

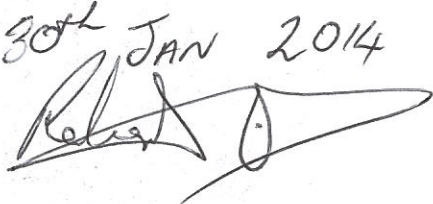
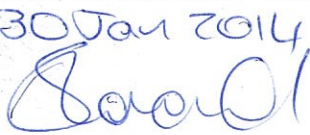


Northparkes Mines

Annual Environmental Management Report

January 2013 – December 2013

Name of Mine	Northparkes Mines
Name of Leaseholder and Mine Operator	North Mining Limited
Mining Leases	ML 1247, ML 1367 and 1641
Environment Protection Licence	EPL 4784
Development Consent	DC 06-0026, including Mod 1 and Mod 2
MOP Commencement Date	1 st July 2011
MOP Completion Date	30 th June 2015
AEMR Commencement Date	1 st January 2013
AEMR Completion Date	31 st December 2013

Reviewed by	
Title	Robert Cunningham, HSEF Manager
Date	30 th JAN 2014
Signature	
Approved by	
Title	Stefanie Loader, General Manager
Date	30 Jan 2014
Signature	

Year in Review 2013



	2012 (actual)	2013 (actual)	2014 (forecast)
<hr/>			
General			
Government fines	0	0	0
Reportable incidents	6	9	0
Legal compliance	✓	✓	✓
ISO 14001 certification	✓	✓	✓
<hr/>			
Mining			
Copper concentrate production (t)	155,841	168,282	170,078
F/T employment level	356	310	310
Total land clearance (ha)	7.44	2.09	160
Total land rehabilitation (ha)	4.2	0.87	0.43
<hr/>			
Community			
Complaints	10	8	0
Main complaint issue	Traffic/Dust	Dust	—
CCC meetings	2	2	2
Investments (\$)	732,750	480,000	553,150
<hr/>			



Contents page

Introduction	8
1. Introduction	8
1.1 Scope	8
1.1.1 Location, history and process overview	9
1.1.2 Site Layout and Infrastructure	11
1.2 Contents, leases and licences	13
1.2.1 Amendments over the reporting period	15
1.2.1.1 Development Consent	15
1.2.1.2 Mining Operations Plan	15
1.2.1.3 Environmental Protection Licence	15
1.2.1.4 Occupation Permit	16
1.3 Mine Contacts	16
1.4 Actions Required at Previous AEMR Review	16
Operations During The Reporting Period	17
2. Brief Summary on key outcomes/achievements	17
2.1 Exploration and Resource Utilisation	17
2.2 Mining and Development	18
2.3 Ore Processing	19
2.4 Employment Levels	19
Environmental Management and Performance	21
3. Environment and Community Team	21
3.1 Environmental Management System	21
3.2 Reportable Environmental Incidents	22
3.3 Meteorology	24
3.3.1 Monitoring	24
3.3.2 Management	24
3.3.3 Results	24
3.3.4 Actions Proposed for 2014	27



3.4	Air Quality	27
3.4.1	Monitoring	27
3.4.2	Straw Bale Deposition Trial on Tailings Dam 1	29
3.4.3	Management	29
3.4.4	Results	29
3.4.5	Actions Proposed for 2014	36
3.5	Noise	36
3.5.1	Monitoring	36
3.5.2	Management	38
3.5.3	Results	39
3.5.4	Actions Proposed for 2014	39
3.6	Blasting	40
3.6.1	Monitoring	40
3.6.2	Management	40
3.6.3	Results	40
3.6.4	Actions Proposed for 2014	40
3.7	Water	41
3.7.1	Monitoring	41
3.7.2	Management	46
3.7.3	Results	47
3.7.4	Actions Proposed for 2014	49
3.8	Land Management and Rehabilitation	49
3.8.1	Monitoring	49
3.8.2	Management	52
3.8.3	Results	56
3.8.3.1	Woodland Revegetation Sites	56
3.8.3.2	Grassland Revegetation Sites	59
3.8.3.3	Estcourt Biodiversity Offset site/Other Projects	67
3.8.3.4	Land Disturbance and Pre-clearing Survey	72
3.8.3.5	Revegetation and Rehabilitation	72
3.8.4	Actions Proposed for 2014	72
3.9	Waste and Hazardous Material Management	72



3.9.1 Monitoring	72
3.9.2 Management	72
3.9.3 Results	73
3.9.4 Actions Proposed for 2014	74
3.10 Tailings and Mineral Waste	74
3.10.1 Management	75
3.10.2 Monitoring	77
3.10.3 Results	78
3.10.4 Actions Proposed for 2014	79
3.11 Greenhouse Gas and Energy	79
3.11.1 Monitoring	79
3.11.2 Management	79
3.11.3 Results	81
3.11.4 Actions Proposed for 2014	81
3.12 Cultural heritage	82
3.12.1 Monitoring	82
3.12.2 Management	84
3.12.3 Results	84
3.12.4 Actions Proposed for 2014	84
Community Relations	85
4. Community engagement	85
4.1 Participation	86
4.2 Contributions and achievements	86
4.3 Complaints	87
4.3.1 Management	87
Compliance Review	90
5. Overview	90
6. Monitoring	90
6.1 Results	90
6.1.1 Government Inspections	90
6.1.2 Non-Compliances	90

List of figures

Figure 1: Regional Proximity.....	10
Figure 2: Operational Layout.....	12
Figure 3: Cross-section showing the zones of mineralisation in relation to existing and proposed mine infrastructure	17
Figure 4: Block Cave Mining Method (schematic).....	18
Figure 5: Employment Levels at NPM.....	20
Figure 6: Temperature and Evaporation Summary	25
Figure 7: Windrose	26
Figure 8: Air Quality Monitoring Locations.....	28
Figure 9: PM ₁₀ Results for 'Hubberstone'	32
Figure 10: PM ₁₀ Results for 'Milpose'	32
Figure 11: Depositional Dust Annual Average	33
Figure 12: Noise monitoring locations	38
Figure 13: Surface water Monitoring Locations.....	43
Figure 14: Groundwater Monitoring Locations.....	44
Figure 15: Locations of rehabilitation and reference monitoring sites.....	51
Figure 16: Existing Ore and Waste Rock Dump and Stockpile Locations.....	75
Figure 17: Aboriginal Cultural Heritage Sensitivity Zones	83



List of tables

Table 1: Main Statutory Approvals as at the end of the reporting period	13
Table 2: Actions Required from 2012 AEMR Review	16
Table 3: Ore Processing Production	19
Table 4: 2013 Reportable Incidents	22
Table 5: Rainfall Summary	25
Table 6: Summary of depositional dust investigations	31
Table 7: Surface Water Monitoring Program	45
Table 8: Ground Water Monitoring Program	45
Table 9: Reporting Period Water Balance	49
Table 10: Three Year Rehabilitation Plan	54
Table 11: Key for Table 12 and Table 13	61
Table 12: Performance of Woodland Rehabilitation Monitoring Sites (from Appendix 14)	62
Table 13: Performance of Grassland Rehabilitation Monitoring Sites (from Appendix 14)	65
Table 14: Key for Table 15.	68
Table 15: Performance of Estcourt offset site (from Appendix 15)	69
Table 16: Energy and Greenhouse Performance Summary	81
Table 17: Complaints Received in 2013	88

Introduction

A summary of Northparkes Mines operations, setting and localised weather conditions experienced during the reporting quarter.

1. Introduction

1.1 Scope

The Annual Environmental Management Report (AEMR) details the environmental performance of Northparkes Mines (NPM) from 1 January 2013 – 31 December of 2013 and outlines proposed actions for the next reporting period. The AEMR applies to NPM's activities being undertaken on Mining Leases (ML) 1247, 1367, 1641 and Goonumbla Rail Siding.

The AEMR has been prepared in accordance with the NSW Department of Trade & Investment (DTI) "ESG3: Mining Operations Plan (MOP) Guidelines September 2013" and Development Consent (DC 06-0026) Schedule 4, Condition 4 which states:

"Within 12 months of this approval, and annually thereafter, the Proponent shall submit an AEMR to the Director-General and to all relevant agencies."

Compliance against conditions state in Development Consent 06-0026, including Modification 1 and Modification 2 (DC 06-0026) (Appendix 1) are required to be reported in the AEMR and are therefore included in this document.

NPM recognise the importance of stakeholders and therefore values the development of positive relationships to aid continual improvement of its environmental management practice. This report is provided to the following stakeholders:

- Department of Trade and Investment (DTI);
- Department of Planning and Infrastructure (DPI);
- Parkes Shire Council (PSC);
- NSW Office of Environment and Heritage (OEH);
- NSW EPA (EPA);
- Peak Hill Local Aboriginal Land Council (PHLALC);
- Wiradjuri Council of Elders (WCE);
- Southern Cross Landholders;
- Local Community Representative;
- Northparkes Community Consultative Committee; and
- General public (available at www.northparkes.com.au).



1.1.1 Location, history and process overview

NPM copper-gold mine is located 27 kilometres north north-west of the town of Parkes in central west New South Wales, Australia (Figure 1). On 1st December 2013, Rio Tinto Limited divested its 80% interest in NPM to China Molybdenum Pty Limited (CMOC). The NPM business continues to run under a joint venture arrangement, with the remaining 20% share owned by the Sumitomo Group.

Majority of the NPM 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. It is primarily a farming based community with other industries such as transport and mining bringing economic diversity.

NPM 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. NPM was the first Australian mine to use block caving as its mining method.

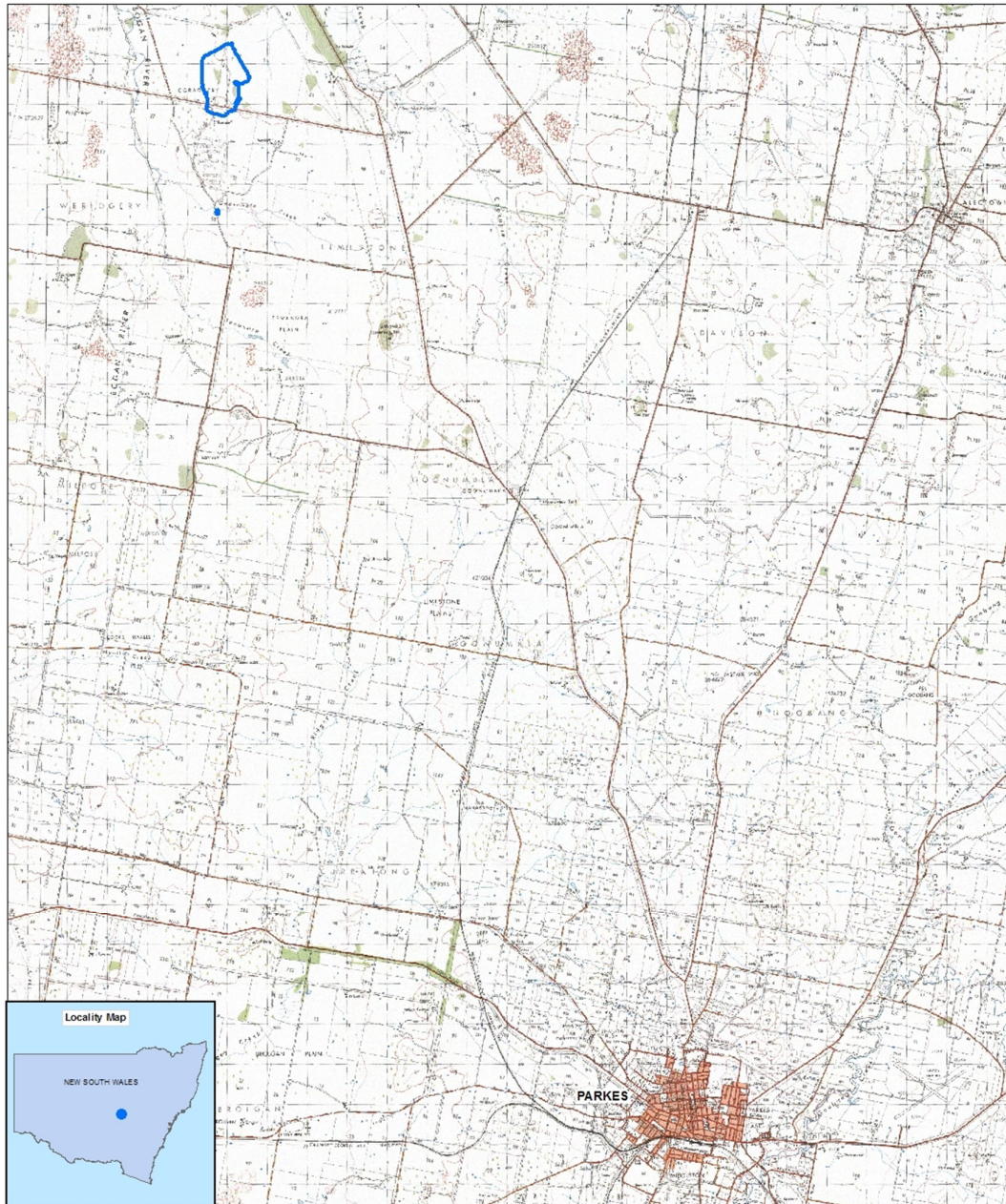
Mining of the E26 orebody occurred in two stages, Lift 1 and Lift 2 with an extension to the north as grades permitted. Production in E26 ended in 2007 with the E48 orebody in full production from 2008.

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 and loaded into sealed containers where it is transported to Port Kembla from Goonumbla Rail Siding. By products from the ore processing facility is stored in the onsite Tailings Storage Facilities.

A significant exploration and evaluation program for additional ore reserves has resulted in the submission of an extensive Environmental Assessment for a significant capital project to extend mine life from 2025 to 2032, including closure.

In addition to mine and mineral process activities, NPM farm the bulk of its 6,481 ha landholding, including a significant portion of the 3,400 ha within its three existing mining leases. The land is farmed using best practice conservation farming methods developed and adopted to maximise productivity and quality, whilst conserving water and soils.

Figure 1: Regional Proximity





1.1.2 Site Layout and Infrastructure

Surface infrastructure and operation layout is shown in Figure 2. Onsite infrastructure includes:

- Two former open cut pits E22 and E27, surrounded by ore stockpiles, waste rock dumps and a sound bund.
- Tailings Storage Facilities (TSFs): TSF1, TSF2 and Estcourt.
- The E26 and E48 underground block cave mine and resultant surface subsidence zone.
- 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, ventilation fans, transfer and overland conveyor, mining offices and contractor laydown areas.
- Marginal ore stockpiles, waste rock dumps 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 building 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 fuel dispensing facilities and portable amenities.
- Farm infrastructure includes bulk storage sheds, workshop and grain silos.

Figure 2: Operational Layout



Legend

- Site Boundary
- NPM - Landswap Area

1.2 Contents, leases and licences

NPM has a large number of statutory approvals and associated legal obligations that regulate its mining and related activities onsite. The status of NPM main statutory approvals are listed in Table 1.

Leases and licences were recently transferred as part of the transfer in ownership. Further discussion of NPM compliance with its legal requirements is outlined in Section 5.

Table 1: Main Statutory Approvals as at the end of the reporting period

Approval No.	Description	Issue Date	Expiry Date
ML 1247	Mining Lease	27/11/1991	26/11/2033
ML1367	Mining Lease	21/03/1995	26/11/2029
ML 1641	Mining Lease	25/03/2010	25/03/2031
EL 5800	Exploration Lease	08/01/2001	08/02/2015
EL 5801	Exploration Lease	08/01/2001	07/01/2014
EL 5323	Exploration Lease	18/07/1997	17/07/2013
DC 06-0026	Development Consent, including	28/02/2007	31/12/2025
	Modification 1	6/10/2009	
	Modification 2	28/10/2009	
N/A	PSC Approval for Road Train Access on Bogan Road	20/07/2010	-
EPL 4784	Environmental Protection Licence	30/05/2012	30 May (Anniversary)
NDG029083	Dangerous Goods Notification	-	27/06/2014
XSTR100194	Licence to Store (Explosives & SSDS)	10/12/2012	26/11/2017
DA2009/0057	Development Consent (Forbes water pipeline)	19/03/2009	19/03/2014
HD 48307	Limestone State Forest Occupation Permit	24/09/2009	31/12/2014
RML 70037	Radiation Management Licence	11/11/2013	10/11/2014
RL 43053	Radiation Licence for use of portable X-ray fluorescence XRF radiation apparatus		06/02/2014
RL 43056	Radiation Licence for use of portable X-ray fluorescence XRF radiation apparatus		06/02/2014
HD48307	Limestone National Forest Occupation Permit	01/01/2009	31/12/2014
80BL244990	Bore Licence (monitoring)	16-Jul-2008	Perpetuity
80BL244991	Bore Licence (monitoring)	16-Jul-2008	Perpetuity
80BL244992	Bore Licence (monitoring)	17-Jul-2008	Perpetuity



80BL620201	Bore Licence (monitoring)	9-Sep-2011	Perpetuity
80BL620202	Bore Licence (monitoring)	9-Sep-2011	Perpetuity
80BL620200	Bore Licence (monitoring)	7-Sep-2011	Perpetuity
80BL620203	Bore Licence (monitoring)	9-Sep-2011	Perpetuity
70AL600028 (WAL8241 GZQ4-IA-TVXK)	Bore Licence (river licence)	13-Jun-2008	
70BL226550	Bore Licence (, water use = mining (low security), irrigation, stock, domestic)	1-Jul-2008	30-Jun-2013
70BL226584	Bore Licence (mining)	27-May-2008	26-May-2013
70BL229975	Bore Licence (stock and domestic)	26-Jul-2004	Perpetuity
70BL230929	Bore Licence (irrigation and mining)	10-Jul-2009	9-Jul-2014
80BL245448	Bore Licence (mining)	18-Jan-2010	17-Jan-2015
80BL245449	Bore Licence (mining)	18-Jan-2010	17-Jan-2015
70CA600376	License Water Access		1-Jan-2100
70CA600853	License Water Access		1-Jan-2100
70CA600502	License Water Access		30-Jul-2017
70CA613780	License Water Access		13-Sep-2015
70WA600026	License Water Access		1-Jul-2024
70CA613868	License Water Access		13-Sep-2022
70CA613874	License Water Access		13-Sep-2015
70CA613936	License Water Access	14-Sep-2012	13-Sep-2015
70WA600026	License Water Access		1-Jul-2024
80WA718412	License Water Access		3-Oct-2015
70CA613702	License Water Access		13-Sep-2015

70AL603276	License Water Access	4-Jul-2013	1-Jan-2100
70AL600501	License Water Access	4-Jul-2013	1-Jan-2100
70AL613779	License Water Access	4-Jul-2013	1-Jan-2100
70AL614065	License Water Access	4-Jul-2013	1-Jan-2100
70AL613873	License Water Access	4-Jul-2013	1-Jan-2100
70AL613867	License Water Access	4-Jul-2013	1-Jan-2100
70AL613935	License Water Access	4-Jul-2013	1-Jan-2100
70AL613801	License Water Access	4-Jul-2013	1-Jan-2100
70AL613701	License Water Access	4-Jul-2013	1-Jan-2100
70AL613937	License Water Access	4-Jul-2013	1-Jan-2100
80AL718411	License Water Access	4-Jul-2013	1-Jan-2100
70AL600852	License Water Access	4-Jul-2013	1-Jan-2100
70AL600028	License Water Access	4-Jul-2013	1-Jan-2100
70AL603027	License Water Access	4-Jul-2013	1-Jan-2100
80BL245450	Bore Licence	18-Jan-2010	17-Jan-2015

All licences are in the process of being renewed under new ownership.

1.2.1 Amendments over the reporting period

1.2.1.1 Development Consent

No applications or modifications of the existing Development Consent 06-0026 were submitted or granted by, the NSW DPI the current reporting period.

An Environmental Assessment was submitted for the Step Change Mine Life Extension Project during the reporting period for the development of other copper resources.

1.2.1.2 Mining Operations Plan

There were no modifications to the 2011 -2015 Mining Operations Plan (MOP) for Mining Leases 1247, 1367 and 1641 in the current reporting period. The MOP is to be reviewed in the next reporting period to reflect the mine plan associated with the Step Change Mine Life Extension Project.

1.2.1.3 Environmental Protection Licence

An Annual Return for the reporting period was submitted to EPA by 31st July of the current reporting period in accordance with requirements under Environment Protection Licence (EPL) 4784 Condition R1.1.



EPL transfer application was received and approved by EPA on 20th November 2013. An Annual Return for the time period that Rio Tinto was in ownership was completed and submitted in December, 2013.

1.2.1.4 Occupation Permit

There were no applications submitted to, or granted by, the Forests NSW to modify the existing Limestone National Forest Occupation Permit in the current reporting period.

1.3 Mine Contacts

Contact details for the current Managing Director and Environmental personnel at NPM are:

Stefanie Loader General Manager

Phone: 02 6861 3000

Email: stefanie.loader@northparkes.com

Robert Cunningham Manager - Health, Safety, Environment, and Farms

Phone: 02 6861 3280

Email: rob.cunningham@northparkes.com

1.4 Actions Required at Previous AEMR Review

Table 2: Actions Required from 2012 AEMR Review

Issue	Action Required	Where Addressed within AEMR
Dust Management on TSF1	Status and management of dust lift off from TSF1 to remain a focus of the operation.	Section 3.4.2
Water data – inclusion of extraction figures per licence	Parkes Shire Council (PSC) keep the record of extraction figures from the bores. NPM receives town water from PSC which may contain both bore and river water through one main. Going forward NPM will request PSC to provide the extraction data for future AMER reporting.	N/A
Water data – water balance to included predicted usage from various sources	The water balance does not have the compatibility to predict water usage from various sources.	N/A
Water licences – amend to suit change in licence	Update of water licences to suit legislation changes will be undertaken in 2014.	N/A
Water data – separate fresh water from recycled water usage onsite	The freshwater and recycled water usage onsite are separated and presented in Table 9	Section 3.7.3
Communications	All communications to go to the Dubbo office.	N/A

Operations During The Reporting Period

2. Brief Summary on key outcomes/achievements

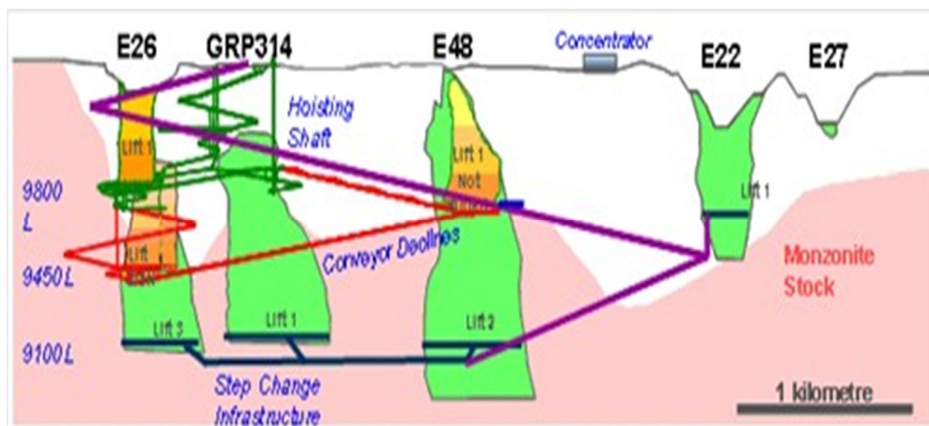
Reporting period summary:

- 6.01 million tonnes of ore milled
- 168,282 tonnes of copper concentrate produced
- Tunnel boring system tested during reporting period.

2.1 Exploration and Resource Utilisation

Exploration and evaluation programs continued in the current reporting period, on both the mining and exploration leases. Mining lease evaluation under the pre-feasibility mine expansion study termed “Step Change Project” (SCP) was completed during the reporting period. The SCP Pre-Feasibility Study evaluated the potential for further underground mining and processing operations based on a series of large tonnage, low-grade areas of mineralisation within the existing mine leases. The ore bodies are identified in Figure 3.

Figure 3: Cross-section showing the zones of mineralisation in relation to existing and proposed mine infrastructure



The SCP failed to be economically viable under market conditions at the time; however the mine will continue to benefit from the work completed under the project, specifically 196 km of mainly underground diamond drilling to define the areas of mineralisation. At the conclusion of the SCP, Rio Tinto sold its 80% interest in Northparkes Mines to CMOC Mining Pty.

The Tunnel Boring System (TBS) was tested during the reporting period, as a means of more efficiently excavating underground tunnels as opposed to conventional drill and blast development. The project suffered some setbacks, and the program was terminated at the time of sale.

Exploration activities during the period included aircore drilling, reverse circulation (RC) and diamond drilling programs. A total of 18,356.4 m of surface drilling was completed during the

reporting period. NPM is committed to identifying and evaluating new ore bodies with the intention extending the NPM mine life.

Exploration and evaluation activities will continue in the next reporting period. Focus is aimed at further evaluating ore body knowledge. A sitewide geophysical inversion project, as well as the current RC and diamond drilling programs will continue on both mining leases and exploration licences.

2.2 Mining and Development

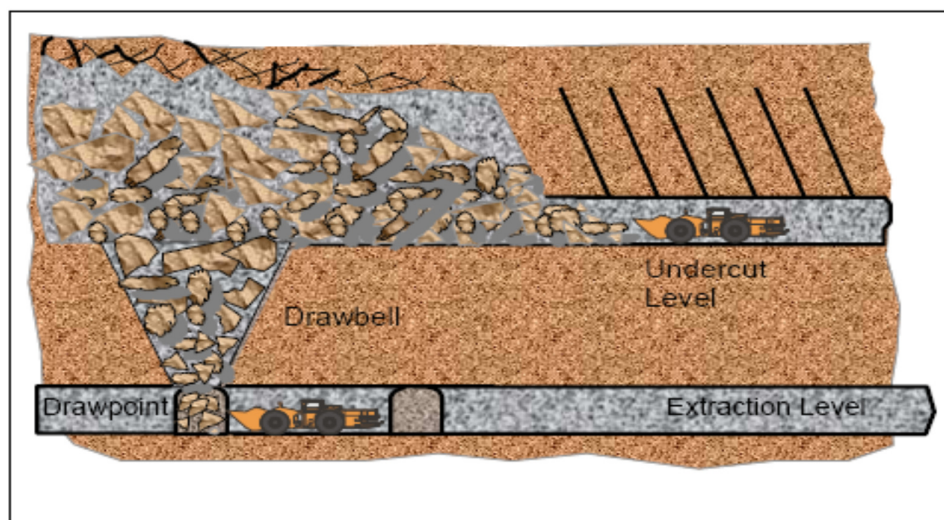
Open cut

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

Underground Operations

Underground mining activities are currently undertaken in ore body E48 using block caving methods. A schematic of the underground mining section is seen in Figure 4. During the previous reporting periods, the E48 mine experienced higher than expected convergence rates which resulted in a destabilisation of underground mine infrastructure. A rehabilitation project commenced to reduce convergence, improve cave integrity and enable continued production from these drives. During the current reporting period, convergence was stabilised and redevelopment took place with notable success. From December 2013 all previously destabilised drives were re-opened. Currently four drawpoints are up and operational, with six more drawpoints to be reopened.

Figure 4: Block Cave Mining Method (schematic)



Automation (remote operation of underground load, haul and dump machinery) continued in the reporting period at an average of 60% automation level, with the intent of achieving full



automation of underground mine operations. This reporting period saw 10 consecutive shifts of greater than 80% of tonnes through automation. Overall automation rates averaged 60% tonnes through automation. There are six electric powered loaders as the primary production fleet which provide many benefits over conventional diesel powered loaders, most notably reduced maintenance costs, longer equipment life and a significant reduction in carbon emissions.

2.3 Ore Processing

A total of 6.01 Mt of sulphide ore was processed in 2013 from E48 underground ore body. Copper-gold concentrate production totalled 168,282 tonnes. Sale of this product was predominantly to customers in China and Japan.

Table 3: Ore Processing Production

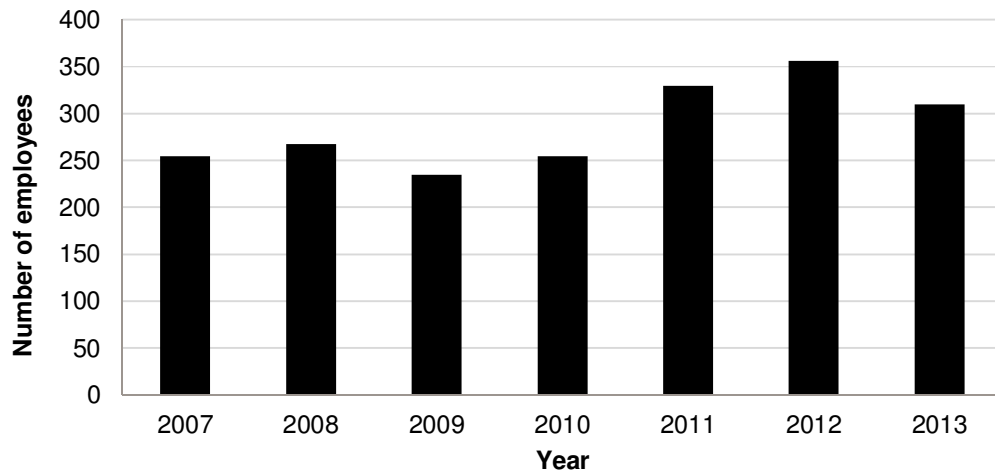
Year	Ore Milled (Mt)	Production	
		Copper Concentrate (t)	Gold (oz)
2009	5.55	98,517	34,254
2010	5.25	116,056	65,279
2011	5.52	146,625	76,004
2012	5.65	155,838	71,799
2013 (actual)	6.01	168,282	67,162
2014 (forecast)	6.41	170,078	59,545

2.4 Employment Levels

Full time permanent employees decreased to 310 in the current reporting period from 356 in the previous reporting period (Figure 5). This decrease reflects the close out of the Step Change Project and right-sizing of the business. NPM continues to employ a large number of contractors, to supplement the permanent workforce.



Figure 5: Employment Levels at NPM



Environmental Management and Performance

3. Environment and Community Team

NPM 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 is a part of the NPM Health, Safety, Environmental and Farms (HSEF) department.

The HSEF policy (Appendix 2) is a part of the developed and implemented Health, Safety, Environment and Quality Management System (HSEQ MS) based on the CMOC HSEQ MS Standard for all of its global operations. This is certified to ISO14001 and audited on an annual basis.

Team members of the Environment team include the following roles:

- Manager – Health, Safety, Environment and Farm (HSEF);
- Superintendent – Environment & Health;
- Senior Environment Advisor;
- Environment Advisor;
- Environment and Health Advisor; and
- Environment and Health Technician.

3.1 Environmental Management System

NPM develop, implement and maintain an ISO 14001 certified HSEQ MS. The HSEQ MS encourages a rigorous and consistent approach to managing and improving its environmental performance across all of its mining and related activities.

The HSEQ MS outlines minimum standards to encourage continual improvement in HSEQ performance. The operational management component of the management system is underpinned by NPM's safety, health and environmental performance standards. NPM's Conformance Audit and ISO 14001 Re-certification Audit were conducted in the reporting period. The purpose of the audit is to assess NPM's alignment with its HSE management system standards, as well as the effectiveness of the NPM HSEQ MS. The audit identified five major non-conformances, 35 minor non-conformances against the Rio Tinto HSE Performance Standards. Against the ISO 14001 criteria there were zero major non-conformances and three minor non-conformances identified against the ISO 14001 Management System.

3.2 Reportable Environmental Incidents

During the reporting period, NPM had nine reportable environmental incidents.

Table 4 provides information on these incidents.

Formal incident notifications summarising the incident details, likely cause/s, actions taken to date and additional proposed measures were submitted to the DEH and other relevant government agencies in accordance with NPM reporting procedures.

Table 4: 2013 Reportable Incidents

Incident No.	Date	Details
1000200825	09 February 2013	<p>PM₁₀ 24 hour average result (87.3 ug/m³) for "Milpose" monitoring location exceeded the 24 hour performance criteria (50 ug/m³) set out in Development Consent 06-0026. The result did not cause an exceedance of the annual average limit. An investigation was undertaken immediately to determine the likely cause of the exceedance.</p> <p>The investigation concluded that the prevailing wind direction was primary from the North West, the direction from the shearing shed toward the PM₁₀ dust monitor location and away from Northparkes mines. Field notes indicate the presence of sheep activity in the nearby paddock. The monitoring cycle occurred on the 11th day without rain; rainfall occurred subsequent to this monitoring result, and under similar field observations (sheep in nearby paddock) PM₁₀ concentrations were considerably lower</p>
1000203946	17 th March	<p>The PM₁₀ High Volume Air Sampler result for the month of March was received on the 10th April 2013. Upon review of results, it was identified that the recorded PM₁₀ value for the 24-hour monitoring cycle on the 17th March 2013 for Milpose was 61.7 ug/m³. This exceeded the 24hr performance criteria (50 ug/m³) set out in Development Consent 06-0026. An investigation was undertaken immediately to determine the likely cause of the exceedance.</p> <p>The investigation concluded that the prevailing wind direction was towards the Mine Lease from the monitor location. Field notes indicate dry conditions with sheep movement in the yard. A review of the monitoring data indicates that the elevated results were localised to the Milpose location.</p>
1000225341	04 May 2013	<p>PM₁₀ 24 hour average result (50.1 ug/m³) for "Milpose" monitoring location exceeded the 24 hour performance criteria (50 ug/m³) set out in Development Consent 06-0026. The result did not cause an exceedance of the annual average limit. An investigation was undertaken immediately to determine the likely cause of the exceedance.</p> <p>The investigation concluded that the prevailing wind direction was towards the Mine Lease from the monitor location. A review of the monitoring data indicates that the elevated result was localised to the Milpose farm. Other PM₁₀ monitoring events in the month of May had a lower recorded value and Depositional Dust results recorded lower values toward the Mine Lease boundary whilst high results were localised to the Milpose location.</p>



Incident No.	Date	Details
1000232626	9 September 2013	<p>On 9th September 2013, the Environment Department was notified by the NSW EPA that it had received a dust related complaint. It is assumed that this is in relation to dust lift off from the tailings storage facility. An investigation was undertaken immediately to determine the likely cause of the non-compliance. Conditions for the day were noted as posing a high dust risk. Deposition of tailings slurry onto TSF2 commenced at the beginning of September in anticipation, until a line failure caused delays. Several management strategies were agreed upon including covering TSF1, which lead to the straw-bale project and purchasing an irrigator for the TSF surfaces.</p>
1000250475	10 October 2013	<p>On 10th October 2013, the Environment Department was notified by the NSW EPA that it had received a dust related complaint. It is assumed that this is in relation to dust lift off from the tailings storage facility. An investigation was undertaken immediately to determine the likely cause of the non-compliance.</p> <p>It was concluded that the prevailing wind direction was primarily from the North-East, with wind speeds of up to 10.9 m/s. The prevailing wind direction suggests that the primary receiver of any emissions would be NPM landholdings associated with ML1367.</p>
1000250829	01 October 2013	<p>On 1st October 2013, the Environment Department was notified by the NSW EPA that it had received a dust related complaint. It is assumed that this is in relation to dust lift off from the tailings storage facility. An investigation was undertaken immediately to determine the likely cause of the non-compliance.</p> <p>The investigation revealed that the prevailing wind direction was from a North-North Westerly direction with wind speeds ranging between 7 m/s and 12 m/s.</p>
1000252306	13 October 2013	<p>PM₁₀ 24 hour average result (122 ug/m³) for "Milpose" monitoring location exceeded the 24 hour performance criteria (50 ug/m³) set out in Development Consent 06-0026. The result did not cause an exceedence of the annual average limit. An investigation was undertaken immediately to determine the likely cause of the exceedence.</p> <p>The investigation concluded that the prevailing wind direction was primarily from the West, towards the Mine Lease from the monitor location. A review of the monitoring data indicates that the elevated result was localised conditions in the vicinity of the sampler.</p>
1000252307	13 October 2013	<p>PM₁₀ 24 hour average result (99.2 ug/m³) for "Hubberstone" monitoring location exceeded the 24 hour performance criteria (50 ug/m³) set out in Development Consent 06-0026. The result did not cause an exceedence of the annual average limit. An investigation was undertaken immediately to determine the likely cause of the exceedence.</p> <p>The investigation concluded that the wind monitoring data from the 13th October 2013 indicated that the prevalent winds were from the South West (29%) and North West (29%). Secondary winds were experienced from the West (13%) and South (11%). The average wind speed for the 24h time period was 5.33 m/s. Calm winds were present 3.13% of the time.</p> <p>Field notes indicate the sample contained a moderate to heavy loading of grey coloured dust and the colouration of the dust in association with the strong south westerly winds, some exceeding 11.1 m/s, are indicative of contribution from Northparkes operations</p>



Incident No.	Date	Details
	06 November 2013	<p>PM₁₀ 24h average result (72.4 µg/m³) for Milpose monitoring location exceeded the 24 hour performance criteria (50 µg/m³) set in the Development Consent 06-0026. The result did not cause an exceedance of the annual average limit. An investigation was undertaken to determine the likely cause of the exceedance.</p> <p>An investigation was undertaken into the cause of the recorded PM₁₀ exceedance at Milpose. The investigation involved the review of meteorological data, comparison with other monitoring results, field notes, local activities, operational activities and regional PM₁₀ results.</p> <p>It was considered from the investigation that this exceedance is not a result of NPM activities. Winds tended to be North Easterly in nature, strongest winds were experienced from the North West. Both ND22 and TDS5 are the neighbouring depositional sites which also lie South West of the mining lease, neither of these experienced any exceedance for the month of November. November is typically a time for harvesting, notes show that harvesting was undertaken at Milpose during the month, with lead-up work likely to have influenced the current results.</p>

3.3 Meteorology

Reporting period summary

- Annual rainfall was 74% of the long term annual average
- Nine major rainfall events triggering flow

3.3.1 Monitoring

NPM operate a meteorological monitoring station located within ML 1367 that complies with AS 2923. The weather station records 15 minute and 24-hour average wind speed, wind direction, air temperature, relative humidity, solar radiation and rainfall.

3.3.2 Management

A meteorological monitoring station is maintained to provide real time and periodic meteorological data for operational purposes. The interpretation of meteorological data assists in daily operational planning and management and to provide an historical record.

Weather data is accessible to employees via the NPM intranet and is used in internal and external environmental reporting.

3.3.3 Results

A total rainfall of 423.5 mm was recorded at the weather station during the reporting period. This is a 99.5 mm decrease from the previous reporting period and is below the long-term average for the region. Table 5 outlines rainfall figures in comparison with the long-term average.

Temperature and evaporation for the reporting period are shown in Table 5. Daily temperature, wind and rainfall data is provided in Appendix 3 for the reporting

period. Temperatures and evaporation followed expected seasonal trends observed in previous climatic conditions for the region.

North-east and south-east winds were the dominant winds throughout the reporting period. This is similar to previous reporting periods and is consistent with long term trends. Annual and quarterly wind roses have been produced to identify the predominant wind directions observed throughout the reporting period.

Table 5: Rainfall Summary

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Monthly Total (mm)	29.5	69.0	17.5	2.0	23.0	119.0	55.0	7.0	43.0	7.5	14.0	37.0
Long Term Average (mm)	52.1	48.1	39.9	40.8	43.5	44.0	44.9	47.0	43.6	44.1	44.9	44.9
YTD Actual (mm)	29.5	98.5	116.0	118.0	141.0	260.0	315.0	322.0	365.0	372.5	386.5	423.5
Wet days	8	6	5	3	5	14	13	4	2	4	4	4
Maximum Temp (Deg C)	43.6	37.8	32.6	20.9	17.3	15.0	14.8	18.4	17.7	23.3	26.6	32.8
Minimum Temp (Deg C)	8.3	8.5	6.9	11.3	7.7	5.8	4.4	5.6	8.8	9.5	14.4	13.3

Figure 6: Temperature and Evaporation Summary

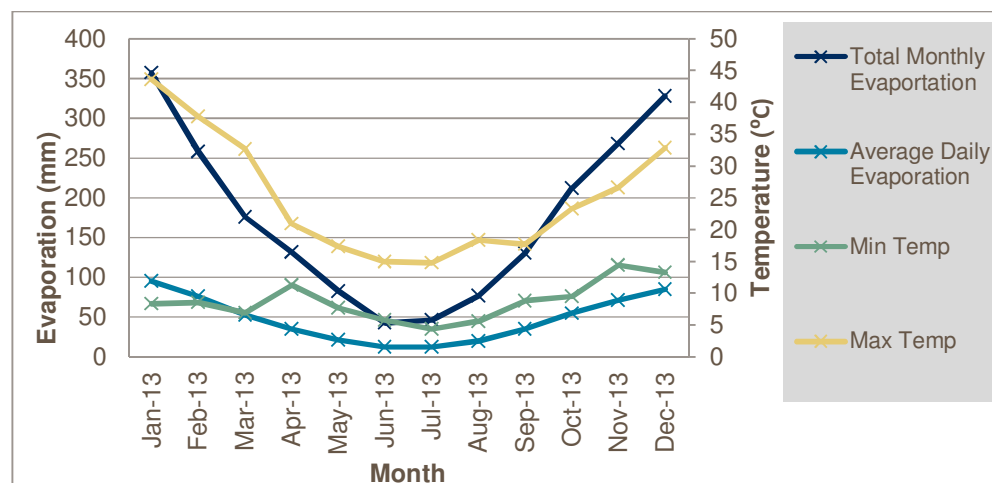
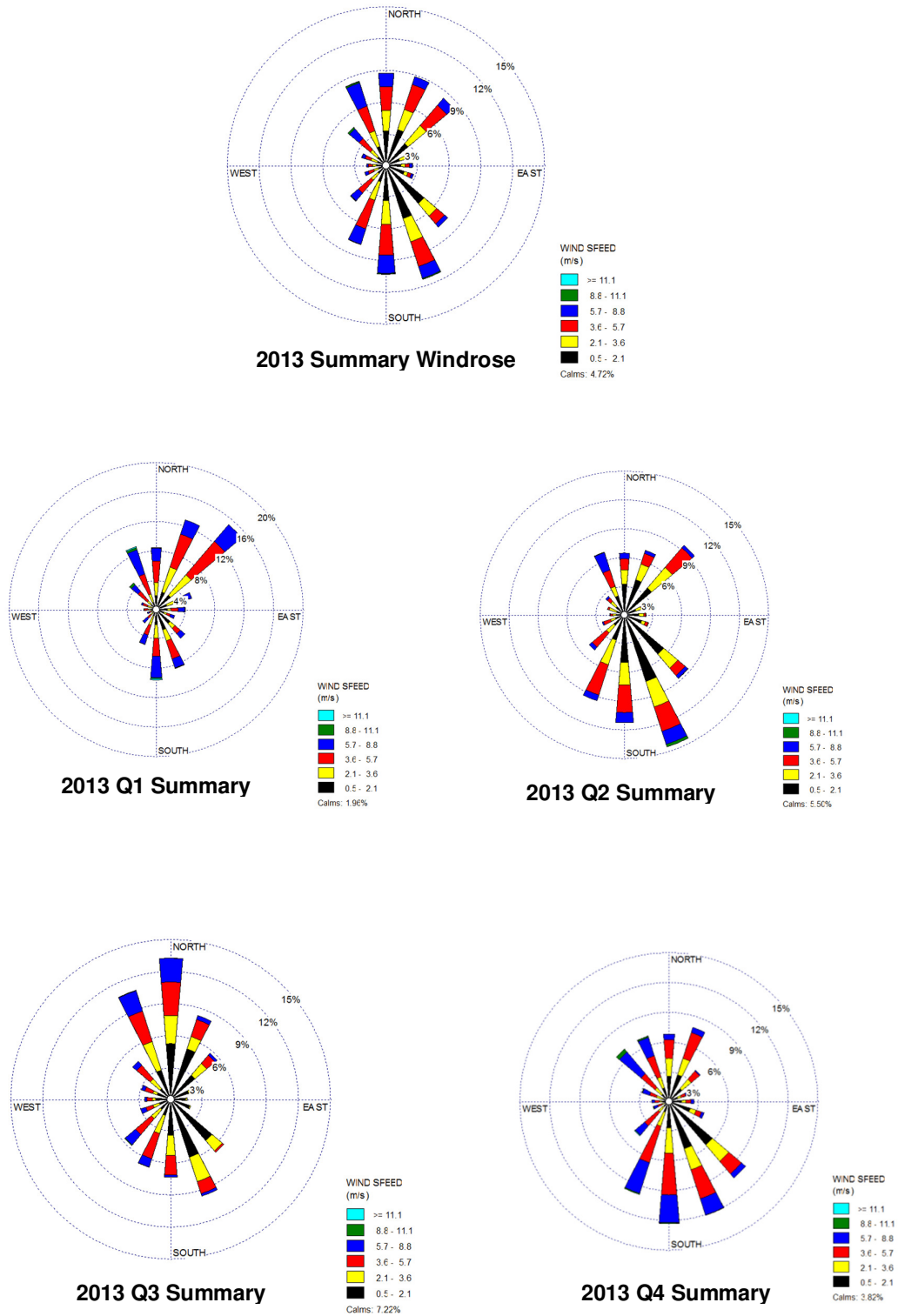


Figure 7: Windrose





3.3.4 Actions Proposed for 2014

- Continued calibration of the weather station

3.4 Air Quality

Reporting period summary

- Nil exceedances of the annual average limits
- All required monitoring conducted during period
- Trialled straw bales on the surface of TSF1 to breakdown wind activity and reduce dust exceedances / complaints.
- Five community complaints relating to dust

3.4.1 Monitoring

NPM has implemented an air quality monitoring program to periodically sample at key locations on and adjacent to the Mine Lease. The program is designed to assess the effectiveness of dust control measures and ensure compliance with DC 06-0026 and EPL 4784 conditions as well as internal standards and procedures.

The monitoring program consists of PM₁₀ high volume air samplers (HVAS) and depositional dust gauges. These 11 monitoring points are strategically located around the mine lease and neighbouring properties (Figure 8).

Fine dust particles measured as PM₁₀ are monitored using high volume air samplers (HVAS). Each station is fitted with a size selective inlet that operates for 24 hours every six days in accordance with AS 3580.9.6. These samplers monitor dust particles that, similar to dust deposition, can also be sourced from a range of mining and non-mining activities. PM₁₀ monitoring is undertaken at the local residences of 'Hubberstone' and 'Milpose'.

Depositional dust gauges record the total of deposited dust for a month long period. Depositional dust gauges are a useful measure of broad scale changes to the local air quality but may be influenced by a number of sources including mining, agriculture, ambient dust, fires and vehicle emissions. Sample collection may also be affected by non-mining organic contamination (e.g. bird droppings, sticks and insects). For this reason depositional dust gauges are a less accurate sampling method from a particular activity.

Depositional dust samples are analysed for insoluble solids, ash residue and combustible matter so that the impact of sample contamination can be assessed.

[illegible]

Date Saved: 17/01/2014 2:26:25 PM
Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994
false easting: 500,000.0000
false northing: 10,000,000.0000
central meridian: 147.0000
scale factor: 0.9996
latitude of origin: 0.0000
Units: Meter

3.4.2 Straw Bale Deposition Trial on Tailings Dam 1

In December 2013 Northparkes initiated and completed dust suppression works on the TSF1 surface. NPM harvested and baled straw to lay in windrows on TSF1. The straw bales will provide a means of dust control, but would also in time add organic matter to the tailings surface and increase the viability of the tailings as a growth medium conducive to vegetation establishment in the long-term. The trial has thus far proven successful and will be tested as the high wind months near.

3.4.3 Management

NPM has a Dust Management Plan which provides a framework to assess, monitor and manage potential dust impact as a result of its activities. Operational and design controls to manage air quality include:

- Environmental training and awareness to employees and contractors;
- Sealing high traffic roads, where possible;
- Copper concentrate product transported in sealed containers;
- Road sweeper used on sealed trafficable areas;
- Use of water carts on unsealed roads;
- Minimising clearing activities and undertaking progressive;
- Use of conveyor systems as opposed to haul trucks in the material handling system;
- Control mechanisms on crushing and conveying infrastructure, including complete or partial enclosure, dust extraction filters and mist sprays;
- Operation of the tailings storage facilities to minimise dust and capped as early as practicable;
- Dust controls on surface reverse circulation drill rigs; and
- Monthly air quality monitoring.

3.4.4 Results

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.

All dust results are made publically available on the NPM website through the Quarterly Reports, as per DC 06-0026.

PM₁₀

PM₁₀ monitoring results for the reporting period are displayed in Figure 9 and Figure 10. The criteria for exceedances (as nominated in DC 06-0026), for both 'Hubberstone' and 'Milpose', are >30 µg/m³ for the annual average and >50 µg/m³ for a 24 hour monitoring period.

Monitoring results for the 'Hubberstone' location show an exceedance for the 24-hour limit in the month of October. Monitoring results for the 'Milipose' location



were exceeded for the 24-hour limit in the months of February, March, May, October and November of the current reporting period. There was no exceedance of the annual average for either 'Hubberstone' or 'Milpose' in the reporting period.

All the exceedences of the DC 06-0026 nominated criteria were investigated, and in the majority of cases it was found that the result was due to localised activities (e.g. shearing of sheep and vehicle movement). These results were considered anomalies and therefore not included in the calculation of the reporting period's annual average.

Overall, results suggest dust levels generally increase throughout the spring period and at a time when farming activities are the most active.

Depositional Dust

The indicative annual averages (IAAs), calculated from the monthly dust deposition results, are displayed in Figure 11 from 2007 to the current reporting period, for each site of the monitoring sites.

During the reporting period, the calculated IAA dust deposition level was below the regulatory limit of $4\text{g/m}^2/\text{month}$ IAA. However, at a number of locations, individual results greater than the internal trigger value were received and investigated, but did not result in any exceedances of the IAA in DC 06-0026.

A high proportion of anomalous results were found to be due to external contaminants, such as bird droppings, bugs, organic matter, and dust from local farming activities. In cases where values above the trigger value were found not to be a result of NPM's activities, these results were deemed an outlier and excluded from the IAA calculation. Table 6 summarises the results of these investigations during the reporting period.

Table 6: Summary of depositional dust investigations

Location	Month	Contamination due to:	Excluded from IAA
ND22	January	Organic matter and farming activity.	✓
	April	Bugs and other organic matter.	✓
	May	Plant material and algal growth.	✓
	June	Farm activities and bird activity around gauge.	✓
	July	Mud from bird activity and inorganic material from ploughed paddock around gauge.	✓
	September	Bugs and bird activity around gauge.	✓
TDE	February	Organic matter.	✓
	March	Bugs, bird urea and organic matter.	✓
	June	Bugs.	✓
TDNE	February	Bugs, bird urea and organic matter.	✓
	March	Bugs, algal growth and other organic matter	✓
	May	Organic matter, bird activity, bugs, insects, spiders	✓
TDN5	November	Harvesting, bugs and algal growth.	✓
TDS5	February	Farming activities.	✓
	April	Algal growth and bugs.	✓
	June	Bird activity around gauge and bugs.	✓
	September	Bird activity, bugs and algal growth.	✓
TDSW	January	Organic matter	✓
	August	Insects, bugs and other organic matter.	✓
	October	Bird activity, bugs and road works.	✓
	November	Farm activity.	✓

Figure 9: PM_{10} Results for 'Hubberstone'

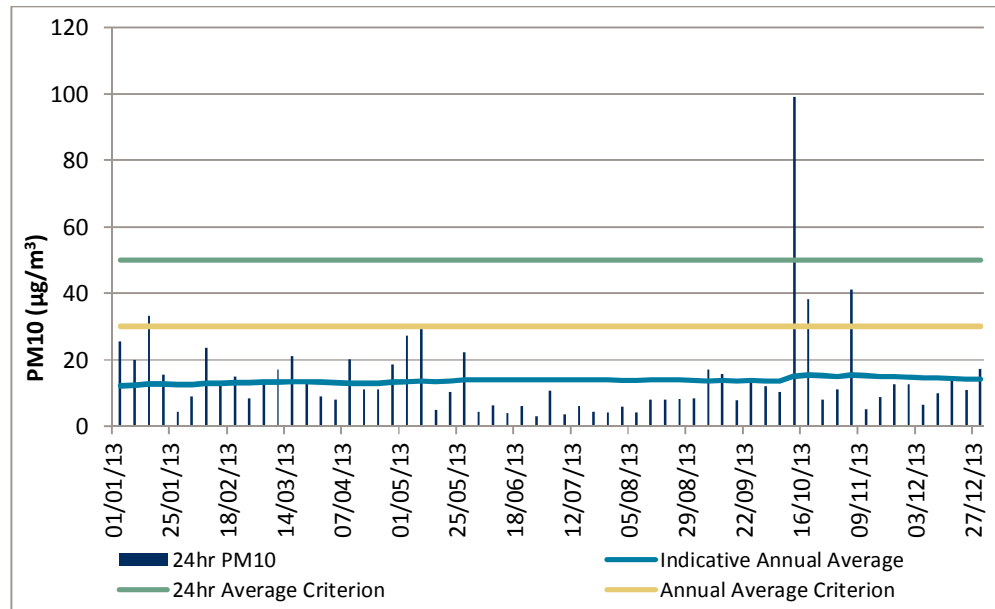


Figure 10: PM_{10} Results for 'Milpose'

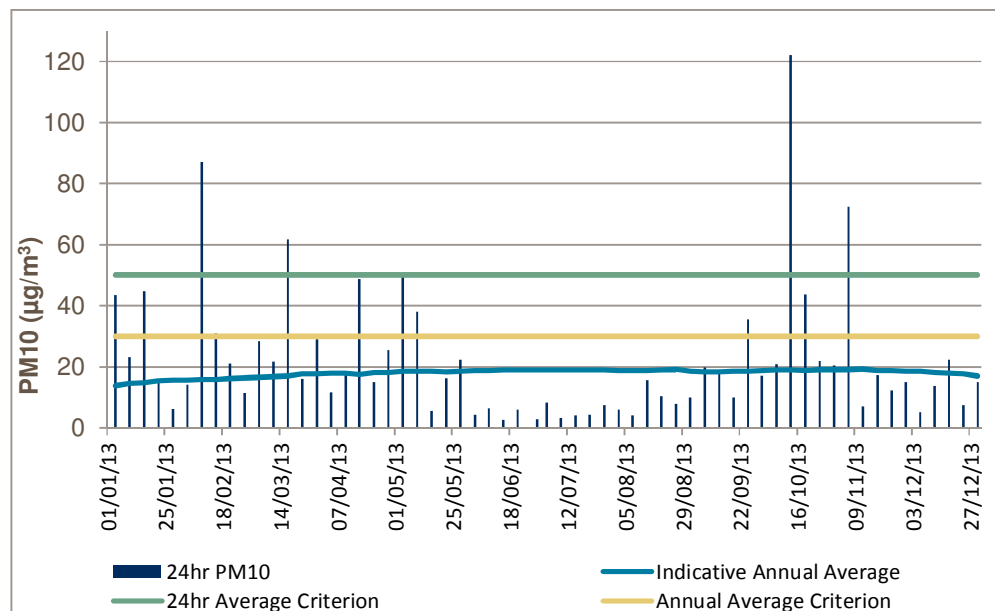
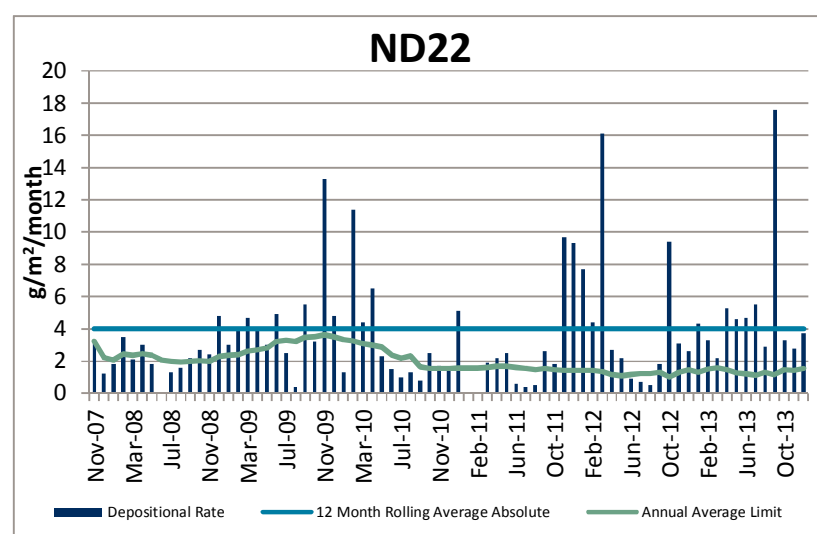
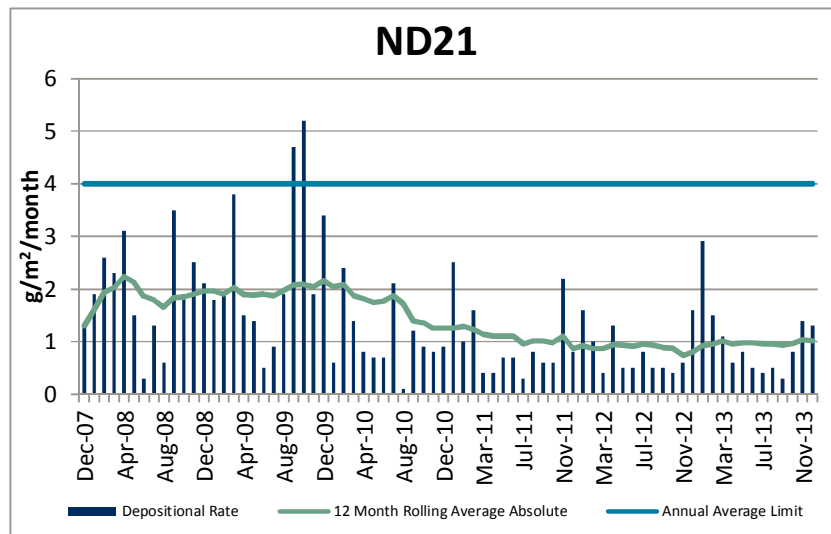
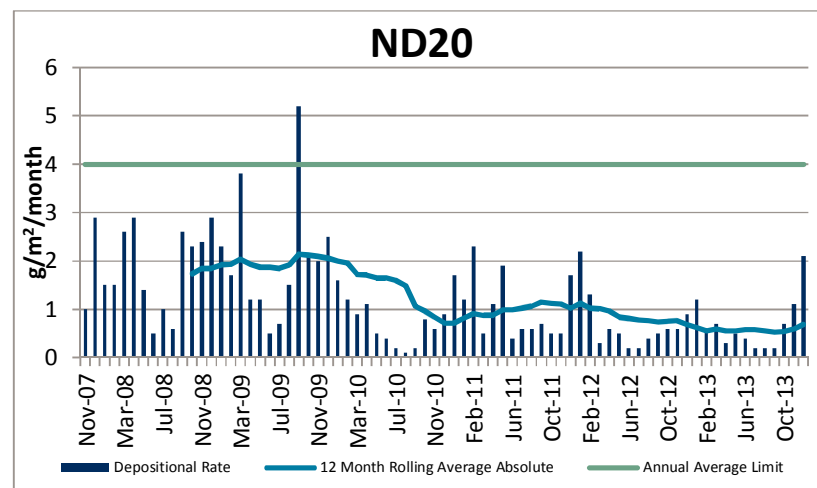
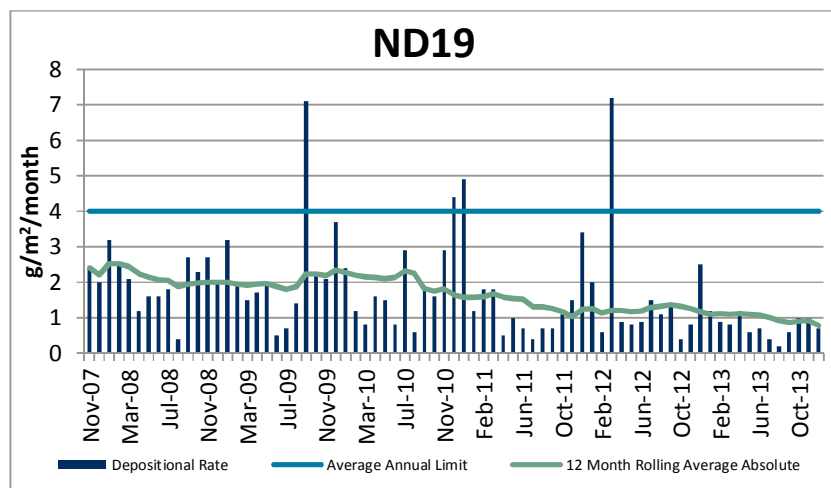
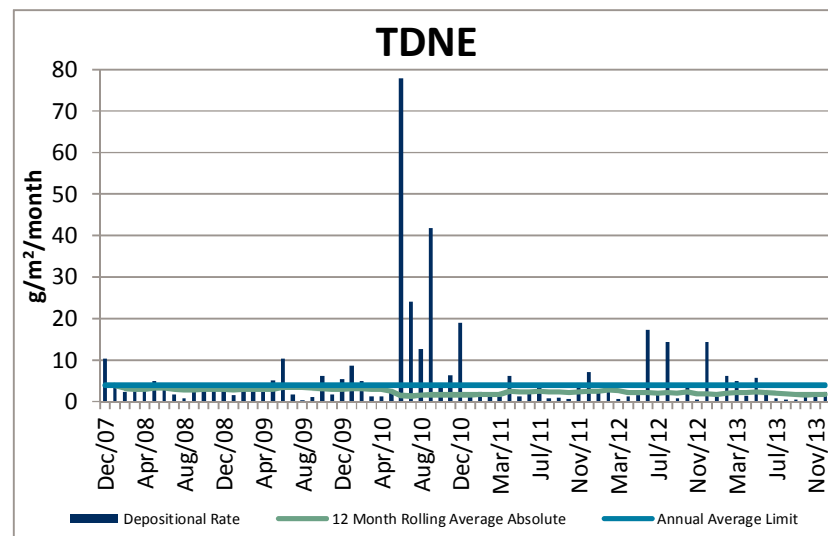
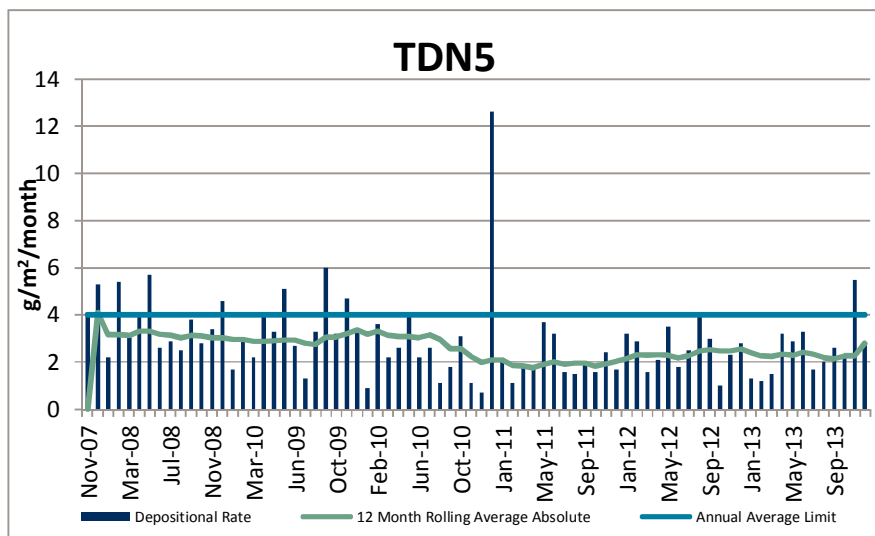
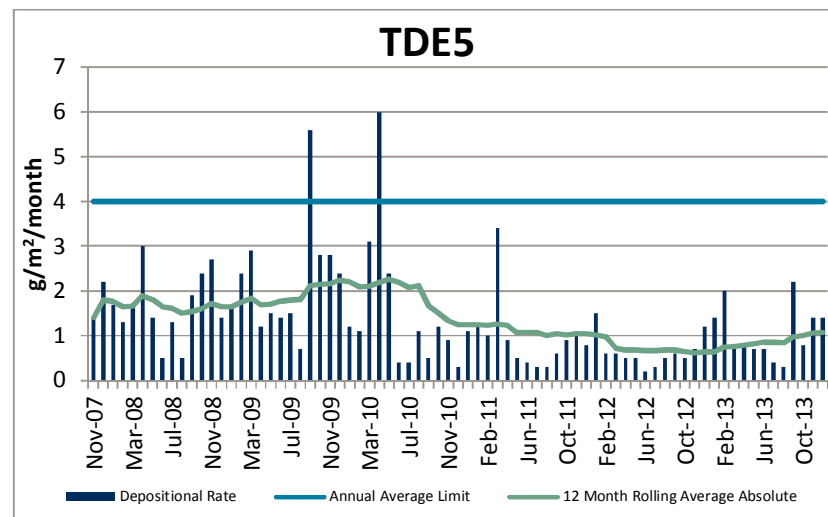
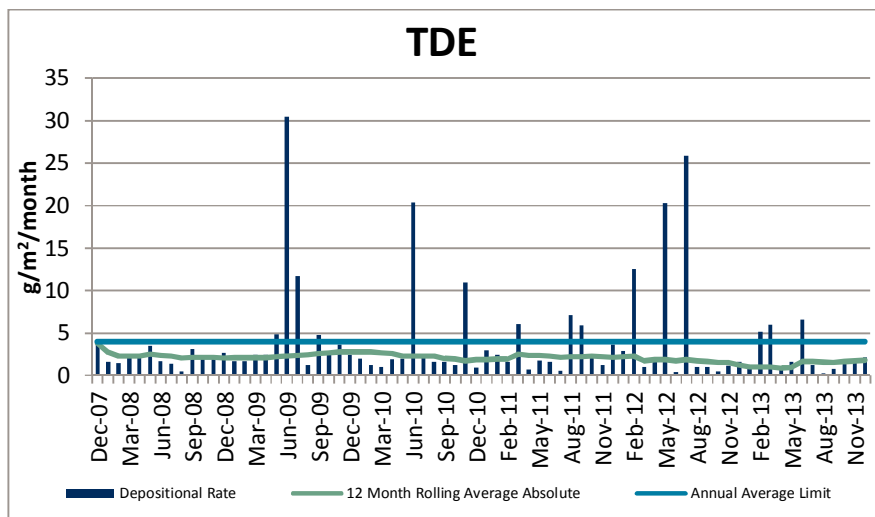
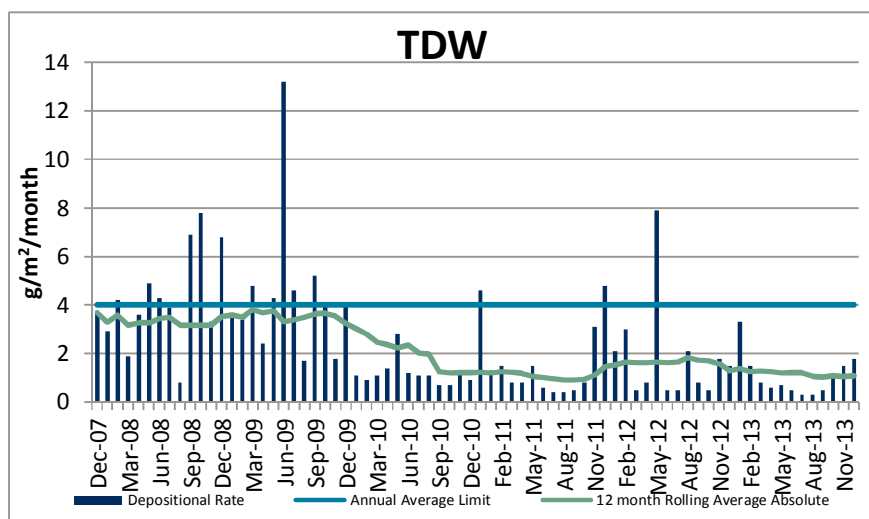
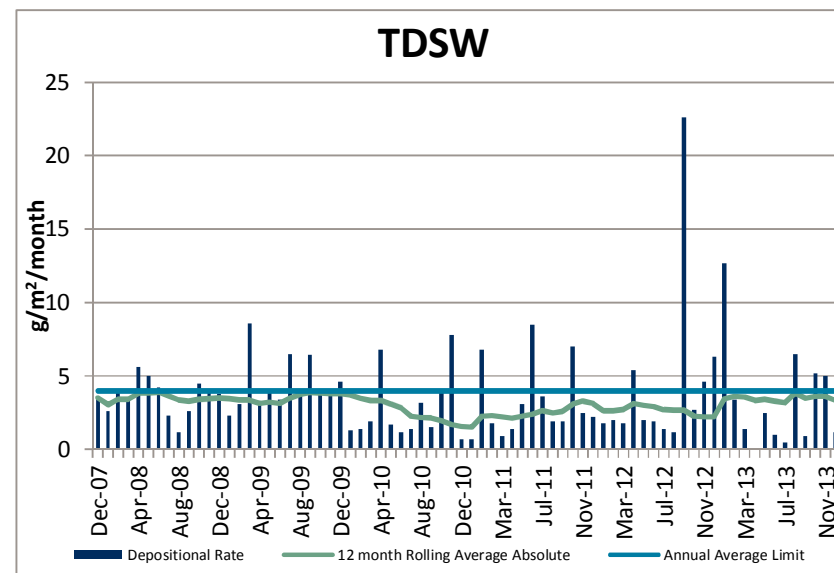
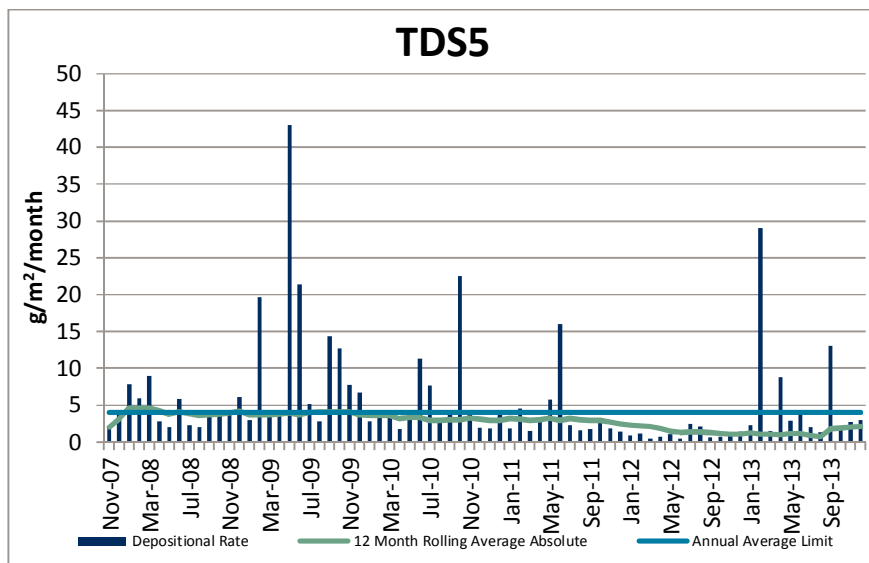




Figure 11: Depositional Dust Annual Average









3.4.5 Actions Proposed for 2014

- Monitor the success of the straw bale trial on TSF1 and investigate on going actions to minimise airborne dust from the tailings storage facilities.

3.5 Noise

Reporting period summary

- Quarterly noise monitoring completed by external noise specialists
- Removal of 'Beechmore' location from NPM Noise Monitoring Program from quarter four due to the residence being unoccupied
- No exceedences of regulatory noise criteria

Noise associated with the mining activities has the potential to affect the surrounding community. NPM implement a number of controls to mitigate noise that may be generated from on-site activities.

3.5.1 Monitoring

NPM undertakes a noise monitoring program at three locations on privately owned properties outside the mining leases. The program consists of both operator-attended and unattended surveys at the three nearest occupied residences 'Hubberstone', 'Milpose', and 'Lone Pine' (Figure 12).

Noise measurements are undertaken in accordance with the requirements of Development Consent (06-0026), AS 1055, and the DECC Industrial Noise Policy, 2000. NPM engage external noise specialists to monitor and analyse the results. All acoustic instrumentation is designed to comply with the requirements of AS 1259.2 and carries current NATA or manufacturer calibration certificates.

Received levels from various noise sources are noted during operator-attended monitoring and particular attention is paid to the extent of the NPM contribution, if any, to measured noise levels. In addition, the operator quantifies and characterises the overall levels of ambient noise. Noise occurring during the surveys is recorded by the operator with an indication of the noise source, noise type, and the time of occurrence. Effect on the mine noise propagation is established by assessing prevailing weather conditions recorded at the NPM weather station, and at the time of the monitoring by the operator. A summary of the weather data is available in Appendix 3.

In addition to the operator-attended monitoring, unattended continuous noise logging is undertaken at the three monitoring locations to determine the overall ambient noise amenity levels of background noise, and any noise generated by mine activity. This is undertaken over a seven day period at which point the loggers



are retrieved and the information is assessed. It should be noted that the ambient noise levels obtained from the loggers are not necessarily the contributed noise emissions arising from NPM operations alone. The ambient noise level data quantifies the overall noise level at a given location independent of its source or character. The noise logger calculates the statistical noise indices and does not 'record' the actual noise.

Figure 12: Noise monitoring locations



3.5.2 Management

Controls to manage noise as a result of NPM activities are implemented in all work areas and detailed in the site Noise and Vibration Management Plan. Such controls include:

- Risk assessment of major works prior to commencement to consider noise management;
- Training and awareness to all employees and contractors;
- Consideration of noise in the purchasing of equipment to relevant noise emission standards;
- Planned and scheduled maintenance programs of mobile and fixed machinery;
- Regular meetings with neighbouring;
- Sounds bunds;
- Scheduling of work during daylight hours and restricted times; and
- A quarterly noise monitoring program undertaken by specialist noise consultants.

In the event that noise related complaints and/or exceedances of noise level criteria occur, these are reported to the DoPI and investigated accordingly.

A quarterly summary of the noise monitoring results is made available on the NPM website.

3.5.3 Results

A total of 144 attended noise surveys were undertaken during the reporting period, of which 123 (i.e. 85%) were during favourable meteorological conditions stipulated into Development Consent conditions. The surveys that were taken during unfavourable meteorological conditions were excluded from assessment. The reasons for this included the wind speed exceeding 3 m/s and rain.

Unattended noise monitoring was conducted at all four sites for quarter 1, quarter 2 and quarter 3 reporting period and at three sites for quarter 4 for a period of seven days respectively. This data was used to assess background ambient noise levels and do not have an applicable exceedance criteria.

Monitoring results during the reporting period were in compliance with the limits specified in Development Consent (06-0026), as was the case in the previous reporting period. Complete results for unattended and attended monitoring data are available in Appendix 4.

During the life of the project the noise monitoring results have generally been in compliance with the limits specified in Development Consent (06-0026).

3.5.4 Actions Proposed for 2014

- Inclusion of additional monitoring locations with new residences being constructed on neighbouring properties.



3.6 Blasting

The objective of blasting is to ensure that optimal fragmentation of mine overburden or ore. Blasting has the potential to impact the surrounding community through vibration in the air (overpressure) and earth (ground vibration). The firing of blasts has the potential to generate dust and fumes. In 2013 there were nil exceedences of blast limits

3.6.1 Monitoring

NPM does not currently undertake surface blasting activities. Therefore monitoring for vibration and airblast overpressure at the privately owned residence, “Hubberstone” has ceased. Monitoring undertaken during Open Cut activities as stipulated in the Development Consent (06-0026) until the cessation of Open Cut mining in October 2010.

3.6.2 Management

NPM does not currently undertake surface blasting activities. Therefore, all associated management activities are no longer applicable. If in future surface mining activities resume, management and monitoring practices will be re-established.

3.6.3 Results

There were no surface blasts in 2013 and there were no community concerns relating to blasting in 2013.

3.6.4 Actions Proposed for 2014

- Program will be reviewed if operational changes occur.

3.7 Water

Reporting period summary:

- Total freshwater consumed was 1998.25 ML
- No significant changes to water quality or levels
- Site water infrastructure upgrades are underway.

NPM source water from numerous locations including imported water from various licences (refer Section 1.2). Water recycled from our on-site ore processing facility and tailings dam reclamation system and water collected through on-site infrastructure.

Effective water management is crucial to the long term success of NPM operations as it is essential in the processing of ore through our concentrator to produce copper concentrate.

NPM is located in a semi-arid water stressed environment and as such maintains a strong focus on water management to:

- Ensure a long term reliable water supply to site;
- Minimise impacts to natural water flows and biotic systems;
- Maximise water efficiency to reduce reliance on fresh water usage; and
- Maintain water quality.

NPM is a zero discharge site and therefore impact to the nearby permanent surface waters is minimal.

3.7.1 Monitoring

Surface and Groundwater

Water monitoring occurs at 69 surface water and 39 groundwater sampling sites. The surface water monitoring program consists of water quality sampling of various surface water courses and drainage system locations on and off the Mine Lease. The groundwater monitoring program involves the monitoring of water levels and quality at various locations up gradient and down gradient from the site. The location of sampling sites is provided in Figure 13 and Figure 14. Water monitoring occurs on a quarterly basis and ad hoc after significant rainfall events.

Water monitoring requirements in regards to the analytical suite monitored and frequencies is displayed in Table 7 and Table 8.

All water monitoring and sample collection, storage and transportation is undertaken in accordance with NPM procedures which are aligned with AS/NZS 5667 – Water Quality - Sampling. Analysis of surface water and groundwater was



carried out in accordance with Office of Environment and Heritage (OEH) approved methods by a NATA accredited laboratory.

Ground and surface water impact assessment criteria is not established under NPM EPL 4784, based upon the fact that Northparkes is a zero discharge site. NPM assesses water quality sample results against background water quality and communicate results on quarterly basis via the NPM website.

Figure 13: Surface water Monitoring Locations



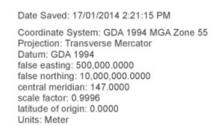


Table 7: Surface Water Monitoring Program

Monitoring Locations	Frequency	Analytical Suite
Watercourses	Annually and during rainfall events that results in flow	pH, EC, TSS, TDS, Cu, Na, K, Ca, Mg, Cl, SO ₄ , HCO ₃ , CO ₃
Farm Dams	Bi-annually	pH, EC, TSS, Cu
	Annually	pH, EC, TSS, TDS, Cu, NA, K, Ca, Mg, Cl, SO ₄ , HCO ₃ , CO ₃
Sediment Ponds	Quarterly and during rainfall events that results in flow	pH, EC, TSS, Cu
	Annually	pH, EC, TSS, TDS, Cu, NA, K, Ca, Mg, Cl, SO ₄ , HCO ₃ , CO ₃
Retention Ponds	Quarterly and during rainfall events that results in flow	pH, EC, TSS, Cu
	Annually	pH, EC, TSS, TDS, Cu, NA, K, Ca, Mg, Cl, SO ₄ , HCO ₃ , CO ₃
Process Water System (including process water dams, TSF's, return water dams, surge dams, retention ponds, grease traps)	Annually	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 8: Ground Water Monitoring Program

Monitoring Locations	Frequency	Analytical Suite
TSF Bores	Quarterly	Levels, pH, EC, Cu
	Annually	pH, EC, TDS, Na, K, Ca, Mg, Cl, SO ₄ , HCO ₃ , CO ₃ , Al, As, Ba, Be, Cd, Co, Cu, Cr, Mo, Ni, Pb, Se, Th, U, Zn
Opencut Bores	Quarterly	Levels, pH, EC, Cu
	Annually	pH, EC, TDS, Na, K, Ca, Mg, Cl, SO ₄ , HCO ₃ , CO ₃ , Al, As, Ba, Be, Cd, Co, Cu, Cr, Mo, Ni, Pb, Se, Th, U, Zn
Underground Bores	Quarterly	Levels, pH, EC, Cu
	Annually	pH, EC, TDS, Na, K, Ca, Mg, Cl, SO ₄ , HCO ₃ , CO ₃ , Al, As, Ba, Be, Cd, Co, Cu, Cr, Mo, Ni, Pb, Se, Th, U, Zn
Regional Bores	Quarterly	Levels, pH, EC, Cu
	Annually	pH, EC, TDS, Na, K, Ca, Mg, Cl, SO ₄ , HCO ₃ , CO ₃ , Al, As, Ba, Be, Cd, Co, Cu, Cr, Mo, Ni, Pb, Se, Th, U, Zn

All water monitoring and sample collection, storage and transportation is undertaken in accordance with NPM procedures which are aligned with AS/NZS



5667 – Water Quality - Sampling. Analysis of surface water and groundwater was carried out in accordance with Office of Environment and Heritage (OEH) approved methods by a NATA accredited laboratory.

3.7.2 Management

NPM source water from numerous locations including imported water from various licences (refer section 1.2). Water recycled from our on-site ore processing facility and tailings dam reclamation system and water collected through on-site infrastructure.

Effective water management is crucial to the long term success of NPM operations as it is essential in the processing of ore through the concentrator to produce copper concentrate.

NPM is located in a semi-arid water stressed environment and as such maintains a strong focus on water management to:

- Ensure a long term reliable water supply to site;
- Minimise impacts to natural water flows and biotic systems;
- Maximise water efficiency to reduce reliance on fresh water usage; and
- Maintain water quality.

NPM is a zero discharge site and therefore impact to the nearby permanent surface waters is minimal.

The NPM 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. Water management activities and strategic actions are coordinated, managed and documented through an onsite Water Committee with interdepartmental representation.

NPM have developed new water quality trigger criteria specific to the nature of the operation and the local environment as the water quality criteria as per DC 06-0026.

Water Balance

NPM have developed and implemented a water model to capture water inputs, outputs and throughputs at the operation.

Results of the model are incorporated in internal management decisions and are communicated internally to the management team on a six monthly basis.



3.7.3 Results

The overall water quality of surface water and ground water remained consistent within long term average. There were fluctuations observed in the surface water quality which is largely attributable to less sediment due to low rainfall during the reporting period. The groundwater levels remained similar to the previous reporting period and within long term averages.

Surface Water

Surface water quality was generally within the range of the long term average for the majority of monitoring locations. Copper levels were at or below the long term averages for all monitoring locations. There were fluctuations observed in pH and EC for farm dams, retention ponds and sediment ponds, this was largely due to lack of sediments in the ponds and a result of decreased rainfall and lower water volumes. The monitoring data for all farm dams are available in Appendix 7.

RP1, RP3, and RP26 reported Cu concentrations higher than the long term average in the previous reporting period; however results from the current reporting period indicate that this has returned to be in-line with the long term average. The pH concentrations remained in-line with long term averages over the reporting period. Complete results for all retention ponds monitoring are available in Appendix 9.

During the reporting period twelve surface water sampling locations were dry or less than 10% volume. At the monitoring locations RP1, RP10, RP13, RP19, RP23, RP26 and SP1 and SP15 only one sampling event occurred over the reporting period, due to the locations being dry during the remainder of the year. The monitoring data for all sediment ponds and process water system are available in Appendix 7 and Appendix 9 respectively.

Groundwater

Groundwater levels remained constant at all monitoring bores during the reporting period and are in line with long term averages.

During the reporting period, the regional bore Moss, which is located on the 'Moss' property, was being actively pumped by the land owner and was unavailable for sampling. All other regional bores were sampled and the monitoring data are available in Appendix 11.

The groundwater pH values remained consistent with long term averages with the exception of P139 bore which showed a decrease in pH. An investigation revealed that the pH at P139 is decreasing gradually over the years. The current decrease in pH is in line with the linear average of the last three years of monitoring data.



In the reporting period no samples were collected at MB7, MB12 and MB16 as the bores were dry. Only one sample was collected at MB11 as the bore was dry during other periods. The monitoring results for all bores located in the open cut and underground area are available in Appendix 10 and Appendix 13. The Copper concentrations for all monitoring bores remained in line with the long term average, with the exception of W14 which showed varied concentrations over the monitoring period and returned to be in-line with long term averages. The EC and pH remained in-line with long term averages over the monitoring period.

Water Courses and rainfall events

Water quality in natural watercourses was subject to normal variations in range of the long term average for the majority of monitoring locations. There were nine rainfall events during the current reporting period that resulted in flow of nearby watercourses and required sampling. Rainfall event sampling indicated no adverse effects from NPM operations on watercourse quality during the reporting period. The monitoring data for water courses sampled during rain events are available in Appendix 5.

Water Balance

In reviewing the mine water balance for the reporting period (*Table 9*) the following is of note:

- Rainfall during the reporting period was below the long term average
- There were nine major rainfall events that resulted in flows during the reporting period resulting in above average rainfall. A year total of 386.5 mm rainfall was recorded onsite. This was approximately 74% of the long term average (523.8mm).
- The volume of freshwater obtained from Parkes Shire Council (PSC) decreased (2,069.49 ML in 2012 to 1998.25 ML in 2013) due to increased water availability on-site. All water imported to site was from groundwater licence allocations. No allocation of NPM river water were received from PSC in the reporting period, as seen in *Table 9*.
- Total water use during the reporting period was comparable to the previous reporting period with a slight decrease of approximately 6% from 6,801 ML in 2012 to 6,378 ML in 2013. Water used per tonne of ore milled was higher due to more water being used to increase recovery.
- Recycled water use increased during this reporting period by 47% (2188.33 ML in 2012 and 3109 ML in 2013). This is due to an increase in pumping of stored water in E27 into the PWS.
- Water entrained in product increased from the previous reporting period.

- Evaporation and seepage values were taken from Goldsim. The change from the previous reporting period is largely due to the change in assumptions for evaporation as a result of E27 input storage.

Table 9: Reporting Period Water Balance

Water Balance	Total (ML)
Total Water Input	3269
Recycled	3109
Change in storage	-936.39
Dewatering water discharged without use	0
Process effluent	0
Non process water	0
Entrained in product, by-products or process wastes	1847
Sent to 3 rd party	0
Make Up Water Requirement	0
Water Use	6378
Water Return	0
Evaporation, Seepage and Other	360.43
Freshwater usage onsite	2873.39
Total Water Output	4781.64

3.7.4 Actions Proposed for 2014

- Water infrastructure upgrades for the site water storage system to build capacity
- Review and update drought and flood management plan for the site.

3.8 Land Management and Rehabilitation

NPM own and manage approximately 10,157 hectares of land within and surrounding the mine leases. This area supports a range of land uses including mining, exploration, crop production and habitat re-establishment.

Rehabilitation activities at NPM incorporate the entire landholding and not just the area covered by the mining leases. The aim of this is to enhance the regional landscape and native habitat values.

3.8.1 Monitoring

Land management aspects are monitored on a continuous basis through inspections conducted by the Farm Manager and members of the Environment team. These aspects include vegetation clearing activities, top soil management and invasive weed and animal pest mitigation.



During the reporting period, NPM engaged external consultants to undertake its annual rehabilitation monitoring program. This program is guided by clearly defined, repeatable and consistent methodologies for monitoring changes in various aspects of ecosystem function, succession and long-term sustainability¹.

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 Analyses and various measurements of ecosystem diversity and habitat values.

Rehabilitation monitoring sites were selected for their proposed final land use, vegetation community type and year of establishment and were considered to be representative of the rehabilitation area as a whole or were similar to and representative of other smaller areas of rehabilitation (Figure 15). In large rehabilitation areas multiple sites were established. The rehabilitation areas consisted of two main vegetation communities including “mixed native woodland” and “native grasslands”.

The woodland sites were tree planting areas with the objective to enhance biodiversity and connectivity throughout the agricultural areas. The native grassland sites were located within the active mining lease on areas revegetated after mining disturbance (e.g. TSFs and batters of waste emplacements). In total, six “woodland” and eight “native grassland” monitoring sites were monitored in the reporting period.

¹ DnA Environmental 2011 Rehabilitation Monitoring Report

Figure 15: Locations of rehabilitation and reference monitoring sites



3.8.2 Management

Land management is conducted in accordance to the Landscape Management Plan² and is inclusive of the Mine Closure Plan, the Rehabilitation Management Plan and the Void Management Plan. Other management plans pertaining to land management include the Aboriginal Heritage Management Plan and the Flora and Fauna Management Plan. The key objectives for NPM are to develop an integrated and strategic approach to land management including:

- Reducing 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 Northparkes 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. The native vegetation areas serve as biodiversity offsets for the mining operations and wildlife corridors. Since acquiring its various land holdings, NPM 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;

NPM has maintained large sections of remnant vegetation within its landholding wherever possible. 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. NPM has committed to planting 10,000 trees in wildlife corridors on an annual basis.

² Landscape Management Plan was submitted to the DoPI on 10th November 2010 and is awaiting approval.



The three year rehabilitation plan is provided in Table 10. Minimal rehabilitation is planned over the next three year period as surface operations will remain stable during this period and limited areas will close enabling rehabilitation.



Table 10: Three Year Rehabilitation Plan

LOCATION	DATE	AREA	REHABILITATION METHOD	MATERIAL TYPE	COMMENTS
Open Cut Operations					
Sound bund (W1, W2, W3, W4) Waste Stockpile	>2015	W4 outer batters	Stable slopes, capping, seeding	Clay, oxide, topsoil	Areas stabilised. W4 outer batters rehabilitated in 2011. Waste stockpiles will be utilised for ongoing construction of tailings storage facilities.
Miscellaneous Areas	As required	Roads, topsoil stockpiles	Ripped, seeding	Topsoil	-
E22 Void	>2015	Inside sound bund	Stable slopes. Capped and rehabilitated if not filled with tailings.	Topsoil/Rock/Clay	Current life of mine plan entails development of a block cave at E22. Thus rehabilitation will not occur until post mining
E27 Void	>2015	Outer batters and cap	Stable slopes, seeding	Topsoil/Rock	Final rehabilitation after TSF decommissioning
Underground Operations					
E26 Void	>2015	Subsidence Zone	Seeding , drainage repairs	Rock armour, Topsoil	Final void rehabilitation at end of mine life
E26 Laydown and Portal Areas	As required	Hardstand areas	Seeding	Topsoil	Concrete Batch Plant, PYBAR laydown area, other contractors,
E26 Lift 2 Waste Stockpile	>2015	Cap	Sealed with clay, topsoiled, seeded	Clay, Topsoil	Rehabilitation requirements dependant on assessment of physical and geochemical properties and use as construction material.
E48 Void	>2015	Subsidence Zone	Seeding , drainage repairs	Rock armour, Topsoil	Final void rehabilitation at end of mine life
Exploration and Evaluation					
Drilling activities	As required	Drill pads and sumps	Hole capping, sump filling	Topsoil	Exploration drilling activities on Mining Lease and Exploration leases



Ore Processing					
TSF 1	>2015	Walls and cap	Native seed broadcasting	Topsoil/Rock/Clay	Final rehabilitation after decommissioning
TSF 2	>2015	Walls and cap	Native seed broadcasting	Topsoil/Rock/Clay	Final rehabilitation after decommissioning
TSF 3	>2015	Walls and cap	Native seed broadcasting	Topsoil/Rock/Clay	Final rehabilitation after decommissioning
TSF 4 (Estcourt)	>2015	Walls and cap	Native seed broadcasting	Topsoil/Rock/Clay	Final rehabilitation after decommissioning
Borrow Pits (Caloola, Estcourt)	As required	Walls	Native seed broadcasting	Topsoil/Rock/Clay	Ongoing material for TSF construction
Agricultural Properties					
Estcourt Offset Site	Ongoing	23 ha agricultural land	In accordance with approved VMP	Topsoil	Natural regeneration currently continuing

3.8.3 Results

Rehabilitation monitoring during the reporting year was conducted by a qualified ecologist. The following is a summary of sites monitored for revegetation success against the draft completion criteria. For the purpose of this summary, 20 primary draft criteria have been used, which, in consultation with government regulators, could be used as the agreed closure milestones. The full monitoring results are contained in Appendix 14.

Table 12 and Table 13 indicate the performance of the rehabilitation monitoring sites against a selection of draft Completion Performance Indicators developed for woodland and grassland communities during the monitoring period. The selection of criteria has been presented in order of ecosystem successional processes, beginning with landform establishment (orange) and ending with indicators of ecosystem stability (blue). The range values will be amended annually.

No significant issues were raised from site inspections by the Farm Manager or Environment team in the reporting period.

3.8.3.1 Woodland Revegetation Sites

For the Woodland Revegetation Sites the rehabilitation monitoring found (taken from Appendix 14):

“In most woodland rehabilitation sites there had been an increasing trend in ecological function between 2009 - 2011 due to improved seasonal conditions which stimulated perennial ground cover and provided an abundance of live annual vegetation. Despite periodic flood events which stimulated a lot of annual plant growth, prolonged dry conditions over the past twelve months and preceding the monitoring event have resulted in a reduction of active plant growth which has been compounded by increased levels of macropod activity and this was typically evident across the range of monitoring sites this year, especially the more sheltered older woodland rehabilitation sites including Estcourt, Beechmore, Altona and Kundibah.

Despite the dry conditions and subtle setbacks, the older woodland rehabilitation sites were establishing well and were ecologically very similar to the local woodlands with which they were being compared to, with Beechmore the only site which did not meet stability and infiltration capacity targets. The two younger Limestone Forest rehabilitation areas continued to maintain high patch area and stability due largely to the high levels of cryptogams and annual plants which provided very high stability, however due to the very hard setting soils and low soil surface roughness infiltration (and nutrient recycling in LFO-02) capacities remained low.

This year all woodland rehabilitation sites contained a population of maturing trees and shrubs (>5cm dbh) and in the young Limestone Forest sites these populations were small but provide an indication of good growth and development of the planted tubestock. In the older rehabilitation sites Beechmore, Altona, Kundibah and Estcourt, the density of trees and shrubs (>5cm dbh) continued to exceed the range values provided by the reference sites and these were increasing in structural diversity and complexity. In most sites the minimum trunk diameters were 5 – 6cm however the maximum dbh was an *E. meliodora* recorded in Estcourt which had a dbh of 36cm. In all sites, including the two new rehabilitation sites in the LFO area there was an appropriate diversity of tree species. While all species were endemic some may not strictly be associated with the particular habitat type being rehabilitated. A large percentage of trees and mature shrubs in the older rehabilitation sites continued to provide reproductive structures such as buds, flowers and/or fruits.

This year many sites had a declining shrub and juvenile tree population with a small number having grown into “trees”, however in most cases many smaller individuals had died. Exceptions included significant recruitment which was observed in LFO-02 and RWood04 both which contained a relatively recent regeneration event. While all sites contained an appropriate diversity of shrubs and juvenile trees, two rehabilitation sites LFO-01 and Estcourt 1997 did not contain an appropriate density, which may have implications in meeting longer-term ecological targets and may require replacement planting and/or grazing exclusion to enhance natural regeneration.

Total ground cover, which is a combination of leaf litter, annual plants, cryptogams, rocks, logs and live perennial plants (<0.5m in height) demonstrated a marginal decrease across all monitoring sites this year, with the exception of one of the woodland reference sites. Of the rehabilitation sites, Beechmore and Altona failed to meet total ground cover targets, while there was low perennial plant cover in LFO-01 and Beechmore. Interestingly the two youngest rehabilitation sites LFO-01 and LFO-02 had the highest level of total ground cover perhaps due to a low level of disturbance by animals and reduced competition levels due to the absence of the competitive mature overstorey.

Dead leaf litter continued to be a dominant ground cover component in the rehabilitation sites however annual plants continued to provide significant levels of ground cover within the two young Limestone Forest rehabilitation sites. In the older more established sites annual plants continued to be much less significant or were not present at all. While rocks were not an important habitat feature in the local woodlands, most sites contained some levels of log cover which provide

additional ground cover protection and critical habitat diversity and except in Altona where a large acacia had died and fallen over, no log cover was yet recorded in the rehabilitation areas. All sites contained at least some vertical structure 0.5 – 2.0m in height and all but the two young Limestone Forest rehabilitation areas contained foliage cover within each of the 2.0m vertical height classes and all had some canopy cover exceeding 6.0m in height, indicating good growth and establishment and the development of mature tree canopies. Rehabilitation sites Estcourt and Beechmore had a mature canopy cover which now provided similar levels of projected foliage cover as the local remnant woodlands.

This year there were no consistent trends in the changes in plant diversity across the range of monitoring sites however in most cases there was a relatively large increase in exotic species richness. While conditions were particularly dry at the time of monitoring, above average rainfall in June had resulted in a flush of plant growth with exotic species tending to persist in lower depressions and in disturbed shady areas beneath tree canopies (i.e. old stockcamps). Other factors that are likely to have affected species diversity include selective browsing, degree of grazing pressure and extent of disturbance, combined with some degree of sampling variability. Nonetheless the results indicate there is typically a lack of native plant diversity within the younger Limestone Forest rehabilitation sites, and these sites were weedier than desired. The older rehabilitation areas Estcourt, Beechmore and Kundibah generally contained an adequate richness of native and exotics species, but there was often a low diversity of forbs and grasses.

The number of species recorded across the range of woodland rehabilitation sites has ranged between 97 – 151 species since 2009 with 24 – 45% of these being exotic species. In 2013, two species were common to all rehabilitation sites and these were a native perennial forb *Dichondra repens* (Kidney Weed) and the exotic annual grass *Lolium rigidum* (Wimmera Ryegrass) and these too were present in almost all of the woodland reference sites, indicating they are very common in the local area. Two species of endemic acacia including *Acacia deanei* (Deane's Wattle) and *A. hakeoides* (Hakea Wattle) and *Eucalyptus populnea* (Bimble Box) which were planted as part of the rehabilitation program were recorded in five of the six sites, while numerous other native tree and shrub species were also common.

The results of the soil analyses indicate that some sites have strongly acidic soil, may be low in organic matter and/or have a low Cation Exchange capacity but most other chemical characteristics were within or similar to those recorded in the local woodlands or were within agricultural industry standards. In 2013 however anomalies in the soil analyses indicated there were particularly high concentrations

of a variety of elements and heavy metals in sites situated in the Limestone Forest (LFO-01, LFO-02 and RWood04) as well as Altona, an old gravel quarry. The high concentration of these combinations of these elements may have the potential to affect plant establishment and ecosystem development.”

3.8.3.2 Grassland Revegetation Sites

For the Grassland Revegetation Sites the rehabilitation monitoring found (taken from Appendix 15):

“...an increase in grazing pressure during this period, the impacts of animal - macropods was less evident in the grassland sites compared to the woodland sites probably due to the absence of shade and protective shelter. In addition, there was no evidence of grazing by travelling stock on reference sites situated on the Travelling Stock Routes (TSRs) over the past twelve months.

Native grasslands are usually devoid of trees and shrubs but small populations of shrubs such as *Maireana brevifolia* (Yanga Bush) continued to be recorded in all grassland rehabilitation sites as a result of voluntary establishment from the soil seed bank however there tended to be a decline in numbers due to the prolonged dry conditions.

Total ground cover, continued to be high in the grassland reference sites however there was a consistent decrease recorded across these sites year due to the dry weather. In the rehabilitated grassland sites however, there tended to be an increase in total ground cover, perhaps due to lower levels of grazing pressures and all sites however continued to have a suitable level of protective ground cover. The most dominant form of ground cover continues to be dead leaf litter in most cases, however this year annual plants were more prolific and had become quite dominant in numerous rehabilitation sites, as well as in one of the reference sites. Perennial grasses and forbs continue to be an important ground cover component in the reference sites but rehabilitation sites that did not have suitable perennial plant cover included TSF1-01, E22-02 and E27-01. Other ground covers and habitat features such as cryptogam, rocks or logs were typically absent or provided very low cover values. Most sites had small amounts of projected foliage cover 0.5 – 2.0m in height due to patches of tall annual and perennial grasses.

This year there were no consistent trends in the changes in plant diversity across the range of grassland monitoring sites however in most cases there was a relatively large increase in total and exotic species richness in most but not all grassland sites. While conditions were particularly dry at the time of monitoring, above average rainfall in June had resulted in a flush of plant growth with exotic

species tending to persist in lower depressions and in more open or disturbed areas where plant competition was lower, especially in sites such as RGrass01 which also contained a high number of native annual species. While grazing did not appear to be primary factor affecting species diversity and composition in these grassland areas this year, the degree of previous disturbances and current competition levels may be key influences. In areas with a high degree of plant cover, there is a higher chance that small plants may be undetected also thus increasing the degree of sampling error. Nonetheless the results indicate there is typically a lack of native plant diversity within the grassland rehabilitation sites with some sites containing a higher diversity of weeds than desired.

The number of species recorded across the range of grassland rehabilitation sites has ranged between 62 – 91 species since 2009 with 27 – 53% of these being exotic species. In 2013, three species were common to all rehabilitation sites and in at least two of the reference sites and these included the exotic annuals *Avena fatua* (Wild Oats) and *Echium plantagineum* Paterson's Curse) and the native perennial species *Walwhalleya proluta* (Rigid Panic).

Rilling continued to be recorded in sites TSF2-01 and E22-02 and these continued to exceed the minimum value of concern and may require amelioration. Investigation for further rilling across the larger TSF2 and E22 areas should also be undertaken with any actively eroding areas treated accordingly. There was also active tunnel erosion in the tree lots near site E22-01 which require amelioration.

Numerous rehabilitation sites continued to have moderately alkaline soils however in site TSF2-01 the soils were slightly acidic. Despite a significant reduction in Electrical Conductivity in TSF2-01, EC levels continued to exceed acceptable levels and continued to be elevated in TSF1-02. The soils in the rehabilitation sites were often low in organic matter, phosphorous and nitrates but the data indicates local soils obtained from the grassland reference sites were often low in fertility, therefore amelioration is not considered necessary. The very high ESP in soils in some of the TSF sites however indicates the soils are highly sodic and may require treatment with gypsum. There continued to be unusually high levels of Sulfur in sites situated on the TSFs and these continued to be particularly high in TSF2-01. There were elevated levels of Copper in most rehabilitation sites but these were significantly high in E27. While the soil analyses have indicated a reduction in some adverse soil chemistry especially in the TSF sites, tailings material continues to seep onto the external walls and continues to have an adverse influence on plant growth and establishment in these seepage areas.



Table 11: Key for Table 12 and Table 13

	Rehabilitation sites meeting or exceeding the range values of their representative community type and have therefore been deemed to meet proposed completion criteria targets.
	Rehabilitation sites not meeting the proposed completion criteria but still falls within “desirable” levels as prescribed by the agricultural industry.
	Rehabilitation sites not meeting the proposed completion criteria and not considered to fall within “desirable” levels as prescribed by the agricultural industry.

Table 12: Performance of Woodland Rehabilitation Monitoring Sites (from Appendix 14)

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Completion Performance Indicators Description	Unit of measurement	Woodland ecosystem range 2013		LFO-01	LFO-02	Estcourt 1997	Beechmore 1999	Altona 1999	Kundibah 2001
Performance indicators are quantified by the range of values obtained from replicated reference sites						Lower	Upper	2013	2013	2013	2013	2013	2013
Phase 2: Landform establishment and stability	Landform function	Landform is functional and performing as it was designed to do	LFA Stability	Based on key physical, biological and chemical characteristics the LFA stability index provides an indication of the sites stability and that it is comparable to or trending towards that of the local remnant vegetation	%	62.9	69.0	72.0	67.0	67.0	62.8	67.4	63.7
			LFA Infiltration	Based on key physical, biological and chemical characteristics the LFA infiltration index provides an indication of the sites infiltration capacity and that it is comparable to or trending towards that of the local remnant vegetation	%	41.1	55.7	34.3	38.9	41.3	39.3	50.4	44.4
			LFA Nutrient recycling	Based on key physical, biological and chemical characteristics the LFA nutrient recycling index provides an indication of the sites ability to recycle nutrient and that it is comparable to or trending towards that of the local remnant vegetation	%	36.2	53.0	36.5	35.8	39.8	38.5	46.2	42.1
			LFA Landscape organisation	The Landscape Organisation Index provides a measure of the ability of the site to retain resources and that it is comparable to that of the local remnant vegetation	%	100	100	100	100	72	81	85	95
	Active erosion	Areas of active erosion are limited	No. Rills/Gullies	Provides an assessment of the number of gullies or rills occurring in a 50m transect and that these are limited and stabilising	No.	0	0	0	0	0	0	0	0
Phase 3: Growth medium development	Soil chemical, physical properties and amelioration	Soil properties are suitable for the establishment and maintenance of selected vegetation species	pH	pH is typical of that of the surrounding landscape or falls within desirable ranges provided by the agricultural industry	pH (5.6 - 7.3)	6.0	7.1	5.34	5.51	6.5	6.5	5.37	6.2
			Organic Matter	Organic Carbon levels are typical of that of the surrounding landscape, increasing or fall within desirable ranges provided by the agricultural industry	% (>4.5)	3.0	4.6	2.3	1.9	2.6	4.6	4.2	2.4
			Nitrate	Nitrate levels are typical of that of the surrounding landscape or fall within desirable ranges provided by the agricultural industry	ppm (>12.5)	1.2	1.9	1.0	2.4	1.4	1.3	3.5	1.0
Phase 4: Ecosystem&	Vegetation	Vegetation contains a diversity of species comparable to that of the	Diversity of shrubs and	The diversity of shrubs and juvenile trees with a stem diameter < 5cm is comparable to that of the local remnant	species/area	1	6	4	6	4	12	7	6

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Completion Performance Indicators Description	Unit of measurement	Woodland ecosystem range 2013		LFO-01	LFO-02	Estcourt 1997	Beechmore 1999	Altona 1999	Kundibah 2001
Landuse Establishment	diversity	local remnant vegetation	juvenile trees	vegetation.									
				The percentage of shrubs and juvenile trees with a stem diameter < 5cm dbh which are local endemic species and these percentages are comparable to the local remnant vegetation	% population	100	100	100	100	100	100	100	98
			Exotic species richness	The total number of live exotic plant species provides an indication of the exotic plant diversity of the site and that it is less than or comparable to the local remnant vegetation	<No./area	13	27	27	31	9	5	16	18
	Vegetation density	Vegetation contains a density of species comparable to that of the local remnant vegetation	Density of shrubs and juvenile trees	The density of shrubs or juvenile trees with a stem diameter < 5cm is comparable to that of the local remnant vegetation	No./area	29	110	25	118	14	64	152	56
	Ecosystem composition	The vegetation is comprised by a range of growth forms comparable to that of the local remnant vegetation	Trees	The number of tree species regardless of age comprising the vegetation community is comparable to that of the local remnant vegetation	No./area	2	4	3	3	6	7	6	10
			Shrubs	The number of shrub species regardless of age comprising the vegetation community is comparable to that of the local remnant vegetation	No./area	0	3	1	3	3	7	10	6
			Herbs	The number of herbs or forb species comprising the vegetation community is comparable to that of the local remnant vegetation	No./area	33	46	36	38	18	20	28	27
Phase 5: Ecosystem & Landuse Development	Protective ground cover	Ground layer contains protective ground cover and habitat structure comparable with the local remnant vegetation	Perennial plant cover (< 0.5m)	Percent ground cover provided by live perennial vegetation (< 0.5m in height) is comparable to that of the local remnant vegetation	%	7	25	1	9.5	6.5	5.0	10.1	15.5
			Total Ground Cover	Total groundcover is the sum of protective ground cover components (as described above) and that it is comparable to that of the local remnant vegetation	%	89	95	92	93	89.5	66.5	71.5	89.5
	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	The percent ground cover abundance of native species (<0.5m height) compared to exotic species is comparable to that of the local remnant vegetation	%	63	87	38.6	17.8	92.6	86.8	57.9	72.2
	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	The number of shrubs or juvenile trees < 0.5m in height provides an indication of establishment success and/or natural ecosystem recruitment and that it is comparable to that of the local remnant vegetation	No./area	7	89	0	82	2	32	21	3

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Completion Performance Indicators Description	Unit of measurement	Woodland ecosystem range 2013		LFO-01	LFO-02	Estcourt 1997	Beechmore 1999	Altona 1999	Kundibah 2001
			shrubs and juvenile trees 1.5 - 2m in height	The number of shrubs or juvenile trees 1.5-2m in height provides an indication of establishment success, growth and/or natural ecosystem recruitment and that it is comparable to that of the local remnant vegetation	No./area	0	18	7	8	3	4	43	8
	Ecosystem structure	The vegetation is developing in structure and complexity comparable to that of the local remnant vegetation	Foliage cover 0.5 - 2 m	Projected foliage cover provided by perennial plants in the 0.5 - 2m vertical height stratum indicates the community structure is comparable to that of the local remnant vegetation	% cover	1	9	13.5	26	10	10	8	25
			Foliage cover >6m	Projected foliage cover provided by perennial plants > 6m vertical height stratum indicates the community structure is comparable to that of the local remnant vegetation	% cover	17	42	0	0	29	21	6	11
	Tree diversity	Vegetation contains a diversity of maturing tree and shrubs species comparable to that of the local remnant vegetation	Tree diversity	The percentage of maturing trees and shrubs with a stem diameter > 5cm dbh which are local endemic species and these percentages are comparable to the local remnant vegetation	%	100	100	100	100	100	100	100	100
	Ecosystem health	The vegetation is in a condition comparable to that of the local remnant vegetation.	Live trees	The percentage of the tree population which are live individuals and that the percentage is comparable to the local remnant vegetation	% population	83	100	100	100	100	100	94.1	100
			Healthy trees	The percentage of the tree population which are in healthy condition and that the percentage is comparable to the local remnant vegetation	% population	7	47	100	100	52.9	38.5	47.1	53
			Flowers/fruit: Trees	The percentage of the tree population with reproductive structures such as buds, flowers or fruit provides evidence that the ecosystem is maturing, capable of recruitment and can provide habitat resources comparable to that of the local remnant vegetation	% population	50	83	25	50	41.2	30.8	58.8	33.3

Table 13: Performance of Grassland Rehabilitation Monitoring Sites (from Appendix 14)

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Completion Performance Indicators Description	Unit of measurement	Grassland ecosystem range 2013		TSF1-01	TSF1-02	TSF2-01	TSF2-02	E22-01	E22-02	E26-01	E27-01
Performance indicators are quantified by the range of values obtained from replicated reference sites						Lower	Upper	2013	2013	2013	2013	2013	2013	2013	2013
Phase 2: Landform establishment and stability	Landform function	Landform is functional and performing as it was designed to do	LFA Stability	Based on key physical, biological and chemical characteristics the LFA stability index provides an indication of the sites stability and that it is comparable to or trending towards that of the local remnant vegetation	%	64.5	73.0	67.0	68.5	67.0	76.0	71.8	60.5	71.0	69.5
			LFA Infiltration	Based on key physical, biological and chemical characteristics the LFA infiltration index provides an indication of the sites infiltration capacity and that it is comparable to or trending towards that of the local remnant vegetation	%	29.3	46.3	39.8	40.9	32.8	33.9	47.0	39.9	46.1	47.8
			LFA Nutrient recycling	Based on key physical, biological and chemical characteristics the LFA nutrient recycling index provides an indication of the sites ability to recycle nutrient and that it is comparable to or trending towards that of the local remnant vegetation	%	28.1	43.2	40.4	39.9	34.2	39.3	47.4	35.3	41.8	45.0
			LFA Landscape organisation	The Landscape Organisation Index provides a measure of the ability of the site to retain resources and that it is comparable to that of the local remnant vegetation	%	100	100	100	100	100	100	100	100	100	100
	Active erosion	Areas of active erosion are limited	No. Rills/Gullies	Provides an assessment of the number of gullies or rills occurring in a 50m transect and that these are limited and stabilising	No.	0	0	0	0	6	0	0	1	0	0
Phase 3: Growth medium development	Soil chemical, physical properties and amelioration	Soil properties are suitable for the establishment and maintenance of selected vegetation species	pH	pH is typical of that of the surrounding landscape or falls within desirable ranges provided by the agricultural industry	pH (5.6 - 7.3)	6.73	7.97	7.90	7.72	6.16	7.50	7.26	8.24	7.91	7.34
			Organic Matter	Organic Carbon levels are typical of that of the surrounding landscape, increasing or fall within desirable ranges provided by the agricultural industry	% (>4.5)	1.6	4.1	1.9	1.1	1.5	1.3	2.6	1.6	2.4	2.7
			Nitrate	Nitrate levels are typical of that of the surrounding landscape or fall within desirable ranges provided by the agricultural industry	ppm (>12.5)	1.2	1.4	2.6	1.2	0.9	1.1	0.3	0.8	1.3	1.8



Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Completion Performance Indicators Description	Unit of measurement	Grassland ecosystem range 2013		TSF1-01	TSF1-02	TSF2-01	TSF2-02	E22-01	E22-02	E26-01	E27-01
Phase 4: Ecosystem & Landuse Establishment	Vegetation diversity	Vegetation contains a diversity of species comparable to that of the local remnant vegetation	Exotic species richness	The total number of live exotic plant species provides an indication of the exotic plant diversity of the site and that it is less than or comparable to the local remnant vegetation	<No./area	14	20	16	20	16	17	24	18	22	22
	Ecosystem composition	The vegetation is comprised by a range of growth forms comparable to that of the local remnant vegetation	Herbs	The number of herbs or forb species comprising the vegetation community is comparable to that of the local remnant vegetation	No./area	26	34	16	24	13	23	20	24	25	22
			Grasses	The number of grass species comprising the vegetation community is comparable to that of the local remnant vegetation	No./area	11	15	7	10	14	8	12	9	10	12
Phase 5: Ecosystem & Landuse Development	Protective ground cover	Ground layer contains protective ground cover and habitat structure comparable with the local remnant vegetation	Perennial plant cover (< 0.5m)	Percent ground cover provided by live perennial vegetation (< 0.5m in height) is comparable to that of the local remnant vegetation	%	16	30	10.5	27	24	30	25.5	11.0	30	2.0
			Total Ground Cover	Total groundcover is the sum of protective ground cover components (as described above) and that it is comparable to that of the local remnant vegetation	%	86	97	99.5	96	86.5	99	100	96	100	87
	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	The percent ground cover abundance of native species (<0.5m height) compared to exotic species is comparable to that of the local remnant vegetation	%	29	77	28.3	42.7	40.6	36.5	23.6	36.6	52.5	16.7
	Ecosystem structure	The vegetation is developing in structure and complexity comparable to that of the local remnant vegetation	Foliage cover 0.5 - 2 m	Projected foliage cover provided by perennial plants in the 0.5 - 2m vertical height stratum indicates the community structure is comparable to that of the local remnant vegetation	% cover	0	5	11	4.5	0	13.5	30.5	1	0.2	22

3.8.3.3 Estcourt Biodiversity Offset site/Other Projects

Management of the Estcourt biodiversity offset is ongoing in alignment with the guidance received from the Office of Environment and Heritage and the Vegetation Management Plan.

NPM is required to establish a biodiversity offset site to mitigate impacts associated with the approved Estcourt TSF (Development Consent 06-0026 Mod1). The Estcourt Offset Area is approximately 65ha in area and is situated approximately 2km northeast of the NPM. The vegetation within the area is comprised of approximately 42 ha of *Eucalyptus microcarpa* (Inland Grey Box) - *E. populnea* (Bimble Box) - *Callitris glaucophylla* (White Cypress Pine) woodland with the remaining 23ha being derived native grassland. The grassy woodland has been subjected to selective thinning and grazing and is now dominated by *Callitris glaucophylla*, with scattered occurrences of *Eucalyptus microcarpa*. Shrubs are scarce but there are several individuals of *Acacia decora* (Western Silver Wattle). The grassy understorey is dominated by a variety of native grasses, herbs and native daisies are common.

The derived grasslands have also been described as formerly part of this *E. microcarpa* - *E. populnea* - *Callitris glaucophylla* tall woodland but apart from some isolated paddocks trees it has been extensively cleared and has endured a long cultivation and grazing history.

Natural regeneration of the site continues to be high, with additional saplings establishing in previously disturbed areas. The 7151 m² area affected by the grassfire in late 2012 has begun to regenerate, and a monitoring site was established as part of the 2013 monitoring program to track progress of regeneration of this area. . The new monitoring site (EOA-06) appears to have recovered from the fire and was ecologically comparable with unaffected woodland, despite having a cover of litter cover which had not yet accumulated to depth and the presence of very hard setting soils.

The offset site was divided into two functional management zones based on the level of environmental management activities required. Zone 1 – Revegetation Zone will include rehabilitation of cleared agricultural land through revegetation activities and Zone 2 – Regeneration Zone will include rehabilitation of existing native vegetation through bush regeneration activities, natural regeneration and supplementary plantings where appropriate. Zone 2 shows a higher level of 'natural resilience' than Zone 1.

Table 15 indicates the performance of the Estcourt Offset Area monitoring sites against a selection of proposed Completion Performance Indicators developed for woodland communities during the 2013 monitoring period. The selection of criteria



has been presented in order of ecosystem successional processes, beginning with landform establishment and stability (orange) and ending with indicators of ecosystem and landuse development (blue). The range values are amended annually.

Table 14: Key for Table 15.

	Rehabilitation sites meeting or exceeding the range values of their representative community type and have therefore been deemed to meet proposed completion criteria targets.
	Rehabilitation sites not meeting the proposed completion criteria but still falls within “desirable” levels as prescribed by the agricultural industry.
	Rehabilitation sites not meeting the proposed completion criteria and not considered to fall within “desirable” levels as prescribed by the agricultural industry.

Table 15: Performance of Estcourt offset site (from Appendix 15)

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Completion Performance Indicators Description	Unit of measurement	Woodland ecosystem range 2013		EOA-01	EOA-02	EOA-03	EOA-04	EOA-05	EOA-06
Performance indicators are quantified by the range of values obtained from replicated reference sites						Lower	Upper	2013	2013	2013	2013	2013	2013
Phase2: Landform establishment and stability	Landform function	Landform is functional and performing as it was designed to do	LFA Stability	Based on key physical, biological and chemical characteristics the LFA stability index provides an indication of the sites stability and that it is comparable to or trending towards that of the local remnant vegetation	%	62.9	69.0	73.0	71.0	70.0	70.5	70.5	65.5
			LFA Infiltration	Based on key physical, biological and chemical characteristics the LFA infiltration index provides an indication of the sites infiltration capacity and that it is comparable to or trending towards that of the local remnant vegetation	%	41.1	55.7	41.7	45.0	50.3	49.4	47.8	40.5
			LFA Nutrient recycling	Based on key physical, biological and chemical characteristics the LFA nutrient recycling index provides an indication of the sites ability to recycle nutrient and that it is comparable to or trending towards that of the local remnant vegetation	%	36.2	53.0	42.2	44.3	47.3	44.3	44.1	36.2
			LFA Landscape organisation	The Landscape Organisation Index provides a measure of the ability of the site to retain resources and that it is comparable to that of the local remnant vegetation	%	100	100	100	100	100	100	100	100
	Active erosion	Areas of active erosion are limited	No. Rills/Gullies	Provides an assessment of the number of gullies or rills occurring in a 50m transect and that these are limited and stabilising	No.	0	0	0	0	0	0	0	0
Phase 3: Growth medium development	Soil chemical, physical properties and amelioration	Soil properties are suitable for the establishment and maintenance of selected vegetation species	pH	pH is typical of that of the surrounding landscape or falls within desirable ranges provided by the agricultural industry	pH (5.6 - 7.3)	6.0	7.1	6.0	6.0	6.0	5.92	5.76	5.65
			Organic Matter	Organic Carbon levels are typical of that of the surrounding landscape, increasing or fall within desirable ranges provided by the agricultural industry	% (>4.5)	3.0	4.6	3.2	3.3	3.6	5.1	3.2	3.6
			Nitrate	Nitrate levels are typical of that of the surrounding landscape or fall within desirable ranges provided by the agricultural industry	ppm (>12.5)	1.2	1.9	0.6	1.4	1.2	1.4	5.0	3.2
Phase 4: Ecosystem& Landuse	Vegetation diversity	Vegetation contains a diversity of species comparable to that of the local remnant vegetation	Diversity of shrubs and juvenile trees	The diversity of shrubs and juvenile trees with a stem diameter < 5cm is comparable to that of the local remnant vegetation.	species/area	1	6	1	1	1	2	1	1

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Completion Performance Indicators Description	Unit of measurement	Woodland ecosystem range 2013		EOA-01	EOA-02	EOA-03	EOA-04	EOA-05	EOA-06
Establishment				The percentage of shrubs and juvenile trees with a stem diameter < 5cm dbh which are local endemic species and these percentages are comparable to the local remnant vegetation	% population	100	100	100	100	100	100	100	100
			Exotic species richness	The total number of live exotic plant species provides an indication of the exotic plant diversity of the site and that it is less than or comparable to the local remnant vegetation	<No./area	13	27	24	22	21	19	20	17
	Vegetation density	Vegetation contains a density of species comparable to that of the local remnant vegetation	Density of shrubs and juvenile trees	The density of shrubs or juvenile trees with a stem diameter < 5cm is comparable to that of the local remnant vegetation	No./area	29	110	12	15	12	2	14	9
	Ecosystem composition	The vegetation is comprised by a range of growth forms comparable to that of the local remnant vegetation	Trees	The number of tree species regardless of age comprising the vegetation community is comparable to that of the local remnant vegetation	No./area	2	4	1	1	1	1	1	2
			Shrubs	The number of shrub species regardless of age comprising the vegetation community is comparable to that of the local remnant vegetation	No./area	0	3	0	0	0	1	0	0
			Herbs	The number of herbs or forb species comprising the vegetation community is comparable to that of the local remnant vegetation	No./area	33	46	24	21	37	38	41	53
Phase 5: Ecosystem & Landuse Development	Protective ground cover	Ground layer contains protective ground cover and habitat structure comparable with the local remnant vegetation	Perennial plant cover (< 0.5m)	Percent ground cover provided by live perennial vegetation (< 0.5m in height) is comparable to that of the local remnant vegetation	%	7	25	8.5	16.5	31	36.5	31	25
			Total Ground Cover	Total groundcover is the sum of protective ground cover components (as described above) and that it is comparable to that of the local remnant vegetation	%	89	95	100	100	100	100	99.5	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	The percent ground cover abundance of native species (<0.5m height) compared to exotic species is comparable to that of the local remnant vegetation	%	63.4	87.1	30.7	29.5	62.9	73.4	66.3	87.1
	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	The number of shrubs or juvenile trees < 0.5m in height provides an indication of establishment success and/or natural ecosystem recruitment and that it is comparable to that of the local remnant vegetation	No./area	7	89	12	15	12	2	14	6

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Completion Performance Indicators Description	Unit of measurement	Woodland ecosystem range 2013		EOA-01	EOA-02	EOA-03	EOA-04	EOA-05	EOA-06
			shrubs and juvenile trees 1.5 - 2m in height	The number of shrubs or juvenile trees 1.5-2m in height provides an indication of establishment success, growth and/or natural ecosystem recruitment and that it is comparable to that of the local remnant vegetation	No./area	0	18	0	0	0	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	Projected foliage cover provided by perennial plants in the 0.5 - 2m vertical height stratum indicates the community structure is comparable to that of the local remnant vegetation	% cover	1	9	1	11	4	0	0.5	0
			Foliage cover >6m	Projected foliage cover provided by perennial plants > 6m vertical height stratum indicates the community structure is comparable to that of the local remnant vegetation	% cover	17	42	0	0	0	19	8	9
	Tree diversity	Vegetation contains a diversity of maturing tree and shrubs species comparable to that of the local remnant vegetation	Tree diversity	The percentage of maturing trees and shrubs with a stem diameter > 5cm dbh which are local endemic species and these percentages are comparable to the local remnant vegetation	%	100	100	0	0	0	100	100	100
	Ecosystem health	The vegetation is in a condition comparable to that of the local remnant vegetation.	Live trees	The percentage of the tree population which are live individuals and that the percentage is comparable to the local remnant vegetation	% population	83	100	0	0	0	66.7	60	76.5
			Healthy trees	The percentage of the tree population which are in healthy condition and that the percentage is comparable to the local remnant vegetation	% population	7	47	0	0	0	14.3	60.0	23.5
			Flowers/fruit: Trees	The percentage of the tree population with reproductive structures such as buds, flowers or fruit provides evidence that the ecosystem is maturing, capable of recruitment and can provide habitat resources comparable to that of the local remnant vegetation	% population	50	83	0	0	0	38.1	60	47.1



3.8.3.4 Land Disturbance and Pre-clearing Survey

A total of 2.09ha of land was disturbed by mining operations during the reporting period. This approved clearing was associated primarily with upgrades of the water management system.

3.8.3.5 Revegetation and Rehabilitation

Rehabilitation works during 2013 have been associated with the rehabilitation of temporary drill pads established as part of Northparkes Mines exploration drilling program. NPM continues its annual commitment to plant 10,000 trees in wildlife corridors to link remnant vegetation communities. During the reporting period these plantings occurred on the southern boundary of Northparkes agricultural property 'Kundibah', in addition to the northern boundary on the agricultural property 'Orana'

3.8.4 Actions Proposed for 2014

- Continue tree planting in wildlife corridors to link remnant vegetation communities
- Establish Stage 4 of tailings capping research project
- Review of the Vegetation Management Plan.

3.9 Waste and Hazardous Material Management Year Summary

- 40.22 % of total waste recycled
- 23.65 % reduction in total waste generated from previous reporting period
- Chemical audit successfully completed.

3.9.1 Monitoring

Onsite non-mineral waste storage facilities are inspected on a regular basis. These inspections target non-mineral waste segregation, general housekeeping, and management of hydrocarbons and chemicals.

NPM undertake inspections at offsite waste disposal facilities receiving non-mineral waste from NPM. Frequency and detail of these inspections are based on the level of risk associated with that waste stream.

NPM also undertake an annual chemical audit on-site which reviews the usage, storage, labelling, quantities, MSDS availability, and approval to be on-site. All chemical approvals are managed on-site via the ChemAlert database.

3.9.2 Management

NPM mining and processing activities generate non-mineral waste such as tyres, waste hydrocarbons, batteries, steel and domestic rubbish. NPM's waste management hierarchy is to eliminate, reduce and recycle where possible and set internal targets to drive this behaviour.



A site wide non-mineral waste management system has been implemented at NPM. The system is managed by waste management specialists and includes the following:

- Provision of suitable waste receptacles;
- Collection and disposal of waste materials;
- Waste tracking and reporting;
- Awareness training; and
- Identification of improvement opportunities.

The system aims to minimise waste generation, and maximise reuse and recycling. This is assisted by a bin colour-coding system to facilitate non-mineral waste segregation at the source of generation. No non-mineral waste was disposed of on-site at NPM during the reporting period.

All non-mineral waste quantities are removed offsite for disposal and are tracked and reported on a monthly basis by NPM's waste service provider.

NPM manages hazardous materials through an internal approval process and the ChemAlert program. All chemicals brought to and used onsite are then registered in a central database. This database contains the Material Safety Data Sheets and can be accessed at any computer terminal to provide guidance on storage, use, and disposal to personnel

All waste bins onsite (general and recycle) bins are labelled which enables NPM to monitor for waste types and quantity which also provides opportunity to implement waste reduction programs onsite.

3.9.3 Results

Total non-mineral waste generated in the reporting period represents a 23.65% reduction from the previous reporting period. This is largely attributable to a reduction in the production of scrap steel (i.e. used grinding material) generated by NPM's Ore Processing, Underground and the completion of the Tunnel Boring Project. The quantity of general waste produced was more than the recyclable waste and thereby there was an decrease in recycling percentage from the last year.

The annual independent audit of NPM's chemical system did not identify any significant issues. Minor improvement opportunities were sighted in individual workplaces predominantly associated with pre-approvals of products, storage and labelling.



3.9.4 Actions Proposed for 2014

- Continue and implement opportunities for waste recycling, re-used and reduction.
- Training and awareness sessions for NPM and NPM contractors.
- Undertake works at the underground hydrocarbon storage areas to comply with the Australian Standard required for storage of hydrocarbons.
- Offsite waste facilities audit

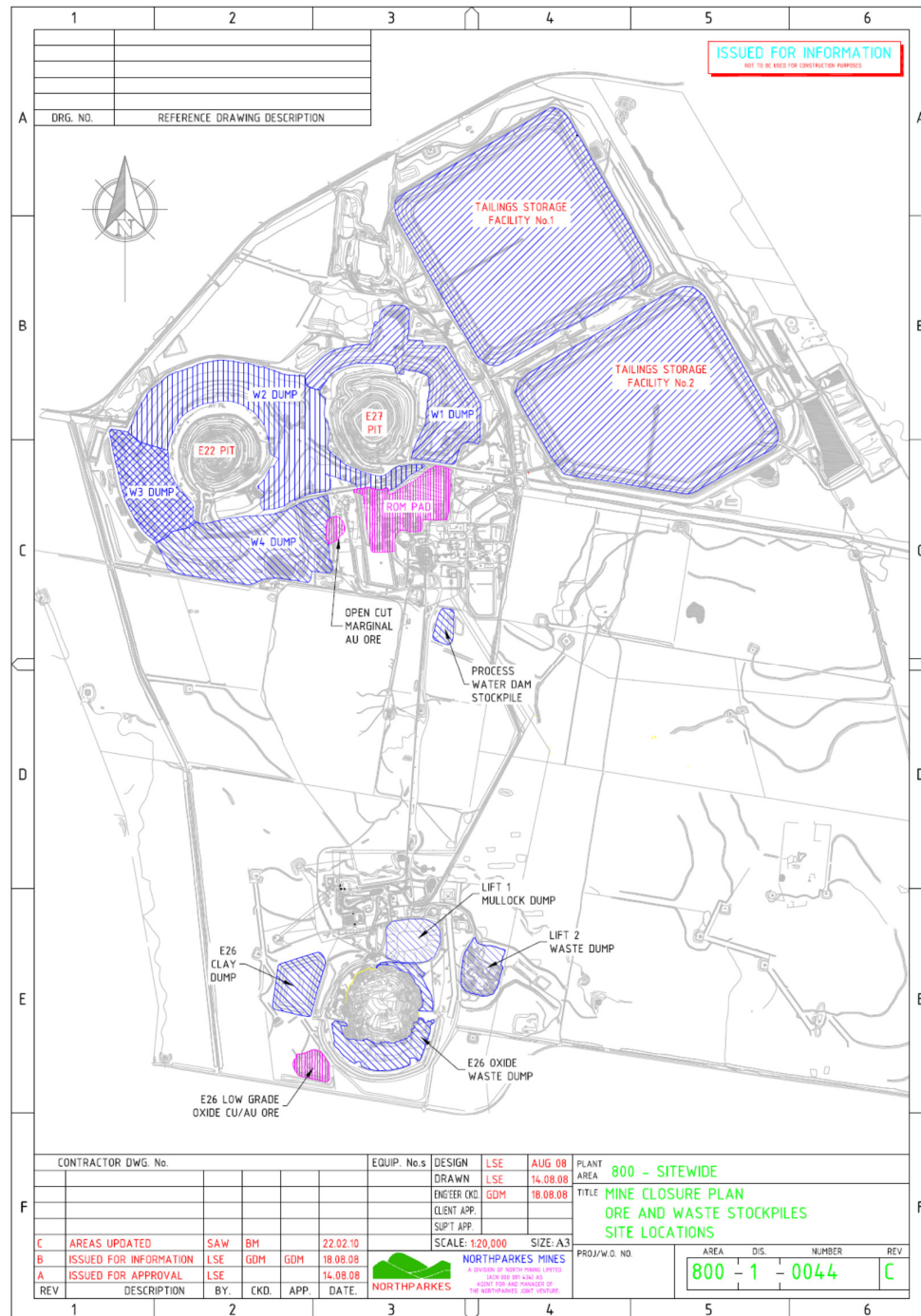
3.10 Tailings and Mineral Waste Reporting period summary

- 5.7 million tonnes of tailings deposited
- 94,652 tonnes of waste rock deposited on waste dumps
- Dust suppression trials continued with straw bales placed on top of the TSF1. Straw bales were placed on TSF1 as dust mitigation measure.

NPM currently have three TSF's on-site, TSF1, TSF2 and Estcourt TSF, which incorporated in-pit deposition into a former open cut pit E27. TSF1 is currently at capacity, with approval for an additional wall lift of four meters. Active tails deposition is occurring in TSF2, Estcourt TSF and E27.

NPM also have a number of waste dumps on-site (Figure 16) one of which is currently being utilised primarily to accommodate waste material from on-going underground development.

Figure 16: Existing Ore and Waste Rock Dump and Stockpile Locations



3.10.1 Management Tailings



A total of approximately 95 Mt of tailings has been deposited at NPM operations to date. All tailings have been deposited within TSF1, TSF2, E27 pit and Estcourt TSF 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.

NPM control measures for the management of tailings during construction and operation are implemented as per the Tailings Operators Manual.

The site tailings strategy is regularly reviewed and the most optimal disposal strategy utilised. The tailings deposition strategy going forward involves alternating deposition between the E27 pit, Estcourt TSF and TSF2. Seepage remediation works were commissioned on TSF2 to realign the seepage drainage channels on the Northern Wall of TSF2.

Waste Rock

Geochemical tests of waste rock are conducted for underground activities to determine the nature of the material prior to excavation for disposal onto a surface dump or stockpile. Waste rock and clay across the operations are stored in either stockpiles or dumps as detailed in *Figure 16*.

Generally underground waste rock has been placed in the E26 Lift 1 Mullock Stockpile. Mineral waste is reused for construction activities. An additional clay dump was constructed to the east of the E26 subsidence zone to store pre-strip material from above the E26 ore body.

Within the constraints of mineral waste management practices these waste dumps and stockpiles may be utilised for construction purposes such as TSF walls, TSF capping, or as road base.



3.10.2 Monitoring

Tailings

NPM maintains an extensive monitoring program to manage impacts associated with tailings storage. Anomalies from the monitoring program are recorded and reported internally for action.

Daily inspections monitor:

- Tailings lines and discharge spigots;
- Tailings walls for any breaches, cracks or structural changes;
- Water levels in the retention ponds, TSFs, decant ponds, sediment ponds, and stilling ponds;
- Pump and pipeline integrity from the plant to the TSF;
- Rainfall measurements; and
- Density of tailings stream.

Weekly inspections monitor:

- Water pressures measured at the TSF1 and TSF2 piezometers
- Monthly inspections of the outer surface of the TSF walls monitor:
- Wall stability, cracking and erosion rills;
- Vegetative cover; and
- Seepage.

Quarterly water monitoring of the surface and groundwater quality surround the tailings storage facilities.

The mine is currently depositing into the Estcourt TSF and E27 pit. Construction of Estcourt TSF was completed and commissioned during 2012.

All construction work on TSF1 and E27 pit were completed in 2009, with minimal repairs in the current reporting period with the exception of TSF2 where seepage remediation works were undertaken on the Southern Wall.

Erosion of TSF1 and TSF2 drop structures continued to be monitored as part of routine surveillance inspections.

TSF impacts on groundwater and surface water are monitored in accordance with the water monitoring program detailed in Section 3.7.

Mineral waste monitoring includes a monthly composite sample of the tailings slurry. The sample is sent for full sulphide and mineralogical analysis to determine plant efficiencies and chemistry of the tailings.



Waste Rock

NPM undertake testing programs to characterise the nature of rock material considered waste from the mining process. NPM engaged external consultants to undertake the Geo-Chemical assessments on waste rocks and tailings to assess the potential environmental risks posed by waste rocks. The works include characterisation of waste rock and tailings generated during mining, as well as rock located in the area of subsidence associated with the mined out ore body.

The samples were submitted for the following tests

- Paste pH and EC
- Total Sulphur
- Acid Neutralising Capacity (ANC)
- Net Acid Generation (NAG) test
- Multi-Element Chemical Assay

Results indicate that the primary waste rocks from the ore bodies are low in sulphur with high acid-neutralising capacity and a negative net acid-producing capacity.

Solubility analyses and leachate tests showed that potentially toxic elements are not mobile at the natural pH of the waste rock and elevated levels are not expected in leachates or pore water.

Using a conservative management approach, waste rock is tested for its acid forming potential even though acid rock drainage does not pose a significant risk for the operations.

Tailings sample indicate low total sulphur content with moderate acid neutralising capacity. All tailings are high content of gold, copper and selenium compared to average crustal abundances.

The Environment team inspects the waste rock dumps on a regular basis for density of vegetative cover, slumping / movement, weed growth, erosion, and drainage lines.

3.10.3 Results Tailings

In the reporting period, 5,703,728 tonnes of tailings were deposited between TSF2 and E27.



Waste Rock

A total of 94,652 tonnes of waste rock from underground development was placed on the Lift 1 Mullock Dump during the reporting period. This was primarily from the Brazen, Discovery and Conviction development drives.

The waste movement for this reporting period decreased from the previous reporting period due to the completion of construction activities of the Estcourt TSF.

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

3.10.4 Actions Proposed for 2014

- Monitor the effectiveness of the straw bales applied to TSF1
- Commence the construction of the Rosedale TSF, pending EA approval.

3.11 Greenhouse Gas and Energy Years Performance

- Successfully implemented two energy efficiency projects
- Improved energy efficiency and reduction in greenhouse emissions
- Accounting and reporting with the requirements of the *National Greenhouse and Energy Reporting Act (2007)*

3.11.1 Monitoring

Metering and monitoring of greenhouse gas emissions sources is paramount to governing direction on greenhouse gas management. Such tracking allows the identification of opportunities for performance improvement.

NPM undertakes regular monitoring of key energy use and greenhouse gas emission sources. All electricity, diesel, LPG, SF6, petrol, oils and greases and ethanol usage figures are recorded and tracked monthly and reported as part of the *National Greenhouse and Energy Reporting Act (2007)* (NGER).

This data is also collected to track toward business targets around energy efficiency and total emissions.

3.11.2 Management

NPM aim to minimise greenhouse gas emissions from all of its activities. This is achieved through the identification of greenhouse gas emission sources, evaluating and prioritising them according to risk. This understanding allows the design and execution of projects to reduce and mitigate emissions. NPM recognise the importance of actively addressing the climate change challenge. Mill processing activities are the largest energy consumer, representing approximately



75% of total site usage; the majority of the remaining 25% is utilised in the mining process.

The Federal Government Energy Efficiency Opportunities Program (EEO) was implemented in 2007. The first cycle EEO was completed with 40 opportunities identified. Of the 40 opportunities identified 16 projects underwent detailed investigation. From the detailed investigation eight projects were implemented.

The 2nd Cycle EEO assessment workshop was completed in 2011 for the current reporting period of 2011 – 2016 with 20 opportunities identified. Of the 20 opportunities identified which eight projects would undergo detailed investigation and implementation during the the five year cycle period ending June 2016. The examples of the projects include:

- Fines Filter – Installation of two new pressure filters to improve the capacity of the filtration section (reduce concentrate recovery losses). This will therefore reduce the kWh/tonne of concentrate produced.
- Underground Crushers Efficiency – Primary crusher gap setting trial to reduce the P80 of E48 crusher. This trial will provide the secondary crusher with smaller F80 and help reduce the P80 of the secondary crusher. Smaller P80 of the secondary crusher will likely to improve the tph of the mill with no or little additional energy use and therefore reduce the kWh/t ore milled.
- Sump Pump Optimisation – Energy saving through re-directing or managing sump and bund water flows. In order to manage the water flows, the water flowing through the pipe line must be monitored. This can be achieved by installing flow monitoring devices on the pipelines. By optimising the sump pump, it may stabilise the mill circuit operation and hence will have potential to also improve the throughput.
- Tertiary Mill Utilisation – Review use of tertiary mill (ML06) at bearing throughput rates. Looking at opportunity to campaign the utilisation of the tertiary mills.
- LH514E Loader Bucket Upgrade - Redesign loader bucket capacity to increase ore carrying capacity. The intent of the bogger bucket upgrade is to look for opportunity to stand down the operation of one bogger and hence lead to direct energy saving. This will increase productivity of the bogger, reduce unit production cost by reducing energy use, maintenance, and labour use for boggers.
- Power Fraction Correction – Power factor for the electrical system in NPM is currently average at 0.9. The requirement by utility authority is to have minimum power factor of 0.95. By improving the power factor, there will be opportunity to reduce electricity cost due to reduced losses in the electrical

system. Power factor correction survey to be undertaken to determine feasibility of the project.

- Vibrating Screen Upgrade – Upgrade the screen capacity of SV08 and SV09. New screen will be more power efficient and will increase the mill throughput due to larger screening capacity.
- Stockpile Management – To reduce variation of stockpile height which has a relationship with total mill throughput. By reducing variation in stockpile height, throughput will increase by an average 6 TPH on an annual basis.

3.11.3 Results

Greenhouse and energy performance at NPM increased throughout the current reporting period in contrast to the previous reporting period (refer to Table 16) as a result of increase in tonnes of ore mined and ore mined compared to previous year.

Table 16: Energy and Greenhouse Performance Summary

Indicator	Previous reporting period (Actual)	Current reporting period (Target)	Current reporting period (Actual)	Target Met
Emissions per tonne of concentrate (t CO ₂ -e/t)	1.47	1.67	1.14	✓
Electricity per tonne milled (GJ/t milled)	0.1434	0.1477	0.1313	✓

During the reporting period NPM donated new energy saving lights to the PCYC basketball courts and the electricians for 60 hours to install them. These lights will use half the power but provide 60 per cent more lighting for the basketball courts.

3.11.4 Actions Proposed for 2014

- Conduct site wide energy awareness campaign
- Implementation of selected 2nd Cycle EEO projects
- Energy efficiency financial reporting to the Clean Energy Regulator



3.12 Cultural heritage Reporting period summary

- Aboriginal Heritage Surveys continued to be completed as required.

3.12.1 Monitoring

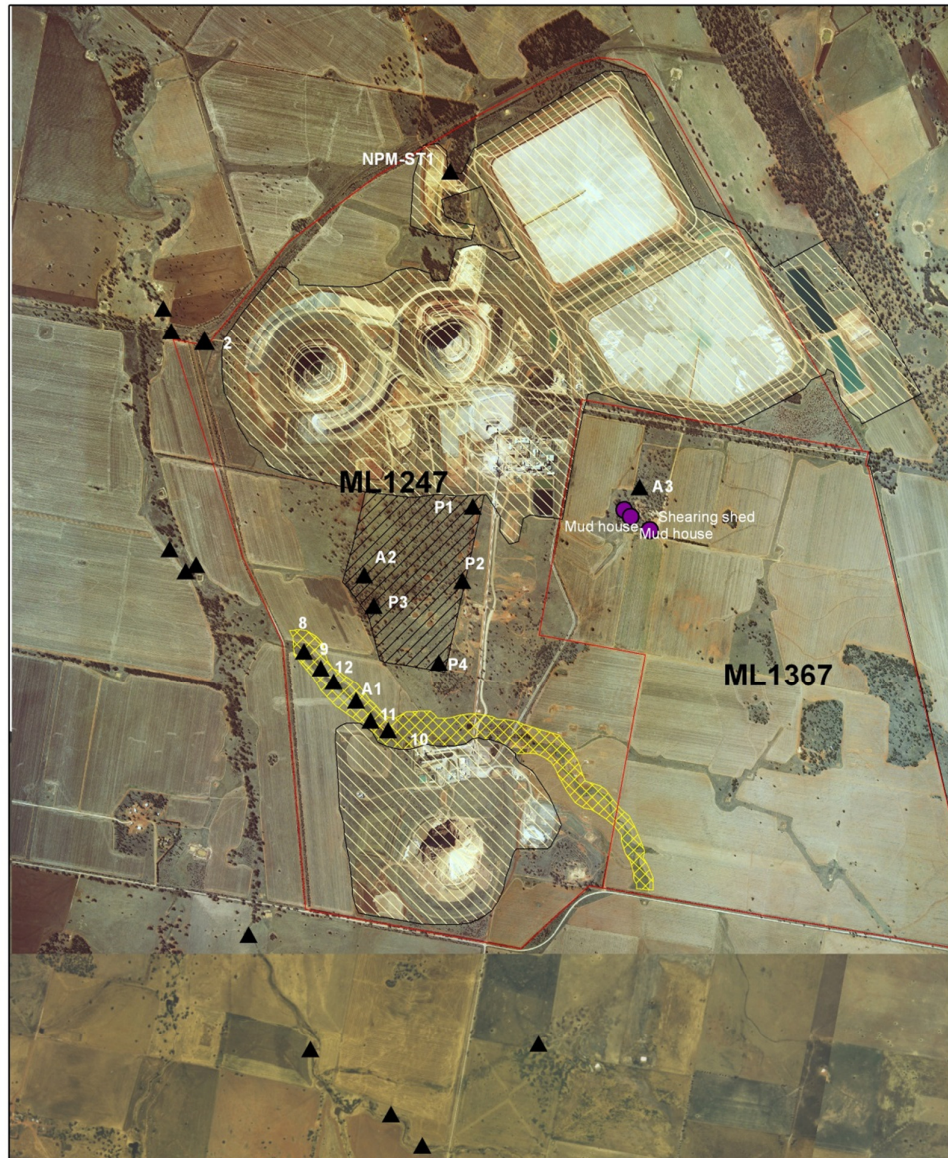
The location of the Aboriginal cultural heritage sensitivity zones are identified in

Figure 17.








Monitoring includes:

- Checking the accuracy of information recorded on the land management system;
- Inspection of protected Aboriginal cultural heritage sites to ensure that they have not been damaged (prior to salvage)
- Audit of the site disturbance process and approvals to ensure that all appropriate archaeological assessments have occurred; and
- Review of the training program to ensure relevant staff have received Aboriginal cultural heritage training.

Figure 17: Aboriginal Cultural Heritage Sensitivity Zones



Legend

 Mining Lease	 Aboriginal sites	 Zone 1 Medium Sensitivity, Goonumbra Creek	 Zone 3 Very Low Sensitivity, Flats waterless terrain
 Identified European Sites	 Zone 2 Low Sensitivity, Limestone Forest	 Zone 4 Zero Sensitivity, Area disturbed by mining related activities	

0 125 250 500 750 1,000
Meters
1:34,000



Cultural Heritage

Map No.: NPM_ENV_004
Reviewed By: E&C Superintendent
Revision Date: 30/07/2010
Version 2



3.12.2 Management

Northparkes has implemented an Aboriginal Heritage Management Plan (AHMP) that provides the framework for the identification, assessment, monitoring and management of Aboriginal cultural heritage on site.

In accordance with the AHMP, the Wiradjuri Executive committee (WEC) formally known as the Aboriginal Heritage Working group (AHWG), met on a regular basis throughout the current reporting period, with four meetings held in February, June, August and December. The WEC is a consultation forum to enable review of the current Northparkes Aboriginal heritage management practices and to identify potential improvement opportunities. The WEC reviews all Site Disturbance Permits at their quarterly meetings.

Northparkes utilises a Site Disturbance Permit approval system to manage the protection of heritage sites on the mine lease. This approval process applies to activities planned to be undertaken in previously undisturbed areas or previously rehabilitated areas. The area to be disturbed is compared against the Aboriginal cultural heritage sensitivity zones and determines the requirement for additional survey work or salvage work prior to starting the project.

3.12.3 Results

Works undertaken by the WEC in the reporting period included:

- Review of all site disturbance permits issued by NPM at regular meetings
- Reviewed a total of 9 Site Disturbance Permits for cultural heritage monitoring requirements.

3.12.4 Actions Proposed for 2014

- Continuation of the quarterly meetings with the Wiradjuri Executive committee
- Continual review of Site Disturbance Permits and opportunity to comment in regard to improvements.

Community Relations

Reporting period summary

- On-going sponsorship and participation in community based programs in the order of \$480,000.
- Support and participate in community activities
- Eight community complaints

Northparkes recognises and respects the importance of positive relations with the surrounding community in which it operates. Its community-related activities are aimed at fostering positive and effective relationships.

4. Community engagement

Northparkes is committed to engagement with the local community to obtain a greater understanding of community issues and to keep the community updated on activities relating to Northparkes' operations.

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 Northparkes personnel. Two meetings were held in the reporting period in March and September. In addition to this a subcommittee has been formed to assist Northparkes in making decisions where sponsorship requests are received from the local community, as part of the Northparkes Community Investment Program, valued at between \$1000 and \$20,000. No significant issues were raised during the meetings held with the community during the reporting period.

Northparkes is also committed to regular communication with its nearby neighbours. Neighbour meetings are typically held twice a year with Northparkes' closest neighbours to provide a consultation and feedback mechanism in regards to mining activities. Two neighbour meetings were held in the reporting period. No significant issues were raised during the meetings held with Northparkes' neighbours in the reporting period.

The "Source" community newsletter continued to be distributed twice during the reporting period with positive feedback from community members on the content, design and intent of the newsletter. "Source" was delivered to approximately 12,000 residents across the district of Parkes and Forbes and is aimed at communicating Northparkes' activities with both shires.



4.1 Participation

An ongoing community issue is the limited number of medical professionals in the Parkes Shire. They work extremely hard to deliver a vital service to our region, which the local community relies upon.

The GP Working group, an initiative of the Parkes Shire Council, was formed to combat the shortage of doctors and services in the region and is responsible for investigating and implementing mechanisms and programs to attract and retain doctors in our region. Northparkes identified an opportunity to hold an annual community sports day to raise money for a new doctor, which has been running annually for five years.

On Saturday September 21, a sporting competition was held in Parkes involving 19 teams competing across four different sports and a mystery event for the coveted inaugural Northparkes GP Cup Shield. Local businesses supported the event by sponsoring teams. Over \$AU20,000 was raised in the reporting period for this cause.

A key community concern and issue for Northparkes in attracting and retaining staff is the availability of doctors and medical professionals in the region. This day therefore not only supports the needs of the local community, it aligns strongly with Northparkes' business drivers.

4.2 Contributions and achievements

Northparkes has developed a strong relationship with the local community over the past 20 years, and has supported local community events, committees and schools through donations, Northparkes Community Investment Program and partnership programs. Northparkes continued its financial assistance to local organisations that provide benefits to the community. Approximately \$AU480,000 was invested in various sporting, educational, cultural, environmental, tourist and agricultural programs.

Northparkes continued to be an active member of the local community. A snapshot of the major initiatives in the current reporting period programs included:

- The Northparkes Volunteering Program that encourages our employees to assist community groups by volunteering their time. During the reporting period over 60 employees participated in the program in a range of projects in the region including a working bee, installing energy efficient lighting in the Parkes PCYC and baking for Legacy;
- A Grants Officer Program in conjunction with Parkes Shire Council;
- A Grants Officer Program in conjunction with Forbes Shire Council;
- An Aboriginal project officer in conjunction with Parkes Shire Council;



- A Sports Grant Program with the Parkes Shire Council
- Five-year partnership with CentaCare – Strong Young Mums;
- Participation in the Northparkes GP Cup;
- Continued support of the Parkes Touch Football Association;
- Supporting Lachlan Health Services with a Palliative Care partnership;
- Supporting education through the Peer Tutoring Program at Parkes High School and Parkes Life Education Program; and
- A community equipment pool which provides community groups to access to equipment such as marquees, a blow up TV screen, a PA system, eskies etc to use at events free of cost.

4.3 Complaints

4.3.1 Management

Northparkes has a process for receiving, investigating, responding and reporting complaints received from community members. A 24-hour external telephone line (02 6861 3000 - Option 3) is in place to provide the public with an opportunity to communicate with Northparkes in regard to any community concerns. This contact number is advertised in the local telephone directory, six-monthly in local newspapers and on the Northparkes website (www.northparkes.com). This website also provides information about all phases of the operation, and has a facility for the community to submit enquiries, concerns or complaints via e-mail direct to the Community and External Relations team.

All complaints received are referred to the Community and External Relations team, and are then responded to in a professional and timely manner. All complaints are recorded and outcomes of investigation findings and corrective actions implemented are communicated to the relevant personnel and reported in the AEMR and the annual Sustainable development report.

During the reporting year Northparkes received five complaints from community members relating to dust generation from TSF1 (Table 17). In addition, three complaints relating to the same issue were reported directly to the EPA. Northparkes maintained regular correspondence with OEHL in regards to progress and effectiveness of projects to control dust generation on the surface of TSF1.

RESULTS

Table 17: Complaints Received in 2013

Incident No.	Issue	Date	Time	Details
1000191353	Traffic	16.01.13	19:05	The complainant called Northparkes at 19.05 about a vehicle from Parkes Heavy Mechanical entering Bogan Road from Northparkes Lane without giving way. The complainant was travelling north from Parkes and said he had to hit his brakes and swerve to avoid the vehicle. The contractors were been spoken to by their contractor superintendent and they offered to write an apology letter.
	Water	11.03.13	10:20	A complainant called and said that her irrigation bore had gone dry twice the weekend previously and went dry on a number of occasions. She believes this was due to mine and town pumping from the Parkes Bore Field. The Community and External Relations manager advised that Northparkes is pumping at really low rates due to the amount of water onsite at the time of the complaint.
	Reputation	28.06.13	11:43	A complainant called to advise she had heard of Northparkes staff speaking badly about her students. After an investigation the employee involved wrote an apology letter to the school explaining there had been a miscommunication and they were deeply sorry. The complainant was happy with this response.
1000231748	Dust	29.08.13	09:30	Received a call from a neighbour to advise that he saw large amounts of dust coming from the tailings and enquiring as to source or reason. The Environment Department followed up with the complainant to inform them of the cause of dust and location.
1000232626	Dust	09.09.13	17:24	Phone call received from EPA at 17:21, they received a complaint regarding dust emissions from Northparkes tailings dams, emissions noted were from TSF2 at 12pm and TSF1 at 2pm.
1000250475	Dust	10.10.13	14:18	Phone call received at 14:18 from EPA, complaint received via the EPA hotline regarding dust emissions from Northparkes tailings storage facilities



1000250829	Dust	13.10.13	16:00	Phone call received from EPA advising that two complaints had been made via the EPA hotline at 16:00 and 16:45 regarding dust emissions from Northparkes tailings storage facilities.
------------	------	----------	-------	---

	Dust	16.10.13	10:10	A complainant called the Community and External Relations team to ask what was happening in regards to the dust and what we're doing to solve the problem. She noted that Sunday before the complaint was the worst day she has seen for dust and said it was like a bushfire and quite dangerous. Community and External Relations advisor explained to her the short term fix of the dust that was taking place, an irrigation system that was being set up asap. Northparkes identified a solution of putting straw bales on top of the dam to act as wind rows to help mitigate the problem.
--	------	----------	-------	--

Compliance Review

5. Overview

In order to ensure compliance against our requirements, Northparkes has a system to identify, evaluate and communicate legal compliance. This system is managed by the Environment team and includes procedures, registers, inspections and audits.

6. Monitoring

Legal compliance is reviewed on an ongoing basis by analysis of monitoring results; maintenance of compliance registers; and a program of regular audits and inspections. Identified areas of non-conformance are promptly actioned as part of the HSEQMS.

Additionally, government authorities including DTI - Resources and Energy, OEH and EPA periodically conduct inspections to assess performance against regulatory requirements and other related matters.

6.1 Results

6.1.1 Government Inspections

A site inspection was carried out on the 6th August of the reporting period by the following representatives as part of the scheduled previous reporting period AEMR review:

- NSW EPA;
- NSW Department of Water;
- NSW Department of Trade and Investment, Division of Resources and Energy;
- Parkes Shire Council.

6.1.2 Non-Compliances

There were no recorded non-compliances during the reporting period and reported in the Annual Return as stipulated in EPL 4784.