BHP

Mt Arthur Coal

Annual Review FY20

25 September 2020

Table of Contents

List of Figures

List of Tables

Table 1: Annual Review title block

Document Details	
Name of Operation	Mt Arthur Coal
Name of Operator	Hunter Valley Energy Coal Pty Ltd
Project Approvals	PA 09_0062 (MOD 1) PA 06_0091
Name of holder of project approvals	Hunter Valley Energy Coal Pty Ltd
Mining Leases	CCL 744, CL 396, ML 1358, ML 1487, ML 1548, ML1593, ML1655, ML 1739, ML 1757, MPL 263
Name of holder of mining leases	Hunter Valley Energy Coal Pty Ltd; Mt Arthur Coal Pty Limited
Water Licences	WAL 917, WAL 918, WAL 1296, WAL 18141, WAL 18247, WAL 41495, WAL 41556
Name of holder of water licences	Hunter Valley Energy Coal Pty Ltd
Mining Operations Plan Commencement Date	1 July 2019 (amendment as approved 20 December 2019)
Mining Operations Plan Completion Date	30 June 2022
Annual Review Commencement Date	1 July 2019
Annual Review Completion Date	30 June 2020
I, James Nixon, certify that this audit report is a true and accurate record of the compliance status of Mt Arthur Coal for the period 1 July 2019 to 30 June 2020 and that I am authorised to make this statement on behalf of Hunter Valley Energy Coal Pty Ltd. Note. a) 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. b) The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or $22,000, or both).	
Name of authorised reporting officer	James Nixon
Title of authorised reporting officer	Principal HSE – Mt Arthur Coal
Signature of authorised reporting officer	
Date	21/09/2020

1. Statement of Compliance

A statement of Mt Arthur Coal's compliance with its project approvals and mining leases is presented in Table 2 with four identified non-compliances during the reporting period being discussed in Table 3.

Table 2: Statement of compliance

Were all conditions of the relevant approval(s) complied with?	
PA 09_0062	NO
EPL 11457	YES
EPBC 2011/5866	YES
EPBC 2014/7377	YES
ML	YES

Table 3: Non-compliance summary

Relevant approval	Condition	Description Summary	Compliance Status	Comment	Report Reference
PA 09_0062	10 (Schedule 3)	Blast monitoring	Non-compliant (Low)	Blast overpressure exceedance of the 120dBL criteria was recorded on 8 August 2019.	Section 11
PA 09_0062	24 (Schedule 3)	Implementation of Air Quality Management Plan	Non-compliant (Low)	Failure to comply with Schedule 3, Condition 24 of MP09_0062 by failing to implement the approved Air Quality Management plan to the satisfaction of the Secretary on 10, 11 and 16 December 2019.	Section 11
PA 09_0062	40 (Schedule 3)	Disturbance outside of ancillary disturbance boundary	Non-compliant (Low)	Failure to comply with Schedule 3, Condition 40 of Project Approval MP 09_0062 by failing to implement the approved Biodiversity Management Plan (BMP) to the satisfaction of the Secretary.	Section 11
PA 09_0062	29 (Schedule 3)	Groundwater monitoring	Non-compliant (Low)	Groundwater monitoring not undertaken in accordance with the approved Plan	Section 11

Note: Compliance Status key for Table 3

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

Acronyms

Acronyms	
AHMP	Aboriginal Heritage Management Plan
ARA	Annual rapid assessment
BioMP	Biodiversity Management Plan
BMP	Blast Management Plan
CASA	Civil Aviation Safety Authority
CCC	Community Consultative Committee
CCL	Consolidated coal lease
CHPP	Coal handling and preparation plant
CL	Coal lease
CRD	Cumulative rainfall departure
DAWE	Commonwealth Department of Agriculture, Water and the Environment
DoEE	Former Federal Department of the Environment and Energy is now part of DAWE
DP&E	Former NSW Department of Planning and Environment now DPIE
DPIE	NSW Department of Planning, Industry and Environment. The change occurred on 1 July 2019
DRE	Former Division of Resources and Energy
DRG	Former Division of Resources and Geoscience
EA	Environmental assessment
EIS	Environmental impact statement
EL	Exploration licence
EMS	Environmental management system
EPA	NSW Environment Protection Authority
EPBC	*Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environment Protection Licence
FY	Financial year
GPA	Ground pasture assessment
HRSTS	Hunter River Salinity Trading Scheme

Acronyms	
HSE	Health, Safety and Environment
HVAS	High volume air sampler
HVEC	Hunter Valley Energy Coal (Mt Arthur Coal)
IROC	Integrated Remote Operations Centre
MAC	Mt Arthur Coal
ML	Mining lease
MOP	Mining Operations Plan
MSC	Muswellbrook Shire Council
NGER	*National Greenhouse and Energy Reporting Act 2007*
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
PA	Project Approval
RACI	Responsible, accountable, consult and inform
RAW	Rapid assessment walkover
RBGS	Royal Botanic Gardens Sydney
ROM	Run of mine
UAV	Unmanned aerial vehicle
VPA	Voluntary Planning Agreement
VWP	Vibrating wire piezometers

2. Introduction

The Mt Arthur Coal Complex, located approximately five kilometres south west of Muswellbrook in the Upper Hunter Valley in New South Wales (NSW) includes the Mt Arthur Coal Open Cut, the Mt Arthur Coal Underground Project (no underground operations are currently taking place), Coal Handling and Preparation Plant (CHPP), rail loop and rail load out. The Mt Arthur Coal Complex (including biodiversity offset areas) and surrounding region is shown in Figure 1 and Figure 2.

This Annual Review details the environmental and community performance for the period from 1 July 2019 to 30 June 2020 for operations at the Mt Arthur Coal Complex.

This document has been prepared in accordance with the Annual Review guidelines issued by the former NSW Department of Planning and Environment (DPIE) in October 2015 and fulfils statutory reporting requirements required in mining leases and Schedule 5 Condition 3 of the Mt Arthur Coal Mine Open Cut Consolidation Project Approval Modification 1 (09_0062 MOD 1).

This report was prepared in consultation with the NSW Resources Regulator, the Department of Planning, Industry and Environment (DPIE), Muswellbrook Shire Council (MSC), NSW Environment Protection Authority (EPA) and Department of Industry – Lands & Water. The report is distributed to a range of external stakeholders and is available on the BHP website at https://www.bhp.com/sustainability/environment/regulatory-information/.

Contact details for personnel associated with environmental management at Mt Arthur Coal can be found in Table 4.

Table 4: Mt Arthur Coal management contact details

Name and role	Phone contact details
Adam Lancey, General Manager, BHP Mt Arthur Coal	(02) 6544 5800
James Nixon, Superintendent Health, Safety and Environment Business Partner, Mt Arthur Coal	(02) 6544 5800

INSERT IN PDF

Figure 1: Mt Arthur Coal mining leases, approved disturbance boundary and offset areas

INSERT IN PDF

Figure 2: Mt Arthur Coal locality plan

3. Approvals

Mt Arthur Coal has a number of statutory approvals, leases and licences that regulate activities on site. During the reporting period, the following approval modifications occurred:

- An amended Mining Operations Plan (MOP) was approved by the Resources Regulator on 20 December 2019 for FY20-FY22 mining operations.

Table 5 shows Mt Arthur Coal's existing statutory approvals as at 30 June 2020.

Table 5: Mt Arthur Coal's existing statutory approvals as at 30 June 2020

Description	Issue date	Expiry date
Project approvals issued by the DPIE		
Mt Arthur Coal Mine Open Cut Consolidation Project Modification 1 (09_0062 MOD 1)	26/09/2014	30/06/2026
Mt Arthur Coal Mine Underground Project (06_0091)	02/12/2008	31/12/2030
Mining leases and exploration licences issued by the DRG		
CCL 744	03/07/1989	21/01/2028
CL 396	23/06/1992	03/02/2024
ML 1358	21/09/1994	21/09/2036
ML 1487	13/06/2001	12/06/2022
ML 1548	31/05/2004	30/05/2025
ML 1593	30/04/2007	29/04/2028
ML 1655	03/03/2011	03/03/2032
ML 1739	25/07/2016	25/07/2037
ML1757	07/07/2017	07/07/2038
MPL 263	17/10/1990	17/10/2032
A 171	18/10/2004	18/10/2020
A 437	04/03/1991	^
EL 5965	14/07/2007	*
Drayton sublease CL 395	13/04/2006 (registered 14/06/2013)	21/01/2029
Drayton sublease CL 229	13/04/2006 (registered 14/06/2013)	02/02/2024
EPL issued by the EPA		

Description	Issue date	Expiry date
EPL 11457	09/10/2001 (varied on 17/10/2018)	Not specified
EPBC approval issued by the DAWE		
EPBC 2011/5866	30/04/2012 (varied on 29/06/2017)	30/06/2022
EPBC 2014/7377	05/12/2016	30/06/2026

^ Application for renewal lodged with the DRG and renewal is currently pending.

* The renewal application was lodged in June 2017 and was deemed adequate. On the 16 December 2019, HVEC received a Notice of Proposed Decision to renew EL 5965 in full, draft conditions and a request for increased Security. HVEC accepted all draft conditions and the Security has now been increased. On 15 May 2020, NSW DPIE confirmed via email that there is nothing outstanding and that EL 5965 is in the final stages of being processed.

4. Operations Summary

4.1 Mining Operations

Mining and processing operations at Mt Arthur Coal continued 24 hours a day, seven days a week during the reporting period. Mining continued within the Ayredale, Calool, Huon, Roxburgh, Saddlers and Windmill open cut pits. Thiess, a subsidiary of the CIMIC Group, operates under a total services contract to mine the Ayredale and Roxburgh pits, located in the southern areas of the Mt Arthur Coal mine. Overburden and interburden material was removed by excavator / shovel and transported via rear dump truck to overburden emplacements, including visual dumps 4 to 5 (VD4 to VD5), contingency dumps 1 to 5 (CD1 to CD5), conveyor corridor dump (CC1) and Saddlers dump. Raw coal was extracted by excavator and transported to the CHPP by rear dump truck.

Raw coal was processed at the CHPP, with approximately 15.3 million tonnes of product coal being railed to the port of Newcastle for export and approximately 0.6 million tonnes of product coal being transported to the Bayswater power station via overland conveyor, as shown in Appendix 4. The domestic coal conveyor used for transport of coal to the Bayswater Power Station was dismantled at end of FY20. Coarse coal waste (rejects) was co-disposed within overburden emplacements and fine coal waste (tailings) was pumped to the tailings storage emplacement in East Pit. Production figures for raw, product and waste materials produced during the reporting period are summarised in Table 6.

Table 6: Production summary

Material	Unit	Approved limit	Previous reporting period (actual)	This reporting period (actual)	Next reporting period (estimate)
Overburden	bank cubic meters	N/A	128,723,000	107,966,000	121,489,000
Run-of-mine coal	tonnes	32,000,000	24,969,000	21,293,000	22,903,000
Coarse and fine reject	tonnes	N/A	4,599,000	3,971,000	4,880,000
Tailings	tonnes (dry)	N/A	2,232,000	1,489,000	2,249,000
Product (saleable) coal	tonnes	27,000,000 (by rail)	18,257,000	16,052,000	16,585,000

4.2 Other Operations

Other operations at Mt Arthur Coal during the reporting period included:

- *Exploration*: 58 boreholes (totalling 18,513 metres) were drilled in ML1358, ML1487 and ML 1548 to further define coal seam geology and geotechnical parameters of the resource. Rehabilitation and sealing of 64 boreholes was completed.
- *Land Preparation:* During the reporting period approximately 154,200 cubic metres of topsoil was recovered from 281 hectares of clearing ahead of mining and for additional dump space using excavators, dozers and trucks. Material was either stockpiled, or placed directly onto reshaped areas to be rehabilitated where able to, with the remaining topsoil being stockpiled. Between 100 to 300 millimetres of topsoil was recovered during stripping.
- *Infrastructure Construction and Management*: The following major projects were commenced, progressed or completed during the reporting period:
    - The first phase of the Tailings Dam Stage 2 raise project involving the downstream raising of an existing embankment by 10 meters to provide ongoing tailings storage capacity;

- Relocation of infrastructure to facilitate the approved extension of Windmill Pit, including detailed planning and design work for the realignment of Edderton Road in accordance with alignment Option 2 presented in PA 09_0062 originally granted in 2010;
- Relocation of powerlines to facilitate the forward mine plan;
- Installation of sediment control structures downstream of the southern conveyor corridor overburden emplacement area prior to dump construction;
- Construction of a temporary deployment facility including carparks, bathhouse and ablutions and office buildings on the north western side of the main pit; and

During the reporting period there were no variations from the current MOP related to construction works on site.

4.3 Employment Details

As at 30 June 2020, Mt Arthur Coal employed 992 permanent and fixed-term contract employees and approximately 1155 contractors on a full-time equivalent basis. Approximately 73 per cent of Mt Arthur Coal's employees resided in the local government areas of Muswellbrook, Upper Hunter and Singleton as at 30 June 2020.

4.4 Next Reporting Period

Forecast operations for the next reporting period, in particular significant changes in the mine, include:

- Complete relocation of infrastructure to facilitate the approved extension of Windmill Pit, including the opening of the realigned Edderton Road in accordance with alignment Option 2 presented in PA 09_0062 originally granted in 2010;
- Complete relocation of infrastructure to facilitate pit progression – EME Pad and Orica facilities;
- Complete construction of new explosives and magazine facility north of Belmont pit – involves a new semi-modular explosive facility and relocate magazine;
- Complete removal of circa 3.8km of old conveyor up to AGL Boundary including removal of redundant coal bin and associated structures;
- Monocline will have significant impact on dump height for a few hundred metres, due to steeply dipping floor;
- Establish an out of pit dump (OP1N) to cater for insufficient dump capacity on low wall over five year plan, particularly with impact of monocline;
- Relocation of powerlines to facilitate the forward mine plan;
- 13 new boreholes – involves installation of monitoring bores and with vibrating wire piezometers (VWP) and 14 monitoring boreholes at 13 new locations;
- 8 water monitoring boreholes (at 4 locations) for North Cut Tailings Storage Facility and 6 water monitoring boreholes at Tailings Storage Facility near Saddlers Creek;
- Installation of sediment control structures downstream of the southern conveyor corridor and OP1N overburden emplacement areas prior to dump construction;
- Installation of additional water pipelines and associated pumps to support ongoing water management strategies;
- Drayton Void pumping and pipeline upgrade works – involves approximately 16 kilometres of pipeline, two 150 L/s electric pontoon pumps and associated electrical works;
- Commencement of the second phase of the Tailings Dam Stage 2 raise project involving the downstream raising of an existing embankment by 10 meters to provide ongoing tailings storage capacity;
- Closure works for the Main Dam and Northcut TSF, comprising:
    - Closure of the Northcut TSF through, dewatering, surface capping and construction of a buttress along the western perimeter of the facility to final landform requirements.

    - Planning and works to move toward de-prescription and risk reduction of the Main Dam through installation of a Culvert
    - Removal of Dam 4.
- Fencing upgrades to conservation areas;
- Denman Rd and Thomas Mitchell Drive intersection upgrade works; and
- Noise and dust monitoring equipment upgrades.

5. Actions Required from Previous Annual Review

The DPIE notified HVEC by letter dated 18 November 2019 that the amended FY19 Annual Review was considered by the Department to satisfy the requirements of the Project Approval and the Department's Annual Review Guideline, October 2015.

The NSW Resources Regulator acknowledged receipt of the FY19 Annual Review on 12 November 2019.

Regulator feedback following review of the FY19 Annual Review is summarised in Table 7. Regulator feedback on additional requirements to be considered during the preparation of the FY20 Annual Review is also summarised in Table 7.

Table 7: Actions required from FY19 Annual Review and additional requirements for FY20 Annual Review

Action required	Requested by	Action taken by HVEC	FY20 Annual Review section
Regulator Feedback from FY19 Annual Review			
No specific feedback from FY19 has been provided for consideration in the development of the FY20 Annual Review.	NSW Resources Regulator, DPIE	N/A	N/A
Regulator Feedback on additional requirements for FY20 Annual Review			
Provide a summary of the results analysis and further investigation associated with notified groundwater trigger level exceedances.	DPIE	Exceedance investigation has been undertaken by a groundwater specialist.	Appendix 2 – Ground Water Monitoring Results and Groundwater Level Drawdown Analysis

6. Environmental Performance

6.1 Noise

Environmental Management

Noise management at Mt Arthur Coal is managed in accordance with:

- MAC-ENC-MTP-032 Noise Management Plan; and
- MAC-ENC-PRO-056 Noise Monitoring Program.

The Noise Management Plan was prepared to fulfil the requirements of project approval, meet conditions of Environmental Protection Licence (EPL) 11457, as well as manage and minimise mine noise impact on the community and environment.

Mt Arthur Coal has eight statutory monitoring locations as detailed in the Noise Monitoring Program and four real-time monitoring locations utilised for internal use. Noise monitoring locations are shown in Figure 3.

A revised Noise Management Plan was submitted to the DPIE in June 2019 and approved on 17 July 2020.

Environmental Performance

An analysis of monthly attended noise monitoring results indicates Mt Arthur Coal's operations did not exceed the $L_{Aeq(15min)}$ or the $L_{A1(1min)}$ limits during the reporting period. A summary of results from Mt Arthur Coal's attended noise monitoring in the reporting period is provided in Table 8. Where a remeasure was required on the same night to determine the sustained noise level, only the remeasure result has been used to calculate tabulated results.

A comparison of FY20 noise monitoring results to previous reporting years is presented in Table 9. FY20 $L_{Aeq(15min)}$ noise levels are generally higher than historical results, with the exception of the maximum $L_{Aeq(15min)}$ at NP04, NP12 and NP13 being generally lower than previous years. Data capture was 100 per cent at all attended noise monitoring sites. On nine occasions noise levels from Mt Arthur Coal were audible but too low to measure at particular sites.

$L_{Aeq(15min)}$ noise level predictions modelled for 2022 in the 2013 noise impact assessment were used for comparison with monitoring results for this reporting period, as shown in Table 8. Maximum $L_{Aeq(15min)}$ noise results are below modelled predictions with the exception of NP10 and NP16.

The additional impact of low frequency noise was assessed in accordance with the EPA's 2017 Noise Policy for Industry. None of the noise measurements recorded during the reporting period satisfied the conditions outlined in the Noise Policy for Industry to require assessment of low-frequency noise.

Complaints and Reportable Incidents

During the reporting period, 19 noise complaints were received from three complainants. This is higher than FY19 (16 noise complaints).

Mt Arthur Coal did not receive any government fines or penalties related to noise during the reporting period and there were no related reportable incidents.

Proposed Improvements

Operational noise will continue to be managed and monitored in accordance with the Noise Management Plan and associated procedures.

Table 8: Monthly attended night time noise monitoring results in decibels

Noise Monitoring Location	$L_{Aeq(15min)}$ dB			$L_{A1(1min)}$ dB		Trend / key management implications	Implemented / proposed management actions
	Approval criteria	2022 prediction	Reporting period performance (min/log ave/max^)	Approval criteria	Reporting period performance (min/log ave/max^)		
NP04	38	38	24*/30/35*	45	25/34/40*	No valid exceedances	Continuation of management and monitoring in accordance with Noise Management Plan
NP07	39	38	25*/31/34*	45	28*/35/37		
NP10	39	36	25/33/37*	45	25/34/39*		
NP12	39	39	28*/32/34*	45	29*/33/35*		
NP13	35	N/A	20/24/27	45	20/28/34		
NP14	35	35	20/30/34*	45	28/38/43		
NP15	35	36	25*/30/32*	45	25*/39/43		
NP16	37	36	25/31/37*	45	25/35/41*		

^ Measurable noise levels only – does not include *inaudible* or *not measurable* results
* Noise emission limits do not apply due to winds greater than three metres per second (at a height of 10 metres), or temperature inversion conditions greater than or equal to four degrees Celsius per 100 metres.

Table 9: Attended noise monitoring results in decibels in comparison to previous years

Monitoring Site	FY20		FY19		FY18	
	Min	Max	Min	Max	Min	Max
$L_{Aeq(15\ min)}$ dB						
NP04	IA	35*	IA	37*	IA	35*
NP07	IA	34*	IA	33	IA	34
NP10	IA	37*	IA	<30*	IA	39*
NP12	IA	34*	IA	35*	IA	36
NP13	IA	27	IA	<30*	IA	30*
NP14	IA	34*	IA	32*	IA	34*
NP15	IA	32*	IA	31*	IA	34*
NP16	IA	37*	IA	32*	IA	32
$L_{Aeq(1\ min)}$ dB						
NP04	IA	40*	IA	47*	IA	50*
NP07	IA	37	IA	37*	IA	45
NP10	IA	39*	IA	35*	IA	43*

Monitoring Site	FY20		FY19		FY18	
	Min	Max	Min	Max	Min	Max
NP12	IA	35*	IA	42*	IA	40
NP13	IA	34	IA	31	IA	32*
NP14	IA	43	IA	34*	IA	41*
NP15	IA	43	IA	34*	IA	44*
NP16	IA	41*	IA	35	IA	42

* Noise emission limits do not apply due to winds greater than three metres per second (at a height of 10 metres), or temperature inversion conditions greater than or equal to four degrees Celsius per 100 metres.
IA – Mt Arthur Coal's operations were inaudible.
NM – Mt Arthur Coal's operations were audible but not measurable.

Insert in PDF

Figure 3: Air quality, blasting, noise and meteorological monitoring locations

6.2 Blasting

Environmental Management

Blasting at Mt Arthur Coal is managed in accordance with MAC-ENC-MTP-015 Blast Management Plan.

The Blast Management Plan details the relevant blast overpressure and vibration impact assessment criteria and compliance procedures and controls related to open cut blasting activities. It includes the blast monitoring program, as well as public infrastructure monitoring requirements, and road closures. It also includes the blast fume management strategy, which aims to minimise visible blast fume and reduce potential for offsite fume migration.

Mt Arthur Coal has five statutory blast monitors:

- BP04 (South Muswellbrook);
- BP07 (Sheppard Avenue);
- BP09 (Denman Road West);
- BP10 (Yammanie North); and
- BP11 (Balmoral Road).

Blast monitoring locations are shown in Figure 3.

The modification project approval states a ground vibration limit for public infrastructure of 50 millimetres per second (mm/s), unless Mt Arthur Coal has a written agreement with the relevant owner of the public infrastructure to exceed these criteria and advised the former DPIE in writing of the terms of the agreement. Written agreements with Roads and Maritime Services (RMS), Telstra and Ausgrid are in place allowing increases in the ground vibration blast impact assessment criteria as follows:

- 150 mm/s with no allowable exceedances (RMS, Ausgrid);
- 10 per cent of the total number of blasts over a period of 12 months are allowed to exceed 100 mm/s (Telstra, Ausgrid); and
- Notification prior to blasting for blasts predicted to exceed 100 mm/s at Denman Road (RMS).

Environmental Performance

During the reporting period 183 blasts were undertaken. Blast data capture rates for the reporting period were 100 per cent at all statutory sites.

Blasting was undertaken between 8 am and 5 pm Monday to Saturday, with no blasts being undertaken on Sundays or public holidays. No blast ground vibration monitoring results above the maximum 10 mm/s limit were recorded at any of the statutory blast monitors during the reporting period. One blast recorded an airblast overpressure result above the maximum 120 dBL limit on 8 August 2019 at 2:17 pm, recording 124.4 dBL at the Sheppard Avenue monitor (BP07). Investigations determined that the overpressure level was not a valid result as it was the result of wind impact on the microphone, not overpressure from the blast event.

Of the 183 blast events fired during the reporting period, four (2.19 per cent) exceeded the airblast overpressure criteria of 115 dBL and one (0.55 per cent) exceeded the ground vibration criteria of 5 mm/s, hence remaining below the five per cent allowable exceedance limits.

Results reflect predictions made in the modification environmental assessment and do not show a significant difference in average or maximum results compared to previous reporting periods. A comparison of FY20 blast monitoring results with previous years is provided in Table 10.

In accordance with the Blast Management Plan, potential impacts to public infrastructure were calculated for blasts in Windmill and Roxburgh pits with all blasts meeting the agreed criteria.

Table 10: Summary of statutory blast monitoring results

Parameter	Statistic	FY20	FY19	FY18
Ground vibration (mm/s)	Average	0.21	0.27	0.25
	Maximum valid result	5.96 (at BP09)	5.51 (at BP09)	9.78 (at BP09)
	Valid blasts above 5 mm/s threshold	1	2	2
Airblast overpressure (dBL)	Average	95.3	95.1	97.2
	Maximum valid result	117.7(at BP10)	120.6 (at BP09)	118.4 (at BP09)
	Valid blasts above 115 dBL threshold	4	5	6

Complaints and Reportable Incidents

During the reporting period, 7 blast complaints were recorded. These complaints are discussed further in Section 9. Reportable blast incidents are discussed in Section 11.

Proposed Improvements

Continued updates on the Site Law database and improvements to the predictive model, which is periodically audited externally, will be undertaken in FY21, allowing for increased accuracy in determining the vibration and overpressure at the design stage.

A review of the Blast Matrices, Pre Blast Approval procedure and Approval to Blast Form will be undertaken in FY21. This will improve the blast impact risk identification process undertaken prior to each blast and reduce the risk of impacts to community and environment as a result of the blasting.

6.3 Meteorological Data

Environmental Management

Meteorological monitoring at Mt Arthur Coal is managed in accordance with MAC-ENC-MTP-040 Air Quality Management Plan.

Mt Arthur Coal's primary statutory real-time meteorological station located at the mine's industrial area (WS09) is an essential component of the operation's environmental monitoring system. Wind speed, wind direction, temperature, rainfall, solar radiation and humidity data is collected at 15 minute intervals and relayed using radio telemetry.

A secondary statutory real-time meteorological station, located off site to the north west of the mine at Wellbrook (WS10), also provides representative weather data for the mine site, including prevailing wind conditions, and is used in conjunction with WS09 to determine the presence and strength of temperature inversions in the local atmosphere as part of the pre-blast environmental assessment. These meteorological stations are shown on Figure 3.

Both statutory meteorological stations comply with the Australian Standard 2923-1987 *Ambient Air – Guide for measurement of horizontal wind for air quality applications* and the EPA's 2017 Noise Policy for Industry.

Environmental Performance

Meteorological data capture rate for the reporting period was 100 per cent at WS09 and 95 percent at WS10.

Total rainfall for the reporting period was 469 mm, which is approximately 24 per cent lower than the long-term average of 619 mm. Wind direction at Mt Arthur Coal (WS09) during the reporting period was predominantly from the north-west (Winter/Spring) and south-east (Summer/Autumn).

Proposed Improvements

Mt Arthur Coal will continue to record and utilise meteorological data from its two statutory monitors during the next reporting period.

6.4 Air Quality

Environmental Management

Air quality at Mt Arthur Coal is managed in accordance with MAC-ENC-MTP-040 Air Quality Management Plan.

Mt Arthur Coal operates an air quality monitoring network consisting of:

- Two statutory dust deposition gauges recording dust deposition, which are derived from mining and non-mining activities. These provide a measure of changing air quality;
- Six statutory real-time dust monitors, referred to as tapered element oscillating microbalance samplers (TEOMs), which record PM_{10} levels on a continuous basis;
- Five additional TEOMs, which also record continuous PM_{10} levels are included in the monitoring network. These are non-statutory and are used for proactive internal management purposes; and
- A Dust Control System, which is monitored 24 hours a day, seven days a week by the Integrated Remote Operations Centre (IROC) in Brisbane who contact site Operations to activate the Dust Trigger Action Response Plan (TARP) when dust trigger levels are exceeded. Operational responses are recorded in the Dust Control System.

Air Quality monitoring locations are shown in Figure 3.

Mt Arthur Coal utilises a predictive dust model that predicts meteorological conditions and PM_{10} concentrations up to 72 hours in advance. This tool is used for operational dust management planning and notification of mining supervisors when adverse weather conditions are predicted.

Environmental Performance

Air dispersion modelling completed for the 2022 representative mining scenario, as part of the 2013 environmental assessment, has been used to evaluate monitoring results for the reporting period.

Depositional Dust Gauges

The results from the statutory depositional dust monitoring results are summarised in Table 11. Depositional dust gauge data capture rates for the reporting period were 100 per cent at all statutory sites.

For the reporting period, no statutory depositional dust gauges exceeded the annual average assessment criteria, as shown in Table 11.

Monitoring results for the reporting period were generally higher than predictions modelled for 2022 in the 2013 air quality assessment, indicating that the dry conditions experienced throughout the reporting period and other local dust producing sources have had an influence on monitoring results.

Table 11: Comparison of annual average deposited dust results

Monitor Location	Approval criteria (annual average)	Annual average depositional dust (g/m^2/month)			Trend / key management implications	Implemented / proposed management actions
		FY20	FY19	FY18		
Edderton Homestead (DD08)	4 g/m^2/ month	2.0	2.0	1.4	No exceedances	Continue dust management in accordance with AQMP
Roxburgh Road (DD14)		3.0	2.6	2.3		

Tapered Element Oscillating Microbalance Samplers

A summary of the non-validated results from the statutory real-time TEOM PM10 monitoring sites for the reporting period is provided in Table 12.

The Edderton Homestead monitor (DC06) had a data capture rate of 85.9 per cent due to an equipment issue and access to rectify the issue being delayed as a result of safety considerations. All other monitors were above the 90% target.

During the reporting period, the short term 24-hour cumulative impact assessment criteria was exceeded 312 times at statutory TEOM monitoring sites over a total of 90 days. All exceedances of the cumulative criteria were reported to the DPIE, as recorded in Table 14.

Table 13 shows the days that were declared extraordinary events by the Secretary. An extraordinary event may be determined due to sources such as extended bushfires, prolonged drought conditions and dust storms. Extraordinary event days contributed to a significant number of alerts and exceedances throughout the FY20 period for Mt Arthur Coal. PM_{10} data recorded on extraordinary event days are not used in the calculation of the long-term annual average.

On the 10th and 16th of December 2019 at DC09 the 24-hour impact assessment criteria of 50 $\mu g/m^3$ was exceeded due to extraordinary weather events as agreed by the Secretary, therefore these results are excluded from application of the criterion. For the remaining recorded exceedances (excluding extraordinary events declared by Secretary) it was determined that the incremental increase in concentrations due to the Mt Arthur Coal project was less than 50 $\mu g/m^3$.

After the removal of the extraordinary event days, Mt Arthur Coal's statutory TEOM monitoring sites remained below the long-term annual impact assessment criteria.

Air dispersion modelling predictions for the 2022 mining scenario have been used to evaluate annual average TEOM PM_{10} results for the reporting period, as summarised in Table 12.

Table 12: Summary of TEOM PM_{10} monitoring results using validated data

Monitor location	Approval criteria (µg/m³)	2022 – predicted cumulative (µg/m³) +	TEOM PM_{10} monitoring results (µg/m³)						Trend / key management implications	Implemented / proposed management actions
			FY20		FY19		FY18			
			Max 24-hour avg	^Annual Ave µg/m³	Max 24-hour avg	Annual Ave µg/m³	Max 24-hour avg	Annual Ave µg/m³		
Sheppard Avenue (DC02)	Short term 24-hour average: 50 Long term annual average: 30	18	217#	27	223#	30	92*	29	No valid exceedances of the incremental impact assessment criteria due to the Mt Arthur Coal project. All TEOMs experienced a drop in the average, or remained consistent with previous years.	Continue dust management in accordance with AQMP
South Muswellbrook (DC04)		19	194#	20	163*	25	65*	22		
Roxburgh Road (DC05)		19	213#	13	124*	21	68*	19		
Edderton Homestead (DC06)		N/A	215#	14	107*	19	46	14		
Antiene (DC07)		18	209#	20	146#	20	67*	18		
Wellbrook (DC09)		17	194#	23	168*	25	78*	21		

* This result, which includes air emissions from all sources, was investigated as it exceeded the short term 24-hour impact assessment criterion of 50 µg/m3. Investigations found the incremental increase in concentrations due to the Mt Arthur Coal project was less than the criterion.

The 24-hour impact assessment criteria of 50 µg/m3 was exceeded due to an extraordinary weather event as agreed by the Secretary, therefore this result is excluded from application of the criterion.

^adjusted long term average. The adjusted value is after the removal of all extraordinary event days where criterion does not apply.

+ these predictions were modelled in 2013, Emissions from Bengalla Mine are not included in these cumulative predictions as detailed emissions information for the Bengalla Continuation Project were not publicly available for inclusion in the modelling for 2022. This has led to the predicted cumulative levels being potentially artificially low.

Table 13: Days that were declared extraordinary events by the Secretary

Months	Dates
July 19	No days
August 19	No days
September 19	No days
October 19	7th, 8th, 18th, 19th, 24th, 25th, 26th, 27th, 28th, 30th, 31st.
November 19	1st, 2nd, 7th, 8th, 12th, 16th, 17th, 19th, 20th, 21st, 22nd, 23rd, 26th, 27th, 28th, 29th, 30th.
December 19	1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th, 16th, 17th, 18th, 19th, 20th, 21st, 22nd, 23rd, 27th, 28th, 29th, 30th, 31st.
January 20	1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th, 16th, 20th, 21st, 22nd, 23rd, 24th, 25th.
February 20	2nd, 4th, 19th, 20th.
March 20	No days
April 20	No days
May 20	No days
June 20	No days

Table 14: 24-hour PM_{10} exceedances and calculated Mt Arthur Coal incremental impact for statutory TEOMs

Date of event	Monitor location	24-hour PM_{10} result ($\mu g/m^3$)	Mt Arthur Coal contribution ($\mu g/m^3$) (incremental impact) *	Declared extraordinary event by Secretary *
08/08/2019	DC02	81.2	0.0	No
	DC09	61.5	0.0	
09/08/2019	DC02	62.3	0.0	No
	DC09	61.0	0.0	
19/08/2019	DC02	62.2	0.1	No
25/08/2019	DC02	63.4	2.7	No
06/09/2019	DC02	102.2	0.0	No
	DC04	79.3	0.0	
	DC05	71.1	0.0	
	DC07	123.8	47.4	
	DC09	89.6	0.1	
10/09/2019	DC02	97.1	8.3	No
13/09/2019	DC02	58.4	0.8	No
	DC09	50.5	1.7	
16/09/2019	DC02	68.7	0.0	No
27/09/2019	DC02	57.0	0.0	No
03/10/2019	DC02	70.2	0.7	No
04/10/2019	DC02	67.6	0.0	No
07/10/2019	DC02	81.0	N/A	Yes
	DC04	61.9	N/A	
	DC07	66.0	N/A	
	DC09	58.8	N/A	
08/10/2019	DC02	51.4	N/A	Yes
	DC07	55.4	N/A	
17/10/2019	DC02	61.2	0.0	No
	DC04	52.8	0.0	

Date of event	Monitor location	24-hour PM_{10} result (µg/m^3)	Mt Arthur Coal contribution (µg/m^3) (incremental impact) *	Declared extraordinary event by Secretary *
	DC07	56.2	6.6	
18/10/2019	DC02	59.7	N/A	Yes
19/10/2019	DC02	60.1	N/A	Yes
24/10/2019	DC02	62.4	N/A	Yes
25/10/2019	DC02	58.0	N/A	Yes
26/10/2019	DC02	146.5	N/A	Yes
	DC04	89.8	N/A	
	DC07	114.3	N/A	
	DC09	80	N/A	
27/10/2019	DC02	77.7	N/A	Yes
	DC04	62.9	N/A	
	DC07	68.8	N/A	
	DC09	58.2	N/A	
28/10/2019	DC02	74.9	N/A	Yes
	DC04	58.0	N/A	
	DC05	54.3	N/A	
	DC07	66.3	N/A	
	DC09	62.7	N/A	
29/10/2019	DC02	63.2	1.3	No
	DC04	54.2	0.2	
30/10/2019	DC02	113.6	N/A	Yes
	DC04	69.4	N/A	
	DC05	60.3	N/A	
	DC06	56.5	N/A	
	DC07	71.6	N/A	
	DC09	68.6	N/A	
31/10/2019	DC02	77.8	N/A	Yes
	DC04	57.1	N/A	
	DC05	57.3	N/A	
	DC06	62.5	N/A	
	DC07	56.5	N/A	
	DC09	86.1	N/A	
01/11/2019	DC02	98.1	N/A	Yes
	DC04	81.0	N/A	
	DC05	79.1	N/A	
	DC06	71.9	N/A	
	DC07	78.7	N/A	
	DC09	93.8	N/A	
02/11/2019	DC02	68.6	N/A	Yes
	DC09	50.2	N/A	
03/11/2019	DC02	59.7	30.5	No
07/11/2019	DC02	95.2	N/A	Yes
	DC04	75.3	N/A	
	DC07	85.2	N/A	
	DC09	71.3	N/A	

Date of event	Monitor location	24-hour PM_{10} result (µg/m^3)	Mt Arthur Coal contribution (µg/m^3) (incremental impact) *	Declared extraordinary event by Secretary *
08/11/2019	DC02	86.8	N/A	Yes
	DC04	71.7	N/A	
	DC07	76.1	N/A	
	DC09	70.6	N/A	
12/11/2019	DC02	119.0	N/A	Yes
	DC04	93.3	N/A	
	DC05	55.6	N/A	
	DC06	69.3	N/A	
	DC07	95.5	N/A	
	DC09	55.5	N/A	
13/11/2019	DC02	54.1	0.7	No
14/11/2019	DC02	60.8	0.0	No
15/11/2019	DC02	64.3	0.0	No
16/11/2019	DC02	79.7	N/A	Yes
	DC04	63.4	N/A	
	DC07	59.1	N/A	
	DC09	58.1	N/A	
17/11/2019	DC02	92.4	N/A	Yes
	DC04	56.7	N/A	
	DC05	73.2	N/A	
	DC06	59.7	N/A	
	DC07	72.0	N/A	
	DC09	63.4	N/A	
18/11/2019	DC02	57.8	0.0	No
	DC04	54.5	0.1	
	DC09	51.1	0.3	
19/11/2019	DC02	64.3	N/A	Yes
	DC07	50.3	N/A	
	DC09	57.9	N/A	
20/11/2019	DC02	74.6	N/A	Yes
	DC04	64.9	N/A	
	DC05	61.2	N/A	
	DC06	67.7	N/A	
	DC07	61.5	N/A	
	DC09	79.6	N/A	
21/11/2019	DC02	118.5	N/A	Yes
	DC04	97.6	N/A	
	DC05	76.7	N/A	
	DC06	96.5	N/A	
	DC07	67.7	N/A	
	DC09	92.0	N/A	
22/11/2019	DC02	142.0	N/A	Yes
	DC04	104.0	N/A	
	DC05	75.8	N/A	

Date of event	Monitor location	24-hour PM_{10} result (µg/m^3)	Mt Arthur Coal contribution (µg/m^3) (incremental impact) *	Declared extraordinary event by Secretary *
	DC07	111.5	N/A	
	DC09	116.4	N/A	
23/11/2019	DC02	63.2	N/A	Yes
	DC04	64.5	N/A	
	DC05	54.1	N/A	
	DC06	103.3	N/A	
	DC07	62.9	N/A	
	DC09	63.4	N/A	
26/11/2019	DC02	216.9	N/A	Yes
	DC04	193.7	N/A	
	DC05	99.5	N/A	
	DC06	214.6	N/A	
	DC07	209.2	N/A	
	DC09	193.9	N/A	
27/11/2019	DC02	95.7	N/A	Yes
	DC04	97.0	N/A	
	DC06	76.6	N/A	
	DC07	88.6	N/A	
	DC09	64.4	N/A	
28/11/2019	DC02	94.2	N/A	Yes
	DC04	80.5	N/A	
	DC05	85.2	N/A	
	DC06	187.0	N/A	
	DC07	71.0	N/A	
	DC09	107.1	N/A	
29/11/2019	DC02	122.2	N/A	Yes
	DC04	107.8	N/A	
	DC05	76.6	N/A	
	DC06	177.1	N/A	
	DC07	110.9	N/A	
	DC09	123.1	N/A	
30/11/2019	DC02	92.0	N/A	Yes
	DC04	71.6	N/A	
	DC06	94.1	N/A	
	DC07	66.1	N/A	
	DC09	90.2	N/A	
01/12/2019	DC02	90.9	N/A	Yes
	DC04	63.5	N/A	
	DC06	110.4	N/A	
	DC07	70.3	N/A	
	DC09	99.4	N/A	
02/12/2019	DC04	89.9	N/A	Yes
	DC06	63.2	N/A	
	DC07	99.1	N/A	

Date of event	Monitor location	24-hour PM_{10} result (µg/m^3)	Mt Arthur Coal contribution (µg/m^3) (incremental impact) *	Declared extraordinary event by Secretary *
	DC09	94.7	N/A	
03/12/2019	DC02	74.0	N/A	Yes
	DC04	61.9	N/A	
	DC07	60.8	N/A	
	DC09	74.2	N/A	
04/12/2019	DC02	79.0	N/A	Yes
	DC04	56.0	N/A	
	DC07	58.6	N/A	
	DC09	56.3	N/A	
05/12/2019	DC02	87.7	N/A	Yes
	DC04	58.1	N/A	
	DC07	65.8	N/A	
	DC09	74.2	N/A	
06/12/2019	DC02	113.6	N/A	Yes
	DC04	73.3	N/A	
	DC07	79.7	N/A	
	DC09	111.1	N/A	
07/12/2019	DC02	123.99	N/A	Yes
	DC04	106.0	N/A	
	DC05	131.0	N/A	
	DC06	195.5	N/A	
	DC07	104.4	N/A	
	DC09	177.7	N/A	
08/12/2019	DC02	62.8	N/A	Yes
	DC04	50.7	N/A	
	DC06	57.2	N/A	
	DC07	50.1	N/A	
	DC09	59.7	N/A	
09/12/2019	DC02	99.7	N/A	Yes
	DC04	101.4	N/A	
	DC05	75.1	N/A	
	DC06	85.7	N/A	
	DC07	85.4	N/A	
	DC09	93.8	N/A	
10/12/2019	DC02	145.0	N/A	Yes
	DC04	110.6	N/A	
	DC05	134.1	N/A	
	DC07	106.8	N/A	
	DC09	120.3	N/A	
11/12/2019	DC02	130.0	N/A	Yes
	DC04	97.0	N/A	
	DC05	134.4	N/A	
	DC07	98.1	N/A	
	DC09	170.3	N/A	

Date of event	Monitor location	24-hour PM_{10} result (µg/m^3)	Mt Arthur Coal contribution (µg/m^3) (incremental impact) *	Declared extraordinary event by Secretary *
12/12/2019	DC02	104.3	N/A	Yes
	DC04	62.0	N/A	
	DC05	62.6	N/A	
	DC06	88.8	N/A	
	DC07	59.5	N/A	
	DC09	89.9	N/A	
14/12/2019	DC02	76.4	N/A	Yes
	DC04	53.0	N/A	
	DC06	81.5	N/A	
	DC07	57.0	N/A	
	DC09	63.1	N/A	
15/12/2019	DC02	62.5	N/A	Yes
	DC04	50.6	N/A	
	DC06	53.6	N/A	
	DC07	54.1	N/A	
	DC09	63.1	N/A	
16/12/2019	DC02	97.8	N/A	Yes
	DC04	58.5	N/A	
	DC07	95.7	N/A	
	DC09	188.1	N/A	
18/12/2019	DC02	53.8	N/A	Yes
	DC09	67.3	N/A	
19/12/2019	DC02	140.3	N/A	Yes
	DC04	110.9	N/A	
	DC05	56.2	N/A	
	DC06	67.1	N/A	
	DC07	107.3	N/A	
	DC09	135.1	N/A	
20/12/2019	DC02	102.1	N/A	Yes
	DC04	52.3	N/A	
	DC06	56.4	N/A	
	DC07	52.8	N/A	
	DC09	73.8	N/A	
21/12/2019	DC02	182.3	N/A	Yes
	DC04	110.6	N/A	
	DC05	74.6	N/A	
	DC06	116.9	N/A	
	DC07	81.8	N/A	
	DC09	144.1	N/A	
22/12/2019	DC02	181.9	N/A	Yes
	DC04	58.3	N/A	
	DC06	69.7	N/A	
	DC07	61.7	N/A	
	DC09	68.0	N/A	

Date of event	Monitor location	24-hour PM_{10} result ($\mu g/m^3$)	Mt Arthur Coal contribution ($\mu g/m^3$) (incremental impact) *	Declared extraordinary event by Secretary *
24/12/2019	DC02	62.1	N/A	No
27/12/2019	DC02	52.4	N/A	Yes
	DC09	51.9	N/A	
28/12/2019	DC02	74.4	N/A	Yes
	DC06	38.7	N/A	
	DC09	111.7	N/A	
29/12/2019	DC02	84.7	N/A	Yes
	DC04	60.9	N/A	
	DC07	58.7	N/A	
30/12/2019	DC02	154.2	N/A	Yes
	DC07	71.3	N/A	
	DC09	94.9	N/A	
31/12/2019	DC02	94.4	N/A	Yes
	DC04	59.3	N/A	
	DC05	69.7	N/A	
	DC07	52.8	N/A	
	DC09	82.7	N/A	
01/01/2020	DC02	145.7	N/A	Yes
	DC04	96.9	N/A	
	DC05	72.8	N/A	
	DC07	102.2	N/A	
	DC09	138.8	N/A	
02/01/2020	DC02	75.1	N/A	Yes
	DC09	52.3	N/A	
03/01/2020	DC02	59.8	N/A	Yes
	DC04	52.9	N/A	
	DC09	51.3	N/A	
04/01/2020	DC02	97.4	N/A	Yes
	DC09	60.6	N/A	
05/01/2020	DC04	120.4	N/A	Yes
	DC05	73.9	N/A	
	DC07	117.8	N/A	
	DC09	136.1	N/A	
08/01/2020	DC04	50.9	N/A	Yes
	DC07	56.7	N/A	
	DC09	56.8	N/A	
11/01/2020	DC02	157.3	N/A	Yes
	DC04	134.6	N/A	
	DC05	76.2	N/A	
	DC07	75.2	N/A	
	DC09	128.7	N/A	
12/01/2020	DC02	89.6	N/A	Yes
	DC04	54.1	N/A	
	DC07	55.5	N/A	

Date of event	Monitor location	24-hour PM_{10} result (µg/m^3)	Mt Arthur Coal contribution (µg/m^3) (incremental impact) *	Declared extraordinary event by Secretary *
	DC09	61.9	N/A	
20/01/2020	DC04	58.3	N/A	Yes
	DC07	53.7	N/A	
	DC09	52.4	N/A	
21/01/2020	DC02	66.1	N/A	Yes
	DC04	55.8	N/A	
	DC07	56.9	N/A	
	DC09	54.5	N/A	
23/01/2020	DC02	81.4	N/A	Yes
	DC04	58.9	N/A	
	DC07	58.8	N/A	
	DC09	59.0	N/A	
01/02/2020	DC02	67.2	0.0	No
02/02/2020	DC02	64.3	N/A	Yes
03/02/2020	DC02	57.0	0.2	No
04/02/2020	DC02	74.1	N/A	Yes
	DC09	58.0	N/A	
19/02/2020	DC02	54.4	N/A	Yes
	DC07	52.4	N/A	
	DC09	52.6	N/A	
02/03/2020	DC02	50.6	0.7	No

Note: The results reported in this table are based on non-validated data, as reported to regulators.
* Criterion doesn't apply under extraordinary event as agreed by the Secretary, as per Note d of Schedule 3, Condition 20 of PA 09_0062. Calculation of the Mt Arthur Coal contribution is not applicable for these declared events.

Total Suspended Particulates

TEOM PM_{10} monitoring data is used to calculate annual average total suspended particulate (TSP) levels. TSP results were calculated by multiplying the annual average PM_{10} results by 2.5, in accordance with the approved AQMP. During the reporting period, TSP remained below the long-term annual impact assessment criteria at all statutory sites, as shown in Table 15. TSP at each of the monitoring locations were below the reported values for FY19 and FY18, which can primarily be attributed to the removal of significant number of extraordinary event days experienced throughout the bushfire season.

Table 15: Summary of total suspended particulate results

Site name	Approval criteria	TSP annual average monitoring results (µg/m^3)			Trend / key management implications	Implemented / proposed management actions
		FY20	FY19	FY18		
Sheppard Avenue (DC02)	Long term annual average: 90 µg/m^3	68	75	71	No exceedances	Continue dust management in accordance with AQMP
South Muswellbrook (DC04)		50	61	55		
Roxburgh Road (DC05)		33	53	47		
Edderton Homestead (DC06)		35	46	35		
Antiene (DC07)		50	51	44		
Wellbrook (DC09)		58	61	51		

Complaints and Reportable Incidents

During the reporting period, 6 dust-related complaints were received from five complainants, which is 71 per cent lower than previous year (21 dust-related complaints). These complaints are discussed further in Section 9.

Proposed Improvements

In line with the principles of continuous improvement that are integral to the site Environmental Management System, Mt Arthur Coal will continue upgrades to the Dust Control System in the next reporting period to improve system accuracy and reliability.

6.5 Biodiversity

Environmental Management

Flora and fauna at Mt Arthur Coal is managed in accordance with:

- MAC-ENC-MTP-047 Rehabilitation Strategy;
- MAC-ENC-MTP-050 Biodiversity Management Plan (BioMP);
- MAC-ENC-PRO-012 Land Management (internal document);
- MAC-ENC-PRO-080 Rehabilitation and Ecological Monitoring Procedure (internal document); and
- MAC-HSE-PRO-002 Pest Animal Management Procedure (internal document).

The BioMP outlines Mt Arthur Coal's biodiversity management and monitoring approach, addressing both State and Commonwealth approval conditions in relation to biodiversity management.

The biodiversity offset areas managed by Mt Arthur Coal, as per the BioMP, are as follows:

- Mt Arthur Conservation Area (99 hectares);
- Saddlers Creek Conservation Area (431.3 hectares);
- Thomas Mitchell Drive Offset Area (on-site) (219.4 hectares);
- Thomas Mitchell Drive Offset Area (off-site) (495 hectares);
- Roxburgh Road 'Constable' Offset Area (109 hectares); and
- Middle Deep Creek Offset Area (1245.5 hectares).

In accordance with the modification project approval, long-term security for the Mt Arthur Coal biodiversity offset areas is provided through conservation agreements, formally registered on title.

Mt Arthur Coal undertakes annual flora and fauna monitoring to track progress against the BioMP and MOP objectives. The monitoring program tracks the condition of habitat areas over time and ensures that the BioMP's established performance indicators and project approval requirements are being met. The program includes 24 active monitoring sites throughout site woodland rehabilitation areas and remnant vegetation areas onsite and within offset areas. Remnant vegetation monitoring sites are used to assess mine impact and natural regeneration, as well providing reference data for comparative assessment of rehabilitation monitoring sites.

FY20 planting for all offset areas was delayed to early FY21 due to forecast conditions improving in the short term.

Weed Assessment and Treatment

Mt Arthur Coal conducted an annual weed assessment in FY20. This included:

- Remote sensing of transects across VD1 rehabilitation, operational areas adjacent the Enviro Dam and the Thomas Mitchel Onsite Offset;
- Rehabilitation specific weed assessment work completed by independent consultants as part of the Rehabilitation and Ecological Monitoring Program; and
- A whole of site weed survey.

The above work was combined into a site weed action plan to used to inform weed treatment works.

Mt Arthur Coal's weed treatment programs are guided by the *Hunter Regional Strategic Weed Management Plan 2017 – 2022* (Hunter Local Land Services, 2017). Mt Arthur Coal primarily targets Weeds of National Significance, as well as State Priority weeds and Regional Priority weeds for the Hunter Region, declared under the *Biosecurity Act 2015*.

Pest Animal Control

Feral animal presence is continually monitored through scheduled inspections and workforce feedback. Information from these sources is used to plan the feral animal control programs across the mine site and all biodiversity offset and conservation areas.

The vertebrate pest management program continued during the reporting period, with the annual campaign utilising 1080 baiting to target wild dogs (*Canis lupus familiaris*) and foxes (*Vulpes vulpes*). Additional programs introduced and conducted in FY20 included:

- Kangaroo harvesting in operational areas;
- A shooting program targeting wild dogs (*Canis lupus familiaris*), foxes (*Vulpes vulpes*), feral cats (*Felis catus*), rabbits (*Oryctolagus cuniculu*) and hares (*Leporidae lepus*);
- Rabbit and hare baiting program; and
- Live rabbit trapping using traps and ferrets.

Environmental Performance

The annual ecological development monitoring program, consisting of vegetation community assessment and fauna surveys, was undertaken in November/December 2019 by independent consultants. The annual survey assessed diversity and habitat condition across five sites in accordance with the rotational schedule of the monitoring program. Those sites consisted of:

- One rehabilitation site in the mine site woodland corridor (Dump 11[Export]);
- Two remnant revegetation reference sites in adjacent areas (ED1 and MACT); and
- One remnant revegetation and one natural revegetation reference site on the Roxburgh Offset (RX1 and RX2 respectively).

Four nest box monitoring locations were also monitored (MACT, TMD Onsite, Saddlers Creek and Mt Arthur).

Biodiversity Monitoring Results

Improvements were made to the Rehabilitation and Ecological Development Monitoring Program (REMP). The REMP was modified so that it can be better aligned or made more consistent to other Mt Arthur Coal monitoring requirements. Specifically, this includes:

- Ecological monitoring required within Conservation Agreement (CA) conservation areas that commenced in this reporting period;
- Aligning the collection of floristic plot data between the REMP and the CAs;
- Transitioning the methodology to the Biodiversity Assessment Method (BAM) for the REMP monitoring and CAs. BAM is the current methodology supported by the NSW Office of Environment and Heritage (OEH) under the NSW Biodiversity Conservation Act 2016; and
- Increasing the number of monitoring locations of existing rehabilitation monitoring sites whilst removing redundant sites (i.e. areas of rehabilitation that are scheduled to be re-disturbed in the future mine plan) from the monitoring schedule.

Results of flora and vertebrate fauna species for the monitoring sites are provided in Table 16, along with a condition assessment score, which indicates ecological health based on condition attributes such as dieback, canopy health,

erosion, vegetation patch shape, epicormic growth, weed invasion, mid strata native density, ground strata native density and connectivity of vegetation.

Results for the one rehabilitation site, a new monitoring area brought online this reporting period after reaching the requisite 3m in growth.

Table 16: Flora and fauna species recorded and condition assessment scores

Item	Rehabilitation Site	Reference Site			Reference (Regeneration) Site
Flora					
	Export	**ED1**	**RX1**	**MACT**	**RX2**
Native species (No.)	11	29	30	30	16
Native species (% of total)	50	97	86	86	64
Introduced species (No.)	11	1	5	5	9
Introduced species (% of total)	50	3	14	14	36
Total species	22	30	35	35	25
Total condition score out of 32	**20 (63%)**	**27 (84%)**	**26 (81%)**	**25 (78%)**	**25 (78%)**
Fauna					
Native Species					
Amphibians	0	0	1	0	0
Reptiles	1	4	5	1	3
Mammals*	1	15	15	5	10
Birds	9	21	21	10	24
Total No. of Native Species	11	40	42	16	37
Introduced Species					
Mammals	1	0	0	1	1
Total Species (Native and Introduced)	12	40	42	17	38
Total Threatened^	0	5	5	2	2

**Does not include migratory- or marine-listed species declared under the EPBC Act.*
^Does not include introduced species

Dump 11 (Export)

This monitoring site is a rehabilitation site located in the east rehabilitation woodland corridor near Thomas Mitchell Drive. Rehabilitation of the site commenced prior to 1995; however, the target vegetation community being rehabilitated was unable to be verified. Based on the area being within the rehabilitation woodland corridor and consideration of the dominant canopy species (*Corymbia maculata* and *Eucalyptus blakelyi*) recorded, the rehabilitation area is most consistent with Central Hunter Ironbark – Spotted Gum – Grey Gum Forest. The monitoring site was established in FY20 and therefore FY20 represents the first monitoring event for this site.

The vegetation canopy is dominated by *Corymbia maculata* (Spotted Gum) and *Eucalyptus blakelyi* (Blakely's Red Gum) with trees up to 15 metres in height (15% cover). No small trees are present. The shrub layer is sparse with a cover of approximately 1% and a height of 0.5-3 metres tall. Native shrubs include regrowth canopy trees while exotic shrubs include *Gomphocarpus fruticosus* (Narrow-Leaved Cotton Bush) and *Opuntia stricta* (Common Prickly Pear). The ground layer has a cover of 65% that is dominated by exotic grasses and forbs up to 0.3 metres in height. Dominant exotic groundcovers include *Hyparrhenia hirta* (Coolatai Grass), *Panicum maximum* var. *maximum* (Guinea Grass), *Chloris gayana* (Rhodes Grass) and *Asphodelus fistulosus* (Onion Weed). Native groundcovers are

present in low numbers and include the grasses *Cymbopogon refractus* (Barbed Wire Grass), *Bothriochloa decipiens* var. *decipiens* (Pitted Bluegrass), *Rytidosperma setaceum* (Smallflower Wallaby Grass) and the forb *Sida corrugata* (Corrugated Sida).

The total fauna species diversity recorded at Export in FY20 was 12 species. The low species diversity is attributed to the area being on an exposed slope with limited foraging resources, few refugia sites and minimal connectivity to larger areas of habitat. No threatened fauna species were recorded at Export.

One introduced species was recorded and included the European Rabbit (*Oryctolagus cuniculus*).

ED1

This monitoring site is a reference site located within the Edderton Road Revegetation Area. The monitoring site was established in FY18 within Central Hunter Box-Ironbark Woodland (Box dominated) vegetation. FY20 represents the second monitoring event for this site.

The vegetation canopy is dominated by *Eucalyptus crebra* (Narrow-leaved Ironbark). The canopy comprises trees up to 20 metres in height (30% cover) and includes younger regenerated trees with heights ranging from 8-14 metres. The shrub layer is sparse (approximately 2%) and between 0.5-3 metres tall, comprising regrowth *Eucalyptus crebra* (Narrow-leaved Ironbark), *Notelaea microcarpa* (Native Olive) and *Brachychiton populneus* (Kurrajong). The ground layer is characterised by a diverse and moderate cover (60%) of mixed native grasses and forbs up to 0.4 metres in height. This layer is dominated by the native *Aristida ramosa* (Purple Wiregrass), *Cymbopogon refractus* (Barbed Wire Grass), *Bothriochloa decipiens* var. *decipiens* (Pitted Bluegrass), *Calotis lappulacea* (Yellow Burr-daisy) and *Eremophila debilis* (Winter Apple). Exotic groundcovers include *Lepidium africanum* (Common Peppercress).

The total fauna species diversity recorded at ED1 in FY20 was 40 species. The relatively high species diversity is attributed to moderate level of foraging resources and refugia sites due to the presence of logs, woody debris and hollow-bearing trees. The area also has connectivity to larger areas of habitat.

Five threatened species were recorded at ED1 and included the following:

- Eastern Bentwing-bat (*Miniopterus orianae oceanensis*) listed as Vulnerable under the BC Act;
- Eastern Cave Bat (*Vespadelus troughtoni*) listed as Vulnerable under the BC Act;
- Large-eared Pied Bat (*Chalinolobus dwyeri*) listed as Vulnerable under the BC Act and EPBC Act;
- Southern Myotis (*Myotis macropus*) listed as Vulnerable under the BC Act; and
- Speckled Warbler (*Pyrrholaemus sagittatus*) listed as Vulnerable under the BC Act.

No introduced species were recorded at ED1.

RX1

This monitoring site is a reference site located at the Roxburgh Offset Area. The monitoring site was established in FY16 within Central Hunter Box-Ironbark Woodland (Ironbark dominated) vegetation. FY20 represents the third monitoring event for this site.

The vegetation canopy is dominated by *Eucalyptus crebra* (Narrow-leaved Ironbark). The canopy comprises trees up to 15 metres in height (40% cover) and includes younger regenerated trees with heights ranging from 7-13 metres. The shrub layer is sparse (approximately 3%) and between 0.5-3 metres tall, comprising regrowth canopy trees and *Acacia paradoxa* (Kangaroo Thorn), *Notelaea microcarpa* (Native Olive) and *Brachychiton populneus* (Kurrajong). Exotic shrubs present include *Opuntia aurantiaca* (Tiger Pear) and *Lycium ferocissimum* (African Boxthorn). The ground layer is characterised by a diverse and moderate cover (55%) of mixed native grasses and forbs up to 0.3 metres in height. This layer is dominated by *Aristida ramosa* (Purple Wiregrass). Other native forbs and grasses include *Cymbopogon refractus* (Barbed Wire Grass), *Austrostipa scabra* (Speargrass), *Calotis lappulacea* (Yellow Burr-daisy), *Eremophila debilis* (Winter Apple) and *Stackhousia viminea* (Slender Stackhousia). Exotic groundcovers present include *Senecio madagascariensis* (Fireweed) and *Sida spinosa*.

The total fauna species diversity recorded at RX1 in FY20 was 42 species. The relatively high species diversity is attributed to moderate level of foraging resources and refugia sites due to the presence of logs, woody debris, and hollow-bearing trees. The area also has connectivity to larger areas of habitat.

Five threatened species were recorded at RX1 and included the following:

- Eastern Cave Bat (*Vespadelus troughtoni*) listed as Vulnerable under the BC Act;
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*) listed as Vulnerable under the BC Act;
- Eastern Freetail-bat (*Mormopterus norfolkensis*) listed as Vulnerable under the BC Act;
- Large-eared Pied Bat (*Chalinolobus dwyeri*) listed as Vulnerable under the BC Act and EPBC Act; and
- Southern Myotis (*Myotis macropus*) listed as Vulnerable under the BC Act.

No introduced species were recorded at RX1.

RX2

This monitoring site is a natural regeneration site located at the Roxburgh Offset Area. The monitoring site was established in FY16 within Central Hunter Box-Ironbark Woodland (Ironbark dominated) (State 2) vegetation and thus comprises derived native grassland vegetation dominated by a mix of native ground cover species. FY20 represents the third monitoring event for this site.

The is monitoring site lacks a canopy but includes scattered low shrubs (2% cover to 1.5m tall) of *Maireana microphylla* (Small-leaf Bluebush) and weeds such as *Lycium ferocissimum* (African Boxthorn) and *Opuntia stricta* (Common Prickly Pear).

The ground cover is dense (approximately 90%) and typically less than 50 cm tall. It is dominated by the native species *Aristida ramosa* (Purple Speargrass) and *Panicum effusum* (Hairy Panic). Other native grasses and forbs were also recorded, including *Chloris ventricosa* (Plump Windmill Grass) and *Vittadinia cuneata* (Fuzzweed). Exotic groundcovers present include *Plantago lanceolata* (Lamb's Tongue), *Asphodelus fistulosus* (Onion Weed) and *Carthamus latus* (Saffron Thistle).

The total fauna species diversity recorded at RX2 in FY20 was 38 species. Although the monitoring site is within open grassland, the relatively high species diversity is attributed to the monitoring site being located adjacent to woodland habitat that contains a moderate level of foraging resources and refugia sites due to the presence of logs, woody debris, and hollow-bearing trees. The adjacent woodland habitat also has connectivity to larger areas of habitat.

Two threatened species were recorded at RX2 and included the following:

- Eastern Bentwing-bat (*Miniopterus orianae oceanensis*) listed as Vulnerable under the BC Act; and
- Southern Myotis (*Myotis macropus*) listed as Vulnerable under the BC Act.

One introduced species was recorded and included the European Rabbit (*Oryctolagus cuniculus*).

MACT

This monitoring site is a reference site located near the Bayswater Rail-loading Facility along Thomas Mitchell Drive, approximately 3 kilometres east of the Mt Arthur access road. The monitoring site was established in 2007 within Grey Box - White Box- Ironbark - Blakely's Red Gum vegetation. FY20 represents the fifth monitoring event for this site.

The vegetation canopy includes *Eucalyptus crebra* (Narrow-leaved Ironbark), *Eucalyptus blakelyi* (Blakely's Red Gum) and *Eucalyptus albens x moluccana* (White Box – Grey Box Intergrade). The canopy comprises trees up to 18 metres in height (40% cover) and includes younger regenerated trees with heights ranging from 8-14 metres. The shrub layer is sparse (approximately 5%) and between 0.5-5 metres tall, comprising regrowth canopy trees and *Acacia paradoxa* (Kangaroo Thorn) and *Acacia falcata* (Hickory Wattle). Exotic shrubs present include *Opuntia stricta* (Common Prickly Pear). The ground layer is characterised by a diverse and moderate cover (65%) of mixed native grasses and forbs up to 0.4 metres in height. This layer is dominated by *Aristida ramosa* (Purple Wiregrass) and *Cymbopogon refractus* (Barbed Wire Grass). Other native forbs and grasses include *Austrostipa scabra* (Speargrass), *Calotis lappulacea* (Yellow Burr-daisy), *Eremophila debilis* (Winter Apple) and *Stackhousia viminea* (Slender Stackhousia). Exotic groundcovers present include *Sida rhombifolia* (Paddy's Lucerne), *Richardia stellaris* and *Conyza bonariensis* (Flaxleaf Fleabane).

The total fauna species diversity recorded at MACT in FY20 was 17 species. Although the area has connectivity to larger areas of habitat, contains a moderate level of foraging resources and refugia sites in the form of logs, woody

debris and hollow-bearing trees, the low species diversity is attributed to the area being exposed to edge effects as it is located between the rail corridor, Thomas Mitchell Drive and an access road.

Two threatened species were recorded at MACT and included the following:

- Eastern Bentwing-bat (*Miniopterus orianae oceanensis*) listed as Vulnerable under the BC Act; and
- Southern Myotis (*Myotis macropus*) listed as Vulnerable under the BC Act.

One introduced species was recorded and included the European Rabbit (*Oryctolagus cuniculus*).

Nest Box Monitoring Results

Nest box monitoring was conducted at MACT, TMD Onsite, Saddlers Creek and Mt Arthur in FY20. Table 17 contains a summary of the nest box occupancy rates recorded in FY20.

The results of the FY20 nest box monitoring were broadly comparable with the previous year of monitoring. Fluctuations in fauna diversity and abundance as observed through monitoring are considered to be natural variations and/or a result of the current condition of the nest boxes, and not attributable to mining-related activities.

Overall, the condition of the nest boxes monitored in FY20 was considered to be low with 14 boxes or approximately 25% of boxes requiring replacement or repair. This is an increase of nest boxes requiring replacement or repair identified in the FY18 and FY19.

A summary of the next box monitoring for each site is provided below.

Table 17: Nest box occupancy rates and species

Nest Box Site	Number of Nest Boxes	Number of Nest Boxes Occupied	Occupancy Rate (%)
MACT	14	3	21
TMD Onsite	6	1	17
Saddlers Creek	8	0	0
Mt Arthur	25	13	52

Assessment against MOP Completion Criteria

Export is located within Domain D Rehabilitation – Native Woodland. Vegetation at this site is at least 24 years old. It is considered that rehabilitation at Export is now at Phase 4 Ecosystem and Landuse Establishment.

An assessment of the rehabilitation site Export against specific performance and completion criteria for rehabilitated vegetation is shown in Table 18 and is taken from the MOP.

The conservation and offset areas are intended to be set aside and be naturally regenerated and/or revegetated to improve ecological values, threatened ecological communities and habitat for threatened species. The remnant vegetation monitoring sites established in the conservation and offset areas are also used as references sites against which rehabilitation sites can be measured.

Performance indicators relevant to the first four years of management of the conservation and offset areas are provided in the MOP under Domain F - Onsite Conservation and Offset Areas. Note that although the MOP specifies “onsite” Conservation and Offset Areas, the same criteria are considered to apply to offsite offset areas, such as the Roxburgh Offset Area. The compliance with these performance indicators and the relevant management actions in the BioMP is evaluated in Table 19. Compliance with the broader scope and requirements of the BioMP will be evaluated through the Independent Environmental Audit and/or Biodiversity Audit process.

Table 18: Status of rehabilitation sites against MOP completion criteria

Relinquishment Criteria	Export (Domain D)
Phase – 4. Ecosystem and Landuse Establishment	
All areas shown as Native Woodland vegetation community in Plan 4, planted with a native species mix (seed or tubestock) targeted at establishing an open grassy woodland vegetation community.	Partially compliant for isolated stand of woodland at this monitoring site. On a whole of site basis, this criterion will not be fully compliant until all rehabilitation has been undertaken in the woodland corridor.
Rehabilitation species composition (seedmix or tubestock) drawn from the species list in Section 7.2 for Central Hunter Box – Ironbark Woodland or Central Hunter Ironbark - Spotted Gum – Grey Box Forest	Partially compliant with Central Hunter Ironbark - Spotted Gum – Grey Box Forest. Site lacks ironbark and box canopy species on species list and contains no shrub species and minimal groundcover species listed on species list.
All structural dominant species represented compared with analogue site	Not compliant
The diversity, percentage and density of shrubs and juvenile trees with a stem diameter <5cm is comparable to that of the local remnant vegetation.	Not compliant
The total number of live native plant species is greater than or comparable to the local remnant vegetation	Not compliant
The number of tree, shrub and sub-shrub species is comparable to that of the local remnant vegetation	Not compliant
Species composition for revegetation will be aimed at establishing a complex community structure consisting of groundcover, understory and canopy.	Not compliant. Species composition planted is unknown, but community structure is not complex.
Nesting boxes (various bird, squirrel glider, possum and bat) and natural habitat features (including large rocks, logs/coarse woody debris, hollow bearing timber) are placed in established native woodland rehabilitation.	Not compliant
Number of weed species and surface area comparable to reference sites	Not compliant
Program implemented for fuel load assessment and reduction, with advice from NSW Rural Fire Service	Unknown
Pest animal infestation comparable to reference sites, with ongoing control program in place.	Compliant
Where adjacent to selected grazing or operational mining land, adequate fencing and signage is installed and maintained to prevent unintentional vehicle and livestock access.	Compliant
Rehabilitated native vegetation distribution will link areas of onsite and near-site native vegetation and be consistent with the biodiversity corridors consistent with the latest version of the DRE Synoptic Plan.	Compliant

Relinquishment Criteria	Export (Domain D)
The Box-Gum reestablishment area based on the north-eastern slope of Visual Dump 1, and shown on Plan 4, will be established with a species mix (seed or tubestock) drawn from the species list presented in Section 7.2 for Central Hunter Box - Ironbark Woodland or Central Hunter Ironbark - Spotted Gum – Grey Box Forest.	N/A

Table 19: Status of remnant vegetation sites against MOP completion criteria and BioMP management actions

	RX1	RX2
MOP Relinquishment Criteria for Phase – 5. Ecosystem and Landuse Sustainability (for Domain F – Onsite Conservation and Offset Areas)		
Compliance with management actions presented in the site Biodiversity Management Plan, as evidenced through the most recent Independent Environmental Audit and/or Biodiversity Audit.	Unknown	Unknown
BMP Section 5.1 – Offset Area Revegetation/Regeneration Works		
Natural regeneration encouraged and facilitated through livestock exclusion, fencing and access control, weed and pest management and bushfire management	Compliant	Compliant (natural regeneration phase)
All active revegetation works will be designed with structural and floristic diversity suitable to meet the benchmark vegetation community targets	N/A – no active revegetation required at this stage.	N/A – no active revegetation required at this stage.
All active revegetation will involve use of local provenance seed.	N/A – no active revegetation required at this stage.	N/A – no active revegetation required at this stage.
Revegetation areas will be subject to a monitoring program developed.	N/A – no active revegetation required at this stage.	N/A – no active revegetation required at this stage.
BMP Section 5.2 – General Offset Area Management Measures		
Fencing will only be used within the offset and conservation areas to replace existing fencing, or where potential vegetation disturbance by land use impacts warrants additional protection	Compliant	Compliant
Identification of areas with potential for impact on ecological values from human, vehicle or stock access	Compliant	Compliant
Fencing will be used to delineate those areas that are being actively regenerated, to exclude grazing impacts and allow vegetation to regenerate naturally	N/A – no active revegetation required at this stage.	N/A – no active revegetation required at this stage.
Appropriate signage will be used at key access points to the offset and conservation area to identify that the areas are of high ecological significance.	Not compliant	Not compliant

	RX1	RX2
A weed control program has been implemented to limit the spread and colonisation of noxious and environmental weeds at the Mt Arthur Coal Complex.	Compliant. However, additional focus recommended for *Opuntia stricta* (Common Prickly Pear) and *Hyparrhenia hirta* (Coolatai Grass)	Compliant. However, additional focus recommended for *Senecio madagascariensis* (Fireweed), *Opuntia stricta* (Common Prickly Pear) and *Lycium ferocissimum* (African Boxthorn).

Weed Control

FY20 weed assessment work consisted of the following elements

- Aerial Assessment: High resolution image processing of data collected by Unmanned aerial vehicle (UAV) of transects across VD1 rehabilitation, operational areas adjacent the Enviro Dam and the Thomas Mitchell Onsite Offset (results presented in Appendix 6);
- Biodiversity monitoring weed assessment work completed by independent consultants as part of the Rehabilitation and Ecological Monitoring Program and Conservation Agreement monitoring; and
- A whole of site weed survey.

All this work was combined into a Weed Management Action Plan. This represents a focus on independent advice and an increased effort in the assessment process to obtain measurable data.

Aerial Assessment data allows individuals of each species and plot changes in numbers over time. The original flyover occurred in May 2019 with three transects of approximately 10ha flown: one over operational area to the west of the Enviro Dam (Transect 3) and two transects across the VD1 (Transects 1 and 2) rehab. Data indicated that prickly pear and boxthorn were the species to focus on and were the species treated in FY19. The monitoring completed in May 2020 substituted one transect flown over VD1 with a new transect over the Thomas Mitchell Drive Onsite Offset (Transect 4). Comparison with the FY19 data indicated that the FY19 and FY20 treatment programs were successfully controlling Prickly Pear with 29% reduction in transect 2 VD1 rehab) and an 81% reduction in transect 3 (the Operational Area). The difference in reduction rates is explained by differing methodologies used by two different contractors have variable success. African Boxthorn results were more varied with an 11% reduction on VD1 and a 5% increase in the Operational Area transect. The difference can be explained due to a delay in treatment in the vicinity of the Operational Area transect to source a better methodology for treatment. Following the flyover a remotely operated forestry mulcher was sourced to treat thick patches. Other key species identified for focus of treatment from the FY20 assessment:

- Galenia (*Galenia pubescens*)
- African Turnip weed (*Sisymbrium thellungii*).
- Blue heliotrope (*Heliotropium amplexicaule*);
- Cotton bush (*Gomphocarpus sp.*);

The reason for the increased prevalence of the above weed species is believed to be the result of increased rainfall in FY20, giving these fast growing species the opportunity to germinate over the reporting period.

As a result of the above monitoring the weed treatment program for FY20 was increased. The following weed species were targeted during the reporting period:

- African boxthorn (*Lycium ferocissimum*);
- Prickly Pear (*Opuntia stricta*);
- Tiger pear (*Opuntia aurantiaca*);
- Blue heliotrope (*Heliotropium amplexicaule*);
- Mother of millions (*Bryophyllum* species)
- Bathurst burr (*Xanthium spinosum*)
- Marshmallow weed (*Malva parviflora*)
- Artichoke thistle (*Cynara cardunculus L*.)
- Sweet briar (*Rosa rubiginosa*)
- Cobblers pegs (*Bidens pilosa*)
- Cotton bush (*Gomphocarpus sp.*);
- Galenia (*Galenia pubescens*)
- Silver-leaved Nightshade (*Solanum elaeagnifolium)*; and
- African Turnip weed (*Sisymbrium thellungii*).

Mt Arthur Coal targeted over 442 hectares of land for weed treatment during the reporting period, an increase of 50 hectares in the previous reporting period. The treatment focused in the north eastern portion of the site, including the VD1 and CD1 rehabilitation areas, operational area surrounding the Environmental Dam and western areas of the site off of Edderton Rd. Weed treatment for Biodiversity Offset Areas treated for included:

- Thomas Mitchell Drive Onsite Offset Area
- Thomas Mitchell Drive Offsite Offset Areas
- Saddlers Creek Offset Area
- Middle Deep Creek Offset Area

Refer to Appendix 6 for figures showing weed treatment locations.

Pest Animal Control

During June 2020 a 1080 baiting campaign with the intent of targeting wild dog and fox baiting was completed across the Mt Arthur Coal mine site and adjacent conservation areas. During the campaign 150 baits were laid across 50 locations, with 17 baits taken. Table 20 shows the breakdown of species and baits taken.

Table 20: 1080 Baiting control program results for FY20

Species	Count
Fox	5
Wild Dog	8
Feral Pig	1

Additional rabbit control programs were undertaken in FY20 targeting all rehabilitation areas across site. The results of these programs are presented in Table 21. Mt Arthur Coal has continued the trial into the use of ferrets in the trapping of rabbits with improvements from the FY20 program. The trial is on hold while during a contractor management review.

Table 21: Rabbit control program results for FY20

Methodology	Count
Baiting	20
Trapping	29

Kangaroo harvesting continued at Mt Arthur Coal in FY20 within operational areas. The program humanely destroyed 12 kangaroos, providing over 521 kilograms of consumable meat. The program is on hold due to operational changes requiring a review into how to complete the work safely.

Complaints and Reportable Incidents

There were no biodiversity complaints received in FY20. Mt Arthur Coal did not receive any government fines or penalties related to flora and fauna during the reporting period and there were no related reportable incidents.

Proposed Improvements

Mt Arthur Coal will continue to implement the REMP during the next reporting period, with monitoring of woodland rehabilitation, remnant woodland community sites and revegetation/regeneration areas within conservation areas. Mt Arthur Coal will also continue to implement annual landform stability assessments of existing rehabilitation in the next reporting period. Investigate the use of remote sensing in the assessment of landform stability as part of the review of the REMP and complete the review of the aerial weed assessment.

.

Mt Arthur Coal will continue removing waste items and repairing sections of fence that require maintenance in conservation and biodiversity offset areas during the next reporting period.

During the next reporting period, Mt Arthur Coal will also implement another vertebrate pest management program on site and across all conservation and offset areas. Improvements in the management of rabbits will be a particular focus, with expanded shooting, trapping and baiting programs to be completed.

6.6 Visual Amenity and Lighting

Environmental Management

Visual amenity and lighting management at Mt Arthur Coal is managed in accordance with:

- MAC-ENC-PRO-071 Visual Assessment Procedure;
- MAC-PRD-PRO-073 Procedure for Lighting Plant Movement and Setup; and
- MAC-ENC-PRO-077 Light Management Procedure.

Mt Arthur Coal's visual assessment procedure ensures overburden emplacement development is monitored and assessed against modelled predictions in the environmental assessment.

Management measures presented in the Light Management Procedure aim to control and reduce the impact of lighting on the surrounding area. The procedure is used in conjunction with the procedure for lighting plant movement and setup, which advises operational staff on correct alignment of lights to avoid offsite impact.

Environmental Performance

Visual impact inspections were completed in July and November of 2019 and January and April 2020. Inspections indicated that locations to the east of Mt Arthur Coal have extensive views of rehabilitated overburden dumps, with reduced visual contrast to surrounding non-mined landforms and peripheral visual impact from active mining activities. From locations to the north and west, a distinct visual contrast between mining activity and the surrounding non-mined landscape is evident due to exposure to low wall overburden dumps. For all locations the shape and size of the overburden dumps are within the predicted model shown in the environmental assessment.

Complaints and Reportable Incidents

During the reporting period, 18 lighting complaints were received from three complainants, which is lower than FY19 (23 complaints). On notification of the complaints, immediate action was taken to locate and redirect the offending lights, in response to addressing the complainant's concerns. These complaints are discussed further in Section 9.

Mt Arthur Coal did not receive any government fines or penalties related to lighting or visual amenity during the reporting period and there were no related reportable incidents.

Proposed Improvements

During the reporting period Mt Arthur Coal continued to incorporate fluvial geomorphic principles into the design of overburden emplacements. Rehabilitated landforms were reshaped to facilitate natural surface flow processes, resulting in a final shape that more closely mimics the adjacent non-mined landscape and reduces visual impact. This process will be developed further in subsequent reporting periods.

Lighting from Mt Arthur Coal will continue to be implemented in accordance with the Light Management Procedure and managed to minimise impacts on the local community whilst maintaining the minimum level necessary for operational and safety needs.

6.7 Aboriginal Cultural Heritage

Environmental Management

Aboriginal cultural heritage at Mt Arthur Coal is managed in accordance with:

- MAC-ENC-MTP-042 Aboriginal Heritage Management Plan.

Mt Arthur Coal has implemented a management plan that provides the framework to identify, assess, monitor, conserve and manage Aboriginal cultural heritage. The management plan assists Mt Arthur Coal to mitigate the impacts of its operations on Aboriginal cultural heritage, comply with the requirements of the *National Parks and Wildlife Act 1974*, *Environmental Planning and Assessment Act 1979* and the modification project approval and continue its active partnership with the Aboriginal community.

Environmental Performance

Minor survey and / or salvage activities were also successfully completed and recorded during the reporting period for the following site works in accordance with the methodology detailed in the Aboriginal Heritage Management Plan:

- Edderton Road Windmill Project - EME Pad & Secondary Access Road
- Windmill Project 11kv & 66kv Power Pole Installation
- Legacy Drill Rehabilitation: Stage 1 due diligence, Stage 2 field inspection, Stage 3 salvage
- Ground Water Monitoring bores & Vibrating Wire Piezometers
- Construction of Pit Dump Haul Road
- Saddlers Central Expansion
- Saddlers Central Topsoil Stockpile and Legacy Survey Area
- Off Lease Hydrogeological Drilling

Complaints and Reportable Incidents

Mt Arthur Coal did not receive any complaints, government fines or penalties related to Aboriginal cultural heritage during the reporting period and there were no related reportable incidents.

Proposed Improvement

A major review of the Mt Arthur Coal cultural heritage management plan commenced in March 2020 and will be completed during the next reporting period, as agreed in consultation with the DPIE, to update the disturbance boundary, cultural heritage site data as well as information about the grinding groove relocation. Visual inspections of the other grinding grooves will be undertaken.

6.8 European Cultural Heritage

Environmental Management

European cultural heritage at Mt Arthur Coal is managed in accordance with the:

- MAC-ENC-MTP-046 European Heritage Management Plan;
- MAC-ENC-MTP-048 Edinglassie and Rous Lench Conservation Management Plan - Volume 1;
- MAC-ENC-MTP-049 Edinglassie and Rous Lench Conservation Management Plan - Volume 2; and
- MAC-ENC-PRG-004 Edinglassie and Rous Lench Heritage Management Program.

Mt Arthur Coal has implemented several management plans that provide the framework to identify, assess, monitor, conserve and manage European cultural heritage. Mt Arthur Coal owns and manages five heritage-listed homesteads as follows:

- Edinglassie Homestead (state significance);
- Rous Lench Homestead (state significance);
- Edderton Homestead Complex (local significance);

- Belmont Homestead Complex (local significance); and
- Balmoral Homestead (local significance).

The two State-significant historic heritage items with possible impacts from the Mt Arthur Coal operation are the Edinglassie and Rous Lench homesteads.

The European heritage management plan assists Mt Arthur Coal to coordinate and manage the European heritage items affected or potentially affected by its operations, comply with the requirements of the *Heritage Act 1977* and the modification project approval and mitigate impacts of its operations on European cultural heritage.

Environmental Performance

During the reporting period, Mt Arthur Coal inspected all of its historic homesteads and related buildings located on freehold land to ensure properties were maintained to an acceptable standard.

Complaints and Reportable Incidents

Mt Arthur Coal did not receive any complaints, government fines or penalties related to European cultural heritage during the reporting period and there were no related reportable incidents.

Proposed Improvements

All heritage structures are planned to remain in situ during the next reporting period with no impacts predicted from the current mine plan. Inspections and maintenance measures will continue to be implemented during the next reporting period to conserve all historic homesteads and related buildings owned by Mt Arthur Coal.

6.9 Contaminated Land and Hydrocarbon Contamination

Environmental Management

Contaminated land at Mt Arthur Coal is managed in accordance with the following internal documents:

- MAC-ENC-PRO-028 Storage of Fuels and Chemicals;
- MAC-ENC-PRO-029 Spill Response;
- MAC-ENC-PRO-074 Contaminated Land Management; and
- MAC-STE-PRO-013 Hazardous Materials Management Procedure.

Hydrocarbons and other hazardous substances are kept in designated storage compounds designed and managed in accordance with relevant standards and procedures. Monitoring and inspection programs are maintained for these facilities to ensure hazardous materials and wastes are being adequately stored and disposed of and that any spills or leaks are promptly reported and managed.

Environmental Performance

During the reporting period, all spills were controlled and contained immediately using emergency spill kits or earthmoving equipment to form a temporary bund. Small spills were disposed of offsite by Mt Arthur Coal's waste contractor. Mt Arthur Coal is considering options regarding management of larger scale contaminated soils on site.

Complaints and Reportable Incidents

Mt Arthur Coal did not receive any complaints, government fines or penalties related to contaminated land or hydrocarbon contamination during the reporting period and there were no related reportable incidents.

Proposed Improvements

Mt Arthur Coal will continue to manage contaminated land and hydrocarbon contamination in accordance with project approval and legislative requirements.

6.10 Spontaneous Combustion

Environmental Management

Spontaneous combustion at Mt Arthur Coal is managed in accordance with:

- MAC-ENC-PRG-002 Spontaneous Combustion Control Program.

Mt Arthur Coal has implemented a spontaneous combustion control program to prevent, monitor, control and report outbreaks of spontaneous combustion.

Environmental Performance

Spontaneous combustion at Mt Arthur Coal is predominantly confined to old mining areas at Bayswater No. 2 and the Drayton sublease area. This is a result of the higher levels of carbon and sulphuric material in the coal seams mined in these Greta measures in comparison to those mined in current active mining areas.

During the reporting period there was an increase in the area recorded as being affected by spontaneous combustion at Mt Arthur Coal. A total of 3776 m² of land was treated for spontaneous combustion in the reporting period. A summary of spontaneous combustion in the reporting period is shown in Table 22.

The increase may be attributed to a number of things:

- Improved monitoring and survey with the implementation of drone technology for spontaneous combustion survey. This has also lead to an increase in treatment.
- There is more acting mining in the southern portion of the operations. These areas are related to the Bayswater No.2 and Drayton Sublease area. These areas are generally managed quickly as they are within active mining areas so are treated with active pit progression.
- The list to the tailings dam wall has lead to exposure of spontaneous combustion prone material. These areas are being actively monitored and are schedule to be covered with the second stage lift of the wall.

Table 22: Summary of spontaneous combustion at Mt Arthur Coal in FY20

Month	Area affected at start of month (m^2)	Area naturally extinguished (m^2)	Area treated (m^2)	New or recurring areas (m^2)	Area affected at end of month (m^2)
July	2246	0	0	504	2750
August	2750	0	1282	290	1758
September	1758	0	4	9	1763
October	1763	0	12	0	1751
November	1751	0	0	0	1751
December	1751	0	0	76	1827
January	2246	0	0	1651	3478
February	3478	0	155	4037	7360
March	7360	0	0	5	7365
April	7365	0	1140	1101	7326
May	7326	0	1101	1814	8039
June	8039	0	82	2036	10201
Total		**0**	**3776**	**11524**	

Complaints and Reportable Incidents

During the reporting period, one complaint was received regarding odour from spontaneous combustion. This complaint is discussed further in Section 9.

Mt Arthur Coal did not receive any government fines or penalties related to spontaneous combustion during the reporting period.

Proposed Improvements

Mt Arthur Coal will continue to monitor spontaneous combustion during the next reporting period, and cap readily accessible areas.

In accordance with the approved mine operations plan, overburden material will continue to be emplaced over current emplacement areas at Bayswater No. 2. This will be carried out in alignment with the design of the extension of the existing tailings storage facility, which is planned to encompass most of this area, and will ultimately treat a significant portion of identified spontaneous combustion areas.

6.11 Bushfire

Environmental Management and Performance

Bushfire at Mt Arthur Coal is managed in accordance with:

- MAC-ENC-PRO-076 Bushfire Prevention Procedure (internal document); and
- MAC-STE-PRO-010 Emergency Procedure – Bushfires (internal document).

Specific prevention and fire suppression control measures are implemented in order to protect remnant vegetation communities as well as Mt Arthur Coal infrastructure. Preventative measures include fuel load assessment and reduction programs, the establishment and maintenance of fire breaks and the prevention of ignition sources. Fire suppression and control is achieved through on-site fire-fighting equipment, including a rescue truck and water carts, facilitated by a network of roads and vehicle access trails, which provide access to all areas of Mt Arthur Coal owned land. Mt Arthur Coal also maintained a trained emergency response team on each shift, and fire extinguishers are fitted in vehicles and buildings.

No grass or bushfires occurred on site or at the conservation or offset areas during the reporting period.

Complaints and Reportable Incidents

Mt Arthur Coal did not receive any complaints, government fines or penalties related to bushfire during the reporting period and there were no related reportable incidents.

Proposed Improvements

During the next reporting period Mt Arthur Coal will continue to manage bushfire risk in accordance with relevant procedures.

6.12 Greenhouse Gas and Energy

Environmental Management

Greenhouse gas and energy at Mt Arthur Coal are managed in accordance with the MAC-ENC-MTP-040 Air Quality Management Plan.

Mt Arthur Coal undertakes regular reviews and monitoring of greenhouse gas emissions and energy efficiency initiatives to ensure that greenhouse gas emissions per tonne of product coal are kept to the minimum practicable level. During the reporting period Mt Arthur Coal continued greenhouse gas and energy consumption monitoring with the use of a centralised database to assist with monthly tracking and reporting of key emission sources. A key focus during the reporting period was to ensure the operation complied with the regulations under the *National Greenhouse and Energy Reporting* (NGER) *Act 2007*.

Environmental Performance

Total emissions were 605 kt CO_2-e in the FY20 reporting period, of which direct (scope 1) emissions accounted for 87 per cent, and scope 2 emissions from the use of grid-based electricity accounted for the remaining 13 per cent. As in the previous reporting period, Mt Arthur Coal used NGER Method 2 measurement of its open fugitive emissions, which increased in absolute terms (to 45 kt CO_2-e) and as a proportion of total scope 1 emissions (nine per cent). Fugitive emissions are expected to continue increasing over time as mining progresses into areas with higher in-situ methane contents.

Fuel combustion will continue to constitute the bulk of emissions from Mt Arthur Coal, accounting for 91 per cent of scope 1 emissions and 80 per cent of total emissions in the reporting period. Energy use was similarly dominated by diesel fuel (95 per cent), with other fuels accounting for one per cent and electricity making up the balance.

Complaints and Reportable Incidents

Mt Arthur Coal did not receive any complaints, government fines or penalties related to greenhouse gas or energy during the reporting period and there were no related reportable incidents.

Proposed Improvements

BHP is committed to reducing its operational emissions globally and has established a company-wide short-term target to maintain FY2022 emissions at or below FY2017 levels while it continues to grow its business. The company also has set a longer term goal of achieving net-zero operational GHG emissions in the latter half of this century, consistent with the Paris Agreement. In 2019, BHP announced a five–year US$400M Climate Investment Program to support funding of initiatives to reduce the company's operational emissions and those related to its value chain.

Mt Arthur Coal will continue to investigate and, where feasible, implement projects to reduce fossil fuel energy consumption and greenhouse gas emissions in accordance with BHP's sustainability commitments, including the company's greenhouse gas emission targets.

6.13 Waste Management

Environmental Management

Waste at Mt Arthur Coal is managed in accordance with:

- MAC-ENC-PRO-033 Waste Handling and Disposal (internal document).

Environmental Performance

During the reporting period Mt Arthur Coal's activities, generated approximately 3977 tonnes of both recycled and non-recycled waste sent off site for management. This is a decrease of approximately 26% per cent on the FY19 total of 5,444 tonnes. Approximately 2,962 tonnes (74 per cent) of the total waste produced and sent off site for management was recycled during the reporting period, as shown in Figure 4. This is consistent with the FY19 percentage recycled off site total of 4,457 tonnes (82 per cent).

Complaints and Reportable Incidents

Mt Arthur Coal did not receive any complaints, government fines or penalties related to waste during the reporting period and there were no related reportable incidents.

Proposed Improvements

During the next reporting period Mt Arthur Coal will continue to manage waste in accordance with relevant procedures.

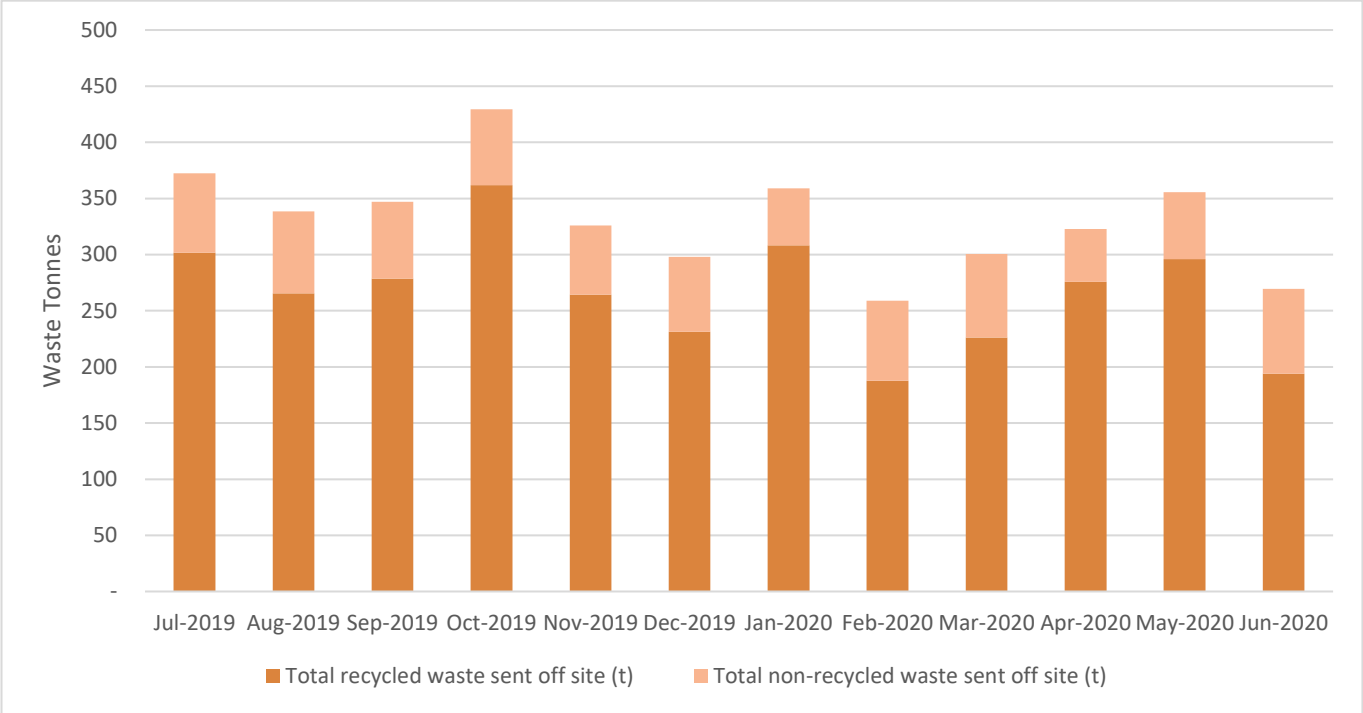

Figure 4: Waste disposal from Mt Arthur Coal

6.14 Public Safety

Environmental Management / Performance

During the reporting period Mt Arthur Coal maintained a boundary security fence around much of the perimeter of its site to ensure no unauthorised access to mining areas. A number of boom gates also exist to restrict unauthorised or unintentional access to the active mining and infrastructure areas. Routine patrols of these boundaries and access points are conducted through the engagement of third party security specialists and by internal statutory compliance personnel with no identified security or access breaches occurring during the reporting period.

During the reporting period Mt Arthur Coal maintained a permanent emergency response team consisting of BHP Emergency Services Officers and Paramedics. These personnel, along with the existing volunteer emergency response team, provide a professional emergency response service to site. The team are dedicated to ongoing continuous improvement, standardisation and preventative work.

Complaints and Reportable Incidents

Mt Arthur Coal did not receive any complaints, government fines or penalties related to public safety during the reporting period and there were no related reportable public safety incidents.

Proposed Improvements

Mt Arthur Coal will continue to maintain and monitor site security and ensure public safety during the next reporting period.

7. Water Management

7.1 Water Balance

Mt Arthur Coal maintains a site water balance model incorporating surface and groundwater inputs and outputs. The model is used to interpret current conditions and forecast future mine water inventories and use. The model build generally aligns to the Minerals Council of Australia Water Accounting Framework.

Mt Arthur Coal did not discharge water into the Hunter River from its licensed discharge point under the Hunter River Salinity Trading Scheme (HRSTS) during the reporting period.

Water use totaled 8,100 ML during the reporting period. The use is a total of model outputs including evaporation, product entrainment and task loss. This is an increase in water usage compared to the 7,200 ML used in FY19. The change in water use is primarily related to increased dust suppression use as a result of climatic conditions.

The largest input to site is typically rainfall as outlined in the modification project environmental assessment, however this was not the case during the reporting period due to ongoing drought conditions and depletion of stored water on site. The largest input to the site was licensed extraction from the Hunter River of approximately 4,509 ML, as shown in Table 23.

Mt Arthur Coal continued to source water from the Muswellbrook Shire Council treated effluent scheme to reduce the demand from other external sources. An estimated 700 ML of recycled effluent was brought onto site for reuse in site operations. This supply contract renewal is anticipated to be executed early in the next reporting.

Table 23: Water take for FY20

Water Licence number	Water sharing plan, source and management zone	Entitlement (Unit Shares)	Passive take / inflows (ML)	Active pumping (ML)	Total (ML)
WAL 917	Hunter Regulated River Water Source (High Security), Zone 1A Management Zone	2,197	-	1,686.9	1686.9
WAL 918	Hunter Regulated River Water Source (General Security), Zone 1A Management Zone	3,564	-	3,060.5	3,060.5
WAL 1296	Hunter Regulated River Water Source (Supplementary), Zone 1A Management Zone	301	-	0	0
WAL 18141	Hunter Regulated River Alluvial Water Source, U/S Glennies Creek Management Zone	104	50*	-	50*
WAL 18247	Hunter Regulated River Alluvial Water Source, U/S Glennies Creek Management Zone	247	191*	-	191*
WAL 41495	Sydney Basin-North Coast Groundwater Source	750	750^	-	750^
WAL 41556	Sydney Basin-North Coast Groundwater Source	250	58^	-	58^

* Alluvial inflow has been calculated, based on predicted flux to and from alluvium (ML/day) as reported in the EIS, to be a total of 241 ML, which has been allocated across the two alluvial licences.

^ Groundwater seepage has been calculated, based on predicated average inflow to the pits (ML/day) as reported in the EIS, to be a total of 808 ML, which has been allocated across the two groundwater licences.

Proposed Improvements

Mt Arthur Coal will continue to use site water collected in both in-pit and out-of-pit storages prior to the use of water from the Hunter River. Where plans indicate that there would be sufficient water stored on site, water allocations for the Hunter River will continue to be offered to leaseholders and near neighbours as a temporary transfer.

7.2 Erosion and Sediment

Environmental Management

Erosion and sediment at Mt Arthur Coal is managed in accordance with:

- MAC-ENC-PRO-060 Erosion and Sediment Control Plan;
- MAC-ENC-PRO-061 Surface Water Monitoring Program; and
- MAC-ENC-PRO-063 Surface and Ground Water Response Plan.

Environmental Performance

Total suspended solids (TSS) results remained low during the reporting period at the majority of statutory sites with below average rainfall limiting the number of samples collected as monitoring points were recorded as dry or water level was too low to sample. The TSS results were mostly consistent compared with results from previous financial years. TSS results are summarised in Table 25, with further results presented in Appendix 1 – Surface Water Quality Monitoring Results. Water management structures were also routinely inspected after rain events > 25mm and maintained to ensure they are performing to design and prevent impacts on downstream waters.

During the reporting period monitoring of riparian vegetation was undertaken as part of the annual riparian vegetation and channel stability assessment, in accordance with the Surface Water Monitoring Program. Table 24 summarises the results of the riparian vegetation assessment undertaken at the monitoring sites. The results of the FY20 channel stability assessment are generally consistent with previous monitoring years' findings. Most sites showed a decrease native and introduced species likely attributable to the current drought condition scores. No active remediation or treatment is recommended at this stage (except for control of priority woody weeds in some sections of Quarry Creek and Ramrod Creek), although these areas should be monitored routinely as part of current programs and potentially after heavy rainfall events.

Table 24: Riparian vegetation assessment - species diversity and total condition scores for FY20

Site	SW03 (Saddlers Creek)			SW04 (Quarry Creek)			SW12 (Ramrod Creek)			SW15 (White's Creek Diversion)		
	FY20	FY19	FY18	FY20	FY19	FY18	FY20	FY19	FY18	FY20	FY19	FY18
Number of native species (% of total)	34 (79)	46 (68)	59 (76)	9 (60)	15 (47)	15 (56)	17 (61)	30 (65)	17 (46)	8 (40)	16 (41)	8 (31)
Number of introduced species (% of total)	9 (21)	22 (32)	19 (24)	6 (40)	17 (53)	12 (44)	11 (39)	16 (35)	20 (54)	12 (60)	20 (59)	18 (69)
Total number of species	43	68	78	15	32	27	28	46	37	20	36	26
Total condition score (% of 32)	25 (78)	27 (84)	26 (81)	21 (78)	25 (81)	25 (81)	25 (81)	25 (81)	25 (81)	24 (75)	24 (75)	24 (75)

Improvements that occurred during the reporting period include:

- The amelioration of dispersive soils were made as part of the FY20 rehabilitation program;
- New sediment controls including sediment control ponds; and
- Erosion and sediment controls are implemented as part of the Permit to Disturb process and inspected on an as needed basis.

Complaints and Reportable Incidents

Mt Arthur Coal did not record any erosion or sediment control complaints or incidents during the reporting period.

Proposed Improvements

New sediment dams constructed for expanded overburden emplacements in the conveyor corridor and upper Saddlers Creek catchment, and the out of pit emplacement area, will be constructed in accordance with the provisions for sediment retention basins in the Managing Urban Stormwater – Soil and Construction Volume 2E – Mines and Quarries Guidelines (DECC, 2008).

Areas prone to erosion with exposed dispersive soils are focused in freshly established rehabilitation areas. These areas undergo annual landform stability assessments as per MAC-ENC-PRO-080 Rehabilitation and Ecological Monitoring Procedure. Plans for improvements to soil amelioration as per the response to the NSW Resources Regulator were developed in the reporting period for execution in FY21. Refer to Section 8 for further details.

7.3 Surface Water

Environmental Management

Surface water at Mt Arthur Coal is managed in accordance with:

- MAC-ENC-MTP-034 Site Water Management Plan (WMP);
- MAC-ENC-PRO-061 Surface Water Monitoring Program;
- MAC-ENC-PRO-059 Site Water Balance;
- MAC-ENC-PRO-063 Surface and Ground Water Response Plan (SWMP); and
- MAC-ENC-PRO-032 Water Management (internal document).

The MAC-ENC-MTP-034 Site Water Management Plan was revised during the reporting period, submitted to DPIE in April 2020 and was under assessment at the time of writing this report. The revised WMP incorporates each of the site water management documents referenced above into a single consolidated WMP.

Water quality downstream of Mt Arthur Coal's operation is currently monitored by an independent consultant at five statutory monitoring sites, plus Mt Arthur Coal's licensed discharge point.

Mt Arthur Coal's Site Water Management Plan outlines measures for managing water on site, while the Surface Water Monitoring Program establishes impact assessment criteria against which monitoring results are compared. Impact assessment criteria are presented as trigger values which, if exceeded, lead to a response such as more intensive monitoring, investigation and if required, remedial action.

Environmental Performance

A summary of the surface water quality data for statutory sites during the reporting period is provided in Table 25, with further results provided in Appendix 1 – Surface Water Quality Monitoring Results.

Water quality parameters in natural watercourses surrounding the mine including Saddlers Creek (SW02 and SW03), Quarry Creek (SW04), Ramrod Creek (SW12) and Whites Creek (SW15) were subject to normal variations in response to the ephemeral nature of the creeks, local geology and weather conditions. Water quality parameters are only recorded at the HRSTS discharge point (SW28) during discharge, and no HRSTS discharge occurred during the reporting period.

Surface water pH measured at individual statutory sites remained relatively constant during the reporting period and within the impact assessment trigger levels of 6.5-9.0 at all times. Surface water EC measured at individual statutory sites remained below impact assessment trigger levels during the reporting period with the exception of SW03 which

recorded an elevated result in December 2019 this results however was determined to be invalid due to a prolonged drought leading no flow in the creek and the pool being close to empty at the time of sampling. Surface water TSS measured at individual statutory sites remained below impact assessment trigger levels during the reporting period at all statutory sites. Results are summarised in Table 25.

SW02 was dry during the reporting period. SW03 was too low to sample for three months. SW04 was too low to sample in eight months. SW12 was too low to sample for three months. SW15 was dry for five months.

Surface water monitoring locations are shown in Figure 5.

Insert in PDF

Figure 5: Groundwater and surface water monitoring locations

Table 25: Summary of statutory surface water quality monitoring results

Site	Impact Assessment Criteria Trigger Values			Monitoring Results			Trend/ key management implications	Implemented / proposed management actions
				min	ave	max		
SW02	pH	6.5 – 9.0		-	-	-	No assessment criteria triggered. Dry during the reporting period	Gain approval of the revised WMP. Continue managing surface water in accordance with site WMP
	EC (µS/cm)	Stage 1	12,365	-	-	-		
		Stage 2	13,900					
	TSS (mg/L)	Stage 1	219	-	-	-		
		Stage 2	277					
SW03	pH	6.5 – 9.0		7.5	7.7	8.0	No assessment criteria triggered	
	EC (µS/cm)	Stage 1	10,133	3,905	7,018	12,300	Stage 1 criteria exceeded on one occasion (not a reportable exceedance) Stage 2 criteria exceeded on one occasion 17/12/2019 determined to be in invalid result. Below average rainfall not mine activity. SW03 was an isolated pond with low volume at the time of sampling (not a reportable exceedance).	
		Stage 2	11,402					
	TSS (mg/L)	Stage 1	37	<5	12	19	No assessment criteria triggered	
		Stage 2	46					
SW04	pH	6.5 – 9.0		7.4	8.0	8.5	No assessment criteria triggered	
	EC (µS/cm)	Stage 1	13,959	474	1381	3620	No assessment criteria triggered	
		Stage 2	15,509					
	TSS (mg/L)	Stage 1	82	8	15	22	No assessment criteria triggered	
		Stage 2	104					
SW12	pH	6.5 – 9.0		7.0	7.4	7.7	No assessment criteria triggered	
	EC (µS/cm)	Stage 1	6,659	7.89	2,551	4,640	No assessment criteria triggered	
		Stage 2	7,153					
	TSS (mg/L)	Stage 1	555	<5	19	44	No assessment criteria triggered	
		Stage 2	708					
SW15	pH	6.5 – 9.0		7.5	7.6	7.9	No assessment criteria triggered	
	EC (µS/cm)	Stage 1	7,128	508	772	1,360		
		Stage 2	8,262					
	TSS (mg/L)	Stage 1	103	<5	11	14		
		Stage 2	130					

Complaints and Reportable Incidents

Mt Arthur Coal did not have any complaints relating to surface water.

Mt Arthur Coal had two reportable incidents relating to surface water. Both relating to a discharge from site as a result of a break in a mine water pipe. Both incidents were reported to the EPA and DPIE. These incidents are discussed further in Section 11.

Proposed Improvements

Mt Arthur Coal will finalise the update to the site Water Management Plan during the next reporting period.

7.4 Ground Water

Environmental Management

Ground water at Mt Arthur Coal is managed in accordance with:

- MAC-ENC-MTP-034 Site Water Management Plan;
- MAC-ENC-PRO-062 Ground Water Monitoring Program (GWMP); and
- MAC-ENC-PRO-063 Surface and Ground Water Response Plan.

Mt Arthur Coal's Site Water Management Plan aims to minimise any adverse impacts on aquifers in proximity to the operation, including the two major aquifer areas, the hard rock coal measures and the shallow alluvial deposits associated with the Hunter River.

The Ground Water Monitoring Program outlines program requirements for monitoring of potential groundwater impacts from mining operations. A program to upgrade ground water monitoring bores, and improve monitoring accuracy, was completed during the FY16 reporting period. Following this a two year interim monitoring program as outlined in Appendix 3 of the GWMP was undertaken, concluding during the FY18 reporting period.

An assessment and analysis of interim monitoring program data was undertaken during the FY19 reporting period by an independent consultant in order to determine if a sufficient reference dataset had been collected to revise and set new groundwater triggers. Following review of the interim monitoring program Mt Arthur Coal revised the groundwater monitoring program with a quarterly sampling schedule (increased from biannual) and revised trigger values, as well as observations and other recommendations from the review. This will form part of the update of the site Water Management Plan, which is currently being undertaken. The revised site Water Management Plan was submitted to DPIE for approval during the this reporting period and is still under assessment.

Although the FY19 Annual Review stated that groundwater trigger values were revised following the completion of the interim monitoring program and would be applied from the FY20 monitoring period, instead the currently approved GWMP dated 28 April 2015 is applicable for the FY20 monitoring period. The revised triggers will not be applied until further review and subsequent approval by the DPIE.

In anticipation of moving to the revised site Water Management Plan, Mt Arthur Coal adjusted the sampling frequency to quarterly instead of bi-monthly (which is beyond the requirements of the currently approved GWMP) and also adjusted the sampling requirements at some of the sites as recommended by the independent consultant. This proactive implementation of the revised site Water Management Plan did result in the following non-compliances with requirements in the currently approved Groundwater Monitoring Program:

- Manual water level data was not collected at all monitoring sites every two months as required. Water level data was collected quarterly for reporting period;
- Water level data collection for GW26 and GW27 were prematurely removed from the monitoring program;
- Water quality samples were collected for total phosphorus and the full suite of metals (aluminium, antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, molybdenum, selenium and zinc) only once rather than twice during the reporting period.
- Water quality data was not collected at all during the reporting period at sites GW6, GW7, GW26, GW42 and GW43 as required.

The Surface and Ground Water Response Plan outlines the response actions to be implemented, should ground water monitoring trigger values be exceeded. Management measures associated with the alluvial ground water cut-off wall and flood levee constructed parallel to Denman Road along the northern boundary of the site to prevent both surface and subsurface migration from the Hunter River to the active pit, have also been incorporated into the Surface and Ground Water Response Plan.

Environmental Performance

A groundwater review was undertaken by an external specialist consultant for the reporting period. The scope of work included:

- Comparison between modelled and observed water levels to June 2020;

- Compare monitoring data to drawdown predictions for the Mt Arthur Coal Consolidation Project Environmental Assessment and the current modelling for the approved operations;
- Review site water quality monitoring data, field reports and laboratory reports and check performance;
- Review of groundwater triggers and report on any trigger exceedances, where review will be based on both the current established groundwater triggers for the site; and
- Review performance of the cut-off wall using available data.

The full Annual Groundwater assessment report is included as Appendix 2.

Drawdown and cut off wall performance

Water level data collected from July 2019 to June 2020 have been compared to the trigger values outlined in the GWMP 2015. The general purpose of these plans is to minimise any adverse impacts on aquifers in proximity to the operation and early indication of adverse impacts. Five bores recorded a water level exceedance over the reporting period: GW23, BCGW18, OD1078P (IW4028), OD1078-Piezo, VWP2 and VWP3.

An analysis of the trigger exceedances is included in Table 26.

A cut-off bentonite barrier wall was constructed between the Huon Open Cut and the Hunter River alluvium in the vicinity of the F4 fault. The purpose of the cut-off wall is to minimise drawdown within the alluvium. VWPs were installed near the cut-off wall to monitor the Permian coal measures underlying the Hunter River alluvium.

Groundwater levels have declined 83 m in the F4 Fault, 97 m in the Edinglassie Seam and 103 m in the Ramrod Creek Seam since installation in 2011. Bore GW42 intersects alluvium and shallow weathered sandstone (regolith) and is located adjacent to the VWPs. Groundwater levels at GW42 remained fairly stable, with a minor increase of 0.32 m since February 2016. As noted in previous reviews, bore GW42 fluctuates in response to rainfall and streamflow trends. Depressurisation observed in the Permian coal measures has not impacted on alluvium and regolith groundwater levels at GW42.

Depressurisation observed in the Permian coal measures also does not appear to have impacted on alluvium groundwater levels as shown by the relatively stable groundwater level trends shown by bores GW16 and GW21. However, as noted earlier these bores may also be influenced by local agricultural land use with enhanced recharge through irrigation. Regardless, the alluvial monitoring shows no adverse impact on the alluvial groundwater conditions and beneficial use of groundwater.

Table 26: Summary of ground water monitoring results by aquifer

Bore ID	Screened Lithology	Location	Comment
GW2	Woodlands Hill Seam	Saddlers Creek/ Saddlers Pit	The 2015 trigger level is set at 145.4 mAHD for bore GW2, and levels has been recorded below 145.4 mAHD from 2008 to 2011, and since 2015. The bore intersects the Woodlands Hill Seam at around 110 m depth. The bore is located within 700 m of Saddlers Pit and within the extent of predicted depressurisation within the Permian coal measures.
GW3	Woodlands Hill Seam	Saddlers Creek/ Saddlers Pit	The 2015 trigger level is set at 145.3 mAHD for bore GW3, and levels has been recorded below 145.3 mAHD from 2017. The bore intersects the Woodlands Hill Seam at around 120.4 m depth. The bore is located within 730 m of Saddlers Pit and around 250 m downslope of GW2, and within the extent of predicted depressurisation within the Permian coal measures.
GW21	Alluvium	Hunter River	Groundwater levels at bore GW21 that intersects the Hunter River alluvium fell below the groundwater level trigger in Q1 and for two consecutive readings in Q3 and Q4. Groundwater levels at GW21 have regularly fluctuated, and show no clear correlation to rainfall trends but show a close correlation to Hunter River levels. The bore is located within 200 m of the Hunter River, and

			demonstrates the influence of the river on the adjacent alluvium. No impacts due to mining are visible in the trends.
GW23	Coal (Ramrod Creek)	On site - north of Mt Arthur North (off Denman Rd)	Groundwater levels have remained below the 2015 trigger level of 132.5 mAHD since monitoring began in 2008. Water levels have remained relatively stable since 2016, with a slight (1-2m) rise in water levels in 2016. It is noted that the logger within GW23 shows instrument drift, with levels deviating from manual dipped levels by as much as 6 m since June 2019. This is the first annual review where the issue of instrument drift has been identified. It is recommended that the datalogger be replaced to assist in correlating groundwater trends with rainfall and streamflow trends.
GW39P	Warkworth Seam	Off Denman Rd - Denman Road West	The 2015 trigger level is set at 120.9 mAHD, and levels have been recorded below 120.9 mAHD since 2016. The bore is constructed as a nested bore with a 75 mm screen to 25.5 m within coal (potentially Mt Arthur Seam), and 25 mm casing to 42.1 to just above the Warkworth Seam. It is assumed the results for GW39P are representative of the larger diameter bore to 25.5 m depth, but this should be verified in the field. The bore is located within an irrigated paddock (central pivot) near the Hunter River, approximately 2 km south-west of MAC open pit and within the extent of predicted depressurisation within the Permian coal measures. The bore is near an alluvial bore (GW39A) and previously recorded an upward gradient from the coal measures to the overlying alluvium. Since 2014 a downward gradient has been shown, with groundwater levels within the coal measures declining over time. This decline likely relates to depressurisation of the coal measures with progression of mining. In contrast bore GW39A has recorded relatively stable groundwater levels at around 221.3 mAHD (± 0.1 m), with a recent slight rise in levels in response to above average rainfall.
BCGW18	Arrowfield	On site – south of MAC open pit and along Quarry Creek	The 2015 trigger level is set at 174.4 mAHD and denoted as being at the base of the bore. The GWMP trigger appears to be erroneous and should be set at 147.7 mAHD, which is the actual elevation for the base of the screen in the bore. The bore has recorded a gradual decline in groundwater levels over time, which became more pronounced since 2016, with the bore potentially dry, with levels at or below 147.7 mAHD since January 2019. The bore is located approximately 2 km south of the active mine pit, within the extent of predicted depressurisation within the Permian coal measures.
OD1078-piezo	Bowfield	On site - south west of Mt Arthur North, beside the drainage coming from the Belmont Pit	Groundwater levels have declined by over 33 m since the start of monitoring in 2008. The rate of decline in levels increased rapidly during March 2017 until June 2020 with groundwater levels declining by 25 m during this period. Water levels declined below the 2015 trigger level of 142.3 mAHD in September 2017. The bore is located approximately 2 km south of the active mine pit, within the extent of predicted depressurisation within the Permian coal measures. It is noted that the logger within OD1078-piezo shows instrument drift, with levels deviating from manual dipped levels by as much as 92 m since October 2017. This is the first annual review where the issue of instrument drift has been identified. It is recommended that the datalogger be replaced to assist in correlating groundwater trends with rainfall and streamflow trends.
OD1078 P (IW4028)	Arrowfield	On site - south west of Mt Arthur North	Groundwater levels have declined over 15 m since February 2016. Water levels have remained below the 2015 trigger level of 153.5 mAHD since monitoring began. The bore is located approximately 2 km south of the active mine pit, within the extent of predicted depressurisation within the Permian coal measures. It is noted that the logger within OD1078P (IW4028) shows instrument drift, with levels deviating from manual dipped levels by as much as 13 m since November 2018. This is the first annual review where the issue of instrument drift has been reported. It is recommended that the datalogger be replaced to assist in correlating groundwater trends with rainfall and streamflow trends.

VWP2	F4 fault	North of MAC open pit, adjacent to cut-off wall	Levels in the F4 fault exceeded the 2015 trigger level since 2013, with trends consistent with the decline in groundwater head in the coal measures recorded at nearby VWP1 and VWP3. The continuing declining groundwater level trend represents mining induced depressurisation in the Permian coal measures. It is recommended that the water level trigger be reviewed.
VWP3 – 227 m **VWP3 – 241m**	Edinglassie Ramrod Creek	North of MAC open pit, adjacent to cut-off wall	Levels in both the Edinglassie and Ramrod Creek seams have exceeded the 2015 trigger level since 2013. The continuing declining groundwater level trend represents mining induced depressurisation as is predicted for the approved operations. It is recommended that the water level trigger be reviewed.

** TLE = Trigger Level Exceedance*

Groundwater Quality

A summary of the ground water quality data for each key aquifer during the reporting period is provided in Table 27. Assessment criteria for groundwater monitoring results consists of a two stage trigger process for EC, and pH results outside the trigger range of 6.5 to 9.0 over three consecutive readings.

Table 27: Summary of ground water monitoring results by aquifer

Bore ID	Screened Lithology	Location	Comment
BCGW22P (IW4026)	Glen Munro	On site - south west of Bayswater No. 3	The bore is over 2 km from the active mine areas and 1 km from a historical rehabilitated pit. EC has an increasing trend, ranging from 8960 µS/cm in November 2017 to 16270 µS/cm in June 2020. It is noted that groundwater levels declined over early 2018 but then rapidly rose by 2.66 m between July 2018 and December 2018. The 2015 1st stage trigger level of 15526 µS/cm was exceeded in March and June 2020. Further review of water quality and potential water sources in the area is recommended. This includes the backfilled pit and water storage within Belmont Pit.
GW2	Woodlands Hill Seam	Saddlers Creek	EC has an increasing trend since June 2015 with fluctuations. Exceeded the EC 2015 1st stage trigger level of 4266 µS/cm in March 2020 and 2nd stage trigger level of 4440 µS/cm in June 2020. Groundwater levels declined from 2017 to 2019 in line with below average rainfall; however, levels have remained relatively stable since 2019 despite continued below average rainfall. Further review of the water quality data and water types is recommended.
GW21	Alluvium (Hunter River)	Off Denman Rd - Edinglassie Homestead	pH has been relatively stable since monitoring began, but fell below the 1st stage 2015 trigger level of 6.5 in June 2020 (6.39). EC was relatively stable since monitoring began. Bore GW21 is an alluvial bore and the groundwater level trends show no clear correlation to rainfall trends. As with bore GW16, the bore appears to be within an irrigated farm paddock and the trends may relate to local land use. It is recommended that the condition of the bore and site land use be checked, with information on local irrigation practices collected.
GW39A	Alluvium (Hunter River)	Off Denman Rd - Denman Road West	EC has fluctuated seasonally since monitoring began. Since December 2019 EC has increased and exceeded 2015 2nd stage trigger level of 6740 µS/cm in March and June 2020. Bore GW39A is an alluvial bore and the groundwater level trends show no clear correlation to rainfall trends. As with bore GW16 and GW21, the bore appears to be within an irrigated farm paddock (central pivot) and the trends may relate to local land use. It is also noted that the bore was hand bailed when sampled, which may have influenced the results. It is recommended that sampling technique be reviewed and the condition of the bore and site land use be checked, with information on local irrigation practices collected.

GW40A	Alluvium (Hunter River)	Hunter River alluvium, west of Mt Arthur Open Cut	EC has fluctuated seasonally since monitoring began. Since September 2019 EC has increased and exceeded the 2015 2nd stage trigger level of 4587 µS/cm in March and June 2020. Review of water level trends shows a general decline in levels since 2013, despite periods of above average rainfall from 2013 to 2017. The bore is located over 3 km from Mt Arthur mine and the decline in levels is unique compared to bores closer to the mine area (i.e. GW16). The bore is positioned on a private property with infrastructure (houses and sheds). It is recommended that the condition and use of the bore is checked, and water supply use in the area verified.
GW41A (IW4029)	Alluvium (Hunter River)	Hunter River alluvium, west of Mt Arthur Open Cut, west of GW40A	Bore GW41A is located over 5 km from the mine area, and within an agricultural area. The bore log indicates GW41A intersects alluvium and is screened shallower (4.5 to 7.5 mbgl) than the original bore (4.5 to 11.6 mbgl). The original GW41A had a relatively stable EC of 3520 µS/cm to 5060 µS/cm from 2008 to 2018, until the bore was decommissioned in July 2018. The replacement bore has recorded an increasing trend in EC since monitoring began in 2016, rising from 815 µS/cm to 10600 µS/cm. GW41A EC has exceeded the 2015 2nd stage trigger level of 4120 µS/cm since July 2019. Since January 2020 the bore recorded a decline in pH from 7.5 to 6.5 and a rise in EC from 815 µS/cm to a peak of 10600 µS/cm in March 2020. This trend is unique to the bore, and due to this and the distance from the mine, likely relates to local agricultural land use practices. It is also noted that the bore was hand bailed when sampled, which may have influenced the results. It is recommended that sampling technique be reviewed and the condition of the bore is recommended, along with information about local land use and irrigation.

Proposed Improvements

- Undertake a review of the groundwater monitoring program be rationalised based on recent findings and additional newly installed bores.
- Review the WMP to ensure consistency between the field program and management plan.
- Review the condition and instrumentation of groundwater bores based on the recommendations the of the annual review assessment report.

8. Rehabilitation

8.1 Buildings and Infrastructure

The former Bayswater conveyor was decommissioned this reporting period. The area now forms part of the Conveyor Corridor overburden dump.

8.2 Topsoil

Topsoil management at Mt Arthur Coal focuses on maintaining the quality of the topsoil resource as a rehabilitation growth medium. Activities undertaken during the reporting period included:

- Prioritising direct placement of topsoil;
- Testing topsoil to determine appropriate depths for stripping and recovery as well as ameliorant requirements;
- Felling and mulching trees in situ on disturbance areas to increase organic content within the topsoil that was used directly on rehabilitation areas; and
- Reusing felled trees from disturbance areas on new rehabilitation areas to provide habitat.

Additional measures generally undertaken when stockpiling topsoil include:

- Restricting stockpile height to generally three metres or less, consistent with the MOP, to minimise compaction and anaerobic conditions within topsoil stockpiles;
- Locating stockpiles so as to reduce the requirement for re-handling and establishing cover crops; and
- Spraying topsoil stockpiles to manage weeds.

Topsoil was placed and spread to an approximate depth of 200 to 300 millimetres on rehabilitation areas. The newly spread topsoil surface was contour cultivated prior to sowing to provide a suitable environment that encourages water infiltration in the soil.

8.3 Landform Design

Mt Arthur Coal aims to create rehabilitation that is safe, stable and non-polluting, that is self-sustaining and comparable to the surrounding natural landscape. Landform and rehabilitation incorporates natural micro-relief and natural drainage lines for landforms designed and constructed post the current modification project approval. The proposed design methodology chosen is an adaptation of the Geofluv™ approach (geomorphic design). The geomorphic design uses the characteristics of stable natural alluvial landforms in the local environment as an analogue on which to base the design of overburden landforms. Importantly, the approach does not replicate existing landforms, but rather uses the key characteristics that make these landforms stable in a new design. Natural landforms in alluvial materials are characterised by an integrated network of drainage channel, typically with slopes initially convex close to ridge lines, becoming concave and progressively flattening with increasing catchment area. The aim is to establish landforms consistent with the erosion rate of natural features in the area.

Future use of areas disturbed by active mining is closely linked to landform design and general vegetation strategies found in the Synoptic Plan. The Environmental Assessment states ‘the conceptual final landform provides an integrated landscape that is consistent with the Synoptic Plan and aims to link existing vegetation communities with mine rehabilitation areas to provide fauna movement corridors for the movement of fauna’. These proposed corridors are consistent with, and will further complement, both the Synoptic Plan and the final landforms of surrounding areas.

Management measures designed to reduce the visual impact created by the overburden emplacement have been incorporated into the mine plan. Such measures include:

- The integration of tree corridors on overburden emplacements as part of progressive rehabilitation;
- The retention of the eastern flank of MacLean’s Hill to assist in creating landscape diversity at the foot of overburden emplacements;

- Modifying final void high walls and low wall slopes to minimise final disturbance;
- Incorporating micro relief features (stag trees, ripping, rock features and habitat trees) throughout overburden emplacements to provide an enhanced naturally appearing landform and fauna habitat;
- The practical consideration of 'Geofluv type' designs on emplacements to sustainably manage water and create a natural looking and stable landform;
- The strategic design and rehabilitation of overburden emplacements for increased visual shielding of operations;
- Establishing visual and ecological planting patterns of native trees to achieve landscape patterns that complement the existing spatial distribution of tree and grass cover in a grazing landscape; and
- Minimising exposure of work areas to sensitive receivers where possible, largely through the timely rehabilitation of visible overburden emplacements.

The final landform design can be seen in Figure 6. Figure 6 shows bulk shaping prior to topsoil placement. Although this geomorphic design has been implemented on other sites within NSW and also worldwide there are many defining characteristics that restrict its use such as space, waste characterisation, rainfall, availability of suitable rock, availability of mulch, final landuse, landform height and steepness of the landform. Mt Arthur Coal has larger higher landforms than other sites in the Hunter Valley, and is also space constrained for emplacement area. The resultant design aligns with industry best practice, but will be monitored over the coming years to ensure further natural landform design incorporates learnings and improvement from the current work.

The MAC-ENC-MTP-047 Rehabilitation Strategy with updated designs was submitted to the former DP&E and former DRG in 2018 with updated information in relation to the design use and void management.

Figure 6: Rehabilitation at Saddlers Central emplacement using natural landform design

8.4 Disturbed Land

Rehabilitation of land is carried out in accordance with:

- MAC-ENC-MTP-052 Mt Arthur Coal Mining Operations Plan;
- MAC-ENC-MTP-047 Rehabilitation Strategy;
- MAC-ENC-MTP-050 Biodiversity Management Plan;
- MAC-ENC-PRO-080 Rehabilitation and Ecological Monitoring; and
- MAC-ENC-PRO-012 Land Management Procedure.

Rehabilitation is designed to achieve a stable final landform compatible with the surrounding environment and to meet the landform commitments presented in the MOP.

This reporting period saw Mt Arthur Coal increased volume and quality of newly established rehabilitation. During the reporting period Mt Arthur Coal completed (achieved Phase 4 – Ecosystem and Landuse Establishment) 81 hectares of rehabilitation across four areas (VD5, VD4, Drayton Void and Saddlers Central). An additional 31.3 hectares entered Phase 3 – Growing Media Development with topsoil being spread. This was aligned to the MOP target of 81 hectares to Phase 4 – Ecosystem and Landuse Establishment, as shown in Table 28. Areas of rehabilitation

undertaken during the reporting period are shown in Appendix 5. The final area entering rehabilitation of 112.3 ha is a significant increase in annual rehabilitation at Mt Arthur Coal.

The trial of using Unmanned Aerial Vehicle (UAV) continued for the early part of the reporting period. The UAV seeding was found to be difficult to manage for large areas. As a result Mt Arthur Coal utilised a plane to complete seeding in FY20. This allowed Mt Arthur Coal to target ideal seeding period (April) and conditions with rainfall occurring within two weeks of seeding, thus improving the chances of quality rehab establishing.

Both woodland and pasture seed mixes and rates have been revised in consultation with an independent specialist, as specified in the MOP.

Table 29 provides the Mt Arthur Coal rehabilitation summary for the operation.

Table 28: Mt Arthur Coal rehabilitation claimed for FY20

Rehabilitation phase	FY20 MOP rehabilitation commitments (hectares)	FY20 areas in active rehabilitation phases (hectares)
Phase 2 – Landform Establishment	0	4.4
Phase 3 – Growing Media Development	0	26.9
Phase 4 – Ecosystem and Landuse Establishment	81	81
Total	**81**	**112.3**

Note: All areas calculated using GDA1994 Zone 56 coordinate system

Table 29: Mt Arthur Coal rehabilitation summary

Mine area type	Previous reporting period (FY19 actual)	This reporting period (FY20 actual)	Next reporting period (FY21 forecast)
A. Total mine footprint[1]	5,171	5,333	5,609
B. Total active disturbance[2]	3,871*	4,152	4,662
C. Land being prepared for rehabilitation[3]	89	31.3	5
D. Land under active rehabilitation[4]	1,211*	1181	947**
E. Completed rehabilitation[5] (as formally certified by NSW Government)	0	0	0

Note: All areas calculated using GDA1994 Zone 56 coordinate system
* Reconciled via survey from FY19
** FY19 actuals, minus FY20 forecast dehab plus FY20 rehabilitation target
1 Total mine footprint includes all areas within a mining lease that either have at some point in time or continue to pose a rehabilitation liability due to mining and associated activities.
2 Total active disturbance includes all areas ultimately requiring rehabilitation.
3 Land being prepared for rehabilitation includes the sum of mine disturbed land that is under the following rehabilitation phases – decommissioning, landform establishment and growing media development (as defined in DRE MOP/Rehabilitation Management Plan Guidelines).
4 Land under active rehabilitation includes areas under rehabilitation and being managed to achieve relinquishment.
5 Completed rehabilitation requires formal signoff by the NSW Resources Regulator that the area has successfully met the rehabilitation land use objectives and completion criteria.

8.5 Other Activities

During the reporting period other rehabilitation related activities undertaken included weed spraying, soil management, minor earthworks repairs and feral animal control.

During the reporting period Mt Arthur Coal appointed a dedicated Rehabilitation Specialist role, which is responsible for collaborating with and influencing mine planning to achieve MOP rehabilitation targets using industry best practice methods, as well as implementing the rehabilitation maintenance and improvement program of works.

A project of improvement of VD1 rehabilitation including:

- Targeted spot weed treatment in higher value areas as presented in Future Harvest 2019
- Stem density reduction in areas dominated by spotted gum;
- Construction of terrestrial fauna habitat; and
- Detailed weed mapping to aid planning works.

Further improvement works can be found in Table 33, as recommended in various consultant reports for the site.

Figure 7: VD5 natural landform design showing FY18-FY20 rehabilitation. Image collected in November 2019 prior to rainfall.

Figure 8: VD5 natural landform design showing FY18-FY20 rehabilitation. Image collected in April 2020 following rainfall.

Drought impacted the first half of the reporting period limiting revegetation efforts. Significant rainfall was received on site in the second half of the reporting period increasing vegetation cover (see Figure 7 and Figure 8 for comparison). This has helped to stabilise the landform but will need intense weed treatment in the short term to keep on track.

A significant review of the Rehabilitation and Ecological Monitoring procedure (REMP) was undertaken in the reporting period. The review included:

- Transitioning the methodology to the Biodiversity Assessment Method (BAM);
- Increased monitoring locations of established rehabilitation;
- An increase in routine inspections as part of land form stability monitoring (Routine Walkover Inspection);
- Independent revegetation inspection aligned with the ecological development monitoring;
- Aligning visual amenity monitoring with rehabilitation goals; and
- Formalising the Ground & Pasture Assessment (GPA) methodology.

In the reporting period Mt Arthur Coal completed the five yearly GPA monitoring. The assessment found:

In general all rehabilitated sites had excellent levels of groundcover and had a good diversity of perennial grass pasture species present. Established rehabilitated sites, excepting the recently established Drayton North, are capable of supporting beef cattle grazing given their established perennial grass species composition and groundcover percentages.

Rehabilitation Management Plan (RMP) trigger points are presented in Table 30 and GPA monitoring results are summarised in Table 31.

Table 30 Ground and Pasture Assessment Rehabilitation Management Plan Trigger points

Component	Lowest	Ideal	Comment
Ground Cover	70%	90-100%	80% cover on steeper slopes
Perennial grass component of pasture	Minimum 40%	60-80%	Provides stable grassland base, must maintain some diversity
Dominant grasses (% of total pasture cover)	>40% of total cover	<40% of total cover	Lack of diversity, often the least palatable grass dominates

Table 31 Ground and Pasture Assessment Results

Site	Groundcover %	Perennial Grass %	Dominant Grass	Action
R1	+95	70	Red Grass 30%	Nil
R2	+95	65	Wire Grass 25%	Nil
R3	+95	70	Wire Grass 35%	Nil
ME	+95	75	Kikuyu 25%	Nil
MW2	+95	80	Rhodes Grass 50%	Strategic grazing of Rhodes grass
BS	80	70	Red Grass 30%	Control rabbits
DN	+95	65	Kikuyu 25%	Nil

Full GPA results are presented in Appendix 5.

Mt Arthur Coal has commenced a project to investigate and rehabilitate legacy exploration sites (mining and exploration leases) from the previous 20 years. These sites are rehabilitated to achieve the following goals:

1. Prevent contaminating water tables with exposed aquifers via boreholes that are not sealed (grouted);
2. Rehabilitation of land for beneficial use;
3. Prevent injury to wildlife / livestock; and
4. Preservation of local biodiversity – preventing the growth of weeds on the pad.

The methodology aligns with the NSW Department of Planning & Environment Exploration Code of Practice: Rehabilitation. This can be summarised as:

1. All sites ground truthed;
2. Random selection dug down to investigate rehabilitation status;
3. Holes grouted where appropriate; and
4. Rehabilitation (i.e. sumps, disturbed ground) methodology aligns with the NSW Department of Planning & Environment Exploration Code of Practice: Rehabilitation.

The results of the project are summarised in Table 32.

Table 32 Summary of the legacy borehole rehabilitation project

	Investigation Findings					
	Total Sites Visited	**Sites removed from program**	**Sites deemed Rehab complete**	**Sites requiring surface rehab Only**	**Sites requiring grouting**	**Survey dig down sample selection**
No of Boreholes	1,148	696	561	216	297	72
	Works Completed in FY20					
	Sites rehabbed			**Sites Grouted**		
No of Boreholes	20			36		

This project will continue in FY21.

Table 33: Mt Arthur Coal rehabilitation maintenance and improvement program

Area	Item		Notes	Results	Follow up monitoring
1. All areas	1.1	Improve and increase monitoring	Changes have been made to the REMP as detailed in Section 8.5. In the next reporting period Mt Arthur Coal will expand flyovers to increase the frequency that rehabilitation areas are captured in aerial routine aerial imagery and LiDAR scans. Mt Arthur Coal will also investigate the usage of LiDAR in monitoring erosion and in using aerial imagery in assessing vegetation health.	See Section 6.5 Future TARP responses to be reported in Section 8.5 of future Annual reviews	Annual ecological development monitoring, aerial imagery and LiDAR scans
	1.2	Kangaroo management	Kangaroo harvesting continued in operational areas in FY20, focusing on VD1 and surrounding area. Mt Arthur Coal plans to continue kangaroo harvesting in FY21.	See Section 6.5	Recording of animals taken and as part of the annual ecological development monitoring.
	1.3	Rabbit management	Rabbit management continued in FY20. The following key activities have been undertaken as part of the rabbit management program: 1. Rabbit baiting using Pindone poison was conducted across site; 2. Rabbit trapping was using ferrets carried out in the VD1 area. This program was not successful and will not be repeated; and 3. Opportunistic shooting of pest species was conducted as part of the kangaroo harvesting program. Targeted pest species shooting will occur in FY20. Rabbit control using a broad baiting will be carried out in FY21 with results reported in the next Annual Review.	See Section 6.5	Annual ecological development monitoring.
	1.4	Replace hand sowing	Work to date has included: 1. Trialling of UAV seeding; and 2. Aerial seeding from a plane FY21 will also include seeding using a tractor pulled spreader.	See Section 8	Annual revegetation inspections and Rapid Assessment Walkover (RAW).
	1.5	Characterisation of rehabilitation materials be completed prior to use	FY20 soil sampling targeted topsoils and waste rock material used in the specific rehabilitation projects. This was due to most projects utilising a combination of direct placement and stockpiled materials. Further soil sampling of stockpiles and rehabilitation materials is planned in FY21	Soil sampling results and report can be supplied on request.	Ongoing sampling of stockpiles and directly placed topsoil.

Area	Item		Notes	Results	Follow up monitoring
	1.6	Use successful examples of rehabilitation success from around site and develop standard practice	Work to date has focussed on centralising data to establish previous methodologies. Work on a new spatial tracking system incorporating graphical representation commenced in June 2019. This work has been incorporated into the recently submitted Forward Program and is part of a broader project covering all of BHPs Australian operations. Routine monitoring (such as RAW) will be spatially represented to improve tracking of maintenance and improvement requirements. Improvements to the Rehabilitation Management Plan have been submitted with the Forward Program, including the incorporation of more quantitative closure criteria.	Updates to RMP	Continual improvement and updating GIS database, RAW and revegetation inspections
	1.7	Weed treatment	Weed assessment completed and weed works commenced for the reporting period. Focus of weed treatment continued to VD1, however treatment was also completed on CD1. A broader list of weed species was targeted in FY20. Mt Arthur Coal continued to trial the into high resolution image processing to quantify weed infestations. This trial will continue into FY21.	See Section 6.5 and Appendix 6.	Annual ecological development monitoring and annual weed assessment.
	1.8	Mulching	The initial application of mulch has been delayed Q2 FY21. Recommendations were originally for the use of hay mulch as temporary stabilisation. Sourcing this material was not possible. A new vendor was onboarded as the supplier and spreader of mulch products in FY20. Mt Arthur Coal intends to utilise temporary stabilisation in newly established rehabilitation in areas where there is a high risk of erosion	N/A	RAW and Revegetation Inspections
	1.9	Contour drain removal	Design requirements assessment scheduled for completion in 2020 will be an ongoing design process due to the complexity of the work. As areas undergo maintenance each area will be assessed for removal contour drains.	N/A	To be confirmed
	1.10	Translocation of key species	Work was assessed in this reporting period and was determined not to be cost effective.	N/A	N/A
	1.11	QA/QC procedures	Processes for tracking and improving the quality of Mt Arthur Coal have been improved rehab over the reporting period by the following: • Update of monitoring program occurred in FY20 (see Section 6.5) • Update of Closure Criteria provided in the recently submitted Rehabilitation Strategy Planned work in the next reporting period includes: • Investigation of utilising site LiDAR for erosion monitoring; • Development of new Performance Standards; and • Developing performance standards advancements will be made each reporting period in the RMP. This will be a staged approach as it will require review of all existing rehabilitation.	TARP responses provided in future Annual Reviews in Section 8.5	Updated management plans and procedures

Area	Item		Notes	Results	Follow up monitoring
2. VD1	2.1	Excavate soil from the sediment dam at VD1 to re-establish its design functionality	VD1 sed dam will be excavated in FY21 as part of maintenance work in the area including application of stabilising mulch and re-seeding.	N/A	RAW and Revegetation Inspections
	2.2	Fill erosion gullies at VD1 (FY17 rehabilitation) to the landform design surface	Work scheduled for completion FY21 after onboarding vendors in FY20. Work will be completed as part of maintenance work in the area including application of stabilising mulch and re-seeding.	See Appendix 5 for Revegetation Inspection results	
	2.3	Weed treatment Trials identified in the Future Harvest 2019 report	Weed treatment trials were delayed to allow for integration with the Royal Botanic Gardens Sydney (RBGS) collaboration work. The partnership with the RBGS will no longer go ahead The scopes for these trials will be reviewed in FY21 with the intent to focus on the most cost effective solution and progress in the next reporting period. Area 1 scope includes: 1. Slashing 2. Rip contours 3. Spray emergent weeds early Spring 4. Re-seed 5. Spot treatment for weeds Area 2 scop includes: 1. Secure area and conduct burn in early Spring 2019 2. Rip contours 3. Spray emergent weeds early Spring 4. Re-seed 5. Spot treatment for weeds (Autumn 2020) 6. Tube stock planting	N/A	RAW and Revegetation Inspections
	2.4	Habitat and water availability	Schedule of this work will be determined by removal of contour drains (see 1.9).	N/A	To be confirmed
	2.5	All weather road access	This work will be incorporated into individual projects across the VD 1 rehab. Additional track to be installed as part of 2.1 and 2.2 above.	N/A	N/A

Area	Item		Notes	Results	Follow up monitoring
	2.6	Installation of habitat features such as stag trees	The Cumberland Ecology 2019 report recommended nest boxes. Mt Arthur Coal will focus on bringing more stag trees, larger felled timber and rock piles to the rehabilitation areas in the interim. Stag trees have been stockpiled at the top of VD1 and initial installations scheduled for FY21.	To be provided in future Annual Reviews in Section 8.5	Annual ecological development monitoring
	2.7	Application of ameliorants	A significant amount of fertiliser and gypsum is to be applied to VD1 based on the soil assessment (see 2.4). This work was scoped in the reporting period to determine the most efficient means of application. Initial it was planned that an aerial application of gypsum would provide the most efficient methodology. The advice on fertiliser application has been reviewed and determined that this may result in increase of weed infestation. It was determined that individual project areas (see 2.9-2.13 below) will have appropriate ameliorants applied.	N/A – follow up soil sampling may be required as determined by monitoring results.	RAW, Revegetation Inspections and soil sampling
	2.8	Irrigation	Broad acre irrigation was deemed as impractical in the last reporting period. Mt Arthur will investigate the use of tanks and drip lines to aid in the establishment of tube stock over FY21.	To be provided in future Annual Reviews in Section 8.5	RAW and Revegetation Inspections
	2.9	Spotted Gum / Box forest	Future Harvest 2019 scope: 1. Stem density reduction – Work was completed in to reduce stem density to approximately 250 stems per ha. 2. Ripping and seeding with native grasses – This is deemed as impractical as areas accessible for machinery is densely covered in exotic grass used in the initial establishment 3. Treatment of exotic grasses – slashing and spraying of exotic grass is described in 2.9 below. 4. Tube stock planting – Will be utilised within areas that have undergone stem thinning. Timing will be dependent on irrigation (2.8 above) and treatment of exotic grasses (2.10 below). FY19 ecological development monitoring recommended planting of characteristic canopy, shrub and groundcover species identified in Table 10 of the MOP. Note that tube stock planting in recent years has had a low success rate due to drought and predation. FY21 works will include continued spot weed treatment. Dependent on the timing of irrigation (see 2.8 above) tube stock planting is scheduled for FY22.	To be provided in future Annual Reviews in Section 8.5	Annual ecological development monitoring, RAW and Revegetation Inspections

Area	Item		Notes	Results	Follow up monitoring
	2.10	Exotic and depleted grasslands	Approximately 118ha of VD1 has a significant cover of exotic grasses. Future Harvest 2019 scope: 1. Segmenting areas into projects of between 5 to 10 ha. 2. Project areas will be slashed, ripped and sprayed to reduce exotic grasses 3.Appropriate ameliorants will be applied with temporary surface stabilisation of a composted mulch being applied 4. Box Gum woodland species mix will be seeded in the areas 5. Follow up spot weed treatment 6. Tube stock planting as required Efforts over the reporting period focussed on spot weed treatment in areas adjacent to the Spotted Gum / Box forest (2.9 above). FY21 will commence with approximately 5 ha in the designated Trial Area 1 above. Other areas will be investigated based on resources availability.	Spot weed treatment results presented in section 6.5. To be provided in future Annual Reviews in Section 8.5	Annual ecological development monitoring, RAW and Revegetation Inspections
	2.11	Native grasslands with emergent Box - Gum canopy and mid-storey	The increase in rainfall over the reporting period has increased the presence of perennial exotic grasses such as Green Panic (*Panicum maximum var. trichoglume*). These areas were originally seeded with exotic pasture crop. Ground cover diversity seeding projects were scheduled to commence in Autumn 2020. However, the increased exotic grass cover indicates that strategy would not have been effective. These areas will be categorised as per 2.10 above in future reports.	Spot weed treatment results presented in section 6.5. To be provided in future Annual Reviews in Section 8.5	Annual ecological development monitoring, RAW and Revegetation Inspections
	2.12	Emergent Box – Gum woodland	Future Harvest 2019 scope: 1. Targeted weed treatment program commenced in the reporting period 2. Monitor for need for stem thinning 3. Consider cool burns 4. Water availability Weed treatment in this area will continue in FY21. Any works regarding water availability will be aligned with significant earth works as per 1.9 above. Revegetation Inspection conducted late in the reporting period indicates that despite weed treatment efforts establishment of target species has been poor. Monitoring of the area will continue	Spot weed treatment results presented in section 6.5. Revegetation Inspections completed in FY20. To be provided in future Annual Reviews in Section 8.5	Annual ecological development monitoring, RAW and Revegetation Inspections

Area	Item		Notes	Results	Follow up monitoring
	2.13	Mixed eucalypt forest with exotic canopy and mid storey	Future Harvest 2019 scope: 1. Targeted stem thinning of inappropriate species 2. Monitor for need for stem thinning 3. Consider cool burns 4. Water availability Targeted spot weed treatment is planned for FY21. Other works listed above are planned for FY22-23.	Spot weed treatment results presented in section 6.5. To be provided in future Annual Reviews in Section 8.5	Annual ecological development monitoring, RAW and Revegetation Inspections
3. VD5	3.1	Application of mulch	See 1.8 above. An initial application of mulch will to higher risk areas in FY21.	N/A	RAW and Revegetation Inspections
	3.2	Erosion	RAW inspections have identified erosion gulleys formed over the previous reporting periods. These will be reworked in		
	3.3	Re-rip, seed and fertilise	A revegetation inspection scheduled for the reporting period was conducted late in the reporting due to impacts of Covid-19. As such ripping work will be determined following the and be re-scheduled for FY20. Areas will be progressively seeded following mulching with a composted mulch from FY21. The use of a composted mulch product is intended to negate the need for a chemical fertiliser.	See Appendix 5 for Revegetation Inspection results	Landform stability monitoring – Annual Rapid Assessment
4. CD1	4.1	Application of ameliorants	A significant amount of fertiliser and gypsum is to be applied to CD1 based on the soil assessment (see 2.4). This work is to be scoped to determine the most efficient means of application. Scoping was to be completed by the end of September 2020 however, has been delayed until further progress is made on VD1 and VD5. As such work is not expected to commence until FY23-24.	N/A	Landform stability monitoring and ecological development monitoring.
	4.2	Stem density reduction	To be completed following 2.9. Focus is currently on VD1 improvements. As such work is not expected to commence until FY23-24.	N/A	Annual ecological development monitoring.
	4.3	Habitat and water availability	To be completed following 4.2. Focus is currently on VD1 improvements. As such work is not expected to commence until FY23-24.	N/A	N/A
	4.4	Understory planting	To be completed following 4.2. Focus is currently on VD1 and VD5 improvements. As such work is not expected to commence until FY23-24. Species to include *Notelaea microcarpa var. microcarpa* (Native Olive), *Bursaria spinosa* (Blackthorn), *Acacia falcata* (Hickory Wattle) and *Acacia paradoxa* (Kangaroo Thorn). Note that tube stock planting in recent years has had a low success rate due to drought and predation. Any planting will require the controls listed in 1.1 and 1.2 as well as an assessment on weather conditions and the efficacy of irrigation. Estimated to commence in Autumn 2022 (note this has been delayed by 12 months to focus on VD1).	N/A	Annual ecological development monitoring and Revegetation Inspections.

Area	Item		Notes	Results	Follow up monitoring
EME Pad	5.1	Rip, seed and fertilise FY17 rehabilitation	Formerly reported on as part of the MacDonalds and Belmont areas. This area was dehabbed as part of the construction of the new Earth Moving Equipment (EME) Build Pad. Area surrounding the EME Pad will be rehabbed in FY21.	To be provided in future Annual Reviews in Section 8.5	Annual ecological development monitoring and Revegetation Inspections.
6. Macdonalds and Belmont area	6.2	Fill erosion gullies at MacDonald's to the landform design surface	This work is to be re-assessed based on the longer term plan as some of the areas will be required for further dumping.	N/A	N/A
	6.3	Remove contour drains			
	6.4	Fill erosion gullies at MacDonald's Void (2000 rehabilitation) to the landform design surface			
7. Dump 11 (Export)	7.1	Revegetation Works	Monitoring occurred in this location for the first time in this reporting period. A revegetation plan was included in the monitoring results. Further monitoring results are presented in Revegetation Inspection (see Appendix 5). The area requires reduction in exotic grasses, establishment of native ground cover and mid storey species and increase in the density of native canopy species. As this area is currently stable works will be delayed until VD1 and VD5 works have progressed further, estimated top commence in FY24.	Section 6.5 and Appendix 5 for Revegetation Inspection results	Annual ecological development monitoring and RAW and Revegetation Inspections.
8.Drayton Void	8.1	Weed treatment	The 5 yearly ground pasture assessment (GPA) recommended that broad leaf weed control occur. Scheduled to occur in Spring FY22 to allow for equipment availability.	See Appendix 5 for Ground and Pasture Assessment	RAW and Revegetation Inspections.
9 Saddlers Central (SDc)	9.1	Initial monitoring	Independent revegetation inspection was conducted in this area for the first time this reporting period Ecological development monitoring is planned to commence in FY21 to gain data for planning maintenance work	N/A	Annual ecological development monitoring and RAW and Revegetation Inspections.

Area	Item		Notes	Results	Follow up monitoring
	9.2	Weed treatment	Spot weed treatment is scheduled for the SDc area in FY21	N/A	Annual ecological development monitoring and RAW and Revegetation Inspections.

8.6 Rehabilitation Activities for Next Reporting Period

The FY20-FY22 Forward Program was submitted to the NSW Resources Regulator for the period 1 July 2019 to 30 June 2022. Performance indicators and completion criteria were developed for the MOP and are representative of current site techniques and information derived from monitoring data. This will be dynamic over the life of the mine, in consultation with the NSW Resources Regulator, progressing towards rehabilitation being self-sustaining on site.

Rehabilitation activities for the FY21 reporting period include the continuation of natural landform design rehabilitation techniques and the inclusion of habitat in new areas as they become available. FY21 has an annual rehabilitation area target of 73 hectares.

New rehabilitation of land will be carried out in accordance with:

- Mt Arthur Coal's FY20-FY22 Forward Program;
- Mt Arthur Coal's Rehabilitation Management Plan;
- MAC-ENC-MTP-047 Rehabilitation Strategy;
- MAC-ENC-MTP-050 Biodiversity Management Plan; and
- MAC-ENC-PRO-012 Land Management Procedure.

Additional focus on improving the quality of rehabilitation of VD1 will continue in FY21 with the aim of establishing self-sustaining Box Gum woodland based vegetation community as described in the MOP.

Details of planned maintenance and improvement are provided in the Mt Arthur Coal Rehabilitation Maintenance and Improvement Program presented in Table 33.

Mt Arthur Coal will investigate the further use of remote sensing to assess erosion, vegetation health and ecological development. This will potentially provide a more detailed assessment of ecological development at Mt Arthur Coal and help guide improvement practices.

During the next reporting period Mt Arthur Coal will continue to utilise the Rehabilitation Specialist role, which is responsible for collaborating with and influencing mine planning to achieve MOP rehabilitation targets using industry best practice methods, as well as implementing the rehabilitation maintenance and improvement program of works presented in Table 33.

9. Community

9.1 Community Engagement

Mt Arthur Coal continues to actively engage and build relationships with key stakeholders and support the local community through its program of community consultation. Mt Arthur Coal's community consultation process was ongoing throughout the reporting period with the following consultation measures undertaken

- Quarterly Community Consultative Committee (CCC) meetings
- MAC representatives attendance at Muswellbrook Chamber of Commerce and Industry events
- Participation in the Upper Hunter Mining Dialogue and several of its working groups
- Telephone and face-to-face engagement with neighbouring landholders as well as written correspondence
- Coal Community Connect newsletter, distributed to key community stakeholders (including surrounding landholders), providing an update on business activities, issued in April, May and June 2020
- The CSIRO Local Voices program is a three year program, launched in 2019 to provide the local community ways to provide feedback to Mt Arthur Coal on its business activities via monthly pulse surveys
- 24 hour BHP Mt Arthur Coal Community Response Line 1800 882 044

Community Response Line

Mt Arthur Coal invites feedback about its activities through a free-call 24-hour Community Response Line (1800 882 044), which is advertised in the local newspapers and at https://www.bhp.com/sustainability/environment/regulatory-information/.

During the reporting period, Mt Arthur Coal received 54 complaints from community members and near neighbours. A comparison of complaints received during the reporting period against previous financial years is shown in Figure 9 and a complete register of complaints is presented in Appendix 3.

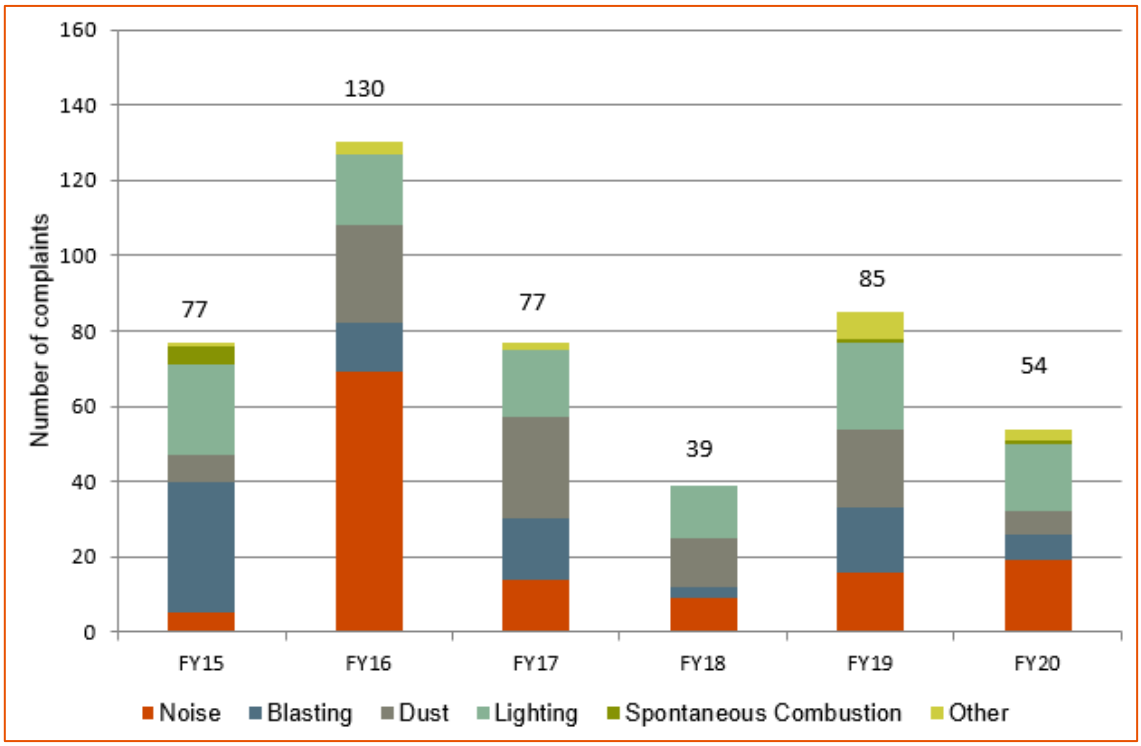

Figure 9: Comparison of complaints received during current and previous financial years

Noise Complaints

During the reporting period, 19 noise complaints were received from three complainants. This is higher than FY19 (16 noise complaints). All complaints were investigated, with noise levels generated by Mt Arthur Coal being measured within internal management benchmarks at the nearest real-time monitor, whenever noise data was available.

Blasting Complaints

During the reporting period, 7 blast vibration complaints were recorded. This is a decrease from 17 complaints in FY19. All investigations revealed weather conditions were suitable for blasting at the time and results indicated overpressure noise and ground vibration levels were within regulatory criteria on dates when the complaints were received.

Air Quality Complaints

During this reporting period it is important to note that NSW experienced extreme bushfire, heat and drought conditions during the October 2019 to January 2020 period. As a result the DPIE identified there were a number of days that the air quality was impacted by these regional events.

Six dust-related complaints were received from five complainants during the reporting period, which is 71 per cent lower than previous year (21 dust-related complaints). With the exception of four dust complaints, two complaint investigations indicated that real-time dust levels and 24-hour averages remained within regulatory limits at the monitoring location nearest to the complainants.

One complaint received on 8 August 2019 was from the Muswellbrook area, the DPIE also issued a notice to Mt Arthur Coal. An investigation was undertaken and a response provided to the DPIE, which is further detailed in Section 11.

Three complaints were received on the dates the DPIE identified that air quality may have been impacted by regional events (dates of 7 November, 12 November and 14 December). At the time of these complaints PM_{10} results were elevated, however Mt Arthur Coal's incremental contribution to the 24-hour PM_{10} result was minimal, as shown in Table 14. Throughout the period Mt Arthur Coal continued to implement all reasonable and feasible measures to minimise dust generation on site.

In 2019, Mt Arthur Coal implemented a new real time dust monitoring system, which has improved the site's capability to better monitor and manage its dust performance, which is evidenced in the reduction in the number of dust related complaints during this reporting period.

Lighting Complaints

During the reporting period, 18 lighting complaints were received from three complainants, which is lower than FY19 (23 complaints). On notification of the complaints, immediate action was taken to locate and redirect the offending lights, in response to addressing the complainant's concerns.

Spontaneous Combustion Complaints

During the reporting period, one complaint was received regarding odour from spontaneous combustion on 13 August 2019. Investigation revealed spontaneous combustion activity at the time of the complaint. Mining operations were altered to reduce spontaneous combustion related activity in response to the complaint. One spontaneous combustion complaint was received in FY19.

Other Complaints

During the reporting period, three complaints were received from three complainants in relation to non-operational activities. Two of these complaints were in relation to a bus service pick up/drop off location and the bus route. On notification of these complaints, immediate action was undertaken to address the concerns raised. The third complaint was in relation to alleged damage to a light vehicle windscreen as a result of a coal train. The incident was investigated and determined the coal train did not cause the damage as it was not loaded at the time of the incident.

Website

Mt Arthur Coal provides information about the operation through the BHP website at https://www.bhp.com/sustainability/environment/regulatory-information/, including project approval documents, blast schedules, coal transport information, Community Consultative Committee (CCC) meeting minutes, community complaint records, environmental monitoring information, independent environmental audits, environmental management plans, EPBC compliance reports and Annual Reviews. Note that the Annual Coal Transport Report is now provided as part of this Annual Review in Appendix 4.

Community Consultative Committee

During the reporting period, Mt Arthur Coal coordinated four CCC meetings in accordance with the Community Consultative Committee Guidelines (DPIE, 2016). In the reporting period, the CCC meetings were held:

- 9 September 2019
- 22 November 2019
- 13 February 2020
- 7 May 2020

Mt Arthur Coal also participated in two Joint CCC meetings with Maxwell Infrastructure Malabar Coal held on:

- 11 December 2019
- 10 June 2020.

9.2 Community Investment

During the reporting period Mt Arthur Coal voluntary contributed $237,085 USD to the local community. Central to Mt Arthur Coal's commitment to the local community is its Voluntary Planning Agreement (VPA) with MSC, of which an additional $583,824 USD is provided annually toward the Mt Arthur Coal Community Fund. Established under the *Environmental Planning and Assessment Act 1979*, the VPA contributes to public amenities and services that may be impacted by the growth of mining operations.

BHP Vital Resources Fund

In response to COVID-19, BHP established the Vital Resources Fund to support regional communities in areas in which it operates which are facing the challenges of the COVID-19 pandemic. Through the Fund, BHP contributed almost $1million to the Hunter Region to support nine projects to address immediate impacts from the COVID-19 pandemic. The projects focussed on emergency services, business capability, health, education and community services.

Local Buying Program

Through the Local Buying Program, Mt Arthur Coal continues to engage and support small eligible local businesses through procuring goods and services, with $18 million of approved spend in FY20 across the three shires of Muswellbrook, Upper Hunter and Singleton.

10. Independent Audit

An independent environmental audit was undertaken at Mt Arthur Coal in June 2017, covering the audit period between 1 July 2014 and 30 June 2017. The audit was undertaken by an audit team led by Peter Horn from Jacobs, approved by the former DPIE. The audit assessed the environmental performance of the project and compliance with the conditions of the project approval, EPL and mining leases including associated assessments, plans or programs. It also reviewed the adequacy of strategies, plans or programs required under these approvals.

The following summary of the audit results was provided in the audit report (Jacobs, April 2018):

"A total of 1,446 conditions and commitments were assessed as part of this audit. 41 issues resulted in 46 non-compliances, of which 33 of the non-compliances were administrative.

A basic risk assessment was conducted for all non-compliances with Low/Medium/High risk levels provided as results. For the non-compliances that were not administrative, there were 8 Low and 5 Medium results. No High risk non-compliances were identified in the audit.

Complaints have reduced over the previous few years results (apart from a spike in complaints in 2015-16). Reportable incidents totalled 7 in the audit period, with the incidents closed out adequately."

The audit report together with Mt Arthur Coal's response to audit issues resulting in non-compliances and audit recommendations is available on the BHP website. Audit actions completed during the reporting period are presented in Table 34. Progress on audit actions that are still outstanding is presented in Table 35. Audit actions reported as completed in the FY19 Annual Review have not been included in this report.

Of the 32 actions agreed with the DPIE 18 of them have been completed. The remaining actions will be completed in FY21.

Preparations for the next Independent Environmental Audit commenced during the reporting period for the period between 1 July 2017 and 30 June 2020. The audit is expected to be completed and submitted to DPIE during FY21.

Table 34: Completed 2017 Independent Environmental Audit issues

Audit report reference	Issue	Audit finding	Conditions and commitments found not compliant	Status
Section 4.1, Table 5 Item 1 (page 9) / Section 4.2, Table 6 Item 2 (page 12)	Due to an administrative Non-compliance in the Noise Management Plan, the DPIE consider it not implemented.	Not Compliant Administrative	PA 09_0062 Schedule 3 Condition 9	**Complete** The revised Noise Management Plan was submitted to the DPIE for approval in June 2019.
Section 4.1, Table 5 Item 5 (page 9) / Section 4.2, Table 6 Item 5 (page 12)	The site was not able to demonstrate the coordination of air quality management with neighbouring mines Drayton, Mangoola and Bengalla. MAC is involved in the Upper Hunter Mining Dialogue.	Not Compliant Low Risk	PA 09_0062 Schedule 3 Condition 23(g)	**Complete** A protocol to coordinate air quality management was developed in August 2019.
Section 4.1, Table 5 Item 6 (page 10) / Section 4.2, Table 6 Item 6 (page 13)	Due to a Non-compliance in the Air Quality Management Plan, DPIE consider it not implemented.	Not Compliant Low Risk	PA 09_0062 Schedule 3 Condition 24	**Complete** The revised Air Quality Management Plan was approved by the DPIE on 25 January 2019.
Section 4.1, Table 5 Item 9 (page 10) / Section 4.2, Table 6 Item 9 (page 13)	Due to an administrative Non-compliance in the Biodiversity Management Plan, DPIE consider it not implemented.	Not Compliant Administrative	PA 09_0062 Schedule 3 Condition 40	**Complete** The revised Biodiversity Management Plan was approved by the DPIE on 22 May 2019.
Section 4.1, Table 5 Item 5 (page 9) / Section 4.2, Table 6 Item 10 (page 12)	The Biodiversity Management Plan does not include: 1) Details for targeted rehabilitation efforts in creeks and drainage lines. 2) Detail on the proposed landscaping associated with public roads.	Not Compliant Administrative	PA 09_0062 Schedule 3 Condition 40(c)	**Complete** The revised Biodiversity Management Plan was approved by the DPIE on 22 May 2019. The revised Plan includes Section 11.3.2 Management of landscaping to reduce visual impacts and Section 11.3.3 Rehabilitation of creeks and drainage lines following mining.
Section 4.1, Table 5 Item 24 (page 11) / Section 4.22, Table 12 Item 3 (page 21)	Evidence was not provided of the submission of an air quality report with the EPL 11457 Annual return.	Not Compliant Administrative	AQGGMP S5	**Complete** No specific air quality monitoring report is required by the EPA to be submitted with the Annual Return. Any exceedances or non-compliances are detailed in the Annual Return forms. The revised Air Quality Management Plan was approved by the DPIE on 25 January 2019.
Section 4.1, Table 5 Item 25 (page 11) / Section 4.24, Table 13 Item 2 (page 21)	No evidence of the audit of the Blast Management Plan (every 3 years) in the audit period.	Not Compliant Administrative	BMP App 5 S8	**Complete** The Mt Arthur Coal Document Management System records all required reviews of management plans listed in PA 09_0062.

Audit report reference	Issue	Audit finding	Conditions and commitments found not compliant	Status
				The revised Blast Management Plan was approved by the DPIE during the previous reporting period.
Section 4.1, Table 5 Item 26 (page 11) / Section 4.24, Table 13 Item 1 (page 21)	Contractors engaged in undertaking drill and blast tasks at MAC are required to understand and follow the Blast Management Plan but no evidence of this was able to be provided.	Not Compliant Low Risk	BMP App 5 S7	**Complete** In line with the site's training matrix relevant contractors have been trained in blast procedures relevant to their role in FY19.
Section 4.1, Table 5 Item 30 (page 11) / Section 4.28, Table 15 Item 3 (page 23)	The audit team were not able to determine whether all reviews required by Section 7 of the AHMP had been completed.	Not Compliant Administrative	AHMP S7.0	**Complete** The Mt Arthur Coal Document Management System records all required reviews of management plans listed in PA 09_0062.
Section 4.1, Table 5 Item 31 (page 11) / Section 4.29, Table 16 Item 1 (page 24)	It was not able to be established if all the required reviews of the European Heritage Management plan had taken place.	Not Compliant Administrative	EHMP S6	**Complete** The Mt Arthur Coal Document Management System records all required reviews of management plans listed in PA 09_0062.
Section 4.1, Table 5 Item 34 (page 11) / Section 4.32, Table 18 Item 1 (page 23) / Section 4.45, Table 26 Item 2 (page 30)	The audit team were not able to verify that all of the required reviews of the NMP had taken place.	Not Compliant Administrative	NMP S9.2	**Complete** Mt Arthur Coal submitted the NMP to the DPIE for approval in January 2019. The Mt Arthur Coal Document Management System records all required reviews of management plans listed in PA 09_0062.
		Not Compliant Administrative	EA 2013 S4.10.3	
Section 4.1, Table 5 Item 36 (page 11) / Section 4.36, Table 20 Item 1 (page 26)	The audit team were not able to verify that all of the required reviews of the WMP had taken place.	Not Compliant Administrative	Site WMP S10	**Complete** DPIE requested the management plans be submitted in a controlled manner rather than as a group and Mt Arthur Coal remains in consultation with DPIE for the approval of the Noise Management Plan. The revised Water Management Plan is awaiting submission. The Mt Arthur Coal Document Management System records all required reviews of management plans listed in PA 09_0062.
Section 4.1, Table 5 Item 37 (page 11) / Section 4.37, Table 21 Item 1 (page 27)	Evidence of the annual review of the Surface Water and Groundwater Response Plan was not able to be provided.	Not Compliant Administrative	Surface Water and Ground Water Response Plan S1.2	**Complete** DPIE requested the management plans be submitted in a controlled manner rather than as a group and Mt Arthur Coal remains in consultation with DPIE for the approval of the Noise Management Plan. The revised Water Management Plan, which now incorporates the Surface

Audit report reference	Issue	Audit finding	Conditions and commitments found not compliant	Status
				Water and Groundwater Response Plan, is awaiting submission. The Mt Arthur Coal Document Management System records all required reviews of management plans listed in PA 09_0062.
Section 4.1, Table 5 Item 38 (page 11) / Section 4.38, Table 22 Item 1 (page 27)	Evidence of the annual review of the Surface Water Monitoring Program was not able to be provided.	Not Compliant Administrative	Surface WMP S1.2	**Complete** DPIE requested the management plans be submitted in a controlled manner rather than as a group and Mt Arthur Coal remains in consultation with DPIE for the approval of the Noise Management Plan. The revised Water Management Plan, which now incorporates the Surface Water Monitoring Program, is awaiting submission. The Mt Arthur Coal Document Management System records all required reviews of management plans listed in PA 09_0062.
Section 4.1, Table 5 Item 39 (page 12) / Section 4.40, Table 23 Item 1 (page 28)	Evidence of the annual review of the Biodiversity MP was not able to be provided.	Not Compliant Administrative	Biodiversity MP S11	**Complete** The revised Biodiversity Management Plan was approved by the DPIE on 22 May 2019.
Section 4.1, Table 5 Item 1 (page 9) / Section 4.2, Table 6 Item 1 (page 12)	A comprehensive system utilising meteorological monitoring and predictive forecasting for noise management was not in place at the time of the audit.	Not Compliant Low Risk	PA 09_0062 Schedule 3 Condition 8(b)	**Complete** A noise forecasting tool has been developed and implemented.
Section 4.1, Table 5 Item 35 (page 11) / Section 4.35, Table 19 Item 1 (page 26)	The site water balance requires updating and has not been updated since 2012.	Not Compliant Low Risk	Site Water Balance S2.2.2	**Completed** The site water balance model was updated and a calibration completed in January 2018. The corresponding Site Water Balance management document has been updated accordingly with the WMP. **Action assigned** (completion of WMP review DPIE dependent).

Audit report reference	Issue	Audit finding	Conditions and commitments found not compliant	Status
Section 4.1, Table 5 Item 33 (page 11) / Section 4.31, Table 17 Item 1 (page 25)	Evidence of an annual review of the Groundwater Monitoring Program was not able to be provided.	Not Compliant Administrative	GMP S1.2	**Completed** The Mt Arthur Coal Document Management System records all required reviews of management plans listed in PA 09_0062. The Interim Monitoring Program of the upgraded monitoring network concluded February 2018. An assessment and analysis of interim monitoring program data has been completed. Sufficient reference dataset has been collected to revise and set new groundwater triggers and monitoring frequency. A further review of the GW model has been under taken in 2020. The Groundwater Monitoring Program has been revised and submitted with the updated WMP. DPIE are currently assessing the submitted WMP. **Action assigned** (completion of WMP review DPIE dependent).

Table 35: Progress on outstanding 2017 Independent Environmental Audit issues

It is noted that where required this action plan will reviewed and updated in line with the findings of the 2020 Independent Environment Audit.

Audit report reference	Issue	Audit finding	Conditions and commitments found not compliant	Status	Proposed Completion Dates
Section 4.1, Table 5 Item 7 (page 10) / Section 4.2, Table 6 Item 7 (page 13)	Due to a Non-compliance in the Water Management Plan, DPIE consider it not implemented	Not Compliant Low Risk	PA 09_0062 Schedule 3 Condition 29	**In progress** • A draft revised Water Management Plan (WMP) was submitted to DPIE in April 2020 and is currently under assessment. The original 2017 IEA completion date was not met as there have been delays in progressing management plan reviews as DPIE have requested that the revised management plans be submitted sequentially to avoid overloading the reviewers. The DPIE also prioritised post approval document review for sites requiring critical updates. The sequential review of management plans can be demonstrated by the following Management Plan submission record;Blast Management Plan (BMP) –submitted March 2018, approved June 2018;	30th April, 2021

Audit report reference	Issue	Audit finding	Conditions and commitments found not compliant	Status	Proposed Completion Dates
				• Air Quality Management Plan (AQMP) – submitted July 2018, approved January 2019; • Noise Management Plan (NMP) – submitted May 2019, approved June 2020; • Water Management Plan (WMP) – submitted April 2020, pending review and approval • Environmental Management Strategy (EMS) – submitted September 2020, pending review and approval **Action assigned** (completion of WMP review DPIE dependent).	
Section 4.1, Table 5 Item 12 (page 10) / Section 4.2, Table 6 Item 12 (page 15)	Due to an administrative Non-compliance in the Aboriginal Heritage Management Plan, DPIE consider it not implemented.	Not Compliant Administrative	PA 09_0062 Schedule 3 Condition 45	**In progress** The Aboriginal Heritage Management Plan (AHMP) is currently being reviewed and revised by Mt Arthur Coal, in consultation with OEH, the Aboriginal community, MSC and relevant landowners. The original 2017 IEA completion date was not met as the DPIE requested that the revised management plans for review be submitted sequentially to avoid overloading the reviewers. The DPIE also prioritised post approval document review for sites requiring critical updates. The sequential review of management plans can be demonstrated by the following Management Plan submission record; • Blast Management Plan (BMP) –submitted March 2018, approved June 2018; • Air Quality Management Plan (AQMP) – submitted July 2018, approved January 2019; • Noise Management Plan (NMP) – submitted May 2019, approved June 2020; • Water Management Plan (WMP) – submitted April 2020, pending review and approval • Environmental Management Strategy (EMS) – submitted September 2020, pending review and approval The Management plan reviews have been completed in FY2020 however due to Covid 19 consultation with the Aboriginal community has not been able to be conducted. Feedback from DPIE has been that the submission of the AHMP be delayed till consultation with the community is able to be undertaken. **Action assigned** (completion of AHMP review DPIE dependent).	30th April, 2021

Audit report reference	Issue	Audit finding	Conditions and commitments found not compliant	Status	Proposed Completion Dates
Section 4.1, Table 5 Item 13 (page 10) / Section 4.2, Table 6 Item 13 (page 15)	Due to an administrative Non-compliance in the Environmental Management Strategy, DPIE consider it not implemented.	Not Compliant Administrative	PA 09_0062 Schedule 5 Condition 1	**In Progress** A draft revised Environmental Management Strategy was submitted to DPIE in August 2020 and is currently under assessment. The original 2017 IEA completion date was not met as the there have been delays in progressing management plan reviews as DPIE have requested that the revised management plans be submitted sequentially to avoid overloading the reviewers. The DPIE also prioritised post approval document review for sites requiring critical updates. The sequential review of management plans can be demonstrated by the following Management Plan submission record; • Blast Management Plan (BMP) –submitted March 2018, approved June 2018; • Air Quality Management Plan (AQMP) – submitted July 2018, approved January 2019; • Noise Management Plan (NMP) – submitted May 2019, approved June 2020; • Water Management Plan (WMP) – submitted April 2020, pending review and approval • Environmental Management Strategy (EMS) – submitted September 2020, pending review and approval **Action assigned** (completion of WMP review DPIE dependent).	30th April, 2021
Section 4.1, Table 5 Item 16 (page 10) / Section 4.7, Table 8 Items 1 and 5 (page 17) / Section 4.8, Table 9 Items 1 (page 18)	There was no evidence of the approval of flow metering devices by NSW Office of Water (or DPI Water).	Not Compliant Low Risk	Water Licence 20BL171995 C2	**In progress** Further investigation into this groundwater licence condition and Mt Arthur Coal's compliance with it will be undertaken as part of the Water Management Plan revision, Where required the Office of Water will be notified of the outcomes of the investigation and any specific actions/due dates that come out of it. **Action assigned**	30th April, 2021
		Not Compliant Administrative	Water Licence 20BL171995 C8		
		Not Compliant Administrative	Water Licence 20BL168155 C7		
Section 4.1, Table 5 Item 17 (page 10) / Section	There was no evidence of the provision of maps or plans showing the	Not Compliant Administrative	Water Licence 20BL171995 C3	**In progress** Further investigation into this groundwater licence condition and Mt Arthur Coal's compliance with it will be undertaken. as part of the Water Management Plan revision, Where required the Office of	30th April, 2021

Audit report reference	Issue	Audit finding	Conditions and commitments found not compliant	Status	Proposed Completion Dates
4.7, Table 8 Item 2 (page 17)	location of works associated with water licences.			Water will be notified of the outcomes of the investigation and any specific actions/due dates that come out of it. **Action assigned**	
Section 4.1, Table 5 Item 18 (page 10) / Section 4.7, Table 8 Item 3 (page 17)	Not all documents developed by the site to address the requirement to minimise ongoing seepage of alluvial groundwater to the mine works were approved by the NSW Office of Water (or DPI Water), specifically the MOP.	Not Compliant Administrative	Water Licence 20BL171995 C5	**In progress** Further investigation into this groundwater licence condition and Mt Arthur Coal's compliance with it will be undertaken. as part of the Water Management Plan revision, Where required the Office of Water will be notified of the outcomes of the investigation and any specific actions/due dates that come out of it. **Action assigned**	30th April, 2021
Section 4.1, Table 5 Item 19 (page 10) / Section 4.7, Table 8 Item 4 (page 17)	Water licence compliance reports were not submitted.	Not Compliant Medium Risk	Water Licence 20BL171995 C7	**In progress** Further investigation into this groundwater licence condition and Mt Arthur Coal's compliance with it will be undertaken. as part of the Water Management Plan revision, Where required the Office of Water will be notified of the outcomes of the investigation and any specific actions/due dates that come out of it. **Action assigned**	30th April, 2021
Section 4.1, Table 5 Item 27 (page 11) / Section 4.26, Table 14 Item 1 (page 22)	The EMS needs to be updated as it quotes procedures that were no longer used and could not be found.	Not Compliant Administrative	EMS Table 2	**In Progress** A draft revised Environmental Management Strategy with an updated document register was submitted to DPIE in August 2020 and is currently under assessment. The original 2017 IEA completion date was not met as there have been delays in progressing management plan reviews as DPIE have requested that the revised management plans be submitted sequentially to avoid overloading the reviewers. The DPIE also prioritised post approval document review for sites requiring critical updates. The sequential review of management plans can be demonstrated by the following Management Plan submission record; • Blast Management Plan (BMP) –submitted March 2018, approved June 2018; • Air Quality Management Plan (AQMP) – submitted July 2018, approved January 2019;	30th April, 2021

Audit report reference	Issue	Audit finding	Conditions and commitments found not compliant	Status	Proposed Completion Dates
				• Noise Management Plan (NMP) – submitted May 2019, approved June 2020; • Water Management Plan (WMP) – submitted April 2020, pending review and approval • Environmental Management Strategy (EMS) – submitted September 2020, pending review and approval **Action assigned** (completion of WMP review DPIE dependent).	
Section 4.1, Table 5 Item 28 (page 11) / Section 4.28, Table 15 Item 1 (page 22)	The Thomas Mitchell Drive offset area has been fenced in accordance with the AHMP but the access protocols were not determined through consultation with the Indigenous Stakeholders.	Not Compliant Administrative	AHMP S5.1	**In Progress** The Aboriginal Heritage Management Plan (AHMP) is currently being reviewed and revised by Mt Arthur Coal, in consultation with OEH, the Aboriginal community, MSC and relevant landowners. The DPIE have requested that the revised management plans for review be submitted sequentially to avoid overloading the reviewers. Additional delays have occurred due to Covid restricting consultation with Stakeholders. **Action assigned** (completion of AHMP review DPIE dependent).	30th April, 2021
Section 4.1, Table 5 Item 29 (page 11) / Section 4.28, Table 15 Item 2 (page 23)	The commitments from Section 5.8 of the AHMP are not followed through in the site induction package.	Not Compliant Administrative	AHMP S5.8	**In Progress** Mt Arthur Coal is going through the process of updating induction requirements for all of site in a complete overhaul of the induction process. This will include assigning requirements for all levels of staff regarding environmental and cultural heritage awareness. Mt Arthur Coal will update the site induction package accordingly. Due to the delay in including the Cultural heritage requirements in this process an interim site-wide notice was issued on 22 August 2019 communicating cultural heritage requirements on site, the purpose being to refresh everyone on the commitments outlined in Section 5.8 of the Aboriginal Heritage Management Plan. Due to the ongoing delay in finalising the AHMP and updating the induction an additional interim site wide notice will be issued by 31 December 2020. The induction will be updated within 2 months of the AHMP being approved by DPIE. **Action assigned**	30th June, 2021

Audit report reference	Issue	Audit finding	Conditions and commitments found not compliant	Status	Proposed Completion Dates
Section 4.1, Table 5 Item 31 (page 11) / Section 4.28, Table 15 Item 4 (page 23)	The offset management plans do not refer to Cultural Heritage issues.	Not Compliant Administrative	AHMP App 4	**In progress** The Aboriginal Heritage Management Plan (AHMP) is currently being reviewed and revised by Mt Arthur Coal, in consultation with OEH, the Aboriginal community, MSC and relevant landowners. The original 2017 IEA completion date was not met as the DPIE have requested that the revised management plans for review be submitted sequentially to avoid overloading the reviewers. Additional delays have occurred due to COVID-19 restricting consultation with Stakeholders. The sequential review of management plans can be demonstrated by the following Management Plan submission record; • Blast Management Plan (BMP) –submitted March 2018, approved June 2018; • Air Quality Management Plan (AQMP) – submitted July 2018, approved January 2019; • Noise Management Plan (NMP) – submitted May 2019, approved June 2020; • Water Management Plan (WMP) – submitted April 2020, pending review and approval • Environmental Management Strategy (EMS) – submitted September 2020, pending review and approval **Action assigned** (completion of AHMP review DPIE dependent).	30th April, 2021
Section 4.1, Table 5 Item 41 (page 12) / Section 4.45, Table 26 Item 1 (page 30)	The Aboriginal Heritage Management Plan should have been updated in consultation with the Aboriginal community and the OEH to specify management and mitigation measures relevant to the 2013 Modification area.	Not Compliant Administrative	EA 2013 S4.7.3	**In progress** The Aboriginal Heritage Management Plan (AHMP) is currently being reviewed and revised by Mt Arthur Coal, in consultation with OEH, the Aboriginal community, MSC and relevant landowners. The original 2017 IEA completion date was not met as the DPIE have requested that the revised management plans for review be submitted sequentially to avoid overloading the reviewers. Additional delays have occurred due to COVID-19 restricting consultation with Stakeholders. The sequential review of management plans can be demonstrated by the following Management Plan submission record; • Blast Management Plan (BMP) –submitted March 2018, approved June 2018;	30th April, 2021

Audit report reference	Issue	Audit finding	Conditions and commitments found not compliant	Status	Proposed Completion Dates
				• Air Quality Management Plan (AQMP) – submitted July 2018, approved January 2019; • Noise Management Plan (NMP) – submitted May 2019, approved June 2020; • Water Management Plan (WMP) – submitted April 2020, pending review and approval • Environmental Management Strategy (EMS) – submitted September 2020, pending review and approval • **Action assigned** (completion of AHMP review DPIE dependent).	

11. Incidents and Non-compliances

Blast Overpressure Exceedance

On 8 August 2019 there was an exceedance of the 120dBL overpressure limited recorded at Sheppard Ave (120.5dBL).

An investigation was undertaken by external blasting experts which determined that there was significant wind interference which caused the elevated level.

The exceedance was report to the EPA and DPIE. DPIE have undertaken an investigation with no further regulatory action being undertaken.

Implementation of Air Quality Management Plan

Air quality investigation reports were submitted to DPIE for 10 and 11 of December 2019. The reports showed that there were no recorded actions in response to a level 3 alarm from the dust monitoring system.

DPIE have undertaken an investigation and determined that this was a failure to comply with Schedule 3, Condition 24 of MP09_0062 by failing to implement the approved Air Quality Management plan to the satisfaction of the Secretary on 10, 11 and 16 December 2019.

DPIE have issued an official caution in relation to this matter.

Clearing outside of Ancillary disturbance boundary

In early January 2020, a contractor undertaking clearing at MAC cleared an area of approximately 250m^2 beyond the pegged disturbance limit, which was also beyond the approved MAC disturbance boundary.

This has been assessed to be a failure to comply with Schedule 3, Condition 40 of Project Approval MP 09_0062 by failing to implement the approved Biodiversity Management Plan (BMP) to the satisfaction of the Secretary.

Section 11.3.1 of the approved BMP refers to the MAC Land Management Procedure, which details control measures to be implemented during vegetation clearing.

DPIE have issued an official caution in relation to this matter.

Uncontrolled Discharge of Water

On 23 January a leak from the Environment Dam to Belmont pit line was identified. Water was observed flowing along the inside of the Denman Rd visual bund, then through a rock lined drainage point and silt fence to a set of culverts under Denman Rd. Assessment determined that there was no material harm to the environment.

The incident was reported to the EPA and DPIE. DPIE have determined that the EPA is the appropriate regulatory authority to administer the incident investigation.

At the time of reporting the investigation is still underway with the EPA. MAC have provided information to the EPA and an action plan to reduce the risk of a similar events occurring in the future.

Uncontrolled Discharge of Water

On 6 February, an excavator was burying a mine water pipeline across the old conveyor access road. As the excavator was completing the task, the bucket clipped the pipe causing it to rupture. The pump connected to the pipe was switched off and the pipeline was not in use at the time the event occurred. Therefore, there was only a minimal amount of residual water in the pipe at the time it was damaged. Water contained within the pipe at the time of the event flowed 160m down the conveyor corridor with a small volume entering Saddlers Creek. The majority of the

water discharged from the line was contained within the conveyor corridor. Saddlers Creek had no water in it at the time of the event. There was no pooling due to the small volume of water that reached the creek which immediately soaked into the soil. Water samples were collected directly from the pipe and sent for analysis. An assessment was completed which found no material harm to the environment.

The incident was reported to the EPA and DPIE, there has been no regulatory action undertaken by either agency at this time.

Groundwater Management Plan Monitoring Schedule

A number of non-compliances with regards to collection of manual water level data and collection of water quality sample data Although the FY18 Annual Review stated that groundwater trigger values were revised following the completion of the interim monitoring program and would be applied for the FY19 monitoring period, instead the currently approved GWMP dated 28 April 2015 is applicable for the FY19 monitoring period. The revised trigger values will not be applied until further review and subsequent approval by the DPIE.

In anticipation of moving to the revised site Water Management Plan in FY21, Mt Arthur Coal adjusted the sampling frequency to quarterly instead of bi-monthly and also adjusted the sampling requirements at some of the sites as recommended by the independent consultant. This premature implementation of the revised site Water Management Plan resulted in a number of non-compliances with regards to collection of manual water level data and collection of water quality sample data, which is discussed in further detail in Section 7.4

12. Activities during Next Reporting Period

Mt Arthur Coal has established the following targets for the next reporting period:

- Undertake update to the Site Law database and predictive blast model, allowing for increased accuracy in determining the vibration and overpressure at the design stage;
- Undertake review of the Blast Matrices, Pre Blast Approval procedure and Approval to Blast Form which will improve the blast impact risk identification process undertaken prior to each blast and reduce the risk of impacts to community and environment as a result of the blasting improvements to the sites current predictive meteorological model; and
- Investigate the use of remote sensing in the assessment of landform stability as part of the review of the
- REMP and complete the review of the aerial weed assessment.
- Undertake a review of the groundwater monitoring program be rationalised based on recent findings and additional newly installed bores.
- Review the WMP to ensure consistency between the field program and management plan.
- Review the condition and instrumentation of groundwater bores based on the recommendations the of the annual review assessment report.
- Relocate one of the environment dam to Belmont mine water lines to the toe of VD5.

These targets will be closely monitored and an update on the status of each will be reported in the next Annual Review. The above four actions have all been assigned a completion date of 30 June 2021. No changes to any management plans will be required as a result of the abovementioned actions.

Table 36 outlines a progress summary of Mt Arthur Coal's performance against targets set for the FY20 period.

Table 36: Mt Arthur Coal's performance against targets for FY20

Target	Status	Performance
Undertake flyrock modelling to assist in reducing the probability and impact of blast overpressure events	Complete	Orica undertook an investigation in January 2020
Undertake improvements to the sites current predictive meteorological model	Completed	Fume, Dust Blast Risk modelling reviewed.
Establish competency of front line leadership and Integrated Remote Operations Centre (IROC) in License to Operate risk management	Completed	IROC have a fully integrated response model.
Embed Licence to Operate risk control effectiveness testing	In Progress	To be completed in FY21
Fit for purpose monitoring systems within the Environment Data Monitoring System Project	In Progress	To be completed in FY21
Drive rehabilitation on trajectory to closure – based on ecological development monitoring	Completed	Monitoring program updated detailed tracking and mainteance scheduling included

Appendix 1 – Surface Water Quality Monitoring Results

Surface Water Quality Results

Site	Month	Date sampled	Flow (description)	Field pH	Field EC (uS/cm)	TDS (mg/L)	TSS (mg/L)	Turbidity (NTU)	Sulfate (mg/L)	Dissolved Fe (mg/L)	Total Fe (mg/L)	Nitrate (mg/L)	O&G (mg/L)
SW02	Jul-19	16 and 17/7/2019											
	Aug-19	20 and 21/8/2019											
	Sep-19	16 and 17/9/2019											
	Oct-19	14 and 15/10/2019											
	Nov-19	18 and 19/11/2019											
	Dec-19	16 and 17/12/2019											
	Jan-20	21 and 22/01/2020											
	Feb-20	18 and 19/2/2020											
	Mar-20	16 and 17/03/2020											
	Apr-20	20, 21 and 22/04/2020											
	May-20	18 and 19/05/2020											
	Jun-20	16 and 17/06/2020											
	Impact Assessment Criteria Trigger Values		**Stage 1 Trigger**	**6.5< >9.0**	**12365**		**219**						
			Stage 2 Trigger		**13900**		**277**						
SW03	Jul-19	16 and 17/7/2019	Still	7.89	3905	2480	19	5.5	853	0.08	1.01	0.01	<5
	Aug-19	20 and 21/8/2019	Still	7.91	4100	2830	7	2.6	894	0.06	0.26	0.02	7
	Sep-19	16 and 17/9/2019	Still	7.71	4740	3360	<5	5.2	704	0.07	0.67	0.01	<5
	Oct-19	14 and 15/10/2019	Still	7.51	5630	3900	8	5.6	1400	0.1	0.69	<0.01	<5
	Nov-19	18 and 19/11/2019	Still	7.88	7780	5840	7	5.8	1800	0.16	0.71	0.01	<5
	Dec-19	16 and 17/12/2019	Still	8.02	12300*	6980	14	12.3	2110	0.22	1.04	<0.01	<5
	Jan-20	21 and 22/01/2020											
	Feb-20	18 and 19/2/2020	Still	7.68	10400	7180	<5	6.6	2570	0.41	0.98	<0.01	<5
	Mar-20	16 and 17/03/2020	Still	7.63	7520	7420	<5	2.3	2920	0.11	0.29	<0.01	<5
	Apr-20	20, 21 and 22/04/2020											
	May-20	18 and 19/05/2020											
	Jun-20	16 and 17/06/2020	Still	7.68	6790	4410	19	8.8	1620	0.09	0.48	<0.01	<5

Site	Month	Date sampled	Flow (description)	Field pH	Field EC (uS/cm)	TDS (mg/L)	TSS (mg/L)	Turbidity (NTU)	Sulfate (mg/L)	Dissolved Fe (mg/L)	Total Fe (mg/L)	Nitrate (mg/L)	O&G (mg/L)
	Impact Assessment Criteria Trigger Values		**Stage 1 Trigger**	**6.5< >9.0**	**10133**		**37**						
			Stage 2 Trigger		**11402**		**46**						
SW04	Jul-19	16 and 17/7/2019											
	Aug-19	20 and 21/8/2019											
	Sep-19	16 and 17/9/2019											
	Oct-19	14 and 15/10/2019											
	Nov-19	18 and 19/11/2019											
	Dec-19	16 and 17/12/2019											
	Jan-20	21 and 22/01/2020											
	Feb-20	18 and 19/2/2020	Still	7.39	477	382	15	27.1	45	0.13	0.6	0.8	<5
	Mar-20	16 and 17/03/2020	Still	8.26	3620	2700	22	22.6	939	0.35	1.62	<0.01	<5
	Apr-20	20, 21 and 22/04/2020	Still	8.46	954	517	8	5.7	151	0.07	8.37	<0.01	<5
	May-20	18 and 19/05/2020											
	Jun-20	16 and 17/06/2020	Still	7.73	474	313	16	72.9	67	0.12	2.6	0.95	<5
	Impact Assessment Criteria Trigger Values		**Stage 1 Trigger**	**6.5< >9.0**	**13959**		**82**						
			Stage 2 Trigger		**15509**		**104**						
SW12	Jul-19	16 and 17/7/2019	Still	7.66	3001	1840	8	2.5	783	0.08	0.36	0.01	<5
	Aug-19	20 and 21/8/2019	Still	7.56	3110	1910	14	8.4	947	<0.05	1.26	0.05	<5
	Sep-19	16 and 17/9/2019	Still	7.53	3820	2580	12	4.8	702	0.3	0.9	0.06	<5
	Oct-19	14 and 15/10/2019	Still	7.45	4640	3370	36	19.7	1490	<0.05	1.33	0.01	<5
	Nov-19	18 and 19/11/2019											
	Dec-19	16 and 17/12/2019											
	Jan-20	21 and 22/01/2020											
	Feb-20	18 and 19/2/2020	Still	7.33	1185	710	17	10.1	332	0.31	0.64	<0.01	<5
	Mar-20	16 and 17/03/2020	Still	6.96	2091	1830	13	8.3	827	0.26	3.44	0.02	<5
	Apr-20	20, 21 and 22/04/2020	Still	7.07	1841	1170	8	3.8	444	0.16	4.23	<0.01	<5
	May-20	18 and 19/05/2020	Still	7.47	2489	1520	<5	0.4	558	<0.05	<0.05	<0.01	<5
	Jun-20	16 and 17/06/2020	Still	7.33	789	490	44	104	254	0.06	1.96	1.92	<5

Site	Month	Date sampled	Flow (description)	Field pH	Field EC (uS/cm)	TDS (mg/L)	TSS (mg/L)	Turbidity (NTU)	Sulfate (mg/L)	Dissolved Fe (mg/L)	Total Fe (mg/L)	Nitrate (mg/L)	O&G (mg/L)
	Impact Assessment Criteria Trigger Values		**Stage 1 Trigger**	**6.5< >9.0**	**6659**		**555**						
			Stage 2 Trigger		**7153**		**708**						
SW15	Jul-19	16 and 17/7/2019	Dam	7.76	1068	595	<5	3	145	0.33	1.03	<0.01	<5
	Aug-19	20 and 21/8/2019	Dam	7.92	1360	801	8	3.8	221	0.34	1.47	0.03	6
	Sep-19	16 and 17/9/2019											
	Oct-19	14 and 15/10/2019											
	Nov-19	18 and 19/11/2019											
	Dec-19	16 and 17/12/2019											
	Jan-20	21 and 22/01/2020											
	Feb-20	18 and 19/2/2020	Dam	7.72	508	312	12	42.4	63	0.18	0.85	0.47	<5
	Mar-20	16 and 17/03/2020	Dam	7.48	671	472	14	5.4	26	0.63	1.55	<0.01	<5
	Apr-20	20, 21 and 22/04/2020	Dam	7.49	575	372	<5	2.6	56	0.28	0.64	<0.01	<5
	May-20	18 and 19/05/2020	Dam	7.48	547	350	<5	0.8	45	0.13	0.23	<0.01	<5
	Jun-20	16 and 17/06/2020	Dam	7.65	676	328	<5	13.5	72	0.12	0.7	0.04	<5
	Impact Assessment Criteria Trigger Values		**Stage 1 Trigger**	**6.5< >9.0**	**7128**		**103**						
			Stage 2 Trigger		**8262**		**130**						

Unable to sample due to dry or low water level

* invalid due to level.

Appendix 2 – Ground Water Monitoring Results and Groundwater Level Drawdown Analysis

Appendix 3 – Community Complaints

Number	Month	**Date**	**Time**	**From**	**Issue**	**Lodgment type**	**Investigation and response to caller**
1	July	10/07/2019	5.57pm	Racecourse Road/Sheppard Avenue	Lighting	Community Response Line	Investigation revealed location of lights, which were redirected or turned off. Caller was advised of investigation results and issue rectified.
2		10/07/2019	9.35pm	Racecourse Road/Sheppard Avenue	Operational Noise	Community Response Line	Investigation revealed no unusual mining operations were occurring at the time. Results at the nearest real-time monitor indicated Operational Noise levels were within regulatory criteria. Caller was advised of investigation and monitoring results.
3		13/07/2019	6.08pm	Racecourse Road/Sheppard Avenue	Lighting	Community Response Line	Investigation revealed location of lights, which were redirected or turned off. Caller was advised of investigation results and issue rectified.
4		18/07/2019	8.38pm	Roxburgh Road	Lighting	Community Response Line	Investigation revealed location of lights, which were redirected or turned off. Caller was advised of investigation results and issue rectified.
5		19/07/2019	6.38pm	Roxburgh Road	Lighting	Community Response Line	Investigation revealed location of lights, which were redirected or turned off. Caller was advised of investigation results and issue rectified.
6		25/07/2019	7.21pm	Racecourse Road/Sheppard Avenue	Lighting	Community Response Line	Investigation revealed location of lights, which were redirected or turned off. Caller was advised of investigation results and issue rectified.
7		27/07/2019	7.08pm	Roxburgh Road	Lighting	Community Response Line	Investigation revealed location of lights, which were redirected or turned off. Caller was advised of investigation results and issue rectified.
8		27/07/2019	7.10pm	Racecourse Road/Sheppard Avenue	Lighting	Community Response Line	Investigation revealed location of lights, which were redirected or turned off. Caller was advised of investigation results and issue rectified.

Number	Month	**Date**	**Time**	**From**	**Issue**	**Lodgment type**	**Investigation and response to caller**
9		29/07/2019	9.44pm	Racecourse Road/Sheppard Avenue	Operational Noise	Community Response Line	Investigation revealed no unusual mining operations were occurring at the time. Results at the nearest real-time monitor indicated Operational Noise levels were within regulatory criteria. Caller was advised of investigation and monitoring results.
10		30/07/2019	6.09pm	Roxburgh Road	Lighting	Community Response Line	Investigation revealed location of lights, which were redirected or turned off. Caller was advised of investigation results and issue rectified.
11		3/08/2019	6.48pm	Roxburgh Road	Lighting	Community Response Line	Investigation revealed location of lights, which were redirected or turned off. Caller was advised of investigation results and action taken.
12	August	4/08/2019	5.52pm	Linden/Roxburgh Road	General Dust	Community Response Line	Investigation revealed no unusual mining activities were occurring at the time, however action was taken to minimise dust. Results at the nearest monitor indicated dust levels were not elevated at the time, and the 24 hour average remained within regulatory criteria. Caller was advised of investigation and actions taken.
13		7/08/2019	6.30pm	Roxburgh Road	Lighting	Community Response Line	Investigation revealed location of lights, which were redirected or turned off. Caller was advised of investigation results and action taken.
14		8/08/2019	2.41pm	Muswellbrook	General Dust	Community Response Line	An investigation was undertaken and a response provided to the DPIE. MAC implemented all reasonable and feasible measures to minimise dust generation on site.
15		12/08/2019	10.21am	Muswellbrook	Blast vibration	Community Response Line	Investigation revealed weather conditions were suitable for blasting at the time. Results indicated overpressure Operational Noise and ground vibration levels were within regulatory criteria. Caller was advised of investigation and monitoring results.

Number	Month	**Date**	**Time**	**From**	**Issue**	**Lodgment type**	**Investigation and response to caller**
16		12/08/2019	10.22am	Muswellbrook	Blast vibration	Community Response Line	Investigation revealed weather conditions were suitable for blasting at the time. Results indicated overpressure Operational Noise and ground vibration levels were within regulatory criteria. Caller was advised of investigation and monitoring results.
17		12/08/2019	12.57pm	Muswellbrook	Blast vibration	Community Response Line	Investigation revealed weather conditions were suitable for blasting at the time. Results indicated overpressure Operational Noise and ground vibration levels were within regulatory criteria. Caller was advised of investigation and monitoring results.
18		12/08/2019	7.36pm	Roxburgh Road	Lighting	Community Response Line	Investigation revealed location of lights, which were redirected or turned off. Caller was advised of investigation results and action taken.
19		13/08/2019	4.53pm	Denman	Spontaneous Combustion	Community Response Line	Investigation revealed the operations team was managing a spontaneous combustion event in-line with the site procedure. Caller was advised of investigation.
20		15/08/2019	1:55pm	Roxburgh Road	Lighting	Community Response Line	Investigation revealed location of lights, which were redirected or turned off. Caller was advised of investigation results and action taken.
21		27/08/2019	6.56pm	Roxburgh Road	Lighting	Community Response Line	Investigation revealed location of lights, which were redirected or turned off. Caller was advised of investigation results and action taken.
22	September	9/09/2019	7.04pm	Roxburgh Road	Lighting	Community Response Line	Investigation revealed location of lights, which were redirected or turned off. Caller was advised of investigation results and actions taken.
23		29/09/2019	6.04am	Roxburgh Road	Operational Noise	Community Response Line	Investigation revealed no unusual mining operations were occurring at the time. Results at the nearest real-time monitor indicated Operational Noise levels were within regulatory

Number	Month	**Date**	**Time**	**From**	**Issue**	**Lodgment type**	**Investigation and response to caller**
							criteria. Caller was advised of investigation and monitoring results.
24		29/09/2019	9.39pm	Roxburgh Road	Operational Noise	Community Response Line	Investigation revealed no unusual mining operations were occurring at the time. Results at the nearest real-time monitor indicated Operational Noise levels were within regulatory criteria. Caller was advised of investigation and monitoring results.
25	October	6/10/2019	8.15am	Racecourse Road/Sheppard Avenue	Operational Noise	Community Response Line	Investigation revealed no unusual mining operations were occurring at the time. Results at the nearest real-time monitor indicated Operational Noise levels were within regulatory criteria. Caller was advised of investigation and monitoring results.
26		13/10/2019	10.42am	Roxburgh Road	Operational Noise	Community Response Line	Investigation revealed no unusual mining operations were occurring at the time. Operational Noise monitoring results indicated Operational Noise levels were within regulatory criteria. Caller was advised of investigation and monitoring results.
27		15/10/2019	11.06pm	Roxburgh Road	Operational Noise	Community Response Line	Investigation revealed no unusual mining operations were occurring at the time. Operational Noise monitoring results indicated Operational Noise levels were within regulatory criteria. Caller was advised of investigation and monitoring results.
28		20/10/2019	10.00pm	Roxburgh Road	Operational Noise	Community Response Line	Investigation revealed no unusual mining operations were occurring at the time. Operational Noise monitoring results indicated Operational Noise levels were within regulatory criteria. Caller was advised of investigation and monitoring results.

Number	Month	**Date**	**Time**	**From**	**Issue**	**Lodgment type**	**Investigation and response to caller**
29		24/10/2019	7.34pm	Ironbark Road	Operational Noise	Community Response Line	Investigation revealed no unusual mining operations were occurring at the time. Operational Noise monitoring results indicated Operational Noise levels were within regulatory criteria. Caller was advised of investigation and monitoring results.
30	November	4/11/2019	10.51am	Denman Road	Blast Vibration	Community Response Line	Investigation revealed weather conditions were suitable for blasting at the time. Results indicated overpressure Operational Noise and ground vibration levels were within regulatory criteria. Caller advised of investigation results.
31		4/11/2019	5.00pm	Singleton	Other	Community Response Line	Investigation revealed the existing bus pick up/drop off point would be better suited to a different location to allow for improved traffic flow and parking options. Caller advised of investigation results.
32		7/11/2019	12.59pm	New England Highway	General Dust	Community Response Line	Investigation revealed operations had been modified. Dust monitoring results indicated levels were within regulatory criteria. Caller advised of investigation and monitoring results.
33		10/11/2019	10.41am	Racecourse Road/Sheppard Avenue	General Dust	Community Response Line	Operations were modified. Dust monitoring results indicated levels were within regulatory criteria. Caller advised of investigation and monitoring results.
34		12/11/2019	2.29pm	Racecourse Road/Sheppard Avenue	General Dust	Community Response Line	Investigation revealed operations had been modified. Dust monitoring results indicated levels were within regulatory criteria. Caller advised of investigation and monitoring results.
35		28/11/2019	10.08pm	Roxburgh Road	Operational Noise	Community Response Line	Investigation revealed no unusual mining operations were occurring at the time. Operational Noise monitoring results indicated Operational Noise levels were within regulatory criteria. Caller advised of investigation and monitoring results.

Number	Month	**Date**	**Time**	**From**	**Issue**	**Lodgment type**	**Investigation and response to caller**
36	December	1/12/2019	9.30pm	Roxburgh Road	Lighting	Community Response Line	The on-coming night shift OCE was notified of the complaint and checked the positioning of the light to ensure it was re-directed away from the caller's location.
37		14/12/2019	7.37pm	Racecourse Road/Sheppard Avenue	General Dust	Community Response Line	Investigation revealed operations had been modified. Caller was advised of investigation and monitoring results.
38		18/12/2019	5.48am	Roxburgh Road	Operational Noise	Community Response Line	Investigation revealed no unusual mining operations were occurring at the time. Operational Noise monitoring results indicated Operational Noise levels were within regulatory criteria. Caller was advised of investigation and monitoring results.
39		25/12/2019	3.51am	Roxburgh Road	Operational Noise	Community Response Line	Investigation revealed no unusual mining operations were occurring at the time. Operational Noise monitoring results indicated Operational Noise levels were within regulatory criteria. Caller was advised of investigation and monitoring results.
40		27/12/2019	1.03pm	Thomas Mitchell Drive	Other	Community Response Line	Investigation revealed that the coal train was not loaded at time of incident. Caller advised of investigation results.
41	January	15/01/2020	12.10pm	Racecourse Road/Sheppard Avenue	Blast Vibration	Community Response Line	Investigation revealed weather conditions were suitable for blasting at the time. Results indicated overpressure Operational Noise and ground vibration levels were within regulatory criteria. Caller was advised of investigation and monitoring results.
42		19/01/2020	5.40am	Roxburgh Road	Operational Noise	Community Response Line	Investigation revealed no unusual mining operations were occurring at the time. Results at the nearest real-time monitor indicated Operational Noise levels were within regulatory

Number	Month	**Date**	**Time**	**From**	**Issue**	**Lodgment type**	**Investigation and response to caller**
							criteria. Caller was advised of investigation and monitoring results.
43	February	9/02/2020	10.42pm	Roxburgh Road	Operational Noise	Community Response Line	Investigation revealed no unusual mining operations were occurring at the time. Results at the nearest real-time monitor indicated noise levels were within regulatory criteria. Caller was advised of investigation and monitoring results.
44		17/02/2020	8.00pm	Jerrys Plains Road	Lighting	Community Response Line	Investigation revealed location of lights, which were redirected or turned off. Caller was advised of investigation results and action taken.
45	March	5/03/2020		Roxburgh Road	Operational Noise	Community Response Line	Investigation revealed no unusual mining operations were occurring at the time. Results at the nearest real-time monitor indicated noise levels were within regulatory criteria. Caller was advised of investigation and monitoring results.
46		9/03/2020		Roxburgh Road	Operational Noise	Community Response Line	Investigation revealed no unusual mining operations were occurring at the time. Results at the nearest real-time monitor indicated noise levels were within regulatory criteria. Caller was advised of investigation and monitoring results.
47	May	2/05/2020	6.15pm	Roxburgh Road	Lighting	Community Response Line	Investigation revealed location of lights, which were redirected or turned off. Caller was advised of investigation results and actions taken.
48		7/05/2020	8.36am	Muswellbrook	Off-site bus route	Email	Investigation revealed the Greyhound Bus Service was using Skellatar Stock Route to transport employees to MAC for work. When notified of issue (load limit restriction of 10T), the bus company immediately amended their bus route to exclude Skellatar Stock Route.

Number	Month	**Date**	**Time**	**From**	**Issue**	**Lodgment type**	**Investigation and response to caller**
49		22/05/2020	7.15pm	Roxburgh Road	Lighting	Community Response Line	Investigation revealed location of lights, which were redirected or turned off. Caller was advised of investigation results and actions taken.
50	June	3/06/2020	11.25am	Dorset Road	Blast vibration	Community Response Line	Investigation revealed weather conditions were suitable for blasting at the time. Results indicated overpressure noise and ground vibration levels were within regulatory criteria. Caller was advised of investigation and monitoring results. Caller advised he was unable to find the Community Response Line phone number on the BHP website. The number is listed on the BHP website, under Environment, Regulatory Information, NSWEC Mt Arthur Coal.
51		3/06/2020	11.27am	Ridgelands Road	Blast Vibration	Community Response Line	Investigation revealed weather conditions were suitable for blasting at the time. Results indicated overpressure noise and ground vibration levels were within regulatory criteria. Caller was advised of investigation and monitoring results.
52		8/06/2020	11.04pm	Roxburgh Road	Operational Noise	Community Response Line	Investigation revealed no unusual mining operations were occurring at the time. Results at the nearest real-time monitor indicated noise levels were within regulatory criteria. Caller was advised of investigation and monitoring results.
53		18/06/2020	11.53pm	Roxburgh Road	Operational Noise	Community Response Line	Investigation revealed no unusual mining operations were occurring at the time. Results at the nearest real-time monitor indicated noise levels were within regulatory criteria. Caller was advised of investigation and monitoring results.
54		27/06/2020	9.56pm	Roxburgh Road	Operational Noise	Community Response Line	Investigation revealed no unusual mining operations were occurring at the time. Results at the nearest real-time monitor indicated noise levels were within regulatory criteria. Caller was advised of investigation and monitoring results.

Appendix 4 – Annual Coal Transport Report FY20

This report has been prepared in accordance with Schedule 3 Condition 46 of Project Approval 09_0062 MOD 1:

Monitoring of Coal Transport

46. The Proponent shall keep records of the:
    (a) amount of coal transported from the site in each financial year;
    (b) number of coal haulage train movements generated by the Mt Arthur mine complex (on a daily basis); and
    (c) make these records available on its website at the end of each financial year.

For the 12 month period ending 30 June 2020:

- Approximately 15.3 million tonnes of export product coal was transported by rail to the Port of Newcastle. This is compliant with Schedule 2 Condition 7(a) of Project Approval 09_0062 MOD 1, which restricts Mt Arthur Coal's coal transport on the Antiene rail spur to a maximum of 27 million tonnes of product coal in a financial year;
- Approximately 0.6 million tonnes of domestic product coal was transported by conveyor to the Bayswater Power Station;
- The total number of train movements was 3,590; and
- The maximum number of train movements in a single day was 22, which occurred once only throughout the reporting period. This is compliant with Schedule 2 Condition 7(b) of Project Approval 09_0062 MOD 1, which restricts Mt Arthur Coal's coal transport on the Antiene rail spur to a maximum of 30 train movements a day.

Note: Each train entering and exiting the site is classified as two train movements and a day refers to the 24 hours from midnight to midnight the next day.

Table A6.1. Daily train movements FY20

Date	Number of train movements
1/07/2019	14
2/07/2019	14
3/07/2019	10
4/07/2019	2
5/07/2019	16
6/07/2019	8
7/07/2019	8
8/07/2019	12
9/07/2019	2
10/07/2019	8
11/07/2019	8
12/07/2019	6
13/07/2019	14
14/07/2019	20
15/07/2019	6
16/07/2019	16
17/07/2019	10
18/07/2019	4
19/07/2019	14
20/07/2019	12
21/07/2019	14
22/07/2019	10
23/07/2019	8
24/07/2019	12
25/07/2019	10
26/07/2019	6
27/07/2019	12
28/07/2019	16
29/07/2019	14
30/07/2019	8
31/07/2019	6
1/08/2019	10
2/08/2019	10
3/08/2019	12
4/08/2019	14
5/08/2019	8
6/08/2019	2
7/08/2019	0
8/08/2019	0
9/08/2019	2
10/08/2019	8
11/08/2019	6
12/08/2019	2
13/08/2019	10
14/08/2019	6
15/08/2019	6
16/08/2019	8
17/08/2019	4
18/08/2019	14
19/08/2019	16
20/08/2019	8
21/08/2019	8
22/08/2019	14
23/08/2019	8
24/08/2019	6
25/08/2019	4
26/08/2019	14
27/08/2019	14
28/08/2019	12
29/08/2019	6
30/08/2019	4
31/08/2019	8
1/09/2019	12
2/09/2019	8
3/09/2019	10
4/09/2019	2
5/09/2019	10
6/09/2019	8
7/09/2019	8
8/09/2019	2
9/09/2019	0
10/09/2019	2
11/09/2019	4
12/09/2019	12
13/09/2019	4
14/09/2019	0
15/09/2019	0
16/09/2019	8
17/09/2019	10
18/09/2019	10
19/09/2019	6
20/09/2019	12
21/09/2019	8
22/09/2019	8
23/09/2019	10

Date	Number of train movements
24/09/2019	0
25/09/2019	0
26/09/2019	0
27/09/2019	8
28/09/2019	10
29/09/2019	10
30/09/2019	8
1/10/2019	14
2/10/2019	6
3/10/2019	14
4/10/2019	10
5/10/2019	8
6/10/2019	8
7/10/2019	10
8/10/2019	8
9/10/2019	8
10/10/2019	6
11/10/2019	12
12/10/2019	6
13/10/2019	16
14/10/2019	2
15/10/2019	0
16/10/2019	0
17/10/2019	0
18/10/2019	2
19/10/2019	12
20/10/2019	10
21/10/2019	6
22/10/2019	10
23/10/2019	12
24/10/2019	16
25/10/2019	6
26/10/2019	14
27/10/2019	14
28/10/2019	12
29/10/2019	2
30/10/2019	4
31/10/2019	14
1/11/2019	10
2/11/2019	16
3/11/2019	14
4/11/2019	10
5/11/2019	14

Date	Number of train movements
6/11/2019	12
7/11/2019	12
8/11/2019	10
9/11/2019	12
10/11/2019	14
11/11/2019	18
12/11/2019	10
13/11/2019	10
14/11/2019	14
15/11/2019	8
16/11/2019	10
17/11/2019	10
18/11/2019	8
19/11/2019	0
20/11/2019	0
21/11/2019	0
22/11/2019	8
23/11/2019	4
24/11/2019	10
25/11/2019	8
26/11/2019	14
27/11/2019	10
28/11/2019	18
29/11/2019	6
30/11/2019	14
1/12/2019	14
2/12/2019	14
3/12/2019	16
4/12/2019	14
5/12/2019	14
6/12/2019	18
7/12/2019	18
8/12/2019	16
9/12/2019	10
10/12/2019	12
11/12/2019	10
12/12/2019	10
13/12/2019	12
14/12/2019	16
15/12/2019	12
16/12/2019	12
17/12/2019	4
18/12/2019	8

Date	Number of train movements
19/12/2019	12
20/12/2019	6
21/12/2019	10
22/12/2019	14
23/12/2019	10
24/12/2019	2
25/12/2019	0
26/12/2019	6
27/12/2019	10
28/12/2019	14
29/12/2019	10
30/12/2019	10
31/12/2019	14
1/01/2020	18
2/01/2020	10
3/01/2020	8
4/01/2020	14
5/01/2020	14
6/01/2020	14
7/01/2020	10
8/01/2020	6
9/01/2020	12
10/01/2020	4
11/01/2020	0
12/01/2020	0
13/01/2020	0
14/01/2020	8
15/01/2020	2
16/01/2020	8
17/01/2020	4
18/01/2020	8
19/01/2020	12
20/01/2020	10
21/01/2020	12
22/01/2020	8
23/01/2020	10
24/01/2020	2
25/01/2020	14
26/01/2020	12
27/01/2020	16
28/01/2020	16
29/01/2020	10
30/01/2020	10

Date	Number of train movements
31/01/2020	12
1/02/2020	12
2/02/2020	6
3/02/2020	16
4/02/2020	10
5/02/2020	10
6/02/2020	14
7/02/2020	8
8/02/2020	10
9/02/2020	0
10/02/2020	14
11/02/2020	0
12/02/2020	0
13/02/2020	0
14/02/2020	0
15/02/2020	8
16/02/2020	2
17/02/2020	6
18/02/2020	8
19/02/2020	14
20/02/2020	12
21/02/2020	12
22/02/2020	10
23/02/2020	12
24/02/2020	10
25/02/2020	8
26/02/2020	10
27/02/2020	12
28/02/2020	12
29/02/2020	12
1/03/2020	14
2/03/2020	10
3/03/2020	16
4/03/2020	12
5/03/2020	10
6/03/2020	12
7/03/2020	18
8/03/2020	16
9/03/2020	4
10/03/2020	0
11/03/2020	0
12/03/2020	0
13/03/2020	0

Date	Number of train movements
14/03/2020	6
15/03/2020	12
16/03/2020	18
17/03/2020	0
18/03/2020	16
19/03/2020	10
20/03/2020	10
21/03/2020	12
22/03/2020	8
23/03/2020	4
24/03/2020	8
25/03/2020	6
26/03/2020	2
27/03/2020	2
28/03/2020	0
29/03/2020	4
30/03/2020	14
31/03/2020	0
1/04/2020	0
2/04/2020	0
3/04/2020	12
4/04/2020	12
5/04/2020	12
6/04/2020	8
7/04/2020	10
8/04/2020	12
9/04/2020	2
10/04/2020	4
11/04/2020	10
12/04/2020	6
13/04/2020	4
14/04/2020	14
15/04/2020	14
16/04/2020	0
17/04/2020	14
18/04/2020	10
19/04/2020	12
20/04/2020	6
21/04/2020	16
22/04/2020	12
23/04/2020	10
24/04/2020	14
25/04/2020	14

Date	Number of train movements
26/04/2020	14
27/04/2020	20
28/04/2020	14
29/04/2020	2
30/04/2020	16
1/05/2020	12
2/05/2020	12
3/05/2020	12
4/05/2020	12
5/05/2020	14
6/05/2020	6
7/05/2020	8
8/05/2020	18
9/05/2020	12
10/05/2020	16
11/05/2020	12
12/05/2020	14
13/05/2020	10
14/05/2020	16
15/05/2020	18
16/05/2020	14
17/05/2020	18
18/05/2020	10
19/05/2020	0
20/05/2020	0
21/05/2020	2
22/05/2020	8
23/05/2020	16
24/05/2020	18
25/05/2020	16
26/05/2020	12
27/05/2020	10
28/05/2020	16
29/05/2020	14
30/05/2020	12
31/05/2020	12
1/06/2020	14
2/06/2020	14
3/06/2020	16
4/06/2020	10
5/06/2020	16
6/06/2020	16
7/06/2020	18

Date	Number of train movements
8/06/2020	18
9/06/2020	20
10/06/2020	8
11/06/2020	14
12/06/2020	14
13/06/2020	16
14/06/2020	16
15/06/2020	16
16/06/2020	18
17/06/2020	20
18/06/2020	18
19/06/2020	4
20/06/2020	18
21/06/2020	18
22/06/2020	22
23/06/2020	14
24/06/2020	10
25/06/2020	16
26/06/2020	18
27/06/2020	18
28/06/2020	20
29/06/2020	18
30/06/2020	12
Total	**3590**
Maximum daily train movements	**22**

Appendix 5 – Rehabilitation Plan & Ground Pasture Assessment & Revegetation Inspection 2020

Appendix 6 – Weed Management Report