Centennial Coal

CENTENNIAL COAL
MYUNA COLLIERY
ANNUAL REVIEW

January 2018 to December 2018

March 2019

Centennial Coal
Environment Matters

Table 1. Annual Review Title Block

Name of Operation	Myuna Colliery
Name of Operator	Centennial Myuna Pty. Ltd.
Development Consent/ Project Approval #	PA10_0080 MOD1 SH110-148
Name of holder of Development Consent / Project Approval	Centennial Myuna Pty. Ltd.
Mining Lease #	ML1632 ML1370 MPL334
Name of Holder of Mining Lease	Centennial Myuna Pty. Ltd.
Water License #	20BL172565 20BL173259
Name of Holder of Water License	Centennial Fassifern Pty. Ltd.
MOP/RMP Start Date	1st January 2016
MOP/RMP End Date	30th November 2022
Annual Review Start Date	1st January 2018
Annual Review End Date	31st December 2018

I, , certify that this audit report is a true and accurate record of the compliance status of Myuna Colliery for the period 1st January 2018 to 31st December 2018and that I am authorized to make this statement on behalf of Centennial Myuna Pty Ltd.

Note:

a) *The Annual Review is an 'environmental audit' for the purposes of s122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion) in an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000.*

b) *The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (intention to defraud by false or misleading statement – maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents –maximum penalty 2 years imprisonment or $22,000,or both).*

Name of Authorised Reporting Officer	ANDREW MYORS
Title of Authorised Reporting Officer	DIRECTOR
Signature of Authorised Reporting Officer	A.J. Myors
Date	11/3/19

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Plans

Plan Reference No	Plan Name
MY11606	Annual Review Plan 2018
MY11301	Myuna Colliery Surface Layout

Appendices

Appendix No	Appendix Name
1	Myuna Colliery Weed Action Plan 2018
2	2018 Ecological Monitoring Report – Swamp Sclerophyll Forest on Coastal Floodplains EEC
3	Centennial Myuna Annual Groundwater Management Report
4	Hydrocarbon Impact Assessment

1. STATEMENT OF COMPLIANCE

Table 2 provides a statement of compliance with the relevant approvals during the reporting period.

Table 2. Statement of Compliance

Were all conditions of the relevant approval(s) complied with?	
Project Approval 10_0080 MOD1	NO
Development consent SH110/148	YES
Mining Operations Plan 2016-2022	YES
Mining Lease 1632	YES
Mining Lease 1370	YES
Mining Purposes Lease 334	YES
Exploration Lease 4444	YES
Exploration Lease 6640	YES
EPL 366	NO
Bore Licence 20BL172565	YES
Bore Licence 20BL173259	YES
Section 151 Point Wolstoncroft SCA	YES
Section 151 Pulbah Island SCA	YES
Section 151 Wangi Point SCA	YES

Table 3 provides a list of conditions that were not complied with during the reporting period.

Table 3. Non-Compliances

Relevant Approval/s	Condition #	Condition summary	Compliance Status	Comment	Where Addressed in Annual Review
EPL 366	M2.3	Water and/or land Monitoring Requirements		Non-compliant sampling container used for Oil & Grease	Section 11
EPL 366 PA 10_0080	L5.1 Sch 3 Cond 11	Noise Limits Noise Criteria		Exceedance of noise criteria limit at R1.	Section 11

Note: Compliance Status Key for Table 3

Risk Level	Colour Code	Description
High		Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence
Medium		Non-compliance with: • Potential for serious environmental consequences, but is unlikely to occur; or • Potential for moderate environmental consequences, but is likely to occur
Low		Non-compliance with: • Potential for moderate environmental consequences, but is unlikely to occur; or • Potential for low environmental consequences, but is likely to occur
Administrative		Only to be applied where the non-compliance does not result in any risk of environmental harm (eg submitting a report to government later than required under approval conditions)

2. INTRODUCTION

Myuna Colliery is an underground coal mine owned and operated by Centennial Myuna Pty Limited. Myuna is located 25 km south west of Newcastle NSW in the Lake Macquarie and Wyong Local Government Areas. The Colliery lease lies within the Parishes of Awaba, Coorumbung, Morisset and Wallarah in the County of Northumberland subsidence district and is located within the Shire of Lake Macquarie.

Lake Macquarie City Council (LMCC) granted Development Consent SH110_148 for the development and operation of the Myuna and Cooranbong Collieries in 1977. The Development Consent was granted pursuant to the provisions of the now repealed Local Government Act 1919. The Development Consent remains in force and authorises the extraction of coal within the Development Consent Mining Area.

The Development of Myuna Colliery began in 1979 and underground mining using bord and pillar mining methods commenced in 1982. Centennial Coal Company Ltd acquired Myuna Colliery in 2002, and has operated the mine since this time.

On 18 January 2012, the then Minister of Planning and Infrastructure granted Project Approval (PA) 10_0080 to Centennial Myuna. A modification to PA10_0080 was approved 1st February 2015.

PA 10_0080 (MOD1) authorises the continued mining in areas outside the existing Development Consent SH110_148 mining area and within the boundary of existing mining leases held by Centennial Myuna. PA 10_0080 MOD1 authorises:

- the use of bord and pillar methods in the Wallarah, Great Northern and Fassifern coal seams;
- the continued use of ancillary infrastructure until 31st December 2032;
- the extraction of not more than 3 million tonnes of ROM coal from the site in any calendar year.

Plan MY11606, which is appended to this document, shows;

- the operation and its regional context,
- Development Consent SH110_148 and Project Approval 10_0080 boundaries,
- mining lease boundaries, and
- current operational disturbance footprint.

Table 4 provides the names and contact details of the key personnel who are responsible for the environmental management of the operation.

Table 4. Environmental Management Contact Details

Name	Position	Email	Phone
John Turner	Mine Manager	myunacolliery@centennialcoal.com.au	02 4970 0221
Angela van der Kroft	Environment & Community Coordinator		02 4970 0263
Pieter van Rooyen	Technical Services Manager		02 4970 0207

3. APPROVALS

The Myuna Colliery Holding is covered by Mining Lease No 1632. Mining Lease No 1632 includes a surface land area of 33 hectares for mine infrastructure (Mining Purposes Lease No. 334). The total lease area is 7426.5 hectares.

Centennial Myuna had subleased part of Consolidated Coal Lease No 762 held by Centennial Mandalong Pty Limited. The sublease area was then transferred to Centennial Myuna Pty Limited as ML1632. Effectively ML1632 replaced Part CCL762. The lease areas are shown on the Myuna Colliery Holding Plan PC14.

MPL334 was granted the 20th October 1994 for a period of 21 years. The renewal of the Mining Purposes Lease 334 took effect 20th October 2015 for a further period of 21 years to 20th October 2036. The lease conditions were amended upon renewal.

Myuna Colliery is classed a Level 1 mine. PA 10_0080 was granted by the Minister for Planning on 18th January 2012 under Section 75J of Part 3A of the EP&A Act 1979.

Table 5 includes a list of all of the environmental approvals held by Myuna Colliery under the EP&A Act, Mining Act, POEO Act, NPW Act, Water Act, Water Management Act, Radiation Act, and any changes made to these approvals during the reporting period.

Table 5. Approvals held by Centennial Myuna

Name	Description	Issued By	Expiry Date	Changed during reporting period?
SH. 110/148	Development Consent for Myuna Colliery	Lake Macquarie City Council	No expiration date specified in the consent. Subject to renewal of mining leases.	N
PA 10_0080	Myuna Colliery Mining Project	Department of Planning and Environment	31/12/2032	N
ML 1632	Mining Lease	Department of Planning and Environment – Division of Resources and Geosciences	13/10/2022	Y
MPL 334	Mining Purposes Lease		20/10/2036	Y
ML 1370	Mining Lease		07/03/2033	Y
EL 4444	Exploration Lease		23/10/2017**	N
EL 6640	Exploration Lease		23/10/2017**	N
Section 151 Licence	Mining Operations – Various Licence, Point Wolstoncroft	National Parks and Wildlife Services	10/09/2020	N

Name	Description	Issued By	Expiry Date	Changed during reporting period?
Section 151 Licence	Mining Operations – Various Licence, Pulbah Island		31/10/2021	N
Section 151 Licence	Mining Operations – Various Licence, Wangi Wangi Point		15/02/2021	N
20BL172565	Bore Licence (Dewatering ground water 4380 ML)	Department of Primary Industries – Water	12/12/2015*	N
20BL173259	Bore Licence (Monitoring Bores)		Perpetuity	N
EPL 366	Environment Protection Licence (EPL)	Environmental Protection Agency	N/A	N

* DPI Water renewed Bore Licence 20BL172565 on 12/12/2015, awaiting copy of licence and expiry date.

** Renewal Applications for EL4444 and EL6640 were submitted to DRG via email on the 20/10/2017. No response has yet been received.

3.1. Changes made to Approvals during reporting period

Instruments of Variation regarding Conditions 4 and 5 of Myuna's Mining Titles were received from the Minister of Resources, effective on the 19 February 2018 for ML 1632, 26 March 2018 for MPL 334 and the 12 April 2018 for ML 1370. They vary the conditions of each Lease by deleting the existing conditions and replacing them with the following:

Condition 4 - Non Compliance Reporting

(a) The lease holder must notify the Department upon becoming aware of any breaches of the conditions of this mining lease or breaches of the Mining Act or Regulations.

(b) Notifications under condition 4(a) must be provided in the form specified on the Department's website within seven (7) days of the mining lease holder becoming aware of the breach.

Condition 5 - Environmental Incident Report

The lease holder must provide environmental incident notifications and reports to the Secretary no later than seven (7) days after those environmental incident notifications and reports are provided to the relevant authorities under the Protection of the Environment Operations Act 1997.

3.2. Annual Review Requirements

The Annual Review has been developed to satisfy the reporting requirements of the approvals listed in Table 6.

Table 6. Annual Review Requirements

Approval	Condition No.	Requirement	Where addressed in Annual Review
Project Approval 10_0080 MOD1	Schedule 5 Condition 4	By the end of March 2013, and annually thereafter, the Proponent shall review the environmental performance of the project to the satisfaction of the Secretary. This review must:	
		(a) describe the development (including any rehabilitation) that was carried out in the past calendar year, and the development that is proposed to be carried out over the next year;	Sections 8 & 8.1
		(b) include a comprehensive review of the monitoring results and complaints records of the project over the past calendar year, which includes a comparison of these results against the: • relevant statutory requirements, limits or performance measures/criteria; • requirements of any plan or program required under this approval; • monitoring results of previous years; and • predictions in the EA;	Sections 6 & 7
		(c) identify any non-compliance over the past year, and describe what actions were (or are being) taken to ensure compliance;	Section 11
		(d) identify any trends in the monitoring data over the life of the project;	Section 6 & 7
		(e) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and	Section 6 & 7
		(f) describe what measures will be implemented over the next year to improve the environmental performance of the project.	Section 6 & 7

Approval	Condition No.	Requirement	Where addressed in Annual Review
ML1370 MPL334	Condition 3	Annual Rehabilitation Report (f) The lease holder must prepare a rehabilitation report to the satisfaction of the Minister. The report must: i. provide a detailed review of the progress of rehabilitation against performance measures and criteria established in the approved MOP; ii. be submitted annually on the grant anniversary date (or at such other times as agreed by the Minister); and iii. be prepared in accordance with any relevant annual reporting guidelines published on the Department's website at www.resources.nsw.gov.au/ environment. Note: the Rehabilitation Report replaces the Annual Environmental Management Report.	i. Section 8 ii. Section 5 iii. Section 5

4. OPERATIONS SUMMARY

Table 7. Production Summary

Material	Approved Limit (PA10_0080 MOD 1)	Previous Reporting Period (Actual)	This Reporting Period (Actual)	Next Reporting Period (Forecast)
Waste Rock/ Overburden	N/A	N/A	N/A	N/A
ROM Coal	3,000,000	1,693,819	2,166,743	2,650,000
Coarse reject	N/A	N/A	N/A	N/A
Fine reject (Tailings)	N/A	N/A	N/A	N/A
Saleable product	3,000,000	1,693,819	2,166,743	2,650,000

4.1. Other Operations

Table 8. Operations Summary

Limits	Approved Limit (PA10_0080 MOD 1)	Previous Reporting Period (Actual)	This Reporting Period (Actual)	Comment (if applicable)
Hours of operation	8760	8760	8760	Nil
Transport (rail)	N/A	N/A	N/A	Nil
Transport (road)	N/A	N/A	N/A	Nil

Note: Water Extraction under Water Licences is discussed in Section 7.

4.1. Exploration

No surface exploration occurred during the reporting period.

4.2. Next Reporting Period

There is no significant material change planned for Myuna Colliery in the next reporting period.

5. ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

The 2017 Annual Review was submitted to the Department of Planning and Environment (DPE) on 26th March 2018 in accordance with Schedule 5, Condition 4 of the Project Approval 10_0080. It was also submitted to the Department of Planning and Environment – Division of Resources and Geosciences (DRG) on the 28th March 2017 in order to satisfy Condition 3 of ML1370 and MPL334 as well as Condition 4 of ML1632. The Annual Review was prepared in accordance with DPE's *Annual Review Guideline – Post-approval Requirements for State significant mining developments (October 2015)* and any relevant annual reporting guidelines published on the DRG's website.

DPE and DRG reviewed the Annual Review and determined that the report generally satisfied the requirements of relevant conditions of the company's approvals and mining leases.

DRG conducted a detailed site inspection of Myuna pit top and infrastructure areas on 17th July 2018. The purpose of this inspection was to review compliance with environmental requirements of relevant approval instruments including the Mining Leases and Mining Operation Plan (MOP).

DRG correspondence dated 3rd September 2018 and DPE correspondence dated 23rd August 2018 outline the actions required following the report review and site inspections. These are detailed below in Table 9.

Table 9. Actions from previous Annual Review

Action Required	Requested By	Action Taken	Where Addressed in Annual Review
Include trend analysis graphs for Deposited Dust and PM_{10}/TSP in Section 6.2.1 and 6.2.2 respectively.	DPE	Trend analysis graphs for Deposited Dust and PM_{10}/TSP included in this AR.	Sections 6.2.1 and 6.2.2
Include the water year 'Take' in Table 14, and include a discussion of surface water result as compared to EA/EIS predictions.	DPE	Water year "Take" included in this AR.	Section 7
Housekeeping to capture decommissioned pipes and equipment and general rubbish,	DRE	Added housekeeping section to the weekly Environmental Inspection.	Section 5
Continuous management of weeds (eg drains and coal stockpiles).	DRE	Ongoing as a part of regular vegetation maintenance.	Section 5

6. ENVIRONMENTAL PERFORMANCE

This section includes a summary of the environmental monitoring and management measures implemented at Myuna Colliery during the 2018 reporting period.

The monitoring locations are summarised in Table 10 below, and shown on Plan MY11301, which is appended to this document.

Table 10. Summary of Monitoring Requirements

Monitoring Type	Overview of Monitoring Requirements	Requirement of Approval / Management Plan	Where Addressed in Annual Review
Noise	Quarterly at 8 locations	Northern Region Noise Management Plan EPL 366	Section 6.1
Air quality	4 x DGs - Monthly 2 x HVAS – every 6 days	Northern Region Air Quality & Greenhouse Gas Management Plan EPL 366	Section 6.2
Biodiversity	Annual surveys at 3 locations	Biodiversity Management Plan	Section 6.3
Heritage	As required	Northern Region Aboriginal Cultural Heritage Management Plan. Northern Region Historic Heritage Management Plan	Section 6.4
Greenhouse Gas	Monthly gas bag sample.	Northern Region Air Quality & Greenhouse Gas Management Plan EPL 366	Section 6.5
Water	Surface Water Volume & Quality - Various Monthly Groundwater Depth	Water Management Plan EPL 366	Section 7
Rehabilitation	N/A	Mining Operations Plan / Rehabilitation Plan	Section 8

6.1. Noise

The control strategies were implemented as per the Northern Region Noise Management Plan and were adequate to manage the risks associated with the operation during the reporting period.

The Northern Region Noise Management Plan outlines potential sources and impacts of elevated noise levels. The Plan also identifies measures which must be in place to reduce noise levels. All contractors and employees undergo induction and regular refresher training that identifies individual responsibilities for noise management.

Result Summary

Attended noise monitoring is undertaken quarterly in accordance with the Myuna Colliery EPL 366 and the Project Approval. Noise monitoring is consistent with the OEH Industrial Noise Policy and Australian Standard AS 1055 Acoustics, Description and Management of Environmental Noise.

The attended monitoring is conducted at 8 locations around the Myuna Colliery pit top. The noise monitoring data is assessed against the Project Approval and EPL limit criteria.

Table 11. Noise Environmental Performance

Noise Receptor	Period		Approval criteria	EIS / EA Predictions	Performance during the reporting period (actual)			
					Q1	Q2	Q3	Q4
R1	Day	L_{Aeq}(15 min)	35	40	I/A	I/A	NM	I/A
	Evening	L_{Aeq}(15 min)	35	39	NM	NM	35	NM
	Night	L_{Aeq}(15 min)	35	35	30	34	38	35
		L_{A1}(1 min)	45	45	32	36	40	37
R2	Day	L_{Aeq}(15 min)	35	40	I/A	I/A	I/A	I/A
	Evening	L_{Aeq}(15 min)	35	39	I/A	I/A	I/A	I/A
	Night	L_{Aeq}(15 min)	35	35	<30	32	31	30
		L_{A1}(1 min)	45	45	<30	34	33	32
R3	Day	L_{Aeq}(15 min)	35	35	38#	I/A	I/A	I/A
	Evening	L_{Aeq}(15 min)	35	35	I/A	I/A	I/A	I/A
	Night	L_{Aeq}(15 min)	35	35	I/A	N/M	I/A	I/A
		L_{A1}(1 min)	45	45	I/A	N/M	I/A	I/A
R4	Day	L_{Aeq}(15 min)	35	44	I/A	I/A	I/A	I/A
	Evening	L_{Aeq}(15 min)	40	42	I/A	I/A	I/A	I/A
	Night	L_{Aeq}(15 min)	38	39	<30	I/A	I/A	35

Noise Receptor	Period		Approval criteria	EIS / EA Predictions	Performance during the reporting period (actual)			
					Q1	Q2	Q3	Q4
		L_{A1}(1 min)	49	49	<30	I/A	I/A	37
R5	Day	L_{Aeq}(15 min)	37	44	I/A	I/A	I/A	I/A
	Evening	L_{Aeq}(15 min)	42	42	I/A	I/A	I/A	34
	Night	L_{Aeq}(15 min)	39	39	<30	N/M	25	35
		L_{A1}(1 min)	49	49	<30	N/M	27	37
R6	Day	L_{Aeq}(15 min)	37	44	I/A	I/A	I/A	I/A
	Evening	L_{Aeq}(15 min)	42	42	I/A	I/A	I/A	I/A
	Night	L_{Aeq}(15 min)	39	39	38	I/A	27	36
		L_{A1}(1 min)	49	49	39	I/A	29	38
R7	Day	L_{Aeq}(15 min)	37	44	I/A	I/A	I/A	I/A
	Evening	L_{Aeq}(15 min)	42	42	I/A	I/A	I/A	I/A
	Night	L_{Aeq}(15 min)	39	39	38	31	NM	37
		L_{A1}(1 min)	49	49	40	33	NM	39
R8	Day	L_{Aeq}(15 min)	37	44	I/A	I/A	I/A	I/A
	Evening	L_{Aeq}(15 min)	42	42	I/A	I/A	I/A	I/A
	Night	L_{Aeq}(15 min)	39	39	<30	I/A	37	31
		L_{A1}(1 min)	49	49	<30	I/A	39	39

*I/A indicates that Myuna Colliery was inaudible at the time of monitoring.

**NM indicates that Myuna Colliery's noise contribution was Not Measureable at the time of monitoring.

Myuna Colliery was operating under Emergency Day conditions on this day which increases the Approval Criteria to 40 dB(A).

6.1.1. Noise Monitoring Data Interpretation

There was one exceedance of the noise limit criteria for the reporting period, as detailed in Section 11 of this document.

Trend

Myuna Colliery has undertaken a program of attended noise monitoring from December 2012 to December 2018. The attended monitoring results have shown a consistency over the 6 year period. Colliery operations have been subjectively observed to contribute little to the measured L_{Aeq} noise levels during any period throughout the day apart from exceedances in the 2016 and current report periods. Extraneous noise sources, namely road traffic, contribute significantly to the noise levels.

EA Prediction

The Myuna Colliery Extension of Mining Project Noise Impact Assessment (Heggies 2010) predicted the operational noise levels and the noise emission levels of the Emergency Stockpile Area during operation would meet the project specific noise criteria at all assessed residential receivers under calm and prevailing weather conditions with the recommended noise mitigation and management strategies in place. The noise monitoring results for the report period have been consistent with the EA prediction.

6.2. Air Quality

Control strategies were implemented as per the Norther Region Air Quality and Greenhouse Gas Management Plan and were adequate to manage the risks associated with the operation during the report period.

The Northern Region Air Quality and Greenhouse Gas Management Plan outlines potential sources and impacts of elevated dust levels. The Plan also identifies measures which must be in place to reduce dust and environmental activities conducted to minimise elevated dust levels. All contractors and employees undergo induction and refresher training that identifies individual responsibilities for air quality management.

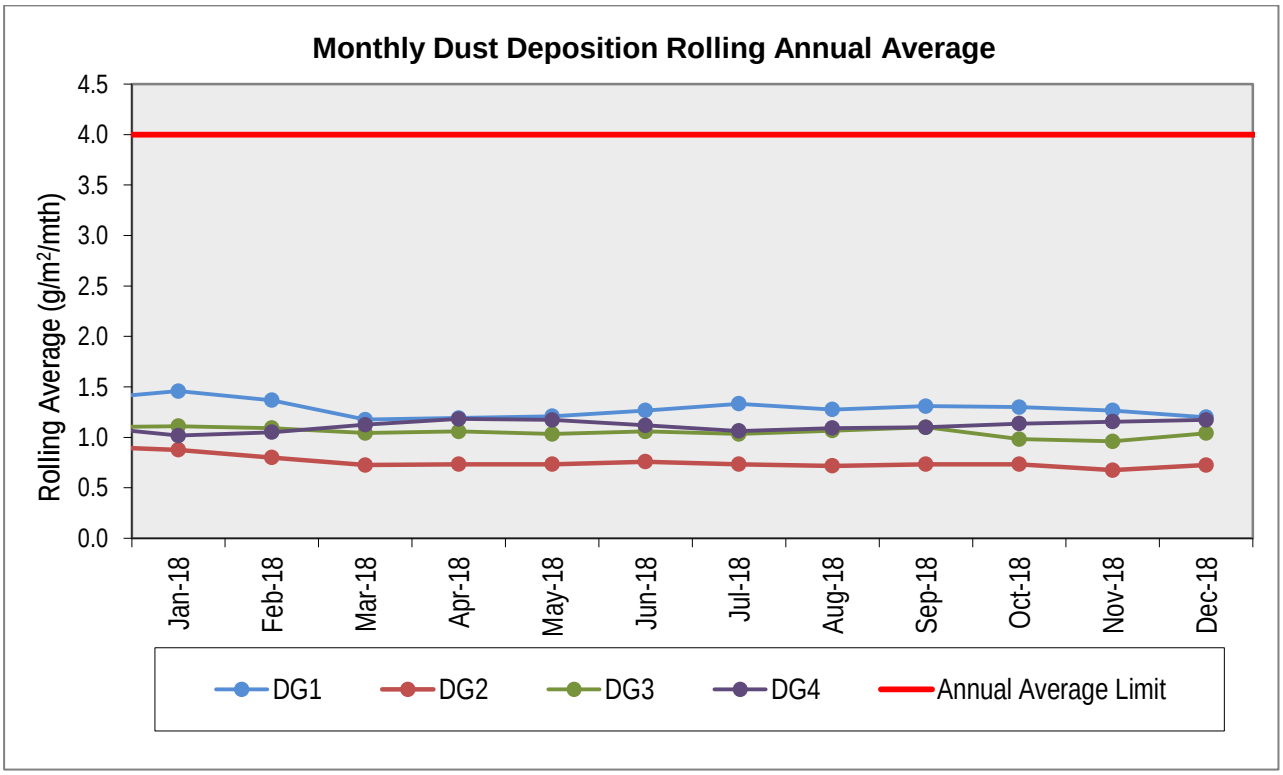


Figure 1. Dust Depositional Gauge – Rolling Annual Average

Table 12. Air Quality Environmental Performance

Dust Monitor	Approval criteria	EIS / EA Predictions	Performance during the reporting period	Long Term Average
DG1	2 g/m^2/month Max Annual Average Increase	<0.1	-0.18	0.05
	4 g/m^2/month Total Annual Average	1.9	1.2	0.9
DG2	2 g/m^2/month Max Annual Average Increase	<0.1	-0.18	0.01
	4 g/m^2/month Total Annual Average	1.9	0.7	1.0
DG3	2 g/m^2/month Max Annual Average Increase	<0.1	-0.06	-0.05
	4 g/m^2/month Total Annual Average	1.9	1.0	1.7
DG4	2 g/m^2/month Max Annual Average Increase	<0.1	0.06	0.02
	4 g/m^2/month Total Annual Average	1.9	1.2	1.4
HVAS PM_{10}	30 µg/m^3 Annual Average	10.8	15.8	13.56
	50 µg/m^3 24 hr Average	10.5 to 51.7	41 (Max 24 hr result)	41 (Max 24 hr result)
HVAS TSP	90 µg/m^3 Annual Average	36.1	31.4	29.0

6.2.1. Dust Deposition

Result summary

The air quality monitoring data is assessed against the Project Approval and EPL limit criteria. There were no exceedances of the air quality limit criteria for the report period.

Depositional dust monitoring was performed at Myuna Colliery during 2018 on a monthly basis at four depositional dust gauges. The limit criterion for depositional dust is 4 g/m^2/month, applied as an annual average.

The current air quality controls include enclosed conveyor and coal handling plant, water sprays on the conveyor system and haul road, a mobile water cannon and a road sweeper. Further controls are being investigated specifically for the waste handling facility, which include treating the area with a commercially available dust suppressant.

Trend

Myuna Colliery has 15 years of dust monitoring data over the period from January 2003 to December 2018. Data for a 10 month period from February 2007 to November 2007 is not available. A trend analysis was undertaken using a linear trend line for the dust deposition monitoring from January 2003 to December 2018.

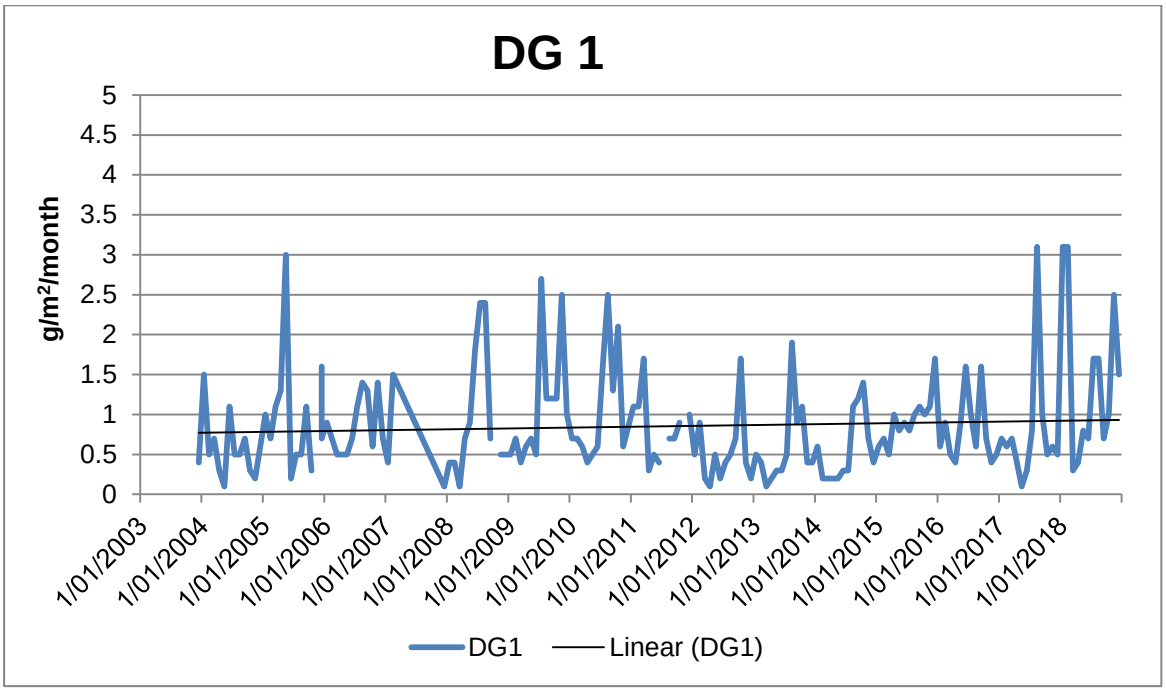


Figure 2. DG1 Trend Analysis Graph

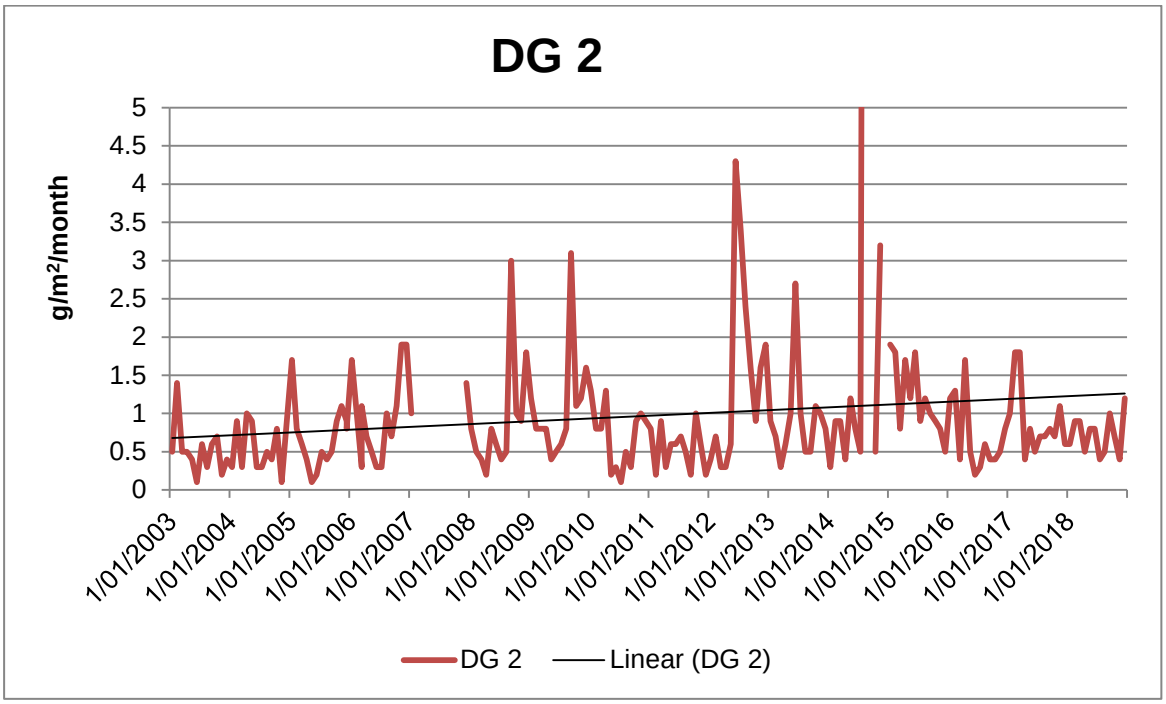


Figure 3. DG2 Trend Analysis Graph

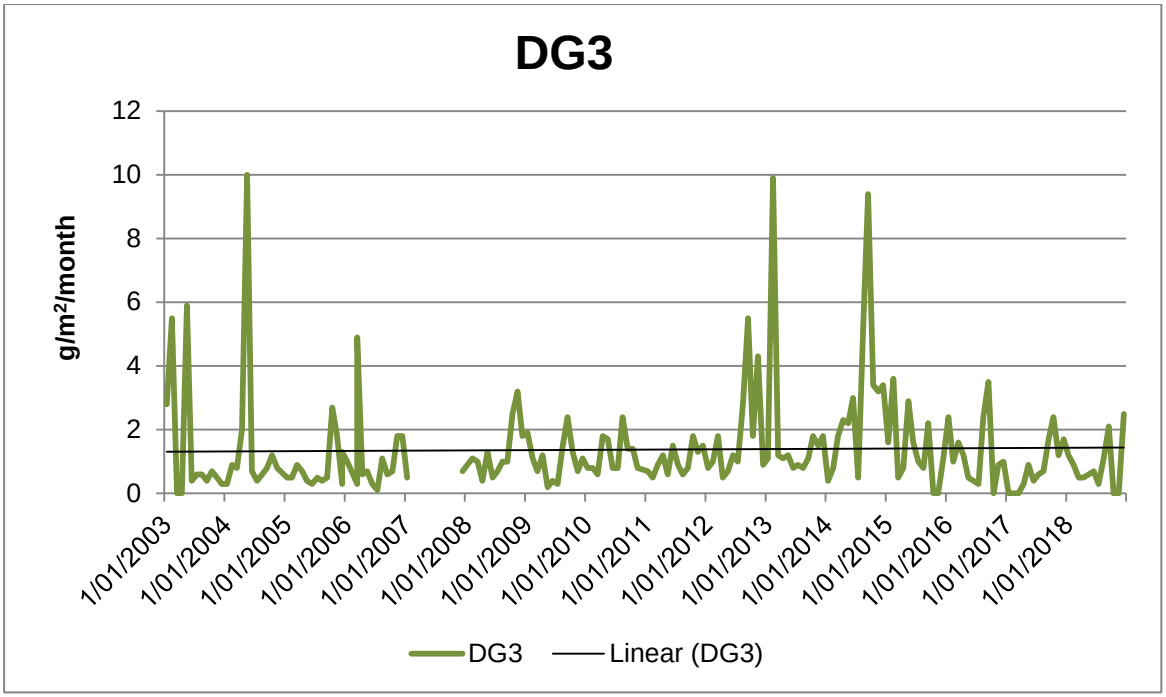


Figure 4. DG3 Trend Analysis Graph

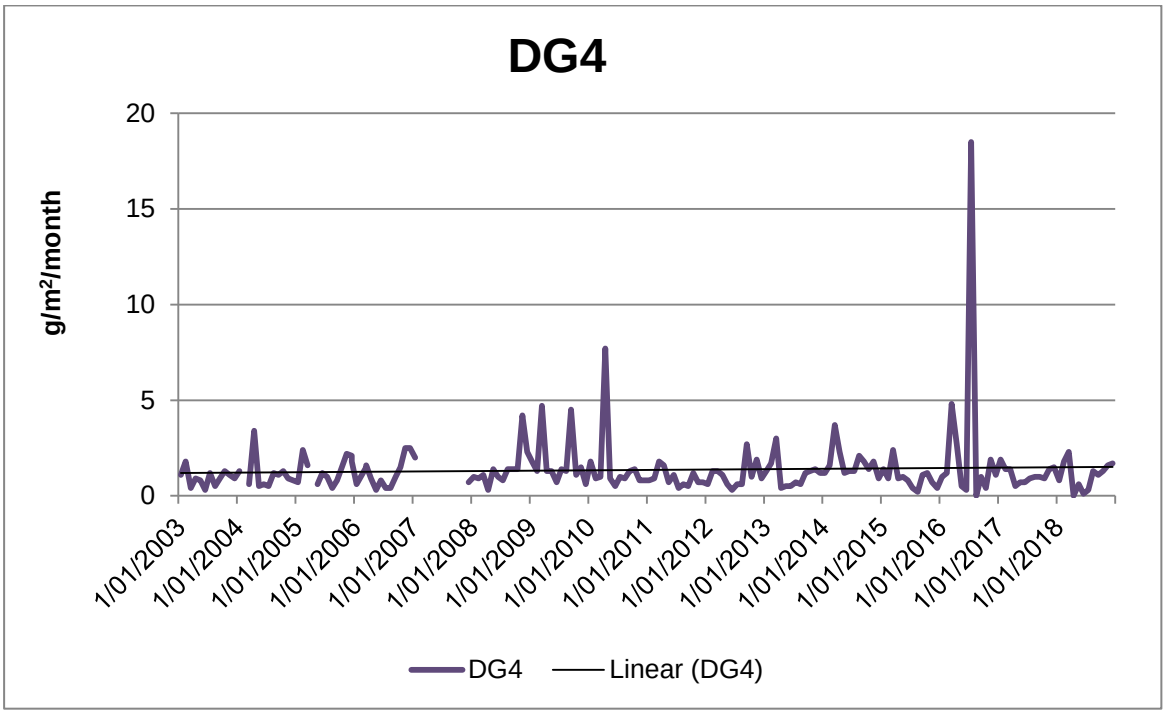


Figure 5. DG4 Trend Analysis Graph

The 2018 annual average and long term average for each dust gauge is provided in Table 12.

The 2018 annual averages for dust gauges 1, 2 and 4 are consistent with the 15 year long term average. The 2018 averages for DG 2, 3 and 4 are less than the long term average while the DG1 annual average is higher than the long term average. The difference between the annual average and the long term average for DG3 is due to the

lower than usual results of 0.3, 0.5 and 0.5 g/m^2/month recorded in July, March and April 2018.

The long term trend lines of DG 3 and 4 display a consistent trend for the monthly dust deposition while DG 1 and 2 display an increasing trend.

Dust Deposition Gauges DG3, for October and November 2018, and DG4, for April 2018, were contaminated with material not associated with deposited dust. The visual analysis from the field staff indicated that the samples were primarily composed of bird droppings, insects and vegetation. The contaminated samples are excluded from the annual and long term average analysis above.

EA Prediction

The Myuna Colliery Extension of Mining Project Air Quality Impact Assessment (Heggies 2010) predicted the dust deposition levels would be below the Project air quality criteria at all receptors. The dust deposition results for the report period have been consistent with the EA prediction.

6.2.2. HVAS

Result Summary

Air quality monitoring for PM10 and Total Suspended Particles (TSP) commenced in August 2013. The monitoring has been conducted in accordance with Schedule 3 Condition 17 of PA10_0080 and Condition M2 of and EPL 366.

The air quality monitoring data is assessed against the Project Approval and EPL limit criteria. The annual average limit criteria for the TSP is 90 µg/m^3 and PM10 is 30 µg/m^3. The 24 hour limit criteria for PM10 is 50 µg/m^3. There were no exceedances of the air quality limit criteria for the report period.

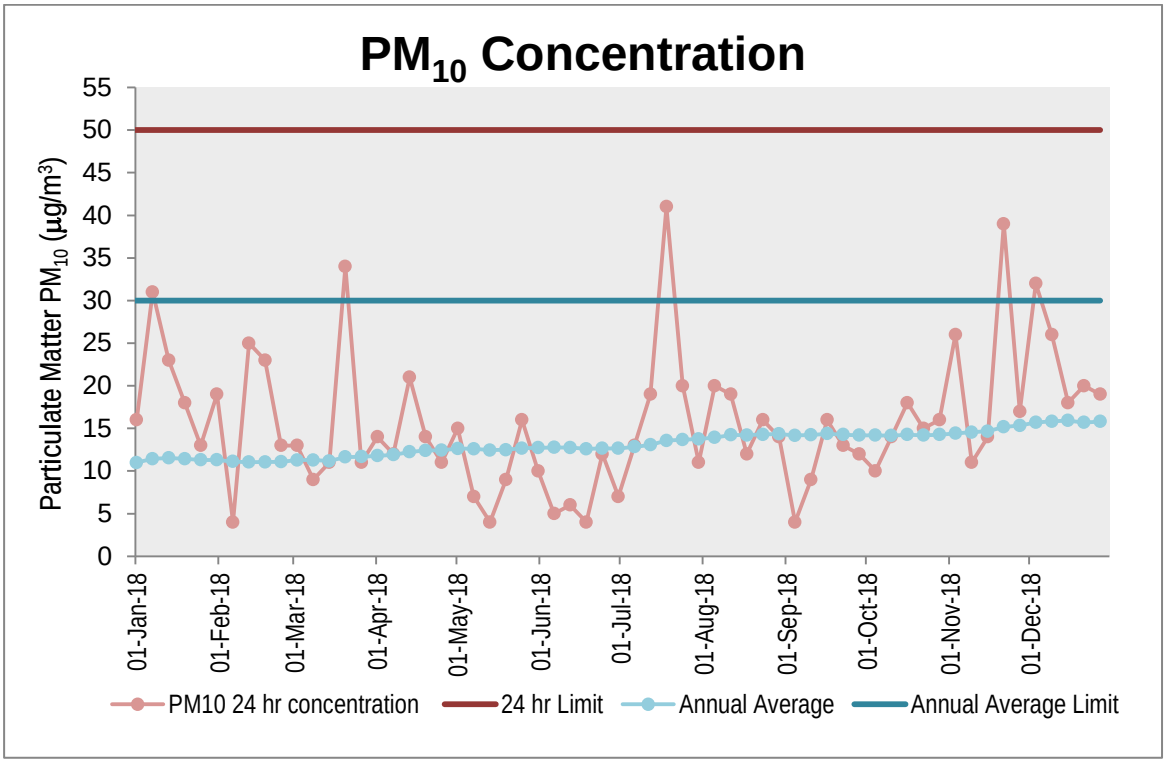


Figure 6. HVAS PM_{10} Rolling Annual Average & 24 hr Results

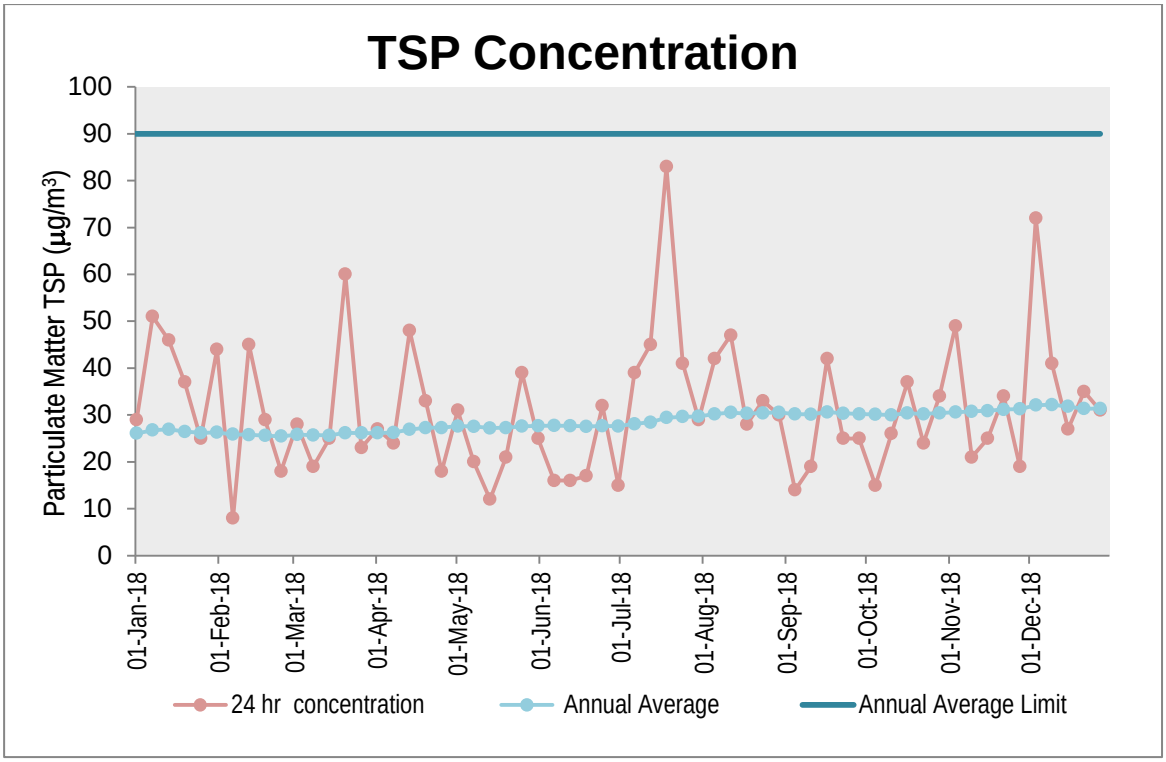


Figure 7. HVAS TSP Rolling Annual Average & 24 hr Results

The maximum recorded 24 hour PM10 concentration for the report period was 41 µg/m^3 and the maximum recorded 24 hour TSP concentration for the report period was 83 µg/m^3.

Trend

The 2018 annual averages for TSP and PM10 are greater than the long term average.

The trend analysis was undertaken using a linear trend line for the TSP and PM_{10} monitoring data from August 2013 to December 2018. The trend lines indicate slightly decreasing trends for the TSP and PM_{10} over the long term monitoring period.

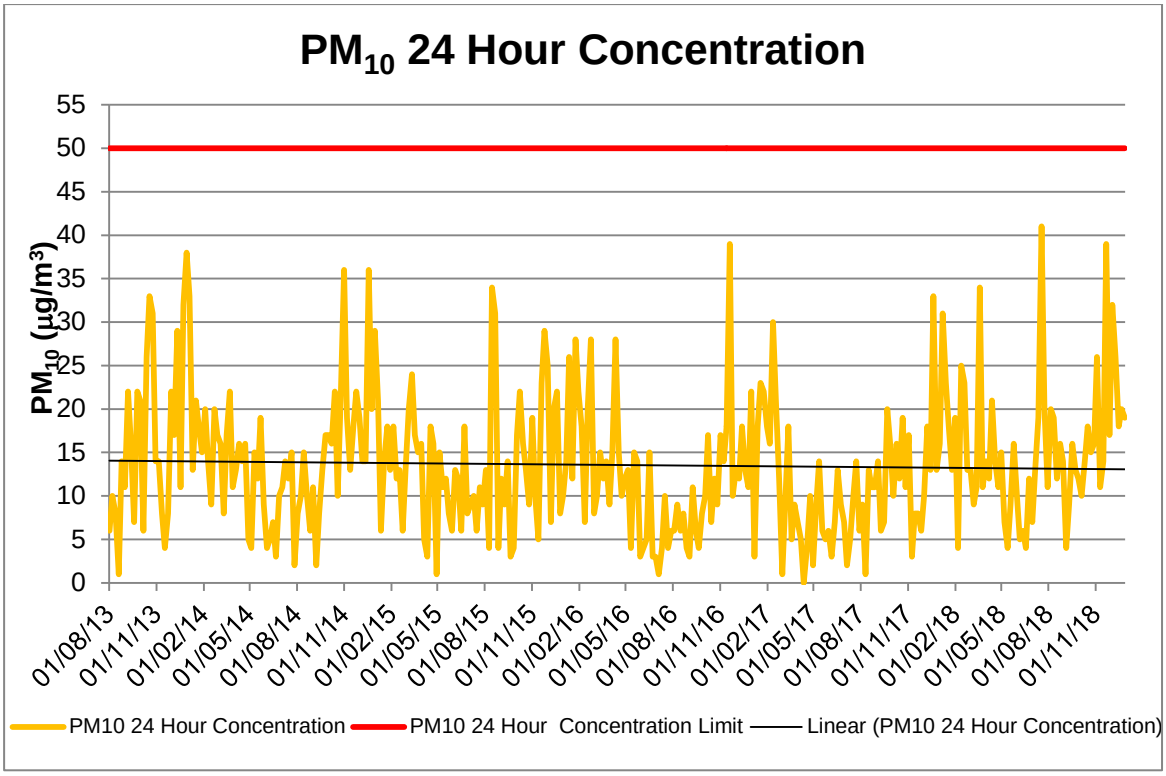


Figure 8. HVAS PM_{10} Trend Analysis Graph

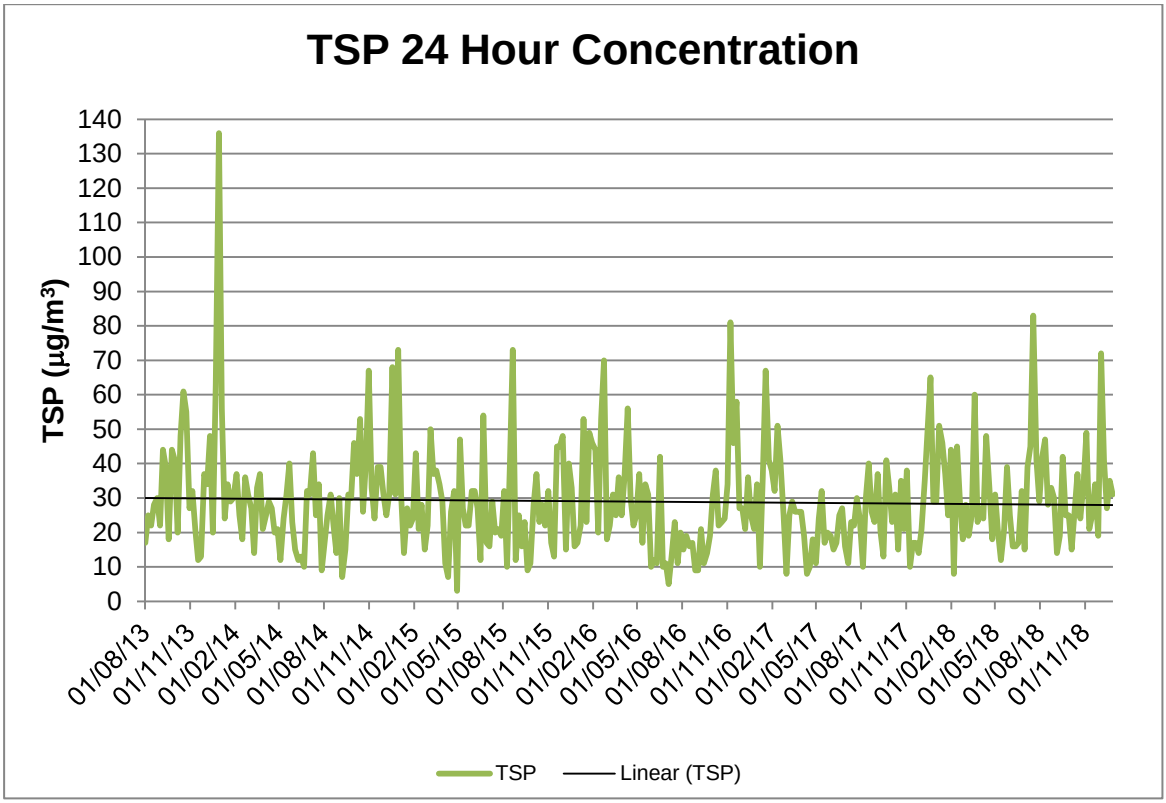


Figure 9. HVAS TSP Trend Analysis Graph

EA Prediction

The Myuna Colliery Extension of Mining Project Air Quality Impact Assessment (Heggies 2010) predicted the cumulative annual average TSP and PM_{10} concentrations would be below the project air quality goal at all private receptors. Cumulative maximum 24-hour PM_{10} concentrations attributable to the Project were predicted to be below the project air quality goals at all surrounding dwellings excluding periods of regional pollution events. The TSP and PM_{10} results for the report period have been consistent with the EA prediction.

6.3. Biodiversity

Control strategies were implemented as per the Biodiversity Management Plan and were adequate to manage the risks associated with the operation during the report period.

The Biodiversity Management Plan for the site outlines measures in place to protect and enhance the Swamp Sclerophyll Forest on Coastal Floodplains Endangered Ecological Community (EEC) on Wangi Creek. All contractors and employees undergo induction and refresher training that identifies individual responsibilities.

Myuna Colliery engaged a consultant to conduct monitoring of the EEC near Wangi Creek. The 2018 Ecological Monitoring Report (Umwelt 2018) is provided in Appendix 3.

Result Summary

The EEC Monitoring Report (Umwelt 2018) provides a qualitative comparison with the baseline assessment of 2016 and the follow up monitoring of 2017. A direct quantitative comparison was not possible as, although the objectives of the monitoring have not changed, the 2018 monitoring program has been updated to collect data in accordance with the Biodiversity Assessment Method (BAM) rather than the BioBanking Assessment Methodology (BBAM). In addition, monitoring will now occur in spring rather than autumn.

The results of the 2018 EEC monitoring suggests that subsidence from the current mining operations is not having a substantial impact on the Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions EEC. The floristic sampling and photos suggest that each sampling site is relatively consistent with the previous years and the analysis of the BAM data to the PCT benchmark data suggests that VMA 1 (Plots 1 and 2) are within benchmark condition and that VMA 2 (Plot 3) does not meet benchmark condition.

Despite VMA 2 not meeting benchmark, a comparison of the condition from 2016 and 2017 against the BBAM benchmark data suggest that the condition of VMA 2, whilst not at benchmark, is relatively stable from year to year. Notwithstanding, some recommended management actions were provided for consideration to provide better data quality and to improve the condition of VMA 2 in 2018.

The data collected in 2018 represents the baseline data for BAM monitoring in future years. The BAM uses a different metric to the BBAM and as such, the data collected in previous years is not directly comparable to the 2017 data.

During the reporting period, approximately 120 labour hours were employed at the site actively controlling high priority target weeds. This equates to six days with a crew of two carrying out primarily cut and paint bush regeneration methods, supported by foliar spraying for dense lantana, Cassia and Crofton weed infestations. Where suitable (i.e. away from waterways) selective herbicides such as Starane and 2-4-D were used to spray lantana to limit the off target damage to grasses and other non-susceptible species. This in turn helps to maintain active groundcover. This was primarily used on

plants growing up to and through boundary fences in hard to reach locations for time efficient control.

Weed control was targeted at Areas 2, 3, 4 and 5. Weeds targeted were Bitou Bush, Lantana, Crofton Weed and Cassia. Work included areas along Wangi Creek in Area 4 with Lantana, Bitou Bush and Tree Tobacco were targeted. Other weeds targeted in Area 4 were Castor Oil and Pampas Grass. Area 2 was treated for Cape Broom, Cassia and Blackberry. These areas are shown in the 2018 Weed Action Plan, included as Appendix 1 to this document.

Trend

From 2012 to the end 2018 there have been seven Annual Weed Action Plans conducted at Myuna Colliery, including an annual weed survey and on ground works. This has resulted in the ongoing suppression and removal of Lantana, Bitou Bush, Pampas Grass, Pine Trees and Castor Oil among others.

EA Prediction

The Myuna Colliery Extension of Mining Project Terrestrial Flora and Fauna Assessment (RPS 2011) predicted due to negligible surface impacts the project was unlikely to impact on any threatened species, endangered populations or threatened ecological communities.

New Material

A Northern Region Biodiversity Management Plan, which will encompass the Centennial Coal operations, Mandalong, Myuna, Newstan and Northern Coal Services, will be developed and implemented in the next Annual Report period.

6.4. Greenhouse Gas

The control strategies were implemented as per the Northern Region Air Quality and Greenhouse Gas Management Plan and were adequate to manage the risks associated with the operation during the reporting period.

Environmental Performance

Estimation of the GHG emissions associated with the Myuna was undertaken using the emission factors and methods outlined in the National Greenhouse and Energy Reporting (Measurement) Determination 2008.

Table 13 provides the total emissions by source in carbon dioxide equivalent tonnes for the reporting period.

Table 13. Total GHG Emissions from Site

Emissions Summary - July 2017 to June 2018	Total (t_{CO2-e})
Electricity	28 281
Diesel	981
Petroleum Based Oils and Greases	156

Emissions Summary - July 2017 to June 2018	Total (t_{CO2-e})
SF6	4
Fugitives - CH_4	625 234
Fugitives - CO_2	4 998
TOTAL	**659 654**

6.5. Heritage

Control strategies implemented as per the Northern Region Aboriginal Cultural Heritage Management Plan (ACHMP) and the Northern Region Historic Heritage Management Plan were adequate to manage the risks associated with the operation during the reporting period.

Result Summary

No monitoring was required under the Northern Region Historic Heritage Management Plan (HHMP) for the 2018 reporting period.

RPS was been engaged to prepare the Phase 2 post-mining initial condition of middens and a rock formation at Pulbah Island in Lake Macquarie in accordance with Centennial's Northern Region Aboriginal Cultural Heritage Management Plan (ACHMP). The purpose of the Phase 2 post mining initial condition monitoring is to reinspect the sites and compare their condition to the last documented results, as well as to provide representatives of the registered Aboriginal Parties with an opportunity to share additional information on the ceremonial significance of the island..

The survey of Pulbah Island was undertaken on Wednesday the 28th of November 2018 involving representatives from the Aboriginal parties who registered an interest in the Centennial Myuna Extension of Mining Cultural Heritage Assessment 2012.

RPS made the following observations, "*Midden sites 45-7-0087, 38-4-1823 and 45-7-0086 are in relatively good condition being stabilised by vegetation growth. Midden site 45-7-0188 has continued to suffer from natural erosion and has largely collapsed into the lake and a small rockfall adjacent to site 45-7-0088 was identified during the phase 2 inspection. The rockfall was also present during the baseline recording and therefore has occurred prior to any undermining.*"

The recommendation of the report was to conduct the Phase 3 post mining secondary condition monitoring as per the Centennial ACHMP approximately 8 months after undermining.

EA Prediction

The Myuna Colliery Extension of Mining Project Cultural Heritage Assessment (RPS 2011) considered there was minimal potential for impact from the Project on sensitive Aboriginal cultural places or objects or on European cultural heritage items.

New Material

The Northern Region Historic Heritage Management Plan, which encompasses the Centennial Coal operations, Mandalong, Myuna, Newstan and Northern Coal Services, was approved by DPE on the 13 July 2018. This Plan replaces Myuna's Non Indigenous Cultural Heritage Management Plan.

7. WATER MANAGEMENT

Centennial Myuna was granted Bore Licence 20BL172565 in December 2010 for the purpose of dewatering up to 4380 ML/ year of ground water from mine workings at Myuna Colliery. Ground water extracted from the underground mine workings is currently discharged from site via LDP B. Volumetric and water quality monitoring data at LDP B is therefore representative of ground water volumes and ground water quality extracted from the mine workings.

The volume of ground water extracted from the works authorized by the licence shall not exceed 4380 ML in any twelve month period commencing the 1st July. The total volume of water discharged through LDP B for the 2017 / 2018 period is 1999 ML. There was no exceedance of the Bore Licence criteria during the reporting period.

Table 14 identifies the water take under the water licences. It is important to note that Table 14 reports on the water year, which is from 1 July 2017 to 30 June 2018, not the calendar year.

Table 14. Water Take

License #	Water Sharing Plan, source and management zone (as applicable)	Entitlement	Passive take / inflows	Active pumping	TOTAL TAKE
20BL172565	North Coast Fractured and Porous Rock Ground Water Sources	4380	1842	81	1923

Note: Volume is reported in megalitres per year (ML/y)

The Wallarah, Great Northern and Fassifern seams contain reservoirs which are used for the retention and settlement of mine water and surface water prior to pumping to the surface settlement ponds. Significant improvements in the water management system have been achieved by increasing the rate of transfer (approximately 10 L/sec to 50 L/sec) from the CHP dam to the underground settlement reservoir. This has been achieved by the addition of a larger diameter pipe line to the automated pumping system and the implementation of a syphon line from the CHP dam to an underground reservoir via a surface to seam borehole. The pump line and syphon line are metered for the purpose of measuring the volume pumped to the underground. The volume of surface water pumped to the underground reservoir during the 2018 reporting period was approximately 22 ML.

The underground water storages in the Wallarah Seam, the Great Northern Seam and the Fassifern Seam are based on an average seam height of 3 m and a recovery ratio of 0.333, Centennial Myuna has estimated the volume of water storages in each of the seams. The underground water storage volumes are shown below in the table below.

The hydrogeological model developed for Myuna Colliery assumes that the volumes of each of these storages are constant. An annual survey of the water storage areas will be conducted when possible for the Annual Groundwater Management Report to determine whether storage volumes have changed and the hydrogeological model is recalibrated as required.

Table 15. Water Storage

Seam	Water Storage Volume (ML)
Wallarah	748
Great Northern	929
Fassifern	1326

Myuna Colliery used 63 ML of potable water for the 2018 reporting period of which approximately 95% (or 60 ML) was used for mining operations.

In accordance with the requirements of the Water Management Plan, the transfer of water from the underground workings to the surface has been monitored daily. The transfer volume for the 2018 report period was approximately 1820 ML.

Visual inspection of the flow volume trend, in the Centennial Myuna Annual Groundwater Management Report Figure 4–1(GHD February 2018), indicates that extraction from the underground workings was decreasing between mid-2013 and 2014. Extraction rates began to increase in 2015. Since 2015 extraction rates have remained relatively constant. The historical observed trends in extraction rate are most likely attributable to the storage of groundwater inflows within old workings and/or underground dams rather than the immediate extraction of groundwater inflows.

7.1. Surface Water Monitoring

Control strategies were implemented as per the Water Management Plan and were adequate to manage the risks associated with the operation during the report period.

Myuna Colliery has a Water Management Plan which discusses responsibilities, pollution sources, hazards, risks and mitigation strategies of water management. Regular refresher training and site inductions discuss water management to make personnel aware of the site issues.

The surface water monitoring has been conducted in accordance with the conditions of EPL366. This Licence specifies monitoring and reporting requirements along with concentration limits for water discharged through LDP A and LDP B. Other EPL monitoring requirements included E1 Manganese monitoring in Wangi Bay.

There was no discharge of water through LDP A during 2018 so this section will focus on LDP B.

Table 16. Summary of Surface Water Monitoring Locations

Monitoring Point Reference	Description / Creek Catchment
LDP B	Discharge Location 1 into Wangi Creek. EPL Monitoring Location 9.
LDP A	Discharge Location 2 into Wangi Creek. EPL Monitoring Location 10.

7.1.1. Surface Water Monitoring Results

Mine water discharged from LDP B is required to be monitored daily during discharge for the following parameters;

- Volume;
- pH;
- Total Suspended Solids (TSS); and
- Oil and Grease

Discharge of mine water occurred on every day in the report period. A sample was collected and analysed for the parameters on every day of discharge (Table 22 and 23).

The flow volumes through LDP B are monitored continuously in accordance with EPL366. The daily volume discharge limit for LDP B is 13000kL. The maximum daily volume discharged was 10 070 kL during the reporting period. The average daily volume discharged for 2018 was 5288 kL. There were no exceedances of the LDP B volume limit criteria during the reporting period.

The pH of the mine water discharged through LDP B was consistent throughout 2018 with a minimum pH level of 7.1 and a maximum of 7.9. The limit criterion for pH is a range between 6.5 and 8.5. There were no exceedances of this limit during the reporting period.

The concentration of total suspended solids analysed in the mine water discharged through LDP B was consistently low with an average concentration of 6 mg/L during 2018. The concentration limit for TSS is 50 mg/L. There were no exceedances of this limit during the reporting period.

The concentration of oil and grease analysed in the mine water discharged through LDP B was consistently low with a maximum below the limit of reporting. The concentration limit for oil and grease is 10mg/L. There were no exceedances of this limit during the reporting period.

Graphs of the main water quality analytes for LDP B for the reporting period are provided in Figure 10 and 6 below.

Table 17. Average Surface Water Quality for the 12 month period from January 2018 to December 2018 and the Long-term Average (LTA)

Monitoring Point Reference	Catchment	pH		TSS		Oil & Grease	
		Average	LTA	Average	LTA	Average	LTA
LDP B (EPL Point 9)	Wangi Creek	7.59	7.64	6	6	0	0

Table 18. LDP B Water Quality

Pollutant	Unit of Measure	No. of Samples required by licence	No. of Samples collected and analysed	Lowest sample value	Mean of samples	Highest sample value	EPL Limit	Recommended Trigger Value (EA)
pH	pH	365	365	7.10	7.59	7.90	6.5 – 8.5	6.5 – 8.5
Total Suspended Solids	mg/L	365	365	1	6	47	50	<50
Oil & Grease	mg/L	365	365	0	0	0	10	-

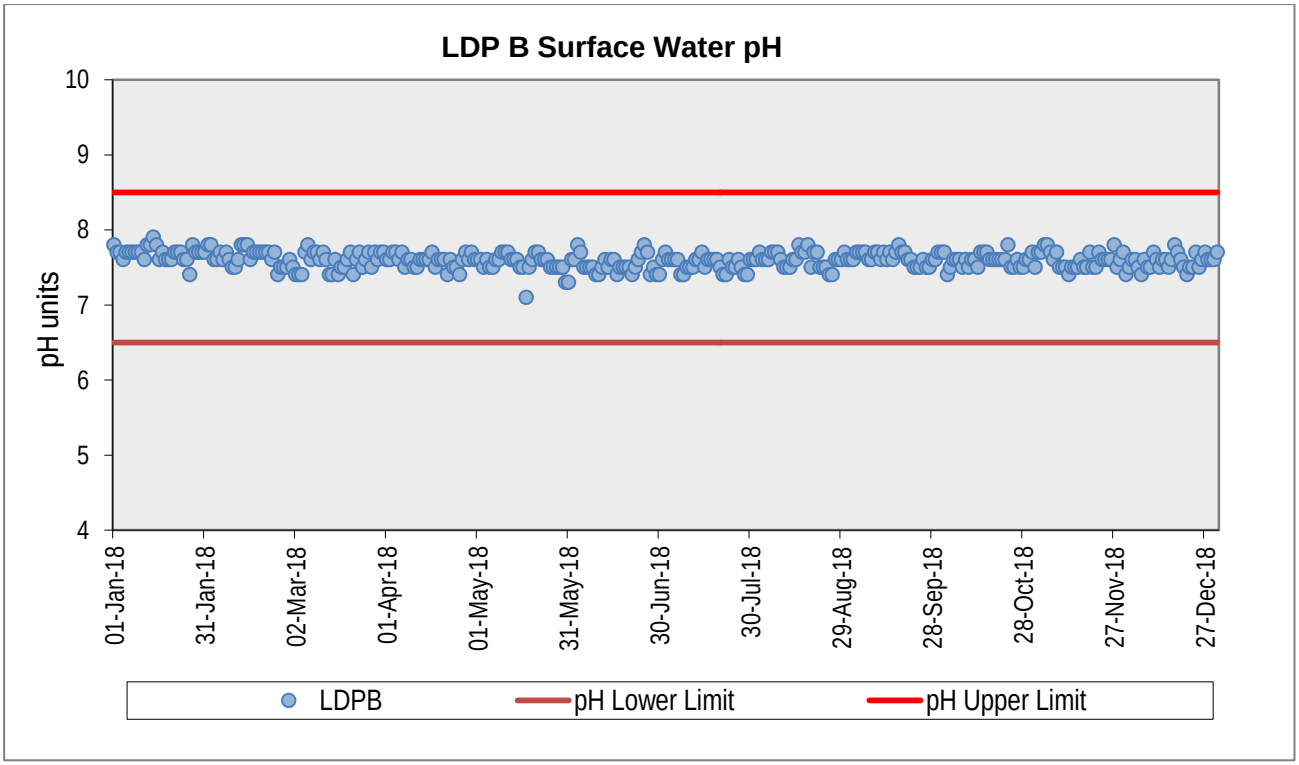


Figure 10. LDP B Water Quality Monitoring Results - pH

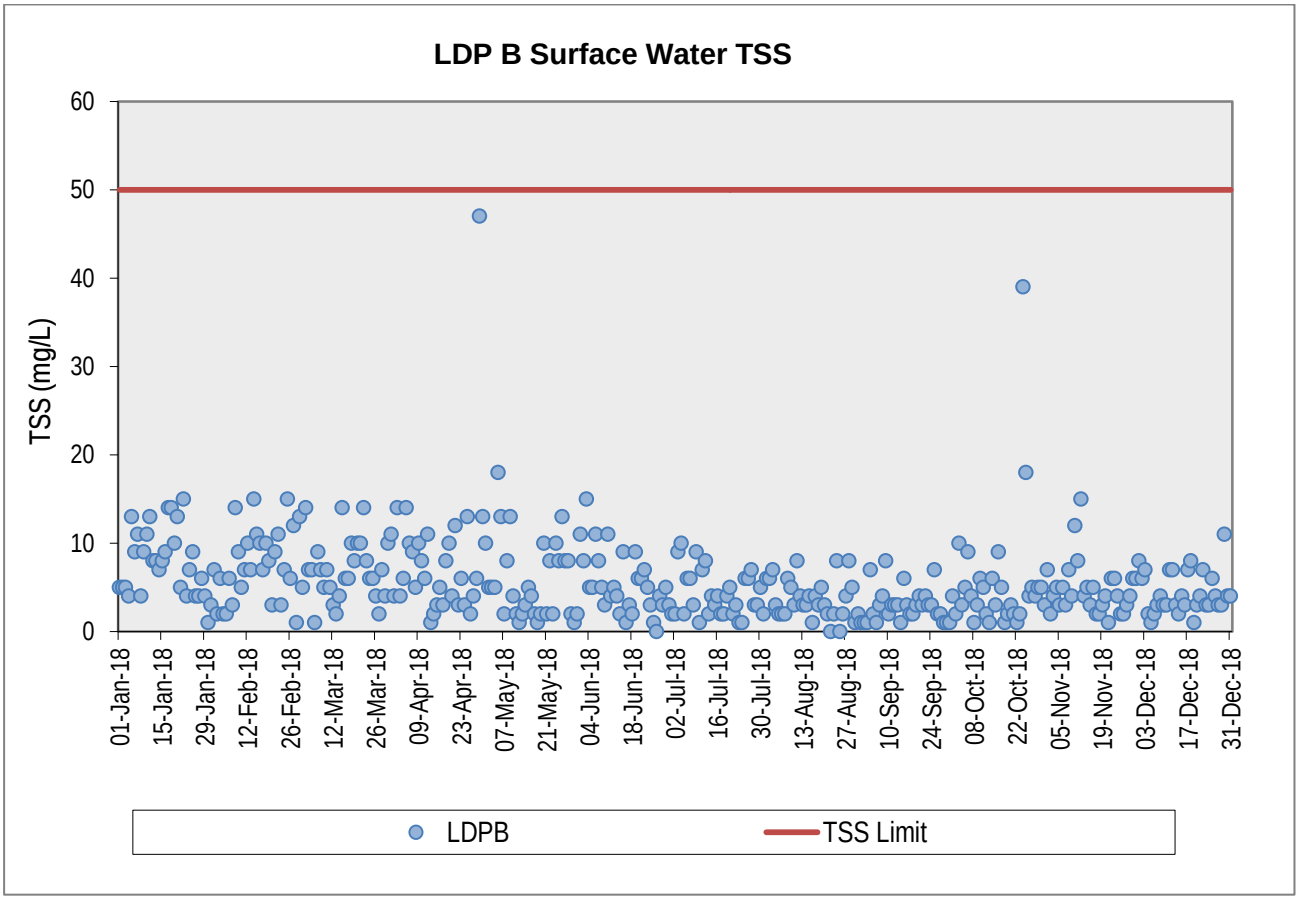


Figure 11. LDP B Water Quality Monitoring Results - TSS

Water Volume is required to be monitored daily during discharge at the licenced discharge points in accordance with EPL 366. Table 19 provides the discharge volume results for LDP B for the Annual Review period. There was no discharge from LDP A during the period

Table 19. LDP Discharge Volumes

Monitoring Point Reference	Frequency	No. of Measurements made	Lowest Result (kL)	Mean Result (kL)	Highest Result (kL)	EPL Limit
LDP B (EPL Point 9)	Daily During Discharge	365	1578	5288	10070	13000

7.1.2. Data interpretation

As shown in the figures below, linear trend lines were applied to the monitoring data from 2011 to 2018 for pH, TSS and Oil & Grease. The trend lines displayed decreasing trends over the eight year period for TSS and Oil & Grease with pH tending to remain relatively constant.

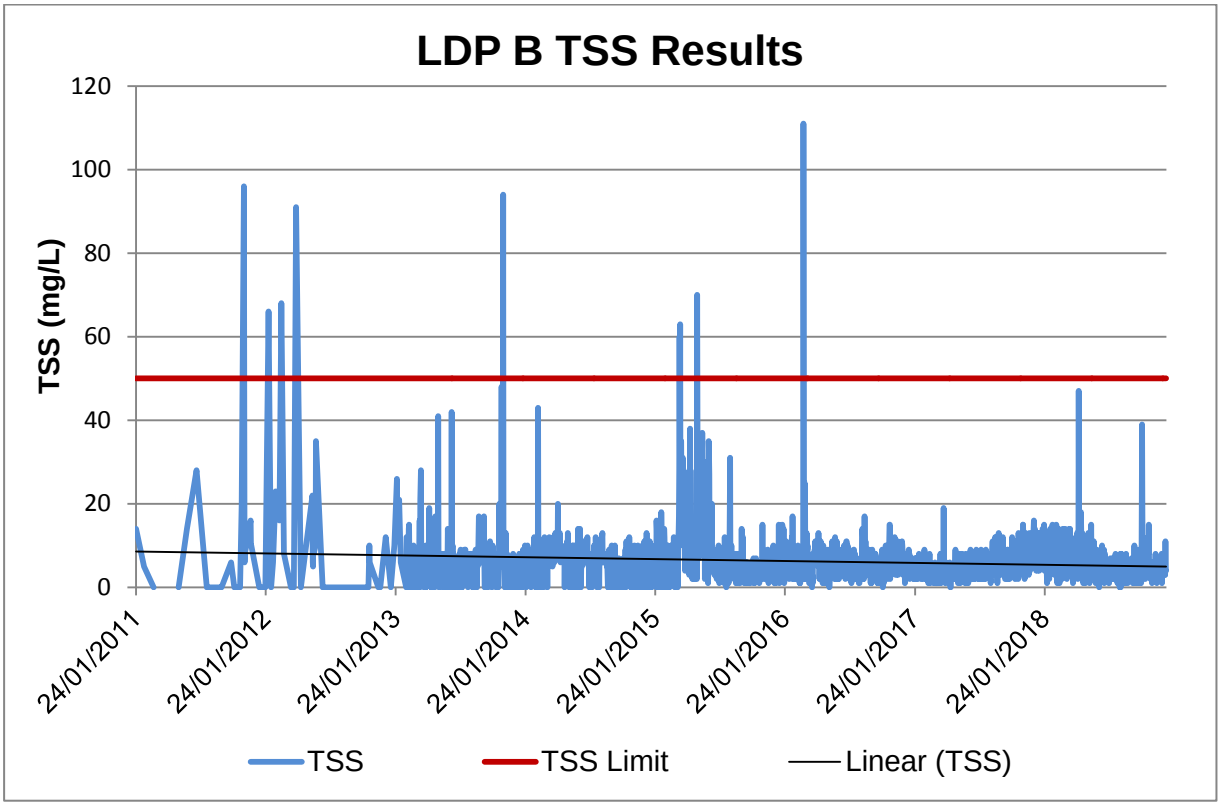


Figure 12. LDP B TSS Monitoring Results and Linear Trend Line

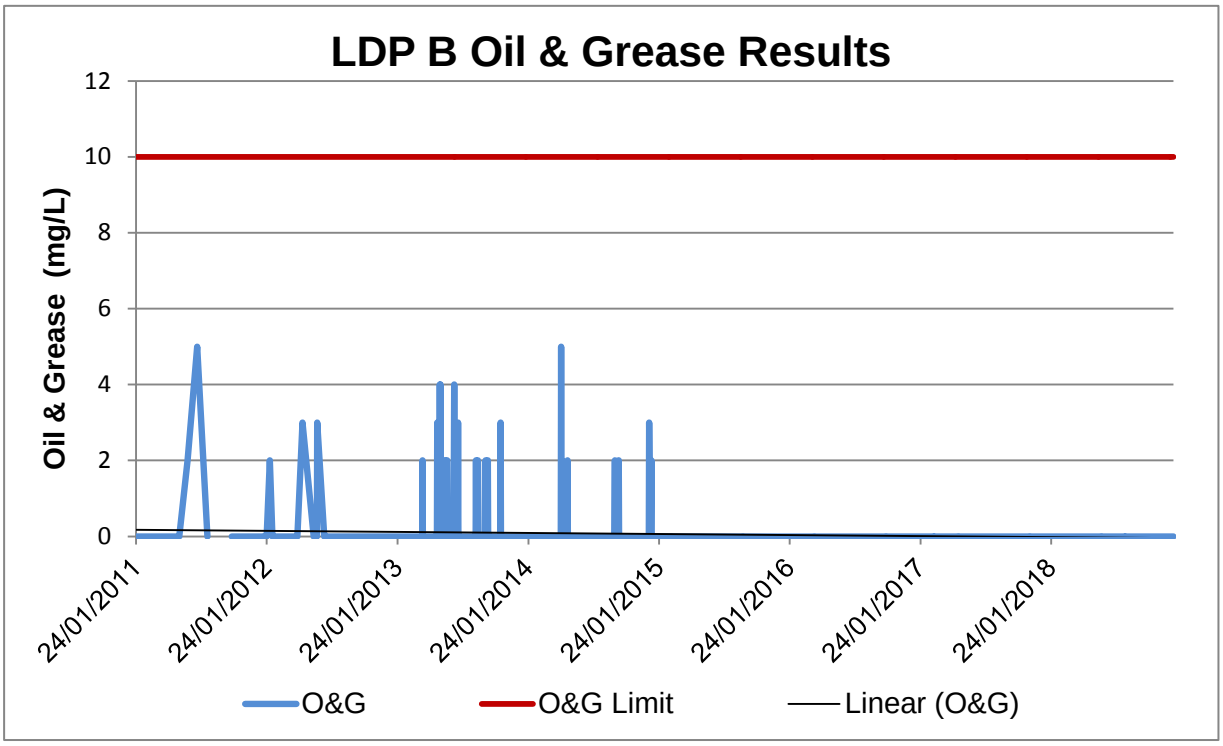


Figure 13. LDP B Oils Monitoring Results and Linear Trend Line

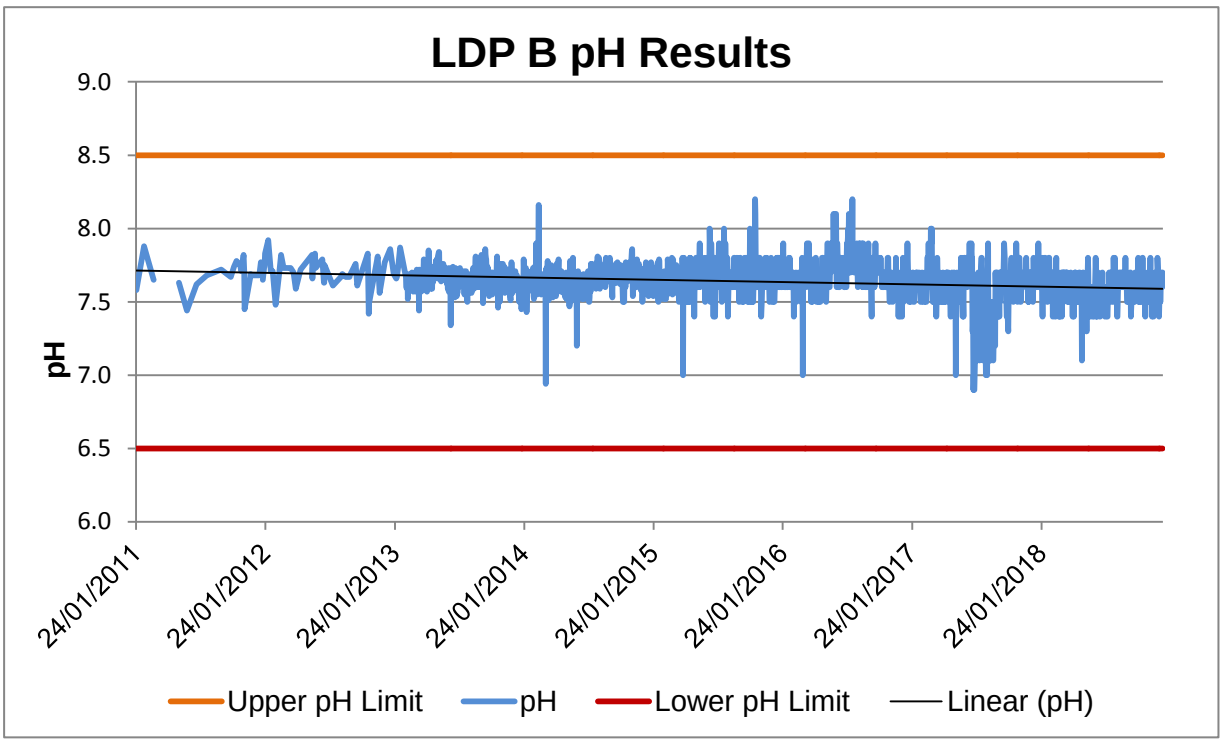
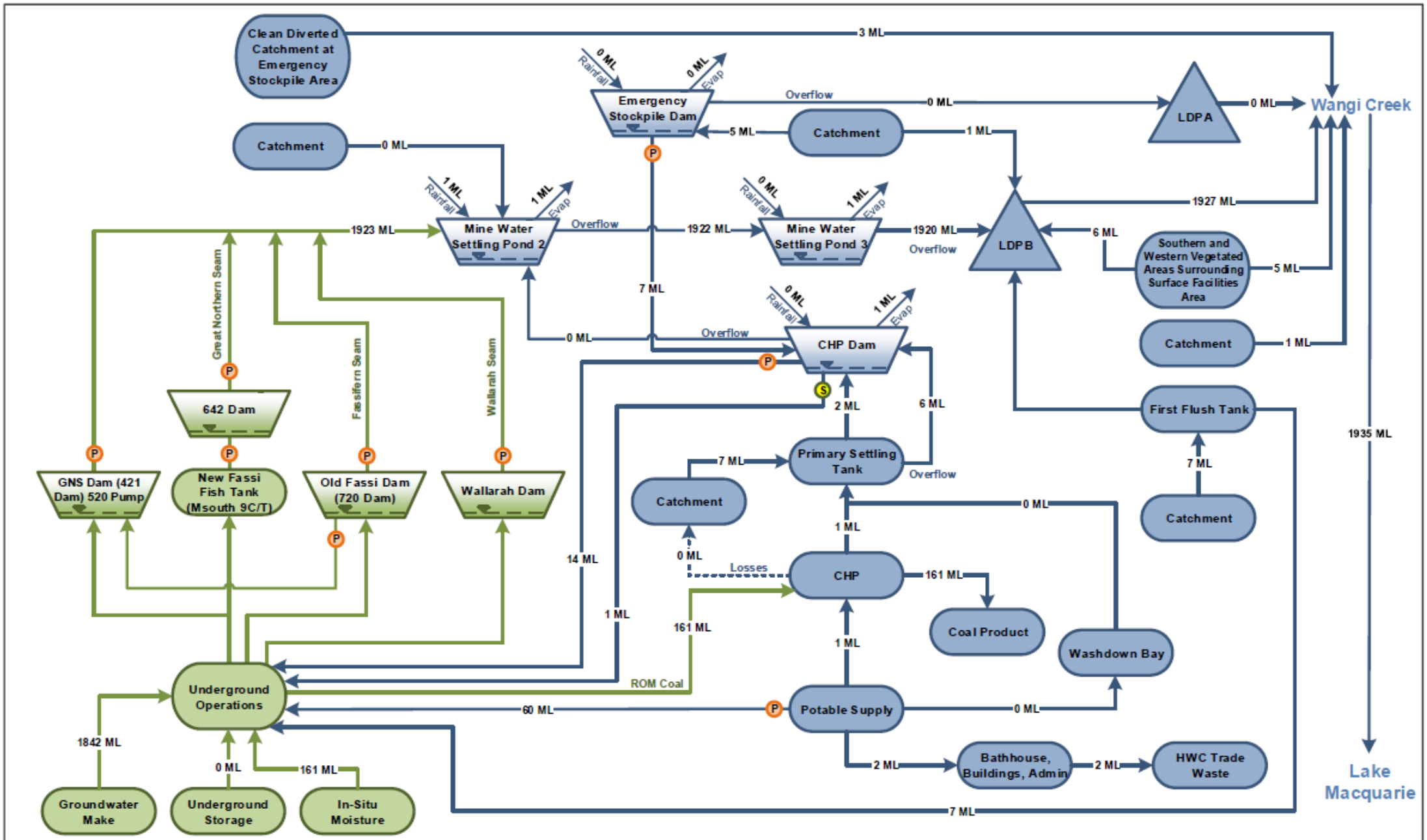


Figure 14. LDP B pH Monitoring Results and Linear Trend Line

7.2. Water Balance

The overall water balance for 2018 is shown as a water cycle schematic on the next page. The results shown are the modelled outputs from the water balance model and include modelled estimates of water volumes that are not able to be directly measured.



LOCATION	Myuna
SEAM	Wall., Fass., GNR
DRAWN	TT
CHECKED	IG
APPROVED	IG
SCALE	NTS

Myuna Colliery
Annual Groundwater Management Report

2018 Annual Water Balance
Annual Water Cycle - 2018

Centennial Coal

DATE Feb 2019

Figure 3-1

7.3. Groundwater Management

In November 2017, Myuna commenced monitoring of groundwater levels around the pit top area. The groundwater monitoring network includes ten shallow alluvial monitoring bored which were installed in August 2012. Details of the groundwater monitoring bores are provided below in Table 21.

.

Table 20. Groundwater Monitoring Bore Details

Bore	Monitoring Period	Lithology	Bore Depth (m)	Monitoring Parameters
MW01	Nov 2017 – Ongoing	Alluvium	6	Groundwater Level
MW05	Nov 2017 – Ongoing	Alluvium	18.5	Groundwater Level
MW06	Nov 2017 – Ongoing	Alluvium	13	Groundwater Level
MW07	Nov 2017 – Ongoing	Alluvium	8.5	Groundwater Level
MW08	Nov 2017 – Ongoing	Alluvium	9	Groundwater Level
MW09	Nov 2017 – Ongoing	Alluvium	7	Groundwater Level
MW10	Nov 2017 – Ongoing	Alluvium	10	Groundwater Level
MW11	Nov 2017 – Ongoing	Alluvium	7	Groundwater Level
MW12	Nov 2017 – Ongoing	Alluvium	8	Groundwater Level
MW13	Nov 2017 – Ongoing	Alluvium	11	Groundwater Level

7.3.1. Groundwater Monitoring Results

As discussed in Section 7.3, the groundwater monitoring network at Myuna Colliery includes ten alluvial monitoring bores. Observed groundwater levels at these monitoring bores are shown below in Table 21.

Table 21. Groundwater Levels for Myuna Colliery

Bore	Groundwater Level (m AHD)																
	Jul 2012	Nov 2016	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018	Oct 2018	Nov 2018	Dec 2018	EIS Prediction
MW01	19.4	19.0	19.0	18.9	18.8	18.7	19.0	19.1	18.7	19.1	19.1	18.5	18.5	18.2	18.4	19.2	Minimal Impact
MW05	13.2	13.0	13.8	13.4	13.5	12.9	13.1	13.0	12.8	12.6	12.6	12.6	12.6	12.5	12.7	13.0	Minimal Impact
MW06	12.2	12.8	12.6	12.8	12.8	12.8	12.9	12.7	11.8	12.6	12.6	12.5	12.5	12.1	12.5	12.8	Minimal Impact
MW07	22.1	21.6	18.2	21.7	21.8	21.9	21.7	21.7	21.8	21.4	21.4	22.2	21.2	21.1	22.3	21.6	Minimal Impact
MW08	21.4	20.3	20.2	20.2	20.2	20.0	20.0	19.6	19.9	20.1	20.2	20.0	20.0	20.1	20.0	20.3	Minimal Impact
MW09	17.3	14.4	14.4	14.3	14.3	14.2	14.7	14.6	13.7	16.2	16.2	16.0	15.3	15.8	15.1	16.1	Minimal Impact
MW10	24.7	23.4	23.3	22.4	22.3	22.7	23.0	23.0	22.7	23.0	23.1	22.9	22.8	23.3	23.6	23.6	Minimal Impact
MW11	12.3	10.9	10.9	10.3	10.0	9.2	9.2	9.0	8.9	9.2	9.1	9.0	9.1	9.3	9.0	9.3	Minimal Impact
MW12	6.8	6.6	6.4	6.2	6.0	5.8	6.4	6.3	6.0	6.8	6.6	6.1	6.5	6.4	6.3	6.7	Minimal Impact
MW13	0.5	2.1	2.1	1.9	1.8	1.8	2.0	1.9	1.7	2.1	1.9	1.8	1.9	2.1	2.0	2.0	Minimal Impact

7.3.2. Data Interpretation

There is a slight increase in groundwater level at MW09 and MW10 over the monitoring period. There is an insufficient number of monitoring rounds to determine the cause or significance of these increasing levels. It is unlikely that the increasing levels at MW09 and MW10 are related to mining as they have not been replicated at surrounding monitoring bores. Groundwater levels have been relatively stable since November 2016 at all other groundwater monitoring locations.

7.4. Phase 2 Site Assessment

A Phase 2 Environmental Site Assessment (ESA) was conducted by AECOM in 2013, subsequent to the decommissioning by foam filling of the Underground Petroleum Storage System (UPSS) infrastructure. The objective of the Phase 2 ESA was to assess the presence of soil, sediment, surface water and ground water contamination in targeted zones identified as areas of potential concern within the Site and determine Centennial's remedial obligations.

The targeted Phase 2 ESA identified phase separated hydrocarbons on site related to historic and current mining operations presenting the potential for soil and ground water impact and off-site sediment and surface water impact, which, under the Contaminated Land Management Amendment Act 2008, triggered the duty to report to the NSW EPA. The extent and associated risk of the potential impact was not evaluated and therefore it had not been determined if remedial action was required or not.

Centennial Coal had reported Myuna Colliery to the EPA in a letter dated 2nd February 2012. The EPA responded to Centennial acknowledging receipt of the Section 60 Duty to Report letter and Centennial's commitment to for staged investigation and remediation works at its mine sites.

EPA officers conducted a site inspection 29th June 2015 for the purpose of reviewing the information provided from the Section 60 Duty to report and the Phase 2 ESA.

Work commenced in November 2016 to undertake the recommendations of the Targeted Phase 2 ESA (AECOM 2013) which are listed below;

- Installation and development of new targeted monitoring ground water wells
- Initial gauging of the ground water wells onsite
- Undertake a comprehensive hydraulic investigation (including determining the transmissivity of the identified PSH), including but not limited to the assessment of the hydraulic gradient of the groundwater to identify the potential for the PSH and the impacted groundwater to migrate off-site towards Wangi Creek and/or Lake Macquarie.
- Delineate the extent of the PSH plume and petroleum hydrocarbon impacted groundwater, further downgradient of the decommissioned USTs and towards Wangi Creek.
- Document the nature and location of the identified PSH, TPH impacted soils and groundwater across the Site in Centennial's Environmental Management Plan (EMP) so that all necessary precautions are taken to ensure that any intrusive works for maintenance or otherwise is undertaken in a manner that protects and mitigates harmful exposure to workers.
- Undertake a Human Health and Ecological Risk Assessment (HHERA) in order to assess the potential human health risk associated with vapor intrusion into the office block/bath house from the identified PSH and TPH solute plumes and the potential ecological and secondary human health risk associated with the metal impact migrating from the site to natural water bodies.
- Report on the findings of the above investigations.

These actions have now been completed with the additional Hydrocarbon Impact Assessment (RCA 2017, Appendix 4) concluding that;

"RCA considers that the hydrocarbon impact is limited to the proximity of the UPST with the potential to be situated under the south eastern portion of the office building and adjacent to a portion of the mine entry tunnel.

RCA considers that there is negligible risk of vapour intrusion into the office building. RCA considers that there is potential for the migration of vapours in underground structures such as service trenches and potentially the mine entry tunnel. There is potential for accumulation of vapours in services trenches. The applied ventilation to the mine entry tunnel is considered to reduce the risk of vapour accumulation in the tunnel to negligible.

With the exception of potential vapour accumulation in services trenches, RCA considers that there appears to be a negligible risk posed to human health or the environment from the identified contamination via other potential exposure routes.

RCA does not consider that the identified hydrocarbon contamination in the vicinity of the UPST requires remediation due to potential human health or environmental impacts, although there may be legislative requirements to undertake remediation. Notification to the NSW EPA about the presence of LNAPL may be required under the Contaminated Land Management Act."

A risk assessment was carried out by Myuna and RCA personnel on the 23 of Jul 2018 which agreed that the risk to human health and the environment from the contamination left in situ was minimal and this significant remediation was not necessary. Actions resulting from the risk assessment included continuation of alluvial groundwater monitoring in order to detect any potential migration of contaminates as well as commencing a program to reduce hydrocarbon contamination from groundwater wells associated with decommissioned Underground Petroleum Storage System (UPSS) infrastructure.

7.5. Manganese Monitoring

The monitoring of filterable Manganese is undertaken as per special condition E1 Additional Monitoring of EPL366, in Wangi Bay on a quarterly schedule. There is no limit criteria applied to the Manganese monitoring. The monitoring results are submitted to the EPA quarterly.

Result Summary

Four samples are collected quarterly from Wangi Bay at the outlet of Wangi Creek. The average of the samples for each quarter is provided in Table 27.

Table 22. Manganese Monitoring Results

Date	March 2018	June 2018	September 2018	December 2018
Unit - µg/L	221	128	6	85

Trends

The Manganese monitoring has been conducted over a period of eight years from 2011. Manganese concentrations recorded in Wangi Bay over the eight year period of monitoring display a downward trend. The results have decreased in consecutive years from 2013 to 2015. The results for 2016 showed a slight increase before decreasing again in the 2017 reporting period, with the exception of one high result in March, and increasing again in 2018, probably influenced by another high result in March.

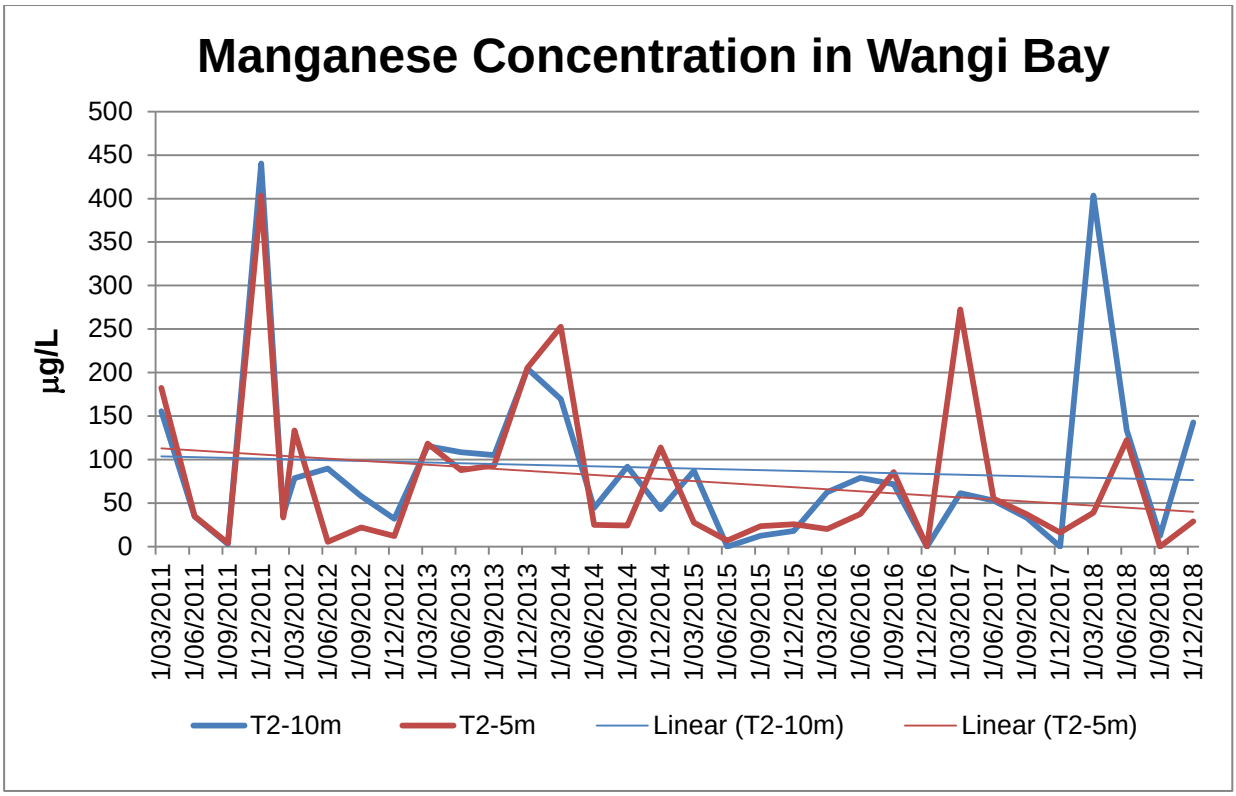


Figure 15. Manganese Monitoring Results and Linear Trend Line

8. REHABILITATION

All surface infrastructure associated with Myuna Colliery's operations is located at the Surface Facilities Area. The Surface Facilities Area encompasses a footprint of approximately 89 hectares, of which 25.2 hectares includes the surface infrastructure. These 25.2 hectares is the total area currently requiring rehabilitation prior to mine closure. The remainder of the Surface Facilities Area is predominantly natural bushland vegetation, the Wangi Creek watercourse and existing cleared easement corridors.

As per Myuna's currently approved MOP (2016 – 2022), final landform creation and rehabilitation activities will largely be undertaken following the completion of mining. Centennial Myuna will redevelop the existing Myuna Colliery Site for light industry based land uses. The area of the downcast shaft will be rehabilitated to natural bush land.

Table 23. Rehabilitation Status

Mine Area Type	Previous Reporting Period (Actual)	This Reporting Period (Actual)	Next Reporting Period (Forecast)
	2017 (ha)	2018 (ha)	2019 (ha)
A. Total mine footprint[1]	7426.5	7426.5	7426.5
B. Total active disturbance[2]	25.2	25.2	25.2
C. Land being prepared for rehabilitation[3]	Nil	Nil	Nil
D. Land under active rehabilitation[4]	Nil	Nil	Nil
E. Completed rehabilitation[5]	Nil	Nil	Nil

8.1. Next Reporting Period

The rehabilitation performance of Myuna Colliery for the next reporting period will be measured against the targets outlined in the currently approved MOP (2016 – 2022).

There are no proposed rehabilitation trials or research projects to be undertaken in the next report period.

There are no rehabilitation activities proposed for the next report period.

[1] **Total Mine Footprint:** includes all areas within a mining lease that either have at some point in time or continue to pose a rehabilitation liability due to mining and associated activities. As such it is the sum of total active disturbance, decommissioning, landform establishment, growth medium development, ecosystem establishment, ecosystem development and relinquished lands (as defined in the DRE MOP/RMP Guidelines). Please note that subsidence remediation areas are excluded.
[2] **Total Active Disturbance:** includes all areas requiring rehabilitation
[3] **Land being prepared for rehabilitation:** includes the sum of mine disturbed land that is under the following rehabilitation phases – decommissioning, landform establishment and growth medium development (as defined in DRE MOP/RMP Guidelines)
[4] **Land under active rehabilitation:** includes areas under rehabilitation and being managed to achieve relinquishment – includes 'ecosystem and land use establishment' and 'ecosystem and land use sustainability (as defined under the DRE MOP/RMP Guidelines)
[5] **Completed rehabilitation**: requires formal sign off from DRE that the area has successfully net the rehabilitation land use objectives or completion criteria

9. COMMUNITY

9.1. Community Consultation and Engagement

The Myuna Colliery Community Consultative Committee (CCC) has been established to provide a formal conduit for exchange of information and views between the local community and Myuna's Management Team.

Membership of the 2018 Myuna CCC:

- Gerard Martin (Community Representative)
- Sandra O'Donnell (Community Representative);
- John Shoebridge (Community Representative);
- Ray Robinson (Community Representative);
- Cr Luke Cubis (Lake Macquarie City Council);
- Mal Yule (Myuna Mine Manager); and
- Angela van der Kroft (Myuna Environment and Community Coordinator).

Two CCC meetings were held during the reporting period, in April and October 2018, with updates being distributed to committee members in January and July.

The meetings were well attended by members with regular agenda items including:

- Progress at the Mine – Operational;
- Monitoring and Environmental Performance;
- Community Complaints and Responses;
- Update on Management Plans & External Audits; and
- Information provided to the community and any feedback.

9.2. Community Sponsorships

Centennial Myuna continues to support the local community through various sponsorship schemes. The following is the sponsorship and support carried out locally during the calendar year:

- Wangi Dobell Festival of Arts and Crafts 2018 hosted by the Wangi Lions Club;
- Wangi Amateur Sailing Club events the Centennial Coal Australia Day Regatta and the Youth Sail Lake Macquarie Regatta;
- Royal Motor Yacht Club Toronto event the Heaven Can Wait Charity Sailing Regatta;
- Toronto Chamber of Commerce events Toronto Festival of Lights and Toronto Aquafest;
- Lake Macquarie Council event Lake Macquarie Heritage Festival; and
- Rotary Club of Toronto event Sunrise Paddlefest.

Centennial Myuna supported local sporting organisations, with sponsorship assistance for new equipment and operational costs. These sporting clubs included Southern Lakes United Football Club, Southern Lakes Cricket Club, Macquarie Shores Swimming Club, Southlakes Athletics Centre, Hunter Academy of Sport, Toronto Amateur Sailing Club, Toronto Ladies Golf, Wangi Women's Bowling Club and Westlakes Athletics Club

Centennial Myuna supported community organisations and events including Meals on Wheels, Marine Rescue Lake Macquarie, Dora Creek Rural Fire Brigade, Bonnells Bay Public School, Westlakes Macquarie Retired Miners Association and Wangi Lions Club.

9.3. Community Complaints

A community complaints register is kept on site and published on the Centennial Myuna website. All community enquiries and complaints received by Myuna Colliery are to be recorded as per MY-EWP-038 Community Complaint and Enquiries Procedure. This information is then entered into the Centennial Coal Environment and Community Database (ECD).

There were no community complaints received in the 2018 report period.

Table 24. Complaints History

Year	Air	Water	Noise	Waste	Other	Total
2018	0	0	0	0	0	0
2017	0	0	0	0	0	0
2016	0	0	0	0	0	0
2015	0	0	0	0	0	0
2014	0	0	0	0	0	0
2013	0	0	0	0	0	0

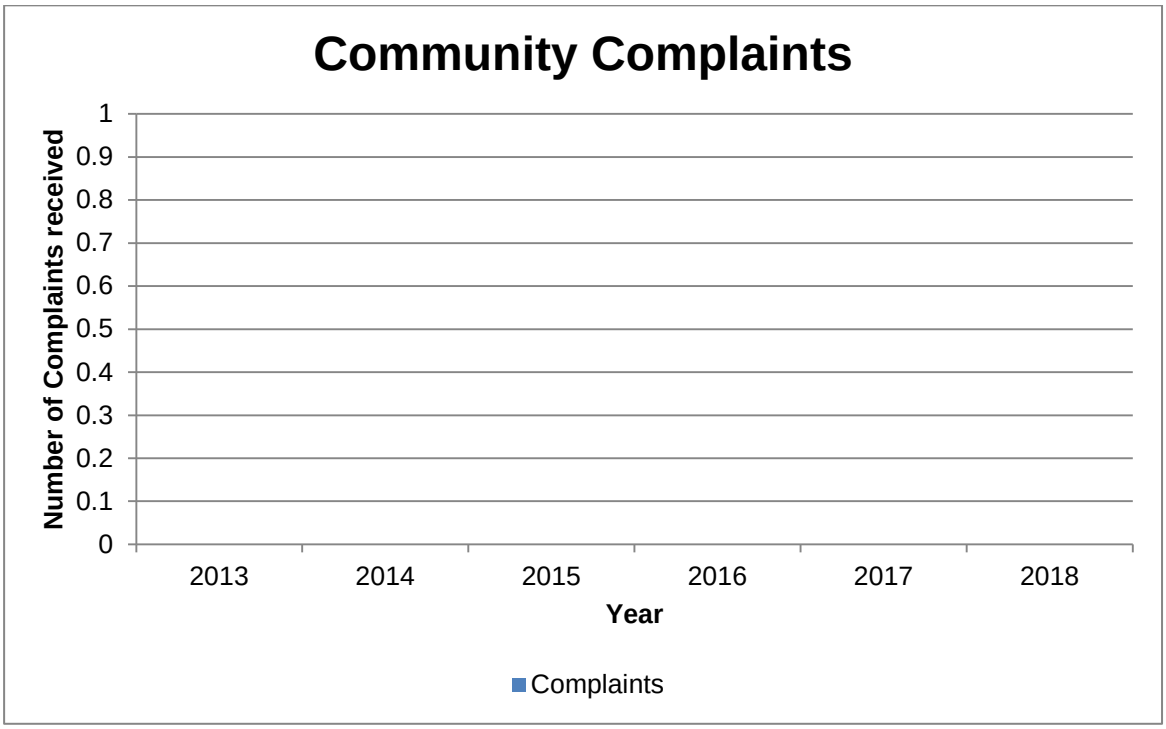


Figure 16. Annual Community Complaints

10. INDEPENDENT AUDIT

There were no independent audits conducted during the reporting period.

10.1. Independent Environmental Audit

In accordance with Schedule 5 Condition 9 of Project Approval 10_0080 MOD1 Centennial Myuna will engage an independent expert, approved by the Department of Planning, to undertake an Independent Environmental Audit (IEA). The next audit will be undertaken during the next (2019) reporting period.

The action plan from the May 2016 IEA is shown below with an update on progress against the actions at the end of the 2018 reporting period.

Table 25. Independent Environmental Audit Action Plan

Item No.	Title Condition No.	Requirement	Compliance/ Recommendations	Action Required	Date Required	Progress
1	PA 10_0080 S3.13	Noise Management Plan	Preparation – Compliant (pending approval from the Secretary) Implementation – Non-compliant Administrative Non-compliance **PA 10_0080-REC-02** - The Noise Management Plan should be updated to reflect the maintenance, operation, collection and use of modelling data of the on-site real-time noise logger.	Update the Noise Management Plan to reflect the maintenance, operation, collection and use of modelling data of the on-site real-time noise logger.	30/6/2017	Completed
2	Soil and Water	*Note: Under the Water Act 1912 and/or the Water Management Act 2000, The Proponent is required to obtain the necessary water licences for the*	Not Verified	Obtain approval for a licence to inject water to the under ground workings from DPI Water.	30/06/2018	Licence application submitted to NRAR on 1 December 2018.

Item No.	Title Condition No.	Requirement	Compliance/ Recommendations	Action Required	Date Required	Progress
		project.				
3	PA 10_0080 S3.21	Surface Water Discharges Compliance with EPL limit criteria.	Non-compliant Low Risk	Implemented manual operation of the syphon line from the CHP dam to the U/G reservoir.		No Further Action Required
5	PA 10_0080 S5.10	Independent Environmental Audit	Non-compliant Administrative Non-Compliance	Noted		No Further Action Required
6	EPL366 L2.1	Concentration Limits Water quality.	Non-Compliant Low Risk **EPL 366-REC-01** - Monitor the effectiveness of the change to the water management system and if exceedances (i.e. TSS) continue, implement further measures to address the exceedances.	Monitor the effectiveness of changes to the Water Management System. Investigate further measures to improve the effectiveness of the water Management System.	30/05/2017 30/06/2017	Completed Completed
7	EPL366 L2.2	Concentration Limits pH quality limit	Non-Compliant Low Risk	Action taken following the incident. Upgraded the Emergency Stockpile Dam pump.		No Further Action Required
8	EPL366 L3.1	Water discharge Volume and Mass Limits	Non-Compliant Low Risk	Implemented manual operation of the syphon line from the CHP dam to the U/G reservoir.		No Further Action Required

Item No.	Title Condition No.	Requirement	Compliance/ Recommendations	Action Required	Date Required	Progress
9	EPL366 M2.1 M2.2	Requirement to monitor concentration of pollutants discharged	Non-compliant Low Risk	Implemented procedure for the secure transport of dust deposition sampler jars.		No Further Action Required
10	EPL366 M4.1	Environmental Monitoring Requirement to monitor noise	Non-compliant Administrative Non-compliance	implemented action to include the noise monitoring schedule in the Quarterly Noise Monitoring report.		No Further Action Required
11	EPL366 M8.1	Requirement to Monitor Volume or Mass	Non-compliant Low Risk	Implemented manual operation of the syphon line from the CHP dam to the U/G reservoir to prevent re-occurrence.		No Further Action Required
12	ML1632 c12	Prevention of Soil Erosion and Pollution	Non-compliant Low Risk	Install sediment erosion controls beneath the outflow to LDP A to minimise the potential for erosion to the drainage channel.	30/03/2017	Completed
13	MPL334 c6	Dams and Escape of Water	Not Verified	Noted		No Further Action Required
14	MPL334 c14	Annual Review	Administrative Non-compliance **MPL 334-REC-01** - Include medium and long-term mining plans in the AEMR.	Review the requirements of the Annual reporting Guidelines and Include all plans required by the guideline.	30/01/2017	Completed.

Item No.	Title Condition No.	Requirement	Compliance/ Recommendations	Action Required	Date Required	Progress
15	MPL334 c21	Prevent contamination, pollution, erosion.	Non-compliant Low Risk	Install sediment erosion controls beneath the outflow to LDP A to minimise the potential for erosion to the drainage channel.	30/03/2017	Completed
16	MPL334 c30	The registered holder shall ensure that the run off from any disturbed areas including the overflow from any depression of ponded area is discharged in such a manner that it will not cause erosion.	Non-compliant Low Risk **MPL 334-REC-02a** – Erosion controls should be installed beneath the outflow to LDP A to minimise the potential for erosion to the drainage channel. Consideration should be given to the installation of a spillway at the Emergency Coal Stockpile Dam including provision of a safe sampling site for the LDP A outflow pipe. **MPL 334-REC-02b** – The earthen bund adjacent to the container housing the water pump at the Emergency Coal Stockpile Dam should be reformed to prevent run-off from a disturbed area to flow into the drainage channel at LDP A. Refer to **PA 10_0080-REC-05** (PA 10_0080, S3.24)	Install sediment erosion controls beneath the outflow to LDP A to minimise the potential for erosion to the drainage channel. Investigate the installation of a spillway at the Emergency Coal Stockpile Dam. Install a safe sample collection site for the LDP A outflow pipe. Construct a bund adjacent to the container housing the water pump to direct surface flow into the Emergency Coal Stockpile Dam.	30/03/2017 30/06/2017 30/06/2018 30/03/2017	Completed Completed Delayed due to redesign of outflow pipe and LDP A sampling arrangement. Completed

10.1. Audit of Groundwater Conditions

In accordance with Condition 6 of Bore Licence 20BL172565 Centennial Myuna will engage an independent expert, approved by the Office of Water, to undertake an audit of the groundwater conditions, all monitoring records and any related impacts. The next audit will be undertaken in December 2020.

Progress against the action plan for the April 2016 Audit is shown in the table below.

Table 26. Independent Groundwater Conditions Audit Action Plan

Condition No.	Requirement	Compliance/ Recommendations	Action Required	Progress
	The approval of this licence is based on interception and extraction of groundwater from the central coast-hunter porous rock groundwater source. No authorisation is granted to intercept or extract surface or ground waters from any other water source.	2. Conduct additional model runs to assess pre-mining water budgets for the alluvium and compare this to current conditions. 3. Implement a groundwater elevation monitoring programme for the shallow alluvial bores on site to: a. Further characterise the influence of the mine relative to climatic changes. b. Further validate the predicted modelling impacts and the uncertainty associated with the predictions. 4. Clarify the rationale behind changing overburden thickness as part of model calibration via clarification in future annual reports.	1. Assess pre-mining water budget for the alluvium and compare with current conditions in the Annual Groundwater Management Report. 2. Implement a groundwater elevation monitoring program. 3. Provide clarification in the Annual Groundwater Management Report of the rationale behind changing overburden thickness as part of model calibration.	Completed. Section 5.2 2016 Annual Groundwater Report. Completed. Section 3.3 2016 Annual Groundwater Report. Completed. Section 5.1.1 2016 Annual Groundwater Report
	The licence holder must provide to the NSW Office of Water for approval a groundwater management plan (GMP) within three months of the issue of this licence, which includes: a) detailing monitoring, remediation and contingency measures,	5. The GMP is recommended to be updated to include a discussion of the long term water extraction, the discharge criteria set in the licence and the	4. Update the Groundwater Management Plan to include a discussion of the long term water extraction, the discharge criteria set	Completed. Section 5.3 Water Management

Condition No.	Requirement	Compliance/ Recommendations	Action Required	Progress
	and mine water discharge scenarios and criteria. b) long term water balance calculations for the site to show that the proposed volumes and rates of groundwater extraction are sustainable. c) measures to monitor the operation of the work, which will demonstrate surface and subsurface mining operations are conducted in a manner which minimises potential impacts on groundwater flow and quality, aquifer integrity, groundwater-dependent ecosystems and other off-site water related impacts, including: a. groundwater sources to which no extraction authorisation is included in this licence b. other groundwater users within a radius from the work defined in the approved groundwater management plan. c. and groundwater dependent ecosystem or surface water source which may be affected by operation of the work. d) verification of any predictive modelling or other assessments related to impacts on groundwater source(s), other users or groundwater dependent ecosystems e) a monitoring and response plan, which is approved by the NSW Office of Water. The plan shall include: i. methods to assess the extent of depressurisation created by a operation of the work and determining the volume of any inflow from overlying seams or other groundwater sources ii. contingency arrangements in the event of predicted interception of groundwater exceeding predictions iii. options to replace groundwater user supply for any affected licensed groundwater licence holder.	sustainability of the scheme, making reference to the impacts on sensitive features identified in this condition. The update should also consider the development of contingency measures following on from verification of the model with monitoring data from the surrounding alluvial system. Also refer to recommendations 2 to 4 with regard to model verification.	in the licence and the sustainability of the scheme, making reference to the impacts on sensitive features identified in this condition. 5. Update the Groundwater Management Plan to include a groundwater elevation monitoring program.	Plan. Completed. Section 6.1.2 Water Management Plan.

Condition No.	Requirement	Compliance/ Recommendations	Action Required	Progress
	The licence holder must submit a report to the NSW Office of Water (the annual groundwater management report or annual report) each year after the commencement of this licence, which will include: a) all raw water monitoring data, an interpretation of that data and a discussion of trends identified in the data and their implications. b) all groundwater extraction data (volumes and rates) taken by the works, the extent of aquifer depressurisation and the salinity impacts, compared with predictions of aquifer performance made in the environmental impact statement(s) or similar project documents. c) an overall comparison of groundwater performance with predictions for the life of the mine provided in the development application and supporting documentation d) water related activities performed and the level of compliance with the GMP, and an outline of proposed adaptive or remediation actions, and, e) assessment of extraction or other depressurisation impacts caused by the work(s) to external water sources, water users or groundwater dependent ecosystems, as specified in condition 2.	6. Include the manually recorded extraction data (field sheets) in an appendix of the annual reports. 7. Clarify the water quality analytes and criteria reported in the annual report with reference to both the surface water management plan and GMP. This would include a discussion to demonstrate that discharges are compliant with licence requirements.	6. Provide all groundwater extraction data in the appendix of the Annual Groundwater Management Report. 7. Conduct a gap analysis on the water quality reporting requirements of the Groundwater Management Plan and the Annual Groundwater Management Report. 8. Investigate and implement formats for presenting data in the Annual Groundwater Management Report in a clear and concise manner.	Completed. Appendix E 2016 Annual Groundwater report. Completed. Section 4.2 2016 Annual Groundwater Report. Completed. Section 4.2 2016 Annual Groundwater Report.
	The licensee shall install to the satisfaction of NSW Office of Water in respect of location, type and construction an appliance(s) to measure the quantity of water extracted from the works. The appliance(s) to consist of either a measuring weir or weirs with automatic recorder, or meter or meters of the dethridge type, or such other class of meter or means of measurement as may be approved by NSW Office of Water. The appliance(s) shall be maintained in good working order and condition. A record of all water extracted from the works shall be kept and supplied to the department upon request. The licensee when requested must supply a test certificates to the accuracy of the appliance(s) furnished either by the manufacturer or by some person duly qualified.	8. Seek approval from DPI-Water for the measurement device.	9. Acquire the specifications from DPI Water for an appliance to measure water volumes extracted. Verify the meter is an acceptable appliance. Seek approval from DPI-Water for the appliance.	Completed

11. INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD

Table 27. Incident/Non-Compliance Summary 1

Nature of the incident/non-compliance	Non compliance with EPL 366 Water and/or Land Monitoring Requirements
Date of incident/ non-compliance (if known; if not known state not known)	18/08/2018
The location of the incident/ non-compliance (include a figure if appropriate), if known	EPA Monitoring Point 9
Detail the cause of the incident/non-compliance	The daily sample for Oil and Grease was taken in a glass sample container and acidified as per AS 5667.1 however the bottle was broken during transit from site to the lab. The sample analysed had been collected in a plastic sample container and was not acidified at the time of sampling.
Detail action that has been, or will be, taken to mitigate any adverse effects of the incident/ non-compliance	There are no adverse environmental effects as a result of the technical non compliance.
Detail action that has been, or will be, taken to prevent recurrence of the incident/ non-compliance	A new sampling procedure was developed and implemented whereby 2 daily samples are now taken in glass and are transported to the lab in separate foam lined eskys. The duplicate sample is retained by the sampling contractor until confirmation is received that the primary sample has been analysed by the laboratory.
Consultation with relevant agency (who, when and the response), or agencies if more than one	Notification sent to EPA, DRE, and DPE.

Table 28. Incident/Non-Compliance Summary 2

Nature of the incident/non-compliance	Exceedance of EPL 366 noise criteria limit.
Date of incident/ non-compliance (if known; if not known state not known)	29/08/2018
The location of the incident/ non-compliance (include a figure if appropriate), if known	R1 Turrama St, Wangi Wangi
Detail the cause of the incident/non-compliance	The exact cause of the exceedance is unknown but it is believed to have been exacerbated by prevailing meteorological conditions.

Detail action that has been, or will be, taken to mitigate any adverse effects of the incident/ non-compliance	There are no adverse environmental effects as a result of the technical non compliance.
Detail action that has been, or will be, taken to prevent recurrence of the incident/ non-compliance	A detailed independent noise investigation will be undertaken during the next reporting period.
Consultation with relevant agency (who, when and the response), or agencies if more than one	Notification sent to EPA, DRE, and DPE.

Table 29. Summary of Reportable Incidents and Regulatory Actions

Compliance Type	Agency(ies)	Number	Response
Incidents	EPA and DPE	1	Nil
Caution Notices		Nil	
Warning Letters		Nil	
Penalty Notices		Nil	
Prosecutions		Nil	

Note: This table includes actions taken by DPE, DRG, Resources Regulator and the EPA during the reporting period.

12. ACTIVITES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

Planned activities for the next reporting year:

- Ongoing implementation of strategies contained in Myuna's approved Management Plans in order to manage the risks associated with the operation
- Review and revision of Management Plans as per approval (10_0080) conditions.
- Ongoing improvements to the surface water monitoring and management.

PLANS

APPENDIX 1 - Myuna Colliery Weed Action Plan 2018

APPENDIX 2 - 2018 Ecological Monitoring Report – Swamp Sclerophyll Forest on Coastal Floodplains EEC

APPENDIX 3 – Myuna Colliery Annual Groundwater Management Report 2018

APPENDIX 4 – Hydrocarbon Impact Assessment

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