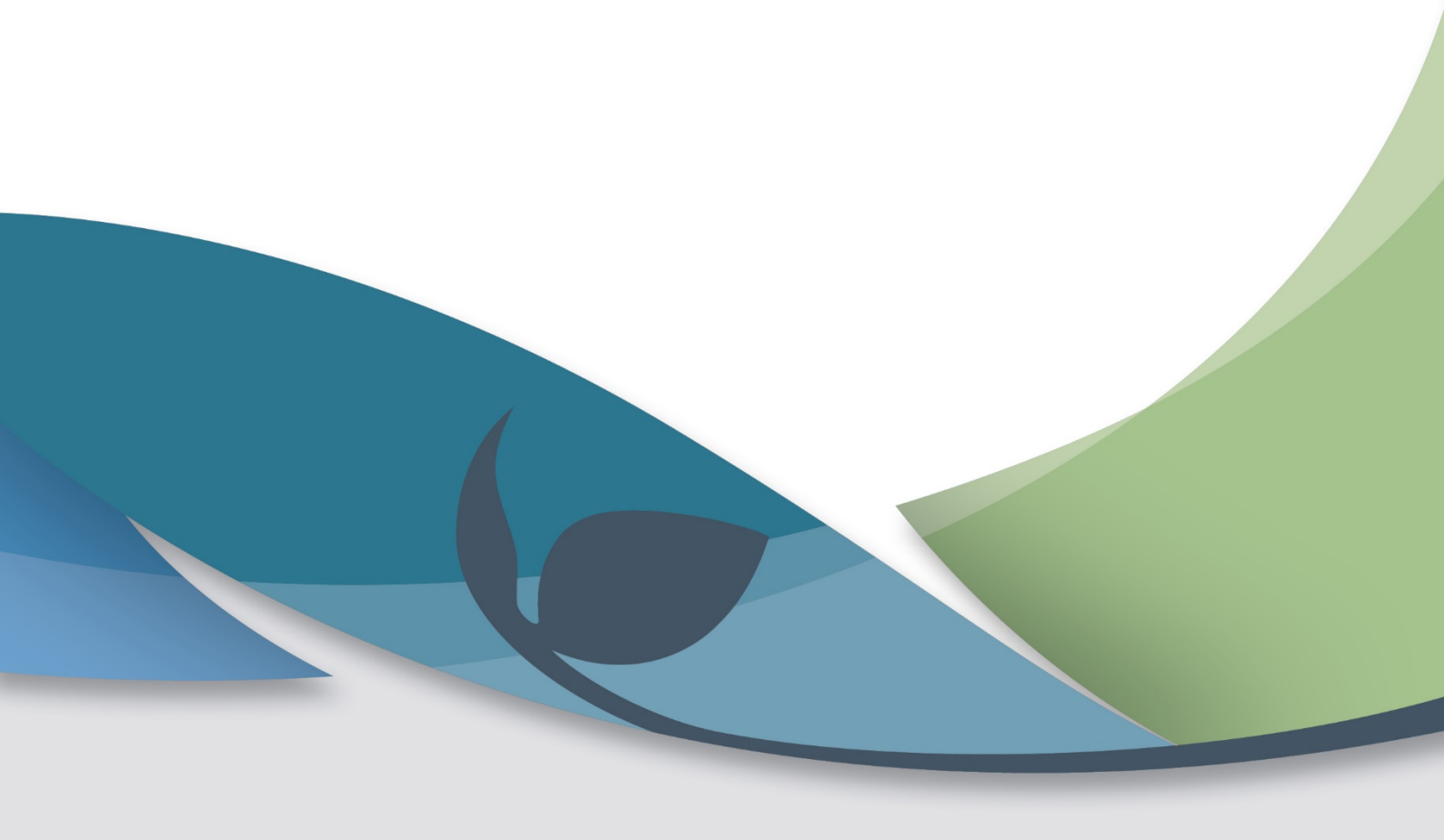
JAMES BAILEY & ASSOCIATES
Environmental and Planning Consultants

DARTBROOK MINE

ANNUAL REVIEW

for Australian Pacific Coal

30 July 2021



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Document Details

Project Name	Dartbrook Mine
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Our Reference	210730 Dartbrook Mine Annual Review_highlights

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TABLES

FIGURES

APPENDICES

Annual Review Title Block

Name of operation	Dartbrook Mine
Name of operator	AQC Dartbrook Management Pty Limited
Development consent	DA 231-07-2000
Name of holder of development consent	Dartbrook Coal Pty Limited
Mining Leases	CL 386, MLs 1497, 1381, 1456
Name of holder of mining leases	AQC Dartbrook Pty Ltd
Water licences	See Table 21
Name of holder of water licences	AQC Dartbrook Pty Ltd, AQC Dartbrook Management Pty Limited
MOP start date	1 January 2018
MOP end date	31 December 2020
Annual Review start date	1 January 2020
Annual Review end date	31 December 2020
I, David Conry, certify that this audit report is a true and accurate record of the compliance status of AQC Dartbrook Management Pty Limited for the period (CY2020) and that I am authorised to make this statement on behalf of AQC Dartbrook Management Pty Limited. *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	David Conry
Title of authorised reporting officer	CEO
Signature of authorised reporting officer	
Date	30 July 2021

Annual Review Distribution

Distribution List
NSW Department of Planning, Industry and Environment (DPIE)
NSW Department of Planning, Industry and Environment – Resources Regulator (DPIE-RR)
Muswellbrook Shire Council (MSC)
Upper Hunter Shire Council (UHSC)
Dartbrook Community Consultative Committee (CCC) Members

1. STATEMENT OF COMPLIANCE

This Annual Review has been prepared to provide a summary of the performance of the Dartbrook Underground Coal Mine (Dartbrook) over the period 1 January – 31 December 2020 (the reporting period).

The compliance status of Dartbrook against relevant approvals is summarised in **Table 1,** with a summary on non-compliances provided in **Table 2**.

The air quality non-compliances identified in **Table 2** relate to exceedances of 24-hour PM10 criteria from DA 231-07-2000 recorded during the month of January 2020 at all HVAS monitoring sites. A review of these results confirmed that the exceedances monitored were not related to any minor Care and Maintenance activities undertaken at Dartbrook Mine at the time, but were likely attributed to a wider-scale dust event prevailing in the region during the monitoring period.

The surface and groundwater non-compliances in **Table 2** relate to the exceedance of historic monitoring trigger levels included in the Site Water Management Plan (SWMP) required under DA 231-07-2000. A review of the monitoring results confirmed that neither historic or current Care and Maintenance activities at Dartbrook are causing unacceptable impacts to surface or groundwater bodies. The Care and Maintenance SWMP and associated surface and groundwater trigger levels were reviewed and updated during the reporting period following the determination of DA 231-07-2000 (MOD7). The revised SWMP has been provided to regulatory agencies for review and comment, but not submitted for final approval (see **Section 7.2.3** and **Section 7.3.3**).

Table 1 Statement of Compliance

Were All the Conditions of the Relevant Approvals Complied With?	Yes/No
Development Consent (DA) 231-07-2000	No
Environmental Protection Licence (EPL) 4885	Yes
Coal Lease 386	Yes
Mining Lease 1497	Yes
Mining Lease 1381	Yes
Mining Lease 1456	Yes

Table 2 Summary of Non-Compliances

Approval	Approval Condition	Compliance Status	Comment	Where addressed in Annual Review
DA 231-07-2000	6.1	Non-compliant	Exceedances of DA 231-07-2000 (MOD7) air quality criteria for 24-hour PM_{10} in January 2020 (all HVAS sites).	**Section 6.3.2**
DA 231-07-2000	4.1(a)	Non-compliant	Groundwater and surface water monitoring results in exceedance of trigger levels identified in the currently approved SWMP.	**Section 7.2.3** and **Section 7.3.3**

2. INTRODUCTION

2.1 BACKGROUND

Dartbrook is owned and managed by AQC Dartbrook Management Pty Limited (AQC). Dartbrook is located 10 kilometres (km) north-west of Muswellbrook and 4.5 km south-west of Aberdeen (see **Figure 1** and **Figure 2**) in New South Wales (NSW). From 1993 until October 2006, Dartbrook operated as an underground longwall coal mine.

Former owners of the mine elected to suspend mining and the operation was placed under Care and Maintenance from 1 January 2007.

Under Care and Maintenance, site activities are generally limited to the maintenance of:

- The Hunter Tunnel, which along with the Kayuga interseam drift, are the only areas of the underground mine that are still accessible. The Hunter Tunnel and Kayuga interseam drift connect to the Eastern and Kayuga Western mine entrances, respectively;
- The Western Facilities (West Site), which is located west of the New England Highway and comprises the administration office, a small workshop, and Wynn and Kayuga mine entrances to the underground mine (see **Figure 3**); and
- The Eastern Facilities (East Site), which is located east of the New England Highway and comprises the Coal Handling and Preparation Plant (CHPP), rail load out facilities, cleared coal stockpiles and the rehabilitated Reject Emplacement Area (REA) (see **Figure 4**).

2.2 PURPOSE

This Annual Review summarises the environmental performance of Dartbrook Mine for the reporting period and has been prepared to meet the requirements of Condition 9.2 of DA 231-07-2000 (as modified).

It has also been prepared generally in accordance with its approvals including:

- DA 231-01-2000;
- ML and Exploration Licence (EL) conditions;
- Environment Protection Licence (EPL) 4885; and
- Continuation of Care and Maintenance Mining Operations Plan (MOP) 2018-2020.

A summary of where the relevant requirements from DA 231-7-2000 and Dartbrook mining authorities has been addressed in this document is provided in **Table 3**. **Figure 5** shows the location of mining authorities held at Dartbrook.

Table 3 Development Consent and Mining Lease requirements for Annual Review

Document DA 231-07-2000, Condition 9.2 Environmental Reporting		Where Addressed
Annual Review: (a)	By the end of March in each year after the commencement of the development, or other timeframe agreed by the Secretary, a report must be submitted to the Department reviewing the environmental performance of the development, to the satisfaction of the Secretary. This review must:	**This document**
(i)	describe the development (including any rehabilitation) that was carried out in the previous calendar year, and the development that is proposed to be carried out over the current calendar year;	**This document**
(ii)	include a comprehensive review of the monitoring results and complaints records of the development over the previous calendar year, including a comparison of these results against the: • relevant statutory requirements, limits or performance measures/criteria; • requirements of any plan or program required under this consent; • monitoring results of previous years; and • relevant predictions in the documents referred to in Condition 1.1(a);	**Sections 1, 6 - 11**
(iii)	identify any non-compliance or incident which occurred in the previous calendar year, and describe what actions were (or are being) taken to rectify the non-compliance or incident and avoid reoccurrence;	**Sections 1, 6 - 11** **Appendix B - F**
(iv)	evaluate and report on: • the effectiveness of the noise, air quality and greenhouse gas management systems; - socio-economic impact of the development including the workforce characteristics of the previous calendar year; and - the surveillance of any prescribed dam on the site to the satisfaction of the DSC; • the outcome of the water budget for the year, the quantity of water used from water storages and details of discharge of any water from the site; and • compliance with the performance measures, criteria and operating conditions in this consent;	**Sections 6 - 9** **Appendix B - F**
(v)	identify any trends in the monitoring data over the life of the development;	**Sections 1, 6 - 9**
(vi)	identify` any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and	**Sections 6 - 9**
(vii)	describe what measures will be implemented over the next calendar year to improve the environmental performance of the development.	**Section 6, 7 and 12**
(b)	Copies of the Annual Review must be submitted to the Department, MSC, UHSC and made available to the CCC and any interested person upon request.	**Section 9**

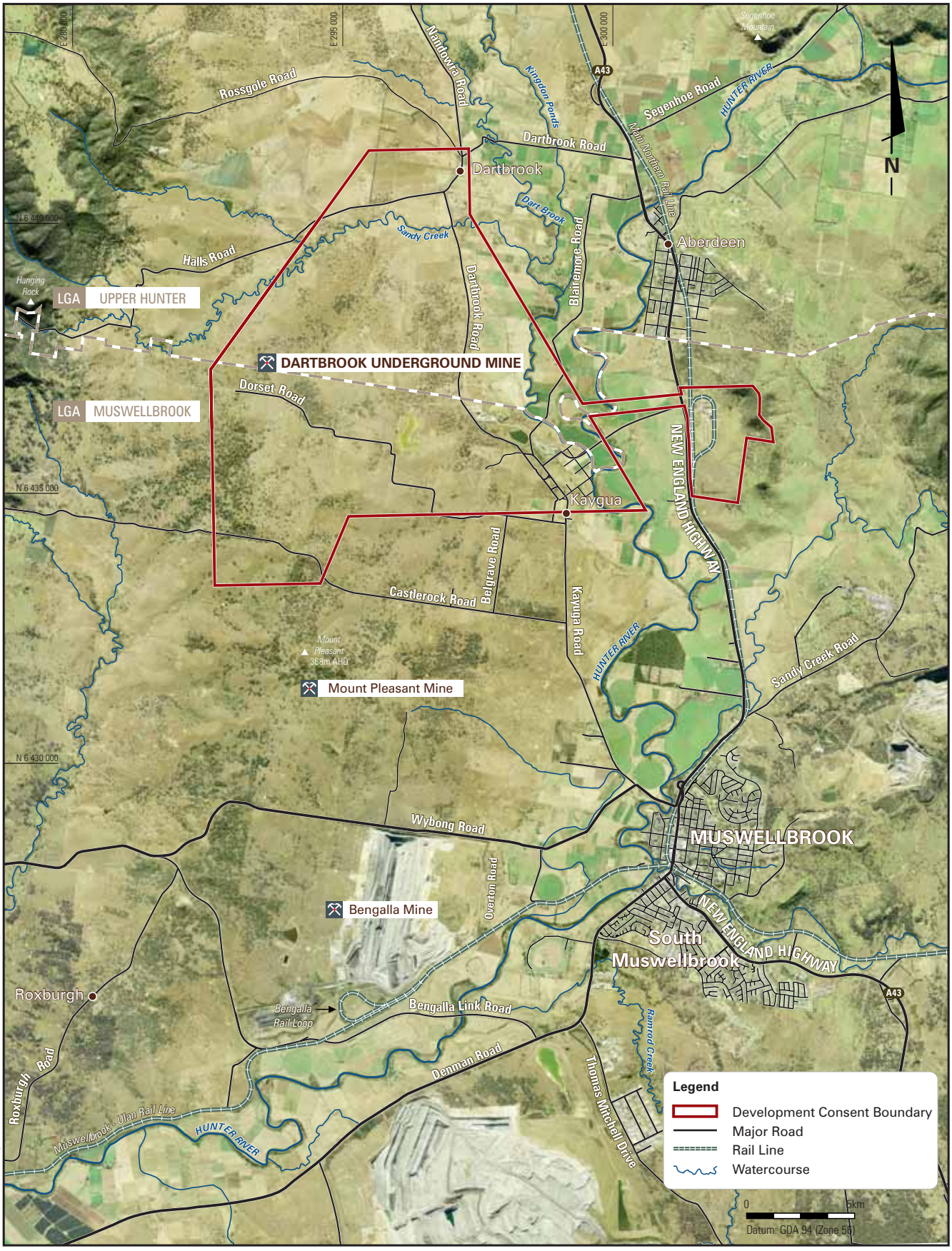
2.3 PERFORMANCE SUMMARY

No coal mining or coal processing activities were undertaken at Dartbrook Mine during the reporting period. The specific aspects of Dartbrook Mine environmental performance for the reporting period are described further in **Section 6** to **Section 8**.

In February 2018, AQC lodged an application to modify DA 231-7-2000 (MOD7) to provide further operational options for Dartbrook (in addition to those already approved) to recommence mining via limited bord and pillar underground mining within the Kayuga Seam and to extend the approval period under DA 231-7-2000 by 5 years (to 5 December 2027).

DA 231-07-2000 (MOD7) was determined by the NSW Independent Planning Commission (IPCN) on 9 August 2019. The IPCN approved the proposed recommencement of mining activities but rejected the proposed five-year extension to the consent approval period. Without the extension to operate under DA 231-7-2000 for a further five years it is impractical to recommence mining at Dartbrook. In November 2019, AQC announced its decision to lodge an appeal against the IPCN determination of MOD7 in the NSW Land and Environment Court. As at the time of drafting this Annual Review the Appeal has not been determined.

Other consultation with neighbours and community stakeholders continued during 2020 as discussed in **Section 9**. The Dartbrook Mine Community Consultative Committee (CCC) continued to meet throughout the year, with meetings held in March, September and December 2020. As noted in **Section 9.1**, no environmental complaints were received during the reporting period.

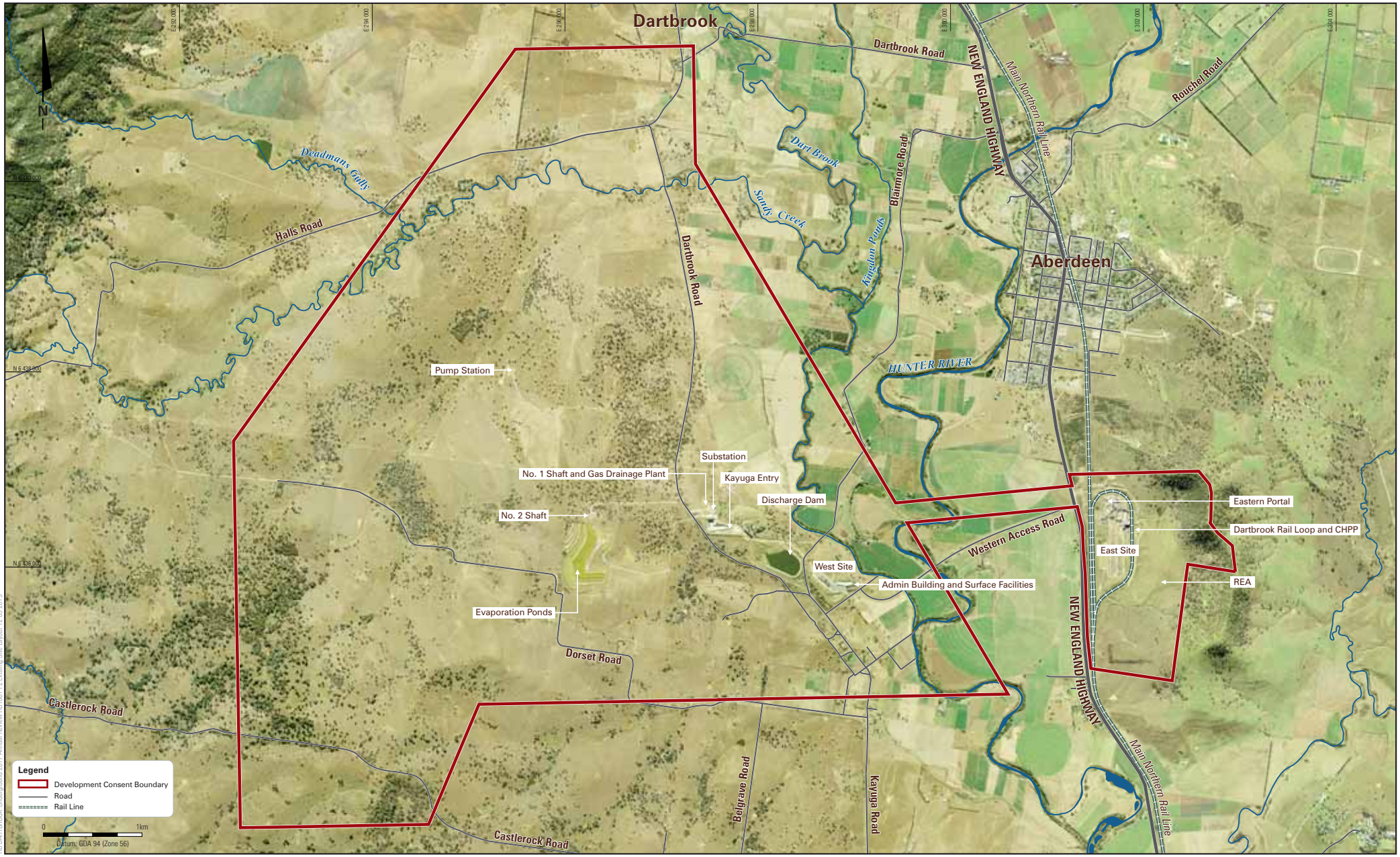


HB DARTBROOK Underground 2019 Annual Review HB1986 F1 Site Locality 25 02 2020

DARTBROOK MINE

Site Locality

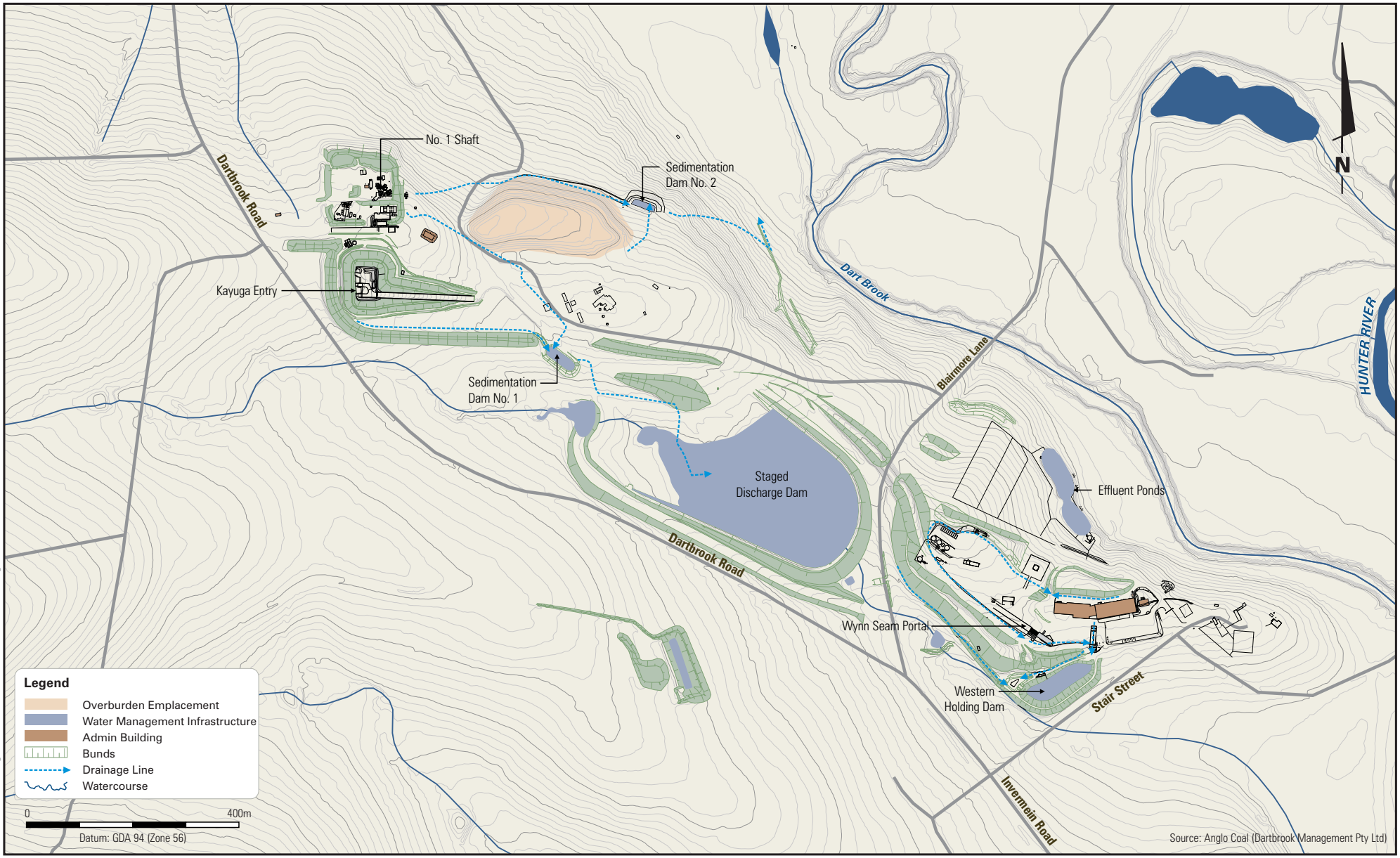
FIGURE 1



DARTBROOK MINE

Existing Site Layout

FIGURE 2

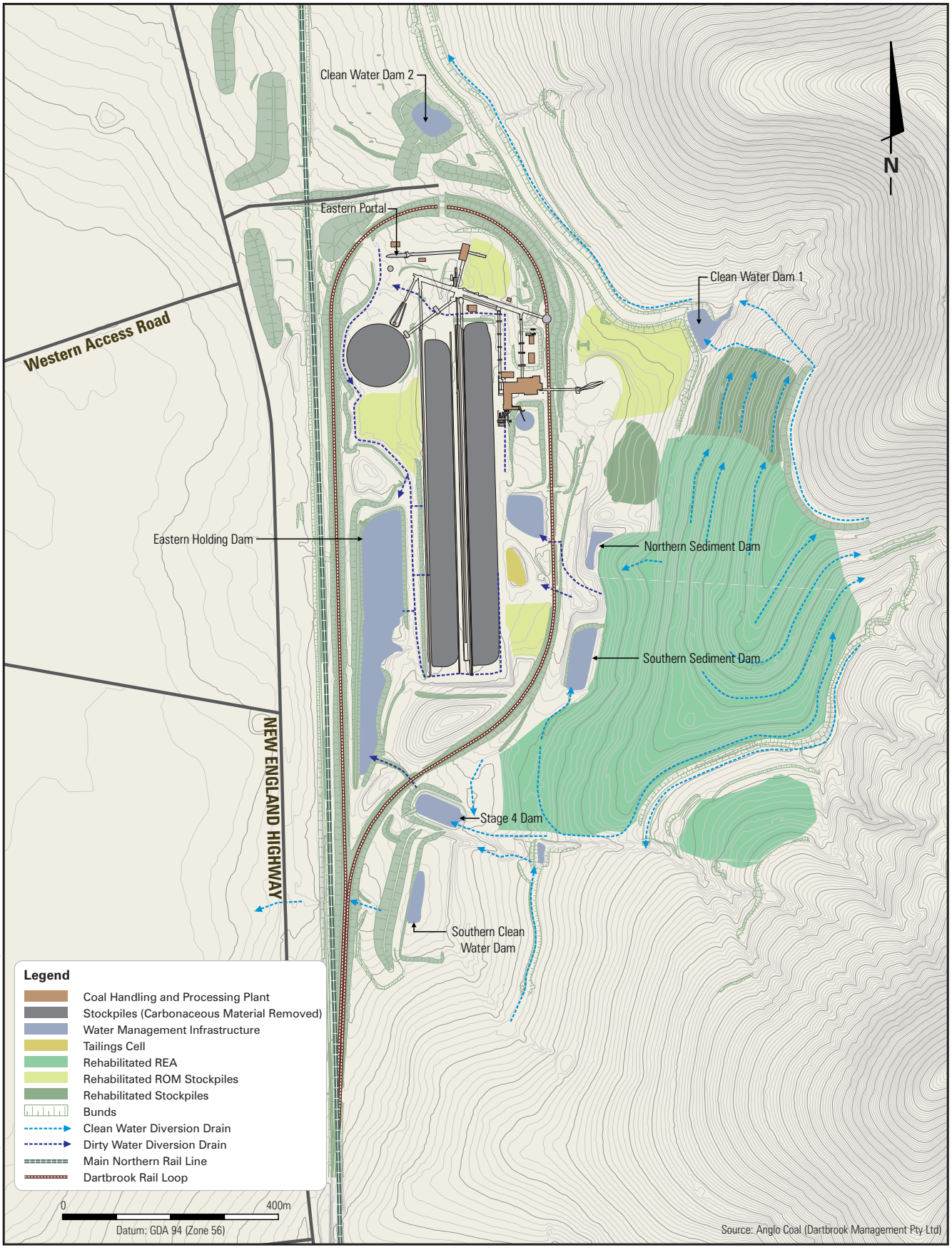


HB DARTBROOK Underground 2017 Annual Review HB1801 F3 Existing Environment - West Site 22 03 2018

DARTBROOK MINE

Existing Environment - West Site

FIGURE 3

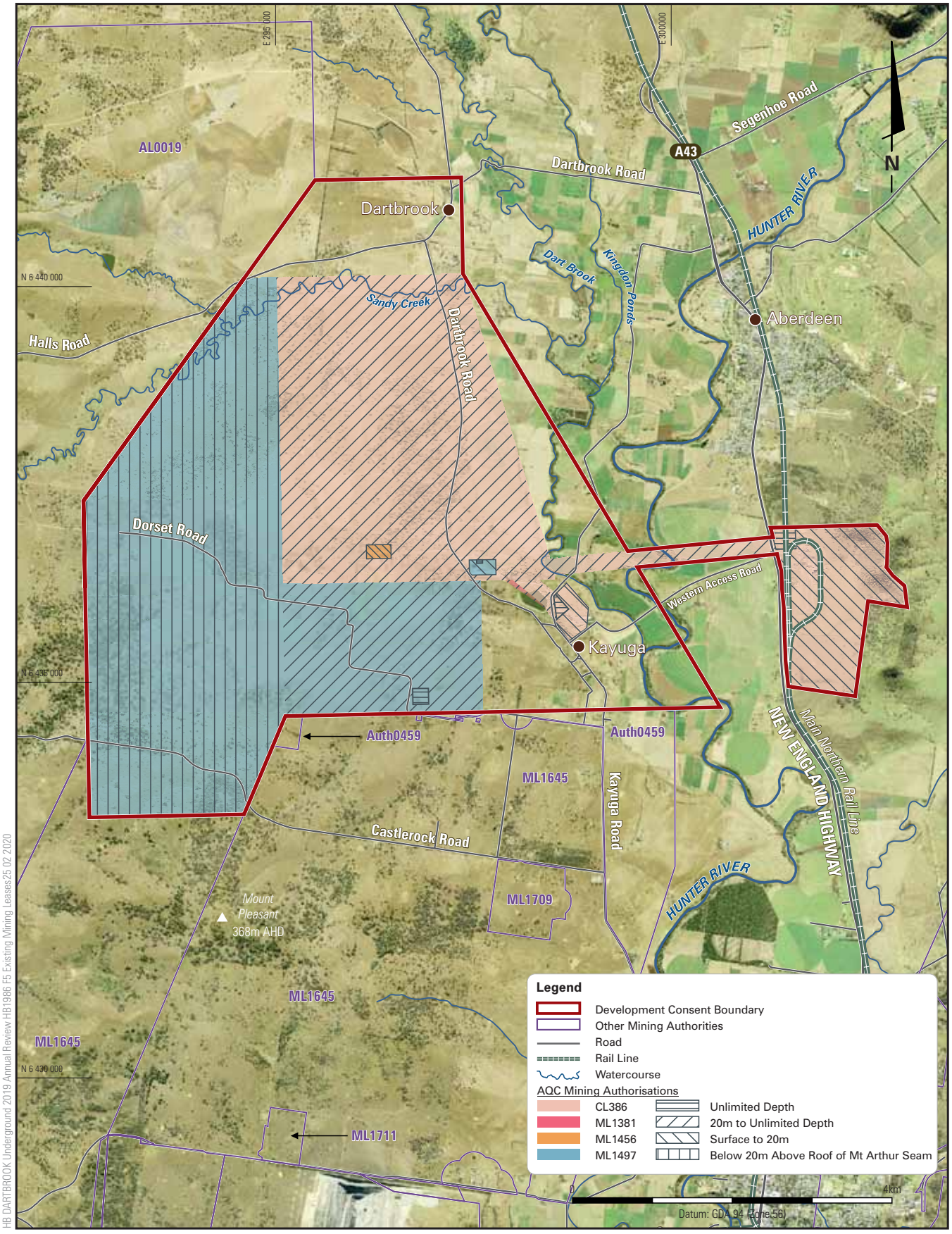


HB DARTBROOK Underground 2017 Annual Review HB1801 F4 Existing Environment - East Site 22 03 2018

DARTBROOK MINE

Existing Environment - East Site

FIGURE 4



DARTBROOK MINE

Existing Mining Leases

FIGURE 5

Note: EL4574, EL4575, EL5525 and A256 not shown on figure

2.4 DARTBROOK MINE CONTACTS

AQC has a team of environmental personnel that provide advice relating to environmental standards and procedures at Dartbrook Mine. The relevant contacts for environmental management at Dartbrook Mine are outlined in **Table 4**.

Table 4 Dartbrook Mine Contacts

Australian Pacific Coal Contacts	
CEO	David Conry
CFO & Company Secretary	Craig McPherson
Environmental Officer (seconded from Hansen Bailey)	Dorian Walsh
Statutory Mine Manager (Terrequip)	John Swan
Site Contact Details	
Dartbrook Mine Address	Dartbrook Mine Stair St, Kayuga NSW 2333
Dartbrook Postal Address	AQC Dartbrook Management Pty Limited PO Box 517, Muswellbrook NSW 2333
Phone Number	02 6540 8875
Facsimile Number	02 6541 1935
Dartbrook Care and Maintenance Contractor Phone Number	02 6540 8950
Dartbrook 24-hour Environment & Community Hotline	1300 131 058

3. APPROVALS SUMMARY

3.1 OVERVIEW

Dartbrook Mine operates within the Development Consent, Leases & Licences summarised in **Table 5**. A summary of minor amendments to DA-231-07-2000 that apply while Dartbrook Mine is on Care and Maintenance is provided in **Appendix A**.

The current MOP covers the period of ongoing Care and Maintenance activities from 1 January 2018 to 31 December 2020.

3.2 STATUS OF MANAGEMENT PLANS

Dartbrook Mine is required to develop and implement several Management Plans under DA 231-07-2000. **Table 6** outlines the environmental management plans utilised onsite and the approval date for each.

Table 5 Consents, Leases & Licences

Description	Approval Date	Expiry Date	Status/ Renewal Date	Approval Authority
Mining & Exploration Authorisations				
Authorisation 256	16/12/1980	02/05/2015*	Lodged 02/04/2015	DPIE-RR
Coal Lease (CL) 386	19/12/1991	19/12/2033	Due 19/12/2032	DPIE-RR
Mining Lease (ML) 1381	23/10/1995	23/10/2016*	Lodged 23/10/2015	DPIE-RR
ML 1456	27/09/1999	26/09/2020*	Lodged 19/09/2019	DPIE-RR
ML 1497	06/12/2001	05/12/2022	Due 5/12/2021	DPIE-RR
Exploration Licence (EL) 4574	13/08/1993	07/04/2015*	Lodged 7/04/2015	DPIE-RR
EL 4575	13/08/1993	23/05/2016*	Lodged 23/05/2016	DPIE-RR
EL 5525	22/09/1998	21/09/2016*	Lodged 29/09/2016	DPIE-RR
Development Consent				
DA 231-07-2000 (as modified)	28/08/2001	05/12/2022	Active	DPIE
Emplacement Area Approvals				
Approval for an Emplacement Area (s126 approval)	13/03/1996	N/A	Active	DPIE
Stage 4 Reject Emplacement Approval C95/2265 (s126 approval)	02/01/2000	N/A	Active	DPIE

Description	Approval Date	Expiry Date	Status/ Renewal Date	Approval Authority
Approval for 14° slopes in the REA Stage 4 (s126 approval)	18/12/2003	N/A	Active	DPIE
Application for Discontinuance of Use of Emplacement Areas (s101 approval)	13/08/2007	Ongoing	Active	DPIE
Licences				
Environmental Protection Licence 4885	Granted 30/11/2000	N/A	Active	EPA
Notification to Work Cover for storage and handling of Dangerous Goods	10/11/2005	N/A	Active	Safe Work NSW
Notification and Declaration to WorkCover that no dangerous goods stored or handled at Dartbrook Mine	Submitted 13/12/2006	N/A	Active	Safe Work NSW
Radiation Licence 5061080	1/07/2013	14/08/2020	Active	EPA
Surface Water Licences	Various	Various	Active	DoI-Water
Bore Water Licences for Stock, Water and/or Domestic Use	Various	Various	Active	DoI-Water
Other				
Suspension of Mining Operations for Care and Maintenance under Section 70 (1) and Suspension of Conditions under Section 168 (1) of the Mining Act 1992, in respect of CL 386, ML 1381, ML 1456 & ML 1497	Suspension of Mining Operations was extended on 31/12/2014	31/08/2018*	Lodged 31/08/2018	DPIE-RR
MOP for Care and Maintenance – Extension	18/12/2017	31/12/2020	Active	DPIE-RR
Revised MOP for Care and Maintenance Extension	Submitted 30/11/2020	31/12/2022	Lodged	DPIE-RR

*Note: * Application lodged with DPIE-RR*

Table 6 Dartbrook Mine Underground Management Plans and Strategies

Management Plan/Program	Approval Date
Environmental Management Strategy	15/04/2002
Archaeology and Cultural Management Plan	09/12/2002
Blast Management Plan*	09/12/2002
Bushfire Management Plan	19/05/2011
Construction Noise Management Plan*	7/11/2001
Dust Management Plan (DMP)	24/11/2015
Erosion and Sediment Control Management Plan	21/10/2014
Flora and Fauna Management Plan	02/11/2011
Land Management Plan	27/01/2002
Landowner Communication and Consultation Plan	09/12/2002
Landscape and Lighting Management Plan	02/11/2011
Longwall Subsidence Management Plan(s)*	22/13/2003
Noise Management Plan*	08/11/2007
Property Subsidence Management Plans*	22/12/2003
Site Water Management Plan (SWMP)	15/09/2015
Soil Stripping Management Plan*	31/05/2005
Spontaneous Combustion Management Plan	1/11/2016
Waste Management Plan	09/12/2002
Vibration Management Plan*	09/12/2002
Mine Closure Plan	Submitted 4/12/2020

** Generally, not applicable during Care and Maintenance operations*

4. OPERATIONS SUMMARY

4.1 EXPLORATION

No exploration activities were undertaken during the reporting period.

4.2 MINING OPERATIONS

As noted in **Table 5**, an application to extend the suspension of the labour and expenditure conditions of Dartbrook Mine's Coal and Mining Leases was lodged in August 2018.

A revised Care and Maintenance MOP was lodged with the Resources Regulator on the 30 November 2020. Further, a revised Mine Closure Plan was also lodged with the relevant regulatory authorities on 4 December 2020 to full fill the requirements of Condition 2.1(e) of Schedule 2 of DA 231-07-2000 and Condition 2(4) of ML1456 and ML1497. Both documents were awaiting review approval from the relevant regulators at the end of 2020.

Table 7 confirms that coal was not processed or transported under Care and Maintenance activities during the reporting period.

4.2.1 Land Preparation

Under Care and Maintenance, land preparation has been restricted to minor works for general maintenance of the site. A Permit to Disturb is obtained prior to the commencement of any activity that will cause surface disturbance.

The Permit to Disturb considers issues such as land ownership, archaeology, threatened flora and fauna species, surrounding infrastructure and rehabilitation techniques.

Limited land preparation work was undertaken in the reporting period. Permits to Disturb were prepared before these works commenced to ensure appropriate environmental controls were in place.

No topsoil was stripped for mining purposes in 2020. Topsoil and overburden continue to be stockpiled at suitable locations onsite. No topsoil or overburden was moved or actively used in 2020.

Table 8 provides an estimate of the quantity of topsoil available to be used for future rehabilitation works.

Table 7 Production Summary

Material	Unit	Approved Limit	Actual Quantity (2019)	Actual Quantity (2020)	Forecast Quantity (2021)
Waste Rock / Overburden	Mbcm	N/A	0	0	0
ROM Coal	Mt	6 Mtpa	0	0	0
Coarse Reject	Mt	N/A	0	0	0
Fine Reject	Mt	N/A	0	0	0
Product Coal	Mt	N/A	0	0	0

Table 8 Topsoil and Overburden Stockpile Status

Activity / Area	Cumulative Production (t)		
	Start of Period 01/01/2020	End of Period 31/12/2020	End of next period 31/12/2021
Topsoil Stripped	0	0	0
Topsoil used / spread	0	0	0
Topsoil Stockpile	14,780	14,780	14,780
Overburden Stockpiles and Bunds	655,747	655,747	655,747

4.2.2 Operations Summary

Operations were conducted generally in accordance with the existing Care and Maintenance MOP and as a result, no coal was processed in 2020.

Head contractor Terrequip were responsible for Dartbrook Mine's Care and Maintenance operations during the reporting period. Terrequip are the current Statutory Managers responsible for Care and Maintenance operations at Dartbrook Mine in relation to AQC's obligations under the *Mining Act 1992*.

Terrequip conducted daily tasks required to maintain the site. These included (but were not limited to) the servicing and maintenance of equipment such as pumps, mine ventilation fans, electrical apparatus and underground mine vehicles.

Routine maintenance of the CHPP was undertaken during the reporting period, which involved minor repairs to structural items.

Other routine tasks included road works, housekeeping, inspections, monitoring and reporting associated with the maintenance of the underground mine.

Access to the underground mine was retained via the Hunter Tunnel and Wynn Seam Portal from the East and West sites, respectively. The underground air quality is monitored utilising a tube bundle system and CITECT. Statutory inspections of accessible areas of the underground workings were conducted during the reporting period by Terrequip.

4.3 WASTE MANAGEMENT

4.3.1 Process Mineral Waste

Dartbrook Mine did not process any mineral waste during the reporting period.

Mineral waste at Dartbrook Mine is confined to the REA, the footprint of which covers approximately 29 ha. Final rehabilitation of the majority of the REA was completed in mid-2007, with monitoring and appropriate maintenance works being undertaken since that time.

Temperature monitoring and inspections of the REA are conducted regularly to check for spontaneous combustion potential. Temperature monitoring results for the REA are provided in **Section 6.10**. No elevated results were recorded during the reporting period.

There was no disposal of coarse reject materials in the REA or tailings or fines in the mine goaf during the reporting period.

REA drainage was maintained in 2020. The drainage basin and the trash trap flowing into the underground pipe in the REA were kept clean to ensure that the pipeline was kept in working order.

A geotechnical inspection of the REA was last undertaken by Douglas Partners in February 2019. The inspection reviewed current monitoring and management arrangements in place for the REA and found that overall, the risk of slope failure of the REA under static conditions was very low. The next independent assessment of the REA is planned to be undertaken in the next reporting period.

Internal environmental / rehabilitation inspections of the REA were conducted regularly throughout the year. These inspections confirmed that rehabilitated areas of the REA were generally in good condition throughout the reporting period, with good grass cover maintained.

4.3.2 Non-Process Waste Management

Dartbrook Mine produces a range of non-mineral waste materials as a result of its activities onsite. To maximise recycling opportunities onsite, Dartbrook Mine utilises a colour coded recycling system. Remondis are responsible for the removal and disposal of all non-process waste generated onsite.

Offsite treatment and disposal facilities are used to ensure that all waste is appropriately tracked, disposed of and reported, in accordance with the Dartbrook Mine Waste Management Plan.

Table 9 provides a summary of waste tracked at Dartbrook Mine during the reporting period.

4.3.3 Hazardous Materials Management

No licensable quantities of dangerous goods were stored or used at Dartbrook Mine during the reporting period. There are nominal quantities of hazardous substances required for use at Dartbrook Mine during Care and Maintenance.

A permit system is in place for the introduction of chemical substances to site and a register of these is maintained. When substances are no longer required, they are removed from site.

Dartbrook Mine also has a licence to possess radiation apparatus, which is imbedded in the coal quality monitoring equipment at the CHPP.

Table 9 Waste Generation

Waste Type	Disposal	Quantity in 2019	Quantity in 2020
General Waste - Non-hazardous (t)	Landfill	3.1	3.75
Scrap Metal (t)	Recycled	2.8	2.68
Office Paper and Co-mingled Recyclables (t)	Recycled	0.2	0.07
Hazardous Waste – Sewage Sludge (Litres)	Treatment	0	0
Waste Oil (Litres)	Recycled / Treatment	0	4,200
Hazardous Waste - Chemical Anchors / Resins (t)	Treatment	0	0
	Approved Landfill	0	0

4.4 ROM & PRODUCT COAL STOCKPILES

The capacity and current status of the coal stockpile areas is listed in **Table 10**. No coal was stored on any stockpile in 2020.

4.5 CONSTRUCTION & DEMOLITION

No construction or demolition activities were undertaken during the reporting period.

4.6 NEXT REPORTING PERIOD

Care and Maintenance operations at Dartbrook Mine during the next reporting period will be generally consistent with the Care and Maintenance MOP.

As noted in **Section 2.3,** AQC announced in November 2019 that an appeal had been lodged in the NSW Land and Environment Court over the determination of the DA 231-07-2000 (MOD7). An update on the appeal and associated changes to site activities will be included in the next Annual Review.

Table 10 Coal Stockpile Status

Stockpile	Coal Type	Capacity (Tonnes Approx.)	Status
Emergency Stockpile	ROM	50,000	Rehabilitated
Circular Stockpile	ROM	80,000	Cleared of coal material
Eastern ROM stockpile	ROM	185,000	Rehabilitated
Western ROM Stockpile	ROM	90,000	Rehabilitated
Southern ROM Stockpile	ROM	70,000	Rehabilitated
Northern ROM Stockpile	ROM	5,000	Rehabilitated
Rectangular Product Stockpile No. 1	Product	200,000	Cleared of coal material
Rectangular Product Stockpile No. 2	Product	200,000	Cleared of coal material
Reject Stockpile	Reject	20,000	Cleared of coal material
TOTAL		**900,000**	

5. ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

AQC consulted with relevant regulatory agencies throughout the previous reporting period to identify the key issues for consideration in this Annual Review.

Correspondence was received from DPIE on 3 June 2020 following their review of the 2019 Annual Review which confirmed that the document satisfied the relevant reporting requirements under DA 231-07-2000 and the 2015 *Annual Review Guideline*. DPIE-RR did not raise any specific issues to be addressed in the 2020 Annual Review.

6. ENVIRONMENTAL MANAGEMENT AND PERFORMANCE

6.1 OVERVIEW

An internal Environment Management System (EMS) has been developed and implemented for Dartbrook Mine. The EMS provides a systematic risk-based approach to the management of safety, health, and environmental aspects associated with the environment.

The EMS reflects the Care and Maintenance status of the mine and accommodates the relevant procedures for the Statutory Mine Area. Internal operational inspections of rehabilitation, water, biodiversity and hydrocarbon management components of the EMS were undertaken regularly in 2020. These inspections did not identify any operational non-compliances.

Table 11 provides a summary of the environmental management actions undertaken during 2020.

Table 11 Environmental Management Overview

Aspect	Performance during 2020	Trends	Management Actions
Air Quality	Elevated 24-hour PM10 concentrations at all five HVAS sites (see **Section 6.3.2**).	The site has been in Care and Maintenance since 2007. Elevated air quality monitoring results were reviewed and confirmed to be a result of external influences and not Dartbrook activities.	Monitoring of PM10 (see **Section 6.3**).
Greenhouse	116,616 tonnes of CO_2 equivalent gas (CO_2-e) was emitted (Scope 1 – 3) during the 2019/20 reporting period.	Increase in monitored CO_2-e emissions on site compared to 2018/19 reporting period.	Methane and CO_2 from the underground workings are released via Ventilation Shaft No. 1 (see Section 6.14)
Noise	Noise levels produced by Care and Maintenance activities are minimal	Noise levels have remained relatively low since the suspension of mining in 2006.	Dartbrook Mine has an exemption from noise monitoring requirements during Care and Maintenance (see **Section 6.6**)
Visual	The tree screen adjacent the New England Highway continued to develop satisfactorily	The tree screen has steadily developed since it was planted in 2011	Ongoing monitoring of tree screen performance
Biodiversity	River Red Gum restoration areas and the Forestry Plantation continued to develop	These areas continue to progress	Inspections of the River Restoration and Forestry Plantation areas. Weed and feral animal control (see **Section 6.5**).
Heritage	No additional impacts to Aboriginal or European heritage items	No impacts to heritage items have occurred during the Care and Maintenance period	General maintenance of European Heritage sites

Aspect	Performance during 2020	Trends	Management Actions
Subsidence	No additional subsidence Previously remediated areas have remained stable	No changes in trends. Additional subsidence impacts were not observed during the reporting period	Annual visual inspections of previously subsided areas (see **Section 6.12**)

6.2 METEOROLOGY

6.2.1 Environmental Management

Dartbrook Mine has two operating meteorological stations, Met-01 and Met-02. The locations of these sites are shown on **Figure 6.** Both meteorological monitoring sites are operated via real-time telemetry to assist with accurate data acquisition.

For reporting purposes (and discussion in this Annual Review), Dartbrook Mine generally uses data from Met-02 due to the availability of long-term data (from 1995 to the present).

6.2.2 Environmental Performance

Rainfall

During the reporting period, a total of 842.8 mm of rainfall was recorded over 146 rain days. This was significantly higher than the total rainfall received in 2019 of 382mm and 380mm in 2018. This was also above the long-term annual average rainfall of 576mm. An annual rainfall summary is provided in **Table 12,** with a further comparison to long-term monthly averages included in **Appendix B**).

Temperature

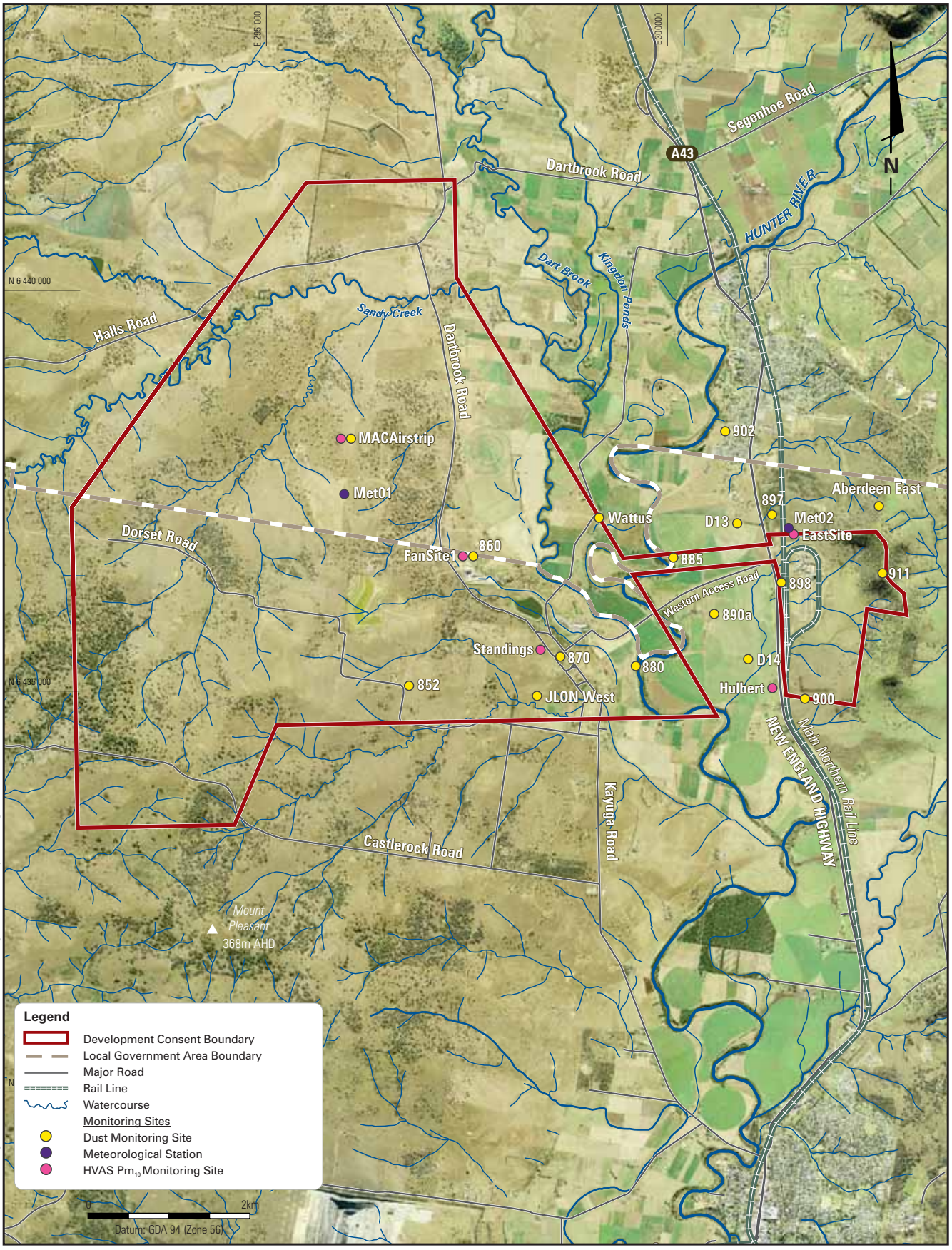
Monthly maximum, average and minimum temperatures recorded at Dartbrook Mine are presented in **Table 13**. January was the warmest month in 2020 with an average daily temperature of 26.7 °C and a maximum temperature of 43.3 °C. July was the coldest month with an average daily temperature of 11.2 °C.

Table 12 Rainfall Summary 2020

Month	Rainfall (mm)	Cumulative Rainfall (mm)
January	76.4	76.4
February	153.2	229.6
March	57.0	286.6
April	90.4	377.0
May	34.2	411.2
June	34.6	442.4
July	85.2	531.2
August	28.0	559.2
September	32.6	591.8
October	112.6	704.4
November	28.0	732.4
December	110.6	842.8

Table 13 Monthly Temperature Summary 2020

Month	Min Temperature (°C)	Avg Temperature (°C)	Max Temperature (°C)
January	17.1	26.7	43.3
February	13.5	23.4	41.7
March	10.5	20.0	34.6
April	5.3	17.9	30.7
May	0.3	13.0	25.3
June	1.1	11.7	21.3
July	0.0	11.2	21.6
August	-0.8	11.8	23.5
September	2.4	15.8	28.8
October	5.8	18.6	32.4
November	8.4	21.6	40.8
December	9.9	21.9	40.7
Average	6.1	17.8	32.1



HB DARTBROOK Underground 2017 Annual Review HB1801 F6 Meteorological and Air Quality Monitoring Network 12 03 2019

DARTBROOK MINE

Meteorological and Dust Monitoring Locations

FIGURE 6

Wind Speed & Direction

In 2020, prevailing winds were generally consistent with long term regional trends.

Table 14 provides a summary of the data captured at Dartbrook Mine in 2020. Monthly wind roses compiled from Met-02 are provided in **Appendix B**.

Table 14 Wind Summary 2020

Month	% Period with Wind Speed <3.0 m/s	% Period with Wind Speed >3.0 m/s	Predominant Wind Direction
January	41.6	58.4	SSE
February	53.8	46.2	SSE
March	61.2	38.8	SSE
April	68.8	31.2	N
May	71.9	28.1	N/NNE
June	73.8	26.2	N/ NNW
July	77.8	22.2	N
August	60.2	39.8	N
September	58.8	41.2	NNE
October	65.2	34.8	NNE
November	59.5	40.5	SSE
December	49.3	50.7	SE

6.2.3 Next Reporting Period

Dartbrook will continue to monitor meteorological conditions on site and will report results in the next Annual Review.

No upgrades to the existing meteorological monitoring infrastructure are planned.

6.3 AIR QUALITY

6.3.1 Environmental Management

Potential impacts to air quality at Dartbrook include airborne dust and odour. These impacts are managed in accordance with the onsite EMS, DA 231-07-2000 conditions and relevant environmental management plans, including the Dust Management Plan (DMP). The DMP is the primary tool used to minimise and control dust impacts onsite.

Coal stockpile areas and the REA have been previously cleared of coal material and revegetated (see **Figure 4**) in order to minimise potential dust emissions during Care and Maintenance. Dartbrook Mine does not generally undertake activities that generate visible dust during Care and Maintenance.

Dust Monitoring Criteria

The air quality standards and goals specified in Schedule 2, Condition 6.1 of DA 231-07-2000 (MOD7) are presented in **Table 15**.

Dartbrook Mine maintains an air quality monitoring network consisting of 17 dust deposition gauges and 5 High Volume Air Samplers (HVAS), the locations of which are shown in **Figure 6**. However, not all of these monitoring locations are included as compliance monitoring locations in the approved DMP.

The compliance monitoring network in the approved the DMP includes:

- Five depositional dust gauges:
  - Three dust deposition gauges at locations representative of the closest private residences to the East Site (including Aberdeen);
  - Two dust deposition gauges at locations representative of the closest private residences to the south and west of the West Site surface facilities; and
- Two PM10 monitoring locations, one located to the south of the CHPP and one south of the West Site workshop, which are representative of the closest private residences; and
- Meteorological stations at the East and West Sites (see **Section 6.2**).

Table 15 Dartbrook Mine Air Quality Criteria

Pollutant	Averaging Period	Criterion
Particulate Matter < 10 µm (PM_{10})	Annual	[a, c] 25 µg/m³
	24 hour	[b] 50 µg/m³
Particulate Matter < 2.5 µm ($PM_{2.5}$)	Annual	[a, c] 8 µg/m³
	24 hour	[b] 25 µg/m³
Total suspended particulate (TSP) matter	Annual	[a, c] 90 µg/m³
Depositional Dust* (g/m2/month)	Annual (total)	4 (g/m2/month)
	Annual (increase over existing levels)	2 (g/m2/month)

**Criteria applicable to the DMP only*

Notes:

a Total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to all other sources).

b Incremental impact (i.e. incremental increase in concentrations due to the development on its own).

c Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents or any other activity agreed by the Secretary.

6.3.2 Environmental Performance

Dust Deposition

During the reporting period, dust monitoring continued at 17 dust deposition monitoring sites located throughout the area.

Results from dust deposition gauges are expressed as insoluble solids, comprised of combustible matter (or organic matter) and ash residue. Ash residue is considered to be more representative of the dust component (from soils and weathered rock) while the remainder, typically organic matter, includes bird droppings, leaf or grass litter, insects and coal.

Standard units for depositional dust are reported in g/m²/month. Most insoluble solid results that are above 4 g/m²/month undergo an XRD scan (microscopic examination) of the combustible matter to determine whether the material is carbonaceous, organic matter or sandy clay matter.

Appendix C presents results of air quality monitoring undertaken throughout the year.

Table 16 and **Figure 7** summarise the annual average deposition rate of insoluble solids and the ash component.

'Contaminated samples' as listed in **Appendix C** were excluded from calculations of annual average dust deposition rates. Contaminated samples collected during the reporting period generally contained varying levels of bird droppings, vegetation and insects.

Results where the monthly Insoluble Solids recorded are greater than 4 g/m²/month are displayed in **Appendix C**. As Dartbrook Mine is not operating, the majority of elevated dust results can be attributed to elevated background levels generated by farming, grazing activities and other industries on adjacent lands.

The annual average dust deposition for insoluble solids during the reporting period ranged from 0.95 g/m²/month (at Site Aberdeen East, southeast of Aberdeen) to 3.34 g/m²/month (at Site 885, Frazer farm paddock).

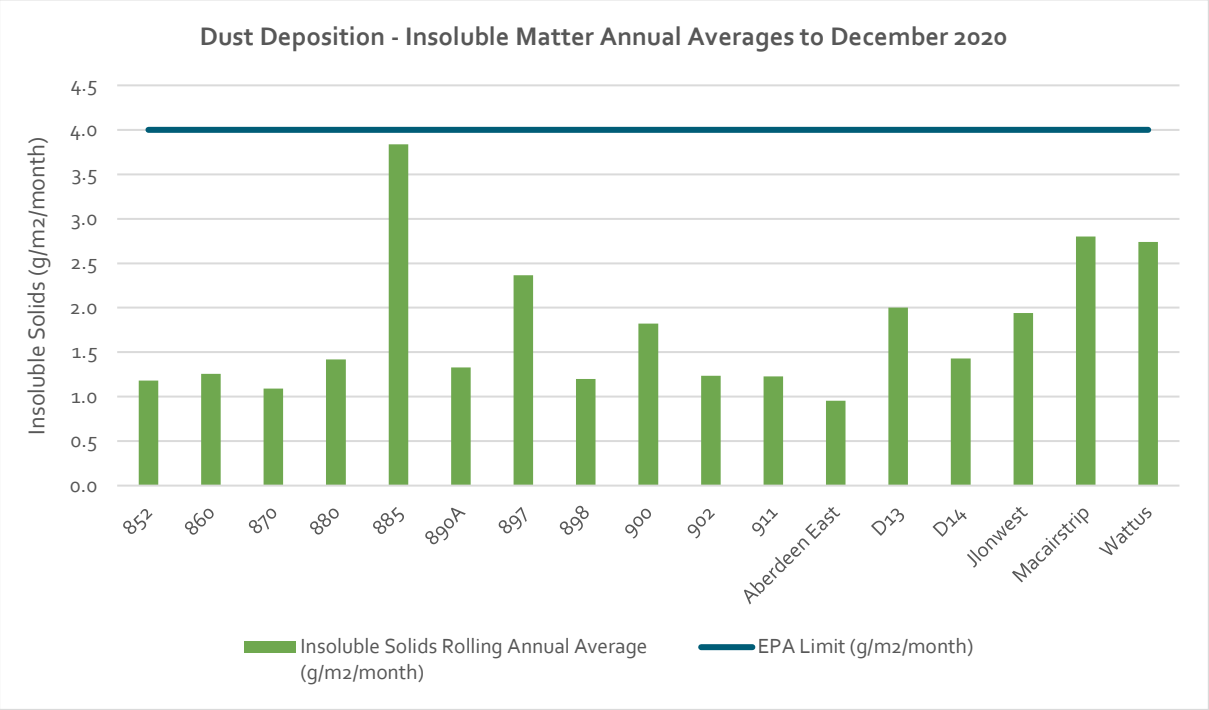
All sites recorded annual average dust deposition rates below the limit of 4 g/m²/month, as of December 2020.

Table 16 Annual Rolling Average Dust Deposition for 2020

Site	Location Description	Insoluble Solids (g/m²/month)	Number of Samples
852	Dorset Road	1.18	12
860	No. 1 Vent Shaft	1.26	12
870	Kayuga Village	1.09	12
880	Hunter River / Dart Brook Junction	1.42	12
885	Frazer Farm paddock near Hunter River	3.84	12
890a	Garoka Dairy	1.33	11*
897	Eastern Site North	2.37	12
898	Eastern Site West	1.20	12
900	Eastern Site South	1.82	12
902	Aberdeen Tree Screen	1.23	12
911	Browns Mountain	1.23	11**
Aberdeen East	South east of Aberdeen	0.95	11**
D13	Residence northwest of CHPP	2.00	12
D14	Southwest of CHPP	1.43	12
JLON West	Residence south of West Site	1.94	12
Macairstrip	Northwest of West site	2.80	12
Wattus	Between Dart Brook and Hunter River	2.74	12

**Not recorded*
***Not sampled in December 2020 as unable to access*

Figure 7 **Depositional Dust Annual Averages 2020**



High Volume Air Samplers

Dartbrook Mine has five HVAS that monitor PM10 (particulate matter less than 10 microns) dust concentration.

Dust is monitored for a 24-hour period on a 6-day cycle. Where samples are not captured due to programming or other technical issues with the monitors, a program re-run is undertaken to capture missing data. Sample analyses are carried out in accordance with the relevant Australian Standards. The locations of the HVAS are illustrated in **Figure 6** and described in **Table 17**.

The data recovery rate was 100% for all HVAS sites in 2020. There was one program re-run undertaken on 6 January 2021 at HVAS ESMS, as a result of a power outage during the run time on the 28 December 2020. All sites were compliant with the NEPC standard for data capture, which requires recovery of data to be greater than 75%.

As shown on **Figure 8**, elevated 24-hour average PM10 results for the HVAS in exceedance of the DA 231-07-2000 criteria of 50 µg/m^3 were recorded at all five monitors on 21 January 2020. A summary of the elevated 24-hour PM10 results is provided in **Table 18**. Given that Dartbrook is currently under Care and Maintenance, there are no activities at the site that have the potential to cause exceedances of the air quality criteria. The elevated PM_{10} concentrations recorded on 21 January 2020 are more likely to be attributable to other activities in the locality.

Table 19 presents the Annual Average PM10 concentrations at the five HVAS during the reporting period and compares these with the predictions in the EIS and subsequent modifications. As shown by the table, PM10 concentrations recorded in the Dartbrook Mine HVAS sites were less than the levels predicted in the EIS and the relevant DA 231-07-2000 annual criteria of 25 µg/m^3 at all sites during the reporting period.

Annual average TSP concentrations for the five HVAS sites were calculated based on measured PM10 values and are presented in **Figure 9**. These results show that the monitored annual average for the reporting period did not exceed the relevant air quality goals for TSP from DA 231-07-2000.

6.3.3 Next Reporting Period

Dust mitigation and control activities will continue to be employed as required. Air quality monitoring will continue in accordance with the DMP.

Table 17 HVAS Monitoring Sites for PM10 and TSP

HVAS Site	Location
East Site Meteorological Station (ESMS)^	East Site, north of the CHPP
Fan Site Number 1 ^	West Site, adjacent to the ventilation fan
Hulbert*	East Site, south-south-west of the CHPP
Standings*	West Site, south of the surface infrastructure
Macairstrip^	West Site, centre of the Mining Leases

** Representative of Private Receiver*
^ Internal Management Site

Table 18 Elevated 24-hour PM10 Monitoring Results 2020

Monitoring Date	Location	24-hour PM10 Result (µg/m³)
21/01/20	ESMS	61
	Fan site 1	99
	Hulbert	53
	Standings	50
	Macairstrip	57

Table 19 Comparison of Measured Annual Average PM10 Concentrations with EIS Predictions

Location	Units	EIS Predicted Annual Average PM10	Annual Average PM10 Results 2020
ESMS	µg/m3	20.1	15.5
Fan site 1	µg/m3	18.7	16.2
Hulbert	µg/m3	17.4	15.1
Standings	µg/m3	17.3	15.2
Macairstrip	µg/m3	17.0	15.5

Figure 8 **HVAS 24-hr Average PM10 Results 2020**

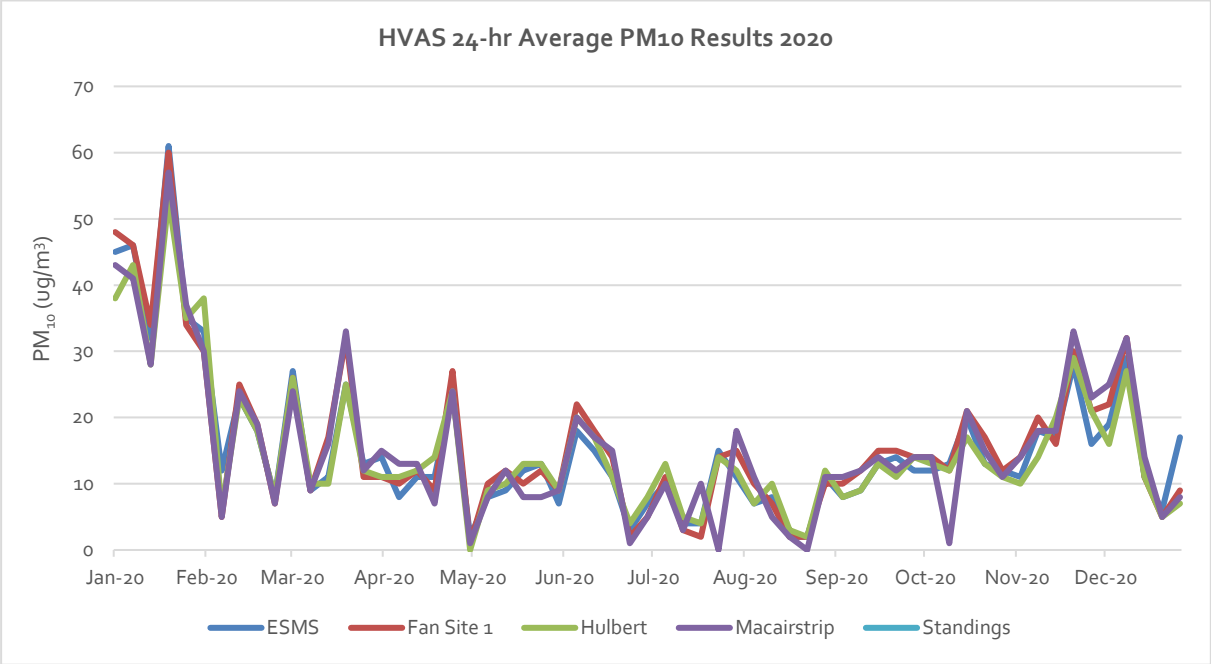
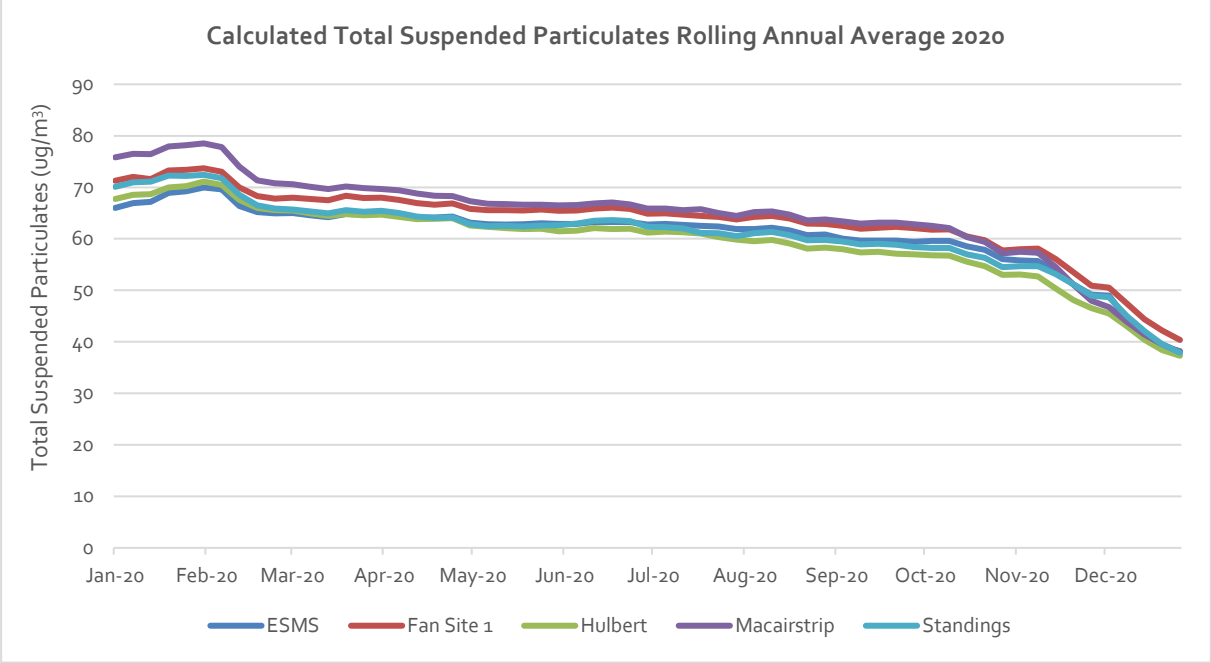


Figure 9 **Calculated Rolling Annual Average TSP Concentrations 2020**



6.4 THREATENED FLORA AND FAUNA

6.4.1 Environmental Management and Performance

In terms of threatened flora and fauna species and habitat values, the Dartbrook Mine environment is a highly modified and fragmented environment of low ecological significance.

Ecological studies previously undertaken at Dartbrook Mine in 2011 (the study) identified two communities listed as Endangered under the *Threatened Species Conservation Act 1995* (now replaced by the *Biodiversity Conservation Act 2016* (BC Act)) within the mining authorisations. This included approximately:

- 2,252 ha of Upper Hunter White Box Grassy Woodland (Box Gum Woodland); and
- 54 ha of Hunter Floodplain Red Gum Woodland.

Two threatened plant species were also identified in this study, including:

- Austral Toadflax (*Thesium australe*); and
- Black Orchid (*Cymbidium canaliculatum*).

The study also found six fauna species that are listed as either threatened under the BC Act or migratory under the Commonwealth Environmental Protection and Biodiversity Act 1999 (EPBC Act).

These species included:

- Eastern Bentwing Bat (*Miniopterus schreibersii oceanensis*), listed as vulnerable under the BC Act;
- Large-footed Myotis (*Myotis macropus*), listed as vulnerable under the BC Act;
- Speckled Warbler (*Chthonicola sagittata*), listed as vulnerable under the BC Act;
- Little Eagle (*Hieraaetus morphnoides*), listed as vulnerable under the BC Act;
- Rufous Fantail (*Rhipidura rufifrons*), listed as marine and migratory under the EPBC Act; and
- White-throated Needletail (*Hirundapus caudacutus*), listed as marine and migratory under the EPBC Act.

Flora and fauna impacts, including all identified threatened and endangered species, are managed in accordance with the approved Flora and Fauna Management Plan.

Care and Maintenance operations at Dartbrook Mine generally do not require the clearing of vegetation. Where minor disturbance is required during Care and Maintenance, activities are undertaken to minimise disturbance to vegetation. A Permit to Disturb system is also used prior to any disturbance to check areas for any significant flora or fauna issues.

6.4.2 Next Reporting Period

Fauna and flora communities on site will continue to be managed in accordance with the approved Flora and Fauna Management Plan. In circumstances where clearing is required, a Permit to Disturb will be completed and appropriate pre-clearing surveys will continue to be undertaken by qualified ecologists.

The native forest tree screen along the New England Highway and the area north of the CHPP, which is planted with native forest will continue to be monitored and maintained. Inspections of the River Red Gum and Forestry Plantation Project areas will also continue.

6.5 NOXIOUS WEEDS AND FERAL ANIMALS

6.5.1 Environmental Management and Performance

The management of noxious weeds and feral animals forms an integral part of the ongoing land management practices adopted for the site as described in the approved Land Management Plan.

Weed Management

Noxious weeds such as African Boxthorn, St John's Wort, Galenia, Bathurst Burr and Green Cestrum have been located on Dartbrook Mine owned land in the past. Their control continued to be a key land management objective during the reporting period.

The control of weeds on the alluvial river flats and riverbank areas on AQC owned land also provides management challenges and AQC seeks to work with their leaseholders to manage weed outbreaks in these areas.

Dartbrook Mine maintains a register which outlines the location of the weeds identified, method for control of the weeds and the control works undertaken across the site.

Weed management activities undertaken in 2020 included continued targeted spraying of African Boxthorn, Prickly Pear, Green Cestrum and Blue Heliotrope. In addition, Dartbrook Mine's leaseholders continued to manage weeds on AQC owned lands used for agricultural purposes.

Feral and Pest Animal Management

Feral and pest animal control at Dartbrook Mine continued during 2020 and was largely focused on kangaroos, feral dogs and pigs.

6.5.2 Next Reporting Period

Site personnel and will continue to undertake weed and feral animal inspections and management across the Dartbrook Mine lands in the next reporting period.

6.6 OPERATIONAL NOISE

6.6.1 Environmental Management

In 2012, the DPIE granted approval for Dartbrook Mine to suspend noise monitoring while under Care and Maintenance. The Care and Maintenance strategy involves low level noise equipment and machinery operation for maintenance activities only. Since coal is not mined at site, there currently is no need to operate production equipment or the CHPP.

6.6.2 Environmental Performance

Noise monitoring would re-commence should Dartbrook Mine recommence active operations.

6.7 VISUAL AND LIGHTING

6.7.1 Environmental Management and Performance

Dartbrook Mine facilities may still have the potential to generate visual and stray light impacts for sensitive receivers located in the surrounding environment during Care and Maintenance. With the use of tree screens, earthen bunds, fencing and shielding, the impacts of visual and stray light are minimised.

The approved Landscape and Lighting Management Plan (LLMP) includes a description of the extent of bunding and screening implemented across the mining authorisation.

A 75-ha forestry plantation was established north of the CHPP in 2003 and is detailed further in **Section 8.4**. As the trees continue to mature, they will provide additional screening of the township of Aberdeen from views of the CHPP.

In 2010, a Tree Screen was developed along the Western Side of the New England Highway in the vicinity of the CHPP to provide a visual buffer for motorists. The tree screen is surveyed on an annual basis and continued to be maintained during the reporting period.

6.7.2 Next Reporting Period

Maintenance of the tree screening areas will continue as required, subject to the prevailing weather conditions.

6.8 ABORIGINAL HERITAGE

6.8.1 Environmental Management and Performance

There are over 100 known Aboriginal heritage sites identified within the mining authorisations of Dartbrook Mine. Sites that are located within the vicinity of the approved surface facilities are fenced and signposted to ensure their protection.

As described in **Section 4.2**, AQC has a Permit to Disturb system in place for planned disturbance activities on site. Part of the permit process includes a pre-disturbance requirement to check the location of planned disturbance against a database of the known Aboriginal site locations, to ensure that potential impacts are avoided.

6.8.2 Next Reporting Period

The existing Permit to Disturb process will continue to be used prior to any surface disturbance to minimise the potential for disturbance to Aboriginal heritage items.

6.9 EUROPEAN HERITAGE

6.9.1 Environmental Management and Performance

Management of European heritage is undertaken in accordance with Dartbrook Mine's Archaeology and Cultural Heritage Management Plan.

General property maintenance works, such as mowing, slashing and fence repairs were ongoing during 2020 to protect the European heritage items under the control of AQC. Such areas include continued work around the Riverview Homestead, Kayuga Homestead and the Dartbrook and Kayuga Cemeteries.

6.9.2 Next Reporting Period

AQC will continue existing efforts for the upkeep of the various European heritage sites on AQC lands.

6.10 SPONTANEOUS COMBUSTION

6.10.1 Environmental Management

The REA remained stable during the reporting period. The risks posed by potential spontaneous combustion at the REA continue to be classified as minimal.

Dartbrook Mine has an approved REA Spontaneous Combustion Management Plan (REA Plan), which outlines measures for monitoring and mitigating potential spontaneous combustion issues.

6.10.2 Environmental Performance

The REA underground temperature is monitored using 13 thermocouples installed in boreholes to measure the temperature of the reject's material. **Figure 10** provides the results of REA thermocouple monitoring from the reporting period.

The risk of spontaneous combustion continues to be considered 'low' as the REA has been fully rehabilitated and all coal material has been removed from the coal stockpiles (as discussed in **Section 8**).

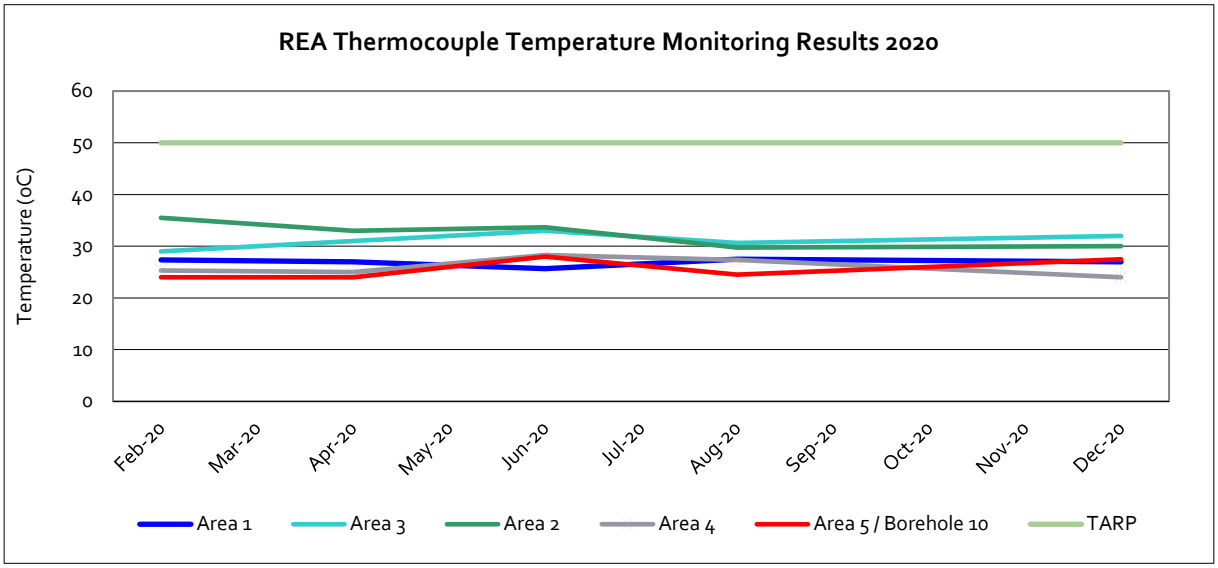
There were no incidents of spontaneous combustion during the reporting period. All temperature monitoring probes read satisfactorily. Temperatures remained generally stable and below the site TARP value of 50 °C (as provided in the approved REA Plan).

Appendix D shows the REA temperature monitoring summary from 2001 to the end of the reporting period. The REA is also monitored for sub-surface water level movements, which have remained relatively stable during the reporting period (as presented in **Appendix D**).

6.10.3 Next Reporting Period

REA thermocouple temperatures and piezometric water levels will continue to be monitored and reported in the next reporting period.

Figure 10 REA Thermocouple Temperature Monitoring Results 2020



6.11 BUSHFIRE

6.11.1 Environmental Management and Performance

As outlined in the Bushfire Management Plan, fire prevention is the primary management objective at Dartbrook Mine.

All surface facilities with the potential to create a fire hazard during Care and Maintenance are kept clear of combustible materials to minimise the risk of a fire within these areas.

The Site Access Road is slashed on a regular basis and most surface areas managed by AQC are also grazed by cattle, which assists in the control of the build-up of fuel loads.

Dartbrook Mine has a fire trailer equipped with a 1,000 L water tank and pump, which can be utilised for an initial response to any fire outbreaks if required.

6.11.2 Next Reporting Period

Bushfire fuel loads across the site will continue to be monitored and reduced (as required).

6.12 MINE SUBSIDENCE

6.12.1 Environmental Management

The management of the effects of subsidence is undertaken as detailed in the originally approved Property Subsidence Management Plans and the Longwall Subsidence Management Plan.

Current management generally involves an annual inspection of previously mined areas to determine if there are any ongoing impacts from subsidence, with remediation works being undertaken as required.

6.12.2 Environmental Performance

A total of 817.8 ha of land has subsided as a result of historic underground mining operations at Dartbrook Mine. The annual subsidence inspection included a review of areas previously subsided during mining of the Kayuga Seam longwall panels KA101 - KA103. The inspection found that the previously treated areas have remained stable.

6.12.3 Next Reporting Period

Annual inspections of previous subsidence areas will continue to be undertaken. Should any new areas be identified as requiring surface repair, remedial actions will be undertaken as soon as practicable. As part of the inspection process, previously remediated sites will be re-inspected to determine if additional repairs are required.

6.13 HYDROCARBON CONTAMINATION

6.13.1 Environmental Management and Performance

There are only minimal quantities of hydrocarbon-based products (such as oils or diesel fuels) stored or used at Dartbrook Mine during Care and Maintenance. This has greatly reduced the potential risk of contamination from such products.

Any oils or fuels that are required to be stored at Dartbrook Mine are appropriately bunded and maintained to prevent spillages to land or water.

The facilities have been constructed so that all drainage from the workshop and service areas flows by gravity into an oil separator for clarification before return to the Western Holding Dam (WHD). The separator and existing sump continued to be serviced and cleaned out regularly during the reporting period to ensure the system remains effective. Inspections of the workshop are ongoing to ensure good housekeeping standards are maintained.

Environmental training, which included spill response, water management and hydrocarbon management continued to be provided to new staff and contractors at the site.

Spill kits containing absorbent materials are strategically located on site to assist in containing and immediately cleaning up any spills should they occur. The West Site hardstand area also has controlled drainage, eventually reaching the WHD through the oil separation system.

During the reporting period, no new indications of contamination by petroleum hydrocarbons, polycyclic aromatic hydrocarbons, or heavy metals were identified.

6.13.2 Next Reporting Period

Environmental spill response awareness training will continue to be provided to new staff and contractors.

6.14 GAS DRAINAGE & VENTILATION

6.14.1 Environmental Management and Performance

The majority of gas from the underground mine workings is managed by mine ventilation and released through an upcast shaft. During Care and Maintenance, methane (CH_4) and carbon dioxide (CO_2) were vented to the atmosphere via Ventilation Shaft No. 1. All gas drainage boreholes previously used to extract gas from the mine goaf have been closed. These sites continued to be regularly inspected during the reporting period.

Scope 1 emissions are from underground fugitives (split into methane and carbon dioxide); or use of diesel, petrol, LPG, oils and greases. Scope 2 emissions are those from the use of electricity on site. **Table 20** provides the 2019/2020 total greenhouse gas emissions, as reported under the National Greenhouse and Energy Reporting (NGER) scheme. The total emissions are calculated from both Scope 1 and Scope 2 emissions.

As shown in **Table 20**, a total of 116,616 tonnes of CO_2 equivalent gas (CO_2-e) was emitted during the 2019/2020 National Greenhouse and Energy Reporting (NGER) period. The main contributor to total emissions was CH_4 gas emitted from the underground mine (102,699 tonnes CO_2-e). The total greenhouse gas emissions value for the 2019/20 NGER period is higher than the 104,260 tonnes CO_2-e reported in the 2019 Annual Review.

6.14.2 Next Reporting Period

Gas emissions, electricity usage and fuel use will continue to be calculated and reported in accordance with relevant legislative requirements.

Table 20 Greenhouse Gas Emissions during 2019/2020 NGER period

Scope 1 Emissions (tCO_2-e)		Scope 2 Emissions (tCO_2-e)	Total Emissions (tCO_2-e)
CO_2	CH_4		
9,390	102,699	4,527	**116,616**

6.15 PUBLIC SAFETY

6.15.1 Environmental Management and Performance

AQC seeks to ensure that the safety of visitors, neighbours and the general public is maintained at all times. Signage, restricted access, fencing and inspections by security personnel are established means of warning the public and preventing access to operational areas of the mine.

To account for the Care and Maintenance status and the reduced number of personnel on site, a number of additional security measures have been implemented, including:

- Installation of security fences around the box cut mine entrance and the Hunter Tunnel entrance;
- Establishment of secure gates on all mine portals to prevent unauthorised access; and
- Employment of a security firm to patrol the site nightly from Monday – Friday and on weekends.

There were no significant security breaches during the reporting period. Regular security patrols are undertaken along the boundary fence between the CHPP and the 'Aberdeen Common' (a public access area). In addition, remote motion activated cameras have been strategically placed around the site to monitor any areas that are vulnerable to trespassers.

6.15.2 Next Reporting Period

Regular patrols by site personnel will continue. Full-time caretakers will remain on-site, fences will be maintained and gates will remain locked and secured.

Vegetation slashing of the site access road and other areas will continue, as required.

7. WATER MANAGEMENT

7.1 OVERVIEW

Dartbrook Mine has a water management system whereby all water accumulated on-site has generally been retained in storages (such as mine water dams or the Wynn Seam Goaf). The main inflows to the site water balance occur via rainfall runoff and groundwater seepage into the goaf. Water can be transferred from these storages via pipelines to the CHPP and the underground mine or between the East and West Sites.

AQC holds a licence to discharge water under the Hunter River Salinity Trading Scheme (HRSTS), however currently does not hold any discharge credits under the scheme.

The site water management system is generally shown on **Figure 3** and **Figure 4**, with a schematic included as **Appendix G**.

During the reporting period, AQC continued to manage the water level in the Wynn Seam Goaf by pumping water to surface dams to encourage evaporation. Water accumulating in the goaf is reclaimed by the Wynn Seam Goaf Dewatering Plant, with a pipeline able to transfer water to the Evaporation Ponds, the Staged Discharge Dam (SDD) and the WHD.

7.1.1 Fresh Water Use

Approximately 1.1 megalitres (ML) of potable water was sourced from the Aberdeen town water supply. Approximately 12.6 ML of groundwater was extracted from two bores (Blairmore bores) adjacent to the West Site.

7.1.2 Water Take

Water take under the Dartbrook Mine water licences during the reporting period is provided in **Table 21**.

Approximately 223 ML of water was pumped from the Hunter Tunnel to the goaf. The volume represents the annual seepage into the Hunter Tunnel. Despite not being able to ascertain whether the seepage of this water is from the Hunter River Alluvium or deeper groundwater sources, this passive take is accounted for with licences from the Hunter Regulated River Alluvial Water Source. The passive take from this water source was higher during the reporting period than previous years due to the wetter conditions experienced in 2020.

In late 2020, a weir was installed in the Hunter Tunnel and hence active pumping from the Hunter Tunnel to the goaf ceased.

Groundwater seepage to the Wynn and Kayuga Seam workings was estimated based on the groundwater modelling undertaken for the EIS. Seepage to the Wynn seam goaf is estimated at 106 ML/year, whereas the Kayuga seam goaf is estimated receive 73 ML/year. Inflows to both the Wynn and Kayuga seam workings are passively taken from the Sydney Basin North Coast Groundwater Source.

As shown in **Table 21**, AQC holds sufficient water licence entitlements to account for water taken as a result of Care and Maintenance activities. Surplus entitlements are used by AQC's leaseholders for agricultural activities on AQC owned land. Agricultural water use is not reported in this Annual Review as the take is not associated with Care and Maintenance activities.

Table 21 Dartbrook Mine Water Take

Water Licence	Water Sharing plan, source and management zone (as applicable)	Entitlement	Passive Take/inflows	2020 Active Pumping (ML)**	Total Entitlement
WSP for Hunter Unregulated and Alluvial Water Sources 2009					
WAL 17739	Dartbrook Alluvial Water Source	30	-	12.6	950
WAL 17762		254			
WAL 17781		278			
WAL 17863		5			
WAL 23875		50			
WAL 17790		228			
WAL 30213		105			
WAL 17889	Dartbrook Unregulated River Source	17	-	-	85
WAL 17797		68			
WAL 18134	Hunter Alluvial Water Source	297	223	-	1,249
WAL 18174		37			
WAL 18210		235			
WAL 18225		121			
WAL 18228		90			
WAL 18239		371			
WAL 18126		98			
WSP for Hunter Regulated River Water Source 2016					
WAL 506	General Security	261	-	-	2,811
WAL 759		24			
WAL 838		8			
WAL 956		176			
WAL 996		120			
WAL 1005		171			
WAL 1021		480			
WAL 1022		264			
WAL 1024		228			
WAL 1025		3			
WAL 1026		5			
WAL 1027		63			
WAL 1235		270			
WAL 13386		270			
WAL 14607		328			

Water Licence	Water Sharing plan, source and management zone (as applicable)	Entitlement	Passive Take/inflows	2020 Active Pumping (ML)**	Total Entitlement
WAL 14609		5			
WAL 9048		135			
WAL 955	High Security	3	-	-	6
WAL 1023		3			
WAL 1267	Supplementary Water	6	-	-	254.8
WAL 1313		30.2			
WAL 1316		10			
WAL 1317		42.			
WAL 1318		23.8			
WAL 13336		18.7			
WAL 14605		89			
WAL 9055		35			
WSP for Sydney Basin North Coast Groundwater Source					
WAL 41523	Sydney Basin North Coast Groundwater Source*	30	179***	-	180
WAL 41524		150			

** Updated to correct Water Source by DoI-Water in 2018*
*** Calculated from NSW Water Accounting System Reporting*
****Estimated seepage into Wynn Seam goaf*

7.1.3 Sewage

There was no irrigation of land using treated effluent during the reporting period.

7.1.4 Surface Water Dams

In contrast to the previous three years (2017-2019), above-average rainfall was experienced during the reporting period. As shown in **Table 22**, dam storage volumes increased during the reporting period as a consequence of the wetter conditions.

Water levels in the Eastern Holding Dam (EHD) and WHD were generally maintained at less than 70% storage capacity to maintain sufficient freeboard.

Hunter River Salinity Trading Scheme

In order to maximise evaporation and readiness for the gravity-fed HRSTS discharge system, the SDD was maintained at approximately 62% capacity during the reporting period.

AQC did not discharge under the HRSTS during the reporting period.

Table 22 Dartbrook Mine Stored Water Summary

Storage	Location	Volume Held (m^3)		
		End of Previous Period Dec 2019	End of Period Dec 2020	Storage Capacity
Clean Water				
Clean Water Dam 1	East Site	2,000	4,000	10,000
Clean Water Dam 2	East Site	1,000	1,500	10,000
Clean Water Dam 3	East Site	0	1,500	10,000
Southern Clean Water Dam	East Site	2,650	5,300	53,000
Dirty Water (runoff)				
Sediment Dam 1	West Site	150	650	1,000
Sediment Dam 2	West Site	0	20	400
Northern Dam REA	East Site	230	690	2,300
Southern Dam REA	East Site	0	400	8,000
Stage 4 REA Dam	East Site	0	0	7,900
Controlled Discharge Water				
SDD	West Site	228,000	248,000	400,000
Contaminated Water				
Western Holding Dam *	West Site	462	2,310	15,400
Eastern Holding Dam *	East Site	26,400	61,600	88,000
Evaporation Ponds	West Site	46,200	66,000	132,000
Wynn Seam Goaf	Underground	~2,948,000	~3,145,000	~3,547,000

*Note: * Maintained at <50-70% as standard practice to ensure sufficient capacity for storm events.*

Groundwater

There was approximately 402 ML of groundwater inflows during the reporting period, comprised of 233 ML of seepage into the Hunter Tunnel and 179 ML of modelled inflow to the mine workings. Groundwater inflow to the Hunter Tunnel was pumped directly into the Wynn Seam Goaf for storage.

The management of accumulated water in the Wynn Seam goaf was the main groundwater management task during the reporting period. The management strategy is to dewater the Wynn Seam Goaf so that the rate of outgoing water is the same as the rate of incoming water.

Site Inventory

During the reporting period, the total dam storage increased from 307.1 ML to 392.0 ML whilst the estimated storage in the Wynn Seam goaf increased from approximately 2,948 ML to 3,145 ML. Therefore, the total site inventory increased from 3,255 ML to 3,537 ML during the reporting period. This increase was due to the above-average rainfall experienced during the reporting period.

Table 23 Estimated Dartbrook Mine Water Balance Components

Water Stream	2020 Volumes (ML)
Inputs	
Fresh Water (Blairmore bore)	12.6
Groundwater Seepage In (including Hunter Tunnel)	402
Rainfall Runoff	356
Recycled to CHPP from Tailings & Storage (not included in total)	0
Imported Potable (Aberdeen)	1.1
Total Inputs	**771.7**
Outputs	
Groundwater Seepage Out	68
Dust Suppression	0
Evaporation – Mine Water	408
Entrained in Process Waste	0
Discharged (HRSTS)	0
Potable Usage	13.7
Total Outputs	**489.7**
Estimated Change in Total Storage	**282**

7.2 GROUNDWATER

7.2.1 Environmental Management

There are two main aquifer systems within the Dartbrook area:

- Alluvial aquifer systems associated with the Hunter River, Dart Brook and Sandy Creek; and
- The Permian coal measures (Burnamwood Formation).

The alluvial aquifers are the most important with respect to groundwater dependent ecosystems and human use. The Hunter River alluvial aquifer is a major aquifer providing high yields and good water quality. It is used for irrigation, stock and domestic purposes, whereas the alluvial aquifers associated with Dart Brook and Sandy Creek are primarily used for stock and domestic purposes.

The Permian aquifers are generally deep, low yielding and contain poor quality (brackish to saline) groundwater. They are less productive aquifers and as such, the impact of the mine on these aquifers has less significance.

AQC undertakes an extensive monitoring program at Dartbrook Mine to fulfil the groundwater monitoring commitments in the SMWP, required under DA 231-07-2000.

The primary objective of the groundwater monitoring program, as prescribed by Condition 4.2 (a) (ii) of DA 231-07-2000 is to collect sufficient data to adequately assess:

- The impact on groundwater levels at neighbouring properties and in the locality, and to identify any water quality impacts;
- The impact of the development on groundwaters associated with the alluvial aquifer of the Hunter River including the ongoing monitoring of the volume and quality of inflows into the Hunter Tunnel;
- Regional groundwater levels and water quality including the extension of the regional groundwater monitoring network to include bores RDH508-511; and

- Any concerns or complaints from surrounding landholders regarding groundwater matters, and any ensuing actions, which shall be recorded and be available to DPIE-Water (formerly DLWC).

In particular, the monitoring program is designed to detect changes to alluvial groundwater levels or quality that may have been induced by mining. The potential impacts of mining include seepage from:

- The Hunter River alluvium into the Hunter Tunnel; and
- REA and Wynn Seam Goaf Tailings water storage area to the Wynn Seam.

Details of the groundwater bores currently included in the groundwater monitoring program are provided in **Table 24**. The scope of the groundwater monitoring program has been reduced since 2006 when the mine was placed under Care and Maintenance.

As noted in **Table 24**, monitoring of groundwater bores is undertaken on a six-monthly basis during Care and Maintenance. **Figure 11** shows the locations of all groundwater monitoring bores sampled during the reporting period.

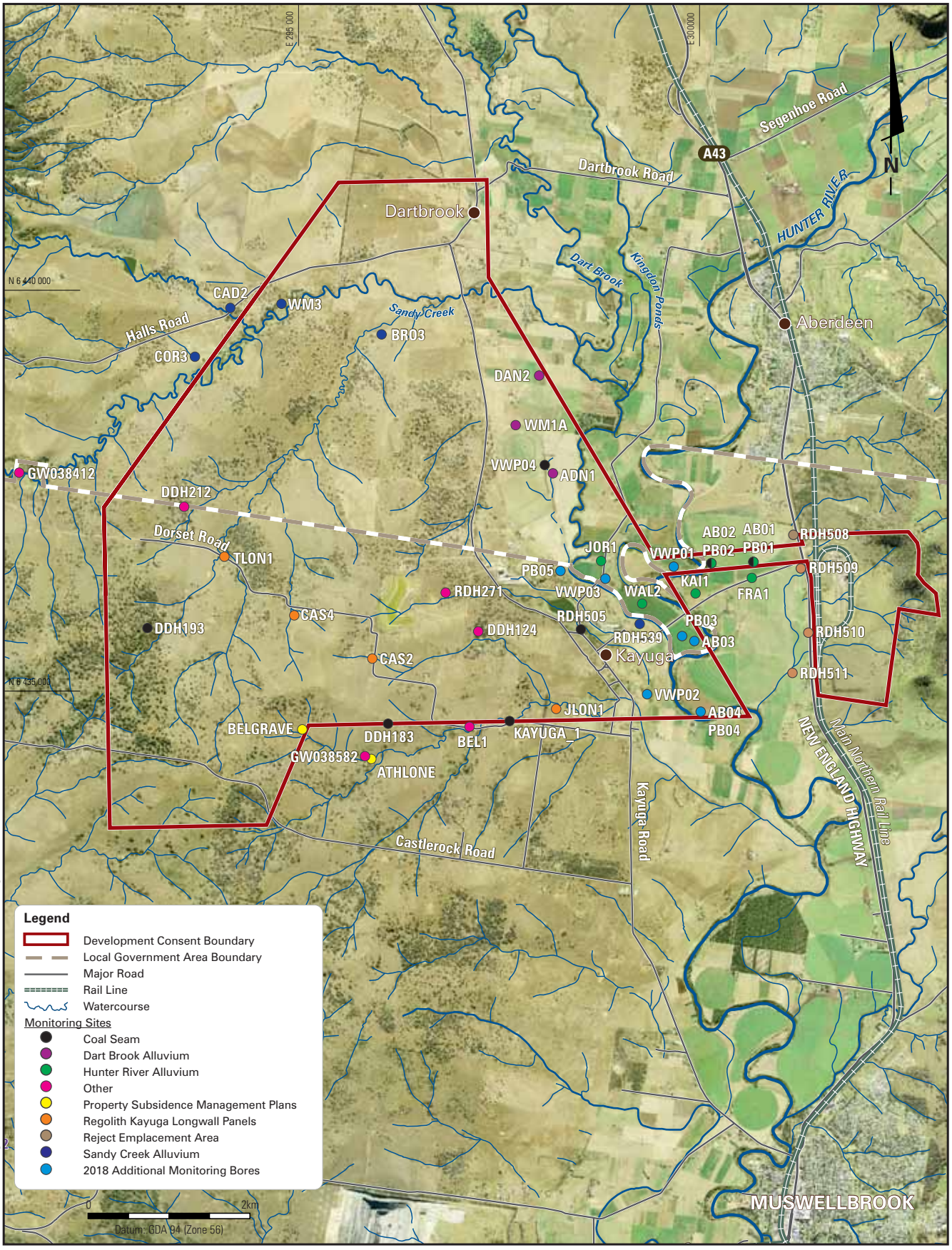
Graphs of the measured groundwater, pH and EC levels at Dartbrook Mine bores during the reporting period are included in **Appendix E**.

Table 24 Groundwater Monitoring Bores

Bore	Bore Type	Aquifer Monitored	Details	Parameter / Frequency
Hunter River Alluvium Monitoring Bores				
FRA1	Well	Hunter River alluvium	Monitor any interaction between the alluvial aquifer to the Hunter Tunnel. Located in a west to east direction across the alluvial plain, along the alignment of the Hunter Tunnel.	Monitored on a six-monthly basis for water depth, pH, EC & additional suite parameters.
JOR1	Well			
KAl1	Well			
WAL2	Well			
Dart Brook Alluvium Monitoring Bores				
ADN1	Well	Dart Brook alluvium	Monitor water levels and quality within the Dart Brook alluvium. These bores are located between the underground mining area and the Hunter River alluvium.	Monitored on a six-monthly basis for water depth, pH, EC & additional suite parameters.
DAN2	Well			
WM1A	Bore			
Sandy Creek Alluvium Monitoring Bores				
BRO3	Bore	Sandy Creek alluvium	Located in the Sandy Creek alluvium.	Monitored on a six-monthly basis for water depth, pH, EC & additional suite parameters.
COR3	Bore			
WM3	Bore			
GW038412	Well			
Coal Seam Monitoring Bores				
Kayuga 1	Bore	Kayuga Seam	Monitor the Kayuga and Wynn Seam aquifers.	Monitored on a six-monthly basis for water depth, pH, EC & additional suite parameters.
DDH183	Bore			
DDH193	Bore			
DDH212a	Bore	Wynn Seam		

Bore	Bore Type	Aquifer Monitored	Details	Parameter / Frequency
Regolith Monitoring Bores				
CAS2	Bore	Regolith – shallow overburden	Monitor the regolith overlying and in the vicinity of the Wynn and Kayuga longwall panels.	Monitored on a six-monthly basis for water depth, pH, EC & additional suite parameters.
CAS4	Windmill			
TLON1	Windmill			
JLON1	Windmill			
Staged Discharge Dam Bore				
RDH505	Bore	Regolith – shallow overburden	Monitors the regolith near the Staged Discharge Dam.	Monitored on a six-monthly basis for water depth, pH, EC & additional suite parameters.
REA Monitoring Bores				
RDH508	Bore	Hunter River Alluvium	These bores are located west of the REA. Monitoring bores RDH508 and RDH509, located on the eastern side of the Hunter River alluvium to detect any seepage from the REA.	Monitored on a six-monthly basis for water depth, pH, EC & additional suite parameters.
RDH509	Bore			
RDH510	Bore			
RDH511	Bore			
Property Subsidence Management Plan Bores				
Belgrave	Bore	Regolith – shallow overburden	Located on private properties near the southern extent of the site.	Monitored on a six-monthly basis for water depth, pH, EC & additional suite parameters.
GW038582	Bore			
Other Monitoring Bores				
Athlone	Bore	Regolith – shallow overburden	Athlone and BEL1 are located south of the Dartbrook mining leases.	Monitored on a six-monthly basis for water depth, pH, EC & additional suite parameters.
BEL1	Well			
CAD2	Bore	Sandy Creek alluvium	Located along a tributary of Sandy Creek	
DDH124	Bore	Wynn Seam	DDH124 is located above completed Wynn Seam workings. DDH212 is located west of the completed mine workings.	
DDH212b	Bore			
DDH212c	Bore			

Note: Bore = Monitoring bore and not a current water supply.
See SWMP for additional suite of parameters.



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DARTBROOK MINE

Groundwater Monitoring Network

FIGURE 11

7.2.2 Cumulative Rainfall Departure

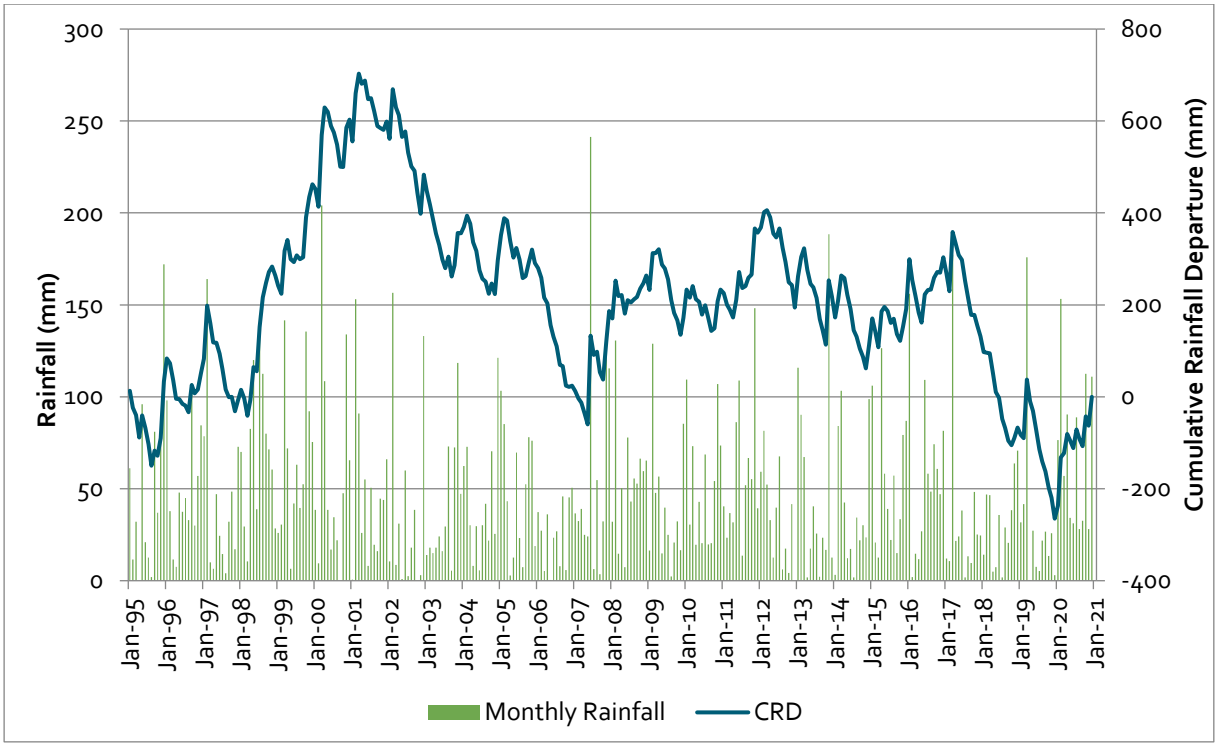
Groundwater levels in relatively shallow wells or bores constructed in alluvium are generally highly dependent on rainfall recharge and can rise or decline quite rapidly in response to rainfall events.

Cumulative rainfall departure (CRD) is a technique for assessing groundwater level trends in unconfined alluvial aquifers and provides a summary of the monthly departure of rainfall from the long-term average. A rising trend in the CRD plot indicates periods of above long-term average rainfall, whilst a falling trend indicates periods when rainfall is below the long-term average.

Monthly rainfall data was sourced from the Meto2 station at Dartbrook Mine. This meteorological station has been operating since the commencement of longwall mining. The recorded monthly rainfall was used to calculate the CRD (shown in **Table 12**).

As reported in **Section 6.2,** Dartbrook experienced above rainfall in 2020 which has resulted in a rise in the CRD as shown in **Figure 12**.

Figure 12 Cumulative Rainfall Departure



7.2.3 Hunter River Alluvium

Water Levels

Graph E-1 in Appendix E shows the long-term groundwater level trends for Hunter River alluvium monitoring bores JOR1, FRA1, KAI1 and WAL2. Bore KAI1 experienced a slight decline in water levels compared to the previous reporting period. Water levels at FRA1 and WAL2 were similar to the previous reporting period. The water levels recorded in 2020 were within the historical ranges for these bores. JOR1 was unable to be accessed for monitoring in 2020.

None of the water level measurements for the Hunter River alluvium monitoring bores exceeded the impact assessment criteria (IAC) specified in the SWMP.

Water Quality

Graphs E-2 and E-3 in Appendix E show the long-term water quality trends for Hunter River alluvium monitoring bores JOR1, FRA1, KAI1 and WAL2.

Bores FRA1, KAI1 and WAL2 recorded slight increases (<1 unit) in pH levels compared to the previous reporting period. The pH values recorded during the reporting period were within the historic ranges for these bores. The pH of the Hunter River alluvium remained neutral, with values ranging from 7.1 to 7.3. None of the recorded pH levels exceeded the IAC under the SWMP.

Electrical Conductivity (EC) for bores FRA1, KAI1 and WAL2 increased from the previous reporting period. There were two exceedances of the IAC for EC during the reporting period:

- The EC measured at FRA1 in April 2020 was 875 µS/cm, which exceeded the trigger value of 659 µS/cm; and
- The two EC measurements at WAL2 in 2020 (2,176 and 2,595 µS/cm) both exceeded the trigger value of 1,917 µS/cm.

The EC recorded at bore WAL2 in October 2020 represents a new maximum for this bore. The recorded values for FRA1 and KAI1 during the reporting period were within the historical ranges for these bores.

JOR1 was unable to be accessed for monitoring in 2020.

7.2.4 Dart Brook Alluvium

Water Levels

Graph E-4 in Appendix E shows the long-term groundwater level trends for Dart Brook alluvium monitoring bores ADN1, DAN2 and WM1A.

Bores ADN1, DAN2 and WM1A exhibited similar trends during the reporting period. Water levels declined from the previous reporting period to April 2020, then increased from April to October 2020. Water levels remained within the historical ranges for these bores.

None of the water level measurements for the Dart Brook alluvium monitoring bores exceeded the impact assessment criteria (IAC) specified in the SWMP.

Water Quality

Graphs E-5 and E-6 in Appendix E the show long-term water quality trends for Dart Brook alluvium monitoring bores ADN1, DAN2 and WMA1.

The recorded pH levels for bores ADN1 and WM1A were similar to the previous reporting period and within the historical ranges for these bores. The pH for bore DAN2 increased to 8.3 in March 2020, which represents a new historical maximum for this bore. The pH then declined from 8.3 to 7.0 from March to November. The pH measurement for DAN2 in March exceeded the IAC of 8.0. This was the only exceedance of the IAC for pH.

The EC values recorded at ADN1 and DAN1 were higher than the values for the previous reporting period. However, these values were within the historical ranges for these bores. The EC for bore WM1A decreased from October 2019 to April 2020, then increased from April to October. The EC recorded in April (1828 µS/cm) represents a new minimum value for this bore. Lower EC values do not pose an environmental issue. There were three exceedances of the IAC for EC during the reporting period:

- Both EC measurements for ADN1 (2,990 and 3,450 µS/cm) exceeded the IAC of 2,970 µS/cm; and
- The EC value for DAN2 in November (2,575 µS/cm) marginally exceeded the IAC of 2,555 µS/cm.

7.2.5 Sandy Creek Alluvium

Water Levels

Graph E-7 in Appendix E shows the long-term groundwater levels for Sandy Creek alluvium monitoring bores COR3, WM3, BRO3 and GW038412. These bores have historically exhibited wide variability in their water levels.

During the reporting period, bores COR3 and GW038412 recorded increases in water level (although only one measurement was able to be taken at COR3). Water levels at WM3 declined from October 2019 to March 2020, then recovered from March to November. Water levels at BRO3 remained stable during the reporting period. All of these variations were within the historical ranges for these bores.

Water Quality

Graphs E-8 and E-9 in Appendix E show the long-term water quality trends for the Sandy Creek alluvium monitoring bores COR3, WM3, BRO3 and GW038412.

No water quality data was collected for BRO3 during the reporting period as there was insufficient water to sample. Only one sample was collected for COR3, as the bore was unable to be accessed in March 2020.

Bores COR3, WM3 and GW038412 exhibited relatively stable pH levels, with fluctuations of less than 0.5 during the reporting period. There were no exceedances of the IAC for pH.

The Sandy Creek alluvium bores have historically exhibited large variations in EC (see Graph E-9 in Appendix E). The EC at COR3, WM3 and GW038412 exhibited differing trends during the reporting period, but remained within the historical ranges for these bores. There were two exceedances of the IAC for EC during the reporting period:

- The EC value for COR3 in November (2,370 µS/cm) marginally exceeded the IAC of 2,360 µS/cm; and
- The EC value for WM3 in March (6,890 µS/cm) exceeded the IAC of 5,366 µS/cm.

7.2.6 Staged Discharge Dam

Water Levels

Graph E-10 in Appendix E shows the long-term groundwater levels for the Staged Discharge Dam bore (RDH505).

The water level at RDH505 declined from October 2019 to March 2020, then recovered back to 2019 levels by October 2020. There were no exceedances of the IAC for water level.

Water Quality

Graph E-11 in Appendix E shows the water quality trends for the Staged Discharge Dam bore (RDH505).

The pH levels for RDH505 remained stable during the reporting period. The EC for RDH505 increased but remained within the historical range for the bore. There were no exceedances of the IAC for pH and EC.

7.2.7 Coal Seams

Water Levels

Graph E-12 in Appendix E shows the long-term groundwater levels for coal seam monitoring bores DDH183, DDH193, DDH212a and Kayuga 1.

These bores have maintained relatively stable water levels during Care and Maintenance. This trend continued during the reporting period, with fluctuations of less than 1 m. The following exceedances of the water level IAC occurred during the reporting period:

- The water level at DDH183 in April (29.5 mbgl) exceeded the IAC of 29 mbgl;

- Both water level measurements for DDH212a (27.57 and 27.6 mbgl) marginally exceeded the IAC of 27.5 mbgl.

Water Quality

Graphs E-13 and E-14 in Appendix E show the long-term water quality trends for coal seam monitoring bores DDH183, DDH193, DDH212a and Kayuga 1.

These bores recorded substantial deviations in pH during mining operations but have remained relatively stable during Care and Maintenance. This trend continued during the reporting period, with pH levels remaining stable (fluctuations less than 0.5) compared to the previous reporting period. There were no exceedances of the IAC for pH.

EC levels have remained relatively stable for all coal seam bores since 2009. All four of the coal seam monitoring bores recorded increases in EC during the reporting period. The EC values recorded during the reporting period are the highest values recorded since 2009. The EC values for DDH183, DDH193 and DDH212a exceeded the IAC for these bores. The EC measurements for Kayuga 1 were within the IAC for that bore.

7.2.8 Regolith

Water Levels

Graph E-15 in Appendix E shows the long-term groundwater levels for bores CAS2, CAS4, JLON1 and TLON1. Only limited data is available for JLON1.

Monitored groundwater levels in CAS4 and TLON1 have remained relatively stable during the Care and Maintenance phase. In contrast, JLON1 has experienced a steady decline in water level since 2002.

Water levels in CAS2, CAS4 and TLON1 remained relatively stable, with fluctuation of less than 0.5 m during the reporting period. The groundwater level in CAS4 declined by approximately 1.2 m compared to the previous reporting period.

The following exceedances of the water level IAC occurred during the reporting period:

- Both water level measurements for CAS2 (43.02 and 42.51 mbgl) exceeded the IAC of 36.5 mbgl; and
- The water level for TLON1 in March (1.77 mbgl) exceeded the IAC of 11.3 mbgl.

The regolith monitoring bores have frequently exceeded the water level IAC prescribed by the SWMP.

Water Quality

Graphs E-16 and E-17 in Appendix E shows water quality trends in bores CAS2, CAS4, JLON1 and TLON1. Only limited monitoring data is available for JLON1.

During Care and Maintenance, pH levels for CAS2, CAS4 and TLON1 have generally been in the range of 6.5 to 7.5. The pH measurements for CAS2 and CAS4 during the reporting period were within this range and did not exceed the IAC for pH. JLON1 experienced a large increase in pH to 9.1 in April, followed by a decrease to 7.5 in October. There were no exceedances of the IAC for pH, although there are no IAC for JLON1 due to sparsity of monitoring at this bore.

CAS2, CAS4 and TLON1 have historically exhibited large variability in EC. CAS2 and CAS4 recorded increases in EC during the reporting period. The two EC measurements for CAS2 (15,560 µS/cm in April and 16,720 µS/cm in October) exceeded the IAC of 13,255 µS/cm. The recorded EC values for JLON1 during the reporting period were within the historical range for the bore.

No water quality data was collected at TLON1 during the reporting period due to water levels being too low to sample.

7.2.9 Rejects Emplacement Area

Water Levels

Graph E-18 in Appendix E shows the long-term water level trends for REA monitoring bores RDH508, RDH509, RDH510 and RDH511.

Water levels for RDH511 have generally been within the range of 7-9 mbgl, whereas levels for RDH508, RDH509 and RDH510 have generally been between 9-12 mbgl. During the reporting period, these bores recorded small increases (<1 m) in water level and remained within historical ranges.

The water level for RDH508a in March (18.07 mbgl) marginally exceeded the IAC of 17.9 mbgl. All other water level measurements during the reporting period were within the IAC for water level.

Water Quality

Graphs E-19 and E-20 in Appendix E show the long-term water quality trends for REA monitoring bores RDH508, RDH509, RDH510 and RDH511.

The pH levels for these bores generally range from slightly acidic to slightly alkaline (pH 6.5 to 8.0). During the reporting period, pH levels for these bores remained close to neutral (pH 7.0), consistent with the long-term trend. There were no exceedances of the IAC for pH.

The REA monitoring bores have historically exhibited large variability in EC. During the reporting period, RDH508 and RDH510 recorded increases in EC to outside of the historical range. The EC at RDH509 fluctuated but remained within the historical range for the bore. Only one EC measurement was able to be taken at RDH511 and this value was the lowest recorded for the bore. The following exceedances of the IAC for EC occurred during the reporting period:

- The EC measurement at RDH508 in March (8,680 µS/cm) exceeded the IAC of 8,003 µS/cm;
- The EC measurement at RDH508a in March (8,300 µS/cm) exceeded the IAC of 7,769 µS/cm;
- Both EC measurements for RDH510 (9,780 and 10,100 µS/cm) exceeded the IAC of 8,744 µS/cm; and
- Both EC measurements for RDH510a (10,200, and 10,500 µS/cm) exceeded the IAC of 8,636 µS/cm.

7.2.10 Landowner Bores

Water Levels

Graph E-21 in Appendix E shows long-term water level trends at private landowner monitoring bores GW038582 and Belgrave.

The water level at GW038582 declined from October 2019 to April 2020, then recovered from April to November. Although these fluctuations were within the historical variability for this bore, the IAC for GW038582 has been exceeded since 2017.

Belgrave was unable to be accessed for monitoring during the reporting period.

Water Quality

Graphs E-22 and E-23 in Appendix E show the long-term water quality trends at private landowner monitoring bores GW038582 and Belgrave.

During the reporting period, GW038582 recorded an increase in EC and a decrease in pH. Both of these parameters remained within historical limits. The pH measurement in April was 8.3, which is greater than the IAC of 7.9. There were no exceedances of the IAC for EC.

Belgrave was unable to accessed for water quality sampling during the reporting period.

7.2.11 Annual Groundwater Assessment

Condition 4.1(b) of DA 231-07-2000 requires the proponent to conduct an annual assessment of the accuracy of the groundwater model predictions contained in the Dartbrook EIS. The assessment involves comparing the results of actual monitoring with the predictions in the Dartbrook EIS.

Based on the water level measurements during the monitoring period and historical data, the following conclusions can be made:

- There has been no long-term decline in the water levels in the locality of the Hunter River alluvial monitoring bores, either during mining operations or care and maintenance. This observation is consistent with the groundwater assessment in the Dartbrook EIS, which predicted that "existing bores and wells in the alluvial lands will remain unaffected by depressurisation within the coal measures" (MER, 2000);

- The Dart Brook and Sandy Creek alluvial monitoring bores have detected larger water level fluctuations than the Hunter River alluvial monitoring bores. Water levels in the Dart Brook and Sandy Creek alluvial monitoring bores declined during previous mining operations but recovered during the Care and Maintenance phase. The declining water levels during previous mining operations coincided with the falling trend in the CRD from mid-2001 to mid-2007. Similarly, rising water levels during Care and Maintenance were correlated with rises in the CRD. The long-term trends for these bores suggest that water levels are strongly influenced by climatic conditions;

- Regolith monitoring bores CAS2, CAS4, JLON1 and TLON1 are located directly above and near the completed Kayuga seam longwall panels. These bores recorded a decline in groundwater levels in response to mining between 2004 and 2006. During Care and Maintenance, groundwater levels have stabilised in bores CAS4 and TLON1, albeit at a lower level than pre-mining conditions. Monitoring of JLON1 recommenced in October 2018 after an extended period of minimal monitoring. Recent water levels in JLON1 are lower than pre-mining levels but have been stable (i.e. not declining). It is difficult to draw conclusions regarding JLON1 due to the interrupted monitoring at this location. The water level in CAS2 declined during previous mining activities and has continued to decline during Care and Maintenance. This trend is attributed to connective cracking induced by previous longwall mining activities. The Dartbrook EIS predicted enhanced hydraulic connectivity up to 100 m above the Kayuga seam goaf. CAS2 is located within this region and the slowly declining water level is consistent with the predictions in the Dartbrook EIS;

- The Belgrave and GW038582 bores monitor the regolith to the south of the completed longwall panels. The bores recorded declines in groundwater levels in response to mining between 2004 and 2006. Water levels in these bores have recovered to pre-mining levels following the commencement of Care and Maintenance. Current trends in groundwater level continue to generally correlate with CRD, as predicted in the Dartbrook EIS;

- Groundwater levels in the coal seam monitoring bores declined during previous mining operations. However, the magnitude of the depressurisation in bores DDH183, DDH193 and DDH212a was less than the drawdown predictions in the Dartbrook EIS. This is due to the mining being suspended in 2006 rather than progressing for the 20-year period that was modelled by MER (2000). Since the cessation of mining, groundwater levels in the coal seam monitoring bores have at least stabilised, if not recovered (albeit not to pre-mining levels); and

- The depressurisation recorded by the Kayuga 1 bore exceeded the predictions in the Dartbrook EIS. This bore recorded a decline in water level of 11.78 m during previous mining, which exceeded the EIS prediction of 8 m. The groundwater modelling undertaken by MER (2000) did not account for mining of the Wynn Seam in this location, which resulted in an underestimation of the drawdown at Kayuga 1.

The following observations were made regarding groundwater quality:

- pH levels during the reporting period were generally within the ranges historically observed during care and maintenance. The exception is bore DAN2 where the pH continued to rise beyond its historical range (as was observed in the previous reporting period). However, the pH for this bore returned to the neutral range in the November monitoring round; and

- Several bores recorded increases in EC during the reporting period. Exceedances of the IAC under the SWMP occurred in multiple groundwater systems, including the Hunter River, Dart Brook and Sandy Creek alluvium monitoring bores. Increases in pH are usually a consequence of dry conditions. However, given that the CRD rose during the reporting period, the observed increases in EC warrant further investigation.
- Australasian Groundwater and Environmental Consultants (AGE, 2019) conducted a review of the IAC exceedances recorded from 2015 to 2018. This review determined that the IAC exceedances do not alter the above conclusions regarding groundwater levels (i.e. that water levels are predominantly influenced by climactic conditions). The review also found that exceedances of the water quality IAC are unlikely to have materialised in environmental harm, but did recommend further investigation if EC levels continue to increase behind historical variability.
- Given that no mining activity has been conducted since the AGE (2019) review, the conclusions regarding water levels are unlikely to have changed. However, the EC has increased beyond historical ranges for certain bores. This increase may be due to the extended dry period prior to this reporting period. Further investigation in exceedances of the IAC for EC will be undertaken if EC values continue to rise during the next reporting period.

7.2.12 Next Reporting Period

No underground mining activities are anticipated to be undertaken during the next reporting period. Groundwater monitoring will continue to be undertaken in accordance with the SWMP.

7.3 SURFACE WATER

7.3.1 Environmental Management

Dartbrook Mine's SWMP includes strategies for the mitigation of impacts to surface water and groundwater resources during the Care and Maintenance period. Multiple control strategies have been implemented across Dartbrook to minimise the risks associated with water pollution. These strategies include:

- Separation of clean and mine water sources;
- Use of sedimentation dams and traps to collect sediment;
- Diversion of clean water around the site;
- Containment of runoff from disturbed areas;
- Usage and re-use of potentially contaminated runoff and process water from the mine;
- Pumping and pipeline systems to transfer water between the surface and underground and also between the East and West Sites;
- Maximise water evaporation through the Evaporation Ponds;
- Employee and contractor awareness and training in relation to spill response and pollution control;
- Licensed discharge facilities to discharge excess water from the SDD into the Hunter River in accordance with the requirements of the HRSTS (following the purchase of discharge credits); and
- Regular sampling and inspections of surface waters.

Surface water samples are collected and analysed on a regular basis from storage dams and streams in and around the mining authorities to examine water quality. Specifically, samples are collected from an upstream and downstream site in the Hunter River and the Dart Brook. This sampling regime is used to confirm that Dartbrook Mine is not having an adverse impact on the surrounding surface water catchment and streams.

The water analyses include measurement of pH, EC, Alkalinity, Calcium, Chloride, Magnesium, Potassium, Sodium, Sulphates, Total Dissolved Solids (TDS) and Total Suspended Solids (TSS). Selected mine water dams are also tested for reactive phosphorus, Methylene Blue Active Substances (foaming agents), oil and grease, and algae.

The surface water monitoring sites at Dartbrook Mine are illustrated in **Figure 13**.

All runoff from the West Site workshop and hardstand area eventually flows through the oil separator and into the WHD. Water from the WHD can be pumped to the SDD or to the EHD, as required, to ensure that the WHD is maintained at <50 - 70 % capacity.

All runoff from the East Site CHPP and disturbed surrounds eventually flows into the EHD. Water from the EHD is pumped onto the coal stockpile areas for evaporation, to the Wynn Seam Goaf or to the WHD, as required, to ensure the EHD is maintained at approximately 50% capacity.

The general levels of the major dams are inspected weekly and the water level of the SDD, WHD and EHD are continuously monitored via the Dartbrook Mine CITECT system. The SDD is also registered under the Dams Safety Act 1978 and as such, is subject to regular inspections. Inspections during the reporting period did not identify any non-compliances.

7.3.2 Environmental Performance

The water quality results in **Appendix F** show that some of the on-site dams and storages recorded pH, EC and Total Suspended Solids levels (and other metal levels) that exceeded the relevant trigger levels in the SWMP. A review of the exceedances of SWMP investigation triggers in accordance with the contingency measures in the approved plan found that the surface water quality results generally reflects the quality of the dewatered groundwater or of surface runoff that has concentrated due to evaporation and surface water runoff. Further, given the water is stored on site with no discharges occurring during the reporting period, there are no consequences of these exceedances. All storages were operated to maximise the evaporation potential whilst maintaining a 50% to 70% freeboard to prevent spills in accordance with the SWMP.

As noted in **Section 7.1**, Dartbrook Mine did not discharge under the HRSTS during the reporting period. As a result, no monitoring at the discharge point was undertaken. All HRSTS monitoring and communications equipment continues to be maintained to ensure compliance with the relevant conditions of Dartbrook Mine's EPL.

Table 25 presents a summary of the water quality results for the Hunter River and Dart Brook for the reporting period.

Graph F1 and F3 in **Appendix F** shows that surface water monitoring results for EC, TDS (and their associated anions and cations) in the Hunter River and Dart Brook were generally similar at both upstream and downstream sites and within the range of long-term data gathered for Dartbrook Mine. These monitoring results were generally within the trigger values specified in the SWMP.

For the Dart Brook, the upstream (DARTUP site) results for EC and TDS (and their associated anions and cations) were found to exceed the SWMP trigger levels during the reporting period on a number of occasions. A review of this result found that the exceedance observed was likely due to the low flow in the Dart Brook at the time of monitoring. The downstream monitoring location in the Dart Brook (Dart(a)) is located within the vicinity of the Hunter River confluence, meaning that this site's recordings can be influenced by backflow from the Hunter River, hence the lower EC and TDS results observed in comparison to those recorded upstream.

The EC levels for the Dart Brook upstream monitoring location were slightly higher than the downstream readings, but both stations recorded values consistent with historical levels and the respective trigger levels included in the SWMP.

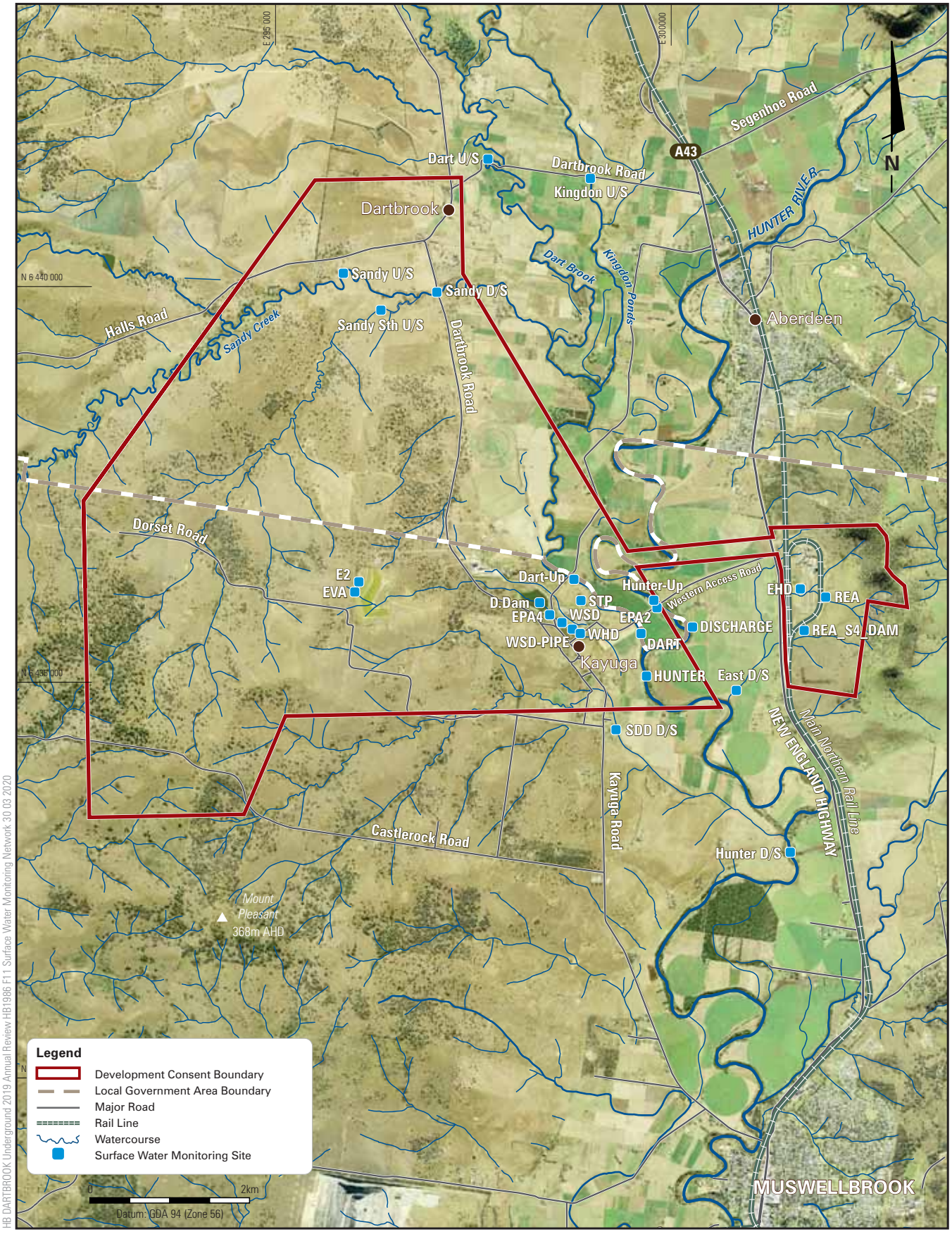
The SWMP was reviewed in 2019 with the monitoring scope and water quality trigger values updated. The draft SWMP was submitted to the regulators for review in December 2019 and March 2020, however the final revised plan has not yet been submitted, pending the decision on the MOD7 appeal.

7.3.3 Next Reporting Period

It is noted that there has been no underground mining activity at Dartbrook Mine during the reporting period. The updated SWMP will be reviewed and submitted for approval in 2021, following the decision of MOD7 appeal and in accordance with the regulatory reviews required under the conditions of DA 231-07-2000.

Table 25 Summary of Water Quality Results for the Hunter River and Dart Brook

Site	EC Range (µS/cm)	TDS Range (mg/L)	pH Range
Hunter River Upstream	347 - 614	230 - 410	6.7 – 8.3
Hunter River Downstream	362 - 562	240 - 380	7.0 – 7.9
Dart Brook Upstream	574 - 4540	380 – 3040	7.84 – 8.14
Dart Brook Downstream	411 - 673	280 - 450	7.0 – 8.29



DARTBROOK MINE

Surface Water Monitoring Network

FIGURE 13

7.4 EROSION & SEDIMENT

7.4.1 Environmental Management

Erosion and sediment control across the site remains a priority, despite the relatively small amount of surface disturbance. Strategies to prevent erosion and control sediment include:

- The installation of diversion drains and contour banks to redirect overland flow from disturbed areas into dams and sediment structures;
- The use and maintenance of silt traps to slow water flow and capture water borne sediments;
- Design of rehabilitation areas to reduce slope length and minimise the potential for erosion;
- The re-establishment of vegetation on disturbed areas to minimise exposure of bare ground with erosion risk; and
- Monitoring and inspection of rehabilitation areas and disturbed areas to identify risks of erosion.

Erosion and sediment controls are managed as described in Dartbrook Mine's Erosion and Sediment Control Plan.

7.4.2 Environmental Performance

Dartbrook Mine continues to undertake maintenance on drains, sediment traps and sumps, as identified during routine inspections undertaken during the reporting period.

Any drains, sumps or traps that contain greater than 30% sediment are generally required to be cleaned out to prevent and minimise unnecessary risks associated with water storage onsite.

Contour banks, drains and sediment traps were constructed as part of the final landform of the REA to ensure that runoff is directed into appropriate sediment and water control structures.

7.4.3 Next Reporting Period

Sediment structures will continue to be monitored during the next reporting period, and maintenance works carried out if required. Water runoff from disturbed areas will continue to be directed into sediment dams until areas are adequately revegetated with grass cover.

The requirements for the Erosions and Sediment Control Plan in DA 231-07-2000 were incorporated into the revised Site Water Management Plan, which was updated in 2019, as discussed in **Section 7.3**. The updated SWMP will be implemented in 2021 following its approval.

8. REHABILITATION

8.1 BUILDINGS

Under the Care and Maintenance program, no mine related buildings at the West or East Sites were constructed or rehabilitated in the reporting period.

8.2 REHABILITATION OF DISTURBED LAND

The rehabilitation that has been completed to date is outlined in **Table 26**. No additional rehabilitation was undertaken during the reporting period. The rehabilitation maintenance activities undertaken during the reporting period are outlined in **Table 27**.

The REA was covered, topsoiled and seeded in 2007. The REA continued to be monitored during the reporting period. Since establishment, the REA rehabilitation area has developed land capability characteristics similar to open grassland, suitable for cattle grazing.

During the reporting period, no surface rehabilitation works were required above previously mined longwalls and no subsidence issues were identified (see **Section 6.12**).

Further development of a final rehabilitation plan was during the reporting period, which included:

- Submission of a revised Dartbrook MOP for the period January 2021 to December 2022 to the DPIE-Resources Regulator (DPIE-RR) in November 2020; and
- Submission of a revised Mine Closure Plan to the DPIE-RR in December 2020. This document was also provided to all stakeholders required to review the plan under the conditions of DA 231-07-2000.

8.3 OTHER INFRASTRUCTURE

No structural rehabilitation work was undertaken in 2020.

8.4 REHABILITATION TRIALS AND RESEARCH

8.4.1 River Restoration Project

The River Restoration Project was undertaken in conjunction with the HCRCMA from 2005 to 2010. Two Fish-Hotels and about 20 log jams remained in place over a 6.5km stretch of the Hunter River that interfaces with Dartbrook Mine owned land. These structures create pool and riffle sequences as well as assisting in bank stabilisation.

Monitoring and maintenance activities of the River Restoration Project area continued during the reporting period. The main maintenance activities included weed spraying within the River Restoration Project areas.

Monitoring and maintenance of the River Restoration Project area will continue in the next reporting period.

8.4.2 Riparian Vegetation Management

Approximately 5,000 tree seedlings have been planted to date in riparian zones within the Dartbrook Mine mining authorities. The seedling stock was comprised mostly of River Red Gum but also river oak, yellow and white box, and apple.

The trees have since established themselves to the point where "crash grazing" by cattle can be undertaken in riparian areas without damaging the trees. "Crash grazing" is undertaken on an ad hoc basis to prevent weeds seeding, which allows native and naturalised grasses to dominate.

8.4.3 River Red Gum Restoration

An experimental study was established in 2007 by the Hunter Central Rivers Catchment Management Authority (HCRCMA) and Dartbrook Mine on a remnant patch of River Red Gum woodland present on the floodplain of the Hunter River.

The purpose of this project is to enhance and protect a population of River Red Gums (listed as being endangered in the Hunter Valley). The project area is remote from any mine related infrastructure, has been fenced to exclude stock, and contains over 2,500 River Red Gums that have been planted amongst the mature population.

The River Red Gum woodland within the restoration area flourished during the reporting period, particularly following extensive rainfall received throughout the year. Regular inspections of the River Red Gum Restoration will continue in 2021.

Table 26 Rehabilitation Status

Mine Area Type		Area Affected / Rehabilitated (ha)		
		Previous Reporting Period (End 2019)	This Reporting Period (End 2020)	Next Reporting Period (End 2021)
A:	MINE LEASE AREA			
A1	Mine Lease(s) Area CL386, ML1381, ML1497, ML1456	3,258	3,258	3,258
B:	DISTURBED AREAS			
B1	Infrastructure area (other disturbed areas to be rehabilitated at closure including facilities, roads)	117	117	117
B2	Active Mining Area (excluding items B3 - B5 below)	-	-	-
B3	Waste emplacements (active/unshaped/in or out-of-pit)	0	0	0
B4	Tailings emplacements (active/unshaped/uncapped)	1	0	0
B5	Shaped waste emplacement (awaits final vegetation)	Nil	Nil	Nil
ALL DISTURBED AREAS		118	118	118
C:	REHABILITATION PROGRESS			
	Overburden Dump	3.7	3.7	3.7
	Wattus Ponds	14.7	14.7	14.7
	Rejects Emplacement Area	29.2	29.2	29.2
	Infrastructure Area	4	4	4
C1	Total Rehabilitated area (except for maintenance)	51.6	51.6	51.6

Mine Area Type	Area Affected / Rehabilitated (ha)		
	Prev Reporting Period (End 2019)	This Reporting Period (End 2020)	Next Reporting Period (End 2021)
D: REHABILITATION ON SLOPES			
D1 10 to 18 degrees	32.9	32.9	32.9
D2 Greater than 18 degrees	-	-	-
E: SURFACE OF REHABILITATED LAND			
E1 Pasture and grasses	51.6	51.6	51.6
E2 Native forest/ecosystems	-	-	-
E3 Plantations and crops	-	-	-
E4 Other (includes non-vegetative outcomes)	-	-	-

Table 27 Maintenance Activities on Rehabilitated Land

Nature of Treatment	Area Treated (ha)		Comment / control strategies / treatment detail
	Report period (2020)	Next period (2021)	
Additional erosion control works (drains re-contouring, rock protection)	<1-20	<1-20	Maintenance works may be required if settlement or erosion has occurred.
Re-covering (detail - further topsoil, subsoil sealing etc.)	0	0	No re-covering of the REA erosion control contour banks or other rehabilitation areas was required during the reporting period.
Soil treatment (detail - fertiliser, lime, gypsum etc.)	0	0	No additional gypsum and fertilizer to the REA erosion control contour banks during the reporting period.
Treatment/management (detail - grazing, cropping, slashing etc.)	0	0	Continued controlled grazing of Wattus Ponds area. Grazing was not undertaken on the REA in 2020.
Re-seeding/replanting (detail - species density, season etc.)	<1	<1	Minor maintenance of REA erosion control contour banks was required during the reporting period.
Adversely affected by weeds (detail - type and treatment)	~20	~20	The following weeds were controlled by spraying or slashing during reporting period: African Boxthorn, Liverseed Grass, Prickly Pear, Green Cestrum, Blue Heliotrope and Galenia. The weed control program will continue in the next reporting period.
Feral animal control (detail - fencing, trapping, baiting etc.)	~20	~20	Kangaroo culling was undertaken (with the approval of the National Parks and Wildlife Service) in 2020 and will continue in the next reporting period.

8.4.4 Forestry Plantation

In 2003, Dartbrook Mine commenced the establishment of a 75ha forestry plantation in conjunction with Forests NSW. The plantation was located on undulating grazing land north of the CHPP, and south of the town of Aberdeen. Approximately 75,000 seedlings, comprised mainly of Spotted Gum (*Corymbia maculata*) were planted in 2004 and 2005.

The plantation was part of a regional plan to create a sustainable forestry resource on land that was previously grazed.

To date, the project area has also been successful at achieving the additional objectives of establishing a biodiversity corridor, providing fauna habitat and stabilising the soil however, long term trends cannot be determined at this point.

Monitoring of the plantation will continue to be undertaken in 2021.

8.4.5 Sustainable Cattle Grazing Trial

Grazing of cattle on the REA was not carried out in 2020. AQC will review opportunities to recommence grazing in this area the next reporting period.

8.5 NEXT REPORTING PERIOD

Dartbrook Mine will continue to undertake rehabilitation maintenance activities as required. These activities may include weed control, feral animal control and erosion management works.

Dartbrook Mine will also continue regular inspections of the areas associated with the River Restoration Project, River Red Gum Restoration Project and Forestry Plantation.

AQC will continue to engage with DPIE-RR and other stakeholders during the 2021 reporting period over the review and implementation of the updated Care and Maintenance MOP and Mine Closure Plan documents.

9. COMMUNITY RELATIONS

9.1 ENVIRONMENTAL COMPLAINTS

9.1.1 Protocol

AQC operates Dartbrook Mine under a Complaints Handling Protocol, which details the process for receiving and responding to complaints.

Complaints can be received via a dedicated complaints telephone line, 1300 131 058, general telephone number, facsimile, email, letter or in person.

All complaints received are recorded in a Complaints Register. The community complaints procedure was further updated in 2017 following the transfer of ownership to AQC. The Dartbrook Mine contact number continues to be advertised on the AQC website and provided to CCC members during meetings.

9.1.2 Complaints

No environmental complaints were received during the reporting period. At the CCC meeting on 25 March 2020, inquiries were made regarding whether AQC had received complaints in relation to two separate matters (see **Table 28**). It was clarified that no such complaints were received and that these matters were not associated with Dartbrook Mine's activities.

Dartbrook Mine has received few complaints during the Care and Maintenance phase. In recent years, Dartbrook Mine received 2 complaints in 2019 and no complaints in 2018 or 2017.

9.2 COMMUNITY LIAISON

9.2.1 Dartbrook Community Consultative Committee

The Dartbrook Mine Community Consultative Committee (CCC) is comprised of community representatives from MSC and UHSC, council staff and the local community.

In 2020, an Independent Chairperson, Lisa Andrews, was appointed to chair the CCC meetings. The council representatives were Councillor Kiwa Fisher (UHSC representative), Paul Smith (UHSC staff representative) and Sharon Pope (MSC staff representative). The 2020 community representatives on the CCC were Arthur Mitchell, Annette Rahn, Tony Lonergan, Jennifer Lecky and Noel Downs (also representing the Wanaruah Local Aboriginal Land Council).

Dartbrook Mine held three meetings with the Community Consultative Committee (CCC) members in 2020. Due to restrictions and concerns with the COVID-19 pandemic, the meeting scheduled for March 2020 was conducted remotely via email. The presentation was emailed to all CCC members on the scheduled meeting date of 25 March 2020. Members were requested to review the document and provide any questions/comments within 7 days. After this time, this information was coordinated by the Independent chairperson and forwarded through to the company for its response. The answers were incorporated into the minutes as a record of the outcome of the engagement process.

The CCC Meetings held in September 2020 and December 2020 were a combination of a face-to-face meeting with some members electing to participate via video conferencing using the Zoom computer platform.

Table 28 lists the dates of meetings held during 2020 and the topics discussed at each meeting. Updates of AQC activities and general environment performance at Dartbrook Mine were also provided to the CCC at each meeting. Minutes of the meetings were posted on the Dartbrook Mine website.

The CCC representatives will also be provided a copy of this Annual Review following its distribution to the regulatory agencies.

Table 28 Summary of Topics Discussed During CCC Meetings in 2020

Date	Topics Discussed
25/03/2020	A presentation was emailed to members due to Covid-19 concerns. The presentation described the activities that occurred since the previous meeting, including: • AQC Management Changes; • Dartbrook Underground Modification 7 Update; • Independent Environment Audit 2019 update; • Environmental monitoring and results; • Complains and Incidents; • Land Management; and • Stakeholder consultation. Questions and comments were received from some representatives following their review of the email. These included: • Seeking confirmation who will be the new CEO of AQC; • Requesting clarification of a complaint received by the EPA and subsequently MSC on 19/12/2019 regarding an illegal dump on leased land. AQC reiterated the complaint was unrelated to any actions by AQC and that once they became aware of the activity, the lessee was instructed to cease this activity; • Support for the commencement of post mining considerations for the mine site and that there should be a target to provide ongoing employment opportunities on the site; and • Questioning whether a complaint has been made against AQC for installation of unmetered water pipes and pumps at a lagoon close to Blairmore Lane. AQC confirmed they had not received any correspondence and that there was no substance to the allegation.
02/09/2020	• An update was provided on the MOD7 Appeal and the Response to Contentions Report that was prepared in response to contentions raised by the IPCN. Key refinements to the Mod 7 proposal that were assessed included: – Removal of the downcast shaft site and associated truck movements on the mine access road; – Relinquishment of the approval under DA 231-07-2000 for underground mining in the Piercefield coal seam in the absence of further approvals; and – Approval to beneficiate all coal extracted (by both longwall and bord and pillar mining methods). • A summary of environmental monitoring results was provided; • No environmental incidents or complaints had been recorded since the previous CCC meeting; • Questions on Notice were received and responded to including: – Requirement to prepare a Mine Closure Plan, which would likely be prepared if AQC were unsuccessful in the Appeal process; – Copies of various Management Plans as well as noise monitoring results from when the Mine was operating, were provided as requested; – Clarification over the CEO's contract, AQC financial position and various statements made to ASX; – The sale process of Garoka Dairy, which was out for Expressions of Interest.

Date	Topics Discussed
16/12/2020	• An update on the status of MOD7 and the appeal process was provided; • A summary of environmental monitoring results was provided; • No environmental incidents or complaints had been recorded since the previous CCC meeting; • An updated draft Dartbrook Care & Maintenance Mining Operations Plan and Mine Closure Plan had been provided to the regulators for comment; • Questions were taken on Notice and responded to where possible, regarding: – The Expressions of Interest on the property and water sales have been received and are commercial in confidence; – The current Site Water Management Plan, which is available on the website would be updated prior to any future mining operations; – The specifics within MOD7 application and submissions, which could not be responded to, as the application is before the Court.

9.2.2 Community Participation

AQC continued to advertise its support and sponsorship of community-based programs and events on its website, at CCC meetings and in its regular community newsletters. AQC did not enter into any sponsorship arrangements during the reporting period. However, AQC continues to welcome sponsorship applications via its website.

9.2.3 Workforce Characteristics

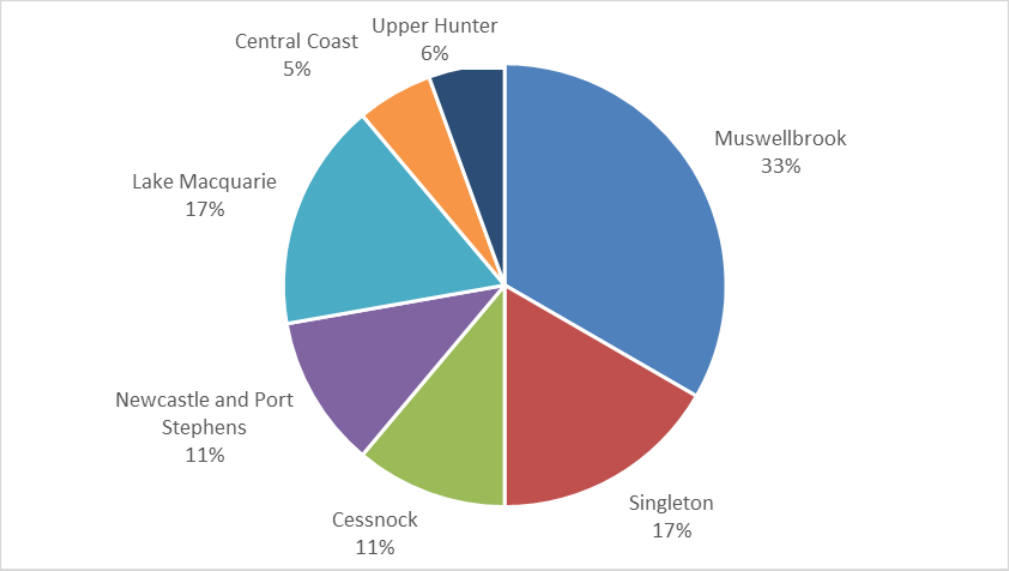
Dartbrook Mine currently maintains a contract workforce of 18 persons residing in the following areas (also see **Figure 14**):

- Muswellbrook (6);
- Upper Hunter (1)
- Singleton (3);
- Cessnock (2);
- Newcastle and Port Stephens (2);
- Lake Macquarie (3); and
- Central Coast (1).

Where practicable, AQC will continue to utilise a locally sourced workforce for activities on site. AQC continues to lease properties surrounding the site to a number of local families and farmers.

No significant changes to workforce characteristics are expected for the continuation of Care and Maintenance into the next reporting period.

Figure 14 Breakdown of Current Workforce by Place of Residence



9.2.4 Leaseholders and Dairy Farm

AQC has seven major leaseholders and agistees that occupy the Dartbrook Mine owned land surrounding the mining authorisations. There are also a number of tenants who occupy residences on AQC land surrounding the mine site.

The Garoka Dairy has been operating in the vicinity of Dartbrook Mine since 1992 and is generally located on the alluvial lands between the Dartbrook CHPP and the workshop and portal entry. The dairy can currently support up to 700 head of cattle.

The Garoka Dairy was listed for sale by Expressions of Interest in late 2020. The sale of the land was not completed during the reporting period.

10. INDEPENDENT ENVIRONMENTAL AUDIT

In accordance with the requirements of DA 231-07-2000 (MOD6), an Independent Environmental Audit (IEA) was undertaken in late 2019 by SLR Consulting.

The IEA Report and AQC Response Plan prepared to respond to the non-compliances and recommendations identified by the auditors is available on the Dartbrook website. The following actions proposed in the AQC Response Plan were undertaken during the reporting period:

- Update of the SWMP and provision to MSC and DPIE-Water for consultation;
- Obtaining approval from DPIE (letter dated 20 March 2020) to defer updates of environmental management plans until the re-commencement of mining is proposed;
- Submission of a draft Mine Closure Plan for regulatory review.

Under the conditions of DA 231-07-2000 approved for MOD7, the next IEA is required to be undertaken within one year of the recommencement of mining operations on site.

11. ENVIRONMENTAL INCIDENTS & NON-COMPLIANCES

11.1 ENVIRONMENTAL INCIDENTS

There were no reportable environmental incidents during the reporting period.

11.2 ENVIRONMENTAL NON-COMPLIANCES

As part of the EMS, internal and external reviews are undertaken to assess compliance with regulatory requirements including the conditions of Development Consent, EPL 4885 and Dartbrook Mine mining authorities.

A summary of the environmental non-compliances identified during the reporting period and where they have been discussed in this document is provided in **Section 1**.

12. ACTIVITIES PROPOSED IN THE NEXT REPORTING PERIOD

The activities proposed to be undertaken in 2020 are summarised in **Table 29**. Further details on the proposed activities are provided in **Section 6** and **Section 7**.

Table 29 Dartbrook Mine Environmental Management Activities Proposed for 2021

Area	Proposed Activity
Operational	AQC will continue to consult with NSW regulatory agencies on the appeal over the determination of DA 231-07-200 (MOD7) determination; AQC will review and update the Dartbrook EMS prior to any recommencement of mining operations.
Air Quality	Dust mitigation and control activities will be employed onsite, where required; Air Quality monitoring will continue onsite in accordance with the DMP.
Erosion and Sediment	Sediment structures will continue to be inspected and maintained where required; Water runoff from previously disturbed areas will continue to be directed into sediment dams; Implementation of the revised SWMP following regulatory review and approval.
Surface Water Management	Monitoring will continue in accordance with the SWMP; Implementation of the revised SWMP following regulatory review and approval.
Groundwater Management	The IAC in the SWMP will be reviewed to determine if these values remain appropriate. A revised SWMP will be submitted for approval in the next reporting period. Groundwater monitoring will be conducted in accordance with the amended SWMP (following endorsement from the relevant regulators).
Rehabilitation	Ongoing monitoring of rehabilitation areas on site, with maintenance work as required; Revise Dartbrook Mine Closure Plan following review by regulatory agencies.
Threatened Flora and Fauna	Fauna and flora communities will be managed in accordance with the approved Flora and Fauna Management Plan; In circumstances where clearing is required, the Permit to Disturb system will continue to be implemented; Inspections of the River Restoration, River Red Gum and Forestry Plantation areas will continue in 2021.
Noxious Weeds and Feral Animals	Weed control will continue to be conducted within the mining authorisations and the Weed Control Register will be maintained; Feral animals will continue to be controlled as necessary.
Visual / Stray Light	Maintenance of the tree screens will continue (as required).
Aboriginal Heritage	The existing Permit to Disturb system will continue to be implemented prior to commencing ground disturbance activities such as exploration and rehabilitation.
European Heritage	Ongoing maintenance of European heritage items as required, in consultation with regulatory agencies.
Spontaneous Combustion	REA thermocouple temperatures will continue to be monitored.
Bushfire	Fuel loads across the site will continue to be monitored and managed as required.

Area	Proposed Activity
Mine Subsidence	Surface inspections of previous mine subsidence areas will continue to determine if further remediation actions are required.
Hydrocarbon Management	Appropriate storage and management of hydrocarbon storages and materials will continue; Areas identified as contaminated will continue to be recorded on the site contamination register.
Waste Management	Ongoing management and monitoring of waste generated on site; Geotechnical inspection of the REA.
Gas drainage / Ventilation	Monitoring of gas emissions from the mine will continue.
Public Safety	Full-time onsite caretakers will remain on site; Fences will be maintained, and gates will remain locked and secured, as required. Vegetation slashing on the mine access road will continue, as required.
REA Rehabilitation	Investigate reintroduction of cattle grazing on Rehabilitated REA, weather conditions permitting.

ABBREVIATIONS

Abbreviation	Meaning
AQC	AQC Dartbrook Management Pty Limited
BC Act	*Biodiversity Conservation Act 2016*
BCD	Environment, Energy and Science – Biodiversity and Conservation Division
CCC	Community Consultative Committee
CHPP	Coal Handling and Preparation Plant
CL	Coal Lease
DA	Development Application
DPIE	NSW Department of Planning, Industry and Environment
DPIE-RR	NSW Department of Planning, Industry and Environment – Resources Regulator
EC	Electrical Conductivity
EIS	Environmental Impact Statement
EL	Exploration Licence
EP&A Act	*Environmental Planning & Assessment Act 1979*
EPBC Act	*Environment Protection & Biodiversity Conservation Act 1999*
EPL	Environment Protection Licence
GHG	Greenhouse Gas Emissions
ha	hectare
Heritage Act	*Heritage Act 1977*
IAC	Impact Assessment Criteria
ICNG	*Interim Construction Noise Guideline*
IPCN	Independent Planning Commission NSW
LEP	Local Environmental Plan
LGA	Local Government Area
M	metres
Mbcm	Million bank cubic metres
Mining Act	*Mining Act 1992*
ML	Mining Lease
MSC	Muswellbrook Shire Council
Mtpa	Million tonnes per annum
NGER Act	*National Greenhouse and Energy Reporting Act 2007*
NPW Act	*National Parks and Wildlife Act 1974*
RL	Reduced Level
RMS	Roads and Maritime Services

Abbreviation	Meaning
SEE	Statement of Environmental Effects
SEPP 33	*State Environmental Planning Policy 33 – Hazardous and Offensive Development*
SEPPs	State Environmental Planning Policies
SPLs	Sound Power Levels
SSD	State Significant Development
SWMP	Site Water Management Plan
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
UHSC	Upper Hunter Shire Council
WM Act	*Water Management Act 2000*

APPENDIX A

SUMMARY OF MINOR AMENDMENTS TO DEVELOPMENT CONSENT CONDITIONS DURING CARE AND MAINTENANCE

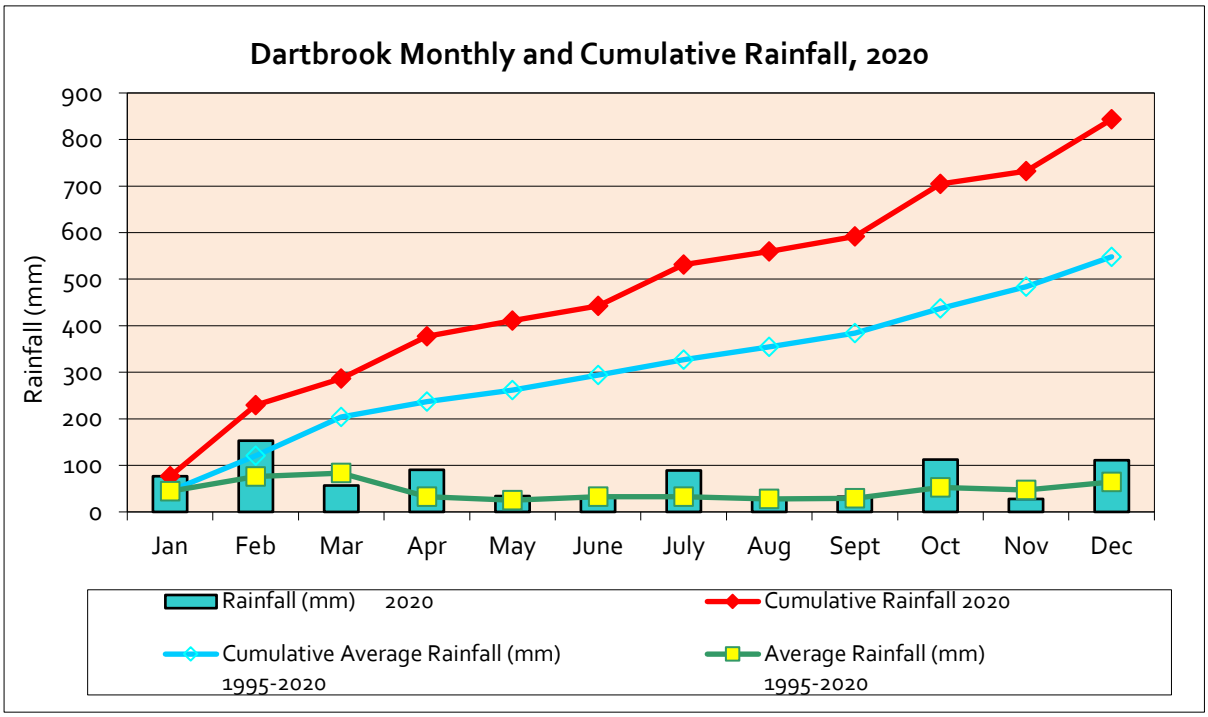
Table A1
Summary of minor amendments to Development Consent conditions during Care and Maintenance

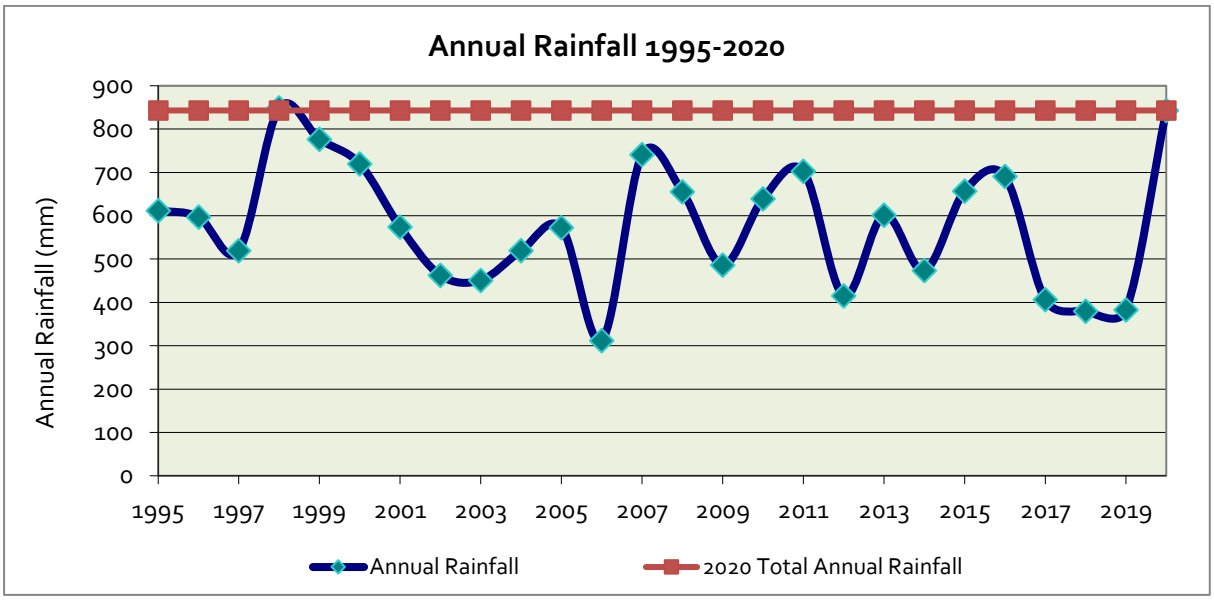
Approval Document Reference	Development Consent No. Reference	Existing Requirement	Requirement During Care & Maintenance
Complaints protocol & Environmental Management Strategy	10.2a (ii)	6 monthly complaints report to DoP (now DPE), MSC, UHSC, EPA, DPI-MR (now DRG) and Dartbrook Community Consultative Committee (DCCC).	Complaints to be included in Annual Environmental Management Report and DCCC Meetings only.
Community Consultation	10.1 (i)	The DCCC meet 6 times per year (every two months).	Three DCCC meetings per annum.
Community Consultation	10.1 (ii)1	Two company representatives required on the DCCC.	One company representative on the DCCC.
Development Consent	10.2b	Required to have two company persons available as EPA contact 24hrs day.	One person as the EPA person contact. This person will be available via a pager system.
Development Consent & Environmental Management Strategy	32.f	Review of Environmental Mgt Plans is required every 5 years (2007 due).	Continue to operate under existing Mgt plans without reviewing. Propose to modify these Mgt Plans should any activities recommence.
Development Consent	3.3 (l)	Surface subsidence monitoring is required up to 3 years following mining.	Reduce this period due to limited impacts observed on the surface from subsidence to-date.
Development Consent	8.1a	An Independent compliance audit is required every 3 years (due 2007).	Audit to occur, scope to be re-defined (e.g. cannot audit against EIS predictions etc).
Development Consent	3.2d	Preparation of the Water Mgt Plan and Soil Stripping Mgt Plan is required prior to construction of the REA.	As the REA is not being constructed and there are no further construction activities proposed, a Soil Stripping Management Plan is not necessary. The Water Management Plan will be prepared prior to Care & Maintenance.
Development Consent	2.1 (e)	A Mine Closure Plan is required to be prepared 2 years prior to completion of mining, in consult with DoP, DPI-MR, DNR, MSC, UHSC & approved by DoP and DPI-MR.	Decision and process to be managed through MOP.
Environmental Management Strategy & Dust Management Plan	6.1b (iii)	Required to report on a quarterly basis the results of air quality monitoring data to DoP and MSC.	Report on annual basis via the AEMR.
Lighting and Landscape Management Plan		Monitoring of tree screens is required 2 - 3 times per year.	Monitor once per year.

Approval Document Reference	Development Consent No. Reference	Existing Requirement	Requirement During Care & Maintenance
Waste Management Plan		A Waste audit is required to be undertaken annually.	Waste to be reported via the AEMR.
Noise Management Plan	6.4.1b	Attended noise surveys are to be undertaken on a quarterly basis.	DP&I advised that noise monitoring could be suspended as from 10/05/12.
REA Surveillance Program		Extensive monitoring requirements for the current REA (e.g. weekly thermocouples).	To be managed through the MOP process with DRG.

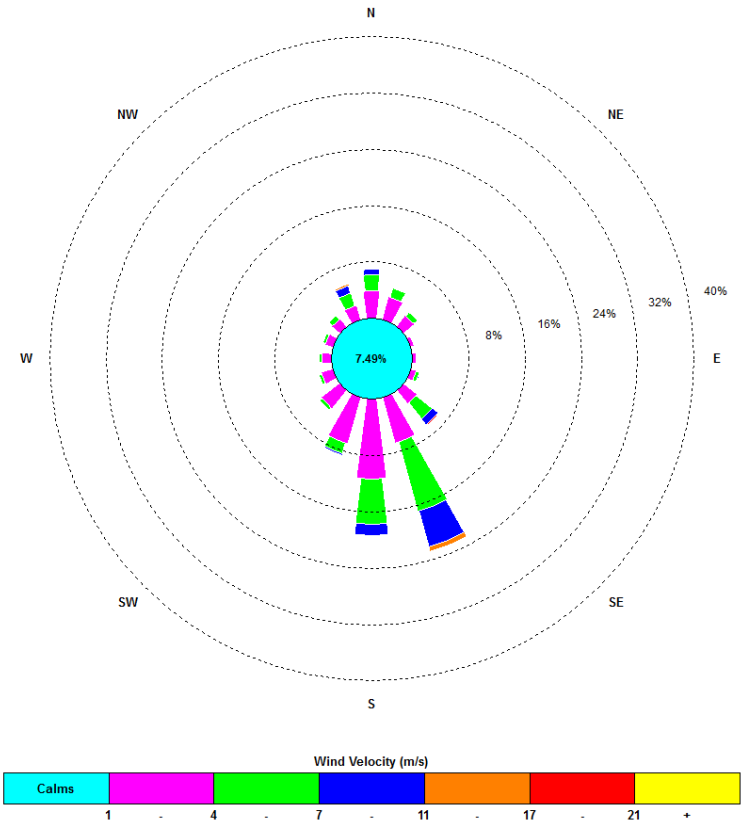
APPENDIX B

METEOROLOGICAL SUMMARY

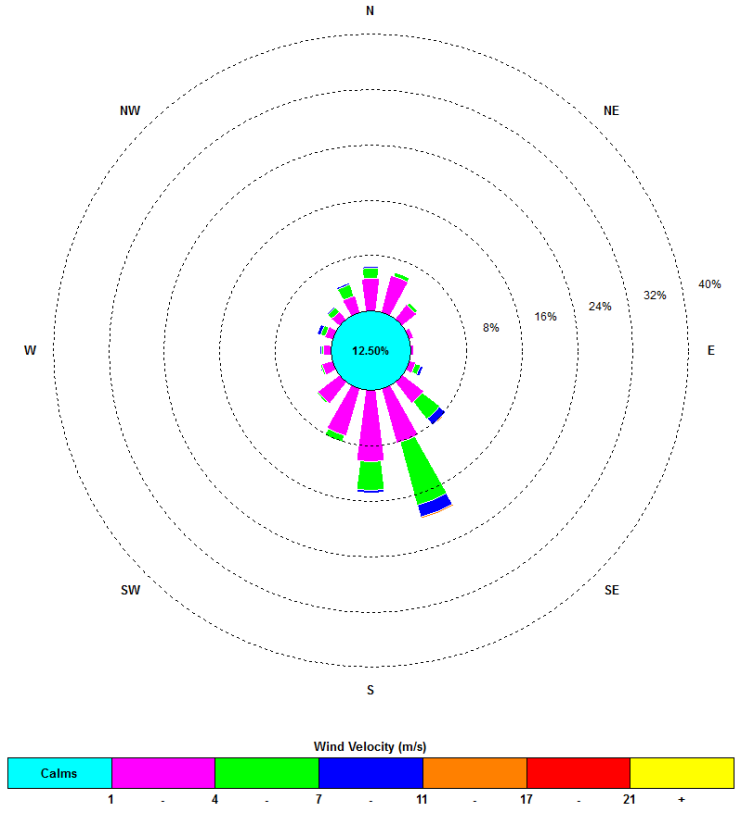

Dartbrook Monthly and Cumulative Rainfall, 2020
Rainfall (mm)
900
800
700
600
500
400
300
200
100
0
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
Oct
Nov
Dec
Rainfall (mm) 2020
Cumulative Rainfall 2020
Cumulative Average Rainfall (mm) 1995-2020
Average Rainfall (mm) 1995-2020


Annual Rainfall 1995-2020
Annual Rainfall (mm)
900
800
700
600
500
400
300
200
100
0
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
2019
Annual Rainfall
2020 Total Annual Rainfall

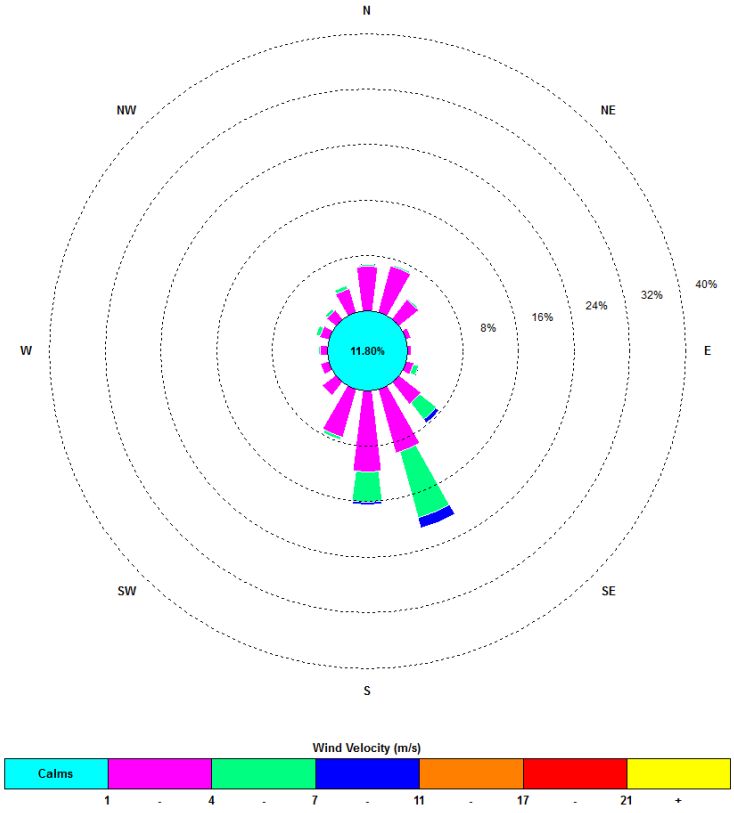
January 2020



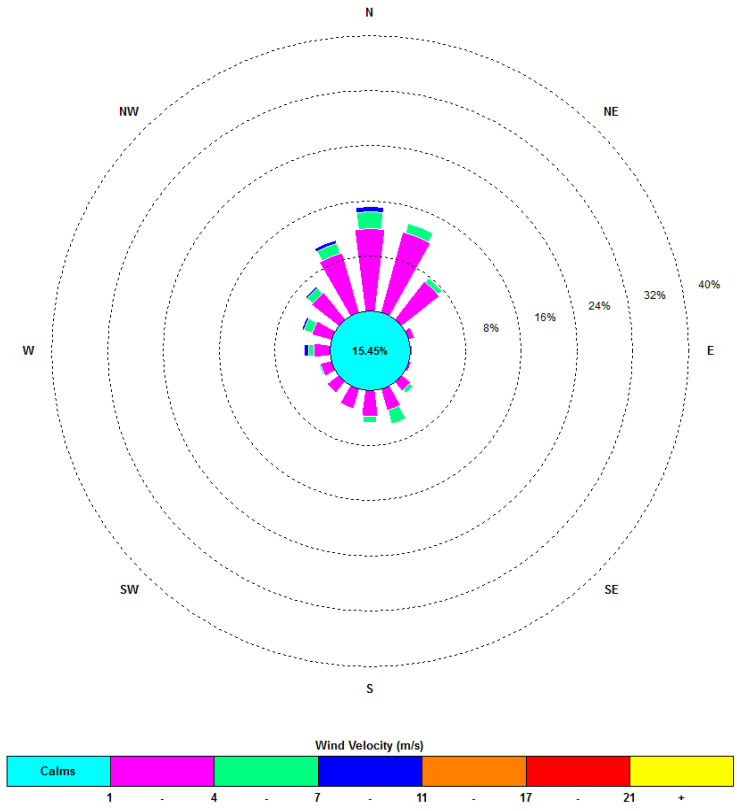
February 2020



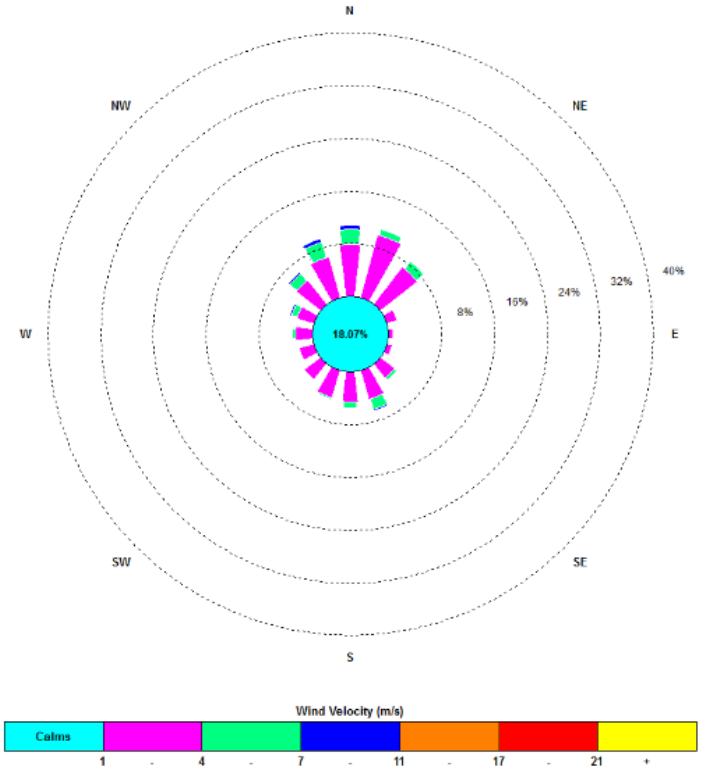
March 2020



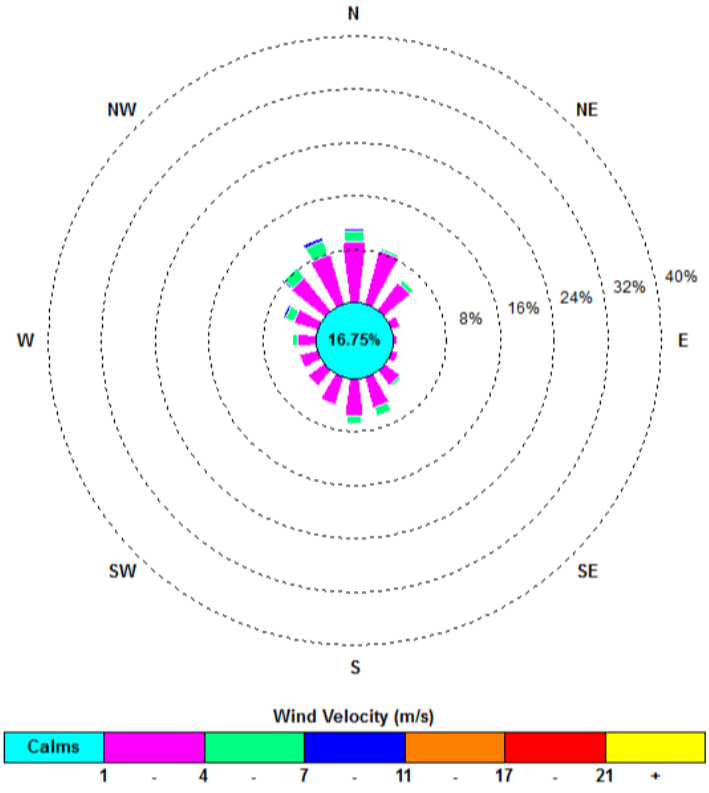
April 2020



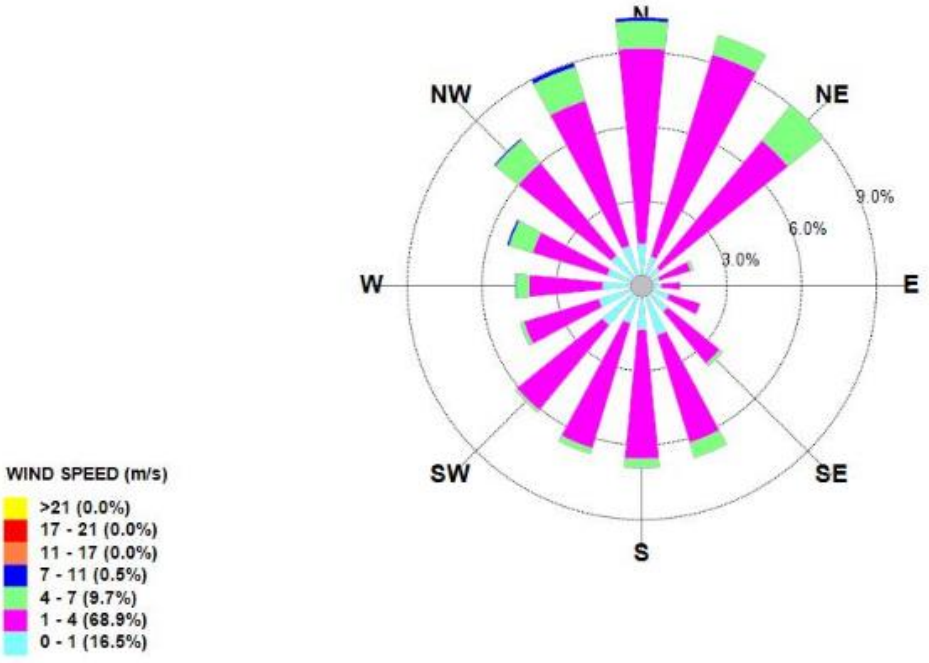
May 2020



June 2020

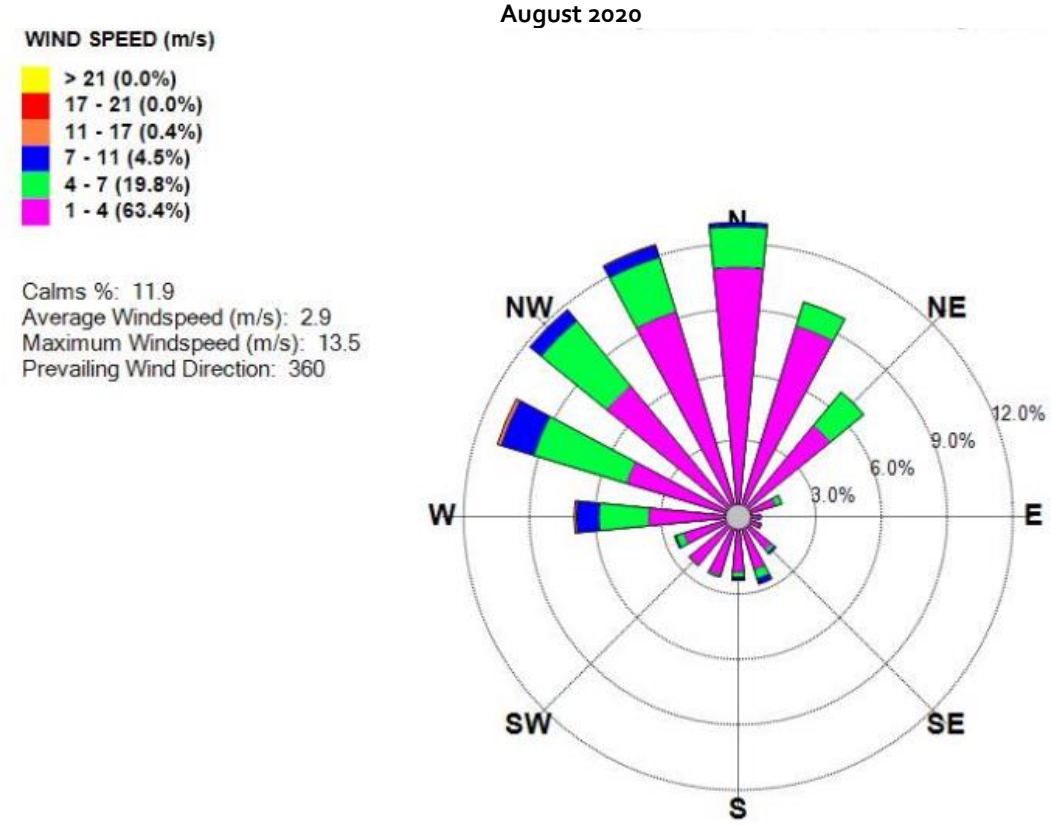


July 2020



Calms %: 4.4
Average Windspeed (m/s): 2.1
Maximum Windspeed (m/s): 15.1
Prevailing Wind Direction: 360

August 2020



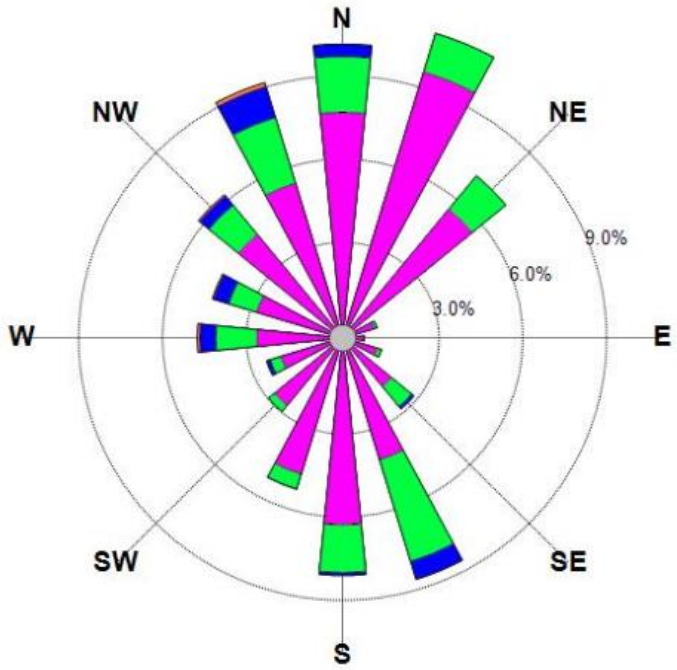
Calms %: 11.9
Average Windspeed (m/s): 2.9
Maximum Windspeed (m/s): 13.5
Prevailing Wind Direction: 360

September 2020

WIND SPEED (m/s)

- > 21 (0.0%)
- 17 - 21 (0.0%)
- 11 - 17 (0.4%)
- 7 - 11 (4.1%)
- 4 - 7 (19.4%)
- 1 - 4 (61.1%)

Calms %: 15.0
Average Windspeed (m/s): 2.9
Maximum Windspeed (m/s): 16.6
Prevailing Wind Direction: 22.5

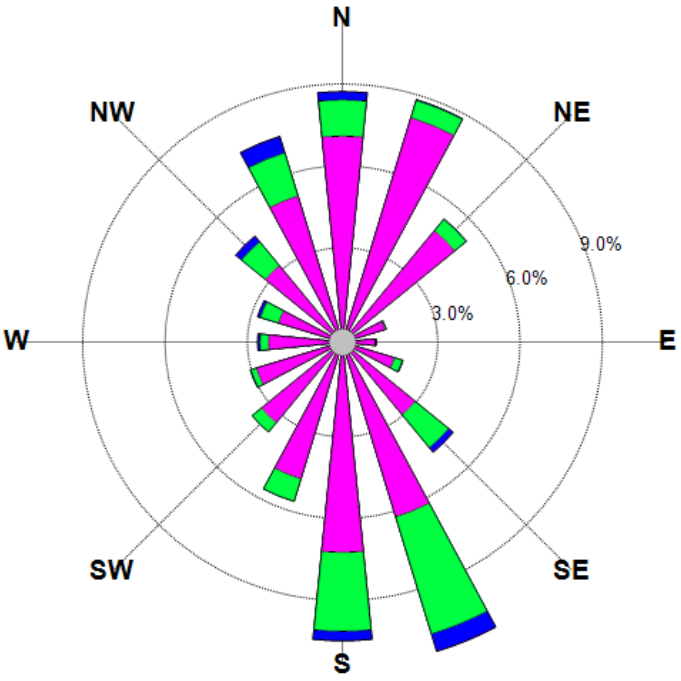


October 2020

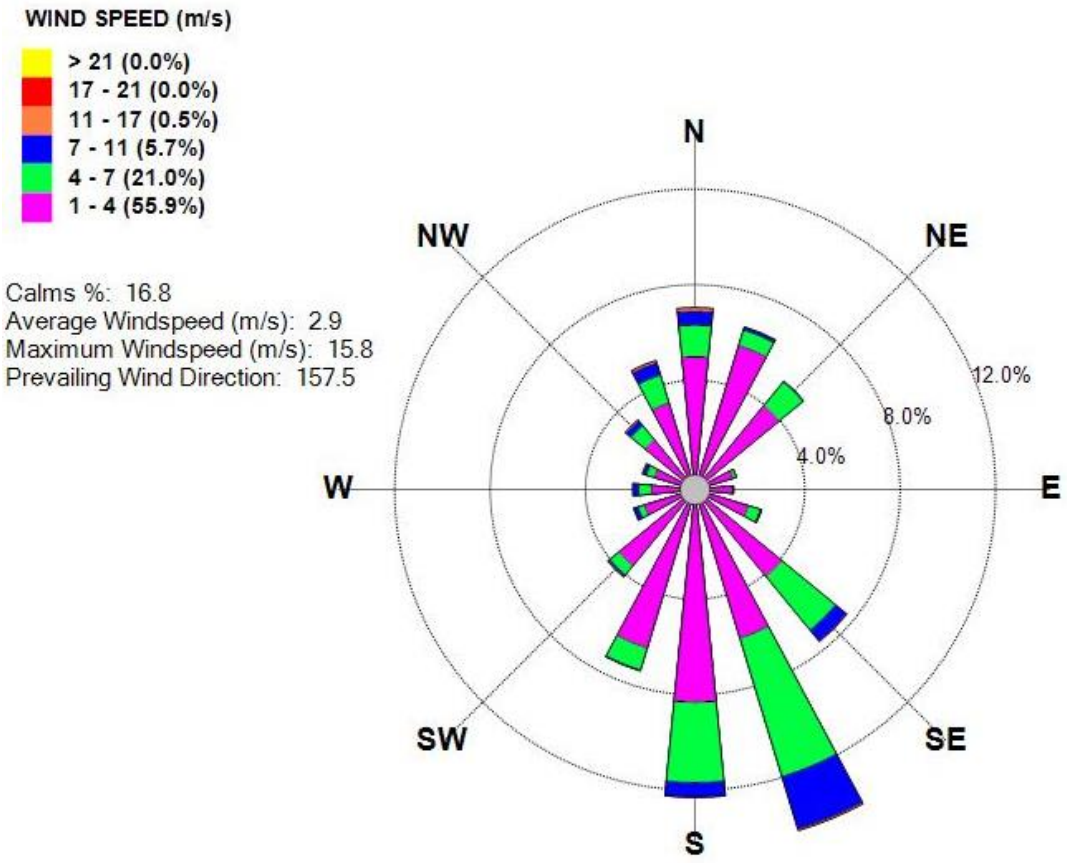
WIND SPEED (m/s)

- > 21 (0.0%)
- 17 - 21 (0.0%)
- 11 - 17 (0.0%)
- 7 - 11 (2.7%)
- 4 - 7 (17.2%)
- 1 - 4 (63.3%)

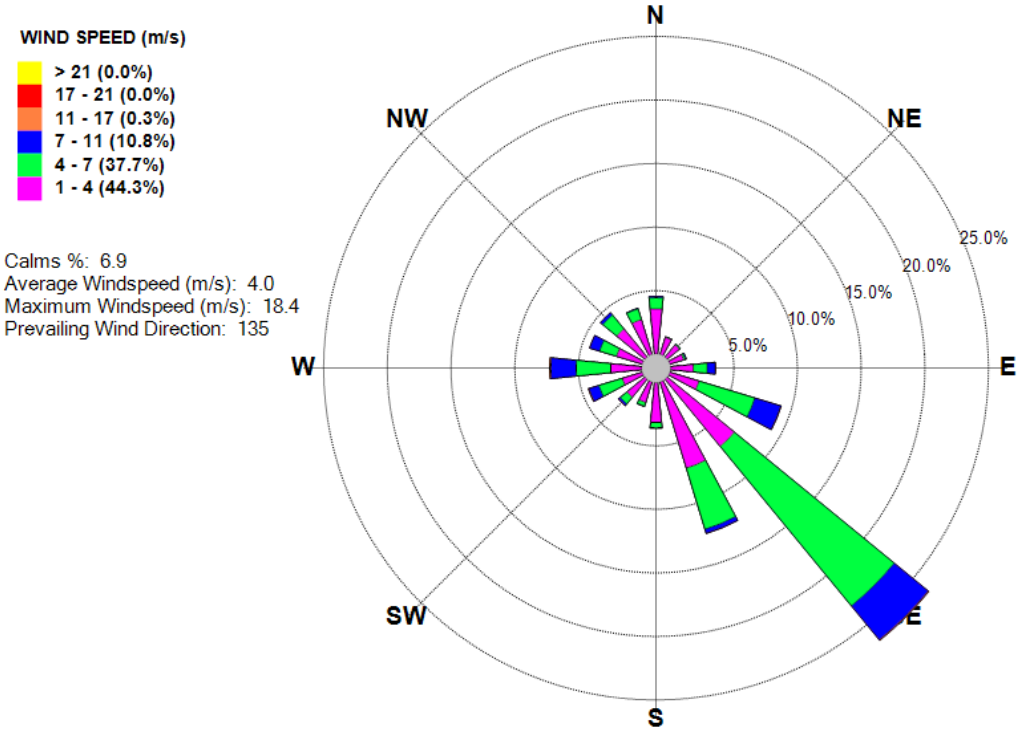
Calms %: 16.9
Average Windspeed (m/s): 2.6
Maximum Windspeed (m/s): 19.4
Prevailing Wind Direction: 157.5



November 2020

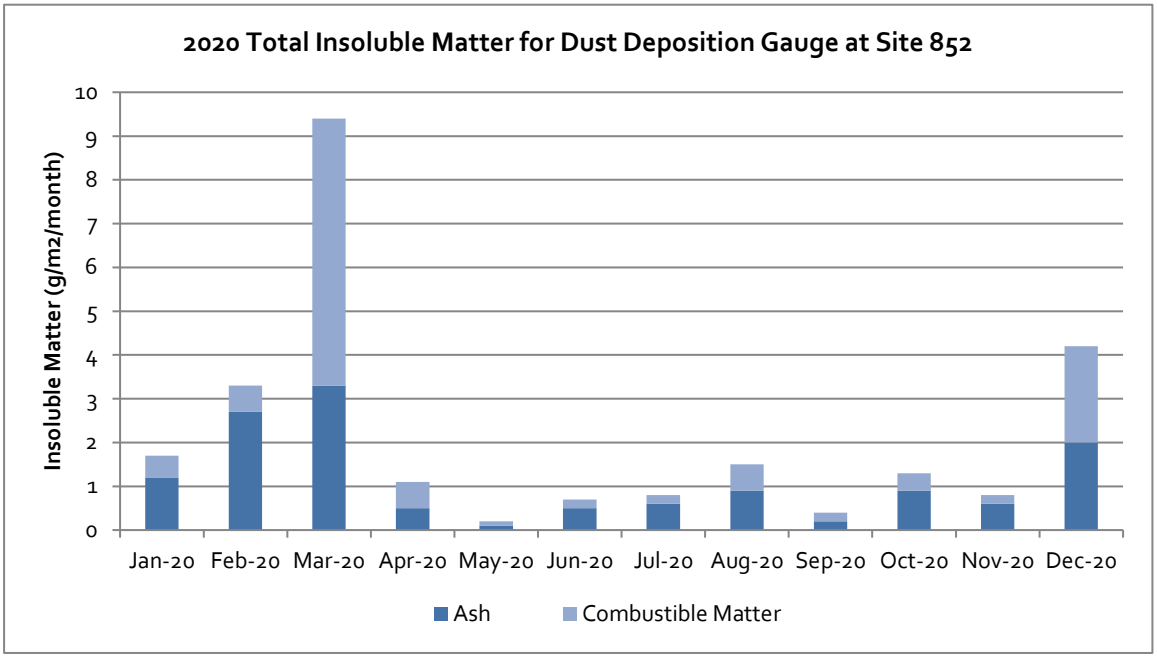


December 2020

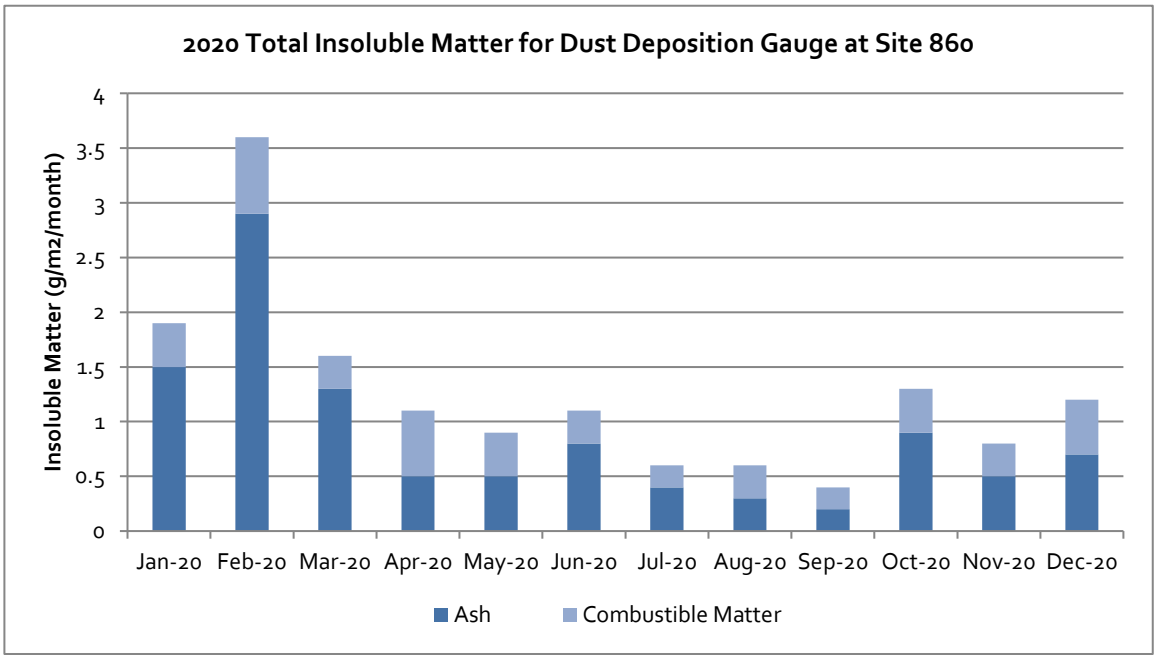


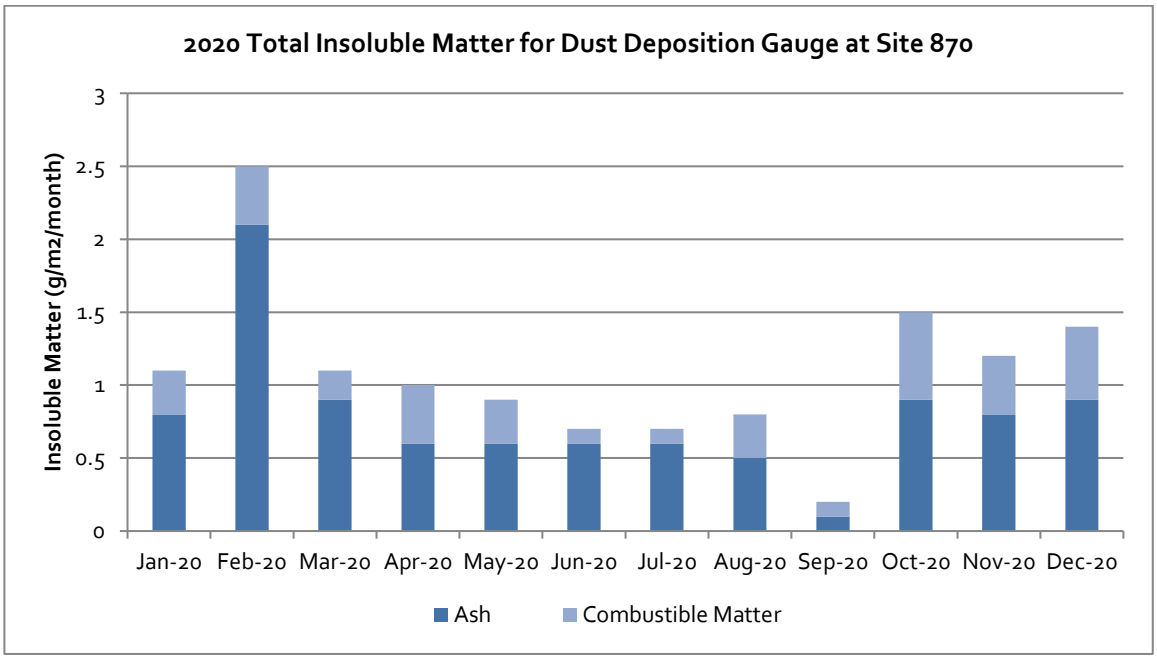
APPENDIX C

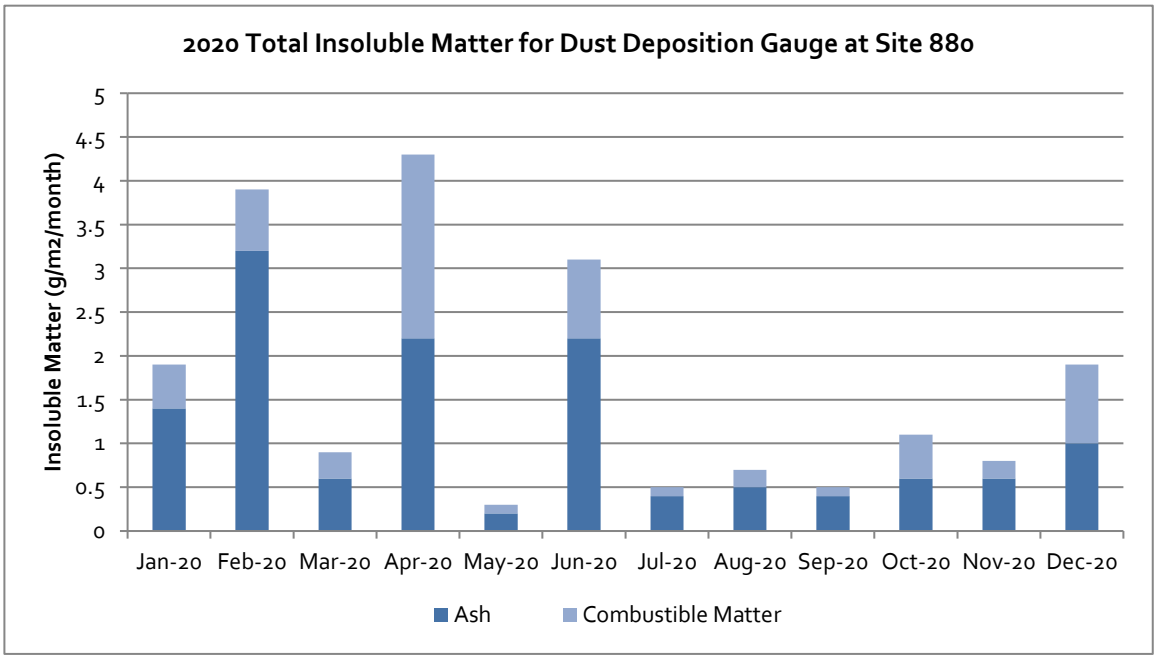
AIR QUALITY MONITORING SUMMARY



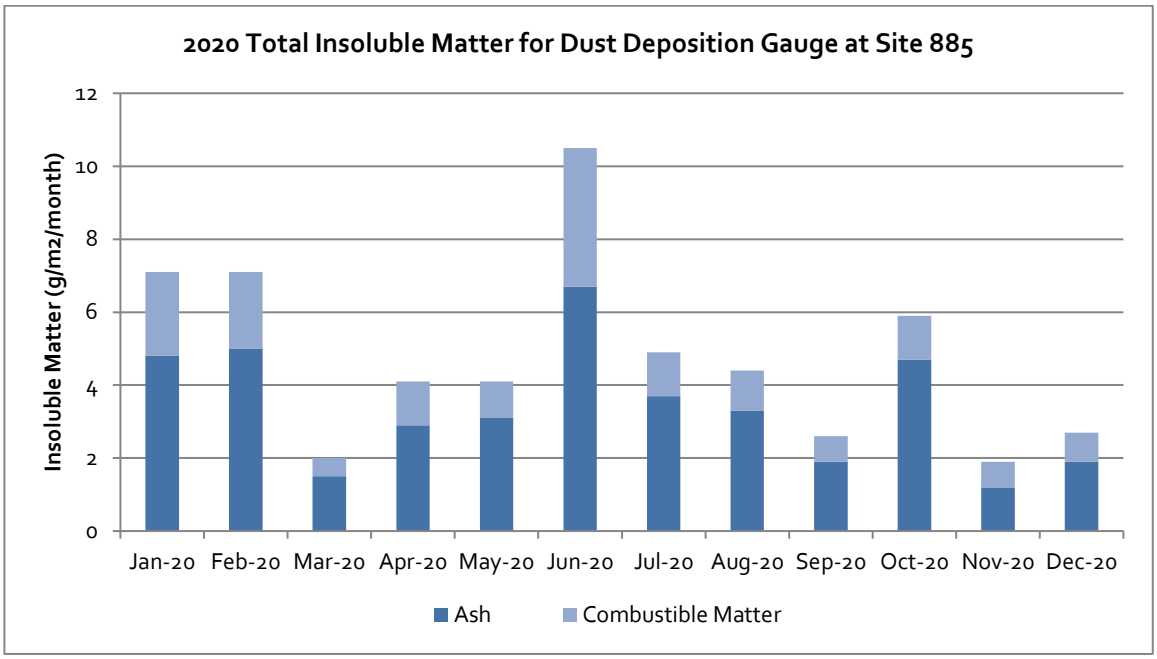
** March & December 2020 results contaminated*



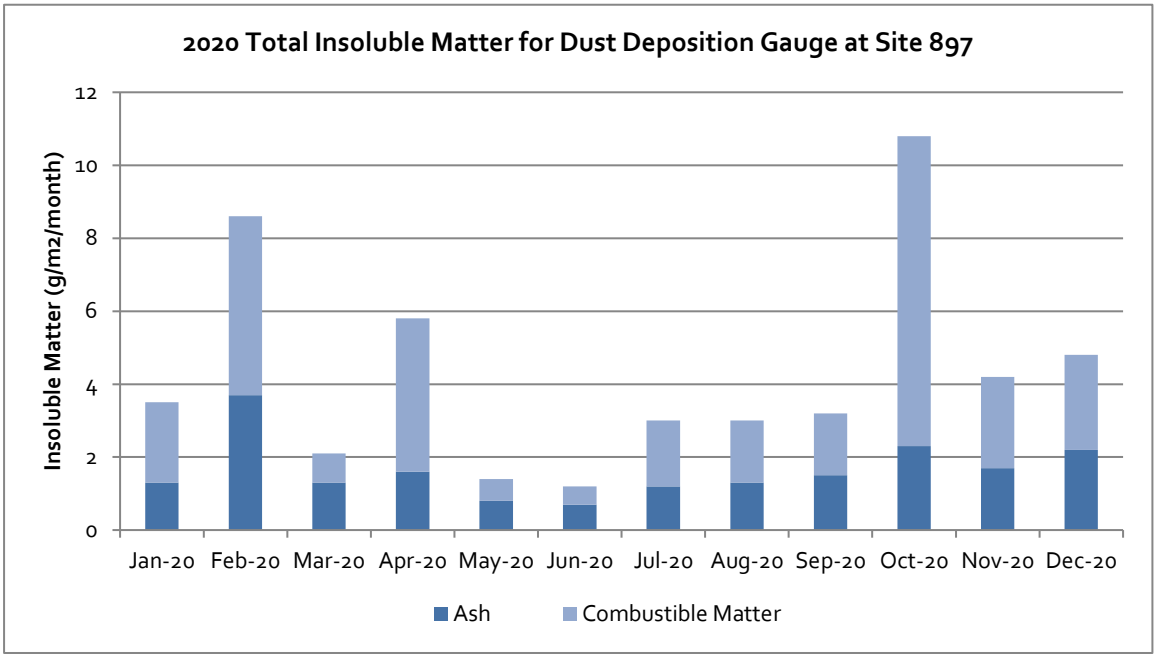




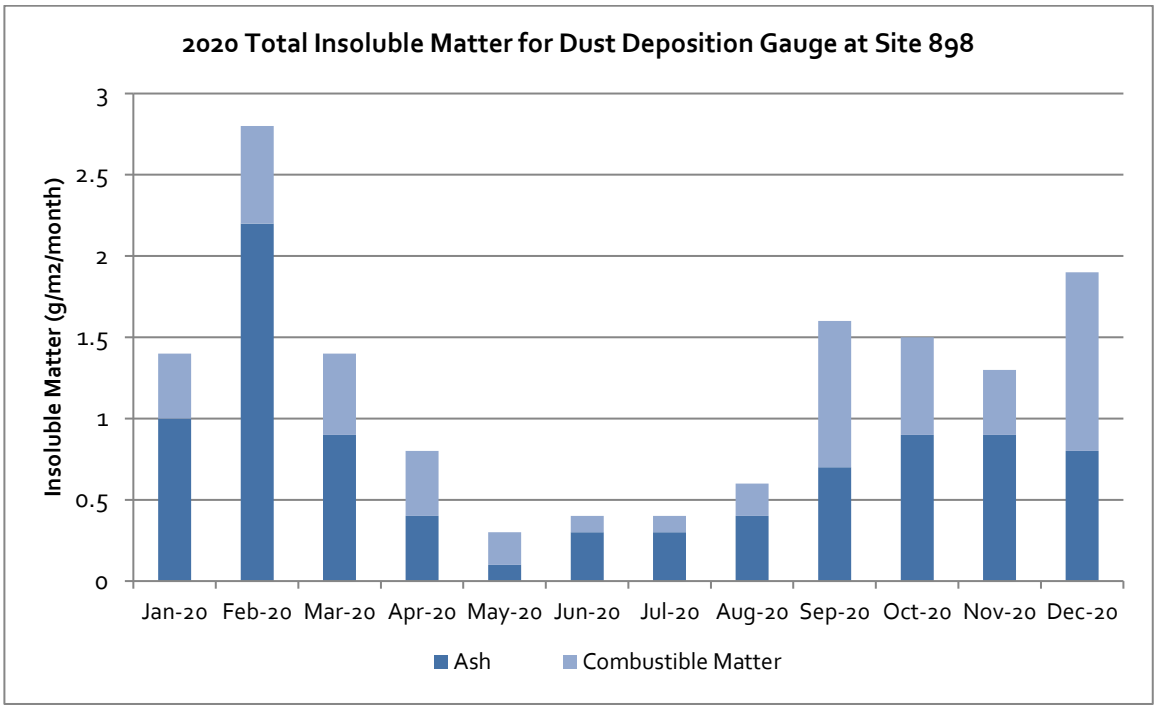
** April 2020 results contaminated*

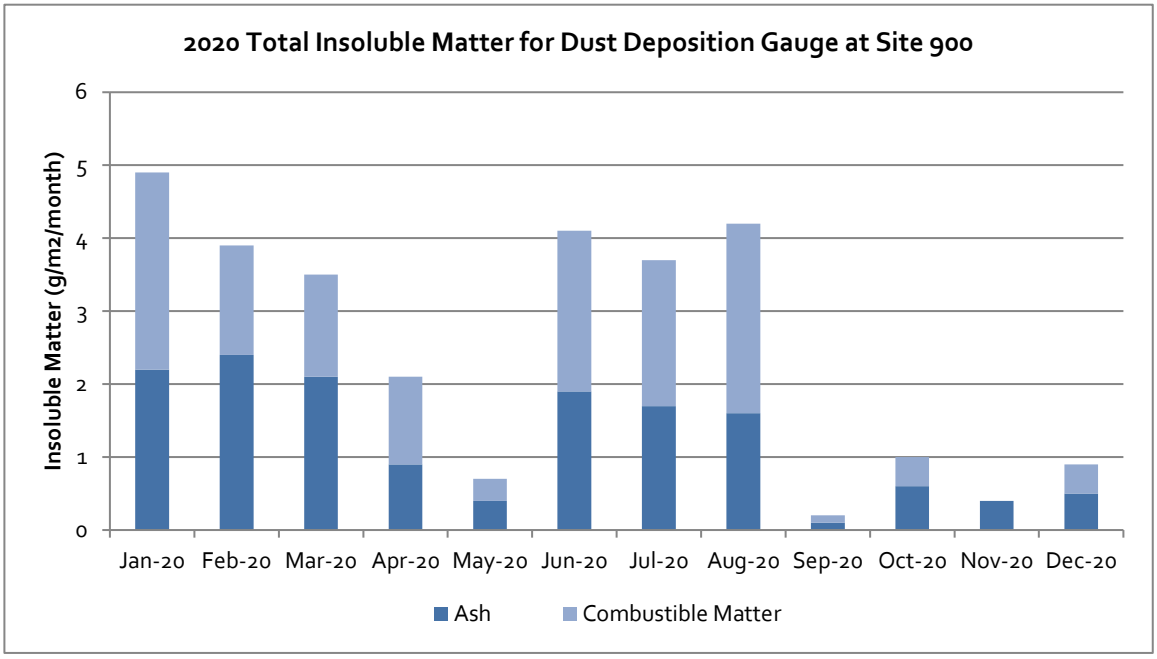


** January, April, June & July 2020 results contaminated*

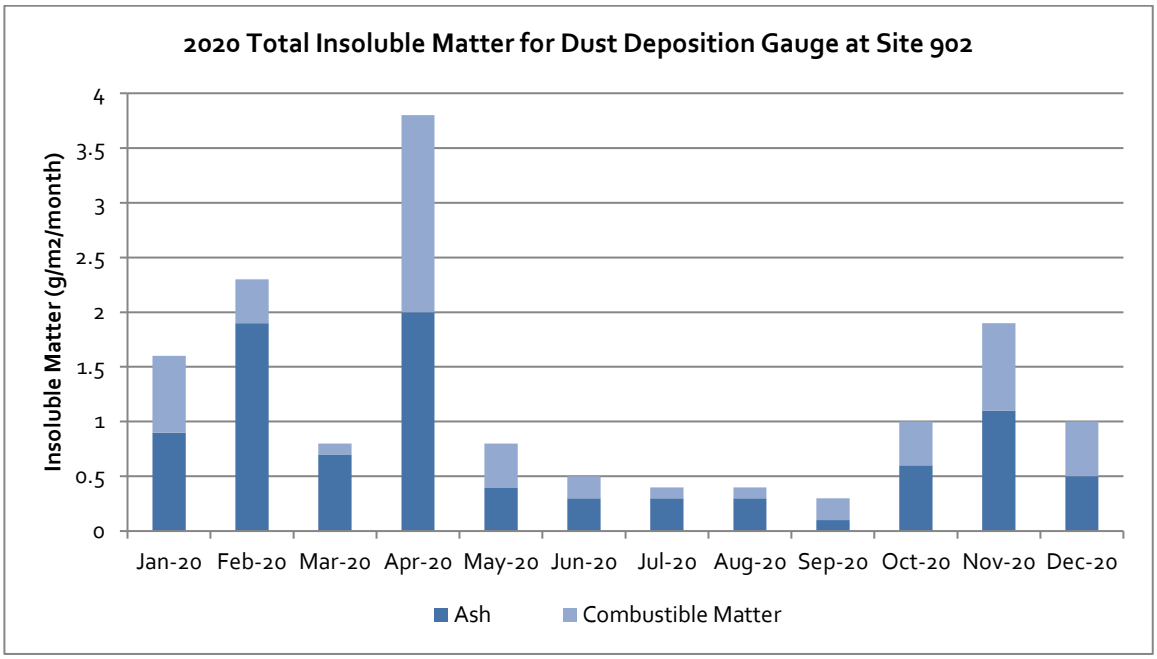


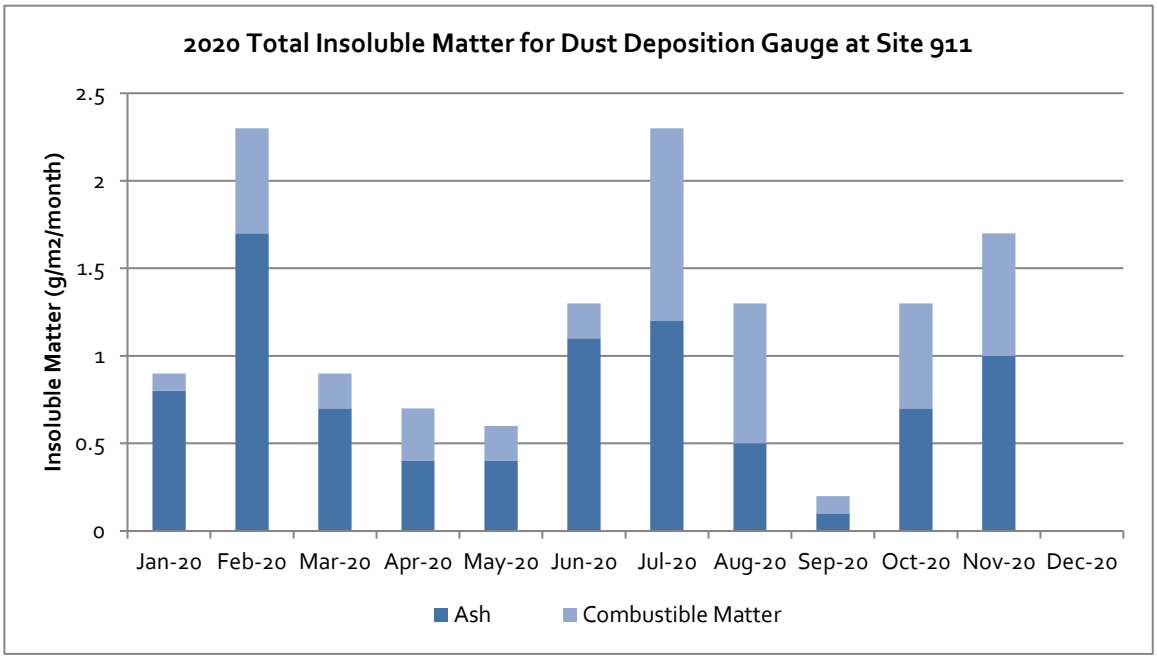
** February, April, September, October, November, December 2020 results contaminated*



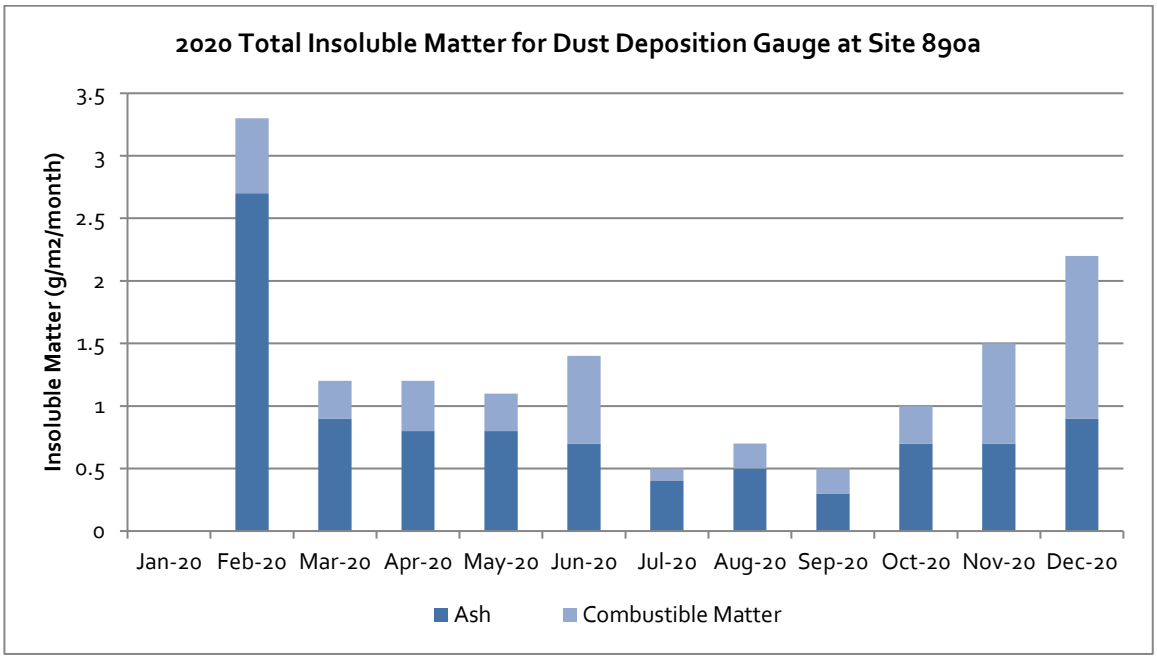


** January, June & August 2020 results contaminated*

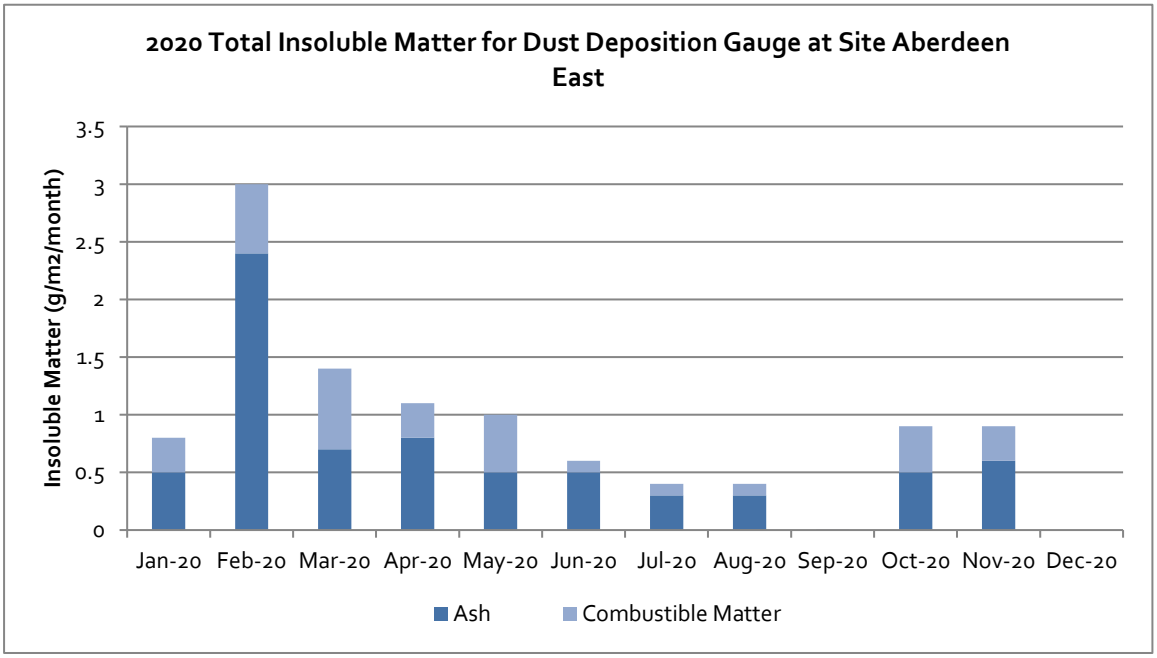




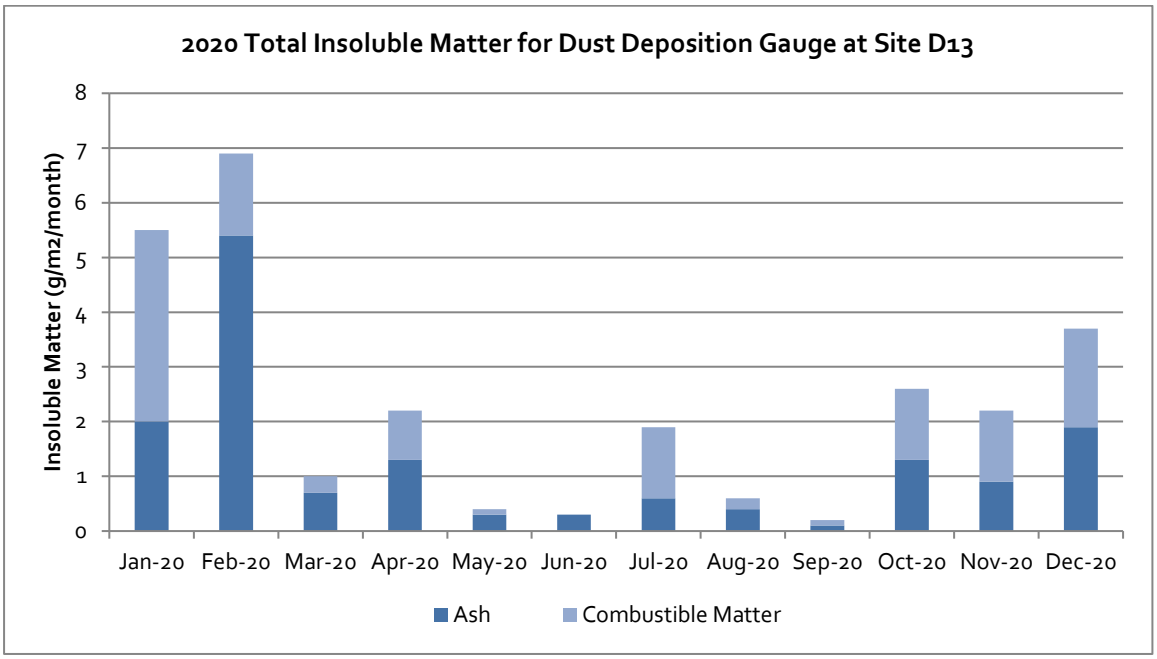
** No access to Dust Gauge in December 2020*



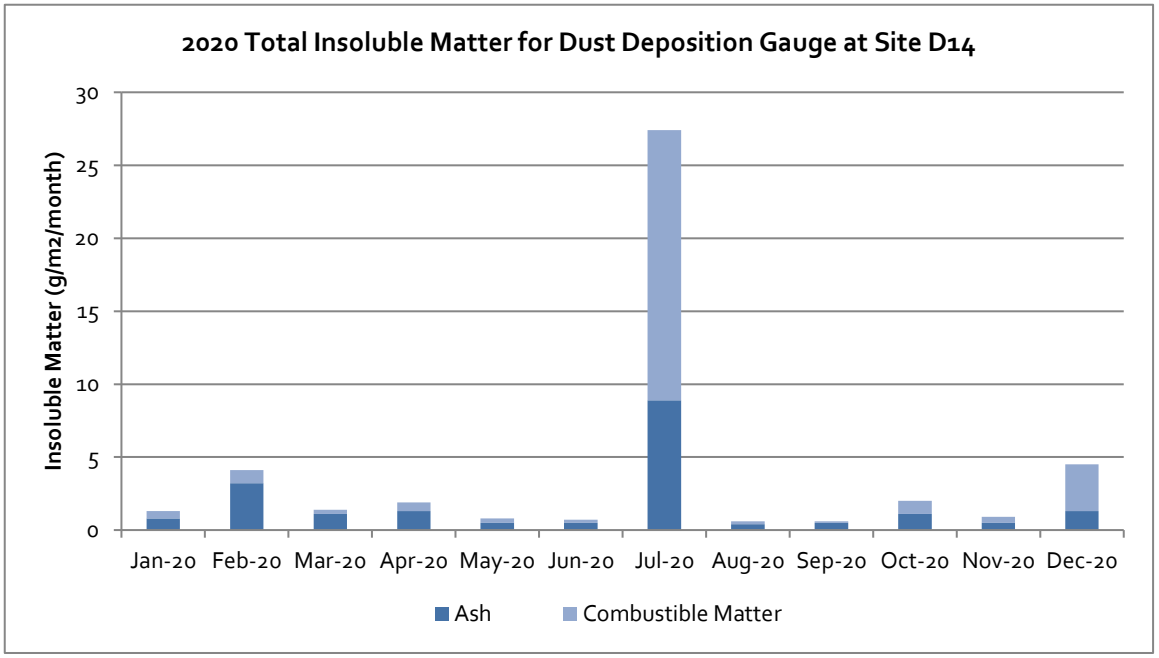
** Not Recorded in January 2020*



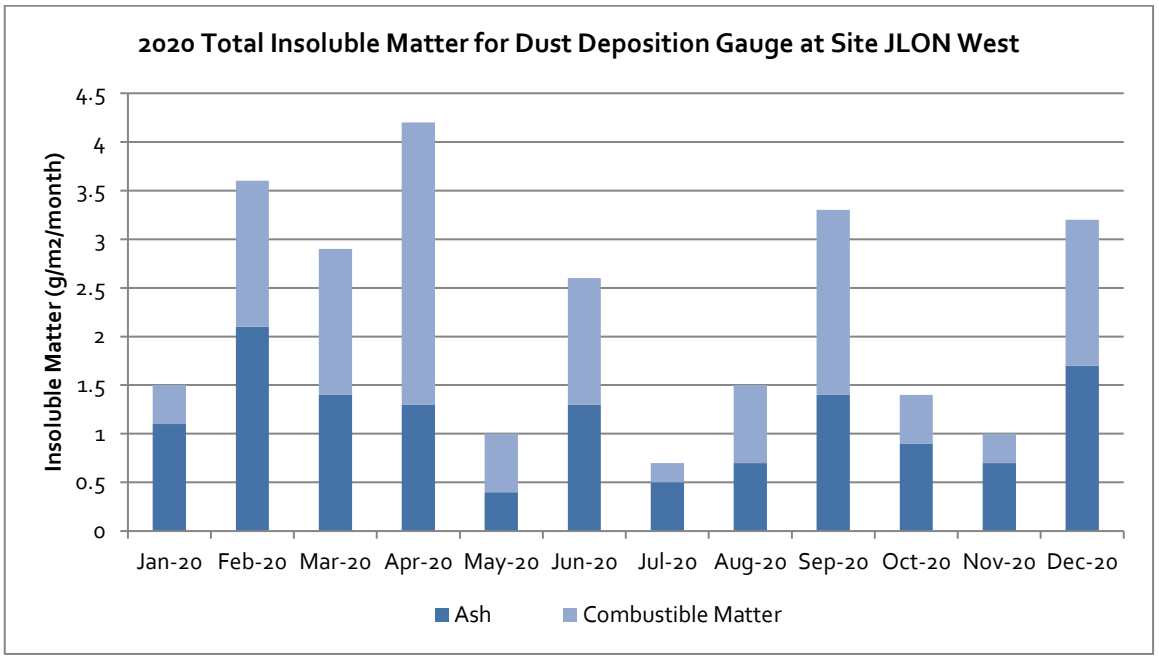
** September 2020 results contaminated*
** No access to Dust Gauge in December 2020*



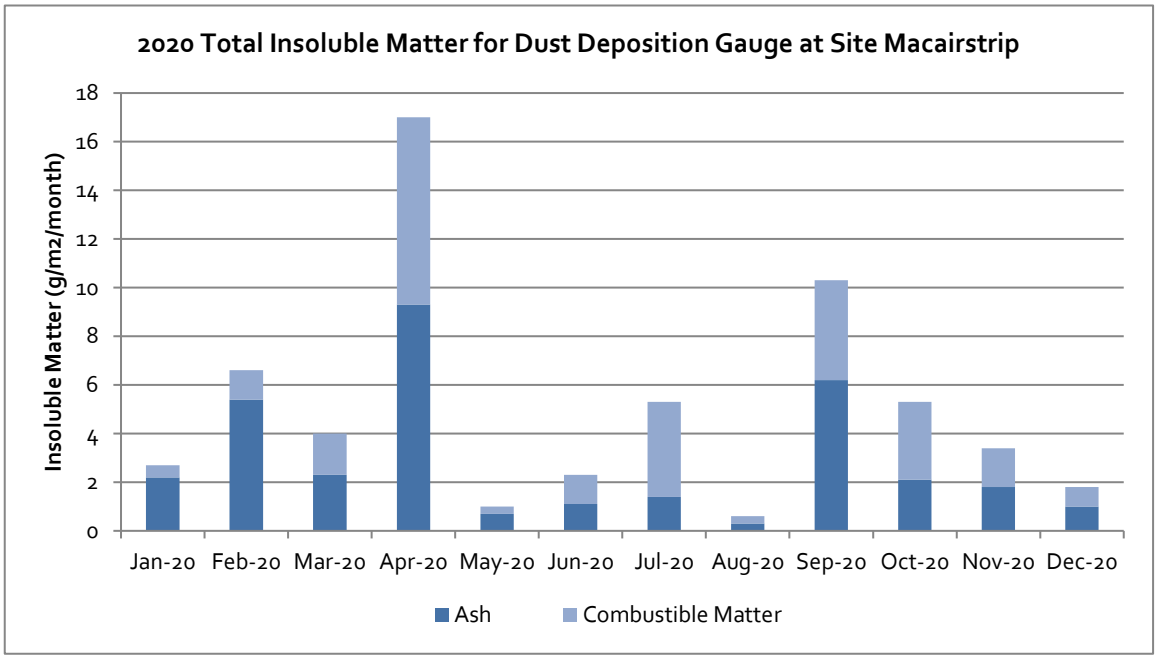
** January results contaminated*



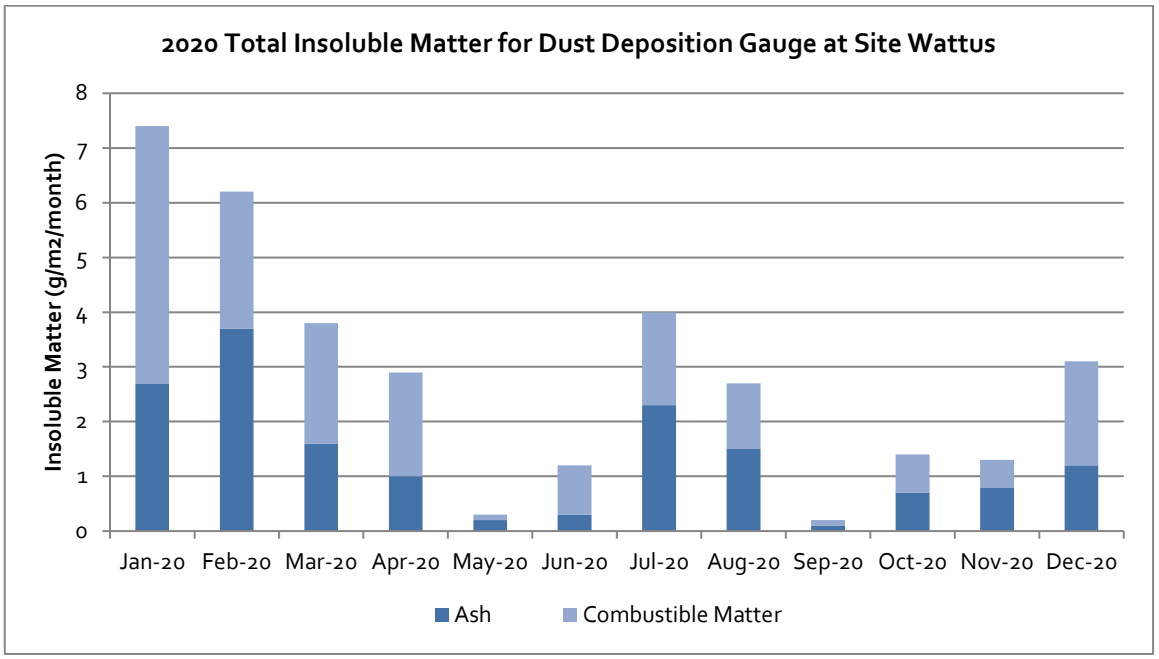
** July & December results contaminated*



** April & September results contaminated*



** April, July, September & October results contaminated*



** July & December results contaminated*

Table C1

Elevated & Contaminated Monthly Depositional Dust Results in 2020

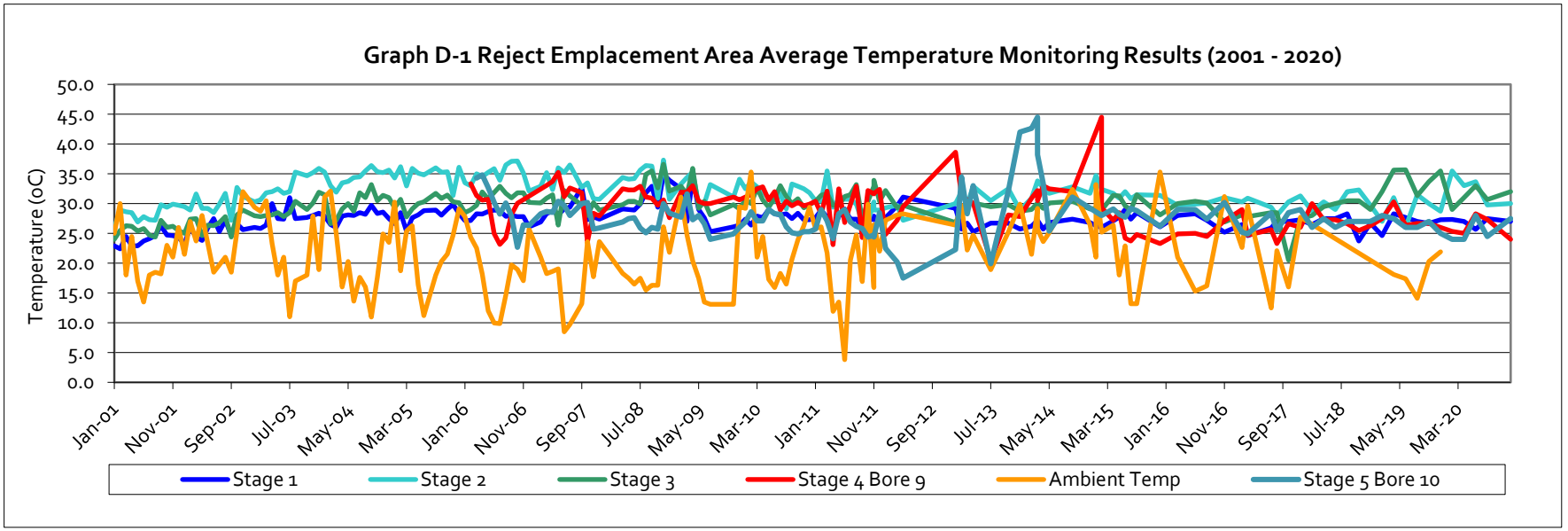
Site	Date	Insoluble Solids (g/m²/month)	Combustible Matter (g/m²/month)	Ash Component (g/m²/month)	Reason for High Reading
852	Mar-20	9.4c	6.1	3.3	Insects, slightly turbid and clear in colour, high combustible matter and low ash/insoluble ratio
	Dec-20	4.2c	2.2	2	High levels of insects and bird droppings present, sample turbid and grey
880	Apr-20	4.3c	2.1	2.2	Insects, slightly turbid, low Ash/IA ratio and high combustible matter
885	Jan-20	7.1c	2.3	4.8	High ash/insoluble ratio, high presence of insects and bird droppings and water turbid and grey in colour
	Apr-20	4.1c	1.2	2.9	High amount of insects, slightly turbid/grey in colour, moderate combustible matter
	Jun-20	10.5c	3.8	6.7	Insects/Bird droppings
	Jul-20	4.9c	1.2	3.7	Insects in sample. Sample is turbid and grey in colour
	Aug-20	4.4	1.1	3.1	Insects
	Oct-20	5.9	1.2	4.7	Insects
897	Feb-20	8.6c	4.9	3.7	High combustible matter, high presence of Insects and water was turbid and grey in colour
	Apr-20	5.8c	4.2	1.6	High amount of insects, slightly turbid and high combustible matter
	Sep-20	3.2c	1.7	1.5	High levels of insects/bird droppings being present and water being noted as turbid and grey
	Oct-20	10.8c	8.5	2.3	Moderate to high levels of insects and bird droppings present, sample turbid and brown, and low Ash/IS%
	Nov-20	4.2c	2.5	1.7	Moderate to high levels of insects and bird droppings present, sample turbid and brown, and low Ash/IS%
	Dec-20	4.8c	2.6	2.2	High levels of insects and bird droppings present, sample turbid and grey

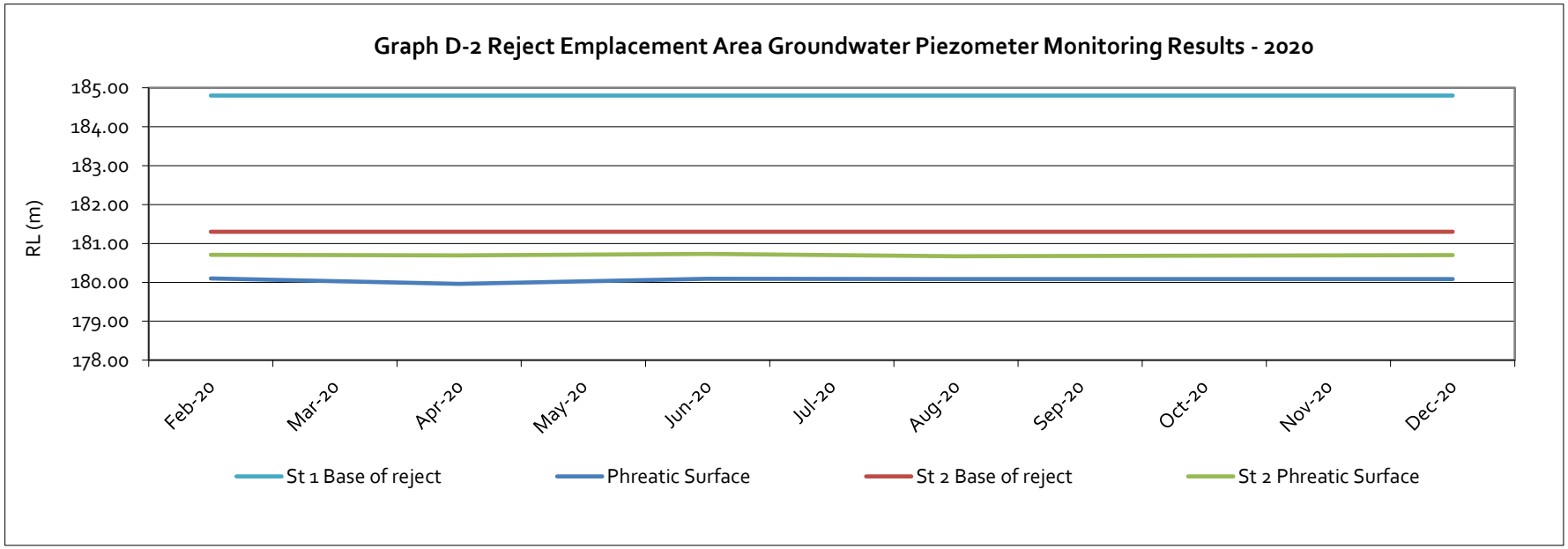
Site	Date	Insoluble Solids (g/m²/month)	Combustible Matter (g/m²/month)	Ash Component (g/m²/month)	Reason for High Reading
900	Jan-20	4.9c	2.7	2.2	High combustible matter, high presence of Insects and Bird droppings and water was turbid and grey in colour
	Jun-20	4.1c	2.2	1.9	Insects/Bird droppings
	Aug-20	4.2c	2.6	1.6	Moderate to high levels of insects and bird droppings present, sample turbid and brown, and low Ash/IS%
D13	Jan-20	5.5c	3.5	2	High combustible matter, moderate insects and slight bird droppings and water turbid and grey in colour
	Feb-20	6.9	1.5	5.4	Insects
D14	Feb-20	4.1	0.9	3.2	Insects
	Jul-20	27.4c	18.5	8.9	Insects/bird droppings in sample. Sample is turbid and brown in colour
	Dec-20	4.5c	3.2	1.3	High levels of insects present, sample turbid and brown and low Ash/IS%
Jlonwest	Apr-20	4.2c	2.9	1.3	High amount of insects, turbid and high combustible matter
	Sep-20	3.3c	1.9	1.4	High levels of insects/bird droppings being present and water being noted as turbid and grey
Macairstrip	Feb-20	6.6	1.2	5.4	Insects
	Apr-20	17c	7.7	9.3	Insects, turbid and brown in colour, low Ash/IS ratio and high combustible matter
	Jul-20	5.3c	3.9	1.4	Insects/bird droppings in sample. Sample is turbid and brown in colour
	Sep-20	10.3c	4.1	6.2	High levels of insects/bird droppings being present and water being noted as turbid and grey
	Oct-20	5.3c	3.2	2.1	Slight to moderate levels of insects and vegetation present, sample slightly turbid and brown, and low Ash/IS%
Wattus	Jan-20	7.4	4.7	2.7	Insects and bird droppings
	Feb-20	6.2	2.35	3.7	Insects and bird droppings
	Jul-20	4c	1.7	2.3	Insects/bird droppings in sample. Sample is turbid and brown in colour
	Dec-20	3.1c	1.9	1.2	High levels of insects present, sample turbid and grey and low Ash/IS%

**Note: c = contaminated sample*

APPENDIX D

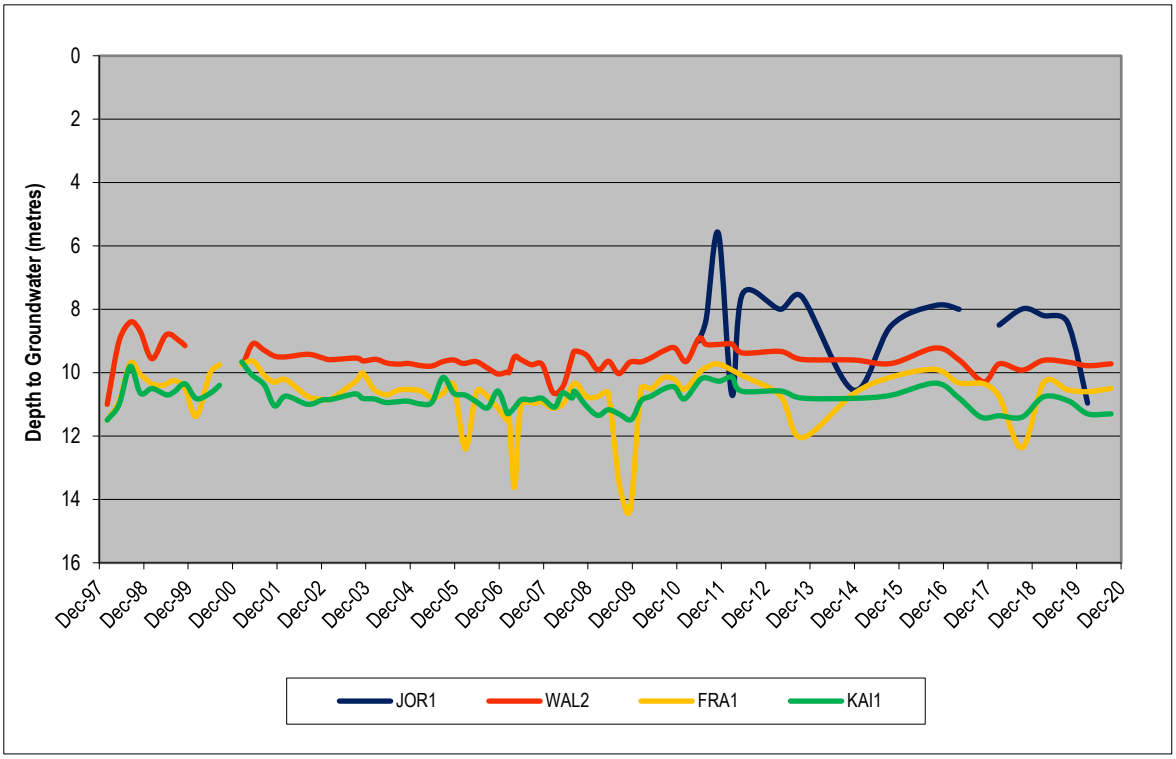
REA MONITORING SUMMARY


Graph D-1 Reject Emplacement Area Average Temperature Monitoring Results (2001 - 2020)
Temperature (oC)
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Jan-01
Nov-01
Sep-02
Jul-03
May-04
Mar-05
Jan-06
Nov-06
Sep-07
Jul-08
May-09
Mar-10
Jan-11
Nov-11
Sep-12
Jul-13
May-14
Mar-15
Jan-16
Nov-16
Sep-17
Jul-18
May-19
Mar-20
Stage 1
Stage 2
Stage 3
Stage 4 Bore 9
Ambient Temp
Stage 5 Bore 10

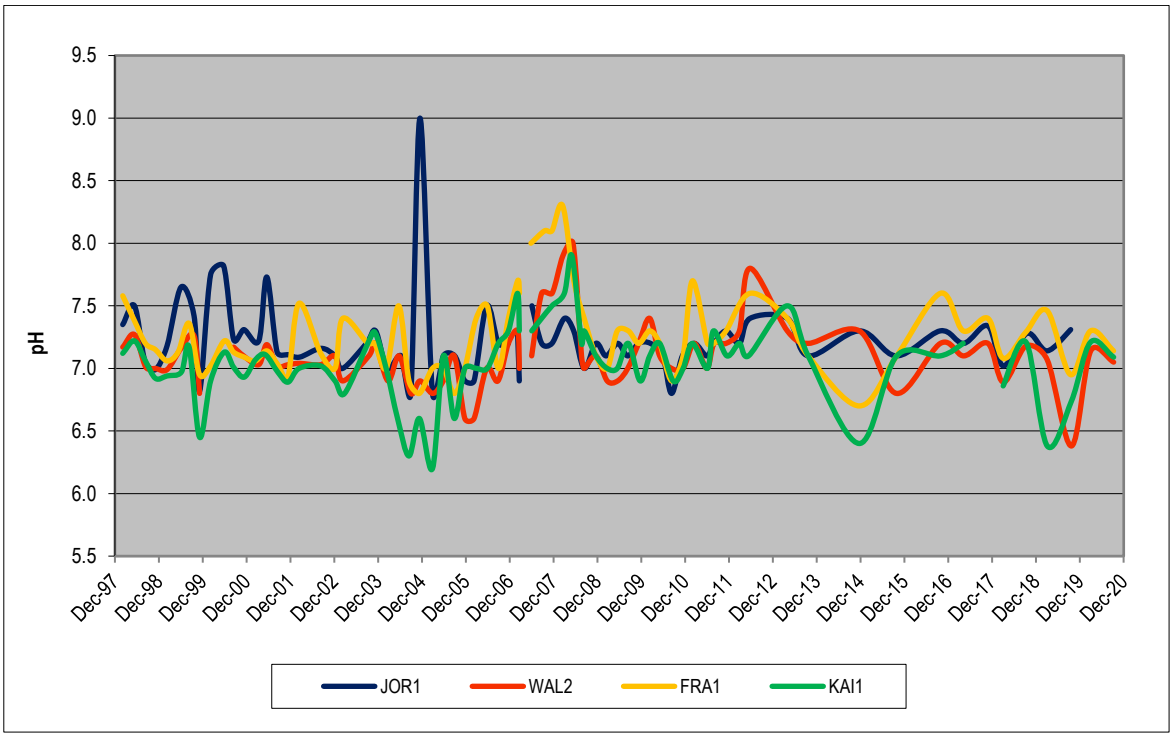

Graph D-2 Reject Emplacement Area Groundwater Piezometer Monitoring Results - 2020
RL (m)
185.00
184.00
183.00
182.00
181.00
180.00
179.00
178.00
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
St 1 Base of reject
Phreatic Surface
St 2 Base of reject
St 2 Phreatic Surface

APPENDIX E

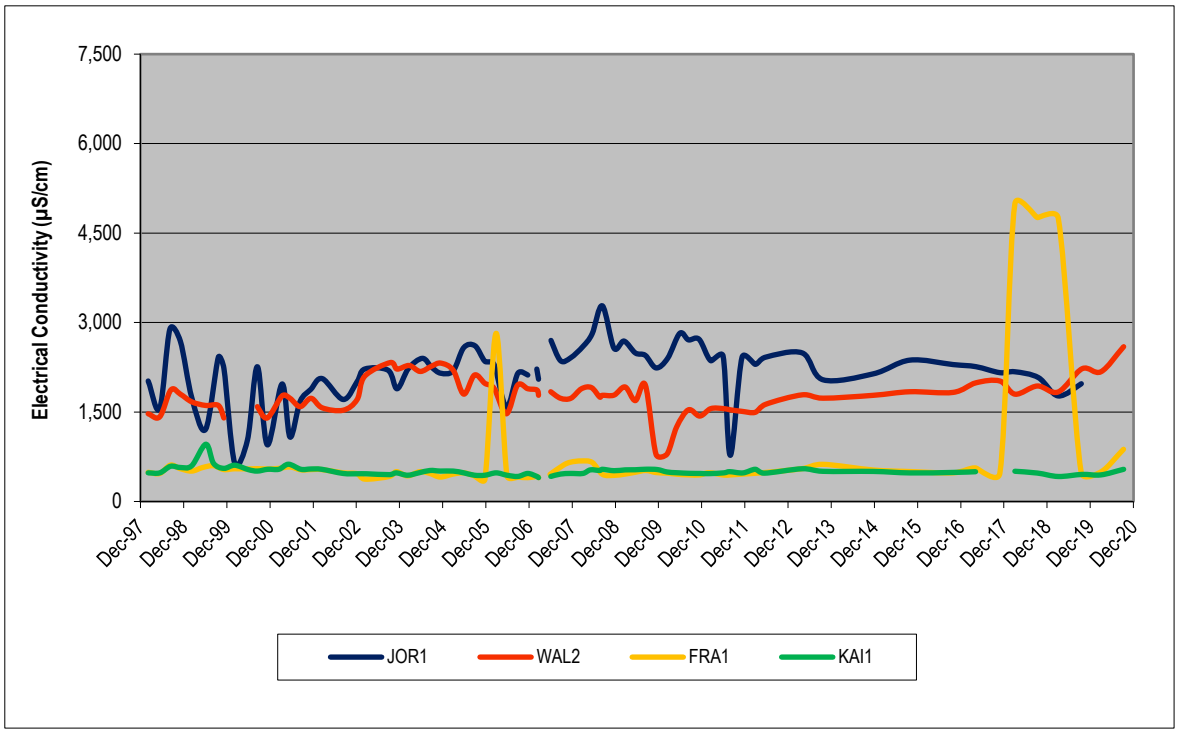
GROUNDWATER MONITORING SUMMARY



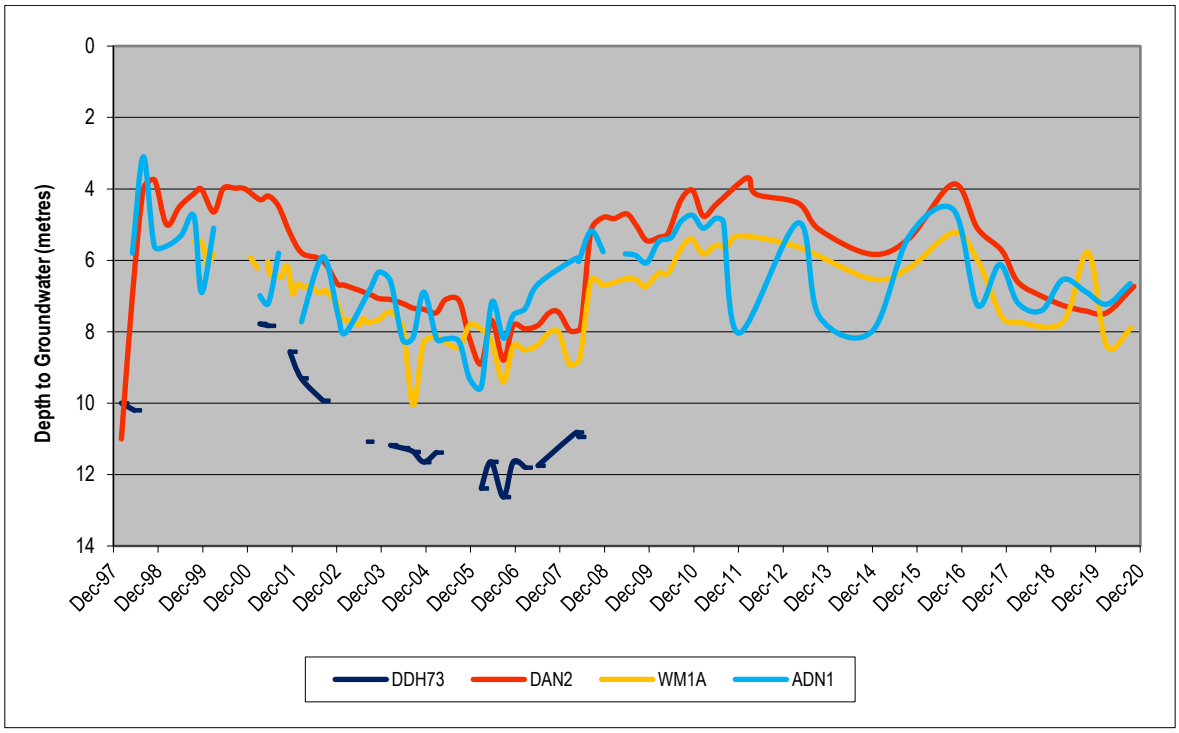
Graph E-1
Groundwater Level for Hunter River Alluvium Bores (1998-2020)



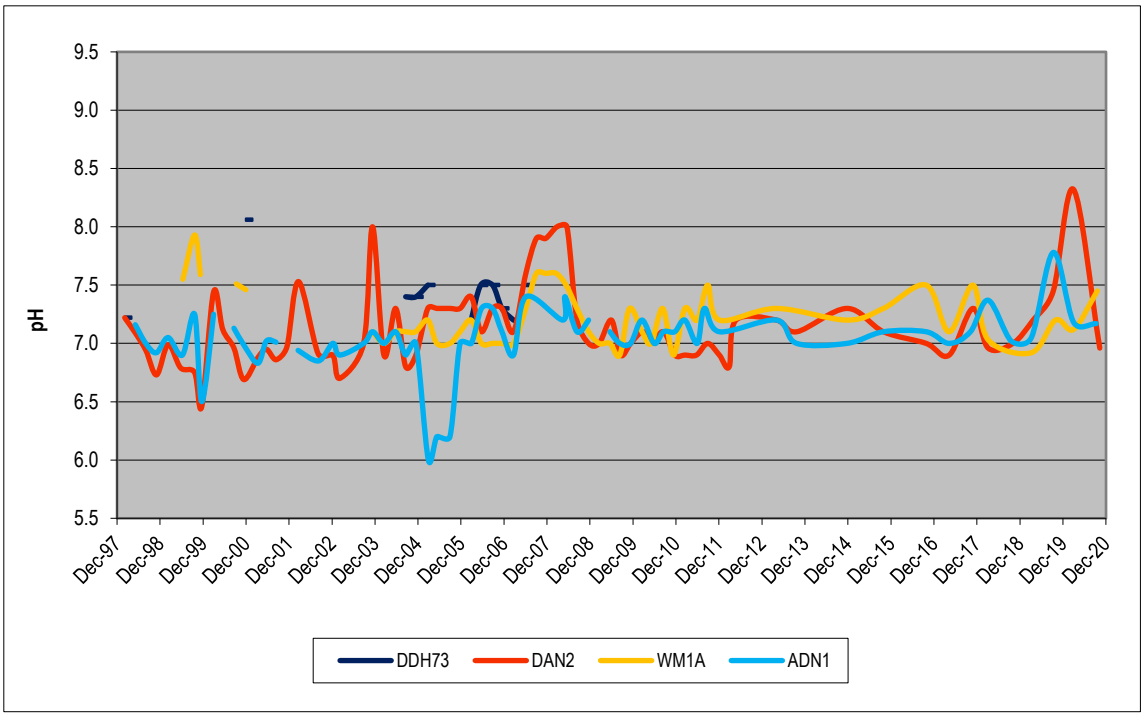
Graph E-2
pH for Hunter River Alluvium Bores (1998-2020)



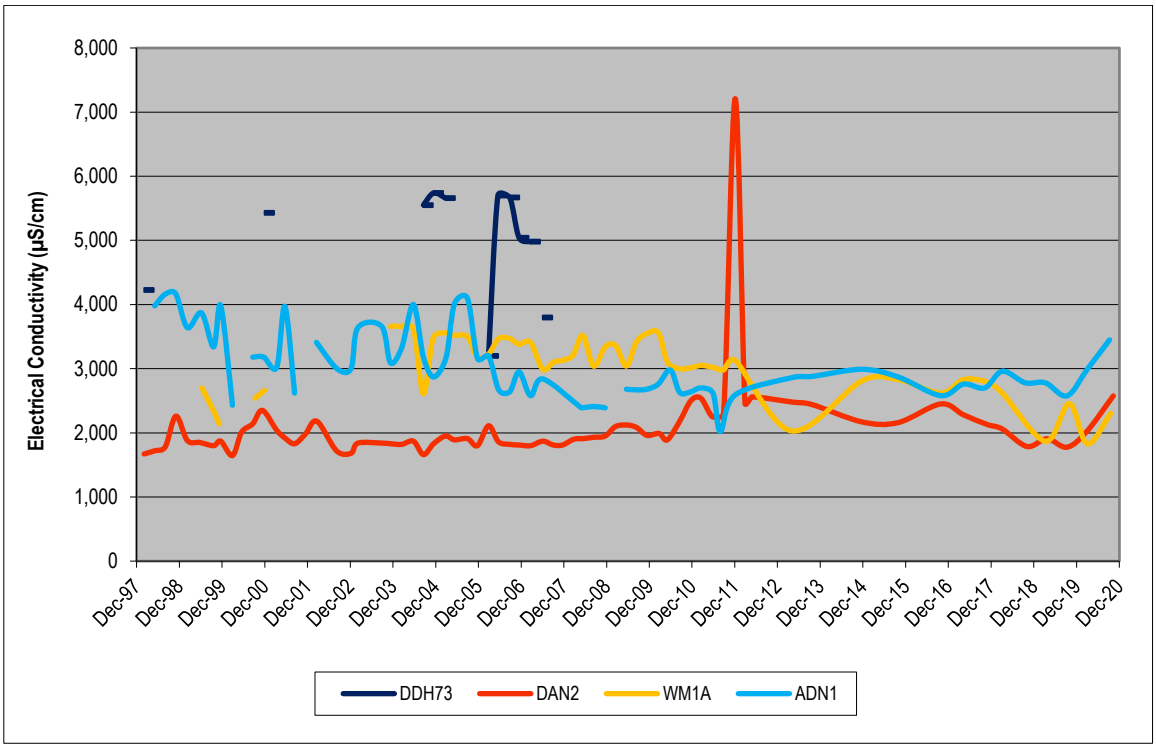
Graph E-3
Electrical Conductivity for Hunter River Alluvium Bores (1998-2020)



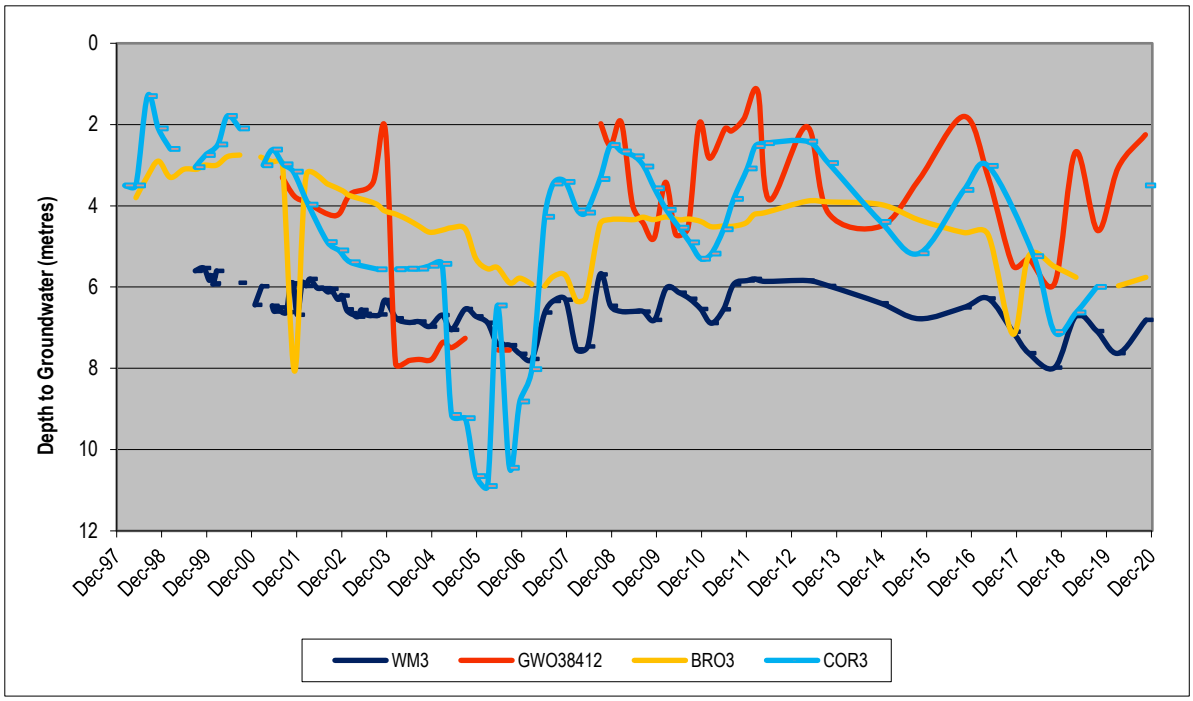
Graph E-4
Groundwater Level for Dart Brook Alluvium Bores (1998-2020)



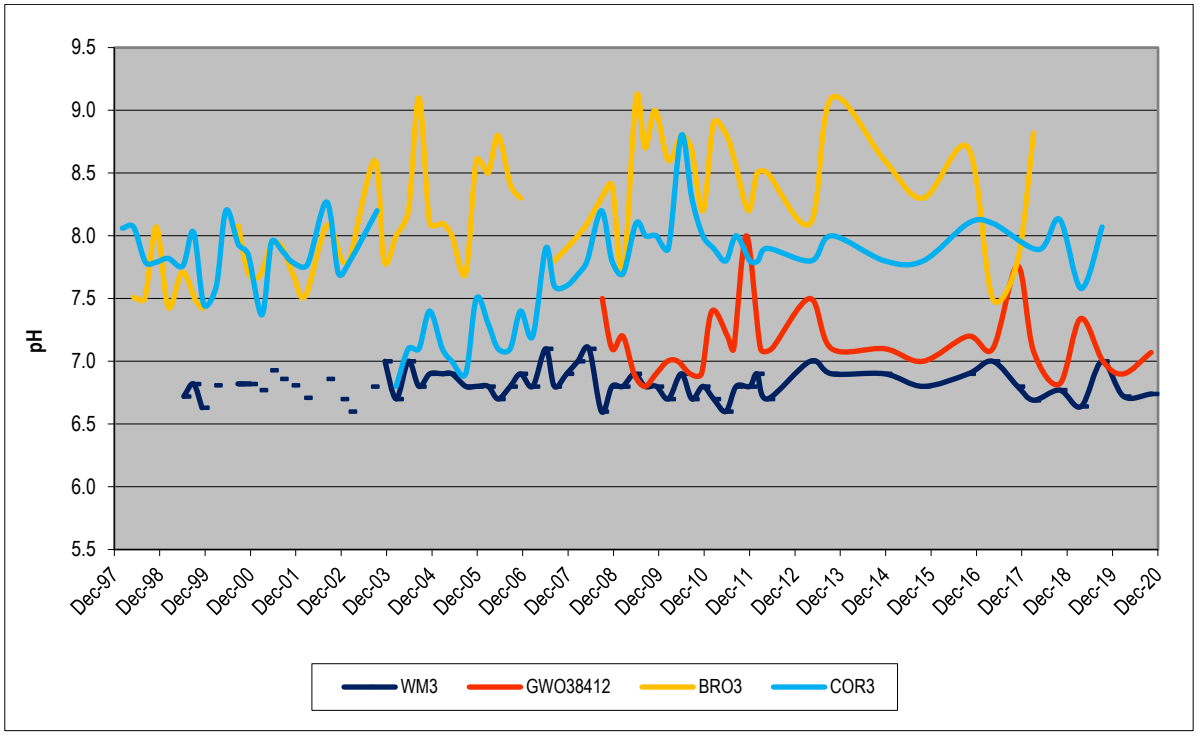
Graph E-5
pH for Dart Brook Alluvium Bores (1998-2020)



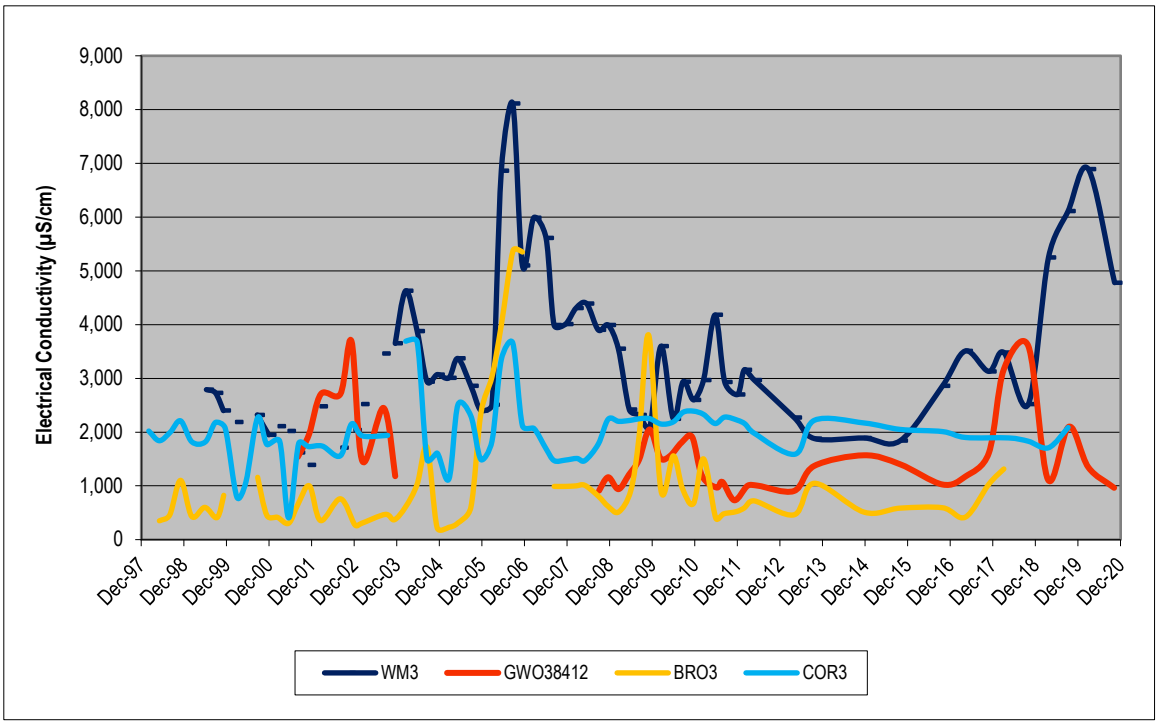
Graph E-6
Electrical Conductivity for Dart Brook Alluvium Bores (1998-2020)



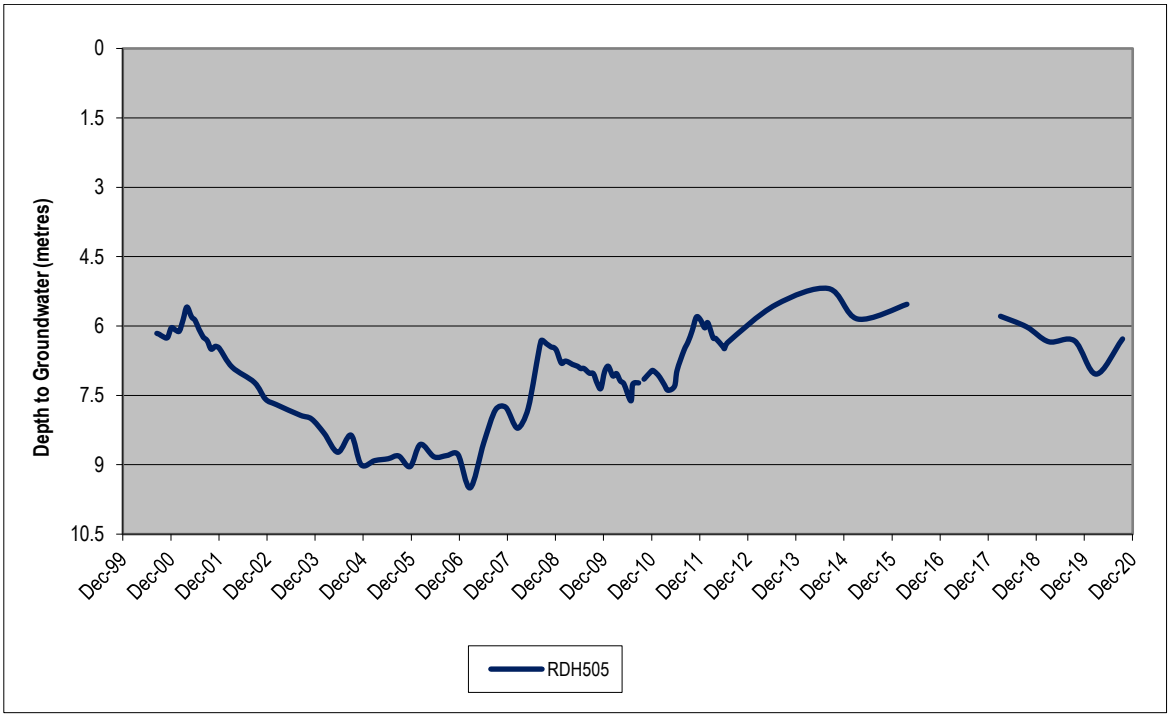
Graph E-7
Groundwater Level for Sandy Creek Alluvium Bores (1998-2020)



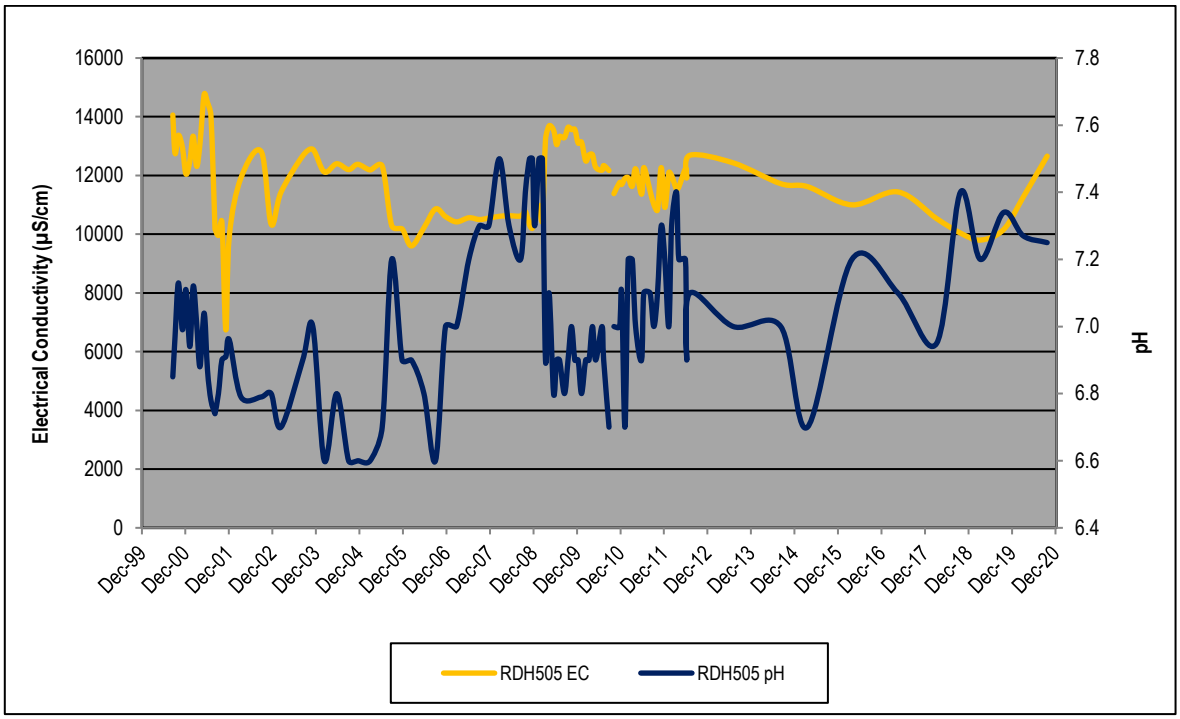
Graph E-8
pH for Sandy Creek Alluvium Bores (1998-2020)



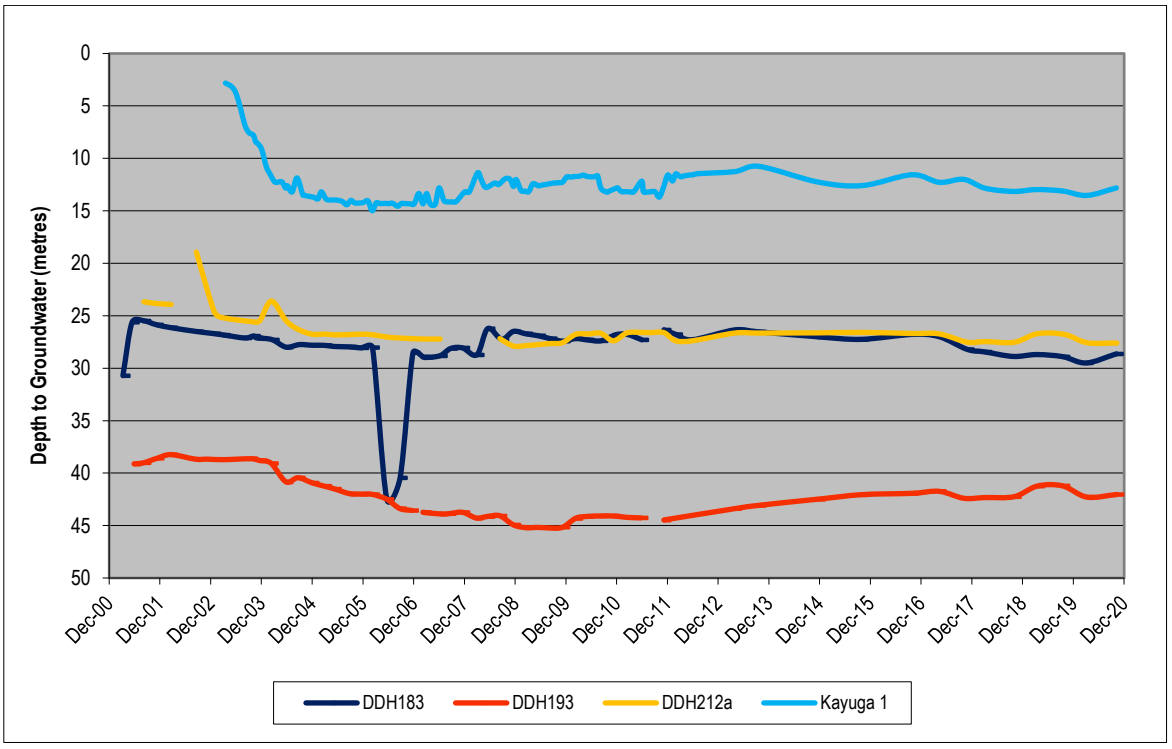
Graph E-9
Electrical Conductivity for Sandy Creek Alluvium Bores (1998-2020)



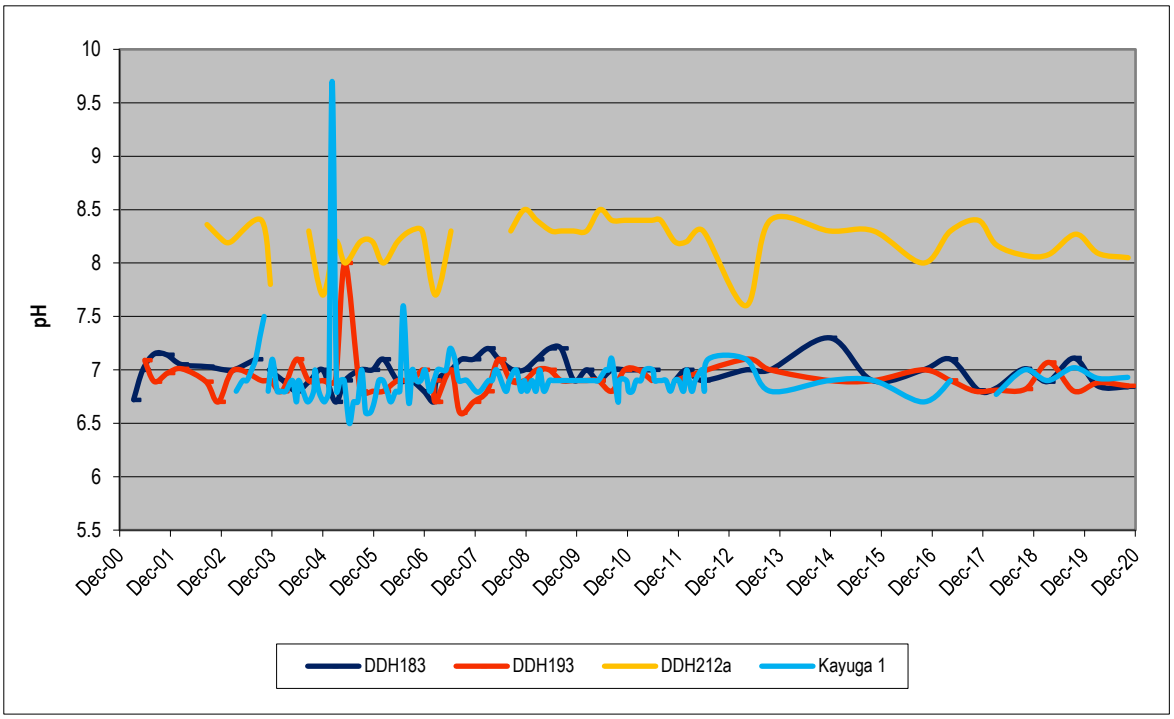
Graph E-10
Groundwater Level for Staged Discharge Dam Bore (2000-2020)



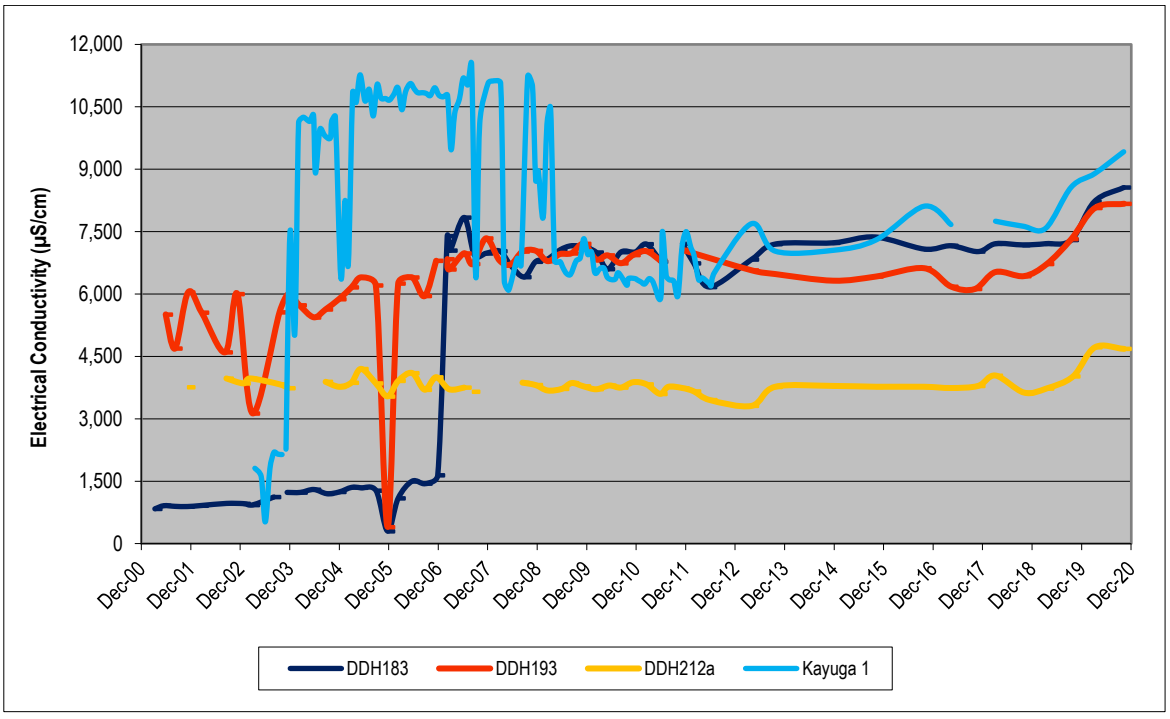
Graph E-11
pH and Electrical Conductivity for Staged Discharge Dam Bore (2000-2020)



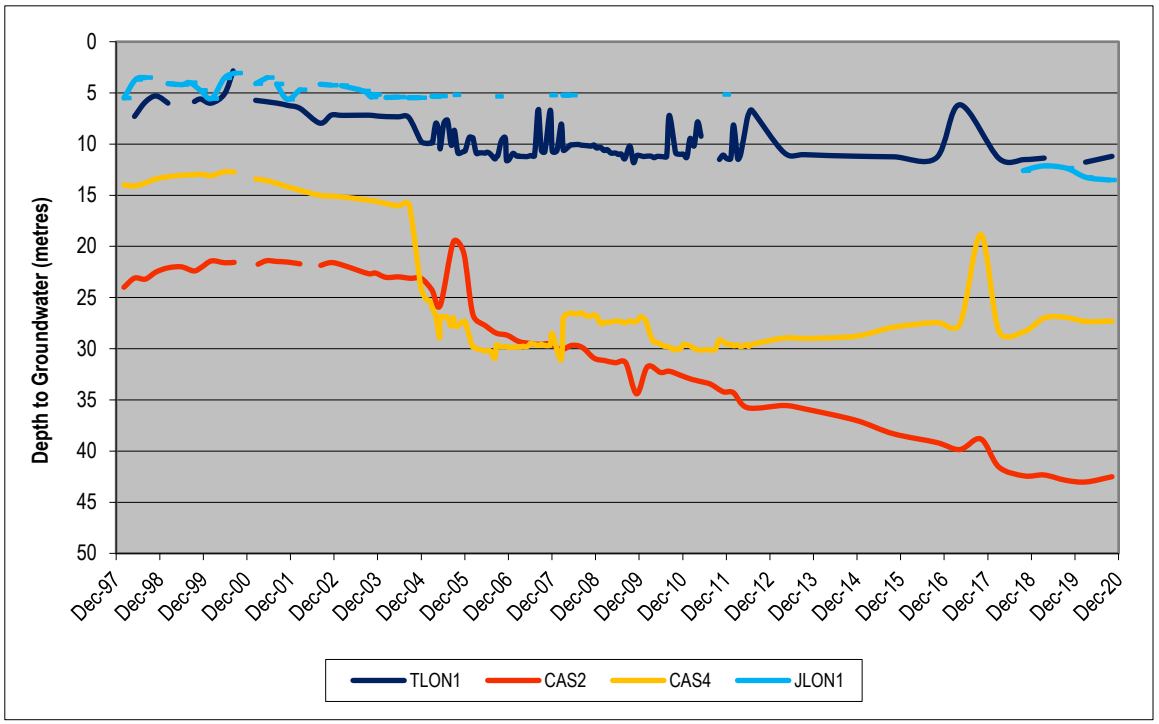
Graph E-12
Groundwater Level for Coal Seam Bores (2001-2020)



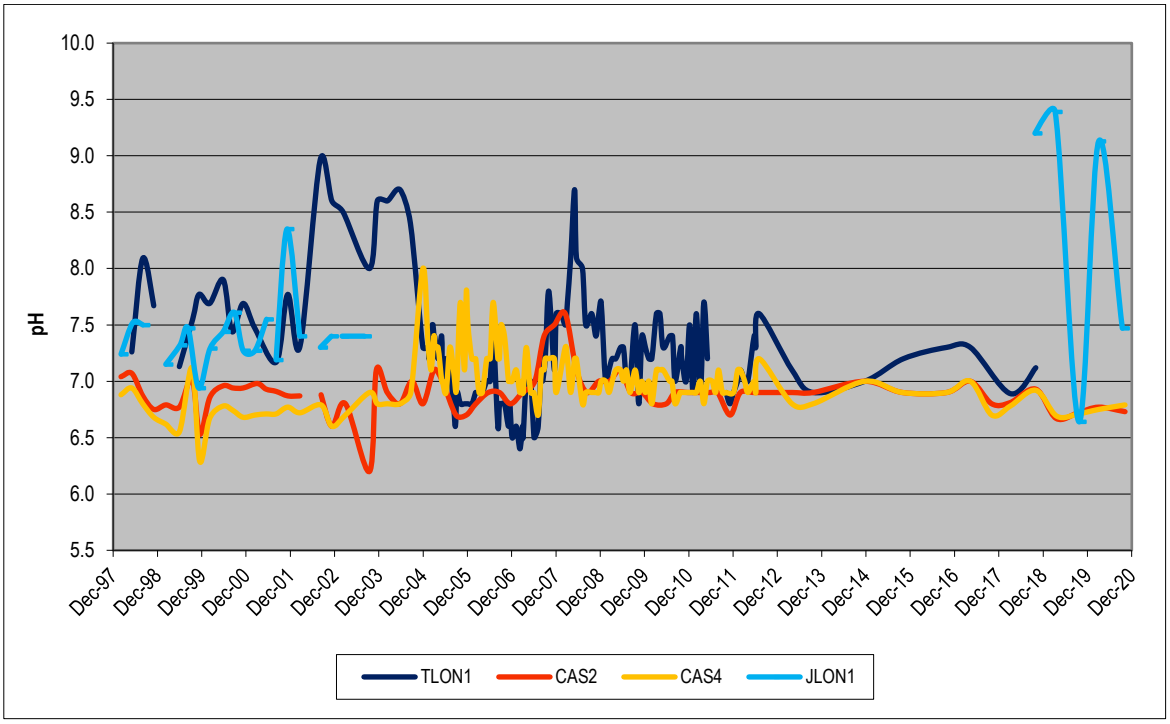
Graph E-13
pH for Coal Seam Bores (2001-2020)



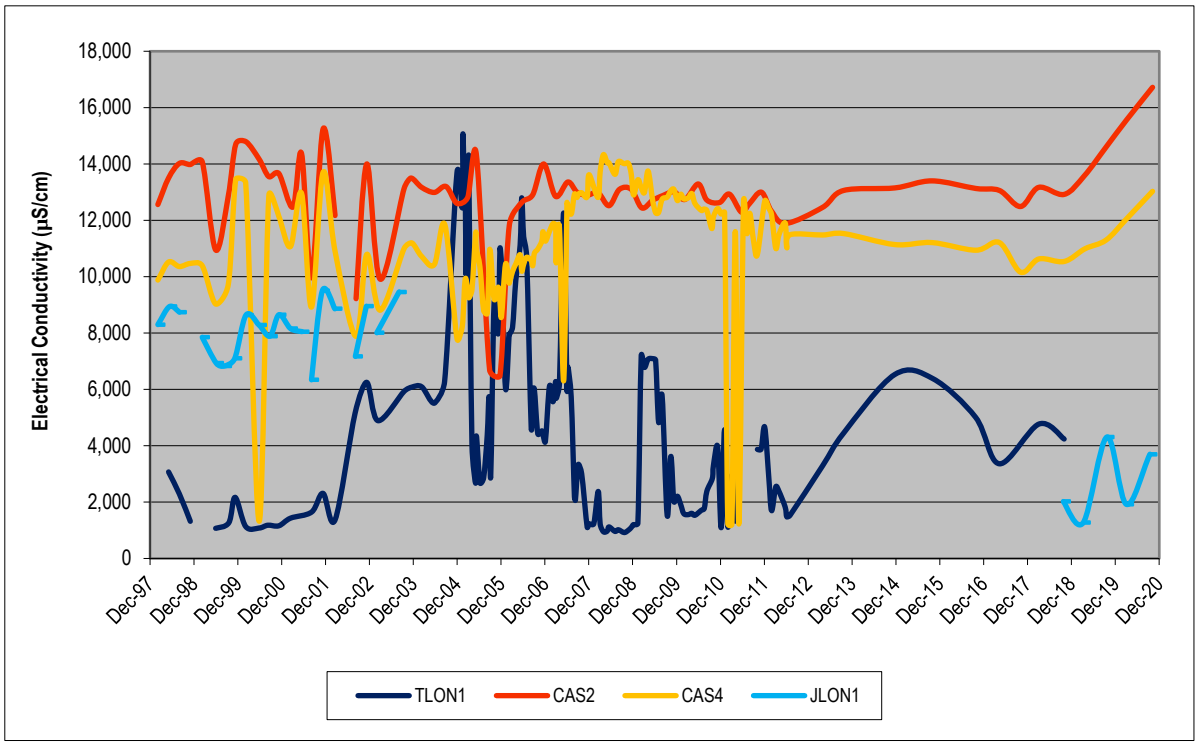
Graph E-14
Electrical Conductivity for Coal Seam Bores (2001-2020)



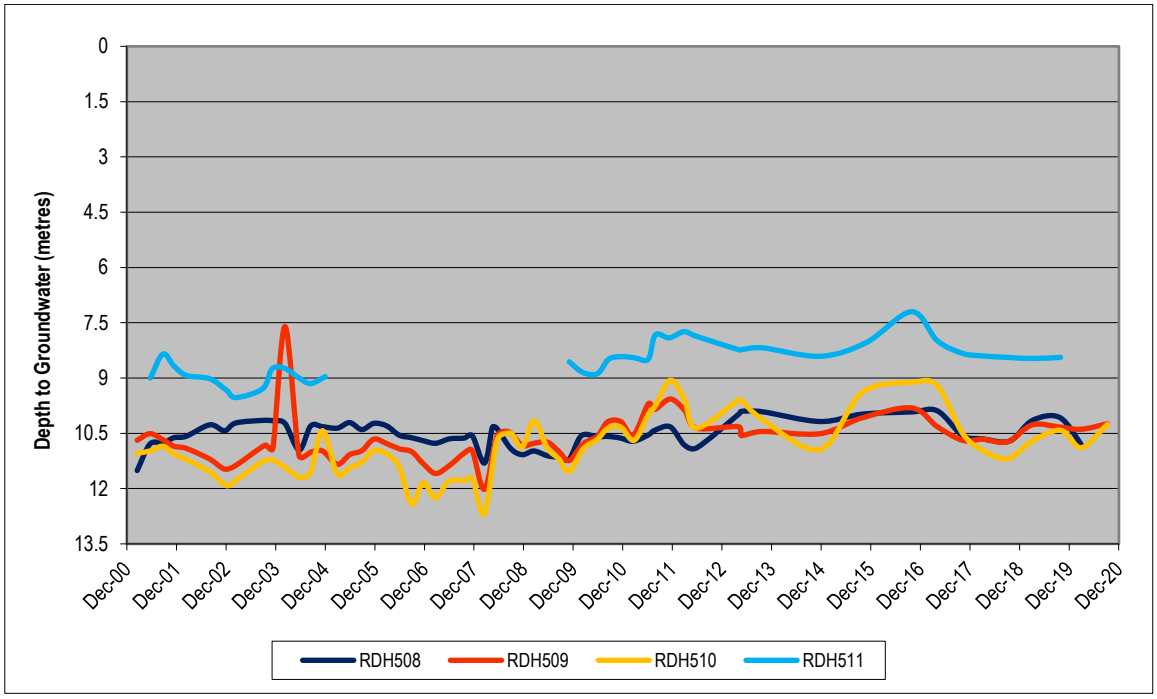
Graph E-15
Groundwater Levels for Regolith Bores (1998-2020)



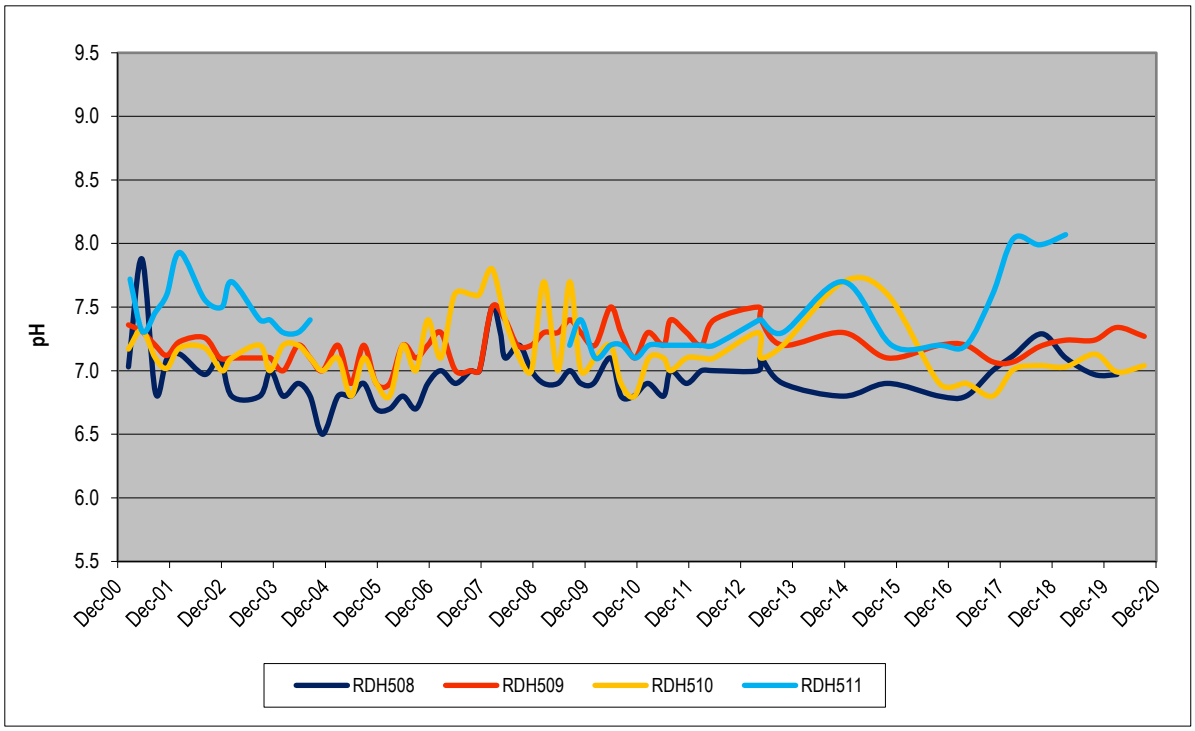
Graph E-16
pH for Regolith Bores (1998-2020)



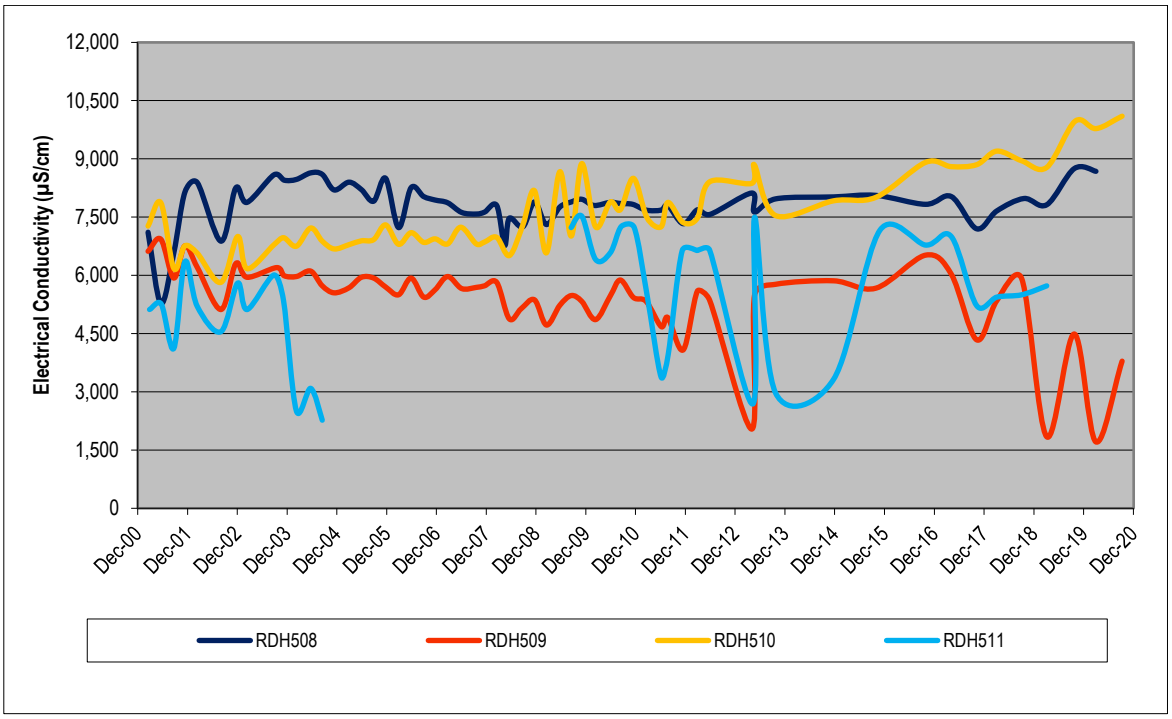
Graph E-17
Electrical Conductivity for Regolith Bores (1998-2020)



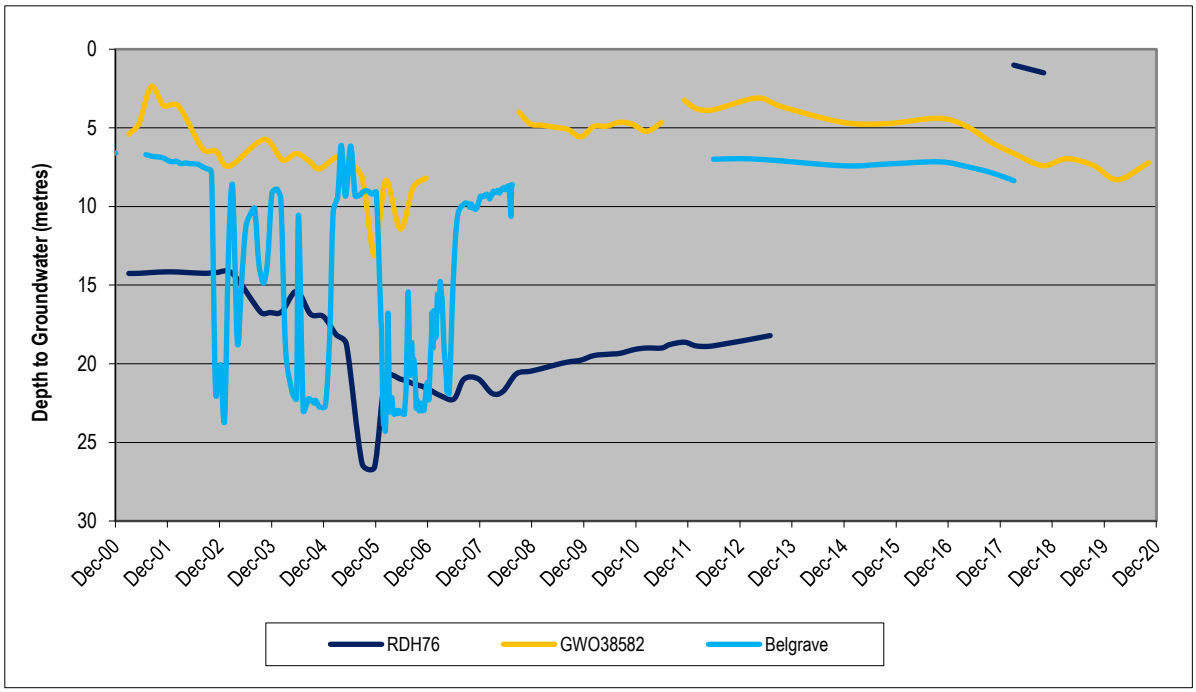
Graph E-18
Groundwater Level for Rejects Emplacement Area Bores (2001-2020)



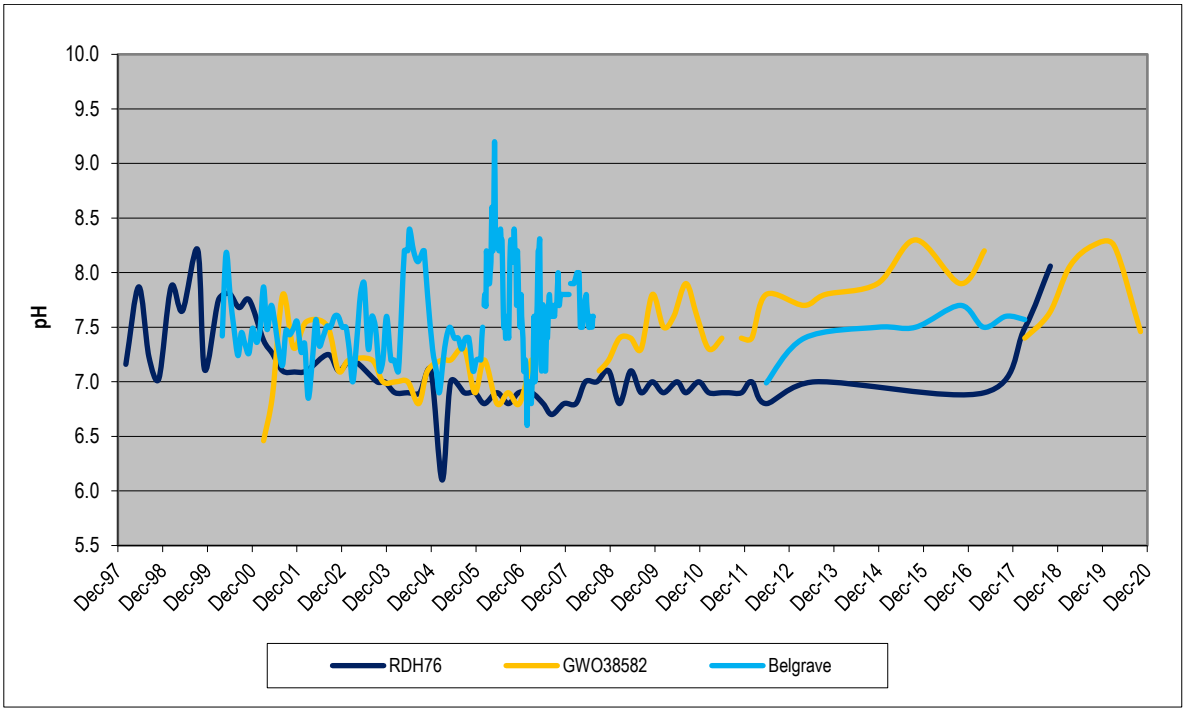
Graph E-19
pH for Rejects Emplacement Area Bores (2001-2020)



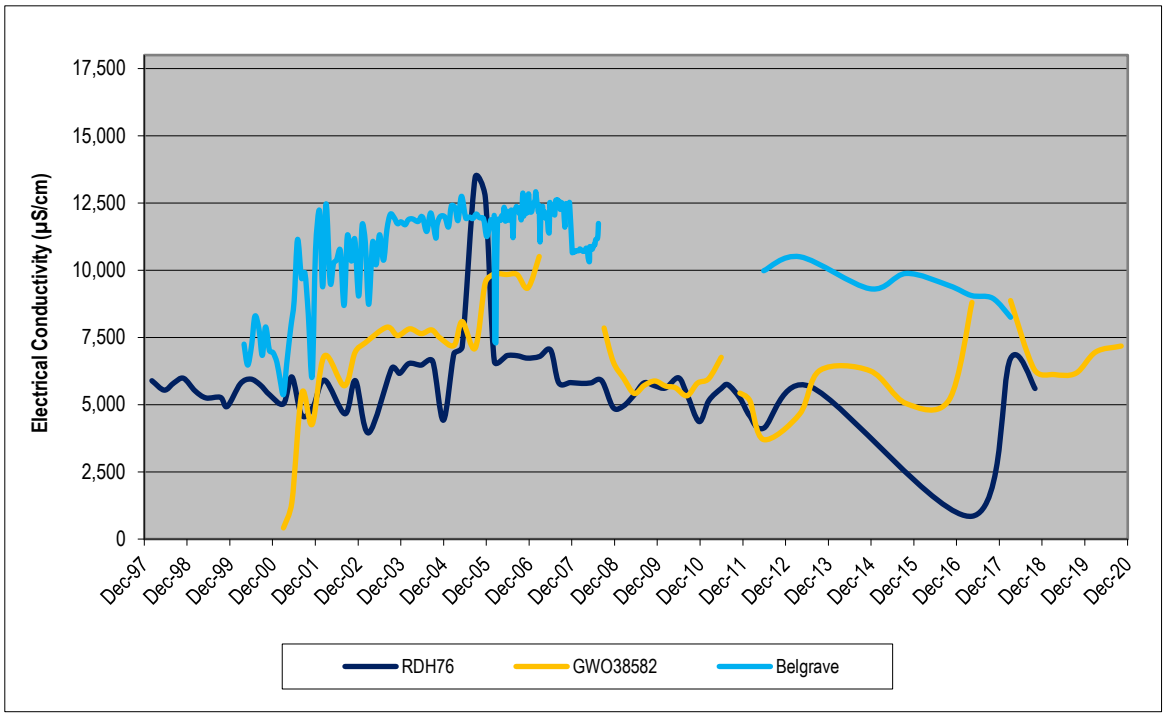
Graph E-20
Electrical Conductivity for Rejects Emplacement Area Bores (2001-2020)



Graph E-21
Groundwater Level for Landowner Property Bores (2001-2020)



Graph E-22
pH for Landowner Property Bores (1998-2020)



Graph E-23
Electrical Conductivity for Landowner Property Bores (1998-2020)

Table E-1 – Groundwater Monitoring Summary

Sample Location	Sample Date	Field EC (µS/cm)	Field pH	Depth to Water (m)
Hunter River Alluvium				
FRA1	31-Mar-20	496	7.3	10.6
FRA1	08-Oct-20	875	7.1	10.5
JOR1				
JOR1				
KAl1	31-Mar-20	446	7.2	11.30
KAl1	09-Oct-20	540	7.1	11.30
WAL2	01-Apr-20	2176	7.1	9.78
WAL2	09-Oct-20	2595	7.1	9.72
Dart Brook Alluvium				
ADN1	01-Apr-20	2990	7.3	7.23
ADN1	09-Oct-20	3450	7.1	6.65
DAN2	31-Mar-20	2028	8.3	7.47
DAN2	09-Nov-20	2575	7.0	6.73
WM1A	01-Apr-20	1828	7.1	8.4
WM1A	19-Oct-20	2303	7.5	7.89
Sandy Creek Alluvium				
BRO3	01-Apr-20			5.97
BRO3	10-Nov-20			5.76
COR3				
COR3	10-Nov-20	2370	7.9	3.5
GWO38412	30-Mar-20	1345	6.9	3.06
GWO38412	06-Nov-20	964	7.1	2.25
WM3	30-Mar-20	6890	6.7	7.63
WM3	10-Nov-20	4780	6.7	6.81
Staged Discharge Dam				
RDH505	30-Mar-20	11270	7.3	7.04
RDH505	16-Oct-20	12660	7.3	6.28
Coal Seams				
DDH183	03-Apr-20	8220	6.9	29.5
DDH183	06-Nov-20	8560	6.8	28.63
DDH193	08-Apr-20	8070	6.9	42.29
DDH193	09-Nov-20	8170	6.9	42.04
DDH212a	08-Apr-20	4720	8.1	27.57

Sample Location	Sample Date	Field EC (µS/cm)	Field pH	Depth to Water (m)
DDH212a	09-Nov-20	4680	8.1	27.6
Kayuga 1	08-Apr-20	8900	6.9	13.53
Kayuga 1	06-Nov-20	9420	6.9	12.81
Regolith				
CAS2	03-Apr-20	15560	6.8	43.02
CAS2	06-Nov-20	16720	6.7	42.51
CAS4	03-Apr-20	12050	6.8	27.34
CAS4	06-Nov-20	13030	6.8	27.3
JLON1	03-Apr-20	1919	9.1	13.26
JLON1	15-Oct-20	3700	7.5	13.52
TLON1	30-Mar-20			11.77
TLON1	06-Nov-20			11.2
Rejects Emplacement Area				
RDH508	30-Mar-20	8680	7.0	10.81
RDH508	08-Oct-20			
RDH508a	30-Mar-20	8300	7.0	18.07
RDH508a	08-Oct-20			
RDH509	30-Mar-20	1710	7.3	10.39
RDH509	08-Oct-20	3790	7.3	10.24
RDH509a	30-Mar-20			14.78
RDH509a	08-Oct-20			14.65
RDH510	31-Mar-20	9780	7.0	10.89
RDH510	08-Oct-20	10100	7.0	10.26
RDH510a	31-Mar-20	10200	7.0	10.8
RDH510a	08-Oct-20	10500	7.1	10.16
RDH511	08-Apr-20			
RDH511	09-Oct-20	2182	7.4	8.25
RDH511a	08-Apr-20			
RDH511a	09-Oct-20	4050	7.2	8.25
Property Subsidence Management Plans				
Belgrave				
Belgrave				
GWO38582	03-Apr-20	6960	8.3	8.3
GWO38582	06-Nov-20	7180	7.5	7.22

Sample Location	Sample Date	Field EC (µS/cm)	Field pH	Depth to Water (m)
Other Monitoring Bores				
Athlone	03-Apr-20	11190	6.8	8.43
Athlone	06-Nov-20	10720	6.8	7.71
BEL1	03-Apr-20	3060	7.2	7.12
BEL1	06-Nov-20	3120	6.9	5.62
CAD2	31-Mar-20			13.27
CAD2	10-Nov-20	4600	6.7	12.21
DDH124	01-Apr-20	609	7.4	14.59
DDH124	22-Oct-20			
DDH212b	08-Apr-20	4680	8.2	27.48
DDH212b	09-Nov-20	4780	8.2	27.49
DDH212c	08-Apr-20			
DDH212c	09-Nov-20	4810	8.1	27.4

Table E-2 – Statistical Analysis of Groundwater Quality Monitoring Data

Sample Location	Parameter	Minimum	Mean	Maximum	Variance
Hunter River Alluvium					
FRA1	pH	7.1	7.2	7.3	0.2
FRA1	EC	496	686	875	379
JOR1*	pH				
JOR1*	EC				
KAI1	pH	7.1	7.2	7.2	0.1
KAI1	EC	446	493	540	94
WAL2	pH	7.1	7.1	7.1	0
WAL2	EC	2176	2386	2595	419
Dart Brook Alluvium					
ADN1	pH	7.1	7.2	7.3	0.2
ADN1	EC	2990	3220	3450	460
DAN2	pH	7.0	7.6	8.3	1.4
DAN2	EC	2028	2302	2575	547
WM1A	pH	7.1	7.3	7.5	0.3
WM1A	EC	1828	2066	2303	475
Sandy Creek Alluvium					
BRO3*	pH				
BRO3*	EC				
COR3**	pH	7.9	7.9	7.9	0
COR3**	EC	2370	2370	2370	0
GWO38412	pH	6.9	7.0	7.1	0.2
GWO38412	EC	964	1155	1345	381
WM3	pH	6.7	6.7	6.7	0
WM3	EC	4780	5835	6890	2110
Staged Discharge Dam					
RDH505	pH	7.3	7.3	7.3	0
RDH505	EC	11270	11965	12660	1390
Coal Seams					
DDH183	pH	6.8	6.8	6.9	0
DDH183	EC	8220	8390	8560	340
DDH193	pH	6.9	6.9	6.9	0
DDH193	EC	8070	8120	8170	100
DDH212(a)	pH	8.1	8.1	8.1	0

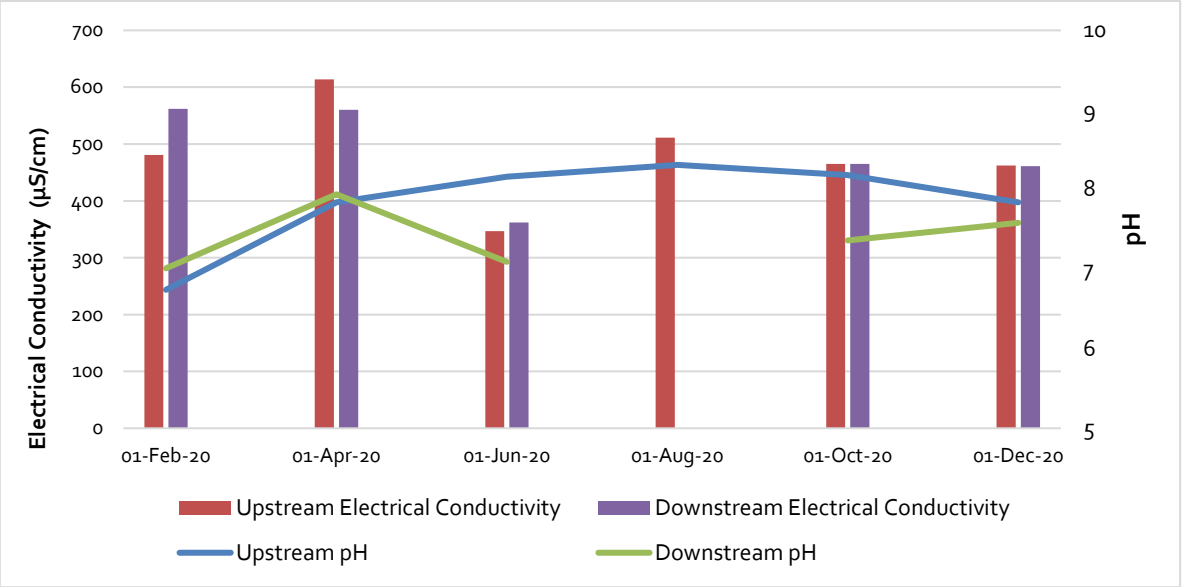
Sample Location	Parameter	Minimum	Mean	Maximum	Variance
DDH212(a)	EC	4680	4700	4720	40
Kayuga 1	pH	6.9	6.9	6.9	0
Kayuga 1	EC	8900	9160	9420	520
Regolith					
CAS2	pH	6.7	6.8	6.8	0
CAS2	EC	15560	16140	16720	1160
CAS4	pH	6.8	6.8	6.8	0
CAS4	EC	12050	12540	13030	980
JLON1	pH	7.5	8.3	9.1	1.7
JLON1	EC	1919	2810	3700	1781
TLON1*	pH				
TLON1*	EC				
Rejects Emplacement Area					
RDH508**	pH	7.0	7.0	7.0	0
RDH508**	EC	8680	8680	8680	0
RDH508a**	pH	7.0	7.0	7.0	0
RDH508a**	EC	8300	8300	8300	0
RDH509	pH	7.3	7.3	7.3	0
RDH509	EC	1710	2750	3790	2080
RDH509a*	pH				
RDH509a*	EC				
RDH510	pH	7.0	7.0	7.0	0
RDH510	EC	9780	9940	10100	320
RDH510a	pH	7.0	7.0	7.1	0.1
RDH510a	EC	10200	10350	10500	300
RDH511**	pH	7.4	7.4	7.4	0
RDH511**	EC	2182	2182	2182	0
RDH511a**	pH	7.2	7.2	7.2	0
RDH511a**	EC	4050	4050	4050	0
Property Subsidence Management Plans					
Belgrave*	pH				
Belgrave*	EC				
GWO38582	pH	7.5	7.9	8.3	0.8
GWO38582	EC	6960	7070	7180	220

Sample Location	Parameter	Minimum	Mean	Maximum	Variance
Other Bore Holes					
Athlone	pH	6.8	6.8	6.8	0
Athlone	EC	10720	10955	11190	470
BEL1	pH	6.9	7.0	7.2	0.4
BEL1	EC	3060	3090	3120	60
CAD2**	pH	6.7	6.7	6.7	0
CAD2**	EC	4600	4600	4600	0
DDH124**	pH	7.4	7.4	7.4	0
DDH124**	EC	609	609	609	0
DDH212b	pH	8.2	8.2	8.2	0
DDH212b	EC	4680	4730	4780	100
DDH212c**	pH	8.1	8.1	8.1	0
DDH212c**	EC	4810	4810	4810	0

** Dry or unable to be sampled in 2020*
*** Only one record during the year*

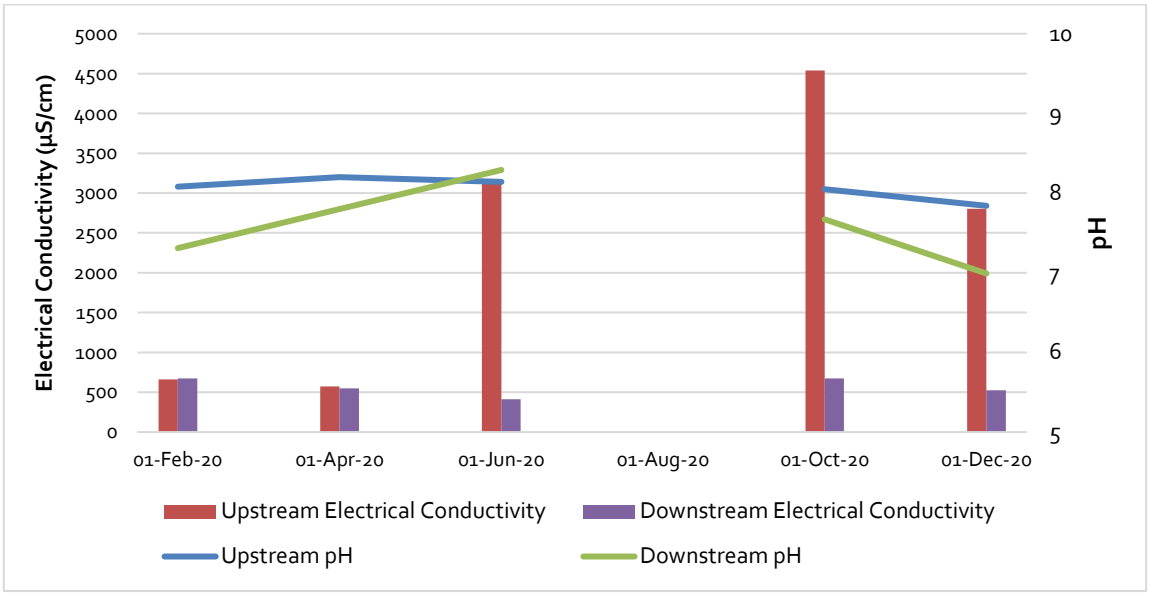
APPENDIX F

SURFACE WATER MONITORING SUMMARY



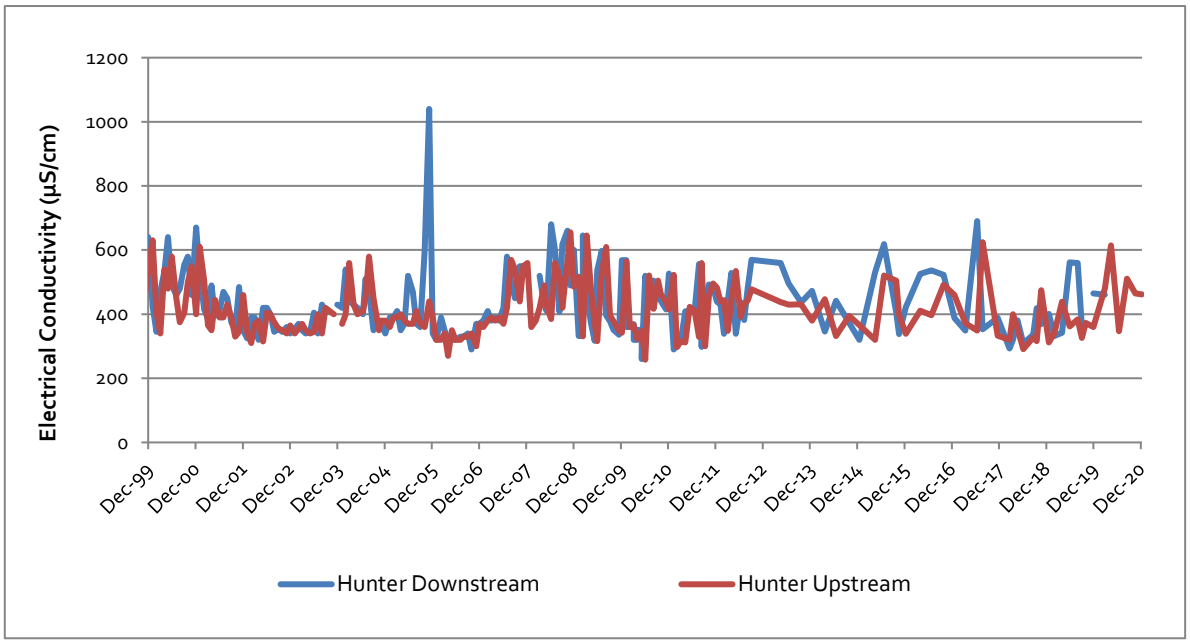
Note: Hunter River Downstream monitoring was not undertaken in August 2020

Graph F-1
Bi-Monthly Hunter River EC and pH Results

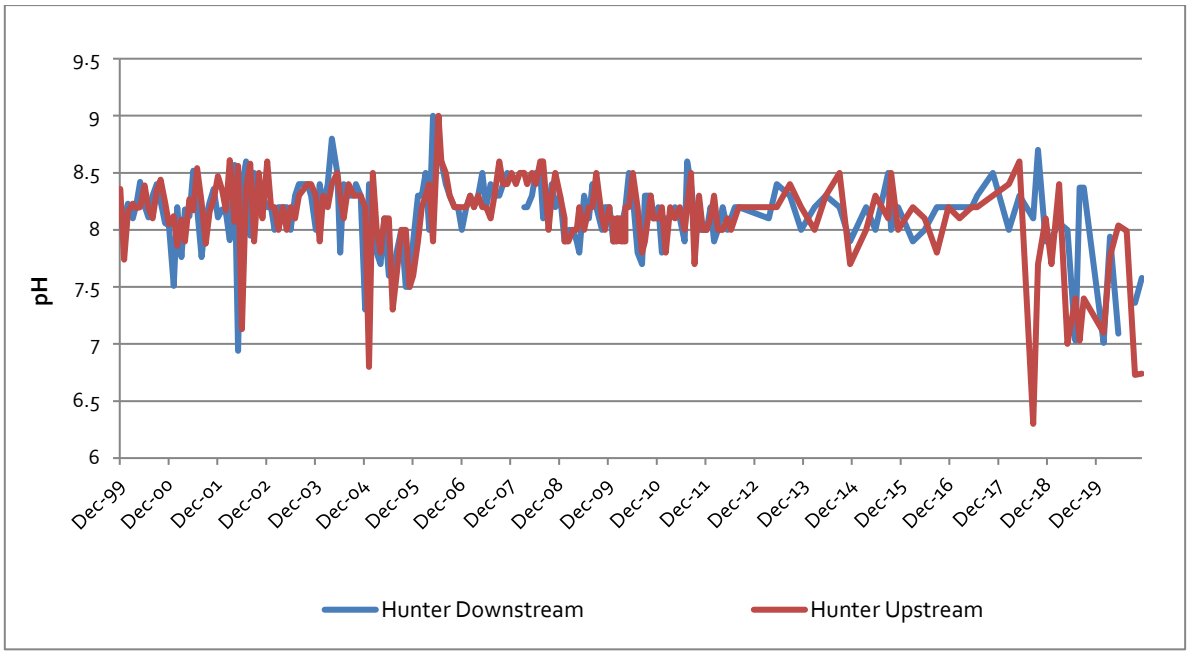


Note: Dart Brook monitoring was not undertaken in August 2020

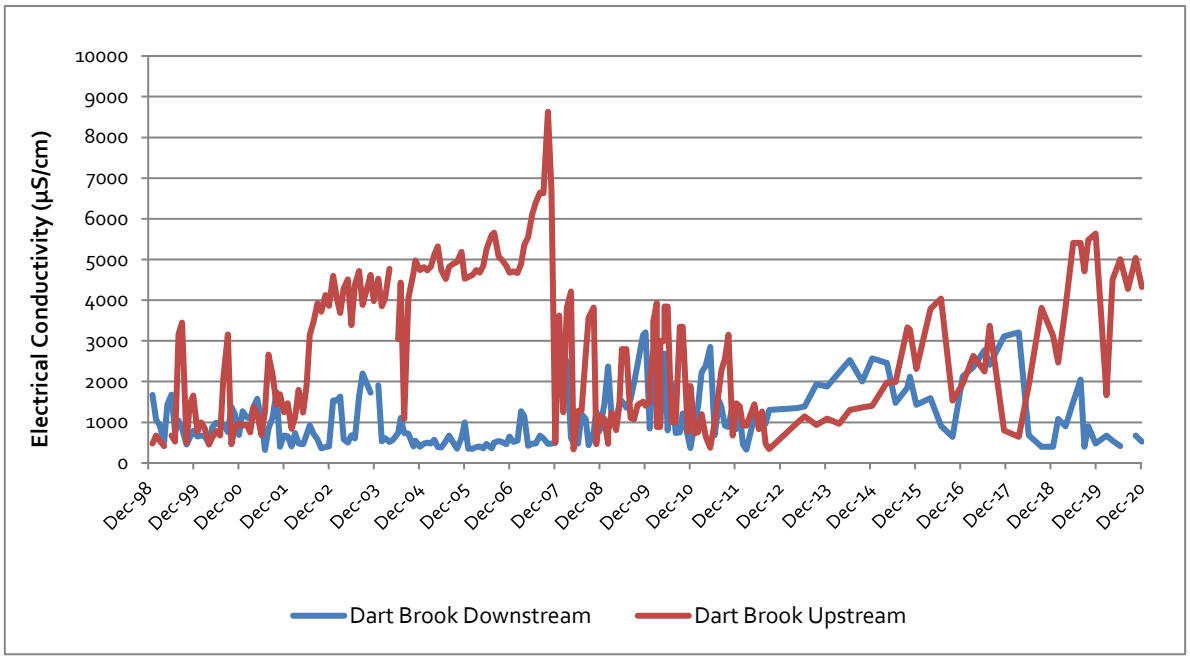
Graph F-2
Bi-Monthly Dart Brook EC and pH Results



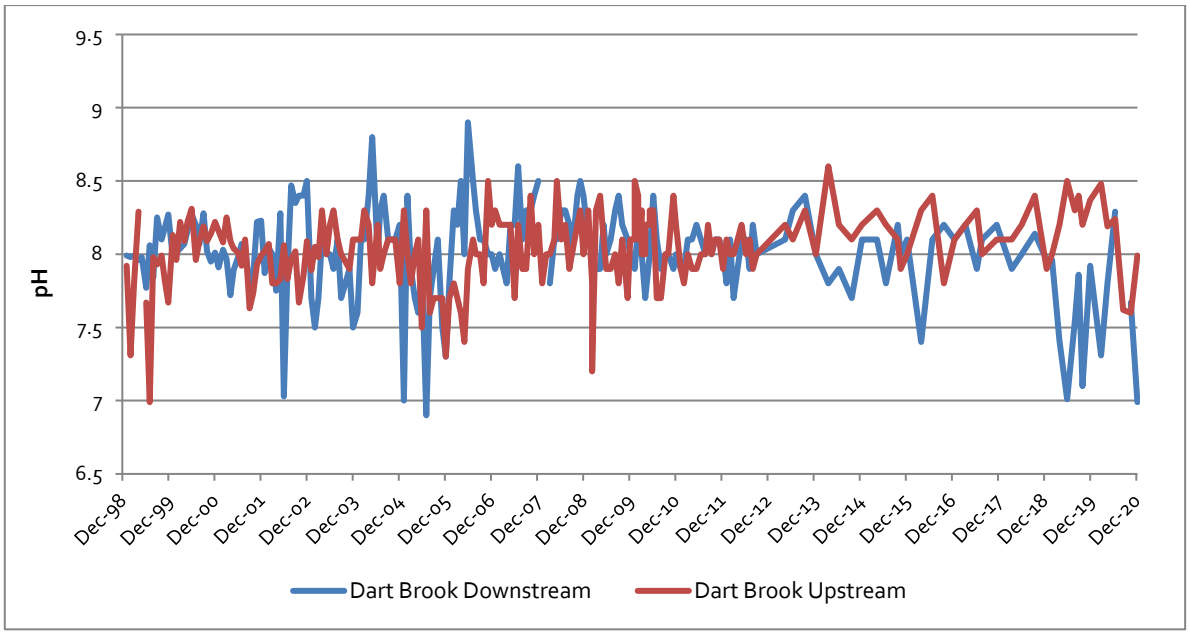
Graph F-3
Hunter River Long Term EC (1999-2020)



Graph F-4
Hunter River Long Term pH (1999-2020)



Graph F-5
Dart Brook Long Term EC (1999-2020)



Graph F-6
Dart Brook Long Term pH (1999-2020)

Table F-1 Annual Surface Water Monitoring Results (August 2020)

Sample Location	Alkalinity - Bicarbonate mg $CaCO_3$/L	Alkalinity - Carbonate mg $CaCO_3$/L	Alkalinity - Hydroxide mg $CaCO_3$/L	Biochemical Oxygen Demand mg/O_2/L	Calcium - total mg/L	Chloride mg/L	Electrical Conductivity µS/cm - field	Faecal Coliforms cols/100mL	Oil & Grease mg/L	pH - field	Phosphorus - Reactive mg/L	Potassium - total mg/L	Sodium - total mg/L	Sulfates mg/L	Total Suspended Solids @105C mg/L
Dart Brook Upstream	208	16	<1	N/A	36	63	2710	N/A	8.53	**8.65**	0.12	**45**	16	0.56	16.7
Dart Brook Downstream	254	<1	<1	N/A	32	92	2980	27 est.	7.89	7.88	0.12	**60**	22	0.40	18.1
E2	*Dry	*Dry	*Dry	N/A	*Dry	*Dry	*Dry	N/A	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry
Eastern Holding Dam	607	616	<1	N/A	5	183	4450	N/A	**9.77**	**9.84**	**0.23**	**588**	<1	0.48	**60.7**
EVA	N/A	N/A	N/A	N/A	N/A	N/A	3173	N/A	8.3	8.20	0.06	N/A	N/A	0.53	9.7
Evaporation Tailing Dam	N/A	N/A	N/A	N/A	N/A	N/A	689	N/A	8.62	8.66	0.06	N/A	N/A	0.55	51.5
Hunter River Downstream	188	<1	<1	N/A	39	38	2730	N/A	8.13	**8.43**	0.03	**37**	44	0.63	9
Hunter River Upstream	186	<1	<1	N/A	39	32	2910	160	8.43	8.31	0.01	**31**	47	0.42	3.9
REA	*Dry	*Dry	*Dry	N/A	*Dry	*Dry	*Dry	N/A	*Dry	*Dry	*Dry	*Dry	*Dry	0.54	
REA Stg 4 Dam	154	<1	<1	N/A	23	15	2440	N/A	6.89	7.08	20	<1		0.53	20
Staged Discharge Dam	4040	4340	<1	N/A	3	1320	2086	N/A	**9.41**	9.53	**0.18**	**4930**	42	0.58	24.5
SDD D/S	76	<1	<1	N/A	11	12	2370	N/A	7.15	7.50	0.68	7	<1	0.61	115
Sewage Treatment Plant	N/A	N/A	N/A	8			3333	N/A	9.45	9.48	1.35	N/A	N/A	0.61	7.8
Western Holding Dam	440	539	<1	N/A	4	206	2687	N/A	**9.93**	**9.96**	**0.91**	**485**	2	0.63	183

N/A - Monitoring parameter not required
** Monitoring for parameter not undertaken in 2020*
Bold: Monitoring result exceeded SWMP Trigger Level

APPENDIX G

WATER BALANCE SCHEMATIC

Water Balance Schematic