NARRABRI MINE
2020 ANNUAL REVIEW

Table 1: Annual Review Title Block

Name of Operation	Narrabri Mine
Name of Operator	Narrabri Coal Operations Pty Ltd
Development consent / Project Approval #	Project Approval 08_0144
Name of holder of development consent/project approval	Narrabri Coal Operations Pty Ltd
Mining lease #	ML 1609
Name of holder of mining lease	Narrabri Coal Pty Ltd
Water Licence #	Refer to Water Licences in Table 5
Name of holder of water licence	Narrabri Coal Pty Ltd, Narrabri Coal Australia Pty Ltd, Posco International Narrabri Investments Pty Ltd, J-Power Australia Pty Ltd, Kores Narrabri Pty Ltd and Upper Horn Investments (Australia) Pty Ltd
MOP/RMP start date	1 December 2020
MOP/RMP end date	31 December 2023
Annual Review Commencement Date	01 January 2020
Annual Review Completion Date	31 December 2020
I, Gerald Linde, certify that this audit report is a true and accurate record of the compliance status of the Narrabri Mine for the period 01 January 2020 to 31 December 2020, and that I am authorised to make this statement on behalf of Narrabri Coal Operations 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	**Gerald Linde**
Title of Authorised Reporting Officer	**General Manager – Narrabri Mine**
Signature	
Date	29 / 03 / 2021

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1 STATEMENT OF COMPLIANCE

This Annual Review has been prepared to provide a summary of the environmental performance of the Narrabri Coal Operations (NCO) over the reporting period, 1 January 2020 to 31 December 2020. The compliance status of the mine against relevant approvals was assessed as at the end of the reporting period and is summarised in Table 2.

Table 2: Statement of Compliance

Were all the conditions of the relevant approvals complied with?	Yes/No
Project Approval (PA) 08_0144	No
Mining Operations Plan (MOP)	Yes
Mining Lease (ML) 1609	Yes
Subsidence Management Plan (SMP) Approval 10/9000	Yes
90CA811347	Yes
90WA812891	Yes
90CA802130	Yes
90WA822539	Yes
WAL15922	Yes
WAL12833	Yes
WAL12822	Yes
WAL20131	Yes
WAL6762	Yes
WAL2671	Yes
WAL2728	Yes
WAL20152	Yes
WAL29549	Yes
WAL43017	Yes
Groundwater Monitoring Bores: 90BL254481-487, 90BL254658-663, 90BL254701, 90BL254958-967, 90BL255167-173, 90BL255216-218, 90BL255769-772, 90BL256060-064, 90BL256344 and 90BL256346	Yes

Any non-compliances during the reporting period are ranked according to the compliance status key in Table 3 and are described in brief detailed in Table 4. Section 11 of this Annual Review further explains any non-compliances and mitigation measures implemented or proposed for the following reporting period to prevent re-occurrence and potential adverse effects.

Table 3: Compliance Status Key

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)

Table 4: Non-Compliances

Relevant Approval	Cond. #	Condition Description (Summary)	Compliance Status	Comment	Where addressed in Annual Review
PA 08_0144	Schedule 4, Condition 23	The proponent shall revise the Aboriginal Cultural Heritage Management Plan to encompass all proposed mine activities and potential impacts associated with Aboriginal cultural heritage management for the site and subsequently implement the Plan. This plan must: (d) describe the measures that would be implemented to protect known Aboriginal sites on the mine site, or any new Aboriginal objects that are identified during the project.	Non-compliant	A potential Aboriginal site of cultural heritage significance was identified within the boundary of the Stage 2 project approval area in November 2017 and verbally notified by a representative of the Gomeroi Narrabri Aborginal Corporation to the Narrabri Mine Environmental Superintendent. Section 3.3 of the Aboriginal Cultural Heritage Management Plan (ACHMP) describes the procedure to follow in the event of the discovery of a potential site. This includes fencing/flagging of the site to ensure its protection, undertaking an archaeological assessment of the site, and registering the site on the AHIMS database. The ACHMP procedure was not followed at the time of discovery. Narrabri Coal Operations self-reported the potential non-compliance to DPI&E on 21 July 2020. On 09/09/2020 DPI&E issued a Warning Letter for failing to implement the approved ACHMP. The Aboriginal site has not been harmed, is registered in the AHIMS database and has been fenced in accordance with the ACHMP.	6.7 11
PA 08_0144	Schedule 4, Condition 1	The Proponent shall ensure that the noise generated by the project does not exceed the levels set out in Table 1.	Non-compliant	A noise measurement was recorded at location R16 (“Newhaven”) over the night time period on 23/06/2020, exceeding the approved noise limits. Mining continuum was noted as the event cause. No community complaints were received at the time of the exceedance. The relevant Government agencies were notified as required. Subsequent monitoring events have recorded noise levels within the approved noise limits.	6.1 11

2 INTRODUCTION

This is the fourteenth Annual Review produced for the Narrabri Mine (Figure 1) and has been prepared in accordance with the NSW Department of Planning, Industry and Environment (DPIE) Integrated Mining Policy – Annual Review Guideline, October 2015. This document has been prepared to satisfy the following requirements:

- The Annual Review requirements of the DPIE under Project Approval (PA) 08_0144 (Schedule 6, Condition 6);
- Environmental Management Report requirements of the Resources Regulator under the Narrabri Mine Mining Lease (ML) 1609; and
- The routine reporting expectations of DPIE-Water.

The Annual Review covers the period 1 January 2020 to the 31 December 2020. The Annual Review provides information on historical aspects of the Narrabri Mine, longer term trends in environmental monitoring results and information on proposed activities to be undertaken during the following reporting period.

2.1 PROJECT DESCRIPTION

Narrabri Mine is located within the Narrabri Local Government Area (LGA), approximately 30 km south-southeast of Narrabri, and 10 km north-northwest of Baan Baa (Figure 1). Mining Lease (ML) 1609 was approved on the 18th of January 2008 in accordance with the provisions of Mining Act 1992 and expires on the 18th of January 2029. The ML encompasses an area of 5,298ha for the predominate purpose of mining for coal.

The current PA 08_0144 Modification 6 will allow the undertaking of mining operations until the 26 July 2031. Modification 5 of PA 08_0144 allows NCO to produce up to 11 Mtpa of ROM coal. The Mining Operations Plan is current from 1 December 2020 to the 31 December 2023.

Narrabri Mine is operated by Narrabri Coal Operations Pty Ltd (NCO). Narrabri Mine is owned by a joint venture between Narrabri Coal Pty Ltd (NCPL), Narrabri Coal Australia Pty Ltd, Upper Horn Investments (Australia) Pty Ltd, J-Power Australia Pty Ltd, Posco International Narrabri Investment Pty Ltd and Kores Narrabri Pty Ltd.

2.2 MINE CONTACTS

The key personnel responsible for operational and environmental management at the Narrabri Mine during the reporting period include:

- *Gerald Linde* – General Manager, retains overall responsibility for all activities and performance at the mine. Contact: (02) 6794 4755.
- *Brent Baker* – Environmental Superintendent, oversees day to day environmental performance across the site. Contact: (02) 6794 4755.

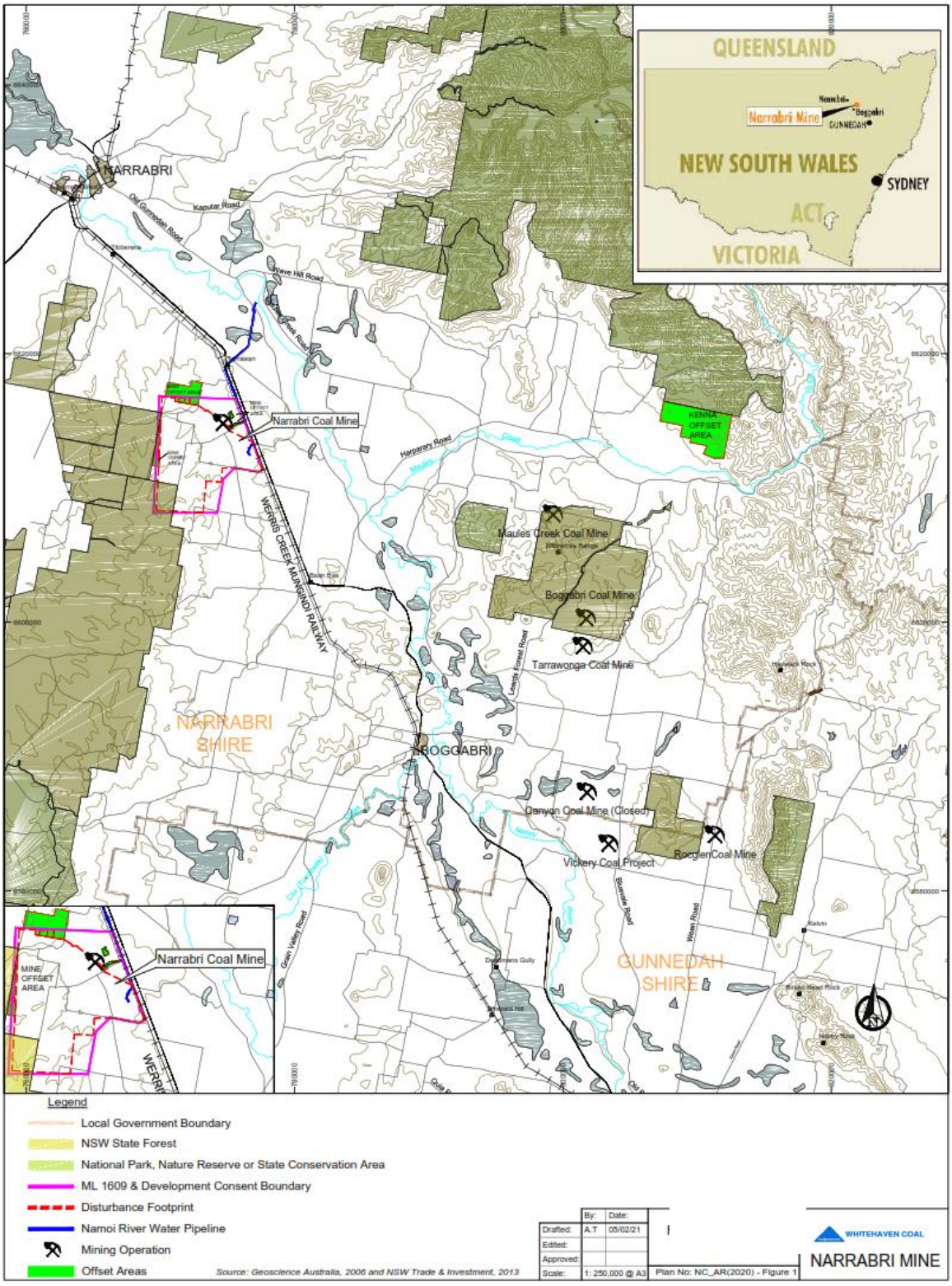

Figure 1: Regional Scale Locality Plan

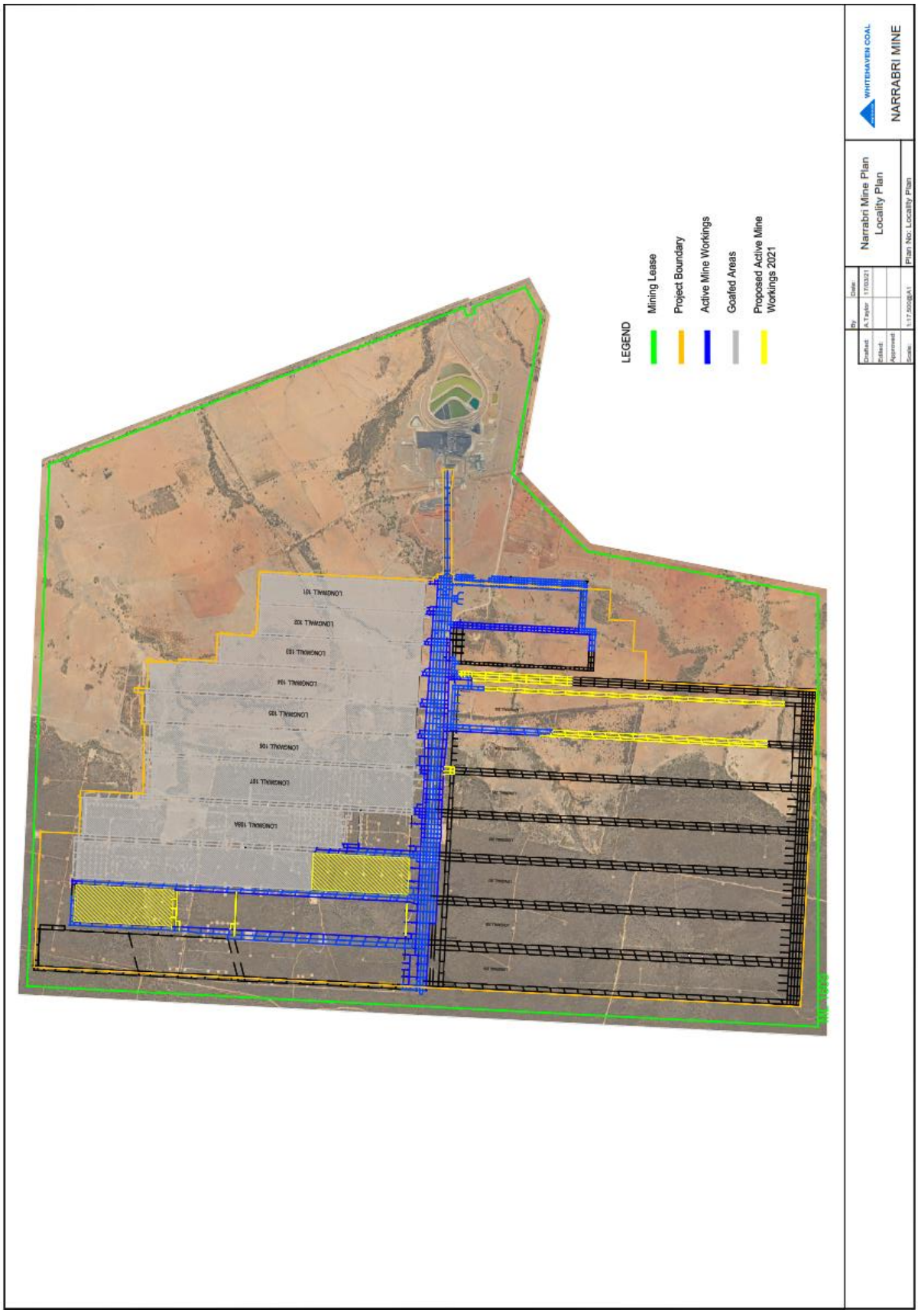

Figure 2: Local Scale Locality Plan

3 APPROVALS

Table 5 provides a summary of the key licences, leases and approvals that have been obtained for the Narrabri Mine to enable the construction and operation of the mine.

Table 5: Licences, Leases and Approvals

Issuing / Responsible Authority	Type of Lease, Licence, Approval	Date of Issue	Expiry	Comments
Resources Regulator	ML 1609	18 January 2008	18 January 2029	**Approval for mining**
Environment Protection Authority (EPA)	Environment Protection Licence (EPL) 12789	20 February 2008	Nil – Anniversary: 20 February	**For mining operation >5,000,000 T (handled and produced annually)**
Narrabri Shire Council (NSC)	Construction Certificate DP 816020 Inspection Report/Permit to Occupy No 2413	17 October 2008 6 August 2009	N/A	**Stage 1 Mine Surface Facilities**
Department of Planning, Industry and Environment (DPIE)- Water	90WA822539 / WAL15922 90WA812891 / WAL20131 90WA812891/ WAL12833 90WA812891/WAL12822 90CA802130 / WAL6762 90CA802130 / WAL2671 90CA802130 / WAL2728 90CA802130 / WAL20152 90WA822539 / WAL29549 TBC/WAL43017 90BL254481-254487 90BL254658-254663 90BL254701 90BL254958-254967 90BL255167- 255173 90BL255216-255218 90BL255769-255772 90BL256060-256064 90BL256289 90BL256293 90BL256344 90BL256346 90BL256386 90BL256396-256397 90BL256402 90BL256410	Various	Various	**GAB – Water supply (248 units)** **Upper Namoi Zone 5 groundwater (150 units)** **Upper Namoi Zone 5 groundwater (67 units)** **Upper Namoi Zone 5 groundwater (43 units)** **River – High Security (20 units)** **River (48 units)** **River (10 units)** **River (600 units)** **Mining – Gunnedah Oxley Basin (818 units)** **Mining – Gunnedah Oxley Basin (403 units)** **Groundwater Monitoring Purposes**
WorkCover NSW	**Notification for explosives use and storage**	**20 December 2020**	**20 July 2025**	**Licence Number – XSTR100215**

Narrabri Shire Council (NSC)	**Construction Certificate DP 816020**	**23 September 2010**	**N/A**	**Stage 2 Mine Surface Facilities**
Minister for Planning	PA 08_0144	26 July 2010	26 July 2031	**P**roject **A**pproval **for Stage 2**
	PA 08_0144 MOD1	30 March 2011	26 July 2031	**Notice of modification under Section 75W of the EP&A Act to update the subsidence management conditions.**
	PA 08_0144 MOD2	21 December 2011	26 July 2031	**Notice of modification under Section 75W of the EP&A Act to allow for a one-off road transport of coal to Tarrawonga Coal Mine.**
	PA 08_0144 MOD4	22 September 2015	26 July 2031	**Notice of modification under Section 75W of the EP&A Act for an expansion of the coal stockpiles.**
	PA 08_0144 MOD5	9 December 2015	26 July 2031	**Notice of modification under Section 75W of the EP&A Act to widen the longwall face and increase the annual production limit.**
	PA 08_0144 MOD6	13 January 2017	26 July 2031	**Notice of modification under Section 75W of the EP&A Act to vary the annual reporting timeframe.**
Resources Regulator	**Mining Operations Plan**	**1 December 2020**	**31 December 2023**	Details mining and rehabilitation activities during the applicable period.

4 OPERATIONS SUMMARY

During the reporting period underground development continued into longwall (LW) panels LW110, LW203 and the 200 Mains. The longwall unit has previously extracted LW101 to LW108A. During the reporting period longwall extraction of LW109 was ongoing.

Table 6 presents the production summary for the previous and current reporting periods and the forecast production schedule for the next reporting period.

4.1 MINING OPERATIONS

Table 6: Production Summary

Material	Approved limit	Previous reporting period (actual)	This reporting period (actual)	Next Reporting period (forecast)
Waste Rock / Overburden	657,000 m^3 (2010 MOP, Table 3.8)	0	0	0
ROM Coal*	11 Million Tonnes CY (PA 08_0144 Sch. 2, Cond.6) > 5 Million Tonnes produced (EPL 12789)	5.59	6.71	6.37

Reject Material	N/A (Million Tonnes)	0.24	0.05	0.14
Saleable Product**	> 5 Million Tonnes handled (EPL 12789)	5.49	6.45	5.87

* - ROM Coal is total production at the mine site. The difference between ROM Coal and final product is related to changes in stockpile volumes at the mine.
** - Saleable Product is coal railed from site.

4.2 OTHER OPERATIONS

4.2.1 Exploration Activities

Exploration drilling was undertaken during the reporting period to further assist production planning and define geological structures within ML 1609. Eight exploration holes were completed on ML 1609.

4.2.2 Construction

There were no surface construction activities completed during the reporting period.

Underground development works have been described in Section 4.1.

4.2.3 Mining Fleet Operations

Coal stockpile dozer fleet was upgraded with the purchase of two Caterpillar D11T machines. The new machines exhibit lower sound power levels than the older Caterpillar dozers that were replaced.

4.2.4 Hours of Operation

The approved hours of operation are provided in Table 7.

Table 7: Hours of Operation

Activity	Hours / Days
Mining Operations	
Pit Bottom Area development	24 hours / 7 days
Underground mining	24 hours / 7 days
Gas drainage	24 hours / 7 days
Ventilation fan operation	24 hours / 7 days
Coal processing and handling	24 hours / 7 days
Rail loading and transportation	24 hours / 7 days
Surface maintenance	24 hours / 7 days
CHPP reject disposal	24 hours / 7 days[1]
Raw materials / supply delivery	7:00am to 10:00pm / 7 days
1: Reject disposal activities will generally be restricted to 7:00am to 10:00pm, 7 days per week. However, it is possible that the proportion of reject material generated by the CHPP may exceed the predicted average 5% level for short periods. To account for these periods of elevated reject production, contingent hours of operation will be 24 hours / 7 days (when inversion conditions do not prevail).	

4.3 NEXT REPORTING PERIOD

4.3.1 Mine Operations

The planned mine production rate for the next reporting period will be 6.37 Mt of ROM coal which is expected to contain approximately 0.14 Mt of coarse reject material. Longwall extraction of LW109 will continue, followed by LW110A & LW110B. Development (First workings) will be carried out for LW110, LW203 and 200 Mains.

4.3.2 Exploration

Exploration drilling will continue to be undertaken at the Narrabri Mine. The primary focus of the exploration activities during the next reporting period will be structure/fault definition, with potentially 12 exploration bore holes drilled on ML 1609.

4.3.3 Construction Activities

Proposed construction activities during the reporting period include;

- Construction of a concrete batch plant to provide concrete for drill hole rehabilitation and other site purposes.

4.3.4 Mining Fleet Upgrades

There are no planned upgrades to the underground mining fleet during the next reporting period.

5 ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

The 2020 Annual Review and subsequent regulatory correspondence identified the following actions, summarised in Table 8.

Table 8: Actions from the Previous Annual Review (2019)

Action required from Previous Annual Review	Requested By	Action Taken by the Operator	Where discussed in Annual Review
Section 6.10.2 of 2019 AR reports on the waste disposal incident that occurred during the reporting period. It is reported that the Waste Management Plan was revised as a result of the incident, however the version currently available on the project website was last reviewed in 2015. Please update the project website to contain the revised Waste Management Plan as reported in the AR by **30 June 2020**;	DPI&E	The Waste Management Plan was updated and Version 4 submitted to DPI&E for review and approval on 31 October 2019. As no response was received the plan was resubmitted to DPI&E for review and approval via the Major Projects Portal on 29 May 2020, and subsequently approved by DPIE on 19 October 2020. The current approved version (v4) is available on the Whitehaven Coal website.	6.10
Section 10.1 of 2019 AR reports the completion of a review of the subsidence monitoring of the Extraction Plan LW107-LW110 and the development of a monitoring guideline in response to a non-compliance identified in the 2019 Independent Environmental Audit. Table 22 reports that this guideline would be complete by 30 April 2020. In accordance with Schedule 2, Condition 4 of the Approval, please submit a copy of this guideline to the Department by **30 June 2020**.	DPI&E	The subsidence monitoring requirements were reviewed and an internal guideline produced and implemented on 24 April 2020. A copy of the guideline was submitted to the DPI&E via the Major Projects Portal on 05 June 2020.	6.13

6 ENVIRONMENTAL PERFORMANCE

The following sub-sections report on the environmental performance achieved during the reporting period and provides a summary of the environmental monitoring data compared to data predictions, trends and management measures. Environmental monitoring locations are illustrated on Figure 3.

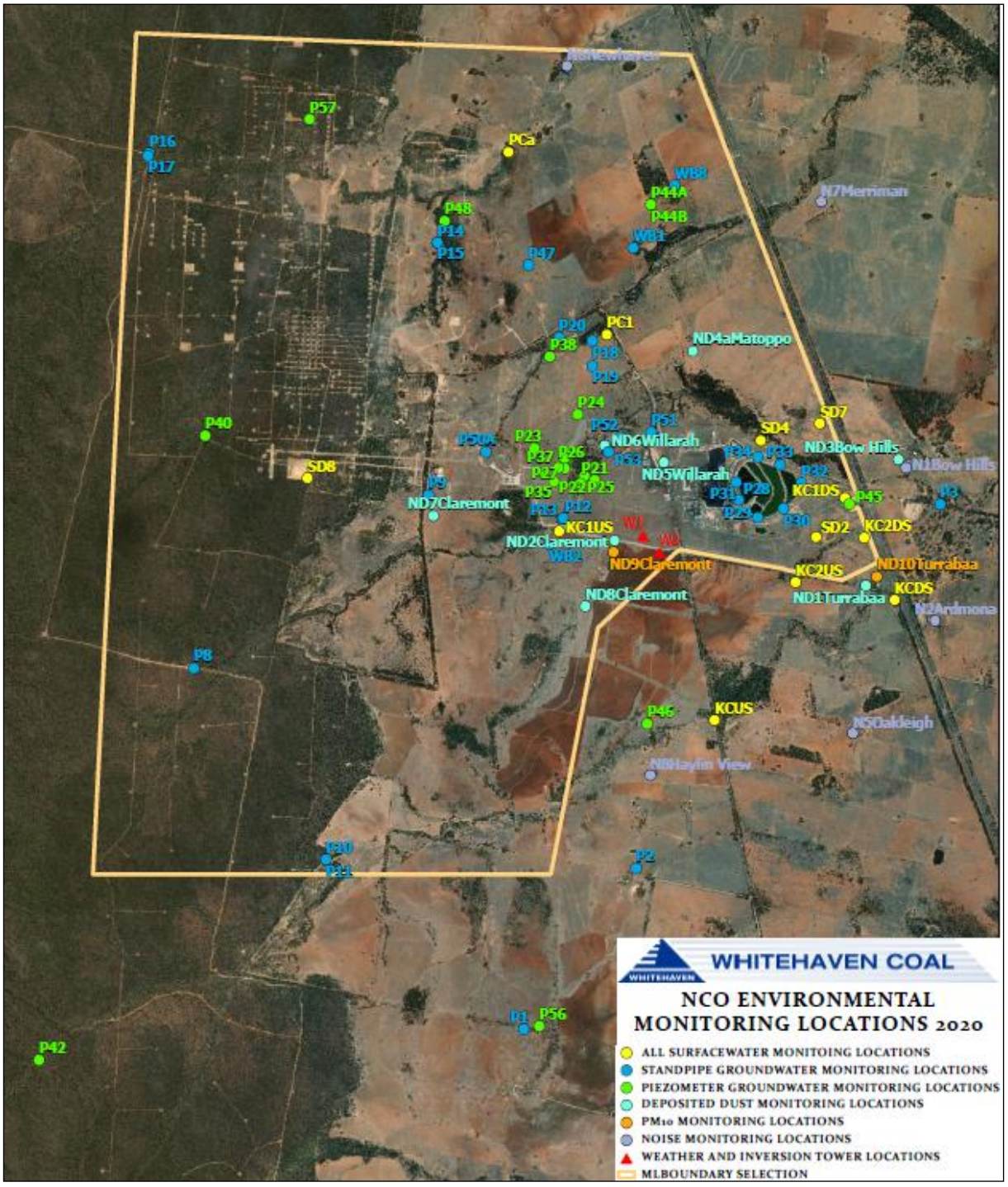

Figure 3: Environmental Monitoring Locations

6.1 NOISE

6.1.1 Environmental Management

Potential noise impacts associated with the Narrabri Mine are managed in accordance with the:

- Noise Criteria and Operating Conditions prescribed under Schedule 4, Conditions 1 to 5 of PA 08_0144;
- EPL 12789 Conditions L4, M7, R4 and E2; and
- NCO has previously prepared the Narrabri Mine Noise Management Plan (NMP) to address the requirements of condition 4, schedule 4 of the PA 08_0144, the NMP was approved by DPIE on the 5 July 2018.

During the reporting period various controls were implemented to manage noise including:

- Two of the fleet of coal stockpile bulldozers were replaced with Caterpillar D11 units exhibiting lower sound power levels;
- Review of real time noise monitors and alarm parameters and subsequent amendments to the Noise Monitoring and Temperature Inversion Conditions- Trigger Action Response Plan (TARP) for surface operations;
- Progressive replacement of reversing alarms on all surface vehicles and machinery to be of the low frequency type;
- Review of noise abatement options for main ventilation fans. Investigations have determined that the acoustic attenuators in the fan discharge ducts have become compromised over time, potentially resulting in increased noise levels. NCO have engaged the OEM to provide replacement acoustic baffles and make design modifications to the fan baffle housings to enable ongoing routine maintenance work on the new baffles;
- Rail track inspections and maintenance activities to mitigate train related noise;
- Purchase of acoustic blankets for use around static surface equipment, for operation in conditions with sensitive noise receptors and/or where sound power levels are increased;
- Maintenance activities along the main entrance road were undertaken to repair potholes and thereby minimise traffic noise;
- The approved hours of operation were adhered to;
- Monitoring of emitted noise levels is undertaken during mining operations to verify compliance with noise criteria and to assess the need, if any, for additional noise attenuation measures; and
- Investigation of noise complaints where received.

The Narrabri Mine noise monitoring network includes:

- Continuous monitoring at three real-time monitoring units for management purposes;
- Temperature Inversion monitoring is undertaken continuously by directly measuring temperature at two elevations 50m apart (10m and 60m from ground level); and
- Quarterly attended monitoring at locations as described in the EPL and Noise Management Plan.

6.1.2 Environmental Performance

Attended Monitoring

Attended noise monitoring is conducted on a quarterly basis during the reporting period by an independent consultant. The attended noise monitoring is used to assess compliance with licence and approval limits for mine contributed noise. A summary of the noise monitoring results are outlined in Table 9 with additional details provided where results were recorded above the criteria at privately-owned residences where a private agreement is not in place.

Quarterly monitoring is also undertaken at N1, however a private agreement is in place and therefore the results are not included in this AR. Quarterly monitoring is also undertaken at N7 and N8, however the properties are owned by Narrabri Coal Operations and therefore the results are not included in this AR.

During the reporting period the mine acquired the property consisting of monitoring location N9. The relevant details of this dealing with respect to noise monitoring events are:

- Private agreement was formed with the landholders on 30 April 2020, which included increased noise criteria; and
- The property sale was settled on 15 January 2021.

Table 9: Noise Monitoring Summary

Plan	Site ID	Site name	Criteria ($L_{Aeq(15\ minute)}$), dB(A))	Criteria ($L_{A(1\ minute-Night)}$), dB(A))	Quarter 1 24-26 March (Mine Contribution, dB(A))[1]		Quarter 2 23-25 June (Mine Contribution, dB(A))[1]		Quarter 3 08-10 Sept (Mine Contribution, dB(A))[1]		Quarter 4 03-05 Nov (Mine Contribution, dB(A))[1]	
			L_{Aeq} 15 min	L_A 1 min Night	L_{Aeq} 15 min	L_A 1 min Night	L_{Aeq} 15 min	L_A 1 min Night	L_{Aeq} 15 min	L_A 1 min Night	L_{Aeq} 15 min	**L_A 1 min Night**
NMP	N3	Ardmona	35	45	26	30	34	28	39[5]	44[5]	I/A	**I/A**
EPL	N5	Oakleigh[3]	35	45	31	27	32	43	40	41	26	**30**[5]
EPL	N6	Newhaven	35	45	25	30[5]	40[2]	40	30	31	<25	**31**[5]
EPL	N8	Haylin View[3]	35	45	34[2]	33	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	**NA[4]**
EPL	**N9**	**High Range[3]**	**35**	**45**	**27**	**29**[5]	**42[2]**	**45**	**29**	**32**	**<25**	**<25**[5]

IA = Inaudible

Note 1: Noise levels presented are the highest measured noise level under compliant weather conditions over the monitoring period.

Note 2: 2dB modifying factor correction for low frequency noise has been applied in accordance with the NPfI. A private

Note 3: Property is owned by Narrabri Coal Operations

Note 4: Monitoring at N8 was discontinued during Q3 and Q4 of the 2020 monitoring program as the EPL12789 specifies that monitoring is to commence when surface activities approach the eastern end of the southern longwall panels. There was no activity in this area and therefore monitoring was not required.

Note 5: Recorded under non-standard weather conditions and therefore not considered to be non-compliant with noise criteria.

On the 23 June 2020 during the night-time monitoring period a noise level of 40dB(A) L_{Aeq} (15 minute) was recorded at monitoring location N6. There was a 5dB exceedance of the $L_{Aeq(15minute)}$ criterion recorded at monitoring location N6. The contributing mining noise sources were listed as main vent fan and surface activities above the longwall panels. The exceedance was reported to the EPA and DPI&E upon receipt of the monitoring results. Measures taken to mitigate noise included ceasing surface drilling activities during night-time periods. Additional noise monitoring was conducted on the 13 August 2020 at monitoring location N6, with maximum noise level of 26 dB(A) L_{Aeq} (15 minute) recorded during the night time period.

On 08 September 2020 noise levels of 39dB(A) L_{Aeq} (15 minute) were recorded at monitoring location N3. The measurements were taken during non-standard meteorological conditions and therefore the noise criteria do not apply, as per Schedule 1 Condition 4 of Project Approval 08_0144. Follow-up monitoring was undertaken on 03 November 2020 in accordance with the requirements of the Noise Management Plan, with monitoring results reporting noise levels below criteria (listed as Inaudible).

Sound Power Testing (SPL)

SPL testing was undertaken on key mobile plant and other fixed equipment during the reporting period, results are summarised in Table 10.

Table 10: SPL Testing Summary

Unit	Equipment Type	Parameter	Modelled SPL (dB)	Result dB
N/A	Main Ventilation Fans	Average	117	**119**
MEU003	Goaf Drainage Unit	In Service	102	**102**[1]
MEU004	Goaf Drainage Unit	In Service	102	**97**[1]
MEU006	Goaf Drainage Unit	In Service	102	**100**[1]
MEU007	Goaf Drainage Unit	In Service	102	**103**[1]
MEU008	Goaf Drainage Unit	In Service	102	**106**[1]
DOZ005	Komatsu D475A Dozer	Dynamic cycle	118	**115**
DZ308[3]	Caterpillar D11T Dozer	Dynamic cycle	118	**113.5**
DZ368[3]	Caterpillar D11T Dozer	Dynamic cycle	118	**115**
DZ401	Caterpillar D9R Dozer	Dynamic cycle	118	**117**
DR014	Sandvik DE710	In Service	109[2]	**106**
DR021	Sankvik DE810	In Service	109	**116**[2]
DR082	Schramm Drill Rig	In Service	109[2]	**115**[2]

Note 1: The reported In Service SWL is not reflective of typical operating conditions.

Note 2: As per the Statement of Commitments (10.14) noise attenuation is required on surface drills when operating over the SE longwall panels to achieve a sound power level of 109dB. The drill rigs were not operating in this area during the noise monitoring.

Note 3: 2 x new Caterpillar D11T stockpile dozers exhibiting lower sound power levels than previous equipment were commissioned during the reporting period.

The reported SPL results for the MEU's (Mobile gas Extraction Units) were not recorded under normal operating conditions. At the time of monitoring underground gas levels did not require extraction via the MEU surface infrastructure. In order to carry out the SPL measurements the MEU equipment had to be

configured to run on surface 'fresh air' intakes which results in an increased noise level. As a preventative measure, any units exhibiting SPL's above the modelled 102dB will be required to have acoustic blankets installed around the noise source prior to resuming operations, until noise measurements under normal operating conditions can confirm the SPL is <102dB.

6.1.3 Proposed Improvement Measures

The primary improvement measure proposed for the next reporting period is related to the main vent fans. Investigations completed during 2020 have determined that the acoustic attenuators in the fan discharge ducts have become compromised over time, potentially resulting in increased noise levels. NCO have engaged the OEM to provide replacement acoustic baffles and make design modifications to the fan baffle housings to enable ongoing routine maintenance work on the new baffles. The new acoustic baffles will be installed during the reporting period, followed by noise monitoring to be reported in the 2021 Annual Review.

6.2 BLAST

As there has not been any surface or near-surface blasting at the site during the reporting period, no blast monitoring has been required or conducted.

6.3 AIR QUALITY

6.3.1 Environmental Management

Potential air quality impacts associated with the Narrabri Mine are managed in accordance with the:

- Air quality criteria prescribed under Schedule 4, Condition 6 of the PA 08_0144;
- EPL 12789 Conditions O3, P1 and M2; and
- NCO has previously prepared the Narrabri Mine Air Quality Management Plan (AQMP) to address the requirements of condition 7A, schedule 4 of the PA 08_0144; the AQMP was approved by DPIE on the 26 May 2015.

Narrabri Mine employs a range of air pollution control measures including:

- Cleared trees and branches will be retained for use in stabilising disturbed areas until they are rehabilitated are no longer required;
- Trigger Action Response Plans (TARPs) have been developed for the major dust generating activities onsite which currently includes: the coal processing area; surface drilling activities; and surface civil works;
- All conveyers will be fitted with appropriate cleaning and collection devices to minimise the amount of material falling from the return conveyer belts and are partly enclosed to minimise dust lift-off;
- The coal rotary breaker is enclosed;
- The CHPP and stockpile areas have a fully automated water spray systems, including conveyor belt sprays and stockpile sprays;
- Clear definition of all the site roads and the restriction of vehicles and equipment to the roads. All site roads and hardstand areas are routinely watered by a mobile water cart;
- Progressive rehabilitation of areas of disturbance including topsoil and subsoil stockpiles;
- Maintaining a perimeter amenity bund and windbreaks.

The Narrabri Mine air quality monitoring network is illustrated on Figure 3 and includes:

- PM_{10} levels are measured by two High Volume Air Samplers (HVAS) for a twenty-four hour period every six days. Total Suspended Particulate (TSP) matter is inferred at a ratio of 1:2 from the measured PM_{10} data; and
- a network of eight Dust Deposition Gauges (DDGs), measuring deposited dust and particulates collected monthly.

6.3.2 Environmental Performance

Depositional Dust results for the reporting period (Table 11) indicate that all monitoring locations are below the annual average criteria of 4 g/m^2/month Total Insoluble Solids. All dust monitoring locations are located on mine owned properties, with the exception of ND3.

The reporting period average for ND3 was 3.2 g/m^2/month and the long-term average is 1.8 g/m^2/month. The reporting period average is above the predicted MOD5 level, but below the annual average criteria. The increase of 1.2 g/m^2/month is below the maximum allowable increase of 2 g/m^2/month. During the first half of the reporting period continuing drought conditions resulted in multiple regional dust storm and bushfire events which impacted on the deposited dust results.

Table 11: Deposited Dust Monitoring Data Summary for the Reporting Period

Site	EPL ID No.	Property Name	PA 08_0144 Annual Average Criteria		Modification 5 EA Levels (g/m^2/month)	Annual Mean Total Insoluble Solids (g/m^2/month)
			Max Increase (g/m^2/month)	Max Total (g/m^2/month)		
ND1	-	Turrabaa	2	4	2.2	**2.2**
ND2	-	Claremont	2	4	1.9	**2.1**
ND3	3	Bow Hills	2	4	2.0	**3.2**
ND4A	-	Matoppo	2	4	2.3	**2.5**
ND5	-	Willarah	2	4	2.9	**3.6**
ND6	-	Willarah	2	4	2.9	**1.8**
ND7	-	Claremont	2	4	1.9	**2.3**
ND8	**-**	**Claremont**	**2**	**4**	**1.9**	**2.3**

The HVAS monitoring conducted (Figure 4 and 5) indicate that the PM_{10} annual average results remain below the applicable criteria of 30 µg/m^3 at both monitoring locations; with PM_{10} results of 10.64 µg/m^3 at ND9 and 9.75 µg/m^3 at ND10. The results for the PM_{10} monitoring also confirm that the TSP criteria for the mine are within the annual average compliance limit. The DPI&E have previously advised that Whitehaven's method for determining TSP concentrations by multiplying PM_{10} concentrations by a factor of 2, is satisfactory. Based on the above, the calculated annual average TSP concentrations of 21.3 µg/m^3 at ND9 and 19.5 µg/m^3 at ND10 are both below the 90 µg/m^3 annual average AQ impact assessment TSP criterion.

During the reporting period exceedances of the 24-hour criterion (50 µg/m^3) were reported to DPI&E and summarised below:

- 9 January 2020 with ND9 and ND10 measuring PM_{10} levels of 67.3 µg/m^3 and 59.7 µg/m^3 respectively. Reported to DPI&E who acknowledged that meteorological conditions on 09 January were affected by an extraordinary event; and
- 3 March 2020 ND10 measured PM_{10} levels of 62.0 µg/m^3. Claremont HVAS monitoring unit is located to the South-west of the mine pit-top area. Weather records for 03 March 2020 indicate dominant wind direction was from the South East. Therefore it is considered unlikely that the air quality recorded at ND9 is attributed to mining related impacts, and is likely related to agricultural activities on properties south of the mine site. This was reported to DPI&E who acknowledged that it was unlikely that site activities impacted the data, but required NCO to include the result in annual average calculations as it was not the result of an extraordinary event.

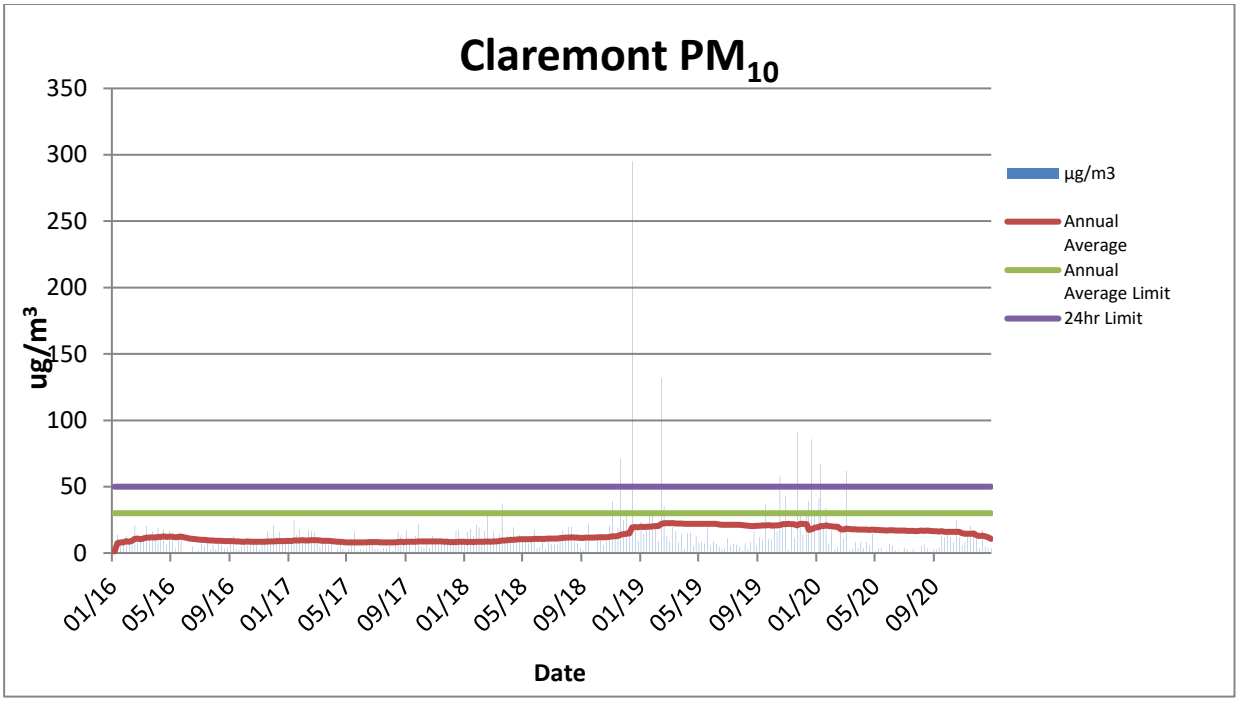

Figure 4: ND9 PM_{10} Results including extraordinary weather events

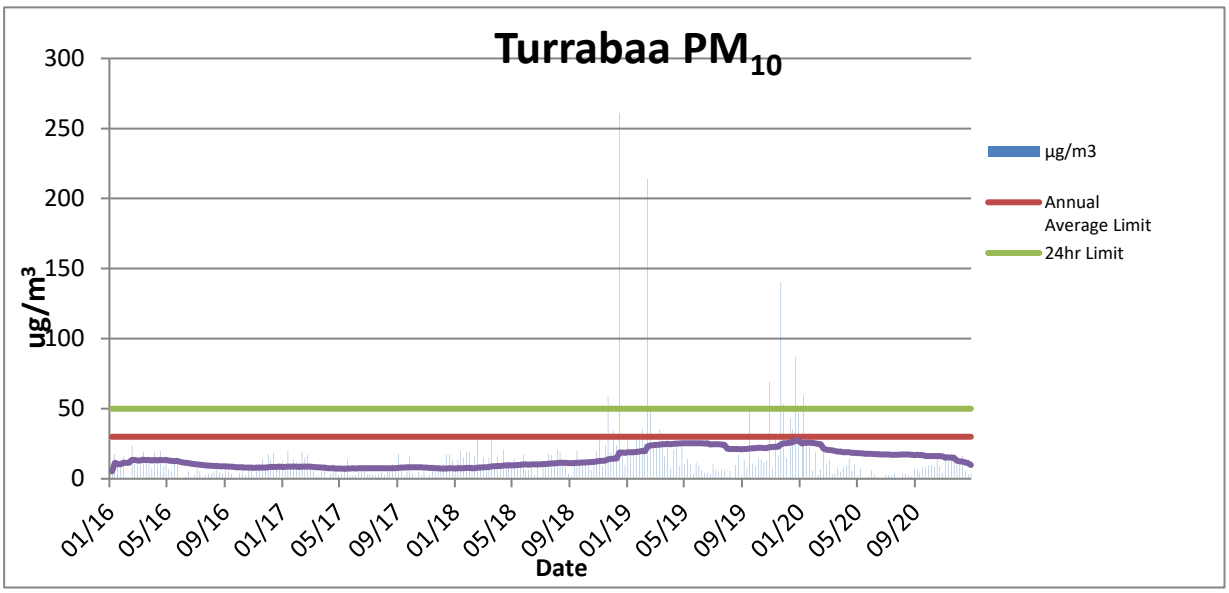

Figure 5: ND10 PM_{10} including extraordinary weather events

During the reporting period (on 03 December 2019) the EPL12789 was varied by the EPA to include a requirement for Narrabri Mine to complete two separate Pollution Reduction Studies:

- Undertake a study and provide a report on the possible use of chemical veneers to suppress dust from coal stockpiles; and
- Engage a suitably qualified person to undertake a quality control audit of the dust suppression systems in operation at the pit top area of the mine and prepare a report on the finding of that audit.

The Pollution Reduction Studies were completed and submitted to EPA for consideration by the due dates. The results of the Chemical Veneer Study concluded that chemical surface veneer treatment demonstrated no substantial reduction in airborne dust emission compared with water spray but requires repeated application as dozer operation continuously disturbs the surface, which would require regeneration of agglomerated surface crust, at very high cost. Effectiveness of surface water application will be enhanced when coal products are delivered to stockpile locations following application of water spray before transfer to stockpiles to achieve product moisture content above the relevant dust extinction moisture (DEM) levels. Recommended improvements were made to product coal discharge conveyor water sprays to ensure product coal moisture remains above the DEM. The findings of the Chemical Veneer study were accepted by EPA and the condition removed from EPL 12789.

The Pit Top Dust Audit did not identify any significant dust issues or problems with the operation or management of the site, and included minor recommendations to improvement of the Dust from Coal Stockpiles- Trigger Action Response Plan (TARP). The recommended changes were made to the TARP and communicated to work crews. In correspondence dated 15 December 2020 the EPA requested additional information on the Pit Top Dust Suppression System. These additional studies will be completed during the 2021 reporting period.

6.3.3 Proposed Improvement Measures

In accordance with a Pollution Reduction Study on EPL12789 during the reporting period the mine will undertake further assessment to determine the effectiveness of the current pit top dust suppression systems and identify what, if any, additional mitigation measures can be employed to ensure dust impacts are minimised.

6.4 METEOROLOGICAL DATA

Meteorological monitoring is conducted onsite in accordance with Schedule 4, Condition 8 of PA 08_0144 at the Narrabri Mine meteorological station. The location of the Narrabri Mine meteorological station is illustrated on Figure 3. Table 12 summarises the monthly meteorological conditions recorded at the Narrabri Mine station for the reporting period.

The total rainfall for the reporting period was recorded at 745.8 millimetres (mm), which is higher than the historical average of 658.5 and significantly higher than the 206.4mm recorded during the 2019 reporting period.

The minimum temperature during the reporting period was recorded at -1.5°C in August 2020 and the maximum temperature was recorded at 43.5°C in December 2020. The temperature recorded was slightly above historical averages.

The 2020 reporting period wind data presented similarities that are comparable to previous reporting periods.

Inversion conditions are calculated from measurements recorded by the site 60m Inversion Tower. Inversions occur during E, F and G stability categories (these categories represent weak, moderate and strong inversion conditions).

Table 12: Summary of Meteorological Conditions

Month	Rain (mm)	Cumulative Rainfall (mm)	Rainfall Days (>1mm)	2m Temperature (˚C)			Wind		Inversion Conditions
				Min	Mean	Max	Av. Speed (m/s)	Predominant Direction	% of Evening/Night Time Period
Jan 2020	92.6	92.6	6	16.6	29.7	42.1	2.7	NW, SE	40.80%
Feb 2020	146.8	239.4	12	11.0	24.5	39.0	2.2	SE	34.50%
Mar 2020	82.4	321.8	6	12.9	22.0	35.2	3.1	SE	39.40%
Apr 2020	51.6	373.4	4	4.4	18.2	29.6	1.9	SE, NW	53.60%
May 2020	19.6	393.0	1	1.7	13.0	24.1	2.8	SE	62.30%
Jun 2020	26.2	419.2	2	2.6	11.1	23.4	2.3	S, SE	58.30%
Jul 2020	31.8	451.0	6	-0.6	10.5	21.5	2.1	S, SE	57.00%
Aug 2020	35.4	486.4	11	-1.5	10.8	24.6	2.2	NW, SE, S, W	56.90%
Sep 2020	16.8	503.2	2	8.4	16.2	28.2	2.5	NW, SE, S, W	53.50%
Oct 2020	62.0	565.2	7	6.0	19.7	32.5	2.1	NW, SE, S	46.90%
Nov 2020	3.4	568.6	1	7.7	24.9	41.8	2.9	SE	34.50%
Dec 2020	177.2	745.8	11	11.2	24.3	36.6	2.7	SE	26.90%

6.5 GREENHOUSE GAS

6.5.1 Environmental Management

Greenhouse Gas (GHG) emissions at the Narrabri Mine are managed in accordance with Schedule 4 Conditions 30 and 32 of PA 08_0144 and the Greenhouse Gas Minimisation Plan (GHGMP). The main sources of GHG emissions considered in the GHGMP are:

- Consumption of diesel fuel – Scope 1;
- Consumption of electricity – Scope 2; and
- Fugitive emissions associated with gas drainage and ventilation – Scope 1.

6.5.2 Environmental Performance

GHG emissions are reported through participation in the National Pollutant Inventory (NPI) and as part of the Whitehaven Group in the National Greenhouse and Energy Reporting Scheme (NGERS). The total of Scope 1 + Scope 2 GHG emissions attributed to the mine reported for the NGERS 2019 – 2020 reporting year were 583,202 t CO_2-e. The following sections detail the key contributors for the NGERS 2019 – 2020 reporting year.

Scope 1 emissions

Scope 1 greenhouse gas emissions for the 2019-2020 NGERS reporting period were 507,061 t CO2-e. This is an increase from the 2018-2019 Scope 1 emissions of 483, 690 t CO2-e. The breakdown of contributors to the Scope 1 emissions total is as follows:

- Fuel combustion (emissions released from combustion of liquid fuels- stationary and transport, and petroleum based oils and greases): approximately 5,471 kL was consumed equating to 12,568 t CO2-e. The fuel usage figures are less than the previous reporting period.
- Fugitive emissions (from extraction of coal):.The reported figure of 494,458 t CO2-e is an increase from the previous reporting period which has been attributed to an increase in ventilation fugitive emissions due to changes in the underground mine gas management strategy.
- Industrial processes (emissions of hydrofluorocarbons and sulphur hexafluoride gases): The reported figure of 35 t CO2-e is an increase from the previous reporting period.

Scope 2 emissions

Approximately 94,002 MWh electricity was purchased by the mine during the 2019 – 2020 reporting period equating to 76,141 t CO_2-e GHG emissions. This is comparable to the previous reporting period and less than the predicted consumption in the EA MOD5. .

6.5.3 Proposed Improvement Measures

As the concentrations of methane in the ventilation and pre-drainage gas streams remain prohibitive for any beneficial use, no additional management measures are to be implemented for fugitive emissions during the next reporting period.

6.6 BIODIVERSITY

6.6.1 Environmental Management

Biodiversity was managed in accordance with:

- Schedule 5, Conditions 1 to 7 of PA 08_0144; and
- the Narrabri Mine Landscape Management Plan (LMP) and Biodiversity Offset Strategy (BOS) prepared to satisfy the requirements of PA 08_0144.

Various treatments were implemented during the reporting period to mitigate impacts of the Narrabri Mine including (but not limited to):

- Weed monitoring and inspections;
- Feral animal monitoring, inspections and control;
- Flora and Fauna monitoring.

6.6.2 Environmental Performance and BOMP Implementation

6.6.2.1 Mine Site Environmental Performance

Weed Management

Weed management programs were implemented at NCO during 2020. Weed management consists of spot spraying programs (two-week programs) periodically throughout the year. Locations are based on ecological monitoring reports and locations of listed weed species. Weed control in the pastoral areas

is planned to be managed by landholder management and pasture improvement (or as recommended in subsequent monitoring reports).

Feral Animals

Vertebrate animal control programs were undertaken at NCO during 2020 including 1080 baiting, pig trapping, and shooting; for known pest species including feral pigs, foxes, wild dogs, and cats.

Monitoring program employed utilising the CSIRO/NSW DEC Sand Plot Technique methodology for use with cameras included 89 days equivalent monitoring, with monitoring results indicating pest species abundance as follows:

- High abundance of Macropods (15.12%) and feral pigs (12.79%);
- Scarce abundance of other pest species (eg. fox, wild dogs, cats, hare, rabbit, deer).

Based on these results a feral pig trapping program was carried out during June 2020. The traps were monitored for a total of 29 days, with 8 pigs trapped.

Open Range shooting was carried out in areas outside the Mine Lease areas with due consideration to safety of mine workers.

Only appropriately qualified and experienced feral animal contractors (appropriate feral animal management qualifications, NSW fire arm licence and pesticide accreditation where relevant) were engaged to undertake feral animal control works for WHC.

Annual Extraction Plan Monitoring

The results of annual monitoring undertaken during the reporting period, as required by the Extraction Plan, which includes the LMP, are summarised in Table 13 and Table 14.

Table 13: Biodiversity Management Plan 2020 Monitoring Results

Performance Measures	BMP Performance Criteria	2020 Results
LW101-LW106		
Woodland vegetation (Inland Grey Box EEC) composition and health	Clearing does not exceed the allowable limit of the Project Approval	126.5 hectares of native vegetation have been cleared at the project to 01/01/2021, from the approved 210.5 hectares.
	Less than 10% change in floristic composition (relative to natural variation found in control areas)	When compared to 2019, both the control and impact plots increased in native species richness, with all but one impact plot meeting the performance criteria.
	Less than 10% increase in exotic species numbers and cover	Increases in exotic species were observed across all IGBW plots in 2020. Exotic cover increased by 50 % at control plot 6 when compared to 2018, whilst all impact plots either showed no variation or decreased in exotic percentage cover in 2019.
	No increase in feral animal presence	No targetable feral animals were present in the control or woodland areas.
Riparian vegetation composition and health	Clearing does not exceed the allowable limit of the Project Approval	2.2 hectares of Riparian vegetation have been cleared to 01/01/2021, from the approved limit of 4.1 hectares.
	Less than 10% change in floristic composition (relative to natural variation found in control areas)	Native species richness increased within all PBBW impact plots with exception of plot 16. This monitoring plot was only partially surveyed due to approximately 50% inundation of the monitoring plot when compared with 2019. Plots 1, 10 and 13, although failing to meet the criteria, all recorded an increase in native species richness but to a lesser degree than noted at control plot 5. No management actions are required to address floristic composition and alternative performance criteria metrics are to be investigated prior to next reporting period.
	Less than 10% increase in exotic species numbers and cover	Increases in exotic species were observed across all PBBW plots in 2020, however no impact plots failed to meet performance criteria. Management actions have therefore been allocated to the management of high threat weed species and for site monitoring to continue at sites showing decline in vegetation health
	No increase in feral animal presence	No change in feral animal presence was observed in 2020. However feral animals were only observed at creek sites (likely due to presence of water) and

Performance Measures	BMP Performance Criteria	2020 Results
		will be managed in accordance with WHC pest management practices.
	Less than 20% increase in length of eroding creek	Refer to creek line assessment outlined in the LMP 2020 monitoring.
Terrestrial fauna habitat for threatened species	Fauna populations do not experience adverse impacts	All woodland sites met performance criteria for terrestrial fauna. Several creek line sites did not meet performance criteria for terrestrial fauna, specifically avian fauna. Changes in avian species compositions are related to the subsidence occurring at several creek line sites which has caused a shift from canopy feeders, plant-based ground foragers and some generalists, towards waterbirds and aerial feeders. The presence of ponding water in these areas may have also influence bird species presence throughout other areas of the site. Management actions related to vegetation are considered suitable to address changes seen in avian fauna.
	Fauna records decrease by greater than 10% (relative to natural variation found in control areas)	
Aquatic macro-invertebrate and macrophyte assemblages	No decline in aquatic habitat quality relatively to natural variation in control areas	Monitoring of ephemeral creeks was discontinued as per the revised BMP (ELA 2015). Monitoring targeted subsidence ponds above LW101 and LW104, as per Narrabri Mine Subsidence Pond Management Plan (ELA 2017). Refer to the Subsidence Pond Monitoring Report (ELA 2019) for results.
LW107-LW110		
Woodland and riparian vegetation health and habitat value	Areas of NDVI change greater than 1 standard deviation from the mean change and greater than 0.1 ha in area.	Two areas of significant change (Area 23 and 21) identified decrease in groundcover unattributed to approved mining activities (e.g. clearing). Areas to be investigated during future monitoring.

Performance Measures	BMP Performance Criteria	2020 Results
	Canopy dieback is not substantially greater than that observed during baseline traverses and considered beyond natural seasonal dieback and natural variation due to weather.	Canopy dieback has been more pronounced in some areas of longwalls than others. Vegetation plots that have been identified as problem areas have been recommended for further monitoring. Recommendations have been made to conclude monitoring at sites in which canopy species are showing no unnatural decline in health and undermining has been completed.
	Data does not indicate declining trend in vegetation and habitat conditions.	Data in 2020 has not indicated that a decline in health has occurred that is outside of the natural variation for most vegetation plots. Recommendations have been made to conclude monitoring at sites in which vegetation is showing no unnatural decline in health and undermining has been completed.
	Less than 10% increase in weed cover in impact quadrats in comparison to control quadrats.	Exotic species percentage cover has remained low (<1%) in all FBS plots across LW107 -LW109 in 2020. Suggesting mining related activities is having little effect on the incursion of exotic species into the woodland/forested areas above LW107 -LW110. All High threat weed species, those listed as priority within the North West Regional Strategic Weed Management Plan (LLS 2017-2022) and as noxious weeds listed within the Narrabri mine BMP107-110 (ELA, 2017)) that have been identified in 2020 should be managed across this BMP.
	Clearing does not exceed the estimated area of clearing assessed by the Stage 2 EA and as updated in Modification 5 (Resource Strategies, 2015) for infrastructure above LW107 to LW110.	126.5 hectares of native vegetation have been cleared to 01/01/2021, from the approved 210.5 hectares.
Observance of trapped Delicate Mouse or Pale-headed	Incidence of Delicate Mouse and/or Pale-headed snake becoming trapped in surface cracks.	No observations or evidence of occurrence was observed during 2020.

Performance Measures	BMP Performance Criteria	2020 Results
Snake within surface cracks		

Table 14: Land Management Plan 2020 Monitoring Results

Performance Measures	Performance Criteria	Comment
LW101-LW106		
Surface cracking		
Surface cracking inspection	Permanent cracks (which do not self-close within one month of longwall face passing) are remediated as soon as practicably possible (and safe to do so) Surface cracking is remediated to prevent erosion and slope instability issues within 6 months of each longwall pass.	Subsidence cracks have been actively remediated as part of the Extraction Plan (LW101 – 106) during 2020 across all undermined longwall panels.
Topographic form (Lidar)		
Landscape morphology	Subsidence across landscape does not exceed subsidence predictions for LW101-LW106.	Subsidence across LW101 to LW106 has been surveyed as part of NCO subsidence monitoring requirements. Predicted maximum subsidence was 2.58m and maximum subsidence observed is 2.58m.
Creeklines	No identifiable change in overall drainage pattern.	Creeks were surveyed for changes in morphology over LW101 to LW106 during Spring surveys required by the LMP during 2020. Minor changes were recorded across most monitoring sites however the majority did not trigger management actions. Subsidence impacts to creeklines was observed within monitoring sites located on LW102 and LW104, with management measures recommended. These will be implemented during the 2021 reporting period.
Soil moisture and nutrient distribution (EM mapping)		
Soil moisture and nutrient distribution (EM mapping)	Identified areas of EM mapping change (greater than 1 standard deviation from the mean change) investigated in the field to determine the source of the change.	This was assessed in 2016 and is scheduled for re-assessment in 2021.

Performance Measures	Performance Criteria	Comment
Multi-spectral image analysis		
Groundcover (multi-spectral images – erosion and pasture cover)	Identified areas of NDVI change (greater than 1 standard deviation from the mean change) investigated in the field to determine the source of the change.	All significant changes identified in LW101 to LW106 can be attributed to the increase in water within the site due to significant rainfall since the capture date of the 2019 imagery. Increased water in ponds and rivers have resulted in a reduction in PAB, whilst areas in depressions and surrounding water sources have experienced increases in groundcover. No substantial changes in mid-storey or overstorey vegetation have been identified.
Pasture		
Pasture biomass	Less than 20% reduction in pasture biomass in impact zones in comparison to control zones	While three individual zones (the transition zone above LW104, 106 and the maximum subsidence zone above LW101) showed a reduction of more than 20% in pasture biomass, field observations noted that the transition zone of LW104 is likely a naturally suppressed growth area due to its vicinity to the Belah (Casuarina cunninghamiana) riparian management area. A lower amount of biomass was also expected within the transition zone of LW106 as two of the sites were impacted by recent rehabilitation works. In addition, all three zones did not vary significantly between survey years.
Weed species	Weed species identified and managed according to the weed management measures provided in the Rehabilitation Management Plan	Weed management consists of spot spraying programs (two-week programs) periodically throughout the year. Locations are based on the locations of weeds within monitoring reports prepared by ELA.

Performance Measures	Performance Criteria	Comment
Weed cover	Less than 10% increase in weed cover in impact zones in comparison to the control zone	Weed cover performance criterion was not met within ten zones, six of which recorded a decrease in mean weed cover when compared to 2019 (section 4.2.2). Whilst not meeting the performance criterion, no significant difference was found between the control and impact sites during 2020 ($p>0.05$). Given the high variability of weed cover between impact zones, it is unlikely that subsidence is the main influence on weed cover across the LMP and that surface activities causing localised disturbance are more likely to be the primary cause. Recommendations for management of weeds have been provided and will be implemented as practicable. .
Soil nutrient status		
pH	pH remains within +/- 0.5 pH unit of baseline pH. If soil amelioration is undertaken, pH is to remain within recommended pH range for pasture (5.2-8.0).	Soil pH has increased at all zones since baseline surveys, including the controls with just two zones recorded within +/- 0.5 pH unit of baseline pH, however all other zones remain within the recommended range for pastures.
EC	Less than 20% increase in EC in comparison to baseline values.	The performance criterion was not met at eight of the nineteen zones. However, all sites recorded a salinity level <2 dS/m. A soil salinity of 2 dS/m salts in soil have minimal impact on the yield of most agricultural crops and pastures, however slightly saline soils (2 – 4dS/m) may affect yields of sensitive pasture species such as Trifolium (Hazelton & Murphy 2007; NSW DPI 2016). .
Organic matter	Less than 20% reduction in organic matter in comparison to baseline values.	Organic matter has increased at all zones since baselines surveys, with exception to MSZ LW106. Although this zone was noted to undergo rehabilitation works in 2019, as such organic matter is expected to be affected and therefore the performance criterion is considered compliant.

Performance Measures	Performance Criteria	Comment
Nitrogen	Less than 20% reduction in total nitrogen in comparison to baseline values.	Total Nitrogen (mg/kg) has increased at all zones in 2020. Therefore, all zones were within the performance criterion
Phosphorous	Less than 20% reduction in phosphorous in comparison to baseline values.	Total Phosphorus (mg/kg) was mistakenly tested for in 2020 despite previous years measurements testing for available Phosphorus (Colwell). As such, no comparison of the 2020 Phosphorus results could be completed against baseline results.
Creek stability and condition		
Field survey of creek stability and condition	Field survey of creek stability and condition	Field survey of creek stability and condition

LW107-LW110

Surface cracking		
Surface cracking Inspection	Permanent cracks (which do not self-close within one month of longwall face passing) are remediated as soon as practicably possible (and safe to do so).	The major surface crack on LW108 has been remediated, further monitoring will be required to assess if sediment slumps further. Surface cracking may be developing at LW108 (POI 3), ELA recommends further site inspections to determine management options.
	Surface cracking is remediated to prevent erosion and slope instability issues within 6 months of mining of each longwall.	
Topographic form (Lidar)		
Landscape morphology	Subsidence across the landscape does not exceed subsidence predictions for LW107 to LW110.	Mean subsidence across most of the BMP is within predicted subsidence outlined within DGS 2017, though several areas have exceeded maximum predictions. Recommendations for investigation will be implemented during the next reporting period.
Creek lines	No identifiable change to overall drainage pattern.	No significant changes to creek line morphology. Recommendations for improvements to erosion and sediment controls have been made during the spring surveys and will be implemented during the next reporting period.

Performance Measures	Performance Criteria	Comment
Groundcover (multi-spectral images – erosion and pasture cover)	Identified areas of NDVI change (greater than 1 standard deviation from the mean change) investigated in the field to determine the source of the change.	NDVI analysis shows the performance criteria have been met within agricultural areas.
	Site specific management report prepared and recommendations implemented where necessary.	

Subsidence Pond Monitoring

The results of annual monitoring undertaken during the reporting period, as required by the Subsidence Pond Management Plan (SPMP) are summarised below:

- Remote sensing analysis in 2020 identified significant changes in PAB which can be attributed to the increase in water within the site due to significant rainfall since the capture date of the 2019 imagery. Increased water in the subsidence ponds and creeks have resulted in a reduction in PAB of the area, whilst areas in depressions and surrounding water sources have experienced increases in groundcover.
- 2020 water quality measurements reflected previous observations in which EC is reflective of inundation and drying periods. EC is currently below the Australian and New Zealand Environment and Conservation Council (ANZECC) water quality guideline limits for freshwater ecosystems, and therefore does not trigger any responses for water quality (ponding) under the Trigger Action Response Plan (TARP) within the Water Management Plan (WMP) for LW101 to LW106 (NCOPL 2016).
- Vegetation has stabilized at subsidence ponds above LW101 and LW104. It is recommended that all monitoring but annual photo point monitoring be discontinued. Weed species should continue to be monitored and outbreaks treated.

Pre-Clearing and Clearing Surveys

During the reporting period the mine has undertaken clearing to facilitate surface disturbance activities. The ecological works for the clearing consisted of the following activities;

- Fauna and flora Pre-clearing Surveys;
- Clearance Supervision; and
- Post-felling inspections.

Prior to the commencement of any disturbance activities the limits of clearing are surveyed and physically marked with flagging tape. Targeted threatened flora surveys were conducted prior to clearing activities commencing with all threatened flora identified during these surveys recorded and their locations mapped using hand held GPS units.

Fauna pre-clearance surveys were also conducted and consisted of identifying, marking and documenting suitable fauna habitat features. These features generally include nests, large woody debris and trees bearing hollows, which have the potential to support species such as bats, gliders, possums, reptiles and birds. All trees with habitat features are felled following a clearing protocol and is done in the presence of a suitably competent ecologist. All trees identified as having habitat features were recorded using a hand-held GPS unit.

Fauna was encountered during clearance works undertaken during the reporting period, including species of birds, mammals and reptiles.

The following threatened flora species were encountered during the clearing works:

- Coolabah Bertya (*Bertya opponens*) – listed as vulnerable under the BC Act and EPBC Act; and
- *Tylophora linearis* – listed as Vulnerable under the BC Act and listed as Endangered under the EPBC Act.

6.6.2.2 BOS Environmental Performance

The Biodiversity Offset Strategy (Eco Logical, 2019) was approved by NSW DPIE on 25th September 2019 and by the Commonwealth DAWE on 16th September 2019 which commits NCO to managing the offset areas to achieve a 'like for like or better' and 'maintained or improved' biodiversity outcomes on the 1,244ha Kenna Offset property located offsite adjacent to the southern boundary of the Kaputar National Park and the 431 ha Onsite (Rosevale, Greylands, Omeo, Greylands Park, Kurrajong Park and Westhaven) Offset properties located within and adjacent to the western boundary NCO mining lease and to the east of Jacks Creek State Forest apart of the large "Pilliga Forest" remnant.

Offset Security Management

WHC continued to consult with NSW DPIE and Commonwealth DAWE during the reporting period to keep the regulators abreast of securement progress; including receiving on 18th March 2020 a 12 month extension to the EPBC Approval 2009/5003 Condition 2 securement date until the 31st March 2021. By the end of the reporting period, the BCT and WHC had finalised a further six Conservation Agreements for the 6 NCO Onsite Offset properties aiming to lodge and register with NSW Land Registry Service by the 31st March 2021; this is in addition to previously achieving securement for the Kenna Offset property on 1st October 2019. Following registration of Conservation Agreements; WHC will prioritise negotiations of those NCO Offset properties that NPWS has previously shown interest in being transferred to National Park Estate.

Infrastructure Management

During the reporting period, 4.4km of BOA demarcation fencing was constructed along the Rosevale, Greylands Road, Kurrajong Park and West Haven Offset properties BOA boundary. Previously stockpiled fencing and other wastes relating to the previous agricultural land use at Kenna Offset property were disposed offsite at the licenced Narrabri waste management facility. Maintenance of signage and gates was undertaken as required to continue to restrict unauthorised access and minimise livestock incursion. Any remaining derelict assets/infrastructure items will continue to be assessed, removed and remediated as required prior to transfer of NCO Offset properties to National Park Estate.

Seed Management

Routine seed assessments completed for the NCO BOA identified a turnaround in climatic conditions across the region due to the above average rainfall in 2020. The routine seed assessments aim to identify on a seasonal basis the life cycle stage and development of native plants to identify what, where, when and how to target appropriate resources to collect seed for future revegetation programs. A total of 5 species were collected resulting in 4,530 grams of local provident seed from across the NCO BOA. As part of the WHC group wide revegetation planning; the onsite collected seed was supplemented with commercially sourced local and regional provident seed by reputable seed collectors. A local revegetation provider was engaged to propagate the seed to produce Box Gum and non-EEC/CEEC Woodland overstorey species seedlings required for the 2020 revegetation program completed as well as planning for the 2021 revegetation program for the NCO BOA.

Revegetation Management

The NCO BOMP revegetation strategy focuses on restoration and revegetation of cleared non-native grassland (former cultivation) and derived native grasslands and assisting natural regeneration in better

quality woodland areas. During the reporting period, revegetation ground preparation utilised ecological burn and tractor tyning to improve seed bed contact for revegetation seeding plus tractors and excavators augering holes (to a depth >0.3m) to relieve compaction, improve permeability and infiltration to increase sub-surface soil moisture for planting. During 2020 WHC coordinated a revegetation program with the understorey revegetation (direct seeding) on the Kenna BOA in September 2020 over 78ha sown including 624kg of native grass seed (19 species), 78kg of native forb seed (10 species) and 1,248kg of bulking agent (lime). Overstorey revegetation program covered 149ha between May and June 2020 planting with 9,199 hiko seedlings of Eucalyptus albens, Eucalyptus blakelyi, Eucalyptus crebra, Brachychiton populneus and Angophora floribunda on the Kenna Offset property. Combined with good seasonal conditions, routine tree watering and maintenance activities post planting have been successful to ensure that over 90% survival has been achieved for the Kenna Offset property which is commensurate with the target Woodland vegetation structure.

Heritage Management

During the reporting period, heritage site and fencing inspections were completed for the 5 known Aboriginal cultural heritage sites within the NCO BOA. Each site is maintained with protective fencing around the heritage site perimeter and signage to mitigate access and disturbance.

Habitat Management

During the reporting period, no specific habitat management works were undertaken.

Weed Management

WHC coordinated routine formal weed monitoring/inspections undertaken across NCO BOA in February, May, September and November 2020. The priority weeds identified included legacy noxious weeds inherited from previous owners management regimes such as African Lovegrass, Mother of Millions, Green Cestrum, Coolatai Grass, Green Cestrum, African Box Thorn and Common Prickly Pear as well as a range of broadleaf weeds within revegetation areas. The weed monitoring/inspections ensure that timely and prioritised weed control is undertaken on a seasonal basis with the spatial information directly given to spraying contractors to identify what, where, when and how to target appropriate resources across the NCO BOA for weed control.

Feral Animals Management

WHC coordinated routine formal feral animal monitoring across NCO BOA in February, May, September and November 2020. The adoption of a “monitor, measure and manage” approach to feral animal management will allow WHC to implement adaptive management in response to changes being measured through monitoring in feral animal abundance specific to the different geographical regions of the NCO BOAs. Feral animal monitoring utilises the relevant methodologies for specific feral animals generally in accordance with the NSW DPI *Monitoring Techniques for Vertebrate Pests* so that a range of methods can be used such as transects/spotlighting and cameras traps where practicable and relevant to specific offset areas/properties. Monitoring demonstrated that certain animals like Eastern Grey Kangaroos and Feral Pigs can be high in abundance seasonally with all other feral animal species recorded as scarce to low abundance levels across 2020. The feral animal monitoring ensures that timely and prioritised feral animal control is undertaken on a seasonal basis identifying what, where, when and how to target appropriate resources across the NCO BOAs for feral animal management.

During the reporting period, WHC implemented a comprehensive feral animal control program across the Kenna and Onsite Offset properties with routine 1080 baiting and pig trapping programs undertaken in March (12 Foxes, 1 Wild Dog and 1 Feral Pig removed from 58 baits presented), June (33 Foxes and 5 Feral Pigs removed from 145 baits presented and 27 Feral Pigs trapped), September (5 Foxes, 9 Wild Dogs and 5 Feral Pigs removed from 145 baits presented and 21 Feral Pigs trapped) and December 2020 (25 Foxes and 9 Feral Pigs removed from 145 baits presented and 21 Feral Pigs trapped). A total of 493 baits were presented across the NCO BOA with 21% taken by feral animals. Night time open

range shooting programs were implemented in conjunction with the other routine control programs resulting in an additional 26 Rabbits, 1 Feral Cat, 24 Hares, 3 Feral Pigs and 3 Foxes controlled in 2020. Only appropriately qualified and experienced feral animal contractors (appropriate feral animal management qualifications, NSW fire arm licence and pesticide accreditation where relevant) were engaged to undertake feral animal control works for WHC.

Soil & Erosion Management

Annual inspections were undertaken including unsealed tracks and associated drainage structures across the NCO BOA to review appropriate erosion and sediment control measures required in accordance with the Blue Book (Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom 2004)). Due to the above average rainfall during the reporting period; additional targeted maintenance was identified for five sites within NCO BOA to mitigate further erosion and sediment issues. The remaining sites and tracks/drainage structures can be continue to be maintained during routine WHC Biodiversity fire break track maintenance program.

Grazing Management

NCO BOA were destocked in September 2016 and continued to be destocked and no strategic grazing occurring during the reporting period. There were one instance of stock incursion during the reporting period; with the stock quickly retrieved and fence repaired to maintain to a stock proof condition.

Bushfire Management

In accordance with the BMP, annual fuel load monitoring was undertaken in December 2020 as part of planning and assessment of bushfire hazard and ecological burn strategy in 2021. During the reporting period, the average overall fuel load measured and fire risk for Kenna Offset property was 5t/ha to 16t/ha (low to moderate) and moderate fire risk; while for Narrabri Onsite Offset properties was 13t/ha to 22t/ha (moderate to high) ranging moderate to high fire risk. There was one small fire (less than 10m^2) started on 29th October 2020 as a result of lightning which was quickly extinguished. Other fire management implemented by WHC during the reporting period included spatial data collection for 6.1km of fire break tracks (across Narrabri Offset properties) and 57.2km of fire break tracks for Kenna Offset property with maintenance carried out as required to a zero fuel barrier standard as required. WHC also completed 48ha of ecological burning on the Kenna Offset property in August 2020. WHC maintains regular communications throughout the reporting period with the Namoi-Gwydir Zone RFS team around planning of the ecological burn programs as well as providing WHC emergency contacts. WHC maintains a specialist fire fighting contractor for an oncall engagement during the fire season to respond in the event of a bushfire on WHC BOAs and non-mining lands.

Monitoring Program

Kenna BOA

During the reporting period, the ecological monitoring program of the Kenna BOA included winter bird surveys that were undertaken in August 2020; annual spring flora monitoring of 22 plots undertaken in November 2020 and annual spring fauna monitoring of 10 general fauna monitoring sites and 16 bird monitoring sites between October and November 2020. During the winter bird surveys, two threatened species were recorded (Brown Treecreeper and Grey-crowned Babbler). During the flora monitoring, all 22 sites exceeded the completion criteria for native species richness (NPS) (80% native species richness benchmark for relevant biometric vegetation communities). This is an increase from 14 sites which met or exceeded the completion criteria in 2019. Native overstorey cover (NOS) increased from 5 sites last year to 10 out of the 22 sites meeting or exceeding the completion criteria (minimum overstorey cover benchmark for relevant biometric vegetation communities). Native midstorey cover (NMS) was consistent with the previous year with 13 out of the 22 sites meeting or exceeding the

completion criteria (minimum midstorey cover benchmark for relevant biometric vegetation communities). Native ground cover grass (NGCG) increased from 11 sites last year to 18 out of the 22 sites meeting or exceeding the completion criteria (based on averaged reference site values for relevant biometric vegetation communities). During the fauna monitoring, 77 bird species were recorded during standardised bird surveys with species richness ranging between 6 and 30 during 2020. This represented an increase from the 68 species detected in 2019 (range 13 to 39). By habitat, 56 species were detected in 5 woodland sites (average = 24.2; range 15 to 30), 42 species in 7 revegetation/rehabilitation sites (average = 12.3; range 6 to 16), and 42 species in 4 regenerated sites (average = 22.3; range 21 to 25). Results from diurnal herpetofauna surveys indicated there were 17 species of reptile across 10 sites (average = 3.3; range 0 to 5). Spotlighting surveys across 12 sites detected 35 different vertebrate species (average = 7.6; range 2 to 12). No gliding mammals were detected during these surveys.

On-site BOA

The 2020 vegetation monitoring surveys within the onsite mine Biodiversity Offset Area (BOA) identified 151 flora species, of which 131 were native and 15 were exotic. This is an increase of 40 native and seven exotic species when compared to the previous year's monitoring.

Overall vegetation health of the onsite BOA improved across OMZs in 2020,. The Inland Grey Box tall grassy woodland on clay soils in the Brigalow Belt South and Nandewar Bioregions vegetation community met all assessed completion criteria in 2020. Criteria was met for groundcover species cover (other) at all communities, grass cover was also met at all except within the Rough-barked Apple riparian forest forb/grass open forest of the Nandewar Bioregion vegetation community. Native plant species richness was on target at two of five vegetation communities, with scores just missing benchmark at two of the communities that were unsuccessful in this criterion. Vegetation types assessed during the reporting period against the relevant completion criteria are presented in Table 15.

Table 15 Mean percentage cover measurements of vegetation communities in 2020 compared to corresponding completion criteria

Vegetation Type	Native Overstorey Cover	Native Mid-storey Cover	Native Groundcover (Grasses)	Native Groundcover (shrubs)	Native Groundcover (Other)	Native Plant Species Richness
Inland Grey Box tall grassy woodland on clay soils in the Brigalow Belt South and Nandewar Bioregions	19	N/A	41.5	0	14	24
Completion criteria	(6 - 25)	(3 - 20)	(20 - 30)	(0 - 0)	(3 - 5)	(25)
Pilliga Box-Poplar Box-White Cypress Pine grassy open woodland on alluvial loams mainly of the temperate (hot summer) climate zone (Benson 88)	0	N/A	26	0	18.5	8
Completion criteria	(25 - 40)	(6 - 25)	(20 - 30)	(3 - 10)	(3 - 5)	(30)

Red Ironbark-Brown Bloodwood shrubby woodland of the Brigalow Belt South Bioregion	20.4	N/A	25.9	1.3	12	24.5
Completion criteria	(25 - 40)	(6 - 25)	(20 - 30)	(3 - 10)	(3 - 5)	(30)
River Oak riparian woodland of the Brigalow Belt South and Nandear Bioregions	17.6	N/A	10.5	0	5.5	22.5
Completion criteria	(10 - 40)	(1 - 60)	(1 - 35)	(1 - 10)	(3 - 20)	(21)
Rough-barked Apple riparian forest forb/grass open forest of the Nandewar Bioregion	18.5	N/A	21	0	15	35
Completion criteria	(6 - 25)	(0 - 5)	(30 - 40)	(3 - 10)	(3 - 5)	(25)

Three high threat weed species were observed onsite as part of the Onsite BOA monitoring in 2020, Lycium ferocissimum (African Boxthorn) observed in OMZ1, Bryophyllum delagoense (Mother of Millions) and Opuntia stricta (Prickly Pear) both observed within OMZ2.

Two threatened native flora species, Bertya Opponens (Coolabah Bertya) listed as vulnerable under the NSW Biodiversity Conservation Act 2016 (BC Act) and the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), and Pomaderris queenslandica (Scant Pomaderris), listed as endangered under the BC Act were identified within the Onsite BOA as part of the 2020 monitoring. All populations were commented to be in high numbers and in good condition, with little evidence of senescence observed when compared to 2019.

A complete flora species list is included as **Appendix A** and photo monitoring records as **Appendix B** as required by the BOS and the associated management plans.

During the 2020 monitoring surveys 51 fauna species were identified, this included 65 birds, four amphibian and three reptile species. Seven mammal species including four invasive species; Vulpes vulpes (fox), Felis catus (cat), Mus musculus (house mouse) and Rattus sp (Rat) were also recorded in fauna monitoring sites in 2020. Increases in fauna species richness and abundance were recorded across all fauna classes in 2020, with exception of reptiles.

Two threatened fauna species, listed as vulnerable under the NSW Biodiversity Conservation Act 2016 (BC Act), were identified during surveys in 2020.

A complete fauna species list has been included as **Appendix C** as required by the BOS and the associated management plans

Recommendations from the annual BOA monitoring (Narrabri Mine Onsite Biodiversity Offset Management Plan – 2020 Monitoring Report) are included below:

- As evident from the 0% canopy score for performance criteria within the '*Pilliga Box-Poplar Box-White Cypress Pine grassy open woodland on alluvial loams mainly of the temperate (hot summer) climate zone (Benson 88)'* vegetation community, mid-storey has not progressed into the height class to be eligible for identification as canopy cover (tree/shrub species >8m tall) during 2020. Vigorous *Callitris glaucophylla* (White Cypress Pine) and low numbers of *Eucalyptus microcarpa* (Grey Box) regeneration has occurred within Site 15 Rep. Site 15

however, has not experienced any regeneration since baseline surveys, suggesting that without management actions such as seeding or planting native stock, performance criteria will not be met within this vegetation community. In addition, 2020 which has been identified as a 'good' year for native plant growth, a mean native species richness of just 8 was calculated for this vegetation community, well below the completion criteria (30 species). Evidence of years of monitoring suggests, that a viable seed bank does not persist within this area and that the assigned completion criteria is not possible. ELA recommends WHC to discuss a modification of completion criteria for this community with the regulator. With supplementary planting, a native woodland without the native species richness integrity score of a vegetation community may be possible.

- It is also recommended to scale back monitoring to at the very least 2+ years between surveys. It is not necessary at this point in the project timeline to monitor annual changes in species composition. Monitoring annually is offering little to the identification of management actions to be undertaken on site, it is likely a larger time scale between monitoring periods will result in better evaluation of suggested management actions. In addition, many of the completion criteria remaining is related to long-term changes in vegetation health and therefore annual monitoring is negligible.
- All High threat weed species, those listed as priority within the North West Regional Strategic Weed Management Plan (LLS 2017-2022) and as noxious weeds listed within the Narrabri mine on-site Biodiversity Offset Management Plan (EMS, 2014)) that have been identified in 2020 should be managed across management zones. A list of plots in which high threat weed species have been identified is presented Appendix A of the BOMP (ELA, 2021).
- The purchasing of star pickets to be located at the end of vegetation transects should be considered prior to the next survey period, to ensure an adequate comparison between years for trend analysis.

6.6.3 Proposed Improvement Measures

- Review the monitoring requirements in the BOS as per the above recommendations.
- Continue the weed and feral animal control programs and subsequent monitoring.

6.7 ABORIGINAL CULTURAL HERITAGE

6.7.1 Environmental Management

Aboriginal Cultural Heritage is managed in accordance with the Aboriginal Cultural Heritage Management Plan (ACHMP), which was prepared to satisfy Schedule 4, Condition 23, and the Statement of Commitments (SoC) detailed in the PA 08_0144. Revision 5 of the ACHMP was provided to the Registered Aboriginal Parties (RAPs) for review and comment during the reporting period. The revised plan will be finalised and submitted to DPI&E for review and approval during the 2021 reporting period. Revision 5 of the ACHMP incorporated additional Aboriginal cultural heritage sites identified during surveys for the *Narrabri Underground Mine Stage 3 Extension Project* (the Stage 3 Project).

6.7.2 Environmental Performance

Soil Disturbance Monitoring

As outlined in the ACHMP, any soil disturbance work within 100 m of a drainage line or in areas not already cleared for agriculture requires the presence of the RAPs to minimise the risk of sites/objects of Aboriginal Cultural Heritage significance being disturbed by clearing activities.

Archaeological Salvage Program

No sites were identified as requiring salvage during the reporting period.

Ongoing Consultation

Narrabri Mine maintains regular contact with a representative of the RAPs in order to ensure appropriate cultural heritage supervision is available for planned surface disturbance activities.

During the reporting period NCO initiated formal bi-annual consultation meetings with the RAPs. As part of this consultation process the Mine has revised the Aboriginal Cultural Heritage induction/training package that is delivered to all personnel performing work at Narrabri Mine.

Previously Unidentified Sites

Thirty two (32) previously unidentified Aboriginal cultural heritage sites were identified during the period within the Stage 3 Project investigation area. The additional sites have been registered on AHIMS, included in, and will be managed in accordance with, the ACHMP (Revision 5).

Non-compliance

During the reporting period a potential Aboriginal site of cultural heritage significance was identified within the boundary of the Stage 2 project approval area in November 2017 (Mayfield GG1) and verbally notified by a representative of the Gomeroi Narrabri Aborginal Corporation to the Narrabri Mine Environmental Superintendent. During the above mentioned Stage 3 survey the site was recorded again, and it became apparent that when the site was initially reported in 2017, the procedures outlined in Section 3.3 of the Aboriginal Cultural Heritage Management Plan (ACHMP) were not implemented (Section 3.3 describes the procedure to follow in the event of the discovery of a potential site, which includes fencing/flagging of the site to ensure its protection, undertaking an archaeological assessment of the site, and registering the site on the AHIMS database). Narrabri Coal Operations self-reported the potential non-compliance to DPI&E on 21 July 2020. On 09/09/2020 DPI&E issued a Warning Letter for failing to implement the approved ACHMP. The Aboriginal site has not been harmed, is now registered in the AHIMS database and has been fenced in accordance with the ACHMP.

6.7.3 Proposed Improvement Measures

A fencing audit was undertaken during the reporting period identifying improvements to fencing around ACH sites. A comprehensive fencing improvement program has been scheduled to commence in early 2021, including replacement and improvement of fencing around all registered ACH sites.

6.8 HISTORIC HERITAGE

There are no items of historic heritage identified in the mining area and hence no specific management measures are required.

6.9 TRANSPORT

6.9.1 Environmental Management

Traffic impacts associated with the Narrabri Mine are managed in accordance with Schedule 4, Conditions 25 to 27 of the PA 08_0144.

6.9.2 Environmental Performance

The portion of Greylands Road that traverses the mining area has been purchased by the mine and is no longer accessible to the public. Scratch Road, in the western portion of the mining lease, has not been utilised to construct mining related infrastructure and as such no agreement has been developed with Narrabri Shire Council (NSC) for the use of this road.

The mine constructed the intersection to the mine in consultation with both NSC and Roads and Maritime Services (RMS). The RMS has advised the mine that the ongoing maintenance of the intersection is the responsibility of the RMS.

6.9.3 Proposed Improvement Measures

No additional improvement measures are proposed during the next reporting period. The mine will continue to liaise with RMS and NSC as required.

6.10 WASTE MANAGEMENT

6.10.1 Environmental Management

Narrabri Mine aims to implement all reasonable and feasible measures to minimise waste and ensure it is appropriately stored, handled and disposed. Waste materials at the mine are managed in accordance with:

- Schedule 4, Condition 33 of PA 08_0144;
- the Narrabri Mine Waste Management Plan (Waste MP) prepared to satisfy the requirements of PA 08_0144;
- the Pollution Incident Response Management Plan (PIRMP); and
- the legal and strategic framework for managing wastes in NSW.

Narrabri Mine waste streams include general waste, underground waste, oil & greases, recyclables (steel and paper/cardboard), drill cuttings and effluent.

6.10.2 Environmental Performance

Waste Streams

Inspections of waste management practices are carried out to ensure general, hydrocarbon and recyclable waste is segregated. Additional segregation of general waste occurs at the licenced contractor's facility to ensure the maximum amount of material can be recycled. Data on waste streams are collated using information provided by the licenced contractors. These records have been included in Figure 6 which shows waste stream volumes over a 5 year period. It should be noted that the licensed waste contractor changed halfway through 2018, which affected the availability of some waste records.

A total of approximately 1,962 tonnes (t) of general waste was removed during the reporting period, of which approximately 88% was transported to the licenced contractors facility for further segregation. These figures are comparable to the previous reporting period. Approximately 7 tonnes of cardboard/paper, 192 tonnes of timber and 209 tonnes of steel were recycled during the reporting period. Approximately 57, 800 L of used oils were collected and recycled during the reporting period by an authorised contractor, which has decreased from the previous reporting period.

Effluent from the sewage and ablutions facilities at the mine is managed through a Sewage Treatment Plant (STP) with a Continuous Extended Aeration Process. The plant is made up of a series of industrial

plastic tanks. Each tank provides a separate function in order to treat the sewage for the required quality and quantity. The system processed on average 34,470 L per day during the reporting period. During the STP process a waste product (sludge) is collected weekly and transported by licensed contractor to the Tamworth Treatment Works. During the reporting period a total of 526,500 L was collected and transported off-site, which is comparable to the previous reporting period quantities.

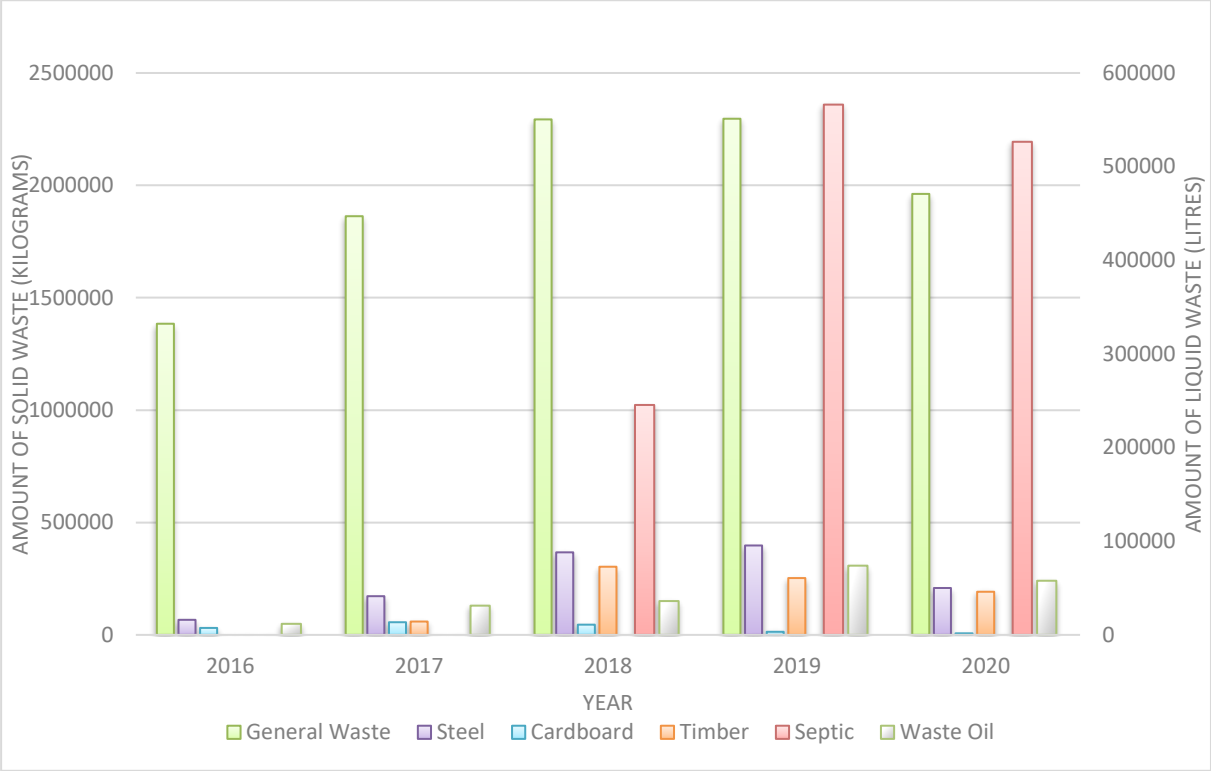

Figure 6: Comparison of waste streams over the previous 5 years

Drill cuttings from exploration, gas drainage and service borehole drilling are excavated from sumps and disposed of in the Rejects Emplacement Area as per site approval conditions.

The Waste Management Plan (v4) was reviewed and submitted to the DPI&E for review in May 2020, and subsequently approved on 19 October 2020.

Improvements to the environmental training packages on Waste Management and Hazardous Substances were completed during the reporting period, and training provided to mine personnel.

Improvements to waste signage was completed during the reporting period.

Waste Incident

During the 2019 reporting period it was reported that an incident occurred involving the disposal of used underground self-rescuer emergency breathing canisters in to the General Waste stream at the mine which were subsequently disposed of into the Narrabri Landfill facility. The NSW EPA issued Narrabri Mine with several Clean-Up Notices during the reporting period, and in consultation with the EPA and Narrabri Shire Council the Landfill clean-up activities were completed to the satisfaction of all parties. Clean-Up Notice 1597023 (dated 14 July 2020) remains in force, which requires NCO to undertake bi-

monthly leachate monitoring at the NSC Landfill facility, with further actions required should a significant increase in pH be observed.

Narrabri Mine entered into an Enforceable Undertaking (EU) with the EPA on 03 April 2020 in response to breaches of the *Protection of the Environment Operations Act 1991*. Narrabri Mine fulfilled its obligations under the EU and the EPA advised on 23 September 2020 that the undertakings required by the EU have been satisfied.

6.10.3 Proposed Improvement Measures

Narrabri Mine will continue to monitor wastes on a regular basis to effectively manage waste generated by the operation and maximise recycling opportunities.

6.11 VISUAL & LIGHTING

6.11.1 Environmental Management

Visual amenity and lighting impacts associated with the Narrabri Mine are managed in accordance with Schedule 4, Conditions 28 and 29 of the PA 08_0144. Various onsite measures have been implemented during previous reporting periods to mitigate visual impacts of the mine including (but not limited to):

- construction of an amenity bund on the southern and western boundaries of the site to obscure views from the south and west;
- the train load-out bin, CHPP, secondary crusher and rotary breaker buildings are manufactured from a green sheeting;
- use of directional lighting in lieu of general area lighting;
- consideration of fixed versus mobile lighting, locations and orientation;
- fixed lighting designed and procured in accordance with *Australian Standard (AS) 4282 – 1997: Control of Obtrusive Effects of Outdoor Lighting* (AS4282); and
- visual lighting inspections as required.

6.11.2 Environmental Performance

No direct community complaints were received during the reporting period relating to the visual amenity or lighting associated with the mine.

6.11.3 Proposed Improvement Measures

No additional improvement measures are proposed during the next reporting period.

Management measures described above will continue to be implemented.

6.12 BUSHFIRE

6.12.1 Environmental Management

Bushfire hazards and risks associated with the Narrabri Mine are managed in accordance with Schedule 5, Conditions 3 and 4 of PA 08_0144, i.e. the Rehabilitation Management Plan (RMP) that forms part of the Landscape Management Plan (LMP). Various treatments have been implemented during the reporting period and previous periods to manage and control potential bushfire risks including:

- implementation of the Bushfire Prevention Standard and Bushfire Emergency Response Procedure;

- Supervisors providing bushfire ratings prior to contractors working on site and providing regular updates on bushfires nearby;
- implementing bushfire Trigger Action Plans (TARPs) and PIRMP;
- participation by Whitehaven Coal personnel in the Narrabri Rural Bushfire Brigade meetings;
- implementation of various bushfire hazard controls , including Hot Work areas/permits, the mine is a non-smoking site and maintenance of equipment/infrastructure;
- monitoring of fuel loads occurred in the Narrabri Mine offset area known as 'Kenna";
- implementing onsite training programs; and,
- maintenance of the roads and tracks within the Narrabri Mine ML was undertaken prior to the bushfire season. Roads and tracks can act as firebreaks and help to facilitate access across the site.

6.12.2 Environmental Performance

No bushfires occurred adjacent to or within the Narrabri Mine ML 1609 area during the reporting period.

6.12.3 Proposed Improvement Measures

No additional improvement measures are proposed during the next reporting period.

Management measures described above will continue to be implemented during the next reporting period.

6.13 MINE SUBSIDENCE

6.13.1 Environmental Management

During the reporting period longwall extraction of LW109 was commenced and at the end of the reporting period is ongoing. The extraction height averaged 4.3 m and the depth of cover ranged between 250 m and 290 m.

6.13.1.1 Subsidence Monitoring

Subsidence monitoring was conducted in accordance with the approved Extraction Plan. Subsidence remained within predicted ranges for all matter except maximum compressive strain and maximum total tensile strain (Table 15).

6.13.2 Environmental Performance

Electricity Transmission Lines

The 11 kV power line that traverses LW101 to LW105 has been decommissioned and as such, the Essential Energy Management Plan and its monitoring requirements are no longer in effect.

Telecommunications Infrastructure

No telecommunications infrastructure exists within the Extraction Plan area for LW101 to LW110.

Public Roads

The one public road within the mining area, known as Greylands Road, has been purchased by the mine and is no longer accessible to the public. Repairs required for traffic-ability for mine personnel are undertaken as required.

Land Surface

No ponding occurred in LW109 during the reporting period.

During the reporting period the subsidence monitoring requirements of the Extraction Plans were reviewed and an internal document 'Subsidence Management Procedure' was developed. Subsidence monitoring has been undertaken in accordance with the Extraction Plan requirements and monitoring records significantly improved. There have been extensive rehabilitation activities of subsidence cracks across the active subsidence areas and previously subsided longwall panels.

Buildings and Other Structures

No buildings or sheds were undermined during the reporting period.

Water Storage Dams and Contour Banks

No known farm dams or contour banks were undermined during the reporting period.

Fences and gates

No fences were undermined during the reporting period. Narrabri Mine has excluded all stock from the active mining area by erecting a fence outside of the subsidence zone to the east of LW101. Any fences/gates required post-mining will be re-instated.

Mine Infrastructure

Pipelines connecting gas drainage wells and the Personal Emergency Device (PED) cable were undermined during the reporting period however no impacts were recorded on this infrastructure. All gas drainage infrastructure in the active mining area is inspected and maintained to ensure subsidence does not adversely impact this equipment. Narrabri Mine also decommissions gas drainage infrastructure when it is no longer required.

6.13.2.1 Comparison against Predictions

Narrabri Mine has monitored the subsidence movement across the surface of LW 107, 108 & Line H in accordance with the approved Extraction Plans. The table below outlines the maximum subsidence parameters recorded as part of the subsidence monitoring program and a comparison with the maximum predicted subsidence parameters as outlined in the Extraction Plan. Subsidence prediction exceedances did not occur during the reporting period. The results are summarised below:

Summary of results for the most recently completed survey measurements indicate:

- The maximum subsidence measurement of Line H (2.86m over LW109) exceeds predicted value of 2.75m. LW 107 and 108 measurements are within predicted values.
- The maximum tilt measurements recorded were within the predicted values.
- The maximum tensile and compressive strain measurements for LW108 exceeds predicted values. LW107 and Line H measurements were within predicted values.

No mine emergency response procedures were activated because of subsidence during the reporting period.

6.13.3 Proposed Improvement Measures

Further actions will be undertaken to establish an integrated electronic GIS based monitoring platform for environmental monitoring, including subsidence crack monitoring.

Table 16: Subsidence Parameters – Predicted and Measured

Longwall Panels (LW) 107 – 108		
	Maximum Predicted Extraction Plan	Maximum Measured
Line 101 – Centre of LW101 – Monitoring has ceased		
Line 102 – Centre of LW102 – Monitoring has ceased		
Line 103 – Centre of LW103 – Northern – Monitoring has ceased		
Line 103 – Centre of LW103 – Southern – Monitoring has ceased		
Line 104 – Centre of LW104 – Northern – Monitoring has ceased		
Line 104 – Centre of LW104 – Southern – Monitoring has ceased		
Line 105 – Centre of LW105 – Northern – Monitoring has ceased		
Line 105 – Centre of LW105 – Southern – Monitoring has ceased		
Line 106 – Centre of LW106 – Northern – Being closed out		
Line 107 – Centre of LW107 – Northern (measured 04/11/20)		
Subsidence (m)	2.75	2.74
Tilt (mm/m)	44	28.0
Tensile Strain (mm/m)	13	10.3
Compressive Strain (mm/m)	16	12.4
Angle of Draw (°, Degrees)	26.5	24.1
Line 108 (measured 13/11/20)		
Subsidence (m)	2.75	2.68
Tilt (mm/m)	38	36.3
Tensile Strain (mm/m)	10	16.2
Compressive Strain (mm/m)	13	38.9
Angle of Draw (°, Degrees)	na	24.7
Line 108 – Southern		
Line A – Cross Panel Survey Line – Being closed out		
Line B – Pine Creek Tributary 1 – Monitoring has ceased		
Line D – Pine Creek– Monitoring has ceased		
Line E – Pine Creek Tributary 1 Crossline 1 – Monitoring has ceased		
Line F – Pine Creek Tributary 1 Crossline 2 – Monitoring has ceased		
Line G – Pine Creek Tributary 1 Crossline 3 – Monitoring has ceased		
Line H – Cross Panel Survey Line (measured 06/11/20)		
Subsidence (m)	2.75	2.86
Tilt (mm/m)	53	31.8
Tensile Strain (mm/m)	13 – 20^	16.6
Compressive Strain (mm/m)	16 – 24^	18.3

7 WATER MANAGEMENT

7.1 WATER SUPPLY

A pipeline from the Namoi River is the main source of raw water supply for the Narrabri Mine, water from this pipeline can be taken from either the Namoi Alluvium or the Namoi River. Table 16 summarises the water taken by the mine during the 2019/20 water year (i.e. the 2019 financial year).

Table 17: Narrabri Mine Water Take

Water Access Licence	Water Sharing Plan	Water Source and Management Zone	Temporary Transfer (ML)	Annual Use limit	Passive Take / Inflows	Water Take	Total Take
WAL 12833	Upper and Lower Namoi Groundwater Sources	Upper Namoi Zone 5 Namoi Valley (Gin's Leap to Narrabri) Groundwater Source	-170	134[6] + 170	24.4[1]	203.8	216[1]
WAL 20131	Upper and Lower Namoi Groundwater Sources	Upper Namoi Zone 5 Namoi Valley (Gin's Leap to Narrabri) Groundwater Source	-	300[6]		199.3	211.5[1]
WAL 12822	Upper and Lower Namoi Groundwater Sources	Upper Namoi Zone 5 Namoi Valley (Gin's Leap to Narrabri) Groundwater Source	-	86[6]		N/A[5]	N/A[5]
WAL15922	NSW Great Artesian Basin Groundwater Source	Southern Recharge Groundwater Source	-	322.4	0.4	0	0.4[2]
WAL 29549	NSW Murray Darling Basin Porous Rock Groundwater Sources	Gunnedah – Oxley Basin MDB Groundwater Source	-	1,022.5	662[3]	458.5[4]	458.5[4]
WAL43017	NSW Murray Darling Basin Porous Rock Groundwater Sources	Gunnedah – Oxley Basin MDB Groundwater Source		503.8		0	0
WAL 2671	Upper Namoi and Lower Namoi Regulated River Water Sources	Lower Namoi Regulated River Water Source	-	60	91	0	0
WAL 6762	Upper Namoi and Lower Namoi Regulated River Water Sources	Lower Namoi Regulated River Water Source (High security)	-	20		19.9	19.9
WAL 2728	Upper Namoi and Lower Namoi Regulated River Water Sources	Lower Namoi Regulated River Water Source	-	12.5		0	0
WAL 20152	Upper Namoi and Lower Namoi Regulated River Water Sources	Lower Namoi Regulated River Water Source	-	750		51.9	142.9

[1] 24.4ML passive take split between WAL 12833 and WAL 20131 Total Take. Passive take calculated for the year from the 2020 groundwater recalibration.

[2] Water Statement from NSW Water records 248 ML groundwater usage. No active pumping from Narrabri Mine was undertaken. Passive take estimated from 2020 groundwater recalibration as 0.4ML for the year

[3] Predicted Annual Inflow Volume from 2020 groundwater recalibration.

[4] 458.5ML was recorded from meter readings at the nominated works (mine box-cut pump), however the annual inflow that was calculated as the water removed from mining activities during 2020 was 264 ML. The calculation is the total aquifer interference volume taking into consideration the inputs of water supply from Dam D, as well as losses from the moisture content of coal extracted and ventilation humidity.

[5] WAL 12822 was converted to Narrabri Coal works approval in August 2020.

[6] The combined annual use limit from the Namoi groundwater work approval was determined to be 400ML in August 2020. This was after the water reporting period in the above table

7.2 SURFACE WATER MANAGEMENT

7.2.1 Environmental Management

The Narrabri Mine water management system is managed in accordance with:

- Schedule 4, Conditions 10 to 17 of PA 08_0144;
- EPL 12789 Conditions P1, L1, L2 and M2; and
- the Narrabri Mine Water Management Plan (WMP) and the Extraction Plan – Water Management Plan (EP–WMP) prepared to satisfy the requirements of PA 08_0144.

During the reporting period various strategies were implemented to manage surface water quality including:

- Separation of clean water, i.e. surface water runoff where water quality is not affected by mining operations, utilizing clean water diversion drains;
- Collection of water from disturbed areas in sediment control dams, i.e. SD1-SD6 and SD8;
- Containment of water potentially affected by coal or other substances and stored within HDPE lined ponds, e.g. hydrocarbons, either from the underground operation or as runoff from the surface facilities/coal processing area, i.e. SB1-SB4;
- The use of appropriate erosion and sediment controls, including silt fences, rock checks and other measures as required;
- No uncontrolled discharge of mine water off-site;
- Maintaining an up-to-date water balance to ensure on-site water demands are satisfied whilst minimising offsite water impacts; and
- Regular sampling and inspections of the onsite and surrounding surface water system. Surface water monitoring locations are illustrated on Figure 2.

7.2.2 Environmental Performance

Surface Water Quality

Narrabri Mine undertakes a surface water monitoring program which includes water pumped from the underground workings. The results of the water quality sampling conducted during the reporting are shown in Appendix D and F, refer to results for the 'Box Cut' sampling location. All water contained within the rail loop dam complex and sediment basins (SB1-4) are contained in HDPE lined ponds and

either processed via a Reverse Osmosis treatment plant or reused in operational areas of the mine. The subsequent brine produced from the RO plant is stored in HDPE lined dams within the rail loop.

Wet Weather Discharge Monitoring

Routine surface water monitoring undertaken around the site includes sediment dam discharges and upstream and downstream locations sampled when flowing for pH, Electrical Conductivity (EC), Oil & Grease (O&G) and Total Suspended Solids (TSS). No discharges occurred, although the upstream and downstream locations of the discharge points were sampled following rainfall events for baseline monitoring.

Subsidence Surface Water Impacts

Refer to Section 6.6.2.1 (Subsidence Pond Monitoring) of this report.

7.2.3 Proposed Improvement Measures

The surface water monitoring program and management measures described above will continue to be implemented during the next reporting period consistent with the approved WMP.

Narrabri Mine will continue to progress refinements to the Water Management plan in consultation with NRAR and the DPI&E.

7.3 GROUNDWATER

Groundwater Monitoring

Groundwater at the Narrabri Mine is managed in accordance with the WMP prepared to satisfy the requirements of the PA 08_0144. Currently groundwater monitoring is conducted at sites located within and surrounding the mine as illustrated on Figure 3 and as outlined in Table 18.

Table 18: Groundwater Monitoring Summary

Location	Parameters	Frequency
All Standpipes P1,P2, P3, P4, P5, P6,P7,P8, P9, P10, P11,P12, P13,P16,P17, P19, P28, P29, P30, P31, P32, P33, P34, P39a, P39b, P43, P47, P51, P52, P53, P58, WB2, WB3a, WB3b, WB4, WB5a, WB5b, WB6a, WB6b, and WB7	Water level EC pH TDS Metals Anions and Cations	Monthly (water level, pH and EC) Quarterly for P28-34 and P58 (water Level, pH, EC, cations and anions) Annually (full water quality)
Vibrating Wire Piezometers P40, P42, P44, P45, P46, P48, P54, P55 and P56	Water Level	Daily (Data Logger)
Mine water pumped into and out of the mine (Box Cut)	EC pH TDS Metals Anion and Cations Discharge Rate	Daily (flow rate) Monthly (full water quality)

7.3.1 Environmental Performance

Annual Hydrogeological Review

An annual hydrogeological review was undertaken by Groundwater Exploration Services for the period 1 January 2020 to 31 December 2020. The results of the review are summarised below. Groundwater monitoring results for this reporting period are provided in Appendix E as required by the WMP.

Standpipe Piezometers

Climate conditions and more specifically rainfall patterns over the past few years have been highly variable with an extended below average rainfall period occurring from early 2017 through to early 2020 followed by above average rainfall in 2020.

Rainfall residual mass curves undertaken in the hydrogeological review indicate that there is a close correlation with groundwater levels in a number of monitoring standpipes screened in shallow weathered strata including Napperby Formation and also in Garrawilla Volcanics. Generally, this is only seen in monitoring standpipes with total depths less than 30m. The deeper monitoring bores appear to be insulated from these environmental variables. Standpipe piezometers showing a clear drawdown in response to mining activities in this reporting period is limited to P16 screened at a total depth of 146m in the Garrawilla Volcanics. The groundwater pressure in P16 is approaching drawdown prediction in the groundwater impact assessment. This will continue to be monitored during the next reporting period.

Vibrating Wire Piezometers (VWP)

The VWP network has continued to evolve in recent years with older single instrument piezometers surrounding the box cut area and targeted multi-level VWP (P57) being decommissioned as predicted impacts pass with progressive mine development. Additional VWP's have been installed in southern areas providing a greater sub-regional context to groundwater pressures at depth.

P40 located at the southern edge of LW110 is the most consequential VWP site for this review period as it is located in proximity to mining activities. The hydrograph shows punctuated response to LW107 with the Brigalow Sandstone reacting soon after longwall start (at great distance) and with approach of the longwall to the central mains in the case of the Hoskissons Coal Seam. This data signal at this site appears to be at the point of failure, possibly due to subsidence related strain. In the 2020 reporting period, the reducing pressures in these lower strata (Hoskissons Coal Seam and Brigalow Sandstone) have levelled out and is asymptotic with the predicted trigger levels for this location. Overlying stratigraphy has been insulated from these significant pressure declines and remain well above modelled trigger levels. The pressures in the Garrawilla Volcanics at P40 is very close in relative level to that of standpipe P16, also screened within the Garrawilla Volcanics located on the western margins of the mine plan.

All trends provided by the VWP network are consistent with predictions of impacts associated with mining activities.

Groundwater Quality

Electrical Conductivity (EC) is the primary analyte used for this review period to assess trends and potential unforeseen impacts on the groundwater environment. During 2020, the most significant trend is an increase in salinity, primarily in shallow standpipe piezometers (<40m) but the trend is also observed in deeper stratigraphy although generally in a much more subdued manner. This trend is consistent in areas in proximity to the mine area and also at distance in monitoring sites that represent background conditions with little prospect of being influenced by mining activities. The largest increase occurring in P4 and P5 to the north of the mine area. This trend cannot be attributed to any mining related stresses and likely natural environmental variability associated with rainfall patterns. Although

2020 experienced an above average rainfall, the preceding three years are well below average and there may be some lag in the recovery of salinity levels.

The salinity levels observed in 2020 are in many cases, maximum values in recorded data to date.

A hydrogeological investigation was undertaken on an increase in water level observed at P30 monitoring bore surrounding the Rail Loop dams. This was reported in the 2019 Annual Review and to the EPA. The investigation recommended an additional monitoring bore be installed to further determine water quality and levels in the immediate area. The additional bore was constructed in September and labelled P58. EPL 12789 was varied during the reporting period to include quarterly monitoring of the 8 monitoring bores surrounding the rail loop ponds along with undertaking an annual review and summary of the monitoring data. The water level observed in the recently installed P58 is more than 5m below other Rail Loop monitoring bores which all show variable levels indicating a disconnection with the apparent perched water levels of the pond complex network. Water level increased in the 4th quarter of 2020 by 0.5m which is the most significant water level change seen within the pond complex monitoring network. The reason for this is potentially post installation recovery in the screened weathered Napperby which has a low permeability, or the higher rainfall observed in 2020. The annual review and summary data required by EPL12789 will submitted during the 2021 reporting period.

Compensatory Water Supply

No compensatory water has been required as no privately-owned water supplies have been affected.

7.3.2 Proposed Improvement Measures

An updated Water Management Plan (v3) and the Groundwater Model (5 yearly) Recalibration report were submitted to the DPI&E for review in September 2020. During the next reporting period Narrabri Mine will continue to progress refinements to the Water Management Plan in consultation with NRAR and the DPI&E.

7.4 SITE WATER BALANCE

Surface water

Table 19 presents an estimate of the volume of stored water at the beginning and end of the reporting period (i.e. calendar year). The Narrabri Mine pumped 492ML into Dam D from the Namoi River Pipeline from Namoi Alluvium or the Namoi River water sources via approved Water Access Licences (refer Section 7.1).

Table 19: Stored Water

	Volumes Held (ML)		Capacity within the Maximum Operating Level at the end of the Reporting Period (ML)
	Start of Reporting Period	At end of Reporting Period	
Clean Water Dam D in Rail loop	73.2	90.4	46.4
Dirty Water (in Sediment Dams and Basins)	18.7	73.5	106.2
Rail Loop Dams (HDPE lined)	339.3	460.5	135.4
* Additional 40ML of storage in containment bund in rail loop.			

Groundwater Inflows

The annual groundwater inflow to the workings has been less than the water use limits of WAL29549 (nominated works 90WA822539) of 818ML/year. In accordance with future impact predictions associated with the groundwater assessment, additional allocation was sought through a controlled action in 2019 for an additional 403 units. The WAL43017 (403 units) was issued in November 2019 and an application has been sought to nominate 90WA822539 (Box cut) as the approved work. The annual inflow that was predicted to be extracted from mining activities from the recalibrated groundwater model during 2020 was 693ML. The pumped volume from the box cut was 436ML during the reporting period. The calculated water take utilising inputs and losses of water within the mine are represented by the waterfall chart below (Figure 7). The predicted groundwater inflow for 2021 is 813ML from the model recalibration. Groundwater consultants were engaged to review the 2020 model recalibration against 10 years of mine operation and have adjusted the expected flows for 2021 to be 536ML. The adjustments have been undertaken with regards to the revised Water Management Plan submitted to NRAR and DPIE for consultation in September 2020. In accordance with Project Approval requirements in schedule 4 condition 9, the groundwater model was re-calibrated with updated site information. This was finalised in September 2020 and has been submitted to DPI&E, and at the end of the reporting period was with NRAR for comment. The recalibrated groundwater model predicts inflow volumes that are closer aligned with site observations.

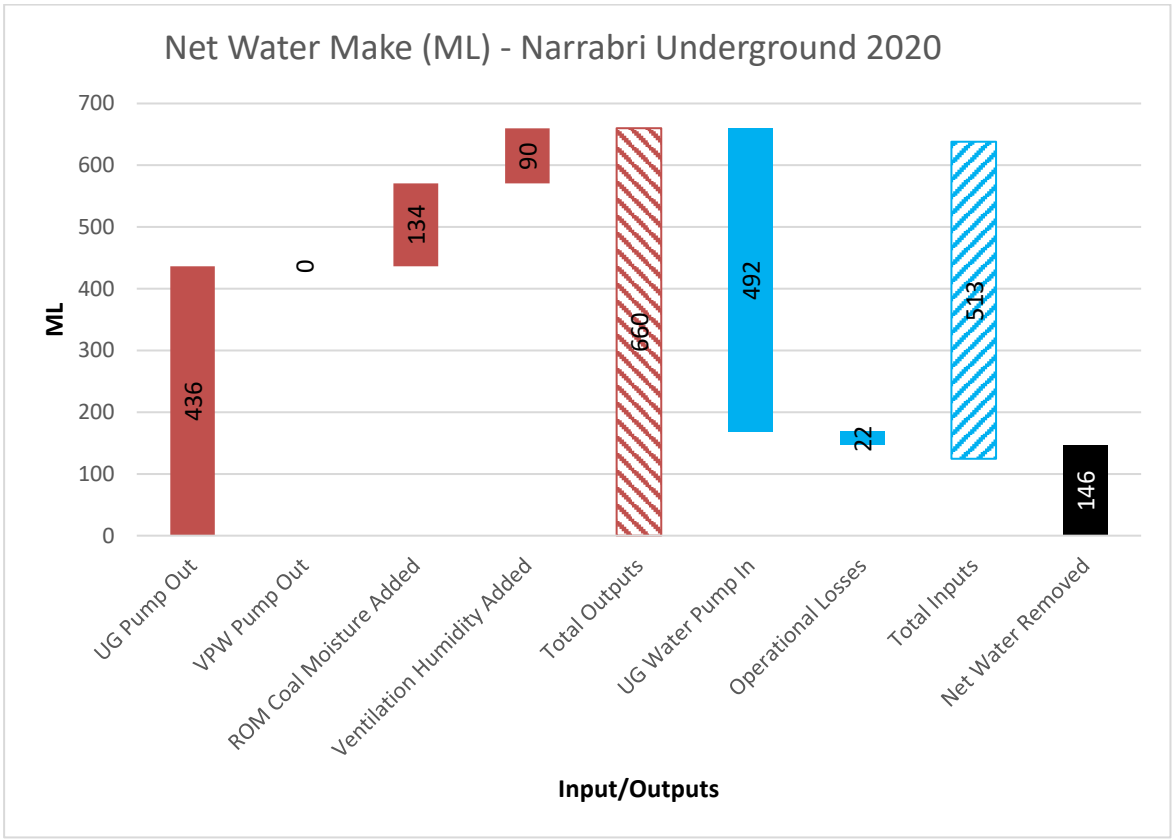

Figure 7: Waterfall chart showing water inputs and outputs for the 2020 reporting period

8 REHABILITATION

The rehabilitation objectives for the Narrabri Mine are described in Schedule 5, Conditions 1 to 4 of PA 08_0144. The MOP summarises the key elements for rehabilitation as well as providing a description of activities and mine landforms.

8.1 REHABILITATION PERFORMANCE DURING THE REPORTING PERIOD

8.1.1 Status of Mining and Rehabilitation

Rehabilitation activities were undertaken over the disturbed areas above LW101-108 during the reporting period, with approximately 18 hectares progressed to Active Rehabilitation. Rehabilitation activities undertaken during the reporting period included: decommissioning drill holes; filling in sumps associated with drilling activities; grading landforms and re-spreading topsoil/subsoil; fertilising and seeding topsoiled areas; and weed management.

Refer to Table 20. Rehabilitation of 18 ha of drilling pads and gas drainage infrastructure sites was undertaken during the reporting period. This rehabilitation has occurred up to and including surface areas above LW101-108 and is progressing closely behind the underground extraction area (LW109).

8.1.2 Post Rehabilitation Land Uses

The rehabilitation completion criteria will be consistent with the description in the Landscape Management Plan. The area in the west of ML 1609 will be returned to native woodland and the area in the east of the ML will be returned to the relevant land capability class.

8.1.3 Rehabilitation Performance Indicators

Table 20 summarises the rehabilitation status for the Narrabri Mine, also refer to Figure 8. Note that areas for each 'Main Area Type' have been reported to align with definitions in the *Annual Review Guideline* (DP&E 2015). The 2019 Annual Review forecast a maximum of 14 hectares of disturbance, with actual area disturbed for 2020 of 12.5 hectares. The forecast active rehabilitation target for 2020 of 11 hectares was achieved.

Table 20: Rehabilitation Status

Mine Area Type	Previous Reporting Period (2019)	This Reporting Period (31/12/2020-Actual)	Next Reporting Period 2021 (Forecast)
A. Total mine footprint	408	406[1]	419
B. Total active disturbance	279	270[1]	275
C. Land being prepared for rehabilitation	29	25	15
D. Land under active rehabilitation	100	111	129
E. Completed rehabilitation	0	0	0

[1]Total Mine Footprint and Total Active Disturbance areas are shown in above table as decreasing during the reporting period. This is a result of correction of errors in mapping from previous reporting periods, where it was discovered that there was a double-up of 'polygons' in the disturbance drawing files. The actual area disturbed during the reporting period 2020 was 12.5 hectares.

8.1.4 Decommissioning and Demolition Activities

No decommissioning activities were undertaken during the reporting period outside of the reclaiming of gas drainage infrastructure, which is re-used where possible.

8.1.5 Other Rehabilitation Activities

Rehabilitation activities associated with exploration activities have been undertaken during the reporting period, with majority of disturbance within EL6243 rehabilitated.

8.1.6 Departmental Sign-off of Rehabilitated Areas

Departmental sign-off was not requested during the reporting period.

8.1.7 Variations in Activities against MOP/RMP

Narrabri Mine prepared a Mining Operations Plan to cover the period 01 December 2020 to 31 December 2023. The MOP was submitted to the Resources Regulator and approved on 26 November 2020.

The disturbance and rehabilitation activities completed during 2020 were generally in accordance with indicative plans in the MOP. The MOP target for cumulative rehabilitated area of 111 hectares at the end of the MOP term (01 December 2020) was achieved.

8.1.8 Monitoring

Internal rehabilitation/revegetation monitoring undertaken to date has primarily been limited to inspections of roads/creeks impacted by subsidence, water management structures, soil stockpiles and seeded areas for evidence of instability/erosion or poor germination, and borehole sealing. This process will continue over the life of the mine, with the extent and nature of activities undertaken being consistent with the relevant MOP, Extraction Plan, Landscape Management Plan and other relevant management plans prepared in satisfaction of PA 08_0144.

8.1.9 Trials, Research Projects and Initiatives

No rehabilitation trials or research were undertaken during the reporting period.

Several Risk Assessments focusing on rehabilitation were completed during the reporting period, these included:

- Broad Brush Risk Assessment- Rehabilitation, for inclusion with the new MOP 2021-2023; and
- Bow-Tie Risk Assessment on Disturbance and Rehabilitation activities.

There were a number of improvements identified during the risk assessments which are being actioned.

8.1.10 Key Issues to Achieving Successful Rehabilitation

The key issues to achieving successful rehabilitation include:

- Poor quality or lack of volume of topsoil;
- Loss or alteration to existing habitats due to subsidence, erosion, weeds and/or pests;
- Alteration of drainage lines due to subsidence;
- Contaminated land occurring onsite;

- Ongoing greenhouse gas emissions due to inadequate sealing of mine entries etc;
- Loss of agricultural resources due to mining disturbance; and
- Discharge of saline or contaminated water.

In cases where the performance is sub-optimal, additional management measures will be implemented (e.g. replanting, repairing landform and water management features, application of mulch/fertilisers, feral animal and weed control etc.).

8.2 ACTIONS FOR THE NEXT REPORTING PERIOD

Work will progress on removing houses and associated infrastructure on mine-owned land that are no longer required or that have been affected by subsidence.

Weed and pest animal control programs and monitoring will continue.

The rehabilitation actions for the next reporting period are detailed in the approved MOP, which covers the period to December 2023.

Staged rehabilitation of the REA will progress as the landform develops, and in accordance with the Rejects Emplacement Area Capping Strategy and Closure Plan.

8.2.1 Proposed Research and Rehabilitation for 2021

Further actions will be undertaken to establish an integrated electronic GIS based monitoring platform for environmental monitoring, including disturbance and rehabilitation tracking.

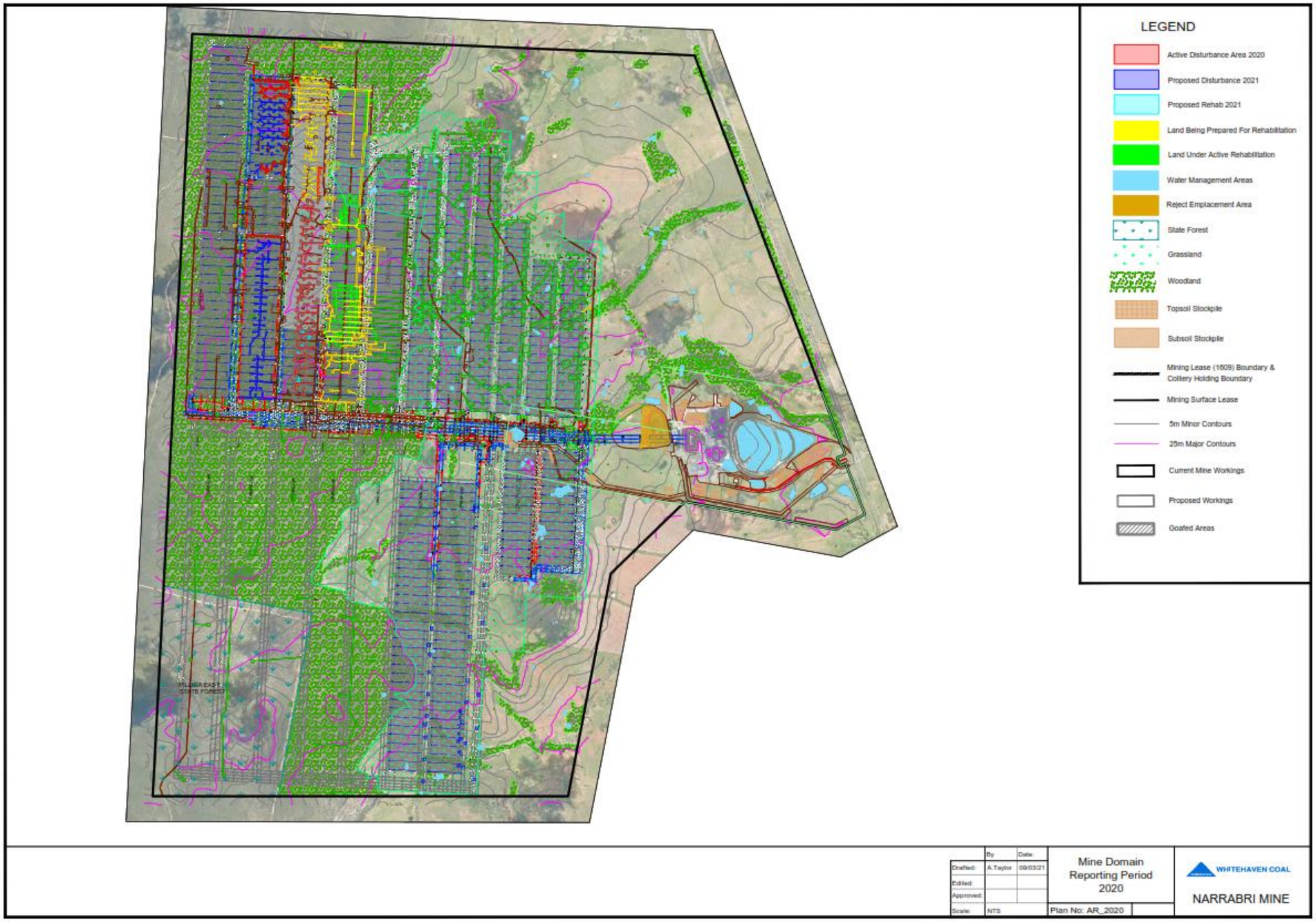

Figure 8: Mine Domains Reporting Period 2020

9 COMMUNITY

Social impacts and opportunities associated with the Narrabri Mine are managed in accordance with PA 08_0144 and the Statement of Commitments (SoC) (Appendix 3 of PA 08_0144).

9.1 COMMUNITY ENGAGEMENT ACTIVITIES

In accordance with Schedule 6, Condition 9 of PA 08_0144, a Community Consultative Committee (CCC) has been formed and operating since 2008. The committee comprises representatives of Narrabri Shire Council, Narrabri Mine and the community. Since its inception, the CCC has met quarterly. The CCC met four times during the reporting period on the 3 March 2020, the 12 August 2020, the 14 October 2020 and the 16 December 2020.

Narrabri Mine representatives continue to maintain contact with neighbours near the mine site. These contacts not only provide a means of information dissemination, but also enable Narrabri Mine to ascertain and address any potential concerns.

In addition, information relating to the mine is available: on the Whitehaven Coal website; the annual sustainability report; and at consultation meetings as required with neighbours and a range of stakeholders including government and non-government agencies. Whitehaven Coal meets monthly with the Narrabri Shire Council and is a regular attendee at the Narrabri and Boggabri Business Chamber meetings.

9.2 COMMUNITY CONTRIBUTIONS & INITIATIVES

As well as attending functions, WHC and Narrabri Mine also contributed to the community by providing approximately $461,086 in financial support and sponsorship to various community events and initiatives during the reporting period, which included those listed in .

Table 21: Donations to organisations in the Narrabri locality during 2020

Organisation	Description	Amount granted
Clontarf Foundation	Narrabri High School	$40,000
Country Universities Centre North West	Scholarships	$10,000
Narrabri LALC	Kitchen Upgrade	$10,000
Narrabri Show Society	Narrabri Show	$4,000
Janice Knox Artwork	Aboriginal artwork	$3,250
St Barnabas	Carols in the Park	$1,500
Rebecca Artis	Community Golf Day	$1,000
Baan Baa Tennis Club	Electrical maintenance	$1,000
Narrabri LALC	Aboriginal cricket shirt framed	$463.91
Narrabri High School	School presentation awards	$250
Future EDU	Develop STEM database	$40,000

9.3 COMMUNITY COMPLAINTS

Narrabri Mine maintains a designated complaints line. In the event of a complaint, details pertaining to the complainant, complaint and action taken are recorded on a complaint register.

During the reporting period, five complaints were made to the mine from two separate complainants. All complaints were received via the telephone complaints line. A summary of the complaints (by category) received during the reporting period are detailed in Table 22. A register summarising the complaint details is also available on the Whitehaven Coal website.

Table 22: Summary of Community Complaints and Enquiries

Complaint	Complaint Category	Method
1	Noise	Phone (complaints line)
2	Noise	Phone (complaints line)
3	Noise	Phone (complaints line)
4	Noise	Phone (complaints line)
5	Noise	Phone (complaints line)

9.3.1 Complaint Trends

Five complaints were received during the reporting period which is a significant decrease from the 2019 annual review period (Figure 8).

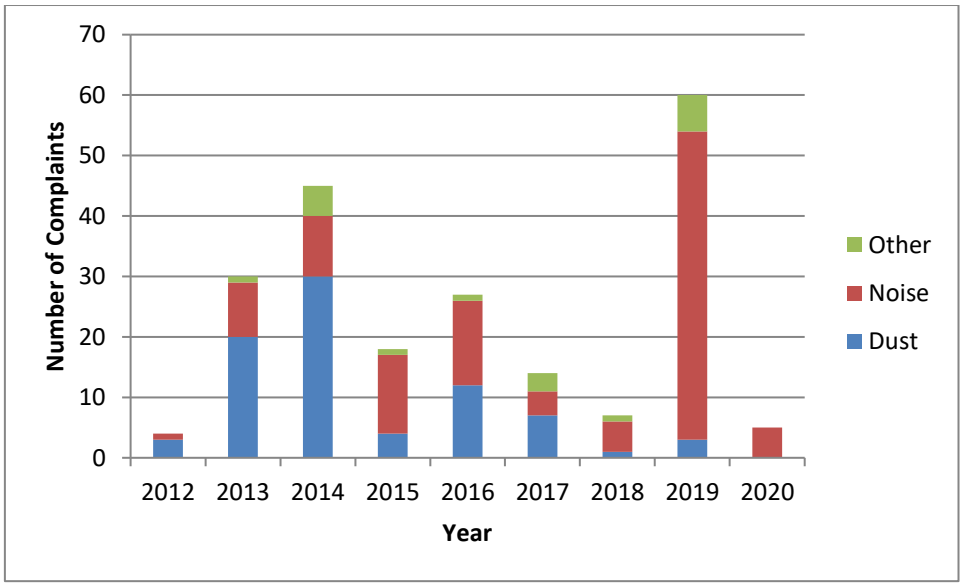

Figure 9: Complaints Trend since commencement of operations

9.3.2 Actions & Proposed Improvements

As community complaints for the previous reporting period have been primarily related to noise concerns, ongoing noise management will include a range of measures not limited to the following:

- Investigations into specific noise generating activities;
- Undertake attended noise monitoring;
- Reviewing real time monitoring data and operational procedures/TARPs;
- Analysis of meteorological data;
- Communicating learnings and issues to operational personnel; and
- Community consultation.

10 INDEPENDENT AUDIT

10.1 INDEPENDENT ENVIRONMENTAL AUDIT

Narrabri Mine were not required to complete an Independent Environmental Audit (IEA) during the 2020 reporting period. The IEA completed during the 2019 reporting period was submitted to DPI&E and accepted as satisfactory on 14 February 2020. The outstanding actions from the Action Plan submitted with the IEA report were completed during the 2020 reporting period as outlined below:

- Review the subsidence monitoring requirements of the Extraction Plan LW107-LW110 and develop a monitoring guideline for implementations (completed on 24 April 2020 in document titled Procedure for Subsidence Monitoring and Management of LW107-LW110);
- Review the Water Management Plan to confirm that actions for water quality incidents adequately address saline contamination (addressed in the Narrabri Mine Brine Management and Beneficial Reuse Options Report dated 29 May 2019); and
- Develop and implement a Complaints Handling Procedure (completed on 30/04/2020 in document titled Procedure for the Recording of Community Complaints).

In accordance with Schedule 6, Condition 7 of PA 08_0144 the next IEA will be commissioned by 13 September 2022. The full 2019 IEA report and NCO's response action plan are available on the Whitehaven Coal website.

11 INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD

11.1 NON-COMPLIANCES

The compliance status of the Narrabri Mine against relevant approvals during the reporting period was assessed in Section 1 as at the end of the reporting period (i.e. 31 December 2020). Further details of any non-compliance and actions undertaken or proposed for the following reporting period is summarised in Table 23.

Table 23: Non-Compliance Details and Proposed Action Plan

Non - Compliance	Date	Cause	Action Plan	Due Date
Section 3.3 of the Aboriginal Cultural Heritage Management Plan (failure to fence and register a cultural heritage site) was not implemented as required by Schedule 2 Condition 23 of Project Approval 08_0144.	Self-reported to DPI&E on 21 July 2020	Administrative error.	The CH site was not harmed. The site has been fenced and registered on AHIMS. NCO have improved the Environmental Management Systems, and strengthened the environmental team to minimise risk of further administrative errors.	Ongoing
PA 08_144, Schedule 4 Condition 1: The Proponent shall ensure that the noise generated by the project does not exceed the levels set out in Table 1.	Recorded at R16 ("Newhaven") during the night period of 23 June 2020.	The Main Vent Fan was noted as the dominant noise source from the mine with potential contributions from NCO surface activities above longwall panels.	Following the June exceedance night-time drilling activities were suspended. Subsequent monitoring events have recorded noise levels within compliance limits. Noise abatement options have been reviewed for the main vent fans. Narrabri Mine have engaged the OEM to supply and install replacement acoustic baffles.	Main fan acoustic baffle replacement to be completed prior to end of 2020.

11.2 REPORTABLE INCIDENTS OR EXCEEDANCES

Details of reportable monitoring exceedances or incidents are included below:

- Failure to implement the ACHMP, as detailed in Section 6.7.2, was reported to the DPI&E during the reporting period.

- Exceedance of 35dBA LAeq (15min) noise limit at the Newhaven property. A noise level of 40dBA was recorded during the night period during attended monitoring on 23 June 2020. The contributing mining noise sources were listed as main vent fan and surface activities above the longwall panels. The exceedance was reported to the EPA and DPI&E upon receipt of the monitoring results. Measures taken to mitigate noise included ceasing surface drilling activities during night-time periods. Additional noise monitoring was conducted on the 13 August 2020 at monitoring location N6, with maximum noise level of 26 dB(A) LAeq (15 minute) recorded during the night time period.

- Exceedance of PM10 air quality 24 hour average criteria at monitoring site ND9 ("Claremont") on 16 March 2020. Claremont HVAS monitoring unit is located to the South-west of the mine pit-top area. Weather records for 03 March 2020 indicate dominant wind direction was from the South East. Therefore it is considered unlikely that the air quality recorded at ND9 is attributed to mining related impacts, and is likely related to agricultural activities on properties south of the mine site. This was reported to DPI&E who acknowledged that it was unlikely that site activities impacted the data, but required NCO to include the result in annual average calculations as it was not the result of an extraordinary event.

11.3 REGULATORY ACTIONS

The following official cautions or warning letters, penalty notices or prosecution proceedings were issued to the mine during the reporting period:

- EPA issued a Penalty Infringement Notice on 20 February 2020 for *Failure to comply with Condition L3.1- Noise generated at the premises must not exceed the noise limits*; in relation to noise monitoring results from 4 September 2019 where a noise level of 39dB was recorded at monitoring location N9 'High Range'.
- DPI&E issued a Warning Letter on 9 September 2020 for carrying out development not in accordance with the conditions of development consent; by breaching Schedule 2 Condition 23 of Project Approval 08_0144, by not implementing Section 3.3 of the Aboriginal Cultural Heritage Management Plan (failure to fence and register a cultural heritage site).
- Resources Regulator commenced prosecution proceedings against Narrabri Coal Pty Ltd and Narrabri Coal Operations Pty Ltd for breaches of the Mining Act 1992 by failing to comply with conditions of an activity approval for Exploration License 6243. These matters commenced during the 2019 reporting period and Narrabri Coal continue to engage with the Resources Regulator towards resolution of this matter,, this includes the negotiation of an Enforceable Undertaking.

Inspectors from the Resources Regulator attended site on 25 February 2020 and undertook general compliance inspections of the Rejects Emplacement Area management, and progressive rehabilitation activities. No non-compliances or areas of concern were identified and no further correspondence issued by the Resources Regulator.

The EPA Armidale Manager Regional Operations attended site on 23 October 2020 and undertook general compliance inspections of the coal stockpiles, brine dams, workshop/refuelling areas, area above current longwall operations. No non-compliances or areas of concern were identified and no further correspondence issued by the EPA.

12 ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

Activities to be completed in the next reporting period to improve the environmental or community performance of the Narrabri Mine, in addition to those separately identified in Section 11 include:

- The primary improvement measure proposed for the next reporting period is related to the main vent fans. Investigations completed during 2020 have determined that the acoustic attenuators in the fan discharge ducts have become compromised over time, potentially resulting in increased noise levels. NCO have engaged the OEM to provide replacement acoustic baffles and make design modifications to the fan baffle housings to enable ongoing routine maintenance work on the new baffles. The new acoustic baffles will be installed during the reporting period.
- In accordance with a Pollution Reduction Study on EPL12789 during the reporting period the mine will undertake further assessment to determine the effectiveness of the current pit top dust suppression systems and identify what, if any, additional mitigation measures can be employed to ensure dust impacts are minimised.
- Continue the weed and feral animal control programs and subsequent monitoring.
- Further actions will be undertaken to establish an improved GIS based monitoring platform for environmental monitoring, including subsidence crack monitoring and disturbance and rehabilitation tracking.
- A fencing audit was undertaken during the reporting period identifying improvements to fencing around ACH sites. A comprehensive fencing improvement program has been scheduled to commence in early 2021, including replacement and improvement of fencing around all registered ACH sites.
- Review and revision of various Environmental Management Plans.
- Seeking approval to relevant approval modifications or amendments.
- Continued community liaison and engagement with local stakeholders.

Appendix A – *Flora Species List*

Scientifc Name	Common Name	Native/Exotic	S12	S12 rep	S13	S13 rep	S14	S14 rep	S15	S15 rep	S16	S16 rep	S17	S17 rep	S18	S18 rep	S19 rep
Acacia burrowii	Burrow's wattle	Native					x				x		x	x	x	x	x
Acacia cheelii	Motherumbah	Native					x										
Acacia deanei	Green wattle, Dean's wattle	Native		x				x		x	x	x					x
Acacia gladiformis	Sword wattle	Native										x					
Acacia ixiophylla	Sticky leaved wattle	Native						x									
Acacia leiocalyx	Lamb's Tail Wattle	Native					x							x	x	x	x
Acacia oswaldii	Umbrella wattle	Native			x												
Acacia penninervis	Mountain hickory	Native									x	x					
Acacia sp.		Native															x
Allocasuarina diminuta	Broombush Sheoak	Native					x					x					
Allocasuarina luehmannii	Bulloak	Native								x							
Allocasuarina sp.		Native														x	
Alphitonia excelsa	Red Ash	Native						x				x	x	x			x
Alstonia constricta	Quinine Bush, Bitter Bark	Native								x				x			x
Alternanthera denticulata	Lesser Joyweed	Native															x
Anagallis arvensis	Scarlet Pimpernel	Exotic							x	x							
Aristida caput-medusae	Many-headed Wiregrass	Native						x				x	x	x			x
Aristida personata	Purple Wire-grass	Native				x		x	x	x	x	x	x	x	x	x	x
Austrostipa ramosissima	Stout Bamboo Grass	Native		x	x	x					x						
Austrostipa scabra	Speargrass	Native		x	x	x		x			x	x		x			x
Austrostipa verticillata	Slender Bamboo Grass	Native												x			
Bertya opponens	Coolabah Bertya	Native												x			
Boerhavia dominii	Tarvine	Native			x												
Boronia glabra	Sandstone Boronia	Native										x					
Boronia anethifolia	Narrow-leaved Boronia	Native										x					
Bothriochloa decipiens	Red Grass	Native							x	x							
Brachychiton populneus	Kurrajong	Native						x					x				x
Brunonia australis	Blue Pincushion	Native			x												
Brunoniella australis	Blue Trumpet	Native				x		x									x
Bryophyllum delagoense	Mother of millions	Exotic		x	x	x											
Callitris endlicheri	Black Cypress Pine	Native									x	x			x	x	x
Callitris glaucophylla	White Cypress Pine	Native		x		x		x		x	x	x		x			x
Calotis cuneifolia	Purple Burr-daisy	Native									x	x					
Calotis lappulacea	Yellow Burr-daisy	Native				x											
Calytrix tetragona	Common Fringe-myrtle	Native									x	x					
Capparis mitchellii	Native Orange	Native			x												
Carex inversa	Knob Sedge	Native				x				x							x
Carthamus lanatus	Saffron Thistle	Exotic							x								
Cassinia arcuata	Sifton Bush	Native										x			x		x
Cassytha glabella	Slender Devils Twine	Native					x	x									
Casuarina cristata	Belah	Native		x	x												
Centaurea melitensis	Maltese Cockspur	Exotic							x								
Cheilanthes sieberi	Mulga Fern	Native			x			x	x	x	x	x	x	x	x		x
Chloris ventricosa	Plump Windmill Grass	Native															
Chrysocephalum apiculatum	Yellow Buttons	Native							x		x						x

Chrysocephalum semipapposum	Clustered Everlasting, Yellow Buttons	Native									x	x					x
Cirsium vulgare	Spear Thistle	Exotic							x								
Convolvulus graminetinus		Native							x								
Conyza bonariensis	Flaxleaf Fleabane	Exotic															
Corymbia trachyphloia	White / Brown Bloodwood	Native					x				x	x		x	x	x	
Crinum flaccidum	Darling lily	Native		x													
Cyanthillium cinereum	Purple Fleabane	Native															x
Cyclospermum leptophyllus	Slender Celery	Exotic							x								
Cymbopogon refractus	Barbed Wire Grass	Native						x	x	x		x		x			x
Cynodon dactylon	Common Couch	Native								x							
Dampiera sp.		Native													x	x	
Daucas glochidiatus	Native Carrot	Native									x						
Denhamia cunninghamii		Native						x									x
Dianella revoluta	Blue Flax-Lily	Native					x	x									
Dianella revoluta var. revoluta	Blue Flax-Lily	Native									x	x					x
Dichondra repens	Kidney Weed	Native		x	x	x											
Dichondra sp. A		Native								x							
Digitaria breviglumis		Native										x	x		x	x	x
Dodonaea viscosa	Sticky Hop-bush	Native						x				x					x
Dondonaea sp.	Hop-bush	Native													x		
Echium plantagineum	Paterson's Curse	Exotic							x	x							
Einadia hastata	Berry Saltbush, Saloop	Native															x
Einadia nutans subsp. nutans	Climbing Saltbush	Native									x						
Einadia polygonoides		Native			x												
Einadia trigonos	Fishweed	Native		x	x	x			x								
Elymus scaber	Common Wheat Grass	Native															
Enchylaena tomentosa	Ruby Saltbush	Native		x	x	x											x
Enteropogon acicularis		Native		x		x											
Enteropogon sp.		Native			x												
Entolasia stricta	Wiry panic	Native		x		x	x							x		x	
Eragrostis curvula	African Lovegrass	Exotic								x							
Eragrostis elongata	Clustered Lovegrass	Native								x							
Eragrostis lacunaria	Purple Love-grass	Native		x	x	x						x					
Eragrostis brownii	Brown's Lovegrass	Native								x							
Eremophila debilis	Winter Apple	Native		x													
Eremophila mitchellii	Budda	Native			x	x	x					x					
Eucalyptus beyeriana	Beyer's Ironbark	Native														x	x
Eucalyptus chloroclada	Dirty Gum, Red Gum	Native									x	x					
Eucalyptus crebra	Narrow-leaved ironbark	Native					x	x									x
Eucalyptus dwyeri	Dwyer's Red Gum	Native					x				x	x		x	x		x
Eucalyptus fibrosa	Red Ironbark, Broad-leaved ironbark	Native					x	x				x	x	x	x		
Eucalyptus microcarpa	Grey Box, Inland Box	Native		x	x	x	x			x							
Eucalyptus sp.		Native								x							
Eucalyptus viridus	Green Mallee	Native															x
Euphorbia drummondii	Caustic weed	Native								x		x					x
Exocarpos cupressiformis	Cherry Ballart	Native															x
Gahnia aspera	Rough Saw-sedge	Native						x			x	x					x
Geijera parviflora	Wilga	Native		x	x	x	x			x							x
Glandularia aristigera	Mayne's Pest	Exotic		x					x	x							
Glycine clandestina	Twining Glycine	Native		x	x	x		x			x						x

Glycine tabacina	Variable Glycine	Native		x		x		x		x	x			x			
Gonocarpus elatus		Native													x	x	
Goodenia glabra	Shiny pansy	Native									x						
Goodenia rotundifolia		Native					x	x				x	x	x	x	x	x
Grevillea floribunda	Seven Dwarfs Grevillea	Native										x					
Haloragis sp.		Native									x						
Harmogia densifolia		Native					x										
Hedypnois rhagadioloides	Cretanweed	Exotic							x	x							
Hibbertia sp.		Native					x	x									
Homoranthus flavescens		Native									x	x	x				x
Hypochaeris glabra	Smooth Catsear	Exotic									x						
Hypochaeris radicata	Catsear	Exotic								x							
Hypochaeris sp.		Exotic							x								
Indigofera adesmiifolia	Tick Indigo	Native						x									x
Indigofera australis	Australian Indigo	Native															x
Jasminum suavissimum		Native		x													
Juncus sp.		Native								x							
Korthasella rubra subsp. geijericola		Native			x												
Lepidium africanum	Common Peppercress	Exotic															
Lepidosperma laterale	Variable Sword-sedge	Native					x				x	x		x			
Leptospermum polygafolium	Tantoon	Native															x
Lolium sp.	Ryegrass	Exotic							x								
Lomandra confertifolia	Mat-rush	Native		x													
Lomandra multiflora	Many-flowered Mat-rush	Native						x			x	x		x			x
Lomandra sp.	Mat-rush	Native					x										
Lycium ferocissimum	African Boxthorn	Exotic		x	x					x							
Macrozamia glaucophylla		Native									x						
Maireana enchylaenoides	Wingless Bluebush	Native		x	x	x											
Maireana microphylla	Small-leaf Bluebush	Native		x	x	x											
Marsdenia viridiflora	Native Pear	Native			x	x						x		x	x		x
Medicago minima	Woolly Burr Medic	Exotic							x								
Melaleuca uncinata	Broombush	Native						x									
Melichrus erubescens	Ruby Urn Heath	Native					x									x	
Melichrus urceolatus	Urn Heath	Native									x	x					
Microlaena stipoides	Weeping Grass	Native									x	x	x				x
Nyssanthes erecta		Native		x													
Olea sp.	Olive	Exotic		x													
Olearia sp.		Native										x					
Opercularia sp.		Native															x
Opuntia stricta	Common Prickly Pear	Exotic		x	x	x			x								
Oxalis perennans		Native						x									
Oxalis sp.		Exotic		x	x				x		x	x	x				x
Panicum effusum	Hairy Panic	Native										x					x
Panicum maximus	Green Panic	Exotic							x								
Panicum sp.		Native						x									
Parsonsia eucalyptophylla	Gargaloo	Native			x	x											
Paspalidium gracile	Slender Panic	Native		x	x						x	x	x				x
Patersonia sp.		Native															x
Persoonia sericea	Silky Geebung	Native									x					x	
Petrorhagia nanteuilii	Childling Pink	Exotic							x	x							

Phebalium squamulosum	Scaly Phebalium	Native					x	x			x	x	x	x	x	x	x
Philotheca ciliata		Native					x	x			x	x	x	x	x	x	x
Phyllanthus virgatus		Native		x	x			x	x			x					x
Pittosporum angustifolium	Weeping Pittosporum	Native			x												
Plantago debilis	Shade Plantain	Native															
Pomax umbellata	Pomax	Native									x	x				x	x
Portulaca oleracea	Pigweed	Native			x												
Portulaca pilosa	Akulikuli	Exotic		x													
Rostellularia adscendens		Native			x												
Rumex sp.		Native							x								
Rytidosperma sp.		Native		x	x	x											
Schkuhria pinnata var. abrotanoides	Curious Weed	Exotic								x							
Schoenus ericetorum	Heath Bog-rush	Native					x								x		
Sclerolaena birchii	Galvinized Burr	Native		x	x												
Sclerolaena muricata var. villosa	Black Rolypoly	Native			x												
Senna artemisioides	Silver Cassia	Native									x						
Sida corrugata	Corrugated Sida	Native			x	x		x									
Sida cunninghamii	Ridged Sida	Native		x										x			
Sida hackettiana	Spiked Sida	Native							x								
Sida rhombifolia	Paddy's Lucerne	Exotic															
Sida sp.		Native								x							x
Sida spinosa	Arrowleaf sida	Exotic												x			x
Silene gallica	French Catchfly	Exotic								x							
Solanum ferocissimum	Spiny Potato Bush	Native						x			x		x				x
Solanum parvifolium		Native		x	x	x											x
Solanum jucundum		Native									x						x
Sonchus oleraceus	Common Sowthistle	Exotic							x								
Sporobolus creber	Western Rat-tail Grass	Native								x							
Taraxacum officinale	Dandelion	Native								x							
Teucreum puberula	Red Berry Stick Plant	Native		x													
Teucrium puberulum	Red Berry Stick Plant	Native						x									
Themeda avenaceus	Native Oatgrass	Native									x						
Thyridolepis mitchelliana		Native						x			x	x	x	x			x
Trifolium campestre	Hop Clover	Exotic							x								
Tylophora linearis		Native			x												x
Vittadinia cuneata	Fuzzweed	Native								x	x						
Vulpia sp.		Exotic								x							
Wahlenbergia communis	Tufted Bluebell	Native															
Wahlenbergia sp.		Native								x							
Walwhalleya proluta	Rigid Panic	Native											x				
Xanthorrhoea sp.		Native									x						
Xerochrysum bracteatum	Golden Everlasting	Native															

Appendix B – *Photo Monitoring Points*

Appendix B Vegetation plot photo monitoring points

Figure B-1: Mine BOA site 12 Rep 2020

Figure B-2: Mine BOA site 13 2020

Figure B-3: Mine BOA site 13 rep 2020

Figure B-4: Mine BOA site 14 2020

Figure B-5: Mine BOA site 14 rep 2020

Figure B-6: Mine BOA site 15 2020

Figure B-7: Mine BOA site 15 rep 2020

Figure B-8: Mine BOA site 16 2020

Figure B-9: Mine BOA site 16 rep 2020

Figure B-10: Mine BOA site 17 2020

Figure B-11: Mine BOA site 17 rep 2020

Figure B-12: Mine BOA site 18 2020

Figure B-13: Mine BOA site 18 rep 2020

Figure B-14: Mine BOA site 19 2020

Figure B-15: Mine BOA site 19 rep 2020

Appendix C – *Fauna Species List*

Scientific name	Common name	Status	S12	S13	S14	S15	S16	S17	S18	S19	TB3
Amphibians											
Crinia signifera	Common Eastern Froglet			~20		~20			~20	~20	
Litoria latopalmata	Broad Palmed Rocket Frog			~20		~20			~20		
Litoria peronii	Perons Tree Frog		~20	~20		~20	~20	~20	~20	~20	
Platyplectrum ornatum	Ornate burrowing frog						2				
Diurnal Birds											
Acanthagenys rufogularis	Spiny-cheeked Honeyeater							1			1
Acanthiza apicalis	Inland Thornbill										
Acanthiza chrysorrhoa	Yellow-rumped thornbill										
Acanthiza nana	Yellow Thornbill										
Acanthiza pusilla	Brown thornbill										
Anas superciliosa	Pacific Black duck										
Cacatua galerita	Sulphur-crested Cockatoo										
Cacomantis pallidus	Pallid Cuckoo										
Chenonetta jubata	Australian wood duck										
Cincloramphus mathewsi	Rufous songlark							1	1		
Climacteris picumnus	Brown Treecreeper	Vulnerable population (BC Act)						1			
Colluricincla harmonica	Grey Shrike-thrush		1		1	1	2	1	1	2	2
Coracina novaehollandiae	Black-faced Cuckoo-shrike					1	1				
Corcorax melanoramphos	White-winged Chough		8	6		5	1	4		4	1
Cormobates leucophaea	White-throated treecreeper				1	1	1	1	1	2	
Corvus coronoides	Australian Raven		4	1	1	2	1	1	2	1	
Coturnix ypsilophora	Brown Quail				3	1					
Cracticus nigrogularis	Pied Butcherbird		1	1		1					
Cracticus tibicen	Australian Magpie		3	5	1		1	1	1	3	
Cracticus torquatus	Grey butcherbird		2	2						2	
Dacelo novaeguineae	Laughing Kookaburra		1		1	2	1			3	
Dromaius novaehollandiae	Emu					1					
Entomyzon cyanotis	Blue-faced Honeyeater			1			1				
Eolophus roseicapillus	Galah		4	6	3	2	2	2		3	1
Eopsaltria australis	Eastern yellow robin		1		1	1		1	1		2
Geopelia humeralis	Bar-shouldered dove								1	1	
Geopelia striata	Peaceful dove		1	1		1	2	1		2	
Gerygone albogularis	White-throated gerygone						1	2			
Gerygone fusca	Western gerygone							1			
Grallina cyanoleuca	Magpie-lark		1	3		2	1		1	1	1
Haliastur sphernurus	Whistling kite				1	2					
Hirundo neoxena	Welcome Swallow		1								
Lalage sueurii	White-winged Triller		4								

Lichenostomus chrysops	Yellow-faced honeyeater							1			
Lichenostomus virescens	Singing Honeyeater							1			
Malurus cyaneus	Superb Fairy-wren		3			2			5	3	3
Manorina melanocephala	Noisy Miner		10	5	4	2	4	1	1		4
Merops ornatus	Rainbow bee-eater					2	2	1			
Myiagra cyanoleuca	Satin Flycatcher				1						
Northiella haematogaster	Blue bonnet					1					
Nymphicus hollandicus	Cockatiel		2	2							
Ocyphaps lophotes	Crested pigeon		6	10		4				1	1
Oriolus sagittatus	Olive-backed oriole					1	1		1	1	
Pachycephala pectoralis	Golden whistler		1		1	1	1		1		1
Pachycephala rufiventris	Rufous Whistler		2		1	2	1	2	4	1	1
Pardalotus striatus	Striated Pardalote								1		
Petrochelidon ariel	Fairy martin					20					
Phaps chalcoptera	Common bronzewing		1		1	1	1		1	1	
Philemon corniculatus	Noisy friarbird				2	3	3	2	2	1	2
Platycercus eximius	Eastern Rosella		2								
Pomatostomus temporalis	Grey-crowned babbler	Vulnerable population (BC Act)	1	4		5	1				
Psephotus haematonotus	Red-rumped parrot					5					
Ptilotula fusca	Fuscous Honeyeater				1						
Rhipidura albiscapa	Grey Fantail		10		1	2	8	4	4	1	4
Rhipidura leucophrys	Willie wagtail		2		1	1	1	2		4	1
Scythrops novaehollandiae	Channel-billed cuckoo		1			1					
Smicrornis brevirostris	Weebill							1			
Strepera graculina	Pied Currawong				1	1	1		1		
Struthidea cinerea	Apostlebird		16	5		6				4	
Taeniopygia bichenovii	Double-barred finch							1			
Todiramphus sanctus	Sacred kingfisher									1	
Nocturnal Birds											
Australian Owlet-nightjar	Aegotheles cristatus				1			1			
Podargus strigoides	*Tawny Frogmouth*			1	1	1	1				
Mammals											
Felis catus	Cat	*	1								
Macropus giganteus	Eastern Grey Kangaroo							1	2		
Mus musculus	House mouse	*	2	2	1			1			
Rattus sp.	Rat sp.	*			1	1		1			
Sminthopsis murina	Common Dunnart						1			1	
Vulpes vulpes	Fox	*				1	1				
Wallabia bicolor	Swamp Wallaby								1		
Reptiles											

Anilios sp.	Blind snake									1	
Christinus marmoratus	Marble Gecko				1		2		1	1	
Egernia striolata	Tree-crevice skink				1			1			

Appendix D – *Surface Water Monitoring*

Sample Location	Date	pH	Electrical Conductivity (µS/cm)	Total Suspended Solids (mg/L)	Grease & Oil (mg/L)	Total Organic Carbon (TOC)	Comments
A1	22 January 2020	9.1	9760	39	<5	----	
A2	22 January 2020	9	9200	119	<5	----	
A3	22 January 2020	8.9	8490	108	<5	----	
B1	22 January 2020	8.4	1010	44	<5	4	
B2	22 January 2020	9.4	45200	19	5	----	
C	22 January 2020	9.5	48200	1050	<5	----	
D	22 January 2020	8.3	905	50	<5	5	
SB3	29 January 2020	9.6	3220	410	<5	25	
SB4	29 January 2020	9.8	3020	291	<5	14	
SD6	29 January 2020	8.4	411	768	<5	9	
LW103 PONDING	29 January 2020	7.82	387	718	8	21	
LW102 NORTH	29 January 2020	7.62	252	1420	<5	12	
LW104 NORTH	29 January 2020	7.33	186	161	<5	28	
LW102 SOUTH	29 January 2020	7.79	293	56	<5	12	
LW101	29 January 2020	7.53	260	326	<5	15	
SB1	30 Janurary 2020	9.5	6700	78	5	----	
SB2	30 Janurary 2020	9.9	7500	18	<5	----	
SD1	30 Janurary 2020	8.3	723	162	6	25	
SD2	30 Janurary 2020	7.5	164	524	8	9	
SD3	30 Janurary 2020	8.2	528	25	5	16	
SD4	30 Janurary 2020	7.7	705	58	<5	6	
SD5	30 Janurary 2020	7.2	125	36	<5	9	
LW101 PONDING	30 Janurary 2020	7.5	240	116	<5	9	
LW102 NORTH	30 Janurary 2020	7.6	345	1500	<5	10	
LW102 SOUTH	30 Janurary 2020	7.3	242	100	<5	8	
LW103 PONDING	30 Janurary 2020	8.2	400	537	<5	8	
LW104 NORTH	30 Janurary 2020	7	190	90	<5	23	
LW105 NORTH	30 Janurary 2020	7	235	58	<5	44	
LW105 SOUTH	30 Janurary 2020	6.9	144	155	<5	19	
LW106 NORTH	30 Janurary 2020	7.3	320	35	<5	12	
A1	20 February 2020	9.2	9150	7	<5	8	
A2	20 February 2020	9.1	7580	85	<5	24	
A3	20 February 2020	9	7650	71	<5	33	
B1	20 February 2020	8.6	1030	<5	<5	2	
B2	20 February 2020	9.5	41400	44	<5	<50	
C	20 February 2020	9.7	49200	386	<5	<50	
D	20 February 2020	8.5	714	74	<5	7	
SB3	24 February 2020	9.2	2330	164	<5	13	
SB4	24 February 2020	9.6	2640	31	<5	14	
SD6	24 February 2020	8.1	349	684	<5	4	
SB1	25 February 2020	9.2	7700	156	<5	24	
SB2	25 February 2020	9.7	5050	18	<5	36	
SD1	25 February 2020	6.9	283	23	<5	23	
SD2	25 February 2020	7.5	135	30	<5	6	

Sample Location	Date	pH	Electrical Conductivity (µS/cm)	Total Suspended Solids (mg/L)	Grease & Oil (mg/L)	Total Organic Carbon (TOC)	Comments
SD3	25 February 2020	7.7	460	33	6	<1	
SD4	25 February 2020	8.2	605	18	<5	13	
SD5	25 February 2020	7.4	235	36	<5	8	
LW101 PONDING	25 February 2020	7.5	210	11	<5	7	
LW102 NORTH	25 February 2020	7.9	470	44	<5	12	
LW102 SOUTH	25 February 2020	7.3	230	35	<5	6	
LW103 PONDING	25 February 2020	8.7	705	165	<5	13	
LW104 NORTH	25 February 2020	8.2	188	94	<5	18	
LW105 NORTH	25 February 2020	7.4	210	64	<5	20	
LW105 SOUTH	25 February 2020	7.1	138	50	<5	19	
A1	19 March 2020	9.5	8650	13	<5	18	
A2	19 March 2020	9.4	7880	9	<5	14	
A3	19 March 2020	9.2	8260	77	<5	22	
B1	19 March 2020	8.3	665	<5	<5	4	
B2	19 March 2020	9.8	45200	20	6	----	
C	19 March 2020	9.9	49700	324	<5	----	
D	19 March 2020	9.1	486	52	<5	<1	
SB1	24 March 2020	9.5	8300	106	15	<1	
SB2	24 March 2020	9.8	5420	26	<5	30	
SB3	24 March 2020	9.6	5400	34	<5	<1	
SB4	24 March 2020	9.8	3150	22	<5	16	
SD3	24 March 2020	8.5	720	120	<5	16	
SD4	24 March 2020	8.8	678	360	<5	7	
SD6	25 March 2020	8.2	375	62	<5	4	
LW103 PONDING	25 March 2020	8.6	635	206	<5	2	
LW104 NORTH	25 March 2020	7.3	280	31	<5	27	
LW105 NORTH	25 March 2020	7.2	230	35	<5	20	
LW106 NORTH	25 March 2020	7.1	155	12	<5	13	
SD1	25 March 2020	7.8	390	8	<5	27	
SD2	25 March 2020	7.7	190	25	<5	6	
SD5	25 March 2020	7.6	380	35	<5	16	
LW101 PONDING	25 March 2020	8.2	282	66	<5	8	
LW102 NORTH	25 March 2020	7.7	450	83	<5	15	
LW102 SOUTH	25 March 2020	7.8	280	11	<5	9	
A1	22 April 2020	9.5	7710	74	<5	16	
A2	22 April 2020	9.3	6960	65	<5	17	
A3	22 April 2020	9.4	7090	96	<5	14	
B1	22 April 2020	8.5	540	<5	<5	4	
B2	22 April 2020	9.8	53800	73	6	----	
C	22 April 2020	9.9	38500	220	<5	----	
D	22 April 2020	8.7	470	71	<5	9	
SB1	30 April 2020	9.1	7900	594	154	12	
SB2	29 April 2020	9.8	4700	12	<5	35	
SB3	29 April 2020	9.5	5100	50	<5	21	

Sample Location	Date	pH	Electrical Conductivity (µS/cm)	Total Suspended Solids (mg/L)	Grease & Oil (mg/L)	Total Organic Carbon (TOC)	Comments
SB4	29 April 2020	9.4	3000	18	<5	12	
SD1	29 April 2020	7.9	469	11	<5	16	
SD2	29 April 2020	8.3	191	32	<5	6	
SD3	29 April 2020	8.5	613	35	<5	12	
SD4	29 April 2020	8.4	712	20	<5	8	
SD5	29 April 2020	7.6	182	14	<5	8	
SD6	29 April 2020	8.6	408	44	<5	4	
A1	26 May 2020	9.3	7780	43	<5	<1	
A2	26 May 2020	9.2	7310	34	<5	1	
A3	26 May 2020	9.1	7470	134	<5	6	
B1	26 May 2020	8.1	573	9	<5	4	
B2	26 May 2020	9.6	54200	48	<5	3880	
C	26 May 2020	9.7	48300	111	<5	4170	
D	26 May 2020	9.2	1010	36	<5	3	
SB1	24 June 2020	9.3	5440	779	168	120	
SB2	24 June 2020	9.6	4290	21	<5	31	
SB3	24 June 2020	9.2	6270	96	<5	10	
SB4	24 June 2020	9.8	2990	16	<5	13	
SD1	24 June 2020	8.2	420	5	<5	13	
SD2	24 June 2020	8.3	198	15	<5	8	
SD3	24 June 2020	8.5	606	37	<5	13	
SD4	24 June 2020	8.7	740	72	<5	10	
SD5	24 June 2020	8.5	196	17	<5	9	
SD6	24 June 2020	8.9	454	28	<5	5	
A1	23 July 2020	9.4	7760	18	<5	84	
A2	23 July 2020	9.2	7180	26	7	31	
A3	23 July 2020	9.3	7140	85	<5	26	
B1	23 July 2020	7.8	651	<5	<5	<1	
B2	23 July 2020	9.7	42600	38	5	823	
C	23 July 2020	9.8	32500	83	11	59	
D	23 July 2020	8.7	774	6	7	4	
A1	18 August 2020	9.1	7130	19	<5	12	
A2	18 August 2020	8.9	6810	28	<5	6	
A3	18 August 2020	8.8	6800	61	25	13	
B1	18 August 2020	7.5	592	<5	<5	3	
B2	18 August 2020	9.7	52900	36	<5	1150	
C	18 August 2020	9.7	37400	32	<5	495	
D	18 August 2020	9.1	673	40	<5	<1	
SB1	27 August 2020	8.9	7530	120	13	84	
SB2	27 August 2020	9.7	4210	12	<5	47	
SB3	27 August 2020	9.5	5070	254	<5	16	
SB4	27 August 2020	9.6	3670	22	<5	38	
SD1	27 August 2020	8.5	448	<5	<5	15	
SD2	27 August 2020	8.8	224	13	<5	7	

Sample Location	Date	pH	Electrical Conductivity (µS/cm)	Total Suspended Solids (mg/L)	Grease & Oil (mg/L)	Total Organic Carbon (TOC)	Comments
SD3	27 August 2020	8.7	637	12	<5	15	
SD4	27 August 2020	9.1	845	7	<5	9	
SD5	27 August 2020	8.2	200	8	<5	7	
SD6	27 August 2020	8.7	499	25	<5	6	
A1	22 September 2020	9.2	7820	36	<5	9	
A2	22 September 2020	9.1	8150	26	5	7	
A3	22 September 2020	9	8650	50	5	101	
B1	22 September 2020	7.9	564	9	<5	4	
B2	22 September 2020	9.7	43000	60	<5	4270	
C	22 September 2020	9.6	35000	31	<5	3560	
D	22 September 2020	8.1	573	14	<5	9	
SB1	23 September 2020	9.1	8030	293	19	<1	
SB2	23 September 2020	9.5	4460	13	<5	22	
SB3	23 September 2020	9.4	7190	96	<5	27	
SB4	23 September 2020	9.6	4090	25	<5	<1	
SD1	23 September 2020	9	470	20	<5	9	
SD2	23 September 2020	8.7	284	30	<5	6	
SD3	23 September 2020	8.6	707	56	<5	8	
SD4	23 September 2020	9.7	983	122	<5	4	
SD5	23 September 2020	8.6	228	11	<5	6	
SD6	23 September 2020	9.1	593	110	<5	6	
A1	27 October 2020	9.2	8080	14	<5	18	
A2	27 October 2020	9.2	8410	16	<5	<1	
A3	27 October 2020	9.1	9030	123	<5	12	
B1	27 October 2020	7.7	565	<5	<5	4	
B2	27 October 2020	9.6	47000	19	<5	-	
C	27 October 2020	9.6	38500	38	<5	-	
D	27 October 2020	8.5	590	81	<5	11	
SB1	28 October 2020	9	6900	220	11	4	
SB2	28 October 2020	9.5	4600	10	<5	33	
SB3	28 October 2020	9.6	7350	98	<5	61	
SB4	28 October 2020	9.6	4400	9	<5	12	
SD1	28 October 2020	8.9	541	<5	<5	7	
SD2	28 October 2020	8.7	290	<5	<5	6	
SD3	28 October 2020	8.8	770	19	<5	7	
SD4	28 October 2020	9.3	1060	26	<5	9	
SD5	28 October 2020	8.2	270	11	<5	5	
SD6	28 October 2020	9.1	605	13	<5	2	
A1	19 November 2020	9.3	8070	22	<5	8	
A2	19 November 2020	9.2	7720	31	<5	<1	
A3	19 November 2020	9.1	7740	116	<5	44	
B1	19 November 2020	8.5	601	22	<5	5	
B2	19 November 2020	9.8	51400	41	<5	<1	
C	19 November 2020	9.7	42600	44	<5	1120	

Sample Location	Date	pH	Electrical Conductivity (µS/cm)	Total Suspended Solids (mg/L)	Grease & Oil (mg/L)	Total Organic Carbon (TOC)	Comments
D	19 November 2020	8.5	616	39	<5	5	
SB1	25 November 2020	9.4	6870	561	<5	82	
SB2	25 November 2020	9.8	5040	16	<5	42	
SB3	25 November 2020	9.9	13300	1050	<5	51	
SB4	25 November 2020	9.9	5090	15	<5	18	
SD1	25 November 2020	8.9	550	47	<5	19	
SD2	25 November 2020	9.3	331	27	<5	9	
SD3	25 November 2020	9.1	885	30	<5	19	
SD4	25 November 2020	9.9	1350	20	<5	12	
SD5	25 November 2020	8.5	325	16	<5	9	
SD6	25 November 2020	9.8	716	26	<5	10	
A1	15 December 2020	9.5	7610	85	<5	19	
A2	15 December 2020	9.4	7420	10	<5	59	
A3	15 December 2020	9.3	6810	184	<5	16	
B1	15 December 2020	8.8	636	6	<5	4	
B2	15 December 2020	9.9	48500	58	<5	98	
C	15 December 2020	9.9	48800	32	<5	112	
D	15 December 2020	9.7	935	84	<5	2	
SB1	21 December 2020	9.0	7570	2540	7	<1	
SB2	21 December 2020	9.3	5070	16	<5	21	
SB3	21 December 2020	8.4	4230	79	<5	8	
SB4	21 December 2020	9.5	4510	9	<5	10	
SD1	21 December 2020	8.7	638	14	<5	12	
SD2	21 December 2020	8.5	334	24	<5	3	
SD3	21 December 2020	8.8	819	29	<5	16	
SD4	21 December 2020	9.1	1300	153	<5	7	
SD5	21 December 2020	8.3	259	17	<5	6	
SD6	21 December 2020	9.1	650	21	<5	3	

Appendix E – *Groundwater Monitoring*

Appendix E - Groundwater Monitoring Results

Site ID	Piezometer / Water Bore	Date	Time	Depth to Water - mbgl	Depth to Stand mbtoc	Field Parameters			Total Metals														Mercury (Hg) - mg/L	pH Lab	EC - Lab - µs/cm	Major Cations					Total Cations - meq/L	Major Anions						Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N - mg/L	Nitrate as N - mg/L	NOX as N - mg/L	Total Dissolved Solids
						pH - Field	EC - Field - µs/cm	Temp - Field - °C	Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Barium (Ba) - mg/L	Beryllium (Be) - mg/L	Cadmium (mg/L)	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Iron (Fe) - mg/L	Lead (Pb) - mg/L	Manganese (Mn) - mg/L	Nickel (Ni) - mg/L	Vanadium (V) - mg/L	Zinc (Zn) - mg/L				Calcium (Ca) - mg/L	Magnesium (Mg) - mg/L	Sodium (Na) - mg/L	Potassium (K) - mg/L		Chloride (Cl) - mg/L	Sulfate (SO4) - mg/L	Hydroxide Alkalinity as CaCO3 - mg/L	Carbonate Alkalinity as CaCO3 - mg/L	Bicarbonate Alkalinity as CaCO3 - mg/L	Alkalinity - mg/L							
ANZECC Guideline - stock drinking water									*5*	*0.5*			*0.01*	*1*	*1*	*1*		*0.1*		*1*		*20*	*0.002*			*1000*						*1000*									*1500*	*400*		*4000*
P1	NG1	30-Jan-20	1320	21.43	22.41	7.6	3080	24.6																																			
		27-Feb-20	1255	21.07	22.05	7.6	3410	22.7																																			
Depth	50	27-Mar-20	1145	21.21	22.19	7.6	3540	21.6																																			
Format.	Garrawilla	28-Apr-20	1025	21.41	22.39	7.5	3830	21.6																																			
		29-May-20	1035	21.59	22.57	7.6	3870	21.3																																			
		30-Jun-20	1045	21.75	22.73	7.6	3970	20.8																																			
		24-Jul-20	1100	21.92	22.9	7.7	3910	19.5																																			
		27-Aug-20	1100	21.99	22.97	7.6	3980	19.4																																			
		18-Sep-20	1350	22.20	23.18	7.34	3829	19.4	0.17	0.002	0.53	<0.001	<0.0001	<0.001	<0.001	0.004	0.25	0.004	0.095	0.002	<0.01	<0.01	<0.0001	8.16	3860	25	24	791	22	38.2	761	31	<1	<1	1170	1170	45.5	8.72	0.38	0.03	0.66	0.69	2300
		28-Oct-20	920	22.40	23.38	7.5	4140	19.1																																			
		27-Nov-20	1000	22.34	23.32	7.5	4160	19.9																																			
		21-Dec-20	1215	22.42	23.4	7.5	4210	19.6																																			
P2	NG2	29-Jan-20	1320	28.69	29.6	6.9	19950	23																																			
		25-Feb-20	1445	28.65	29.56	6.9	20150	22.6																																			
Depth	50	24-Mar-20	1415	28.59	29.5	6.9	19870	21.9																																			
Format.	Napperby	24-Apr-20	1225	28.60	29.51	6.9	20500	21.9																																			
		28-May-20	1315	28.61	29.52	6.9	21800	21.3																																			
		30-Jun-20	1250	28.64	29.55	6.8	21900	21.4																																			
		22-Jul-20	1250	28.67	29.58	6.8	21700	21.2																																			
		26-Aug-20	1310	28.63	29.54	6.7	21700	19.3																																			
		18-Sep-20	1021	27.75	28.66	6.45	20220	18.2	0.41	0.001	0.318	<0.001	0.0004	<0.001	0.012	0.004	0.31	<0.001	1.27	0.016	<0.01	0.005	<0.0001	7.65	17600	175	435	4260	88	232	5900	343	<1	<1	2850	2850	230	0.34	4.28	<0.01	0.04	0.04	13100
		23-Oct-20	1305	28.60	29.51	6.5	22400	20.1																																			
		26-Nov-20	1240	28.59	29.5	6.5	22500	20.4																																			
		21-Dec-20	1150	28.57	29.48	6.6	22000	19.8																																			
P3	NG3	30-Jan-20	1030	9.91	10.84	6.8	16230	22.1																																			
		27-Feb-20	850	9.91	10.84	6.7	17180	21.7																																			
Depth	45	27-Mar-20	1040	9.95	10.88	6.8	17420	21.7																																			
Format.	Pamboola	28-Apr-20	935	9.98	10.91	6.7	18190	21.8																																			
		29-May-20	950	10.01	10.94	6.6	18430	21.1																																			
		30-Jun-20	950	10.01	10.94	6.6	18800	20																																			
		24-Jul-20	1005	10.02	10.95	6.6	18100	19.8																																			
		27-Aug-20	1215	10.03	10.96	6.6	18520	18.6																																			
		23-Sep-20	1400	10.02	10.95	6.42	18101	17	1.5	0.002	0.16	<0.001	0.001	0.003	0.006	0.014	2.23	0.006	0.096	0.008	<0.01	0.048	<0.0001	7.53	18900	296	476	3190	42	194	5250	985	<1	<1	1430	1430	197	0.87	0.58	<0.01	0.01	0.01	12000
		29-Oct-20	1000	9.98	10.91	6.7	19500	20.4																																			
		27-Nov-20	930	10.00	10.93	6.6	19390	20.2																																			
		23-Dec-20	935	9.91	10.84	6.7	19100	20.1																																			
P4	NG4	29-Jan-20	1205	17.05	17.93	6.8	26620	23.2																																			
		27-Feb-20	1100	16.98	17.86	6.7	26040	23																																			
Depth	30	24-Mar-20	1305	17.00	17.88	6.8	24960	22.8																																			
Format.	Napperby	24-Apr-20	1050	17.00	17.88	6.7	24800	22.5																																			
		28-May-20	1200	16.99	17.87	6.6	25200	22.6																																			
		30-Jun-20	1120	16.96	17.84	6.6	26100	21.8																																			
		22-Jul-20	1140	17.00	17.88	6.5	26000	19.6																																			
		27-Aug-20	1200	16.93	17.81	6.5	28200	19.4																																			
		18-Sep-20	911	16.97	17.85	6.34	25664	18.3	0.61	0.003	0.159	<0.001	0.0002	0.002	0.014	0.008	2.22	0.004	1.4	0.012	<0.01	0.02	<0.0001	7.59	21100	258	760	6170	112	347	7630	1900	<1	<1	2560	2560	306	6.24	1.55	<0.01	0.05	0.05	18300
		23-Oct-20	1140	17.91	18.79	6.5	28500	19.9																																			
		26-Nov-20	1110	16.88	17.76	6.5	28300	20.7																																			
		23-Dec-20	1310	16.91	17.79	6.6	28500	20.8																																			
P5	NG5	29-Jan-20	945	23.03	23.97	6.7	25860	22.9																																			
		27-Feb-20	1030	22.73	23.67	6.8	24720	23.2																																			
Depth	30	24-Mar-20	1240	22.96	23.9	6.8	24640	22.5																																			
Format.	Pamboola	24-Apr-20	1010	22.95	23.89	6.7	23900	22.7																																			
		28-May-20	935	22.97	23.91	6.5	24400	21.9																																			
		29-Jun-20	925	22.98	23.92	6.6	24900	21.1																																			
		22-Jul-20	905	23.01	23.95	6.6	25100	19.6																																			
		26-Aug-20	915	23.00	23.94	6.7	25400	18.9																																			
		18-Sep-19	830	22.14	23.08	6.42	26611	17.8	0.42	0.002	0.17	<0.001	0.0002	<0.001	0.011	0.016	0.45	0.003	1.53	0.019	<0.01	0.049	<0.0001	7.76	22000	211	444	4590	70	248	8400	800	<1	<1	2510	2510	304	10	3.66	<0.01	<0.01	<0.01	18400
		22-Oct-20	1115	23.11	24.05	6.6	28400	20.7																																			
		26-Nov-20	910	23.09	24.03	6.5	28500	20.6																																			
		23-Dec-20	1340	23.08	24.02	6.6	28900	20.6																																			
P6	NG6	29-Jan-20	1015			Dry																																				
		25-Feb-20	1345			Dry																																					
Depth	90	24-Mar-20	1030			Dry																																					
Format.	Pilliga Sandstone	28-Apr-20	1100			Dry																																					
		28-May-20	1000			Dry																																					
		29-Jun-20	955			Dry																																					
		22-Jul-20	940			Dry																																					
		26-Aug-20	940			Dry																																					
		23-Sep-20	1000			Dry																																					
		22-Oct-20	910			Dry																																					
		26-Nov-20	935			Dry																																					
		21-Dec-20	910			Dry																																					
P7	NG7	29-Jan-20	1040	63.13	64.07	6.7	310	22.3																																			
		25-Feb-20	1330	63.16	64.1	6.7	285	21.3																																			
Depth	90	24-Mar-20	1100	63.17	64.11	6.3	215	21.2																																			
Format.	Pilliga Sandstone	28-Apr-20	1130	63.16	64.1	6.4	230	21.8																																			
		28-May-20	1030	63.14	64.08	6.4	270	21.7																																			
		29-Jun-20	1025	63.17	64.11	6.4	340	20.1																																			
		23-Jul-20	1010	63.18	64.12	6.5	345	20.2																																			
		26-Aug-20	1215	63.24	64.18	6.3	345	18.6																																			
		22-Oct-20	940	63.08	64.02																																						
		29-Oct-20	1040	63.17	64.11	5.24	127	17.2	0.02	<0.001			<0.0001	0.001	0.002	<0.001	<0.05	<0.001	0.007	0.002		0.005	<0.0001	6.07	114	<1	1	20	3	1.03	24	5	<1	<1	27	27	1.32	----	0.08	<0.01	0.12	0.12	217
		26-Nov-20	1000	63.12	64.06																																						
		21-Dec-20	935	63.10	64.04																																						
P8	NC-110S	29-Jan-20	1135	50.45	51.49	7.2	678	21.6																																			
		25-Feb-20	1240	50.44	51.48	7	729	21.2																																			
Depth	65	24-Mar-20	1210	50.48	51.52	6.9	710	20.8																																			
Format.	Purlawaugh	28-Apr-20	1230	50.47	51.51	7	745	21.1																																			
		28-May-20	1125	50.48	51.52	7	730	21																																			
		29-Jun-20	1125	50.53	51.57	6.9	710	19.9																																			
		22-Jul-20	1110	50.53	51.57	6.9	720	20																																			
		26-Aug-20	1120	50.54	51.58	6.9	745	17.6																																			
		23-Sep-20	1230	50.55	51.59	6.55	749	17.8	10.7	0.016	0.529	<0.001	0.0003	0.011	0.011	0.079	12.7	0.053	0.053	1.14	0.012	0.118	<0.0001	7.64	732	28	8	122	8	7.57	76	7	<1	<1	276	276	7.8	1.54	0.05	<0.01	0.03	0.03	481
		22-Oct-20	1045	50.48	51.52	6.8	745	19.2																																			

		26-Nov-20	1040	50.52	51.56	7	930	18.8																																			
		21-Dec-20	1020	50.49	51.53	7.1	755	18.9																																			
P9	GWB5S	30-Jan-20	1150	26.21	27.02	6.8	20950	23.5																																			
		25-Feb-20	1030	26.22	27.03	6.8	20880	22.5																																			
Depth	30	26-Mar-20	1040	26.21	27.02	6.9	20750	21.9																																			
Format.	Purlawaugh	28-Apr-20	1255	26.24	27.05	6.8	21800	21.6																																			
		26-May-20	1330	26.23	27.04	6.7	22100	21.5																																			
		25-Jun-20	1035	26.16	26.97	6.8	22900	21.2																																			
		23-Jul-20	1005	26.10	26.91	6.7	21600	19.8																																			
		28-Aug-20	1130	26.28	27.09	6.7	22300	19.4																																			
		23-Sep-20	1200	26.31	27.12	6.61	21509	18.8	0.22	<0.001	0.027	<0.001	<0.0001	0.002	<0.001	0.01	5.9	0.005	0.124	0.001	<0.01	0.023	<0.0001	7.57	22100	336	471	3870	49	225	6290	1720	<1	<1	694	694	227	0.44	1.6	<0.01	0.18	0.18	14500
		28-Oct-20	950	26.28	27.09	6.7	23700	19.9																																			
		27-Nov-20	1120	26.32	27.13	6.6	23500	20.9																																			
		23-Dec-20	1045	26.32	27.13	6.7	22800	20.2																																			
P10	NC-030D	29-Jan-20	1235	22.50	23.48	7.5	9760	22.2																																			
		25-Feb-20	1415	22.64	23.62	7.5	9650	21.8																																			
Depth	130	24-Mar-20	1335	22.53	23.51	7.4	9420	21.6																																			
Format.	Napperby	24-Apr-20	1135	22.34	23.32	7.2	9270	21.5																																			
		28-May-20	1235	22.51	23.49	7.3	9310	21.3																																			
		29-Jun-20	1210	22.31	23.29	7.2	10190	20.7																																			
		22-Jul-20	1210	22.60	23.58	7.1	9450	19.3																																			
		26-Aug-20	1215	22.80	23.78	7	9670	18.9																																			
		22-Oct-20	1215	22.75	23.73																																						
		29-Oct-20	1220	21.57	22.55	7.03	15841	18.3	<0.01	0.003			<0.0001	0.02	<0.001	<0.001	4.52	<0.001	1.03	0.016		<0.005	<0.0001	7.61	17300	296	288	2410	39	144	5040	839	<1	<1	914	914	178	10.4	0.55	<0.01	0.01	0.01	10200
		26-Nov-20	1150	20.71	21.69																																						
		21-Dec-20	1110	20.72	21.7																																						
P11	NC-030S	29-Jan-20	1255	28.63	29.62	7.3	6210	22.4																																			
		25-Feb-20	1430	28.91	29.9	7.4	6280	21.9																																			
Depth	50	24-Mar-20	1355	28.90	29.89	7.4	6130	21.5																																			
Format.	Purlawaugh	24-Apr-20	1200	28.88	29.87	7.2	5930	21.3																																			
		28-May-20	1250	29.16	30.15	7.4	6020	21.2																																			
		29-Jun-20	1225	29.49	30.48	7.3	6110	21																																			
		22-Jul-20	1230	29.57	30.56	7.3	6030	19.9																																			
		26-Aug-20	1240	29.51	30.5	7.2	6150	18.7																																			
		18-Sep-20	1430	28.74	29.73	6.79	7553	18	<0.01	0.005	0.571	<0.001	<0.0001	0.02	0.002	0.006	9.16	0.147	0.005	<0.01	<0.01	0.025	<0.0001	7.64	7010	265	115	1070	7		2690	<1	<1	<1	280	280			0.12	<0.01	<0.01		**4720**
		22-Oct-20	1240	30.25	31.24	7.4	6370	19.9																																			
		26-Nov-20	1215	30.58	31.57	7.4	6380	20.3																																			
		21-Dec-20	1130	30.80	31.79	7.3	6070	19.5																																			
P12	NC-098D	30-Jan-20	1055	45.17	45.98	7.8	3260	22.8																																			
		25-Feb-20	930	45.15	45.96	7.7	3220	22.5																																			
Depth	90	26-Mar-20	955	45.20	46.01	7.7	3130	21.7																																			
Format.	Napperby	30-Apr-20	910	45.12	45.93	7.7	3050	21.2																																			
		28-May-20	1125	45.12	45.93	7.7	3100	21.3																																			
		25-Jun-20	1015	45.15	45.96	7.7	3110	20.8																																			
		23-Jul-20	930	45.11	45.92	7.7	3080	20.6																																			
		28-Aug-20	1100	45.11	45.92	7.7	3110	19.4																																			
		28-Oct-20	1215	45.12	45.93	7.48	3056	18.5	<0.01	0.01			<0.0001	<0.001	0.011	<0.001	0.61	<0.001	0.563	0.043		<0.005	<0.0001	8.19	3300	27	15	686	8	32.6	464	8	<1	<1	1200	1200	37.2	6.59	0.59	<0.01	0.01	0.01	1910
		28-Oct-20	1230	46.84	47.65																																						
		27-Nov-20	1040	45.09	45.90																																						
		23-Dec-20	1010	44.78	45.59																																						
P13	NC-098S	30-Jan-20	1115	14.32	15.19	7.7	2010	23.2																																			
		25-Feb-20	950	14.08	14.95	7.8	2050	21.6																																			
Depth	30	26-Mar-20	930	13.80	14.67	7.8	2040	20.7																																			
Format.	Garrawilla	30-Apr-20	850	13.36	14.23	7.8	1890	20.5																																			
		29-May-20	1150	13.09	13.96	7.8	1850	21.1																																			
		25-Jun-20	1000	12.98	13.85	7.7	1910	19.9																																			
		23-Jul-20	915	12.93	13.8	7.5	1850	19.1																																			
		28-Aug-20	1040	12.92	13.79	7.4	2120	19.3																																			
		24-Sep-20	1300	13.00	13.87	7.28	2061	18.2	0.31	0.001	0.177	<0.001	<0.0001	<0.001	0.002	0.003	0.61	0.004	0.044	0.004	<0.01	0.018	<0.0001	8	2080	55	85	259	7	21.2	360	54	<1	<1	638	638	24	6.28	0.28	<0.01	0.2	0.2	1240
		28-Oct-20	1245	13.08	13.95	7.5	2460	19.2																																			
		27-Nov-20	1025	13.23	14.1	7.4	1900	19.7																																			
		23-Dec-20	955	13.26	14.13	7.5	1840	19.7																																			
P16	NC-119D	29-Jan-20	1105	65.07	65.91	6.8	1780	22.9																																			
		25-Feb-20	1305	67.21	68.05	6.8	1780	22.2																																			
Depth	146	24-Mar-20	1130	68.26	69.1	6.7	2030	21.2																																			
Format.	Garrawilla	28-Apr-20	1155	69.72	70.56	6.7	2100	21.2																																			
		28-May-20	1055	72.69	73.53	6.8	2570	21.7																																			
		29-Jun-20	1050	74.86	75.7	6.8	2590	21.5																																			
		22-Jul-20	1035	75.43	76.27	6.8	2580	20.5																																			
		26-Aug-20	1040	76.40	77.24	6.8	2270	18.9																																			
		22-Oct-20	1000	77.19	78.03																																						
		29-Oct-20	950	77.31	78.15	7.48	4310	17.7	<0.01	<0.001			<0.0001	<0.001	<0.001	<0.001	1.6	<0.001	0.066	0.014		0.005	<0.0001	7.84	4760	78	22	799	25	41.1	1160	<1	<1	<1	674	674	46.2	5.83	17.6	<0.01	0.01	0.01	2510
		26-Nov-20	1015	77.95	78.79																																						
		21-Dec-20	950	77.91	78.75																																						
P17	NC-119S	29-Jan-20	1110	Dry																																								
		25-Jan-20	1310	Dry																																								
Depth	56	24-Mar-20	1145	Dry																																								
Format.	Purlawaugh	28-Apr-20	1205	Dry																																								
		28-May-20	1100	Dry																																								
		29-Jun-20	1100	Dry																																								
		22-Jul-20	1045	Dry																																								
		26-Aug-20	1050	Dry																																								
		24-Sep-20		Dry																																								
		22-Oct-20	1015	Dry																																								
		29-Oct-20	930	Dry																																								
		26-Nov-20	1020	Dry																																								
		21-Dec-20		Dry																																								
P19	NC-123R	28-Aug-20	1010	130.78	131.23																																						
		22-Oct-20	1110	129.94	130.39																																							
Depth	187	28-Oct-20	1100	131.23	131.68	7.25	11064	20.8	<0.10	<0.010			<0.010	<0.010	<0.010	<0.010	0.96	<0.010	0.025	0.016		<0.050	<0.0001	7.68	12000	119	194	2800	157	148	581	<1	<1	<1	5700	5700	130	6.27	7.77	<0.01	0.04	0.04	8170
Format.	Pamboola	27-Nov-20	1150	129.81	130.26																																						
		21-Dec-20	1240	129.23	129.68																																							
P30		31-Jan-20	1130	13.86	14.64	7.2	22850	22.4																																			
		27-Feb-20	1230	13.76	14.54	7.2	23320	22.1																																			
Depth	25	26-Mar-20	1405	13.78	14.56	7.2	22760	22																																			
Format.	Rail Loop Dam	30-Apr-20	1200	13.60	14.38	7	24500	21																																			
		26-May-20	1135	13.58	14.36	6.9	28200	21.1																																			
		25-Jun-20	1230	13.44	14.22	6.9	28500	20.5																																			
		23-Jul-20	1300	13.46	14.24	6.9	27200	19.3																																			
		08-Aug-20		13.28	14.06																																						

		28-Aug-20	1330			6.9	26800	19.2																																	
		24-Sep-20	700	13.30	14.08	7.08	22958	16.9	0.9	0.002	0.097	<0.001	<0.0001	0.002	0.001	0.003	2.03	0.012	0.03	0.005	<0.01	0.014	<0.0001	7.74	23700	217	552	4350	18	246	6920	1510	<1	<1	714	714	241	1.03	<0.01	<0.01	7.52	7.52	15400
		28-Oct-20	1210	13.24	14.02	7	26100	19.7																																			
		27-Nov-20	1340	13.18	13.96	7	24700	20.3																																			
		18-Dec-20	830	13.14	13.92	7.08	22958	16.9																7.72	21900	194	452	3750	17	210	6230	1580	<1	<1	768	768	224	3.12					13500
		23-Dec-20	1230	13.20	13.98	6.7	23400	19.5																																			
P29		**31-Jan-20**	1115	5.15	6.08	7.8	10140	21.4																																			
		27-Feb-20	1215	5.03	5.96	7.8	10340	21.6																																			
Depth	**25**	**30-Apr-20**	1145	5.02	5.95	7.7	8960	21.2																																			
Format.	**Rail Loop Dam**	**26-May-20**	1120	4.98	5.91	7.3	9090	21.3																																			
		25-Jun-20	1245	4.98	5.91	7.7	8950	20.9																																			
		23-Jul-20	1245	4.96	5.89	7.9	8680	19.1																																			
		08-Aug-20		4.95	5.88																																						
		28-Aug-20	1315	4.97	5.9	7.7	9160	18.3																																			
		23-Sep-20	630	4.90	5.83	7.47	10354	16.9	0.15	0.002	0.191	<0.001	<0.0001	0.002	<0.001	<0.001	0.25	0.001	0.007	0.001	<0.01	<0.005	0.0001	7.93	9030	49	120	2080	7	103	3090	419	<1	<1	771	771	111	3.88	<0.01	<0.01	12	12	6180
		28-Oct-20	1155	4.91	5.84	8.1	9610	18.5																																			
		27-Nov-20	1325	4.92	5.85	8.1	9690	18.9																																			
		18-Dec-20	900	4.87	5.8	7.47	10354	16.5																7.99	10700	46	108	1960	7	96.6	3010	497	<1	<1	768	768	111	6.75					5930
		23-Dec-20	1215	4.89	5.82	8	9870	18.1																																			
P28		**31-Jan-20**	1100		0.93	Dry																																					
		27-Feb-20	1200		0.93	Dry																																					
Depth	**15**	**27-Mar-20**	1335		0.93	Dry																																					
Format.	**Rail Loop Dam**	**30-Apr-20**	1140		0.93	Dry																																					
		26-May-20	1105		0.93	Dry																																					
		26-Jun-20	1225		0.93	Dry																																					
		23-Jul-20	1235		0.93	Dry																																					
		28-Aug-20	1305		0.93	Dry																																					
		24-Sep-20	700		0.93	Dry																																					
		28-Oct-20	1140		0.93	Dry																																					
		27-Nov-20	1320		0.93	Dry																																					
		18-Dec-20	930		0.93	Dry																																					
		23-Dec-20	1200		0.93	Dry																																					
P31		**31-Jan-20**	1055	16.05	16.96	7.4	6950	22.7																																			
		27-Feb-20	1155	15.94	16.85	7.3	7010	22.1																																			
Depth	**15**	**20-Mar-20**	1330	16.09	17	7.4	7080	21.7																																			
Format.	**Rail Loop Dam**	**30-Apr-20**	1125	16.01	16.92	7.3	7160	21.4																																			
		25-May-20	1055	16.09	17	7.3	7100	21.4																																			
		25-Jun-20	1210	16.12	17.03	7.3	7150	20.8																																			
		23-Jul-20	1230	16.12	17.03	7.3	6910	19.5																																			
		08-Aug-20		16.01	16.92																																						
		28-Aug-20	1300	16.13	17.04	7.3	6760	19.5																																			
		24-Sep-20	730	16.09	17	6.99	7550	16.7	0.44	<0.001	0.128	<0.001	<0.0001	<0.001	0.002	0.002	1.14	0.005	0.387	0.002	<0.01	0.008	<0.0001	7.85	6670	128	213	1220	15	77.4	1780	332	<1	<1	939	939	75.9	0.97	0.05	0.02	5.04	5.06	4480
		28-Oct-20	1130	16.06	16.97	7.4	7090	19.8																																			
		27-Nov-20	1315	16.06	16.97	7.3	7010	20.9																																			
		18-Dec-20	945	16.05	16.96	6.99	7550	16.9																7.92	7350	90	153	1170	14	68.3	1660	372	<1	<1	919	919	72.9	3.26					4020
		23-Dec-20	1155	16.06	16.97	7.4	7100	19.6																																			
P32		**31-Jan-20**	1015	9.08	10.04	8.4	3020	22.8																																			
		27-Feb-20	1130	8.90	9.86	8.4	3230	22.8																																			
Depth	**15**	**26-Mar-20**	1300	8.42	9.38	8.4	2290	22.4																																			
Format.	**Rail Loop Dam**	**30-Apr-20**	1100	7.96	8.92	8.3	2310	21.8																																			
		26-May-20	1030	7.91	8.87	8.5	2120	22.3																																			
		25-Jun-20	1300	7.90	8.86	8.5	2130	21.7																																			
		23-Jul-20	1205	7.89	8.85	8.6	1890	20.1																																			
		08-Aug-20		7.87	8.83																																						
		28-Aug-20	1245	7.88	8.84	8.6	2030	20.3																																			
		24-Sep-20	800	7.86	8.82	8.39	1974	17.2	0.66	0.003	0.009	<0.001	<0.0001	0.003	<0.001	0.004	0.89	0.003	0.009	0.001	0.03	<0.005	<0.0001	8.58	2060	<1	5	489	<1	21.7	39	97	<1	60	980	1040	23.9	4.86	<0.01	<0.01	1.76	1.76	1380
		28-Oct-20	1050	7.90	8.86	8.7	1910	20.4																																			
		27-Nov-20	1255	7.96	8.92	8.7	2010	20.9																																			
		18-Dec-20	1000	7.99	8.95	8.39	1974	17.2																8.42	3310	1	16	764	<1	34.6	359	276	<1	39	969	1010	36	2.06					2000
		23-Dec-20	1130	8.02	8.98	8.5	1910	19.8																																			
P33		**31-Jan-20**	1035		0.97	Dry																																					
		27-Feb-20	1135		0.97	Dry																																					
Depth	**15**	**26-Mar-20**	1035		0.97	Dry																																					
Format.	**Rail Loop Dam**	**30-Apr-20**	1115		0.97	Dry																																					
		26-May-20	1035		0.97	Dry																																					
		25-Jun-20	1305		0.97	Dry																																					
		23-Jul-20	1210		0.97	Dry																																					
		28-Aug-20	1250		0.97	Dry																																					
		24-Sep-20	830		0.97	Dry																																					
		28-Oct-20	1100		0.97	Dry																																					
		27-Nov-20	1300		0.97	Dry																																					
		18-Dec-20	1030		0.97	Dry																																					
		23-Dec-20	1135		0.97	Dry																																					
P34		**31-Jan-20**	1035		0.95	Dry																																					
		27-Feb-20	1140		0.95	Dry																																					
Depth	**15**	**26-Mar-20**	1310		0.95	Dry																																					
Format.	**Rail Loop Dam**	**30-Apr-20**	1120		0.95	Dry																																					
		26-May-20	1040		0.95	Dry																																					
		25-Jun-20	1310		0.95	Dry																																					
		23-Jul-20	1215		0.95	Dry																																					
		28-Aug-20	1250		0.95	Dry																																					
		24-Sep-20	900		0.95	Dry																																					
		28-Oct-20	1110		0.95	Dry																																					
		27-Nov-20	1305		0.95	Dry																																					
		18-Dec-20	1045		0.95	Dry																																					
		23-Dec-20	1140		0.95	Dry																																					
P47		**30-Jan-20**	1215	23.97	25.22	7.2	5730	23.1																																			
		25-Feb-20	1040	23.97	25.22	7.2	6010	22.5																																			
Depth	**30.5**	**26-Mar-20**	1110	23.99	25.24	7.3	5840	22.2																																			
Format.	**Garrawilla**	**28-Apr-20**	1320	23.99	25.24	7.1	5920	22.1																																			
		26-May-20	1305	24.01	25.26	7	5830	21.8																																			
		26-Jun-20	1055	24.02	25.27	7	5850	21.6																																			
		23-Jul-20	1030	24.05	25.3	7	5820	20																																			
		28-Aug-20	1150	24.02	25.27	7.1	6090	19.8																																			
		24-Sep-20	1400	24.04	25.29	6.94	6072	18.3	4.65	0.002	0.093	<0.001	<0.0001	0.022	0.022	0.02	6.64	0.005	0.173	0.058	0.02	0.025	<0.0001	7.95	5670	32	123	1230	38	66.2	1040	390	<1	<1	1650	1650	70.4	3.1	0.34	<0.01	0.01	0.01	3880
		27-Oct-20	1020	24.00	25.25	6150	7	20																																			
		27-Nov-20	1140	23.99	25.24	7	6260	21.2																																			
		23-Dec-20	1100	24.01	25.26	7	6320	20.4																																			
P39A		**30-Jan-20**	940	6.50	7.5	8.1	4240	21.2																																			
		27-Feb-20	1000	6.44	7.44	8.1	4280	21.2																																			
Depth	**80**	**27-Mar-20**	945	6.53	7.53	8.1	4270	22.4																																			

Format.	Watermark	28-Apr-20	850	6.42	7.42	7.8	4310	21.2																																			
		29-May-20	900	6.39	7.39	7.9	4350	20.6																																			
		30-Jun-20	900	6.41	7.41	8	4420	20.1																																			
		24-Jul-20	920	6.42	7.42	8.1	4310	18.8																																			
		27-Aug-20	915	6.45	7.45	8	4640	18.7																																			
		23-Sep-20	1000	6.48	7.48	7.16	5819	17.9	1.35	0.008	0.11	<0.001	<0.0001	0.002	0.009	0.004	11.2	<0.001	0.68	0.006	<0.01	0.022	<0.0001	7.88	6310	96	98	1210	22	66	1630	318	<1	<1	812	812	68.8	2.06	0.44	<0.01	<0.01	<0.01	4150
		03-Nov-20	940	6.52	7.52																																						
		27-Nov-20	900	6.54	7.54																																						
		23-Dec-20				No Access - Wet weather																																						
P39B		30-Jan-20	1000	6.81	7.71	8.2	6910	21.2																																			
		27-Feb-20	940	6.77	7.67	8.3	6860	21.1																																			
Depth	32	27-Mar-20	1010	6.72	7.62	8.1	6920	22.3																																			
Format.	Alluvium	28-Apr-20	910	6.64	7.54	7.9	7090	20.8																																			
		29-May-20	920	6.70	7.6	7.8	7050	22.3																																			
		30-Jun-20	915	6.80	7.7	7.6	7090	20																																			
		24-Jul-20	935	6.85	7.75	7.6	6850	18.6																																			
		27-Aug-20	930	6.84	7.74	7.5	6720	18.4																																			
		23-Sep-20	900	6.85	7.75	7.08	9114	16.7	5.1	0.003	0.071	<0.001	<0.0001	0.027	0.037	0.005	16.6	0.003	0.81	0.016	0.03	0.015	<0.0001	7.85	8000	151	237	1530	17	94	2620	779	<1	<1	525	525	101	3.38	0.02	<0.01	<0.01	<0.01	5940
		03-Nov-20	930	6.88	7.78	7.6	6980	18.2																																			
		27-Nov-20	850	6.91	7.81	8.2	7270	19.2																																			
		23-Dec-20				No Access - Wet Weather																																						
P43		30-Jan-20	920	7.52	8.47	7.5	11230	23.9																																			
		27-Feb-20	920	7.69	8.64	7.6	11200	23.8																																			
Depth	65	27-Mar-20	915	7.97	8.92	7.5	10980	23.6																																			
Format.	Watermark	28-Apr-20	825	8.12	9.07	7.4	11370	22.1																																			
		29-May-20	840	8.24	9.19	7.2	11860	22.3																																			
		30-Jun-20	830	8.30	9.25	7.4	12080	22.8																																			
		24-Jul-20	900	7.34	8.29	7.5	11670	20.8																																			
		27-Aug-20	845	8.56	9.51	7.5	11660	20.1																																			
		23-Sep-20	1100	8.66	9.61	6.96	11476	18.5	9.87	0.007	0.261	<0.001	<0.0001	0.014	0.018	0.015	17	0.011	2.35	0.02	0.02	0.052	<0.0001	7.83	9680	108	209	2080	33	114	3500	397	<1	<1	797	797	123	3.8	0.52	<0.01	0.02	0.02	6660
		03-Nov-20	900	8.86	9.81	7.3	11470	20.5																																			
		27-Nov-20	830	8.97	9.92	6.8	12100	21.4																																			
		23-Dec-20				No Access Wet Weather																																						
P51		31-Jan-20	925	6.83	7.41	7.6	19650	23.8																																			
		25-Feb-20	1135	6.84	7.42	7.5	19870	24.1																																			
Depth	17	26-Mar-20	1200	6.87	7.45	7.6	19280	23.4																																		0		
Format.	Napperby (REA)	30-Apr-20	1020	7.04	7.62	7.5	20600	23.5																																			
		26-May-20	1155	6.89	7.47	7.4	21800	23.7																																			
		25-Jun-20	1135	6.88	7.46	7.3	22100	22.9																																			
		23-Jul-20	1120	6.99	7.57	7.4	21400	21.3																																			
		28-Aug-20	1210	6.95	7.53	7.4	21500	21.1																																			
		23-Sep-20	930	7.07	7.65	7.16	20362	18.6	2.01	0.002	0.134	<0.001	<0.0001	0.004	0.003	0.009	2.3	0.006	0.276	0.005	<0.01	0.023	<0.0001	7.77	21400	29	474	4040	12	216	6360	750	<1	<1	905	905	213	0.79	0.05	<0.01	0.01	0.01	13200
		27-Oct-20	1130	7.08	7.66	7.1	20900	21.1																																			
		27-Nov-20	1210	7.14	7.72	7.3	22700	21.6																																			
		21-Dec-20	1300	7.16	7.74	7.5	22300	20.4																																			
P52		31-Jan-20	940	9.67	10.22	7.4	2130	22.7																																			
		25-Feb-20	1150	8.28	8.83	7.3	2210	22.5																																			
Depth	24	26-Mar-20	1200	8.57	9.12	7.4	2150	22.2																																			
Format.	Napperby (REA)	30-Apr-20	1035	7.85	8.4	7.3	2190	23.2																																			
		26-May-20	1210	8.29	8.84	7.3	2290	22.2																																			
		25-Jun-20	1145	8.24	8.79	7.3	2300	21.9																																			
		28-Aug-20	1225	8.91	9.46	7.3	2260	20.4																																			
		23-Sep-20	1000	9.15	9.7	7.02	2044	17.7	0.33	<0.001	0.206	<0.001	<0.0001	<0.001	0.005	0.004	0.51	<0.001	0.352	0.016	<0.01	0.023	<0.0001	7.85	2050	100	108	192	7	22.4	336	83	<1	<1	654	654	24.3	3.99	0.11	<0.01	0.15	0.15	1190
		27-Oct-20	1145	9.28	9.83	7.2	2280	20.3																																			
		27-Nov-20	1220	9.46	10.01	7.4	2410	20.8																																			
		21-Dec-20	1315	9.58	10.13	7.4	2310	19.9																																			
P53		31-Jan-20	955	12.30	12.8	7.6	1080	22.7																																			
		25-Feb-20	1210	10.94	11.44	7.5	1095	22.3																																			
Depth	24	26-Mar-20	1230	11.01	11.51	7.6	1070	22.4																																			
Format.	Garrawilla (REA)	30-Apr-20	1045	10.33	10.83	7.6	1060	22.9																																			
		26-May-20	1225	10.66	11.16	7.6	1048	22.2																																			
		25-Jun-20	1155	10.60	11.1	7.6	1060	21.9																																			
		24-Jul-20	1135	11.06	11.56	7.6	970	20.1																																			
		28-Aug-20	1235	11.23	11.73	7.6	1010	19.9																																			
		23-Sep-20	1030	11.38	11.88	7.29	1072	18.4	6.19	<0.001	0.206	<0.001	<0.0001	0.026	0.007	0.01	10.6	0.001	0.103	0.022	0.02	0.086	<0.0001	7.95	1070	51	49	118	4	11.8	62	13	<1	<1	526	526	12.5	2.94	0.11	<0.01	<0.01	<0.01	610
		27-Oct-20	1155	11.48	11.98	7.4	980	20.5																																			
		27-Nov-20	1230	11.63	12.13	7.5	1020	21.1																																			
		21-Dec-20	1330	11.78	12.28	7.6	1065	19.9																																			
		20-Jan-21	1145	11.80	12.3	7.7	1080	20.2																																			
		02-Mar-21	1205	11.71	12.21	7.5	1065	20.6																																			
PS8		28-Aug-20	930	20.49	20.94	7	9190	18.3																																			
Depth	40	23-Sep-20	1100	18.90	19.35	6.97	9860	17	0.22	0.03	0.536	<0.001	<0.0001	<0.001	0.008	0.005	0.36	0.001	0.432	0.03	0.03	0.034	<0.0001	7.83	8660	95	100	2300	33	114	1060	159	<1	<1	3940	3940	112	0.85	2.79	<0.01	<0.01	<0.01	6860
Formation	Rail Loop Dam	27-Oct-20	1210	18.72	19.17	7	8750	19.6																																			
		27-Nov-20	1245	13.07	13.52	7.1	9200	20.6																																			
		18-Dec-20	805	18.16	18.61	6.89	10989	20.8																7.4	11100	78	93	2680	60	130	1130	89	<1	<1	5130	5130	136	2.47					7230
		23-Dec-20	1115	16.61	17.06	7.1	9460	19.8																																			
		27-Jan-21	920	18.41	18.86	7.3	9330	21.1																																			
		02-Mar-20	1320	18.37	18.82	7.2	9610	20.6																																			
Mayfield Spring Top		29-Jan-20	1400			7.6	1030	28.1																																			
Depth	0	25-Feb-20	1510			7.9	620	27.8																																			
Merrilong Dam		24-Mar-20	1230			8	1123	24.5																																			
		24-Apr-20	1255			8	970	21.1																																			
		28-May-20	1340			8.5	2050	17.9																																			884
		29-Jun-20	1330			8.5	2920	13.6																																			
		22-Jul-20	1310			8.3	3000	11.2																																			
		26-Aug-20	1340			8.4	3340	14																																			
		02-Oct-20	930			7	3810	20.7	<0.01	<0.001	0.096	<0.001	0.0001	<0.001	0.033	0.003	0.41	<0.001	0.84	0.289	<0.01	0.068	<0.0001	7.01	3810	54	124	436	11	32.1	1080	227	<1	<1	47	47	36.1	5.84	0.02	<0.01	<0.01	<0.01	1920
		23-Oct-20	1340			8.9	4220	24.2																																			
		26-Nov-20	1315			8.8	5540	25.6																																			
		21-Dec-20	1050			8.5	5820	20.7																																			4450
WB2		30-Jan-20	1125																																							
		25-Feb-20	1000																																							
Depth	Unknown	26-Mar-20	1010			7.5	4130	20.8																																			
Format.	Garrawilla	09-Apr-02	830			7.3	3180	19.9																																			
		29-May-20	1110			7.3	1735	23.8																																			
		25-Jun-20	945			7.1	1850	14.2																																			
		23-Jul-20	945			7.2	1720	16.8																																			
		28-Aug-20	1110			7.1	1670	23.8																																			
		24-Sep-20	1500	12.56	12.94	Equipment issue - NST																																						
		28-Oct-20	1225			7.5	1650	23.2																																			
		27-Nov-20	1055			7.6	1640	20.9																																			
		23-Dec-20	1025			7.6	1650	22.4																																			

WB3b		31-Jan-20																																									
		27-Feb-20																																									
Depth	Unknown	26-Mar-20																																									
Format.	Namoi Alluvium	30-Jan-20	1340	9.47	9.98	6.75	904	22.7																																			
		20-Mar-20	1046	8.72	9.23	7.54	711	22.7																																			
		03-Apr-20	1010	8.68	9.19	7.09	723	21.8																																			
		22-Apr-20	1350	8.65	9.16	7.16	778	21.1	<0.01	<0.001			<0.0001	<0.001	<0.001	<0.001		<0.001	0.502	<0.001		<0.005	<0.0001	7.55	809	55	26	85	3	8.66							8.20	2.70	0.14	<0.01	<0.01	<0.01	456
		19-May-20	1501	9.05	9.56	7.17	748	21.9																																			
		02-Jun-20	1148	9.44	9.95	7.44	719	21.6																																			
		16-Jul-20	1537	8.89	9.40	7.14	755	21.6																																			
		21-Aug-20	1028	8.71	9.22	6.81	762	21.5																																			
		21-Sep-20	1557	9.69	10.20	6.72	779	22.1	<0.01	<0.001			<0.0001	<0.001	<0.001	<0.001	0.19	<0.001	0.472	<0.001		<0.005	<0.0001	7.38	778	50	24	80	3	8.03	58	17	<1	<1	336	336	8.7	4.04	0.18	<0.01	<0.01	<0.01	520
		20-Oct-20	1233	8.66	9.17	6.95	768	22.9																																			
		13-Nov-20	958	8.67	9.18	6.85	754	22.7																																			
		09-Dec-20	943	8.64	9.15	7.15	733	22.2																																			
WB4		30-Jan-20	1431	8.82	9.37	6.82	913	22.9																																			
		20-Mar-20	1103	8.85	9.40	7.23	908	22.2																																			
Depth	Unknown	03-Apr-20	1029	8.85	9.40	6.9	922	21.9																																			
Format.	Namoi Alluvium	22-Apr-20	1439	8.85	9.40	7.19	910	22.4	<0.01	<0.001			<0.0001	<0.001	<0.001	<0.001		<0.001	0.001	<0.001		<0.005	<0.0001	7.68	939	65	34	88	1	9.90							9.82	0.36	<0.01	<0.01	0.04	0.04	544
		19-May-20	1521	8.90	9.45	6.84	928	21.7																																			
		02-Jun-20	1143	8.88	9.43	7.04	909	21.3																																			
		16-Jul-20	1556	8.87	9.42	7.11	911	21.5																																			
		21-Aug-20	1050	8.88	9.43	6.81	912	21.6																																			
		21-Sep-20	1437	8.89	9.44	6.65	912	22.3	<0.01	<0.001			<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.002	<0.001		<0.005	<0.0001	7.47	902	59	33	82	1	9.25	82	32	<1	<1	345	345	9.87	3.24	<0.01	<0.01	<0.01	<0.01	582
		20-Oct-20	1212	8.89	9.44	6.87	913	22.7																																			
		13-Nov-20	1020	8.89	9.44	6.83	914	22.6																																			
		09-Dec-20	1009	8.90	9.45	7.09	903	22.3																																			
WB5a		30-Jan-20	1142	11.44	12.56	7.15	403.5	24.6																																			
		20-Mar-20	953	10.48	11.60	7.05	600	22																																			
Depth	Unknown	03-Apr-20	9.03	10.58	11.70	6.91	471.9	21.6																																			
Format.	Namoi Alluvium	22-Apr-20	1201	10.57	11.69	7.09	439.8	22.7	<0.01	0.013			<0.0001	<0.001	<0.001	<0.001		<0.001	0.730	0.001		<0.005	<0.0001	7.64	463	38	20	26	3	4.75							4.76	0.09	0.12	<0.01	0.06	0.06	284
		19-May-20	1416	10.71	11.83	6.79	498.9	21.8																																			
		02-Jun-20	1024	10.81	11.93	7.12	460.4	21.5																																			
		09-Jul-20	1351	10.93	12.05	6.85	515	21.1																																			
		21-Aug-20	1121	10.38	11.50	6.77	483.4	21.6																																			
		21-Sep-20	1228	10.37	11.49	6.41	418.2	22.5	<0.01	0.012			<0.0001	<0.001	<0.001	<0.001	0.92	<0.001	1.09	<0.001		<0.005	<0.0001	7.07	394	33	19	23	3	4.29	27	56	<1	<1	129	129	4.5	2.47	0.11	<0.01	0.08	0.08	283
		20-Oct-20	1124	10.46	11.58	6.45	376.1	22.3																																			
		13-Nov-20	914	10.19	11.31	6.59	415.8	21.5																																			
		09-Dec-20	845	10.34	11.46	6.79	427.3	21.0																																			
WB5b		20-Mar-20	1018	11.22	12.34	7.3	357.6	22.3																																			
		03-Apr-20	913	11.21	12.33	7	389.2	21.4																																			
Depth	Unknown	22-Apr-20	1246	11.14	12.26	6.92	529	21.2	<0.01	<0.001			<0.0001	<0.001	<0.001	<0.001		<0.001	0.107	<0.001		<0.005	<0.0001	7.57	559	<1	<1	248	248	5.86							6.08	1.84	<0.01	<0.01	<0.01	<0.01	283
Format.	Namoi Alluvium	19-May-20	1427	11.09	12.21	6.97	397.3	21.5																																			
		02-Jun-20	1037	11.08	12.20	7.31	390.1	21.4																																			
		09-Jul-20	1401	11.09	12.21	6.85	457	20.9																																			
		21-Aug-20	1130	10.73	11.85	7.07	451.6	20																																			
		21-Sep-20	1320	10.67	11.79	6.57	537	21.2	<0.01	<0.001			<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.111	<0.001		<0.005	<0.0001	7.22	520	49	20	31	2	5.49	32	14	<1	<1	240	240	5.99	4.34	0.01	<0.01	<0.01	<0.01	364
		20-Oct-20	1139	10.89	12.01	6.92	467.8	22.6																																			
		13-Nov-20	925	10.59	11.71	6.9	449.3	21.6																																			
		09-Dec-20	909	10.75	11.87	7.32	439.2	21.3																																			
WB6b		30-Jan-20	1030	23.16	24.00	6.92	608	22.3																																			
		20-Mar-20	928	13.18	14.02	7.08	836	22.9																																			
Depth	Unknown	03-Apr-20	832	12.89	13.73	6.99	784	20.8																																			
Format.	Namoi Alluvium	22-Apr-20	1059	13.65	14.49	7.16	615	21.6	<0.01	<0.001			<0.0001	<0.001	<0.001	<0.001		<0.001	0.367	<0.001		<0.005	<0.0001	7.76	644	46	20	66	2	6.86							6.98	0.86	0.02	<0.01	0.05	0.05	330
		19-May-20	1356	12.41	13.25	6.79	646	21.0																																			
		02-Jun-20	945	12.37	13.21	6.87	630	19.7																																			
		09-Jul-20	1315	12.24	13.08	7.04	634	20.3																																			
		21-Aug-20	1221	11.95	12.79	6.92	631	20.0																																			
		21-Sep-20	1129	12.17	13.01	6.71	592	21.8	<0.01	<0.001			<0.0001	<0.001	<0.001	<0.001	0.76	<0.001	0.343	<0.001		<0.005	<0.0001	7.48	591	42	20	65	2	6.62	28	22	<1	<1	292	292	7.08	3.37	0.03	<0.01	0.08	0.08	410
		20-Oct-20	1058	22.76	23.60	6.85	618	21.3																																			
		13-Nov-20	849	12.35	13.19	6.86	611	21.0																																			
		09-Dec-20	816	14.03	14.87	7.03	591	20.8																																			
WB7		29-Jan-20	900	2.29	2.29	7.1	1050	24.1																																			
		27-Feb-20	1355	1.75	1.75	7.1	1070	23.8																																			
Depth	Unknown	27-Mar-20	1240	2.06	2.06	7.3	845	21.5																																			
Format.	Namoi Alluvium	24-Apr-20	925	1.85	1.85	7.5	760	20.6																																			
		28-May-20	900	3.83	3.83	7	800	14.3																																			
		29-Jun-20	850	4.34	4.34	7.1	890	12.9																																			
		24-Jul-20	1200	3.47	3.47	7.2	810	13.2																																			
		26-Aug-20	845	3.38	3.38	7.1	820	12.9																																			
		18-Sep-20	1123	3.45	3.45	7.29	808	17.8	<0.01	<0.001	0.008	<0.001	<0.0001	<0.001	<0.001	0.037	<0.05	0.001	<0.001	<0.001	<0.01	0.022	<0.0001	7.97	804	38	21	116	2	8.72	51	66	<1	<1	265	265	8.22	2.97	<0.01	<0.01	2.37	2.37	472
		29-Oct-20	910	2.68	2.68	7.3	960	17.2																																			
		26-Nov-20	930	2.74	2.74	7	870	20.5																																			
		23-Dec-20	835	3.44	3.44	7.4	750	17.6																																			

Appendix F – *Ambient Flow Monitoring*

Sample Location	Date	pH	Electrical Conductivity (µS/cm)	Total Suspended Solids (mg/L)	Grease & Oil (mg/L)	Total Organic Carbon (TOC)	Comments
PCa	17 January 2020	6.3	46	740	<5	24	
KCDS	24 January 2020	7.04	156	1620	<5	13	
KC2US	24 January 2020	6.9	63	467	<5	13	
KCUS	24 January 2020	7.04	99	1140	<5	10	
KC1US	24 January 2020	7.09	82	519	<5	14	
PCa	24 January 2020	6.97	99	242	<5	19	
PC1	24 January 2020	7.47	322	274	<5	45	
KCUS	10 February 2020	7.2	42	1260	8	7	
KCDS	10 February 2020	7.4	64	4040	<5	7	
KC2DS	10 February 2020	6.6	93	89.6	<5	9	
KC1DS	10 February 2020	6.4	46	113	<5	9	
KC2US	10 February 2020	7.4	40	506	5	4	
KC1US	10 February 2020	7.1	60	909	<5	6	
PC1	10 February 2020	7.4	40	480	<5	4	
PCA	10 February 2020	6.9	175	87	<5	17	
KCDS	4 December 2020	7.6	250	266	<5	23	
KCUS	4 December 2020	7.4	152	131	<5	22	
KC1DS	22 December 2020	7.3	272	263	<5	10	
KC2DS	22 December 2020	7.2	125	28	<5	12	
KC1US	22 December 2020	7.3	116	78	<5	11	
KC2US	22 December 2020	7.3	90	20	<5	12	
KCDA	22 December 2020	7.5	140	126	<5	9	
KCUS	22 December 2020	7.5	145	143	<5	9	
PCa	22 December 2020	7.7	75	204	<5	11	
PC1	22 December 2020	7.5	235	101	<5	14	