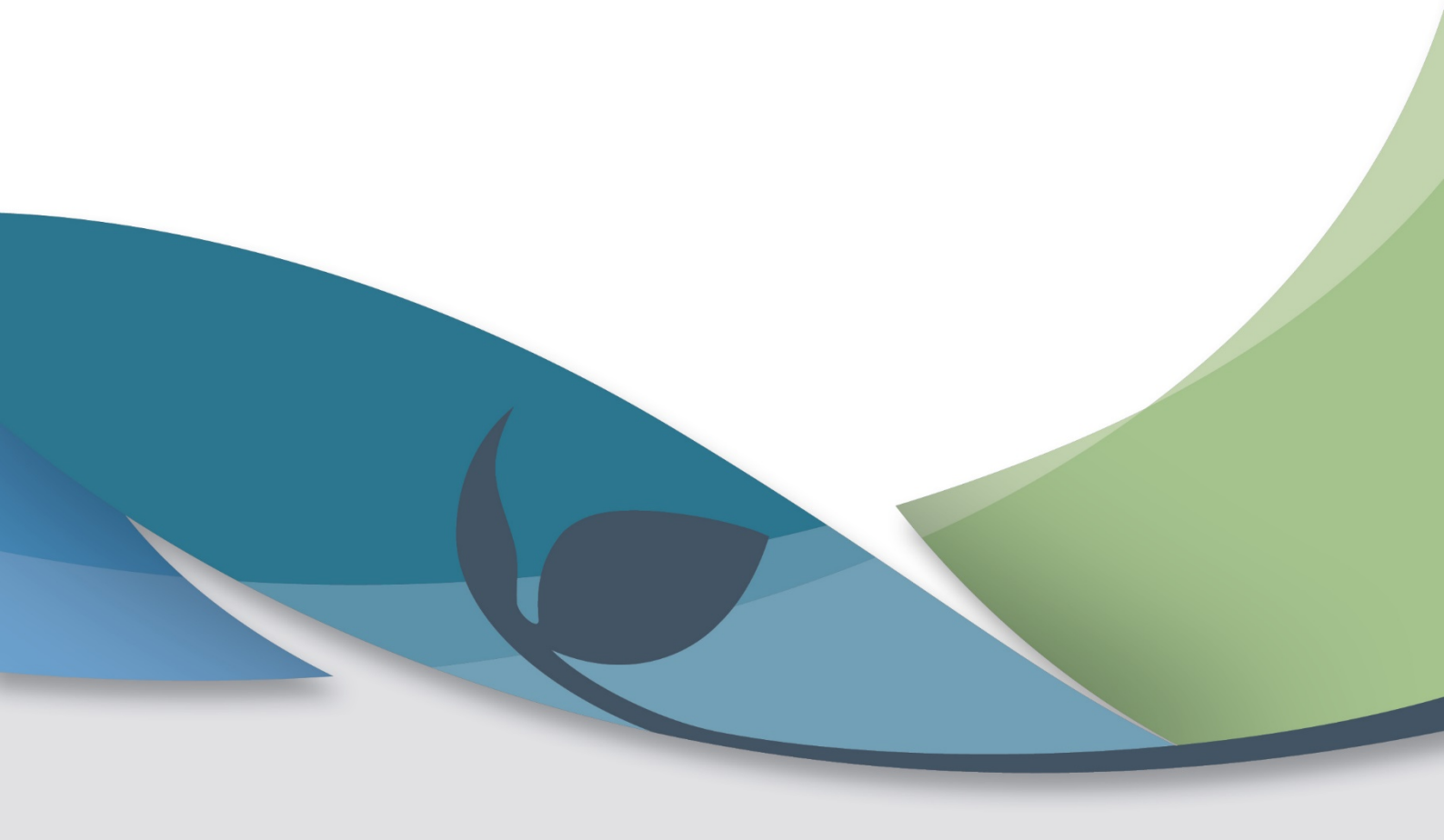
JAMES BAILEY & ASSOCIATES
Environmental and Planning Consultants

DARTBROOK MINE

ANNUAL REVIEW 2021

for Australian Pacific Coal

31 March 2022



DOCUMENT CONTROL

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Document Details

Project Name	Dartbrook Mine
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Author Address	6/127-129 John Street, Singleton NSW 2330
Our Reference	220331 Dartbrook Mine Annual Review

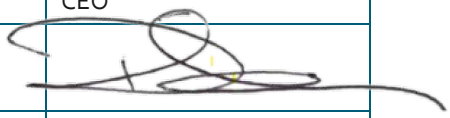
CONTENTS

TABLES

FIGURES

APPENDICES

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 19
Name of Holder of Water Licences	AQC Dartbrook Pty Ltd, AQC Dartbrook Management Pty Limited
MOP Start Date	1 January 2021
MOP End Date	2 July 2022
Annual Review Start Date	1 January 2021
Annual Review End Date	31 December 2021
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 (CY2021) 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	31 March 2022

Annual Review Distribution

Distribution List
NSW Department of Planning and Environment (DPE)
NSW Department of Planning and Environment – Resources Regulator (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 2021 (the reporting period).

The compliance status of Dartbrook against relevant approvals is summarised in **Table 1**. There were no non-compliance with regulatory approvals during the reporting period.

On 13 September 2021, the NSW Resources Regulator (RR) issued a Notice under Section 240 of the *Mining Act 1992* (Mining Act). This Notice directed AQC to undertake a rehabilitation risk assessment and revise its rehabilitation cost estimate. Although the issuance of a Section 240 Notice does not constitute a non-compliance with AQC's mining authorisations, the directions in the Notice will need to be satisfied in the next reporting period to maintain compliance.

Table 1 Statement of Compliance

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

2. INTRODUCTION

2.1 BACKGROUND

Dartbrook Mine 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 and Kayuga interseam drift, which connect to the Eastern and Western mine entrances, respectively;
- The Western Facilities (West Site), which is located west of the New England Highway and comprises the administration office, workshop, mine portals and water management infrastructure (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 loadout facilities, rail loop, 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).

A summary of where the relevant requirements from DA 231-07-2000 and Dartbrook mining authorities have been addressed in this document is provided in **Table 2**. **Figure 5** shows the location of mining authorities held at Dartbrook.

Table 2 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**

Document	Where Addressed
DA 231-07-2000, Condition 9.2 Environmental Reporting	
(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 - Appendix 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 - Appendix 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 231-07-2000 (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 231-07-2000 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 not the proposed five-year extension to the consent approval period. Without the extension to operate under DA 231-07-2000 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.

The MOD7 application was the subject of a conciliation conference conducted pursuant to Section 34 of the *Land and Environment Court Act 1979* (LEC Act). AQC entered into a Section 34 agreement with the Minister for Planning and Public Spaces on 21 December 2021. This agreement gave effect to MOD7 and extended the approved duration of mining operations until 5 December 2027.

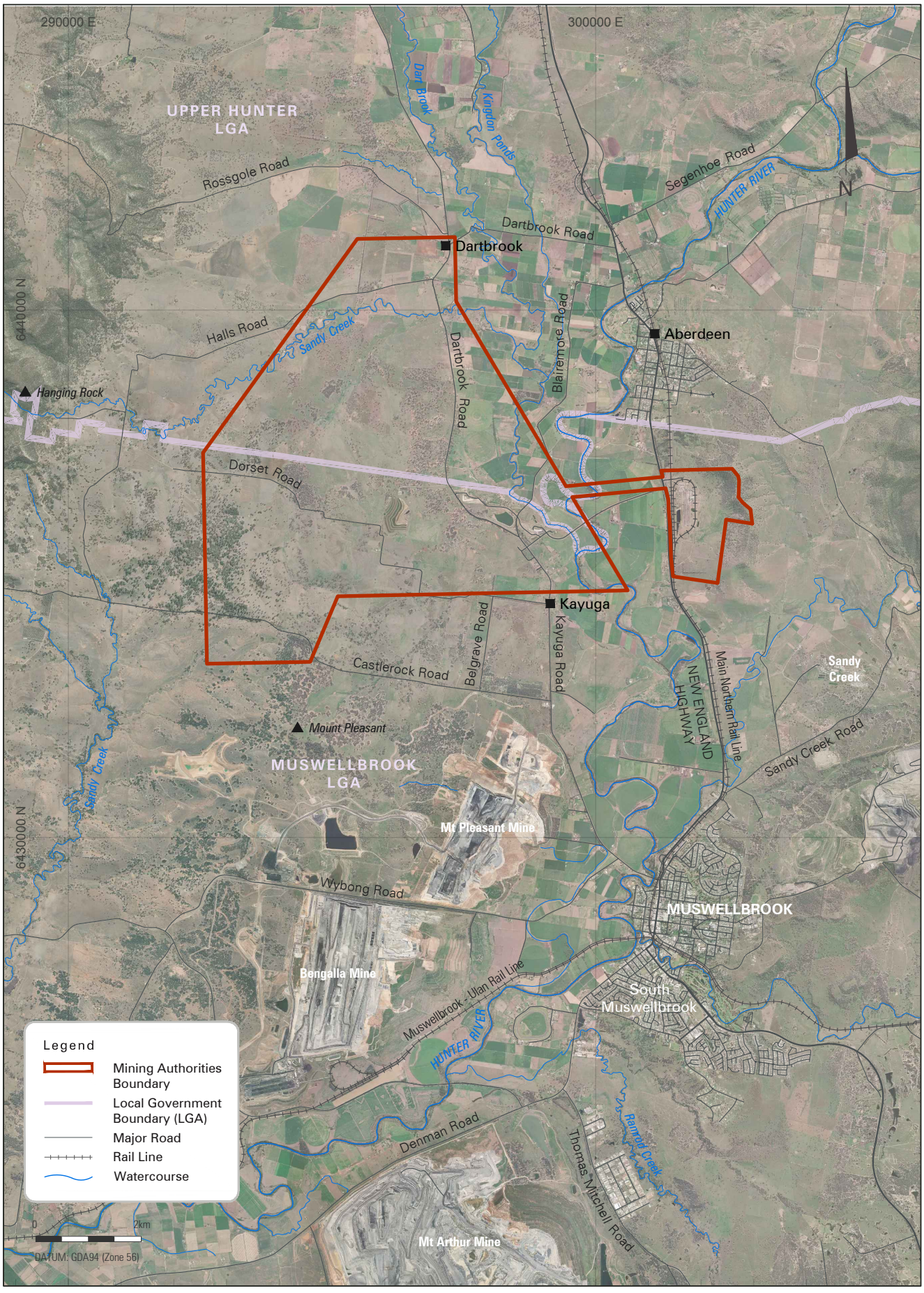
Other consultation with neighbours and community stakeholders continued during 2021 as discussed in **Section 9**. The Dartbrook Mine Community Consultative Committee (CCC) continued to meet during the reporting period, with meetings held in June and December 2021. As noted in **Section 9.1**, no environmental complaints were received during the reporting period.

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 3**.

Table 3 Dartbrook Mine Contacts

Australian Pacific Coal Contacts	
CEO	David Conry
CFO & Company Secretary	Craig McPherson
Environmental Officer (seconded from James Bailey & Associates)	Dorian Walsh
Statutory Mine Manager	John Swan
Site Contact Details	
Dartbrook Mine Address	Dartbrook Mine Stair Street, 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



JBA 2188 DAR - F 01 SITE LOCALITY (14/03/2022)

DARTBROOK MINE

Site Locality

FIGURE 1

Australian Pacific Coal

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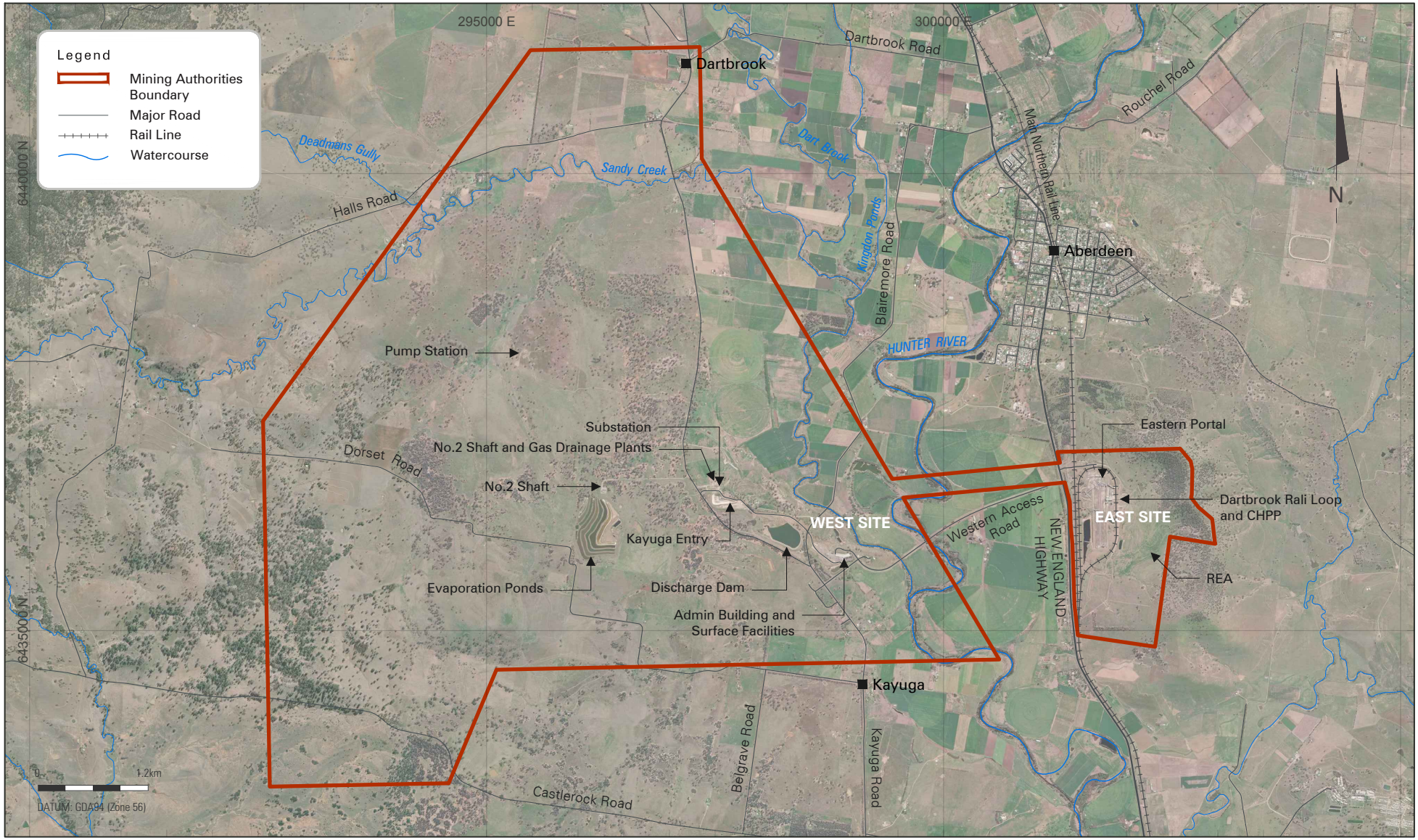

JBA 2188 DAR - F 02 EXISTING SITE LAYOUT (14/03/2022)

DARTBROOK MINE

Existing Site Layout

FIGURE 2

Australian Pacific Coal

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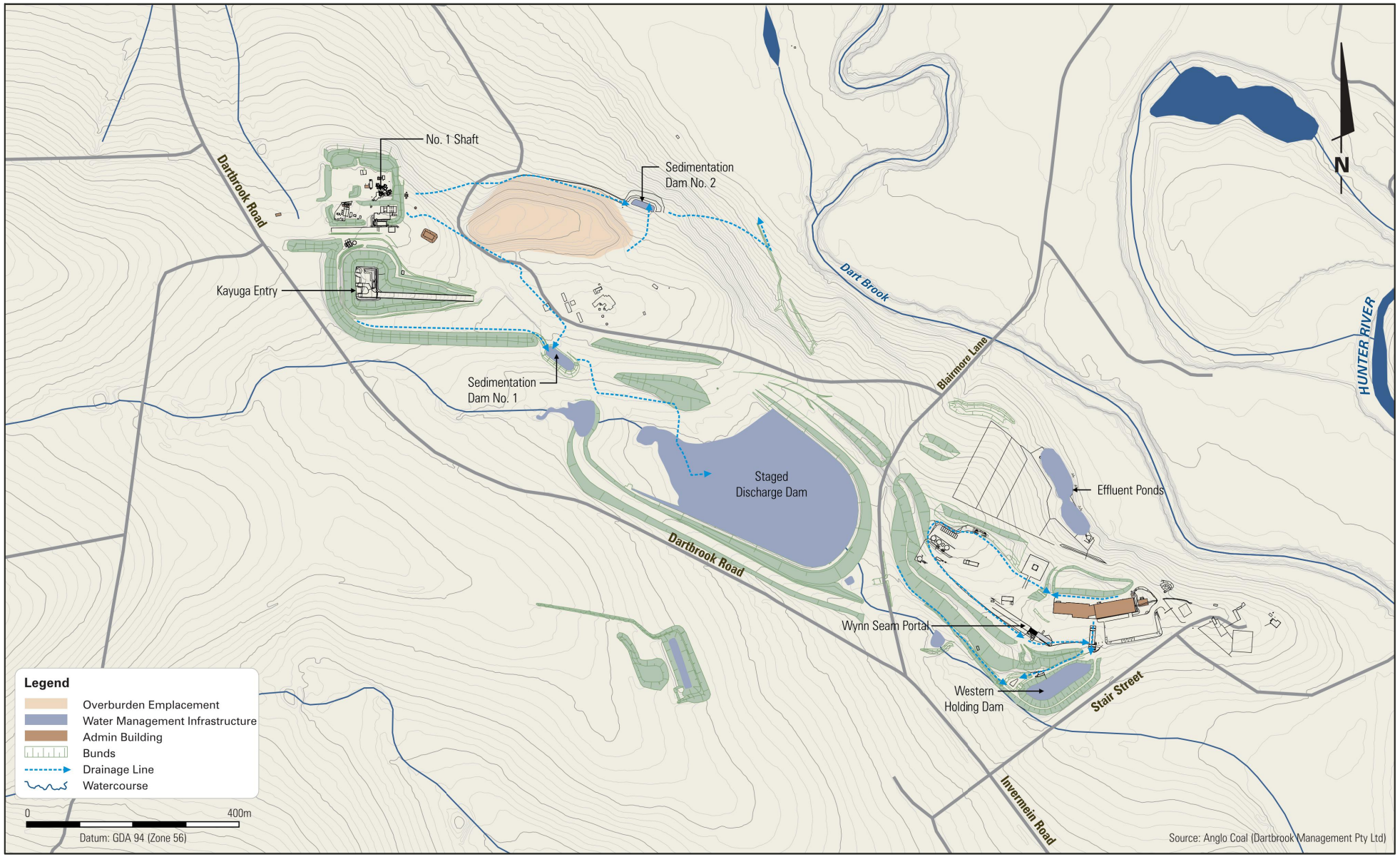

JBA 2188 DAR - F 03 EXISTING SITE LAYOUT (WEST) (25/02/2022)

DARTBROOK MINE

Australian Pacific Coal

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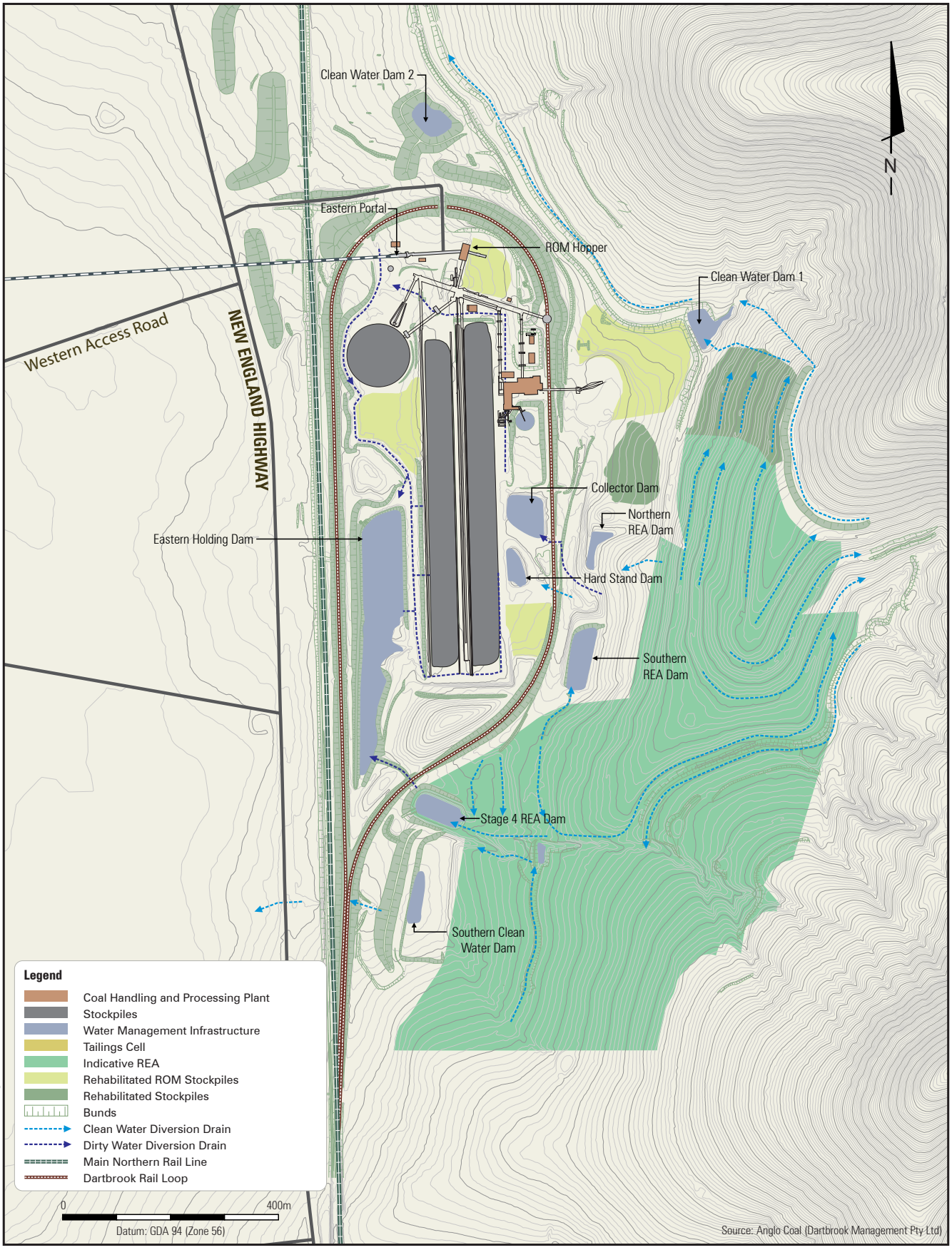
Existing Site Layout - West Site

FIGURE 3



HB DARTBROOK Surface Water Management Plan HB1804 F1 East Site Infrastructure 17 07 2020

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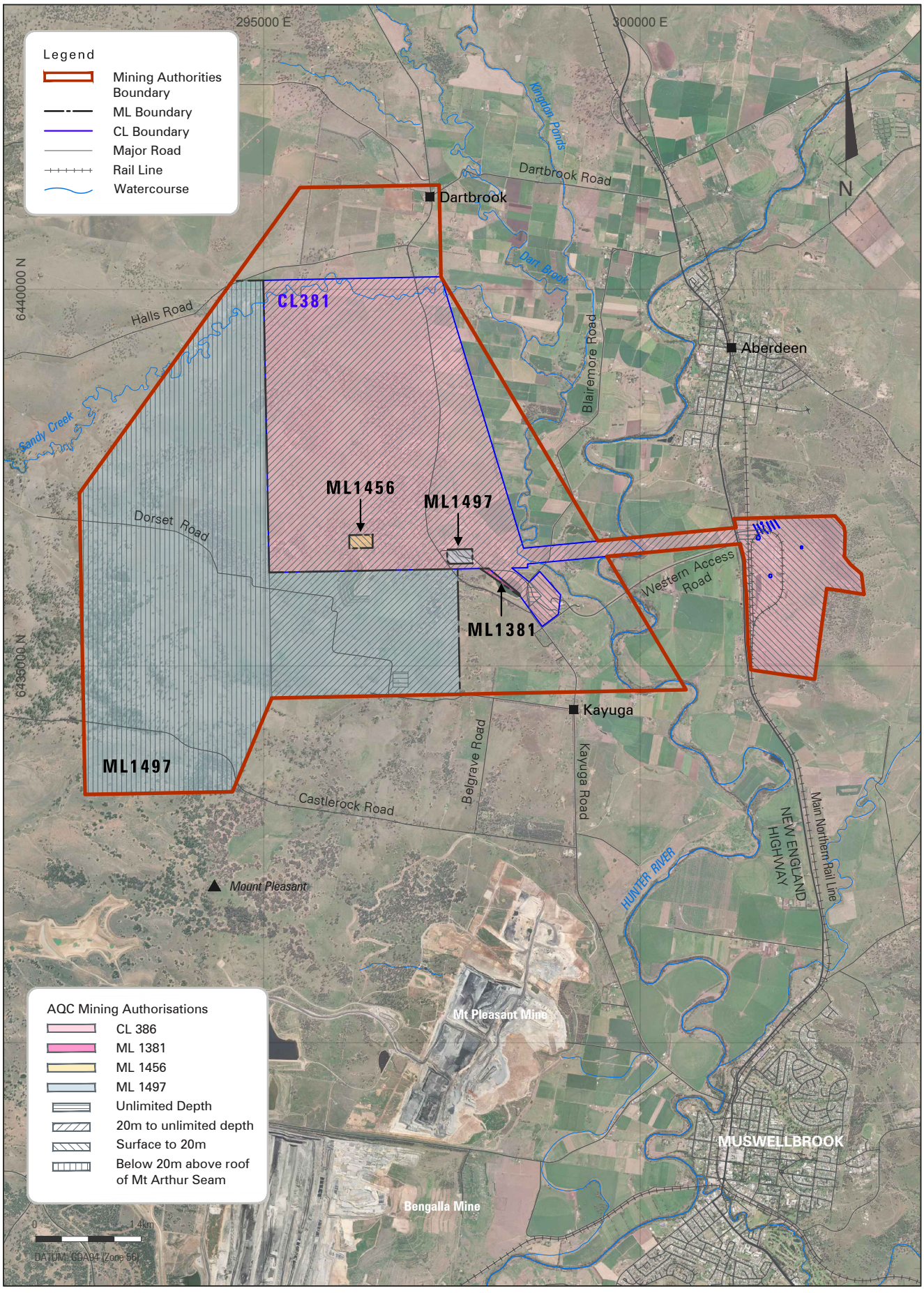
DARTBROOK MINE

Existing East Site Infrastructure

FIGURE 4



JBA 2188 DAR - F 05 EXISTING MINE LEASES (14/03/2022)

DARTBROOK MINE

Existing Mining Leases

FIGURE 5

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3. APPROVALS SUMMARY

3.1 OVERVIEW

Table 4 lists the Development Consent, Leases & Licences that apply to the management of Dartbrook Mine. A summary of minor amendments to DA 231-07-2000 that apply while Dartbrook Mine is under Care and Maintenance is provided in **Appendix A**.

The current MOP covers the period of ongoing Care and Maintenance activities from 1 January 2021 to 2 July 2022.

Table 4 Consents, Leases & Licences

Description	Approval Date	Expiry Date	Status/ Renewal Date	Approval Authority
Mining & Exploration Authorisations				
Authorisation 256	16/12/1980	02/05/2015*	Renewal lodged 02/04/2015	RR
Coal Lease (CL) 386	19/12/1991	19/12/2033	Active	RR
Mining Lease (ML) 1381	23/10/1995	23/10/2016*	Renewal lodged 23/10/2015	RR
ML 1456	27/09/1999	26/09/2020*	Renewal lodged 19/09/2019	RR
ML 1497	06/12/2001	05/12/2022	Renewal lodged 3/12/2021	RR
Exploration Licence (EL) 4574	13/08/1993	07/04/2015*	Renewal lodged 7/04/2015	RR
EL 4575	13/08/1993	23/05/2016*	Renewal lodged 23/05/2016	RR
EL 5525	22/09/1998	21/09/2016*	Renewal lodged 29/09/2016	RR
Development Consent				
DA 231-07-2000 (as modified)	28/08/2001	05/12/2027	Active	DPE
Emplacement Area Approvals				
Approval for an Emplacement Area (s126 approval)	13/03/1996	N/A	Active	DPE
Stage 4 Reject Emplacement Approval C95/2265 (s126 approval)	02/01/2000	N/A	Active	DPE
Approval for 14° slopes in the REA Stage 4 (s126 approval)	18/12/2003	N/A	Active	DPE
Application for Discontinuance of Use of Emplacement Areas (s101 approval)	13/08/2007	Ongoing	Active	DPE

Description	Approval Date	Expiry Date	Status/ Renewal Date	Approval Authority
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
Water Access Licences	Various	Various	Active	DPE-Water
Bore Water Licences for Stock, Water and/or Domestic Use	Various	Various	Active	DPE-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	RR
MOP for Care and Maintenance	3/09/2021	2/07/2022	Active	RR

*Note: * Application lodged with RR*

3.2 STATUS OF MANAGEMENT PLANS

Dartbrook Mine is required to develop and implement several Management Plans under DA 231-07-2000. **Table 5** outlines the environmental management plans utilised onsite and the approval date for each.

Table 5 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

Management Plan/Program	Approval Date
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
Pollution Incident Response Management Plan	16/08/2018
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

** 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 4**, an application to extend the suspension of the labour and expenditure conditions of Dartbrook Mine's mining authorisations was lodged in August 2018.

A revised Care and Maintenance MOP for 2021-2022 was lodged with the Resources Regulator on 30 November 2020. This MOP was approved by RR on 3 September 2021 and will be valid until 2 July 2022. A Rehabilitation Management Plan will be prepared in the next reporting period to supersede the current MOP.

Table 6 confirms that coal was not processed or transported 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 2021. Topsoil and overburden continue to be stockpiled at suitable locations onsite. No topsoil or overburden was moved or actively used in 2021.

Table 7 provides an estimate of the quantity of topsoil available to be used for future rehabilitation works.

Table 6 Production Summary

Material	Unit	Approved Limit	Actual Quantity (2020)	Actual Quantity (2021)	Forecast Quantity (2022)*
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

** Options for future mining will be considered; however, it is not possible to forecast coal production at this stage.*

Table 7 Topsoil and Overburden Stockpile Status

Activity / Area	Cumulative Production (t)		
	Start of Period 01/01/2021	End of Period 31/12/2021	End of next period 31/12/2022
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 2021.

Terrequip Mining Pty Ltd (Terrequip), a contractor of AQC, was the mine operator at the beginning of the reporting period. AQC assumed the role of mine operator from Terrequip in July 2021.

The Statutory Manager is responsible for undertaking the daily tasks associated with Care and Maintenance. Such tasks include 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 is available via the Kayuga Entry and Western Drift, both located at the West Site. The underground air quality is monitored utilising a tube bundle system and CITECT. The required statutory inspections of accessible areas of the underground workings were conducted during the reporting period.

4.2.3 Equipment Fleet

No mobile equipment was used on site during 2021 due to it being under Care and Maintenance.

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 rejects or tailings during the reporting period.

REA drainage was maintained in 2021. 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 Waste Management Plan.

Table 8 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 8 Waste Generation

Waste Type	Disposal	Quantity in 2020	Quantity in 2021
General Waste - Non-hazardous (t)	Landfill	3.75	6.04
Scrap Metal (t)	Recycled	2.68	0
Office Paper and Co-mingled Recyclables (t)	Recycled	0.07	0.4
Hazardous Waste – Sewage Sludge (Litres)	Treatment	0	0
Waste Oil (Litres)	Recycled / Treatment	4,200	0
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 9**. No coal was stored on any stockpile in 2021.

4.5 CONSTRUCTION & DEMOLITION

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

Table 9 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**	

4.6 NEXT REPORTING PERIOD

The legal proceedings regarding MOD7 to DA 231-07-2000 were resolved by way of Court Order on the 11 March 2021, resulting in extension of approved mining operations until 5 December 2027. AQC is currently considering its options for recommencement of underground mining at Dartbrook. If recommencement of mining is deemed to be feasible, AQC will fulfill the regulatory requirements necessary for further underground mining.

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 (now DPE) on 3 June 2020 following their review of the 2020 Annual Review which confirmed that the document satisfied the relevant reporting requirements under DA 231-07-2000 and the 2015 *Annual Review Guideline* (DPE, 2015). RR did not raise any specific issues to be addressed in the 2021 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 2021. These inspections did not identify any operational non-compliances.

Table 10 provides a summary of the environmental management actions undertaken during 2021.

Table 10 Environmental Management Overview

Aspect	Performance during 2021	Trends	Management Actions
Air Quality	Dust concentrations measured during the reporting period were within all relevant air quality criteria.	As has been the trend during Care and Maintenance, Dartbrook has not contributed to air quality exceedances.	Continuation of air quality monitoring (see **Section 6.2**).
Greenhouse	93,801 tonnes of CO_2 equivalent gas (CO_2-e) was emitted (Scope 1 – 3) during the 2020/21 reporting period.	Decrease in CO_2-e emissions on site compared to 2019/20 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.
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 1,028.2 mm of rainfall was recorded over the 141 rain days. This was higher than the total rainfall received in 2020 (842.8 mm) and 2019 (382 mm). This was also above the long-term annual average rainfall of 595 mm. An annual rainfall summary is provided in **Table 11,** 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 12**. January was the warmest month in 2021 with an average daily temperature of 22.9 °C and a maximum temperature of 37.3 °C. July was the coldest month with an average daily temperature of 11.2°C and a minimum of -1.2 °C.

Table 11 Rainfall Summary 2021

Month	Rainfall (mm)	Cumulative Rainfall (mm)
January	54.8	54.8
February	116.8	171.6
March	137.2	308.8
April	22.8	331.6
May	26.8	358.4
June	70.4	428.8
July	32.4	461.2
August	26.8	488.0
September	33.8	521.8
October	72.0	593.8
November	303.6	897.4
December	130.8	1028.2

Table 12 Monthly Temperature Summary 2021

Month	Min Temperature (°C)	Avg Temperature (°C)	Max Temperature (°C)
January	10.2	22.9	37.3
February	12.2	21.9	33.0
March	11.3	20.5	34.6

Month	Min Temperature (°C)	Avg Temperature (°C)	Max Temperature (°C)
April	2.8	16.2	28.4
May	0.1	13.7	26.1
June	0.0	11.4	22.5
July	-1.7	11.2	23.9
August	0.2	13.0	26.6
September	1.1	15.2	28.7
October	7.6	17.9	33.9
November	7.9	18.8	30.6
December	11.2	21.7	35.3
Average	**5.2**	**17.0**	**30.1**

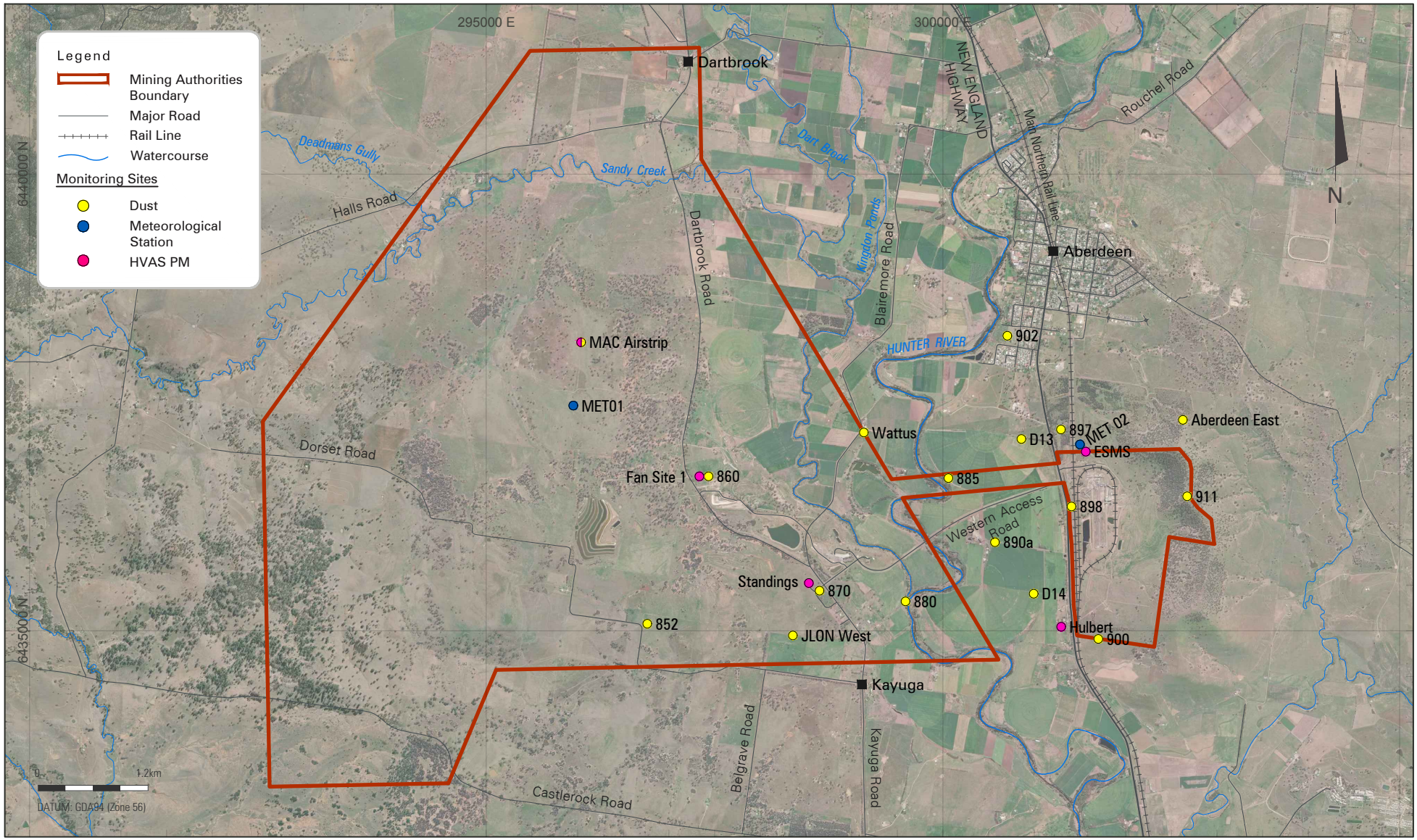
Wind Speed & Direction

In 2021, prevailing winds were generally consistent with long term regional trends.

Table 13 provides a summary of the data captured at Dartbrook Mine in 2021. Monthly wind roses compiled from Met-02 are provided in **Appendix B**.

Table 13 Wind Summary 2021

Month	% Period with Wind Speed <3.0 m/s	% Period with Wind Speed >3.0 m/s	Predominant Wind Direction
January	44.6	55.4	SSE
February	55.7	44.3	SSE
March	33.3	66.7	SSE
April	75.0	25.0	SSE
May	77.0	23.0	N
June	67.8	32.2	N
July	61.6	38.4	N
August	62.9	37.1	W
September	55.4	44.6	NNW
October	59.5	40.5	NNW
November	58.9	41.1	S
December	60.9	39.1	SSE



JBA 2188 DAR - F 06 MET AND DUST MONITORING (14/03/2022)

DARTBROOK MINE

Australian Pacific Coal

JAMES BAILEY & ASSOCIATES
Environmental and Planning Consultants

Meteorological and Dust Monitoring Locations

FIGURE 6

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 DA 231-07-2000 conditions and 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 are presented in **Table 14**. The conditions of DA 231-07-2000 were modified through the Section 34 agreement reached in relation to MOD7. The modified Development Consent does not include criteria related to depositional dust. However, depositional dust monitoring was conducted throughout the reporting period, as these criteria were applicable during that period.

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 nearest private residences to the East Site (including Aberdeen);
  - Two dust deposition gauges at locations representative of the nearest private residences to the south and west of the West Site;
- Two PM10 monitoring locations, one located to the south of the CHPP and one to the 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 14 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

Pollutant	Averaging Period	Criterion
Depositional Dust* (g/m^2/month)	Annual (total)	4 (g/m^2/month)
	Annual (increase over existing levels)	2 (g/m^2/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 to be undertaken 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/m^2/month. Most insoluble solid results that are above 4 g/m^2/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 the results of air quality monitoring undertaken throughout the year. **Table 15** and **Figure 7** summarise the measured dust deposition levels during the reporting period. Annual average dust deposition levels were within the criterion of 4 g/m^2/month at all monitoring sites.

'Contaminated samples' (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.

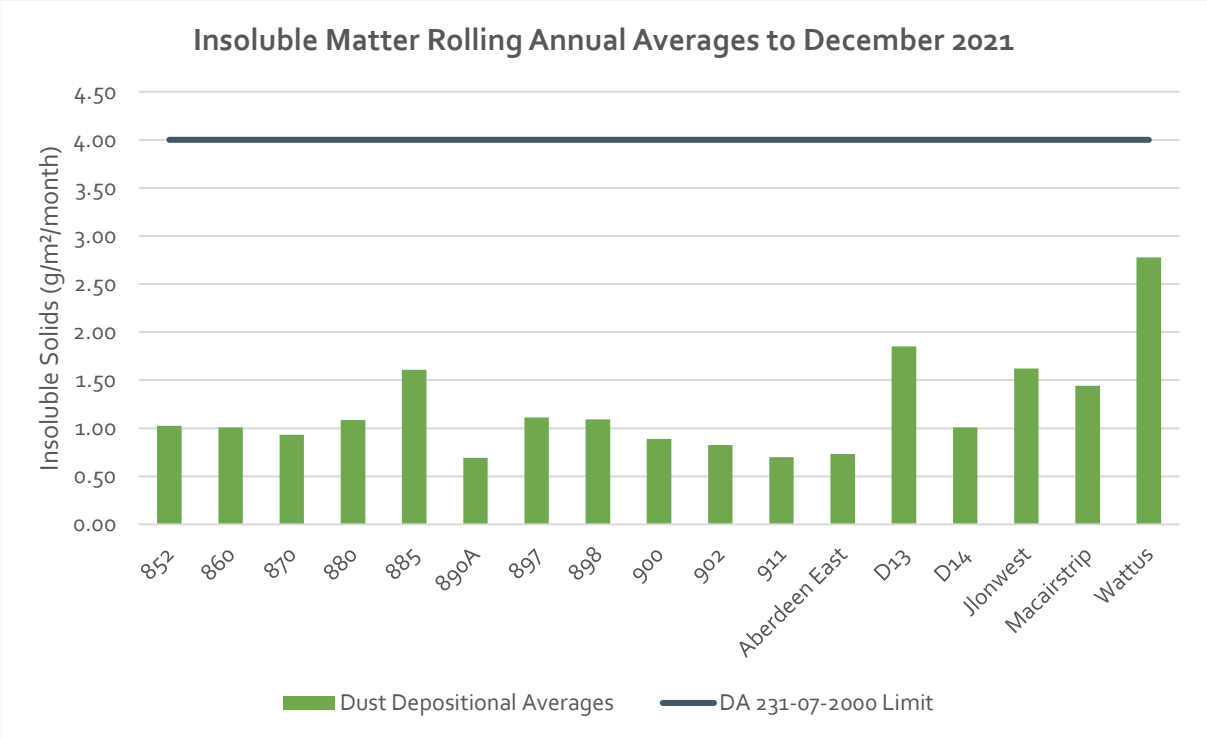
Table 15 Annual Rolling Average Dust Deposition for 2021

Site	Location Description	Insoluble Solids (g/m^2/month)	Number of Samples*
852	Dorset Road	1.03	12
860	No. 1 Vent Shaft	1.01	12
870	Kayuga Village	0.93	12
880	Hunter River / Dart Brook Junction	1.08	12
885	Frazer Farm paddock near Hunter River	1.61	12
890a	Garoka Dairy	0.69	12
897	Eastern Site North	1.11	10
898	Eastern Site West	1.09	12
900	Eastern Site South	0.89	9
902	Aberdeen Tree Screen	0.83	12
911	Browns Mountain	0.70	11

Site	Location Description	Insoluble Solids (g/m²/month)	Number of Samples*
Aberdeen East	South east of Aberdeen	0.73	12
D13	Residence northwest of CHPP	1.85	12
D14	Southwest of CHPP	1.01	12
JLON West	Residence south of West Site	1.62	9
Macairstrip	Northwest of West site	1.44	12
Wattus	Between Dart Brook and Hunter River	2.78	12

**No measurements taken*

Figure 7 **Depositional Dust Annual Averages 2021**



High Volume Air Samplers

Dartbrook Mine has five HVAS that monitor concentrations of PM10 (particulate matter less than 10 microns) 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 16**.

The data recovery rate was 100% for all HVAS sites in 2021, except for site ESMS, which experienced technical issues in November and December. As such, the recovery rate for ESMS was 82% across the reporting period. There were seven program re-runs undertaken during 2021 across all HVAS sites except for the Standings HVAS (which was interrupted by a power outage during the run time). 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,** all PM10 concentrations recorded by the HVAS sites were within the criterion of 50 µg/m^3 throughout 2021

Table 17 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 annual average criterion of 25 µg/m^3 at all sites during the reporting period.

The rolling 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 criterion for TSP.

6.3.3 Next Reporting Period

Dust mitigation and control activities will continue to be employed as required. Assuming that the site remains under Care and Maintenance, air quality monitoring will continue to be undertaken in accordance with the DMP. If further mining is to be carried out, AQC will need to prepare an Air Quality and Greenhouse Gas Management Plan in accordance with the conditions of DA 231-07-2000 (as modified).

Table 16 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 17 Comparison of Measured Annual Average PM10 Concentrations with EIS Predictions

Location	Units	EIS Predicted Annual Average PM10	Annual Average PM10 Results 2021
ESMS	µg/m3	20.1	7
Fan site 1	µg/m3	18.7	9.9
Hulbert	µg/m3	17.4	8.4
Standings	µg/m3	17.3	9
Macairstrip	µg/m3	17.0	9

Figure 8 **HVAS 24-hr Average PM10 Results 2021**

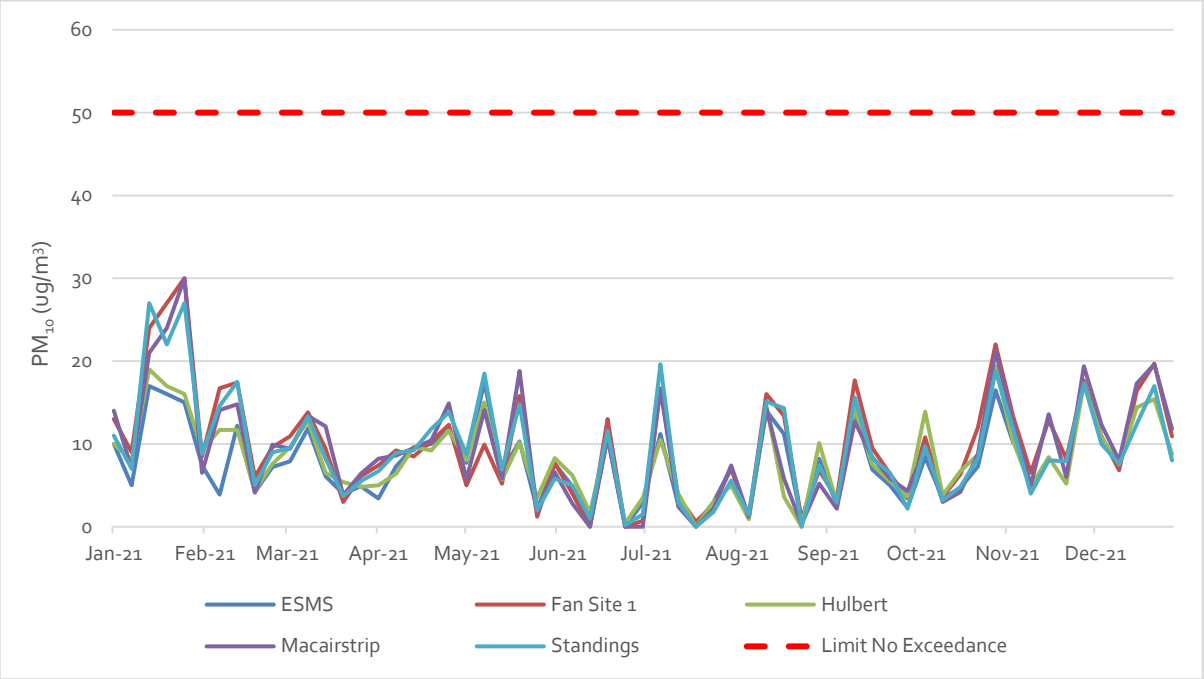
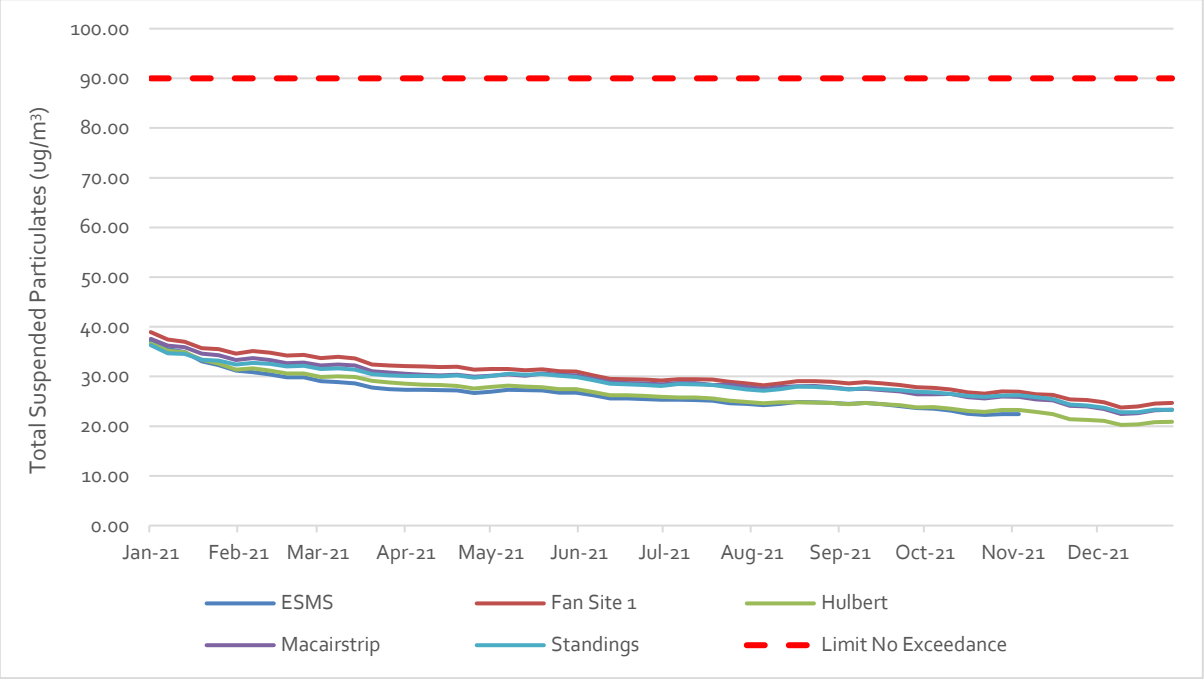


Figure 9 **Calculated Rolling Annual Average TSP Concentrations 2021**



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 the 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 2021 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 2021 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 DPE 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 currently mined at site, there currently is no need to operate production equipment or the CHPP.

6.6.2 Environmental Performance

No noise monitoring was undertaken during the reporting period, as Dartbrook remained under Care and Maintenance.

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 the Archaeology and Cultural Heritage Management Plan.

General property maintenance works, such as mowing, slashing and fence repairs were ongoing during 2021 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

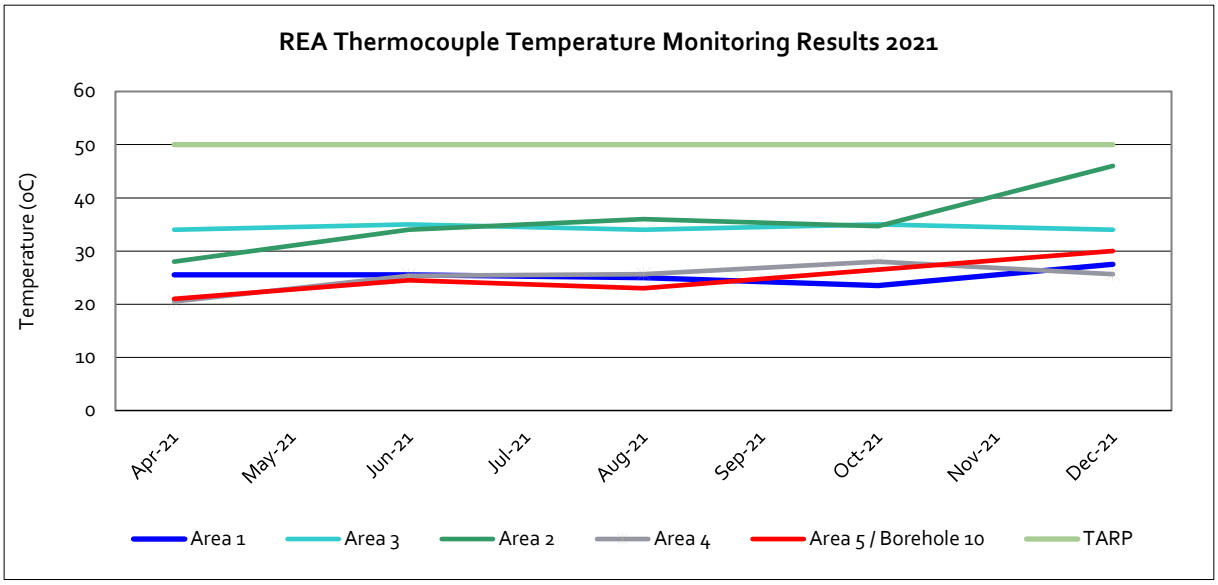
The REA underground temperature is monitored using 13 thermocouples installed in boreholes to measure the temperature of the reject's material. **Figure 10** provides the results of REA thermocouple monitoring from the reporting period.

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**).

Figure 10 REA Thermocouple Temperature Monitoring Results 2021



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.

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 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 been 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 18** provides the 2020/2021 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 18**, a total of 93,801 tonnes of CO_2 equivalent gas (CO_2-e) was emitted during the 2020/2021 National Greenhouse and Energy Reporting (NGER) period. The main contributor to total emissions was CH_4 gas emitted from the underground mine (83,577 tonnes CO_2-e). The total greenhouse gas emissions value for the 2020/21 NGER period is lower than the 112,055 tonnes CO_2-e for the previous NGER reporting period.

Table 18 Greenhouse Gas Emissions during 2020/2021 NGER period

Scope 1 Emissions (tCO_2-e)		Scope 2 Emissions (tCO_2-e)	Total Emissions (tCO_2-e)
CO_2	CH_4		
8,292	83,577	1,932	**93,801**

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.

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 by 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. 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 0.7 megalitres (ML) of potable water was sourced from the Aberdeen town water supply during the reporting period. Approximately 5.7 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 19**.

Prior to 2021, water that accumulated in the Hunter Tunnel was pumped to the Wynn seam goaf. These pumping volumes were assumed to be a reasonable estimate of seepage into the Hunter Tunnel. In late 2020, a weir was installed in the Hunter Tunnel and hence active pumping from the Hunter Tunnel to the goaf was discontinued.

Previous experience during Care and Maintenance has indicated that seepage into the Hunter Tunnel is typically in the order of 180 ML/year. Despite not being able to ascertain whether 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.

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 to 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 19**, 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 19 Dartbrook Mine Water Take

Water Licence	Water Sharing plan, source and management zone (as applicable)	Entitlement	Passive Take/inflows (ML)	2021 Active Pumping (ML)	Total Entitlement
WSP for Hunter Unregulated and Alluvial Water Sources 2009					
WAL 17781	Dartbrook Water Source	278	-	5.7	328
WAL 23875		50			
WAL 18134	Hunter Alluvial Water Source	297	180**	-	1,249
WAL 18174		37			
WAL 18210		235			
WAL 18225		121			
WAL 18228		90			
WAL 18239		371			
WAL 18126		98			
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 DPE-Water in 2018*
*** Estimated based on previous monitoring*
****Estimated seepage into Wynn and Kayuga seam workings*

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 drought conditions experienced from 2017 to 2019, above-average rainfall was experienced during the reporting period. As shown in **Table 20**, 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 to achieve 50-70% freeboard.

Hunter River Salinity Trading Scheme

In order to maximise evaporation and readiness for the gravity-fed HRSTS discharge system, the SDD was generally maintained at 30-50% capacity (i.e. 50-70% freeboard), as recommended by the SWMP.

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

Table 20 Dartbrook Mine Stored Water Summary

Storage	Location	Volume Held (m^3)		
		End of Previous Period Dec 2020	End of Period Dec 2021	Storage Capacity
Clean Water				
Clean Water Dam 1	East Site	4,000	10,000	10,000
Clean Water Dam 2	East Site	1,500	6,000	10,000
Clean Water Dam 3	East Site	1,500	10,000	10,000
Southern Clean Water Dam	East Site	5,300	15,900	53,000
Dirty Water (runoff)				
Sediment Dam 1	West Site	650	1,000	1,000
Sediment Dam 2	West Site	20	200	400
Northern Dam REA	East Site	690	2,300	2,300
Southern Dam REA	East Site	400	8,000	8,000
Stage 4 REA Dam	East Site	0	7,505	7,900
Controlled Discharge Water				
SDD	West Site	248,000	260,000	400,000
Contaminated Water				
Western Holding Dam *	West Site	2,310	3,080	15,400
Eastern Holding Dam *	East Site	61,600	57,200	88,000
Evaporation Ponds	West Site	66,000	125,400	132,000
Wynn Seam Goaf	Underground	~3,145,000	~3,179,000	~3,547,000

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

Groundwater

There was an assumed 359 ML of groundwater inflows during the reporting period, comprised of 180 ML of seepage into the Hunter Tunnel and 179 ML of modelled inflow to the mine workings. Groundwater inflow to the Hunter Tunnel is allowed to passively drain to the Wynn Seam goaf.

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 392.0 ML to 506.6 ML whilst the estimated storage in the Wynn Seam goaf increased from approximately 3,145 ML to 3,179 ML. Therefore, the total site inventory increased from approximately 3,537 ML to 3,686 ML during the reporting period. This increase was due to the above-average rainfall experienced during the reporting period.

Table 21 Estimated Dartbrook Mine Water Balance Components

Component	2021 Volumes (ML)
Inputs	
Fresh Water (Blairmore bore)	5.7
Groundwater Seepage In (including Hunter Tunnel)	359
Rainfall Runoff	264
Recycled to CHPP from Tailings & Storage (not included in total)	0
Imported Potable (Aberdeen)	0.7
Total Inputs	629.4
Outputs	
Groundwater Seepage Out	68
Dust Suppression	0
Evaporation – Mine Water	408
Entrained in Process Waste	0
Discharged (HRSTS)	0
Potable Usage	6.4
Total Outputs	482.4
Estimated Change in Total Storage	147

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 DPE-Water.

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 22**. 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 22**, monitoring of groundwater bores was undertaken on a quarterly basis during the reporting period. **Figure 11** shows the locations of all groundwater monitoring bores sampled during the reporting period.

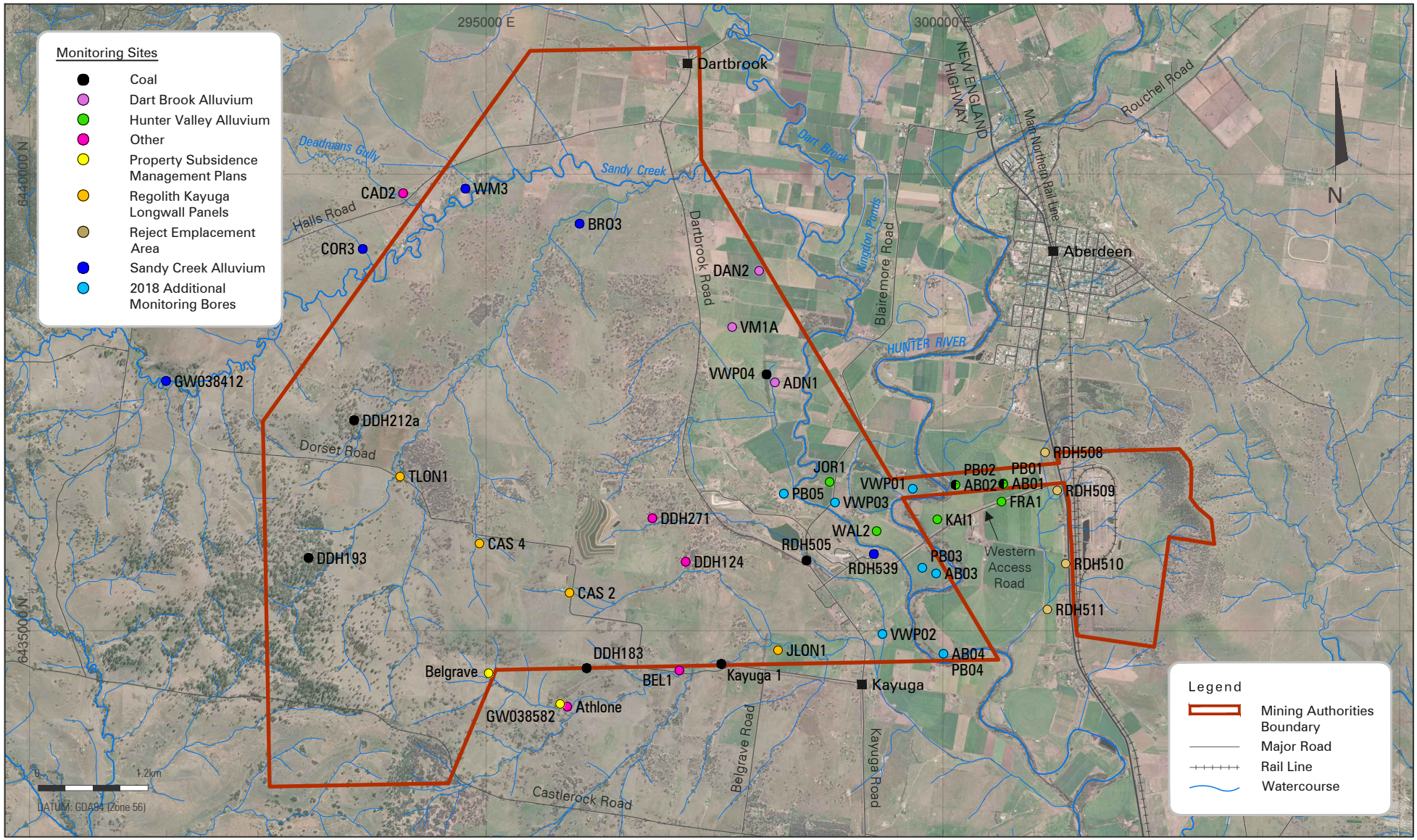
Graphs of the measured groundwater, pH and EC levels at Dartbrook Mine bores during the reporting period are included in **Appendix E**.

Table 22 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.	Water depth, pH and EC are monitored on a quarterly basis. Additional parameter suite is monitored every six months.
JOR1	Well			
KAI1	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.	Water depth, pH and EC are monitored on a quarterly basis. Additional parameter suite is monitored every six months.
DAN2	Well			
WM1A	Bore			
Sandy Creek Alluvium Monitoring Bores				
BRO3	Bore	Sandy Creek alluvium	Located in the Sandy Creek alluvium.	Water depth, pH and EC are monitored on a quarterly basis. Additional parameter suite is monitored every six months.
COR3	Bore			
WM3	Bore			
GW038412	Well			
Coal Seam Monitoring Bores				
Kayuga1	Bore	Kayuga Seam	Monitor the Kayuga and Wynn Seam aquifers.	Water depth, pH and EC are monitored on a quarterly basis. Additional parameter
DDH183	Bore			
DDH193	Bore			

Bore	Bore Type	Aquifer Monitored	Details	Parameter / Frequency
DDH212a	Bore	Wynn Seam		suite is monitored every six months.
Regolith Monitoring Bores				
CAS2	Bore	Regolith – shallow overburden	Monitor the regolith overlying and in the vicinity of the Wynn and Kayuga longwall panels.	Water depth, pH and EC are monitored on a quarterly basis. Additional parameter suite is monitored every six months.
CAS4	Wind mill			
TLON1	Wind mill			
JLON1	Wind mill			
Staged Discharge Dam Bore				
RDH505	Bore	Regolith – shallow overburden	Monitors the regolith near the Staged Discharge Dam.	Water depth, pH and EC are monitored on a quarterly basis. Additional parameter suite is monitored every six months.
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.	Water depth, pH and EC are monitored on a quarterly basis. Additional parameter suite is monitored every six months.
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.	Water depth, pH and EC are monitored on a quarterly basis. Additional parameter suite is monitored every six months.
GW038582	Bore			
Other Monitoring Bores				
Athlone	Bore	Regolith – shallow overburden	Athlone and BEL1 are located south of the Dartbrook mining leases.	Water depth, pH and EC are monitored on a quarterly basis. Additional parameter suite is monitored every six months.
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.



JBA 2188 DAR - F 11 GW MONITORING (14/03/2022)

DARTBROOK MINE

Groundwater Monitoring Locations

FIGURE 11

Australian Pacific Coal

JAMES BAILEY & ASSOCIATES
Environmental and Planning Consultants

7.2.2 Cumulative Rainfall Departure

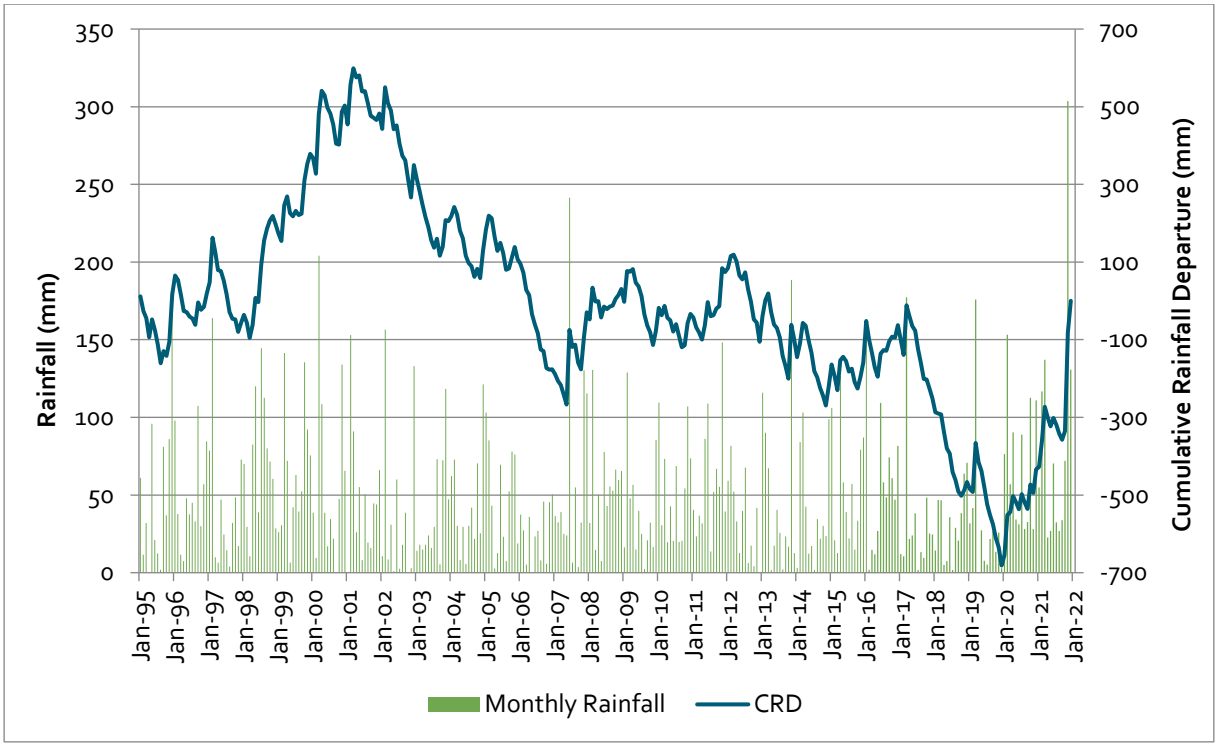
Groundwater levels in relatively shallow wells or bores constructed in alluvium are generally highly dependent on rainfall recharge and can rise or decline quite rapidly in response to rainfall events.

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 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 11**).

As reported in **Section 6.2,** Dartbrook experienced above average rainfall in 2021 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. Water levels at KAI1, FRA1 and WAL2 were similar to the previous reporting period. The water levels recorded in 2021 were within the historical ranges for these bores. JOR1 was unable to be accessed for monitoring in 2021.

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.

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 6.7 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. The following exceedances of the IAC for EC occurred during the reporting period:

- All quarterly EC measurements at FRA1 exceeded the trigger value of 659 µS/cm;
- The EC values measured at KAI1 in January, August and October were 556, 601 and 614 µS/cm respectively. These results exceeded the trigger value of 541 µS/cm;
- All quarterly EC measurements at WAL2 exceeded the trigger value of 1,917 µS/cm.

The EC recorded at bore WAL2 in October 2021 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 2021.

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 rises in water levels compared to the previous reporting period. These trends are consistent with the above average rainfall experienced during the reporting period. 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 DAN2 were similar to the previous reporting period and within the historical ranges for these bores. The pH for bore WM1A increased to 8.6 in October 2021, which represents a new historical maximum for this bore.

The EC values recorded at WMA1, ADN1 and DAN2 were higher than the values for the previous reporting period. However, these values were within the historical ranges for these bores. Exceedances of the IAC for EC during the reporting period include:

- The EC measurements for ADN1 (3,360, 3,060 and 3,440 µS/cm) exceeded the IAC of 2,970 µS/cm; and
- The EC values for DAN2 in January, April and July (2,905, 3,200 and 3,110 µS/cm) 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, BRO3 and WM3 recorded increases in water level compared to the last reporting period (although only two measurements were able to be taken at COR3 and one measurement at

BRO3). Water levels at GWO38412 increased in January and May, then decreased in August and October. 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 two samples were collected for COR3 due to access issues.

Bores COR3, WM3 and GW038412 exhibited relatively stable pH levels, with fluctuations of generally less than 0.5 during the reporting period. There was one pH measurement of 6.5 at GWO38412 in August 2021 which represents a new historical minimum for this bore.

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 contrasting trends during the reporting period, but remained within the historical ranges for these bores.

The EC value for COR3 in August (3,176 µS/cm) exceeded the IAC of 2,360 µS/cm. This was the only exceedance of the IAC for EC.

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 increased from October 2020 to October 2021, reflecting the above average rainfall experience during the reporting period. 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 and EC levels for RDH505 remained within historical ranges during the reporting period. 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. DDH193 and DDH212a were unable to be accessed for monitoring. There were no measured exceedances of the water level IAC during the reporting period.

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.

EC levels have remained relatively stable for all coal seam bores since 2009. The EC values recorded over the last three years show an increasing trend in EC. The EC values for DDH183 in January and May (8,050 and 8,290 µS/cm)exceeded the IAC of 7,350 µS/cm. The EC measurements for Kayuga 1 were within the IAC for that bore.

DDH193 and DDH212a were unable to be accessed for sampling during the reporting period.

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.

Monitored groundwater levels in CAS4 and TLON1 have remained relatively stable during the Care and Maintenance phase. These trends continued during the reporting period, with fluctuations of less than 0.5 m during the reporting period.

Although the dataset for JLON1 is limited, water levels recorded during the reporting period will similar to those from recent years.

CAS2 has a exhibited a steady decline in water level since 2002. CAS2 experienced a rise in water level, which is contrary to the long-term trend. This may be attributable to the above average rainfall experienced during the reporting period. Notwithstanding the increase in water level, all depth measurements for CAS2 (41.56, 40.43, 38.68 and 37.15 mbgl) exceeded the IAC of 36.5 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 andCAS4 have generally been in the range of 6.5 to 7.5. The pH measurements for CAS4 during the reporting period were within this range and did not exceed the IAC for pH. There was one pH measurement of 6.2 at CAS2 in October, which remains within the historical range for the bore. The pH at JLON1 returned to relatively neutral levels in May 2021 after a spike to 7.4 in January. JLON1 has exhibited wide variability in pH and the values recorded during the reporting period are within the historical range for this bore.

CAS2, CAS4 and TLON1 have historically exhibited large variability in EC. EC levels at CAS2 and CAS4 remained below the highest EC levels recorded in the 2020 reporting period. However, the increasing EC trend at these bores (which has been observed since 2016) continued during the reporting period.

The four EC measurements for CAS2 (16,170, 15,590, 16,640 and 16,230 µS/cm) 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, water levels at these bores remained within historical ranges.

All other water level measurements during the reporting period were within the IAC for water level.

Bores RDH508 and RDH508a were unable to be monitored during the reporting period.

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 was one pH result of 6.1 at RDH510 in August 2021, which represents a new historical minimum for this site. However, pH levels for that bore returned to the typical range in October 2021.

The REA monitoring bores have historically exhibited large variability in EC. During the reporting period, RDH509 and RDH510 recorded increases in EC outside of their historical ranges. Only one EC measurement was able to be taken at RDH511 and this value was within the historical range for the bore. EC levels for RDH511 and RDH511a remained below the IAC during the reporting period. The following exceedances of the IAC for EC occurred during the reporting period:

- The EC measurement at RDH509 in August (7,020 µS/cm) exceeded the IAC of 5,874 µS/cm;
- The EC measurement at RDH509a in October (4,010S/cm) exceeded the IAC of 3,471 µS/cm;
- EC measurements for RDH510 (9,660, 8,890, 10,330 and 10,070 µS/cm) exceeded the IAC of 8,744 µS/cm; and
- EC measurements for RDH510a (10,250, 9,890, 10,930 and 10,510 µS/cm) exceeded the IAC of 8,636 µS/cm.

Bores RDH508 and RDH508a were unable to be sampled during the reporting period.

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 November 2020 to January 2021, then recovered from January to May. Although these fluctuations were within the historical variability for this bore, the IAC for GW038582 has been exceeded since 2017. GW038582 was unable to be accessed for monitoring in July and October.

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, the recorded EC and pH values for GW038582 remained within the historical variability for this bore. The pH measurement in May was 8.2, 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 continued to decline during Care and Maintenance. This decreasing trend has been attributed to connective cracking induced by previous longwall mining activities. The decreasing water level above the Kayuga seam goaf (including at CAS2) is consistent with the predictions in the Dartbrook EIS. In contrast to the long-term trend, water levels at CAS2 increased in 2021. This recovery coincided with above average rainfall. Further monitoring at CAS2 is required before any change in water level trend can be confirmed;

- The Belgrave and GW038582 bores monitor the regolith to the south of the completed longwall panels. These bores recorded declines in groundwater levels in response to mining between 2004 and 2006. A recovery in water levels was observed during Care and Maintenance. These water level trends have generally correlated 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 Kayuga1 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 Kayuga1.

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;

- Several bores recorded increases in EC during the reporting period, which continued the upward trend observed during the previous reporting period. This recent trend has been evident in the Hunter River alluvium, Dart Brook alluvium, regolith and coal seam groundwater system. The increases in EC has coincided with wet conditions and rising water levels;

- 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 beyond historical variability; and
- 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. 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

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-laden water;
- 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 storages 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 with 50 - 70 % freeboard.

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 with 50 -70% freeboard.

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 a declared dam under the *Dams Safety Act 2015* 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 sufficient 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 23 presents a summary of the water quality results for the Hunter River and Dart Brook for the reporting period.

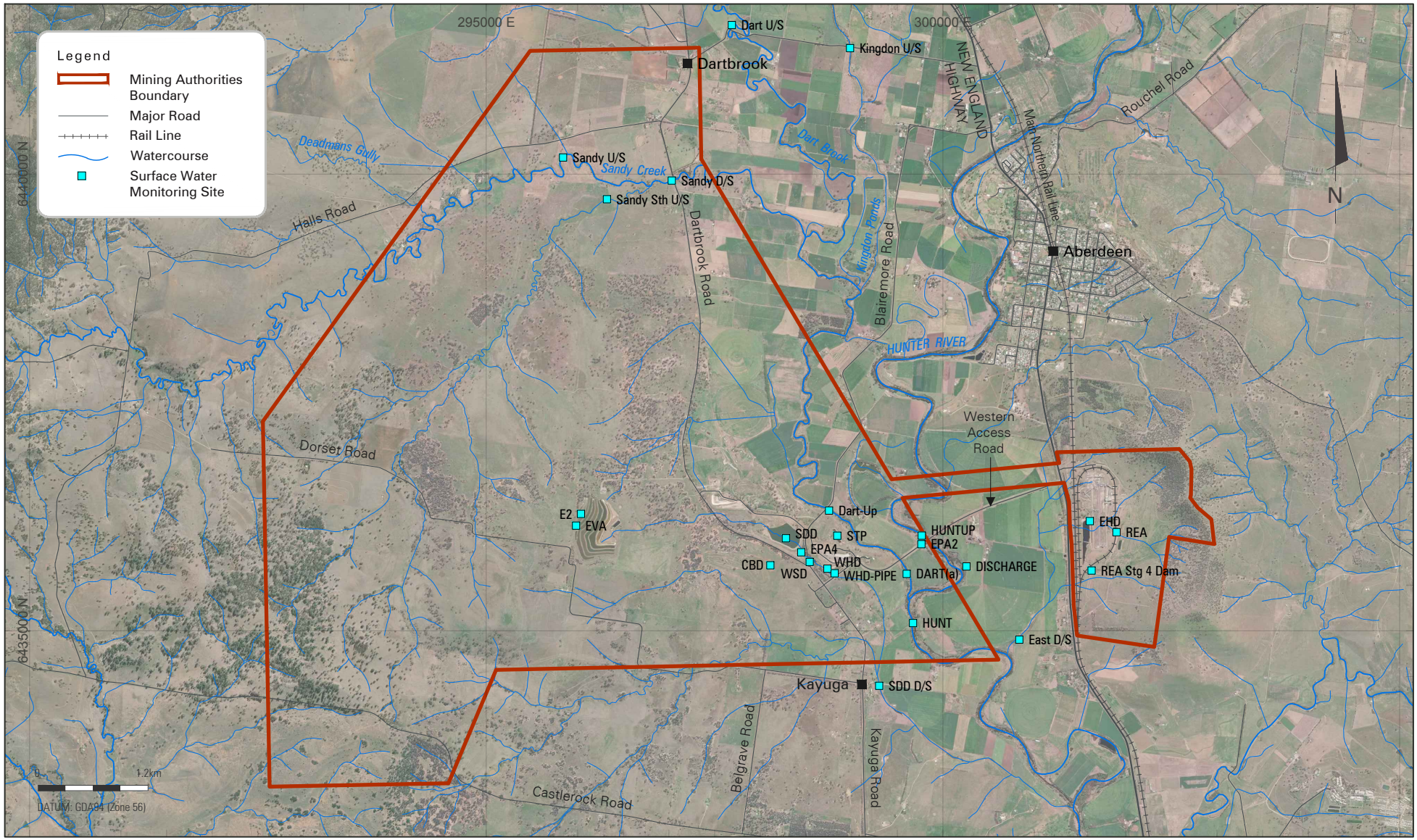
Graph F1 and F3 in **Appendix F** shows that surface water monitoring results for EC, TDS (and their associated anions and cations) in the Hunter River and Dart Brook were generally similar at both upstream and downstream sites and within the range of long-term data gathered for Dartbrook Mine.

Both the Hunter River monitoring sites (HUNTER and HUNTUP) recorded TDS values that exceeded the relevant IAC in the SWMP. Both Dart Brook monitoring sites (DART(a) and DARTUP) recorded pH values outside of the IAC in the SWMP. Given that the upstream and downstream sites exhibit comparable values, these exceedances are not attributed to activities at Dartbrook.

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.

Table 23 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	599 – 689	340 – 460	7.9 – 8.3
Hunter River Downstream	620 – 803	420 – 540	7.9 – 8.0
Dart Brook Upstream	512 – 2,196	340 – 1,470	7.8 – 8.5
Dart Brook Downstream	539 – 1,114	360 – 720	7.6 – 8.0



JBA 2188 DAR - F 13 SW MONITORING (14/03/2022)

DARTBROOK MINE

Australian Pacific Coal

JAMES BAILEY & ASSOCIATES
Environmental and Planning Consultants

Surface Water Monitoring Locations

FIGURE 13

7.3.3 Next Reporting Period

It is noted that there has been no underground mining activity at Dartbrook Mine during the reporting period. Following resolution of the legal proceedings in relation to MOD7, AQC Dartbrook will consider options for recommencement of mining. If further mining is proposed, the SWMP will be updated to reflect a change from Care and Maintenance back to operations.

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:

- Installation of diversion drains to direct clean runoff away from disturbed areas;
- The installation of diversion drains and contour banks to redirect runoff 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 Erosion 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**.

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 24**. No additional rehabilitation was undertaken during the reporting period. The rehabilitation maintenance activities undertaken during the reporting period are outlined in **Table 25**.

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**).

A revised MOP for Continuation of Care and Maintenance (January 2021 to December 2022) was submitted to the RR in November 2020. The RR approved this MOP until 2 July 2022.

A draft Mine Closure Plan was submitted to the RR in December 2020. In its letter dated 31 March 2021, the RR advised that a rehabilitation risk assessment must be undertaken in order for the Mine Closure Plan to be deemed adequate. AQC has commenced the rehabilitation risk assessment and will complete this assessment in the next reporting period.

8.3 OTHER INFRASTRUCTURE

No structural rehabilitation work was undertaken in 2021.

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 24 Rehabilitation Status

Mine Area Type	Area Affected / Rehabilitated (ha)		
	Previous Reporting Period (End 2020)	This Reporting Period (End 2021)	Next Reporting Period (End 2022)
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

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 25 Maintenance Activities on Rehabilitated Land

Nature of Treatment	Area Treated (ha)		Comment / control strategies / treatment detail
	Report period (2021)	Next period (2022)	
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 2021.
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 control was undertaken (with the approval of the National Parks and Wildlife Service) in 2021 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 2021. 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 complete the required rehabilitation risk assessment and prepare a Rehabilitation Management Plan (to supersede the approved MOP) in accordance with the NSW rehabilitation reforms.

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.

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 2017, 2018 or 2020.

9.2 COMMUNITY LIASON

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, and still retains the position. The council representatives were Councillor Kiwa Fisher (UHSC representative), Paul Smith (UHSC staff representative) and Sharon Pope (MSC staff representative). The 2021 community representatives on the CCC were Arthur Mitchell, Annette Rahn, Tony Lonergan and Jennifer Lecky.

Dartbrook Mine held two meetings with the Community Consultative Committee (CCC) members in 2021 (June and December). Due to restrictions and concerns with the COVID-19 pandemic, the meeting scheduled for December 2021 was conducted remotely via video conference. The presentation was emailed to all CCC members on the scheduled meeting date of 8 December 2021. 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.

Table 26 lists the dates of meetings held during 2021 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 are published 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 26 Summary of Topics Discussed During CCC Meetings in 2021

Date	Topics Discussed
23/6/2021	The presentation described the activities that occurred since the previous meeting, including: • Dartbrook Underground Modification 7 Update; • Environmental monitoring and results; • Complaints and Incidents; • Land Management; and • Stakeholder consultation. Questions, comments and responses were received from representatives during the presentation. These included: • Update on the potential sale of 8-mine owned properties; • Weed control program and potential focus areas; • Goaf water levels; and Retention of Stage Discharge Dam.
8/12/2021	A presentation was emailed to members due to Covid-19 concerns. The presentation described the activities that occurred since the previous meeting, including: • Dartbrook Underground Modification 7 Update; • Environmental monitoring and results; • Complaints and Incidents; • Land Management; and • Stakeholder consultation. Questions, comments and responses were received from representatives in regards to the presentation. These included: • Land management activities are the responsibility of the new landholder where • Address issues contacting the site office; • New relevant landowners details to be provide to the Chairperson; • DPIE (now DPE) requires AQC to request an extension to MOP to 2022. • Confirmed that exploration activities will be included in the new rehabilitation reform documentation. Recent consultation with regulators included: • the proposal to surrender the Dartbrook EPL and • Submission of updated MOP, tenement reporting and renewal of MLs.

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

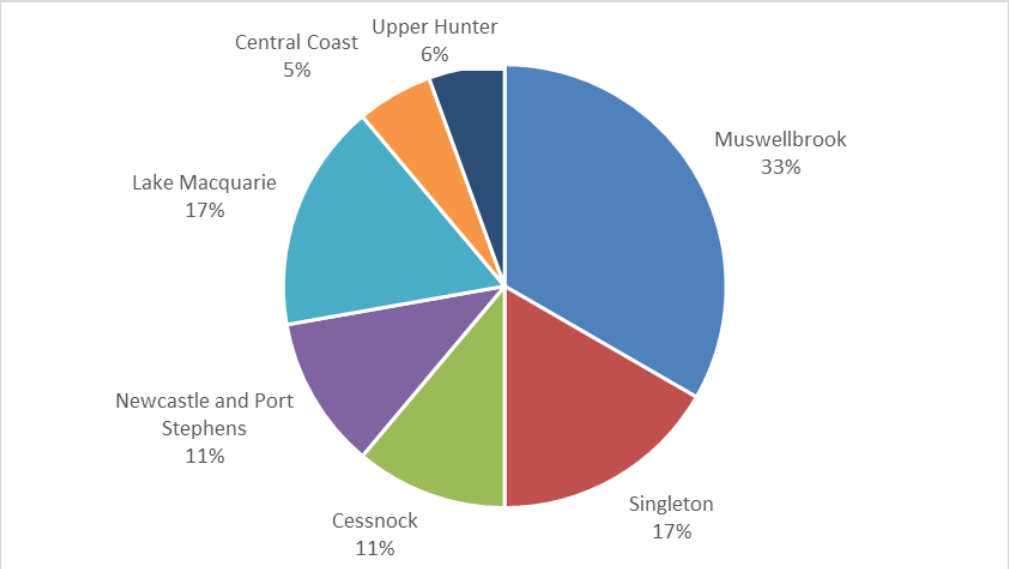
Dartbrook Mine currently maintains a contract workforce of 18 persons residing in the following areas (also see **Figure 14**):

- 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.

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. This sale was 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.

Under the conditions of DA 231-07-2000 (as modified by 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

Following resolution of the legal proceedings relating to MOD7, AQC will consider its options for recommencement of mining at Dartbrook. If further mining is to be carried out, the existing environmental management plans will be updated to reflect operational management rather than Care and Maintenance. However, at this stage, Care and Maintenance will continue into the next reporting period.

The activities proposed to be undertaken in 2021 are summarised in **Table 27**. Further details on the proposed activities are provided in **Section 6** and **Section 7**.

Table 27 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.

Area	Proposed Activity
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.
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*
CCC	Community Consultative Committee
DCCC	Dartbrook Community Consultative Committee
CHPP	Coal Handling and Preparation Plant
CRD	Cumulative rainfall departure
CL	Coal Lease
DA	Development Application
°C	Degrees Celsius
DMP	Dust Management Plan
DPE	NSW Department of Planning and Environment
EC	Electrical Conductivity
EIS	Environmental Impact Statement
EMS	Environmental Management Strategy
EL	Exploration Licence
EHD	Eastern Holding Dam
EPBC Act	*Environment Protection & Biodiversity Conservation Act 1999*
EPL	Environment Protection Licence
ESMS	East Site Meteorological Station
g	grams
µS/cm	micro Siemens per centimetre
GHG	Greenhouse Gas Emissions
ha	hectare
HCRCMA	Hunter Central Rivers Catchment Management Authority
HRSTS	Hunter River Salinity Trading Scheme
HVAS	High Velocity Air Sampler
IAC	Impact Assessment Criteria
IEA	Independent Environmental Audit
IPCN	Independent Planning Commission NSW
LLMP	Landscape and Lighting Management Plan
µm	micrometres
ML	megalitres
MEG	Regional NSW – Department of Mining, Exploration and Geoscience

Abbreviation	Meaning
Mining Act	*Mining Act 1992*
ML	Mining Lease
MSC	Muswellbrook Shire Council
Mtpa	Million tonnes per annum
PM10	Particulate Matter less than 10 microns
REA	Reject Emplacement Area
REA Plan	REA Spontaneous Combustion Management Plan
RL	Reduced Level
ROM	Run of Mine
RR	NSW Resources Regulator
SDD	Staged Discharge Dam
SWMP	Site Water Management Plan
t	tonnes
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
TARP	Trigger Action Response Plan
UHSC	Upper Hunter Shire Council
WHD	Western Holding Dam

APPENDIX A

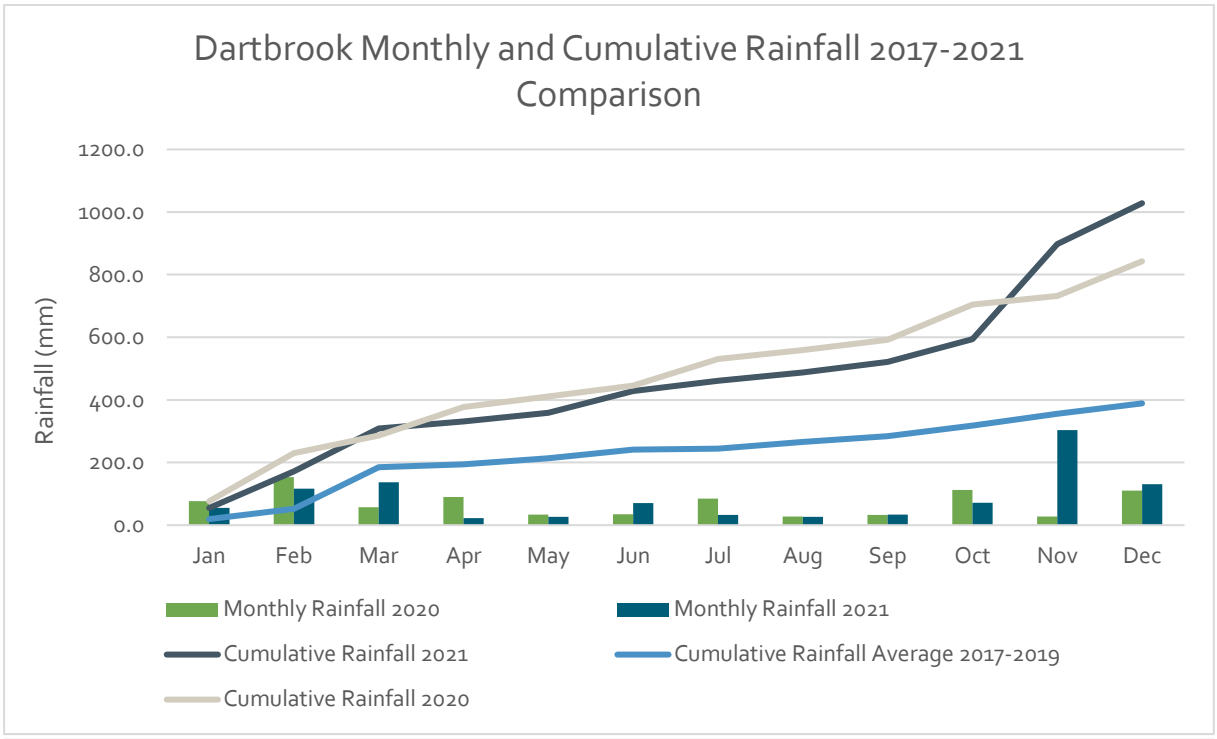
SUMMARY OF MINOR AMENDMENTS TO DEVELOPMENT CONSENT CONDITIONS DURING CARE AND MAINTENANCE

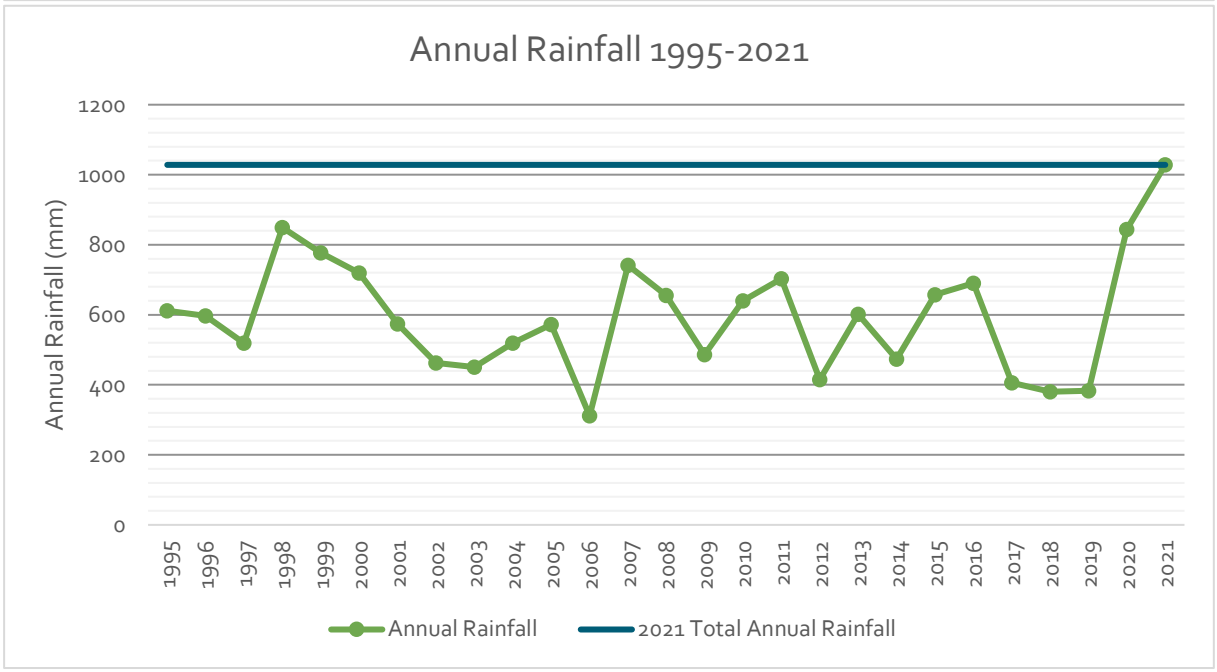
Table 30 Summary of Minor Amendments to Development Consent Conditions

Approval Document Reference	Development Consent No. Reference	Existing Requirement	Requirement During Care & Maintenance
Complaints protocol & Environmental Management Strategy	10.2 (a) (ii)	6 monthly complaints report to DoP (now DPE), MSC, UHSC, EPA, DPI-MR (now MEG) and Dartbrook Community Consultative Committee (DCCC).	Complaints to be included in Annual Review 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	10.2 (b)	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	3.2 (f)	Review of Environmental Management Plans is required every 5 years (2007 due).	Continue to operate under existing Management plans without reviewing. Propose to modify these Management 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	8.1 (a)	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	3.2 (d)	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 was prepared prior to Care & Maintenance.
Environmental Management Strategy & Dust Management Plan	6.1b (iii)	Required to report on a quarterly basis the results of air quality monitoring data to DPE and MSC.	Report on annual basis via the Annual Review.
Lighting and Landscape Management Plan	6.5 (a)	Monitoring of tree screens is required 2 - 3 times per year.	Monitor once per year.
Waste Management Plan		A Waste audit is required to be undertaken annually.	Waste to be reported via the Annual Review.
Noise Management Plan	6.4.1 (a)	Attended noise surveys are to be undertaken on a quarterly basis.	DPE 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 MEG.

APPENDIX B

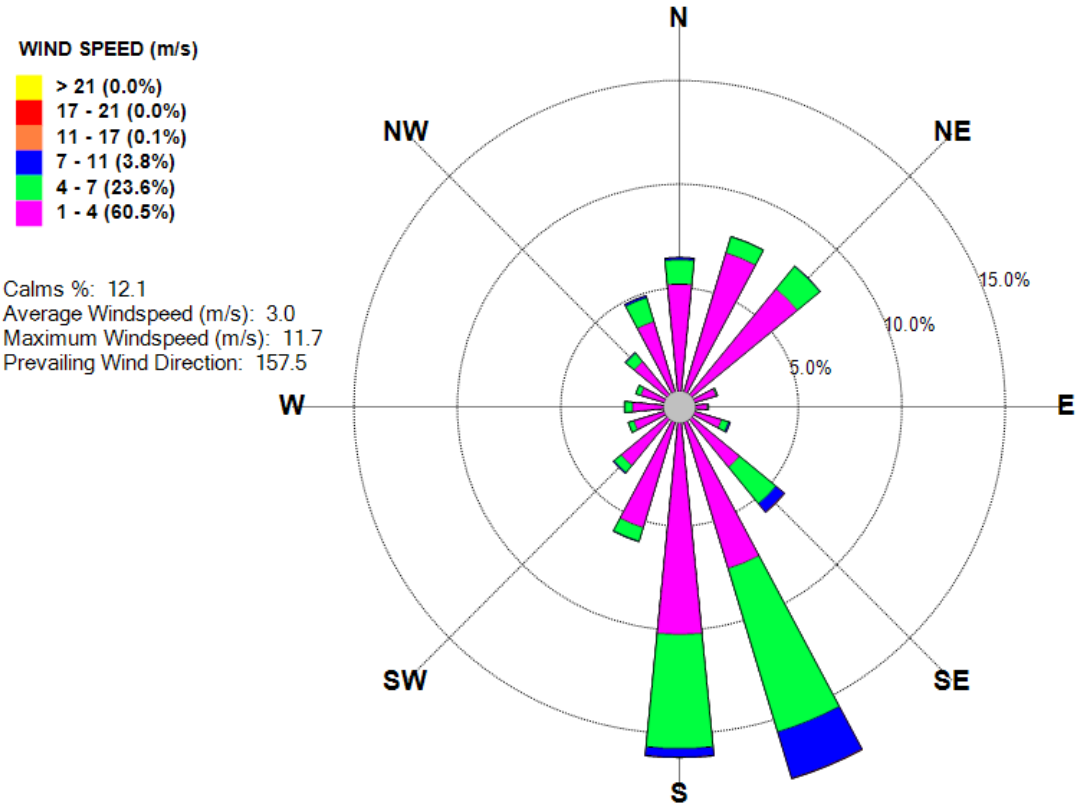
METEOROLOGICAL SUMMARY


Dartbrook Monthly and Cumulative Rainfall 2017-2021 Comparison
Rainfall (mm)
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Monthly Rainfall 2020
Monthly Rainfall 2021
Cumulative Rainfall 2021
Cumulative Rainfall Average 2017-2019
Cumulative Rainfall 2020


Annual Rainfall 1995-2021
Annual Rainfall (mm)
1200
1000
800
600
400
200
0
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Annual Rainfall
2021 Total Annual Rainfall

Dartbrook Met02 - Windrose

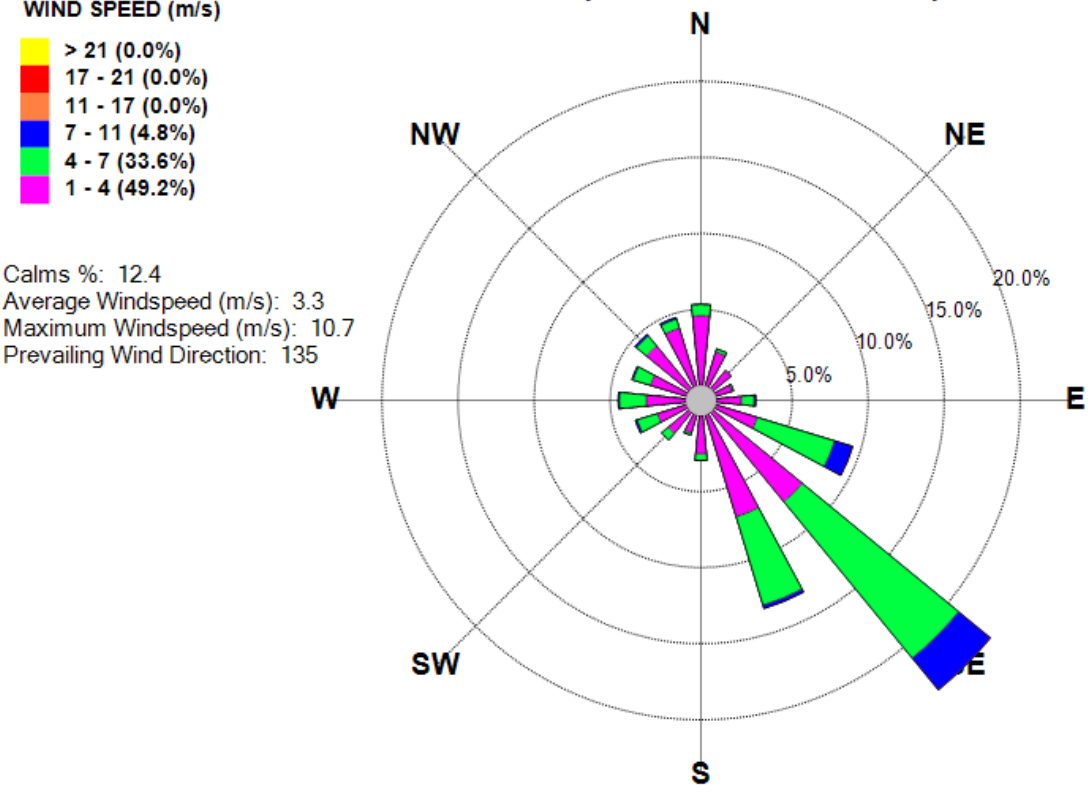
00:00 1 January 2021 to 23:55, 31 January 2021



Calms %: 12.1
Average Windspeed (m/s): 3.0
Maximum Windspeed (m/s): 11.7
Prevailing Wind Direction: 157.5

Dartbrook Met01 - Windrose

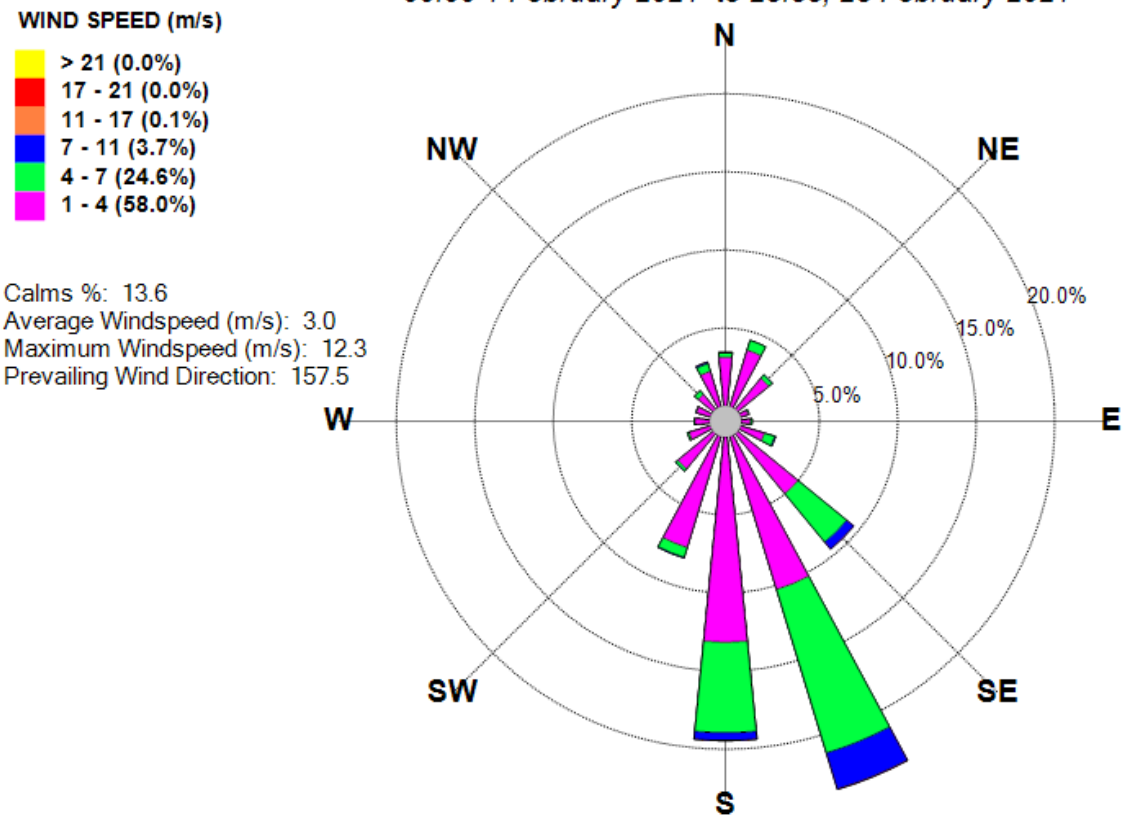
00:00 1 January 2021 to 23:55, 31 January 2021



Calms %: 12.4
Average Windspeed (m/s): 3.3
Maximum Windspeed (m/s): 10.7
Prevailing Wind Direction: 135

Dartbrook Met02 - Windrose

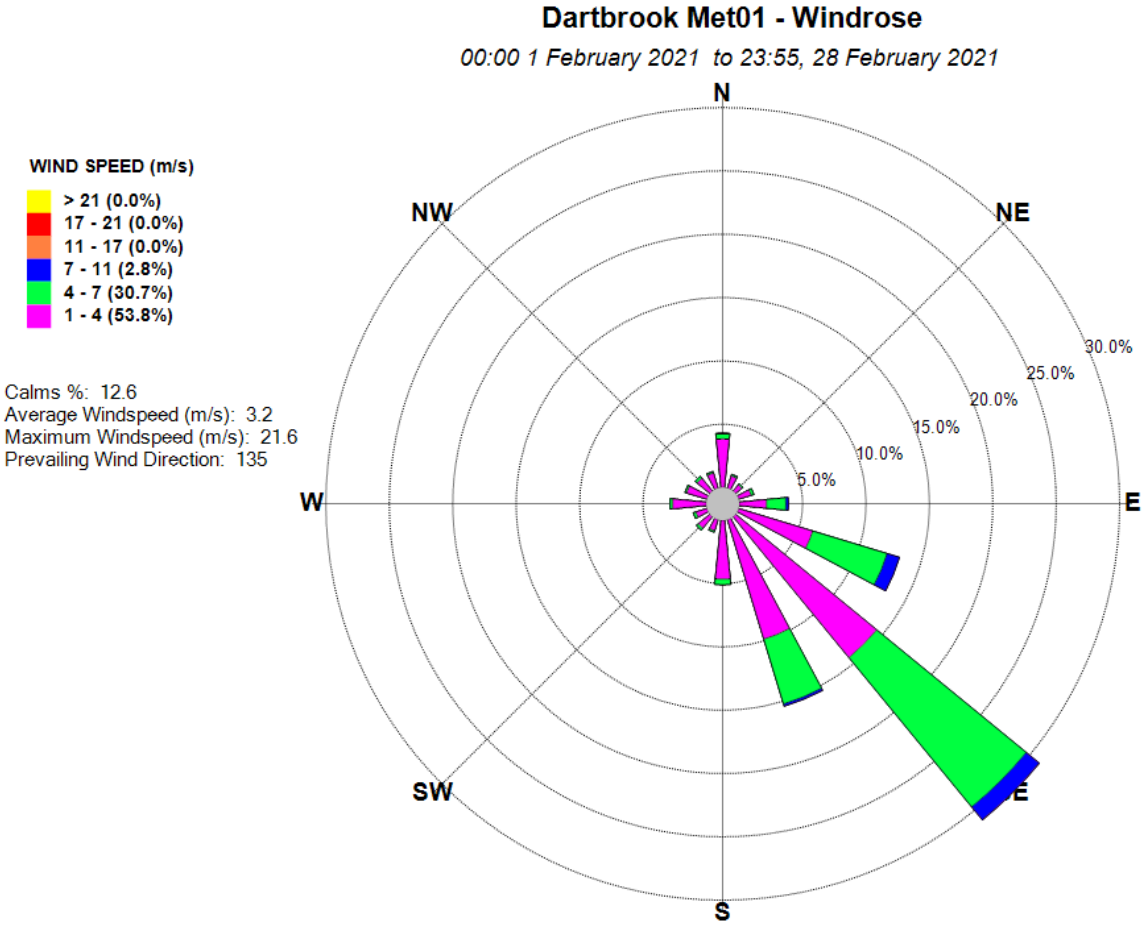
00:00 1 February 2021 to 23:55, 28 February 2021



Calms %: 13.6
Average Windspeed (m/s): 3.0
Maximum Windspeed (m/s): 12.3
Prevailing Wind Direction: 157.5

Dartbrook Met01 - Windrose

00:00 1 February 2021 to 23:55, 28 February 2021



Calms %: 12.6
Average Windspeed (m/s): 3.2
Maximum Windspeed (m/s): 21.6
Prevailing Wind Direction: 135

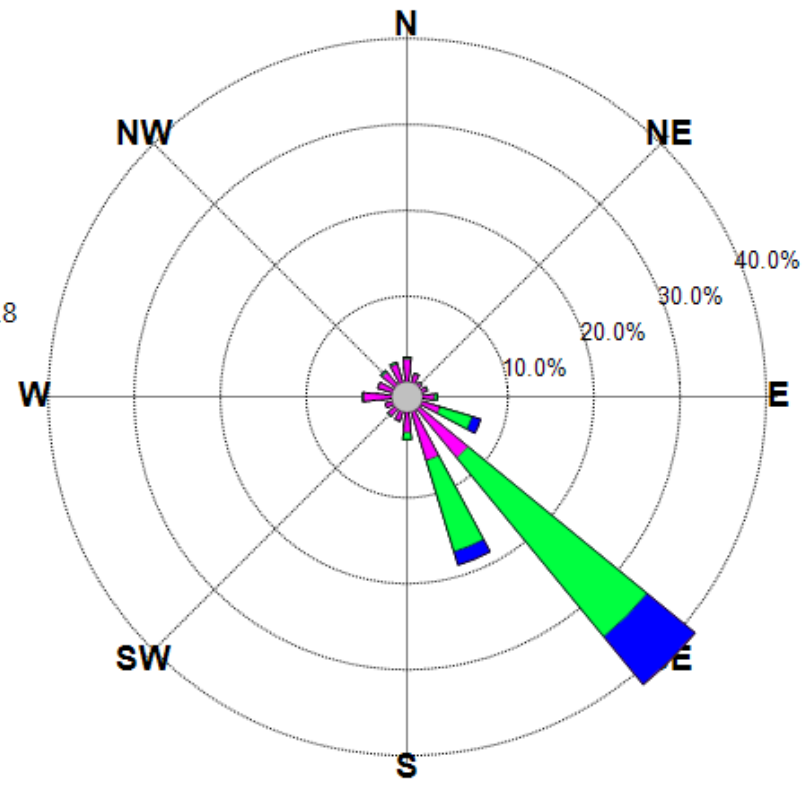
Dartbrook Met01 - Windrose

00:00 9 March 2021 to 23:55, 21 March 2021

WIND SPEED (m/s)

- **> 21 (0.0%)**
- **17 - 21 (0.0%)**
- **11 - 17 (0.0%)**
- **7 - 11 (9.9%)**
- **4 - 7 (44.4%)**
- **1 - 4 (36.7%)**

Calms %: 9.1
Average Windspeed (m/s): 4.1
Maximum Windspeed (m/s): 11.8
Prevailing Wind Direction: 135



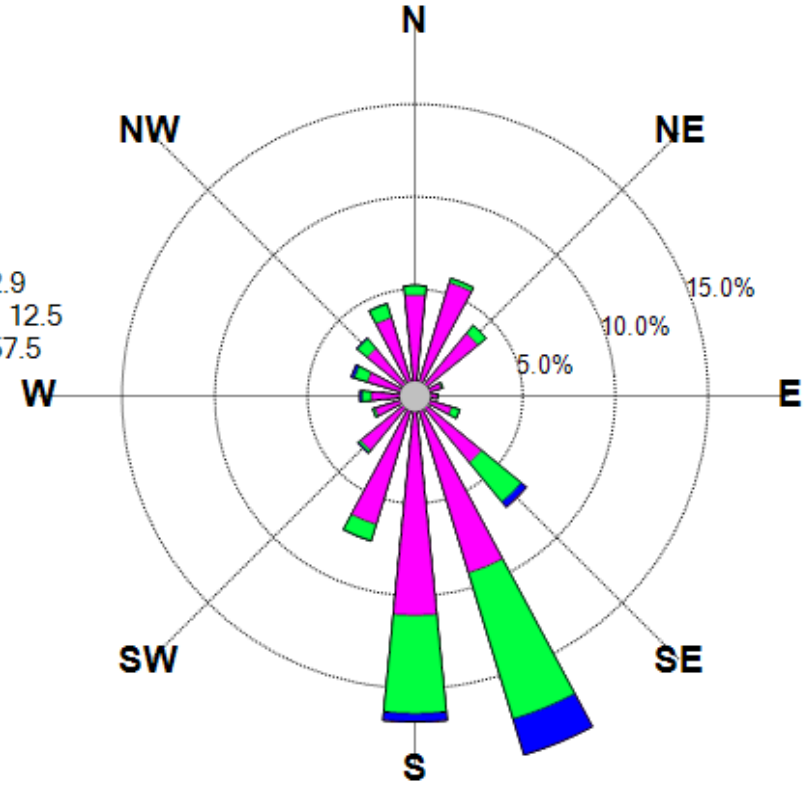
Dartbrook Met02 - Windrose

00:00 1 March 2021 to 23:55, 31 March 2021

WIND SPEED (m/s)

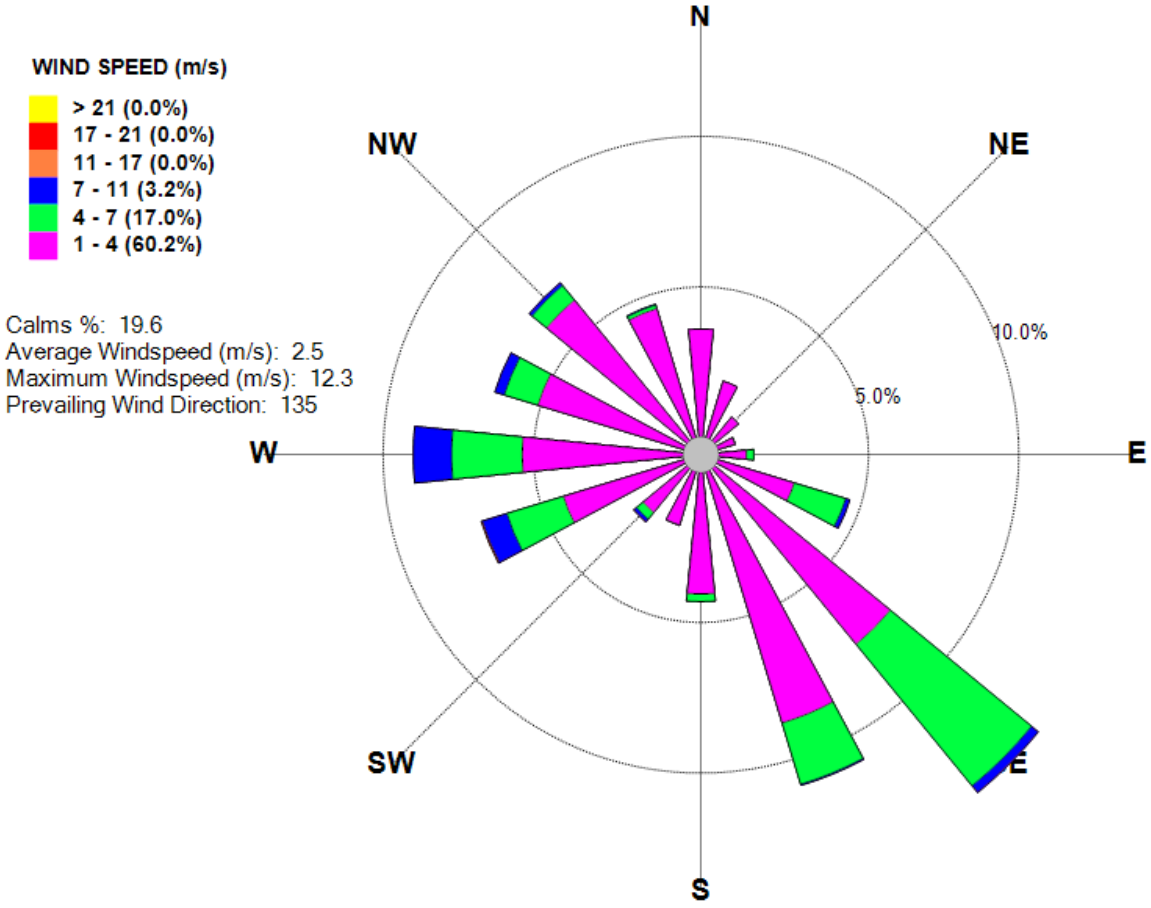
- **> 21 (0.0%)**
- **17 - 21 (0.0%)**
- **11 - 17 (0.0%)**
- **7 - 11 (3.2%)**
- **4 - 7 (22.1%)**
- **1 - 4 (60.6%)**

Calms %: 14.1
Average Windspeed (m/s): 2.9
Maximum Windspeed (m/s): 12.5
Prevailing Wind Direction: 157.5



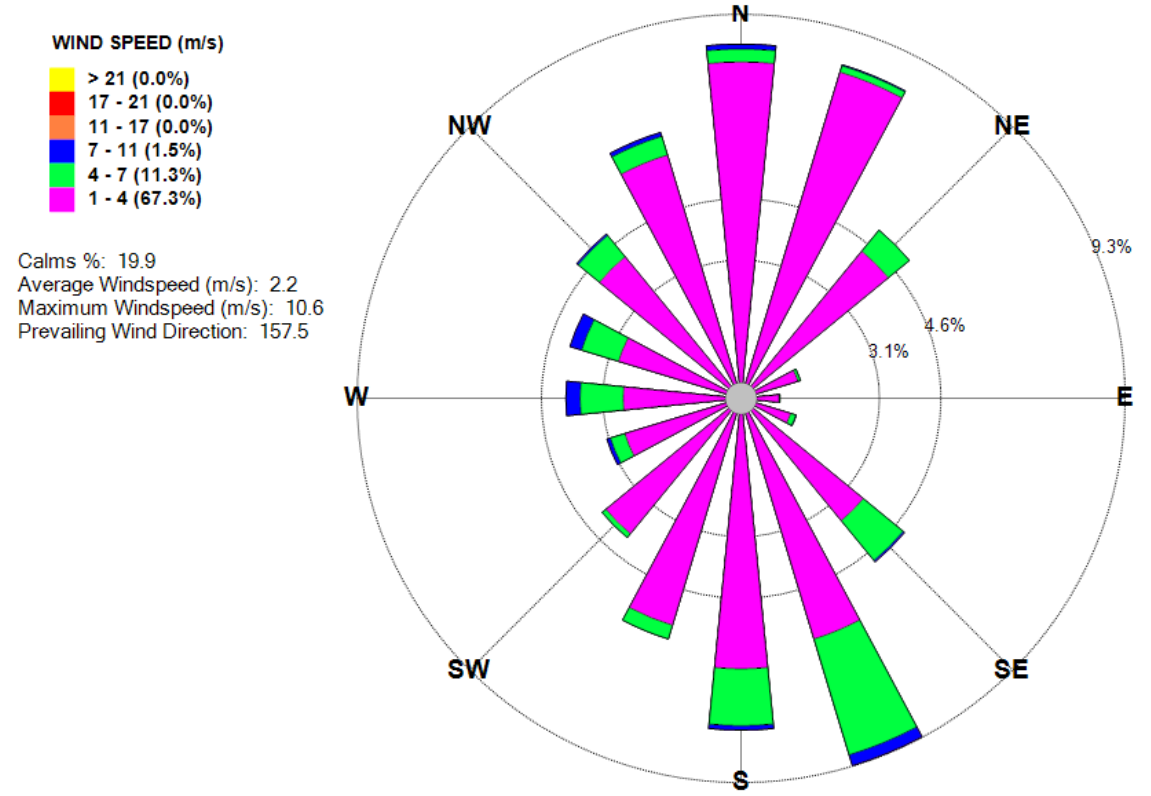
Dartbrook Met01 - Windrose

00:00 1 April 2021 to 23:55, 30 April 2021



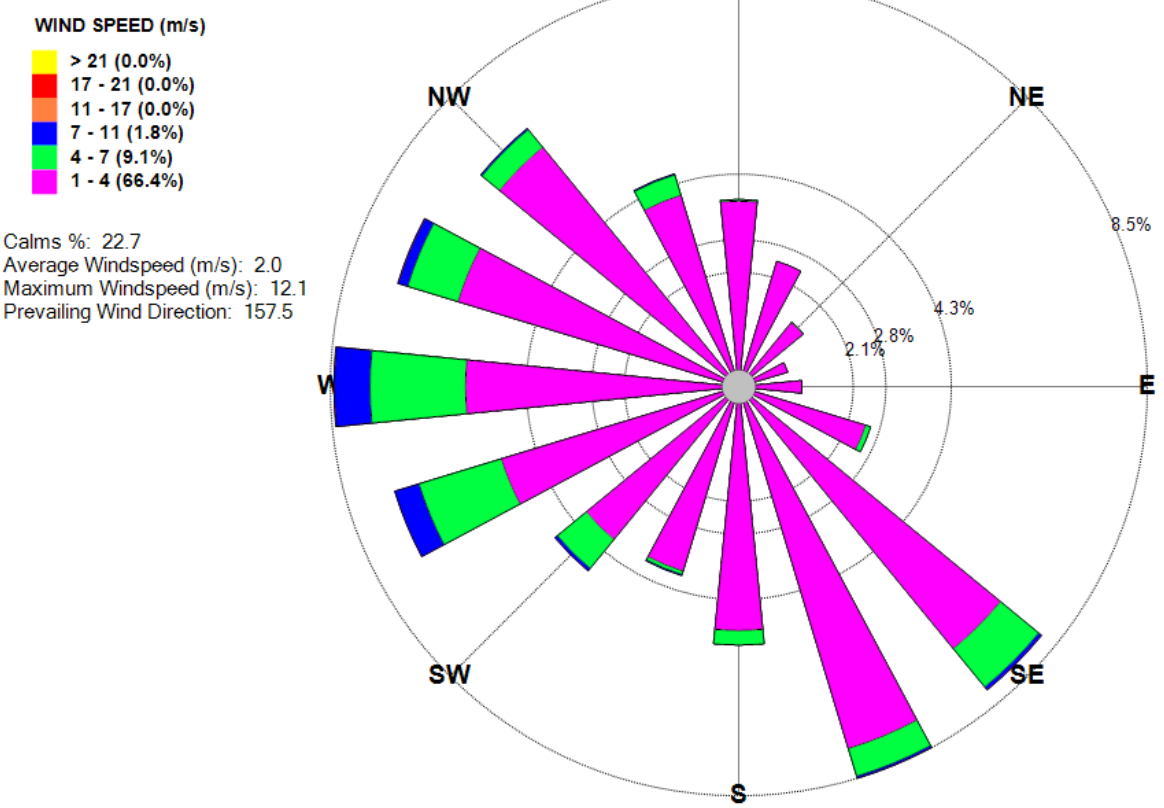
Dartbrook Met02 - Windrose

00:00 1 April 2021 to 23:55, 30 April 2021



Dartbrook Met01 - Windrose

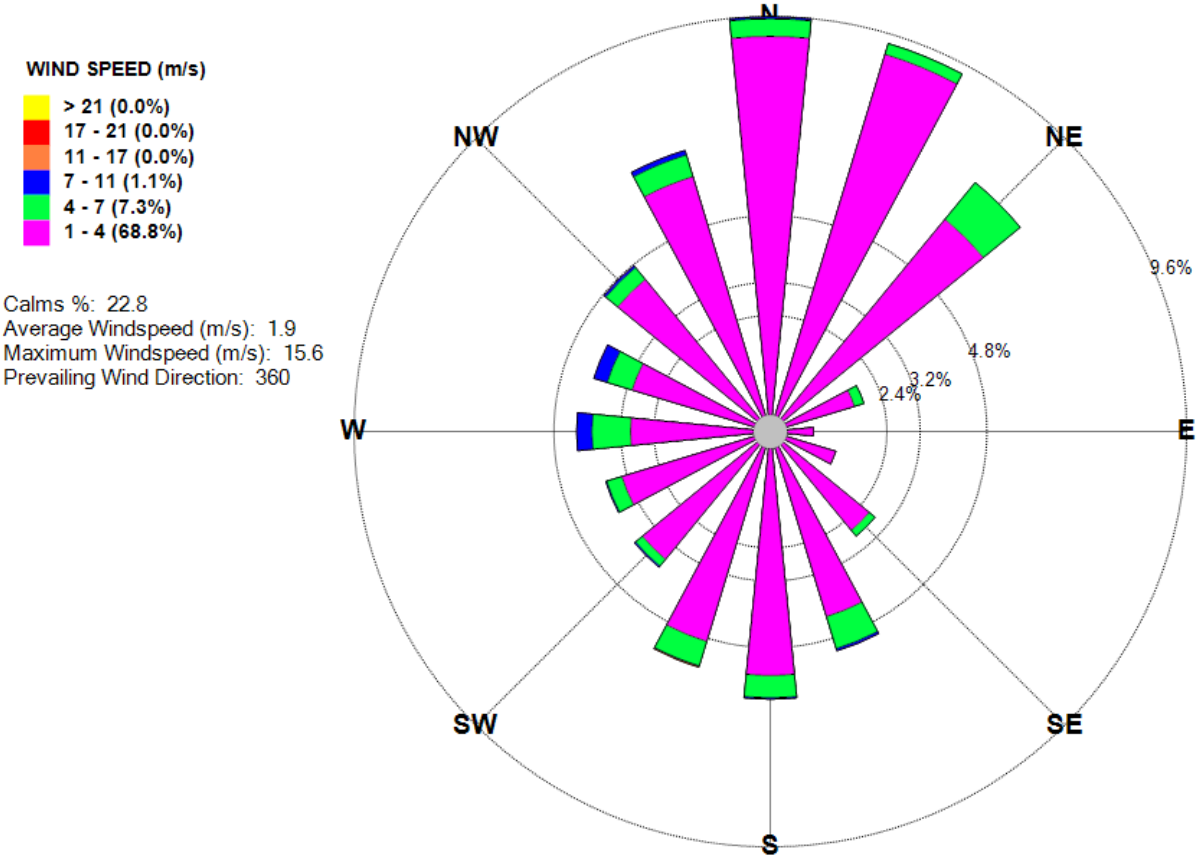
00:00 1 May 2021 to 23:55, 31 May 2021



Calms %: 22.7
Average Windspeed (m/s): 2.0
Maximum Windspeed (m/s): 12.1
Prevailing Wind Direction: 157.5

Dartbrook Met02 - Windrose

00:00 1 May 2021 to 23:55, 31 May 2021



Calms %: 22.8
Average Windspeed (m/s): 1.9
Maximum Windspeed (m/s): 15.6
Prevailing Wind Direction: 360

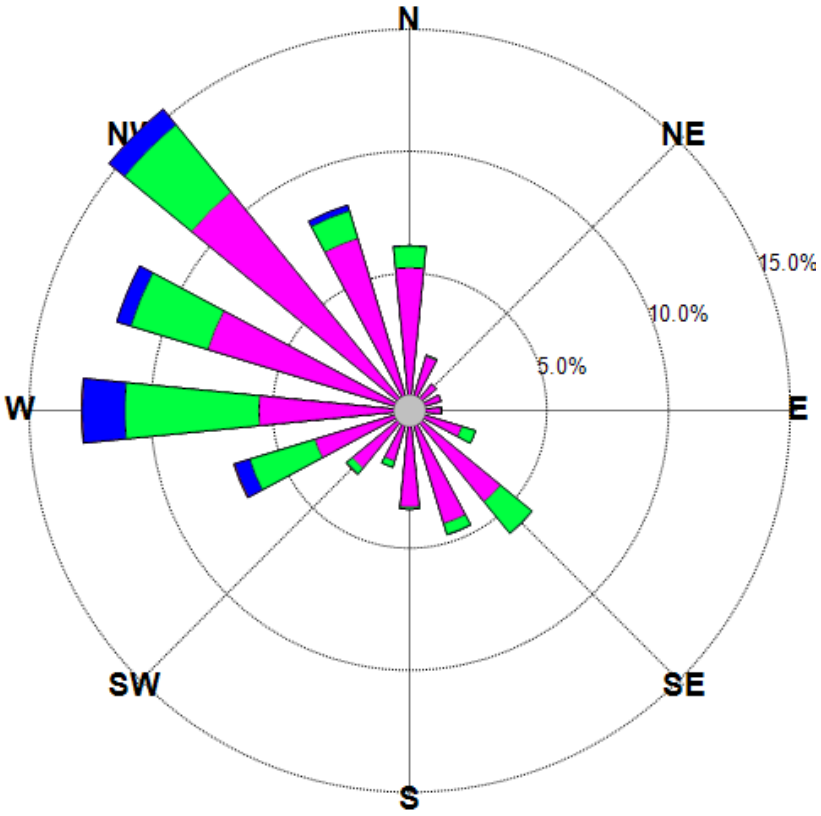
Dartbrook Met01 - Windrose

00:00 1 June 2021 to 23:55, 30 June 2021

WIND SPEED (m/s)

- **> 21 (0.0%)**
- **17 - 21 (0.0%)**
- **11 - 17 (0.1%)**
- **7 - 11 (4.1%)**
- **4 - 7 (20.7%)**
- **1 - 4 (60.9%)**

Calms %: 14.2
Average Windspeed (m/s): 2.7
Maximum Windspeed (m/s): 12.9
Prevailing Wind Direction: 315



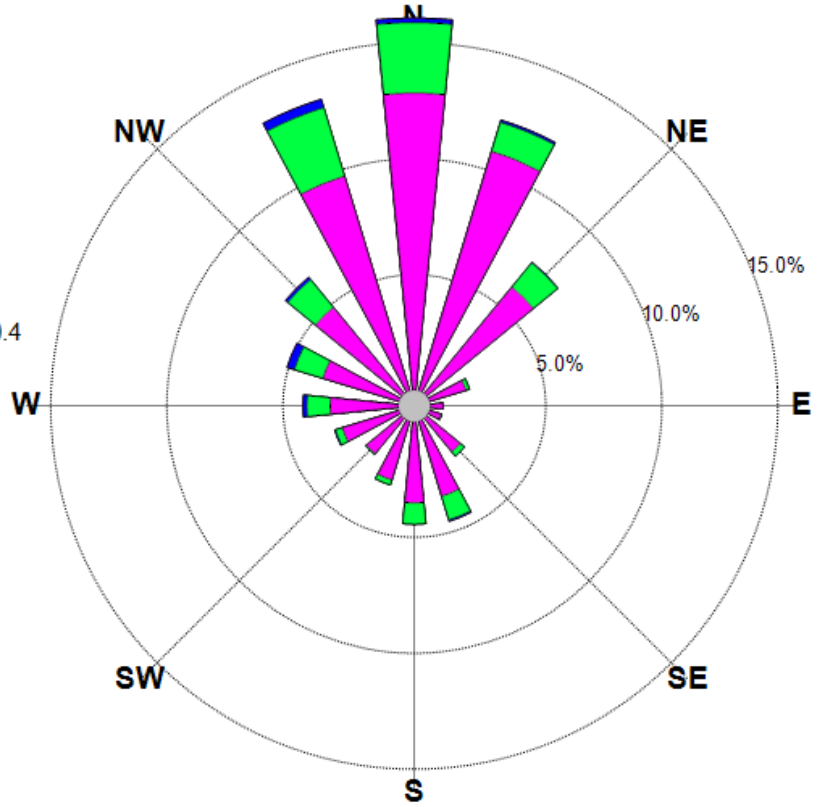
Dartbrook Met02 - Windrose

00:00 1 June 2021 to 23:55, 30 June 2021

WIND SPEED (m/s)

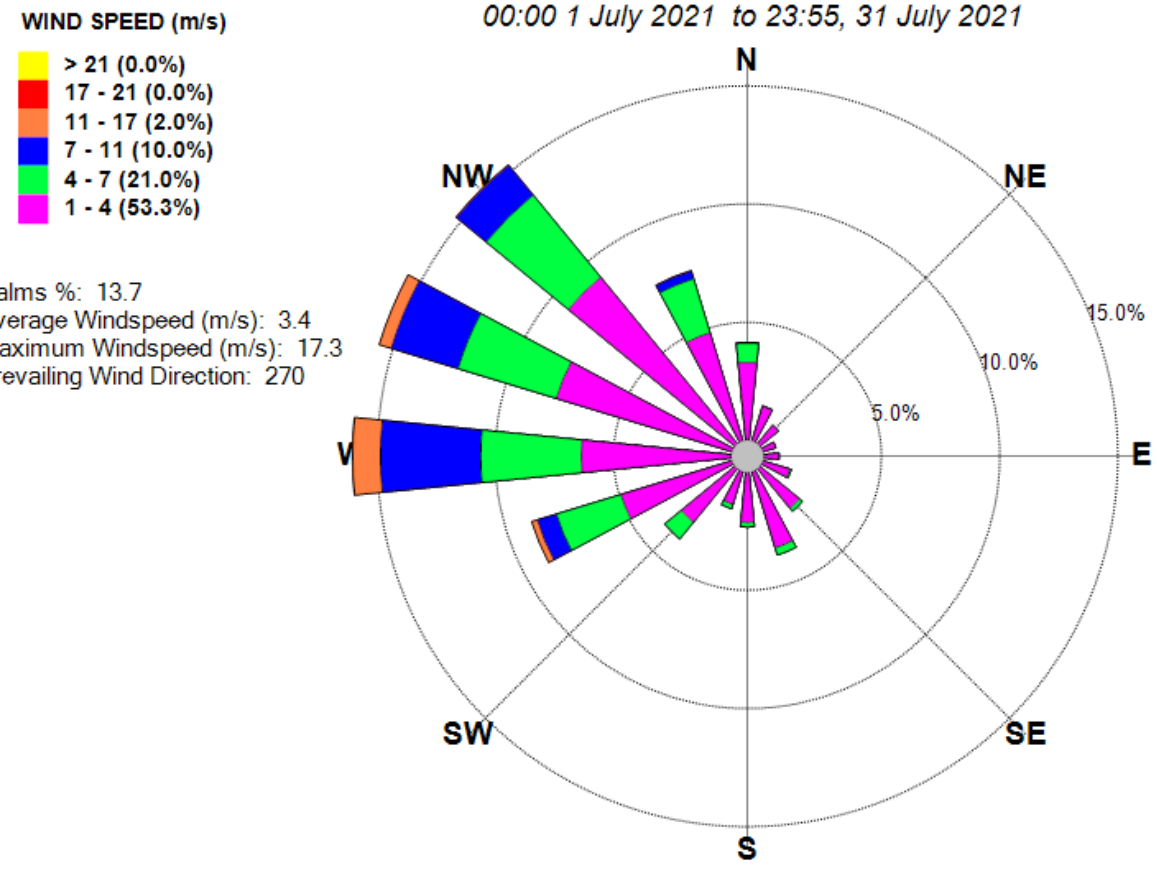
- **> 21 (0.0%)**
- **17 - 21 (0.0%)**
- **11 - 17 (0.0%)**
- **7 - 11 (1.4%)**
- **4 - 7 (15.6%)**
- **1 - 4 (69.2%)**

Calms %: 13.8
Average Windspeed (m/s): 2.5
Maximum Windspeed (m/s): 10.4
Prevailing Wind Direction: 360



Dartbrook Met01 - Windrose

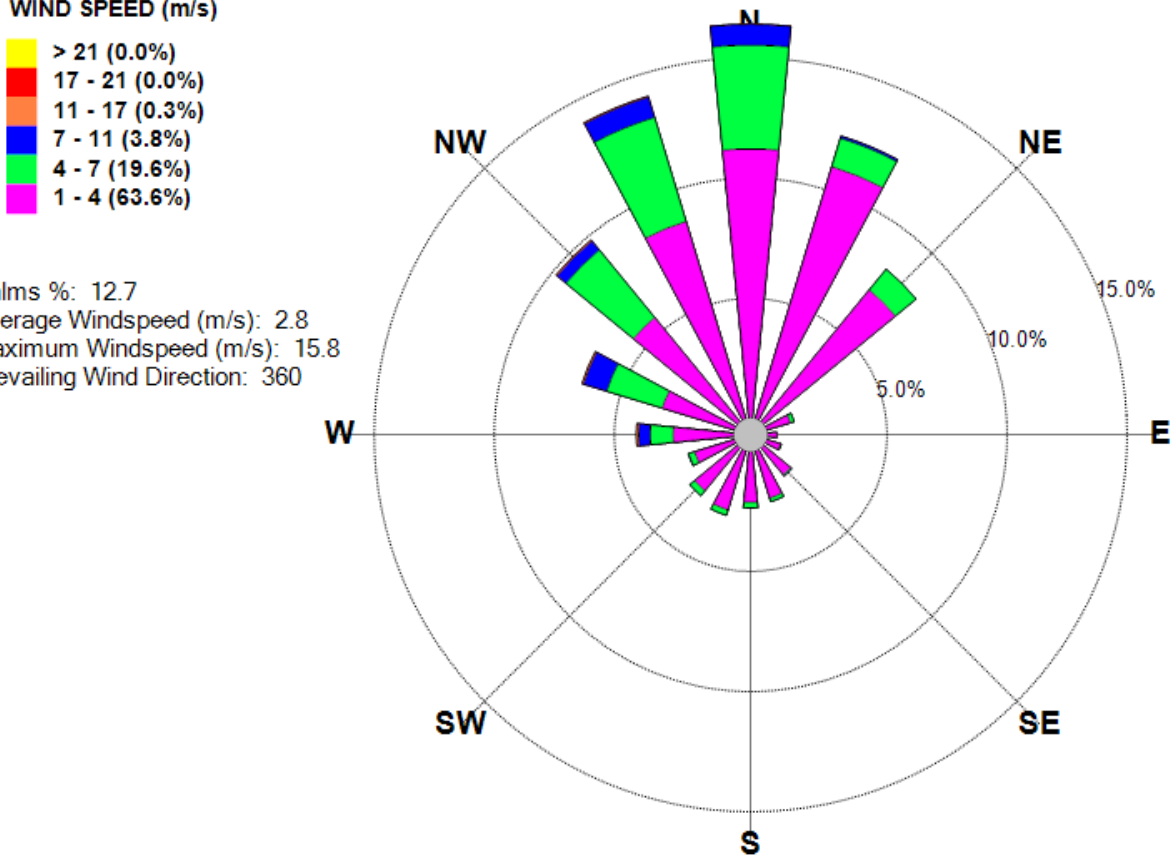
00:00 1 July 2021 to 23:55, 31 July 2021



Calms %: 13.7
Average Windspeed (m/s): 3.4
Maximum Windspeed (m/s): 17.3
Prevailing Wind Direction: 270

Dartbrook Met02 - Windrose

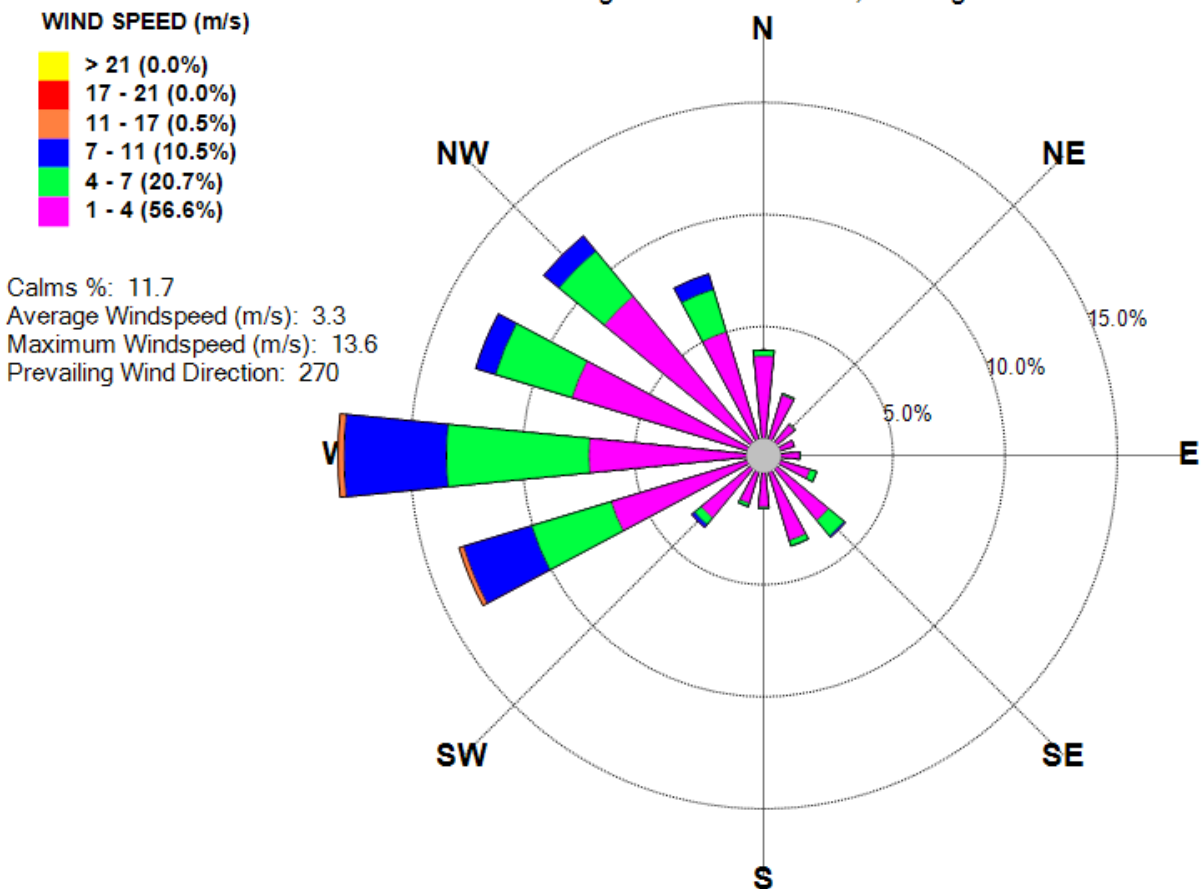
00:00 1 July 2021 to 23:55, 31 July 2021



Calms %: 12.7
Average Windspeed (m/s): 2.8
Maximum Windspeed (m/s): 15.8
Prevailing Wind Direction: 360

Dartbrook Met01 - Windrose

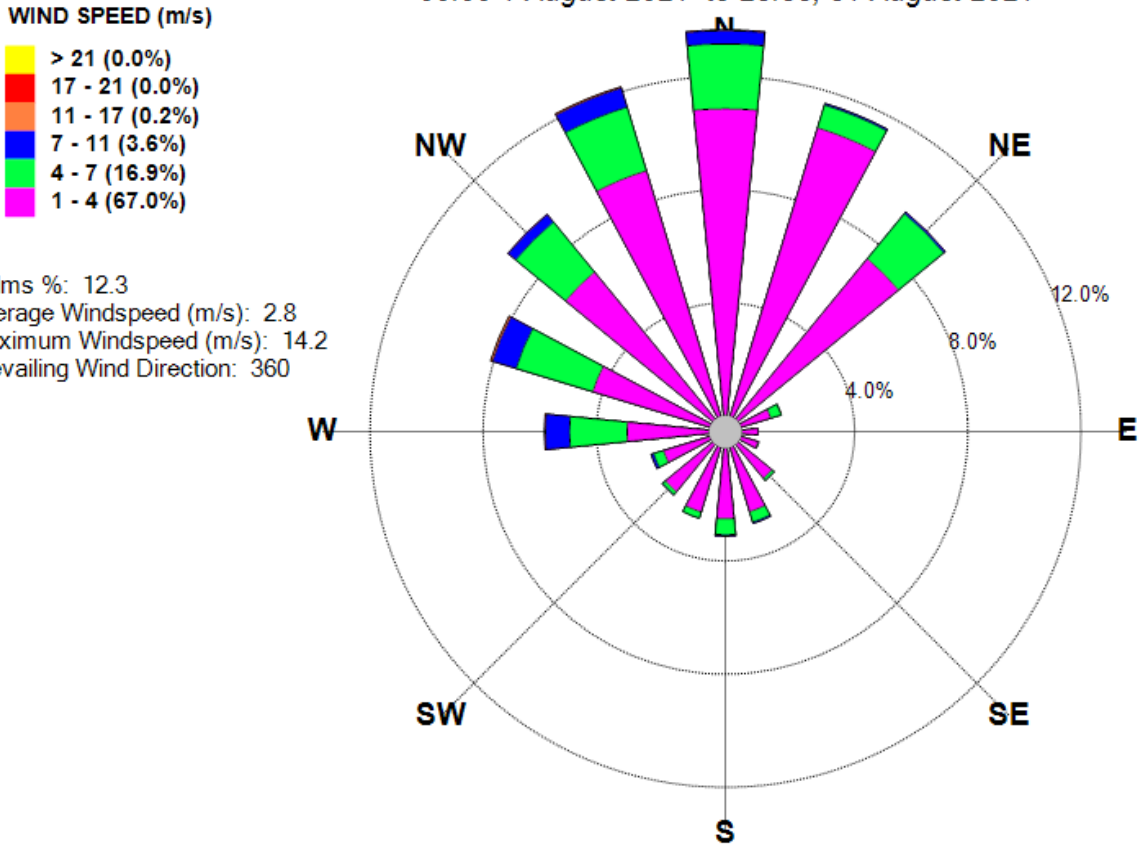
00:00 1 August 2021 to 23:55, 31 August 2021



Calms %: 11.7
Average Windspeed (m/s): 3.3
Maximum Windspeed (m/s): 13.6
Prevailing Wind Direction: 270

Dartbrook Met02 - Windrose

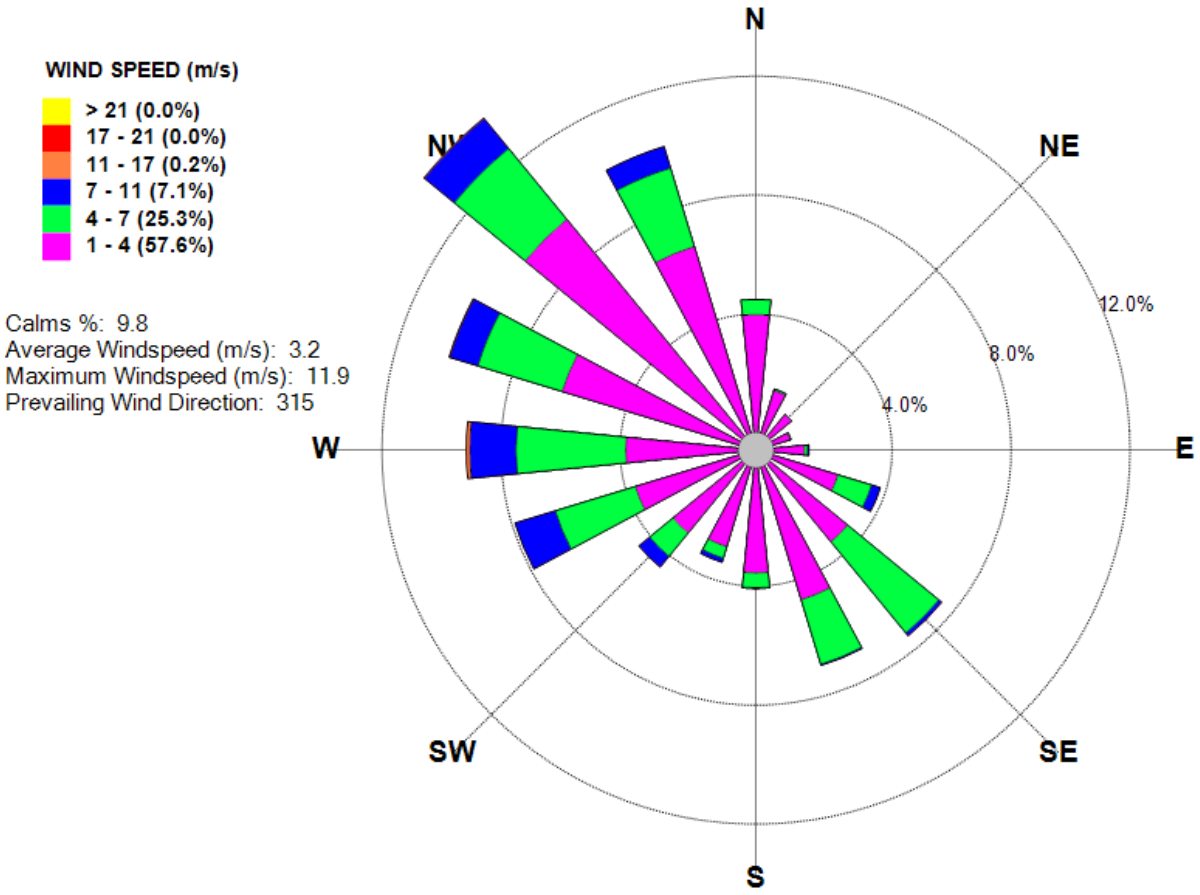
00:00 1 August 2021 to 23:55, 31 August 2021



Calms %: 12.3
Average Windspeed (m/s): 2.8
Maximum Windspeed (m/s): 14.2
Prevailing Wind Direction: 360

Dartbrook Met01 - Windrose

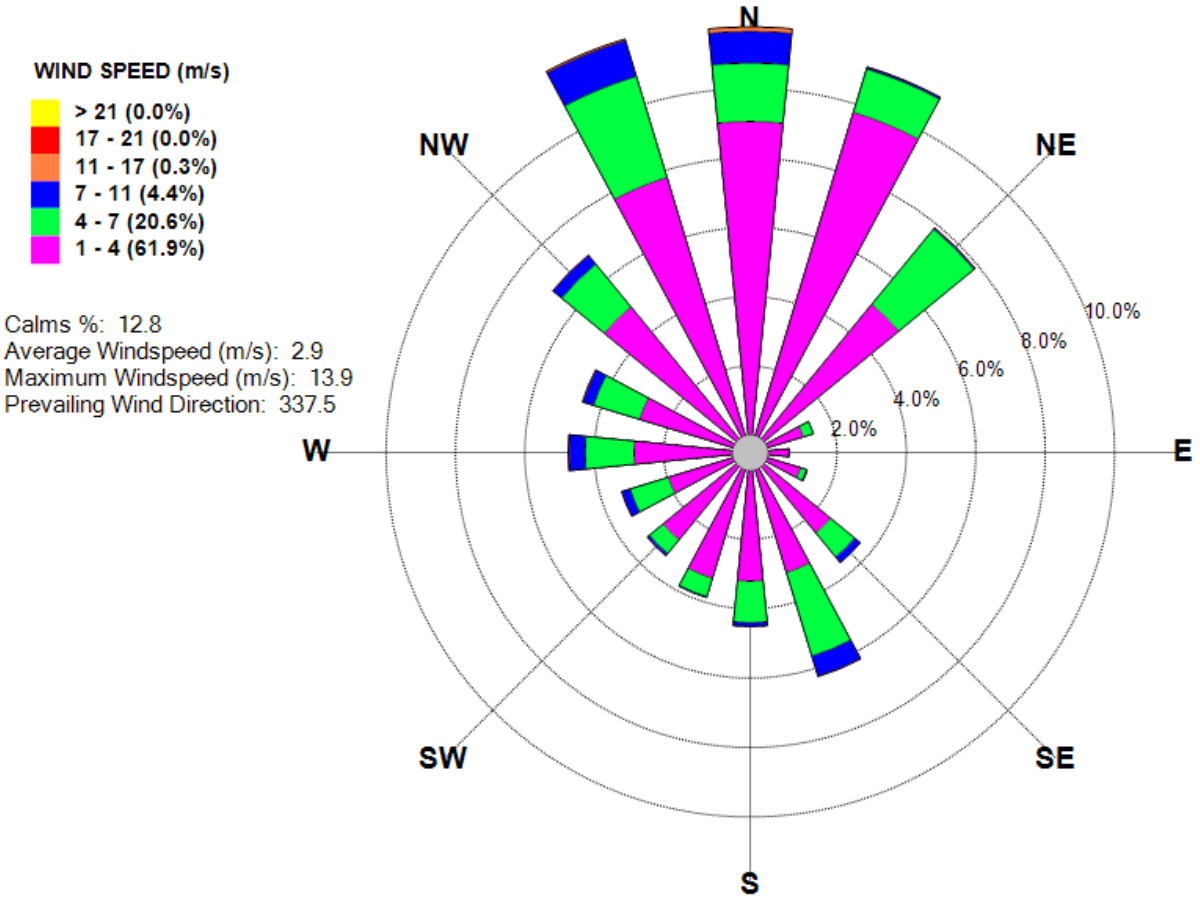
00:00 1 September 2021 to 23:55, 30 September 2021



Calms %: 9.8
Average Windspeed (m/s): 3.2
Maximum Windspeed (m/s): 11.9
Prevailing Wind Direction: 315

Dartbrook Met02 - Windrose

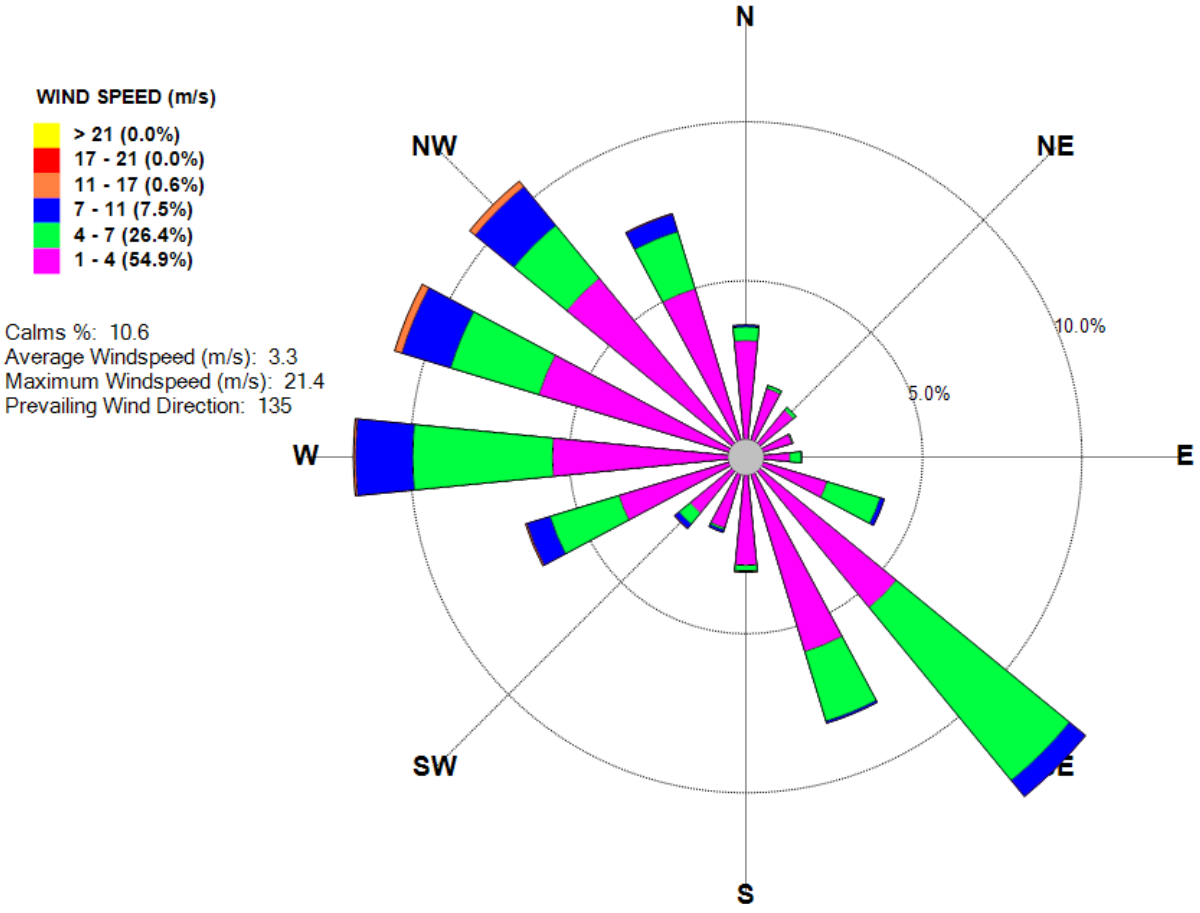
00:00 1 September 2021 to 23:55, 30 September 2021



Calms %: 12.8
Average Windspeed (m/s): 2.9
Maximum Windspeed (m/s): 13.9
Prevailing Wind Direction: 337.5

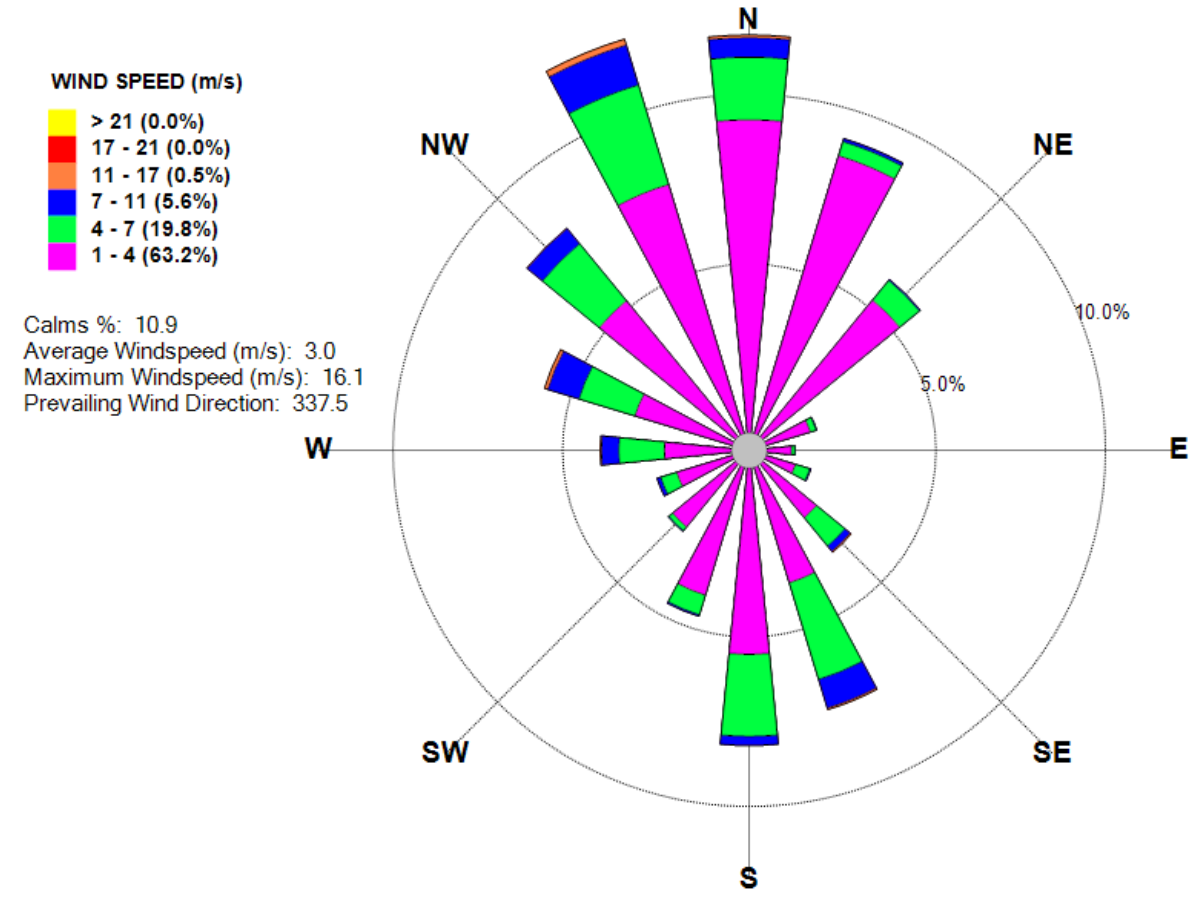
Dartbrook Met01 - Windrose

October 2021



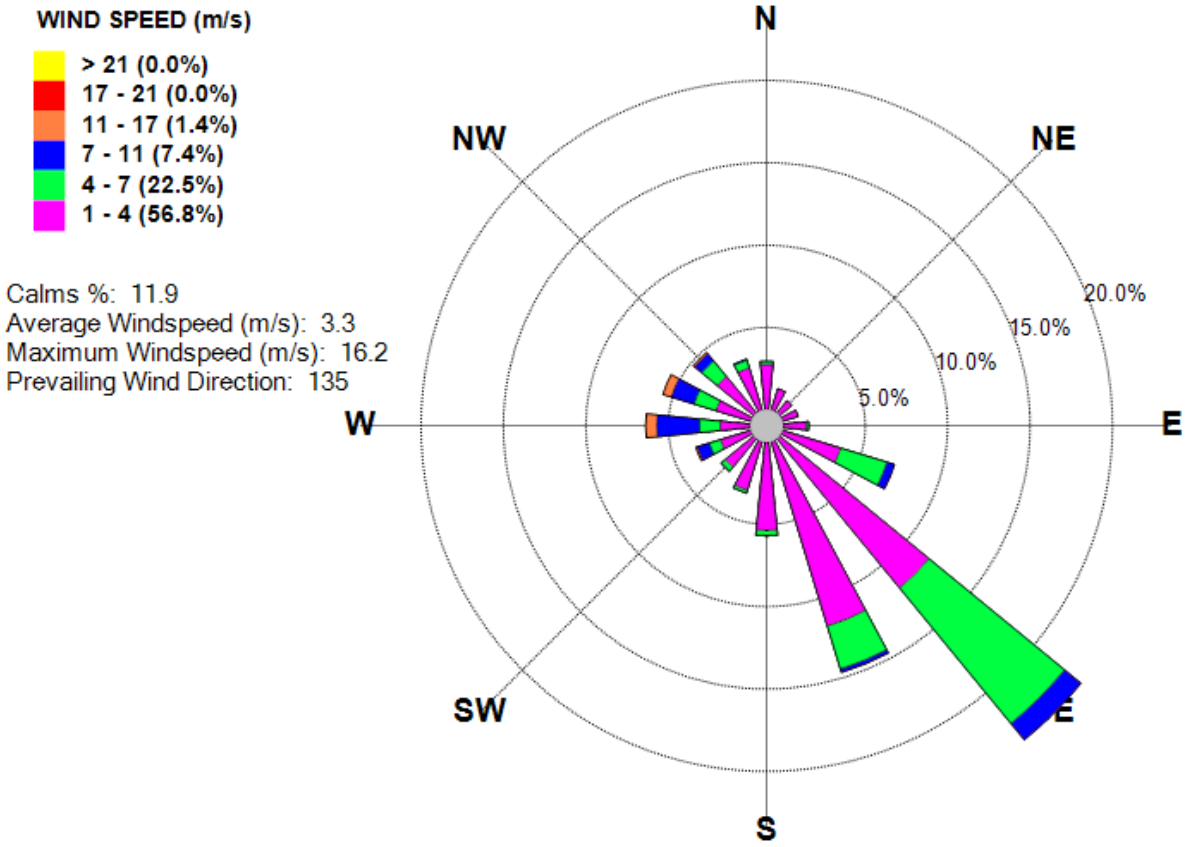
Dartbrook Met02 - Windrose

October 2021



Dartbrook Met01 - Windrose

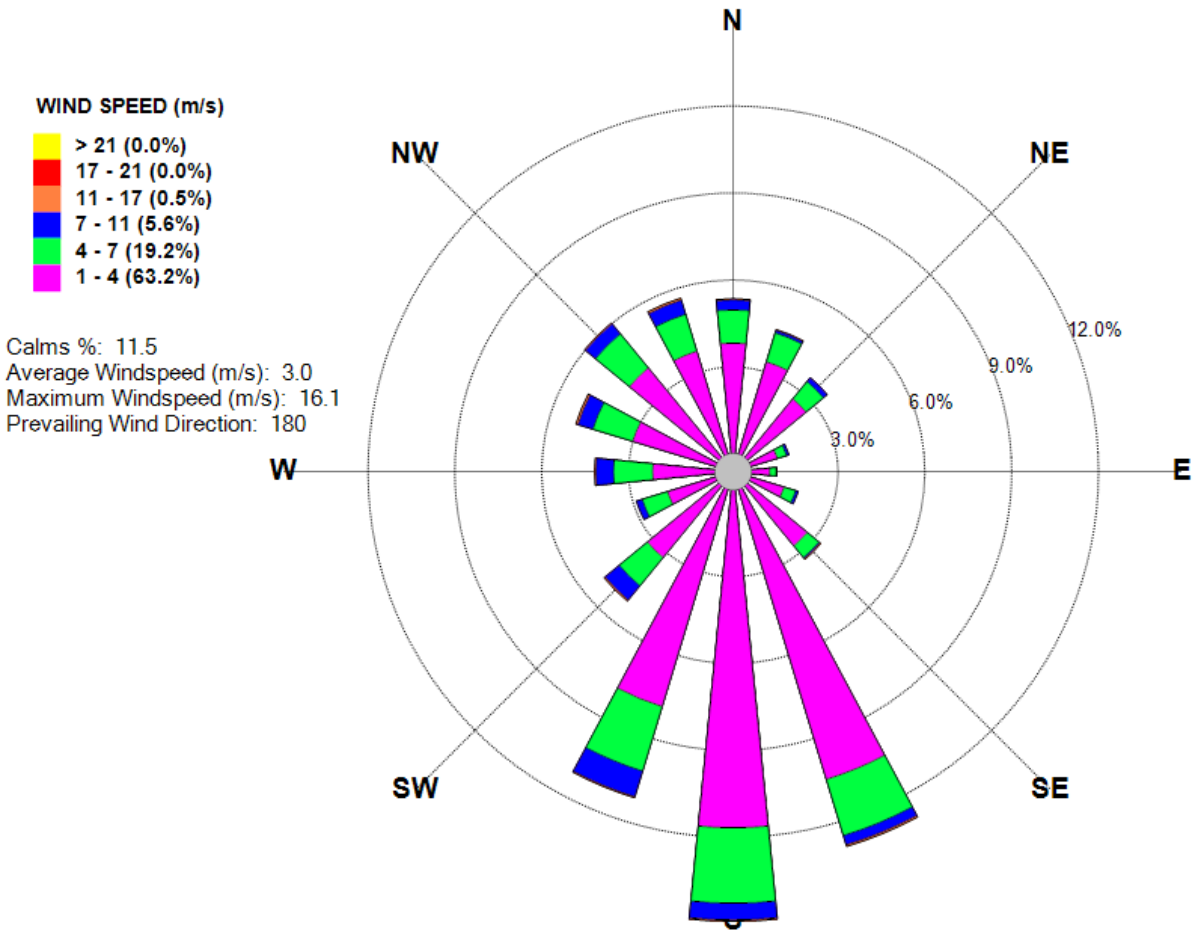
November 2021



Calms %: 11.9
Average Windspeed (m/s): 3.3
Maximum Windspeed (m/s): 16.2
Prevailing Wind Direction: 135

Dartbrook Met02 - Windrose

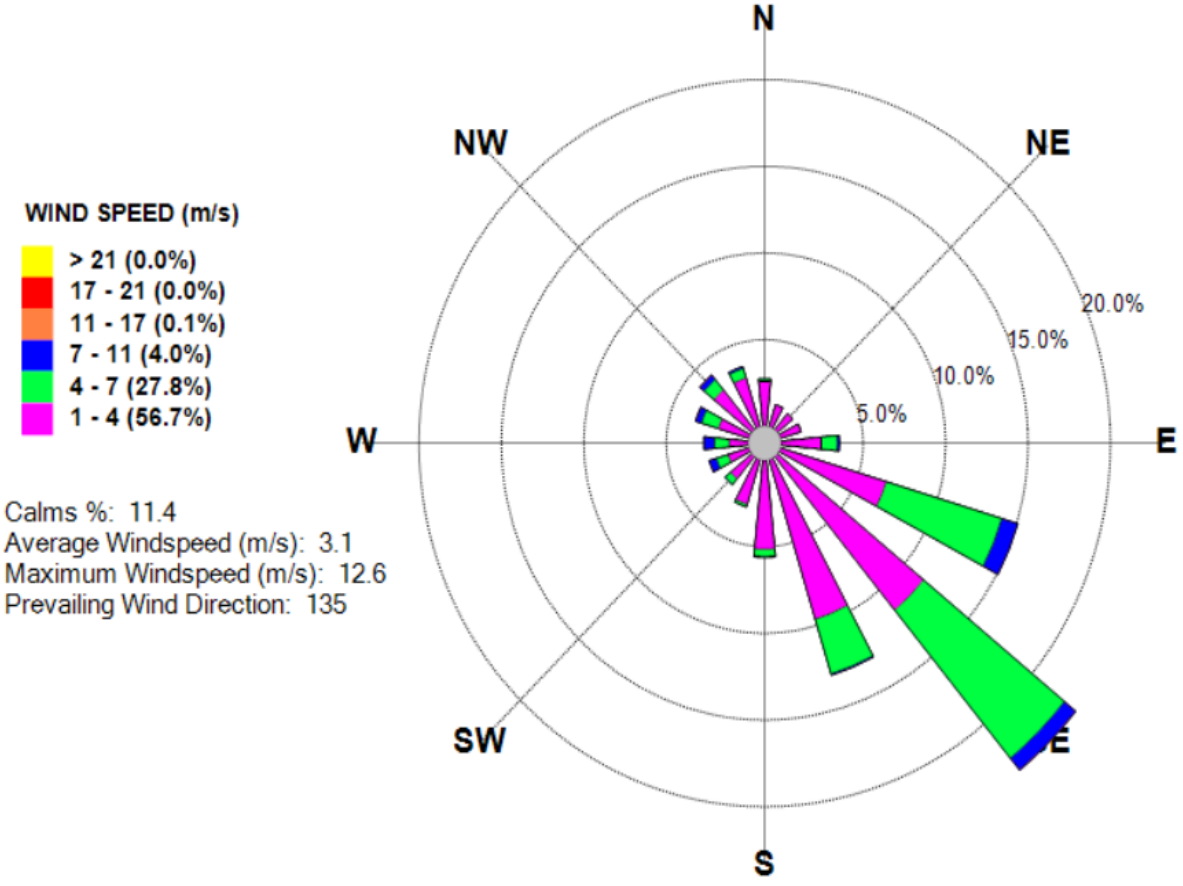
November 2021



Calms %: 11.5
Average Windspeed (m/s): 3.0
Maximum Windspeed (m/s): 16.1
Prevailing Wind Direction: 180

Dartbrook Met01 - Windrose

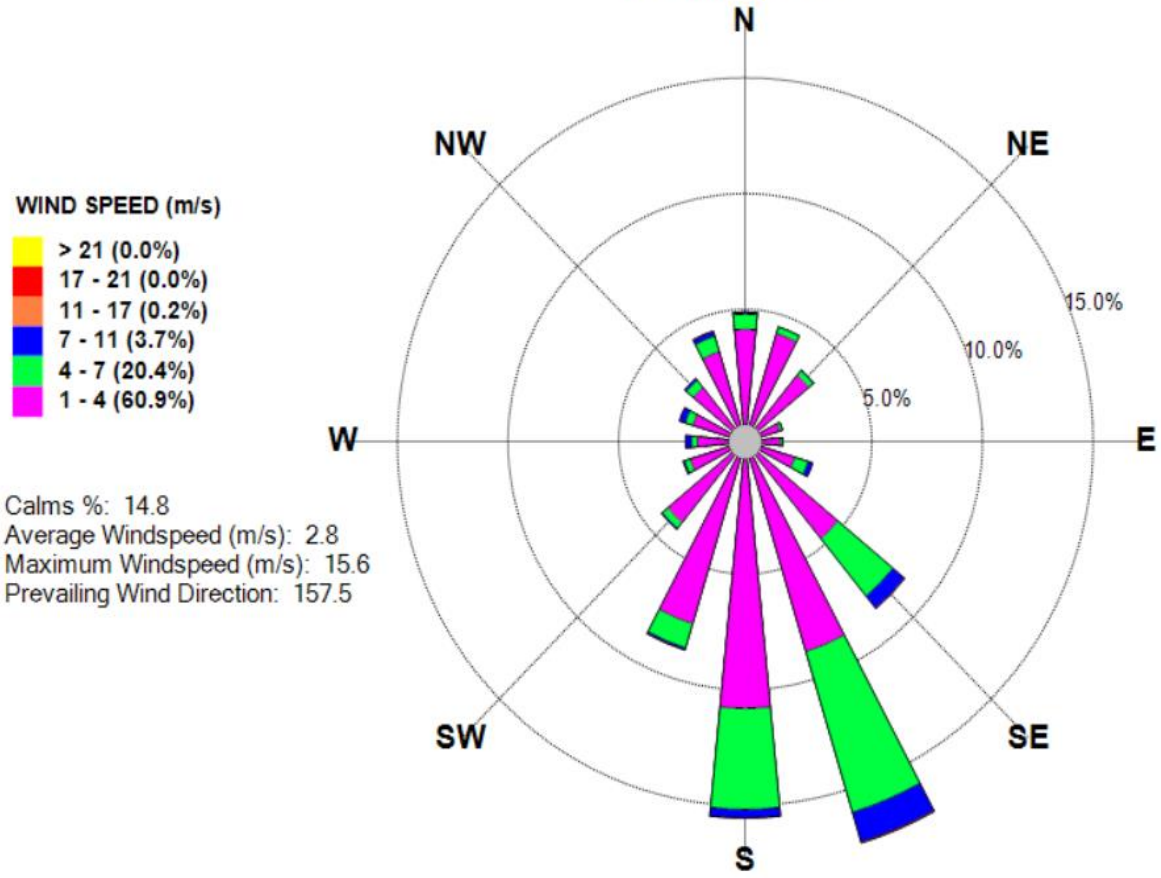
December 2021



Calms %: 11.4
Average Windspeed (m/s): 3.1
Maximum Windspeed (m/s): 12.6
Prevailing Wind Direction: 135

Dartbrook Met02 - Windrose

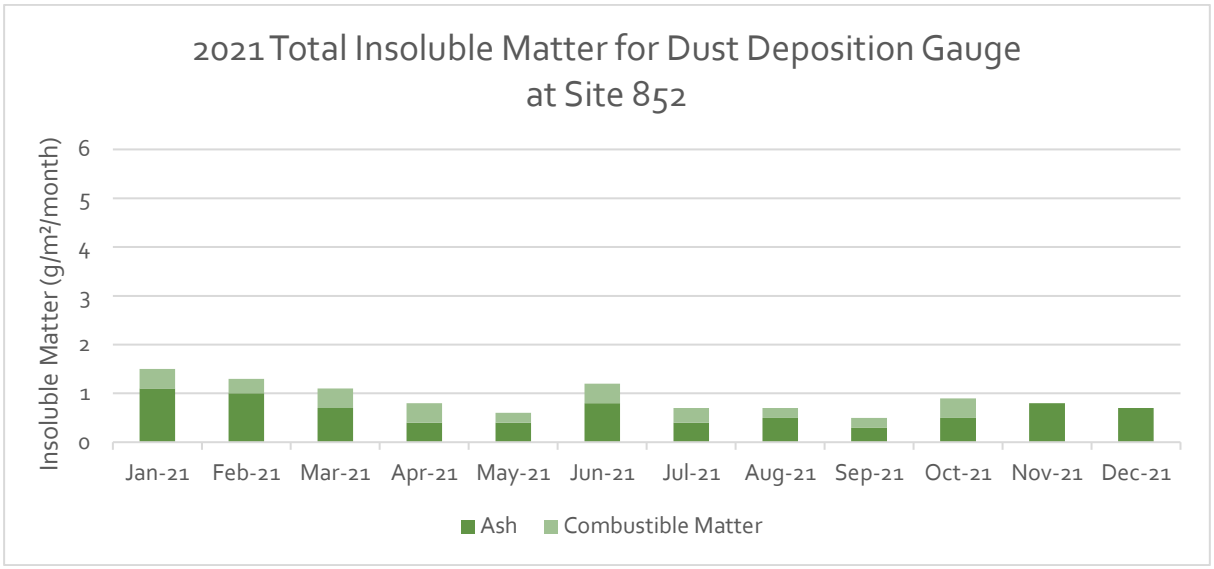
December 2021

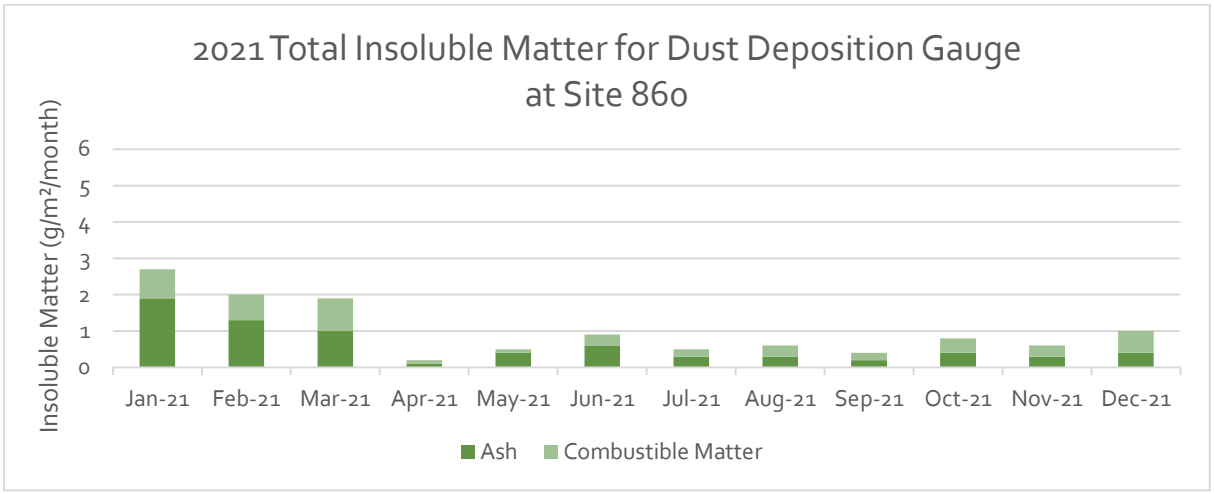


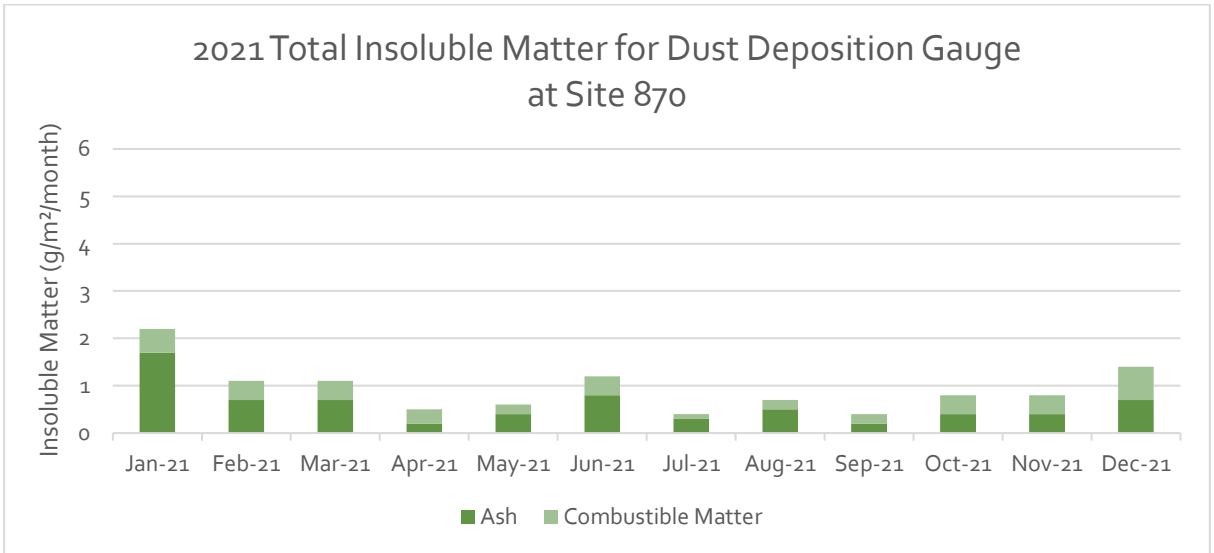
Calms %: 14.8
Average Windspeed (m/s): 2.8
Maximum Windspeed (m/s): 15.6
Prevailing Wind Direction: 157.5

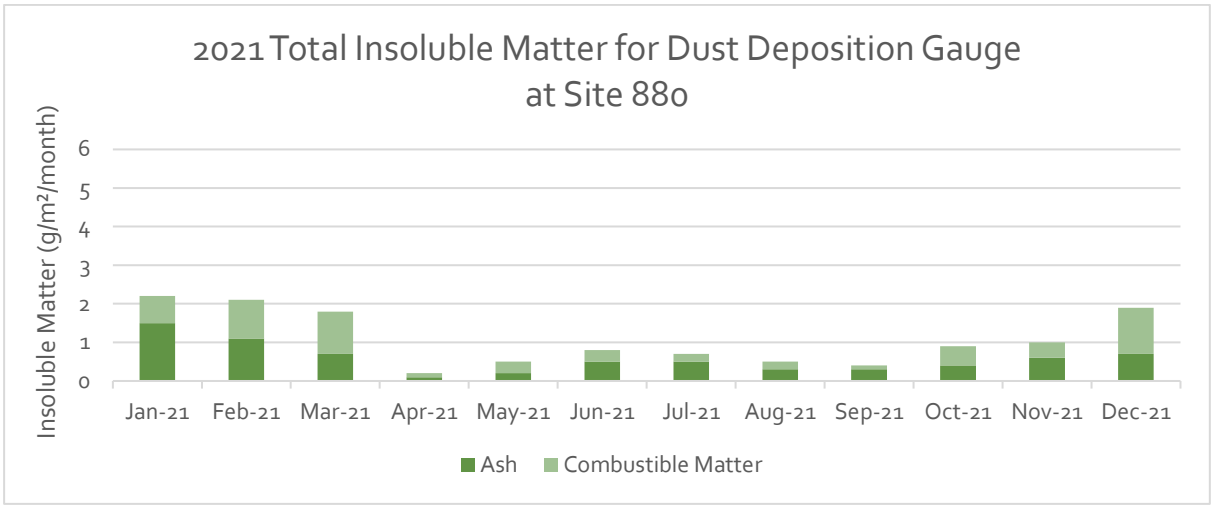
APPENDIX C

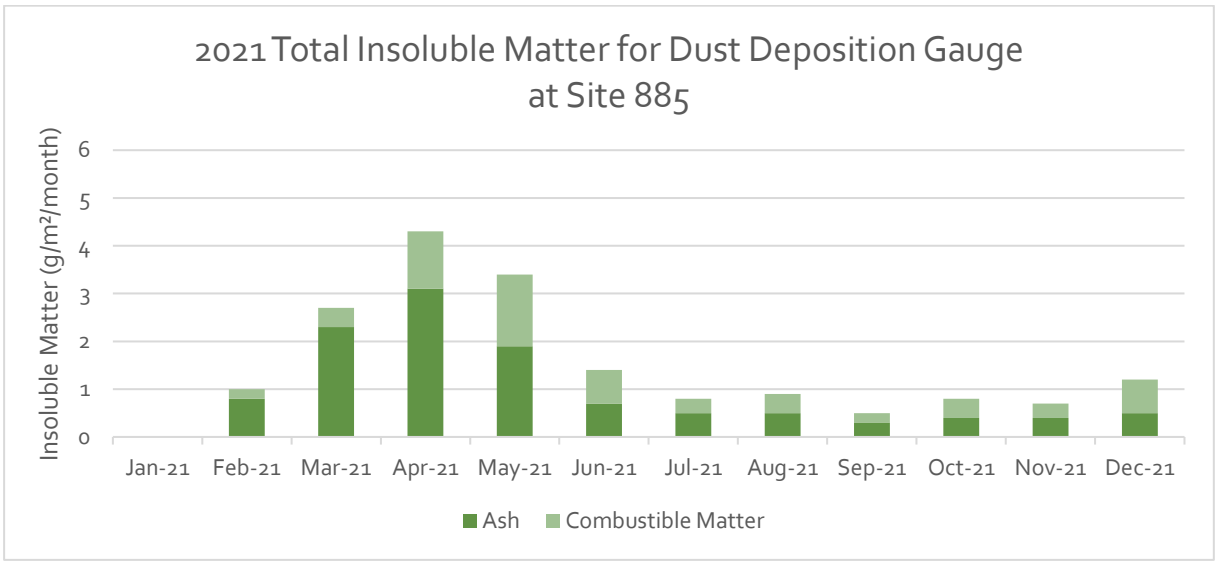
AIR QUALITY MONITORING SUMMARY

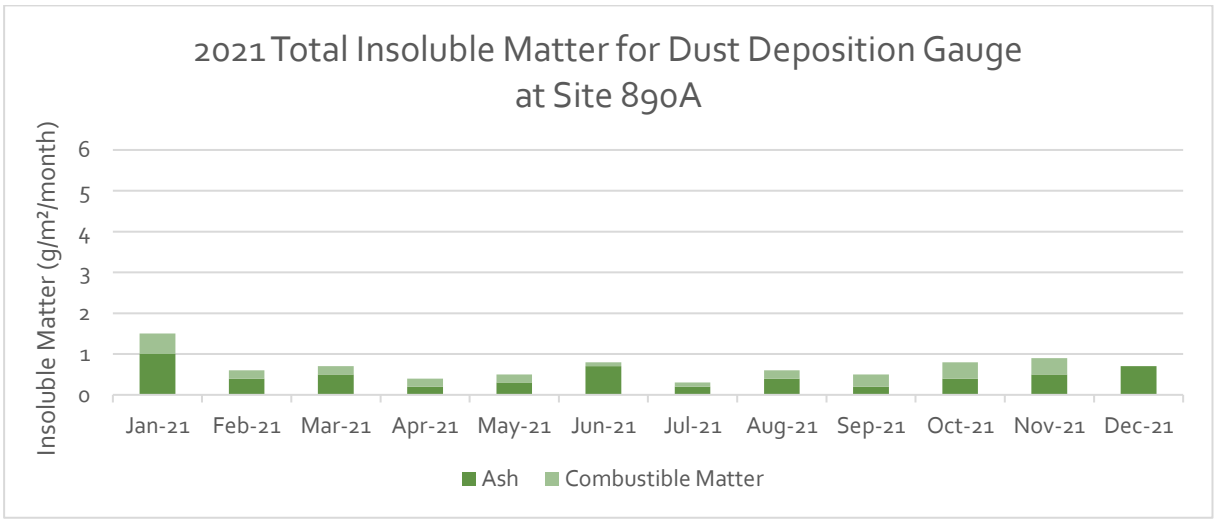

2021 Total Insoluble Matter for Dust Deposition Gauge at Site 852
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Ash
Combustible Matter

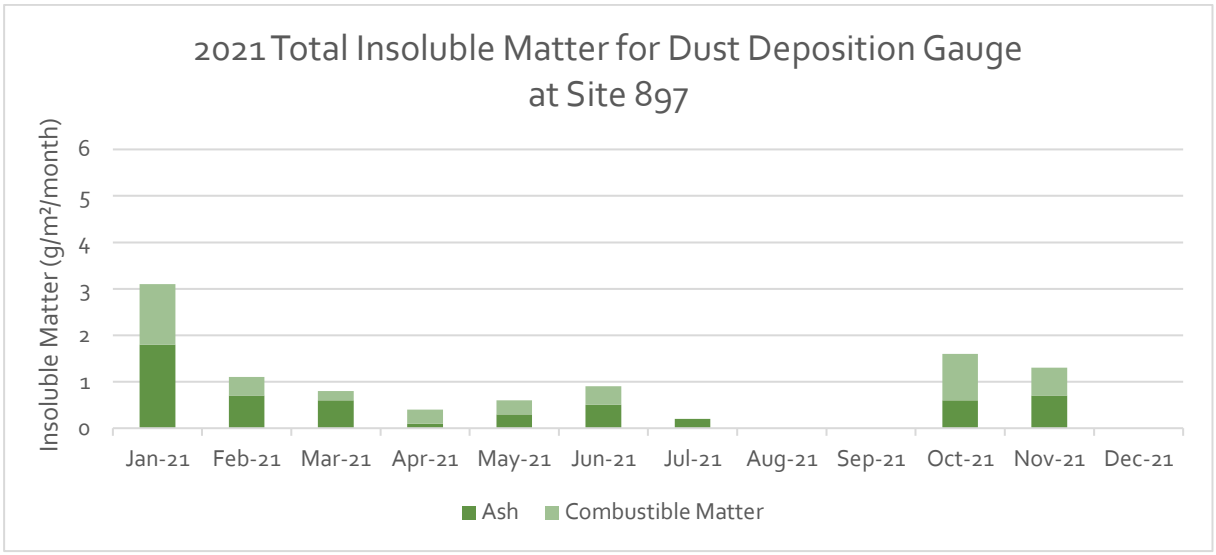

2021 Total Insoluble Matter for Dust Deposition Gauge at Site 860
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Ash
Combustible Matter

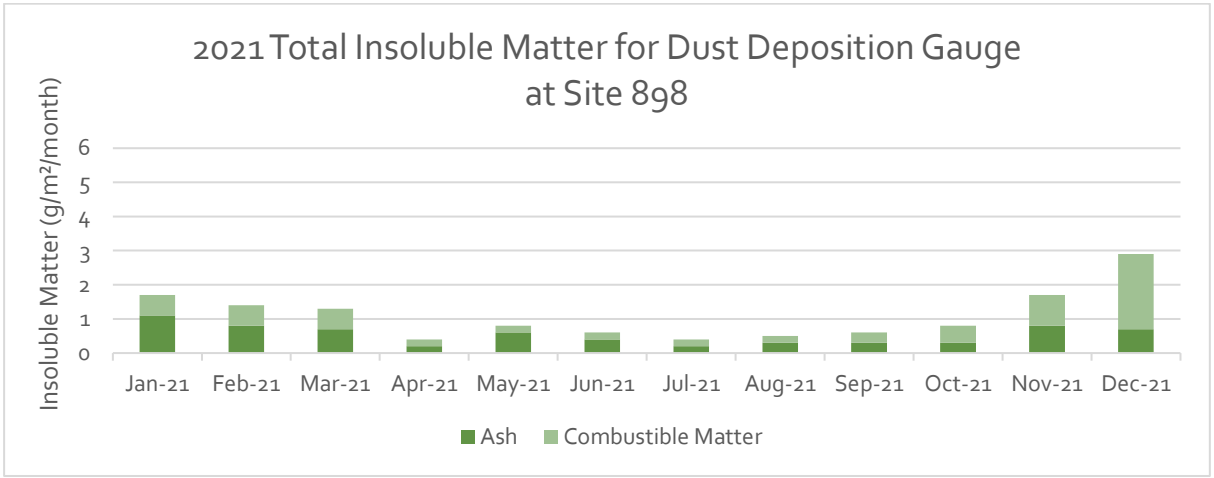

2021 Total Insoluble Matter for Dust Deposition Gauge at Site 870
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Ash
Combustible Matter

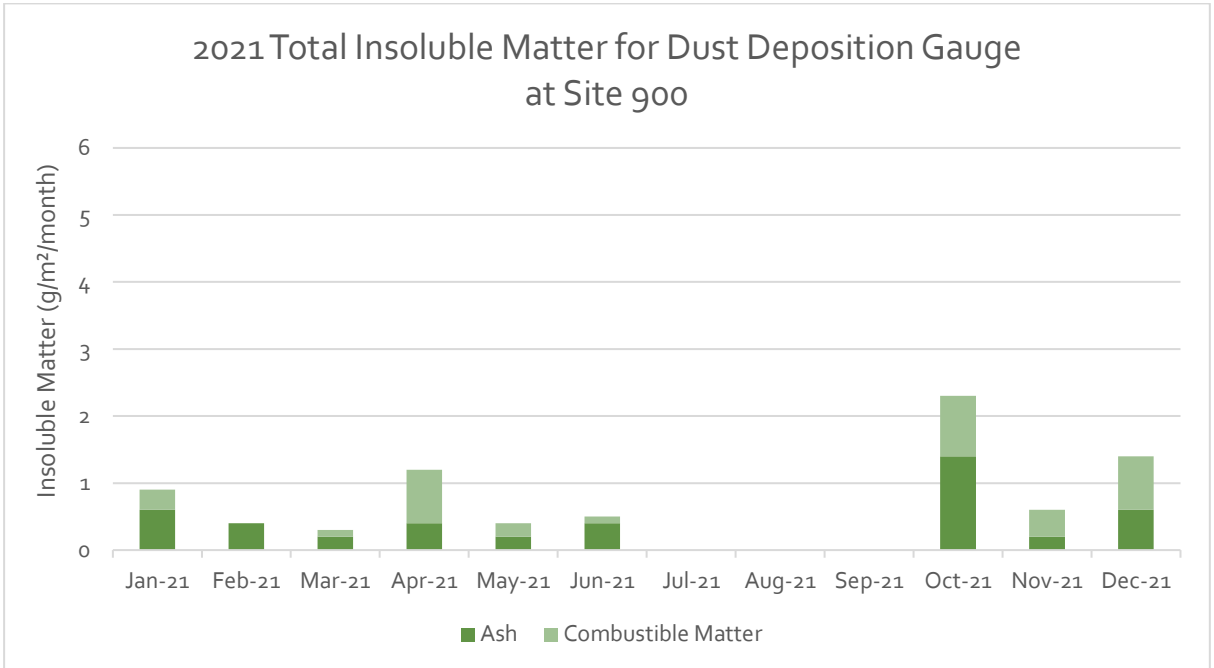

2021 Total Insoluble Matter for Dust Deposition Gauge at Site 880
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Ash
Combustible Matter

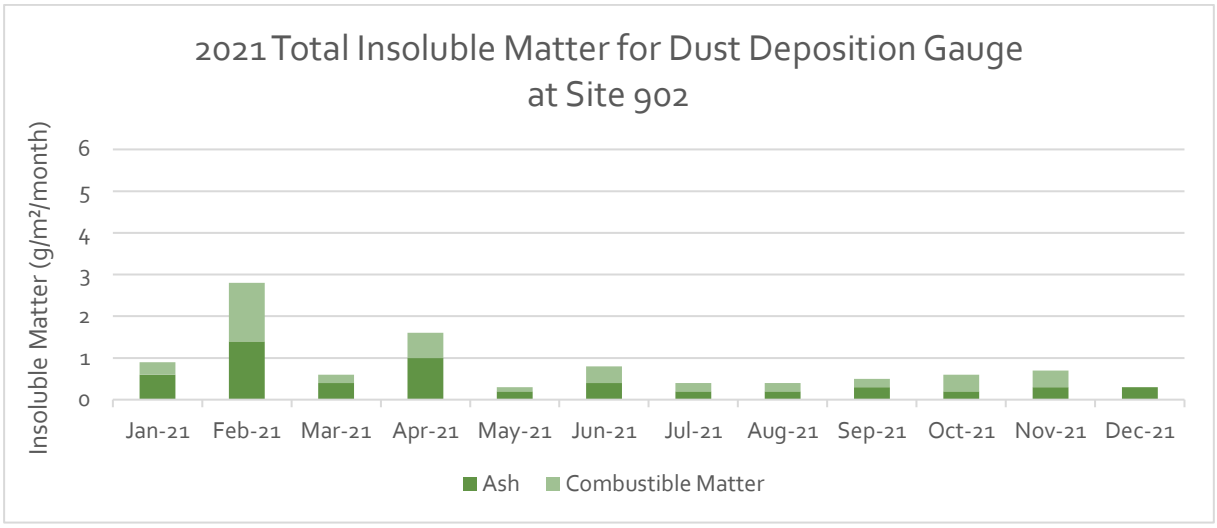

2021 Total Insoluble Matter for Dust Deposition Gauge at Site 885
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Ash
Combustible Matter

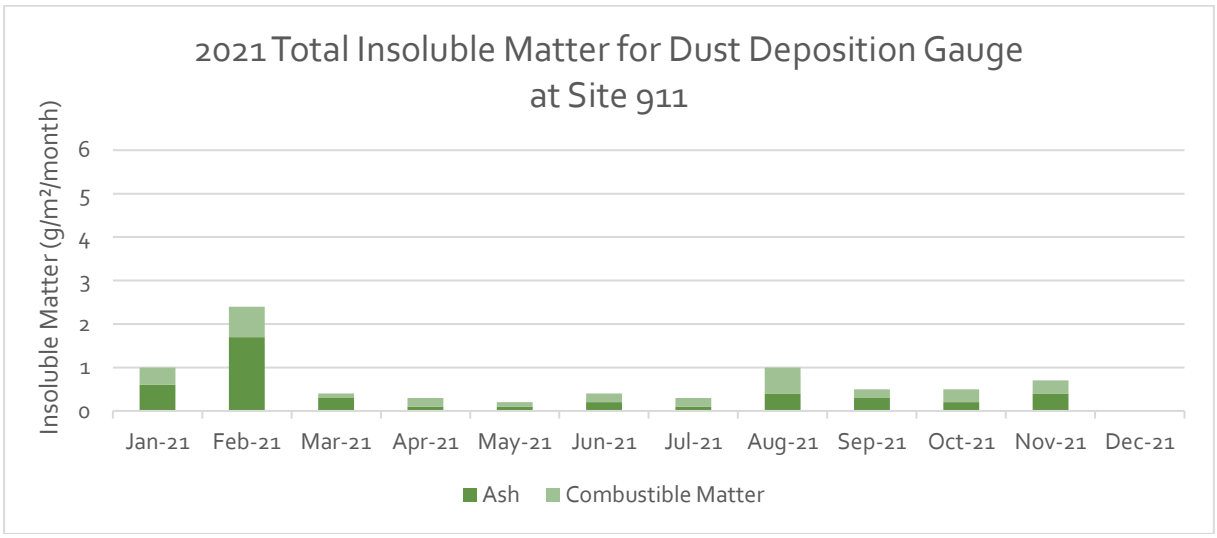

2021 Total Insoluble Matter for Dust Deposition Gauge at Site 890A
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Ash
Combustible Matter

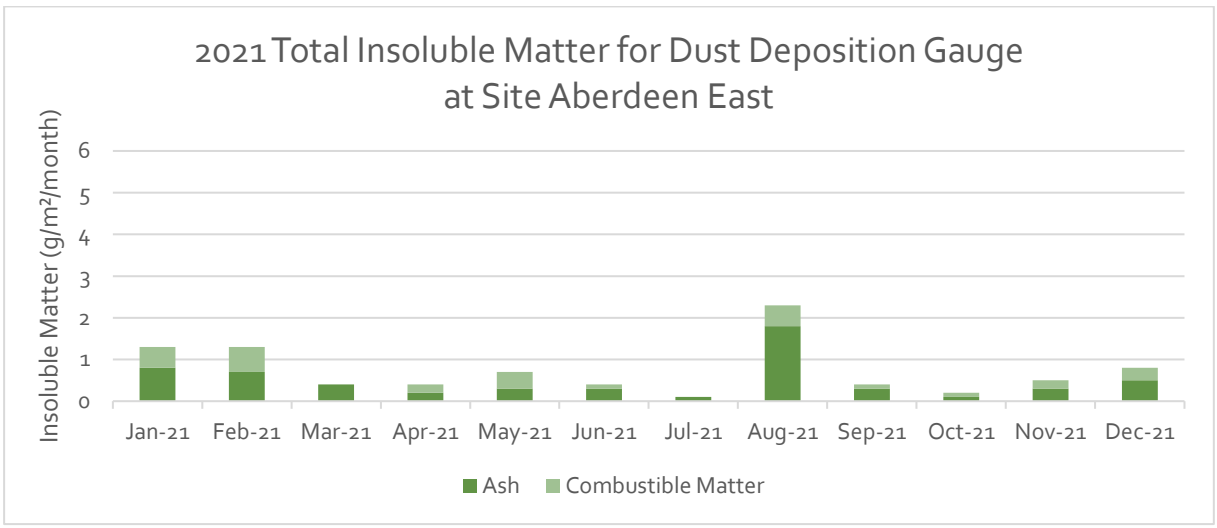

2021 Total Insoluble Matter for Dust Deposition Gauge at Site 897
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Ash
Combustible Matter

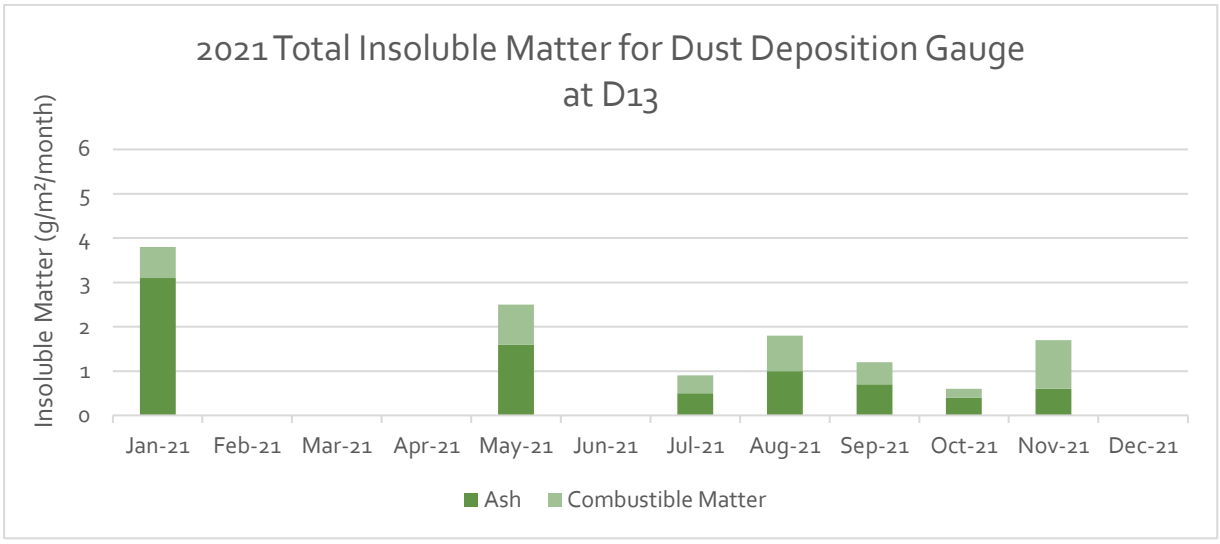

2021 Total Insoluble Matter for Dust Deposition Gauge at Site 898
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Ash
Combustible Matter

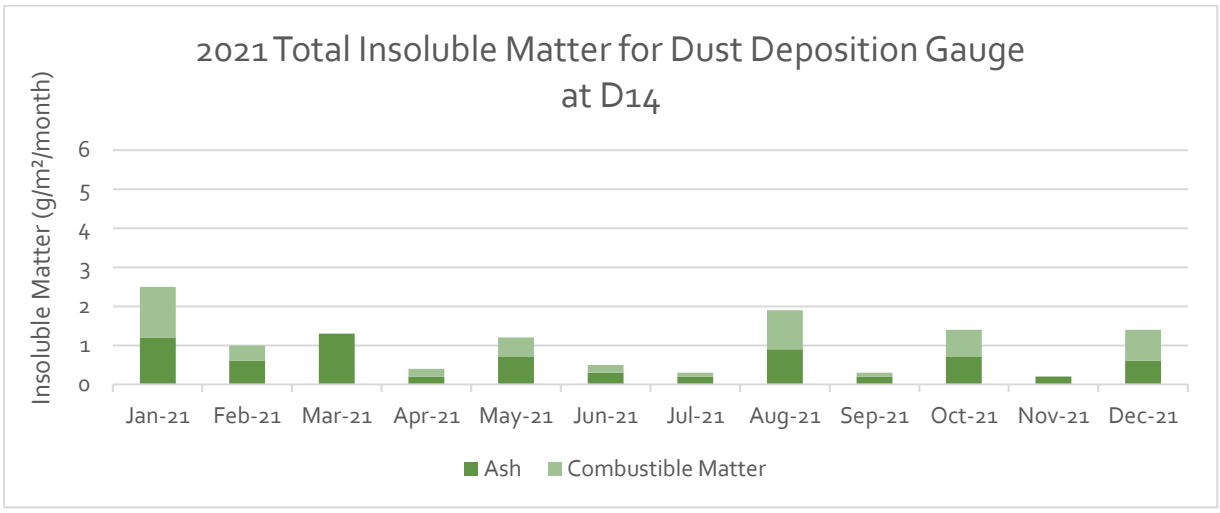

2021 Total Insoluble Matter for Dust Deposition Gauge at Site 900
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Ash
Combustible Matter

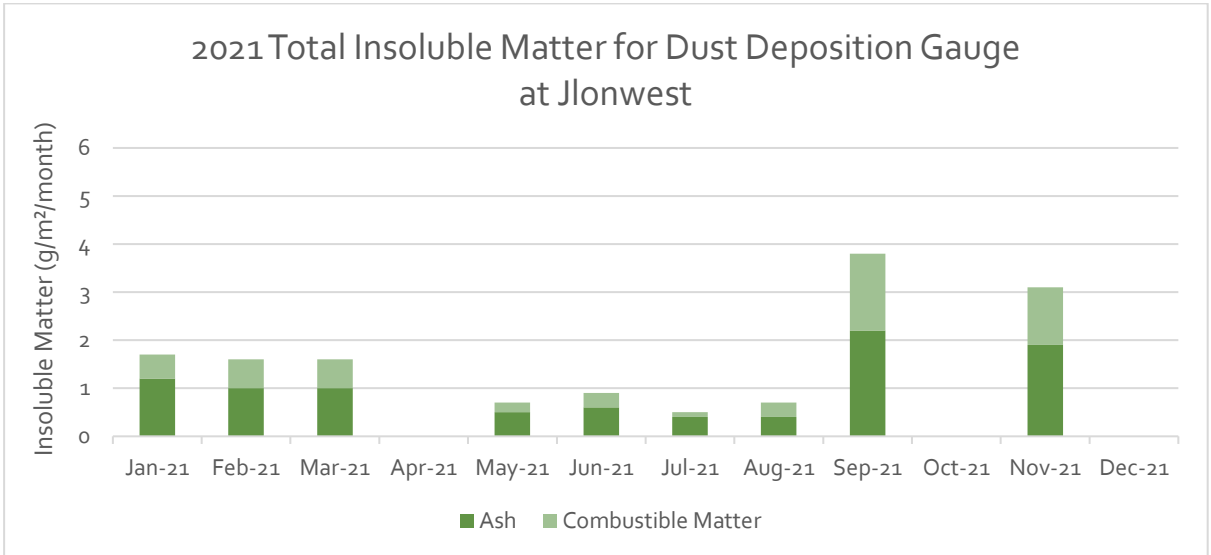

2021 Total Insoluble Matter for Dust Deposition Gauge at Site 902
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Ash
Combustible Matter

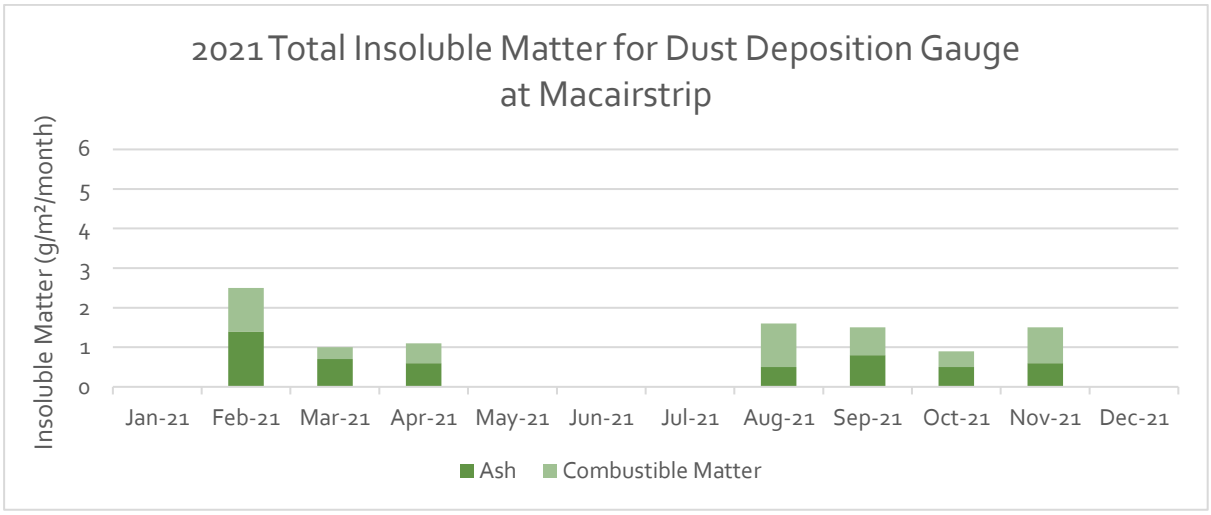

2021 Total Insoluble Matter for Dust Deposition Gauge at Site 911
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Ash
Combustible Matter


2021 Total Insoluble Matter for Dust Deposition Gauge at Site Aberdeen East
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Ash
Combustible Matter


2021 Total Insoluble Matter for Dust Deposition Gauge at D13
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Ash
Combustible Matter


2021 Total Insoluble Matter for Dust Deposition Gauge at D14
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Ash
Combustible Matter


2021 Total Insoluble Matter for Dust Deposition Gauge at Jlonwest
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Ash
Combustible Matter


2021 Total Insoluble Matter for Dust Deposition Gauge at Macairstrip
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Ash
Combustible Matter

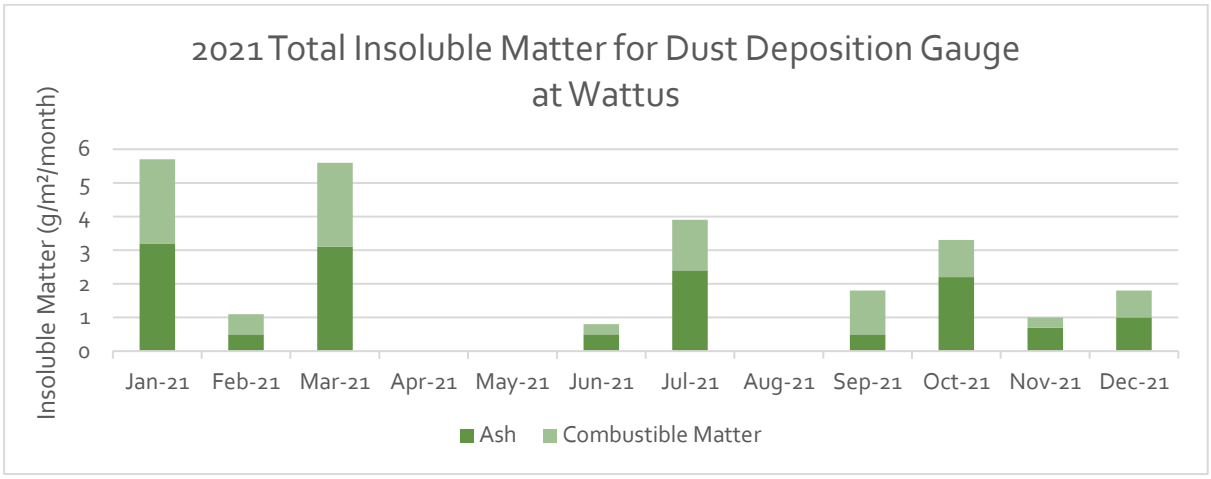

2021 Total Insoluble Matter for Dust Deposition Gauge at Wattus
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Ash
Combustible Matter

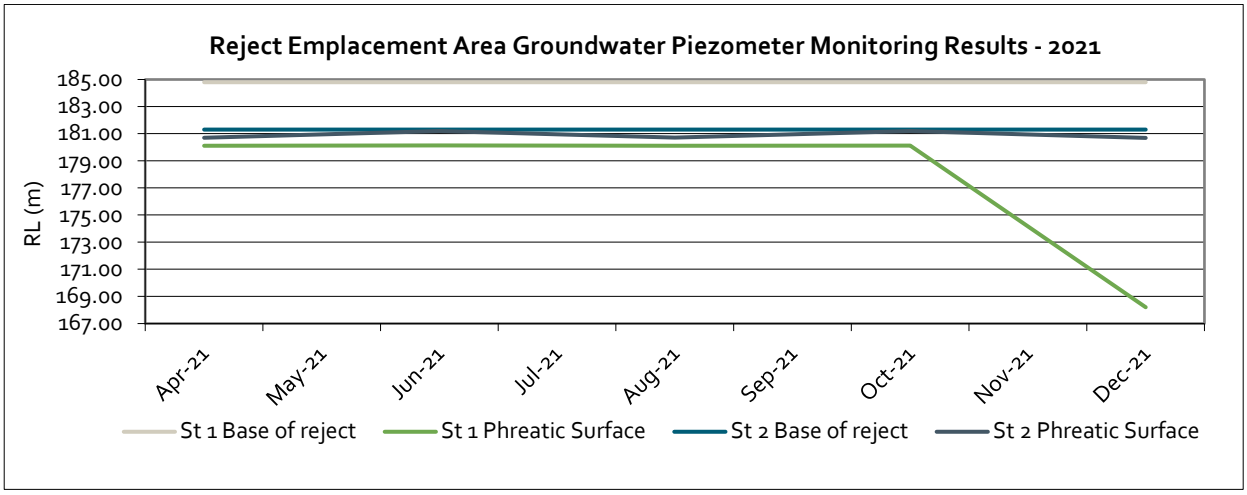
Table 31 Contaminated Monthly Depositional Dust Results in 2021

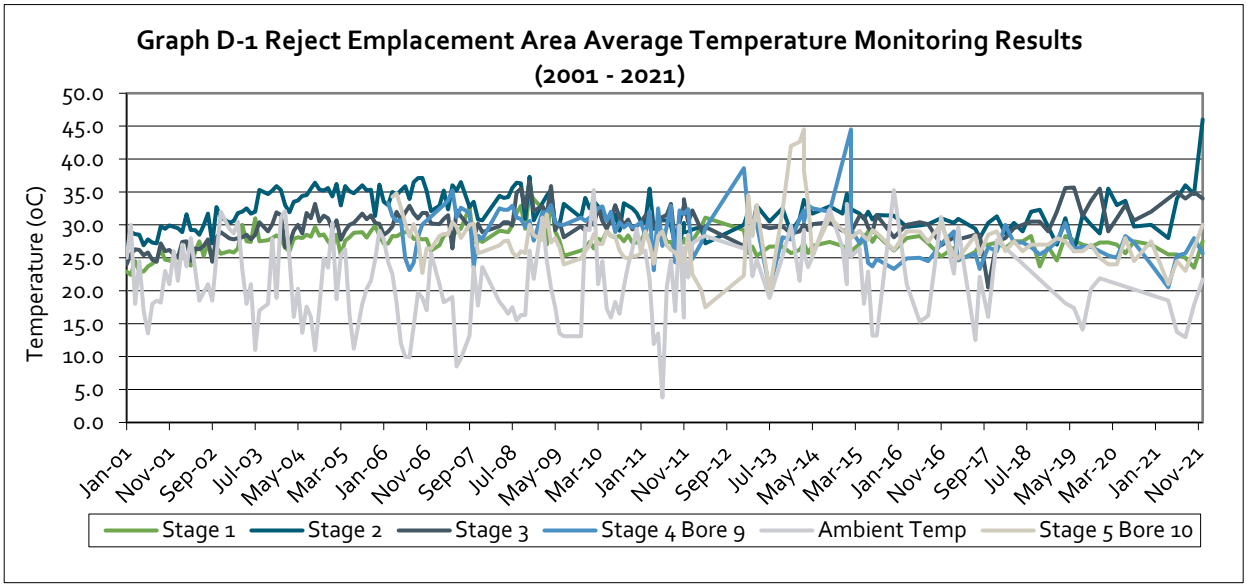
Site	Month	Insoluble Solids (g/m²/month)	Combustible Matter (g/m²/month)	Ash Component (g/m²/month)	Reason for High Reading
885	Jan	3.6	2	1.6	Deemed contaminated due to high levels of insects present, sample slightly turbid and brown, low Ash/IM% and high combustible matter. Jar overflowing.
897	Aug	12.2	3.8	8.4	Deemed contaminated due to high levels of insects, bird droppings and vegetation present, sample turbid and brown, and high combustible matter.
D13	Feb	3.7	1.9	1.8	Deemed contaminated due to high levels of insects present, sample turbid and grey, low Ash/IM% and high combustible matter
D13	Mar	2.3	0.9	1.4	Deemed contaminated due to high levels of insects present, sample turbid, low Ash/IM% and high combustible matter
D13	Apr	5.2	4.4	0.8	Deemed contaminated due to high levels of insects present, sample turbid, low Ash/IM% and high combustible matter
D13	Jun	5.2	3.4	1.8	Deemed contaminated due to high levels of insects and bird droppings present, sample turbid and green, low Ash/IM% and high combustible matter.
D13	Dec	3.1	2.1	1	Deemed contaminated due to high levels of insects, bird droppings and vegetation present, sample turbid and brown
Macairstrip	Jan	4.3	2.4	1.9	Deemed contaminated due to slight/moderate levels of insects and bird droppings present, sample slightly turbid and green, low Ash/IM% and high combustible matter.
Macairstrip	May	17.8	9.4	8.4	Deemed contaminated due to high levels of insects and bird droppings present, sample turbid and brown, low Ash/IM% and high combustible matter.
Macairstrip	Jun	5	3.7	1.3	Deemed contaminated due to high levels of insects, bird droppings and vegetation present, sample turbid and brown, low Ash/IM% and high combustible matter.

Site	Month	Insoluble Solids (g/m²/month)	Combustible Matter (g/m²/month)	Ash Component (g/m²/month)	Reason for High Reading
Macairstrip	Jul	4.7	3.7	1	Deemed contaminated due to high levels of insects, bird droppings and vegetation present, sample turbid and brown, low Ash/IM% and high combustible matter.
Macairstrip	Dec	17.6	11.2	6.4	Deemed contaminated due to high levels of insects, bird droppings and vegetation present, sample turbid and brown.
Wattus	Apr	3.3	2.2	1.1	Deemed contaminated due to high levels of insects and bird droppings present, sample turbid, low Ash/IM% and high combustible matter
Wattus	May	6.7	4.1	2.6	Deemed contaminated due to high levels of insects and bird droppings present, sample turbid and grey, low Ash/IM% and high combustible matter.
Wattus	Aug	4.3	2.2	2.1	Deemed contaminated due with insects and bird droppings present, sample turbid, low Ash/IM% and high combustible matter.

APPENDIX D

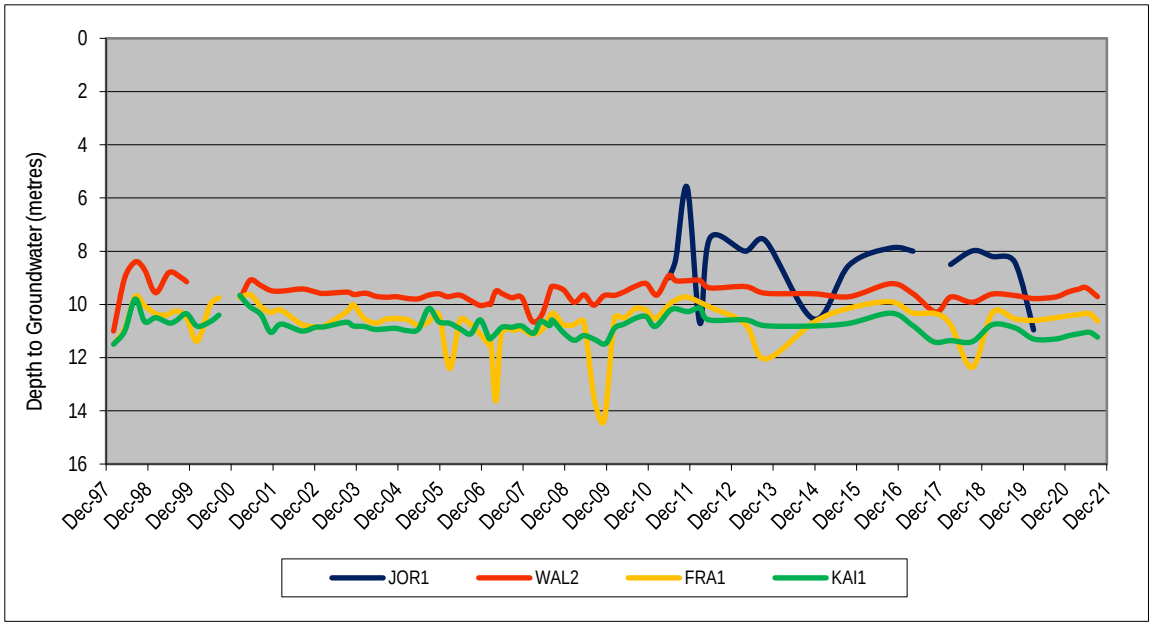
REA MONITORING SUMMARY


Reject Emplacement Area Groundwater Piezometer Monitoring Results - 2021
RL (m)
185.00
183.00
181.00
179.00
177.00
175.00
173.00
171.00
169.00
167.00
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
St 1 Base of reject
St 1 Phreatic Surface
St 2 Base of reject
St 2 Phreatic Surface

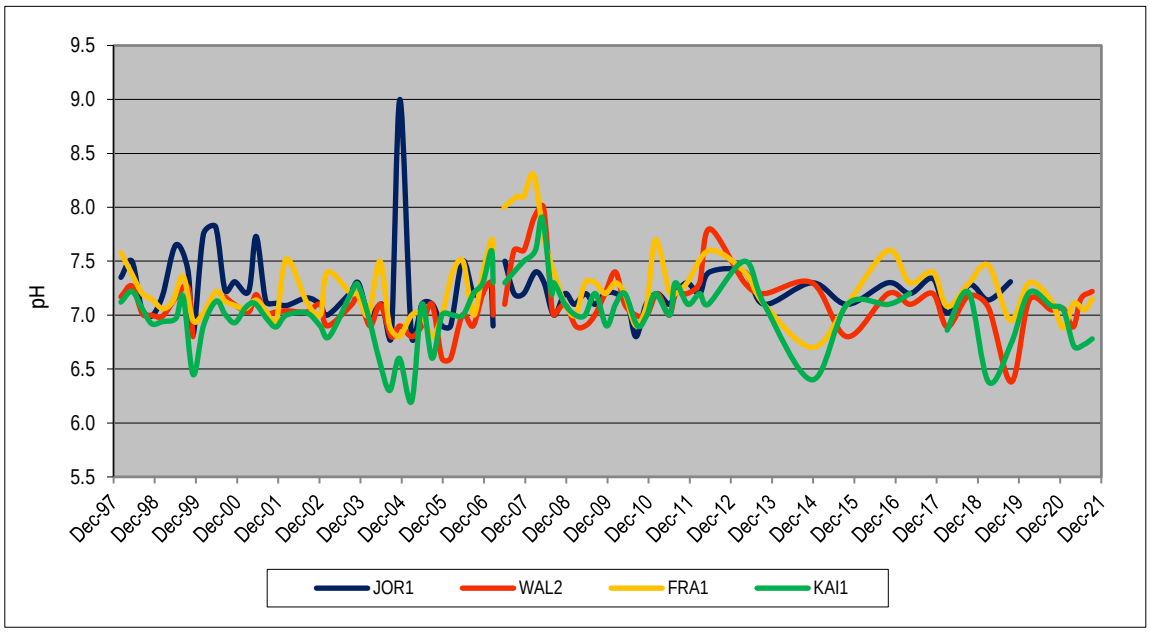

Graph D-1 Reject Emplacement Area Average Temperature Monitoring Results
(2001 - 2021)
Temperature (oC)
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Jan-01
Nov-01
Sep-02
Jul-03
May-04
Mar-05
Jan-06
Nov-06
Sep-07
Jul-08
May-09
Mar-10
Jan-11
Nov-11
Sep-12
Jul-13
May-14
Mar-15
Jan-16
Nov-16
Sep-17
Jul-18
May-19
Mar-20
Jan-21
Nov-21
Stage 1
Stage 2
Stage 3
Stage 4 Bore 9
Ambient Temp
Stage 5 Bore 10

APPENDIX E

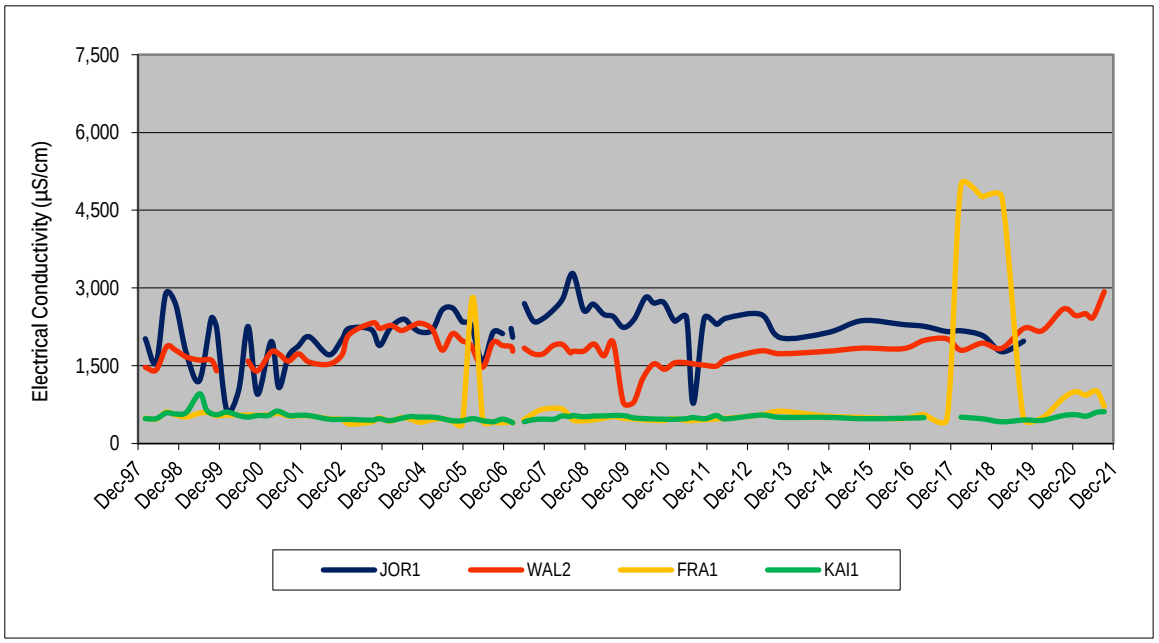
GROUNDWATER MONITORING SUMMARY



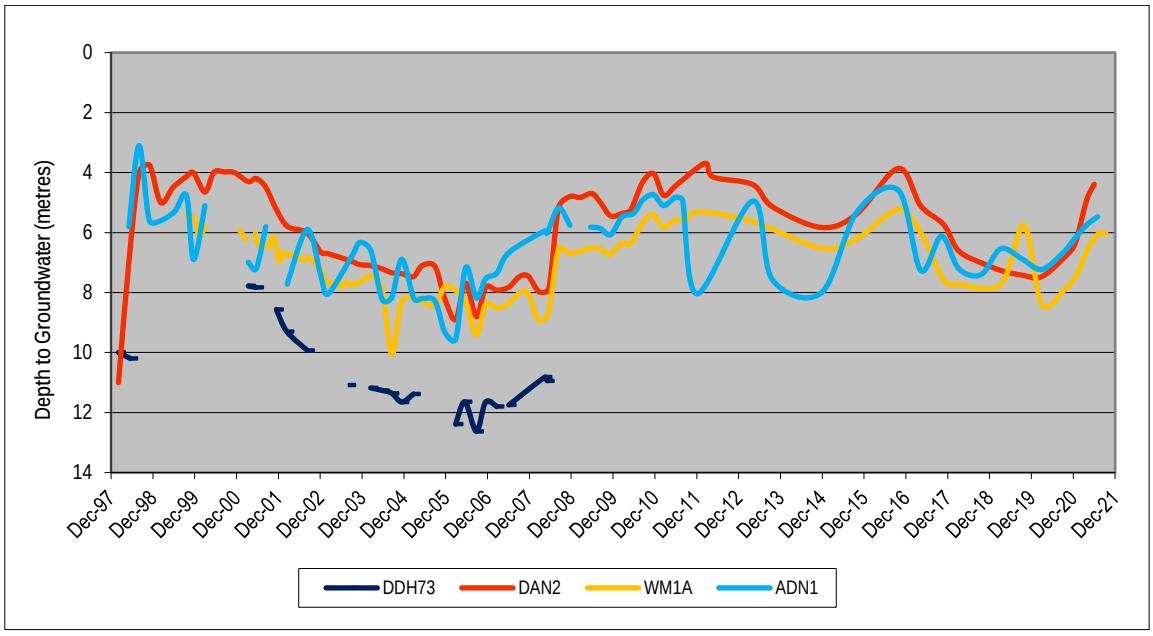
Graph E-1
Groundwater Level for Hunter River Alluvium Bores (1998-2021)



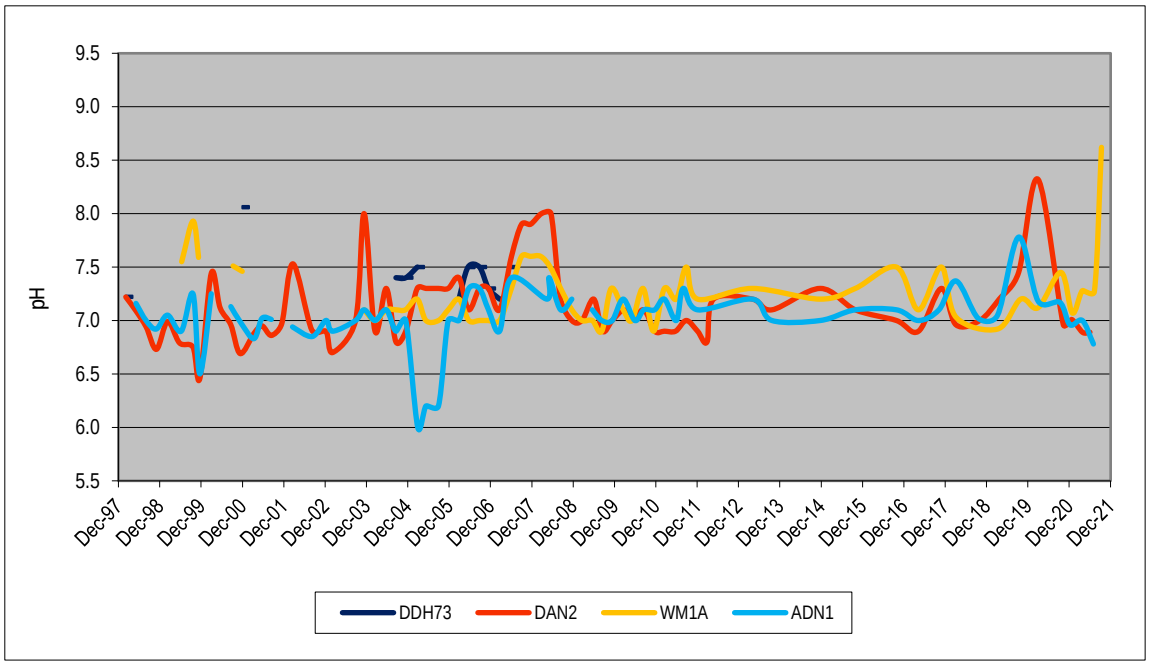
Graph E-2
pH for Hunter River Alluvium Bores (1998-2021)



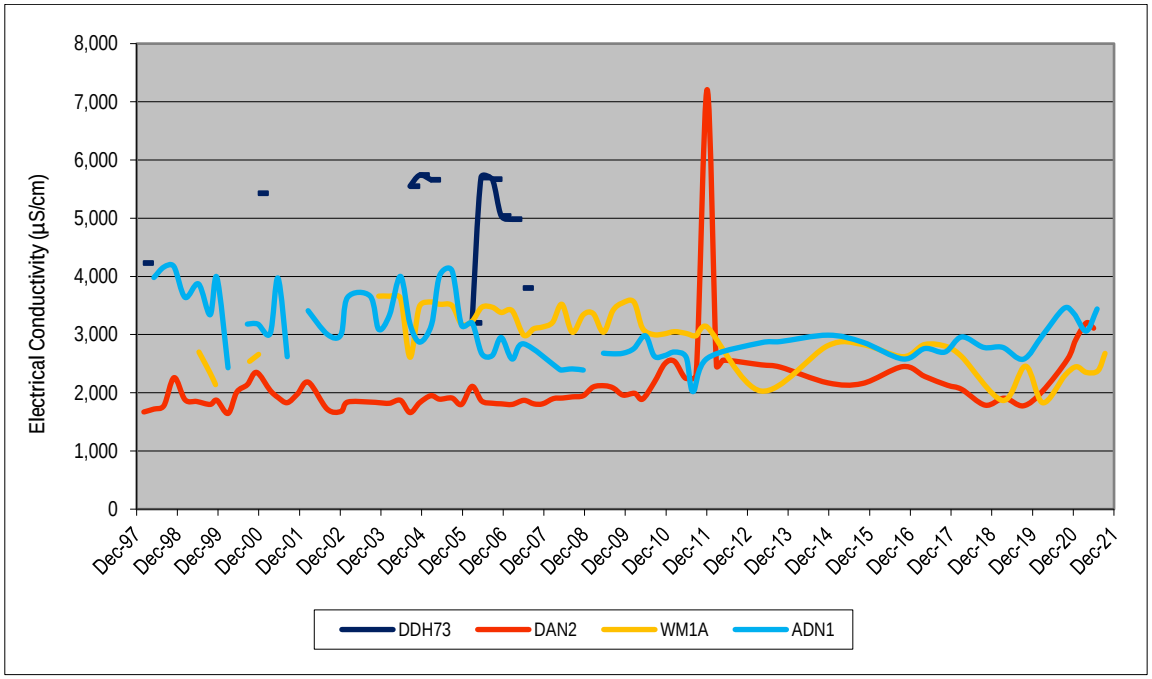
Graph E-3
Electrical Conductivity for Hunter River Alluvium Bores (1998-2021)



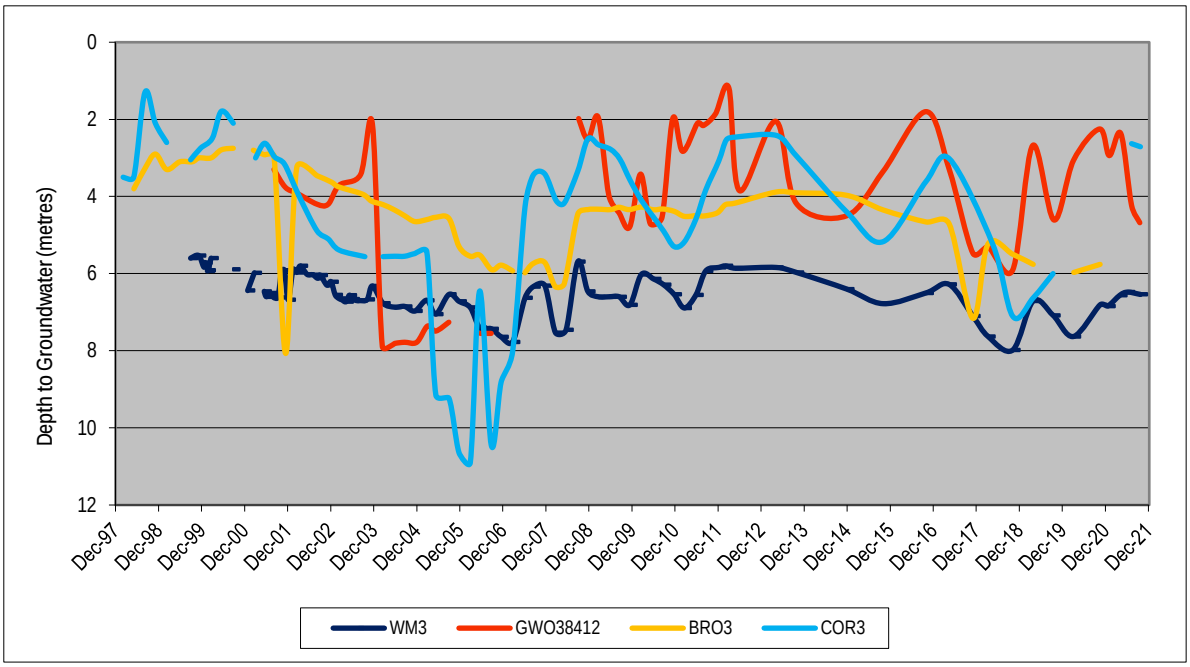
Graph E-4
Groundwater Level for Dart Brook Alluvium Bores (1998-2021)



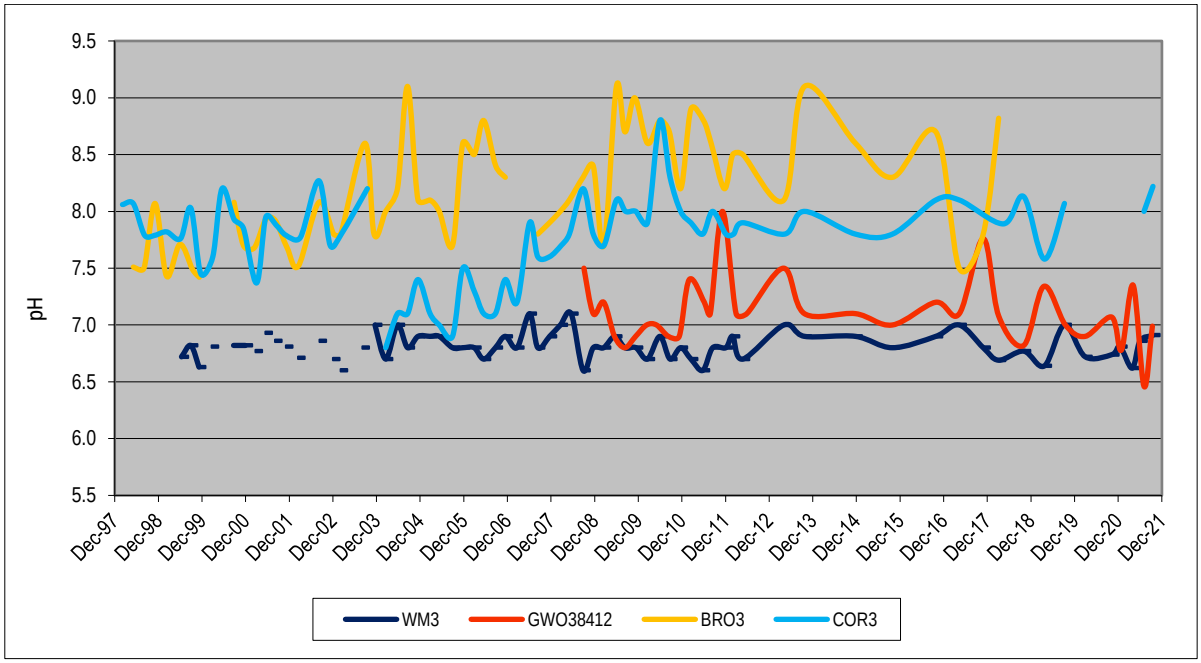
Graph E-5
pH for Dart Brook Alluvium Bores (1998-2021)



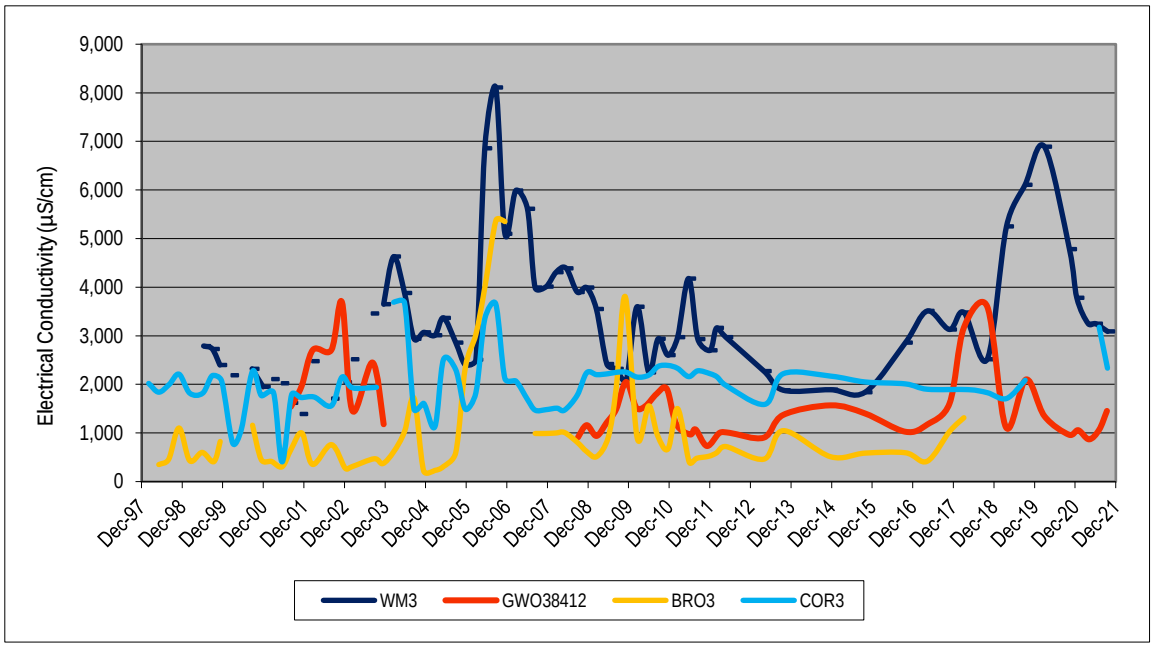
Graph E-6
Electrical Conductivity for Dart Brook Alluvium Bores (1998-2021)



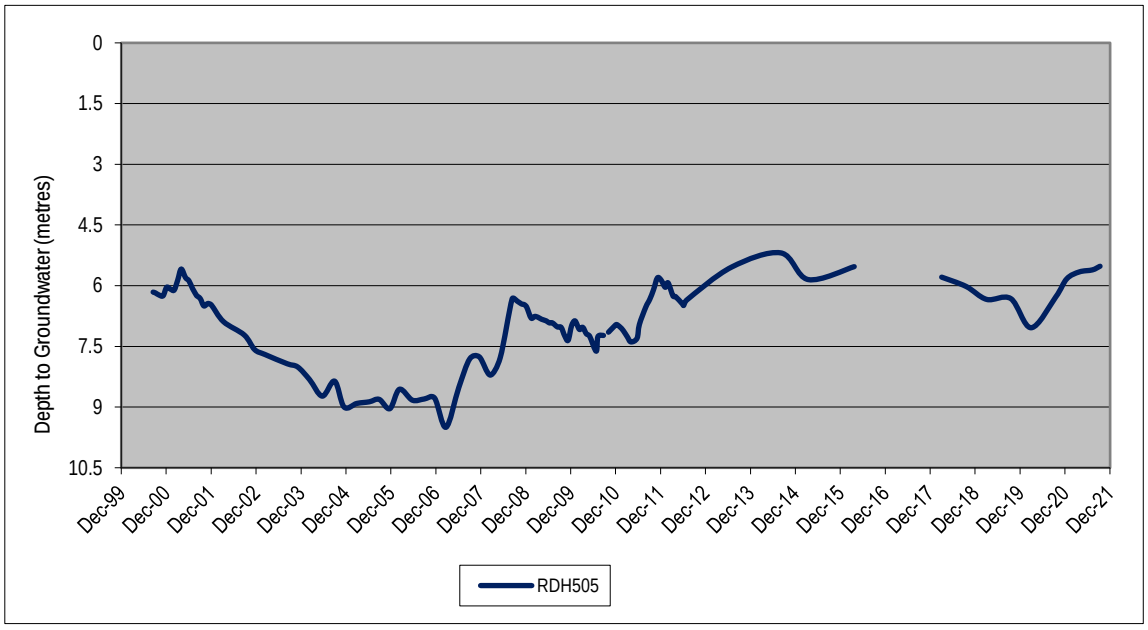
Graph E-7
Groundwater Level for Sandy Creek Alluvium Bores (1998-2021)



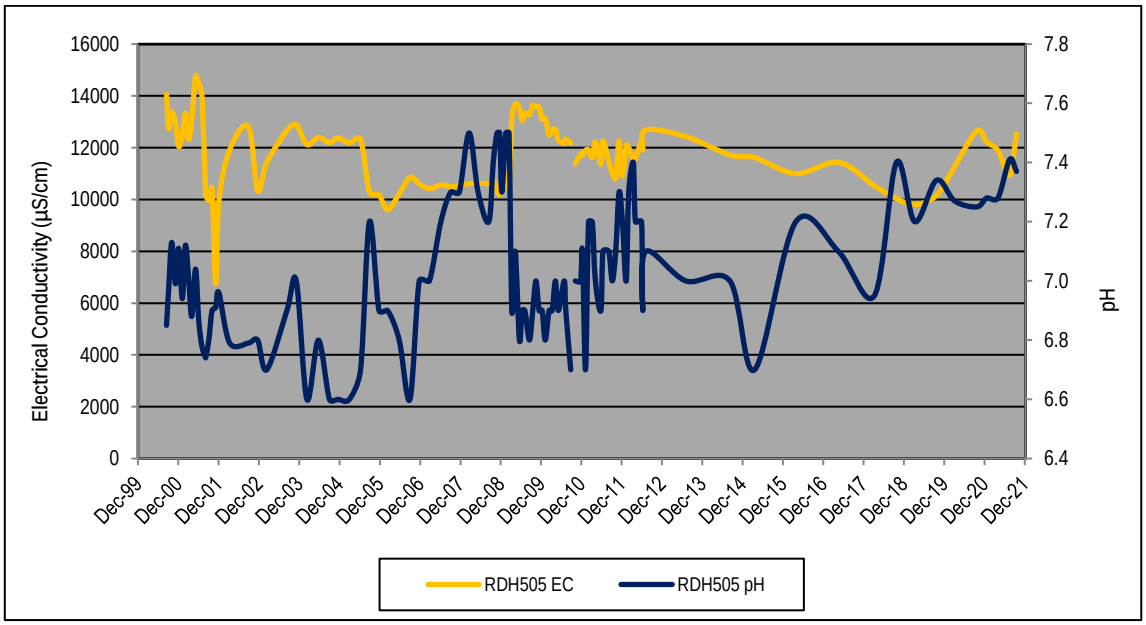
Graph E-8
pH for Sandy Creek Alluvium Bores (1998-2021)



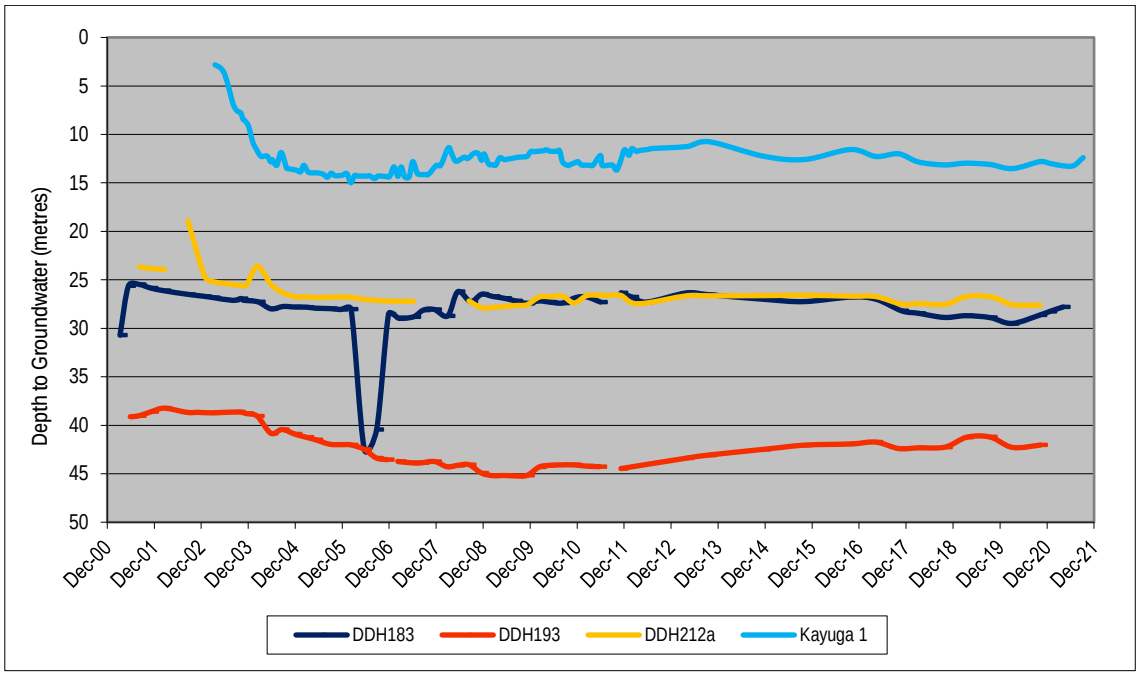
Graph E-9
Electrical Conductivity for Sandy Creek Alluvium Bores (1998-2021)



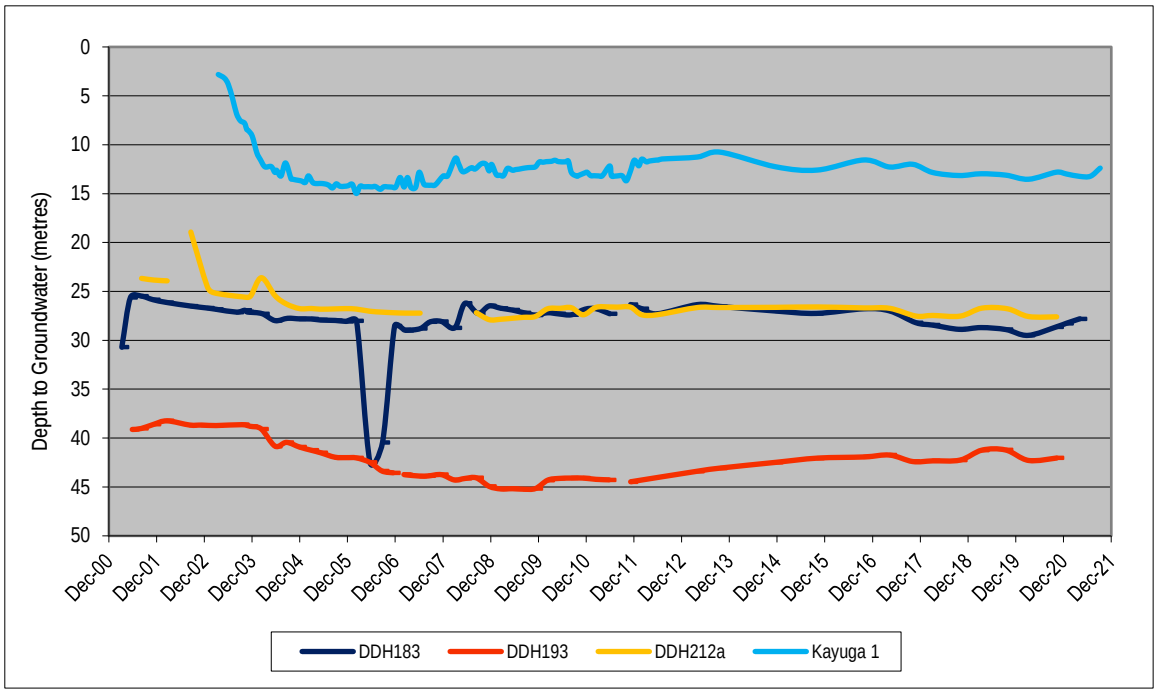
Graph E-10
Groundwater Level for Staged Discharge Dam Bore (2000-2021)



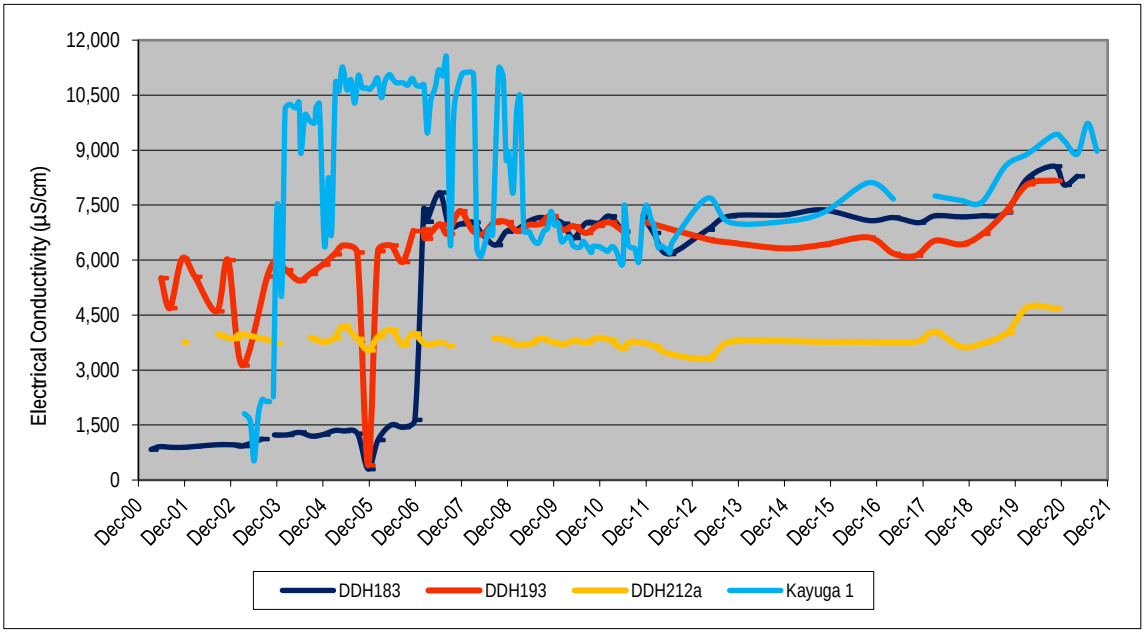
Graph E-11
pH and Electrical Conductivity for Staged Discharge Dam Bore (2000-2021)



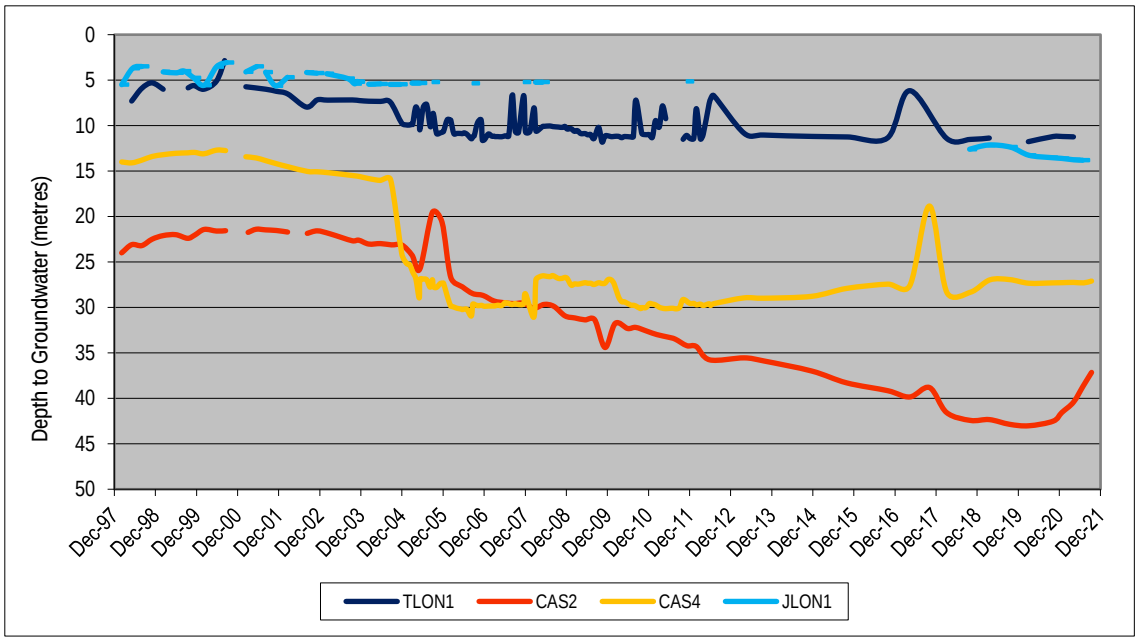
Graph E-12
Groundwater Level for Coal Seam Bores (2001-2021)



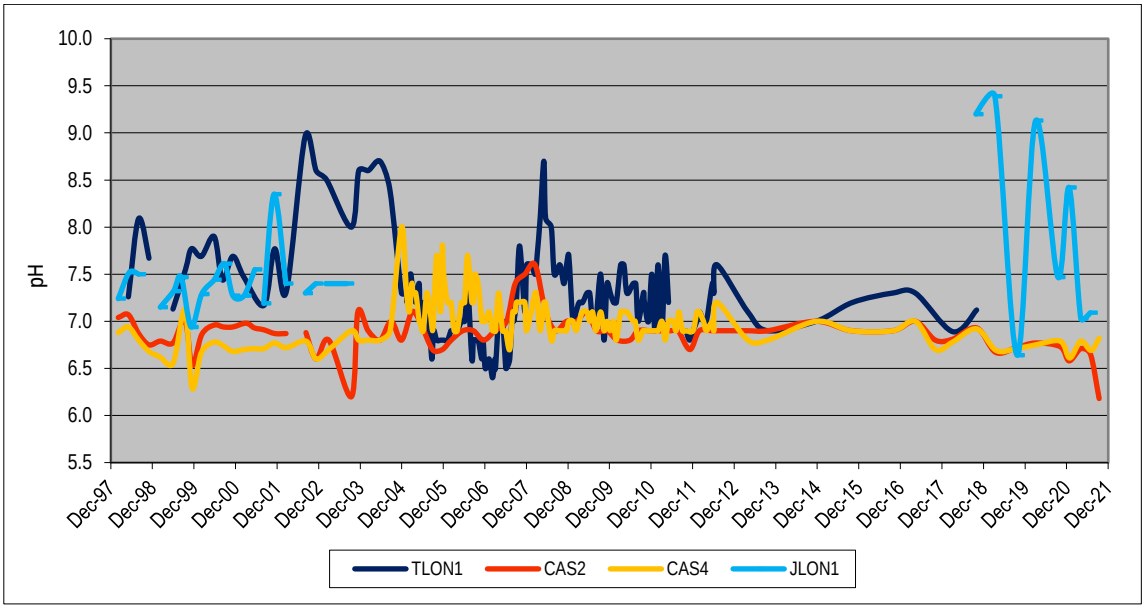
Graph E-13
pH for Coal Seam Bores (2001-2021)



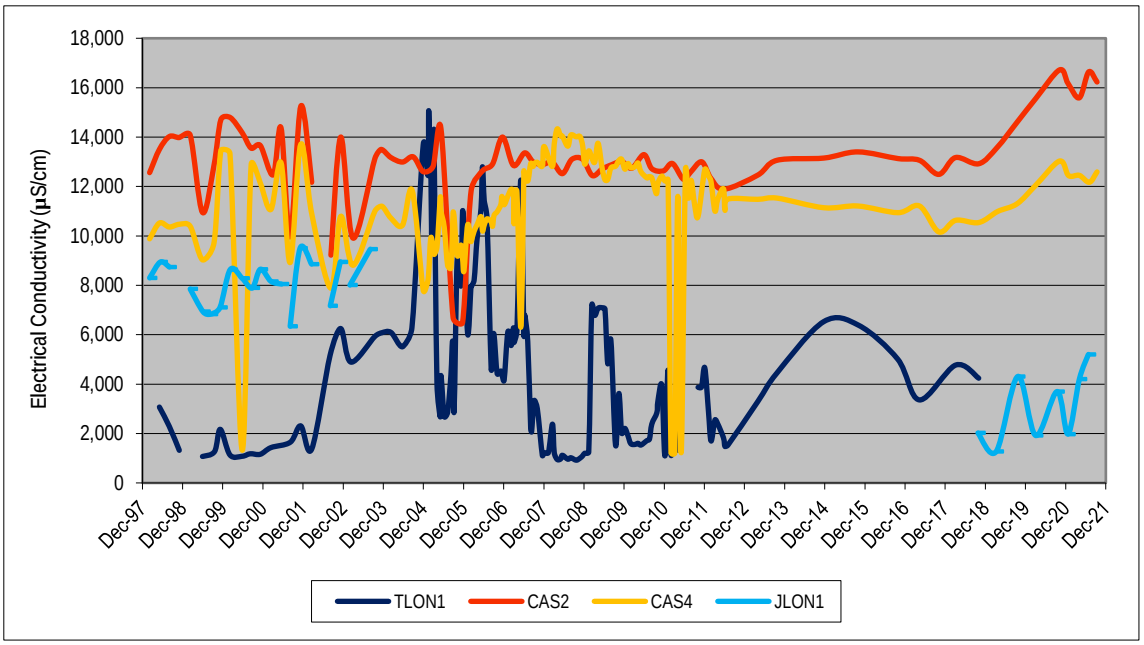
Graph E-14
Electrical Conductivity for Coal Seam Bores (2001-2021)



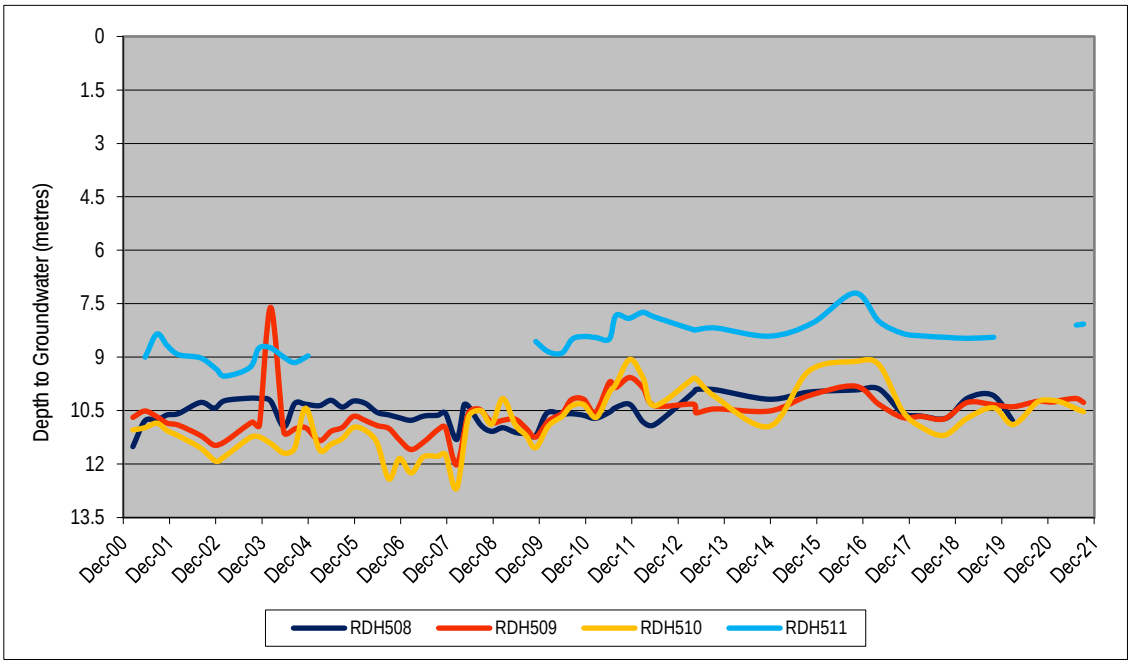
Graph E-15
Groundwater Levels for Regolith Bores (1998-2021)



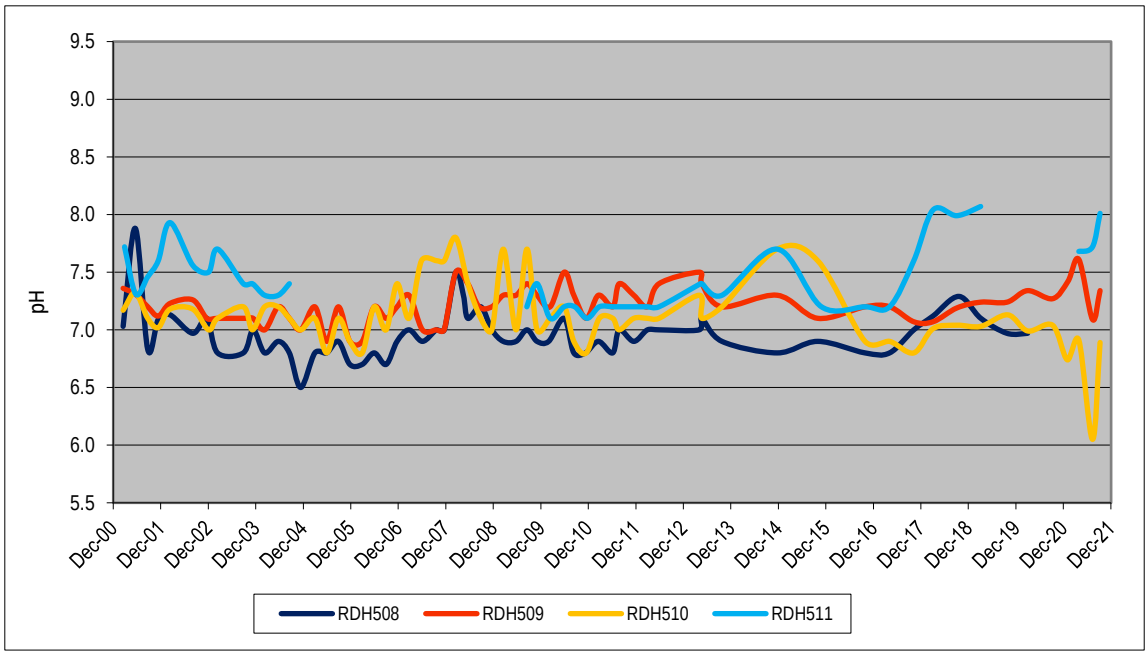
Graph E-16
pH for Regolith Bores (1998-2021)



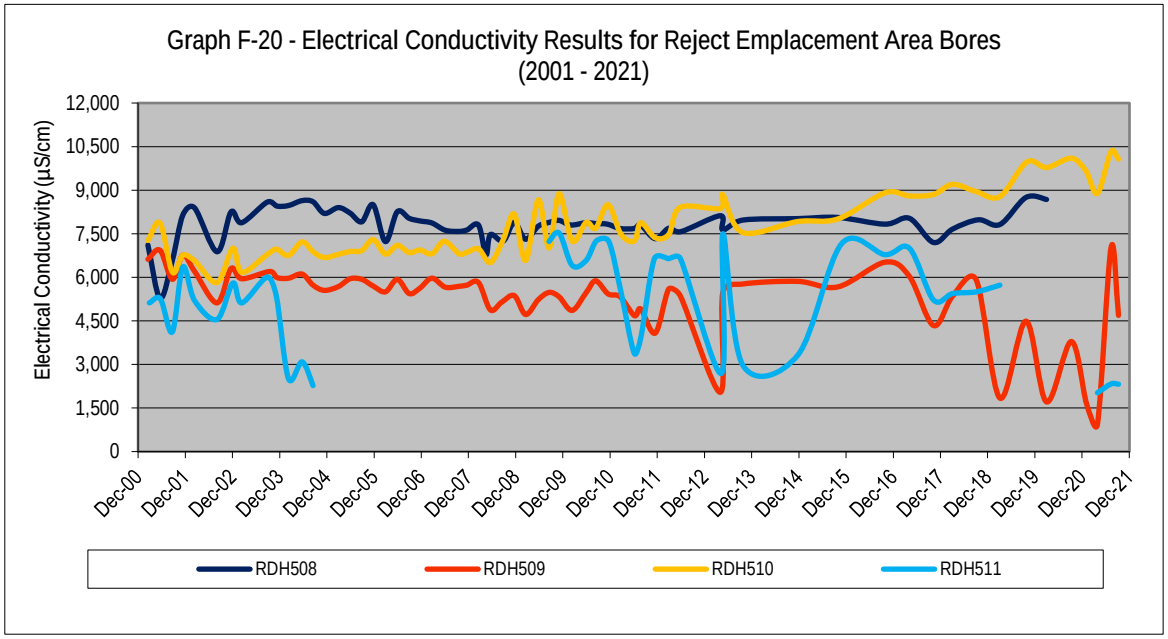
Graph E-17
Electrical Conductivity for Regolith Bores (1998-2021)



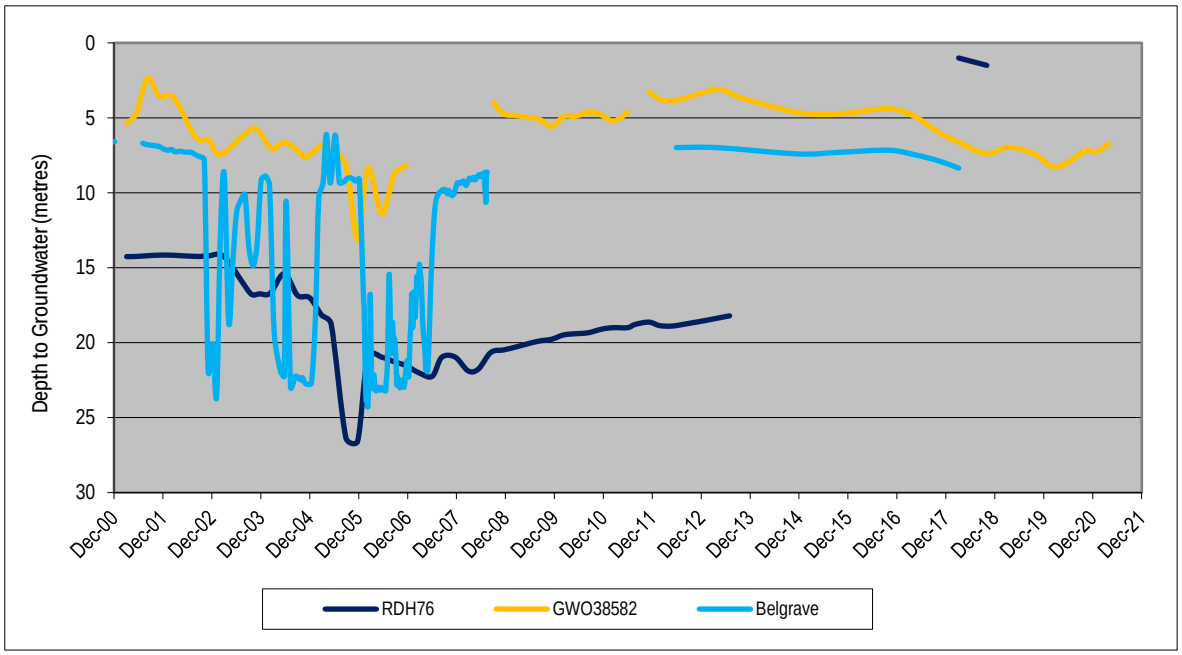
Graph E-18
Groundwater Level for Rejects Emplacement Area Bores (2001-2021)



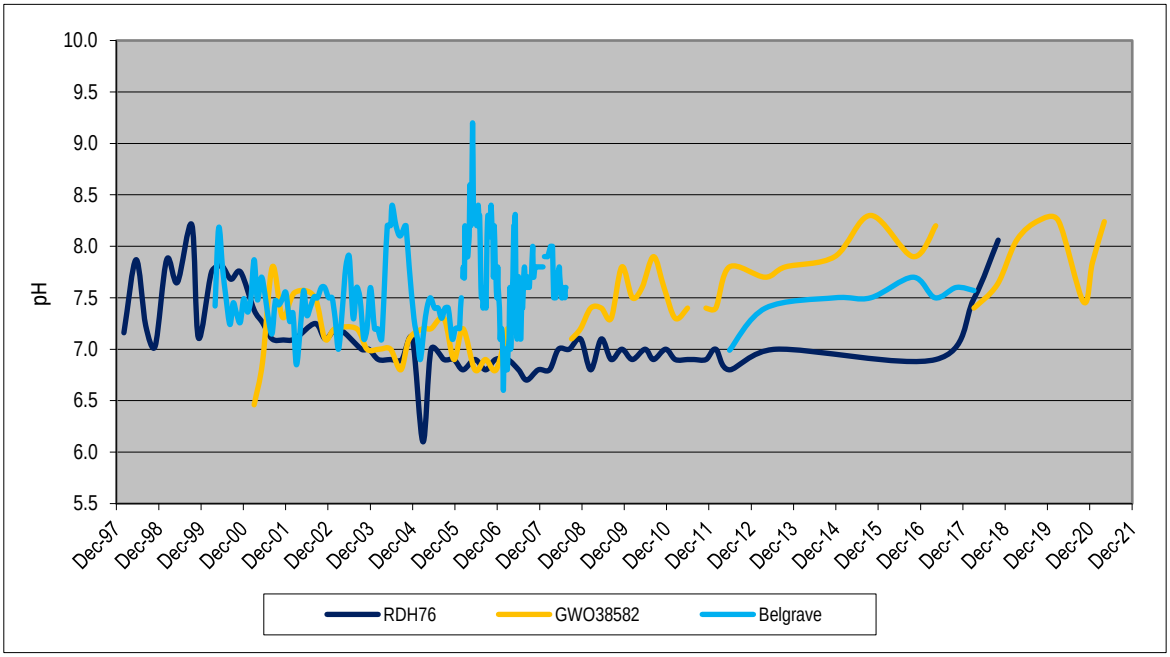
Graph E-19
pH for Rejects Emplacement Area Bores (2001-2021)



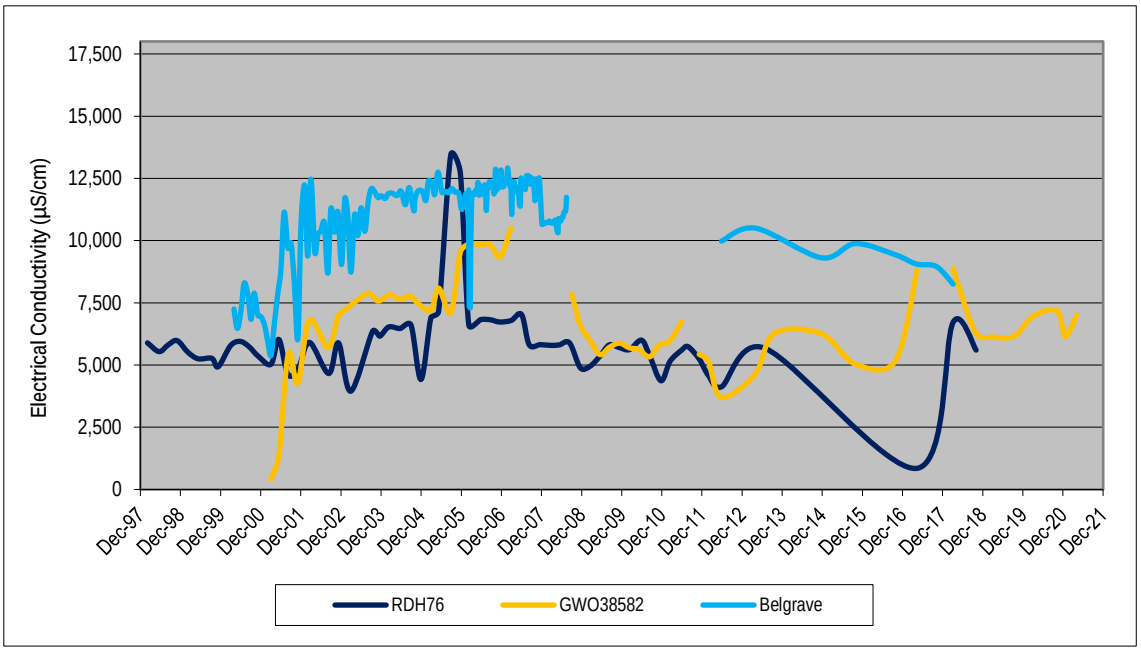
Graph E-20
Electrical Conductivity for Rejects Emplacement Area Bores (2001-2021)



Graph E-21
Groundwater Level for Landowner Property Bores (2001-2021)



Graph E-22
pH for Landowner Property Bores (1998-2021)



Graph E-23
Electrical Conductivity for Landowner Property Bores (1998-2021)

Table E-1 – Groundwater Monitoring Summary

Sample Location	Sample Date	Field EC (µS/cm)	Field pH	Depth to Water (m)
Hunter River Alluvium				
FRA1	28-Jan-21	1002	6.9	10.43
FRA1	28-Apr-21	933	7.1	10.38
FRA1	03-Aug-21	1014	7.1	10.35
FRA1	11-Oct-21	718	7.2	10.63
JOR1				
JOR1				
JOR1				
JOR1				
KAl1	28-Jan-21	556	7.1	11.18
KAl1	03-May-21	527	6.7	11.10
KAl1	03-Aug-21	601	6.7	11.05
KAl1	11-Oct-21	614	6.8	11.23
WAL2	28-Jan-21	2467	7.1	9.53
WAL2	26-Apr-21	2505	6.9	9.43
WAL2	02-Jul-21	2432	7.2	9.37
WAL2	11-Oct-21	2929	7.2	9.71
Dart Brook Alluvium				
ADN1	06-Jan-21	3360	7.0	6.23
ADN1	26-Apr-21	3060	7.0	5.75
ADN1	02-Aug-21	3440	6.8	5.47
ADN1				
DAN2	21-Jan-21	2905	7.0	6.32
DAN2	27-Apr-21	3200	6.9	4.92
DAN2	02-Jul-21	3110	6.9	4.39
DAN2				
WM1A	27-Jan-21	2448	7.1	7.43
WM1A	27-Apr-21	2350	7.3	6.63
WM1A	10-Aug-21	2379	7.3	6.03
WM1A	12-Oct-21	2677	8.6	6.03
Sandy Creek Alluvium				
BRO3	21-Jan-21			
BRO3	27-Apr-21			5.75
BRO3	26-Jul-21			

Sample Location	Sample Date	Field EC (µS/cm)	Field pH	Depth to Water (m)
BRO3	18-Oct-21			
COR3	15-Jan-21			
COR3	27-Apr-21			
COR3	04-Aug-21	3176	8.0	2.63
COR3	18-Oct-21	2334	8.2	2.71
GWO38412	27-Jan-21	1058	6.8	2.94
GWO38412	05-May-21	869	7.4	2.37
GWO38412	04-Aug-21	1067	6.5	4.23
GWO38412	13-Oct-21	1454	7.0	4.68
WM3	15-Jan-21	3780	6.8	6.84
WM3	27-Apr-21	3250	6.6	6.56
WM3	02-Jul-21	3250	6.9	6.48
WM3	18-Oct-21	3090	6.9	6.54
Staged Discharge Dam				
RDH505	14-Jan-21	12220	7.3	5.83
RDH505	26-Apr-21	11900	7.3	5.66
RDH505	10-Aug-21	10930	7.4	5.61
RDH505	11-Oct-21	12530	7.4	5.52
Coal Seams				
DDH183	22-Jan-21	8050	6.7	28.26
DDH183	05-May-21	8290	6.9	27.8
DDH183	29-Jul-21			
DDH183				
DDH193	11-Aug-21			
DDH193				
DDH193				
DDH193				
DDH212a	11-Aug-21			
DDH212a				
DDH212a				
DDH212a				
Kayuga 1	22-Jan-21	9250	6.7	12.99
Kayuga 1	05-May-21	8890	6.9	13.24
Kayuga 1	26-Jul-21	9730	6.8	13.22
Kayuga 1	08-Oct-21	8970	8.9	12.39

Sample Location	Sample Date	Field EC (µS/cm)	Field pH	Depth to Water (m)
Regolith				
CAS2	22-Jan-21	16170	6.6	41.56
CAS2	05-May-21	15590	6.7	40.43
CAS2	29-Jul-21	16640	6.7	38.68
CAS2	13-Oct-21	16230	6.2	37.15
CAS4	27-Jan-21	12440	6.6	27.28
CAS4	05-May-21	12450	6.8	27.25
CAS4	04-Aug-21	12170	6.7	27.3
CAS4	13-Oct-21	12590	6.8	27.1
JLON1	22-Jan-21	1979	8.4	13.61
JLON1	05-May-21	4200	7.0	13.76
JLON1	26-Jul-21	5200	7.1	13.81
JLON1	18-Oct-21			
TLON1	27-Jan-21			11.2
TLON1	05-May-21			11.24
TLON1	02-Jul-21			
TLON1				
Rejects Emplacement Area				
RDH508	26-Jul-21			
RDH508				
RDH508				
RDH508				
RDH508a	26-Jul-21			
RDH508a				
RDH508a				
RDH508a				
RDH509	03-Feb-21	1642	7.4	10.26
RDH509	28-Apr-21	942	7.6	10.2
RDH509	11-Aug-21	7020	7.1	10.16
RDH509	08-Oct-21	4690	7.3	10.27
RDH509a	03-Feb-21			
RDH509a	28-Apr-21	2743	7.0	14.53
RDH509a	11-Aug-21			14.5
RDH509a	08-Oct-21	4010	7.0	14.53
RDH510	29-Jan-21	9660	6.7	10.21

Sample Location	Sample Date	Field EC (µS/cm)	Field pH	Depth to Water (m)
RDH510	28-Apr-21	8890	6.9	10.28
RDH510	11-Aug-21	10330	6.1	10.45
RDH510	08-Oct-21	10070	6.9	10.53
RDH510a	29-Jan-21	10250	6.9	10.1
RDH510a	28-Apr-21	9890	7.0	10.19
RDH510a	11-Aug-21	10930	7.0	10.35
RDH510a	08-Oct-21	10510	6.9	10.44
RDH511	25-Jan-21			
RDH511	28-Apr-21	2024	7.7	8.1
RDH511	11-Aug-21	2328	7.7	8.07
RDH511	08-Oct-21	2320	8.0	8.17
RDH511a	29-Jan-21			
RDH511a	28-Apr-21	3030	7.4	8.1
RDH511a	11-Aug-21	6220	7.3	8.07
RDH511a	08-Oct-21	7120	7.2	8.17
Property Subsidence Management Plans				
Belgrave	26-Jul-21			
Belgrave				
Belgrave				
Belgrave				
GWO38582	22-Jan-21	6150	7.8	7.28
GWO38582	05-May-21	7010	8.2	6.73
GWO38582	29-Jul-21			
GWO38582	13-Oct-21			
Other Monitoring Bores				
Athlone	22-Jan-21	10460	6.9	7.72
Athlone	05-May-21	9930	6.9	7.38
Athlone	29-Jul-21			
Athlone	11-Oct-21			
BEL1	22-Jan-21	3440	6.8	5.54
BEL1	05-May-21	2226	7.4	4.25
BEL1	26-Jul-21	3230	7.3	4.34
BEL1	13-Oct-21	3740	7.3	4.43
CAD2	15-Jan-21	4500	6.5	12.07
CAD2	27-Apr-21	4500	7.8	11.87

Sample Location	Sample Date	Field EC (µS/cm)	Field pH	Depth to Water (m)
CAD2	02-Jul-21	4210	6.6	11.79
CAD2	18-Oct-21			
DDH124	27-Jan-21			14.39
DDH124	26-Apr-21			14.12
DDH124	29-Jul-21			14
DDH124				
DDH212b				
DDH212b				
DDH212b				
DDH212b				
DDH212c				
DDH212c				
DDH212c				
DDH212c				

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

Sample Location	Parameter	Minimum	Mean	Maximum	Variance
Hunter River Alluvium					
FRA1	pH	6.9	7.0	7.2	0.3
FRA1	EC	718	917	1014	296
JOR1*	pH				
JOR1*	EC				
KAI1	pH	6.7	6.8	7.1	0.3
KAI1	EC	527	575	614	87
WAL2	pH	6.9	7.1	7.2	0.3
WAL2	EC	2432	2583	2929	497
Dart Brook Alluvium					
ADN1	pH	6.8	6.9	7.0	0.2
ADN1	EC	3060	3287	3440	380
DAN2	pH	6.9	6.9	7.0	0.1
DAN2	EC	2905	3072	3200	295
WM1A	pH	7.1	7.6	8.6	1.6
WM1A	EC	2350	2464	2929	579
Sandy Creek Alluvium					
BRO3*	pH				
BRO3*	EC				
COR3	pH	8.0	8.1	8.2	0.2
COR3	EC	2334	2755	3176	842
GWO38412	pH	6.5	6.9	7.4	0.9
GWO38412	EC	869	1112	1454	585
WM3	pH	6.6	6.8	6.9	0.3
WM3	EC	3090	3343	3780	690
Staged Discharge Dam					
RDH505	pH	7.3	7.3	7.4	0.1
RDH505	EC	10930	11895	12530	1600
Coal Seams					
DDH183	pH	6.7	6.8	6.9	0.1
DDH183	EC	8050	8170	8290	240
DDH193*	pH				
DDH193*	EC				
DDH212(a)*	pH				

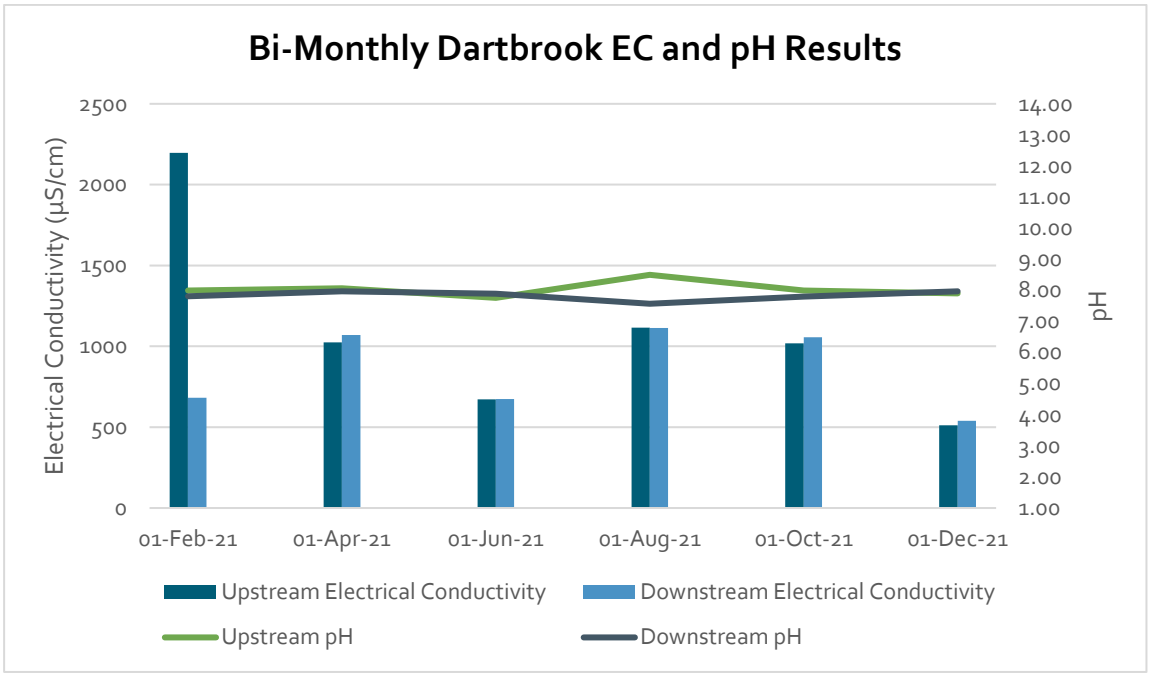
Sample Location	Parameter	Minimum	Mean	Maximum	Variance
DDH212(a)*	EC				
Kayuga 1	pH	6.7	7.3	8.9	2.1
Kayuga 1	EC	8890	9210	9730	840
Regolith					
CAS2	pH	6.2	6.5	6.7	0.5
CAS2	EC	15590	16158	16640	1050
CAS4	pH	6.6	6.7	6.8	0.2
CAS4	EC	12170	12413	12590	420
JLON1	pH	7.0	7.5	8.4	1.4
JLON1	EC	1979	3793	5200	3221
TLON1*	pH				
TLON1*	EC				
Rejects Emplacement Area					
RDH508*	pH				
RDH508*	EC				
RDH508a*	pH				
RDH508a*	EC				
RDH509	pH	7.1	7.4	7.6	0.5
RDH509	EC	942	3574	7020	6078
RDH509a	pH	7.0	7.0	7.0	0.0
RDH509a	EC	2743	3376.5	4010	1267
RDH510	pH	6.1	6.6	6.9	0.9
RDH510	EC	8890	9738	10330	1440
RDH510a	pH	6.9	7.0	7.0	0.1
RDH510a	EC	9890	10395	10930	1040
RDH511	pH	7.7	7.8	8.0	0.3
RDH511	EC	2024	2224	2328	304
RDH511a	pH	7.2	7.3	7.4	0.2
RDH511a	EC	3030	5457	7120	4090
Property Subsidence Management Plans					
Belgrave*	pH				
Belgrave*	EC				
GWO38582	pH	7.8	8.0	8.2	0.4
GWO38582	EC	6150	6580	7010	860

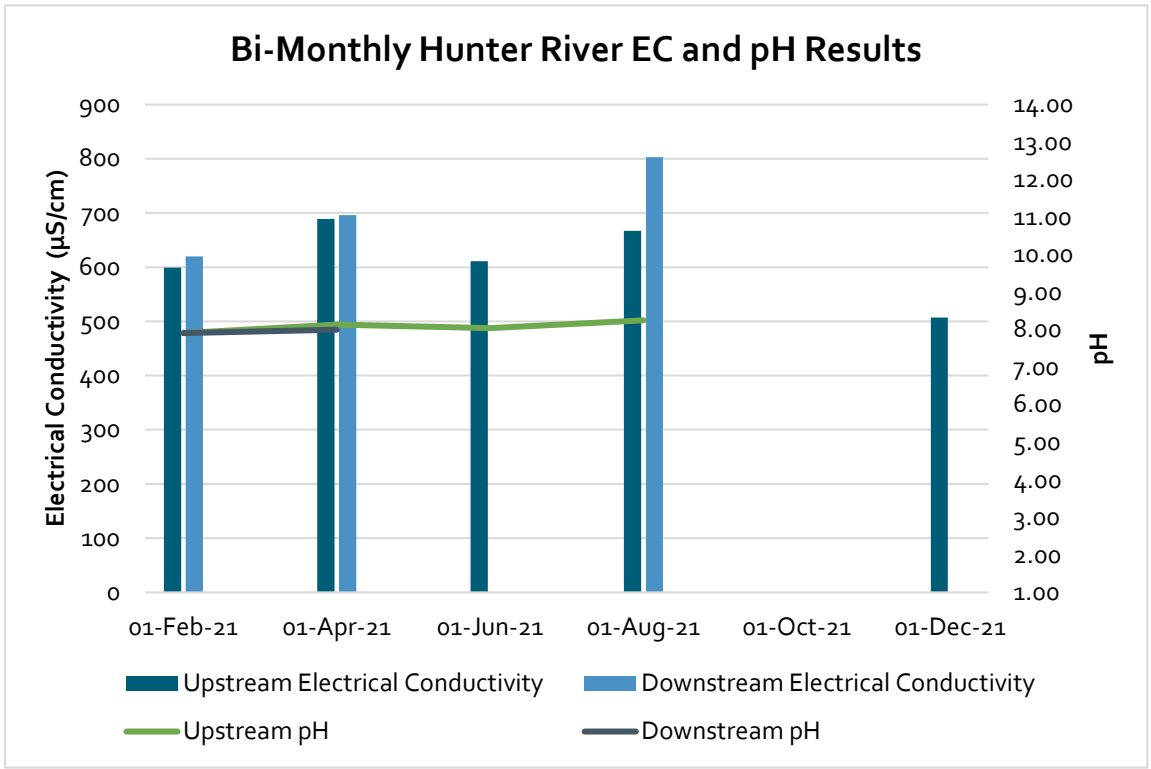
Sample Location	Parameter	Minimum	Mean	Maximum	Variance
Other Bore Holes					
Athlone	pH	6.9	6.9	6.9	0.0
Athlone	EC	9930	10195	10460	530
BEL1	pH	6.8	7.2	7.4	0.6
BEL1	EC	2226	3159	3740	1514
CAD2	pH	6.5	7.0	7.8	1.2
CAD2	EC	4210	4403	4500	290
DDH124*	pH				
DDH124*	EC				
DDH212b*	pH				
DDH212b*	EC				
DDH212c*	pH				
DDH212c*	EC				

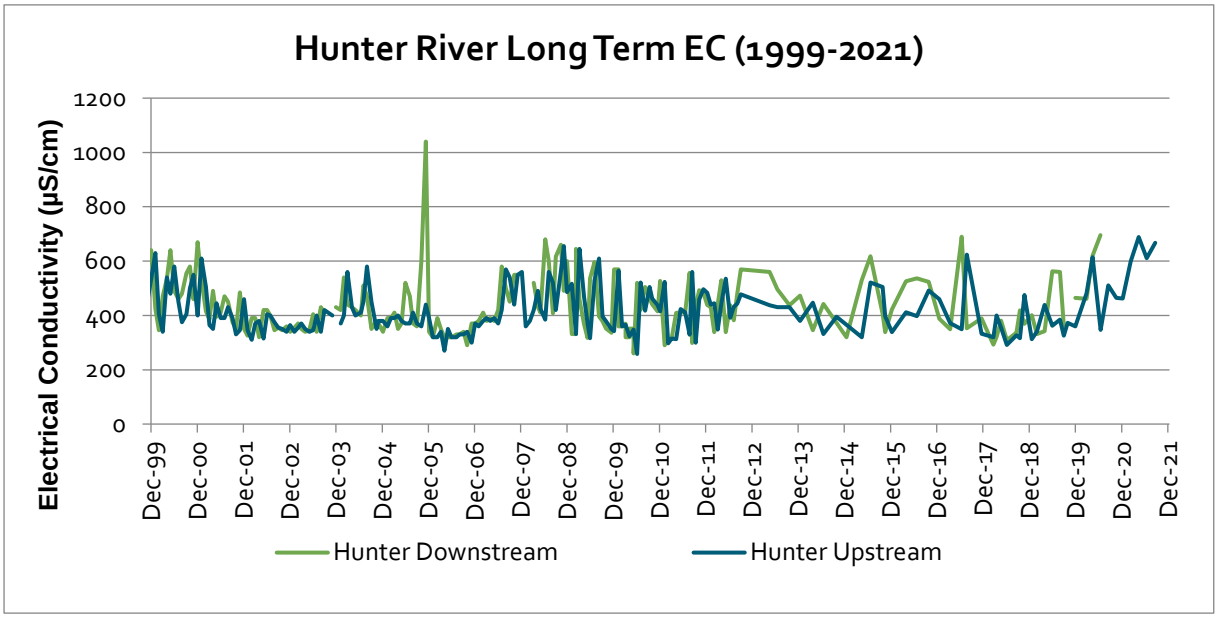
** Bore was dry or otherwise unable to be sampled in 2021*

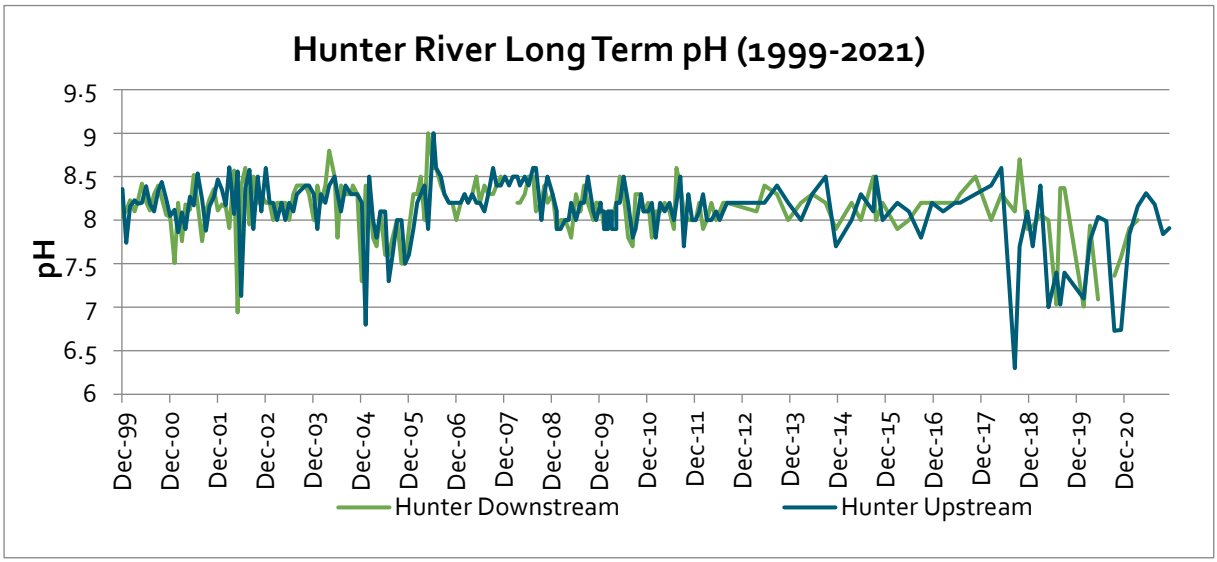
APPENDIX F

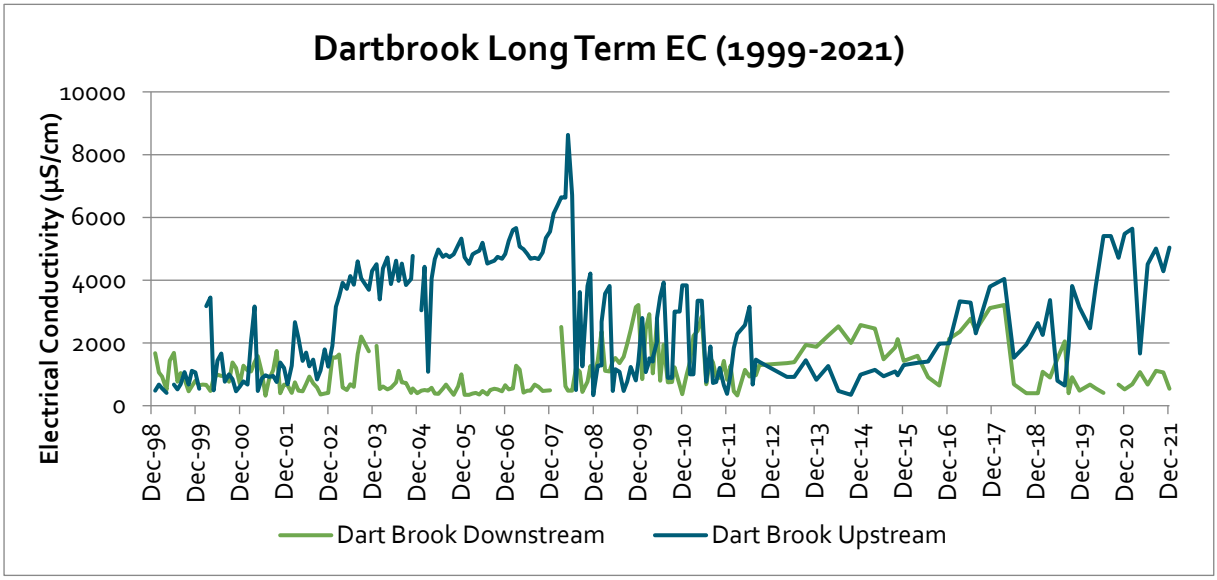
SURFACE WATER MONITORING SUMMARY


Bi-Monthly Dartbrook EC and pH Results
Electrical Conductivity (µS/cm)
2500
2000
1500
1000
500
0
14.00
13.00
12.00
11.00
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
pH
01-Feb-21
01-Apr-21
01-Jun-21
01-Aug-21
01-Oct-21
01-Dec-21
Upstream Electrical Conductivity
Downstream Electrical Conductivity
Upstream pH
Downstream pH


Bi-Monthly Hunter River EC and pH Results
Electrical Conductivity (µS/cm)
900
800
700
600
500
400
300
200
100
0
14.00
13.00
12.00
11.00
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
pH
01-Feb-21
01-Apr-21
01-Jun-21
01-Aug-21
01-Oct-21
01-Dec-21
Upstream Electrical Conductivity
Downstream Electrical Conductivity
Upstream pH
Downstream pH


Hunter River Long Term EC (1999-2021)
Electrical Conductivity (µS/cm)
1200
1000
800
600
400
200
0
Dec-99
Dec-00
Dec-01
Dec-02
Dec-03
Dec-04
Dec-05
Dec-06
Dec-07
Dec-08
Dec-09
Dec-10
Dec-11
Dec-12
Dec-13
Dec-14
Dec-15
Dec-16
Dec-17
Dec-18
Dec-19
Dec-20
Dec-21
Hunter Downstream
Hunter Upstream


Hunter River Long Term pH (1999-2021)
pH
9.5
9
8.5
8
7.5
7
6.5
6
Dec-99
Dec-00
Dec-01
Dec-02
Dec-03
Dec-04
Dec-05
Dec-06
Dec-07
Dec-08
Dec-09
Dec-10
Dec-11
Dec-12
Dec-13
Dec-14
Dec-15
Dec-16
Dec-17
Dec-18
Dec-19
Dec-20
Hunter Downstream
Hunter Upstream


Dartbrook Long Term EC (1999-2021)
Electrical Conductivity (µS/cm)
10000
8000
6000
4000
2000
0
Dec-98
Dec-99
Dec-00
Dec-01
Dec-02
Dec-03
Dec-04
Dec-05
Dec-06
Dec-07
Dec-08
Dec-09
Dec-10
Dec-11
Dec-12
Dec-13
Dec-14
Dec-15
Dec-16
Dec-17
Dec-18
Dec-19
Dec-20
Dec-21
Dart Brook Downstream
Dart Brook Upstream

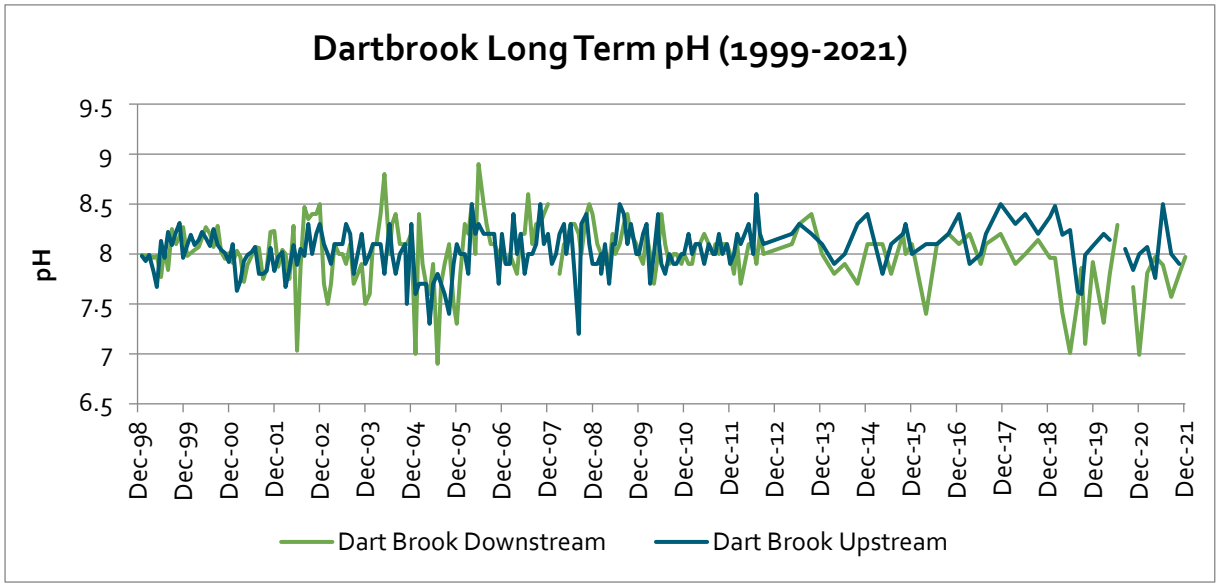

Dartbrook Long Term pH (1999-2021)
pH
9.5
9
8.5
8
7.5
7
6.5
Dec-98
Dec-99
Dec-00
Dec-01
Dec-02
Dec-03
Dec-04
Dec-05
Dec-06
Dec-07
Dec-08
Dec-09
Dec-10
Dec-11
Dec-12
Dec-13
Dec-14
Dec-15
Dec-16
Dec-17
Dec-18
Dec-19
Dec-20
Dec-21
Dart Brook Downstream
Dart Brook Upstream

Table 1 Annual Surface Water Monitoring Results (August 2021)

Sample Location 2021	pH - field	Electrical Conductivity µS/cm - field	Alkalinity - Hydroxide mg $CaCO_3$/L	Alkalinity - Carbonate mg $CaCO_3$/L	Alkalinity - Bicarbonate mg $CaCO_3$/L	Chloride mg/L	Calcium - total mg/L	Magnesium - total mg/L	Sulfates mg/L	Sodium - total mg/L	Potassium - total mg/L	Nitrates mg N/L	Phosphorus - Reactive mg/L	Biochemical Oxygen Demand mg/O_2/L	MBAS mg/L	Faecal Coliforms cols/100mL	Total Suspended Dissovled Solids @105C mg/L	Total Dissolved Solids - calculation mg/L
Dartbrook Downstream	7.57	1114	<1	<1	294	182	68	52	29	73	2	0.5	0.16	N/A	N/A	<9	21	750
Dartbrook Upstream	8.5	1116	<1	<1	264	198	69	52	22	74	2	0.3	0.15	N/A	N/A	<9	12	750
E2	9.12	15970	<1	3940	4940	1020	8	9	45	4250	38	0.1	0.15	N/A	N/A	N/A	86	10700
Eastern Holding Dam	9.61	2930	<1	541	566	209	1	2	<1	687	6	0	0.53	N/A	0	N/A	91	1960
Evaporation Tailing Dam	9.5	1128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<0.01	0.12	N/A	N/A	N/A	117	760
Hunter Downstream	7.96	803	<1	<1	283	75	58	37	39	52	2	0.1	0.07	N/A	N/A	<9	10	540
Hunter Upstream	8.25	667	<1	7	271	40	54	32	44	44	2	0	0.04	N/A	N/A	<9	<5	450
REA	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry
REA Stg 4 Dam	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry	*Dry
Sewage Treatment Plant	9.33	2960	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.1	1.57	12	N/A	N/A	62	1980
SDD	9.57	19570	<1	7640	3340	1250	4	11	23	4980	41	0	0.1	N/A	<0.1	N/A	32	13110
WHD	9.34	2258	<1	239	628	190	3	5	<1	510	6	<0.01	0.16	N/A	<0.1	N/A	30	1510
WSD	7.91	435	<1	<1	214	7	32	10	<1	36	10	<0.01	0.06	N/A	N/A	N/A	12	290

APPENDIX G

WATER BALANCE SCHEMATIC

Water Balance Schematic