




***CENTENNIAL COAL
MYUNA COLLIERY
ANNUAL REVIEW
January 2019 to December 2019***

March 2020



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	1 st January 2016
MOP/RMP End Date	30 th November 2022
Annual Review Start Date	1 st January 2019
Annual Review End Date	31 st December 2019
<p>I, _____, certify that this audit report is a true and accurate record of the compliance status of Myuna Colliery for the period 1st January 2019 to 31st December 2019 and that I am authorized to make this statement on behalf of Centennial Myuna Pty Ltd.</p> <p>Note:</p> <p>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.</p> <p>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).</p>	
Name of Authorised Reporting Officer	Michael Clark
Title of Authorised Reporting Officer	Director
Signature of Authorised Reporting Officer	
Date	23-03-20

Contents

1. STATEMENT OF COMPLIANCE	6
2. INTRODUCTION.....	8
3. APPROVALS	10
3.1. Changes made to Approvals during reporting period.....	11
3.2. Annual Review Requirements	11
4. OPERATIONS SUMMARY.....	14
4.1. Other Operations.....	14
4.1. Exploration	14
4.2. Next Reporting Period	14
5. ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW.....	15
6. ENVIRONMENTAL PERFORMANCE	16
6.1. Noise.....	17
6.1.1. Noise Monitoring Data Interpretation	19
6.2. Air Quality	19
6.2.1. Dust Deposition.....	21
6.2.2. HVAS	24
6.3. Biodiversity.....	27
6.4. Greenhouse Gas.....	29
6.5. Heritage	29
7. WATER MANAGEMENT.....	30
7.1. Surface Water Monitoring.....	31
7.1.1. Surface Water Monitoring Results	32
7.1.2. Data interpretation.....	35
7.2. Water Balance.....	37
7.3. Groundwater Management.....	39
7.3.1. Groundwater Monitoring Results	39
7.3.2. Data Interpretation	41
7.4. Manganese Monitoring.....	41
8. REHABILITATION.....	43
8.1. Next Reporting Period	43
9. COMMUNITY	44
9.1. Community Consultation and Engagement	44
9.2. Community Sponsorships	44
9.3. Community Complaints	45
10. AUDITING.....	46
10.1. Independent Environmental Audit	46
10.1. Audit of Groundwater Conditions	49

11. INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD	52
12. ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD.....	53

Tables

Table 1. Annual Review Title Block	2
Table 2. Statement of Compliance.....	6
Table 3. Non-Compliances	7
Table 4. Environmental Management Contact Details	8
Table 5. Approvals held by Centennial Myuna.....	10
Table 6. Annual Review Requirements.....	12
Table 7. Production Summary	14
Table 8. Operations Summary	14
Table 9. Actions from previous Annual Review.....	15
Table 10. Summary of Monitoring Requirements	16
Table 11. Noise Environmental Performance.....	17
Table 12. Air Quality Environmental Performance.....	20
Table 13. Air Quality Criteria Exceedances.....	24
Table 14. Total GHG Emissions from Site.....	29
Table 15. Water Take	30
Table 16. Water Storage.....	31
Table 17. Summary of Surface Water Monitoring Locations.....	32
Table 18. Average Surface Water Quality for the 12 month period from January 2018 to December 2018 and the Long-term Average (LTA)	32
Table 19. LDP 9 Water Quality	33
Table 20. LDP Discharge Volumes	35
Table 21. Groundwater Monitoring Bore Details.....	39
Table 22. Groundwater Levels for Myuna Colliery.....	40
Table 23. Manganese Monitoring Results	41
Table 24. Rehabilitation Status	43
Table 25. Complaints History	45
Table 26. Independent Environmental Audit Compliance.....	46
Table 27. Independent Environmental Audit Action Plan.....	47
Table 28. Independent Groundwater Conditions Audit Action Plan	49
Table 29. Incident/Non-Compliance Summary 1	52
Table 30. Summary of Reportable Incidents and Regulatory Actions.....	52

Figures

Figure 1.	Dust Depositional Gauge – Rolling Annual Average	20
Figure 2.	DG1 Trend Analysis Graph.....	22
Figure 3.	DG2 Trend Analysis Graph.....	22
Figure 4.	DG3 Trend Analysis Graph.....	23
Figure 5.	DG4 Trend Analysis Graph.....	23
Figure 6.	HVAS PM ₁₀ Rolling Annual Average & 24 hr Results.....	25
Figure 7.	HVAS TSP Rolling Annual Average & 24 hr Results.....	25
Figure 8.	HVAS PM ₁₀ Trend Analysis Graph.....	26
Figure 9.	HVAS TSP Trend Analysis Graph.....	27
Figure 10.	LDP 9 Water Quality Monitoring Results - pH.....	34
Figure 11.	LDP 9 Water Quality Monitoring Results - TSS	34
Figure 12.	LDP 9 TSS Monitoring Results and Linear Trend Line	35
Figure 13.	LDP 9 TSS Monitoring Results and Linear Trend Line	36
Figure 14.	LDP 9 pH Monitoring Results and Linear Trend Line.....	36
Figure 15.	Manganese Monitoring Results and Linear Trend Line.....	42
Figure 16.	Annual Community Complaints	45

Plans

Plan Reference No	Plan Name
MY11606	Annual Review Plan 2019
MY11301	Myuna Colliery Surface Layout

Appendices

Appendix No	Appendix Name
1	Myuna Colliery Weed Action Plan 2019
2	2019 Ecological Monitoring Report
3	Centennial Myuna Annual Groundwater Management Report

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	YES
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
PA 10_0080	Sch 3 Cond 17	Air Quality Criteria		Exceedance of 24 hr PM10 criteria	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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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.

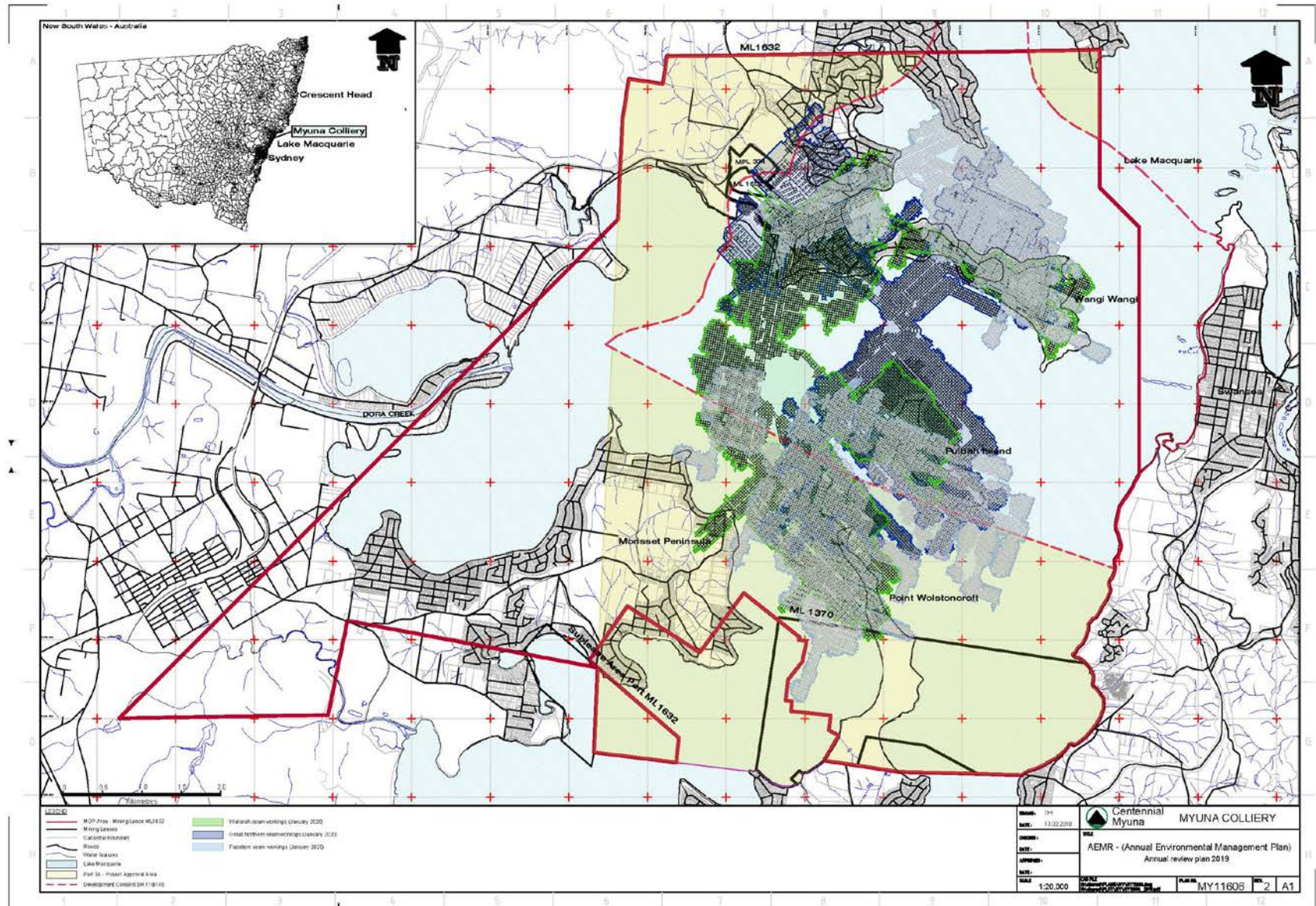
Plan MY11606, shows;

- 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
Mal Yule	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	National Parks and Wildlife Services	10/09/2020	N

Name	Description	Issued By	Expiry Date	Changed during reporting period?
	Wolstoncroft			
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

There were no changes to any of the above approvals during the reporting period.

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: <ul style="list-style-type: none"> • 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	<p>Annual Rehabilitation Report</p> <p>(f) The lease holder must prepare a rehabilitation report to the satisfaction of the Minister. The report must:</p> <ul style="list-style-type: none"> 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. <p>Note: the Rehabilitation Report replaces the Annual Environmental Management Report.</p>	<ul style="list-style-type: none"> 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	2,166,743	1,561,793	2,282,879
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	2,166,743	1,561,793	2,282,879

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

During the 2020 reporting period, Myuna Colliery will undertake a survey program in the south-eastern portion of the combined Project Approval/Development Consent area. This work is required to ensure that a minimum of 40 m of rockhead is kept between the bottom of Lake Macquarie and the Mine's workings. The following survey methods will be used:

- Drone Aeromag trial.
- Sub-bottom Profiling (Sparker survey)
- Drilling program.

5. ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

The 2018 Annual Review was submitted to the then Department of Planning and Environment (DPE), now Department of Planning, Industry and Environment (DPIE), on 13th March 2019 in accordance with Schedule 5, Condition 4 of the Project Approval 10_0080. It was also submitted to the Department of Planning and Environment – Resources Regulator (RR) on the 13th March 2019 in order to satisfy Condition 3 of ML1370 and MPL334 as well as Condition 4 of ML1632. On the 29 March 2019, an amended Myuna Colliery 2018 Annual Review and the 2018 Q1 Noise Compliance Report was also supplied to DPE. 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.

In correspondence dated 3rd May 2019, DPE note that they have reviewed the Annual review and consider it to satisfy the requirements of the Project Approval and request the following;

Table 9. Actions from previous Annual Review

Action Required	Requested By	Action Taken	Where Addressed in Annual Review
Any application of 'Emergency Day' noise limits is clearly identified in reporting of noise results.	DPE	Noted for future Annual Reviews.	Not applicable for 2019 reporting period

6. ENVIRONMENTAL PERFORMANCE

This section includes a summary of the environmental monitoring and management measures implemented at Myuna Colliery during the 2019 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 reporting period (actual)			
					Q1	Q2	Q3	Q4
R1	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	NM	I/A
	Night	L _{Aeq} (15 min)	35	35	I/A	30	I/A	I/A
		L _{A1} (1 min)	45	45	I/A	32	I/A	I/A
R2	Day	L _{Aeq} (15 min)	35	40	I/A	I/A	I/A	I/A
	Evening	L _{Aeq} (15 min)	35	39	NM	NM	I/A	I/A
	Night	L _{Aeq} (15 min)	35	35	I/A	33	30	I/A
		L _{A1} (1 min)	45	45	I/A	40	33	I/A
R3	Day	L _{Aeq} (15 min)	35	35	I/A	I/A	I/A	I/A
	Evening	L _{Aeq} (15 min)	35	35	30	I/A	I/A	I/A
	Night	L _{Aeq} (15 min)	35	35	NM	30	NM	I/A

Noise Receptor	Period		Approval criteria	EIS / EA Predictions	Performance during reporting period (actual)			
					Q1	Q2	Q3	Q4
		min)						
		L _{A1} (1 min)	45	45	NM	32	NM	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	33	32	28	I/A
		L _{A1} (1 min)	49	49	34	33	30	I/A
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	I/A
	Night	L _{Aeq} (15 min)	39	39	33	29	30	I/A
		L _{A1} (1 min)	49	49	34	30	31	I/A
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	32	31	30	I/A
		L _{A1} (1 min)	49	49	34	33	32	I/A
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	31	34	36	I/A
		L _{A1} (1 min)	49	49	33	38	38	I/A
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	25	32	33	I/A

Noise Receptor	Period		Approval criteria	EIS / EA Predictions	Performance during reporting period (actual)			
					Q1	Q2	Q3	Q4
		min)						
		L _{A1} (1 min)	49	49	26	34	34	I/A

*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.

6.1.1. Noise Monitoring Data Interpretation

There were no exceedances of the noise limit criteria for the reporting period.

Trend

Myuna Colliery has undertaken a program of attended noise monitoring from December 2012 to December 2019. The attended monitoring results have shown a consistency over the 7 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 2018 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 Northern 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.

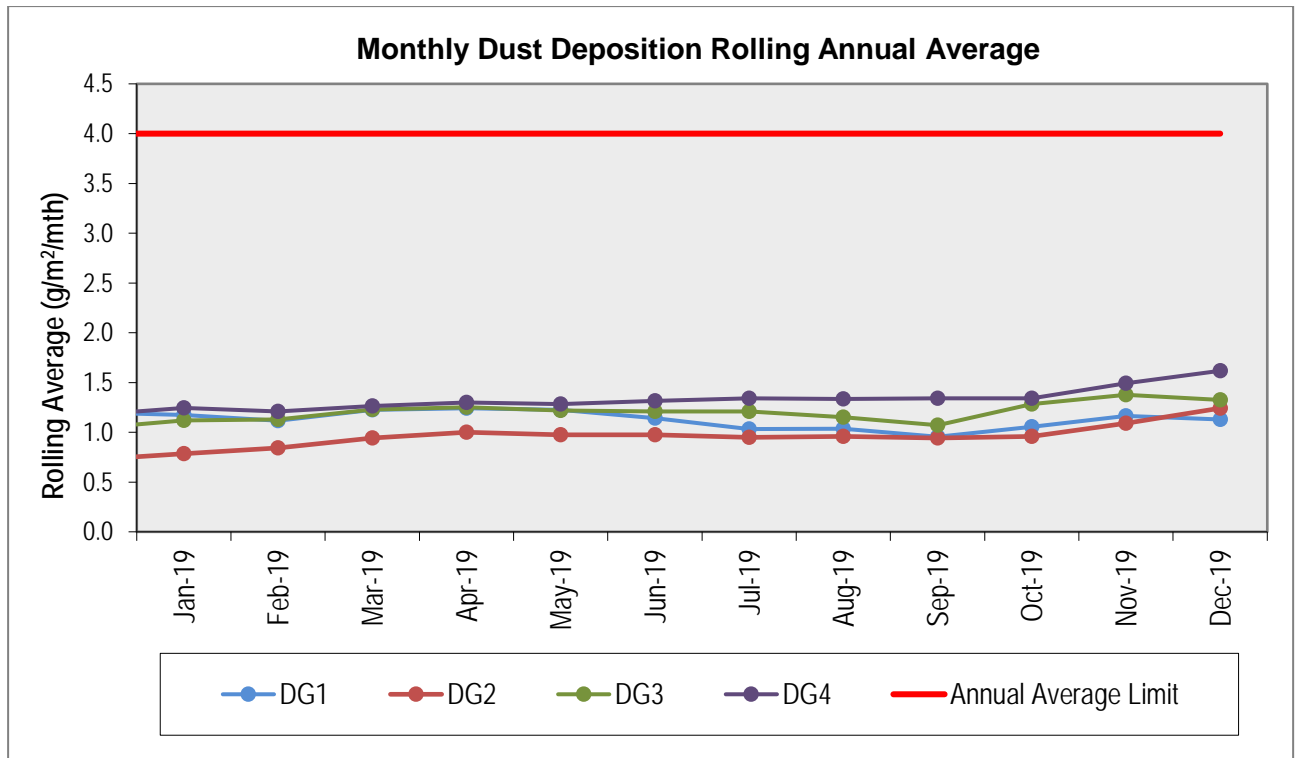


Figure 1. Dust Depositional Gauge – Rolling Annual Average

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	-0.07	0.04
	4 g/m ² /month Total Annual Average	1.9	1.1	0.9
DG2	2 g/m ² /month Max Annual Average Increase	<0.1	0.52	0.05
	4 g/m ² /month Total Annual Average	1.9	1.2	1.0

Dust Monitor	Approval criteria	EIS / EA Predictions	Performance during the reporting period	Long Term Average
DG3	2 g/m ² /month Max Annual Average Increase	<0.1	0.29	-0.03
	4 g/m ² /month Total Annual Average	1.9	1.3	1.4
DG4	2 g/m ² /month Max Annual Average Increase	<0.1	0.44	0.05
	4 g/m ² /month Total Annual Average	1.9	1.6	1.4
HVAS PM ₁₀	30 µg/m ³ Annual Average	10.8	17.9	14.20
	50 µg/m ³ 24 hr Average	10.5 to 51.7	73 (Max 24 hr result)	73 (Max 24 hr result)
HVAS TSP	90 µg/m ³ Annual Average	36.1	37.9	30.3

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 2019 on a monthly basis at four depositional dust gauges. The limit criterion for depositional dust is 4 g/m²/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, mobile water cannon, a road sweeper and a water cart operating on site during coal haulage activities. Further controls are being investigated specifically for the waste handling facility, which include sealing the area or treating the area with a commercially available dust suppressant.

Trend

Myuna Colliery has 16 years of dust monitoring data over the period from January 2003 to December 2019. 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 2019.

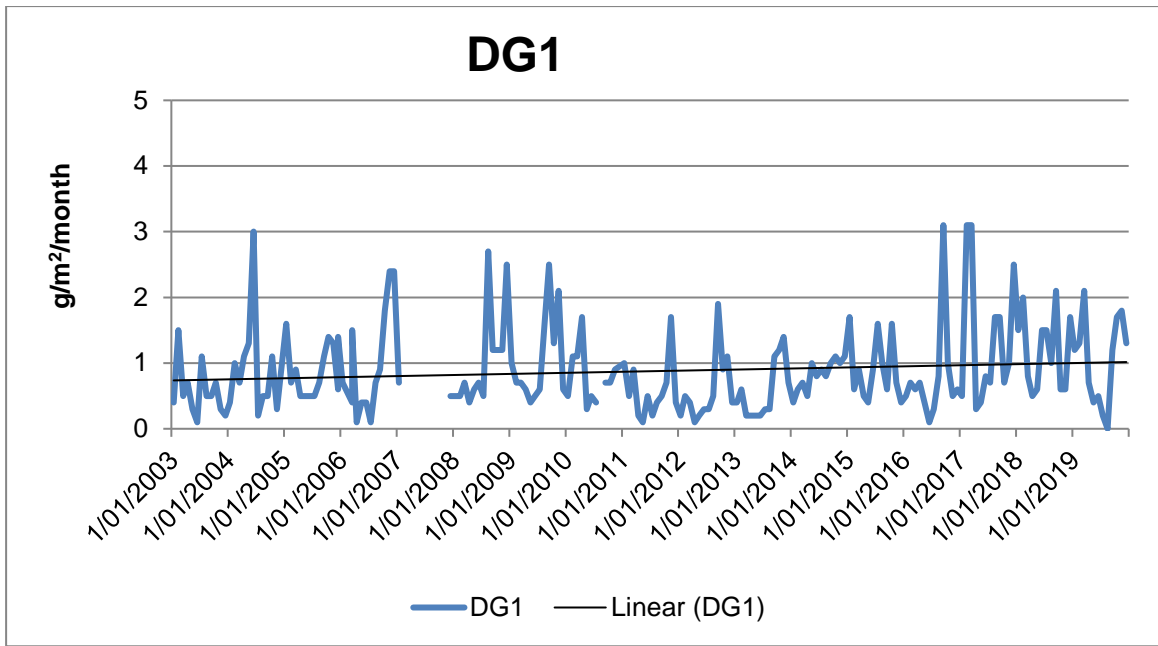


Figure 2. DG1 Trend Analysis Graph

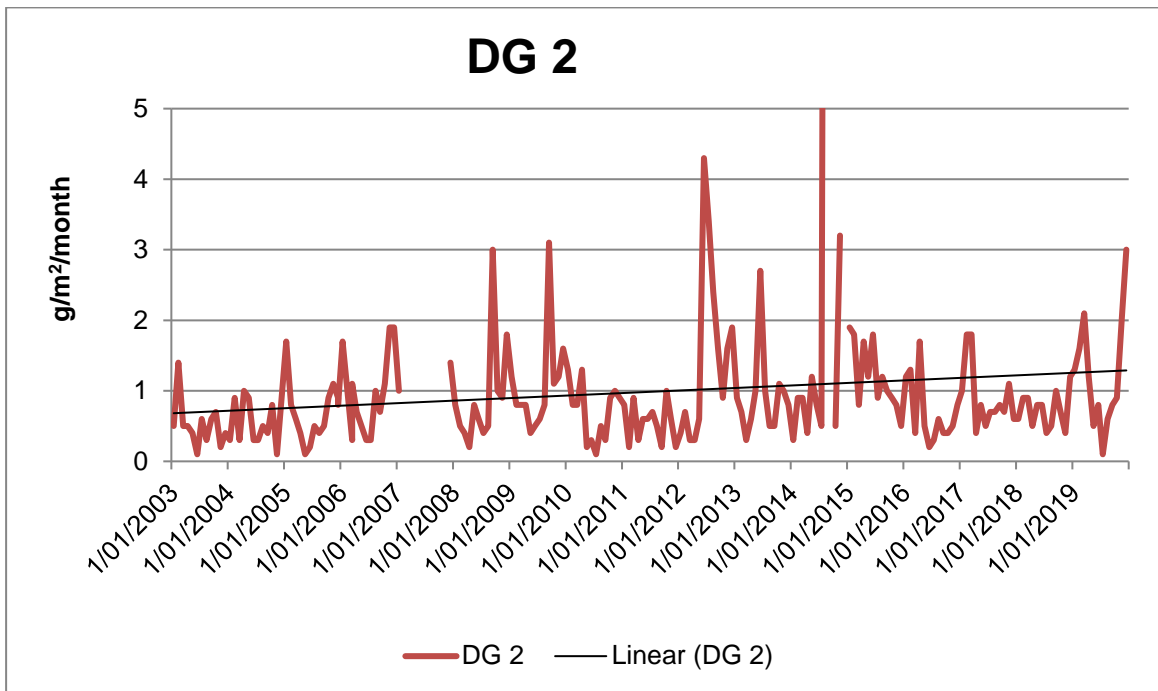


Figure 3. DG2 Trend Analysis Graph

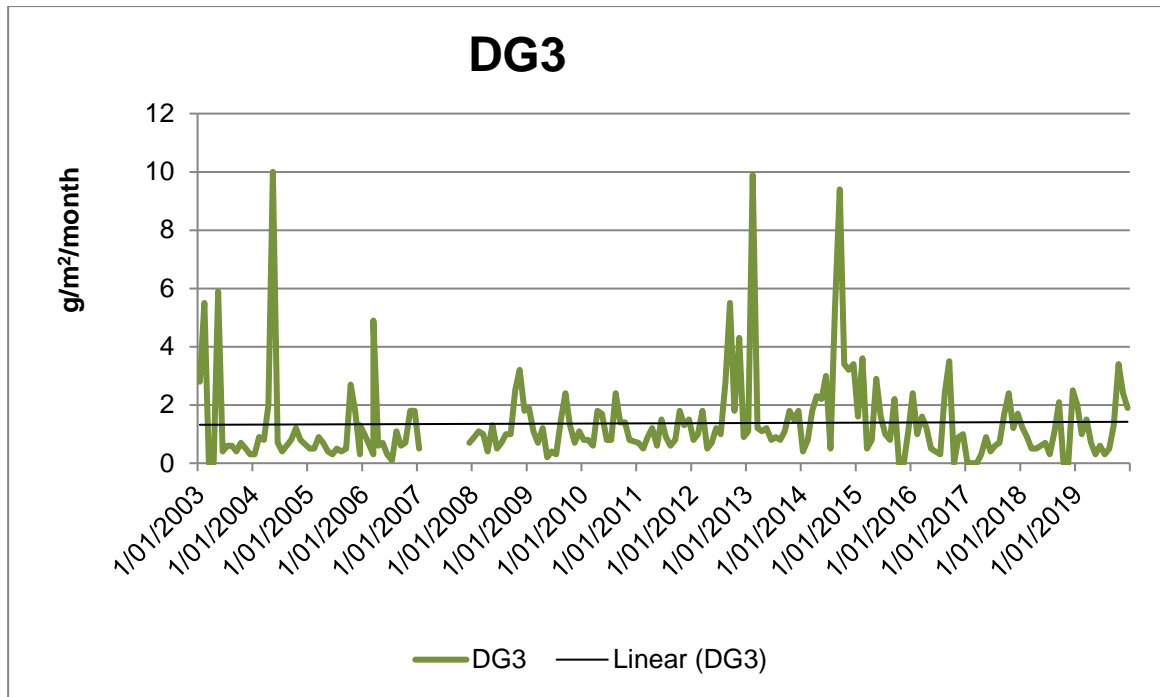


Figure 4. DG3 Trend Analysis Graph

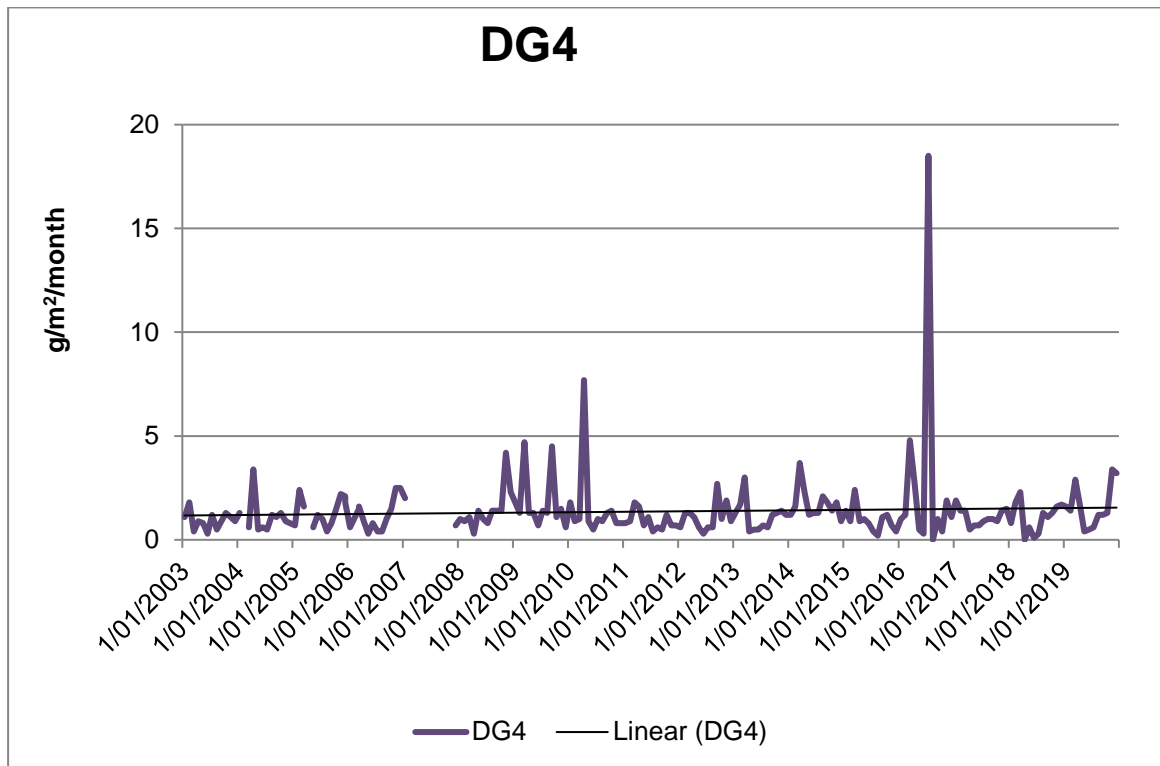


Figure 5. DG4 Trend Analysis Graph

The 2019 annual average and long term average for each dust gauge is provided in Table 12.

The 2019 annual averages for all dust gauges are consistent with the 16 year long term average. The 2019 averages for DG 3 is less than the long term average while the DG 1, 2 and 4 annual averages are higher than the respective long term averages.

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 Gauge DG1, for August 2019, was 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.

New Material

A revised version of the Northern Region Air Quality and Greenhouse Gas Management Plan, which encompasses the Centennial Coal operations, Mandalong, Myuna, Newstan and Northern Coal Services, was submitted to DPIE on the 30 October 2019 for review and approval. The plan was updated to take into consideration recommendations received during the Myuna Colliery Independent Environmental Audit.

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 criterion for TSP is 90 $\mu\text{g}/\text{m}^3$ and for PM10 is 30 $\mu\text{g}/\text{m}^3$. The 24 hour limit criterion for PM10 is 50 $\mu\text{g}/\text{m}^3$. There were five (5) exceedances of the 24 hour limit criteria for PM10 during the report period. These are detailed in Table 13 below.

Table 13. Air Quality Criteria Exceedances

Date	24 hr PM10 ($\mu\text{g}/\text{m}^3$)	Cause	Non-Compliance?
08/01/2019	73	Trucking on haul road	Yes
22/11/2019	75	Smoke from NSW Bushfires	No
28/11/2019	64	Smoke from NSW Bushfires	No
04/12/2019	79	Smoke from NSW Bushfires	No
10/12/2019	135	Smoke from NSW Bushfires	No

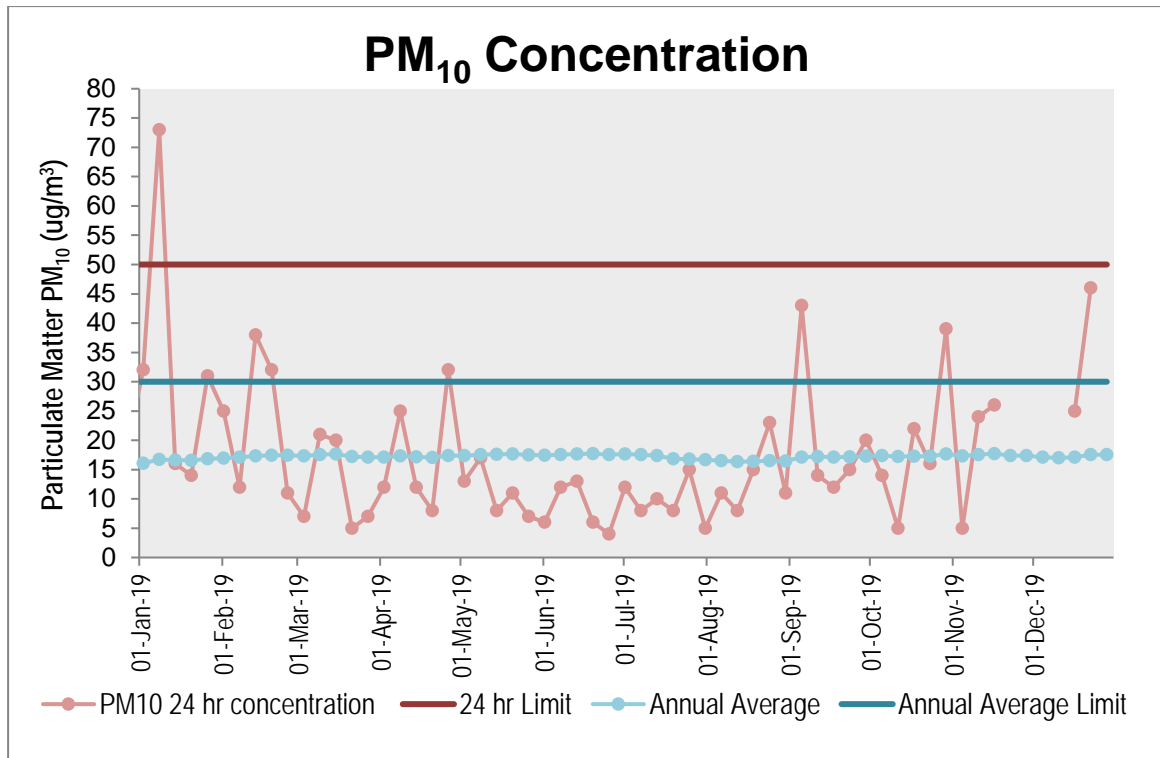


Figure 6. HVAS PM₁₀ Rolling Annual Average & 24 hr Results

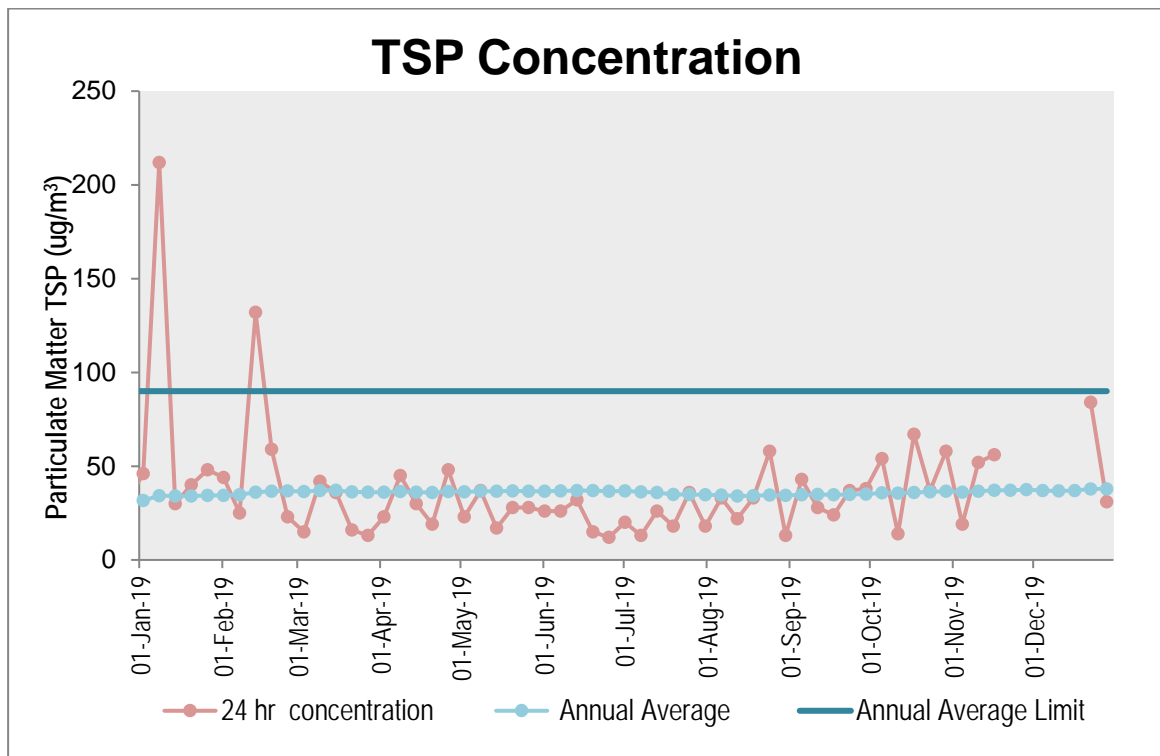


Figure 7. HVAS TSP Rolling Annual Average & 24 hr Results

Note that breaks in the 24 hr concentration lines in the graphs shown in Figures 6 and 7 occur due to the removal of results from contaminated samples. There is no way or approved method of separating the particulates generated by the operation from the

contamination. Also, the results for those sample runs are not representative of particulate concentrations at the site and are therefore excluded from annual averaging.

The maximum recorded 24 hour PM₁₀ concentration, which was not impacted by bushfire smoke, for the report period was 73 µg/m³ and the maximum recorded 24 hour TSP concentration, which was not impacted by bushfire smoke, for the report period was 212 µg/m³.

Trend

The 2019 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 PM₁₀ monitoring data from August 2013 to December 2019. The trend lines indicate slightly decreasing trends for the TSP and PM₁₀ over the long term monitoring period.

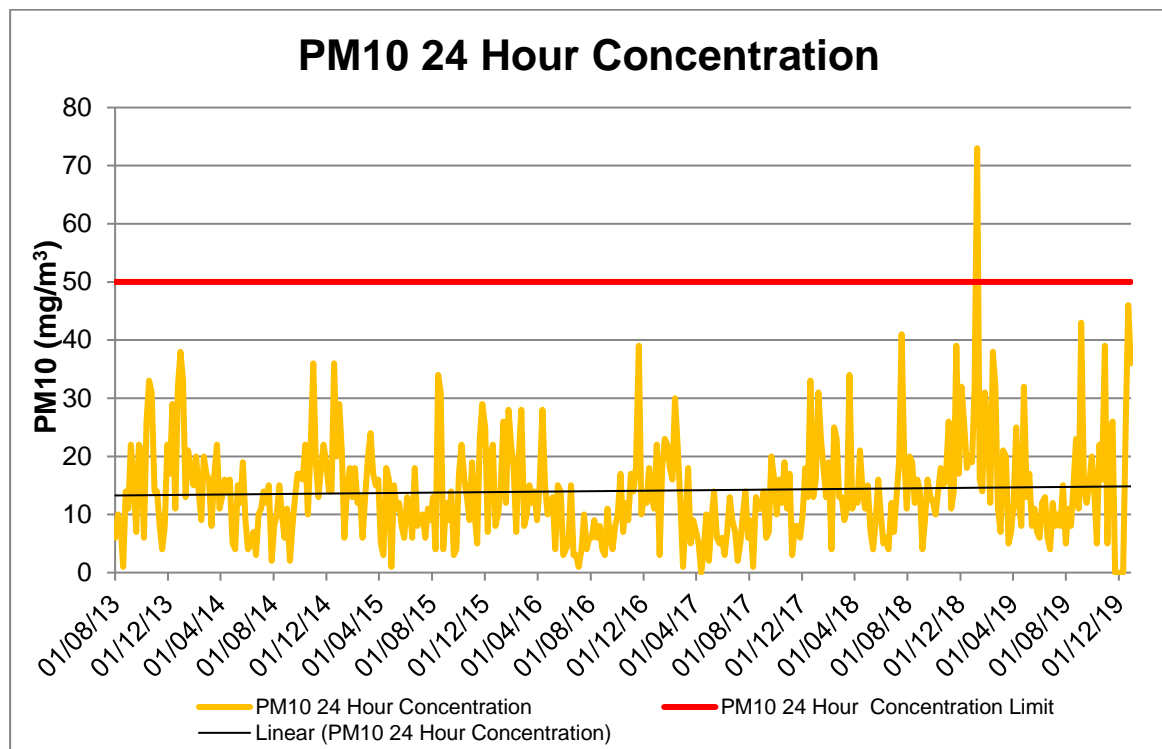


Figure 8. HVAS PM₁₀ Trend Analysis Graph

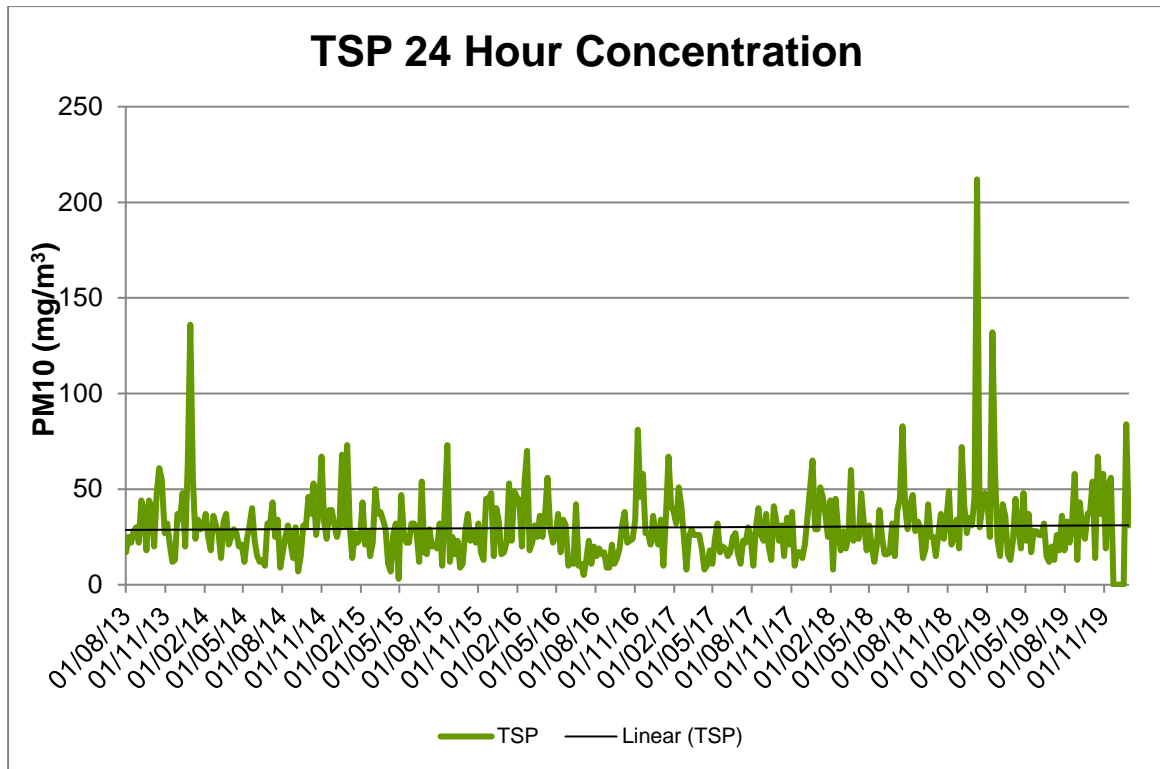


Figure 9. HVAS TSP Trend Analysis Graph

EA Prediction

The Myuna Colliery Extension of Mining Project Air Quality Impact Assessment (Heggies 2010) predicted the cumulative annual average TSP and PM₁₀ concentrations would be below the project air quality goal at all private receptors. Cumulative maximum 24-hour PM₁₀ 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 PM₁₀ 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 2019 Ecological Monitoring Report (Umwelt 2019) is provided in Appendix 3.

Result Summary

The EEC Monitoring Report (Umwelt 2019) provides a qualitative comparison with the baseline assessment of 2016 and the follow up monitoring of 2017 and 2018. A direct quantitative comparison was not possible as, although the objectives of the monitoring have not changed, in 2018, the 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, from 2018, monitoring occurs in spring rather than autumn.

The results of the 2019 EEC monitoring suggest that current mining operations are 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 generally within benchmark condition however VMA 2 (Plot 3) generally 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, as well as the results from 2018 and 2019, suggest that the condition of VMA 2 is relatively stable from year to year. Notwithstanding this, some recommended management actions were provided for consideration to provide better data quality and to improve the condition of VMA 2 in 2019.

The number of weed species in VMA 1 has risen substantially since monitoring began, particularly in Plot 1 where one weed species was present in 2016 and 2017, however nine were present in 2018 and 2019. Despite this, during the 2019 monitoring event, weed species coverage was still low. This substantial change in weed species number is likely as a result of a combination of factors including minor changes in plot location, changes in ecologists conducting the surveys, weather conditions and the tendency of the creekline to bring in and flush weedy material through the plots.

During 2019 HLM spent approximately 100 labour hours on ground at the site actively controlling high priority target weeds. This equates to 5 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 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.

Trend

From 2012 to the end 2019 there have been eight 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 Plant 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 encompasses the Centennial Coal operations, Mandalong, Myuna, Newstan and Northern Coal Services, was approved by DPE on the 23 April 2019. This Plan replaces Myuna's Biodiversity Management Plan.

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

Table 14. Total GHG Emissions from Site

Emissions Summary - July 2017 to June 2018	Total (tCO₂-e)
Electricity	29 827
Diesel	1 232
Petroleum Based Oils and Greases	199
SF6	4
Fugitives - CH ₄	551 636
Fugitives - CO ₂	4 893
TOTAL	587 791

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 2019 reporting period.

RPS was engaged to prepare the Phase 3 post-mining condition report for 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 3 post mining 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 21st of August 2019 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, 45-7-0191*

and 45-7-0086 are in relatively good condition being stabilised by vegetation growth. Midden site 45-7-0188 continues to suffer from natural erosion and has largely collapsed into the lake. Condition reports for 45-7-0088 and 45-7-0219 are largely non applicable given they are Aboriginal Place recordings for the whole of the island itself.”

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.

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 9. Volumetric and water quality monitoring data at LDP 9 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 9 for the 2018 / 2019 period is 1877 ML. There was no exceedance of the Bore Licence criteria during the reporting period.

Table 15 identifies the water take under the water licences. It is important to note that Table 15 reports on the water year, which is from 1 July 2018 to 30 June 2019, not the calendar year.

Table 15. 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	1563	118	1681

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 2019 reporting period was approximately 35 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 16. Water Storage

Seam	Water Storage Volume (ML)
Wallarah	740
Great Northern	929
Fassifern	1504

Myuna Colliery used 64 ML of potable water for the 2019 reporting period of which approximately 95% (or 61 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 2019 report period was approximately 1752 ML.

Visual inspection of the flow volume trend, in the Centennial Myuna Annual Groundwater Management Report Figure 4–1(GHD March 2020), 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 until the end of 2019. 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 9 and LDP 10. Other EPL monitoring requirements included E1 Manganese monitoring in Wangi Bay.

There was no discharge of water through LDP 10 during 2019 so this section will focus on LDP 9.

Table 17. Summary of Surface Water Monitoring Locations

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

7.1.1. Surface Water Monitoring Results

Mine water discharged from LDP 9 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 19 and 20).

The flow volumes through LDP 9 are monitored continuously in accordance with EPL366. The daily volume discharge limit for LDP 9 is 13000 kL. The maximum daily volume discharged was 9 682 kL during the reporting period. The average daily volume discharged for 2018 was 5 126 kL. There were no exceedances of the LDP 9 volume limit criteria during the reporting period.

The pH of the mine water discharged through LDP 9 was consistent throughout 2019 with a minimum pH level of 7.2 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 9 was consistently low with an average concentration of 6 mg/L and a maximum concentration of 24 mg/L during 2019. 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 9 was consistently low with a maximum below the limit of reporting. The concentration limit for oil and grease is 10 mg/L. There were no exceedances of this limit during the reporting period.

Graphs of the main water quality analytes for LDP 9 for the reporting period are provided in Figure 10 and 11 below.

Table 18. 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 9 (EPL Point 9)	Wangi Creek	7.62	7.63	6	7	0	0

Table 19. LDP 9 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	7.20	7.62	7.90	6.5 – 8.5	6.5 – 8.5
Total Suspended Solids	mg/L	365	365	0	6	24	50	<50
Oil & Grease	mg/L	365	365	0	0	0	10	-

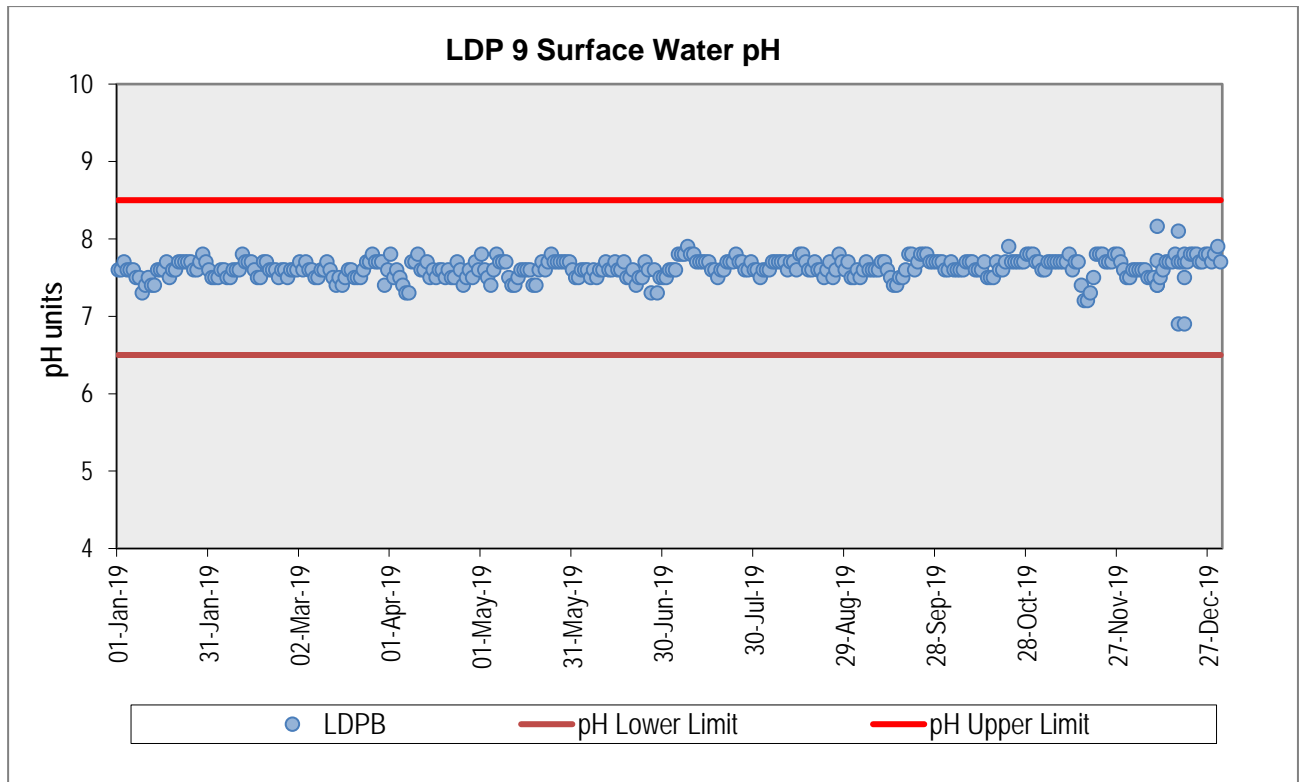


Figure 10. LDP 9 Water Quality Monitoring Results - pH

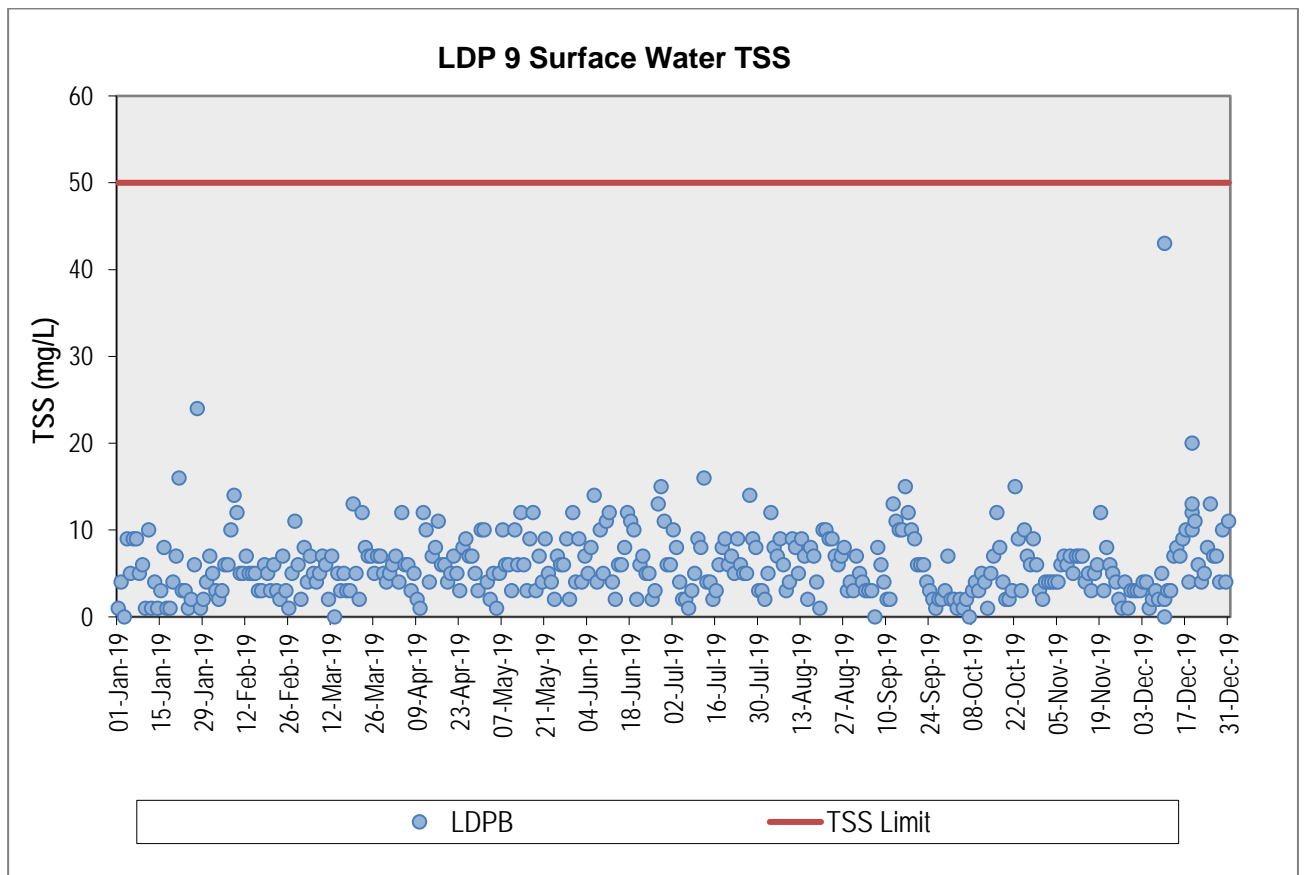


Figure 11. LDP 9 Water Quality Monitoring Results - TSS

Water Volume is required to be monitored daily during discharge at the licenced discharge points in accordance with EPL 366. Table 20 provides the discharge volume results for LDP 9 for the Annual Review period. There was no discharge from LDP 10 during the period

Table 20. LDP Discharge Volumes

Monitoring Point Reference	Frequency	No. of Measurements made	Lowest Result (kL)	Mean Result (kL)	Highest Result (kL)	EPL Limit
LDP 9 (EPL Point 9)	Daily During Discharge	365	1918	5140	9682	13000

7.1.2. Data interpretation

As shown in the figures below, linear trend lines were applied to the monitoring data from 2011 to 2019 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.

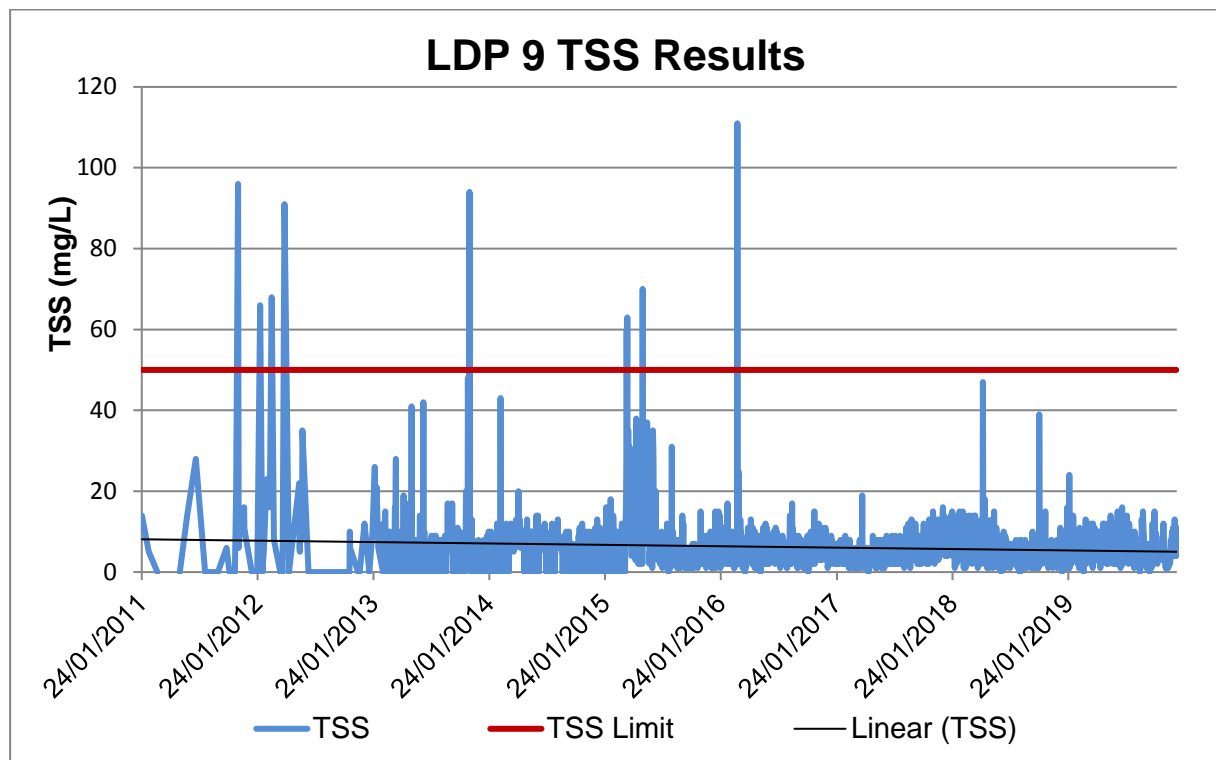


Figure 12. LDP 9 TSS Monitoring Results and Linear Trend Line

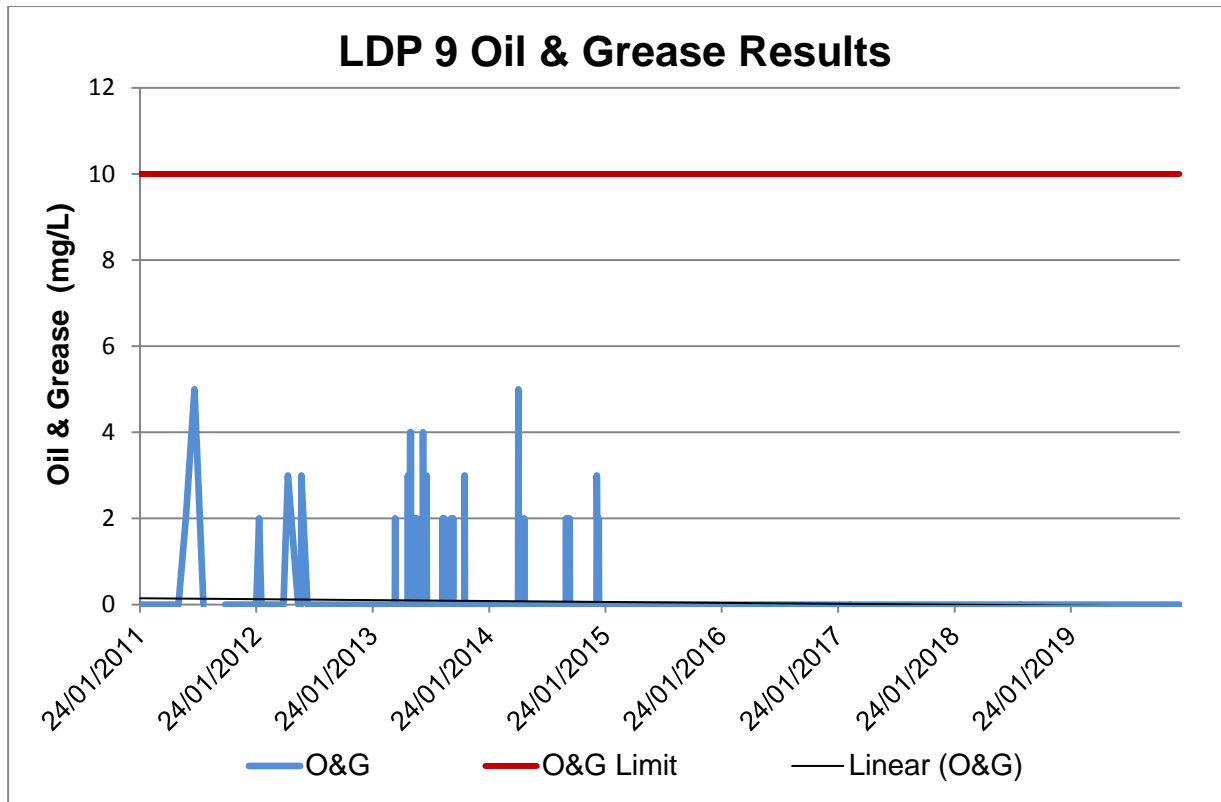


Figure 13. LDP 9 TSS Monitoring Results and Linear Trend Line

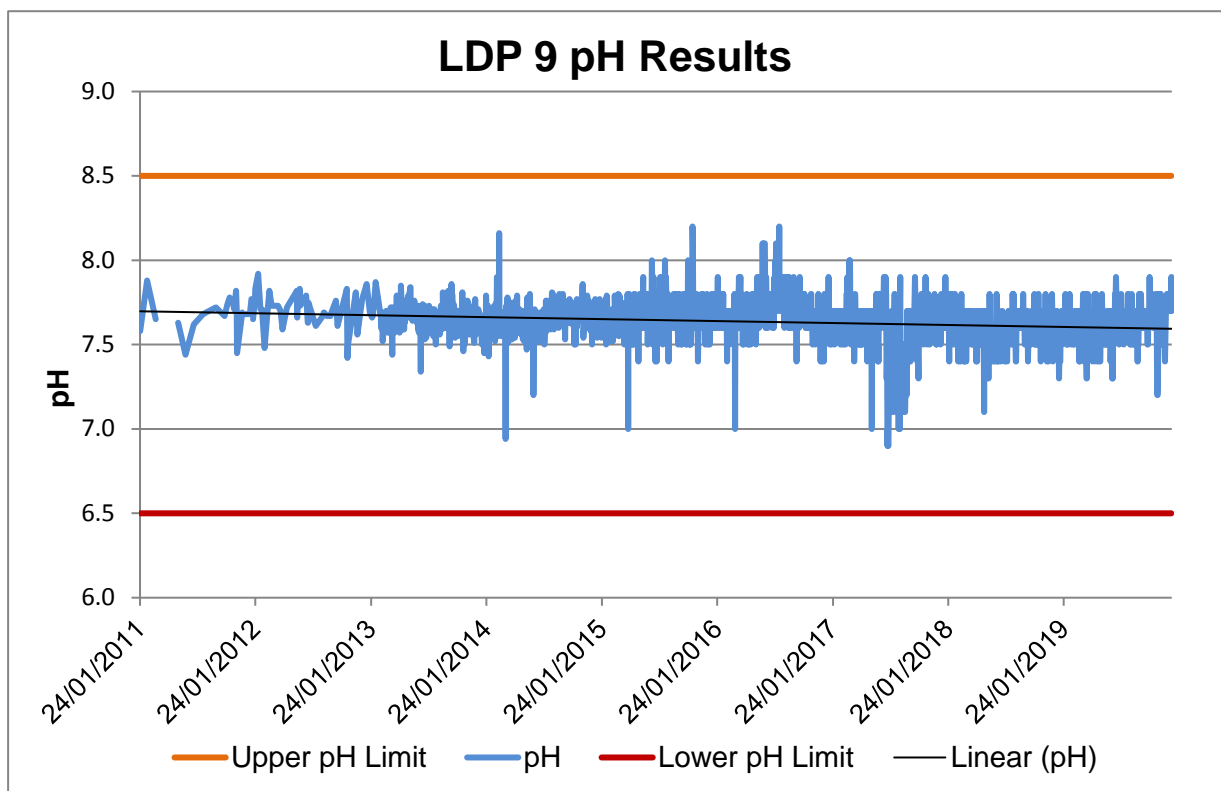


Figure 14. LDP 9 pH Monitoring Results and Linear Trend Line

7.2. Water Balance

The overall water balance for 2019 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.

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 bores which were installed in August 2012. Details of the groundwater monitoring bores are provided below in Table 21.

Table 21. 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 for 2019 are shown below in Table 22.

Table 22. Groundwater Levels for Myuna Colliery

Bore	Groundwater Level (m AHD)												EIS Prediction
	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019	Dec 2019	
MW01	18.8	19.1	19.1	19.1	19.0	19.0	18.8	18.7	18.7	18.8	18.9	18.5	Minimal Impact
MW05	12.8	13.2	12.9	13.0	13.3	13.3	13.2	12.6	12.6	12.7	12.6	12.6	Minimal Impact
MW06	12.8	12.8	12.8	12.1	12.8	12.8	12.7	12.7	12.7	12.7	12.9	12.7	Minimal Impact
MW07	21.6	21.6	21.7	21.7	21.6	21.5	21.3	21.2	21.1	21.3	21.4	21.4	Minimal Impact
MW08	20.2	19.8	20.1	19.2	20.0	19.9	19.6	20.0	20.2	20.2	20.1	20.0	Minimal Impact
MW09	16.1	14.8	15.6	16.1	15.4	15.4	15.8	15.4	16.8	16.8	15.6	14.9	Minimal Impact
MW10	23.7	23.3	23.2	23.6	23.2	23.3	23.3	23.1	23.5	23.5	23.3	23.0	Minimal Impact
MW11	9.3	9.2	9.7	9.4	9.2	9.2	9.3	9.3	9.6	9.5	9.4	9.3	Minimal Impact
MW12	6.4	6.2	6.4	6.5	6.2	6.1	6.4	6.3	7.0	7.0	6.0	5.7	Minimal Impact
MW13	2.0	1.7	1.8	2.0	1.8	1.8	2.0	1.8	2.3	2.4	1.8	1.6	Minimal Impact

7.3.2. Data Interpretation

Groundwater levels at all monitoring locations remained relatively stable during the reporting period. Since November 2016, MW09 displays a trend of increasing groundwater level. It is unlikely that the increasing level is related to mining as this trend has not been replicated at surrounding monitoring bores. Groundwater levels have been relatively stable at all other groundwater monitoring locations since November 2016.

7.4. 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 23.

Table 23. Manganese Monitoring Results

Date	March 2019	June 2019	September 2019	December 2019
Unit - µg/L	73	21	209	161

Trends

The Manganese monitoring has been conducted over a period of nine years from 2011. Manganese concentrations recorded in Wangi Bay over the nine year period of monitoring display a relatively constant trend at T1 and a downward trend at T2. The results 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 and in 2019, influenced by a high result in September.

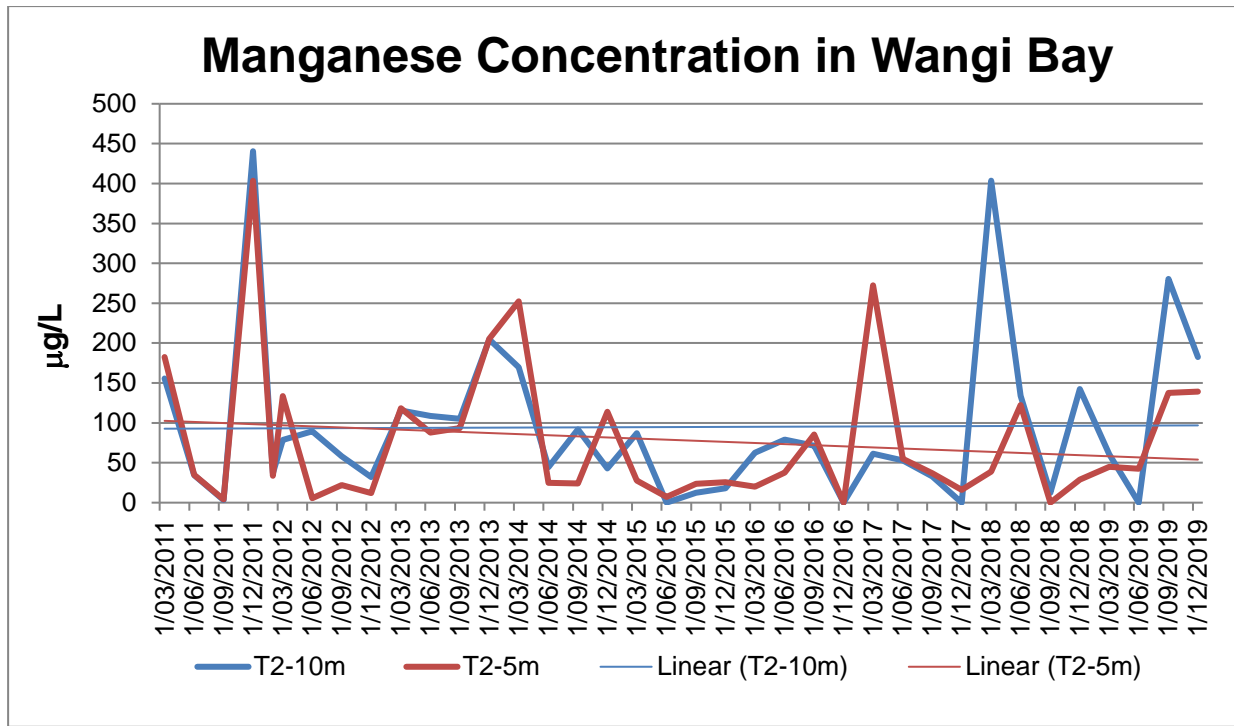


Figure 15. Manganese Monitoring Results and Linear Trend Line

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 24. Rehabilitation Status

Mine Area Type	Previous Reporting Period (Actual)	This Reporting Period (Actual)	Next Reporting Period (Forecast)
	2018 (ha)	2019 (ha)	2020 (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 met 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 2019 Myuna CCC was:

- Gerard Martin (Community Representative)
- Sandra O'Donnell (Community Representative);
- John Shoebridge (Community Representative);
- Ray Robinson (Community Representative);
- Cr Luke Cubis (Lake Macquarie City Council);
- John Turner (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 2019, with updates being distributed to committee members in January and July.

Following the passing of John Shoebridge on 18 July 2019 and the resignation of Sandra O'Donnell from the CCC on 29 July 2019, Myuna are currently seeking community representatives to join the Committee.

Regular agenda items for the meetings included:

- 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 2019 hosted by the Wangi Lions Club;
- Royal Motor Yacht Club Toronto event the Heaven Can Wait Charity Sailing Regatta;
- Awaba Oval Board (LMCC) Operating Committee for improvements to Awaba Sporting Complex;
- Australian Sports Foundation Team Lake Macquarie - International Children's Games in Russia in July 2019;
- Toronto Lions Club events; Float your Boat and Carols by the Lake; 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, Westlakes Wildcats Football Club, Southern Lakes Cricket Club, Macquarie Shores Swimming Club, Lake Macquarie Crocs Masters Swimming Club, Westlakes Athletics Club, Wangi RSL Amateur Sailing Club, Marmong Point Sailing Club, Toronto Ladies Golf, Westlakes District Netball Association, Macquarie Scorpions Rugby League Football Club and Toronto Awaba Stags Football Club.

Centennial Myuna supported community organisations and events including Meals on Wheels, Southlakes Carers Inc., Special Children’s Christmas Party, Immune Deficiencies Foundation as well as Wyee Public School, Teralba Public School and Wangi Public School.

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 2019 report period.

Table 25. Complaints History

Year	Air	Water	Noise	Waste	Other	Total
2019	0	0	0	0	0	0
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

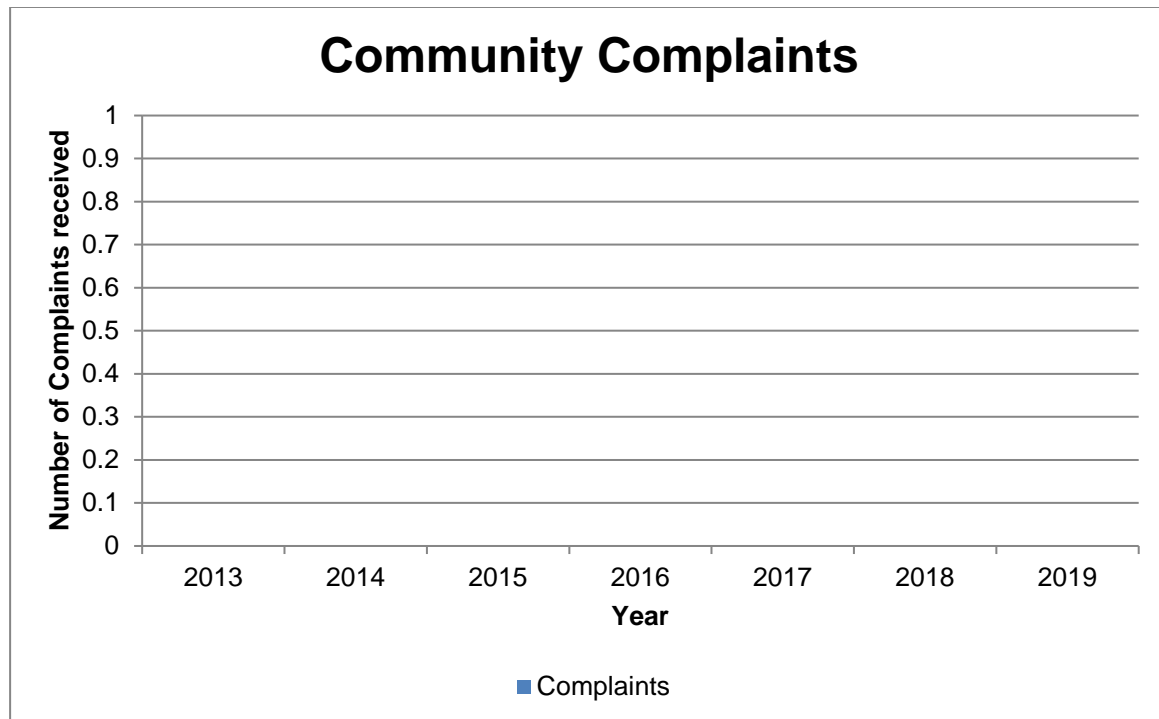


Figure 16. Annual Community Complaints

10. AUDITING

10.1. Independent Environmental Audit

Centennial Myuna engaged MCW Environmental Pty Ltd (MCW) as the independent expert approved by the DPE to carry out an Independent Environmental Audit (IEA) of Myuna Colliery in accordance with Condition 9, Schedule 5 of Project Approval 10_0080 MOD1.

The audit period was defined as from 31 May 2016 (last date of the previous IEA site inspection) to 7 May 2019 (date of site visit conducted by MCW Environmental). The Independent Environmental Audit assessed compliance with the PA10_0080 MOD1, EPL366, Mining Lease 1632 and Mining Purposes Lease 334. In addition the audit included a review of the adequacy of the strategies plans and programs required under the project approval.

Table 26. Independent Environmental Audit Compliance

Relevant Approval	Percent Compliant (%)	Number of Conditions Non-compliant	Number of Conditions Not Verified
Project Approval Myuna Mine PA 10_0080	82	7	4
Project Approval Myuna Mine PA 10_0080 Appendix 3 Statement of Commitments	100	0	0
Environmental Protection Licence No. 366	94	3	3
Mining Lease 1632	97	1	0
Mining Purposes Lease 334 (Covering Pit Top area only)	100	0	0
Mining Lease 1370	100	0	0

An Action Plan was developed and submitted to the Department of Planning and Environment which describes the corrective actions to be undertaken for each non compliance and recommendation. The Action Plan has a scheduled completion date for each action. The Audit Report and Action Plan has been published on the Centennial Coal website.

Progress against the action plan is shown in Table 27. The next Independent Environmental Audit is scheduled for May 2022.

Table 27. Independent Environmental Audit Action Plan

Item No.	Title Condition No.	Requirement	Compliance/ Recommendations	Action Required	Proposed Completion	Progress
1	PA 10_0080 S2.11	Operation of Plant and Equipment	Undertake repairs to the bund wall at the bulk oil storage area.	Repairs complete. No further action required.	N/A	Complete
2	PA 10_0080 S3.1	Subsidence	That Myuna develops and implements a process to assess settlement measurements against the 20mm vertical subsidence criteria that includes consideration of survey error; shrink/swell; and any other relevant factor. The procedure should define who is responsible for doing the works required and for reporting any non-compliance with the criteria.	Review Subsidence Management plan to incorporate a review process of subsidence data and roles and responsibilities of reporting any non-compliances.	28/02/2020	Complete
3	PA 10_0080 S3.1	Subsidence	That Myuna formalise and implement a process to demonstrate that mine workings are conducted in accordance with the first workings mine design.	Design and implement a documented process to periodically conduct surveys to verify workings are in accordance with the mine design.	30/10/2020	Ongoing
5	PA 10_0080 S3.9	First Workings	Seek formal confirmation from the DRE that it is satisfied that the first workings have been designed to remain stable and non-subsiding.	Submit documentation to DRE and request that they advise if they are satisfied that the workings are designed to remain stable and non-subsiding.	30/06/2021	Ongoing
6	PA 10_0080 S3.11	Noise Criteria	Implement the recommendations of the Advitech Noise Exceedance Investigation Report (once finalised).	Recommendations of the Advitech Noise Exceedance Investigation Report will be considered and implemented as appropriate and practical.	30/11/2020	Ongoing
7	PA 10_0080 S3.12	Operating Conditions	Ensure the real-time continuous noise monitor is used as described in the NMP as a tool to proactively guide the day to day planning of Myuna Colliery. This includes setting of trigger levels and sending alerts to enable managers to alter operational activities as required.	Noise monitor to be upgraded to a type capable of alarming. Trigger levels to be set for new monitor to allow it to be used in the making of operational decisions.	20/12/2020	Ongoing

Item No.	Title Condition No.	Requirement	Compliance/ Recommendations	Action Required	Proposed Completion	Progress
8	PA 10_0080 S3.12	Operating Conditions	Consider better integration of meteorological data to enable pro-active management under higher impact meteorological scenarios (e.g. winds about the west and north).	Investigate better integration of meteorological data to enable pro-active management under higher impact meteorological scenarios and implement if feasible to do so.	20/12/2020	Ongoing
9	PA 10_0080 S3.16	Greenhouse Gas Emissions	Include site specific measures to minimise the release of greenhouse gas emissions in the Myuna Appendix of the Northern Region AQGHGMP. The measures should be implemented by the site.	Include site specific measures in the Myuna Appendix of the Northern Region AQGHGMP for the minimisation of greenhouse gas emissions.	20/11/2019	Complete
10	PA 10_0080 S3 Note	SOIL AND WATER Under the Water Act 1912 and/or the Water Management Act 2000, the Proponent is required to obtain the necessary water licences for the project.	Confirm with NRAR that all applicable licences required at the site have been obtained including a Certificate of Title for WAL 41560; and clarify conditions of WAL41560. Where licences are required, work with NRAR to obtain these licences.	Confirm with NRAR that all applicable licences required at the site have been obtained including a Certificate of Title for WAL 41560; and clarify conditions of 20MW065029. Where there are corrections to be made with licencing requirements, liaise with NRAR to have these addressed	27/05/2022	Ongoing
11	PA 10_0080 S3.25	Water Management Plan	Implement the monitoring program for stream health and channel stability and visual monitoring for channel incision as outlined in the WMP.	Stream Health and Channel Stability Monitoring has been requisitioned for 2019. This will include visual monitoring for the occurrence of channel incision as per the WMP.	20/12/2019	Complete
12	PA 10_0080 S3.27	Water Management Plan	Ensure that surface and groundwater quality and quantity monitoring data is sufficiently reviewed / analysed to determine whether the TARP's require activation.	Implement a system to document and record review/analysis of surface and groundwater quality and quantity monitoring data to determine whether the TARP's require activation.	20/03/2020	Complete
13	ML 1632 Condition 12	Prevention of Soil Erosion and Pollution	As per the recommendation of the RCA report, consider obligations for ongoing management of the contamination in consultation with the EPA.	Consider obligations for ongoing management of the contamination in consultation with the EPA.	20/12/2019	Complete

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 28. 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.	<p>2. Conduct additional model runs to assess pre-mining water budgets for the alluvium and compare this to current conditions.</p> <p>3. Implement a groundwater elevation monitoring programme for the shallow alluvial bores on site to:</p> <p>a. Further characterise the influence of the mine relative to climatic changes.</p> <p>b. Further validate the predicted modelling impacts and the uncertainty associated with the predictions.</p> <p>4. Clarify the rationale behind changing overburden thickness as part of model calibration via clarification in future annual reports.</p>	<p>1. Assess pre-mining water budget for the alluvium and compare with current conditions in the Annual Groundwater Management Report.</p> <p>2. Implement a groundwater elevation monitoring program.</p> <p>3. Provide clarification in the Annual Groundwater Management Report of the rationale behind changing overburden thickness as part of model calibration.</p>	<p>Completed. Section 5.2 2016 Annual Groundwater Report.</p> <p>Completed. Section 3.3 2016 Annual Groundwater Report.</p> <p>Completed. Section 5.1.1 2016 Annual Groundwater Report</p>
	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
	<p>and mine water discharge scenarios and criteria.</p> <p>b) long term water balance calculations for the site to show that the proposed volumes and rates of groundwater extraction are sustainable.</p> <p>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:</p> <p>a. groundwater sources to which no extraction authorisation is included in this licence</p> <p>b. other groundwater users within a radius from the work defined in the approved groundwater management plan.</p> <p>c. and groundwater dependent ecosystem or surface water source which may be affected by operation of the work.</p> <p>d) verification of any predictive modelling or other assessments related to impacts on groundwater source(s), other users or groundwater dependent ecosystems</p> <p>e) a monitoring and response plan, which is approved by the NSW Office of Water. The plan shall include:</p> <p>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</p> <p>ii. contingency arrangements in the event of predicted interception of groundwater exceeding predictions</p> <p>iii. options to replace groundwater user supply for any affected licensed groundwater licence holder.</p>	<p>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.</p>	<p>in the licence and the sustainability of the scheme, making reference to the impacts on sensitive features identified in this condition.</p> <p>5. Update the Groundwater Management Plan to include a groundwater elevation monitoring program.</p>	<p>Plan.</p> <p>Completed. Section 6.1.2 Water Management Plan.</p>

Condition No.	Requirement	Compliance/ Recommendations	Action Required	Progress
	<p>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:</p> <ul style="list-style-type: none"> 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. 	<p>6. Include the manually recorded extraction data (field sheets) in an appendix of the annual reports.</p> <p>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.</p>	<p>6. Provide all groundwater extraction data in the appendix of the Annual Groundwater Management Report.</p> <p>7. Conduct a gap analysis on the water quality reporting requirements of the Groundwater Management Plan and the Annual Groundwater Management Report.</p> <p>8. Investigate and implement formats for presenting data in the Annual Groundwater Management Report in a clear and concise manner.</p>	<p>Completed. Appendix E 2016 Annual Groundwater report.</p> <p>Completed. Section 4.2 2016 Annual Groundwater Report.</p> <p>Completed. Section 4.2 2016 Annual Groundwater Report.</p>
	<p>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.</p>	<p>8. Seek approval from DPI-Water for the measurement device.</p>	<p>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.</p>	<p>Completed</p>

11. INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD

Table 29. Incident/Non-Compliance Summary 1

Nature of the incident/non-compliance	Exceedance of PA10_0080 Air Quality Criteria (PM ₁₀)
Date of incident/ non-compliance (if known; if not known state not known)	8/01/2019
The location of the incident/ non-compliance (include a figure if appropriate), if known	“HVAS PM10” as indicated on plan MY11301, appended to this report.
Detail the cause of the incident/non-compliance	The exceedance is believed to have been caused by dust generated by coal haulage trucks operating on the haul road.
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 non compliance.
Detail action that has been, or will be, taken to prevent recurrence of the incident/ non-compliance	Haulage company to bring a water cart to site for use during haulage operations and haul truck drivers reminded of their responsibility to operate the in-situ haul road dust suppression system as required and to maintain appropriate speed along the haul road to limit dust generation.
Consultation with relevant agency (who, when and the response), or agencies if more than one	Notification sent to DPE and RR.

Table 30. Summary of Reportable Incidents and Regulatory Actions

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

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

12. ACTIVITIES 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 2019

APPENDIX 2 - 2019 Ecological Monitoring Report – Swamp Sclerophyll Forest on Coastal Floodplains EEC

APPENDIX 3 – Myuna Colliery Annual Groundwater Management Report 2019



Centennial Myuna Pty Ltd
c/o Level 18, BT Tower
1 Market Street
Sydney NSW 2000

