

A decorative graphic on the left side of the page consists of a vertical column of red and black hexagons. The top hexagon is red, and the others are black. They are arranged in a staggered pattern, with some hexagons overlapping. The background behind the hexagons is a vertical gradient from red at the top to black at the bottom.

Annual Review

Ashton Coal Project

1 January 2020 – 31 December 2020

This page has intentionally been left blank

ASHTON COAL

PTY LTD

ABN: 22 078 556 500

Annual Review

for the

Ashton Coal Project

1 January 2020 – 31 December 2020

Compiled for:

Ashton Coal Operations Pty Limited
ABN 22 078 556 500
Glennies Creek Road
CAMBERWELL NSW 2330
PO Box 699
SINGLETON NSW 2330

Telephone: (02) 6576 1111
Facsimile: (02) 65761122
Email: Ashton.environment&community@yancoal.com.au

Compiled by:

R.W. Corkery & Co. Pty. Limited
Geological & Environmental Consultants
ABN: 31 002 033 712



R.W. CORKERY & CO. PTY. LIMITED

Brooklyn Office:

1st Floor, 12 Dangar Road
PO Box 239
BROOKLYN NSW 2083

Orange Office:

62 Hill Street
ORANGE NSW 2800

Brisbane Office:

Level 54, 111 Eagle Street
BRISBANE QLD 4000

Telephone: (02) 9985 8511

Email: brooklyn@rwcorkery.com

Telephone: (02) 6362 5411

Email: orange@rwcorkery.com

Telephone: (07) 3205 5400

Email: brisbane@rwcorkery.com

Ref No. 737/24c

March 2021

TITLE BLOCK

Name of Operation	Ashton Coal Project
Name of Operator	Ashton Coal Operations Pty Limited
Development consent / project approval #	309-11-2001-i
Name of holder of development consent / project approval	Ashton Coal Operations Pty Limited
Mining Lease #	ML 1529, ML 1533 and ML 1623
Name of holder of mining lease	White Mining (NSW) Pty Limited
Water licence #	Multiple - see Section 3
Name of holder of water licence	Ashton Coal Mines Limited
MOP/RMP start date	01/07/2018
MOP/RMP end date	26/02/2024
Annual Review start date	01/01/2020
Annual Review end date	31/12/2020
<p>I, Aaron McGuigan, certify that, to the best of my knowledge, this report is a true and accurate record of the compliance status of the Ashton Coal Project for the period 1 January 2020 to 31 December 2020 and that I am authorised to make this statement of behalf of Ashton Coal Operations Pty Limited.</p> <p><i>Note.</i></p> <p>a) <i>The Annual Review is an 'environmental audit' for the purposes of section 122B(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.</i></p> <p>b) <i>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); Section 307A, 307B and 307C (false or misleading application/information/documents – maximum penalty 2 years imprisonment or \$22,000, or both).</i></p>	
Name of authorised reporting officer	Aaron McGuigan
Title of authorised reporting officer	Operations Manager
Signature of authorised reporting officer	
Date	30 March 2021

CONTENTS

	Page
TITLE BLOCK	ii
1. STATEMENT OF COMPLIANCE	1
2. INTRODUCTION	2
2.1 OVERVIEW OF OPERATIONS	2
2.2 SCOPE AND FORMAT	2
2.3 KEY PERSONNEL CONTACT DETAILS	4
3. APPROVALS	5
4. OPERATIONS SUMMARY	7
4.1 MINING OPERATIONS	7
4.2 GAS MANAGEMENT	7
4.3 OTHER OPERATIONS DURING THE REPORTING PERIOD	9
4.4 NEXT REPORTING PERIOD	9
5. ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW	11
6. ENVIRONMENTAL PERFORMANCE	12
6.1 SUMMARY OF ENVIRONMENTAL PERFORMANCE	12
6.2 METEOROLOGICAL MONITORING	13
6.3 NOISE	17
6.4 BLASTING	18
6.5 AIR QUALITY	19
6.6 BIODIVERSITY	26
6.7 HERITAGE	48
6.8 SUBSIDENCE	49
6.9 WASTE MANAGEMENT	51
7. WATER MANAGEMENT	53
7.1 WATER TAKE AND BALANCE	53
7.2 SURFACE WATER	55
7.3 GROUNDWATER	61
8. REHABILITATION	64
8.1 REHABILITATION PERFORMANCE DURING THE REPORTING PERIOD	64
8.2 NORTH-EAST OPEN CUT REHABILITATION	64
8.3 PEST AND WEED CONTROL	68
8.4 ACTIONS FOR THE NEXT REPORTING PERIOD	68
9. COMMUNITY	70
9.1 COMMUNITY COMPLAINTS	70

CONTENTS

	Page
9.2 COMMUNITY LIAISON	70
9.3 COMMUNITY SUPPORT PROGRAM	71
10. INDEPENDENT AUDIT	73
11. INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD	76
12. ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD	77

APPENDICES

Appendix 1	Noise Compliance Report 2020
Appendix 2	Annual Groundwater Monitoring Review 2020

FIGURES

Figure 2.1	Local Setting	3
Figure 4.1	Mining Operations	8
Figure 6.1	Environmental Monitoring Locations	14
Figure 6.2	Monthly Wind Roses – January to June 2020	15
Figure 6.3	Monthly Wind Roses – July to December 2020	16
Figure 6.4	Deposited Monitoring Results	20
Figure 6.5	PM ₁₀ Monitoring Results – Site 7	22
Figure 6.6	PM ₁₀ Monitoring Results – Site 9	23
Figure 6.7	PM ₁₀ Monitoring Results – Site 10	24
Figure 6.8	Fauna Diversity 2006 - 2020	28
Figure 7.1	Surface Water and Groundwater Monitoring Locations	56
Figure 7.2	Surface Water Quality Monitoring Results – 2020	57
Figure 7.3	Surface Water Quality Monitoring Results – 2012 to 2020	58
Figure 8.1	Weed Treatment Areas - 2020	69
Figure 9.1	Community Complaints – Mine Life	71

TABLES

Table 1.1	Statement of Compliance	1
Table 3.1	Ashton Coal Project – Consents, Leases and Licences	5
Table 4.1	Production Summary	7
Table 4.2	Ground Disturbance Permits - 2020	9
Table 6.1	Environmental Performance	12
Table 6.2	Monthly Rainfall Records	13
Table 6.3	Summary of Attended Noise Monitoring Results – 2020	18
Table 6.4	Deposited Dust Monitoring Results – Sampling Point D6 – 2020	20

CONTENTS

	Page
Table 6.5	Summary of PM ₁₀ Monitoring Results – 2020..... 21
Table 6.6	24-hour PM ₁₀ Exceedance Investigation Outcomes – 2020 25
Table 6.7	ACP Greenhouse Gas Emissions – 2016/2017 to 2019/2020 26
Table 6.8	Monitoring Site RCE Index Score – 2014 to 2020 29
Table 6.9	Stream Health Monitoring – Macroinvertebrate Diversity 31
Table 6.10	Stream Health Monitoring – SIGNAL Scores..... 33
Table 6.11	Bowmans Creek Riparian Zone – Completion Criteria Status..... 36
Table 6.12	Southern Woodland Conservation Area – Completion Criteria Status 41
Table 6.13	Farmland – Completion Criteria Status..... 47
Table 6.14	Subsidence Monitoring Results 50
Table 6.15	Approximate Waste Volumes 2018 to 2020 52
Table 7.1	Water Take – 2019/2020 Financial Year 53
Table 7.2	Input / Output Water Balance – 2020 Calendar Year 54
Table 7.3	Surface Water Monitoring Summary - 2020 59
Table 7.4	Consecutive Surface Water Trigger Level Exceedances 60
Table 8.1	Rehabilitation Summary 64
Table 8.2	North East Open Cut Rehabilitation Area – Rehabilitation Sites Completion Criteria Status 2020 66
Table 8.3	North East Open Cut Rehabilitation Area – Rehabilitation Sites Completion Criteria Status 2020 67
Table 9.1	Community Complaints Summary - 2020 70
Table 10.1	2020 Independent Audit - Action Response Plan Status..... 74
Table 12.1	Actions to be Completed Next Reporting Period 77

This page has intentionally been left blank

1. STATEMENT OF COMPLIANCE

The compliance status of relevant approvals was reviewed for the reporting period and is summarised in **Table 1.1**. It was determined that there were no non-compliances during the reporting period. Non-compliances with the conditions of EPL 11879 are reported separately as part of the EPL Annual Return.

Table 1.1
Statement of Compliance

Were all conditions of the relevant approval(s) complied with?	Yes / No
Development Consent 309-11-2001-i	Yes
Mining Lease 1529	Yes
Mining Lease 1533	Yes
Mining Lease 1623	Yes
Water Access Licences 1358, 15583, 8404, 997, 1120, 1121, 6346, 23912, 984, 19510, 36702, 36703, 29566, 41501, 41552, 41553	Yes

2. INTRODUCTION

2.1 OVERVIEW OF OPERATIONS

The Ashton Coal Project (ACP) is located approximately 14km northwest of Singleton, New South Wales (see **Figure 2.1**). The ACP includes the decommissioned North-east Open Cut (NEOC), an underground coal mine, a Coal Handling and Preparation Plant (CHPP) and a rail siding. The ACP was granted Development Consent DA 309-11-2001-i in October 2002 by the (then) Minister for Planning. DA 309-11-2001-i has been modified a total of ten times, with the most recent modification (MOD5) being granted on 20 June 2016.

Ashton Coal Operations Pty Limited also holds Project Approval (PA) 08_0182, issued on 17 April 2015, for open cut mining within the South East Open Cut (SEOC) (see **Figure 2.1**). The granting of MOD5 permitted the integration of the existing ACP and the SEOC project, with the combined development referred to as the Ashton Mine Complex. As operations at the SEOC project have not yet commenced, this Annual Review reports only upon the operations associated with the ACP.

A brief summary of the operations at the ACP are provided as follows.

North-east Open Cut

The NEOC was mined between January 2004 and September 2011 at which point coal extraction ceased and, with approval, placement of coarse reject within the NEOC void commenced. The NEOC will continue to provide for coarse reject storage prior to the ultimate final landform rehabilitation, and may be used for coal fines emplacement, if needed.

Ashton Underground Coal Mine

The Ashton underground operations commenced in December 2005 with the first longwall coal extracted within the Pikes Gully Seam in March 2007. Construction of the Bowmans Creek Diversion was completed in November 2012 allowing extraction of coal from beneath those excised sections of Bowmans Creek. Coal extraction operations within the underground operations remain ongoing with an approved maximum production of 5.45Mtpa.

Coal Handling and Preparation Plant

The CHPP was commissioned in April 2004 and expanded during 2006/2007, increasing its capacity from 400t/hr to 1 000t/hr. The CHPP continues to process coal from the Ashton underground operations for export through the Port of Newcastle, NSW.

2.2 SCOPE AND FORMAT

This Annual Review for the Ashton Coal Project has been compiled by R.W. Corkery & Co. Pty Limited on behalf of Ashton Coal Operations Pty Limited (ACOL). ACOL became part of Yancoal Australia Limited in July 2009.

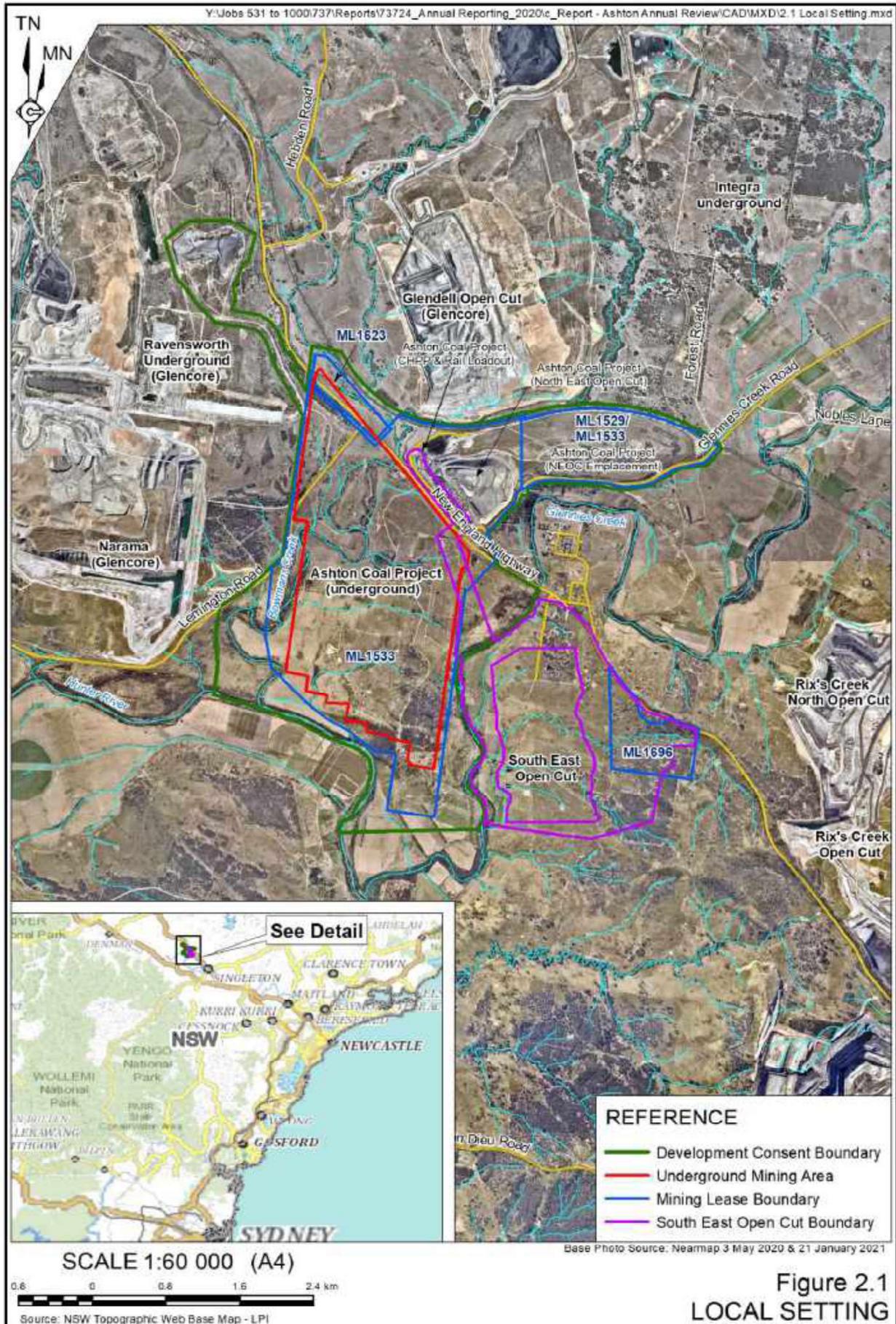


Figure 2.1
LOCAL SETTING

This is the sixth Annual Review submitted for the ACP, following eleven Annual Environmental Management Reports, and is applicable for the period 1 January to 31 December 2020 (“the reporting period”). The information presented within this Annual Review has been compiled based on information and advice provided by ACOL.

This Annual Review has been prepared in accordance with the requirements of *Schedule 5 Condition 10* of DA No. 309-11-2001-I (MOD5), the annual reporting requirements of Mining Leases 1529, 1533 and 1623, and the commitments outlined in the MOP. This Annual Review generally follows the format and content requirements identified in the Department of Planning and Environment’s (DPE) *Annual Review Guideline* dated October 2015.

2.3 KEY PERSONNEL CONTACT DETAILS

The Operations Manager, Mr Aaron McGuigan is the primary mine contact (Tel: 02 6570 9104). Mr McGuigan is currently the Manager Mining Engineering for legislative purposes and as such, is responsible for the environmental management of the mine and ensuring compliance with all relevant legislative obligations. Mr Phillip Brown (Tel: 0439 909 952) is the nominated Environment & Community Relations Superintendent and is also responsible for the environmental management of the mine. The contact details for the mine office are as follows.

Postal Address:	Ashton Coal Operations Pty Limited PO Box 699 SINGLETON NSW 2330	Tel: 02 6576 1111 Fax: 02 6576 1122
Email:	Ashton.environment&community@yancoal.com.au	
Physical Address:	Ashton Coal Operations Glennies Creek Road CAMBERWELL NSW 2330	

A 24-hour Environmental Hotline (Tel: 1800 657 639) is maintained by ACOL. Details of calls taken on this number are forwarded to the Environment & Community Relations Superintendent for further actioning, if required.

3. APPROVALS

ACOL has operated the ACP under the key approvals listed in **Table 3.1**.

Table 3.1
Ashton Coal Project – Consents, Leases and Licences

Page 1 of 2

Consent/Lease/Licence	Issue Date	Expiry Date	Details / Comments
Development Approvals			
Development Consent DA 309-11-2001-i	11 October 2002	26 February 2024 ¹	Granted by the (then) Minister for Planning and last modified on 20 June 2016 (MOD5).
Mining Authorities²			
Mining Lease ML 1529	10 September 2003	11 November 2021	Granted by the (then) Minister for Mineral Resources. Incorporates 128.7ha of surface area. Renewal pending following lodgement of renewal application on 19 May 2020.
Mining Lease ML 1533	26 February 2003	25 February 2024	Granted by the (then) Minister for Mineral Resources. Incorporates 883.4ha of surface area.
Mining Lease ML 1623	30 October 2008	30 October 2029	Granted by (then) Minister for Mineral Resources. Incorporates 26.17ha of surface area.
Other Licences			
Environment Protection Licence No. 11879	2 September 2003	Not applicable	Issued by the (then) Department of Environment and Climate Change (EPA). Current licence version dated 3 February 2020.
Water Access Licence (WAL) 1358	Continuing		Hunter Regulated River Water Source. Supplementary water. Share component: 4ML.
WAL 15583	Continuing		Hunter Regulated River Water Source. General security. Share component: 354ML.
WAL 8404	Continuing		Hunter Regulated River Water Source. High security. Share component: 80ML.
WAL 997	Continuing		Hunter Regulated River Water Source. High security. Share component: 11ML.
WAL 1120	Continuing		Hunter Regulated River Water Source. High security. Share component: 3ML.
WAL 1121	Continuing		Hunter Regulated River Water Source. General security. Share component: 335ML.
WAL 6346	Continuing		Hunter Regulated River Water Source. Supplementary water. Share component: 15.5ML.
WAL 23912	Continuing		Jerrys Water Source. Share component: 14ML.
WAL 984	Continuing		Hunter Regulated River Water Source. General security. Share component: 9ML.
WAL 19510	Continuing		Hunter Regulated River Water Source. High security. Share component: 130ML.
WAL 36702	Continuing		Jerrys Water Source. Share component: 116ML.
WAL 36703	Continuing		Jerrys Water Source. Share component: 150ML.

Table 3.1 (Cont'd)
Ashton Coal Project – Consents, Leases and Licences

Page 2 of 2

Consent/Lease/Licence	Issue Date	Expiry Date	Details / Comments
Other Licences (Cont'd)			
WAL 29566		Continuing	Jerrys Water Source Aquifer Share component: 358ML.
WAL 41501		Continuing	Sydney Basin-North Coast Groundwater Source. Share component: 100ML.
WAL 41552		Continuing	Sydney Basin-North Coast Groundwater Source. Share component: 511ML.
WAL 41553		Continuing	Sydney Basin-North Coast Groundwater Source. Share component: 81ML.
Note 1: Mining operations approved until 26 February 2024 or for a period of 12 years following recommencement of open cut mining operations (including overburden removal) at the Ashton Mine Complex, whichever is longer.			
Note 2: See Figure 2.1 .			

It is noted that this Annual Review has been prepared to fulfil the annual reporting requirements of DA 309-11-2001-i, ML 1529, ML 1533, ML1623 and the various Water Access Licences listed in **Table 3.1**. A separate Annual Return has continued to be submitted to the NSW EPA in accordance with the requirements of Environment Protection Licence 11879. Reporting requirements under the approved Extraction Plan for LW201-204 and 2009 Conservation Agreement (for Southern Voluntary Conservation Area) are also included in the scope of this report.

ACOL also holds a range of additional licences, approvals and permits which are reported upon separately. This includes Exploration Licence 4918, granted on 18 December 1995 with a current expiry date of 17 December 2015 (renewal pending), and Exploration Licence 5860, granted on 22 May 2001 with a current expiry date of 21 May 2020 (renewal pending) (see **Figure 2.1**).

4. OPERATIONS SUMMARY

4.1 MINING OPERATIONS

Open cut coal mining activities ceased in September 2011 and open cut rehabilitation works were completed between 2011 and 2012 with the exception of the Open Cut Void which is used as a reject emplacement.

Approval for underground mining operations includes the extraction of coal from the Pikes Gully (PG), Upper Liddell (ULD), Upper Lower Liddell (ULLD and Lower Barrett (LB) coal seams. Underground mining relies upon the longwall extraction method following continuous miner development of main headings and twin heading gate-roads.

During the reporting period coal was mined from Longwall (LW) 203 and LW204 within the ULLD seam with road development principally between Panels LW205 and LW206 (A and B) and the 200 Mains (see **Figure 4.1**). **Table 4.1** presents a summary of the production statistics for the previous, current and next reporting periods.

In summary, a total of 3 383 255t of Run of Mine (ROM) coal was mined from underground operations during the reporting period and a total of approximately 1 596 915t of product coal was transported to the Port of Newcastle by rail.

Table 4.1
Production Summary

Material	Approved limit (specify source)	Previous reporting period (actual)	This reporting period (actual)	Next reporting period (forecast)
Topsoil Stripped	None specified	0	0	0
Waste Rock / Overburden (m ³)	None specified	0	0	0
ROM Coal / Ore (t) ²	5 450 000 ¹	2 035 229	3 383 255	2 707 109
Coarse Reject (t)	None specified	996 098	1 459 538	1 041 213
Fine Reject (Tailings) (t)	None specified	217 750	398 036	283 953
Saleable Product (t)	None specified	843 414	1 597 769	1 381 943
Note 1: For underground operations as specified by DA 309-11-2001-i, Schedule 2, Condition 6(a). A maximum of 3 600 000t from open cut mining operations is also provided by MP 08_0182, however, this approval has not yet been enacted.				
Note 2: ROM coal does not equate to the sum of rejects and saleable product due to slight variance in the timing between extraction, stockpiling, processing and transport of coal off site.				

Based on current resource estimates and extraction rates, it is anticipated that the remaining underground mine life is approximately seven years (i.e. until 2027).

4.2 GAS MANAGEMENT

Construction of four gas drainage borehole wells, located above LW204, commenced during the reporting period. The gas drainage plant functioned throughout the reporting period, although flaring¹ was sporadically unable to be undertaken due to low methane concentrations. Greenhouse gas emissions continued to be reported as required by the National Greenhouse Gas and Energy Reporting (NGER) requirements (see Section 6).

¹ Flaring is a process of combusting, principally methane, to produce gases with a lower global warming potential.



Figure 4.1 Mining Operations

4.3 OTHER OPERATIONS DURING THE REPORTING PERIOD

A total of 13 internal Ground Disturbance Permits (GDPs) were applicable during the reporting period (see **Table 4.2**).

Table 4.2
Ground Disturbance Permits - 2020

Ground Disturbance Permit No.	Purpose	Rehabilitation Status
158	LW202 subsidence crack repairs.	All disturbance rehabilitated
159	Trenching works to install HDPE gas pipes.	All disturbance rehabilitated
160	Aboriginal investigation test pits at LW204.	All disturbance rehabilitated
161	Gas drainage bores and line at LW204.	All disturbance rehabilitated
162	LW203 (north) subsidence crack repairs.	All disturbance rehabilitated
163	Gas drainage bores and lines at LW204.	All disturbance rehabilitated
164	Aboriginal investigation test pits at LW204 and Oxbow site.	All disturbance rehabilitated
165	Voluntary Conservation area subsidence crack treatment.	All disturbance rehabilitated
166	CHPP earthworks.	All disturbance rehabilitated
167	Aboriginal salvage works associated with 11kV power line relocation.	All disturbance rehabilitated
168	Augering of four 600mm holes for anchor points within the SEOC conveyor easement.	All disturbance rehabilitated
169	LW203 subsidence repairs.	Rehabilitation ongoing
171	11kv power line relocation.	Rehabilitation ongoing

No exploration drill holes were drilled during the reporting period and no other exploration, land preparation or construction activities were undertaken during the reporting period.

Environmental monitoring activities continued throughout the reporting period including air quality, surface water, groundwater, flora and fauna and subsidence monitoring. Results of this monitoring is summarised in Sections 6 and 7.

4.4 NEXT REPORTING PERIOD

The activities proposed for 2021 will principally involve a continuation of activities undertaken during the previous twelve months. The following provides a summary of the planned activities.

Exploration

It is not anticipated that further exploration will be undertaken during the next reporting period.

Mining

During the next reporting period, mining will focus upon continued longwall mining within Panels LW204 and LW205 (see **Figure 4.1**). It is estimated that in the order of 2 700 000t of ROM coal will be extracted during the next reporting period.

Rehabilitation

Rehabilitation activities planned for the 2021 reporting period include the rehabilitation of any subsidence impacts. Ongoing remedial treatment of subsidence surface cracking and maintenance of existing disturbance, principally erosion and sediment control, will also be undertaken as necessary.

Monitoring

Environmental, meteorological and subsidence monitoring will continue to be undertaken during the next reporting period in accordance with the approved management plans. As the majority of management plans were reviewed and revised during the reporting period to reflect improved monitoring programs and recommendations arising from the 2019 Independent Environmental Audit, further changes to monitoring programs are not anticipated during the next reporting period.

Community Consultation and Liaison

The community consultative committee will continue to be convened during the next reporting period. It is expected that meetings will be held once every four months unless otherwise agreed with the committee. The 24hr environmental hotline will be maintained and a register retained of any complaints received.

Mining Operations Plan (MOP) and Management Plans

The current MOP, prepared for the period ending 26 February 2024, is planned to be further amended during the next reporting period to reflect updated rehabilitation / biodiversity completion and performance criteria as developed through the ecological monitoring undertaken during the reporting period and planned changes to rehabilitation of the NEOC emplacement. As the majority of management plans were reviewed and revised during the current reporting period, no further changes to management plans are expected during the next reporting period.

5. ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

The 2019 Annual Review was forwarded to the Resources Regulator and the Department of Planning, Industry and Environment (DPIE) compliance unit on 31 March 2020. A notice of receipt was received from the Resources Regulator on 1 April 2020 and feedback was received from the DPIE compliance unit dated 30 April 2020. DPIE indicated that the Annual Review was considered to generally satisfy the conditions of the approval. No further response to the 2019 Annual Review was received from the Resources Regulator.

6. ENVIRONMENTAL PERFORMANCE

6.1 SUMMARY OF ENVIRONMENTAL PERFORMANCE

A summary of environmental performance for the principal environmental aspects is provided in **Table 6.1**. Further detail regarding specific environmental aspects is also provided in the following subsections.

Table 6.1
Environmental Performance

Aspect	Approval criteria / EIS prediction	Performance during the reporting period	Trend/key management implications	Implemented/proposed management actions
Noise	No exceedance of applicable noise criteria.	No exceedances. No community noise complaints were received for the mine during the reporting period.	Monitoring implies management measures are currently adequate.	No additional management action required. Continue proactive management approach.
Blasting	No exceedance of applicable blast criteria.	No blasting during reporting period.	Not applicable – no blasting	As no blasting planned for the next reporting period, no specific actions are required.
Air Quality	No exceedances of the 24-hour incremental PM ₁₀ criteria. Consistent exceedances the annual average PM ₁₀ criteria between January 2020 and October/November 2020.	No exceedances attributable to the ACP.	Implies management measures are currently adequate.	No additional management action required.
Biodiversity	No significant impacts upon flora, fauna species, populations, communities or habitat.	No adverse impacts upon flora, fauna species, populations, communities or habitat attributable to the ACP were recorded. Notwithstanding, actions to improve biodiversity management have been recommended.	Current mining design and safeguards are currently adequate. However, further proactive land management actions can be taken to improve biodiversity outcomes.	Within Bowmans Creek Riparian Area, proposed habitat enhancement and controlled grazing to be investigated. Ongoing pest and weed control.
Heritage	Management in accordance with approved Aboriginal Heritage Management Plan, including salvage.	Archaeological investigations in accordance with management plan and in consultation with Aboriginal Community. No complaints or issues raised.	Implies management actions are currently adequate.	No additional management action currently required.
Subsidence	Subsidence management in accordance with approved Subsidence Management Plan / Extraction Plan.	Subsidence impacts generally within predicted levels in accordance with the Extraction Plan. Minor rehabilitation and maintenance works completed to address impacts.	Implies management measures and action responses are currently adequate and predictions sufficiently accurate.	Continued monitoring and review of results. Continue remediation as required in accordance with approved Extraction Plans.

6.2 METEOROLOGICAL MONITORING

Meteorological data is used by ACOL to interpret environmental impacts and to understand air quality and noise management outcomes. The ACP has two meteorological monitoring stations, namely Monitoring Site 1 (M1 - predominantly used to monitor for noise and air quality impacts in adverse weather conditions and determine temperature inversion stability class) and the Repeater Station (the main monitoring site) (see **Figure 6.1**).

A summary of rainfall data since the commencement of operations is presented in **Table 6.2**. Total rainfall during the 2020 calendar year was 996.4mm, significantly above the average rainfall of 659.0mm.

Table 6.2
Monthly Rainfall Records

Period	Average Monthly Rainfall (mm)												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	
2004	81.2	145.6	47.8	23.0	22.6	2.1	1.5	7.0	36.2	61.8	42.8	81.6	546.2
2005	56.6	116.8	79.2	8.5	43.4	87.0	12.0	7.0	41.4	107.6	86.0	15.2	660.7
2006	57.2	47.3	37.6	25.4	1.8	30.8	37.4	13.4	116.8	2.8	62.0	39.0	471.5
2007	30.0	32.6	83.0	27.8	30.4	270.5	14.8	73.7	9.0	15.4	124.2	58.2	769.6
2008	52.6	134.6	44.4	103.2	1.6	72.6	19.4	63.2	73.8	60.0	51.6	50.0	727
2009	3.6	161.6	84.8	47.6	42.8	27.4	20.9	0.4e	27.6	47.0	28.4	67.6	559.7
2010	51.0	66.6	69.8	24.8	70.2	40.2	64.8	24.5	24.6	58.6	92.2	33.6	620.9
2011	25.0	35.6	90.2	54.0	78.6	132.4	17.4	43.8	79.4	101.6	155.2	43.4	856.6
2012	45.8	142.6	76.6	28.8	12.2	55.8	35.2	7.2	4.8	3.2	27.4	53.4	493.0
2013	131.6	100.0	100.4	21.2	33.6	57.8	10.8	5.0	27.4	4.8	175.2	22.6	690.4
2014	6.8	136.6	119.2	76.4	10.6	21.0	42.6	58.2	33.8	21.2	16.2	157.4	700.0
2015	142.8	17.4	15.6	269.6	73.2	27.0	18.4	59.6	15.0	31.0	119.4	113.0	902.0
2016	218.2	9.6	13.6	11.0	20.2	113.6	47.2	35.2	75.8	46.4	50.2	112.6	753.6
2017	27.8	31.2	176.8	52.4	28.0	40.4	1.6	9.4	9.0	76.0	20.8	45.0	518.4
2018	13.8	76.6	83.2	16.0	10.0	45.6	2.8	30.4	25.6	57.8	91.8	81.0	534.6
2019	66.4	31.6	153.2	9.4	19.4	20.6	9.0	29.8	40.2	1.6	22.0	0.0	403.2
2020	62.0	169	108.2	71.2	30.0	43.8	121.4	39.2	53.6	126.2	29.6	142.2	996.4
<i>Average</i>	63.1	85.6	81.4	51.2	31.1	64.0	28.1	31.7	40.8	48.4	70.3	65.6	659.0

Note: Results relevant to this reporting period are in **bold**.

Monthly wind roses for the reporting period are presented in **Figures 6.2** and **6.3**. It is noted that data for April 2020 was sourced from the Glendell meteorological station due to issues with the on-site weather station's wind vane becoming frozen in place during this period. The on-site weather station was repaired in April 2020 following identification of this issue.

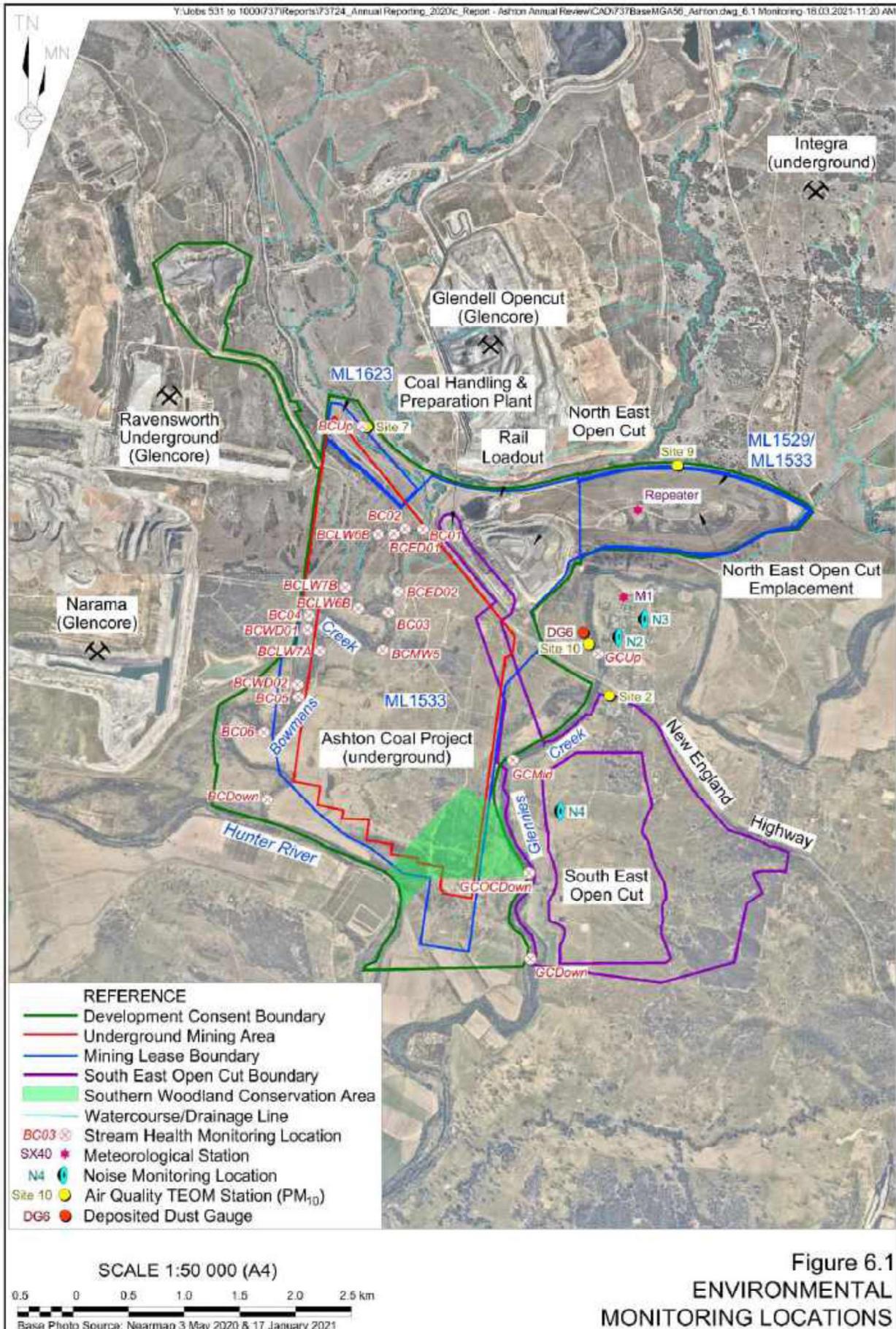


Figure 6.1
ENVIRONMENTAL
MONITORING LOCATIONS

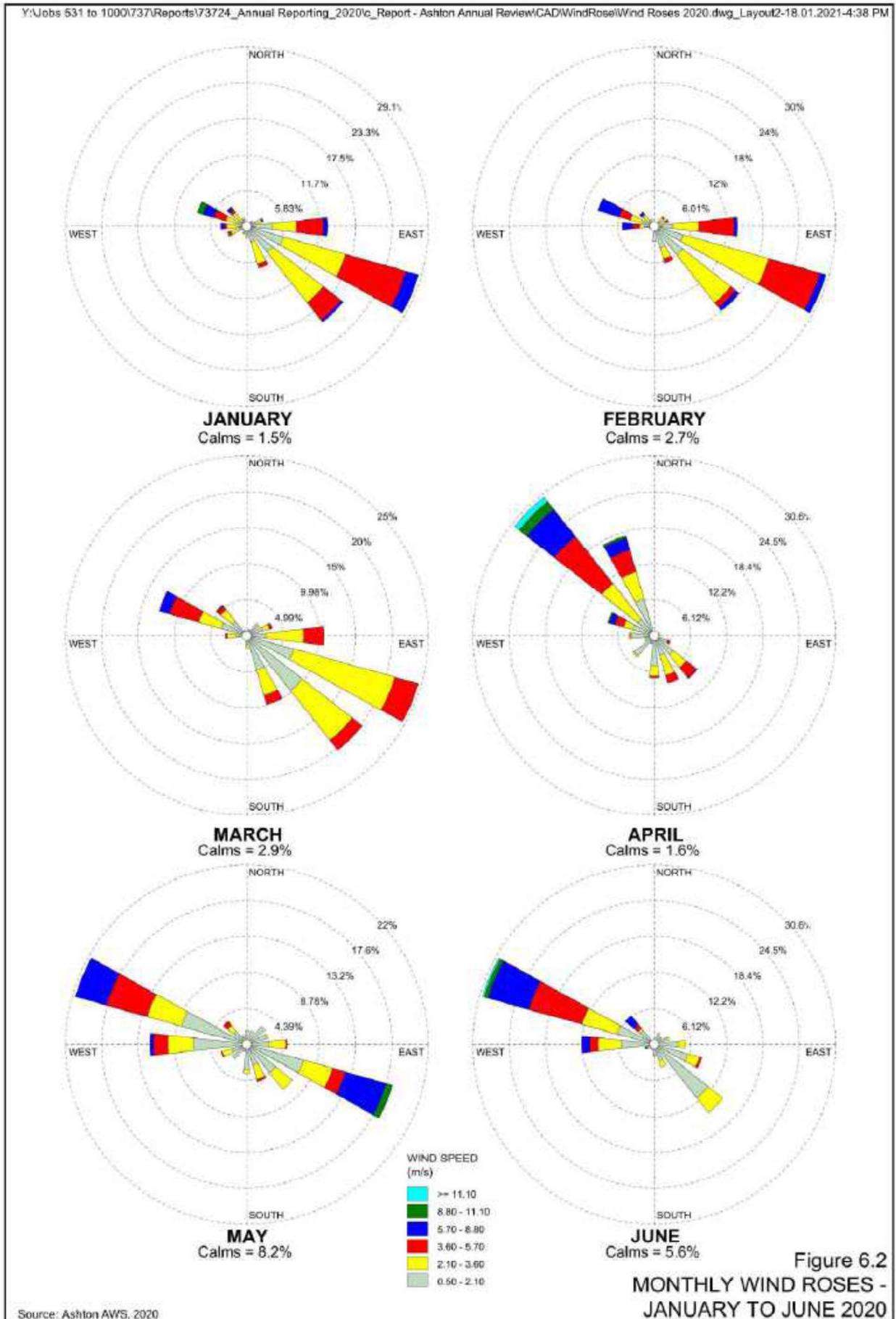


Figure 6.2
MONTHLY WIND ROSES -
JANUARY TO JUNE 2020

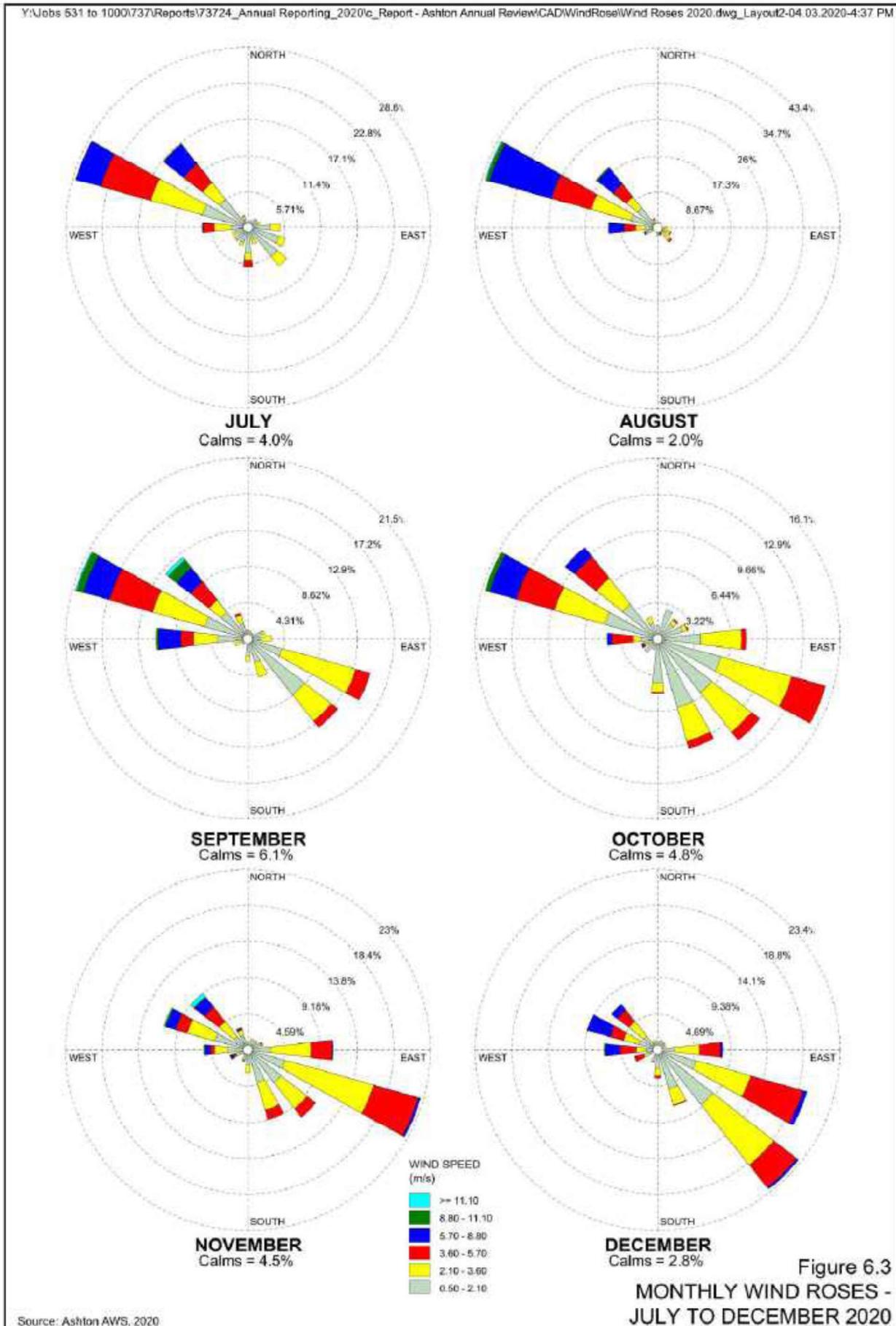


Figure 6.3
 MONTHLY WIND ROSES -
 JULY TO DECEMBER 2020

6.3 NOISE

Environmental Management

Relevant noise impact assessment criteria, noise emission controls and compliance procedures are detailed in the Noise Management Plan for the ACP. The principal noise controls implemented at the ACP site during the reporting period included the maintenance of mobile plant, CHPP and ventilation fans, limiting hours of mobile noise generation (e.g. drilling), permanent noise mitigation controls at the CHPP, and pit top facilities located below the natural surface level.

Environmental Performance

Noise monitoring for the ACP consists of the following.

- Continuous noise monitoring – one continuous real time monitoring station located within Camberwell Village (see **Figure 6.1**) which informs proactive management of noise generating activities at the site. Monitoring results are not used for regulatory purposes.
- Unannounced² attended noise monitoring – monthly night-time monitoring conducted at three attended noise monitoring locations (see **Figure 6.1**).
- Secondary attended noise monitoring – undertaken within 75 minutes of an attended noise monitoring measurement if results indicate that ACP-related noise exceeds the relevant noise criteria under standard weather conditions (i.e. wind speeds up to 3m/s at 10m above ground level and/or a temperature inversion of up to 3°C).

Monthly noise monitoring results for each of the three attended noise monitoring locations are presented in **Table 6.3** and a copy of the attended noise monitoring compliance report prepared by EMM is presented as **Appendix 1**.

The results of attended noise monitoring during the reporting period indicate that ACP operations were inaudible at all three monitoring locations during seven of the twelve months, with measured noise levels attributable to non-ACP related road and rail traffic, wildlife, livestock and other mine operations. Operations at ACP were audible during January, April, May, July and September 2020, however, noise remained below the applicable criteria, including night-time sleep disturbance criteria ($L_{A(1 \text{ min})}$).

When audible, the ACP operations were also determined to be compliant with cumulative noise criteria.

These results are consistent with noise monitoring results for previous years, with ACP operations remaining largely inaudible at the designated noise monitoring locations.

Reportable Incidents

No reportable incidents were recorded during the reporting period.

² ACOL are not informed of the monitoring until it is completed.

Table 6.3
Summary of Attended Noise Monitoring Results – 2020

Month	Criteria (dB)			Location			Exceedance	
	Period	Day	Evening	Night	N2 (dB) ¹	N3 (dB) ¹		N4 (dB) ¹
January	LAeq (15 min)	38	38	36	35	36	IA	No
	LA1 (1 min)	-	-	46	44	45	IA	No
February	LAeq (15 min)	38	38	36	IA	IA	IA	No
	LA1 (1 min)	-	-	46	IA	IA	IA	No
March	LAeq (15 min)	38	38	36	IA	IA	IA	No
	LA1 (1 min)	-	-	46	IA	IA	IA	No
April	LAeq (15 min)	38	38	36	35 ²	34 ²	31 ²	No
	LA1 (1 min)	-	-	46	35 ²	34 ²	31 ²	No
May	LAeq (15 min)	38	38	36	<33 ²	<35	IA	No
	LA1 (1 min)	-	-	46	<33 ²	40	IA	No
June	LAeq (15 min)	38	38	36	IA	IA	IA	No
	LA1 (1 min)	-	-	46	IA	IA	IA	No
July	LAeq (15 min)	38	38	36	35 ²	36 ²	IA	No
	LA1 (1 min)	-	-	46	40 ²	44 ²	IA	No
August	LAeq (15 min)	38	38	36	IA	IA	IA	No
	LA1 (1 min)	-	-	46	IA	IA	IA	No
September	LAeq (15 min)	38	38	36	36	36 ²	26	No
	LA1 (1 min)	-	-	46	39	40 ²	26	No
October	LAeq (15 min)	38	38	36	IA	IA	IA	No
	LA1 (1 min)	-	-	46	IA	IA	IA	No
November	LAeq (15 min)	38	38	36	IA	IA	IA	No
	LA1 (1 min)	-	-	46	IA	IA	IA	No
December	LAeq (15 min)	38	38	36	IA	IA	IA	No
	LA1 (1 min)	-	-	46	IA	IA	IA	No

IA = Inaudible.
 Note 1: Estimated or measured noise attributed to ACP.
 Note 2: Criteria not applicable due to non-standard weather conditions (i.e. wind speeds over 3m/s at 10m above ground level and/or a temperature inversion greater than 3°C.
 Source: EMM Consulting – 2020.

Further Improvements

Other than ongoing plant maintenance, monthly attended noise monitoring, and proactive management using continuous noise monitoring data, no additional management measures are planned during the next reporting period.

6.4 BLASTING

No surface blasts were undertaken during the reporting period.

6.5 AIR QUALITY

Environmental Management

Relevant air quality impact assessment criteria, air quality management measures and compliance procedures are detailed in the Air Quality and Greenhouse Gas Management Plan (AQGGMP) for the ACP. The principal air quality management measures applicable to the reporting period included:

- large earth berms and tree screens between the operations and the village (previously constructed and trees established);
- clear delineation and maintenance of roads and use of water carts to keep trafficked areas in a damp condition;
- keeping stockpiles damp by the use of fixed or mobile water sprays under dry and windy conditions; and
- proper maintenance of all diesel equipment used on site and fitting equipment with appropriate pollution control devices.

Greenhouse gas management during the reporting period included the flaring of gas from gas drainage bores, where feasible, to reduce greenhouse gas emissions. Additionally, energy efficient equipment is specified for all new or upgraded fixed and mobile plant as required.

Environmental Performance

Air quality monitoring at the ACP site consists of the following.

- Depositional dust monitoring – one sample collected every 30 days (± 2 days) from one depositional dust gauge (see **Figure 6.1**).
- Particulate matter 10 micrometres or less (PM₁₀) – two real-time tapered element oscillating microbalance (TEOM), Sites 9 and 10 (see **Figure 6.1**). One additional TEOM sampler (Site 7) is used for operational management purposes and is not reflective of impacts on sensitive receivers.

The results of air quality monitoring are provided as follows.

Deposited Dust

Deposited dust monitoring results for Sampling Point D6 during the reporting period are presented in **Table 6.4** with long-term data presented in **Figure 6.4**.

The highest insoluble solids measurements recorded during the reporting period were 5.0g/m²/month in April 2020, 7.1g/m²/month in both May and September 2020 and 21.9g/m²/month in December 2020. Comments recorded during sample collection indicate that these samples were all contaminated (e.g. bird droppings, insects, vegetation). With the exception of December 2020, the corresponding ash contents were more consistent with other months and confirm that a substantial portion of the insoluble solids was organic matter. It is noted that the December 2020 sample was very heavily contaminated, more than has previously been observed by the monitoring contractor.

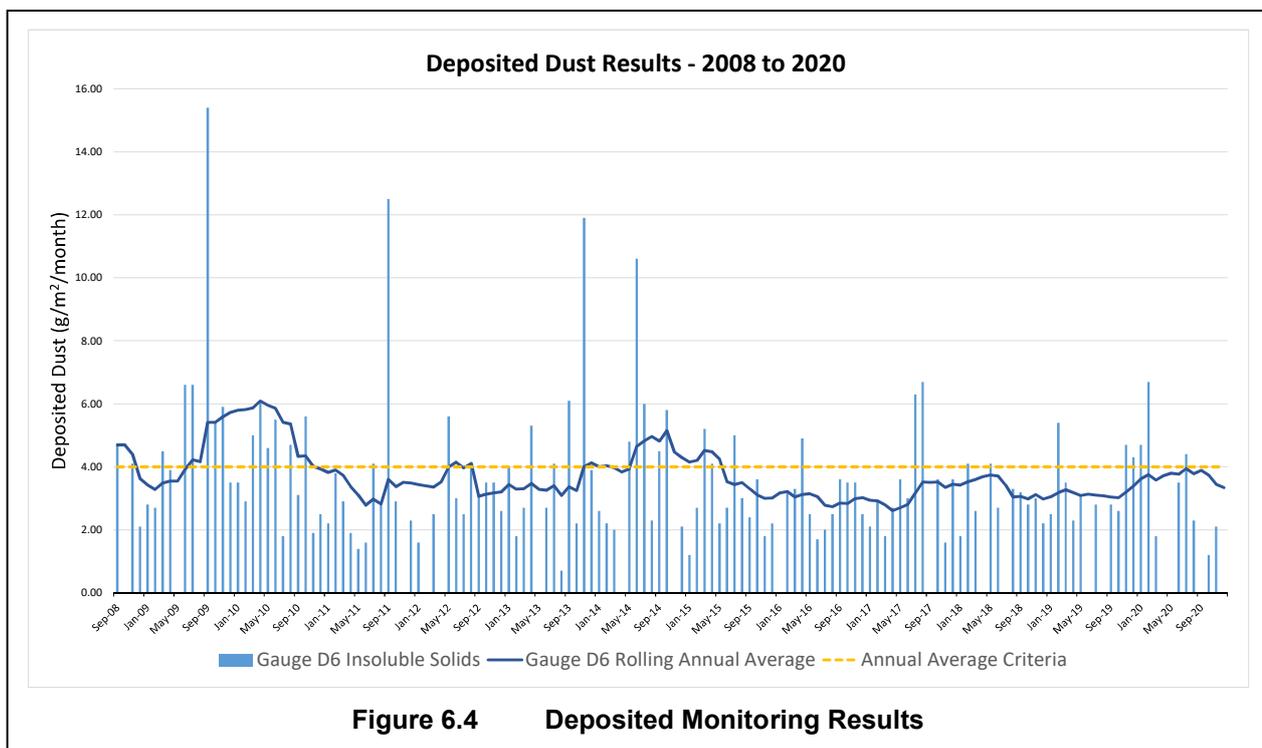
The rolling annual average deposited dust levels recorded throughout the reporting period remained below the criteria of 4g/m²/month, indicating good air quality with respect to dust deposition.

Table 6.4
Deposited Dust Monitoring Results – Sampling Point D6 – 2020

Month	Sampling Period		Dust Deposition Rate (g/m ² /month)			Comments
	Start Date	End Date	Insoluble	Rolling Annual Average	Ash	
January	1/01/2020	31/01/2020	4.7	3.62	3.60	-
February	1/02/2020	29/02/2020	6.7	3.75	2.60	-
March	1/03/2020	31/03/2020	1.8	3.58	1.30	-
April	1/04/2020	30/04/2020	5.0*	3.72	2.60	Contaminated – bird droppings, turbid/grey.
May	1/05/2020	31/05/2020	7.1*	3.80	3.20	Contaminated – bird droppings, turbid/grey.
June	1/06/2020	30/06/2020	3.5	3.77	2.10	-
July	1/07/2020	31/07/2020	4.4	3.94	2.70	-
August	1/08/2020	31/08/2020	2.3	3.78	1.70	-
September	1/09/2020	30/09/2020	7.1*	3.89	2.40	Contaminated – bird droppings, turbid/grey.
October	1/10/2020	31/10/2020	1.2	3.73	0.80	-
November	2/11/2020	1/12/2020	2.1	3.44	1.50	-
December	1/12/2020	31/12/2020	21.9*	3.34	15.80	Contaminated with bird droppings, insects and vegetation. Water turbid/grey.
Minimum			1.20	3.34	0.80	-
Maximum			21.9	3.83	15.80	-

* Contaminated sample determined by an independent monitoring contractor or a NATA accredited laboratory and not included in the rolling annual average.

Source: Ashton Coal Operations Pty Limited.



Long term deposited dust monitoring results indicate that the rolling annual average has remained below criteria since 2015 following two significant exceedances due to regional dust storms.

Suspended Particulates – PM₁₀ and TSP

Table 6.5 provides a summary of the PM₁₀ monitoring results for the reporting period and Figures 6.5 to 6.7 present the PM₁₀ data for the reporting period and the long-term monitoring data for each ACP TEOM. The highest recorded 24-hour average PM₁₀ concentration during the reporting period ranged between 82.7µg/m³ and 98.6µg/m³, with the highest value measured on 29 November 2020 at monitoring Site 10. All monitoring locations recorded maximum suspended particulate concentrations above the 50µg/m³ 24-hour incremental development consent criteria during the reporting period, particularly during January and November 2020. These elevated concentrations are generally consistent with similarly elevated PM₁₀ levels recorded at the Upper Hunter Air Quality Monitoring Network (UHAQMN) station at Camberwell at these times.

Table 6.5
Summary of PM₁₀ Monitoring Results – 2020

Monitoring Site	Minimum 24-hr µg/m ³	Maximum 24-hr µg/m ³	Short-Term Criteria µg/m ³	Annual Average 2020 µg/m ³	Annual Average Criteria µg/m ³
Site 7	4.3	82.7	50	21.1	30
Site 9	5.2	90.0		25.8	
Site 10	4.9	98.6		23.2	
UHAQMN*	3.4	103.3		24.3	
Source: Ashton Coal Operations Pty Limited.			* Provided as reference		

All PM₁₀ results above 50µg/m³ at ACP boundary monitors were investigated throughout the year including a review of wind direction data and “upstream / downstream” monitoring points, as well as assessing regional air quality trends and localised influences or events at the time. All exceedances and the contributions that may be attributable to Ashton Coal Operations are shown in Table 6.6. Where potential ACP contributions were ≥25µg/m³, a detailed review of daily wind conditions and PM₁₀ monitoring results was completed.

As illustrated in Table 6.6, there were no days when the ACP calculated contribution at nearby privately-owned residences exceeded the 50µg/m³ 24-hour incremental PM₁₀ criteria.

The annual average PM₁₀ concentrations for each monitoring location ranged between 21.1µg/m³ and 25.8µg/m³ during the reporting period.

The rolling annual average for PM₁₀ concentrations exceeded the annual average criteria value of 30µg/m³ between 1 January 2020 and 28 October 2020 at Site 7, 1 January 2020 and 29 November at Site 9 and 1 January 2020 and 30 October at Site 10. These results primarily reflect regionally elevated particulate levels as a result of bushfires during late 2019 and January 2020. Bushfires and dust storms are defined by the development consent as extraordinary events and are excluded from the criteria and therefore are not classified as an exceedance. Rolling annual average PM₁₀ concentrations declined steadily during the reporting period and returned below the annual average criteria value by either November 2020 or December 2020 at all three monitoring locations. Notably, the rolling annual average PM₁₀ concentration at Site 9 fell below the annual average criteria value of 30µg/m³ for the first time since June 2017 at the end of November 2020.

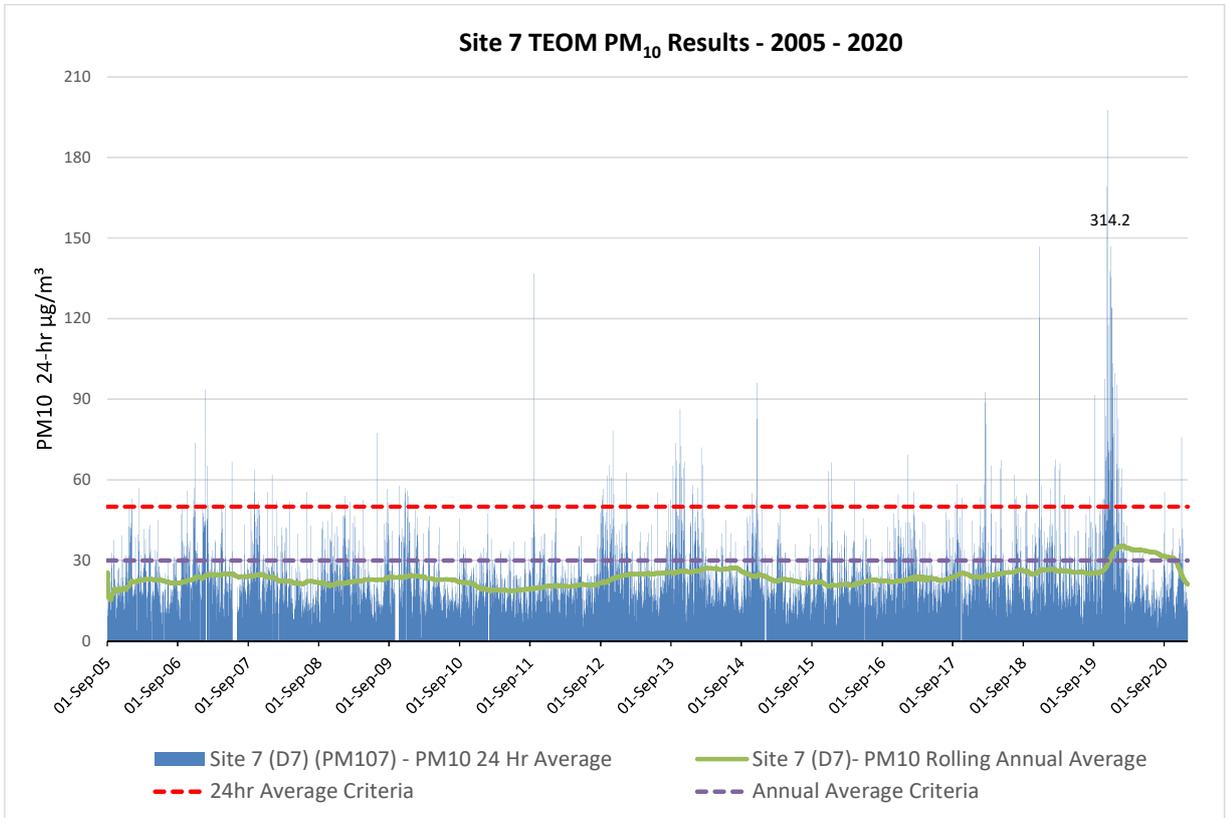
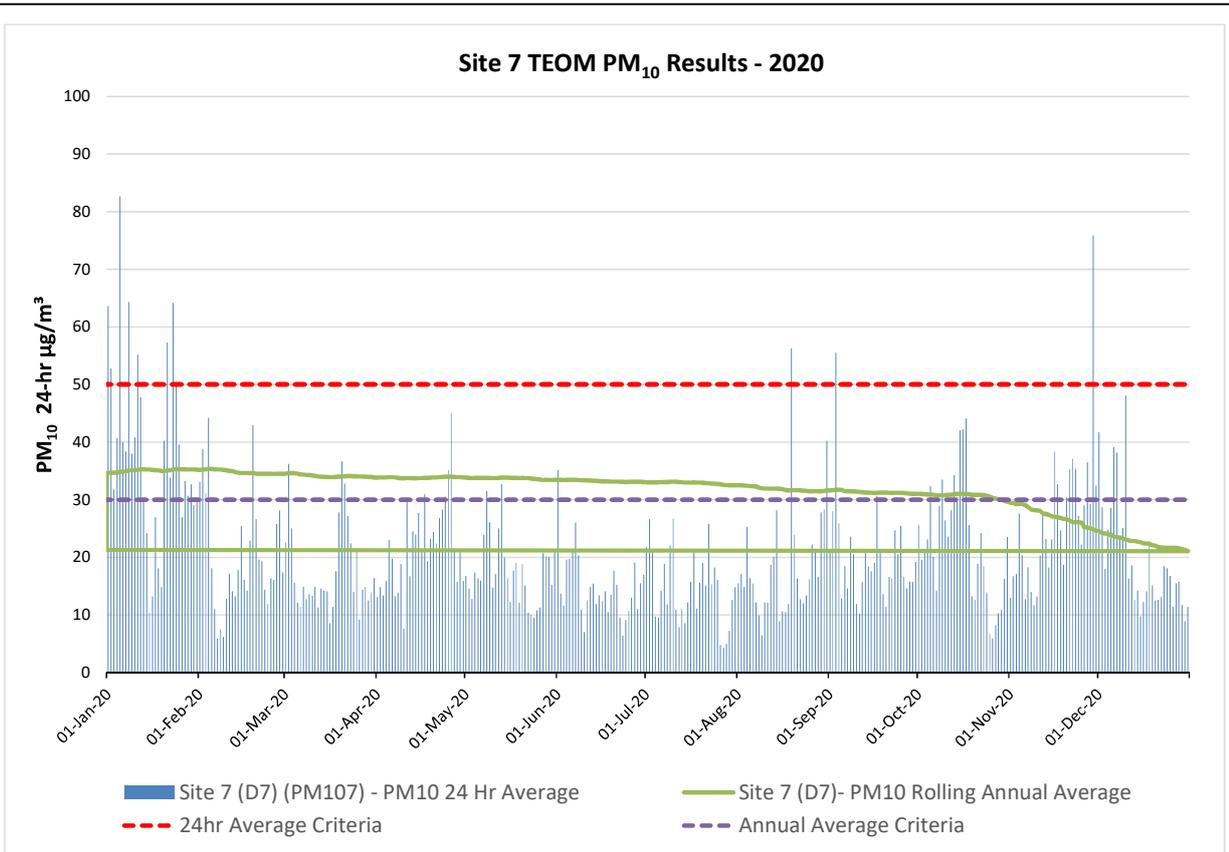
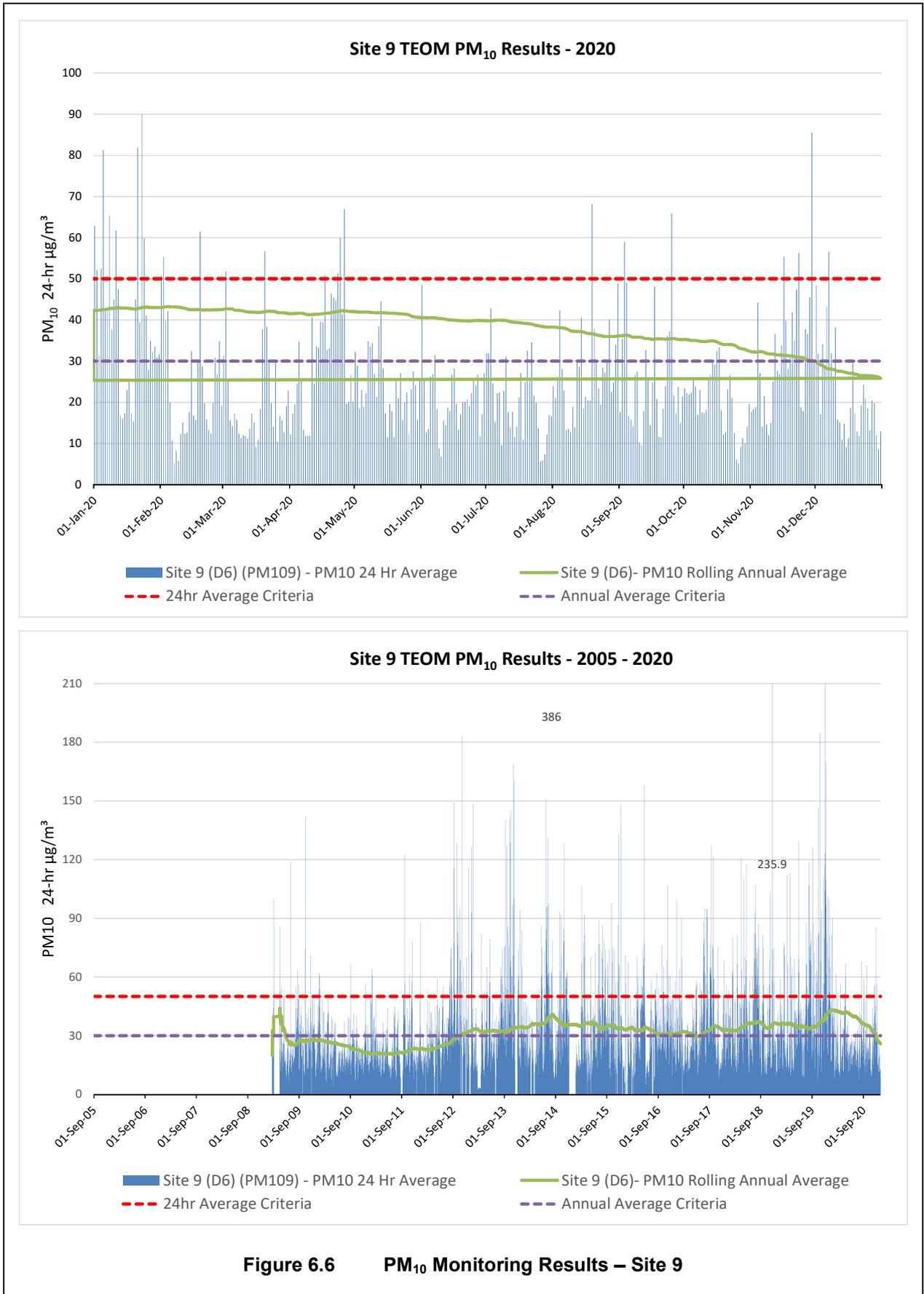


Figure 6.5 PM₁₀ Monitoring Results – Site 7



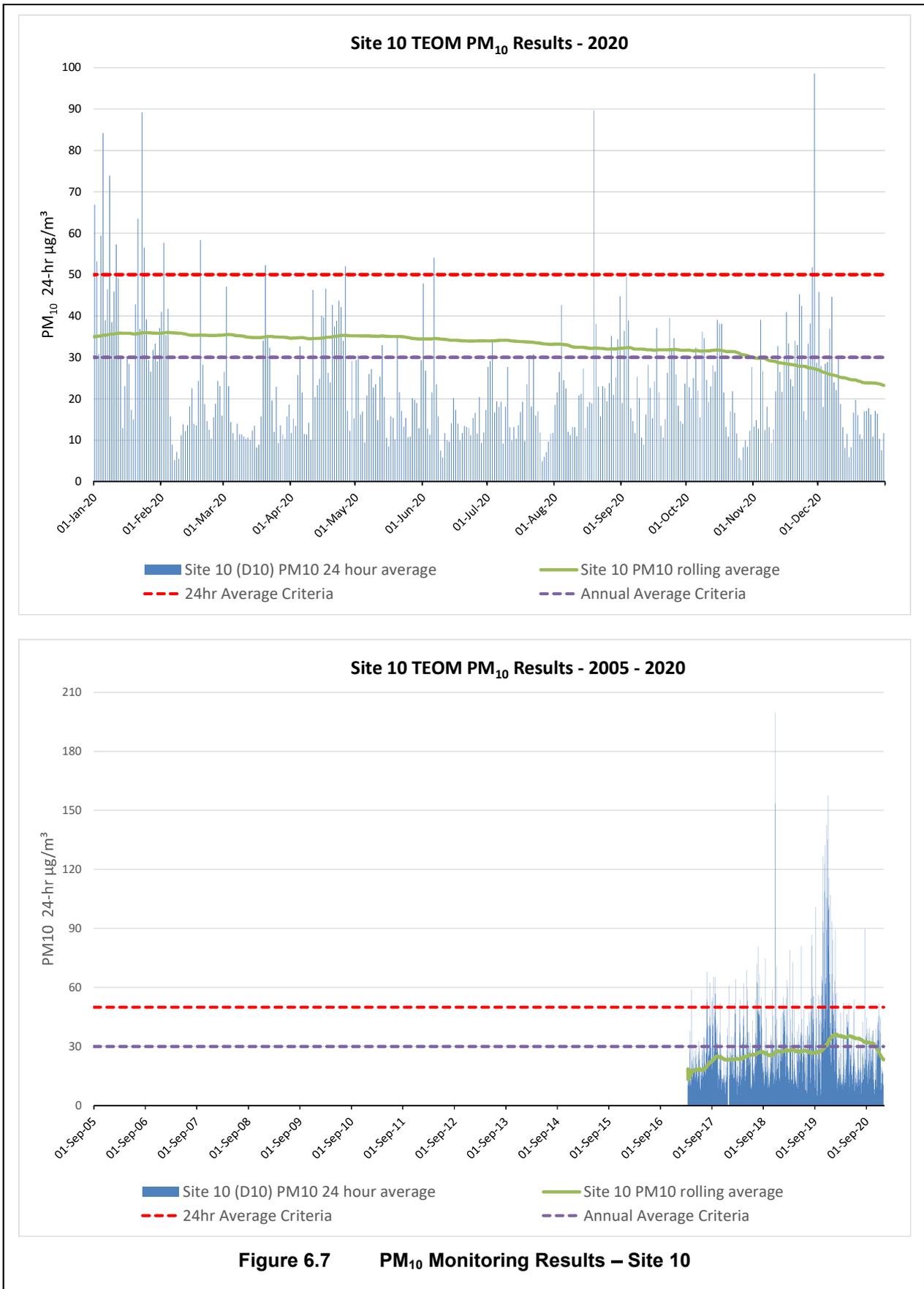


Table 6.6
24-hour PM₁₀ Exceedance Investigation Outcomes – 2020

Page 1 of 2

Date	PM ₁₀ (µg/m ³)			Comments
	Site 9	Site 10	Potential ACP Contribution	
1/01/2020	62.9	66.9	0	-
2/01/2020	52.1	53.2	0	-
4/01/2020	52.4	59.4	18.7	-
5/01/2020	81.3	84.2	0	-
8/01/2020	65.4	73.9	8.5	-
11/01/2020	61.7	57.3	0	-
21/01/2020	81.9	63.5	6.2	-
23/01/2020	90.0	89.2	25.0	Detailed review completed.
24/01/2020	59.8	56.5	0	-
1/01/2020	50.7	41.0	7.9	-
2/01/2020	55.3	57.7	18.9	-
19/01/2020	61.4	58.4	15.5	-
2/03/2020	51.8	47.1	10.9	-
20/03/2020	56.7	52.3	15.6	-
17/04/2020	50.9	46.6	4.3	-
23/04/2020	51.3	43.7	7.6	-
24/04/2020	59.9	42.1	17.8	-
26/04/2020	66.9	52.0	6.9	-
6/06/2020	26.8	54.1	33.1	Detailed review completed.
19/08/2020	68.2	89.7	33.4	Detailed review completed.
3/09/2020	59.0	49.5	0	-
25/09/2020	65.9	34.6	9.1	-
30/11/2020	85.6	98.6	15.6	Detailed review completed.

Source: Ashton Coal Operations Pty Limited.

The annual average PM₁₀ during the reporting period for all ACP monitoring sites was generally consistent with or lower than that recorded at the DPIE-operated Upper Hunter Air Quality Monitoring Station at Camberwell, which recorded an annual average PM₁₀ of 24.3µg/m³.

As TSP is proportionally calculated from the annual average PM₁₀ result at Site 10, all exceedances of the annual PM₁₀ criteria equate to an exceedance of the annual TSP criteria of 90µg/m³ and would have similar proportional contributions from the ACP operations.

Greenhouse Gas

Greenhouse gas emissions associated with the ACP were reported on behalf of ACOL by Yancoal Australia Limited under the National Greenhouse and Energy Reporting Scheme (NGER) for the 2019-2020 reporting period. Scope 1 greenhouse gas emissions include both

direct greenhouse gas production as a result of ACP operations as well as fugitive emissions associated with underground mine ventilation, gas drainage, gas flaring and post-mining gas. Scope 2 emissions include indirect greenhouse gas emissions primarily associated with emissions generated during the production of electricity used on site.

Table 6.7 presents an overview of ACP Scope 1 and Scope 2 greenhouse gas emissions for the reporting period and the previous five reporting periods. In summary, scope 1 emissions associated with the ACP totalled 196 641tCO_{2-e} (tonnes CO₂ equivalent) compared to 216 181tCO_{2-e} for the previous 2018-2019 reporting period, representing a decrease of approximately 9.0%. Scope 2 emissions associated with the ACP during the 2019-2020 reporting period totalled 32 982tCO_{2-e} compared to 35 738tCO_{2-e} during the previous 2018-2019 reporting period, representing a decrease of approximately 7.7%.

Table 6.7
ACP Greenhouse Gas Emissions – 2016/2017 to 2019/2020

Greenhouse Gas Emission Type	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020
Scope 1 (tCO _{2-e})	299 810	389 794	339 443	259 148	216 181	196 641
Scope 2 (tCO _{2-e})	37 443	340 048	43 076	35 506	35 738	32 982
Total (tCO _{2-e})	337 253	423 842	382 519	294 654	251 919	229 623

Source: Yancoal Australia Limited – National Greenhouse and Energy Reporting Scheme Results 2019/2020.

Significant variability in year to year ACP greenhouse gas emissions are primarily a reflection of changes in gas management methods as well as differences in gas levels between longwalls and seams mined during each reporting period. Notwithstanding, the installation of the gas drainage and flaring facility in February 2014 has generally resulted in a substantial reduction in emissions compared to previous reporting periods.

Reportable Incidents

There were no days when the ACP calculated contribution at nearby privately-owned residences exceeded the 50µg/m³ 24-hour incremental PM₁₀ criteria. Therefore, no reportable incidents relating to air pollution occurred during the reporting period.

Further Improvements

Whilst elevated suspended particulates were recorded during the reporting period due to regional bushfires, evaluation of 24-hour average exceedances indicates that the calculated contribution from activities at ACP remained within the approved criteria. As the controls and management measures in place are considered effective, these will continue to be applied during the next reporting period.

6.6 BIODIVERSITY

Environmental Management

Biodiversity at the ACP site is managed under the Ashton Coal Flora and Fauna (Biodiversity) Management Plan (FFMP) and the Southern Woodland Conservation Area (SWCA). Management measures include establishment of the SWCA, targeted rehabilitation to improve habitat linkages across the landscape, placement of nesting boxes, stock exclusion from selected areas, weed and feral pest control and ongoing monitoring.

Environmental Performance

Multiple terrestrial and aquatic flora and fauna monitoring programs are completed each year to determine the condition of ecological communities and habitats, and compare these findings against relevant management plan performance indicators and closure objectives.

The monitoring programs include terrestrial and aquatic monitoring, weed and vertebrate pest monitoring and associated management measures where required. The monitoring program covers important biodiversity areas including the Bowmans Creek riparian corridor, the River Red Gum communities and the SWCA. It complements the rehabilitation monitoring of Bowmans Creek Diversion and North East Open Cut (NEOC), and the mining impacted “Farmland” above the underground mine, which is discussed further in Section 8. The following provides a summary of the key outcomes of the monitoring undertaken during the reporting period.

Where relevant, monitoring has been compared to completion / performance criteria developed for the ACP site. These updated completion / performance criteria are to be included in an amended MOP to be submitted during the next reporting period.

Flora and Fauna Monitoring

Bi-annual fauna monitoring was undertaken during the reporting period by Umwelt Environmental and Social Consultants in June 2020 and November 2020. Fauna monitoring at the ACP site has been undertaken within the Southern Woodlands Conservation Area (SWCA) since 2005 and was expanded in 2010 to include the northern woodland and SEOC areas. The program was again expanded in 2018 to include monitoring of rehabilitated areas within the NEOC and Bowmans Creek Diversion. The study areas for bi-annual fauna monitoring include ten survey transect sites, including four sites consisting of remnant vegetation (‘control’ sites), four sites located over previously undermined areas (‘impact’ sites) and two sites within rehabilitated areas.

A total of 125 fauna species were recorded as a result of the bi-annual fauna monitoring program, including 25 mammals, 81 birds, seven amphibians and 12 reptiles. The following six threatened species were recorded during the fauna monitoring surveys.

- Grey-crowned babbler (*Pomatostomus temporalis temporalis*).
- Speckled warbler (*Pyrrholaemus sagittatus*).
- Brush-tailed phascogale (*Phascogale tapoatafa*).
- Grey-headed flying-fox (*Pteropus poliocephalus*).
- Little bentwinged-bat (*Miniopterus australis*).
- Squirrel glider (*Petaurus norfolcensis*).

All six species are listed as vulnerable under the NSW *Biodiversity Conservation Act 2016* and the grey-headed flying-fox (*Pteropus poliocephalus*) is also listed as vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. All of the above threatened species have previously been recorded at the ACP site with a total of 26 threatened species having been recorded since monitoring commenced in 2006.

The following seven introduced species were recorded during the fauna monitoring surveys.

- European rabbit (*Oryctolagus cuniculus*).
- Brown hare (*Lepus capensis*).
- Red fox (*Vulpes vulpes*).
- Black rat (*Rattus rattus*).
- House mouse (*Mus Musculus*).
- Cat (*Felis catus*).
- Spotted dove (*Streptopelia chinensis*).

In addition to the above, dogs (*Canis lupus familiaris*) and pigs (*Sus scrofa*) were anecdotally recorded as occurring within the ACP site during the reporting period.

Analysis of the fauna monitoring results indicated that species diversity was similar between the control (96 species) and impact (100 species) monitoring sites. Comparisons among species groups indicated a more pronounced increase in species diversity for both reptiles and amphibians as well as a slight decrease in diversity for both birds and mammals compared to previous monitoring results (see **Figure 6.9**). These declines were consistent across both control and impact monitoring sites and are most likely explained by the drought conditions occurring following three consecutive years of below average rainfall and above average temperatures.

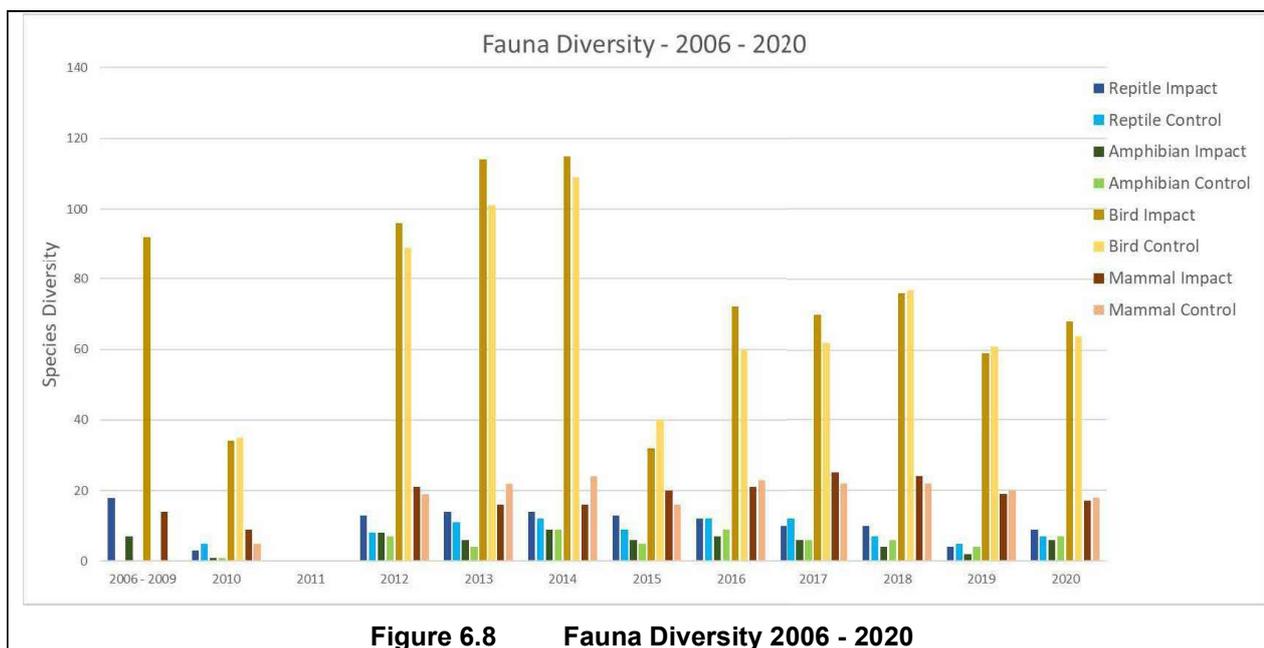


Figure 6.8 Fauna Diversity 2006 - 2020

Nest box inspections indicated that 37 of the 39 nest boxes installed in the SWCA remain in a condition sufficient to support roosting and nesting of arboreal species. Common brushtail possums (*Trichosurus vulpecula*) were the only species found to be using the next boxes during the fauna surveys, with nine possums found to be occupying eight boxes on two occasions.

The results of the bi-annual fauna monitoring program indicate that threatened fauna species and their habitats have not been adversely impacted by mining activities. Furthermore, the results of the fauna monitoring program indicate compliance with the relevant performance criteria outlined in the FFMP and no further actions are required to address FFMP compliance.

Aquatic Ecology – Bowmans Creek and Glennies Creek

Biannual monitoring of aquatic ecology was undertaken by Marine Pollution Research Pty Ltd in autumn (1 to 3 June 2020) and spring (30 November to 2 December 2020).

Monitoring during this reporting period builds on both the results of initial surveys conducted in 2001 to support the original development application as well as the results of biannual monitoring undertaken since 2006. These results also include the eighth year of monitoring for the Bowmans Creek Diversion which was completed in 2012.

Monitoring locations currently include 18 sites within Bowmans Creek, one within each of the two Bowmans Creek Diversion channels and two within Glennies Creek. A further two monitoring sites will be added to the Bowmans Creek Diversion channels and Glennies Creek locations following the proposed increase in block bank height and the commencement of the SEOC construction respectively.

Habitat Condition

Whilst wet conditions during the reporting period resulted in an increase in the overall extent of aquatic habitat at the ACP site compared to the previous reporting period, habitat complexity in the form of submerged macrophytes and emergent macrophyte beds had not recovered prior to the autumn 2020 surveys. The extent of emergent macrophyte beds and the overall availability of aquatic habitat was observed to have improved by the spring 2020 sampling round, with further improvements expected in the event that water levels are maintained.

Aquatic habitat conditions for each monitoring site, measured using the Riparian Channel Environment habitat scoring system (RCE index), are presented in **Table 6.8**.

Table 6.8
Monitoring Site RCE Index Score – 2014 to 2020

Year	Period	Site RCE Index Score (% Condition) ¹												
		BCUp	BC1	BCLW6B ²	BCED1 ³	BCED2	BC3	BCMW5	BCLW7A ²	BCWD2 ³	BC6	BCDown	GCUp	GCMid
2014	Autumn	78.8	77.9	72.1	74.0	-	78.8	-	72.1	76.9	76.9	76.0	73.1	73.1
	Spring	78.8	77.9	73.1	75.0	-	76.9	-	71.2	76.9	75.0	74.0	73.1	73.1
2015	Autumn	78.8	76.9	71.2	78.8	-	77.9	-	76.0	79.8	74.0	73.1	74.0	73.1
	Spring	77.9	75.0	69.2	75.0	-	77.9	-	73.1	76.9	74.0	71.2	74.0	74.0
2016	Autumn	77.9	75.0	69.2	75.0	-	77.9	-	73.1	76.9	74.0	71.2	74.0	74.0
	Spring	77.9	75.0	69.2	75.0	-	77.9	-	73.1	76.9	74.0	70.2	74.0	74.0
2017	Autumn	76.9	74.0	68.3	74.0	-	77.9	-	73.1	75.0	74.0	70.2	72.1	71.2
	Spring	74.0	74.0	69.2	74.0	-	77.9	-	73.1	75.0	72.1	70.2	73.1	73.1
2018	Autumn	76.0	76.9	71.2	Dry	-	77.9	-	75.0	Dry	72.1	70.2	73.1	73.1
	Spring	76.0	76.9	Dry	Dry	-	Dry	-	75.0	Dry	Dry	70.2	71.2	71.2
2019	Autumn	Dry	73.1	Dry	Dry	-	Dry	-	Dry	Dry	Dry	70.2	71.2	71.2
	Spring	Dry	74.0	Dry	Dry	-	Dry	-	Dry	Dry	Dry	73.1	71.2	71.2
2020	Autumn	76.9	74.0	74.0	77.9	78.8	76.9	74.0	74.0	Dry	76.9	52.9	73.1	73.1
	Spring	76.9	75.0	73.1	80.8	79.8	77.9	74.0	74.0	80.8	76.0	52.9	73.1	73.1
Minimum		74.0	73.1	68.3	74.0	78.8	76.9	74.0	71.2	75	72.1	52.9	71.2	71.2
Maximum		78.8	77.9	74.0	80.8	79.8	78.8	74.0	76.0	80.8	76.9	76.0	74.0	74.0
Mean		77.2	75.4	70.9	76.0	79.3	77.8	74.0	73.6	77.2	74.5	69.0	72.9	72.8

Note 1: Monitoring sites are presented in order from upstream (left) to downstream (right). See **Figure 6.1**.
Note 2: Excised Creek monitoring sites.
Note 3: Diversion channel creek sites.
Source: Marine Pollution Research Pty Ltd (2019).

For those sites which were sampled, all sites were found to be in ‘good’ condition (i.e. >70%) with the exception of BCDown (53%). The riparian and aquatic habitat condition at BCDown was very poor and was below the long term mean for this site during both the autumn and spring survey rounds. This low score is largely the result of low scores of sediment composition, detritus and aquatic vegetation, with muddy sediments in the lower section of Bowmans Creek first noted during the autumn 2019 survey.

Relatively high scores recorded for sites BCED1, BCED2 and BCWD2 are largely reflective of factors including a more continuous and denser riparian corridor adjacent to these sites, minimal bank undercutting and minimal fine sediment accumulation. With the exception of site BCDown, habitat condition scores during both the autumn and spring sampling rounds were generally consistent with or higher than the long term mean for all monitoring sites.

Habitat condition scores recorded at Glennies Creek monitoring sites (GCUp and GCMid) improved compared to those recorded during the previous reporting period, with scores now consistent with those recorded for these sites during the spring 2017 and autumn 2018 monitoring rounds. Habitat conditions at these sites are generally dependent upon water levels, with upstream dam water releases providing relatively stable flow rates during the reporting period.

Stream Health – Aquatic Fauna

Table 6.9 and **Table 6.10** present the long term macroinvertebrate diversity and SIGNAL Index scores respectively for monitoring locations within Bowmans Creek and Glennies Creek. In accordance with sampling triggers outlined in the FFMP, diversity values and SIGNAL scores are ranked as either ‘Low’, ‘In’ or ‘High’ if they fall below, within or above one standard deviation from the long term mean.

Macroinvertebrate diversities recorded for Bowmans Creek during the reporting period were low for four of the 11 sites sampled in autumn and were either In or High for all sites sampled in spring. Low values likely reflect the delayed recovery of macroinvertebrate assemblages following prolonged dry conditions prior to the reporting period. Regional drought conditions during the previous two reporting periods resulted in reduced water quality (increased salinity and sediments) and habitat condition due to drought induced pool contraction and associated dieback of exposed plants. Higher diversity levels recorded during the spring sampling round display the recovery of macroinvertebrate assemblages during the reporting period in response to increased rainfall and water availability.

Table 6.9
Stream Health Monitoring – Macroinvertebrate Diversity

Year	Period	Diversity (No. Taxa)																			
		Bowmans Creek Sites [^]											Summary		Glennies Creek Sites [^]					Summary	
		BC Up	BC1	BCLW6B	BCED1	BCED2	BC3	BC4.5	BCLW7A	BCWD2	BC6	BC Down	Total	Mean Site	GC Up	GCOC Up	GC Mid	GCOC Down	GC Down	Total	Mean
2007	Autumn	12	-	-	-	-	-	-	21	-	-	9	25	14.0	26	-	17	-	14	34	19.0
	Spring	21	-	-	-	-	-	-	17	-	-	17	30	17.0	22	26	22	23	20	42	22.6
2008	Autumn	20	-	-	-	-	-	-	21	-	-	16	32	18.8	26	24	24	24	23	42	24.2
	Spring	24	12	18	-	-	-	-	21	-	-	16	37	18.8	21	20	21	22	20	34	20.8
2009	Autumn	23	12	24	-	-	-	-	21	-	-	22	44	19.8	22	24	23	27	24	41	24.0
	Spring	-	15	12	-	-	23	-	29	-	-	25	46	21.2	21	-	20	-	23	33	21.0
2010	Autumn	-	12	14	-	-	12	-	26	-	-	22	40	17.5	18	-	25	-	22	36	22.0
	Spring	18	-	19	-	-	-	-	-	-	22	12	39	19.2	9	-	30	22	-	34	20.3
2011	Autumn	20	-	19	-	-	-	-	-	-	18	21	33	20.0	-	-	27	23	-	34	25.0
	Spring	22	-	21	-	-	-	-	-	-	17	19	37	19.8	20	-	27	22	-	35	23.0
2012	Autumn	26	-	19	-	-	-	-	-	-	24	17	39	22.2	14	-	17	18	-	26	16.3
	Spring	35	22	17	-	-	-	-	35	-	31	23	52	26.7	26	-	28	24	-	41	26.0
2013	Autumn	27	23	23	-	-	26	-	33	-	24	24	52	25.7	17	-	21	-	-	22	19.0
	Spring	35	18	27	24	-	26	-	29	21	25	30	53	26.1	24	-	29	-	-	32	26.4
2014	Autumn	31	24	15	26	-	29	-	27	25	25	23	52	25.0	26	-	23	-	-	31	24.5
	Spring	32	20	25	27	-	22	-	21	21	31	24	52	24.8	22	-	22	-	-	30	22.0
2015	Autumn	23	21	13	27	-	23	-	24	21	20	19	47	21.2	20	-	21	-	-	28	20.5
	Spring	21	18	10	21	-	20	-	20	18	20	16	38	18.2	18	-	18	-	-	23	18.0
2016	Autumn	21	20	13	23	-	22	-	20	24	27	24	49	21.6	20	-	22	-	-	27	21.0
	Spring	21	16	20	22	-	23	-	20	24	20	22	41	20.9	19	-	18	-	-	26	18.5
2017	Autumn	23	20	18	19	-	22	-	19	22	21	20	36	20.4	17	-	20	-	-	25	18.5
	Spring	20	20	18	16	-	26	-	17	21	23	24	42	20.6	19	-	15	-	-	22	17.5
2018	Autumn	22	17	14	Dry	-	15	19	16	Dry	19	15	39	17.1	21	-	20	-	-	28	20.5
	Spring	21	18	Dry	Dry	-	Dry	20	24	Dry	14	19	40	19.3	17	-	19	-	-	22	18.0

Table 6.9 (Cont'd)
Stream Health Monitoring – Macroinvertebrate Diversity

Year	Period	Diversity (No. Taxa)																			
		Bowmans Creek Sites [^]											Summary		Glennies Creek Sites [^]					Summary	
		BC Up	BC1	BCLW6B	BCED1	BCED2	BC3	BC4.5	BCLW7A	BCWD2	BC6	BC Down	Total	Mean Site	GC Up	GCOC Up	GC Mid	GCOC Down	GC Down	Total	Mean
2019	Autumn	Dry	14	Dry	Dry	-	Dry	18	Dry	Dry	14	21	30	16.8	18	-	16	-	-	26	17.0
	Spring	Dry	13	Dry	Dry	-	Dry	Dry	Dry	Dry	Dry	9	18	11.0	20	-	19	-	-	25	19.5
2020	Autumn	15	20	16	21	22	20	17	7	Dry	15	9	28	16.2	22	-	25	-	-	31	23.5
	Spring	25	23	20	22	21	21	22	21	21	20	20	39	21.5	26	-	32	-	-	36	29.0
LTM¹		23.6	17.6	18.0	22.8		22.2	16.6	23.1	21.9	21.9	19.6	40.1	20.1	20.1	⁻⁴	21.7	⁻⁴	⁻⁴	30.7	21.0
SD LTM²		5.5	3.8	4.6	3.7		4.6	3.8	5.3	2.1	4.9	5.0	8.9	3.7	3.9	⁻⁴	4.1	⁻⁴	⁻⁴	6.3	2.9
2020 Status ³	Autumn	Low	In	In	In		In	In	Low	-	Low	Low	Low	Low	In	-	In	-		In	In
	Spring	In	High	In	In		In	High	In	In	In	In	In	In	High	-	High	-		In	High
Note 1: Long Term Mean of results preceding the two seasonal results recorded for the current reporting period.																				^ See Figure 6.1.	
Note 2: Standard deviation of results preceding the two seasonal results recorded for the current reporting period from the Long Term Mean.																					
Note 3: Status of each site compared to the Long Term Mean (LTM), where 'Low' = results below one standard deviation from the LTM, 'In' = results within one standard deviation from the LTM, and 'High' = results higher than one standard deviation above the LTM.																					
Note 4: Value not calculated due to low sample number.																					
Source: Marine Pollution Research Pty Ltd (2020).																					

Table 6.10
Stream Health Monitoring – SIGNAL Scores

Year	Period	Signal Score																			
		Bowmans Creek Sites [^]											Summary		Glennies Creek Sites [^]					Summary	
		BC Up	BC1	BCLW6B	BCED1	BCED2	BC3	BC4.5	BCLW7A	BCWD2	BC6	BC Down	Creek Score	Mean Site	GC Up	GCOC Up	GC Mid	GCOC Down	GC Down	Creek Score	Mean Site
2007	Autumn	2.17	-	-	-	-	-	2.93	3.24	-	-	3.33	2.95	2.92	3.71	-	3.81	-	3.58	3.71	3.70
	Spring	3.57	-	-	-	-	-	4.31	3.35	-	-	3.59	3.64	3.69	4.19	3.92	3.71	3.48	3.65	3.80	3.79
2008	Autumn	3.84	-	-	-	-	-	4.17	3.81	-	-	4.25	4.00	4.02	4.16	3.82	3.71	4.13	3.62	3.90	3.89
	Spring	4.13	3.92	3.89	-	-	-	4.00	3.71	-	-	3.88	3.93	3.92	3.85	3.84	4.00	3.62	3.40	3.74	3.74
2009	Autumn	3.87	3.64	3.50	-	-	-	3.76	4.00	-	-	3.70	3.75	3.74	3.68	4.00	4.10	3.96	4.05	3.95	3.96
	Spring	-	3.29	3.82	-	-	3.15	-	3.70	-	-	3.74	3.55	3.54	3.63	-	3.56	-	3.90	3.71	3.70
2010	Autumn	-	3.36	2.83	-	-	4.09	-	3.63	-	-	3.90	3.61	3.58	4.00	-	4.25	-	3.68	3.98	3.98
	Spring	3.33	-	3.84	-	-	-	-	-	-	3.52	3.67	3.58	3.59	3.22	-	3.61	3.55	-	3.53	3.46
2011	Autumn	3.60	-	3.47	-	-	-	-	-	-	3.44	3.60	3.58	3.57	-	-	3.81	3.74	-	3.78	3.78
	Spring	3.86	-	3.35	-	-	-	-	-	-	4.06	3.68	3.79	3.80	4.10	-	3.80	4.05	-	3.97	3.98
2012	Autumn	3.85	-	3.33	-	-	-	-	-	-	3.57	3.44	3.55	3.53	3.71	-	3.53	3.50	-	3.57	3.58
	Spring	3.77	3.68	4.00	-	-	-	-	3.85	-	3.62	3.75	3.82	3.83	3.92	-	3.79	4.50	-	4.05	4.07
2013	Autumn	3.77	3.73	3.45	-	-	3.73	-	3.61	-	3.83	3.76	3.70	3.70	3.88	-	4.14	-	-	4.03	4.01
	Spring	3.76	4.00	3.62	3.45	-	4.04	-	3.74	3.42	3.95	4.11	3.79	3.79	4.17	-	4.00	-	-	4.08	4.09
2014	Autumn	3.53	3.21	3.54	3.96	-	3.37	-	3.88	3.35	3.67	3.59	3.57	3.57	3.91	-	4.38	-	-	4.14	4.15
	Spring	4.00	3.47	3.63	4.48	-	3.70	-	3.53	3.65	3.63	3.86	3.67	3.66	4.15	-	4.33	-	-	4.24	4.24
2015	Autumn	3.83	3.65	3.10	3.44	-	3.70	-	3.23	3.70	3.53	3.72	3.57	3.54	3.50	-	4.19	-	-	3.85	3.85
	Spring	3.57	3.39	3.00	3.67	-	3.95	-	3.30	3.88	3.90	4.00	3.66	3.63	3.81	-	4.29	-	-	3.97	3.97
2016	Autumn	3.75	4.05	3.77	3.45	-	3.50	-	3.17	3.63	3.40	3.82	3.61	3.61	3.22	-	3.71	-	-	3.44	3.47
	Spring	3.52	3.13	3.26	3.70	-	3.38	-	3.00	3.73	3.47	3.50	3.36	3.41	3.65	-	3.35	-	-	3.65	3.50
2017	Autumn	3.35	3.78	2.94	3.88	-	4.05	-	3.11	3.38	3.42	3.68	3.42	3.51	3.94	-	3.53	-	-	3.56	3.73
	Spring	3.61	3.84	3.59	3.44	-	3.38	-	3.38	3.52	3.55	3.45	3.42	3.53	3.55	-	3.63	-	-	3.54	3.59

Table 6.10 (Cont'd)
Stream Health Monitoring – SIGNAL Scores

Year	Period	Signal Score																			
		Bowmans Creek Sites [^]											Summary		Glennies Creek Sites [^]					Summary	
		BC Up	BC1	BCLW6B	BCED1	BCED2	BC3	BC4.5	BCLW7A	BCWD2	BC6	BC Down	Creek Score	Mean Site	GC Up	GCOC Up	GC Mid	GCOC Down	GC Down	Creek Score	Mean Site
2018	Autumn	3.71	3.27	2.62	Dry	-	2.92	-	2.69	Dry	3.28	3.20	3.18	3.13	3.42	-	3.88	-	-	3.64	3.65
	Spring	3.05	3.18	Dry	Dry	-	Dry	-	3.71	Dry	3.45	3.00	3.30	3.30	4.14	-	3.75	-	-	3.93	3.95
2019	Autumn	Dry	3.43	Dry	Dry	-	Dry	-	Dry	Dry	3.08	3.05	3.18	3.19	3.94	-	3.86	-	-	3.90	3.90
	Spring	Dry	4.09	Dry	Dry	-	Dry	-	Dry	Dry	Dry	2.75	3.42	3.42	4.12	-	3.61	-	-	3.86	3.87
2020	Autumn	3.15	3.38	3.23	3.22	3.11	3.06	3.00	2.00	Dry	3.17	2.50	3.07	2.98	3.65	-	4.00	-	-	3.84	3.83
	Spring	3.73	3.76	3.17	3.75	3.37	3.35	3.42	3.25	3.89	3.39	3.32	3.50	3.49	4.17	-	3.94	-	-	4.04	4.05
LTM¹		3.62	3.58	3.43	3.61	-	3.61	3.83	3.48	3.58	3.58	3.62	3.57	3.57	3.82	⁻⁴	3.86	⁻⁴	⁻⁴	3.83	3.83
SD LTM²		0.40	0.31	0.38	0.21	-	0.37	0.54	0.34	0.18	0.24	0.34	0.23	0.24	0.29	⁻⁴	0.28	⁻⁴	⁻⁴	0.21	0.22
2020 Status ³	Autumn	Low	In	In	Low	-	Low	Low	Low	-	Low	Low	Low	Low	In	-	In	-	-	In	In
	Spring	In	In	In	In	-	In	In	In	High	In	In	In	In	High	-	In	-	-	In	High
<p>Note 1: Long Term Mean of results preceding the two seasonal results recorded for the current reporting period. See Figure 6.1</p> <p>Note 2: Standard deviation of results preceding the two seasonal results recorded for the current reporting period from the Long Term Mean.</p> <p>Note 3: Status of each site compared to the Long Term Mean (LTM), where 'Low' = results below one standard deviation from the LTM, 'In' = results within one standard deviation from the LTM, and 'High' = results higher than one standard deviation above the LTM.</p> <p>Note 4: Value not calculated due to low sample number.</p> <p>Source: Marine Pollution Research Pty Ltd (2020).</p>																					

Site SIGNAL scores recorded for Bowmans Creek were also low at seven of the 11 sites sampled in autumn and either In or High at all sites sampled in spring. Low SIGNAL scores are likely the result of the survival and predominance of more tolerant taxa with low SIGNAL values during the prevailing dry conditions leading into the reporting period. Increases in SIGNAL scores during the spring sampling round likely reflect recolonisation by more sensitive taxa, with complete recolonisation likely to take time due to the need for adult stages of these taxa to recolonise upstream areas by aerial means.

For Glennies Creek, all macroinvertebrate diversities and SIGNAL scores were either within one standard deviation from the long term mean or higher during both seasonal sampling periods.

In summary, 'low' trigger values recorded for monitoring sites within Bowmans Creek during the reporting period are attributable to natural variation and natural environmental responses to prevailing climatic conditions. As such, no further action was required under the FFMP TARP.

In addition to aquatic macroinvertebrates, five native fish species, flathead gudgeons (*Phylipnodon grandiceps*), striped gudgeon (*Gobiomorphus australis*), long-finned eel (*Anguilla reinhardtii*), firetail gudgeons (*Hypseleotris galii*) and mullet (*Mugil cephalus*), and two pest species, plague minnow (*Gambusia holbrooki*) and carp (*Cyprinus carpio*), were also recorded at sites within both Bowmans Creek and Glennies Creek during the reporting period.

Vegetation - Bowmans Creek Riparian Zone

Monitoring of the Bowman Creek riparian vegetation was undertaken during the reporting period between 25 May and 4 June 2020 by DnA Environmental. Monitoring of riparian vegetation is undertaken at the ACP site to assess the condition of vegetation associated with Bowmans Creek, the status of vegetation and rehabilitated areas within the Bowmans Creek Diversion channels, and the condition of local protected River Red Gum (*Eucalyptus camaldulensis*) populations.

A total of 17 riparian vegetation sites were monitored during the reporting period, including nine Casuarina monitoring sites, five Eucalypt Woodland monitoring sites, and three Casuarina reference sites. Monitoring of reference sites which are representative of natural vegetation communities is undertaken in order to inform appropriate completion criteria and ecological targets for rehabilitated areas within the ACP site.

Table 6.11 presents an overview of the performance of each monitoring site against the relevant completion criteria. In summary, rehabilitated casuarina and eucalypt woodland sites have generally formed functional and stable ecosystems comparable to conditions recorded in reference sites not subject to mining-related impacts. Compared to reference sites, several monitoring sites along both the natural Bowmans Creek channel and Bowmans Creek Diversion displayed lower stability associated with increased animal disturbance and a higher diversity and abundance of exotic species. Other performance targets which have not yet been achieved are primarily dependent upon community maturity, with performance indicators including litter cover, canopy cover, trunk diameter and provision of wildlife habitat expected to develop over time.

Table 6.11
Bowmans Creek Riparian Zone – Completion Criteria Status

Page 1 of 3

Rehabilitation Phase	Completion Criteria	Performance Indicator	Unit of Measure	Monitoring Site													
				C1	C2	C3	C4	Q3	Q4	Q7	Q9	Q10	R1	R3	R5	R6	RRG01
Phase 2: Landform establishment and stability	Landform suitable for final landuse and generally compatible with surrounding topography and final landform design	Slope	< Degrees (18°)	2	2	18	15	3	15	15	14	3	3	1	18	2	22
	Areas of active erosion are limited	No. Rills/Gullies	No.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phase 3: Growth medium development	Soil properties are suitable for the establishment and maintenance of selected vegetation species	pH	pH (5.6-7.3)	6.9	6.4	6.9	7.1	7.4	6.6	7.3	7.2	7.2	6.7	6.7	7.7	6.3	7.4
		Organic Matter	% (>4.5)	3.0	3.0	3.9	2.4	3.3	5.1	4.3	5.9	5.6	2.4	2.4	4.6	4.6	5.9
		Phosphorous	mg/ kg (50)	24.2	19.6	23.6	12.4	6.5	13.7	47.8	18.3	27.5	18.6	45.9	30.1	23.6	52.1
Phase 4: Ecosystem & Landuse Establishment	Landform is stable and performing as it was designed to do	LFA Stability	%	80.1	67.0	71.1	70.1	70.9	73.8	76.5	70.6	73.6	70.5	69.1	70.3	73.5	71.0
		LFA Landscape organisation	%	100	100	100	100	100	100	100	100	100	100	98	96	100	100
	Vegetation contains a diversity of species comparable to that of the local remnant vegetation	Diversity of shrubs and juvenile trees	% population	100	100	100	100	NA	0	NA	0	0	100	100	100	100	100
		Total species richness	No./ area	33	35	38	15	NA	25	NA	18	26	40	29	29	38	16
		Native species richness	>No./ area	7	10	14	4	NA	5	NA	6	11	10	9	12	16	8
		Exotic species richness	<No./ area	26	25	24	11	NA	20	NA	12	15	30	20	17	22	8
	Vegetation contains a density of species comparable to that of the local remnant vegetation	Density of shrubs and juvenile trees	No./ area	16	50	30	50	NA	0	NA	0	0	3	4	6	30	4
	The vegetation is comprised by a range of growth forms comparable to that of the local remnant vegetation	Trees	No./ area	1	2	5	1	NA	1	NA	1	1	3	3	3	5	2
		Shrubs	No./ area	0	0	2	0	NA	0	NA	1	1	1	1	0	0	1
Herbs		No./ area	18	19	17	7	NA	13	NA	7	10	20	12	13	18	6	
Grasses		No./ area	8	7	8	4	NA	6	NA	5	10	11	10	8	10	2	



Table 6.11 (Cont'd)
Bowmans Creek Riparian Zone – Completion Criteria Status

Rehabilitation Phase	Completion Criteria	Performance Indicator	Unit of Measure	Monitoring Site													
				C1	C2	C3	C4	Q3	Q4	Q7	Q9	Q10	R1	R3	R5	R6	RRG01
Phase 5: Ecosystem & Landuse Sustainability	Landform is ecologically functional and performing as it was designed to do	LFA Infiltration	%	57.4	51.8	53.7	55	52.1	56.8	54.7	53.6	49.2	49.9	51.9	45.1	51.7	47.5
		LFA Nutrient recycling	%	55.9	52.7	53.5	55.8	50.3	54.5	53.4	49.3	49.3	48.4	51.5	45.1	51	44.8
	Ground layer contains protective ground cover and habitat structure comparable with the local remnant vegetation	Perennial plant cover (< 0.5m)	%	43.5	49.5	18.5	17.5	20	47.5	63	20.5	25.5	23.5	57.5	44.5	23.5	50.5
		Total Ground Cover	%	100	100	100	99	95	100	100	100	100	100	95.5	97	100	92
	Vegetation contains a diversity of species per square meter comparable to that of the local remnant vegetation	Native understorey abundance	> species/m ²	1	1.6	1.2	1	1.2	0.8	1	0.4	1.4	0.8	1.2	1.2	2.6	0.8
		Exotic understorey abundance	< species/m ²	5	6.2	6.6	3.4	5.4	4.4	5.8	4	5.2	5.2	4	3.8	5	3
	Native ground cover abundance is comparable to that of the local remnant vegetation	Percent ground cover provided by native vegetation <0.5m tall	%	11.3	11.1	11.9	13.7	10.2	10.4	13.7	6.5	13.6	21.8	14.6	32.1	35.9	9.3
	The vegetation is maturing and/or natural recruitment is occurring at rates similar to those of the local remnant vegetation	Shrubs and juvenile trees 0 - 0.5m in height	No./ area	0	0	1	0	NA	0	NA	0	0	1	0	0	1	0
		Shrubs and juvenile trees >2m in height	No./ area	16	49	25	48	NA	0	NA	0	0	2	1	4	26	4
	The vegetation is developing in structure and complexity comparable to that of the local remnant vegetation	Foliage cover 0.5 - 2 m	% cover	40	26	24.5	13	18.5	41	14.5	45	1	25.5	19	29	16.5	51
		Foliage cover >6m	% cover	33	15	13	41	13	35	17	10	33	13	9	0	0	52
	Vegetation contains a diversity of maturing tree and shrubs species comparable to that of the local remnant vegetation	Tree diversity	species/area	1	1	5	1	NA	1	NA	1	1	3	3	3	4	2

Table 6.11 (Cont'd)
Bowmans Creek Riparian Zone – Completion Criteria Status

Page 2 of 3

Rehabilitation Phase	Completion Criteria	Performance Indicator	Unit of Measure	Monitoring Site													
				C1	C2	C3	C4	Q3	Q4	Q7	Q9	Q10	R1	R3	R5	R6	RRG01
Phase 5: Ecosystem & Landuse Sustainability (Cont'd)	Vegetation contains a density of maturing tree and shrubs species comparable to that of the local remnant vegetation	Tree density	No./ area	24	80	44	108	NA	7	NA	4	10	14	24	4	15	8
	The vegetation is in a condition comparable to that of the local remnant vegetation.	Healthy trees	% population	75	25	36.4	4.6	NA	14.3	NA	0	20	78.6	54.2	100	73.3	50
		Medium health	% population	0	38.8	52.3	41.7	NA	28.6	NA	25	0	21.4	37.5	0	26.7	12.5
		Advanced dieback	% population	21	33	9	50	NA	57	NA	25	0	0	8.3	0	0	0
		Dead Trees	% population	4.2	3.8	2.3	3.7	NA	0	NA	50	80	0	0	0	0	37.5
		Flowers/fruit: Trees	% population	0	0	13.6	3.7	NA	0	NA	0	0	7.1	25	25	20	37.5
NA = Not Applicable Green = Meets or exceeds completion criteria. Blue = Soil performance indicator target falls within industry guidelines but may not be similar to local soils. Light Brown = Eucalypt Woodland sites meet or exceed comparable ecological performance targets derived from Casuarina reference sites.																	
Source: DnA Environmental (2020).																	

Monitoring also indicated that the remnant River Red Gum population remained in moderate to good health, with a viable reproductive population present and high numbers of saplings reflecting previous regeneration and recruitment events. No young seedlings were recorded during the reporting period, with this observation likely to be attributable to drought conditions, grazing pressure and competition with exotic species. However, a high degree of reproductive capacity was recorded during 2020 with 36 (59%) of the mature and old growth trees bearing buds and/or fruits. Destocking and improved seasonal conditions have resulted in significant understorey growth of grasses and weeds during the reporting period.

Erosion and decreased soil stability associated with previous cattle presence in riparian areas has been the most significant threat to the health of riparian areas associated with Bowmans Creek. In particular, during drought conditions in 2017 and 2019, increased levels of grazing in riparian areas combined with increased vulnerability of soils and creek banks to erosion threatened rehabilitated areas as well as established remnant vegetation. However, groundcover has been observed to recover during the reporting period following the removal of cattle and improved rainfall conditions. Any future grazing to manage understorey weeds and increasing fuel loads will be carefully controlled to avoiding overgrazing.

Fourteen priority and declared weed species were recorded across the Bowmans Creek monitoring sites during the reporting period and will require continued control.

Vegetation - Southern Woodland Conservation Area

A Voluntary Conservation Agreement covering the SWCA was established between ACOL and the Minister for the Environment under the *National Parks and Wildlife Act 1974* on 16 September 2010. The SWCA covers an area of 65.66ha above the existing underground mine (see **Figure 6.1**) and contains remnant Hunter Valley vegetation communities, threatened fauna species and archaeological sites of high significance.

Monitoring of the SWCA was undertaken during the reporting period by DnA Environmental between 25 May 2020 and 4 June 2020. Monitoring methods included the use of the Biometric Assessment Method in areas of subsidence repair, NSW Biodiversity Conservation Division monitoring forms and photo points for three established sites (SVCA01, SVCA02 & SVCA03), transects in areas of subsidence repair and additional photo monitoring points. Three eucalypt woodland reference sites were also used to inform benchmark ecological community values and determine appropriate ecological performance targets and completion criteria.

Table 6.12 presents an overview of the performance of each monitoring site within the SWCA against the relevant completion criteria. In summary, woodland sites SVCA01 and SVCA02 met almost all of the specified completion criteria although native species diversity was slightly low at site SVCA02 and higher numbers of exotic species were recorded at both sites compared to the previous reporting period. Most completion criteria were also met at site SVCA04 with the exception of lower levels of mature canopy cover and observations of extensive subsidence cracking.

Cover provided by native plants was comparable to local woodlands at the derived grassland site SVCA03, although perennial plant cover and diversity of native species were both slightly low compared to completion criteria. Exotic species levels were acceptable, and no tree or shrub regeneration was observed at this site.

Subsidence crack treatment works involving clearing, excavation and backfilling were undertaken at sites SVCA05 and SVCA06 in 2018. These two sites displayed low ecological function, reduced levels of groundcover and perennial cover, limited projected foliage and a predominance of exotic species. It is anticipated that these sites will develop towards the completion criteria as they mature. Additional amelioration works are required at these sites as sink holes have been observed to develop following the reactivation of subsidence cracks.

Ten priority and declared weed species were recorded across the SVCA monitoring sites. Exotic perennial grasses considered to be environmental weeds were also recorded in increasing patches throughout the SVCA, ACOI farmland and roadside areas.

Vegetation - Farmland Underground Mining Area

Monitoring of the agricultural grazing lands, including both pasture and woodland, located above the underground mining area was undertaken by DnA Environmental between 25 May 2020 and 4 June 2020.

Three eucalypt woodland and three native grassland reference sites were used to develop benchmark ecological values and inform ecological performance targets and completion criteria for woodland and grassland areas within the underground mining affected areas.

Table 6.13 presents an overview of the performance of each monitoring site against the relevant completion criteria. In summary, the three woodland sites (UGWood01, UGWood02 and UGWood03) were found to be more ecologically functional than the reference sites. Floristic diversity increased at all woodland sites compared to the previous reporting period, although floristic diversity remained low compared to completion criteria at sites UGWood02, SVCA02, SVCA05 and SVCA06. Exotic species were more abundant at sites UGWood1 and SVCA06 compared to reference sites.

With the exception of site UGPast04 which was rehabilitated in 2018, all underground pasture sites had an ecological function comparable to or higher than native grasslands and displayed a lower total and native species diversity compared to reference sites. Significant decreases in species diversity recorded during the reporting period have been attributed to both the dominance of some native grass species which have excluded other species following rainfall in early 2020 as well as difficulty locating species during surveys as a result of long grass.

Soil characteristics in the underground woodland and grassland sites were generally similar to those identified in reference sites which have not been subject to mining-related disturbance. Soil analyses indicated that soils in the farmland areas generally displayed elevated levels of magnesium, potassium, iron and sulphur, however, similar concentrations recorded for reference sites indicate that these elevated levels may occur naturally in the local area. Sites UGWood02 and UGPast06 displayed significantly elevated levels of sulfur compared to reference site values. The causes of these abnormal concentrations will be investigated further as a greater database of soil analysis results is developed over coming years.

Table 6.12
Southern Woodland Conservation Area – Completion Criteria Status

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Primary Performance Indicators	Unit of measure	Woodland ecosystem range 2019		SVCA01	SVCA02	SVCA03	SVCA04	SVCA05	SVCA06
						Lower	Upper						
Phase 2: Landform establishment and stability	Landform slope, gradient	Landform suitable for final landuse and generally compatible with surrounding topography and final landform design	Slope	Landform is generally compatible within the context of the local topography and final landform design.	< Degrees (18°)	5	25	10	7	3	8	8	7
			No. Subsidence Cracks	Woodland impacted by mine subsidence are restored and comparable to the reference sites	No.	0	0	0	0	0	1	2	0
	Sum of subsidence cracks width	Provides an assessment of the extent of subsidence cracking and demonstrates that repair works have been satisfactory	m	0	0	0	0	0	0.1	1.60	0		
Phase 3: Growth medium development	Soil chemical, physical properties and amelioration	Soil properties are suitable for the establishment and maintenance of selected vegetation species	pH	pH is typical of the surrounding landscape or falls within desirable ranges provided by the agricultural industry	pH (5.6-7.3)	5.4	6.3	5.5	5.9	6.0	5.4	6.1	7.0
			Organic Matter	Organic Matter levels are typical of the surrounding landscape, increasing or fall within desirable ranges provided by the agricultural industry	% (>4.5)	4.2	5.3	5.6	6.3	4.8	3.4	4.8	4.2
			Phosphorous	Available Phosphorus is typical of the surrounding landscape or fall within desirable ranges provided by the agricultural industry	mg/kg (50)	7.4	64.2	13.4	16.3	14.0	7.8	7.8	11.7
Phase 4: Ecosystem & Landuse Establishment	Landscape Function Analysis (LFA): Landform stability and organisation	Landform is stable and performing as it was designed to do	LFA Stability	The LFA stability index is comparable to or trending towards the local remnant vegetation	%	67.0	69.0	74.5	67.6	83.3	85.2	66.2	71.3
			LFA Landscape organisation	The Landscape Organisation Index provides a measure of the ability of the site to retain resources and is comparable to the local remnant vegetation	%	89	100	100	100	100	100	71	87

Table 6.12 (Cont'd)
Southern Woodland Conservation Area – Completion Criteria Status

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Primary Performance Indicators	Unit of measure	Woodland ecosystem range 2019		SVCA01	SVCA02	SVCA03	SVCA04	SVCA05	SVCA06
						Lower	Upper						
Phase 4: Ecosystem & Landuse Establishment (Cont'd)	Vegetation diversity	Vegetation contains a diversity of species comparable to that of the local remnant vegetation	Diversity of shrubs and juvenile trees	The diversity of shrubs and juvenile trees with a stem diameter < 5cm is comparable to the local remnant vegetation.	species/area	2	3	6	3	0	NA	NA	NA
				The percentage of shrubs and juvenile trees with a stem diameter < 5cm dbh which are local endemic species and these percentages are comparable to the local remnant vegetation	% population	3	100	96	97	0	NA	NA	NA
			Total species richness	The total number of live plant species is comparable to the local remnant vegetation	No./area	47	66	71	58	28	NA	NA	NA
			Native species richness	The total number of live native plant species is greater than or comparable to the local remnant vegetation	>No./area	39	47	45	38	15	NA	NA	NA
			Exotic species richness	The total number of live exotic plant species is less than or comparable to the local remnant vegetation	<No./area	8	19	26	20	13	NA	NA	NA
	Vegetation density	Vegetation contains a density of species comparable to that of the local remnant vegetation	Density of shrubs and juvenile trees	The total density of shrubs or juvenile trees with a stem diameter < 5cm is comparable to the local remnant vegetation	No./area	6	194	51	29	0	NA	NA	NA
				The density of endemic shrubs or juvenile trees with a stem diameter < 5cm is comparable to that of the local remnant vegetation	No./area	6	159	49	28	0	NA	NA	NA

Table 6.12 (Cont'd)
Southern Woodland Conservation Area – Completion Criteria Status

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Primary Performance Indicators	Unit of measure	Woodland ecosystem range 2019		SVCA01	SVCA02	SVCA03	SVCA04	SVCA05	SVCA06
						Lower	Upper						
Phase 4: Ecosystem & Landuse Establishment (Cont'd)	Ecosystem composition	The vegetation is comprised by a range of growth forms comparable to that of the local remnant vegetation	Trees	The number of tree species regardless of age comprising the vegetation community is comparable to the local remnant vegetation	No./area	2	2	3	2	0	NA	NA	NA
			Shrubs	The number of shrub species regardless of age comprising the vegetation community is comparable to the local remnant vegetation	No./area	0	2	3	3	0	NA	NA	NA
			Herbs	The number of herbs or forb species comprising the vegetation community is comparable to the local remnant vegetation	No./area	20	36	36	24	13	NA	NA	NA
			Grasses	The number of grass species comprising the vegetation community is comparable to the local remnant vegetation	No./area	11	16	18	18	10	NA	NA	NA
Phase 5: Ecosystem & Landuse Sustainability	Landscape Function Analysis (LFA): Landform function and ecological performance	Landform is ecologically functional and performing as it was designed to do	LFA Infiltration	LFA infiltration index is comparable to or trending towards the local remnant vegetation	%	46.7	56.1	50.5	59.8	61.9	61.9	39.8	39.7
			LFA Nutrient recycling	LFA nutrient recycling index is comparable to or trending towards the local remnant vegetation	%	48.3	52.4	52.4	59.2	57.3	58.3	38.4	39
	Protective ground cover	Ground layer contains protective ground cover and habitat structure comparable with the local remnant vegetation	Perennial plant cover (< 0.5m)	Percent ground cover provided by live perennial vegetation (<0.5m in height) is comparable to the local remnant vegetation	%	9	58	40	11	56.0	76	29	38.5
			Total Ground Cover	Total groundcover is the sum of protective ground cover components (as described above) and that it is comparable to the local remnant vegetation	%	84	100	98.5	100	100	100	73	86.5

Table 6.12 (Cont'd)
Southern Woodland Conservation Area – Completion Criteria Status

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Primary Performance Indicators	Unit of measure	Woodland ecosystem range 2019		SVCA01	SVCA02	SVCA03	SVCA04	SVCA05	SVCA06
						Lower	Upper						
Phase 5: Ecosystem & Landuse Sustainability (Cont'd)	Ground cover diversity	Vegetation contains a diversity of species per square meter comparable to that of the local remnant vegetation	Native understorey abundance	The abundance of native species per square metre averaged across the site has more than or an equal number of native species as the local remnant vegetation	> species/m ²	7.2	11.0	11	6.2	5.0	12.4	7.2	5.4
			Exotic understorey abundance	The abundance of exotic species per square metre averaged across the site has less than or an equal number of exotic species as the local remnant vegetation	< species/m ²	0.4	2.6	3	0.8	1	1.8	1.6	2.4
	Native ground cover abundance	Native ground cover abundance is comparable to that of the local remnant vegetation	Percent ground cover provided by native vegetation <0.5m tall	The percent ground cover abundance of native species (<0.5m) compared to exotic species is comparable to the local remnant vegetation	%	80	95	85.7	91.8	92.6	90.2	89.3	71.4
	Ecosystem growth and natural recruitment	The vegetation is maturing and/or natural recruitment is occurring at rates similar to those of the local remnant vegetation	shrubs and juvenile trees 0 - 0.5m in height	The number of shrubs or juvenile trees <0.5m in height provides an indication of establishment success and/or natural ecosystem recruitment and is comparable to the local remnant vegetation	No./area	1	59	13	13	0	NA	NA	NA
			shrubs and juvenile trees 0.5 - 1m in height	The number of shrubs or juvenile trees 0.5-1m in height provides an indication of establishment success, growth and/or natural ecosystem recruitment and is comparable to the local remnant vegetation	No./area	1	35	27	10	0	NA	NA	NA
			shrubs and juvenile trees 1.5 - 2m in height	The number of shrubs or juvenile trees 1.5-2m in height provides an indication of establishment success, growth and/or natural ecosystem recruitment and is comparable to the local remnant vegetation	No./area	1	21	2	2	0	NA	NA	NA

Table 6.12 (Cont'd)
Southern Woodland Conservation Area – Completion Criteria Status

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Primary Performance Indicators	Unit of measure	Woodland ecosystem range 2019		SVCA01	SVCA02	SVCA03	SVCA04	SVCA05	SVCA06
						Lower	Upper						
Phase 5: Ecosystem & Landuse Sustainability (Cont'd)	Ecosystem structure	The vegetation is developing in structure and complexity comparable to that of the local remnant vegetation	Foliage cover 0.5 - 2 m	Projected foliage cover provided by perennial plants in the 0.5 - 2m vertical height stratum indicates the community structure is comparable to the local remnant vegetation	% cover	0	6	9	1	37	2	1	7.5
			Foliage cover 2 - 4m	Projected foliage cover provided by perennial plants in the 2 - 4m vertical height stratum indicates the community structure is comparable to the local remnant vegetation	% cover	5	12	9	5	0	5	0	0
			Foliage cover >6m	Projected foliage cover provided by perennial plants >6m vertical height stratum indicates the community structure is comparable to the local remnant vegetation	% cover	31	42	39	47	0	18	22	21
	Tree diversity	Vegetation contains a diversity of maturing tree and shrubs species comparable to that of the local remnant vegetation	Tree diversity	The diversity of trees or shrubs with a stem diameter >5cm is comparable to the local remnant vegetation	Species/ area	1	2	2	2	0	NA	NA	NA
				The percentage of maturing trees and shrubs with a stem diameter >5cm dbh which are local endemic species and these percentages are comparable to the local remnant vegetation	%	100	100	100	100	0	NA	NA	NA
	Tree density	Vegetation contains a density of maturing tree and shrubs species comparable to that of the local remnant vegetation	Tree density	The density of shrubs or trees with a stem diameter > 5cm is comparable to the local remnant vegetation	No./ area	12	85	29	25	0	NA	NA	NA

Table 6.12 (Cont'd)
 Southern Woodland Conservation Area – Completion Criteria Status

Page 6 of 6

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Primary Performance Indicators	Unit of measure	Woodland ecosystem range 2019		SVCA01	SVCA02	SVCA03	SVCA04	SVCA05	SVCA06
						Lower	Upper						
Phase 5: Ecosystem & Landuse Sustainability (Cont'd)	Ecosystem health	The vegetation is in a condition comparable to that of the local remnant vegetation.	Healthy trees	The percentage of the tree population which are in healthy condition and that the percentage is comparable to the local remnant vegetation	% population	14	50	20.7	24	0	NA	NA	NA
			Flowers/fruit: Trees	The presence of reproductive structures such as buds, flowers or fruit provides evidence that the ecosystem is maturing, capable of recruitment and can provide habitat resources comparable to that of the local remnant vegetation	% population	0	8	6.9	4	0	NA	NA	NA
<p>Green = Meets or exceeds completion criteria.</p> <p>Blue = Soil performance indicator target falls within industry guidelines but may not be similar to local soils.</p> <p>NA = Not Applicable.</p> <p>Source: DnA Environmental (2020)</p>													

**Table 6.13
Farmland – Completion Criteria Status**

Rehabilitation Phase	Completion criteria	Performance Indicators	Unit of measure	Pasture						Woodland		
				UGPast01	UGPast02	UGPast03	UGPast04	UGPast05	UGPast06	UGWood 01	UGWood 02	UGWood 03
Phase 2: Landform establishment and stability	Landform suitable for final landuse and generally compatible with surrounding topography and final landform design	Slope	< Degrees (18°)	2	2	3	5	2	2	2	1	4
	No visible subsidence cracking	No. Subsidence Cracks	No.	1	0	0	1	0	0	2	2	0
		Sum of subsidence cracks width	m	0.25	0	0	1.05	0	0	0.04	0.38	0
Phase 3: Growth medium development	Soil properties are suitable for the establishment and maintenance of selected vegetation species	pH	pH (5.6-7.3)	6.4	6.5	5.9	5.8	6.4	5.4	5.4	5.5	6.0
		Organic Matter	% (>4.5)	4.8	5.1	5.6	3.8	6.3	5.1	3.3	2.9	5.0
		Phosphorous	mg/kg (50)	33.4	76.4	9.4	12.4	100.6	21.3	19.0	9.4	12.1
Phase 4: Ecosystem & Landuse Establishment	Landform is stable and performing as it was designed to do	LFA Stability	%	77.1	70.7	82	70.8	72	77.7	71.5	68.7	73.4
		LFA Landscape organisation	%	100	100	100	84	100	96	100	89	83
	Pasture productivity is comparable to analogue sites.	Green Dry Matter Biomass	kg/ha	1400	1000	>3000	>3000	<400	2200	NA	NA	NA
Phase 5: Ecosystem & Landuse Sustainability	Landform is ecologically functional and performing as it was designed to do	LFA Infiltration	%	55.6	52.7	57.6	36.5	50.9	48.1	40	43.7	37.6
		LFA Nutrient recycling	%	56	51.1	52.9	37.5	49.7	49.1	41.1	44.2	40.6
	Ground layer contains protective ground cover and habitat structure comparable with the local remnant vegetation	Perennial plant cover (< 0.5m)	%	50.0	15.0	49	67.5	19	57	36.5	29	53
		Total Ground Cover	%	100	100	100	87.0	100	97.5	91	96	89.5
	Vegetation contains a diversity of species per square meter comparable to that of the local remnant vegetation	Native understorey abundance	> species/m2	2.4	1.0	4.8	6.4	1.6	2.4	6.6	6.6	7.8
		Exotic understorey abundance	< species/m2	1.8	2.6	5	1.8	2.8	3	6	1.6	2.8
	Native ground cover abundance is comparable to that of the local remnant vegetation	Percent ground cover provided by native vegetation <0.5m tall	%	63	27.5	68.7	76.8	30.0	47.1	50.5	86.6	81.5
	The vegetation is developing in structure and complexity comparable to that of the local remnant vegetation	Foliage cover 0.5 - 2 m	% cover	0	24.7	31	0	0	0	6	27.5	20
		Foliage cover 2 - 4m	% cover	0	0	0	0	0	0	8	11	10
Foliage cover 4 - 6m		% cover	0	0	0	0	0	0	12	10	6	
Foliage cover >6m		% cover	0	0	0	0	0	0	11	16	0	

Green = Meets or exceeds completion criteria.
Blue = Soil performance indicator target falls within industry guidelines but may not be similar to local soils.
NA = Not Applicable.

Source: DnA Environmental (2020)

Both woodland and pasture sites within the underground mining affected areas were subject to variable levels of subsidence-related impacts including subsidence cracking and ponding. Several sites have previously been subject to subsidence rehabilitation works, including ripping, seeding and/or planting, with further general subsidence and subsidence cracking impacts observed during the reporting period requiring further treatment. As predicted, some pasture areas have been subjected to increased ponding in natural drainage lines following subsidence of the natural landform. It is recommended that older rehabilitation sites be inspected in order to identify which sites require additional subsidence repairs and rehabilitation.

Eleven priority and declared weed species were recorded across the underground mining monitoring sites. Extensive areas of pasture were found to be dominated by Cobbler's Peg (*Bidens Pilosa*) as a result of previous disturbance regimes, destocking and post-drought conditions.

Reportable Incidents

No reportable incidents were recorded during the reporting period.

Further Improvements

As a result of the monitoring undertaken during the reporting period the following improvements are planned.

- Strategic grazing management will be reintroduced to effectively manage weed biomass and fuel loads.
- Within the Bowmans Creek Riparian corridor, investigations will be undertaken to identify crucial erosion areas and where rehabilitation and restoration works are required.
- Habitat enhancement plantings, particularly within the narrow casuarina woodland areas, will also be considered. Plantings will include a high proportion of shrubs, native grasses, and reeds to aid with erosion control.
- The successful establishment of vegetation within areas of subsidence rehabilitation will continue to be monitored and supplementary works undertaken as required.

Ongoing weed control will also continue to be undertaken, including manual methods and use of cut and paste herbicide where existing native trees and shrubs are present to minimise collateral mortality associated with broadcast spraying.

6.7 HERITAGE

Management of heritage was undertaken in accordance with the Heritage Management Plan (dated September 2020) which was updated during the reporting period. The following heritage inspection and salvage works were undertaken by Stratum Archaeology Pty Ltd during the reporting period in accordance with existing Aboriginal Heritage Impact Permits.

- Inspections of four gas well locations above LW203 and LW204. No additional Aboriginal objects were salvaged.

- ULLD seam salvage works, including walkover and site collection in subsidence crack zones above LW204 and inspections of drill pad locations. Surface collections were completed at seven previously identified sites and additional salvage excavation works were completed in the ULLD crack zone.
- Inspections of small areas for gas wells at the northern end of LW204, an inspection borehole, borehole pump site and seam to surface riser. A new Aboriginal site was identified along the track south of the inspection boreholes and will be registered on the Aboriginal Heritage Information Management System and protected in situ.
- Salvage works associated with the relocation of the 11kV powerline, including inspection of six new pole locations, surface collection and salvage probes. Three isolated artefacts were collected and one artefact was recovered from a salvage probe.
- Inspection of ULLD LB shaft and LB boreholes, including surface collection of one artefact on the trackway to a borehole.
- Salvage works at a previously identified Oxbow site on the northern side of a tributary line in advance of surface clearing works.
- Ongoing analysis of artefacts salvaged from the ACP site with Registered Aboriginal Parties.

Ongoing consultation with the Aboriginal community also continued through the Aboriginal Community Consultative Forums (ACCF), of which two were held during the reporting period on 25 August and 8 December 2020. During the ACCF meetings, Company personnel and representatives of the Aboriginal community discussed current and future mine activities, upcoming cultural heritage and archaeological fieldwork, and any issues associated with the management of cultural heritage on site.

There were no reportable heritage incidents during the reporting period and currently no further improvements or changes to heritage management are planned during the next reporting period.

6.8 SUBSIDENCE

Environmental Management

To date, five Extraction Plans have been prepared/approved for the ACP. Environmental assessments, public safety management plans, subsidence assessments and subsidence monitoring plans have been incorporated into Extraction Plans as required. Copies of all relevant Extraction Plans and approvals are available on the ACP website.

Environmental Performance

Underground longwall mining operations commenced in February 2007, with mining of the PG seam (LW1 to LW8) and ULD seam (LW101 to LW106A) since completed. Mining operations during the reporting period were undertaken in LW203 and LW204, with extraction of LW203 completed in May 2020 and extraction of LW204 commencing in July 2020.

Subsidence monitoring was undertaken in accordance with the *Ashton Coal Mine Longwalls 201 to 204 Extraction Plan – November 2016* and included both regular surveys following longitudinal and transverse subsidence lines as well as visual inspections of environmental, land and infrastructure features. Subsidence monitoring for each longwall includes survey lines located over the start and end line for each panel as well as various traverse cross lines relevant to the panel, surface or strata features. **Table 6.14** summarises the maximum incremental and cumulative subsidence parameters for each of the relevant monitoring locations during the reporting period.

Subsidence monitoring indicated that no exceedance of the incremental and cumulative subsidence predictions occurred at the locations monitored during the reporting period.

Table 6.14
Subsidence Monitoring Results

Location	Maximum Subsidence (m)	Maximum Tilt (mm/m)	Subsidence Attributable to Longwall	Results Consistent with Extraction Plan Predictions
LW 203				
XL5	5.83	127.5	2.71	Yes
LW1023CL2	2.78	81.0	1.02	Yes
LW 204				
XL5	4.95	59.0	2.72	Yes
LW104-CL1	5.55	81.0	2.76	Yes
Source: Ashton Coal Operations Pty Limited (2021) – bi-monthly subsidence monitoring reports.				

Visual observations of minor to moderate surface cracking were made along the western edge of LW203 and minor compression humps and tensile cracking were observed in the vicinity of the LW203 start position. Additionally, moderate cracking was observed on the access track to the main fans and drainage gas drainage plant. Subsidence impacts to the culvert under the alternate access road south of the private Right of Way and ponding in this area were also observed.

Repairs to the private Right of Way alternate access road and other access tracks in the vicinity of LW203 were undertaken as required during the reporting period to maintain access and ensure the serviceability of roads. Furthermore, remediation programs were developed and implemented over areas of LW203, LW202 and LW201 following the completion of extraction within LW203 and observations of reactivated subsidence impacts including cracking, compression humps and ponding in these areas.

Ponding of water has been observed as a consequence of subsidence in areas which were typically flat prior to mining operations. Remediation of areas which display ponding is planned to occur following the completion of multi-seam mining operations below the surface. Ponding is considered low risk and has served to provide temporary water sources for stock and wildlife at the surface.

Following the commencement of extraction within LW204, moderate cracking and ponding were observed within the zone of influence of LW204. Remediation works were not yet required to address these subsidence impacts within the LW204 area, although maintenance of

the private Right of Way and alternative access route are undertaken as required. As extraction within LW204 passed beneath the 132kV transmission lines, remediation works were completed on three sets of power poles affected by subsidence impacts.

There were no further recorded or observed subsidence impacts, incidents, service difficulties or community complaints during the reporting period.

Reportable Incidents and Further Improvements

The results of subsidence monitoring indicate that subsidence-related impacts are generally in accordance with predicted impact levels, with no reportable incidents during the reporting period. Monitoring will continue to be undertaken in accordance with the current Extraction Plan during the next reporting period. No further improvements to subsidence management or monitoring are considered necessary at this stage, although an Extraction Plan for LW205 to LW 208 will be developed during the next reporting period.

6.9 WASTE MANAGEMENT

In accordance with *Schedule 2, Condition 39* of DA 309-11-2001-i, a summary of waste management during the reporting period is provided as follows.

Wastes generated on site during the reporting period included the following.

- Hazardous (Recycled) – sludge, effluent, empty drums, lead acid batteries, oil filters, oily water, waste grease and waste oil.
- Non-Hazardous (Recycled) – paper and cardboard, confidential documents, scrap steel and timber.
- Hazardous (Disposal) – medical and sanitary waste, oily rags, hydraulic hose and chemical anchors.
- Non-Hazardous (Disposal) – diesel particulate filters and mixed solid waste.

As part of ACOL's Environmental Management Strategy and as outlined in the current MOP for the site, appropriate waste segregation and recycling are encouraged through the provision of appropriate on site recycling facilities.

The approximate volume of each waste stream generated during the reporting period is presented in **Table 6.15** together with the proportion of waste recycled. The proportion of waste recycled increased from 40.39% in 2019 to 41.04% in 2020, whilst the total volume of waste increased by approximately 6.8%.

There were no reportable incidents relating to waste during the reporting period. Waste volumes will continue to be monitored into the future and opportunities to minimise waste or increase recycling implemented, where appropriate.

Table 6.15
Approximate Waste Volumes 2018 to 2020

Waste Class	Waste Stream	Total Volume (kg) ¹		
		2018	2019	2020
Hazardous (Recycled)	Sludge	3 078	10 071	11 944
	Effluent (Off Site)	-	-	16 000
	Empty Drums	3 562	2 060	914
	Lead Acid Batteries	438	1 032	408
	Oil Filters	5 325	1 345	2 202
	Oily Water (Off Site)	19 258	66 942	59 167
	Waste Coolant	-	1 370	-
	Waste Grease	624	286	290
	Waste Oil	23 662	21 100	37 802
	Coagulant	-	1 936	-
	Activated Carbon	150	-	-
		Recycled (%)	9.36%	15.76%
Non-Hazardous (Recycled)	Paper and Cardboard	6 685	6 710	7 605
	Confidential Documents	605	288	418
	Scrap Steel	145 760	149 440	157 380
	Timber (Uncontaminated)	12 200	9 340	920
		Recycled (%)	27.58%	24.62%
Hazardous (Disposal)	Medical and Sanitary Waste	261	465	293
	Hydraulic Hose	1 282	-	2 006
	Asbestos	-	2 200	-
	Oily Rags	499	580	378
	Chemical Anchors	1 039	1 050	669
		Recycled (%)	0.51%	0.64%
Non-Hazardous (Disposal)	Diesel Particulate Filters	10 563	17 145	22 321
	Mixed Solid Waste	364 132	379 920	398 252
		Recycled (%)	62.54%	58.97%
Total Waste		599 123	673 280	718 969
Recycled Waste		221 347	271 920	295 050
Recycled Waste (%)		36.95%	40.39%	41.04%
Note 1: Combined waste volume generated by both the ACP open cut and underground mining operations.				
Source: J R Richards & Sons total waste management report – ACP open cut and underground.				

7. WATER MANAGEMENT

7.1 WATER TAKE AND BALANCE

The ACP has three primary water demands: aboveground dust suppression, underground supply and supply to the CHPP. **Table 7.1** presents the water take under each of the applicable water licences for the ACP over the 2019/2020 financial year (i.e. 1 July 2019 to 30 June 2020).

Table 7.1
Water Take – 2019/2020 Financial Year

Page 1 of 2

WAL	Reference Number	Water Sharing Plan, Source and Management Zone	Entitlement (ML)	Passive Take / Inflows (ML)	Active Pumping (ML)	Total (ML)
Surface Water						
984	20AL201282	Hunter Regulated Water Sharing Plan, surface water, zone 3A (Glennies Creek)	9	5.55	315.77	321.32
997	20AL201311	Hunter Regulated Water Sharing Plan, surface water, zone 3A (Glennies Creek)	11			
8404	20AL200491	Hunter Regulated Water Sharing Plan, surface water, zone 3A (Glennies Creek)	80			
15583	20AL204249	Hunter Regulated Water Sharing Plan, surface water, zone 3A (Glennies Creek)	354			
1120	20AL201624	Whole Water Source (Hunter Regulated River Water Source)	3	15.01	62.69	77.70
1121	20AL201625	Hunter Regulated Water Sharing Plan, surface water, zone 1B (Hunter River from Goulburn River Junction to Glennies Ck Junction)	335			
19510	20AL211015	Hunter Regulated Water Sharing Plan, surface water, zone 1B (Hunter River from Goulburn River Junction to Glennies Creek Junction)	130			
1358	20AL203056	Hunter Regulated Water Sharing Plan, surface water, zone 3A (Glennies Creek)	4	0	0	0
6346	20AL203106	Hunter Regulated Water Sharing Plan, surface water, zone 1B (Hunter River from Goulburn River Junction to Glennies Creek Junction)	15.5	0	0	0
29566	20AL212287	Hunter Unregulated and Alluvial Water Sources 2009, Aquifer, Jerry's Management Zone (Jerry's Water Source)	358	6.20	0	6.20
23912	20AL211423	Hunter Unregulated and Alluvial Water Sources 2009, surface water, Whole Water Source (Jerry's Water Source) (Bowmans Creek)	14	6.26	0	6.26
36702	20AL212975	Hunter Unregulated and Alluvial Water Sources 2009, Surface water, Jerry's Management Zone (Jerry's Water Source) (Bowmans Creek)	116			
36703	20AL212976	Hunter Unregulated and Alluvial Water Sources 2009, Surface water, Jerry's Management Zone (Jerry's Water Source) (Bowmans Creek)	150			

Table 7.1 (Cont'd)
Water Take – 2019/2020 Financial Year

Page 2 of 2

WAL	Reference Number	Water Sharing Plan, Source and Management Zone	Entitlement (ML)	Passive Take / Inflows (ML)	Active Pumping (ML)	Total (ML)
Groundwater						
41501	20AL216171	North Coast Fractured and Porous Rock Groundwater Sources 2016, Sydney Basin-North Coast Groundwater Source	100	0	0	0
41552	20AL219014		511	88.9	0	88.9
41553	20AL219015		81	0	0	0
Total 2019/2020				121.92	378.46	500.38
Total 2018/2019				173.57	248.10	421.67
Total 2017/2018				53.01	262.33	315.34
Source: Ashton Coal Operations Pty Limited.						

Water take is measured and partitioned in accordance with the protocol detailed within the Water Management Plan (WMP), which incorporates a combination of site observations, measurements and predictions of the site water balance model. Water take occurs via two separate methods: incidental (or passive) take, and pumped surface water take. Incidental take occurs through mining-induced fracturing of aquifers which report to the underground workings. This water is removed from the mine by a network of dewatering pumps. Pumped surface water take involves active pumping from Glennies Creek and the Hunter River to provide higher quality water for a variety of uses including potable water, use in equipment and as fire-fighting water at the mine.

Both passive and active water take during the reporting period remained within licenced entitlements associated with individual WALs.

In addition to measuring water take, ACOAL separately reports the ACP's water balance annually in accordance with the Mineral Council of Australia's *Water Accounting Framework for the Minerals Industry* (2012). **Table 7.2** provides a summary of the water inputs and outputs as well as the changes in water storage at the ACP during the reporting period.

Table 7.2
Input / Output Water Balance – 2020 Calendar Year

Page 1 of 2

Input / Output	Component	Sub – Component	Water Volume (ML) ¹
2020 Inputs	Surface Water	Precipitation and Runoff	966.5
		Rivers and Creeks	586.0
		External Surface Water Storages	0.0
	Groundwater	Aquifer Interception	344.4
		Bore Fields	0.0
		Entrainment	160.7
	Third Party Water	Contract / Municipal	0.6
		Waste Water	0.0
Total Inputs			2 058.2

Table 7.2 (Cont'd)
Input / Output Water Balance – 2020 Calendar Year

Page 2 of 2

Input / Output	Component	Sub-Component	Water Volume (ML) ¹
2020 Outputs	Surface Water	Discharge	0.0
		Environmental Flows	0.0
	Groundwater	Seepage	580.1
		Reinjection	0.0
	Supply to Third Party		0.0
	Other	Evaporation	159.3
		Entrainment	878.8
		Other (e.g. ventilation moisture loss)	330.7
	Total Outputs		1 948.9
	Total Inputs minus Total Outputs		109.3
Storage at the Start of 2020		1 544.0	
Storage at the End of 2020		1 877.0	
Overall Water Imbalance		223.7	
Note 1: Volumes represent a combination of measured, simulated and estimated volumes with variable levels of confidence (low to high).			
Source: Hydro Engineering and Consulting Pty Ltd (2021).			

7.2 SURFACE WATER

Environmental Management

Surface water management at the ACP is conducted in accordance with the approved WMP and associated surface water monitoring program. The ACP site is a zero discharge site. No discharge off site occurred during the reporting period and no compensatory water was required by or provided to private landholders during the reporting period.

Environmental Performance

Water quality for the creeks and river surrounding ACP is monitored monthly by an independent consultant at fourteen (14) approved monitoring sites (see **Figure 7.1**) with sample analysis by a NATA accredited laboratory. Surface water quality (SWQ) monitoring data for the reporting period is summarised in **Table 7.3** and presented graphically in **Figure 7.2**. Data since 2012 is presented in **Figure 7.3**.

SWQ trigger levels specified within the WMP (and reproduced in **Table 7.3**) must be exceeded on three consecutive readings, or differ significantly from the preceding three readings, before an action response is required. **Table 7.4** provides a summary of instances during the reporting period where trigger levels were exceeded on three (or more) occasions. In summary, three (or more) consecutive exceedances of pH, EC or TDS trigger values were recorded across five monitoring sites on eight occasions during the reporting period. Reviews of monitoring results completed each month concluded that these results were likely associated with high flow events during 2020 following periods of low or no flow during 2018 and 2019.

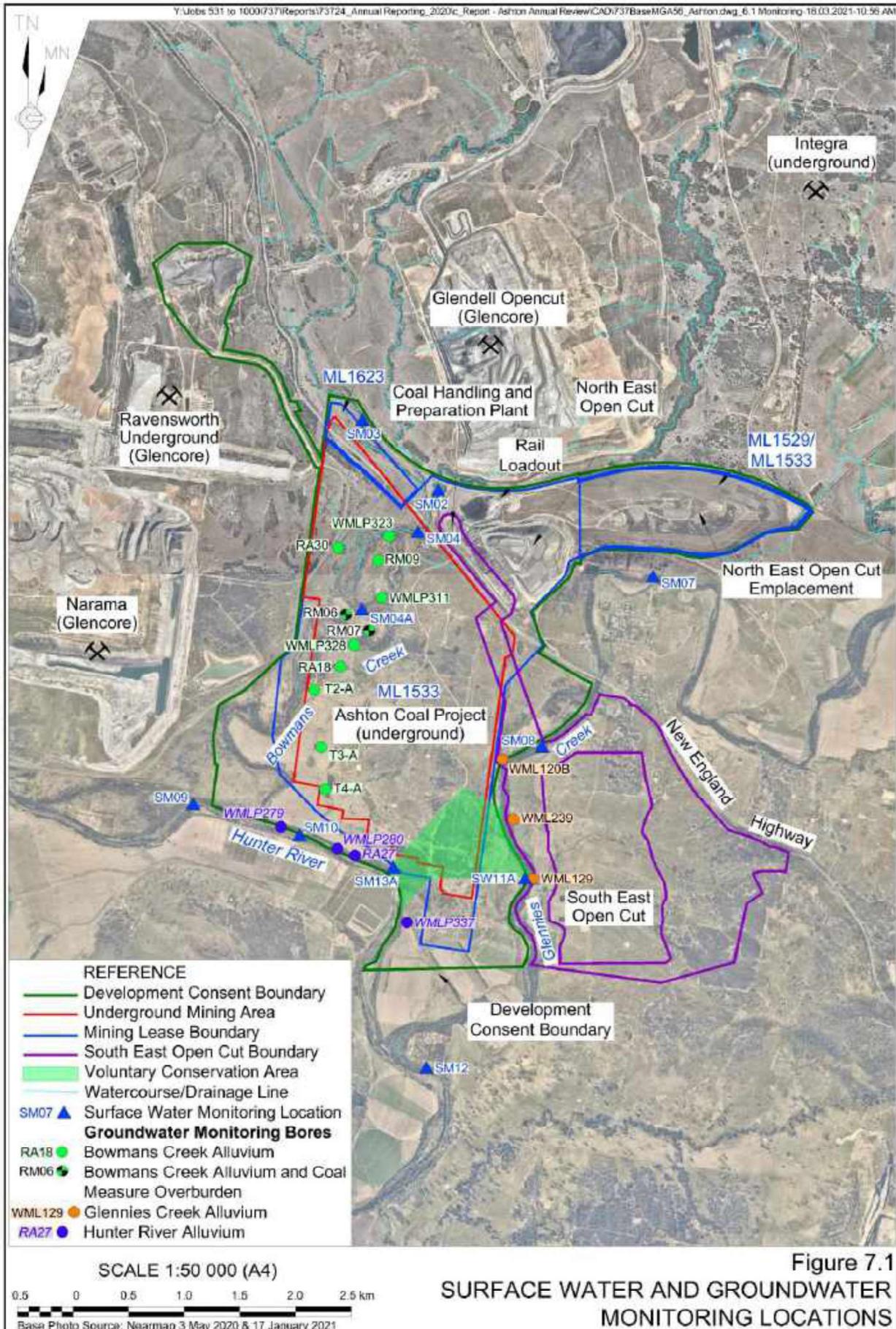
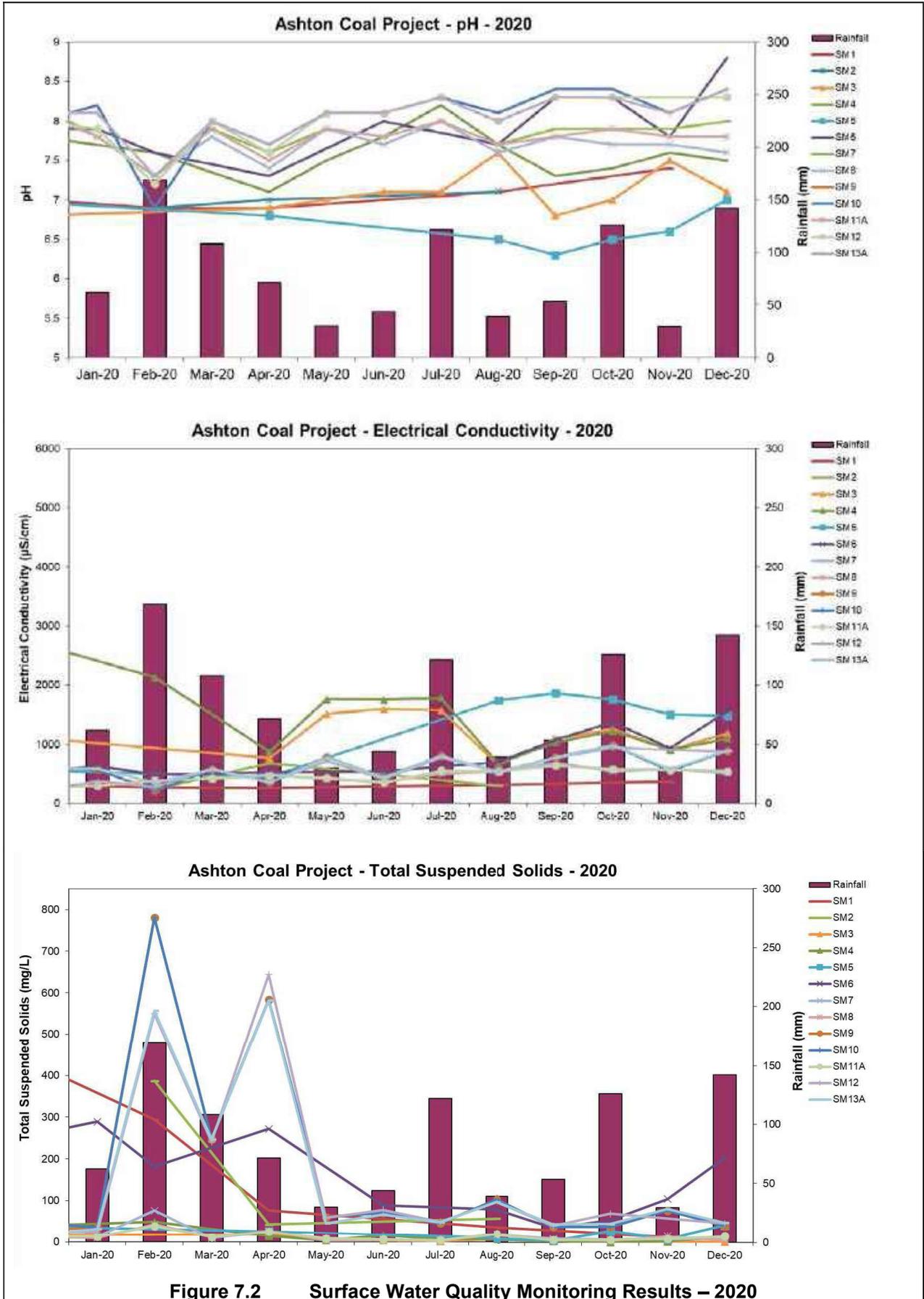


Figure 7.1
SURFACE WATER AND GROUNDWATER
MONITORING LOCATIONS



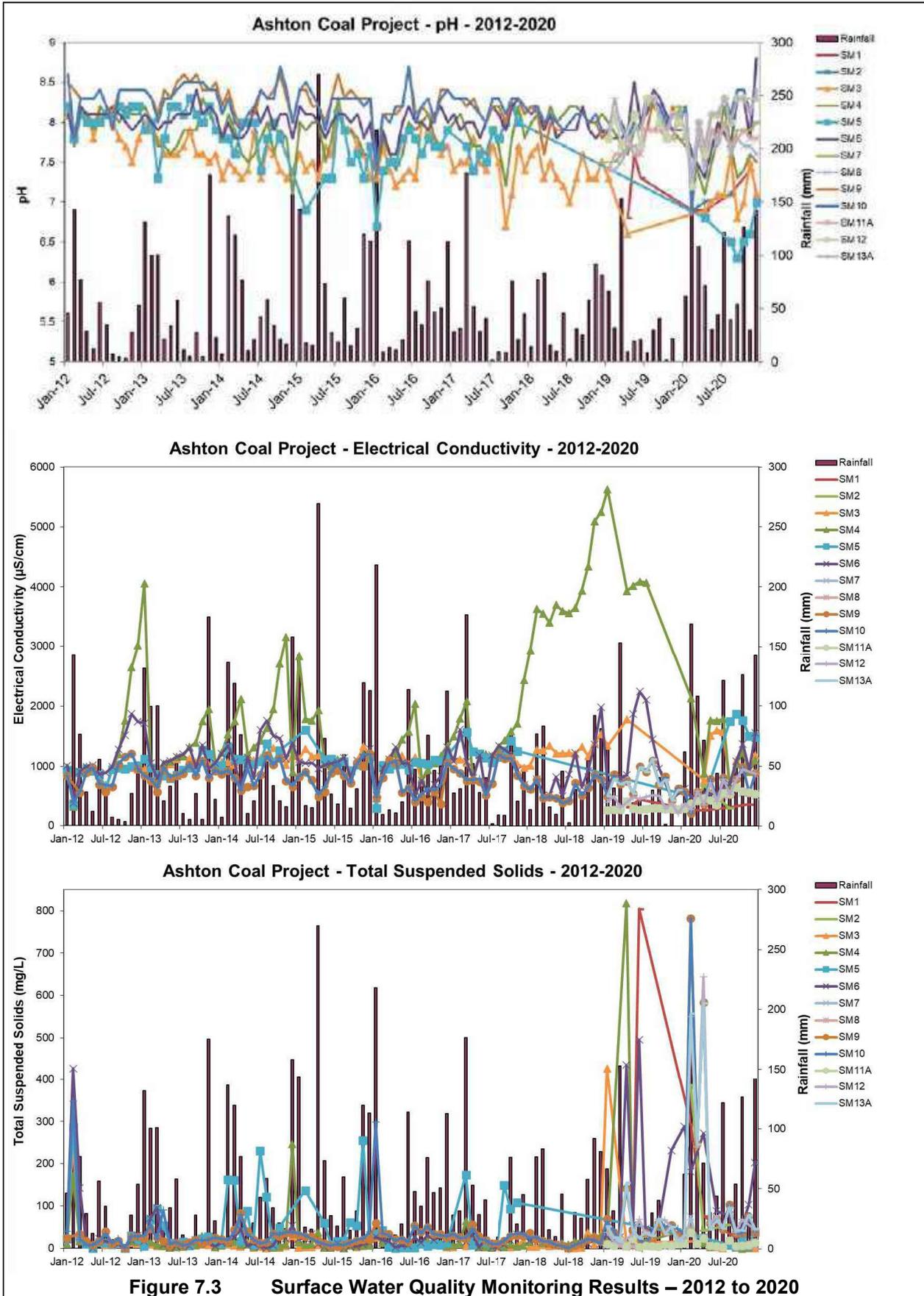


Table 7.3
Surface Water Monitoring Summary - 2020

Sampling Site [^]	pH	pH Trigger Value ¹	EC (µS/cm)	EC Trigger Value ²	TDS (mg/L)	TDS Trigger Value ²	TSS (mg/L)	TSS Trigger Value ²
Bettys Creek								
SM1	6.9 – 7.4 (7.1)	<6.97 - >7.70 [<6.6 - >8.0]	263 – 362 (303)	>1 198 [>1 811]	270 – 357 (317)	>794 [>1 193]	13 – 294 (105)	>122 [>273]
SM2	6.9 – 7.1 (7.0)	<6.87 - >7.63 [<6.6 - >7.6]	239 – 679 (405)	>1 144 [>1 803]	310 – 509 (433)	>732 [>1 105]	43 – 387 (162)	>116 [>116]
Bowmans Creek								
SM3	6.8 – 7.6 (7.1)	<7.42 - >7.88 [<7.2 - >8.1]	653 – 1 597 (1 171)	>1 440 [>1 620]	431 – 1 300 (831)	>878 [>965]	1 – 18 (7)	>20 [>62]
SM4	7.1 – 8.2 (7.6)	<7.71 - >8.09 [<7.4 - >8.3]	668 – 2 130 (1 323)	>3 656 [>10 790]	423 – 1 310 (887)	>2 270 [>6 331]	3 – 49 (13)	>37 [>104]
SM4A	6.8 – 7.7 (7.5)	<7.60 - >8.10 [<7.4 - >8.3]	388 – 924 (725)	>1 140 [>1 796]	377 – 593 (475)	>653 [>1 067]	1 – 82 (17)	>19 [>44]
SM5	6.3 – 7.0 (6.6)	<7.66 - >7.97 [<7.5 - >8.1]	442 – 1868 (1 465)	>1 542 [>1 796]	384 – 1 440 (1 050)	>891 [>1 031]	5 – 40 (19)	>20 [>31]
SM6	7.3 – 8.8 (8.0)	<7.84 - >8.23 [<7.6 - >8.4]	485 – 1 552 (867)	>1 108 [>1 831]	253 – 980 (551)	>642 [>810]	34 – 289 (145)	>26 [>60]
Glennies Creek								
SM7	7.3 – 8.0 (7.8)	<7.66 - >8.03 [<7.5 - >8.2]	292 – 690 (476)	>577 [>763]	186 – 384 (285)	>342 [>424]	4 – 76 (16)	>19 [>35]
SM8	7.3 – 8.0 (7.7)	<7.62 - >7.96 [<7.3 - >8.1]	292 – 644 (477)	>562 [>756]	201 – 360 (293)	>334 [>422]	3 – 43 (13)	>22 [>45]
SM11A	7.3 – 8.0 (7.8)	<7.74 - >8.02 [<7.6 - >8.3]	293 – 640 (480)	>564 [>768]	195 – 369 (295)	>332 [>409]	4 – 39 (14)	>20 [>43]
Hunter River								
SM9	6.9 – 8.4 (8.1)	<8.00 - >8.32 [<7.8 - >8.4]	210 – 983 (622)	>942 [>1 101]	155 – 537 (381)	>541 [>646]	35 – 781 (176)	>34 [>69]
SM10	7.3 – 8.4 (8.1)	<8.00 - >8.32 [<7.8 - >8.4]	363 – 989 (652)	>942 [>1 101]	186 – 564 (398)	>526 [>644]	41 – 588 (158)	>42 [>63]
SM12	7.2 – 8.3 (8.0)	<7.84 - >8.24 [<7.6 - >8.3]	275 – 942 (602)	>728 [>913]	151 – 548 (362)	>415 [>506]	24 – 644 (172)	>36 [>82]
SM13A	7.3 – 8.4 (8.1)	<8.02 - >8.32 [<7.8 - >8.4]	345 – 986 (638)	>927 [>1 080]	179 – 559 (383)	>516 [>639]	32 – 582 (158)	>41 [>76]
<p>() = Average [] = no / low flow trigger value NS – Not Sampled (Dry) [^] See Figure 7.1 Bold Red Text – Exceedance of Trigger Level for three consecutive samples. Note 1: pH trigger values are less than the 20th and 5th percentile of baseline values (i.e. to December 2011) for each site during flow and no / low flow conditions respectively. Note 2: EC and TSS trigger values are greater than the 80th and 95th percentile of baseline values (i.e. to December 2011) for each site during flow and no / low flow conditions respectively.</p>								
Source: Ashton Coal Operations Pty Limited.								

Table 7.4
Consecutive Surface Water Trigger Level Exceedances

Parameter	Monitoring Location ¹	Period	Response	
pH	SM5	August - December	Internal review of results and local environmental conditions completed by ACOL concluded that circumstances did not warrant a detailed investigation. Exceedances were attributed to periods of high flow following prolonged periods of very low (or no) flow during the previous two reporting periods.	
	SM4A	September - November		
	SM4	September - December		
EC	SM3	May – July		
	SM5	August – October		
	SM8	September - November		
TDS	SM3	May – July		
	SM5	August - October		
TSS	SM9	January – December		External investigation conducted by HEC concluded that elevated results were likely the result of regional drought conditions in 2019 followed by periods of high rainfall in 2020.
	SM10	February - December		
	SM12	February – December ²		
	SM13	February - December		

Note 1: see **Figure 7.1**.

Note 2: inaccessibility of monitoring location SM12 precluded sampling at this location during November 2020.

Exceedances of the relevant TSS trigger values were recorded at the Hunter River monitoring locations for all twelve monitoring rounds during the reporting period at site SM9 and for all monitoring rounds with the exception of January 2020 at sites SM10, SM12 and SM13A. Elevated TSS levels exceeding the trigger levels for the Hunter River monitoring sites were also recorded during the second half of the previous reporting period. An external investigation into elevated TSS levels recorded at the Hunter River monitoring sites between July 2019 and August 2020 was completed by Hydro Engineering and Consulting Pty Ltd (HEC). The investigation found that:

- very high TSS levels were recorded between February 2020 and April 2020, coinciding with a high flow event in the Hunter River in February 2020;
- the high flow event followed an extended period of very low flow, with the Singleton gauging station recording the lowest single year (2018) and two year total flow (2018/2019) in 107 years of records;
- low rainfall during 2018 and 2019 would likely have denuded vegetation regionally, leading to increased suspended solids in runoff following rainfall events;
- high TSS values and trends recorded upstream at the WaterNSW Moses Crossing station mirrored trends observed at ACOL monitoring sites, with a peak TSS level of 5 180mg/L recorded on the same day (19 February 2020) that peak flow was recorded within the monitored reach of the Hunter River;
- high observed TSS was likely related to regional drought conditions and low flow in 2019 followed by periods of increased rainfall and high flow in 2020; and
- the data does not indicate that elevated TSS levels in the Hunter River were the result of mining-related impacts.

Reportable Incidents

As both internal and external investigations of trigger action response levels determined water quality was not affected by the ACP, no reportable incidents occurred during the reporting period.

Further Improvements

No alteration to current surface water control measures are planned or currently considered necessary.

7.3 GROUNDWATER

Environmental Management

Groundwater management at the ACP is conducted in accordance with the approved WMP and associated groundwater monitoring program. A groundwater model based on mine plans and past groundwater monitoring results is employed to predict changes to the local hydrological regime and potential impacts on groundwater associated with ACP activities. In order to determine if groundwater impacts associated with ACP operations remain consistent with those predicted a groundwater monitoring network has been established (see **Figure 7.1**) targeting the following aquifers.

- Saturated quaternary sediments (alluvium) including:
 - Bowmans Creek Alluvium (BCA);
 - Glennies Creek Alluvium (GCA); and
 - Hunter River Alluvium (HRA).
- Shallow Permian sandstone and minor coal seams, referred to as coal measures overburden (CMOB).
- Permian coal measures of varying thickness targeted by mining (Coal Measure).

As part of the approved WMP, impact assessment criteria and TARPs have been developed to investigate and, if necessary, respond to any monitoring results that are inconsistent with predicted impacts / defined criteria.

Groundwater monitoring was undertaken by Australasian Groundwater and Environmental Consultants Pty Ltd (AGE) throughout the reporting period including both water level and water quality. A detailed annual groundwater summary prepared by AGE is presented as **Appendix 2**, with key monitoring observations summarised in the following sections.

Groundwater Levels

Monitoring results for BCA bores indicated that groundwater levels increased throughout the reporting period, with previously dry bores (T2A, WMLP328, WMLP311, PB1, RA18 and T5) all returning water level readings during the reporting period. Groundwater level increases within BCA bores corresponded with increasing Cumulative Rainfall Departure (CRD) (i.e. increasing rainfall relative to the long-term monthly average rainfall) recorded for the ACP site. All BCA trigger bores were recorded above the relevant groundwater level trigger values from

April 2020 with the exception of bore T2A which recorded levels above the relevant trigger value from August 2020. As Bowmans Creek is not a flow-regulated Creek, monitoring results for BCA bores are more reflective of natural regional climatic conditions, compared to the bores targeting alluvial aquifers associated with the flow-regulated Glennies Creek and the Hunter River.

Monitoring results for GCA bores indicated that groundwater levels were relatively stable during the reporting period, with a slight decline in groundwater levels observed between February and June 2020 at bore WML120B. Groundwater levels at all GCA bores remained above the relevant groundwater level trigger values during the reporting period.

Similarly, groundwater levels recorded for HRA bores remained relatively stable, with the exception of bores WMLP280 and WMLP279 which displayed increases during the reporting period. The relative stability of HRA groundwater levels is attributed to the regularity of controlled releases in the Hunter River upstream of the ACP site.

Groundwater results recorded during the reporting period for longwall specific monitoring bores indicated that water levels remained relatively stable for bores adjacent panels LW203/LW204. Vibrating wire piezometer (VWP) readings also remained relatively stable in bore WMLP269 (the closest VWP bore to LW203) throughout the reporting period, although two sensors recorded a decline in pressure head in August 2020.

Monitoring results for CMOB bores displayed increasing groundwater levels over the reporting period, correlating with increasing CRD recorded at the ACP site (AGE, 2021). Monitoring results for Coal Measure bores indicated groundwater levels which remained relatively stable throughout the reporting period, with the exception of bore GM1 which fluctuated throughout the period.

Generally, the site has experienced no mining impacts to the GCA and HRA alluvial aquifers and impacts are within predictions in the coal measures. Increased rainfall recharge has impacted groundwater levels in the BCA and shallow CMOB bores.

Groundwater Quality

Groundwater pH measurements remained stable throughout the reporting period for all monitored aquifers. There were no consecutive exceedances of pH trigger values and the slight changes in pH are attributed to natural variation. As previously recorded, pH within alluvial bores was slightly acid to neutral and groundwater within Coal Measure and CMOB bores was generally neutral to slightly alkaline within the following ranges.

- BCA – pH 6.62 (WMLP323) to 7.62 (RM10).
- GCA – pH 6.25 (WMLP358) to 7.10 (WMLP343).
- HRA – pH 6.52 (WMLP336) to 7.28 (WMLP337).
- Coal Measure – pH 6.42 (WMLP302) to 8.08 (WML262).
- CMOB - pH 6.61 (T2P) to 7.50 (T3P).

During the reporting period the electrical conductivity (EC) within all monitored aquifers ranged from fresh to brackish as follows.

- BCA – 732 μ S/cm (WMLP311) to 3 680 μ S/cm (PB1).
- GCA – 323 μ S/cm (WMLP358) to 902 μ S/cm (WMLP349).
- HRA – 509 μ S/cm (WMLP336) to 2 945 μ S/cm (WMLP337).
- Coal Measure – 580 μ S/cm (WML120A) to 4 218 μ S/cm (WML183).
- CMOB – 896 μ S/cm (WMLP324) to 2 408 μ S/cm (WML115B).

Two BCA bores (WMLP323 and WMLP328) exceeded the trigger levels on three consecutive occasions during the reporting period, triggering the response plan outlined in the WMP. These bores have been investigated previously. These investigations concluded that BCA EC levels have increased as a result of reduced rainfall recharge since 2018. This trend is expected to reverse if the water levels in the BCA continue to increase.

EC levels recorded for GCA and HRA bores similarly remained relatively stable throughout the reporting period, with the exception of HRA bores WMLP337 and WMLP279 which displayed declining EC levels.

Analysis of major ions indicated that the similar CMOB, BCA and HRA water types are distinguishable from the GCA and the Coal Measure water types, due to the differing water source and recharge/discharge mechanism associated with each body. Dissolved metals, select nutrients, turbidity and cyanide concentrations were also compared against ANZECC|ARMCANZ livestock limits (ANZECC & ARMCANZ, 2000). There were no exceedances for any of the analytes assessed.

Reportable Incidents

No reportable incidents occurred during the reporting period. Whilst the trigger action response within the WMP was enacted for elevated EC results in two BCA bores, subsequent investigation concluded that these trigger events were attributable to previous drought conditions and no further action (except continued monitoring) was required.

Further Improvements

Monitoring will continue in accordance with the current Water Management Plan (WMP) (which was revised during the reporting period). No further improvements are planned at this stage.

8. REHABILITATION

8.1 REHABILITATION PERFORMANCE DURING THE REPORTING PERIOD

Figure 8.1 shows the status of rehabilitation and a summary of the areas of rehabilitation is provided in Table 8.1.

Table 8.1
Rehabilitation Summary

Mine Area Type	Previous Reporting Period (Actual)	This Reporting Period (Actual)	Next Reporting Period (Forecast)
	2019 (ha)	2020 (ha)	2021 (ha)
Total mine footprint ¹	909.6	918.3	918.3
Total active disturbance ¹	178.9	182.0	182.0
Land being prepared for rehabilitation	0	0	0
Land under active rehabilitation ¹	733.2	736.3	736.3
Completed rehabilitation ²	0	0	0

Note 1: Includes subsidence remediation areas.
Note 2: Areas which have been formally relinquished or signed off by the relevant agency.

During the reporting period minor rehabilitation works totalling 3.1ha were completed in accordance with Ground Disturbance Permits for activities including gas drainage infrastructure construction, subsidence repairs and archaeological investigations (see Section 4.3). Rehabilitation of subsidence-related impacts generally included excavation to the limit of the crack, backfilling, compaction, topsoil spreading and seeding of the impacted areas.

Monitoring outcomes for the Bowmans Creek Riparian corridor, SWCA, and farmland areas are discussed in Section 6.6, given that these areas principally relate to biodiversity management and improvement.

8.2 NORTH-EAST OPEN CUT REHABILITATION

Monitoring of NEOC rehabilitation (and other important biodiversity areas) was undertaken between 25 May and 4 June 2020 by DnA Environmental. Revised completion and performance criteria were developed and utilised for performance evaluation, and an amended MOP reflecting these updated criteria is to be submitted for approval during the next reporting period.

Monitoring of the NEOC rehabilitation area includes assessment of areas rehabilitated to *mixed woodland habitat* (formerly “Trees Over Grass”) and *exotic pastures*. Rehabilitation of the NEOC overburden emplacement commenced in 2005, with the entire ~140ha of rehabilitation being completed in 2012. There is currently ~68ha of rehabilitated exotic pasture and ~71ha of native trees and shrubs.

During the previous reporting period it was decided, following advice from DnA Environmental, that livestock grazing was no longer considered an appropriate post-mining

landuse option for the NEOC rehabilitation. Instead, a single final land use domain, “*Mixed eucalypt woodland habitat*”, consisting of additional woodland habitat of various densities and a higher diversity of shrubs, will cover the areas formerly referred to as *Pasture* and *Trees-over-Grass*. It is intended to convert approximately 15ha of exotic pasture areas into areas of eucalypt woodland habitat over the next five years (subject to suitable meteorological conditions). This updated rehabilitation strategy will be reflected within a MOP amendment to be submitted during the next reporting period.

Rehabilitation monitoring continued to assess the performance of both the existing mixed woodland habitat and exotic perennial pastures, with three woodland rehabilitation sites and four exotic pasture rehabilitation sites being monitored in 2020. Rehabilitation performance is compared against a range of ecological performance targets and completion criteria obtained from non-mining-disturbed reference sites. Three mixed eucalypt woodland and three native grassland reference sites were established in 2019. The range values of each performance indicator will be measured annually to reflect seasonal conditions and disturbance events.

Rehabilitation performance is assessed against the completion criteria summarised in **Table 8.2**. Completion criteria targets are met if they are within the specified target ranges recorded at corresponding woodland or grassland reference sites, as represented by an appropriately coloured box.

The outcomes of the 2019 monitoring demonstrate that many completion targets have been met, with some exceptions. Ecological performance indicators for the mixed eucalypt woodland habitat and exotic pastures demonstrate these rehabilitated areas have generally developed into highly functional and stable communities, functionally comparable to the local woodlands and native grasslands. It was also noted that the extreme seasonal conditions experienced over the past twelve years, combined with simultaneous changes in total grazing pressure (both livestock and macropods), has had a significant impact on the composition and diversity of both the NEOC vegetation and the reference sites.

Due to the age of the woodland rehabilitation and positive monitoring results, DnA Environmental suggest that monitoring effort in existing woodland and pasture rehabilitation areas could be scaled down, with monitoring effort being focussed on assessing the development of new woodland areas established as part of the proposed pasture-to-woodland conversion program.

It was also recommended that, whilst areas of exotic perennial pastures previously established on the NEOC are likely to persist, additional sowing of exotic species should be avoided, as these highly competitive species can restrict germination and establishment of native tree and shrub seed and reduce the diversity of desirable grasses and herbs in the longer-term.

Table 8.2
North East Open Cut Rehabilitation Area – Rehabilitation Sites Completion Criteria Status 2020

Page 1 of 2

Rehabilitation Phase	Completion criteria	Performance Indicators	Unit of measure	Exotic Pasture Sites				Woodland Sites		
				M2008 01	M2008 02	M2009 01	M2010 01	M2008 03	M2012 03	M2012 04
Phase 2: Landform establishment and stability	Landform suitable for final landuse and generally compatible with surrounding topography and final landform design	Slope	< Degrees (18°)	14	14	14	14	4	2	1
	Areas of active erosion are limited	No. Rills/Gullies	No.	0	0	0	0	0	0	0
		Cross-sectional areas of rills	M ²		0	0	0	0	0	0
Phase 3: Growth medium development	Soil properties are suitable for the establishment and maintenance of selected vegetation species	pH	pH (5.6-7.3)	7.1	7.4	7.95	7.2	8.6	9.6	8.84
		EC	dS/m (<0.150)	0.063	0.086	0.121	0.127	0.152	0.262	0.173
		Organic Matter	% (>4.5)	5.0	6.8	8.6	8.2	4.1	5.6	5.8
		Phosphorous	mg/kg (50)	11.8	297.4	74.4	80.3	34.4	19.0	5.5
		Nitrate	mg/kg (>12.5)	0.9	1.6	1.8	4.9	11.7	1.4	1.3
		Cation Exchange Capacity (CEC)	Cmol+/kg (>14)	12.9	15.1	21.5	16.2	16.8	18.8	14.4
		Exchangeable Sodium Percentage (ESP)	% (<5)	1.7	1.8	2.2	0.8	2.7	13.1	3.8
Phase 4: Ecosystem & Landuse Establishment	Landform is stable and performing as it was designed to do.	LFA Stability	%	75.1	71.3	77	84	76	68.1	61.9
		LFA Landscape organisation	%	100	100	100	100	96	94	100
	Pasture productivity is comparable to analogue sites.	Green Dry Matter Biomass	kg/ha	>3000	>3000	>3000	>3000	-	-	-
Phase 5: Ecosystem & Landuse Sustainability	Landform is ecologically functional and performing as it was designed to do	LFA Infiltration	%	47.4	49.4	53.5	61.2	53	48.7	50.6
		LFA Nutrient recycling	%	47.7	47.6	53.9	57.9	43.2	48.6	51.6
	Ground layer contains protective ground cover and habitat structure comparable with the local remnant vegetation.	Litter cover	%	17.5	46.5	57.5	34.5	62	69	69.5
		Annual plants	<%	22.5	0	0	5	5.5	2	0.5
		Cryptogram cover	%	3.5	6	0	0	0	0.5	0
		Rock	%	0.5	2.5	0.5	0	0	1.5	12
		Log	%	0	0	3	0	0	0	0



**Table 8.3
North East Open Cut Rehabilitation Area – Rehabilitation Sites Completion Criteria Status 2020**

Rehabilitation Phase	Completion criteria	Performance Indicators	Unit of measure	Exotic Pasture Sites				Woodland Sites		
				M2008 01	M2008 02	M2009 01	M2010 01	M2008 03	M2012 03	M2012 04
Phase 5: Ecosystem & Landuse Sustainability (Cont'd)		Bare ground	<%	0	7.0	4	0	3	6	16
		Perennial plant cover (< 0.5m)	%	56	38.0	35.0	60.5	29.5	21	2
		Total Ground Cover	%	100	93.0	96	100	97	94	84
	Vegetation contains a diversity of species per square meter comparable to that of the local remnant vegetation.	Native understorey abundance	>species/m ²	2.6	0.4	0.0	0.0	1.2	0.4	1.2
		Exotic understorey abundance	<species/m ²	5.8	2	2.2	4.4	3	2.4	1.8
	Native groundcover abundance is comparable to that of the local remnant vegetation.	Percent groundcover provided by native vegetation <0.5m tall.	%	33.0	5.7	0.0	0.0	27.3	10.0	31.6
	The vegetation is developing in structure and complexity comparable to that of the local remnant vegetation.	Foliage cover 0.5m – 2m	% cover	7.5	31.5	18.5	18	13	12	12
		Foliage cover 2m – 4m	% cover	-	-	-	-	25	14	21
		Foliage cover 4m – 6m	% cover	-	-	-	-	17	8	35
		Foliage cover >6m	% cover	-	-	-	-	6	4	21
Green = Meets or exceeds completion criteria. Blue = Performance indicator target falls within industry guidelines or desirable ranges but may not be similar to reference sites NA = Not Applicable. Source: DNA (2020)										

8.3 PEST AND WEED CONTROL

A programmed range of pest and weed control activities were also undertaken across ACP rehabilitation areas, biodiversity conservation areas and buffer land during the reporting period. Pest control activities included wild dog and fox baiting programs completed during autumn (May to June 2020) and spring (October to November 2020). The baiting program accounted for a total of 12 wild dogs and 13 foxes, with target species accounting for 31% of baits taken.

A feral pig trapping program, including both trapping and open range opportunistic shooting, was implemented in August, November and December 2020 in response to observed feral pigs and feral pig wallows on site. A total of 37 feral pigs were trapped and dispatched during the reporting period and a further eight were shot and killed during kangaroo culling activities.

An open range shooting program was also undertaken at the ACP site as part of a kangaroo culling program approved and licenced by the NSW National Parks and Wildlife Service. Open range shooting was undertaken in August, October and December 2020, with a total of 231 kangaroos, 25 rabbits and four hares killed during the reporting period.

Active weed control treatment was also completed across approximately 385 hectares of land owned by ACO, targeting African Boxthorn, African Olive, Castor Oil, Coolatai Grass, Mother of Millions, Prickly Pear, St John's Wort general weeds around infrastructure and disturbed areas. **Figure 8.3** displays the areas treated for weeds during the reporting period.

No rehabilitation trials or research was undertaken during the reporting period and there were no variations to the rehabilitation activities.

No permanent buildings were structurally altered, renovated or removed during the reporting period.

8.4 ACTIONS FOR THE NEXT REPORTING PERIOD

Rehabilitation during the next reporting period will principally relate to rehabilitation of disturbance associated with gas drainage network development and other minor infrastructure projects, as needed. Should favourable meteorological conditions persist, the first block of the woodlands rehabilitation conversion program may be undertaken within the NEOC area. An amendment to the MOP will also be lodged during the next reporting period to reflect the revised completion and performance criteria and proposed conversion of pasture rehabilitation to mixed eucalypt woodland within the NEOC emplacement area.

Rehabilitation of subsidence impacts will also be undertaken, as required, including surface crack backfilling, compaction, and vegetation enhancement. Ongoing repairs will be made to any subsidence-damaged infrastructure, including the right of way access road, in accordance with the approved subsidence monitoring and management plans.

Maintenance works, such as erosion and sediment control, and ongoing control of weeds and feral pests will also be undertaken as required. Additional feral pest control options will also be investigated including those targeting feral cats, hares, rabbits and feral pigs. Other measures to improve biodiversity outcomes, as outlined in Section 6.6 of this Annual Review, will also be investigated and implemented as appropriate.



Source: ENRIGHT Land Management (2021) – Map 2

Figure 8.1 Weed Treatment Areas - 2020

9. COMMUNITY

9.1 COMMUNITY COMPLAINTS

All complaints during the reporting period were recorded in the complaints register (available on the Ashton Coal Website) which is reproduced as **Table 9.1**. Two complaints were received during the 2020 reporting period, both of which were related to dust. Investigations following the receipt of these complaints concluded that operations at the ACP site were unlikely to have contributed significantly to the dust noted in either complaint.

Table 9.1
Community Complaints Summary - 2020

Date and Time	Nature of Complaint	Details
3 July 2020 (3:32pm)	Dust	Complainant emailed to state / request: "There is dust coming into the village, could please investigate." Wind direction was generally from the west towards complainant's residence for the hour leading up to the complaint, and no rain was received for approximately a fortnight. With no surface operations, and the upwind dust levels (D7) equal to or exceeding downwind levels (D10), the investigation indicates the majority of the dust was most likely being generated upwind (to the west) of Ashton. Complainant was advised by email (at 4.32pm on 3/7/20) that it was unlikely that dust contribution was emanating from Ashton.
29 July 2020 (3:44pm)	Dust	Complaint received from Camberwell resident, with the message reading: "Complaining about the dust and dirt coming out." Light winds generally from the north-west towards the complainant's residence were recorded for the hour leading up to the complaint, with heavy rain received over the three days prior. Complainant was advised by email (at 9:15am on 30/07/20) that site operations and monitoring data at the time of the complaint had been reviewed which determined that Ashton was not a significant contributor to measured dust levels.
Source: ACOL		

A summary of all complaints received over the life of the mine is presented as **Figure 9.1** and illustrates a decreasing trend in complaints, with the greatest reduction occurring following completion of the NEOC. Previously the nature of complaints was predominantly noise, followed by dust and blasting.

9.2 COMMUNITY LIAISON

The principal formal community consultation undertaken is via the Ashton Community Consultative Committee. In accordance with *Condition 7 of Schedule 5* of DA 309-11-2001-i, ACOL has established a Community Consultative Committee for the ACP. During the reporting period, the committee consisted of:

- three representatives of the local community (Mr John McInerney, Mrs Debbie Richards, Mr Michael Bestic);
- a representative from Singleton Shire Council (Clr. Godfrey Adamthwaite); and
- four representatives from ACOL (Mr Aaron McGuigan, Mr Lachlan Crawford, Mr Phillip Brown and Mr Amrish Trivedi).

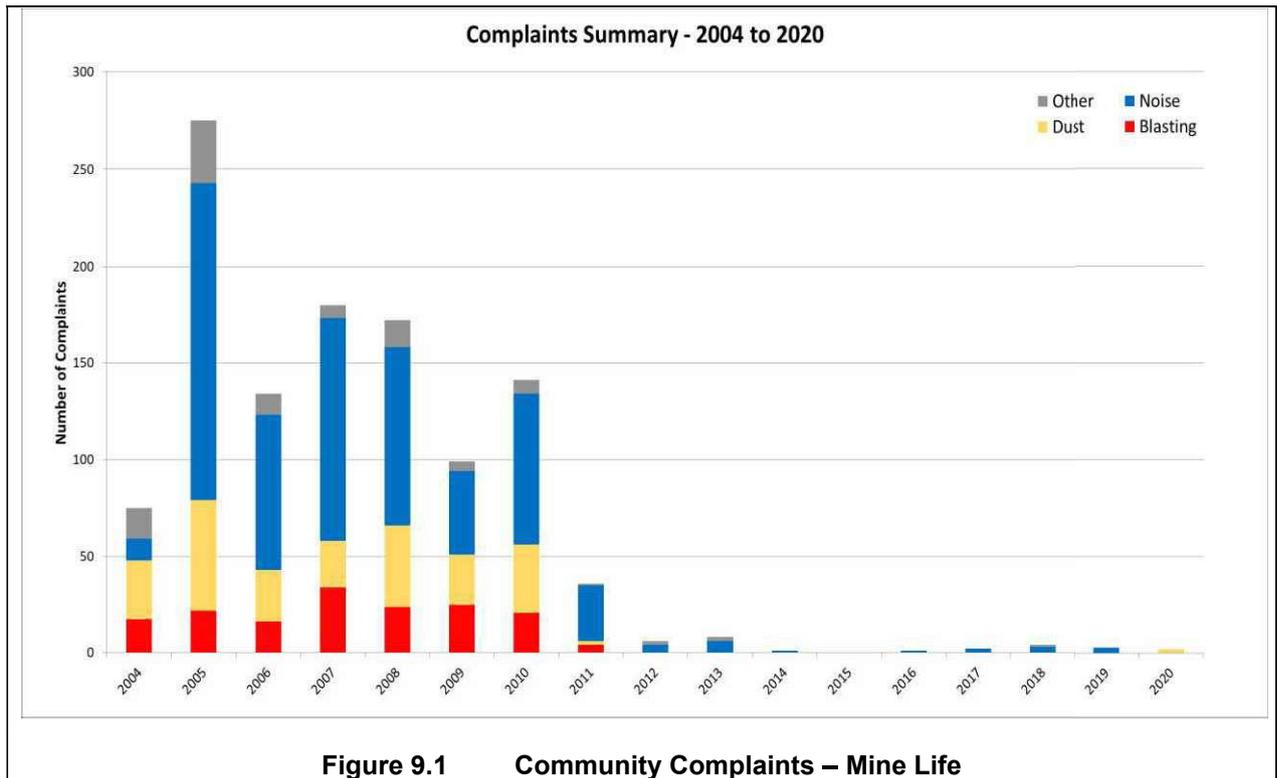


Figure 9.1 Community Complaints – Mine Life

The committee was chaired by Mrs Margaret MacDonald-Hill, an independent chairperson appointed as the independent Chair by the Secretary, DPIE.

The committee held a total of three meetings during the reporting period (13 February, 9 July and 15 October 2020). The meetings have continued to provide an opportunity for ACOL to keep the community up to date with activities undertaken and programmed at the ACP and for community members to table issues relating to the ACP for ACOL’s consideration. It is noted that ACOL provided presentations during each meeting to provide updates on mine development, environmental monitoring and performance, subsidence management, planning, and other relevant matters.

Copies of minutes, presentations and annual CCC Chairperson’s reports to DPIE are available on the Ashton Coal website at www.ashtoncoal.com.au.

ACOL also undertakes engagement through the Aboriginal Community Consultation Forum (ACCF). The ACCF is a community engagement process in place to ensure ongoing dialogue between the Aboriginal Community and Ashton Coal. ACCF meetings regularly discuss planned mining operations, potential impacts to Country, upcoming projects and salvage works. Two meetings were held during the reporting period on 25 August and 8 December 2020 and regular meetings will continue during the next reporting period (see Section 6.7 for further information).

9.3 COMMUNITY SUPPORT PROGRAM

ACOL provides support to local community groups, initiatives and sponsorships through the Community Support Program. Following applications made via ACOL’s website (<https://www.ashtoncoal.com.au/page/sustainability/community/community-support-program/>),

opportunities to generate positive community impacts through either monetary grants or in-kind support are identified with a focus on four categories including: social and community, environment and education, health and training.

During the reporting period, a total of approximately \$83 900.00 was allocated either directly by ACOL or jointly with Mount Thorley Warkworth to the following community groups and causes.

- Singleton Strikers
- Maitland City Boxing
- Singleton Heights Preschool
- Rescue Helicopter Service*
- Singleton Heights Public School
- Northern NSW Helicopter Service*
- Singleton Business Chamber*
- Singleton Rotary Club*
- Singleton Theatrical Society*
- University of Newcastle
- Singleton Schools Learning Community

It is noted that due to circumstances and restrictions associated with COVID-19, funding for those groups indicated with an asterisk above has been delayed until the next reporting period due to the deferral of projects.

10. INDEPENDENT AUDIT

In accordance with the requirements of DA 309-11-2001i (MOD5), an independent environmental audit of the ACP was undertaken by Barnett & May on 5 December 2019 and finalised on 5 March 2020. The audit covered the period from 20 June 2016 to 30 September 2019. A total of six non-compliances were recorded, four with EPL 11879 and one each with ML1533 and ML1623 relating to the following.

- Failure of air quality monitoring equipment resulting in non-continuous monitoring (EPL Condition M2.2).
- Piezometers being destroyed resulting in inability to sample all locations specified by EPL Point 8 (EPL Condition M2.3).
- The telephone complaints line was identified in 2017 as being inactive (EPL Condition M6.1).
- The annual noise compliance report was not submitted to EPA (EPL Condition R5.1).
- Inspection by Resources Regulator on 29 May 2018 identified not all requirements of the MOP were fully implemented (ML1533 Condition 2.1 / ML1623 Condition 3a).

No non-compliances were recorded against DA 309-11-2001i (MOD5). The non-compliances for the mining leases were both rectified during the 2018 reporting period and non-compliances for EPL 11879 are reported separately as part of the EPL Annual Return.

A number of recommendations were provided within the audit with a response plan submitted to the DPIE on 6 March 2020 together with the final Audit Report. A review of the status of the response plan as at the end of this reporting period is provided in **Table 10.1**.

The next independent environmental audit is due in 2022.

**Table 10.1
2020 Independent Audit - Action Response Plan Status**

Ref	Audit Observation	Auditor Recommendation	ACOL Response	Proposed Action	Timeline	Status Update
EPL Cond M2.2	In 2016 PM ₁₀ data was not able to be captured for a period of 19 days at Site 2 due to equipment failure. In 2017 PM ₁₀ data was not captured on multiple occasions from Points 7, 9 and 10, due to equipment failures and supply delays in replacement of the faulty equipment. Air monitoring stations are inspected regularly.	There is no recommendation related to this non-compliance. Ashton's existing equipment monitoring program is appropriate.	In 2016, the 19 days of non-captured data represents 5% of total annual data. 2017 non-captured data represented 1.8% of total annual data. ACOL has an existing monitoring and maintenance regime for the three onsite AQ monitors (TEOM), including daily checks of TEOM function and data receipt, monthly field audit and servicing, and quarterly calibration	Introduction of automated alarm that notifies ACOL staff and contracted environmental monitoring database managers upon nonreceipt of monitoring data. Incorporate this requirement into the ACOL Air Quality and Greenhouse Gas Management Plan (AQGGMP).	Complete.	The AQGGMP was updated during the reporting period (version dated September 2020). Alerts are now received by ACOL personnel upon nonreceipt of monitoring data.
EPL Cond M2.3	In 2017 groundwater samples were not collected from all piezometers associated with Point 8. It is noted that failure to collect water from a dry piezometer does not trigger a non-compliance against this condition. However, if piezometers have been destroyed by the mining operations, then, in consultation with the EPA, those piezometers should be either replaced (relocated) or removed from the groundwater monitoring plan (refer to EPL Condition P1.3).	Consult with the EPA regarding the modification of the groundwater monitoring requirements for Point 8.	Selection of replacement EPL groundwater monitoring sites in consultation with EPA has been completed. EPA have incorporated new groundwater monitoring sites into latest version of EPL11879 (21 November 2019) as Sites 20 to 31.	New EPL groundwater monitoring sites to be documented in groundwater monitoring program, as part of Water Management Plan (WMP) review.	Complete	The WMP was updated during the reporting period (version dated September 2020). Additional EPL bores YAP016 (EPL site 20) and WMLP320 (EPL site 21) have been incorporated into the WMP.

Table 10.1 (Cont'd)
2019 Independent Audit - Action Response Plan Status

Ref	Audit Observation	Auditor Recommendation	ACOL Response	Proposed Action	Timeline	Status Update
EPL Cond M6.1	Ashton's website provides both email and telephone enquiries and complaints lines. In 2017 the telephone complaints line was found to be inactive by DPE on 1 February 2017.	Schedule checks of the complaints line (monthly) to ensure that it is operational.	Following the February 2017 incident, complaints handling protocols were revised to ensure notification of ACOL staff following community complaints, and the requirement for a monthly test of the Community Enquiries Line was introduced.	Requirement for monthly test of the Community Enquiries Line to be documented in the Complaints Handling Procedure (Doc No: 4.3.1.1.2).	6/06/2020	The update of the Complaints Handling Procedure has been completed and monthly tests are undertaken.
EPL Cond R5.1	No evidence was sighted by the Auditor to confirm that annual noise compliance assessment reports were prepared and issued to the EPA.	Prepare annual Noise Compliance Assessment Reports and issue those reports to the EPA	Annual Noise Compliance Assessment Reports (NCAR) were submitted to NSW EPA subsequent to IEA, with no further action required by EPA. 2019 NCAR submitted to NSW EPA with 2019 EPL Annual Return.	Requirement to check for, and include, supporting reports as part of EPL Annual Return to be documented in the Environmental Management Strategy	Completed	Environmental Management Strategy updated during the reporting period (version dated September 2020).
ML1533 Cond 2.1/ ML1623 Cond 3(a)	An inspection by DRE inspectors on 29 May 2018 identified several instances where the requirements of the MOP were not being fully implemented. The DRE recommendations were fully implemented.	Ensure that all commitments in the MOP (and other management plans) are fully implemented. Ensure that all Annual Reviews are submitted with the required time frames.	Non-compliance resulted from (a) lack of clarity regarding topsoil management for minor disturbance projects, and (b) inconsistency between MOP and Fauna and Flora Management Plan commitments regarding handling of cleared vegetation. Both issues were rectified during the drafting of the latest MOP (September 2018)	No additional action proposed	Not Applicable	No further actions required.

11. INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD

During the reporting period there were no:

- non-compliances with the development consent, mining leases or water access licences.
- notifiable / reportable incidents or exceedances; or
- official cautions, warning letters, penalty notices or prosecution proceedings.

Non-compliances with EPL 11879 relating to monitoring frequencies have been reported separately through the 2020 EPL Annual Return.

12. ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

Activities planned to be completed during the next reporting period are outlined in Section 4.4 and planned improvements in environmental management practices in Sections 6 and 7. In summary, the key actions for the next reporting period are summarised in **Table 12.1**.

Table 12.1
Actions to be Completed Next Reporting Period

Action	Indicative Completion Date
1. Submit a MOP amendment to integrate revised rehabilitation criteria, TARP trigger / response details and biodiversity enhancement measures.	31.12.21
2. Investigate controlled grazing within the Bowmans Creek Riparian area to manage weeds and fuel loads and implemented as appropriate.	31.12.21
3. Continue planning towards (and subject to improved meteorological conditions, implementation of) program to convert areas of NEOC pasture rehabilitation to mixed eucalypt woodland.	31.12.21 (subject to met conditions)
4. Undertake investigation within the Bowmans Creek Riparian corridor to identify crucial erosion areas and where rehabilitation and restoration works are required.	31.12.21
5. Plan for and, subject to improved meteorological conditions) undertaken habitat enhancement plantings, particularly within the narrow casuarina woodland areas.	31.12.21 (subject to met conditions)

This page has intentionally been left blank