	-	02 6861 3211
Community, Environment and Farms Superintendent	Chase Dingle	02 6861 3264
People, Safety and Environment Manager	Stacey Kelly	0419 961 615

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, known as CMOC Mining Pty Ltd (CMOC).

The majority of CMOC 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.

Northparkes is an open cut and underground operation, however the open cut mines have been economically exhausted and operations of these pits ceased in 2010. The two underground ore bodies, E26 and E48, access copper sulphide porphyry ore bodies using the block cave mining method. The E26 block cave ceased production in 2010. The E26 orebody continued to be mined using the sub level caving mining method which commenced in 2016.

Ore is transported to surface where it is processed through a semi-autogenous grinding (SAG) circuit and associated floatation process. The copper concentrate slurry is filtered through ceramic discs, loaded into sealed containers and transported to Port Kembla from Goonumbla Rail Siding. By-products from the ore processing facility are stored in the onsite Tailings Storage Facilities.

A copy of the 2017 Northparkes Value Chain is provided as Figure 2. The value chain is a high-level model developed by CMOC and 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. CMOC 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.

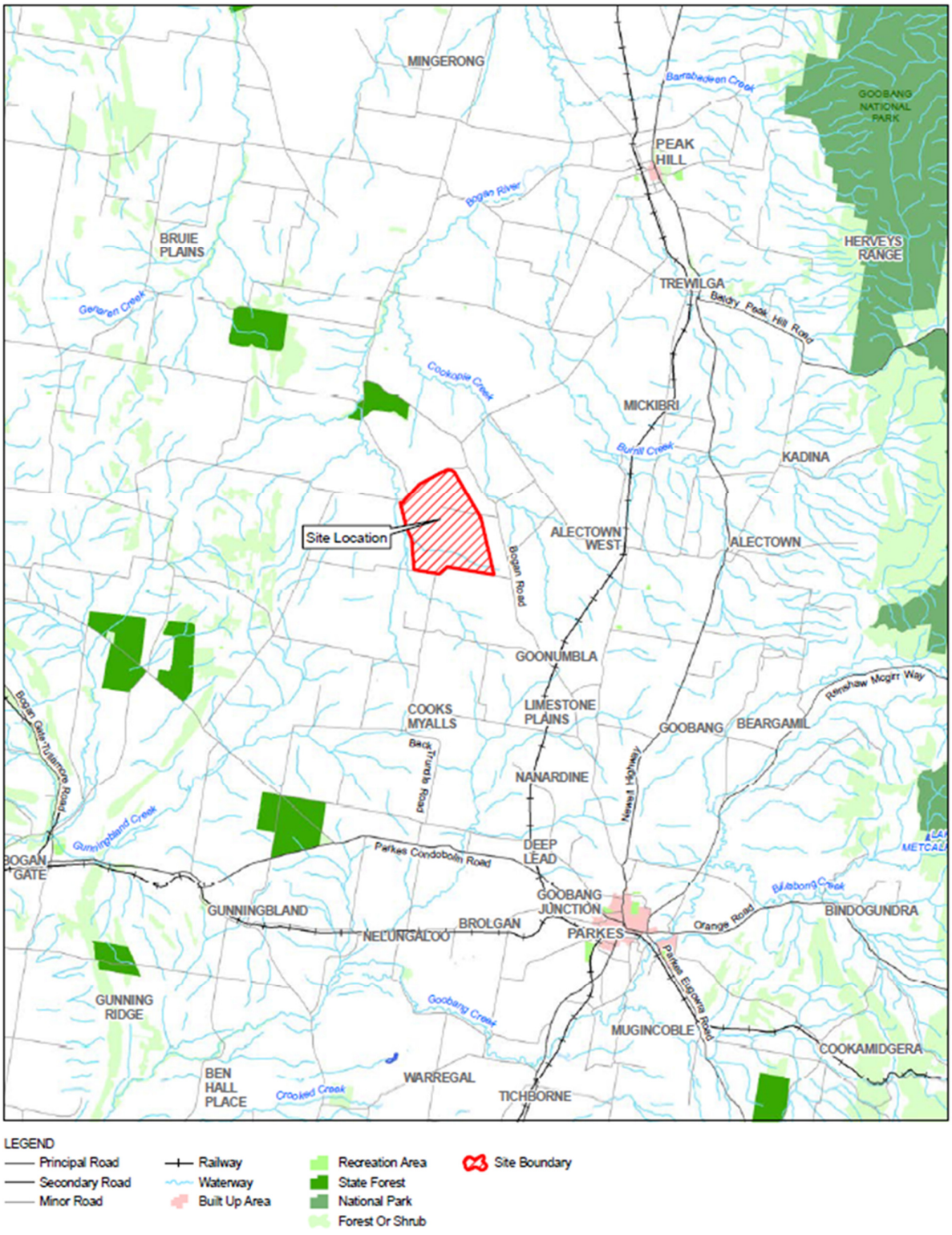

Figure 1 Project Locality Plan.

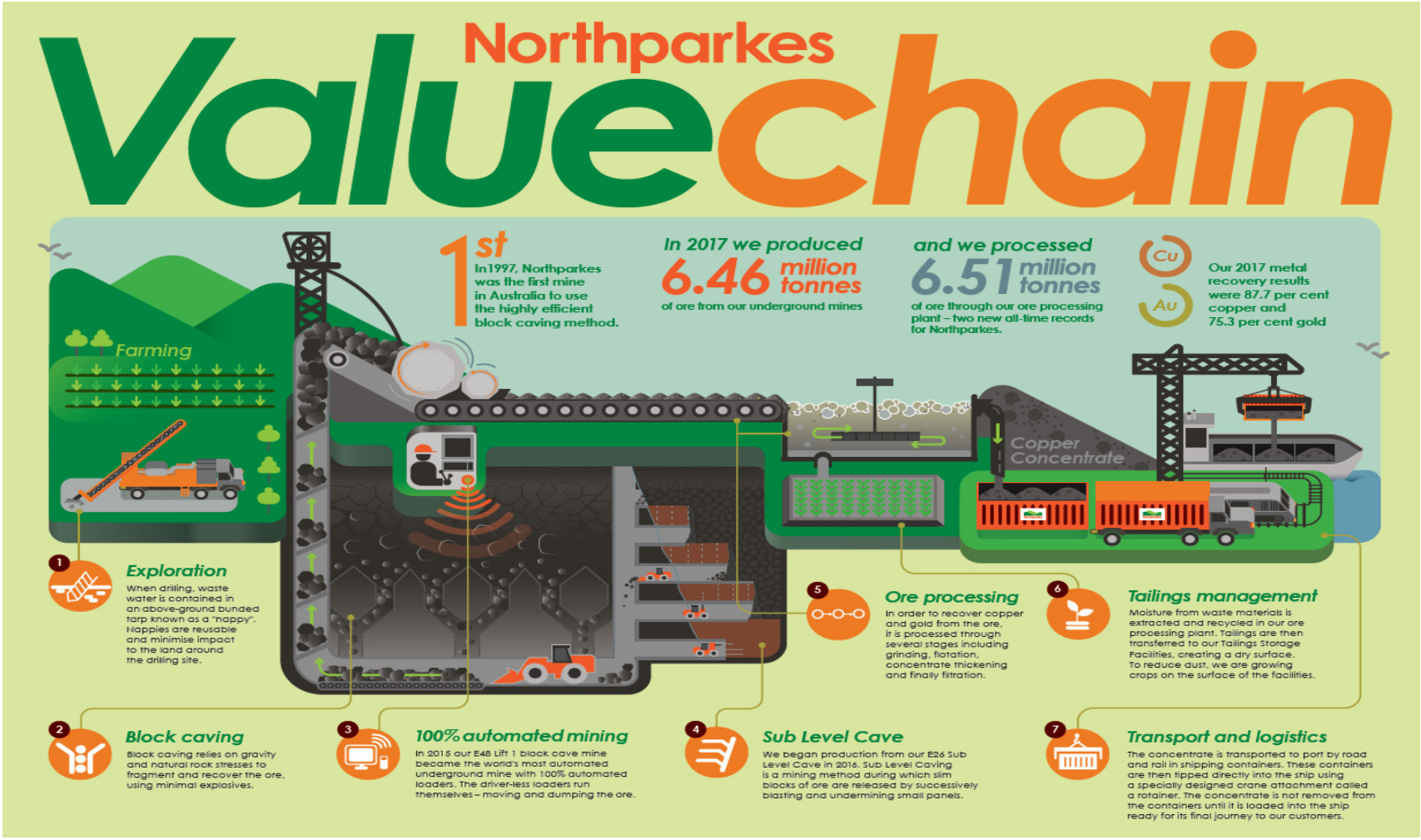

Figure 2 Northparkes 2017 Value Chain

2.2.2 Site Layout and Infrastructure

Surface infrastructure and operation layout is shown in Figure 3.

Onsite infrastructure includes:

- One former open cut pit E22, surrounded by ore stockpiles, waste rock dumps and a sound bund;
- Tailings Storage Facilities: TSF1, TSF2, Estcourt which includes E27 and Rosedale plus associated infrastructure;
- The E26 Sub Level Cave (SLC) and E48 underground block cave mine and resultant surface subsidence zones;
- Underground mining fixed plant infrastructure including two crushers, maintenance workshops and materials handling conveyor system;
- Surface mining related infrastructure such as the portal, hoisting shaft, secondary crusher, ventilation fans, transfer and overland conveyor, mining offices and contractor laydown areas;
- Marginal ore stockpiles, waste rock dumps, topsoil stockpiles and stockpiles of clay and oxide material are located around the surface subsidence zone outside the predicted subsidence limits;
- The processing plant including surface crusher, crushed ore stockpiles, active grinding mills, froth flotation area, concentrate filtration and storage bays and tailings storage facilities;
- Service infrastructure including administration buildings and change rooms, core shed, metallurgical laboratory, emergency response shed, warehouse, workshop, electrical infrastructure, surface contractor lay down areas and associated roads;
- Goonumbla rail siding infrastructure including portable amenities; and
- Water management infrastructure.

2.3 Scope

This Annual Review details the environmental performance of Northparkes from 1 January 2017 – 31 December of 2017, outlines proposed actions for the next reporting period and applies to activities being undertaken within Mining Leases (ML) 1247, 1367, 1641, 1743 and Goonumbla Rail Siding.

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 Expansion 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 Project Approval 11_0060 (the Approval) (in particular Schedule 6, Condition 4) and Mining Leases (ML) 1247, 1367, 1641, 1743. Key requirements of these approvals are described in Table 4.

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

CMOC 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 and Environment (DPE);
- Department of Primary Industries – Water;
- Parkes Shire Council (PSC);
- Forbes Shire Council (FSC);
- NSW Office of Environment and Heritage (OEH);
- NSW Environment Protection Agency (EPA);
- Peak Hill Local Aboriginal Land Council (PHLALC);
- Wiradjuri Council of Elders (WCE);
- Northparkes Community Consultative Committee; and
- General public (available at http://www.northparkes.com/).

2.4 Annual Review Requirements

Table 4 Annual Review Requirements

Licence Approval or Guideline	Section Reference	Requirement	Reference in this Report
Project Approval 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 12.1
	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)	Section 4

		(b) ensure that the waste generated by the project is appropriately stored, handled and disposed of; and (c) monitor and report on effectiveness of the waste minimisation and management measures in the Annual Review	
ML 1247	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
ML 1367	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
ML 1641	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
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

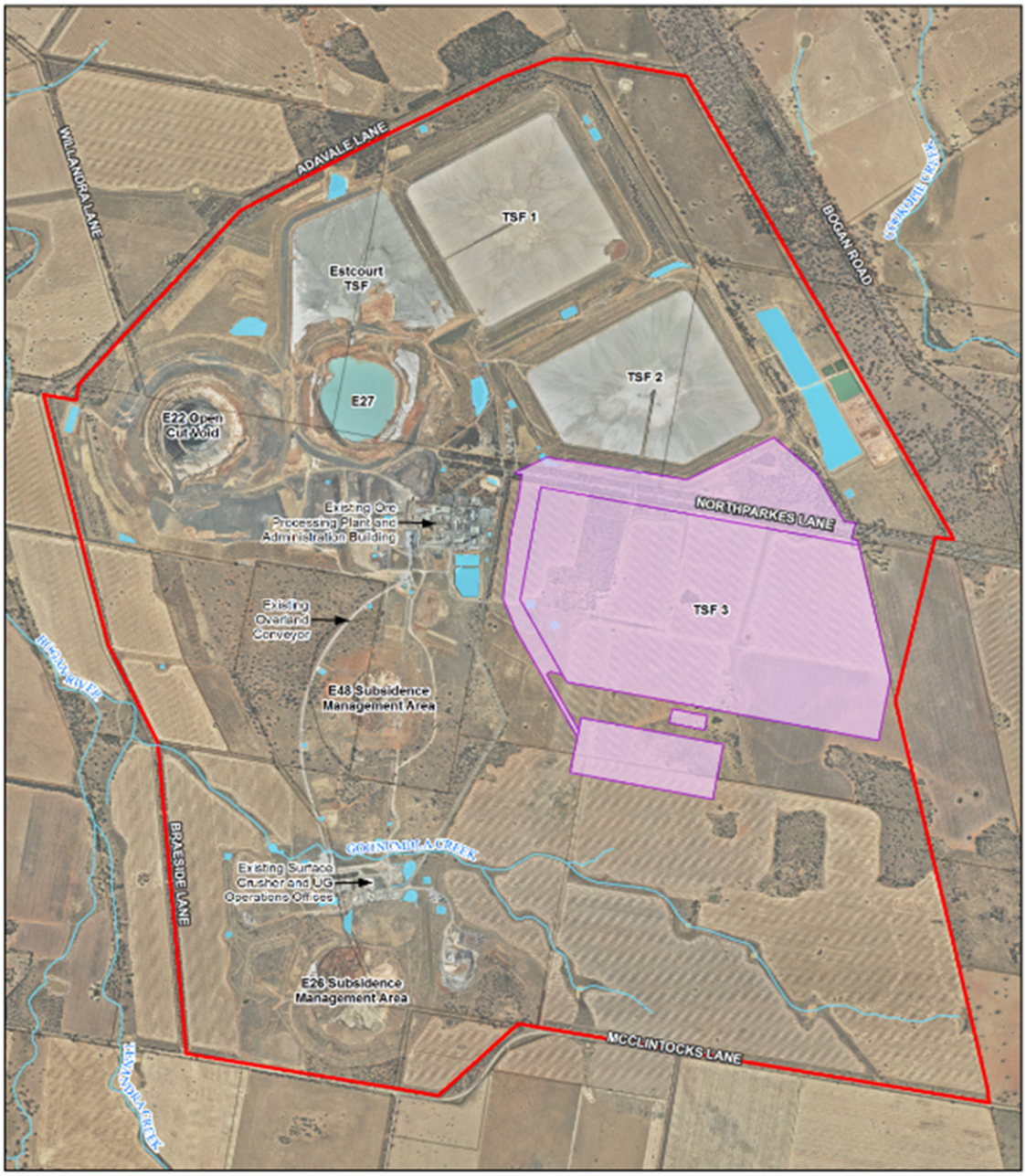

Figure 3 Surface Infrastructure and Operational Layout

3. APPROVALS

3.1 Approvals, Leases and Licences

Table 5 summarises the key mining leases and approvals currently held by CMOC which are relevant to the operations at Northparkes.

Table 5 Summary of Licences

Approval	Description	Issue Date
Project Approvals		
PA11_0060	Project Approval – Step Change Project (Mine Extension)	16/07/2014
PA11_0060 Mod 1	Modification to include Sub Level Cave Mining	16/5/2015
PA11_0060 Mod 2	Correct error in project boundary	31/3/2016
PA11_0060 Mod 3	Development and operation of E26 Lift 1 North	22/8/2017
EPBC 2013/6788	EPBC Approval	13/02/2014
Council Approvals		
	PSC Approval for Road Train Access on Bogan Road	19/11/1999
DA2009/0057	Development Consent (Forbes Water Pipeline)	19/03/2009
Mining Leases		
ML 1247	Mining Lease (1629.6 ha)	27/11/1991
ML1367	Mining Lease (826.2 ha)	21/03/1995
ML1641	Mining Lease (24.4 ha)	25/03/2010
ML1743	Mining Lease (193.3 ha)	01/09/2016
Exploration Leases		
EL 5800	Exploration Lease (245 km^2)	08/01/2001
EL 5801	Exploration Lease (495 km^2)	08/01/2001
EL 5323	Exploration Lease (218 km^2)	18/07/1997
Environmental Protection Licences		
EPL 4784	Environmental Protection Licence	30/05/2001
Dangerous Good and Explosives		
35/02983	Dangerous Goods Notification	09/04/2015
07-100146-001	Licence to Possess and Store (Explosives)	27/07/2009
XMNF200011	Licence to Manufacture, Transport, Use, Possess and Store Explosives	19/03/2014
5060895	Radiation Management Licence	10/11/2017
Water Licences		
WAL9995	Water Access Entitlement	08/03/2005
WAL8241	Water Access Entitlement	01/07/2012
WAL7866	Water Access Entitlement	01/07/2004
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
WAL21471	Water Access Entitlement	03/12/2010
WAL21466	Water Access Entitlement	03/12/2010
WAL1698	Water Access Entitlement	01/07/2004
WAL13108	Water Access Entitlement	20/12/2006
WAL10082	Water Access Entitlement	18/10/2005
Forestry Occupation Permits		
HD 48307	Limestone State Forest Occupation Permit	24/09/2009
Mining Operations Plan		
Current MOP (as amended)	2016-2020 MOP Approval	13/05/2015

3.1.1 Amendments during the Reporting Period

3.1.2 Project Approval

Project Approval 11_0060 was granted on 16 July 2014. Two modifications to the Approval have been granted since the original Approval (dated 16/5/2015 and 31/3/2016 respectively). The latest modification (Mod 3) was lodged for assessment under the *Environmental Planning and Assessment Act 1979* (*EP&A Act*) in July 2017 and approval granted in September 2017. The modification involved the establishment of an additional extraction level at approximately 520 to 540m below ground level at the northern extent of the approved E26 underground mine to target approximately 36 million tonnes of ore.

The Department of Planning and Environment (DPE) found that the modification would have no significant environmental impacts beyond those associated with the original project. DPE also found that the modification is in the public interest, as it would allow CMOC to maximise the extraction of minerals thereby increasing royalty payments to the state, and would contribute to the security of employment for the mine workforce.

3.1.3 Environmental Protection Licence

On 1 December 2017, the Environmental Protection Authority (EPA) issued a licence variation notice (no. 1558061) to add pollution reduction programs requiring CMOC to undertake a comprehensive review of the existing surface water management system and dust management at the site (Condition U1 and U2 respectively). Both conditions must be satisfied within the 2018 reporting period.

An Annual Return for the reporting period was submitted to the EPA on 20 June 2017 in accordance with requirements under Environment Protection Licence (EPL) 4784 Condition R1.5.

4. OPERATIONS SUMMARY

4.1 Production Statistics

A summary of production figures for the 2016 and 2017 calendar years is provided in Table 6 below. Also shown are the predicted production figures for the 2018 reporting period.

Table 6 Production and Waste Rock Summary

Material	Approved Limit	Previous Reporting Period	This Reporting Period	Next Reporting Period (predicted)
Waste Rock/Overburden	N/A	64,652	14,004	42,000
Ore mined (Mt)	8.5	6.07	6.46	6.35
Fine Reject (Tailings) (Mt)	N/A	5.93	6.38	6.28
Saleable Product (Mt)	N/A	137,415	132,063	125,820

Mining operations within the 2017 reporting period remained below the limits specified in the Approval. Specific conditions from Schedule 2 of the Approval are presented in Table 7 with responses on the compliance of each also provided.

Table 7 Compliance with Project Approval Conditions

Project Approval Condition No. and Description	Compliance Response
5. The Proponent may carry out mining operations on site until 31 December 2032.	Compliant
6. The Proponent must not process more than 8.5 million tonnes of ore onsite in any calendar year.	Compliant, see Table 6.
7. The Proponent shall ensure that all ore concentrate produced on the site is transported to the Goonumbla Rail Siding via haulage on Bogan Road	Compliant, all transport of concentrate to the Goonumbla Rail siding was via haulage on Bogan Road.

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). 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, CMOC confirmed its position as the most automated underground mine in the world and achieved 100 percent automation of underground mine loaders.

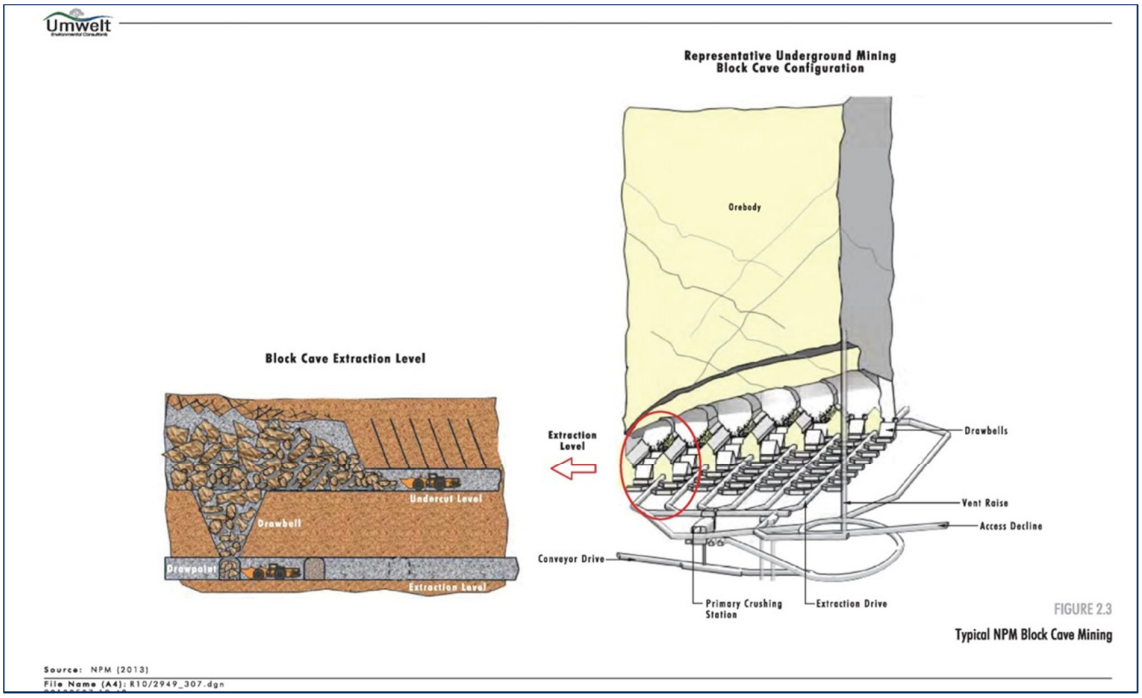

Figure 4 Block Cave Mining Method

4.2.3 Waste Rock

A total of 14,004 tonnes of waste rock from underground development was placed on the Lift 1 Mullock Dump during the reporting period. This was primarily from the E26 SLC access development. The waste movement for this reporting period decreased from the previous reporting period due to the reduced mine development in the reporting period.

No issues were identified from the inspections of waste rock dumps across site in the current reporting period.

A total of 42,000 tonnes of waste rock is planned to be placed on the Lift 1 Mullock Dump during the next reporting period. This material will come from raise boring the two ventilation shafts. Topsoil stockpiles at the end of the reporting period are captured in Appendix 1.

4.3 Exploration and Resource Utilisation

Exploration and evaluation programs continued across ML 1247, ML1367, and ML 1641 in the current reporting period, as shown in Figure 6. No exploration activities were undertaken on ML 1743 during the year. No non-compliances have been noted for the mining and exploration leases (as stated in Figure 5) related to exploration or evaluation activities.

A total of 41 drill holes for 11,719.8m were completed for exploration and evaluation purposes during the reporting period. The drilling comprised 21 reverse circulation holes for a total of 2,673.0m, and 20 diamond drill holes, for a total of 9,046.8m of core. The majority of this core was tested for mineralised extensions on the eastern side of E26 Lift1. CMOC is committed to identifying and evaluating new ore bodies with the intention of extending mine life.

Mining lease evaluation works involved:

- The completion of diamond drilling to support ongoing development studies for the E26 Lift 1 North Project;
- Percussion drilling to define potential surface extractive operations at the E31N Deposit; and
- Underground drilling for both grade control and geotechnical purposes within and adjacent to current mining operations at the E26 SLC.

Surface exploration drilling, both percussion and diamond, occurred across a number of targets within ML1247 and ML1641 during the reporting period. In addition to new drilling, two previously completed vertical holes drilled at E48 during 2016, (E48D271 and E48D272) were cut and sent for assaying. The holes were drilled for geotechnical purposes in support of the E48 vent raise project.

Exploration and evaluation activities will continue in the next reporting period. The focus of these activities will be diamond drilling to evaluate near mine extensions as well as the drill testing of new targets derived from project generation onsite. Figure 5 is a cross section showing the zones of mineralisation in relation to existing mine infrastructure.

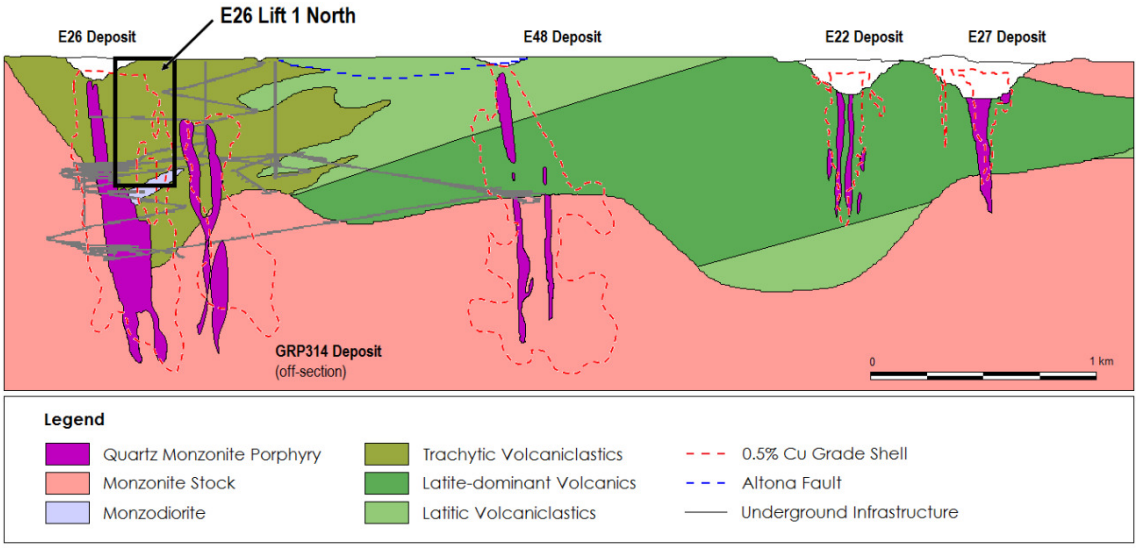

Figure 5 Cross section showing the zones of mineralisation in relation to existing mine infrastructure.

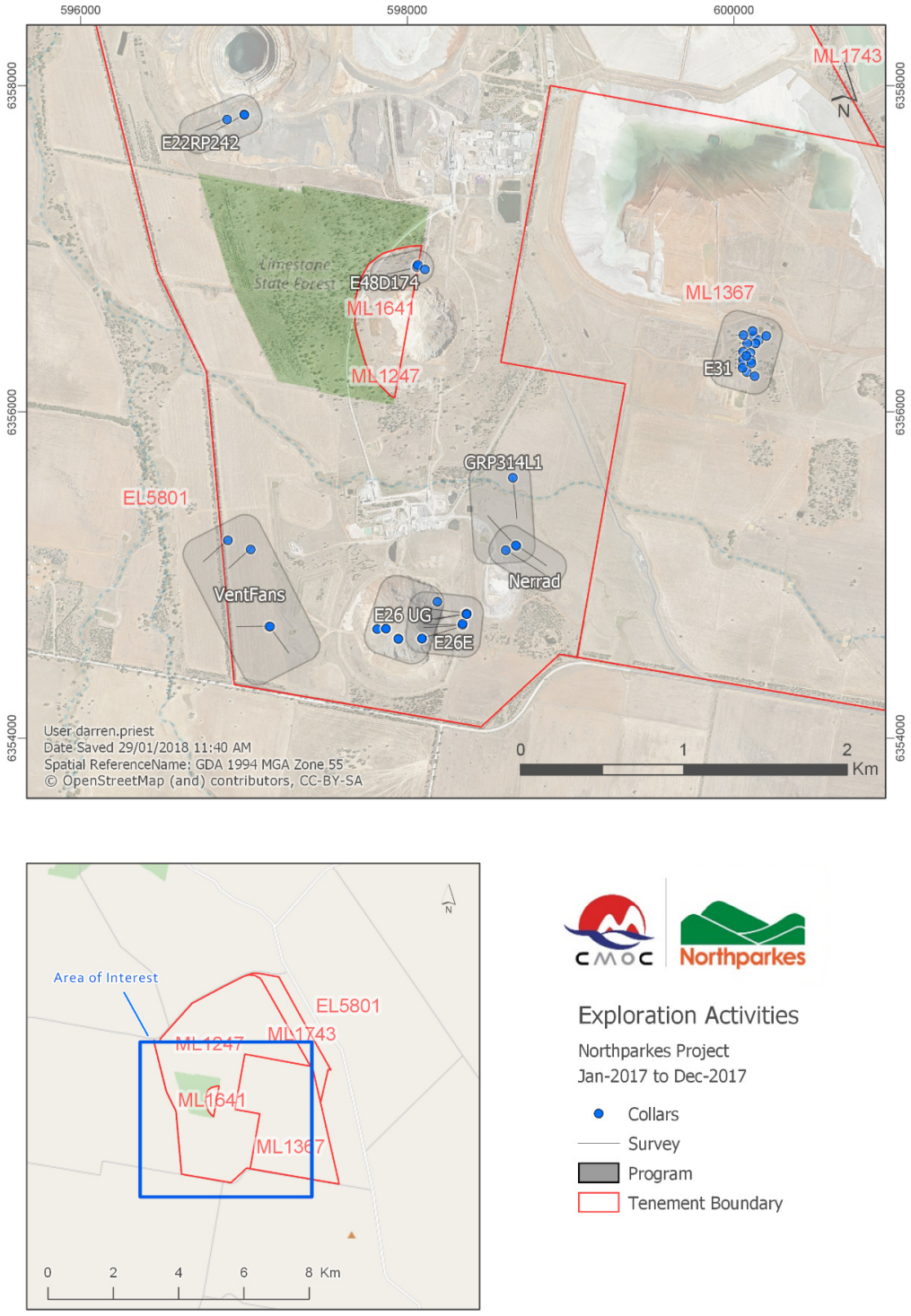

Figure 6 Exploration and Evaluation Drilling Activities for 2017 - Mining Leases

4.4 Ore processing

In 2017, a total of 6.51 Mt of sulphide ore was processed from the underground ore body. Copper-gold concentrate production totalled 132,063 tonnes and this product was predominantly sold to customers in China and Japan. Production for the past five years is presented in Table 8.

Ore processing includes a number of defined stages including grinding, floatation and thickening. The grinding circuit comprises two separate modules (Mod 1 and Mod 2), each incorporating a Semi Autogenous Grinding (SAG) mill, oversize crushing technology, two stages of ball milling and froth floatation.

The floatation process floats a sulphide concentrate to recover copper and gold bearing minerals. From the floatation, the concentrate is processed through the concentrate thickener and transferred to the storage shed.

The tailings component is pumped from the floatation stage to a tails thickener and then to the Tailings Storage Facility (TSF).

Table 8 Ore Processing Production

Year	Ore Milled (Mt)	Production Copper Concentrate (t)
2013	6.01	168,282
2014	6.13	169,376
2015	6.04	151,518
2016	6.07	137,445
2017	6.51	132,063

4.5 Tailings

In the reporting period, 6,377,937 tonnes of tailings were deposited between Estcourt TSF, E27, TSF Infill and Rosedale TSF. A summary of the reporting period tailings distribution and TSF capacities is provided in Table 9 below.

Table 9 Distribution and Capacity of Tailings Storage Facilities

Tailings Storage Facility	Distribution (%)	Capacity (Mt)
TSF1	0	0
TSF2	0	0.1
Infill	14	0.8
Estcourt Stage 1	18	0.8
Rosedale Stage 1	69	0.5

A total of 100.2 Mt of tailings has been deposited at Northparkes operations to date. All tailings have been deposited within TSF1, TSF2, Estcourt/E27 pit, Rosedale TSF and the TSF Infill located approximately 2km from the processing plant. The tailings are sub-aerially deposited into the active TSF and tailings liquid and runoff is contained and directed to the internal central decant tower.

The TSFs have been designed to provide;

- Safe and permanent containment of all tailings 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.

CMOC's control measures for the management of tailings during construction and operation are implemented as per the Tailings Operators Manual and Tailings Management Plan.

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, TSF Infill and TSF1 Closure.

Dust mitigation trials continued on TSF2 to manage risks associated with air quality. This included monitoring of the barley that was directly seeded into the tailings surface along with pasture trial and the use of nitro humus during 2016. Visual inspections have indicated that the barley has taken well to the tailings surface and where established has reduced the risk of wind erosion of the tailings surface.

Other trials of different vegetation species determined that tall wheat grass, some medics and some clovers all also established good ground cover. These particular species are either perennial, meaning that they grow again each year or are annuals that distribute large seed banks promoting self-regeneration potentially reducing the requirement for future sowing. The sowing of these species has been scheduled for 2018.

4.6 Construction Activities during 2017

A summary of construction activities undertaken during the reporting period and their completion status is provided in Table 10.

Table 10 Summary of construction activities during the reporting period

Infrastructure	Commencement Date	Completion Date
Mine Infrastructure Area (MIA)		
TSF1 Projects; Infill, buttressing and closure design	January 2017	July 2018
Estcourt lift stage 2	October 2017	March 2018
E48 Ventilation Fan Upgrade Project	December 2017	October 2018

4.6.1 *TSF 1 Closure Design*

Construction of the TSF1 closure design includes the further development of existing batters, the construction of a higher central tailings deposition location as to provide final "convex" shape and the construction of a new larger toe drain and RP20 water storage facility.

The purpose of the convex landform is to provide a variable final landform feature for the TSF.

4.6.2 TSF Infill Project

The TSF Infill project was completed during the reporting period and will allow direct tailings placement between TSF1 and TSF2. In November 2017, CMOC commenced the deposition of tailings between TSF1 and TSF2, which is expected to continue throughout the next reporting period.

This project also included the closure of the return water dam RP4 and establishing RP9 as the new return water dam for the Mine Infrastructure Area.

4.6.3 Estcourt TSF Stage 2 Lift

In late 2017, CMOC commenced significant civil works in order to increase the storage capacity of Estcourt TSF. This work will increase Estcourt's/E27 storage capacity from 12.5Mt to 20.0Mt and is scheduled to be completed in Q1 2018.

4.6.4 E48 Ventilation Fan Upgrade Project

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

The commissioning trials are expected to be completed during the last quarter of 2018.

4.7 Next Reporting Period

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

- Single flotation project
- E48 Ventilation Fan Upgrade Project
- TSF Rosedale Stage 2 Wall Lift
- Various sustaining capital works projects to support the mining and ore processing operations including infrastructure upgrades and mobile equipment rebuilds and purchases.

5. ACTIONS REQUIRED FROM 2016 ANNUAL REVIEW

Actions raised at the Annual Review (AR) meeting held on 29 August 2017 are provided in Table 11 below.

Table 11 Actions from the 2016 Annual Review Meeting

Action required from previous AR	Requested by	Action taken	Section Addressed
Review the DPE guidelines prior to submitting the report.	DPE	Reformatted 2017 AR	Whole document
Include graphical representation of data, trends and comparisons with previous years.	DPE	Include in 2017AR	Whole document
Include a comparison of results with the predictions in the EA.	DPE	Include in 2017 AR	Section 4, Section 6, Section 7, Section 8.
Include a compliance summary.	DPE	Include in 2017 AR	Section 1
Include all incidents rather than only those submitted to the EPA or regulator.	DPE	Include in 2017 AR	Section 11
Include positive outcomes and dust management projects completed during the year and maps of where these took place (e.g. Sampling off site to satisfy neighbours).	EPA	Include in 2017AR	Section 8.4
Include the project management work, rehabilitation and shaping of TSF1; update the dust management plan to include dust management practices during the shaping and rehabilitation of TSF1 and alternating use of Rosedale	EPA	Description of TSF1Cosure Design Project included in 2017 AR, along with the dust mitigation measures employed during the reporting period. In late 2017, CMOC also engaged third party to undertake an assessment of the effectiveness of the current Air Quality Management Plan.	Section 4
Show a breakdown of tailings in a table regarding distribution of tailings and capacity of TSFs.	EPA	Include in 2017 AR	Section 4.5
Include evidence of surface maintenance and upgrades regarding blocked drains	EPA	Include in 2017 AR	Section 7.1.2
Complete analysis of straw bale area on TSFs and determine if there is contamination	EPA	Straw bales left in situ, no analysis required	NA
Include rainfall data for 10 year period. Demonstrate groundwater rise-why it increased and effect on water quality.	EPA	Include in 2017 AR	Section 7
Site water management plan to be updated to include TSF1 changes and surge dam management.	EPA	Captured within Water Management Plan V.8.	NA
Include information on audits, EPA visits and inspections-include incidents or actions from EPA	EPA	Include in 2017 AR	Section 12
Include top soil stockpile locations	EPA	Include in 2017 AR	Appendix 1
Add Wiradjuri Executive Committee (WEC) to stakeholder distribution	EPA	Distribution list updated to include WEC	NA
For abnormal results-compare to approval limits and include a story, forecast and plan.	EPA	Include in 2017 AR	Whole document

6. ENVIRONMENTAL MANAGEMENT AND PERFORMANCE

6.1 Environment Team

Northparkes has an HSE Policy committed to pollution prevention and continual improvement of environmental management activities. To support the intent of this Policy, environmental management is undertaken by the onsite Environmental team, which forms part of the People, Safety and Environment (PSE) department.

The HSE policy is a part of the developed and implemented Health, Safety, Environment and Quality Management System (HSE MS). This is certified to ISO14001 and audited, both internally and externally, on an annual basis.

6.2 Environmental Management System

The Environment Management System (EMS) at Northparkes provides the strategic framework for environmental management. 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 CMOCs monitoring, reporting and auditing requirements;
- Outlines relevant roles, responsibilities and accountabilities relevant to environment management for all CMOC employees and contractors.

During the reporting period, CMOC maintained the EMS and was certified to the new 2015 ISO 14001 standard.

CMOC has developed a suite of environmental management plans (EMP) to guide environmental management at Northparkes. The plans have been developed in accordance with the EMS, the Approval and other statutory requirements. The revision status of approved key EMPs, as required by Schedule 6, Condition 3 of the Approval, is summarised in Table 12.

Table 12 Key Environmental Management Plans

Management Plan	Status
Biodiversity Offset Management Plan	Revision 4-Revised 24 November 2016
Water Management Plan Surface Water Management Plan Groundwater Management Plan	Revision 8-Revised 22 May 2017 Revision 3-Revised 22 May 2017 Revision 2-Revised 3 October 2016
Pollution Incident Response MP (PIRMP)	Revision 7-Revised 22 November 2017
Air Quality Management Plan	Revision 14-Revised 17 October 2017
Noise Management Plan	Revision 12-Revised 17 October 2017
Waste Management Plan	Revision 8-Revised 29 September 2016

Environmental Management Strategy	Revision 9-Revised 16 October 2016
Flora and Fauna Management Plan	Revision 4-Revised 15 February 2014
Blast Management Plan	Revision 3-Revised 20 October 2017
Cultural Heritage Management Plan	Revision 5-Revised 23 October 2017
Rehabilitation Management Plan	Revision 9-Revised 23 October 2017

The PIRMP listed in Table 12 applies to all activities that have the potential to generate pollution incidents. These include, but are not limited to, water discharge events, 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 November 2017, and revised accordingly.

6.2.1 Meteorology

The Approval (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 CMOC 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 13.

Table 13 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

6.2.1.1 Temperature

Maximum, minimum and average temperatures are calculated daily from the 15 min recordings. Figure 7 shows average monthly temperature records for the reporting period (10m MET recordings). Compared to the previous reporting period, the average minimum temperatures are notably lower in winter and lower in spring, while maximums remain consistent with the previous reporting period.

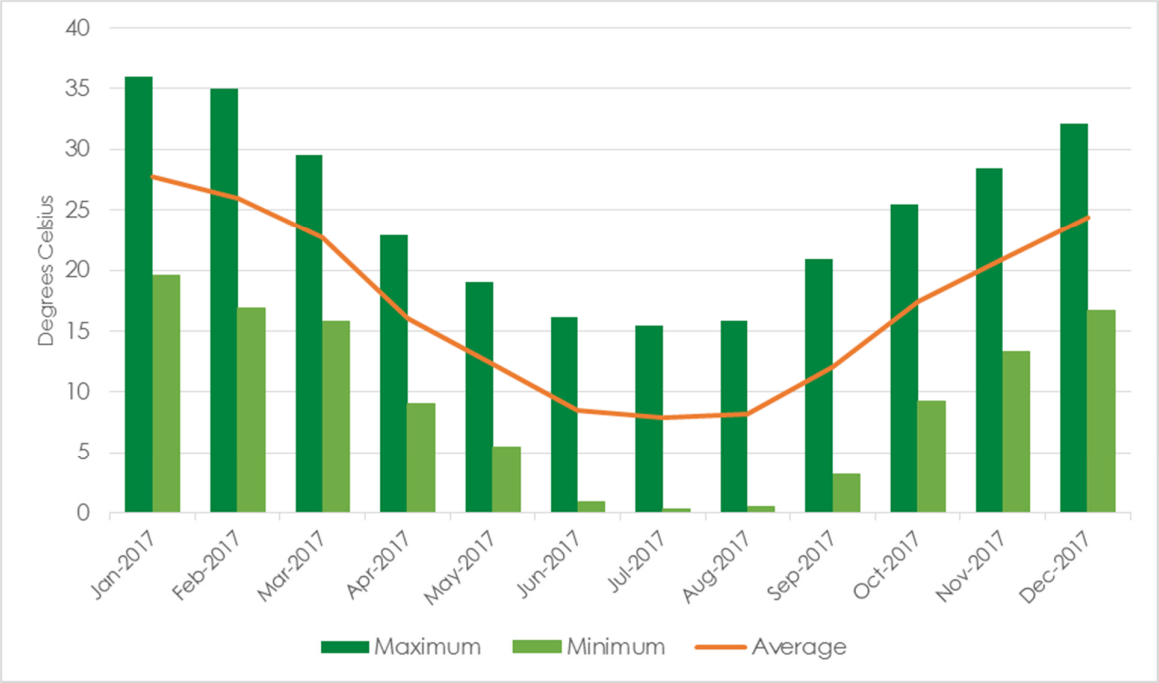

Figure 7 Monthly temperature records

6.2.1.2 Rainfall

A total rainfall of 471 mm was recorded at the weather station during the reporting period. This represents a 232 mm (66%) decrease from the previous reporting period. The rainfall received during the reporting period was also below the long-term average for the region (611mm).

Evaporation followed expected seasonal trends observed in previous climatic conditions for the region.

A comparison of 2016 and 2017 rainfall is shown in Figure 8.

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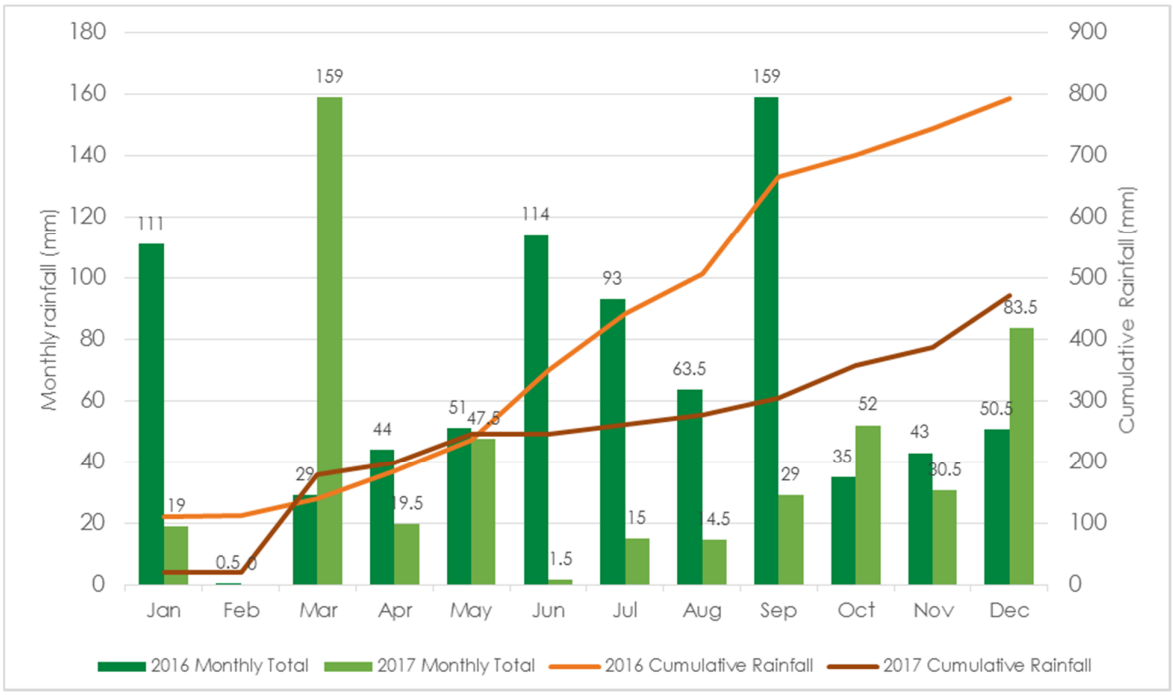


Figure 8 Comparison of 2016 and 2017 rainfall

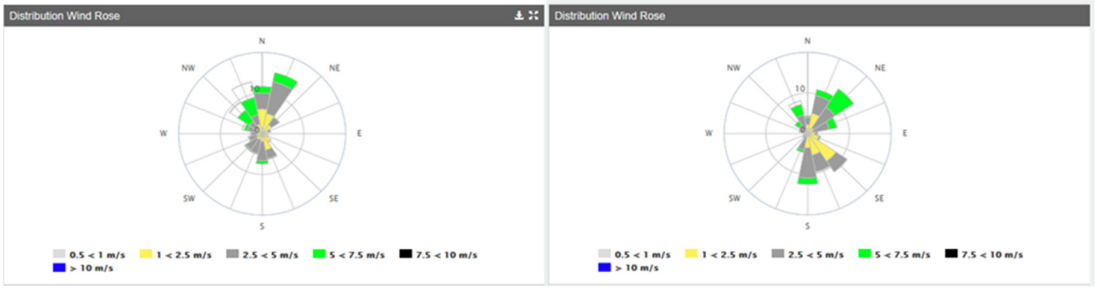
6.2.1.3 Wind

Wind speed and direction are important parameters for the preparation of blasting activities, investigating noise and dust complaints, and assessing cumulative impacts as a result of other operations in the region. Wind data for the 2017 reporting period are presented in the wind roses provided in Figure 9. Wind speed values are displayed as metres per second.

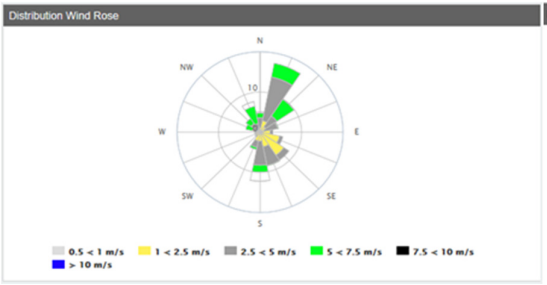
Analysis of data reveals that prevailing winds during the 2017 reporting period were predominantly from the north and north-east from January through March and November through December. The winter and spring periods typically indicated winds from the south. The prevailing wind conditions during this reporting period were consistent with the historical data as presented in the 2010 EA. Average wind speeds were notably higher between February and April and were notably lower in June and November than the previous reporting period.

Figure 9 Monthly wind rose summary for 2017

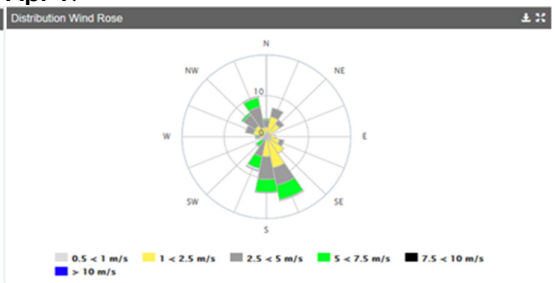
Jan 17 **Feb 17**



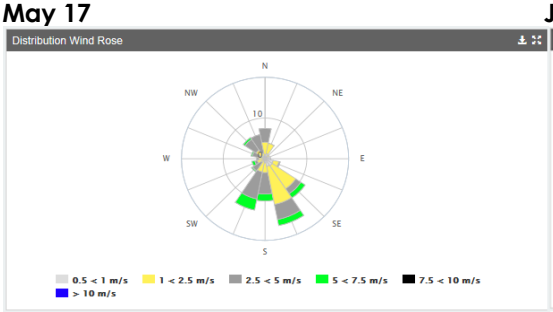
Mar 17



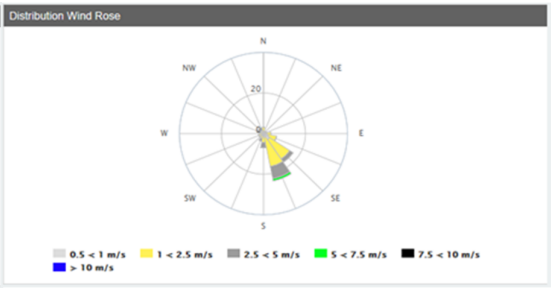
Apr 17



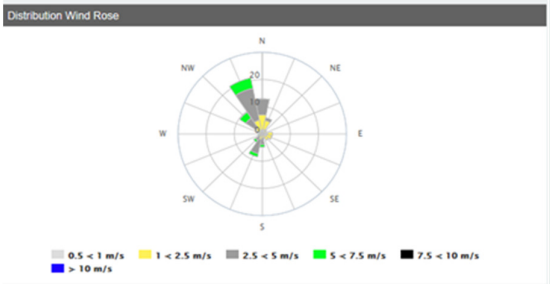
May 17



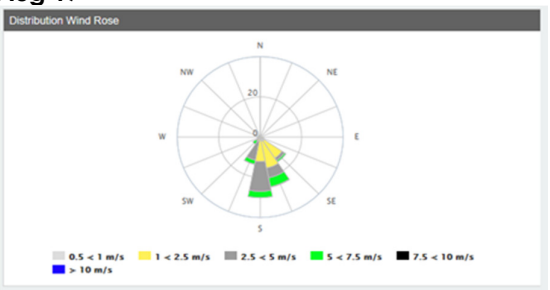
June 17



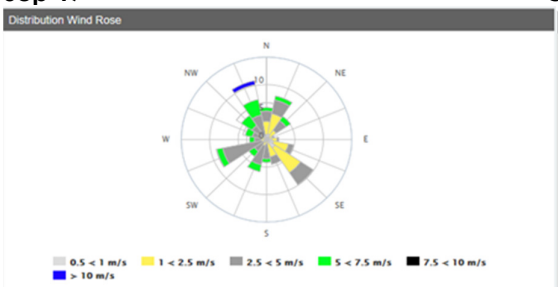
July 17



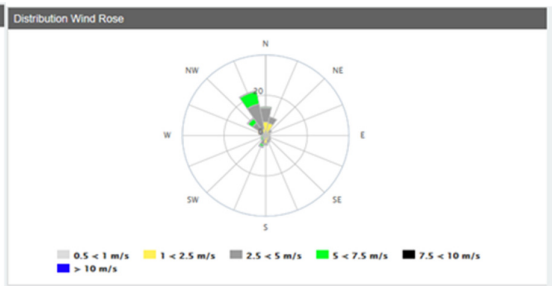
Aug 17



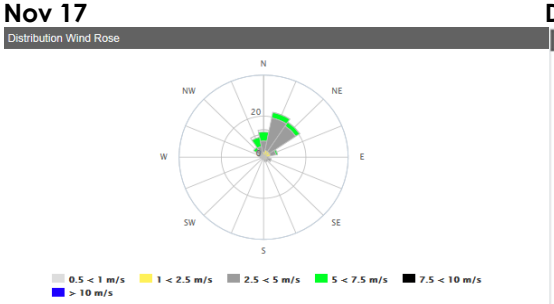
Sep 17



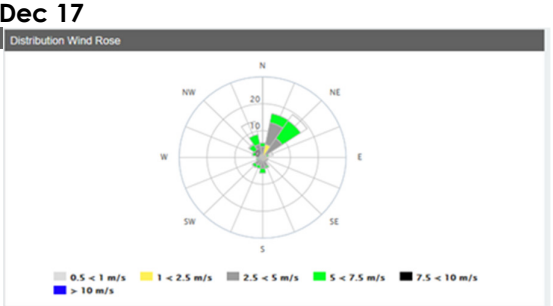
Oct 17



Nov 17



Dec 17



6.2.2 *Improvements and Initiatives*

Building on the work completed during the 2016 reporting period, CMOC continued to implement and refine the real-time air quality management system at Northparkes. This included ongoing utilisation of real-time meteorological data and weather forecasting to guide the day-to-day implementation of reactive and proactive mitigation measures.

6.3 Air Quality

6.3.1 *Environmental 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, CMOC 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 Approval. These will continue to be implemented throughout 2018. During the 2017 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;
- CMOC has a private agreement in place with the owners of "Avondale" for the property to remain unoccupied over mine life;
- 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 Approval.

CMOC 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 14. A figure showing the location of each air quality monitoring site is provided in Appendix 2.

Table 14 Air Quality Monitoring Sites

Site ID	Type	Units	Frequency
Milpose	PM10 (BAM) andTSP (HVAS)	µg/m3	Continuously and Every 6 days
Hubberstone	PM10 (BAM) andTSP (HVAS)	µg/m3	Continuously and Every 6 days
Hillview	PM10 (BAM) andTSP (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 Environmental 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.

The dust management trials implemented on TSF1 and TSF2 in 2016 were found to be very successful for the reporting period. This finding is based on the observations by staff during the daily inspection and the comparison of air quality monitoring data against the 2015 results. The results in the reporting period have shown that there has been no adverse impact of dust generated by the project, on the surrounding environment.

The barley stubble on TSF 2 was effective at managing dust lift-off, even with no regrowth. The planting provided adequate ground cover to the surfaces of the TSF to manipulate surface wind speeds, and was still effective during the 2017 reporting period. Barley as a dust mitigation measure aims to provide short-medium term cover. In the presence of this ground cover, the proposed plan for 2018 is to sow a range of pasture species (both annual and perennial) that will persist and regenerate, providing a more medium term solution. The range of pasture species proposed for 2018 include; Tall Wheat Grass, Medic Scimitar, Medic Cavalier, Clover Hykon Rose and Clover Balansa.

6.3.2.1 PM_{10}

PM10 monitoring results for the 'Hubberstone', 'Milpose' and 'Hillview' monitoring locations, for the reporting period, are displayed in Figure 10, Figure 11 and Figure 12 respectively. The criteria for exceedances (as nominated in the Approval), 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 required by the Approval for all but one occasion. On the 6th May 2017, there was one abnormally high result at all locations. This high result is directly attributable to localised agricultural activities (sowing) in the surrounding region, as all PM10 monitoring locations reported an elevated dust level on this date. The missing data for each of the locations was attributed to power surges, most likely the result of nearby lightning strikes, damaging equipment and/or equipment failure due to aging equipment.

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

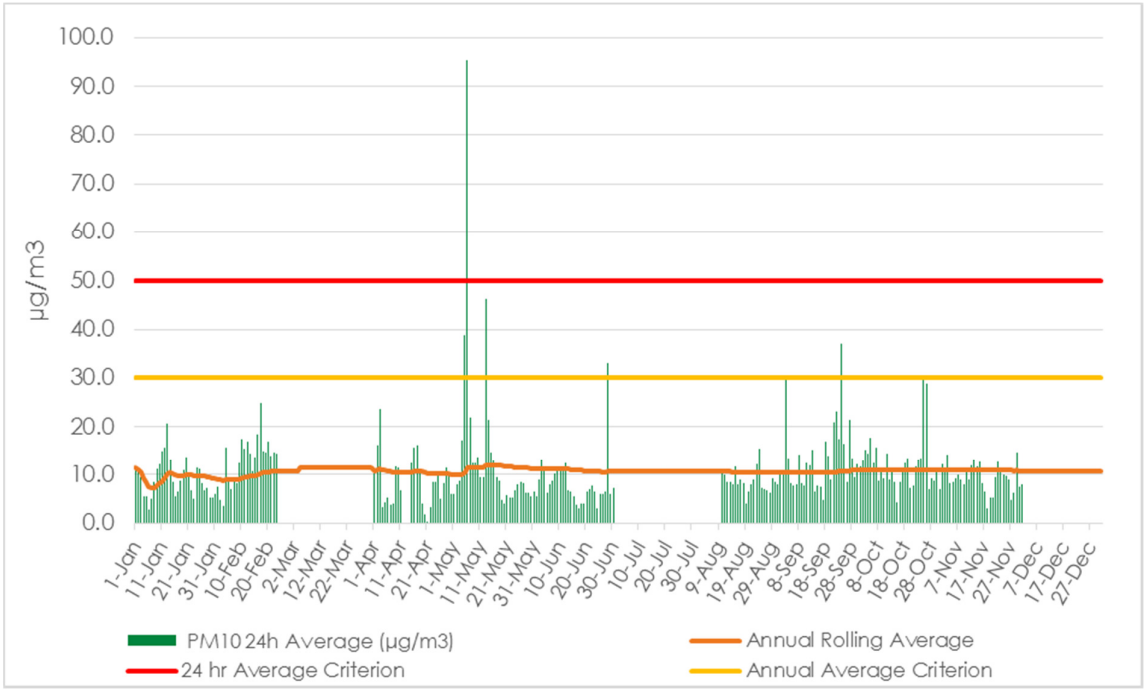


Figure 10 PM10 Monitoring results - Hubberstone

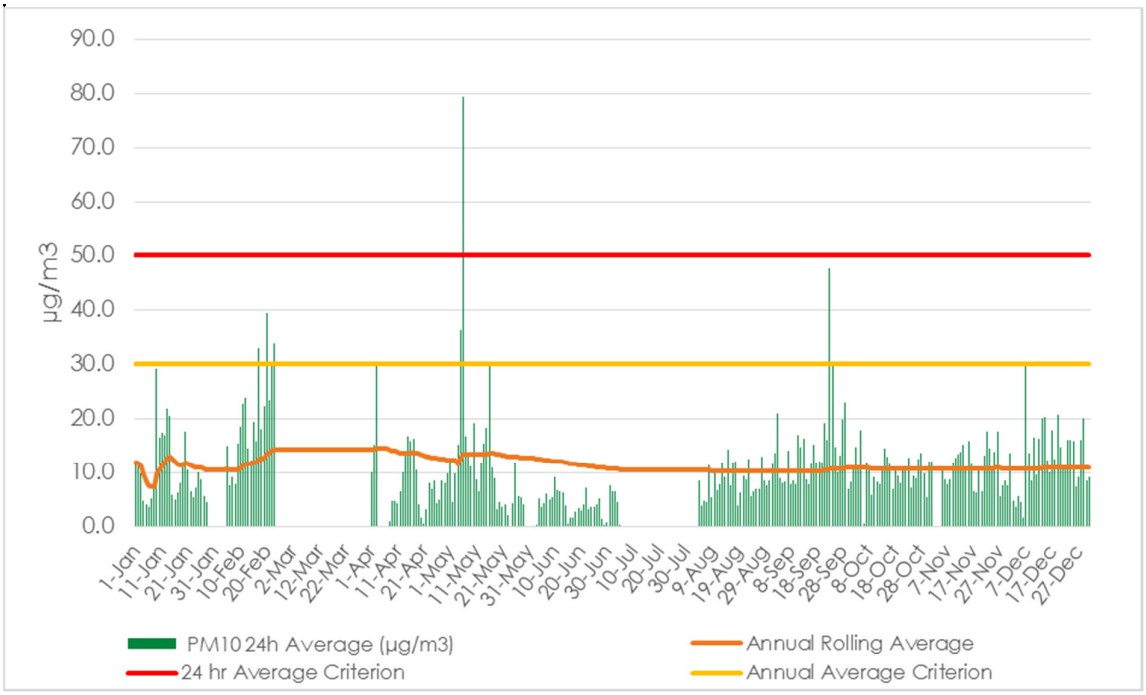


Figure 11 PM10 Monitoring results - Milpose

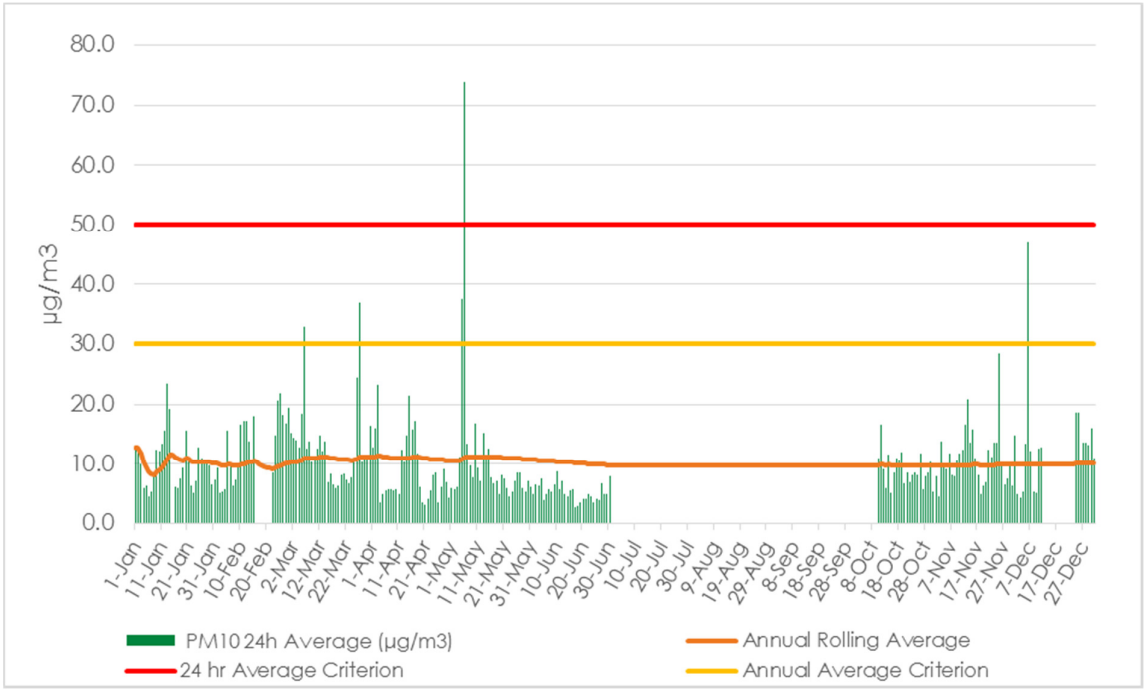


Figure 12 PM10 Monitoring Results - Hillview

6.3.2.2 Total Suspended Solids (TSP)

All recorded dust levels at all TSP monitoring locations were under the required criteria set by the Approval (90 µg/m^3) for the 2017 monitoring period. Results are presented in Figure 13, Figure 14 and Figure 15 respectively. The annual average TSP dust levels recorded at all TSP monitoring locations are below the predicted levels within the EA (50 µg/m^3).

The missing data for each of the locations was attributed to power surges, most likely the result of nearby lightning strikes, damaging equipment and/or equipment failure due to aging equipment. CMOC has experienced ongoing issues with one of the motherboards, originally installed at the Hillview monitoring location. CMOC and it's contractor trialled a number of trouble shooting techniques and sent the device away for repairs in November 2017. While the issue now appears to be resolved and data is being recorded at all locations, CMOC has replaced the back-up motherboard, in preparation for any future technical issues.

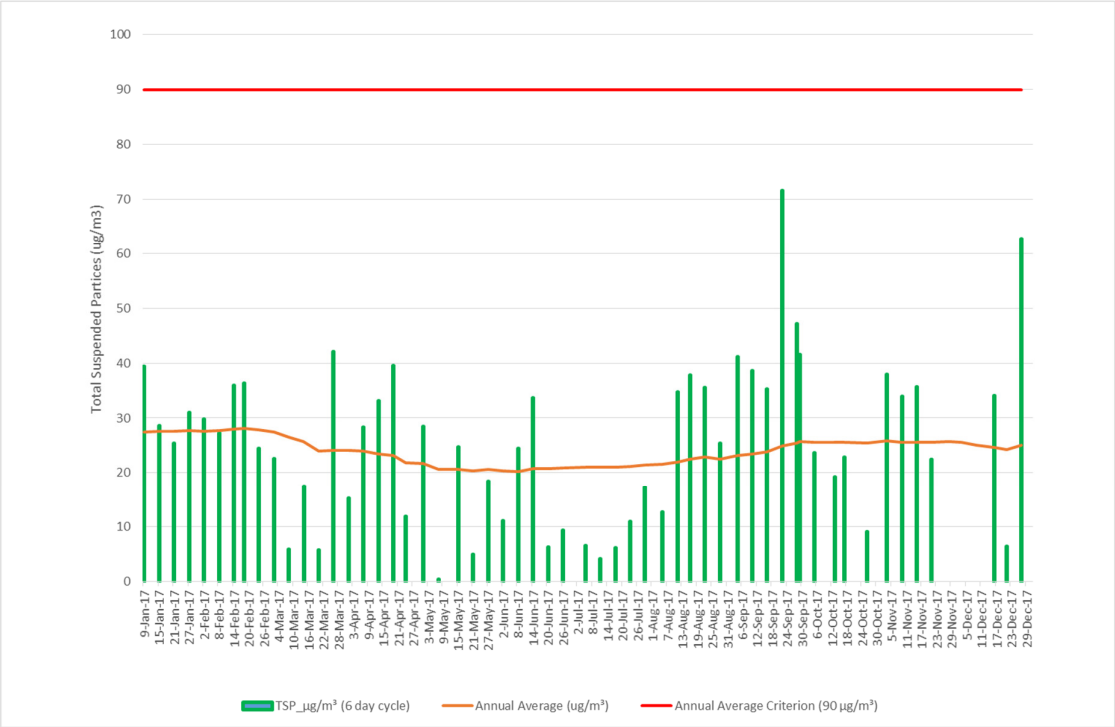


Figure 13 TSP Results for Hubberstone

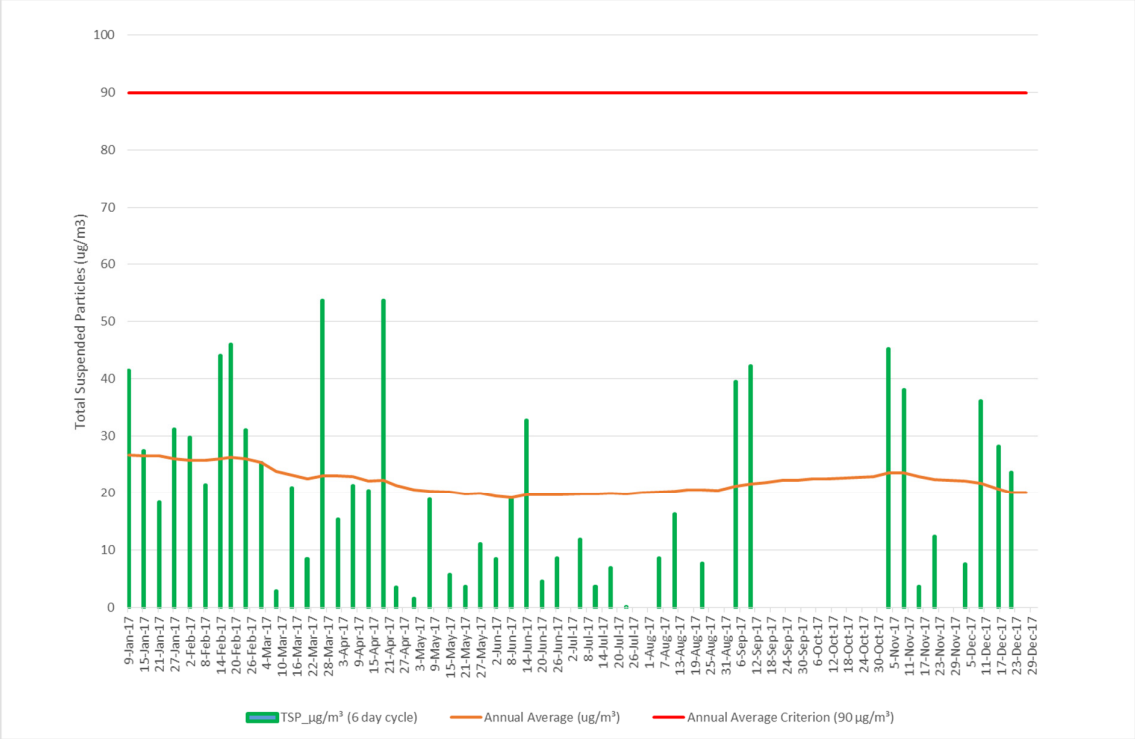


Figure 14 TSP Results for Milpose

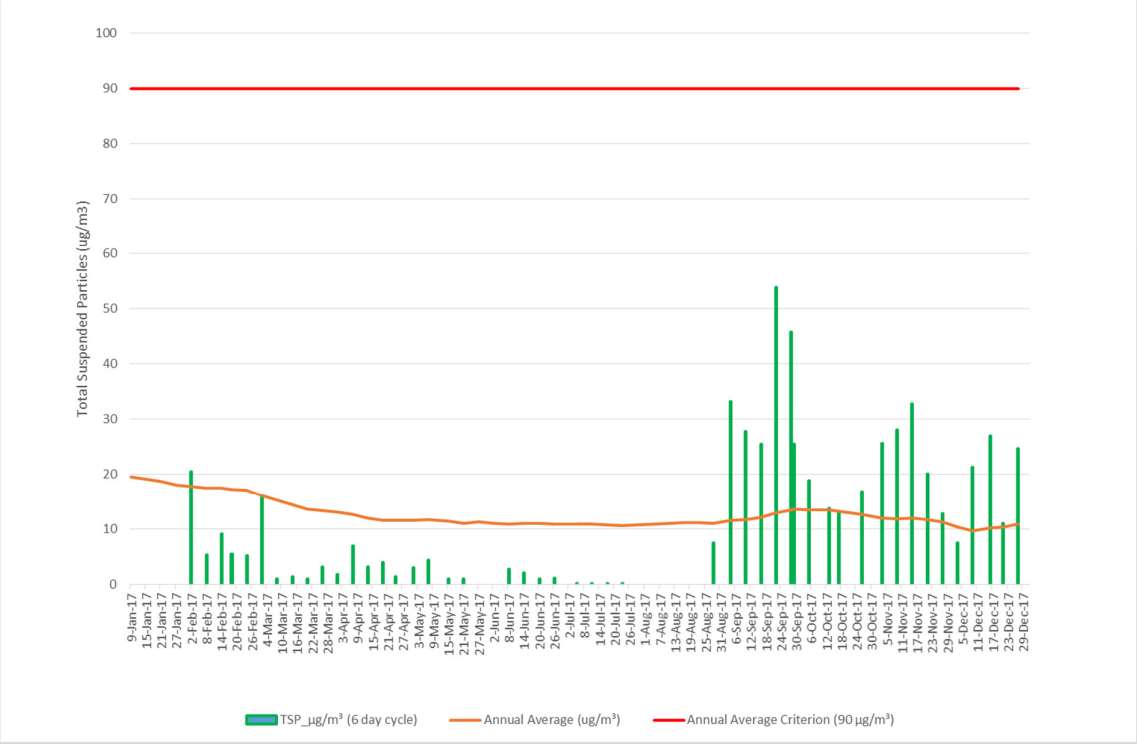


Figure 15 TSP Results for Hillview

6.3.2.3 Depositional Dust

Depositional dust samples were subject to visual analysis by a NATA accredited laboratory to determine sample contamination by naturally occurring impurities. Figure 16 presents the corrected annual average (CAA) results following visual analysis of the eleven dust monitors.

The results indicate that all depositional dust gauges remained below the criterion for the annual average during 2017.

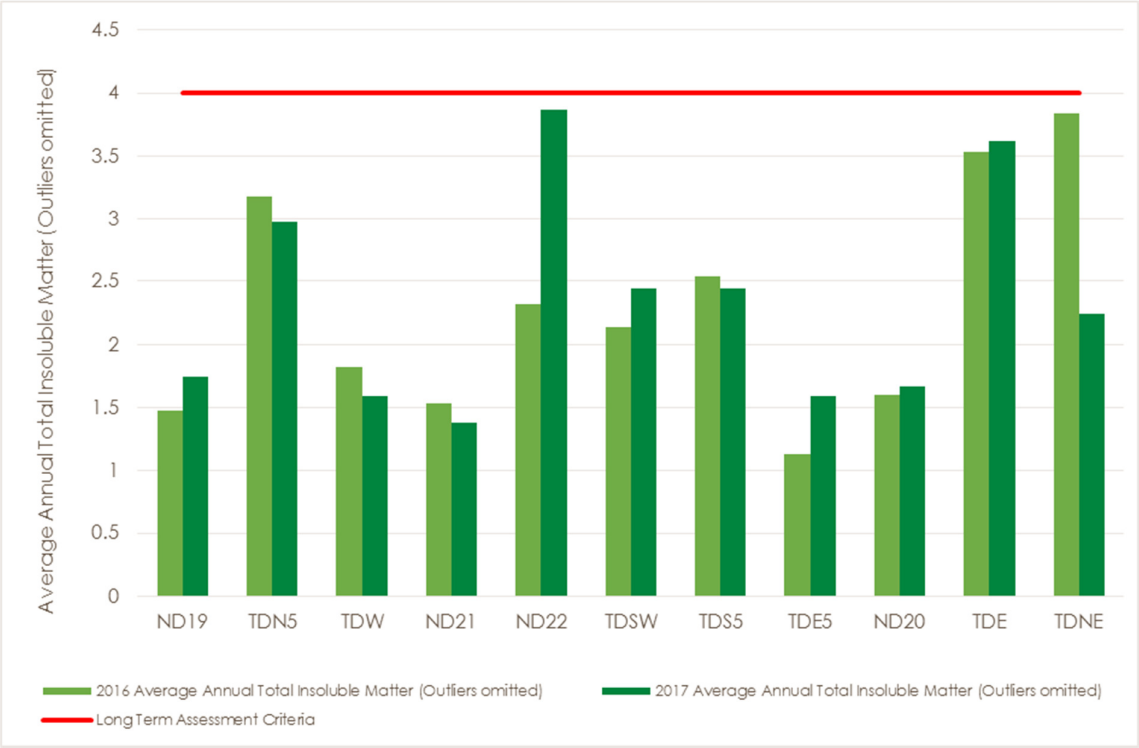


Figure 16 Depositional Dust Annual Averages

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 or local dirt roads). On thirteen occasions over the reporting period, samples were deemed contaminated, reordered as an outlier and excluded from the CAA calculation. This included samples from January (ND22), February (ND22 and TDN5), April (TDNE and ND22), May (TDE, TDNE, ND22 and TDN5), June (TDN5), July (TDNE and TDN5) and October (TDE).

All dust gauge results remain below the criteria specified in the Approval. 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 recorded during the 2017 reporting period remain within the range of these historical results.

The annual average depositional dust levels recorded at all depositional dust monitoring locations, with the exception of ND22 were below the predicted levels within the EA (2.9g/m^2/month). CMOC's investigations have found that the monitoring locations TDE and ND22 are consistently impacted by extraneous sources and recommend they be removed from the regional air quality monitoring network.

6.3.3 Improvements and Initiatives

During 2018, CMOC will employ a number of additional strategies for managing potential air quality impacts, these include:

- Continue construction works on TSF1 and commence active tailings emplacement;
- Plant perennial and annual pasture species on TSF2 to provide a more sustainable ground cover and to reduce risk of dust lift off from the TSF's;
- Investigate planting additional tree corridors to help disperse wind flows near high risk dust lift off areas;

- Implement the recommendations from the dust management assessment in accordance with Condition U2 of EPL4784;
- Alternate tailings material deposition between the active tailings storage facilities, reducing exposed areas; and
- Implement seeding trials on the Rosedale TSF and investigate alternate sowing methods to provide a short-term vegetative cover on any active TSF's that are at capacity.

In addition to these strategies, CMOC will review its regional air quality monitoring network to ensure any monitoring locations that are consistently impacted by extraneous sources nearby, are removed or relocated.

6.4 Noise

6.4.1 Environmental Management

Operational noise is managed by CMOC 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 - There are three approaches to controlling noise generated by the source: source elimination; Best Management Practice (BMP) and Best Available Technology Economically Achievable (BATEA).
- Controlling the transmission of noise - There are two approaches: the use of barriers and land-use controls which attenuate noise by increasing the distance between sources and receiver; and
- Controlling noise at the receiver - There are two approaches: negotiating an agreement with the landholder or acoustic treatment of dwellings to control noise.

Noise control measures at Northparkes are designed to comply with the Approval and the requirements of the NSW Industrial Noise Policy.

Operational control measures include:

- CMOC has a private agreement in place with the owners of "Avondale" for the property to remain unoccupied over mine life;
- 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;
- Avoiding the unnecessary clustering of earth moving equipment;
- 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;
- Pro-active management of equipment operations, including positioning of exposed equipment to lower elevations during noise enhancing meteorological conditions and review of design options to incorporate passive noise attenuation measures into the construction process, such as provision for equipment use at lower elevations during winter evening and night periods;
- Incorporation of active noise attenuation measures such as bunding and shielding around equipment during winter night time operations;
- A noise management system that uses a combination of predictive meteorological forecasting and real-time noise monitoring data to guide the day to day planning of mining operations, and the implementation of both proactive and reactive noise mitigation measures to ensure compliance with the relevant conditions and approvals;
- A program of regular noise monitoring of site operations to determine whether the operations are complying with the criteria set out in the Approval. This monitoring will be undertaken as attended and real-time noise monitoring at surrounding receivers over the life of the mine;
- Additional targeted noise monitoring during construction periods for TSFs, and whilst campaign open cut mining operations occur during winter night time operations. 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 neighboring receivers. Appropriate noise mitigation measures will be implemented as required; and
- Development of a Construction Noise Management Plan in consultation with relevant agencies and potentially affected receivers that will outline the impact mitigation measures to be implemented should targeted noise monitoring during construction activities identify exceedances of relevant noise impact assessment criteria.

6.4.2 Environmental Performance

CMOC undertakes a noise monitoring program at four locations on privately owned properties outside the mining leases. The program consists of both operator-attended and unattended surveys at the four nearest occupied residences 'Hubberstone', 'Milpose', 'Lone Pine' and 'Hillview' (see Appendix 3).

Noise measurements are undertaken in accordance with the requirements of the Approval, *AS 1055*, and the *DECC Industrial Noise Policy, 2000*. CMOC 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.

A total of 135 attended noise surveys were undertaken during the reporting period, of which 123 (91%) were during favourable meteorological conditions, as stipulated in the Approval. The surveys undertaken during unfavourable meteorological conditions were excluded from assessment. The reasons for this included the wind speed exceeding 3 m/s, animal/insect noise and rain. All night monitoring for Q4 was unable to be completed due to wind noise in excess of 60dB, however previous monitoring indicates compliance with the night time limits at all locations.

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 criteria.

A summary of the attended noise monitoring results is provided in Table 15. This includes all quarterly monitoring conducted in 2017.

Table 15 Summary of Attended Noise Monitoring Results

Location	Operational noise impact criteria dB(A)$L_{eq(15min)}$	Sleep disturbance noise criteria dB(A) L_1 (1 min)	8-10 Mar		14-16 Jun		20-22 Sep		6-8 Dec	
			dB(A)$L_{eq(15min)}$	L_1 (1 min)	dB(A)$L_{eq(15min)}$	L_1 (1 min)	dB(A)$L_{eq(15min)}$	L_1 (1 min)	dB(A)$L_{eq(15min)}$	L_1 (1 min)
Hubberstone	35	45	33	^	~	35	^	^	^	≠
Milpose	35	45	31	28	29	^	~	~	~	≠
Lone Pine	35	45	~	33	23	^	^	46*	^	≠
Hillview	35	45	^	^	~	34	^	~	^	≠

* Note: This measurement was impacted by extraneous noise not related to the mine. As LA^1 results are not adjustable, this measurement is not representative of noise produced by the mine and should be disregarded.
^ NPM Inaudible.
~ NPM 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. CMOC was successful in achieving the long-term intrusive noise goals during the 2017 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 Improvements and Initiatives

CMOC will continue to implement the operational controls in the approved NMP including its quarterly attended noise monitoring. If operations remain the same, CMOC propose no new initiatives as the project continues to comply with the approvals noise criteria.

CMOC will develop a Construction Noise Management Plan in consultation with relevant agencies and potentially affected receivers that will outline the impact mitigation measures to be implemented should targeted noise monitoring during construction activities on the Rosedale Stage 2 Project identify exceedances of relevant noise impact assessment criteria.

6.5 Blasting

6.5.1 Environmental Management

COMC 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 Environmental Performance

Blast monitoring did not occur in 2017 due to there being no surface blasting activities in 2017.

6.5.3 Improvements and Initiatives

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

6.6 Biodiversity and Ecology

6.6.1 Environmental Management

Biodiversity issues at Northparkes are managed in accordance with the approved Biodiversity Offset Management Plan (BOMP). The BOMP provides a framework for managing biodiversity values within the project boundary, Biodiversity Offset Areas (BOAs), and wider locality.

The BOMP guides the management of potential risks to biodiversity as a result of operations at Northparkes. Specifically, the BOMP aims to:

- Provide details of the parties responsible for monitoring, reviewing, and implementing the BOMP;
- Ensure compliance with all legislative requirements, statutory approvals/ licences and corporate responsibilities of CMOC;
- 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;
- Describe the practical management strategies (including procedures) 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, control weeds and pests; and
- Describe biodiversity monitoring and reporting requirements.

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

CMOC has implemented a range of biodiversity monitoring activities since the commencement of operations, in addition to those studies completed for the EA. Biodiversity monitoring has included the following programs or studies:

- Rehabilitation monitoring for both the mine site and the offset areas;
- Flora and fauna monitoring at the Kokoda Biodiversity Offset Site (Kokoda); and
- Annual pine donkey orchid population monitoring survey.

The following sections summarise activities related to biodiversity management, provide updates on key biodiversity studies undertaken during the reporting period, and summarises the performance of CMOC in meeting requirements of the Approval and internal management plans. Monitoring results from the Estcourt and Limestone forest offsets has not yet been finalised, and will therefore be included in the 2018 Annual Review.

6.6.2 Environmental Performance

6.6.2.1 Rehabilitation Monitoring

CMOC engage external consultants to undertake rehabilitation monitoring at Kokoda. 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 2017 at Kokoda, refer to the 2017 Kokoda Offset Monitoring Report, available via the Northparkes website at http://www.northparkes.com/news/#publications .

6.6.2.2 Kokoda Ecological Monitoring

A range of ecological field surveys were undertaken across the Kokoda Biodiversity Offset Site (Kokoda) in 2017. 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.

6.6.2.2.1 Floristic Data Using Plot-Based Surveys

A total of seventeen 20 x 20 metre permanent flora sampling sites (plots) were undertaken at Kokoda in 2017. The location of survey sites were 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 2017 Kokoda Offset Monitoring Report.

Floristic plot-based survey at Kokoda in 2017 recorded 128 plant species; including 32 non-native (exotic) species and 96 native species. No threatened flora species were detected in the flora plots during field surveys. For more information on the floristic diversity at Kokoda, refer to the 2017 Kokoda Offset Monitoring Report.

6.6.2.2.2 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 2017, refer to the 2017 Kokoda Offset Monitoring Report.

6.6.2.2.3 *Targeted Bird Surveys*

Targeted bird surveys were carried out at Kokoda in winter and spring 2017. Bird surveys were conducted at six sites across one day in winter and twelve sites across four days in spring. Surveys consisted of 2 x 2 ha area searches for 20 minutes in suitable habitat within Kokoda.

All bird surveys undertaken at Kokoda in 2017 were undertaken by an 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, in most cases once in the early morning and once in the afternoon (specifically between sunrise and 10:30 am and between 3:00 pm and sunset) when birds are most active and vocal to maximise detectability. Any opportunistic bird species identified during surveys were also recorded.

In the 2017 winter surveys, the ecologist noted that there was also abundant flowering eucalypts at three of the remnant spring bird survey sites.

During targeted bird surveys at Kokoda in 2017, a total of 60 bird species were recorded during winter and a total of 68 bird species during spring. During the surveys, two threatened bird species were recorded (Figure 17). These included:

- Superb parrot (Polytelis swainsonii) (EPBC: V/ TSC: V) - observed during winter and spring surveys.
- Grey-crowned babbler (eastern sub-species) (Pomatostomus temporalis)(TSC-V)- observed during winter and spring surveys.

Figure 17 Superb Parrot and Grey-crowned babbler (eastern sub-species)

The grey-crowned babbler (right) 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.

In addition, three species listed as vulnerable and/or migratory under the *Biodiversity Conservation Act 2016* and *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) were recorded during surveys in 2017. These were the;

- Flame Robin (Petroica phoenicea)(EPBC:V)- observed during winter;
- Speckled Warbler (Pomatostomus temporalis temporalis) (EPBC:V)- observed during winter and spring; and
- Satin Flycatcher (Myiagra cyanoleuca) (listed migratory)- observed during spring.

6.6.2.2.4 *Biometric Vegetation Surveys*

Biometric vegetation surveys were undertaken at the Kokoda Biodiversity Offset Site in 2017 between the 9th and 11th of October to support Northparkes Voluntary Conservation Agreement (VCA). Results were found to be consistent with previous monitoring years. The VCA for Kokoda was submitted in 2017, as per the Northparkes project approvals and was signed by CMOC and the Office of Environment and Heritage (OEH) Executives in February 2018.

6.6.2.2.5 *Qualitative Biannual Inspections*

Biannual inspections of the Kokoda Biodiversity Offset Site were undertaken on 12 May 2017 and 19 December 2017 and recorded the presence and locations of pests and weeds as well as outlined any maintenance activities that may require action.

During the May inspection, CMOC personnel recorded numerous rabbit warrens located in a creek that transects the property, some minor erosion of the creek crossings between GBReveg 3 – GBReveg 4 and Ironwood 1 and Dwood 2, and an isolated patch of Tree-of-heaven along the creek south of the house. Positive items noted during the inspection included natural regeneration of 0.5m to 1m high Eucalyptus species in numerous locations across the property, as well as successful weed spraying to mitigate the spreading of blackberry.

During the December inspection, CMOC personnel recorded minor damage to two sections of the fence along the access road following a large storm event, as well as partial erosion along the access road and road way into a creek crossing. The occurrence of tree of heaven remained along the creek south of the house and there were still occurrences of rabbit warrens located along a creek as well as some instances of St John's Wort and Patterson's curse across the property. An investigation into the requirements for the development of a firebreak along the western, southern and eastern boundary fences will be required during the next reporting period as to clear the build-up of fallen trees and branches following a storm event, as to provide access for emergency vehicles should an unplanned fire ignite. The inspection identified that natural regeneration continued to develop across the property as well as the boundary fence along the northern side is continuing to be replaced at a kilometre per year in consultation with the neighbour.

6.6.2.3 *Pine Donkey Orchid Population Monitoring*

Field surveys of the two populations of the pine donkey orchid (Diuris tricolor) (Figure 18) found within the Northparkes mining lease were carried out on 4 and 5 October 2017, as to coincide with known flowering times. Populations were surveyed adjacent to the E48 Subsidence zone area and along Adavale lane pine donkey orchid management zones.

The survey comprised of recording the locations of each individual plant encountered along the walking transect, using a GPS-generated point. Transects were generally between 5 and 10 metres apart to achieve comprehensive spatial coverage of each population, with the aim of locating every individual orchid visible.

Seventy-four individual pine donkey orchids (Diuris tricolor) were recorded in the two Management Zones surveyed. These included:

- 37 individual plants near the E48 Subsidence Zone area; and
- 37 in the Adavale Lane area.

It is suspected that the prolonged dry conditions and increased macropod grazing contributed to the dramatic decrease in pine donkey orchids recorded during the 2017 surveys in comparison to the 2016 surveys.

Figure 18 Pine Donkey Orchid (Diurus Tricolor)

6.6.3 Improvements and Initiatives

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

Revegetation works within CMOC's BOAs will target the optimal planting times during 2018/2019 and may commence during the 2018 reporting period. They will be undertaken in accordance with the commitments outlined in the approved BOMP and the VCA. The 2018 and 2019 revegetation works will involve the planting of approximately 34,000 native species throughout a total area of 34 ha within the habitat restoration zones of the Kokoda. The individual areas subject to revegetation are planted with species aimed at restoring the following ecological communities:

- Dwyer's Red Gum – Grey Box – Mugga Ironbark – Black Cypress Pine Forest; and
- Grey Box Grassy Woodlands.

Whilst the 2017 revegetation program was generally successful, winter and heavy grazing by macropods impacted a number of the planting areas on or surrounding the Mining Lease. Supplementary planting may be required within these areas during the 2019 reporting period if survival rates do not meet internal objectives.

6.7 Waste Management

6.7.1 Environmental Management

The Approval, specifically Condition 38, requires the following with 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:

- Green putrescible waste will be collected on site and disposed of at an appropriate licences waste management facility;
- Loose green waste is mulched and used on site for landscaping and rehabilitation (where feasible);
- General waste from operations (food etc) is disposed of at an appropriate licensed waste management facility;
- Recyclable wastes are separated on site and 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. This is undertaken in accordance with the site's bioremediation pad management procedure;
- 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;
- Concrete wash down areas are located away from surface water drains; and
- Clean water surface water/runoff is diverted around mine facilities (where feasible).

CMOC operates a bioremediation area to manage contaminated waste materials at Northparkes. A Bioremediation Management Procedure guides the implementation of the bioremediation process and includes details on required maintenance actions, sampling and testing of contaminated materials within the area.

6.7.2 Environmental Performance

CMOC 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 slight decrease in many waste streams compared to the 2016 reporting period. This suggests that waste minimisation and management techniques have improved over the reporting period for some waste streams. However, the total waste produced is an increase on the 2016 reporting period due to increased production rates. Operational waste collection statistics for the current and 2017 reporting periods are summarised in Table 16.

Table 16 Summary of Waste Disposal

Waste Stream	2017 Reporting Period (tonnes)
Hazardous recycled: coolant; effluent; empty drums; oil filters; oily water; oily sludge; waste grease; waste oil; dust suppressant/resin/glue; and fluorescent tubes.	182.26
Hazardous disposal: hydraulic hose; medical/sanitary waste, and oily rags.	19.82
Non-Hazardous recycled: co-mingled	14.71
Non-Hazardous disposal: mixed solid waste	160.15
Contained onsite: timber and effluent	53.09
Recycled metal	2,072.31
TOTAL	**3,502.34**

CMOC 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 washbay, which minimises waste water and returns water to the water management system for re-use.

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

6.7.3 Bioremediation Areas

One bioremediation area was established at Northparkes in the reporting period, as listed in Table 17. Successful implementation of this bioremediation area has allowed for onsite treatment of contaminated material and subsequently reduced the need to transfer contaminated waste material offsite. Bioremediation Area 1 was active during the 2017 reporting period (refer to Table 17).

Bioremediation area management was undertaken in accordance with the Northparkes bioremediation procedure, which includes details on the management, watering, aeration, sampling and testing of contaminated waste materials within the area. The materials retained in the bioremediation area were turned and watered as required. A bioremediation agent was also applied to the material as necessary.

Compliance testing was undertaken in Area 1 during the reporting period and the material will be appropriately disposed of once if it meets the criteria.

Table 17 Summary of Bioremediation Areas

Bioremediation Area	Location	Established	Description
Area 1	Surge Dam	2017	Original bioremediation area for the treatment of hydrocarbon laden material from Surge Dam 1 and 2 clean-out. Material has been treated and samples sent away for analysis.

6.7.4 Improvements and Initiatives

Consistent with the implementation of the waste management hierarchy, CMOC and its waste contractor continue to look for ways to re-use waste materials onsite in preference of direct disposal. CMOC has set itself an ambitious target of a 20% reduction in the make-up of waste disposed to landfill within 5 years, based on the 2017 waste disposal data.

6.8 Cultural Heritage

6.8.1 Environmental Management

The management of cultural heritage issues at Northparkes is undertaken in accordance with the Cultural Heritage Management Plan (CHMP). The current CHMP provides the framework for the identification, assessment, monitoring and management of Aboriginal cultural heritage on site.

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.

NPM 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 Environmental Performance

In accordance with the CHMP, the Wiradjuri Executive Committee (WEC) met on a regular basis throughout the reporting period, with four meetings held in March, July, September and December. The WEC is a consultation forum to enable appropriate review of the aboriginal heritage management practices at Northparkes and identify potential improvement opportunities in the community. The WEC reviews all SDP's at their quarterly meetings.

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

- Review of all site disturbance permits issued by CMOC during the reporting period;
- Feedback on selection of Northparkes Indigenous Scholarship recipients and encouragement of Indigenous employment;
- Maintained and increased the Indigenous workforce participation rates to 6% as part of the School2Work program which actively engages the community;
- Commitments outlined in the 2018 work plans included: education, community engagement and employment and training; and
- Continuous provision of employment opportunities for the Indigenous workforce.

One Aboriginal due diligence archaeological assessment was undertaken during the reporting period to assess the risk of heritage impact around the construction area and associated works of the ventilation shaft project at Northparkes.

A search of the Office of Environment and Heritage (OEH) administered Aboriginal Heritage Information Management System (AHIMS) database was conducted on 30 March 2017. The search encompassed a 24 kilometre by 24 kilometre area, centred on the ventilation shaft study area. The AHIMS search returned 27 Aboriginal sites within the search area. Robb Clegg (Chairperson Wiradjuri Council of Elders) accompanied by Dr Jodie Benton undertook the visual inspection of the proposed ventilation shaft area on 30 June 2017. No new Aboriginal objects or potential archaeological deposits were recorded and the assessment concluded that there is low likelihood that the proposed work will harm Aboriginal cultural heritage objects or sites.

6.8.3 Improvements and Initiatives

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

- Develop and complete 2018 work plans in the three identified areas: education, employment and community engagement;
- Conduct a one day workshop for the accreditation of Indigenous people to complete their certification to complete cultural surveys. Support the Northparkes Indigenous Scholarship Program by identifying candidates and providing input during the program;
- Support school to work programs including training and apprenticeships;
- Increase the percentage of Indigenous employees within the workforce to 10%, within 5 years;
- Raise employee awareness and knowledge of Cultural Heritage through induction programs and sessions with leadership teams;
- Improve community engagement through volunteer opportunities including the Local Aboriginal Land Council project and Meet You Up The Street program; 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 in accordance with Approval. The Water Management Plan (WMP) acts as the overarching document to governing 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 Environmental Management

Surface water is managed in accordance with the SWMP and associated water management plans which conform to the approval, 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 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 waste rock stockpile areas, TSF embankments and surface infrastructure areas that are not associated with mineralized ore. Runoff from these areas is collected in settlement 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), stilling ponds (STP), the Caloola Dams, the Process Water Dam and the Return Water Dam to avoid uncontrolled discharge into surrounding watercourses and to maximise water reuse.

Erosion and sediment control is guided by the WMP and the SWMP, and is consistent with the "Blue Book" - *Managing Urban Stormwater, Soils and Construction, Volume 1* (Landcom, 2004) and *Managing Urban Stormwater, Volume 2E: Mines and Quarries* (DECC, 2008). Erosion and sediment control measures implemented include but are not limited to:

- Minimising ground disturbance where possible;
- Amelioration of dispersive soil to minimise the risk of rill, gully and tunnel erosion and to allow the infiltration of surface water;
- Contour scarification of compacted surfaces to encourage infiltration and surface roughness;
- Placing removed soils in areas where they are less likely to be affected by rainfall;

- Stockpiling in a stable manner by ensuring that topsoil is not dispersed and the height of stockpiles is restricted to 3m;
- Long term (greater than six months) stockpiles are stabilised by appropriate seeding or mulched vegetation where possible;
- Disturbed areas are rehabilitated as soon as possible following disturbance, including regrading where required;
- Where feasible, understory and ground cover vegetation are retained in and around drainage lines;
- Preventing vehicles from entering top soiled rehabilitation areas to prevent damage to vegetation and soil structure;
- Erosion and sediment control measures are installed before commencement of any works;
- All erosion control measures are maintained until all earthworks and mining activities are completed and site rehabilitation is complete;
- All erosion and sediment control measures employed are appropriately designed, sized, located and installed. Erosion and sediment control measures include the use of:
    - Silt fencing
    - Channel bed and bank protection
    - Earth bunds and diversion drains
    - Geotextile sediment fencing
    - Sediment retention basins.

In accordance with the Approval, CMOC 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 SWB will be revised in 2018 in order to better reflect modifications to the mine plan.

The following subsections describe surface water monitoring and environmental performance.

7.1.1.1 Surface Water Quality Monitoring

Water quality monitoring is undertaken at Northparkes specifically within the three defined water management systems of;

- Clean water management system, which includes farm dams and watercourses;
- Dirty water management system, which includes settlement ponds; and
- Contaminated water management system, which includes all aspects of ore processing, and retention ponds.

The monitoring locations of watercourses and surface water storages are provided Appendix 4. Table 18 identifies surface water monitoring locations assessed for each of the above listed water management systems. There were some dams within the water management system that are typically dry or have only recently been constructed. 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 from instabilities formed 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 as well as presence of riparian vegetation. Photographs may also be taken to provide further information on the status of the watercourse.

Table 19 provides information on the watercourse stability monitoring program.

Table 18 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 19 Watercourse stability monitoring program

Location	Frequency	Assessment Requirements
WC13, WC14, WC3, WC5	Quarterly, additional sampling following heavy rainfall events.	Visual assessment of channel form, presence of instabilities in watercourse banks or in crossing structure (bridge/culvert).
Crossing structures – Goonumbla Creek	Quarterly, additional sampling following heavy rainfall events.	Photographs to be taken to provide visual evidence of the condition of the watercourse.

CMOC 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.

7.1.1.2 Water Storage and Usage Monitoring

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.

7.1.1.3 Surface Water Quality Criteria

CMOC engaged an independent consultant to review monitoring data from 1995 – 2015 to determine appropriate trigger levels for the surface and groundwater monitoring programs. The consultant has developed a two stage water quality trigger system based on the statistical analysis of the existing available water quality data.

Previous 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 and site relevant water quality trigger levels. The trigger levels for surface water quality sites are detailed in Appendix C of the approved WMP.

7.1.2 Environmental Performance

7.1.2.1 Results of Ambient and Events Based Monitoring

No samples were collected at RP16, RP22, RP24, WC3, WC6, WC14 and FD12 for the reporting period as they were dry or <10% volume throughout the monitoring period. Only one sampling event occurred at monitoring locations RP4, RP12, RP25, RP28, RP31, GT2, DD, SCT, WC4, WC5, WC11 and WC13 , due to locations also being dry or <10% volume during 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, with the exception of the following:

- RP20 - increased from 0.04mg/l to 0.246mg/l;
- RP23 - increased from 0.035mg/l to 0.153mg/l; and
- RP25 - increased from 0.017mg/l to 0.238mg/l.

The increase in copper at RP20, located to the north-east of TSF 1, is directly associated with elevated suspended solids following a rainfall event (156mm between the 6 March 2017 and the 24 March 2017), as during the reporting period the pond underwent redevelopment in line with ongoing closure works.

RP23 and RP25 are storm water retention ponds located along the overland conveyor. Increased copper levels are likely attributable impacts due to ore spillage form the conveyor that has then washed into the retention ponds following a rainfall event (as mentioned above). The ponds are designed for the purpose of capturing this runoff and water retained in these facilities was utilised by the ore processing plant. All recorded copper levels are below the Stage 1 trigger levels as stated in the approved Water Management Plan and the Australian and New Zealand Environment and Conservation Council (ANZECC) stock drinking water guideline for copper.

The copper concentrations for farm dams remained stable and in-line with or below the long term averages. The pH concentrations at all farm dams recorded higher than average results compared with the long term averages, however remained below internal trigger levels. These farm dams are located outside the mining lease within neighboring properties, or adjacent to CMOC's farming operations. The higher than average results may be attributed to variations in rainfall during the reporting period and from capturing farm runoff water. The electrical conductivity for the reporting period was in-line with or below the long-term averages.

Electrical conductivity levels for retention ponds and process water monitoring locations were consistent with long term averages, apart from site SD2, which triggered Northparkes Stage 2 investigation trigger levels. The investigation found that these levels can be attributed to receiving all water from mining activities. Monitoring results for pH indicated that retention ponds and process water monitoring locations predominantly stayed below internal trigger levels, and were consistent with the long term averages. RP5, RP15, RP19, RP20, RP26 and RP32 all reported higher pH results when compared to the previous reporting period, however, they still remained within the neutral range. All locations however remained below internal Stage 2 trigger levels and the ANZECC stock drinking water guideline.

Monitoring results for sediment ponds were predominantly consistent with the long term averages and below Stage 2 trigger values. The pH concentrations for all sediment ponds remained statistical similar with the previous reporting period and slightly above the long term averages. This increase is due to the collection of large volumes of rainwater runoff from surrounding areas as well as natural variation. Electrical conductivity (EC) for sediment ponds slightly decreased over the reporting period, with recordings below the long term average apart from SP10 and SP15 which both had results from Q2 above the long term average. However, EC levels for both locations were back below the average in Q3 2017.

Similarly, the monitoring results for watercourses were in-line with the long term averages for all parameters, apart from pH. monitoring locations WC1, WC2, WC4, WC5, WC7, WC12 and WC13 all had pH results above the long term average throughout the reporting period. These results are similar to those experienced in the sediment and retention ponds onsite. WC2, WC7 and WC12 had elevated results surpassing internal trigger levels. As these locations are located both up and downstream of Northparkes it is most likely that the elevated pH at these locations is the result of upstream agricultural activities. Electrical conductivity across the watercourses were above the long term average for the first quarter of the reporting period, however recorded levels below the long term average for the remainder of the reporting period.

Copper levels for watercourses were well below the long term average, and below internal Stage 2 trigger levels and the ANZECC stock drinking water guideline. CMOC will continue to monitor and assess local water courses to ensure there are no detrimental mine related impacts to the local environment. As a follow-up from the previous reporting period, WC5 has recorded well below copper levels than the long term average and previous year's results. Total dissolved Solid samples for all water courses were above the long term average.

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 4.

7.1.2.2 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 water storages at the beginning and end of 2017, as well as the maximum storage capacities are provided in Table 20.

Table 20 Water Storages

Name	Catchment area (ha)	January 2017 Volume (ML)	December 2017 Volume (ML)	Storage Capacity (ML)
Sediment Ponds				
SP3	26.4	15	5	28.8
SP4	Removed with TSF Infill			
SP10	5.7	N/A	N/A	1.8
SP15	40	1	1	12.8
SP16	9.8	N/A	N/A	6.3
Retention Ponds				
RP1	8.7	5	5	13.2
RP2	4.8	0.2	1	1.5
RP3	14.3	0.5	1	4.6
RP4	3.7	0.5	0	1.2
RP5	5.9	N/A	0.5	1.9
RP6	7.1	N/A	0.5	2.3
RP7	29.7	2	3	9.5
RP8	9.0	2	2	14.4
RP9 (was previously SP5)	30.0	70	70 – used for construction works on TSF 1 Closure Project	76
RP10	2.8	N/A	N/A	0.9
RP12	2.6	N/A	N/A	0.8

Name	Catchment area (ha)	January 2017 Volume (ML)	December 2017 Volume (ML)	Storage Capacity (ML)
RP13	6.5	N/A	0.5	2.1
RP15	0.5	3	1	2.9
RP16	16.2	N/A	N/A	5.2
RP19	11.6	0.5	0.5	3.7
RP20	16.2	2	5	20
RP21	2.6	0.7	0.5	0.8
RP22	4.3	0.3	0.5	1.4
RP23	0.3	N/A	N/A	0.1
RP24	0.8	N/A	N/A	0.2
RP25	0.4	N/A	N/A	0.1
RP26	0.2	3	2	10.0
RP27	10.9	0.5	10	65
RP28	0.7	0	0.1	0.2
RP29	6.0	N/A	N/A	1.9
RP30	Removed in TSF Infill			
RP31	Removed in TSF Infill			
RP32	5.7	N/A	0.5	2.8
Process Water Management System				
Return Water Dam	Removed in TSF Infill			
Process Water Dam	N/A	115	130	200
E22 Void	98.4	15900	16000	27000
Caloola Dams	N/A	400	347	1090
SD1 and SD2	N/A	3	2	7.1
TOTAL		**16,946.5***	**16,588.6**	**28,513.7**

* January 2017 total includes volumes from water storages that were decommissioned during the reporting period.

The most notable change during the reporting period was the commissioning of the E22 Void as the main water storage for the site. This significantly reduced the operating restrictions on the Caloola Dams as the E22 has the appropriate free board to take a 1:100 average recurrence interval (ARI), 72 hour storm event on the tailing storage facilities.

7.1.2.3 Water Supply

Northparkes sources water from numerous locations including imported water from various licences (see Table 5). 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 operations 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 Approval, CMOC accesses groundwater from the Lachlan Alluvial Water Sources. CMOC also holds water entitlements for surface water extraction from the Lachlan River. Furthermore, CMOC can trade additional water to make up shortfalls or sell any excess water in a reporting period. Where necessary, Northparkes uses existing water entitlements to supplement demand. The water supplied by CMOC licenses for mining activities during the 2017 reporting period is detailed in Table 21.

Table 21 Water Supply

Water Licence	Water sharing plan, source and management zone	Allocation (ML)	Temporary Transfer (ML)	Passive take/ inflows	Active Pumping	Total
WAL9995	Lachlan River, Water Sharing Plan; Lachlan River Regulated River Water Source	260	0	0	No	0
WAL8241		2976	0	0	No	0
WAL7866		495	0	0	No	0
WAL21471		200	0	0	No	0
WAL21466		50	0	0	No	0
WAL1698		486	0	0	No	0
WAL13108		300	0	0	No	0
WAL34955	Lachlan River, Water Sharing Plan; NSW Murray Darling Basin Fractured Rock Groundwater Sources	232	0	<10	No	<10
WAL32138	Lachlan River, Water Sharing Plan; Lachlan Unregulated and Alluvial Water Sources	1110	0	0	No	0
WAL32120		1050	0	0	Yes	89
WAL32004		1600	0	0	Yes	424
WAL31969		1728	0	0	No	0
WAL31963		700	0	0	No	0
WAL31930		600	0	0	No	0
WAL31863		534	0	0	No	0
WAL31850		500	0	0	No	0
WAL10082	Lachlan River, Water Sharing Plan;	1	0	0	No	0

Core water demands during the 2017 reporting period were for ore processing and dust suppression. Small quantities of water were also required for vehicle wash down and potable water uses. Table 22 outlines future estimated water volumes for Northparkes 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 22 Predicted Water Demand

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

7.1.3 Improvements and Initiatives

2018 will see a number of initiatives regarding water management. CMOC will work to streamline monitoring requirements and refine the site water model to reflect current and future operations.

Ongoing work will continue to occur with management of drainage systems, including desilting of sediment dams and drains, and maintenance of sediment dam capacity. A review is planned of all surface water infrastructure to support a revision in monitoring requirements of historical sediment dams utilised during construction. A review of the WMP will occur to reflect any improvement opportunities.

7.2 Groundwater

7.2.1 Environmental Management

Groundwater is managed in accordance with the approved GWMP. The GWMP provides a framework defining how CMOC 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 CMOC's monitoring and reporting requirements for groundwater management.

7.2.1.1 Groundwater Monitoring Program

CMOC's groundwater monitoring program aims to identify any changes to the natural groundwater system as a result of mining operations and ensure compliance with the Approval. 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 23 and their respective locations are shown in Appendix 4.

During the reporting period, MB4 was decommissioned as it is now covered by the TSF Infill project.

Table 23 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.

7.2.1.2 Groundwater Quality Criteria

Northparkes Trigger Levels

CMOC 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. CMOC 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 CMOC 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 Environmental Performance

There were no non-compliance issues relevant to groundwater management recorded during the reporting period. All bores show trends that are generally within historical ranges. Parameters recorded as part of the scheduled groundwater monitoring for this period are summarised below and results provided in Appendix 4.

7.2.2.1 Groundwater Levels

Quarterly monitoring of groundwater levels are undertaken by appropriate CMOC personnel in accordance with the approved GWMP. Throughout 2017 and over the last 10 years, groundwater levels have displayed a consistent upward trend at all monitoring bores (Figure 19, Figure 20, Figure 21& Figure 22), which is likely to be the result of increasing annual rainfall (Figure 23). Changes in rainfall over the past decade may also have effects on local water quality variability, which is further discussed in Section 7.2.2.2. Groundwater levels remained below internal trigger values set in the WMP.

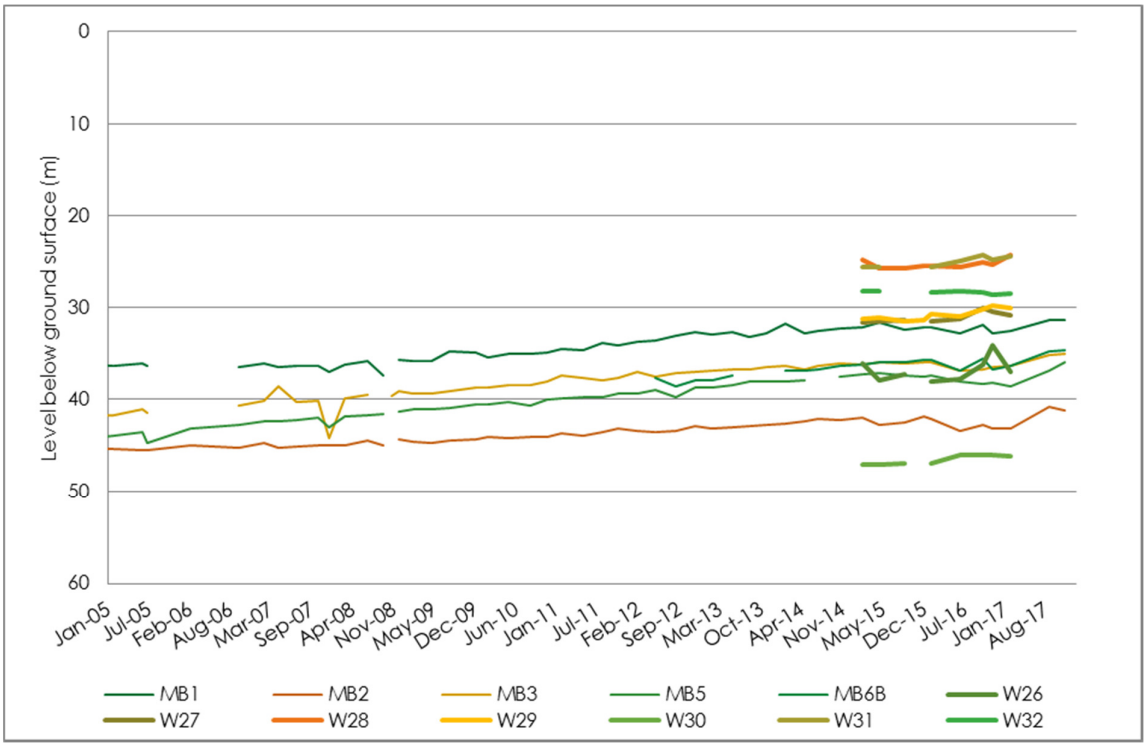


Figure 19 Long term groundwater levels for TSF bores

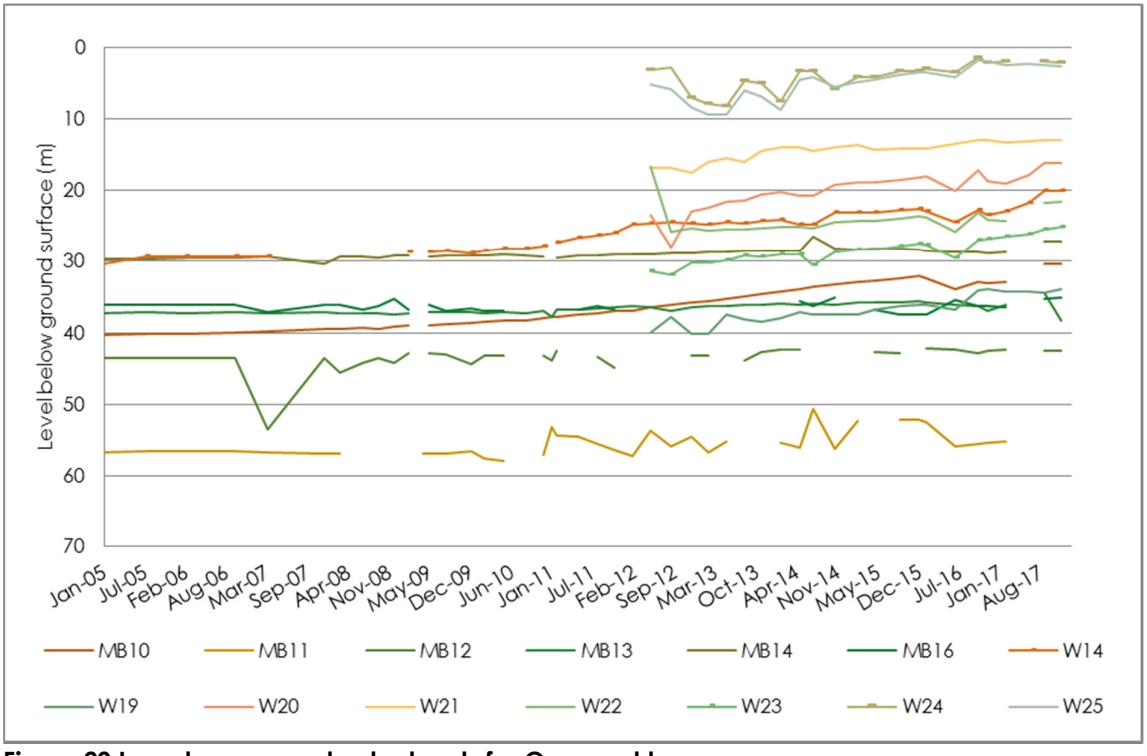


Figure 20 Long term groundwater levels for Open-cut bores

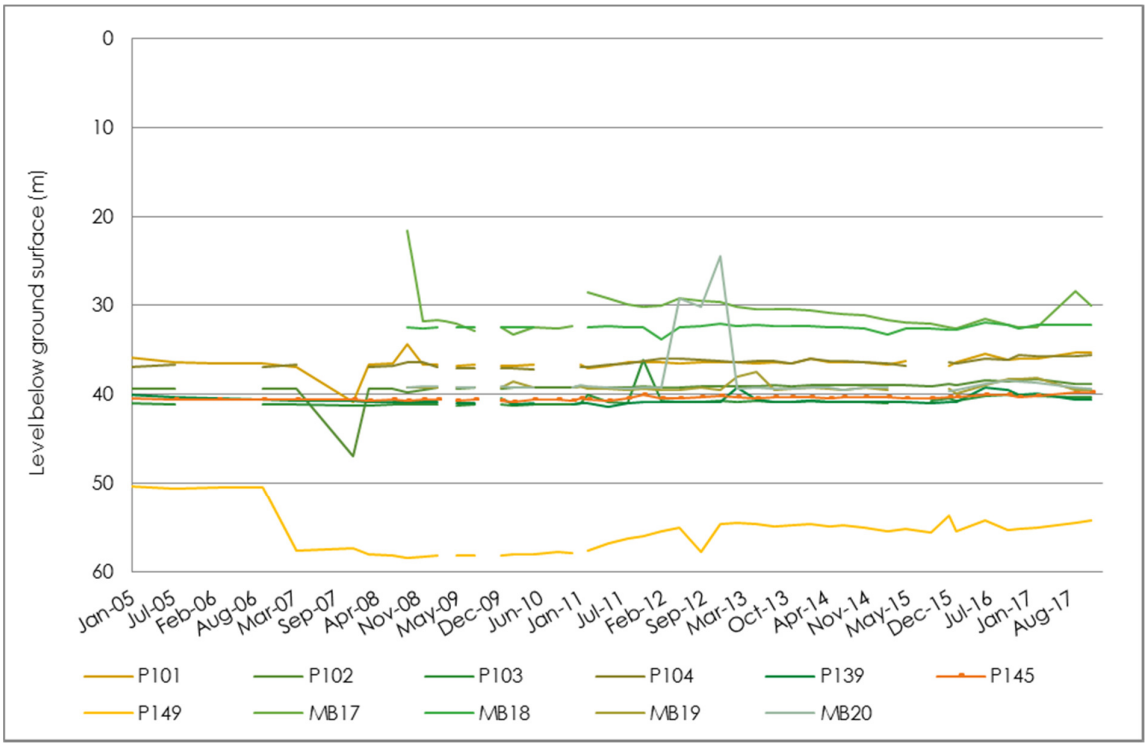


Figure 21 Long term groundwater levels for Underground bores

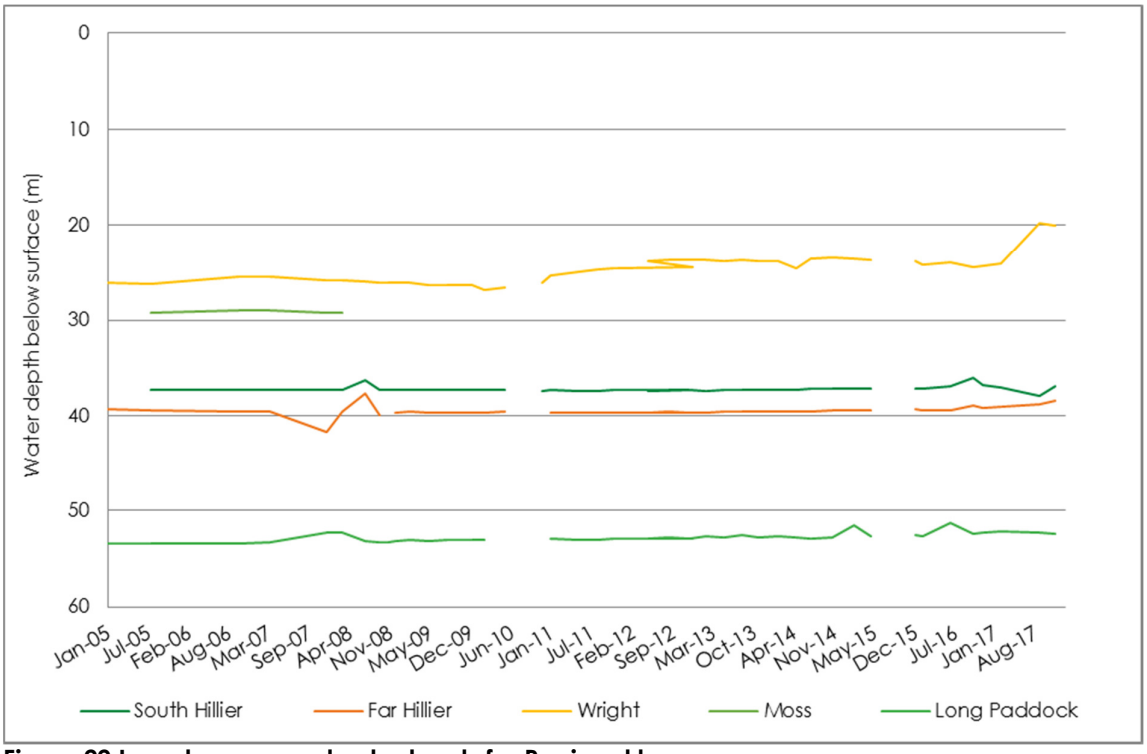


Figure 22 Long term groundwater levels for Regional bores

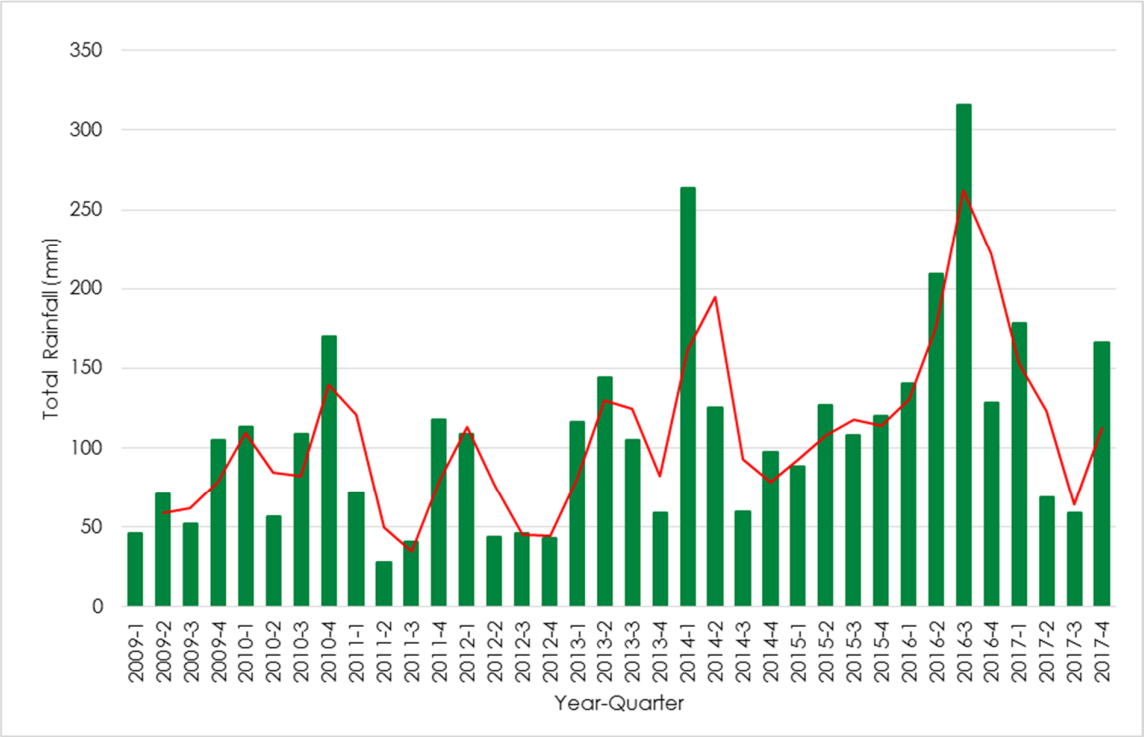


Figure 23 Quarterly rainfall at Northparkes mines (Note: Parkes airport rainfall data used between the period Q1 2009 - Q4 2017)

7.2.2.2 Groundwater Quality

TSF Bores

MB04 was decommissioned during the reporting period as part of the TSF Infill Project. For the remainder of the TSF Bores, pH, copper and electrical conductivity have remained in line with the historical average for this reporting period.

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. The copper concentrations for all open cut bores were in line with the last reporting period and the long term average. The pH concentrations remained consistent with previous years. There were no significant changes in the electrical conductivity results for the reporting period. All results are in-line with long term averages and the predictions of the EA.

Underground Bores

The electrical conductivity results for all underground bores were in-line with long term averages. The pH results for underground bores were predominantly above the long term average, but remain within site trigger levels. There were slight variances in the monitoring results through all quarters, but the results are similar to the last reporting period. The copper concentrations at underground bore sites remain in line with the previous reporting period and long term average, apart from bore MB18, which had an isolated result of 0.151mg/l. This result is above the long term average of 0.03 mg/l and the bore will be closely monitored during the 2018 reporting period to determine the accuracy of the elevated result during the 2017 reporting period.

Regional Bores

Regional ground water quality remained similar to the previous reporting period and in-line with the long term averages. Groundwater pH at each regional bore were generally consistent with previous monitoring periods, with the exception of Far Hillier, which increased from previous reporting period and was above the long term average and internal trigger level. As this monitoring location is in the centre of an agricultural cropping area, wheat harvesting adjacent to the bore is likely the cause the higher pH result. The result, although higher than normal, is still below ANZECC stock drinking water guidelines. Copper levels across three of the locations in Q3 were higher than the last reporting period, however, these readings were still well below the ANZECC stock drinking water guidelines. EC concentrations for the monitoring period remain in line with historical trend for all regional bore sites.

The groundwater monitoring results were predominantly in-line with historical long term average data, and consistent with the EA predictions. The monitoring results are available in Appendix 4.

7.2.3 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. CMOC is proposing to revise the frequency of groundwater quality monitoring as quarterly monitoring is not showing any significant trends.

7.3 Water Balance

Northparkes has implemented a water model to capture water inputs, outputs and throughputs. The GoldSim model was updated in 2014 by external consultants to incorporate the requirements from the Approval.

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:

- In 2017, a total of 471 mm rainfall was recorded onsite which was 49 per cent lower than the 2016 reporting period rainfall;
- The volume of freshwater imported to site decreased (1808 ML in 2014, 1913 ML in 2015, 2221 ML in 2016 and 1926 ML in 2017) from the previous reporting period. All water imported to site was from two groundwater licence allocations owned by CMOC or through a commercial arrangement with Parkes Shire Council. No allocations of CMOC's river water was imported to site in the reporting period, as shown in
- Table 21;
- Total water use during the reporting period was comparable to the previous reporting period with a decrease of approximately 10% from 6296 ML in 2016 to 5650 ML in 2017. Water used per tonne of ore milled was lower due to increase water recovery on the Estcourt TSF;
- Recycled water use decreased during this reporting period by approximately 9% (4075 ML in 2016 and 3724 ML in 2017). This is comparable to the decreased site water demand;
- Water entrained in product decreased from the previous reporting period; and
- Details of Northparkes water balance for the reporting period are outlined in Table 24.

Table 24 Reporting period water balance

Water Balance	Total (ML)
Total Water Input	1926
Recycled	3724
Water Use	**5650**
Evaporation, Seepage and Other	398.5
Entrained in product, by-products or process wastes	12.2
Dewatering water discharged without use	0
Process effluent	0
Change in water storage onsite	**-363**

8. LAND MANAGEMENT AND REHABILITATION

CMOC 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.

In early 2015, CMOC finalised the freehold purchase of the Kokoda Biodiversity Offset Site (Kokoda), a 350 ha property located in the Mandagery locality of the Central West Slopes of NSW. Kokoda was purchased to offset the residual impacts resulting from the Northparkes Step Change Project (PA 11_0060). This project approval includes the construction of the Rosedale TSF, which commenced construction in 2015 and has had a range of preclearance and clearing supervision activities associated with its construction.

Rehabilitation activities at Northparkes incorporate the entire landholding in order to enhance the regional landscape and native habitat values. The Rehabilitation Strategy is described in Section 2.19 of the EA. The State and Federal approvals both state that the rehabilitation of Northparkes must be consistent with the Rehabilitation Strategy (i.e. Condition 39, Schedule 4 of PA11_0060). The MOP summarises the key elements of the Rehabilitation Strategy as well as providing a description of activities and mine landform.

8.1 Northparkes Farms and Adjacent Vegetation Monitoring

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, top soil 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. Onsite ecological monitoring in 2017 focused on the pine donkey orchid populations and rehabilitation. Refer to Section 6.6.2.3 for more information on pine donkey orchid monitoring undertaken in 2017.

8.2 Offset Monitoring

Rehabilitation and ecological monitoring in 2017 focused on the Kokoda, Estcourt and Limestone Biodiversity Offset Sites. Kokoda is scheduled for yearly monitoring whilst Estcourt and Limestone are monitored in 3 year intervals.

In 2017 ongoing flora and fauna monitoring program continued at Kokoda. This monitoring program aims to measure the success of management and restoration strategies in meeting the approval conditions and performance indicators (as outlined in the Northparkes Biodiversity Offset Management Plan (BOMP)) in a timely manner. The monitoring program incorporates annual systematic monitoring as well as biannual (twice yearly) inspections.

8.2.1 Biannual Inspections

Biannual inspections were undertaken at Kokoda in May and December 2017 and included a broad assessment of the site condition aimed at identifying any visually obvious management issue that require immediate attention. The biannual inspections at Kokoda monitor;

- Weed and pests;
- Sedimentation, erosion or salinity issues;
- Natural regeneration success; and

- Maintenance checks of the boundary fence, signage, tracks and homestead were also undertaken.

8.2.2 Rehabilitation Monitoring

CMOC engage external consultants to undertake rehabilitation monitoring at Kokoda. 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 2017 at Kokoda, refer to the 2017 Kokoda Offset Monitoring Report.

The 2017 Kokoda Offset Monitoring Report is a result of work carried out as part of the Biodiversity Offset Strategy and associated BOMP. The BOMP was prepared to guide the ongoing management of the Kokoda for biodiversity conservation and enhancement purposes. The BOMP was prepared in accordance with the Approval requirements issued for the Northparkes Step Change Project and provides a framework for the implementation of ecological management actions, regeneration strategies, controls and monitoring programs for Kokoda.

Kokoda is 350 hectares of land and is located in the Mandagery locality of the Central West Slopes of NSW, approximately 52 kilometres south-east of the Northparkes mine. Historically the property has been grazed by sheep and cattle however now will remain free from domestic livestock grazing. Vegetation surveys undertaken by Umwelt in 2013, indicate the property is comprised of ten different vegetation communities consisting of derived grasslands and a variety of different woodlands communities which vary according to soil type, topography and historical land practices.

In 2015, 17 x 20m x 20m permanent monitoring sites were established across the range of vegetation communities which included:

- Three Grey Box Grassy woodland reference sites;
- Five DNG sites which will be regenerated back to Grey Box Grassy woodland;
- Three Dwyer's Red Gum – Grey Box – Mugga Ironbark – Black Cypress woodland reference sites;
- Three DNG which will be regenerated back to the Dwyer's Red Gum – Grey Box – Mugga Ironbark – Black Cypress woodland community;
- One White Box Grassy Woodland Critically Endangered Ecological Community (CEEC);
- One Grey Box – Ironbark woodland; and
- One Dwyer's Red Gum – Grey Box – Mugga Ironbark – Black Cypress Pine Forest which was mapped as low quality woodland.

A range of 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.

The monitoring methodology adopted at Kokoda is consistent with that used in the Northparkes rehabilitation monitoring program (DnA Environmental 2010 – 2014a; 2018a) and the Estcourt Offset Area ecological monitoring program (DnA Environmental 2010b – 2014; 2018b). The methodology includes a combination of landscape function analysis, accredited soil analyses; various measurements of ecosystem diversity and habitat values; and adapted from the Biometric methodology. This year however, an agricultural soil analysis was also undertaken as previous soil results indicated that all sites did not have heavy metal contaminants, other than high iron levels which were typical of the local area. The timing of the annual vegetation monitoring was consistent with previous monitoring years and was undertaken during 9 - 11 October.

Performance of the woodland revegetation monitoring sites against "proposed" Primary Completion Performance Indicators

Table 25 below indicates the performance of the woodland revegetation monitoring sites against the proposed Primary Completion Performance Indicators in 2017. The selection of criteria has been presented in order of rehabilitation phases according to the ESG3 MOP guidelines (*excluding Phase 1: Decommissioning*). The range values of the ecological performance targets are amended annually. Revegetation sites meeting or exceeding the range values of their representative community type (i.e. Grey Box woodland reference sites) 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.

Performance of the DRG woodland revegetation monitoring sites against "proposed" Primary Completion Performance Indicators

Table 26 below indicates the performance of the woodland revegetation monitoring sites against a selection of proposed Primary Completion Performance Indicators in 2017. The selection of criteria has been presented in order of rehabilitation phases according to the ESG3 MOP guidelines (*excluding Phase 1: Decommissioning*). The range values of the ecological performance targets are amended annually. Revegetation sites meeting or exceeding the range values of their representative community type i.e. Dwyer's Red Gum woodland reference sites 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.

Conclusion

The proposed revegetation activities within the derived grassland areas as described in the BOMP aim to increase biodiversity and habitat values through the removal of livestock grazing to allow natural regeneration, supplemented with direct seeding and tubestock planting. These activities are likely to result in the cleared grassland areas developing into woodland communities and therefore meeting most ecological performance indicators in the medium to longer term. The reference sites at Kokoda are typically degraded and of low quality which subsequently have provided low performance targets. In the Grey Box woodlands in particular, 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.

Table 25 Performance of the Kokoda Offset Grey Box revegetation sites against primary completion performance indicators for Grey Box woodland communities in 2017.

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Grey Box Woodland ecosystem range 2017		GBReveg1	GBReveg2	GBReveg3	GBReveg4	GBReveg5	WBWood1	IronWood1
Performance indicators are quantified by the range of values obtained from replicated reference sites				Lower	Upper	2017	2017	2017	2017	2017	2017	2017
Phase 2: Landform establishment and stability	**Landform slope, gradient**	Landform suitable for final landuse and generally compatible with surrounding topography	Slope	1	3	5	4	3	4	3	3	4
	Active erosion	Areas of active erosion are limited	No. Rills/Gullies	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	5.4	5.6	4.8	5.7	6.2	6.2	6.2	6.0	5.3
			Organic Matter	5.9	7.5	2.5	5.1	2.1	1.9	2.1	2.5	3.5
			Phosphorous	22.3	35.1	15.7	26.9	17.4	20.3	17.1	18.4	20.7
Phase 4: Ecosystem and Landuse Establishment	**Landscape Function Analysis (LFA): Landform stability and organisation**	Landform is stable and performing as it was designed to do	LFA Stability	64.8	68.8	72.8	73.3	71.2	70.7	73.9	65.0	69.5
			LFA Landscape organisation	100	100	100	100	100	100	100	100	100

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Grey Box Woodland ecosystem range 2017		GBReveg1	GBReveg2	GBReveg3	GBReveg4	GBReveg5	WBWood1	IronWood1
	Vegetation diversity	Vegetation contains a diversity of species comparable to that of the local remnant vegetation	Diversity of shrubs and juvenile trees	0	4	1	0	0	0	0	5	8
			The percentage of shrubs and juvenile trees which are local endemic species.	0	100	100	0	0	0	0	100	100
			Exotic species richness	0	2	15	8	17	12	13	3	0
	Vegetation density	Vegetation contains a density of species comparable to that of the local remnant vegetation	Density of shrubs and juvenile trees	0	21	1	0	0	0	0	10	137
	Ecosystem composition	The vegetation is comprised by a range of growth forms comparable to that of the local remnant vegetation	Trees	1	2	1	0	0	0	0	4	6
			Shrubs	0	4	0	0	0	0	0	2	3
			Herbs	6	8	18	14	19	14	18	13	5

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Grey Box Woodland ecosystem range 2017		GBReveg1	GBReveg2	GBReveg3	GBReveg4	GBReveg5	WBWood1	IronWood1
Phase 5: Ecosystem and 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	**54.7**	**59.4**	**44.7**	**41.7**	**46.1**	**49**	**50.1**	**54.8**	**54.1**
			LFA Nutrient recycling	**52.0**	**56.3**	**46.4**	**43.7**	**48.3**	**47.8**	**50.1**	**54.9**	**51.1**
	Protective ground cover	Ground layer contains protective ground cover and habitat structure comparable with the local remnant vegetation	Perennial plant cover (< 0.5m)	**2**	**6**	**18.5**	**10.5**	**31.5**	**7**	**14**	**12.5**	**7.5**
			Total Ground Cover	**100**	**100**	**100**	**99**	**100**	**100**	**100**	**100**	**98.5**
	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	**100**	**100**	**39.5**	**71.8**	**49.2**	**32.4**	**46.4**	**94.7**	**100**
	Ecosystem growth and natural recruitment		Shrubs and juvenile trees 0 - 0.5m in height	**0**	**8**	**1**	**0**	**0**	**0**	**0**	**8**	**90**

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Grey Box Woodland ecosystem range 2017		GBReveg1	GBReveg2	GBReveg3	GBReveg4	GBReveg5	WBWood1	IronWood1
		The vegetation is maturing and/or natural recruitment is occurring at rates similar to those of the local remnant vegetation	Shrubs and juvenile trees 1.5 - 2m in height	0	0	0	0	0	0	0	0	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	0	4	0	0	0	0	0	0	3
			Foliage cover >6m	51	54	0	0	0	0	0	54	46
	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	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	8	23	0	0	0	0	0	8	40
	Ecosystem health		Live trees	85	100	0	0	0	0	0	100	75.0

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Grey Box Woodland ecosystem range 2017		GBReveg1	GBReveg2	GBReveg3	GBReveg4	GBReveg5	WBWood1	IronWood1
		The vegetation is in a condition comparable to that of the local remnant vegetation.	Healthy trees	0	48	0	0	0	0	0	25	7.5
			Flowers/fruit: Trees	38	61	0	0	0	0	0	25	32.5

Table 26 Performance of the Kokoda Offset Dwyer's Red Gum revegetation sites against primary completion performance indicators for Dwyer's Red Gum woodland communities in 2017

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Dwyer's Red Gum Woodland ecosystem range 2017		DReveg1	DReveg2	DReveg3	DWoodLQ
Performance indicators are quantified by the range of values obtained from replicated reference sites				Lower	Upper	2017	2017	2017	2017
Phase 2: Landform establishment and stability	Landform slope, gradient	Landform suitable for final landuse and generally compatible with surrounding topography	Slope	3	4	4	3	4	3
	Active erosion	Areas of active erosion are limited	No. Rills/Gullies	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	5.4	5.6	5.7	5.5	5.9	5.6
			Organic Matter	2.8	4.7	3.1	2.8	2.5	3.5
			Phosphorous	16.7	19.7	19.4	19.0	18.7	28.2
			LFA Stability	67.7	73.5	72.4	73.5	71.1	68.1

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Dwyer's Red Gum Woodland ecosystem range 2017		DReveg1	DReveg2	DReveg3	DWoodLQ
Phase 4: Ecosystem and Landuse Establishment	Landscape Function Analysis (LFA): Landform stability and organisation	Landform is stable and performing as it was designed to do	LFA Landscape organisation	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	3	7	2	2	1	3
			The percentage of shrubs and juvenile trees which are local endemic species.	100	100	100	100	100	100
			Exotic species richness	0	6	17	5	16	4
	Vegetation density	Vegetation contains a density of species comparable to that of the local remnant vegetation	Density of shrubs and juvenile trees	36	1974	11	2	1	10
	Ecosystem composition	The vegetation is comprised by a range of growth forms comparable to that of the local remnant vegetation	Trees	3	4	1	1	1	2
			Shrubs	2	5	1	3	0	2
			Herbs	5	14	18	10	15	6
Phase 5: Ecosystem and 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	52.9	58.8	46.1	37.7	50.1	55.9
			LFA Nutrient recycling	51.5	57.1	44.6	43.2	51.7	54.2
	Protective ground cover		Perennial plant cover (< 0.5m)	4	9	4.5	12.5	1	5.5

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Dwyer's Red Gum Woodland ecosystem range 2017		DReveg1	DReveg2	DReveg3	DWoodLQ
		Ground layer contains protective ground cover and habitat structure comparable with the local remnant vegetation	Total Ground Cover	94	99	99.5	98.5	100	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	82	100	35.1	78.7	29.5	100
	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	36	1730	2	2	1	10
			shrubs and juvenile trees 1.5 - 2m in height	0	0	2	0	0	0
	Ecosystem structure	The vegetation is developing in structure and complexity comparable to that of the local remnant vegetation	Foliage cover 0.5 - 2 m	0	13	0.5	0	0	0
			Foliage cover >6m	10	44	0	0	0	29
	Tree diversity	Vegetation contains a diversity of maturing tree and shrubs species comparable to that of the local remnant vegetation	Tree diversity	100	100	100	0	0	100
	Tree density	Vegetation contains a density of maturing tree and shrubs species comparable to that of the local remnant vegetation	Tree density	9	79	1	0	0	9
	Ecosystem health		Live trees	30	78	100	0	0	100

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Dwyer's Red Gum Woodland ecosystem range 2017		DReveg1	DReveg2	DReveg3	DWoodLQ
		The vegetation is in a condition comparable to that of the local remnant vegetation.	Healthy trees	2.6	33.3	0	0	0	11.1
			Flowers/fruit: Trees	11	56	0	0	0	66.7

8.3 Management

8.3.1 Northparkes Farms and Adjacent Vegetation

Land management is conducted in accordance with the MOP, Conceptual Mine Closure Plan and the BOMP. Other management plans pertaining to land management include the Surface Water Management Plan, Heritage Management Plan and the Flora and Fauna Management Plan. The key objectives for CMOC is to develop an integrated and strategic approach to land management including;

- Reducing the Northparkes footprint and impacts;
- Land preservation and rehabilitation;
- Conservation and improvement of biodiversity;
- Land conservation through sustainable agricultural management;
- Establishment of environmental offsets on the CMOC properties; and
- Interaction with adjoining land holders and communities to address cross border and regional land use issues.

Agricultural land around the mine site is used primarily for crop farming in combination with native vegetation communities. Some of the native vegetation areas around the mine site serves as biodiversity offsets for the mining operations (such as Estcourt Offset Site and the Limestone State Forest) while others provide wildlife corridors facilitating fauna movement and gene flow across the broader landscape. Since acquiring its various land holdings, CMOC 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;
- Soil conservation works; and
- Stubble retention.

Wherever possible, CMOC has maintained remnant vegetation within its landholding. 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.

Revegetation activities are designed for erosion control, aesthetic improvement and ecosystem regeneration. These activities are undertaken on constructed landforms such as waste rock dumps, tailings storage facilities, topsoil stockpiles, and other disturbed areas. Revegetation is also undertaken to create wildlife corridors. Table 27 provides a summary of the areas of disturbance and rehabilitation status for each domain as required in the MOP.

Table 27 Rehabilitation Status

Mine Area Type	2016 Reporting Period	2017 Reporting Period (actual)	2018 Reporting Period (predicted)
	Year X-1 (ha)	Year X (ha)	Year X+1 (ha)
A. Total Mine Footprint	1251.04	1251.04	1251.04
B. Total active disturbance	1120.29	1138.29	1138.29
C. Land being prepared for rehabilitation	7.25	18	18
D. Land under active rehabilitation	99	81	81
E. Completed Rehabilitation	0	0	0

8.3.2 Kokoda Offset Site

Kokoda is managed in accordance with the BOMP, which outlines the short, medium and long-term management strategies, monitoring actions, and performance and completion criteria for Kokoda. The BOMP was approved by DPE in December 2016.

Management activities for the 2018 reporting period at the Kokoda will be focused on weed and pest management, along with replacing an additional one kilometre of perimeter fencing. Active rehabilitation of the Kokoda will commence within 12 months of the execution of the Voluntary Conservation Agreement.

8.3.3 Revegetation and Rehabilitation on the Mine Lease

Rehabilitation works on the mining lease during 2017 have been associated with the development of the final landform for TSF1.

Rehabilitation works scheduled for 2018 include the continual development of the final landform for TSF1. The construction phase of this project is scheduled to be completed in Q2 2018, with direct tailings emplacement scheduled commence immediately after. Tailing emplacement is then likely to continue for a period of at least three years.

Rehabilitation activities proposed for the 2018 reporting period are consistent with the approved MOP. In addition, CMOC will continue to develop local wildlife corridors by planting an additional 5,000 trees within the 2018 reporting period.

8.4 Research and Rehabilitation Trials and Use of Analogue Sites

Since 2015, CMOC has engaged in seeding trial projects on the existing TSFs to reduce dust lift off and ensure the project conforms to the strict Approval conditions. Seeding was identified as a successful mitigation strategy to reduce dust lift off through vegetation cover provided by various introduced vegetation species on the existing TSF's.

The results of the study during the reporting period include:

- Regeneration of cover crop on TSF2 which provided vegetation cover and crust stability, reducing dust lift off, which still remains (Figure 24). This resulted in zero dust related complaints for the three years since commencement of the project; and
- The following vegetation species (annual and perennial) were the most appropriate species for future TSF surface sowing; Tall Wheat Grass, Medic Scimitar, Medic Cavalier, Clover Hykon Rose and Clover Balansa.

As a result of this project and CMOC target of industry leading practices, further seeding trials on the Rosedale TSF and TSF2 will be undertaken in 2018.

Figure 24 The effectiveness of seed trials conducted in April 2015 still provides effective ground cover

9. COMMUNITY RELATIONS

9.1 Reporting Period Summary

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

During 2017, CMOC:

- Expanded stakeholder relationships;
- Worked closely with the community and proactively participated in community initiatives such as the Parkes Elvis Festival, Trundle Bush Tucker Day, White Ribbon Day and the Parkes Show;
- Invested in the future of the community through meaningful partnerships in excess of $214,080; and
- Provided in-kind support to community groups through the Central West via its award-winning Volunteer Leave Program (Figure 25) - CMOC employees volunteered 547.5 hours in the reporting period.

CMOC recognises the importance of positive relations with its community and takes this into account in the operation of its business and the decisions made.

Figure 25 Employees participating in the Volunteer Leave Program

9.2 Community Engagement

CMOC 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 approximately seven community members and three CMOC personnel. Two meetings were held in the reporting period in March and December 2017. No significant issues were raised during the meetings held with the community during the reporting period.

CMOC 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 regards to mining activities.

Two regular neighbours meetings were held in the reporting period in March and December. An additional meeting was held in July providing an opportunity to consult our neighbours regarding the minor modification to our development consent to allow for continued block caving mining in E26.

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

The "Source" community newsletter was distributed twice during the reporting period with positive feedback from community members on the content, design and intent of the newsletter. The newsletter was published in July and December via insertion in the Parkes Champion Post and Forbes Advocate.

The Northparkes Facebook page was used actively as a two-way communication channel by both CMOC and the community in 2017.

Figure 26 Employees engaging with community members

9.3 Contributions and Achievements

In line with its commitment to support a sustainable community, CMOC 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 CMOC make decisions regarding sponsorship requests from the local community, as part of the Northparkes Community Investment Program.

In 2017, CMOC continued to provide financial assistance to local organisations that deliver benefits to the community. In excess of $214,080 was invested in various sporting, educational, cultural, industry, environmental and agricultural programs.

This funding was complemented by the nationally recognised Northparkes Volunteer Leave Program. This program allows CMOC employees to volunteer for two days each year to help community groups throughout the Central West. Employees receive time in lieu if volunteering takes place outside of work hours. During the reporting period employees donated 547 hours to groups and projects throughout the Central West.

Figure 27 A sample of photographs collected at CMOC supported events

The major initiatives in the current reporting period programs included:

- 111 employees participated in 15 volunteering initiatives, which included helping prepare for The Parkes agricultural show, the White Ribbon Day March, first aid training at Parkes High School and assisting with the Trundle Bush Tucker day;
- 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;
- Sponsorship of the Parkes, Peak Hill and Trundle agricultural shows;
- 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; and
- Increased sponsorship of the Parkes Elvis Festival.

9.4 Complaints

9.4.1 Management of Complaints

CMOC 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 Northparkes website (www.northparkes.com).

Registered neighbours of Northparkes also received via post a magnetised contact list including all relevant contact numbers of CMOC personnel.

The website provides information about all aspects of Northparkes 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.

CMOC maintained its dust risk notification communication strategy in 2017. 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 CMOC 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 CMOC received one complaint from community members. This is a slight increase in the total complaints that occurred in the previous reporting period (0) which was a significant improvement from the eight that occurred in the 2013 reporting period. It is also noted that at the time of writing this review, no complaints have been received since February 2017.

A summary of the complaint is provided in Table 28. The complaint was handled in accordance with Northparkes Stakeholder Communications Management Plan. Monthly summaries of complaints are made publicly available on Northparkes website at: http://www.northparkes.com/news/#community-reports

Table 28 Complaint Summary

Date of Complaint	Complainant Reference	Issue	Response
15/2/17	RMS Worker	Road works - driver behaviour	Investigated, unable to identify perpetrator.

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

9.5 Workforce Profile at Northparkes Mines

Wherever possible, local personnel are employed by CMOC and its contractors. The CMOC team at Northparkes consists of 313 staff, with majority locally based. A breakdown of the local government areas where NPM employees reside is presented in Table 29.

Table 29 Residential Locality of CMOC Employees

Locality	CMOC Employee Residency (%)
Parkes	75%
Forbes	11%
Dubbo	2%
Orange	2%
Peak Hill	1%
Other	9%

10. INDEPENDENT AUDIT

No Independent audits were undertaken during the 2017 reporting period, as the Approval requirement is to undertake the audit every three years and the last was conducted in 2015. The next scheduled audit will be undertaken during the 2018 reporting period.

11. INCIDENTS AND NON-COMPLIANCES

11.1 Non-compliances during the reporting period

Two non-compliances were recorded for the 2017 reporting period, the first was related to the eastern surge dam overflow and the second was related to the security of the biodiversity offsets. Details of the non-compliances are provided in Table 30.

The eastern surge dam overflow occurred on the 4 April 2017, when approximately 1ML of water overflowed the dam due to a miscommunication between personnel from night and day shift regarding the monitoring of water levels during pumping resulting in overflow of the surge dam overnight. An internal investigation was conducted to determine the cause of the incident and a report was filed to the EPA on 6 April 2017. Water sampling of the surge dam identified that the risk to the environment from the incident was negligible and was classified by the EPA as a notification rather than an incident. Employees immediately isolated and decommissioned the surge dam valve and management has been streamlined into one department to improve controls and prevent future incidents. On 2 August 2017, CMOC received an Official Warning for the incident, related to a breach of Condition O1 and O2 of EPL4784. The EPA did note that CMOC had taken a number of corrective actions which include:

- The eastern surge dam valve has been isolated and decommissioned and can no longer be physically turned on without unlocking; and
- The management of all water infrastructure including the surge dams are now under one department.

As per the Approval, CMOC were required to arrange security of Kokoda by 25 March 2017, but was unable to deliver this security, resulting in an administrative non-compliance. On 9 February 2018 the Voluntary Conservation Agreement (VCA) was signed by executives of CMOC and the OEH. The NSW Biodiversity Conservation Trust (BCT) will register the conservation agreement on the property title. Once this is complete, the BCT will inform local council of the agreement and return a copy of the documents to CMOC for execution.

Table 30 Non-Compliances

Date of non-compliance	Relevant Approval	Condition No.	Condition Description	Compliance Status	Description	Action taken
6/4/2017	EPL 4784	Condition O1 and O2	East Surge Dam Overflow	Non-Compliant	Approximately 1ML of water overflowed the eastern surge dam. Water did not leave the Mine Lease.	An internal investigation and water sampling was conducted. A report was filed to the EPA on the 6th April.
25/3/2017	PA 11_0060	Schedule 3, Condition 27	Security of Biodiversity Offsets	Administrative Non-Compliant	Failure to secure the Kokoda Biodiversity Offset by the 25/3/2017.	The VCA has been signed by CMOC and OEH executives. Pending registration with BCT.

11.2 Summary Environmental Incidents

During the reporting period, one reportable environmental incident at Northparkes as detailed in Table 30.

Formal incident notifications summarising the details, likely causes, actions taken to date and additional proposed measures were submitted to the EPA, Department of Industry, Resources and Geoscience and/or other relevant government agencies in accordance with reporting procedures.

During the reporting period, a total of seventeen non-reportable environmental incidents, where details, likely causes, actions to date and additional proposed measures were uploaded into the site software package (known as NED) in accordance with reporting procedures.

For the reporting period, out of the nine non-reportable environmental incident categories, CMOC identified that air quality monitoring (35%) and hydrocarbon related incidents (18%) composed the majority of the environmental incidents that occurred across the reporting period. Of the air quality monitoring incidents, 50% were related to technical difficulties with monitoring equipment, and the remaining 50% were related to elevated PM10 dust levels. These elevated result were directly attributable to localised agricultural activities (sowing) in the surrounding region, as all PM10 monitoring locations reported an elevated dust level on this date. All hydrocarbon incidents involved issues with hydraulic hoses from operational machinery. A summary of the environmental incidents for the reporting period are displayed in Figure 28.

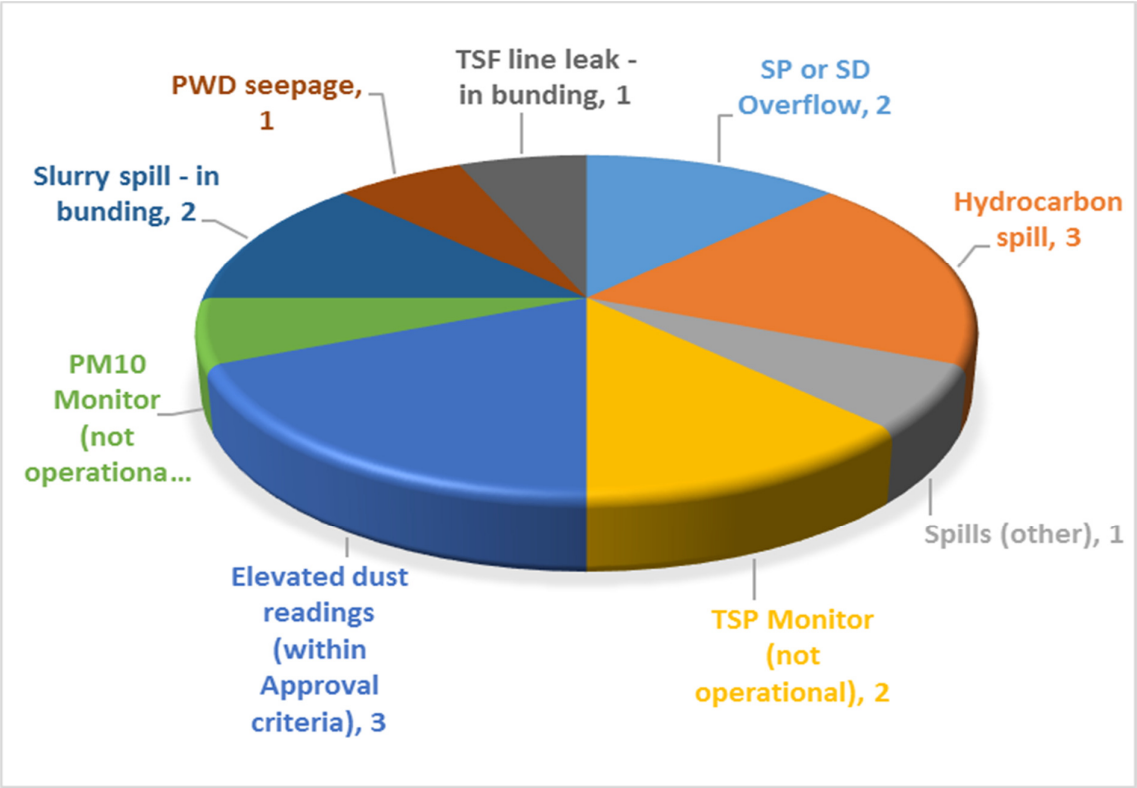


Figure 28. Non-reportable environmental incidents for the 2017 reporting period

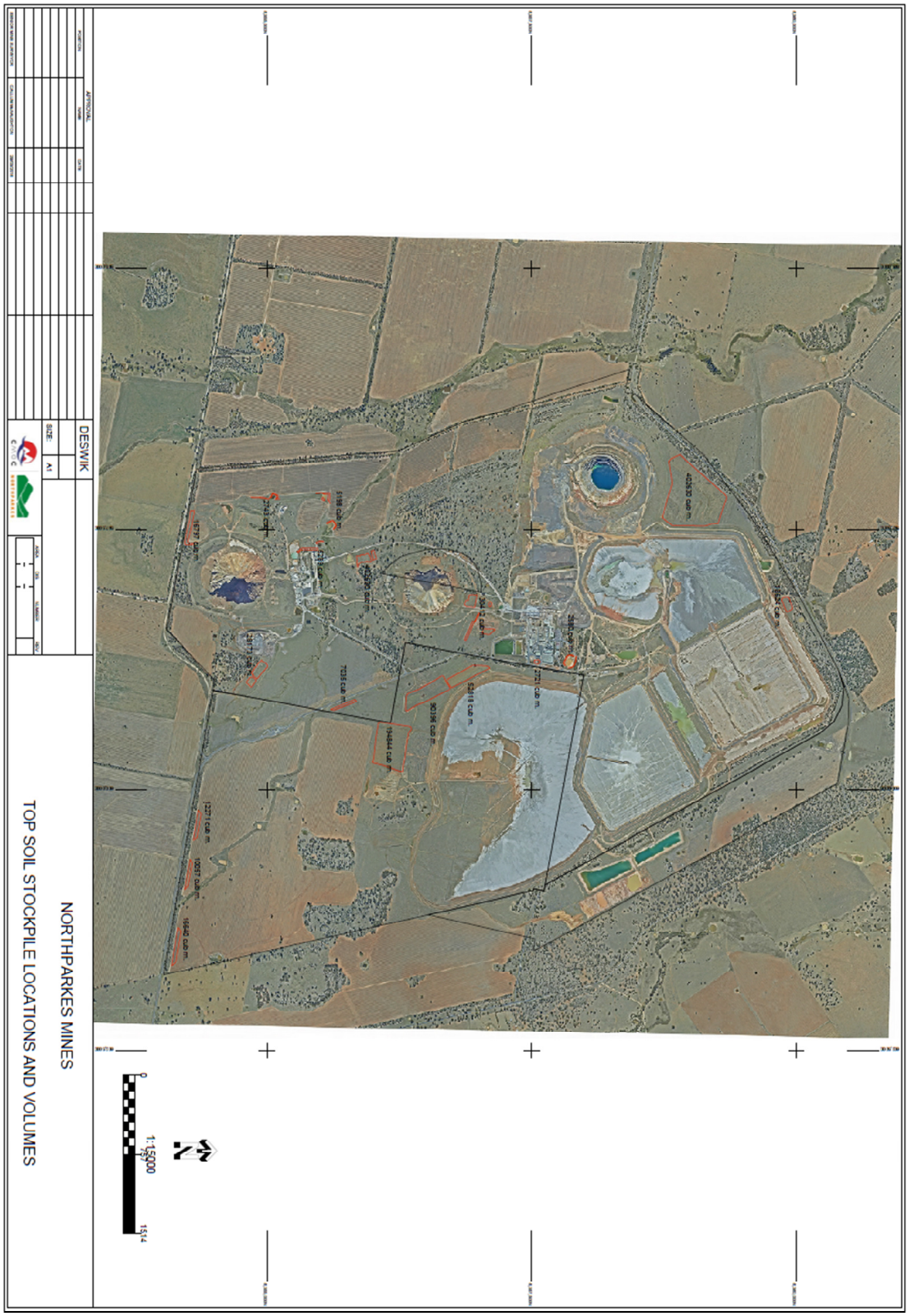
12. ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD.

Activities proposed for the next reporting period include:

- Review and revision of various Environmental Management Plans;
- Seeking approval to relevant approval modifications or amendments;
- A stakeholder information day and identification of community support initiatives;
- Planting of approximately 5,000 trees within the Mining Lease;
- Scoping and feasibility study for an update to field monitoring equipment and a software data management program to increase the efficiency of data transfer and management from field monitoring;
- Rosedale TSF seeding trials;
- TSF2 reseeding with a variety of perennial and annual grasses to mitigate dust lift off;
- Water monitoring assessment aimed to improve the efficiency of field monitoring and removing unnecessary monitoring sites from the monitoring schedule; and
- Review of the regional air quality monitoring network, to remove those monitoring locations that are impacted by extraneous sources.

APPENDIX 1

Topsoil Stockpiles



APPENDIX 2

Dust monitoring locations

APPENDIX 3

Noise monitoring Locations

Legend

Real time Noise

mineral_titles

NPM_Drainage

0 0.5 1 2 3 4 Kilometers

1:40,000

Monitoring Locations

Noise

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Units: Meter

APPENDIX 4

Water monitoring

Surface water monitoring locations

Legend

Farm Dams · Water Course · mineral_titles

Surface Water · Process Water · NPM_Drainage

0 0.375 0.75 1.5 2.25 3 Kilometers

1:35,000

Monitoring Locations
Surface Water

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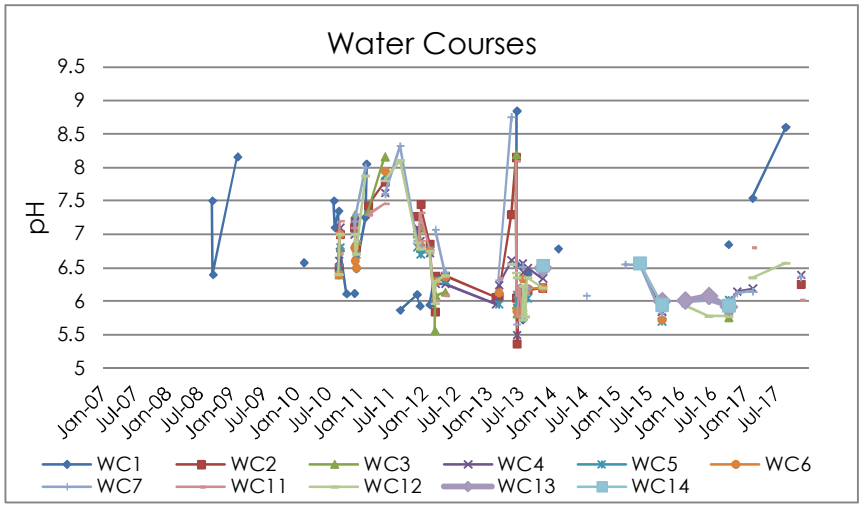
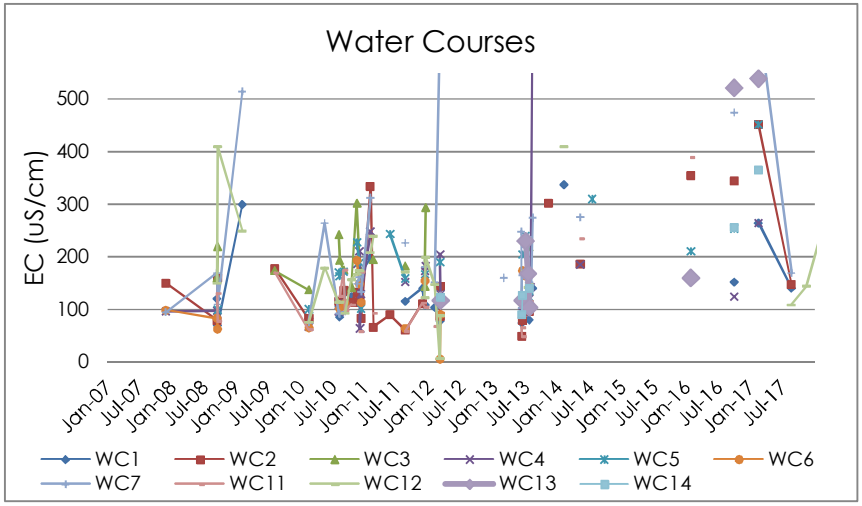
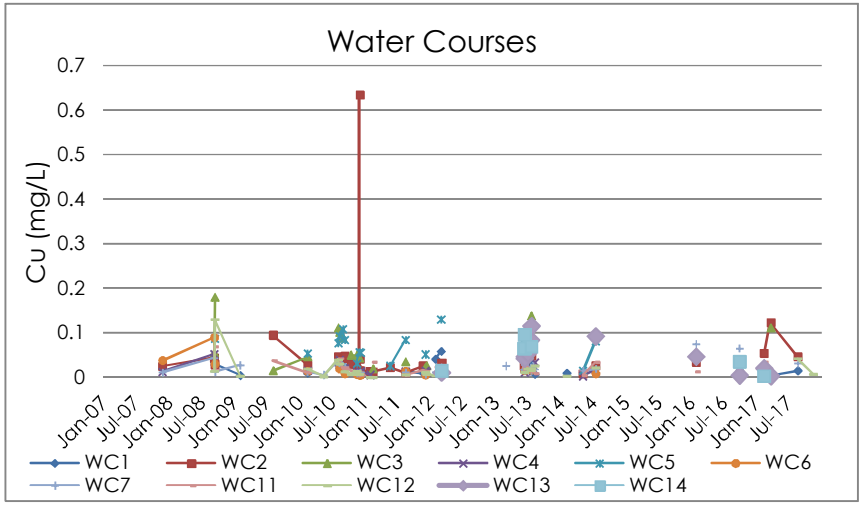
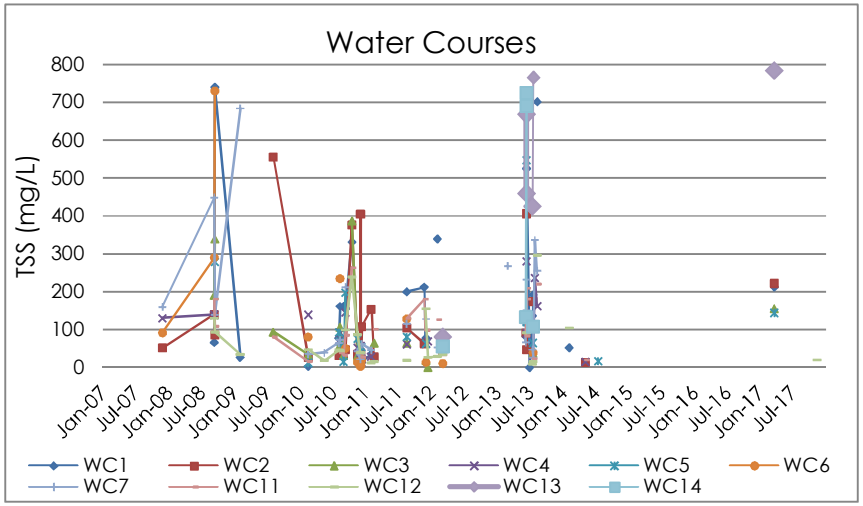
Units: Meter

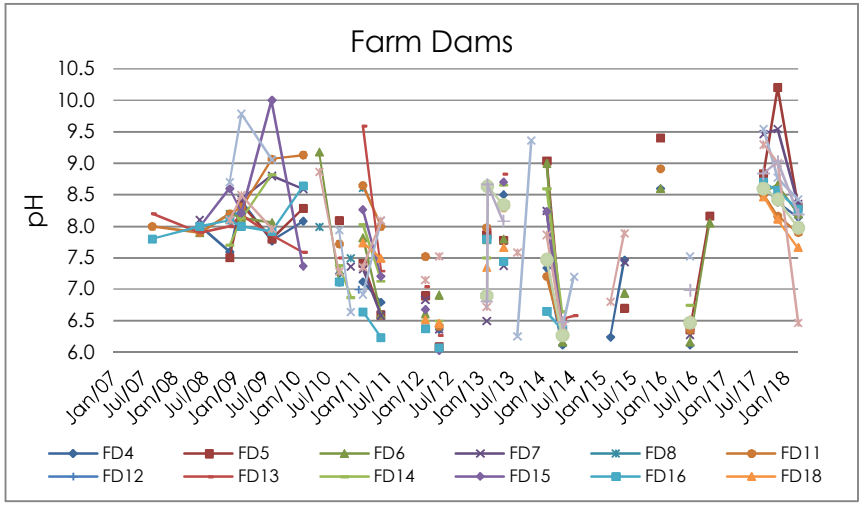
Surface water monitoring results







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9.0
8.5
8.0
7.5
7.0
6.5
6.0
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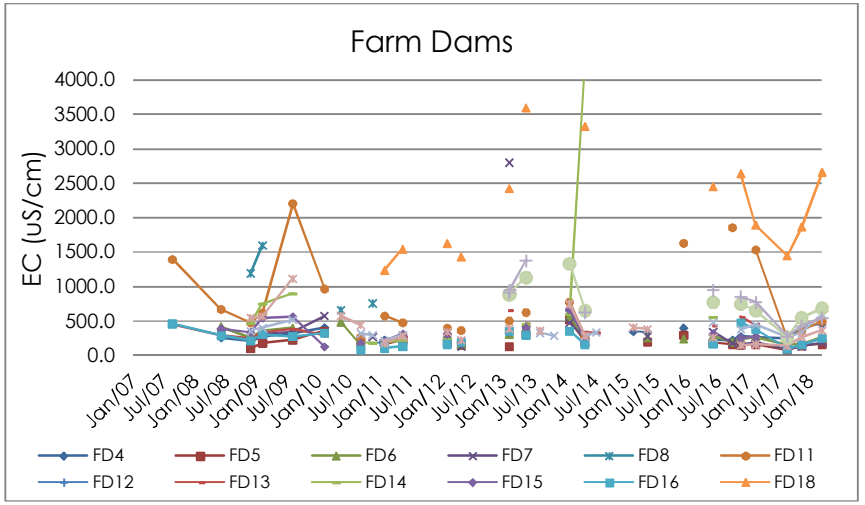
FD12 FD13 FD14 FD15 FD16 FD18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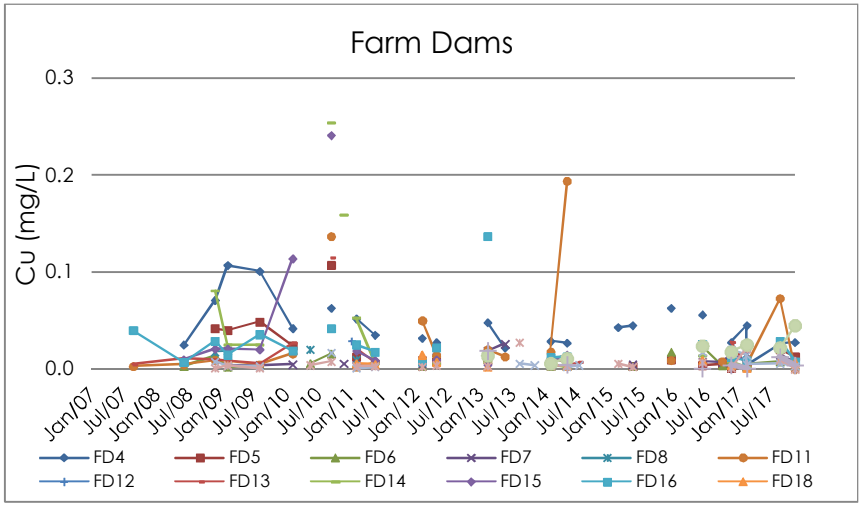
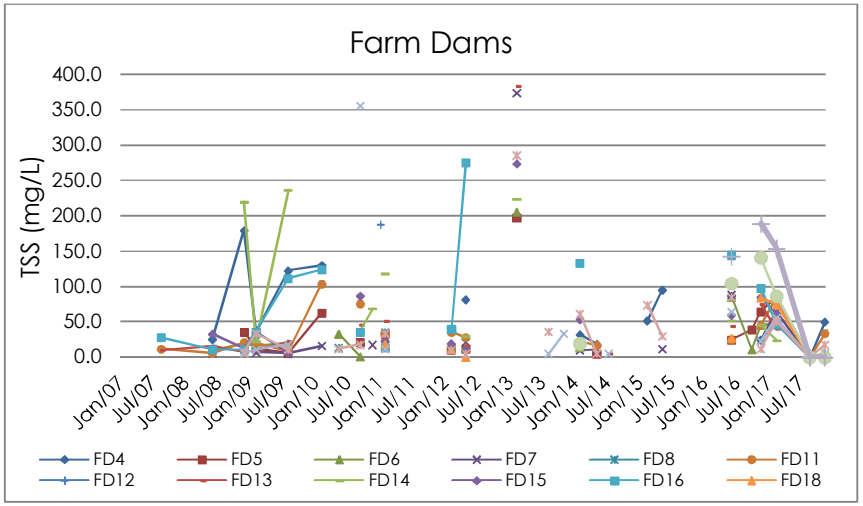
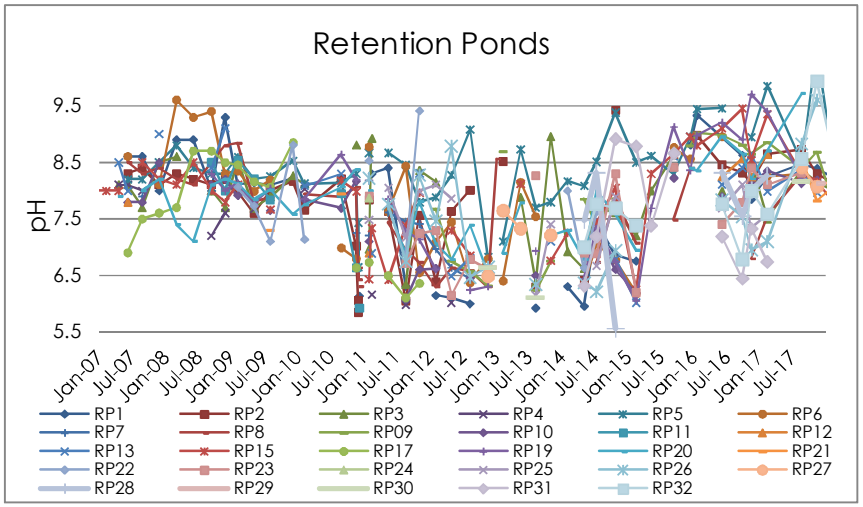
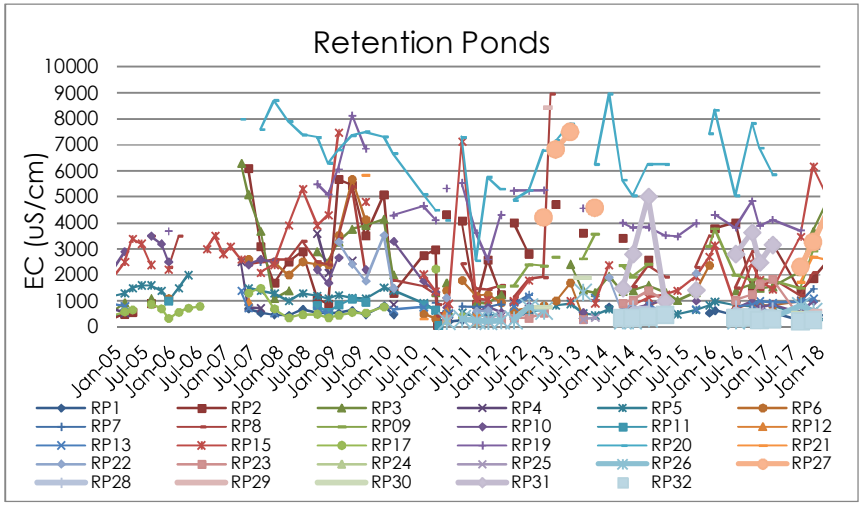
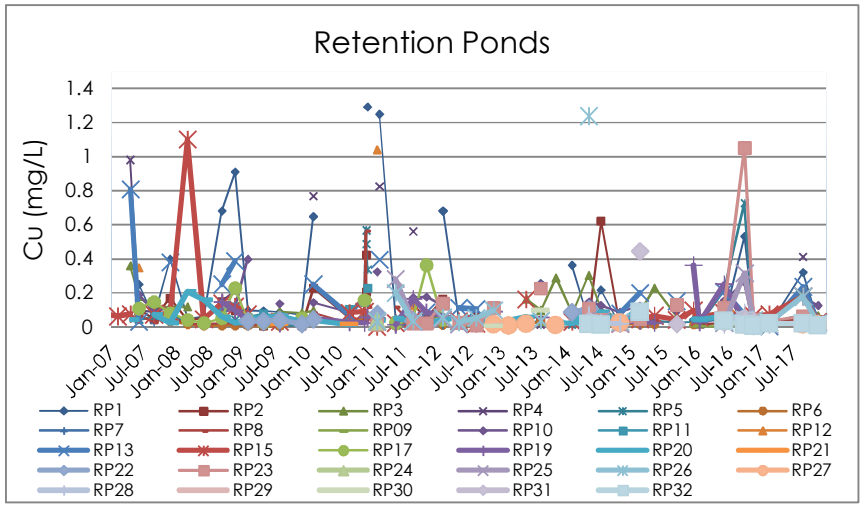
FD4 FD5 FD6 FD7 FD8 FD11
FD12 FD13 FD14 FD15 FD16 FD18

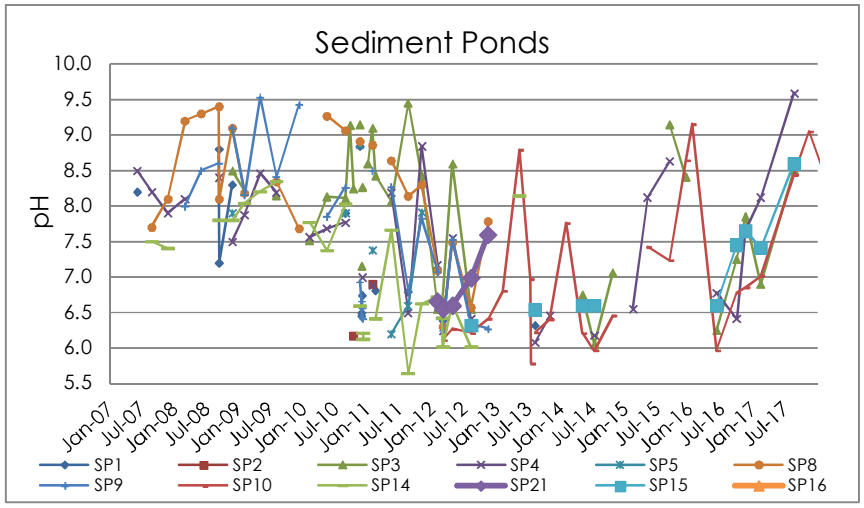

Farm Dams
Cu (mg/L)
0.3
0.2
0.1
0.0
Jan/07 Jul/07 Jan/08 Jul/08 Jan/09 Jul/09 Jan/10 Jul/10 Jan/11 Jul/11 Jan/12 Jul/12 Jan/13 Jul/13 Jan/14 Jul/14 Jan/15 Jul/15 Jan/16 Jul/16 Jan/17 Jul/17
FD4 FD5 FD6 FD7 FD8 FD11
FD12 FD13 FD14 FD15 FD16 FD18

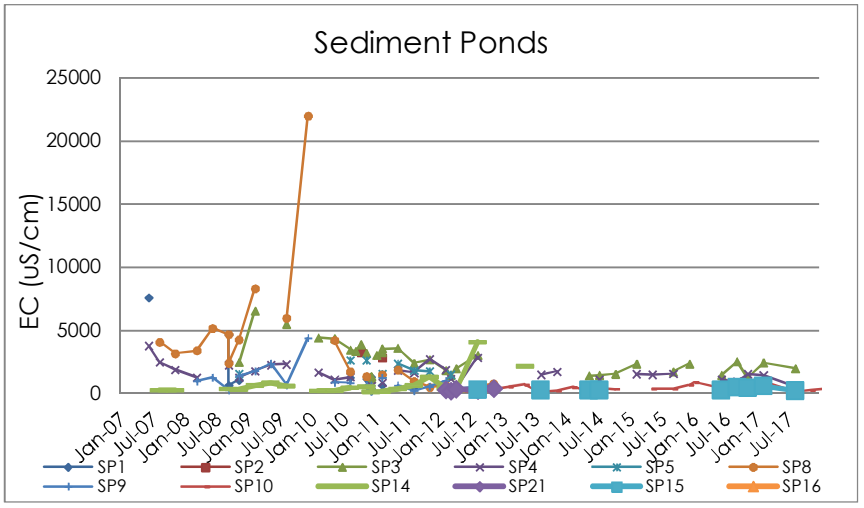

Farm Dams
TSS (mg/L)
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
Jan/07 Jul/07 Jan/08 Jul/08 Jan/09 Jul/09 Jan/10 Jul/10 Jan/11 Jul/11 Jan/12 Jul/12 Jan/13 Jul/13 Jan/14 Jul/14 Jan/15 Jul/15 Jan/16 Jul/16 Jan/17 Jul/17
FD4 FD5 FD6 FD7 FD8 FD11
FD12 FD13 FD14 FD15 FD16 FD18

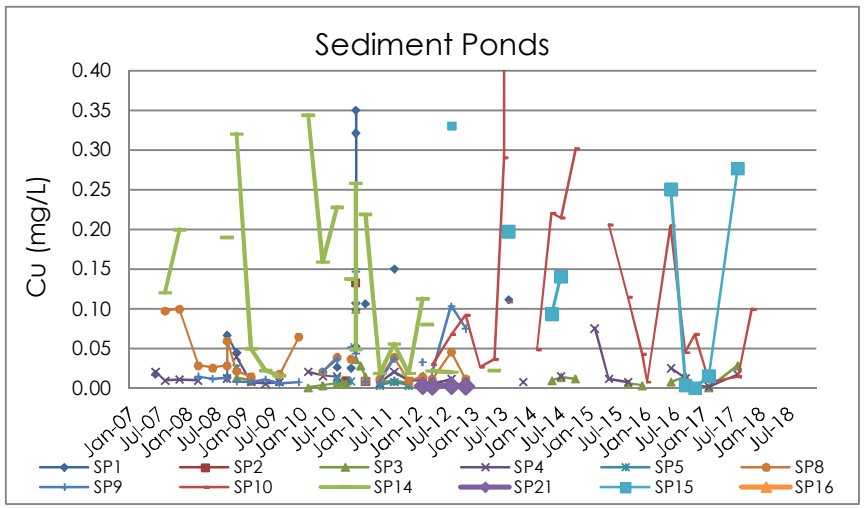

Retention Ponds
pH
9.5
8.5
7.5
6.5
5.5
Jan-07 Jul-07 Jan-08 Jul-08 Jan-09 Jul-09 Jan-10 Jul-10 Jan-11 Jul-11 Jan-12 Jul-12 Jan-13 Jul-13 Jan-14 Jul-14 Jan-15 Jul-15 Jan-16 Jul-16 Jan-17 Jul-17
RP1 RP2 RP3 RP4 RP5 RP6
RP7 RP8 RP09 RP10 RP11 RP12
RP13 RP15 RP17 RP19 RP20 RP21
RP22 RP23 RP24 RP25 RP26 RP27
RP28 RP29 RP30 RP31 RP32

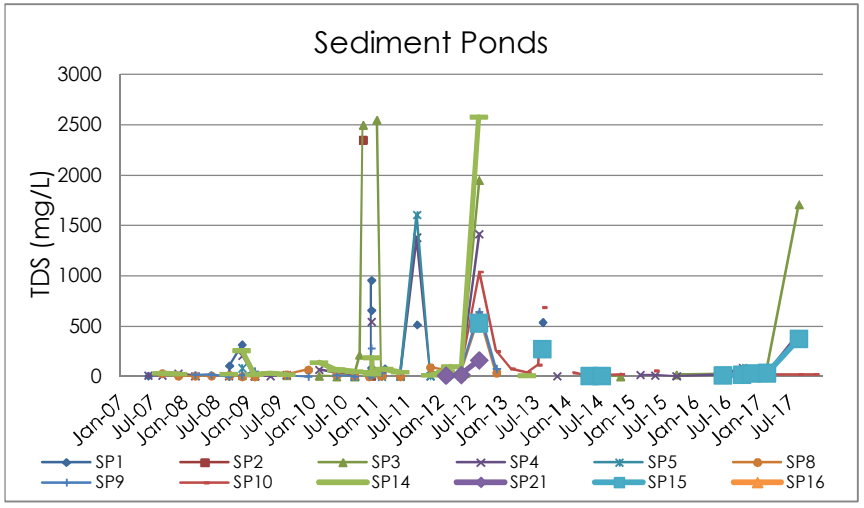

Retention Ponds
EC (uS/cm)
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Jan-05 Jul-05 Jan-06 Jul-06 Jan-07 Jul-07 Jan-08 Jul-08 Jan-09 Jul-09 Jan-10 Jul-10 Jan-11 Jul-11 Jan-12 Jul-12 Jan-13 Jul-13 Jan-14 Jul-14 Jan-15 Jul-15 Jan-16 Jul-16 Jan-17 Jul-17 Jan-18
RP1 RP2 RP3 RP4 RP5 RP6
RP7 RP8 RP09 RP10 RP11 RP12
RP13 RP15 RP17 RP19 RP20 RP21
RP22 RP23 RP24 RP25 RP26 RP27
RP28 RP29 RP30 RP31 RP32


Retention Ponds
Cu (mg/L)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Jan-07 Jul-07 Jan-08 Jul-08 Jan-09 Jul-09 Jan-10 Jul-10 Jan-11 Jul-11 Jan-12 Jul-12 Jan-13 Jul-13 Jan-14 Jul-14 Jan-15 Jul-15 Jan-16 Jul-16 Jan-17 Jul-17
RP1 RP2 RP3 RP4 RP5 RP6
RP7 RP8 RP09 RP10 RP11 RP12
RP13 RP15 RP17 RP19 RP20 RP21
RP22 RP23 RP24 RP25 RP26 RP27
RP28 RP29 RP30 RP31 RP32


Sediment Ponds
pH
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
Jan-07 Jul-07 Jan-08 Jul-08 Jan-09 Jul-09 Jan-10 Jul-10 Jan-11 Jul-11 Jan-12 Jul-12 Jan-13 Jul-13 Jan-14 Jul-14 Jan-15 Jul-15 Jan-16 Jul-16 Jan-17 Jul-17
SP1 SP2 SP3 SP4 SP5 SP8
SP9 SP10 SP14 SP21 SP15 SP16

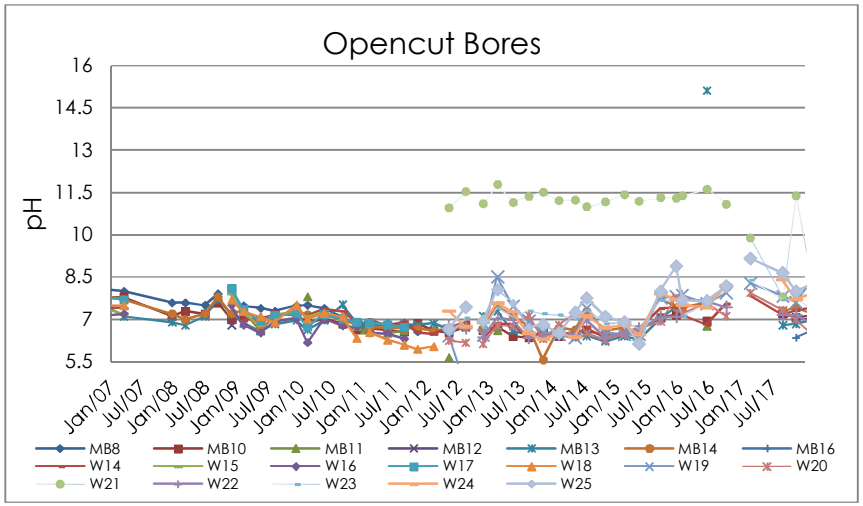

Sediment Ponds
EC (uS/cm)
25000
20000
15000
10000
5000
0
Jan-07 Jul-07 Jan-08 Jul-08 Jan-09 Jul-09 Jan-10 Jul-10 Jan-11 Jul-11 Jan-12 Jul-12 Jan-13 Jul-13 Jan-14 Jul-14 Jan-15 Jul-15 Jan-16 Jul-16 Jan-17 Jul-17
SP1 SP2 SP3 SP4 SP5 SP8
SP9 SP10 SP14 SP21 SP15 SP16

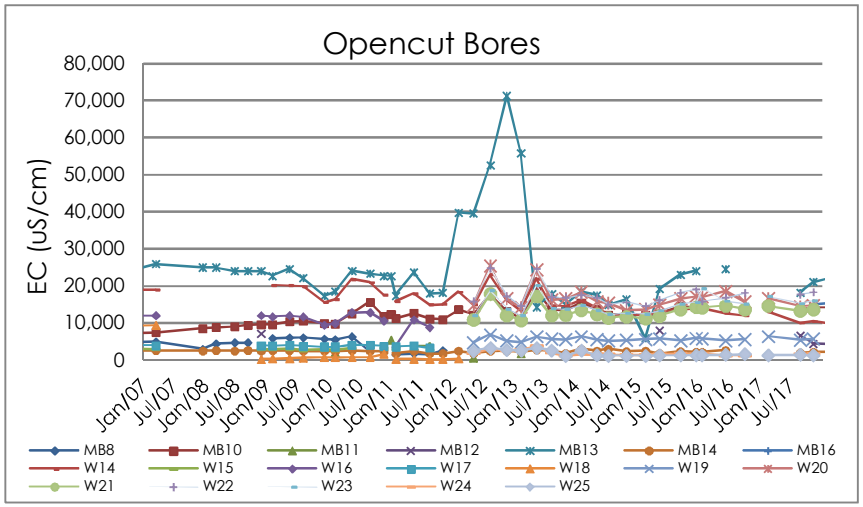

Sediment Ponds
Cu (mg/L)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Jan-07 Jul-07 Jan-08 Jul-08 Jan-09 Jul-09 Jan-10 Jul-10 Jan-11 Jul-11 Jan-12 Jul-12 Jan-13 Jul-13 Jan-14 Jul-14 Jan-15 Jul-15 Jan-16 Jul-16 Jan-17 Jul-17 Jan-18 Jul-18
SP1 SP2 SP3 SP4 SP5 SP8
SP9 SP10 SP14 SP21 SP15 SP16

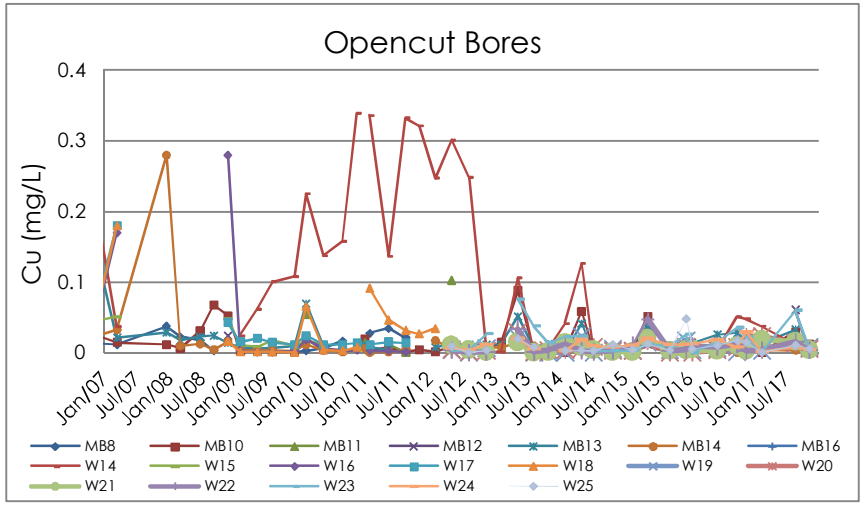

Sediment Ponds
TDS (mg/L)
3000
2500
2000
1500
1000
500
0
Jan-07 Jul-07 Jan-08 Jul-08 Jan-09 Jul-09 Jan-10 Jul-10 Jan-11 Jul-11 Jan-12 Jul-12 Jan-13 Jul-13 Jan-14 Jul-14 Jan-15 Jul-15 Jan-16 Jul-16 Jan-17 Jul-17
SP1 SP2 SP3 SP4 SP5 SP8
SP9 SP10 SP14 SP21 SP15 SP16

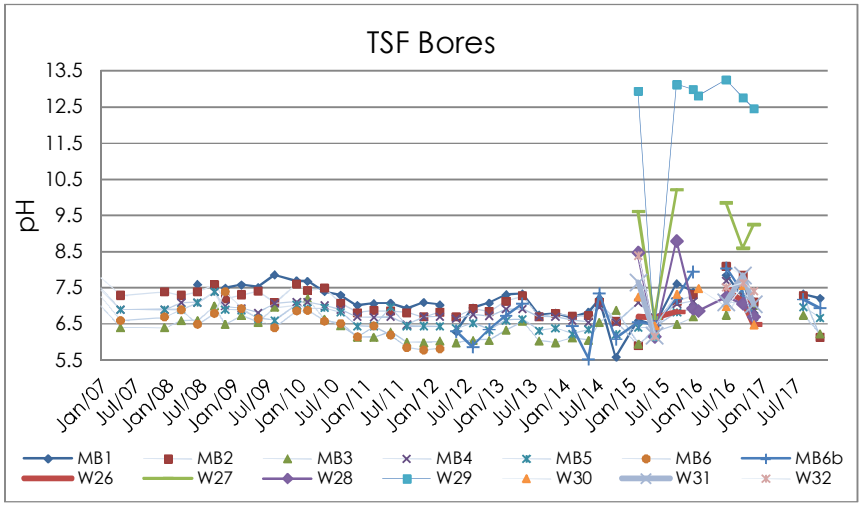
Ground water monitoring locations

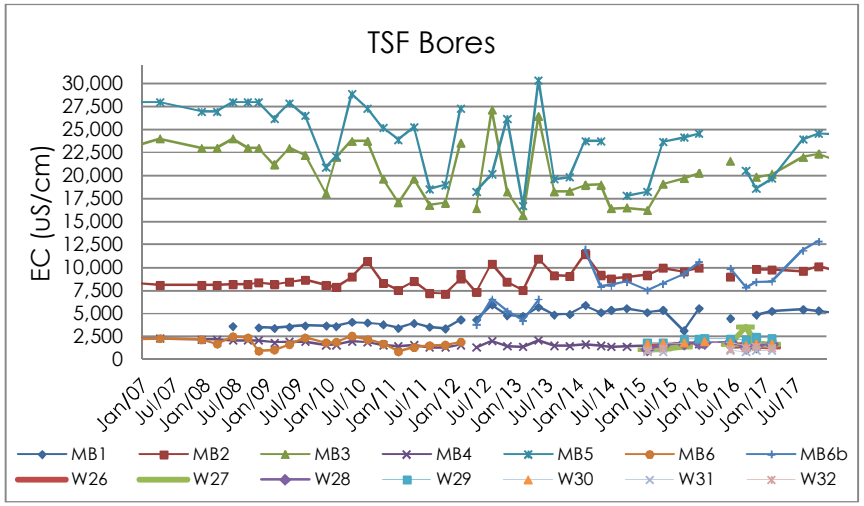
Ground water monitoring results

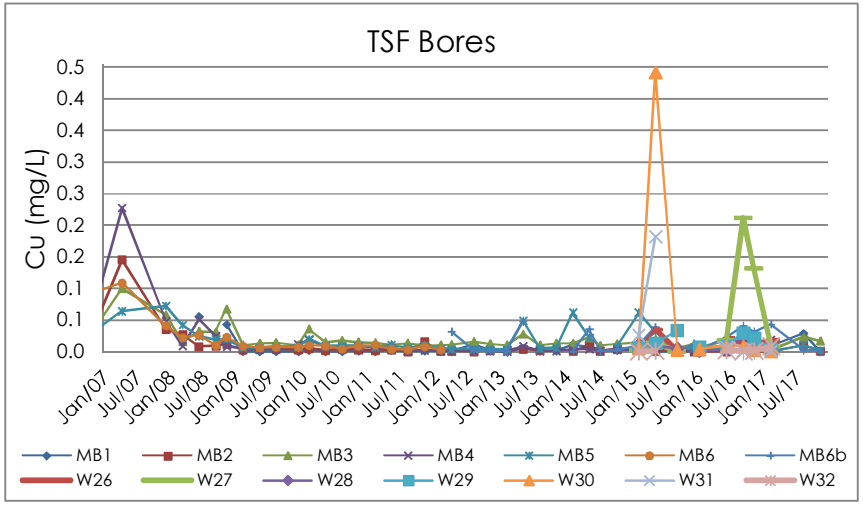


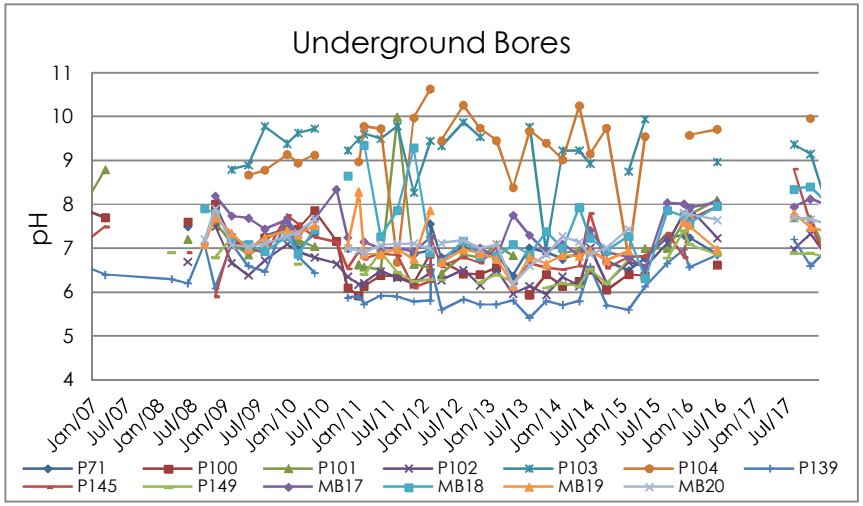


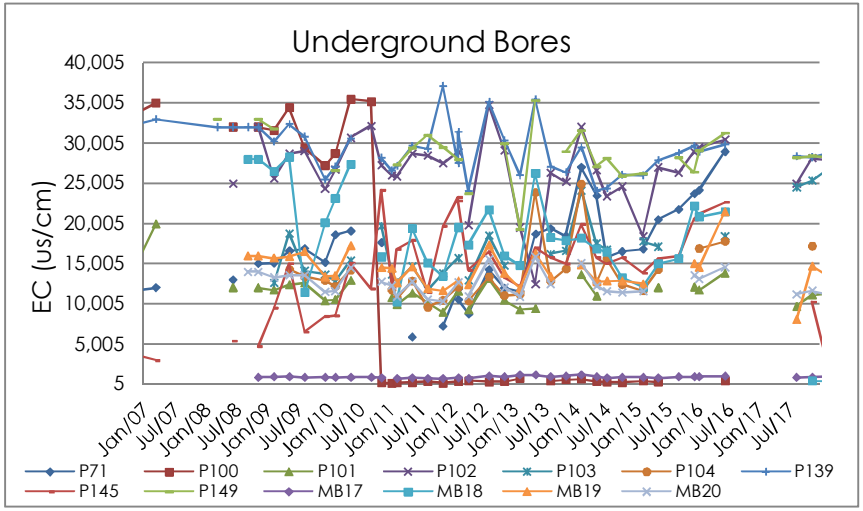


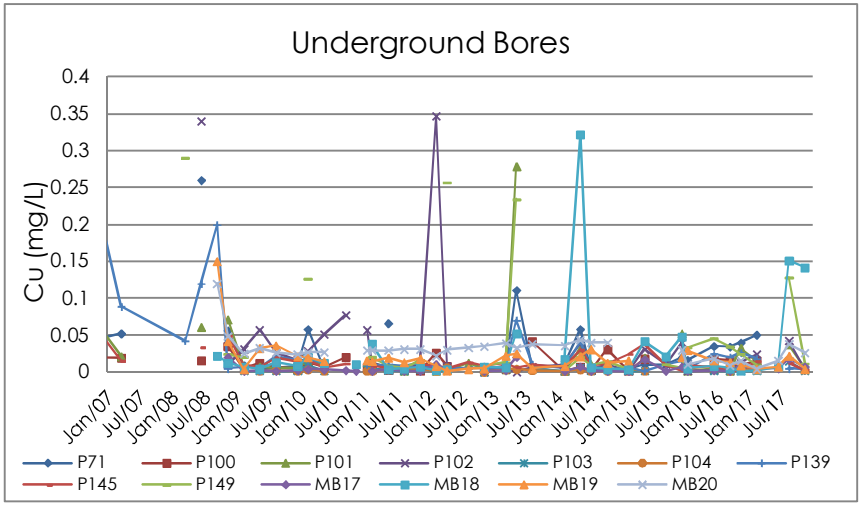

TSF Bores
pH
13.5
12.5
11.5
10.5
9.5
8.5
7.5
6.5
5.5
Jan/07 Jul/07 Jan/08 Jul/08 Jan/09 Jul/09 Jan/10 Jul/10 Jan/11 Jul/11 Jan/12 Jul/12 Jan/13 Jul/13 Jan/14 Jul/14 Jan/15 Jul/15 Jan/16 Jul/16 Jan/17 Jul/17
MB1 MB2 MB3 MB4 MB5 MB6 MB6b
W26 W27 W28 W29 W30 W31 W32

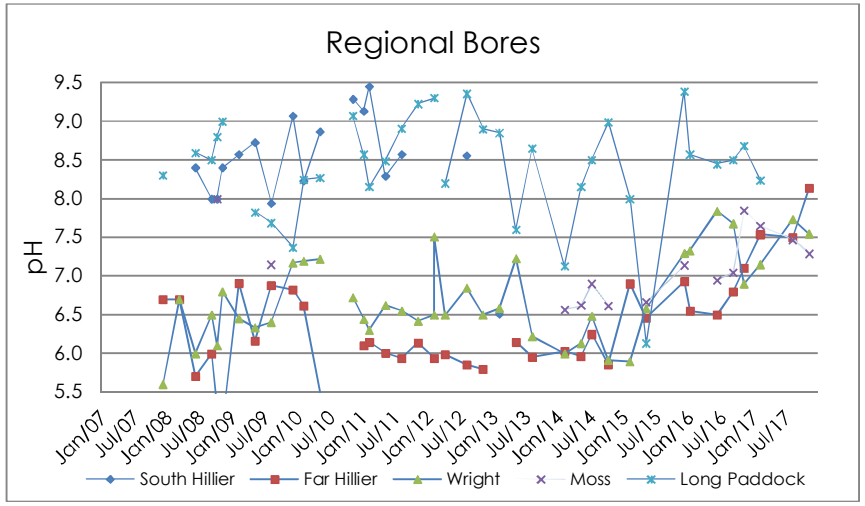

TSF Bores
EC (uS/cm)
30,000
27,500
25,000
22,500
20,000
17,500
15,000
12,500
10,000
7,500
5,000
2,500
0
Jan/07 Jul/07 Jan/08 Jul/08 Jan/09 Jul/09 Jan/10 Jul/10 Jan/11 Jul/11 Jan/12 Jul/12 Jan/13 Jul/13 Jan/14 Jul/14 Jan/15 Jul/15 Jan/16 Jul/16 Jan/17 Jul/17
MB1 MB2 MB3 MB4 MB5 MB6 MB6b
W26 W27 W28 W29 W30 W31 W32

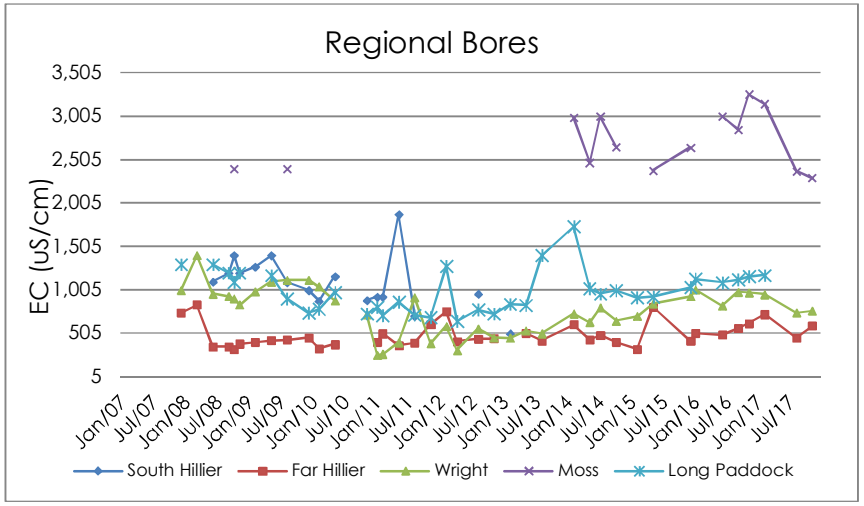

TSF Bores
Cu (mg/L)
0.5
0.4
0.4
0.3
0.3
0.2
0.2
0.1
0.1
0.0
Jan/07 Jul/07 Jan/08 Jul/08 Jan/09 Jul/09 Jan/10 Jul/10 Jan/11 Jul/11 Jan/12 Jul/12 Jan/13 Jul/13 Jan/14 Jul/14 Jan/15 Jul/15 Jan/16 Jul/16 Jan/17 Jul/17
MB1 MB2 MB3 MB4 MB5 MB6 MB6b
W26 W27 W28 W29 W30 W31 W32

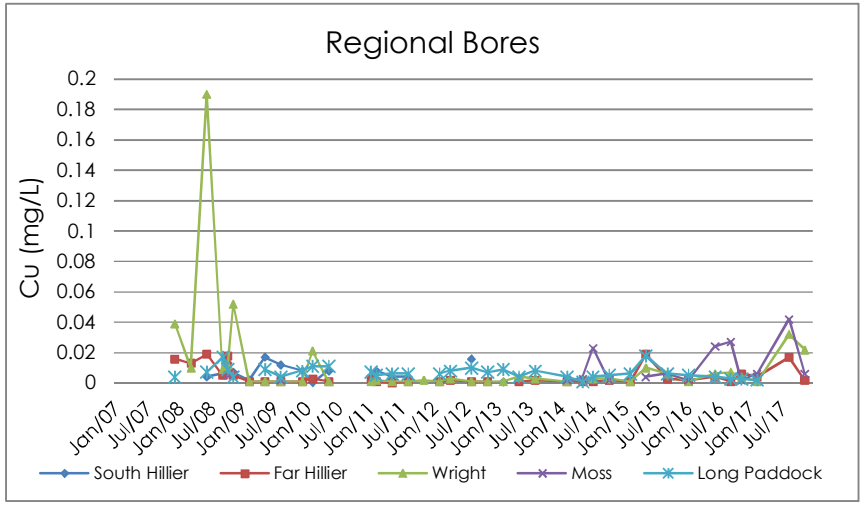

Underground Bores
pH
11
10
9
8
7
6
5
4
Jan/07 Jul/07 Jan/08 Jul/08 Jan/09 Jul/09 Jan/10 Jul/10 Jan/11 Jul/11 Jan/12 Jul/12 Jan/13 Jul/13 Jan/14 Jul/14 Jan/15 Jul/15 Jan/16 Jul/16 Jan/17 Jul/17
P71 P100 P101 P102 P103 P104 P139
P145 P149 MB17 MB18 MB19 MB20


Underground Bores
EC (us/cm)
40,005
35,005
30,005
25,005
20,005
15,005
10,005
5,005
5
Jan/07 Jul/07 Jan/08 Jul/08 Jan/09 Jul/09 Jan/10 Jul/10 Jan/11 Jul/11 Jan/12 Jul/12 Jan/13 Jul/13 Jan/14 Jul/14 Jan/15 Jul/15 Jan/16 Jul/16 Jan/17 Jul/17
P71 P100 P101 P102 P103 P104 P139
P145 P149 MB17 MB18 MB19 MB20


Underground Bores
Cu (mg/L)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Jan/07 Jul/07 Jan/08 Jul/08 Jan/09 Jul/09 Jan/10 Jul/10 Jan/11 Jul/11 Jan/12 Jul/12 Jan/13 Jul/13 Jan/14 Jul/14 Jan/15 Jul/15 Jan/16 Jul/16 Jan/17 Jul/17
P71 P100 P101 P102 P103 P104 P139
P145 P149 MB17 MB18 MB19 MB20


Regional Bores
pH
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
Jan/07 Jul/07 Jan/08 Jul/08 Jan/09 Jul/09 Jan/10 Jul/10 Jan/11 Jul/11 Jan/12 Jul/12 Jan/13 Jul/13 Jan/14 Jul/14 Jan/15 Jul/15 Jan/16 Jul/16 Jan/17 Jul/17
South Hillier
Far Hillier
Wright
Moss
Long Paddock


Regional Bores
EC (uS/cm)
3,505
3,005
2,505
2,005
1,505
1,005
505
5
Jan/07 Jul/07 Jan/08 Jul/08 Jan/09 Jul/09 Jan/10 Jul/10 Jan/11 Jul/11 Jan/12 Jul/12 Jan/13 Jul/13 Jan/14 Jul/14 Jan/15 Jul/15 Jan/16 Jul/16 Jan/17 Jul/17
South Hillier
Far Hillier
Wright
Moss
Long Paddock


Regional Bores
Cu (mg/L)
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Jan/07 Jul/07 Jan/08 Jul/08 Jan/09 Jul/09 Jan/10 Jul/10 Jan/11 Jul/11 Jan/12 Jul/12 Jan/13 Jul/13 Jan/14 Jul/14 Jan/15 Jul/15 Jan/16 Jul/16 Jan/17 Jul/17
South Hillier
Far Hillier
Wright
Moss
Long Paddock