DARTBROOK MINE

ANNUAL REVIEW 2022

for Australian Pacific Coal

31 March 2023

DOCUMENT CONTROL

Document Status

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Annual Review Distribution

Distribution List	
1.	NSW Department of Planning and Environment (DPE)
2.	NSW Department of Regional NSW – Resources Regulator (RR)
3.	Muswellbrook Shire Council (MSC)
4.	Upper Hunter Shire Council (UHSC)
5.	Dartbrook Community Consultative Committee (CCC) Members

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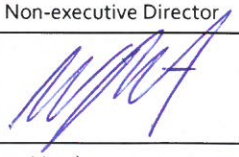
APPENDICES

Australian Pacific Coal

Title Block

Name of Operation	Dartbrook Mine
Name of Operator	AQC Dartbrook Management Pty Ltd
Development Consent	DA 231-07-2000
Name of Holder of Development Consent	AQC Dartbrook Management Pty Ltd
Mining Leases	CL386, ML1497, ML1381, ML1456
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 Ltd
Annual Review Start Date	1 January 2022
Annual Review End Date	31 December 2022
I, Jeff Beatty, 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	Jeff Beatty
Title of Authorised Reporting Officer	Non-executive Director
Signature of Authorised Reporting Officer	
Date	31 March 2023

1. STATEMENT OF COMPLIANCE

This Annual Review has been prepared to provide a summary of the performance of the Dartbrook Mine (Dartbrook) over the period 1 January – 31 December 2022 (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.

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 is located approximately 10 kilometres (km) north-west of Muswellbrook and 4.5 km south-west of Aberdeen (see **Figure 1** and **Figure 2**) in the Upper Hunter region. Dartbrook is managed by AQC Dartbrook Management Pty Ltd (AQC), which is the holder of Development Consent DA 231-07-2000.

DA 231-07-2000 authorises the carrying out of underground coal mining and ancillary surface activities at Dartbrook until 5 December 2027. Longwall mining was carried out by the previous owner from 1993 until October 2006. Dartbrook was placed under care and maintenance at the end of 2006 and no operational activities have been undertaken since that time.

Activities at Dartbrook during care and maintenance are generally limited to the maintenance of:

- The Hunter Tunnel and Kayuga interseam drift, which connect to the underground mine entrances;
- The West Site, which is located west of the New England Highway and includes the administration office, workshop, mine portals and water management infrastructure (see **Figure 3**); and
- The East Site, which is located east of the New England Highway and includes 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 231-07-2000;
- Mining Lease (ML) and Exploration Licence (EL) conditions; and
- Environment Protection Licence (EPL) 4885.

Table 2 shows where the regulatory requirements relevant to this Annual Review have been addressed in this document. **Figure 5** shows the location of mining authorities held at Dartbrook.

Section 8 of this Annual Review serves as the annual rehabilitation report required under AQC's mining leases. **Table 2** lists the mining lease conditions relevant to annual rehabilitation reporting.

Table 2 Development Consent and Mining Lease requirements for Annual Review

Condition	Requirement	Where Addressed
Development Consent DA 231-07-2000		
9.2(a)	**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**
9.2(a)(i)	(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;	**Sections 4 & 8**

Condition	Requirement	Where Addressed
9.2(a)(ii)	(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 6, 7 & 9.1**
9.2(a)(iii)	(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;	**Section 11**
9.2(a)(iv)	(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, 7 & 9.2.3**
9.2(a)(v)	Identify any trends in the monitoring data over the life of the development;	**Sections 6 & 7**
9.2(a)(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 & 7**
9.2(a)(vii)	Describe what measures will be implemented over the next calendar year to improve the environmental performance of the development.	**Sections 6, 7 and 12**
9.2(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**
Mining Leases (CL386, ML1381, ML1456 and ML1497)		
13(2)(a)	The holder of a mining lease must prepare a report (an annual rehabilitation report) for the mining lease that includes— A description of the rehabilitation undertaken over the annual reporting period;	**Section 8**
13(2)(b)	A report demonstrating the progress made through the phases of rehabilitation provided for in the forward program applying to the reporting period;	**Section 8**

Condition	Requirement	Where Addressed
13(2)(c)	A report demonstrating progress made towards the achievement of the following— (i) the objectives set out in the rehabilitation objectives statement; (ii) the criteria set out in the rehabilitation completion criteria statement; (iii) for large mines—the final land use as spatially depicted in the final landform and rehabilitation plan.	**Section 8**

2.3 PERFORMANCE SUMMARY

No coal mining or coal processing activities were undertaken at Dartbrook during the reporting period. The specific aspects of Dartbrook's 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 bord and pillar underground mining within the Kayuga Seam and to extend the approval period for 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 would have been 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 (LEC).

The legal proceedings associated with MOD7 concluded in March 2022, with the LEC deciding in AQC's favour. As a result, the approved duration of mining operations under DA 231-07-2000 was extended by five years to 5 December 2027.

Other consultation with neighbours and community stakeholders continued during 2022 as discussed in **Section 9**. The Dartbrook Mine Community Consultative Committee (CCC) continued to meet during the reporting period, with meetings held in March and November 2022. As noted in **Section 9.1**, one complaint was received during the reporting period.

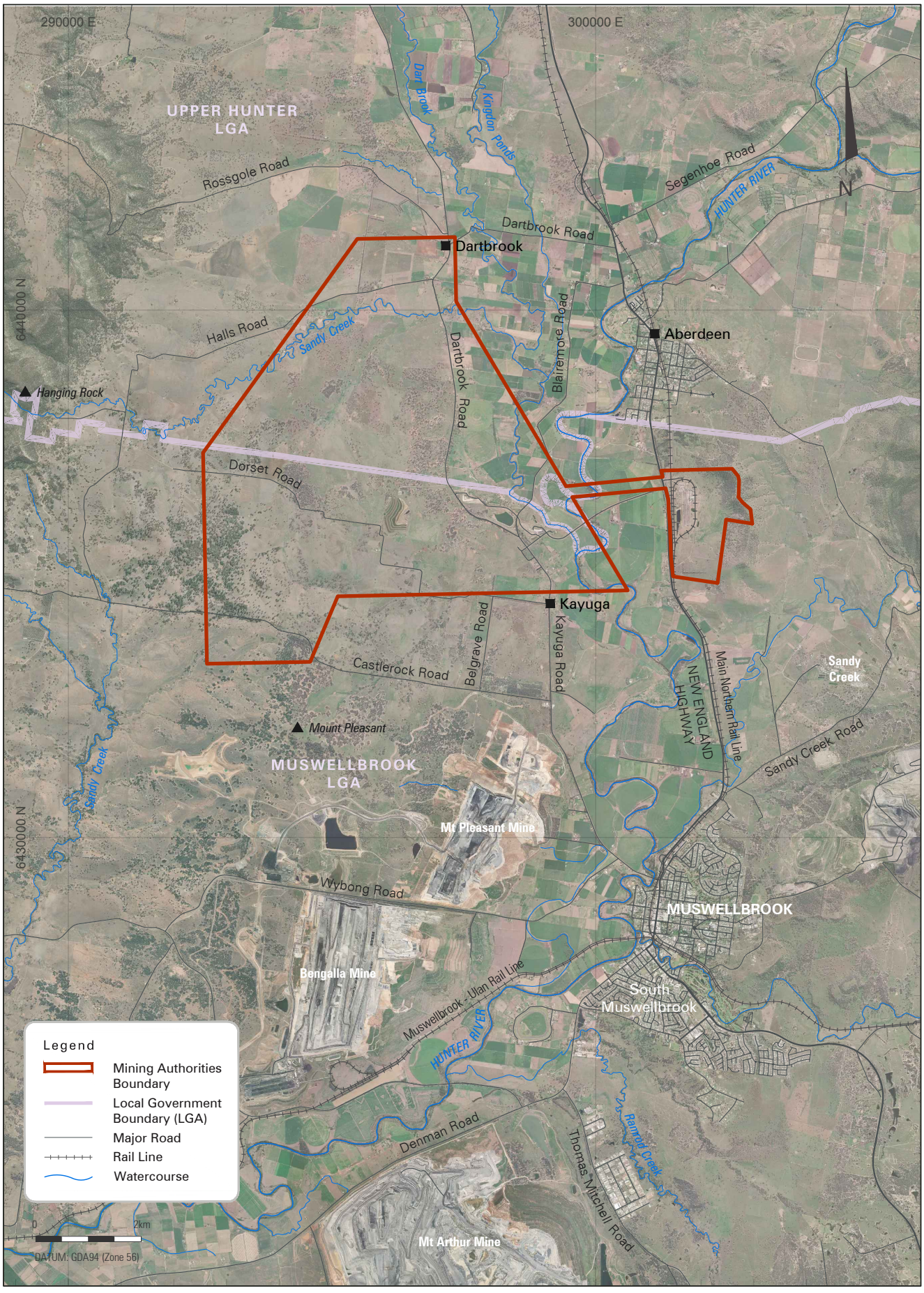
2.4 DARTBROOK MINE CONTACTS

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

AQC Contacts	
General Manager	Jeff Beatty
Statutory Mine Manager	John Swan
Environment Manager	Geoff Mackenzie
Site Contact Details	
Dartbrook Mine Address	Dartbrook Mine Stair Street, Kayuga NSW 2333
Dartbrook Postal Address	PO Box 517, Muswellbrook NSW 2333
Phone No.	02 6540 8875

AQC Contacts	
Facsimile No.	02 6541 1935
Dartbrook Care & Maintenance Contractor Phone No.	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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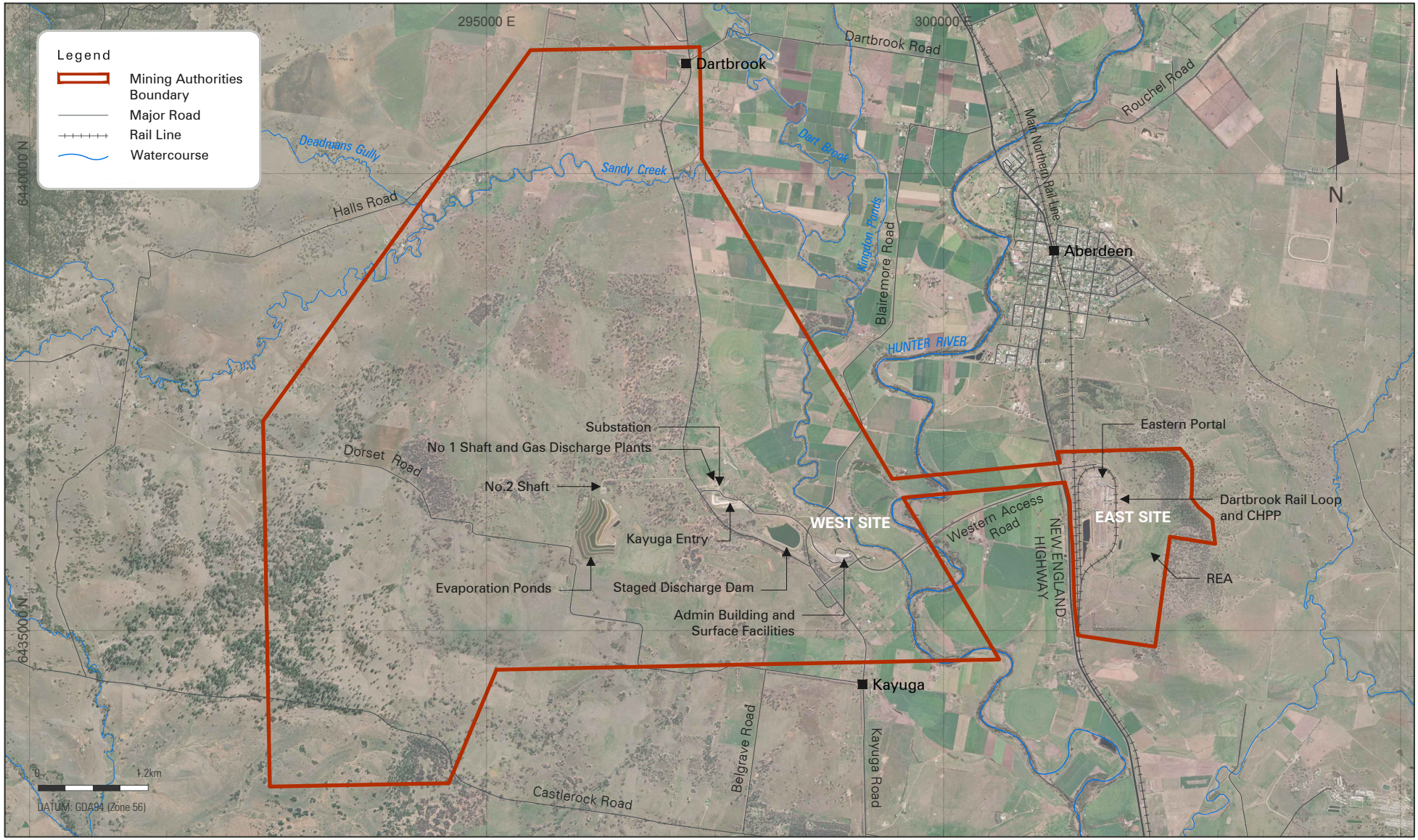

JBA 2188 DAR - F 02 EXISTING SITE LAYOUT (30/03/2023)

DARTBROOK MINE

Existing Site Layout

FIGURE 2

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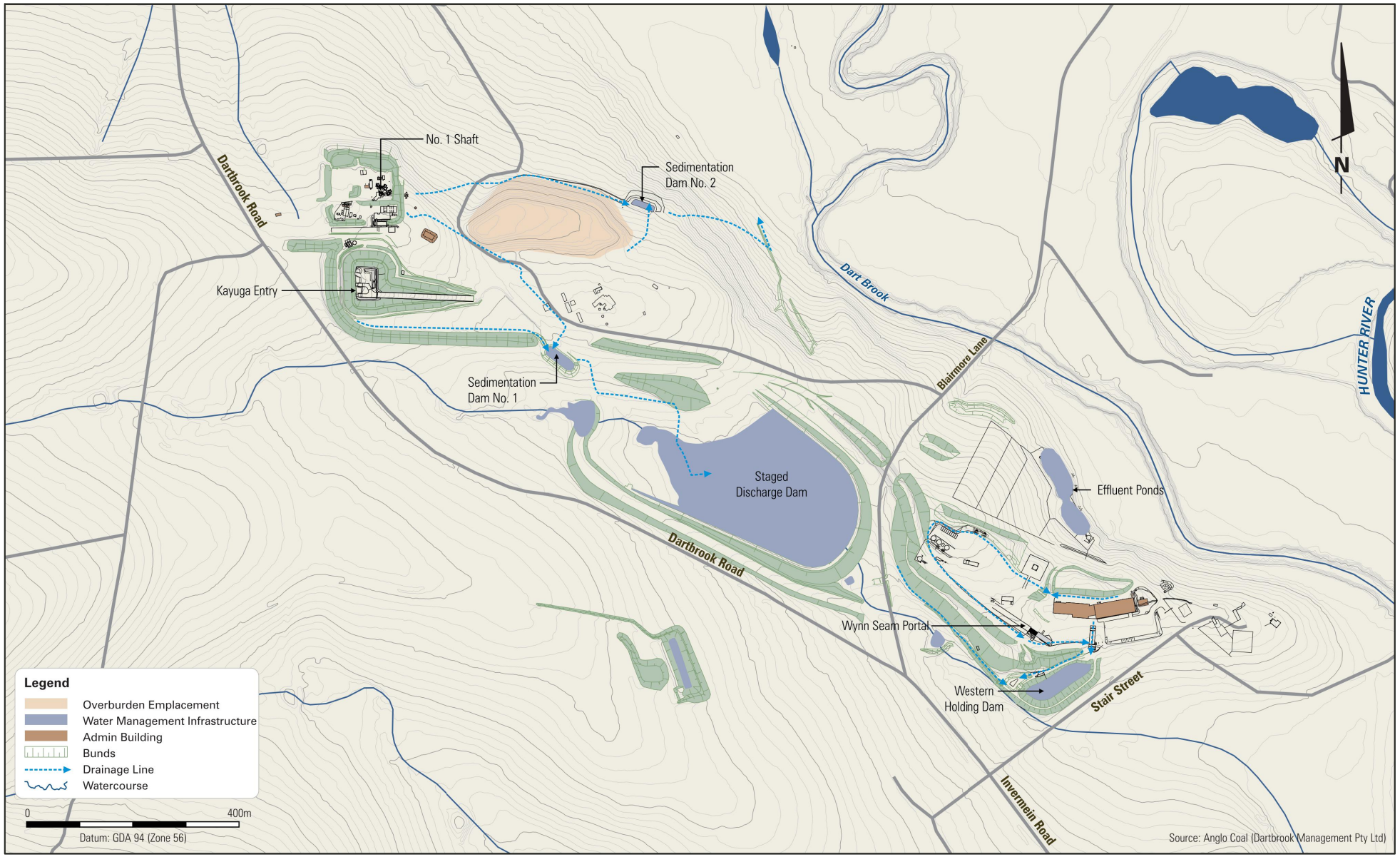


JBA 2188 DAR - F 03 EXISTING SITE LAYOUT (WEST) (25/02/2022)

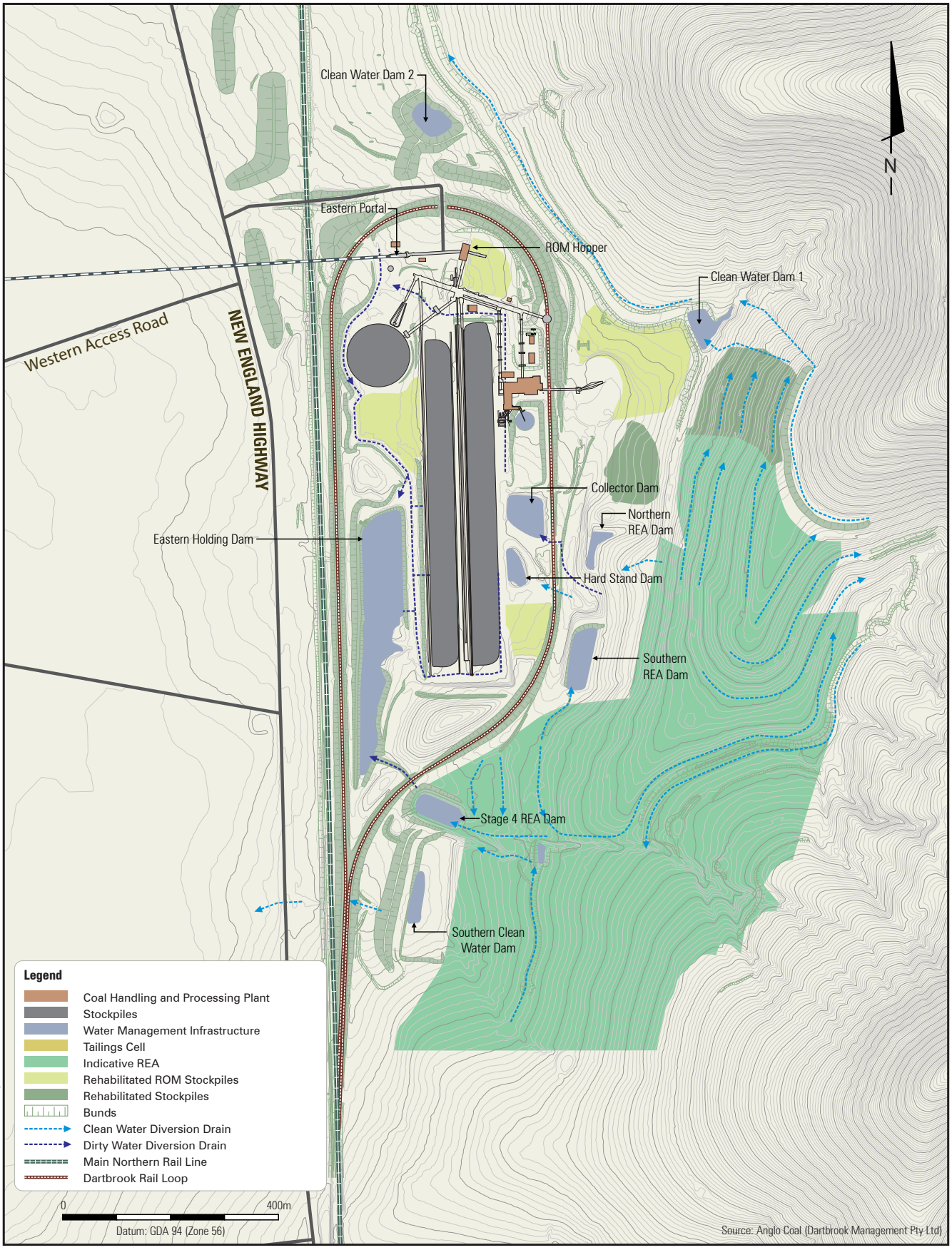
DARTBROOK MINE

Australian Pacific Coal

JAMES BAILEY & ASSOCIATES
Environmental and Planning Consultants

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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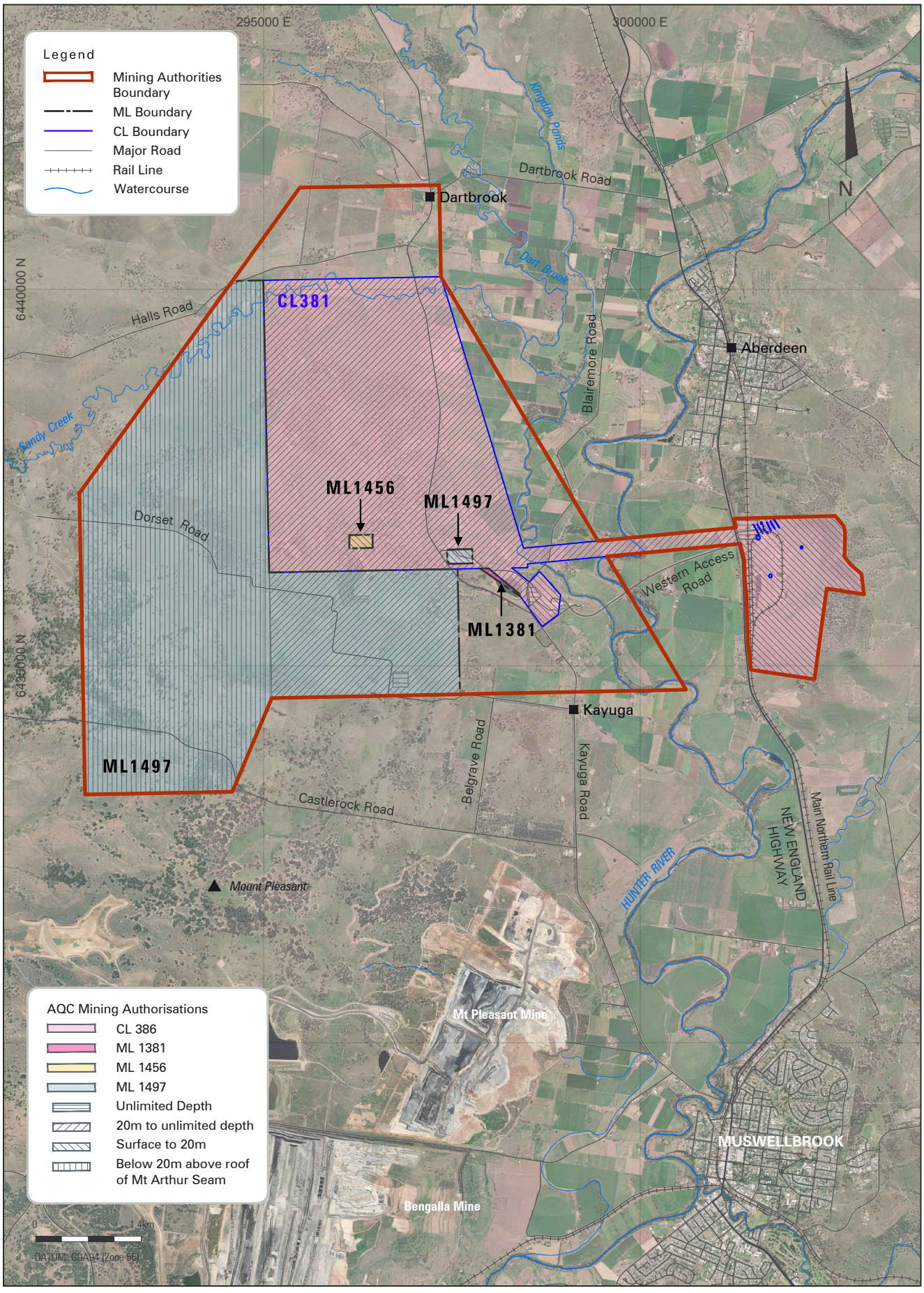
DARTBROOK MINE

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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Environmental and Planning Consultants

3. APPROVALS SUMMARY

3.1 OVERVIEW

Table 4 lists the Development Consent, Leases & Licences that apply to the management of Dartbrook Mine.

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	13/08/2024	Active	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	14/08/2023	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

*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 that were implemented during the reporting period.

The following management plans were updated and submitted for DPE approval during the reporting period:

- Archaeology and Cultural Heritage Management Plan;
- Erosion and Sediment Control Plan;
- Flora and Fauna Management Plan;
- Air Quality and Greenhouse Gas Management Plan;
- Landscape and Lighting Management Plan; and
- Noise Management Plan.

These updated management plans are expected to be approved during the next reporting period and will supersede the versions listed in **Table 5**. Once approved, the Air Quality and Greenhouse Gas Management Plan will replace the current Dust Management Plan.

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

Management Plan/Program	Approval Date
Erosion and Sediment Control Management Plan	21/10/2014
Flora and Fauna Management Plan	02/11/2011
Land Management Plan	27/01/2002
Landowner Communication and Consultation Plan	09/12/2002
Landscape and Lighting Management Plan	02/11/2011
Longwall Subsidence Management Plan(s)*	22/13/2003
Noise Management Plan*	08/11/2007
Property Subsidence Management Plans*	22/12/2003
Pollution Incident Response Management Plan	16/08/2018
Rehabilitation Management Plan	N/A
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

Dartbrook Mine remained under care and maintenance throughout the reporting period. As shown in **Table 6**, there was no coal production, processing or transportation 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 2022. Topsoil and overburden continue to be stockpiled at suitable locations onsite. No topsoil or overburden was moved or actively used in 2022.

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 (2021)	Actual Quantity (2022)	Forecast Quantity (2023)
Waste Rock / Overburden	Mbcm	N/A	0	0	0.023
ROM Coal	Mt	6 Mtpa	0	0	0.84
Coarse Reject	Mt	N/A	0	0	0.21
Fine Reject	Mt	N/A	0	0	0
Product Coal	Mt	N/A	0	0	0.63

Table 7 Topsoil and Overburden Stockpile Status

Activity / Area	Cumulative Production (t)		
	Start of Period 01/01/2022	End of Period 31/12/2022	End of next period 31/12/2023
Topsoil Stripped	0	0	2,253
Topsoil used / spread	0	0	0
Topsoil Stockpile	14,780	14,780	17,033
Overburden Stockpiles and Bunds	655,747	655,747	679,190

4.2.2 Operations Summary

Care and maintenance activities were conducted in accordance with the following plans:

- '*Mining Operations Plan: Continuation of Care and Maintenance January 2021 – December 2022*' (Hansen Bailey, 2020); and
- '*Dartbrook Mine: Rehabilitation Management Plan*' (JBA, 2022).

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

A limited surface equipment fleet was used for care and maintenance activities during the reporting period. The fleet included a diesel Load Haul Dump (LHD) mobile plant and a Driftrunner underground diesel vehicle for underground access and emergency purposes.

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 2022. 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 undertaken by Douglas Partners in July 2022. 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 low.

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 2021	Quantity in 2022
General Waste - Non-hazardous (t)	Landfill	6.04	9.995
Scrap Metal (t)	Recycled	0	1.5
Office Paper and Co-mingled Recyclables (t)	Recycled	0.4	0.015
Hazardous Waste – Sewage Sludge (Litres)	Treatment	0	0
Waste Oil (Litres)	Recycled / Treatment	0	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 2022.

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

Stockpile	Coal Type	Capacity (Tonnes Approx.)	Status
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 concluded in March 2022, resulting in extension of approved mining operations until 5 December 2027. Dartbrook is currently planning for recommencement of mining operations in the next reporting period. Dartbrook will update the necessary management plans required prior to recommencement of construction and mining.

5. ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

On 13 September 2021, AQC Dartbrook Management Pty Ltd (AQC) received 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. The directions in the Section 240 Notice were satisfied during the reporting period.

No regulatory authorities provided comments on the previous year's 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 2022.

Table 10 provides a summary of the environmental management actions undertaken during 2022.

Table 10 Environmental Management Overview

Aspect	Performance during 2022	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 in accordance with the Dust Management Plan (see **Section 6.2**).
Greenhouse	91,680 tonnes of CO_2 equivalent gas (CO_2-e) was emitted (Scope 1 – 2) during the 2021/22 reporting period.	Decrease in CO_2-e emissions on site compared to 2020/21 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, Dartbrook Mine generally uses data from Met-02 due to the availability of long-term data (from 1995 to the present). However, Met-02 experienced technical faults during the reporting period that affected its rainfall and temperature measurements. For this Annual Review, rainfall and temperature data for 2022 has been sourced from the Bureau of Meteorology's (BOM) meteorological station at Scone Airport (Station 061363).

6.2.2 Environmental Performance

Rainfall

During the reporting period, a total of 826 mm of rainfall was recorded by the BOM's Scone Airport meteorological station over the 147 rain days. This was lower than the total rainfall recorded by Met-02 in 2021 (1,028.2 mm) and 2020 (842.8 mm). Notwithstanding, the total rainfall in 2022 was substantially above the long-term average of 620.7 mm. An annual rainfall summary is provided in **Table 11**, with a further comparison to long-term monthly averages included in **Appendix B**.

Temperature

Table 12 presents a summary of the daily maximum temperatures measured by the BOM's Scone Airport meteorological station. February was the warmest month in 2022 with a mean daily maximum of 29.5°C whereas July was the coldest month with a mean daily maximum of 16.0°C.

Table 11 Rainfall Summary

Month	Rainfall (mm)	Cumulative Rainfall (mm)
January	101.2	101.2
February	45.2	146.4
March	129.8	276.2
April	18.4	294.6
May	37.2	331.8
June	17.0	348.8
July	75.2	424.0
August	75.0	499.0
September	97.4	596.4
October	139.2	735.6
November	80.0	815.6
December	10.4	826.0

BOM Scone Airport used as representative data due to technical difficulties at Met-02.

Table 12 Monthly Maximum Temperatures

Month	Lowest Maximum Temperature (°C)	Mean Maximum Temperature (°C)	Highest Maximum Temperature (°C)
January	19.5	29.4	33.9
February	23.1	29.5	35.9
March	20.6	25.6	32.0
April	17.9	23.9	28.7
May	15.0	19.8	26.4
June	13.3	16.4	20.9
July	11.5	16.0	18.8
August	13.8	18.2	22.5
September	12.3	19.9	22.7
October	16.5	22.8	27.5
November	17.3	25.5	33.3
December	22.4	28.7	35.7
Average	**16.9**	**23.0**	**28.2**

BOM Scone Airport used as representative data due to technical difficulties at Met-02.

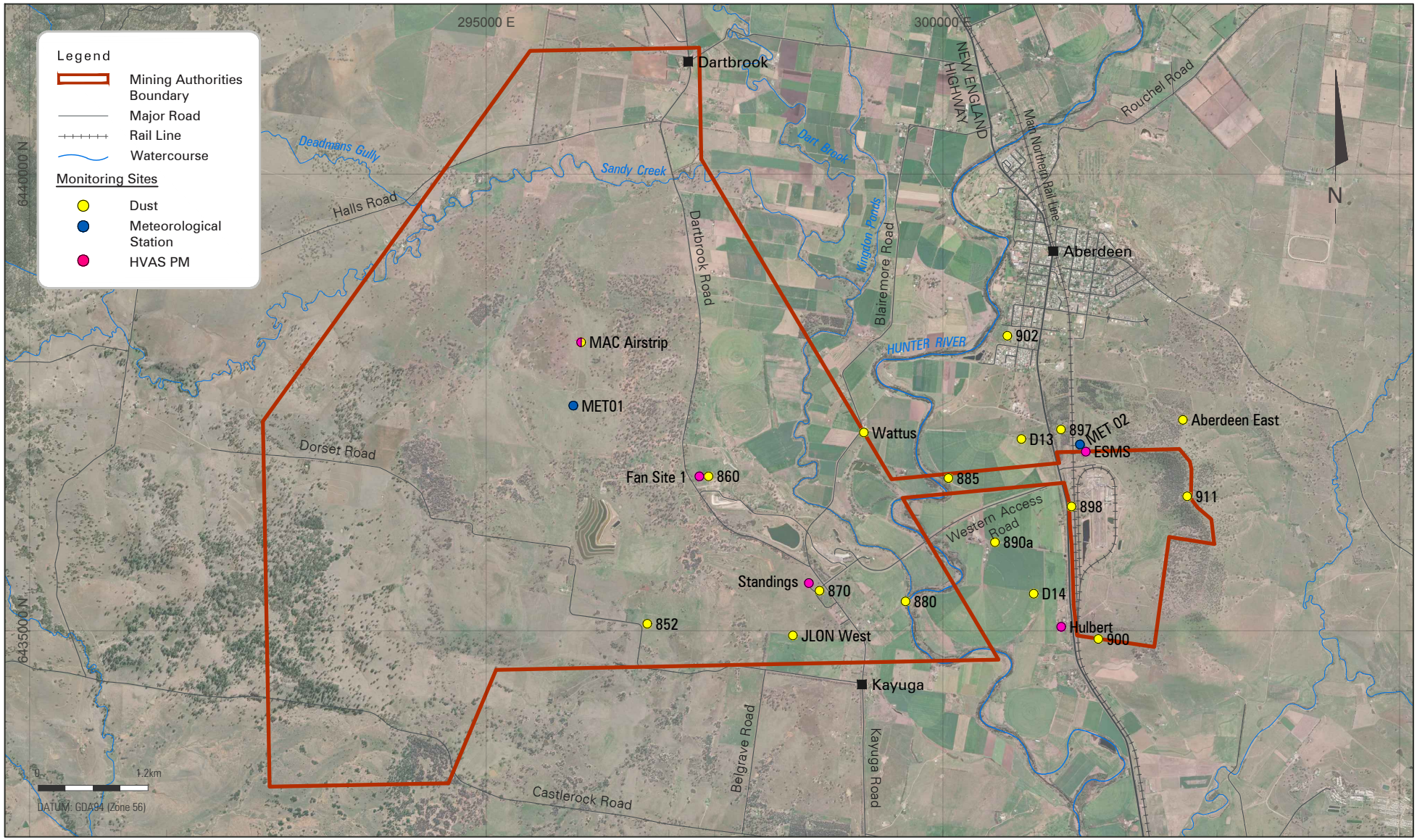
Wind Speed & Direction

In 2022, prevailing winds were generally consistent with long term regional trends.

Table 13 provides a summary of the data captured at Dartbrook Mine in 2022. Monthly wind roses compiled from Met-02 are provided in **Appendix B**.

Table 13 Wind Summary

Month	% Period with Wind Speed <3.0 m/s	% Period with Wind Speed >3.0 m/s	Predominant Wind Direction
January	61.0	39.0	S
February	55.3	44.7	SSE
March	65.9	34.1	S
April	72.7	27.3	S
May	72.5	27.5	S
June	64.3	35.7	NNW
July	69.5	30.5	S
August	66.2	33.8	N
September	63.6	36.4	S
October	68.2	31.8	SSE
November	62.9	37.1	N
December	55.0	45.0	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 MOD7 (as approved by the LEC). 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 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) [d]	Annual (total)	4 (g/m^2/month)
	Annual (increase over existing levels)	2 (g/m^2/month)

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.

[d] Depositional dust criteria are no longer included in DA 231-07-2000. However, dust deposition is required to be monitored under the current DMP

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 generally within the criterion of 4 g/m^2/month, exception for the Macairstrip monitor which was impacted by activities outside of Dartbrook Mine and experienced several contaminated samples. DA 231-07-2000 does not prescribe criteria for dust deposition. As such, the elevated concentration at the Macairstrip monitor is not considered a non-compliance against the Development Consent.

'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.

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 98% for the Fan Site 1 and Standings HVAS, and 95% for Macairstrip HVAS in 2022. There were three program re-runs undertaken during 2022 for the Fan Site 1 and Hulbert HVAS. The East Site Meteorological Station (ESMS) HVAS experienced technical issues from January to May and Hulbert HVAS experienced technical issues from February to May. As such, the recovery rates for ESMS and Hulbert were 62% and 57%, respectively, across the reporting period. These recovery rates do not meet the NEPC standard for data capture, which requires recovery of data to be greater than 75%. However, there were no activities during the reporting period that would have generated substantial emissions of particulate matter.

As shown on **Figure 8,** all PM10 concentrations recorded by the HVAS sites were within the criterion of 50 µg/m^3 throughout 2022.

Table 17 presents the Annual Average PM10 concentrations at the five HVAS sites during the reporting period and compares these with the predictions in the Environmental Impact Statement (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.

Table 15 Annual Rolling Average Dust Deposition for 2022

Site	Location Description	Insoluble Solids (g/m^2/month)	Number of Samples
852	Dorset Road	1.04	12
860	No. 1 Vent Shaft	0.89	12
870	Kayuga Village	0.95	11
880	Hunter River / Dart Brook Junction	0.89	12
885	Frazer Farm paddock near Hunter River	2.30	12
890a	Garoka Dairy	0.71	11
897	Eastern Site North	1.08	10
898	Eastern Site West	1.23	9
900	Eastern Site South	0.57	10
902	Aberdeen Tree Screen	0.42	12
911*	Browns Mountain	0	0
Aberdeen East	South east of Aberdeen	0.97	2
D13	Residence northwest of CHPP	3.31	12
D14	Southwest of CHPP	1.90	12
JLON West	Residence south of West Site	1.58	9
Macairstrip	Northwest of West site	4.12	12
Wattus	Between Dart Brook and Hunter River	1.08	12

Figure 7 Depositional Dust Annual Averages 2022

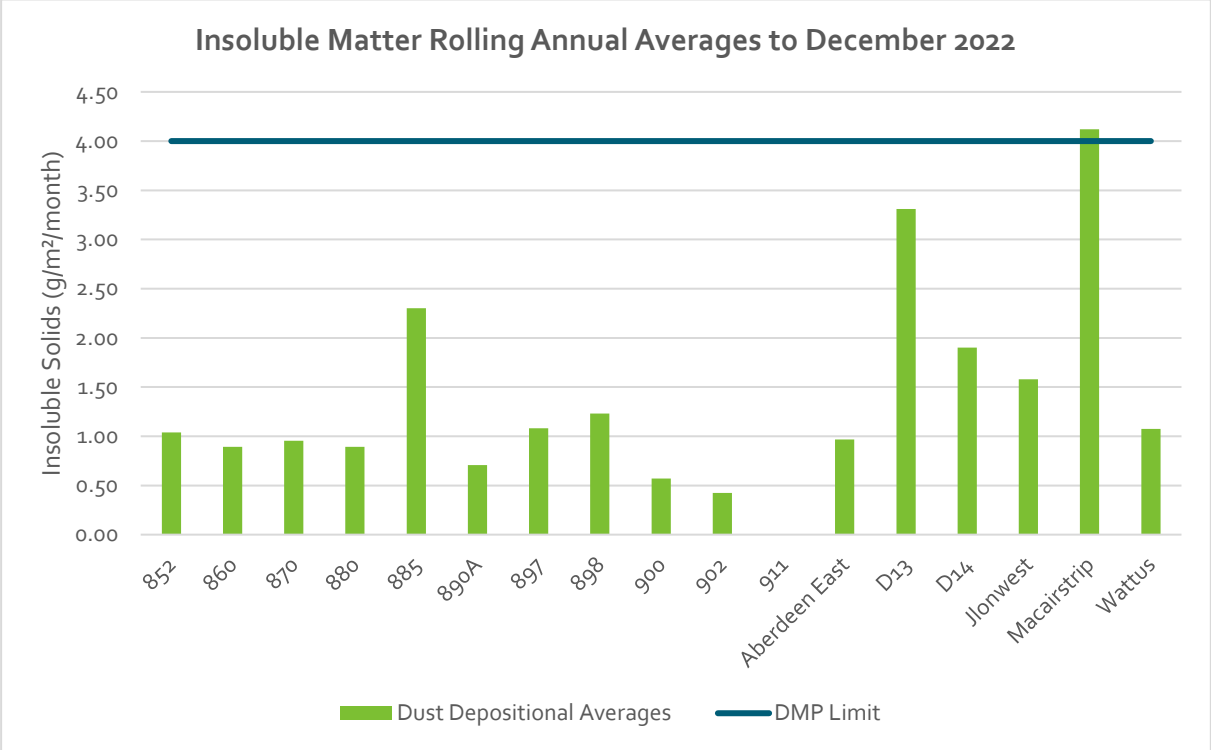


Table 16 HVAS Monitoring Sites for PM10 and TSP

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 2022
ESMS	µg/m³	20.1	6.4
Fan site 1	µg/m³	18.7	10.0
Hulbert	µg/m³	17.4	8.6
Standings	µg/m³	17.3	10.0
Macairstrip	µg/m³	17.0	8.7

Figure 8 **HVAS 24-hr Average PM10 Results 2022**

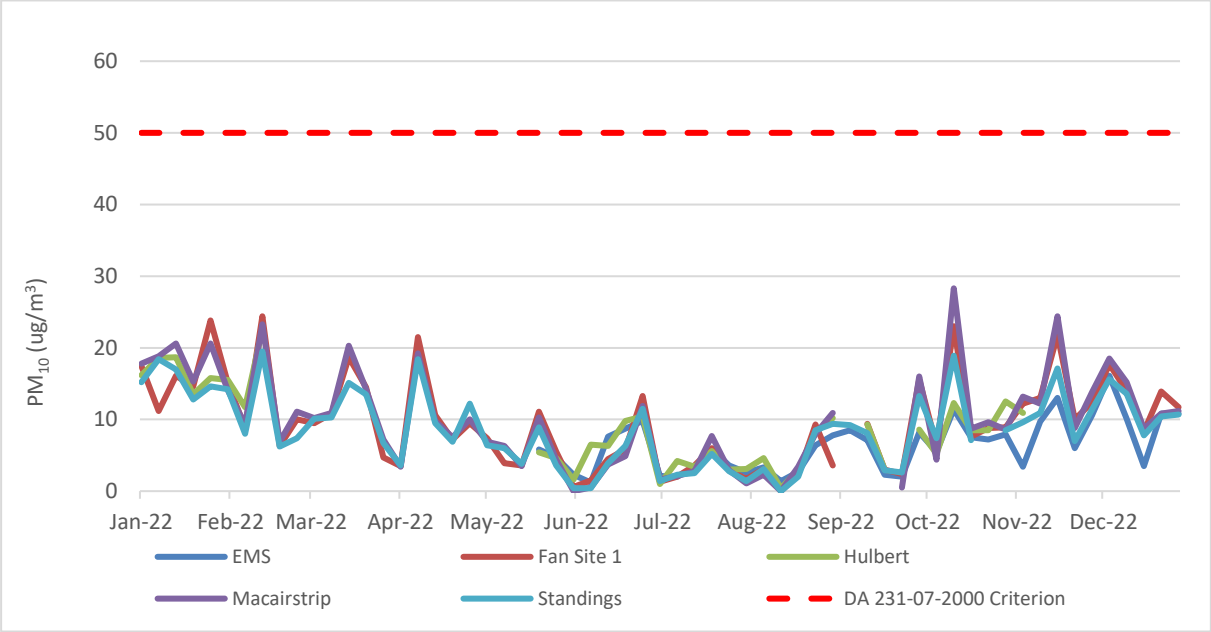
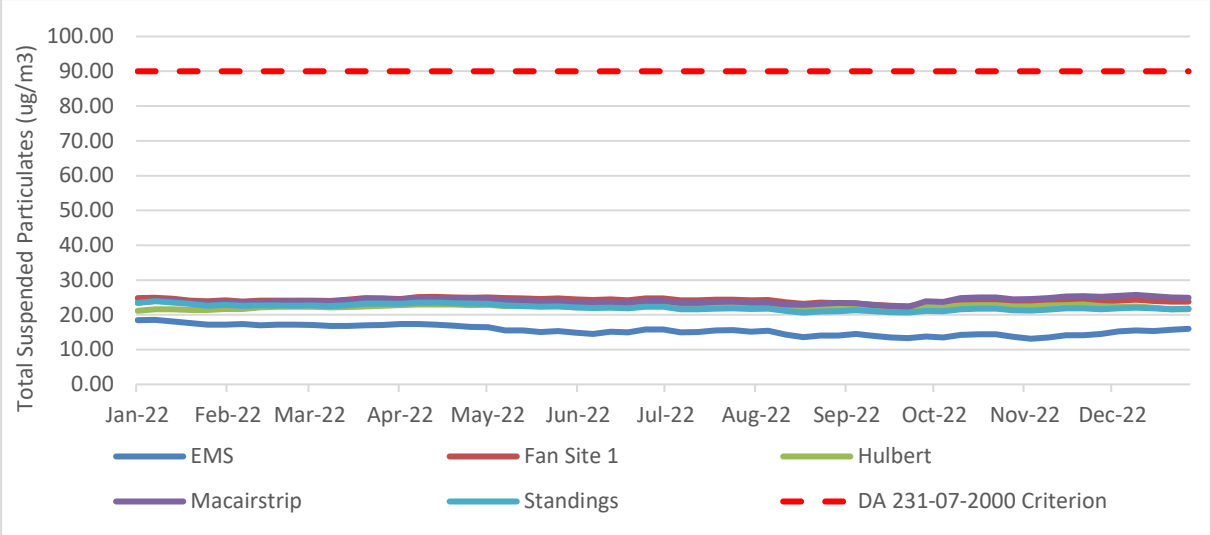


Figure 9 **Calculated Rolling Annual Average TSP Concentrations 2022**



6.3.3 Next Reporting Period

Prior to recommencing construction activities, Dartbrook will prepare an Air Quality and Greenhouse Gas Management Plan (AQGGMP) in accordance with Condition 6.1(f) of DA 231-07-2000. Once approved by the Secretary of DPE, the AQGGMP will supersede the current DMP. Dust management and monitoring measures will be undertaken in accordance with the approved AQGGMP.

In the event that Dartbrook remains under care and maintenance for the next reporting period, air quality monitoring will continue to be undertaken in accordance with the DMP.

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

Prior to recommencing construction activities, Dartbrook will update its Flora and Fauna Management Plan in accordance with Schedule 2, Condition 3.5 of DA 231-07-2000. Land disturbance activities and ecological monitoring will be conducted in accordance with the Flora and Fauna Management Plan.

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 previously been identified at Dartbrook Mine. 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 2022 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 2022 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

Prior to recommencing construction activities, Dartbrook will update its Noise Management Plan in accordance with Schedule 2, Condition 6.4.2(a) of DA 231-07-2000. Noise mitigation and monitoring measures will be implemented in accordance with the Noise Management Plan.

In the event that recommencement of construction does not occur in the next reporting period, the suspension of noise monitoring under care and maintenance will continue to apply.

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 8.7.4**. 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

Prior to recommencing construction activities, Dartbrook will update its Landscape and Lighting Management Plan in accordance with Schedule 2, Conditions 3.8 and 6.5 of DA 231-07-2000. 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

Prior to recommencing construction activities, Dartbrook will update its Archaeology and Cultural Heritage Management Plan in accordance with Schedule 2, Condition 3.4 of DA 231-07-2000. A Ground Disturbance Permit (GDP) process will be implemented prior to any surface disturbance associated with recommencement of mining operations.

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 2022 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

Prior to recommencing construction activities, Dartbrook will update its Archaeology and Cultural Heritage Management Plan in accordance with Schedule 2, Condition 3.4 of DA 231-07-2000. No European heritage items are expected to be impacted by the construction or mining activities proposed for the 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

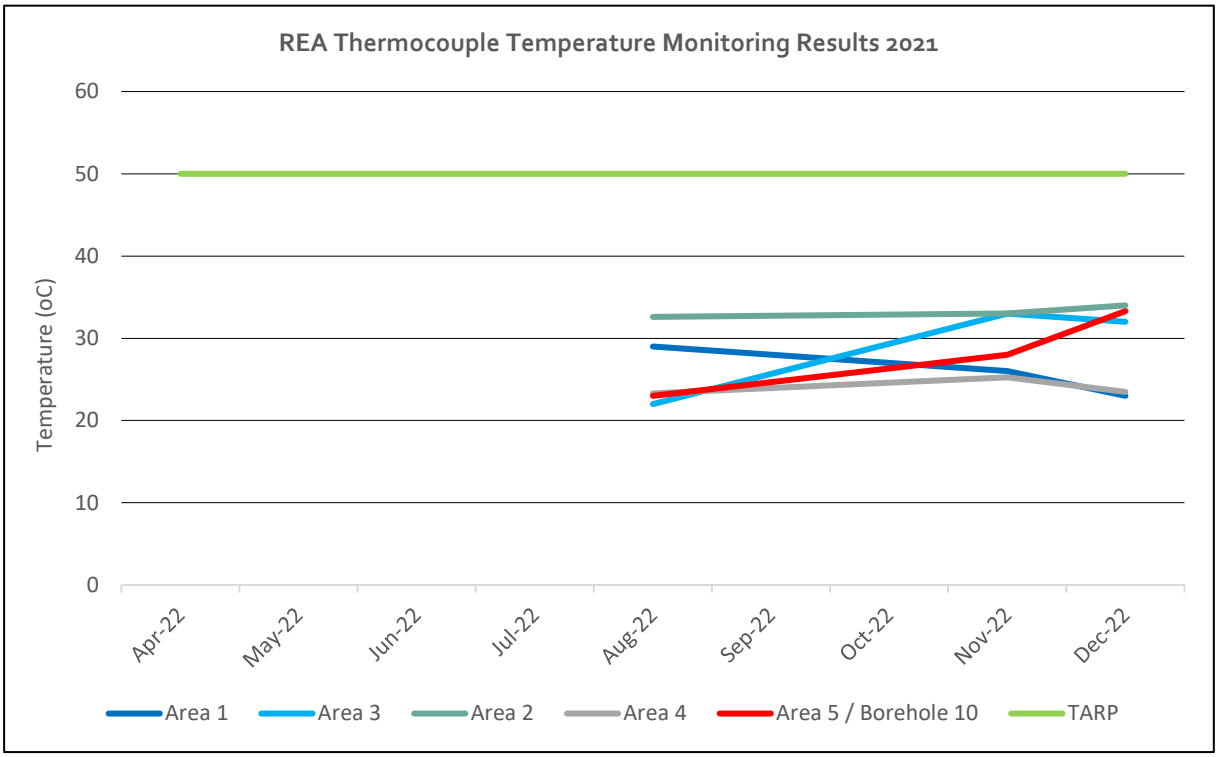
The REA underground temperature is monitored using 13 thermocouples installed in boreholes to measure the temperature of the reject's material. **Figure 10** provides the results of REA thermocouple monitoring from the reporting period. REA temperature monitoring did not take place across any sites from April to August 2022 due to the unsafe nature of the access tracks.

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 Trigger Action Response Plan (TARP) value of 50 ºC (as provided in the approved REA Plan).

Appendix D shows the REA temperature monitoring summary from 2001 to the end of the reporting period.

Figure 10 REA Thermocouple Temperature Monitoring Results 2022



6.10.3 Next Reporting Period

Prior to recommencement of mining operations, the Spontaneous Combustion Management Plan will be updated in accordance with Schedule 2, Condition 2.2 of DA 231-07-2000. The coal stockpile areas, REA and underground workings have remained static throughout the care and maintenance period, but will become active work areas once mining operations recommence. The updated Spontaneous Combustion Management Plan will include management strategies for these key areas of the site.

REA thermocouple temperatures and piezometric water levels will continue to be monitored and reported in accordance with the Spontaneous Combustion Management Plan.

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) in accordance with the Bushfire Management Plan.

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

Underground mining is scheduled to recommence in the next reporting period. Schedule 2, Condition 3.3 of DA 231-07-2000 requires the preparation of an Extraction Plan prior to undertaking second workings. An Extraction Plan will not be required as the proposed mining activities in the next reporting period do not constitute second workings.

The mining activities proposed for the next reporting period are not expected to be induce significant subsidence. Notwithstanding, annual inspections of 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

Hydrocarbon use will materially increase once Dartbrook transitions from care and maintenance back to an operational state. The existing management practices will continue to be appropriate for operational activities.

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 2021/2022 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 91,680 tonnes of CO_2 equivalent gas (CO_2-e) was emitted during the 2021/2022 NGER period. The main contributor to total emissions was CH_4 gas emitted from the underground mine (82,993 tonnes CO_2-e). The total greenhouse gas emissions value for the 2021/22 NGER period is lower than the 93,801 tonnes CO_2-e for the previous NGER reporting period.

Table 18 Greenhouse Gas Emissions during 2021/2022 NGER period

Scope 1 Emissions (tCO_2-e)		Scope 2 Emissions (tCO_2-e)	Total Emissions (tCO_2-e)
CO_2	CH_4		
6,816	82,993	1,871	**91,680**

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

The security measures implemented during care and maintenance will continue to be appropriate after recommencement of mining operations. 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 consisting of surface dams and the Wynn Seam Goaf (which is a large underground storage). The main inflows to the site water balance occur via rainfall runoff and groundwater seepage. Pipelines enable the transfer of water between surface dams and the Wynn Seam Goaf, as well 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 Western Holding Dam (WHD).

7.1.1 Fresh Water Use

Approximately 1.9 megalitres (ML) of potable water was sourced from the Aberdeen town water supply during the reporting period. Approximately 6.9 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	-	6.9	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.

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 (m³)		
		End of Previous Period Dec 2021	End of Period Dec 2022	Storage Capacity
Clean Water				
Clean Water Dam 1	East Site	10,000	10,000	10,000
Clean Water Dam 2	East Site	6,000	7,100	10,000
Clean Water Dam 3	East Site	10,000	10,000	10,000
Southern Clean Water Dam	East Site	15,900	21,200	53,000
Dirty Water (runoff)				
Sediment Dam 1	West Site	1,000	1,000	1,000
Sediment Dam 2	West Site	200	232	400
Northern Dam REA	East Site	2,300	2,300	2,300
Southern Dam REA	East Site	8,000	8,000	8,000
Stage 4 REA Dam	East Site	7,505	7,742	7,900
Mine Water				
SDD	West Site	260,000	300,000	400,000
Western Holding Dam	West Site	3,080	5,390	15,400
Eastern Holding Dam	East Site	57,200	69,520	88,000
Evaporation Ponds	West Site	125,400	128,040	132,000
Wynn Seam Goaf	Underground	~3,179,000	~3,600,000	>4,356,000

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 506.6 ML to 570.5 ML whilst the estimated storage in the Wynn Seam goaf increased from approximately 3,179 ML to 3,600 ML. Therefore, the total site inventory increased from approximately 3,686 ML to 4,171 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	2022 Volumes (ML)
Inputs	
Fresh Water (Blairmore bore)	6.9
Groundwater Seepage In (including Hunter Tunnel)	359
Rainfall Runoff	602
Recycled to CHPP from Tailings & Storage (not included in total)	0
Imported Potable (Aberdeen)	1.9
Total Inputs	969.8
Outputs	
Groundwater Seepage Out	68
Dust Suppression	0
Evaporation – Mine Water	408
Entrained in Process Waste	0
Discharged (HRSTS)	0
Potable Usage	8.8
Total Outputs	484.8
Estimated Change in Total Storage	485

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 are to 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 electrical conductivity (EC) levels at Dartbrook Mine bores during the reporting period are included in **Appendix E**.

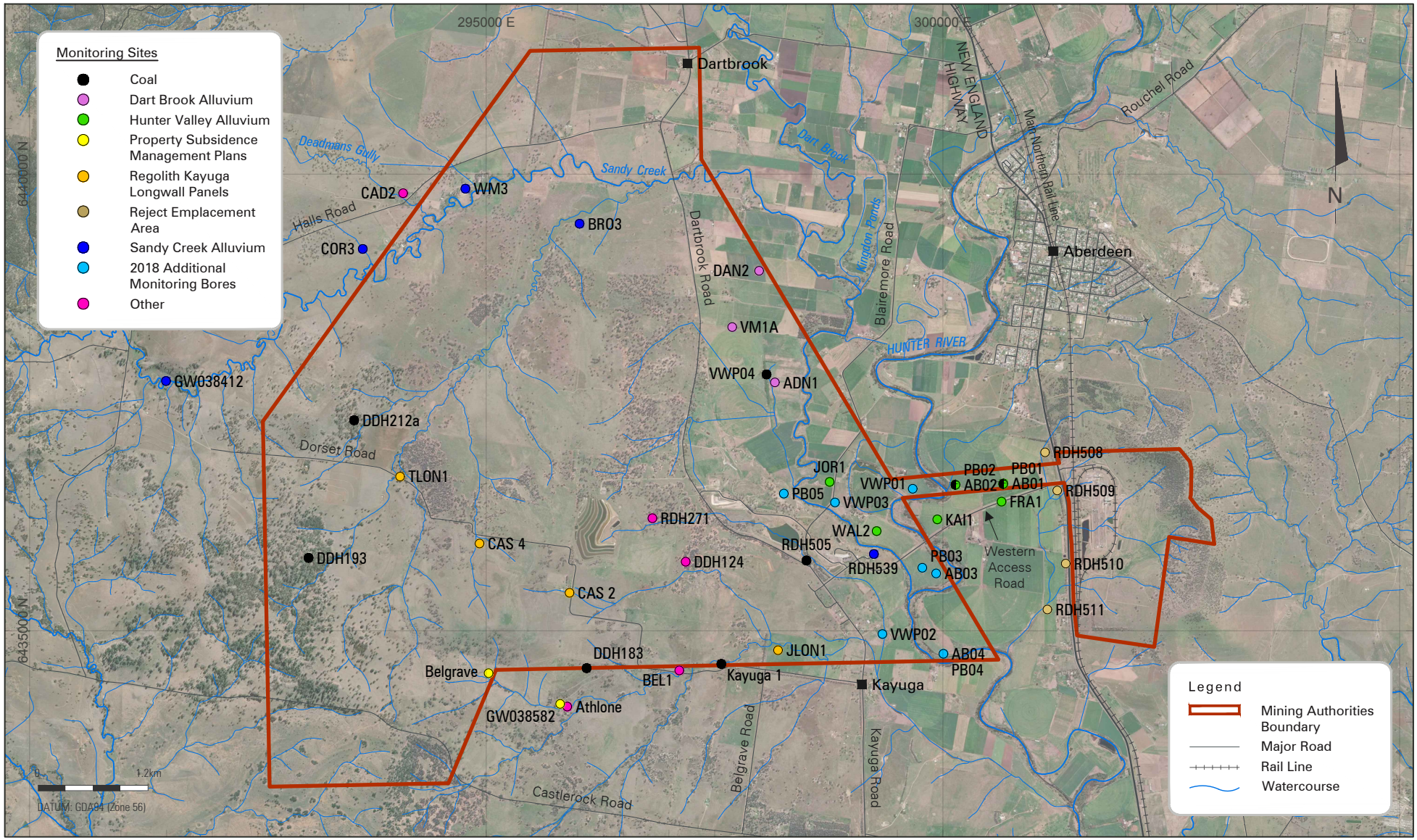
Table 22 Groundwater Monitoring Bores

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.	
DDH183	Bore			
DDH193	Bore			

Bore	Bore Type	Aquifer Monitored	Details	Parameter / Frequency
DDH212a	Bore	Wynn Seam		Water depth, pH and EC are monitored on a quarterly basis. Additional parameter 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			

Bore	Bore Type	Aquifer Monitored	Details	Parameter / Frequency
RDH271	Bore	Wynn Seam	RDH271 is located near but not directly above the completed Wynn and Kayuga seam longwall panels.	

Note: Bore = Monitoring bore and not a current water supply.
See SWMP for additional suite of parameters.
**JLON1 is not included in the SWMP but is monitored for the landowner's benefit.*



JBA 2188 DAR - F 11 GW MONITORING (30/03/2023)

DARTBROOK MINE

Groundwater Monitoring Locations

FIGURE 11

Australian Pacific Coal

JAMES BAILEY & ASSOCIATES
Environmental and Planning Consultants

7.2.2 Cumulative Rainfall Departure

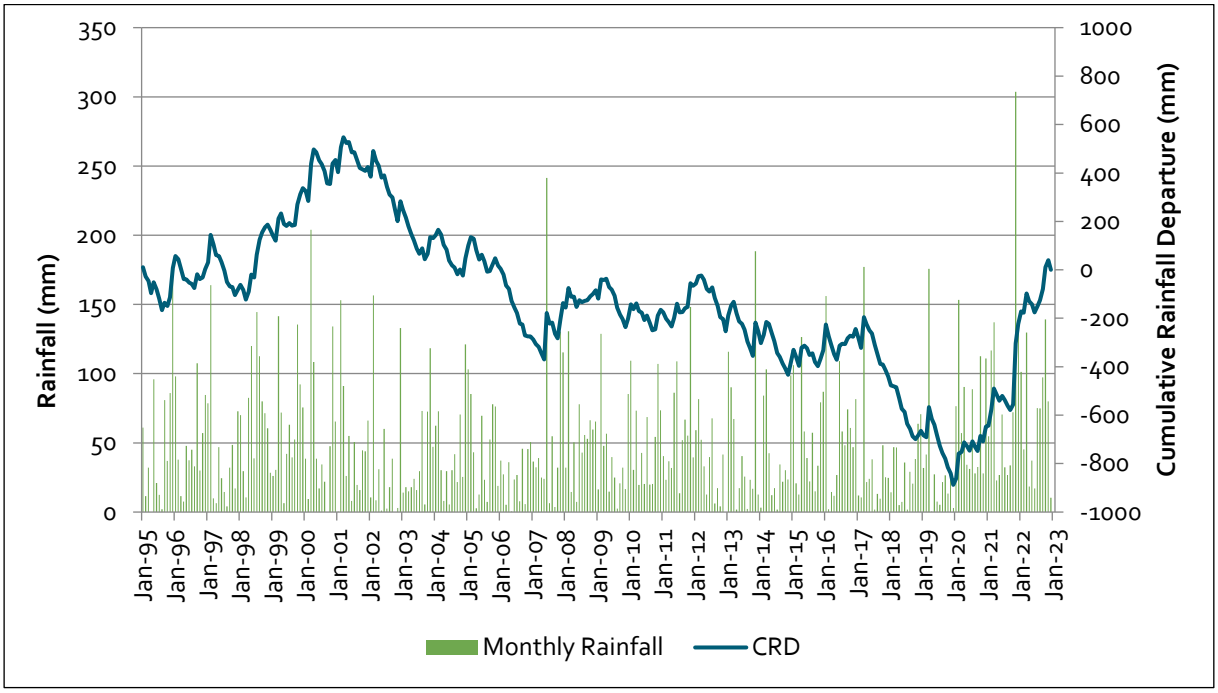
Groundwater levels in relatively shallow wells or bores constructed in alluvium are generally highly dependent on rainfall recharge and can rise or decline quite rapidly in response to rainfall events.

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 for 2022 was sourced from the Bureau of Meteorology (BOM) Scone Airport station. This data was added to the long-term dataset for Met-02 to calculate the CRD (shown in **Figure 12**).

As reported in **Section 6.2**, Dartbrook experienced above average rainfall in 2022, as reflected by the rising trend in the CRD.

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. KAI1, FRA1 and WAL2 recorded increases in water levels during the reporting period. This trend is consistent with the high rainfall experienced during the year. JOR1 was unable to be accessed for monitoring in 2022.

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 at bores FRA1, KAI1 and WAL2 were similar to the previous reporting period and within the historic ranges for these bores. The recorded pH values for the Hunter River alluvium were neutral, ranging from 6.9 to 7.3. None of the recorded pH levels exceeded the IAC under the SWMP.

FRA1, KAI1 and WAL2 exhibited differing EC trends over the reporting period. FRA1 exhibited an increase in EC compared to the previous years values, but values remained within the historic range for the bore. WAL2 recorded decreasing EC values but remained within the historic range for the bore. The EC remained relatively static in bore KAI1. 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 value measured at KAI1 in October exceeded the trigger value of 541 µS/cm;
- All quarterly EC measurements at WAL2 exceeded the trigger value of 1,917 µS/cm.

JOR1 was unable to be accessed for monitoring in 2022.

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. Bores DAN2 and WM1A recorded water levels higher than their previous maximum values, whereas ADN1 remained within its historical range.

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** show long-term water quality trends for Dart Brook alluvium monitoring bores ADN1, DAN2 and WM1A.

The recorded pH levels for bores ADN1, DAN2 and WM1A were similar to the previous reporting period and within the historical ranges for these bores.

The EC values recorded at ADN1 and DAN2 were similar to the previous reporting period and within the historical ranges for these bores. WM1A recorded EC values lower than its historic range during the February, April and July monitoring periods. Its EC then substantially increased to 3,920 µS/cm in October, which represents a new maximum value for this bore.

Exceedances of the IAC for EC during the reporting period include:

- The EC measurement for DAN2 in January (2,680 µS/cm) exceeded the IAC of 2,555 µS/cm; and
- The EC measurement for WM1A in December (3,920 µS/cm) exceeded the IAC of 3,535 µS/cm.

There were no exceedances of the IAC for pH.

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, GW038412 and WM3 recorded minor increases in water level compared to the last reporting period. This observation is consistent with the above average rainfall experience during the reporting period. Water levels for these bores remained within their historical ranges.

Bore BRO3 was unable to be accessed during the reporting period due to a change in land owner.

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.

Bores COR3, WM3 and GW038412 exhibited similar pH levels to the previous reporting period. There were no exceedances of the IAC for pH.

The Sandy Creek alluvium bores have historically exhibited large variations in EC (see Graph E-9 in **Appendix E**). The EC at COR3, WM3 and GW038412 decreased during the reporting period, with values at GW038412 reaching a new historical low. The EC measurements at COR3 and WM3 remained within historical ranges. There were no exceedances of the IAC for EC.

7.2.6 Staged Discharge Dam

Water Levels

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

The water level at RDH505 continued the rising trend observed in recent years, which is attributable to high rainfall levels. All water level measurements during the reporting period were above the historical range for the bore. 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 measurements for RDH505 were similar to those from the previous reporting period and remained within historical ranges. 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.

Of the coal seam monitoring bores, only Kayuga 1 was able to be monitored during the reporting period. Kayuga 1 recorded a significant increase in water level, which is attributable to the high rainfall experienced during the reporting period. There were no exceedances of the IAC for water level.

Bores DDH183, DDH193 and DDH212a were unable to be accessed during the monitoring period. AQC will consult with the land owner regarding access to these sites.

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 previous mining operations but have remained relatively stable during Care and Maintenance. During the reporting period, pH values at Kayuga 1 remained relatively static, although a large increase to 7.7 was recorded in October. This represents an exceedance of the IAC of 7.1 for this bore.

EC levels have remained relatively stable for all coal seam bores since 2009. Kayuga 1 recorded a significant decline in EC during the reporting period. The recorded values in April, July and October appear to be anomalies.

An investigation will be conducted to determine whether EC measurements at Kayuga 1 are being affected by external factors.

DDH183, 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.

All of the regolith monitoring bores exhibited rising water levels during the reporting period, with CAS2 and TLON1 recording substantial increases. These trends are consistent with the high rainfall that occurred during the reporting period. TLON1 recorded a new historical maximum of 2 mbgl in October.

There were no exceedances of the water level IAC during the reporting period.

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 and CAS4 have generally been in the range of 6.5 to 7.5. The pH measurements for CAS2 and CAS4 remained within this range during the reporting period. The pH measured at CAS4 in October (pH 7.3) marginally exceeded the IAC of 7.2.

TLON1 recorded an increase in pH during the reporting period, whereas pH levels remained relatively stable at JLON1. There were no exceedances of the IAC for pH at these bores.

CAS2, CAS4 and TLON1 have historically exhibited large variability in EC. The CAS2 and CAS4 bores recorded decreases in EC during the reporting period. Notwithstanding this decreasing trend, the EC values at CAS2 in January, April and July were above the IAC of 13,255 µS/cm.

The TLON1 bore provided EC data for the first time since 2018. The July measurement of 849 µS/cm represents a new historical low for this bore. The other readings during the reporting period were within the historical range.

JLON1 recorded decreasing EC values during the reporting period. These values remained within the bore's historical range.

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. Of the REA monitoring bores, only RDH509 was able to be accessed for monitoring during the reporting period. Water levels at RDH509 increased during the reporting period, but remained within the historical range for the bore.

AQC will consult with the relevant landowner regarding access to bores RDH508, RDH510 and RDH511.

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). Only RDH509 was able to be sampled during the reporting period. This bore recorded neutral pH levels (7.0 to 7.3), which is typical for this bore.

The REA monitoring bores have historically exhibited large variability in EC. During the reporting period, RDH509 recorded decreasing EC levels, including a new historical low of 820 µS/cm in July.

There were no exceedances of the IAC for the REA monitoring bores.

7.2.10 Landowner Bores

Graphs E-21, E-22 and E-23 in **Appendix E** shows the long-term trends at private landowner monitoring bores GW038582 and Belgrave.

Neither of these bores was able to be access for monitoring 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. These bores have recorded considerable rises in water level during the wet conditions experienced in 2021-22. 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. However, water levels at CAS2 have risen during 2021-22 coincident with above average rainfall. This suggests that water levels in the regolith are still more strongly correlated with rainfall than the effects of previous longwall mining;

- 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 Kayuga 1 bore exceeded the predictions in the Dartbrook EIS. This bore recorded a decline in water level of 11.78 m during previous mining, which exceeded the EIS prediction of 8 m. However, this bore has almost recovered to pre-mining water levels due to the high rainfall experienced in 2021-22.

The following observations were made regarding groundwater quality:

- pH and EC levels during the reporting period were generally within the ranges historically observed during care and maintenance;
- 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

The SWMP will be updated during the next reporting period to accommodate the proposed transition from care and maintenance back to mining operations. The update of the SWMP will include a review of the groundwater monitoring network, particularly the bores that are located on third-party owned land. AQC will consult with these land owners regarding land access for monitoring.

The update of the SWMP will also include a review of the groundwater IAC, as there has been substantial data collected since the IAC were previous defined.

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

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.

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 Eastern Holding Dam (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 levels 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.

7.3.2 Environmental Performance

As noted in **Section 7.1.4**, Dartbrook Mine did not undertake any discharges under the HRSTS during the reporting period. All HRSTS monitoring and communications equipment continues to be maintained to ensure compliance with the relevant conditions of Dartbrook Mine's EPL.

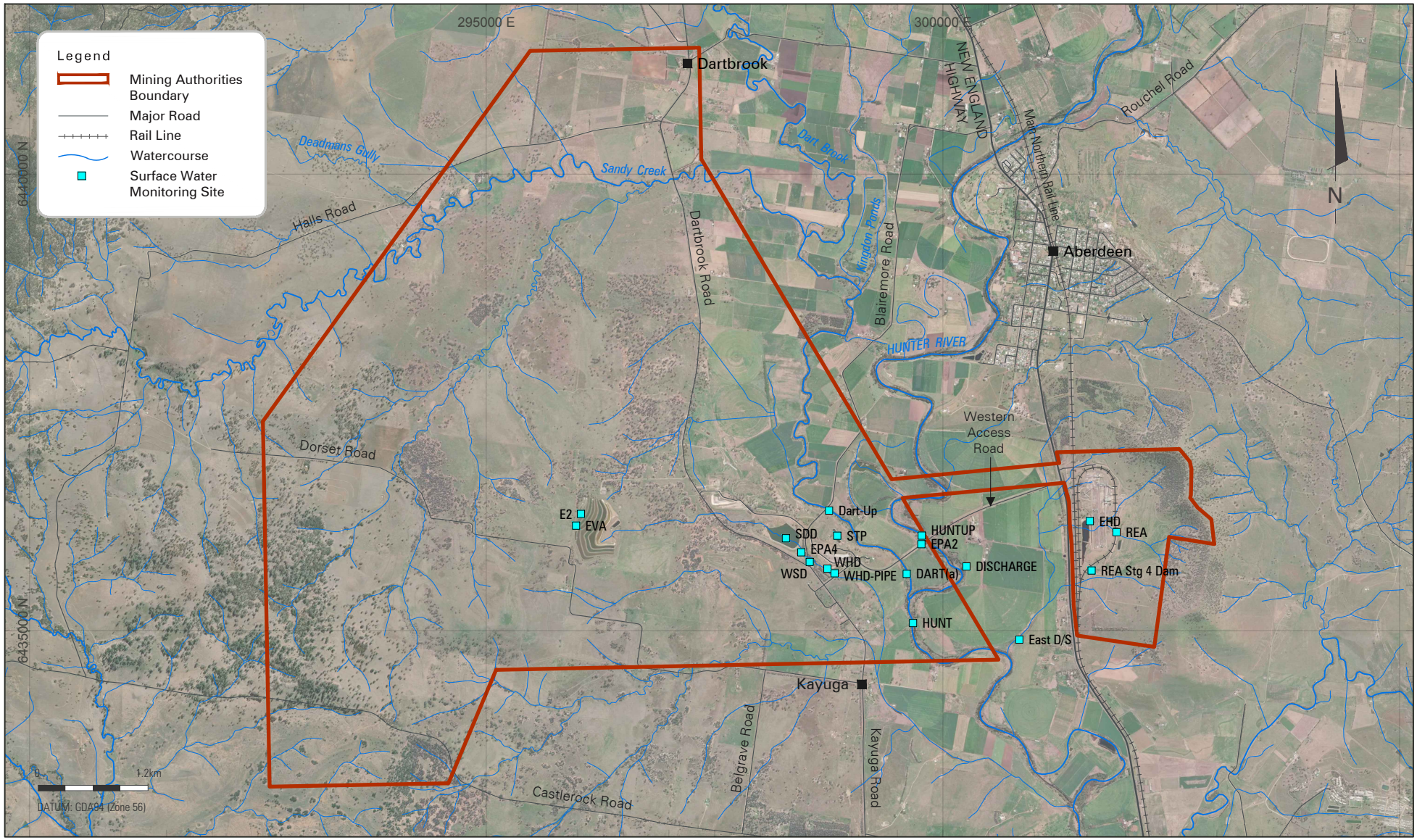
Table 23 presents a summary of the water quality results for the Hunter River and Dart Brook for the reporting period. The Hunter River downstream monitoring site (HUNT) was unable to be accessed during the reporting period due to localised flooding.

The Hunter River upstream monitoring site (HUNTUP) recorded EC values that exceeded the IAC specified under the SWMP. There were no exceedances of the IAC for pH at HUNTUP.

Neither of the Dart Brook monitoring sites (DART(a) and DARTUP) recorded any EC or pH values that exceeded the IAC in the SWMP.

Graphs F1 and F3 in **Appendix F** show the long-term water quality trends for EC, TDS (and their associated anions and cations) in the Hunter River and Dart Brook. These graphs indicate that water quality is generally similar at both upstream and downstream sites located on these watercourses.

Appendix F also presents water quality data for the on-site dams and storages. The water quality in surface storages generally reflects the quality of the dewatered groundwater or of surface runoff that has concentrated due to evaporation. All storages were operated to maximise the evaporation potential whilst maintaining a sufficient freeboard to prevent spills in accordance with the SWMP.



JBA 2188 DAR - F 13 SW MONITORING (30/03/2023)

DARTBROOK MINE

Australian Pacific Coal

JAMES BAILEY & ASSOCIATES
Environmental and Planning Consultants

Surface Water Monitoring Locations

FIGURE 13

Table 23 Summary of Water Quality Results for the Hunter River and Dart Brook

Site	EC Range (µS/cm)	pH Range
Hunter River Upstream	377 – 674	7.3 – 8.2
Hunter River Downstream	N/A	N/A
Dart Brook Upstream	409 – 1,019	8.0 – 8.2
Dart Brook Downstream	438 – 1,057	7.6 – 8.3

7.3.3 Next Reporting Period

The SWMP will be updated during the next reporting period to accommodate the proposed transition from care and maintenance back to mining operations. This update will include a revision of the surface water monitoring network and water quality IAC.

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

The Erosion and Sediment Control Plan will be updated in the next reporting period to reflect the transition from care and maintenance back to mining operations.

8. REHABILITATION

8.1 SURFACE AND REHABILITATION ACTIVITIES DURING THE REPORTING PERIOD

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

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**). Routine weed management was conducted across the site throughout the reporting period that included spraying and slashing. **Table 24** outlines material production throughout the reporting period.

Table 24 Material Produced During Annual Reporting Period

Material	Unit	Quantity
Stripped Topsoil	m^3	0
Rock/overburden	m^3	0
ROM Coal Extracted	Mt	0
Reject Material	Mt	0
Product	Mt	0

8.2 CURRENT DISTURBANCE AND REHABILITATION PROGRESSION

Table 25 outlines the current disturbance and rehabilitation development at Dartbrook Mine. No land use establishment has taken place during the reporting period. The REA is the only disturbed area at Dartbrook that has been rehabilitated to date. All other disturbance relates to infrastructure which will be required for future mining operations.

Table 25 Status of Disturbance and Rehabilitation at end of Reporting Period

Disturbance	Unit	Quantity
Total Disturbance Footprint – Surface Disturbance	Ha	166.38
Total Active Disturbance	Ha	135.42
Rehabilitation – Land Preparation	Ha	0
Ecosystem and Land Use Establishment	Ha	0
Ecosystem and Land Use Development	Ha	30.96
Rehabilitation Completion	Ha	0

8.3 REHABILITATION KEY PERFORMANCE INDICATORS

No new surface disturbance or rehabilitation activities were undertaken during the reporting period as shown in **Table 26**. Approximately 18.6% of the total surface disturbance footprint has been rehabilitated to date.

Table 26 Rehabilitation KPIs at the End of the Reporting Period

Disturbance	Unit	Value
New Disturbance Footprint – Surface Disturbance	Ha	0
New Rehabilitation Commenced During Annual Reporting Period	Ha	0
Established Rehabilitation	Ha	30.96
Annual Rehabilitation to Disturbance Ratio		N/A
% Rehabilitated Land to Total Mine Footprint	%	18.6

8.4 PROGRESSIVE ACHIEVEMENT OF ESTABLISHED REHABILITATION

The intended final land use for all rehabilitated land at Dartbrook Mine is agriculture (as shown in **Table 27**).

Table 27 Established Rehabilitation for Final Land Use at the End of the Reporting Period

Rehabilitation	%
Established Rehabilitation for Agricultural Final Land Uses	100
Established Rehabilitation for Native Ecosystem Final Land Uses	0
Established Rehabilitation for Other/Non-Vegetated Final Land Uses	0

8.5 REHABILITATION MONITORING

Monitoring of rehabilitated areas, namely the REA, was conducted regularly throughout the reporting period to ensure that the revegetation is self-sustaining, and rehabilitation will achieve long term stability and meet objectives. Monitoring included the regular inspection of the following aspects:

- Soil conditions and erosion;
- Drainage and sediment control structures;
- Runoff water quality;
- Revegetation germination rates;
- Plant health; and
- Weed infestation.

Results from these monitoring efforts were utilised to identify opportunities for continual improvement including:

- Re-seeding or re-planting

- Weed control;
- Repair of drainage channels and desilting sediment dams; and
- Maintenance of eroded areas.

8.6 STATUS OF PERFORMANCE AGAINST REHABILITATION OBJECTIVES AND COMPLETION CRITERIA

The REA is currently the only rehabilitated area at Dartbrook. The proposed rehabilitation objectives for the REA are:

- Safe, stable and non-polluting;
- Fit for the intended post-mining land use; and
- Nominated land capability classification is achieved and is self-sustaining.

A geotechnical inspection of the REA was included in the rehabilitation risk assessment undertaken during the reporting period. This risk assessment found that the REA was generally geotechnically stable but identified a drainage culvert which will require remedial work in the future.

The target land capability for the REA is Class VI or VII land. The steep terrain prevents this area from achieving a higher land capability class. Class VI or VII land is considered suitable for grazing and as established from the REA grazing trial (see **Section 8.7.5**), the rehabilitated REA has successfully supported cattle grazing. As such, the rehabilitated REA is on target to achieving the intended land capability class and final land use.

8.7 REHABILITATION RESEARCH AND TRIALS

8.7.1 River Restoration Project

The River Restoration Project was undertaken in conjunction with the Hunter Central Rivers Catchment Management Authority (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.

8.7.2 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.

8.7.3 River Red Gum Restoration

An experimental study was established in 2007 by the 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 2023.

8.7.4 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 2023.

8.7.5 Sustainable Cattle Grazing Trial

A cattle grazing trial was undertaken on the rehabilitated REA in 2015 to demonstrate that the rehabilitated land was established for its intended final land use. In April 2015, 27 Angus and Angus/ Herefords Cross weaner steers were introduced, with an average mass of 274 kg. The cattle were weighed 7 times throughout the year and reached an average weight of 462 kg in December 2015 (Hansen Bailey, 2016).

Pasture growth of the REA was monitored on five occasions across five sites to coincide with the weighing of the steers. The monitoring found that the sites displayed a high ground cover rate and consisted of several grass species including Rhodes Grass, Phalaris Green Panic and Lucerne. A number of native grass species are periodically present across the REA including Queensland Blue Grass, Plains Grass, Wallaby Grass and Barbwire Grass (Hansen Bailey, 2016)

No cattle grazing of the REA was carried out in 2022. AQC will review opportunities to recommence grazing in the next reporting period.

8.8 NEXT REPORTING PERIOD

Dartbrook Mine is expected to recommence mining operations in the next reporting period. The infrastructure required for future mining operations is already in place. Additional disturbance will be limited to further development of the REA. The REA will be progressively rehabilitated, although this is anticipated to occur later in the mine life.

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.

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

One environmental complaint was received during the reporting period. This complaint was received in relation to the spread of St John's Wort (a weed species) onto an adjoining landowner's land. The complaint was followed up with the complainant and investigated. Weed control practices were scheduled for the next suitable weather conditions.

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, 2020 or 2021.

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.

An Independent Chairperson, Lisa Andrews, has been the chairperson of Dartbrook CCC meetings since 2020. The council representatives were Paul Smith (UHSC staff representative) and Theresa Folpp (MSC staff representative). The 2022 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 2022 (March and November).

Table 28 lists the dates of meetings held during 2022 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 28 Summary of Topics Discussed During CCC Meetings in 2022

Date	Topics Discussed
16/03/2022	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 third-party offers to acquire Dartbrook from AQC; • Gas drainage and greenhouse gas emissions; • Final objective for the rehabilitation for the Staged Discharge Dam; and • Timing and viability of recommencement of operations on site.
23/11/2022	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 relation to the presentation. These included: • CHPP operation and noise attenuation; • The timing of the operational workforce; • Water storage capacity of the Wyn Seam goaf; • Land management and weed control; and • Sources of water seeping into the Hunter Tunnel.

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.

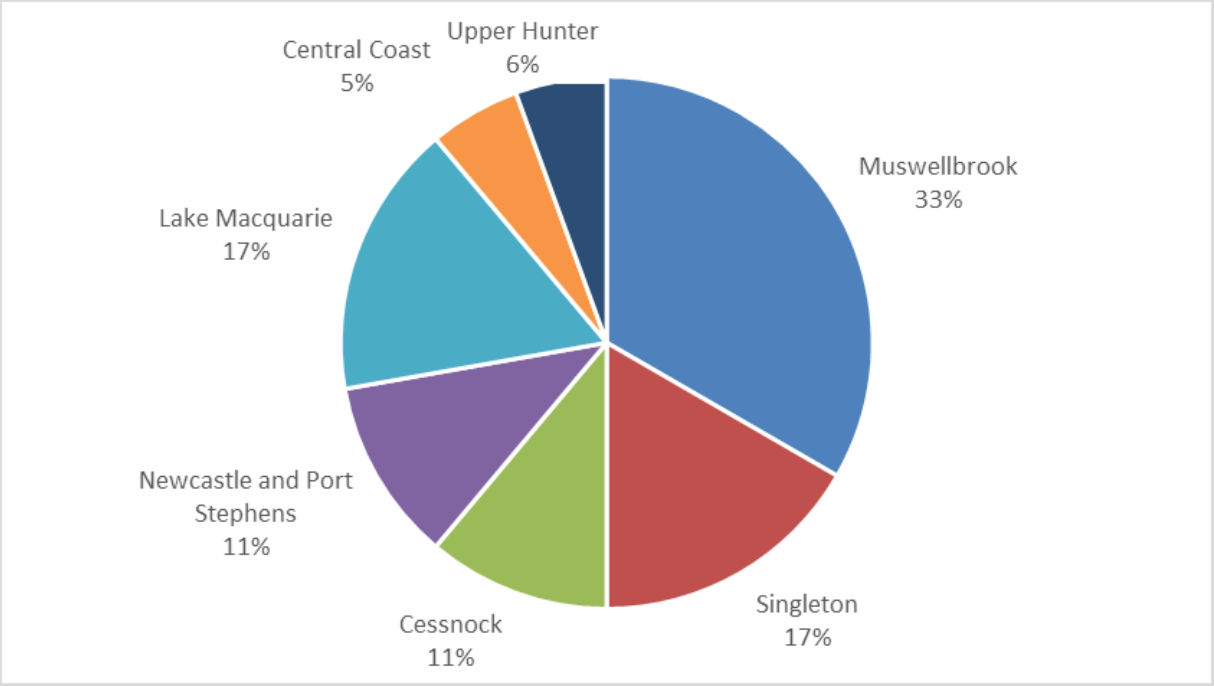
9.2.3 Workforce Characteristics

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).

Figure 14 Breakdown of Current Workforce by Place of Residence



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. Given that mining is anticipated to recommence in the next reporting period, the next IEA is anticipated to occur in the 2024 reporting period.

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.

As explained in **Section 6.2**, one of Dartbrook's meteorological stations (Met-02) experienced technical issues during the reporting period. Schedule 2, Condition 8.2 of DA 231-07-2000 requires AQC to maintain and operate a meteorological station at the site. Met-01 continued to operate during the period that Met-02 experienced its technical issues. Therefore, Dartbrook remained compliant with Schedule, Condition 8.2 of DA 231-07-2000.

12. ACTIVITIES PROPOSED IN THE NEXT REPORTING PERIOD

Following resolution of the legal proceedings relating to MOD7, AQC has commenced planning for the recommencement of mining at Dartbrook. DA 231-07-2000 (as modified by MOD7) requires the update of particular management plans prior to recommencement of construction and mining. These plans will be updated in consultation with the relevant regulatory authorities.

The activities proposed to be undertaken in 2022 are summarised in **Table 29**. Further details on the proposed activities are provided in **Section 6** and **Section 7**.

Table 29 Dartbrook Mine Environmental Management Activities Proposed for 2023

Area	Proposed Activity
Operational	• Minor construction activities to return the site to operating conditions; and • Commencement of mining in the Kayuga Seam.
Air Quality	• An AQGGMP will be prepared prior to recommencement of construction; and • Dust mitigation and control activities will be employed in accordance with the AQGGMP.
Erosion and Sediment	• An Erosion and Sediment Control Plan will be prepared prior to recommencement of construction; and • Water runoff from previously disturbed areas will continue to be directed into sediment dams.
Surface Water Management	• The SWMP will be updated prior to recommencement of mining; and • Water management and monitoring in accordance with the revised SWMP.
Groundwater Management	• The SWMP will be updated prior to recommencement of mining; • The groundwater monitoring network and IAC will be reviewed during the SWMP update; and • Groundwater monitoring will be conducted in accordance with the revised SWMP.
Rehabilitation	• Ongoing monitoring of rehabilitation areas on site, with maintenance work as required.
Threatened Flora and Fauna	• The Flora and Fauna Management Plan will be updated prior to recommencement of construction; • Further disturbance will be undertaken pursuant to the GDP process; and • Inspections of the River Restoration, River Red Gum and Forestry Plantation areas will continue.
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	• The Landscape and Lighting Management Plan will be updated prior to recommencement of construction; and • Maintenance and improvement of the existing tree screens (as required).
Aboriginal Heritage	• The Archaeology and Cultural Heritage Management Plan will be updated prior to recommencement of construction; and • The existing GDP system will continue to be implemented prior to further ground disturbance.

Area	Proposed Activity
European Heritage	• The Archaeology and Cultural Heritage Management Plan will be updated prior to recommencement of construction; and • Ongoing maintenance of European heritage items as required, in consultation with regulatory agencies.
Spontaneous Combustion	• The Spontaneous Combustion Management Plan will be updated prior to recommencement of mining; and • 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;
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.

ABBREVIATIONS

Abbreviation	Meaning
AQC	AQC Dartbrook Management Pty Limited
BC Act	*Biodiversity Conservation Act 2016*
BOM	Bureau of Meteorology
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
GDP	Ground Disturbance Permit
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
mbgl	Metres Below Groundwater Level
ML	megalitres

Abbreviation	Meaning
MEG	Regional NSW – Department of Mining, Exploration and Geoscience
Mining Act	*Mining Act 1992*
ML	Mining Lease
MSC	Muswellbrook Shire Council
Mtpa	Million tonnes per annum
NGER	National Greenhouse Energy Reporting
PM10	Particulate Matter less than 10 microns
REA	Reject Emplacement Area
REA Plan	REA Spontaneous Combustion Management Plan
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

REFERENCES

- Australasian Groundwater and Environmental Consultants (2019), *Dartbrook Mine Trigger Exceedance Review 2015-2018.*
- James Bailey & Associates (2022), *Dartbrook Mine Rehabilitation Management Plan.*
- Hansen Bailley (2020), *Mining Operations Plan: Continuation of Care and Maintenance January 2021-December 2022.*
- Hansen Bailey (2016), *Dartbrook Mine Annual Review 2016.*
- Mackie Environmental Research (2000), *Dartbrook Extended – Underground Coal Mine: Water Management Studies.*

Appendix A

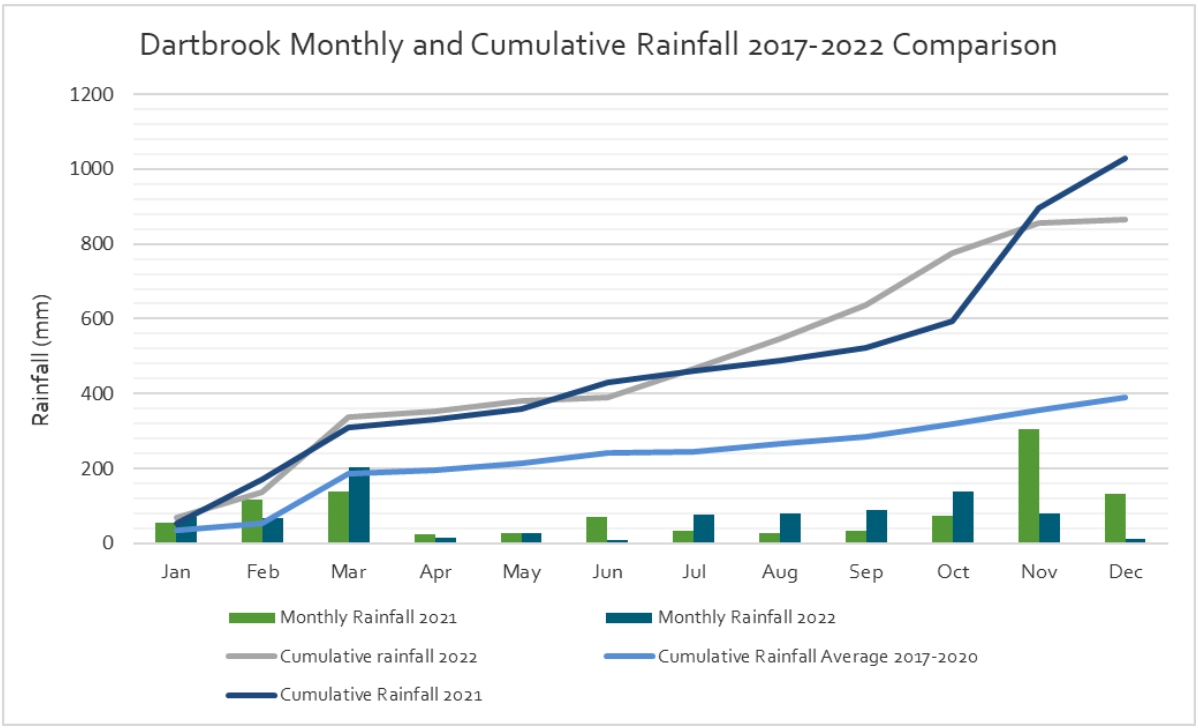
Summary of Minor Amendments to Development Consent Conditions During Care and Maintenance

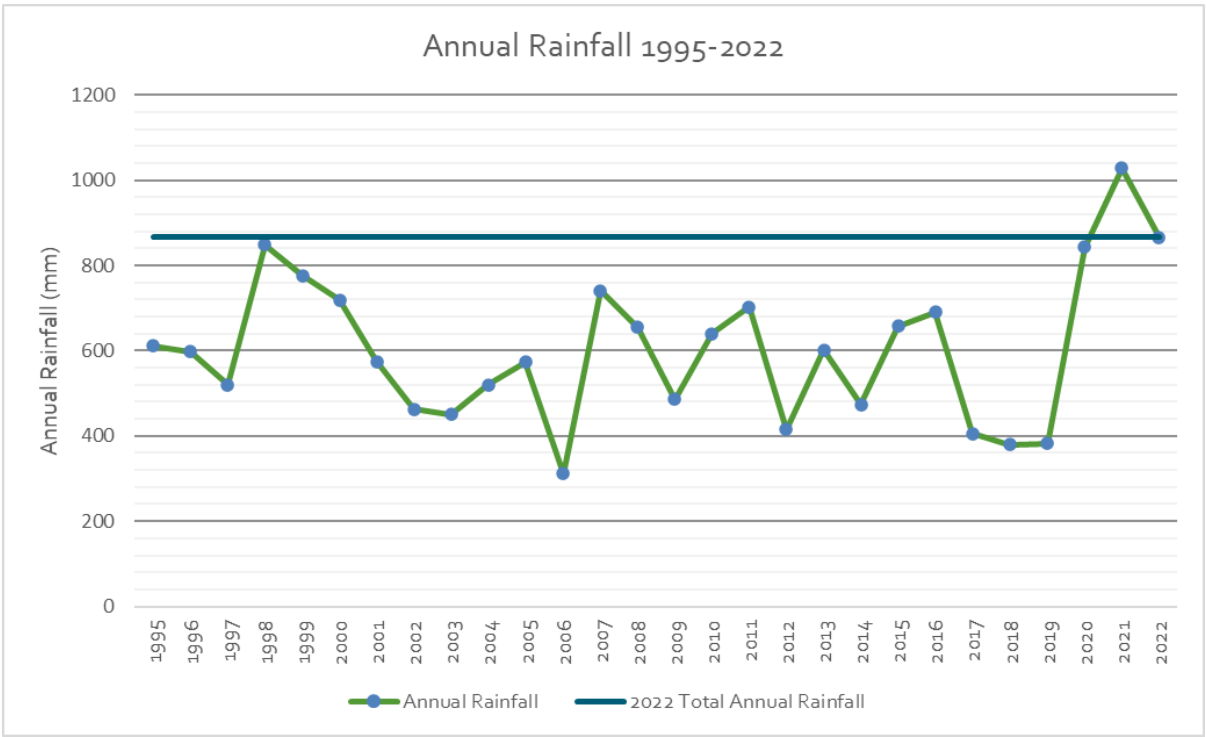
Table 30 Summary of Minor Amendments to Development Consent Conditions

Approval Document Reference	Development Consent No. Reference	Existing Requirement	Requirement During Care & Maintenance
Complaints protocol & Environmental Management Strategy	10.2 (a) (ii)	Six 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 six 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

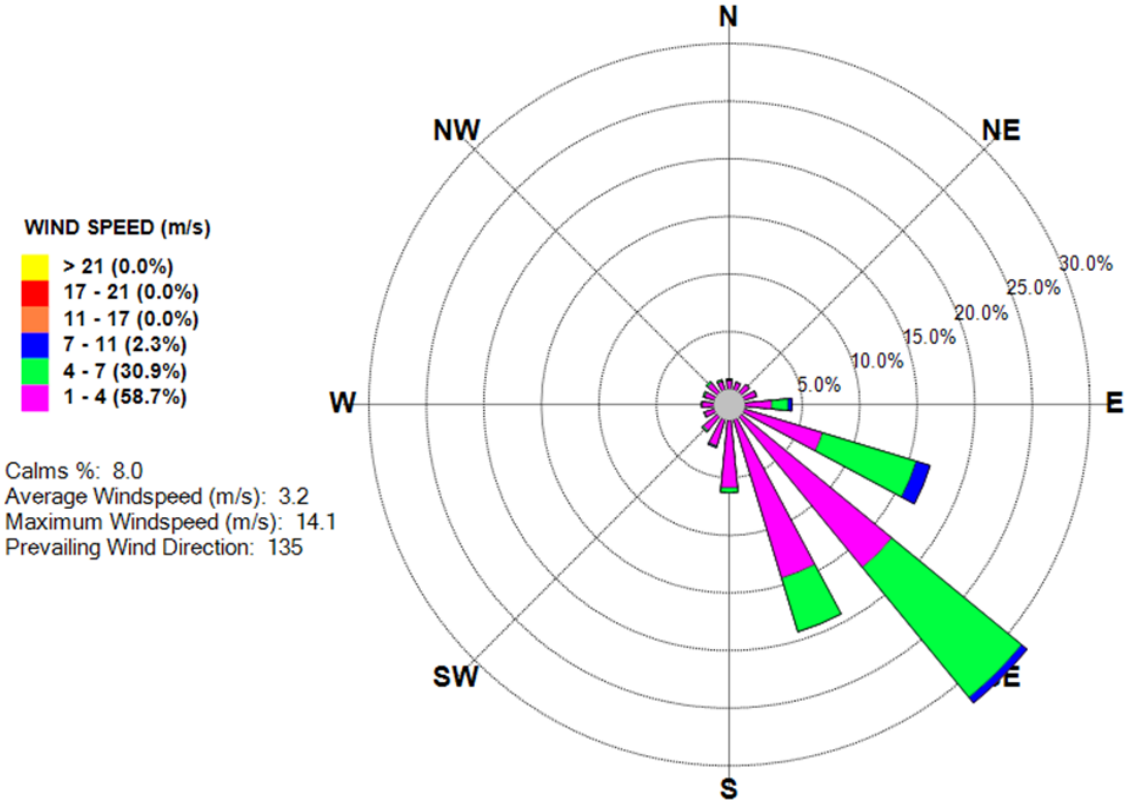
Meteorological Summary


Dartbrook Monthly and Cumulative Rainfall 2017-2022 Comparison
Rainfall (mm)
1200
1000
800
600
400
200
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Monthly Rainfall 2021
Monthly Rainfall 2022
Cumulative rainfall 2022
Cumulative Rainfall Average 2017-2020
Cumulative Rainfall 2021


Annual Rainfall 1995-2022
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
2022
Annual Rainfall
2022 Total Annual Rainfall

Dartbrook Met01 - Windrose

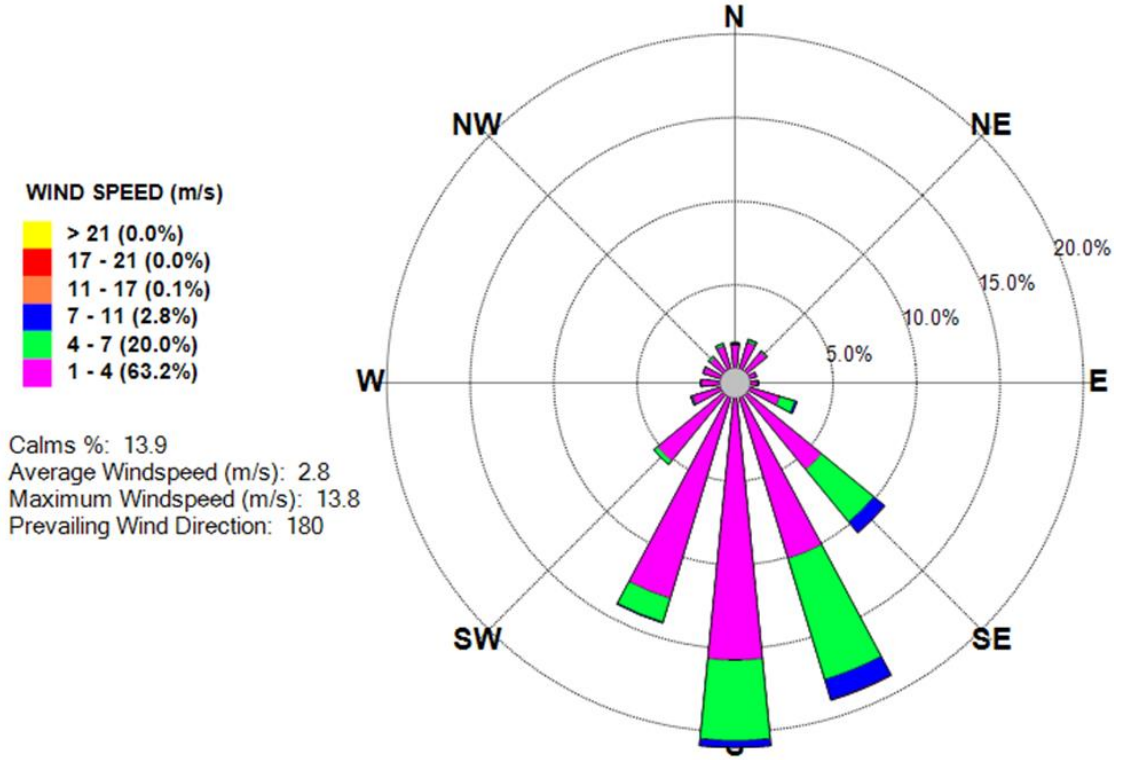
January 2022



Calms %: 8.0
Average Windspeed (m/s): 3.2
Maximum Windspeed (m/s): 14.1
Prevailing Wind Direction: 135

Dartbrook Met02 - Windrose

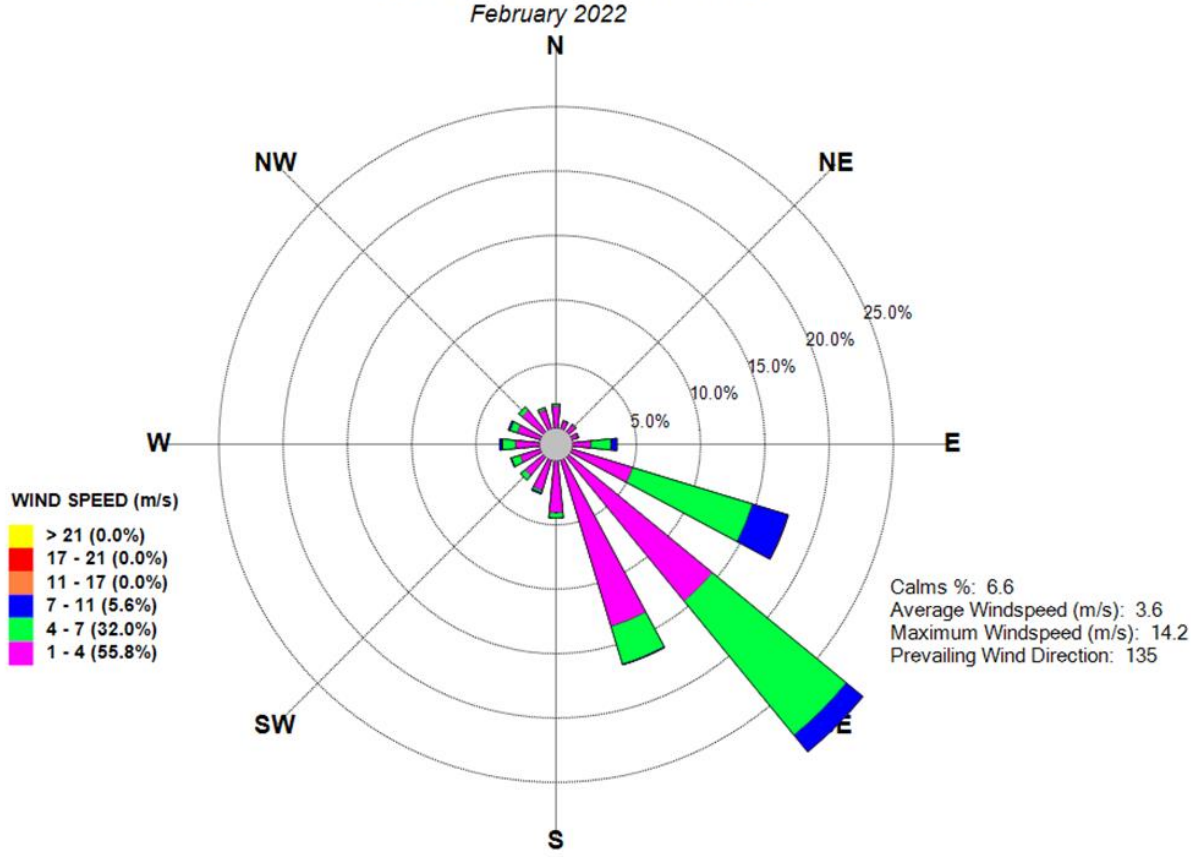
January 2022



Calms %: 13.9
Average Windspeed (m/s): 2.8
Maximum Windspeed (m/s): 13.8
Prevailing Wind Direction: 180

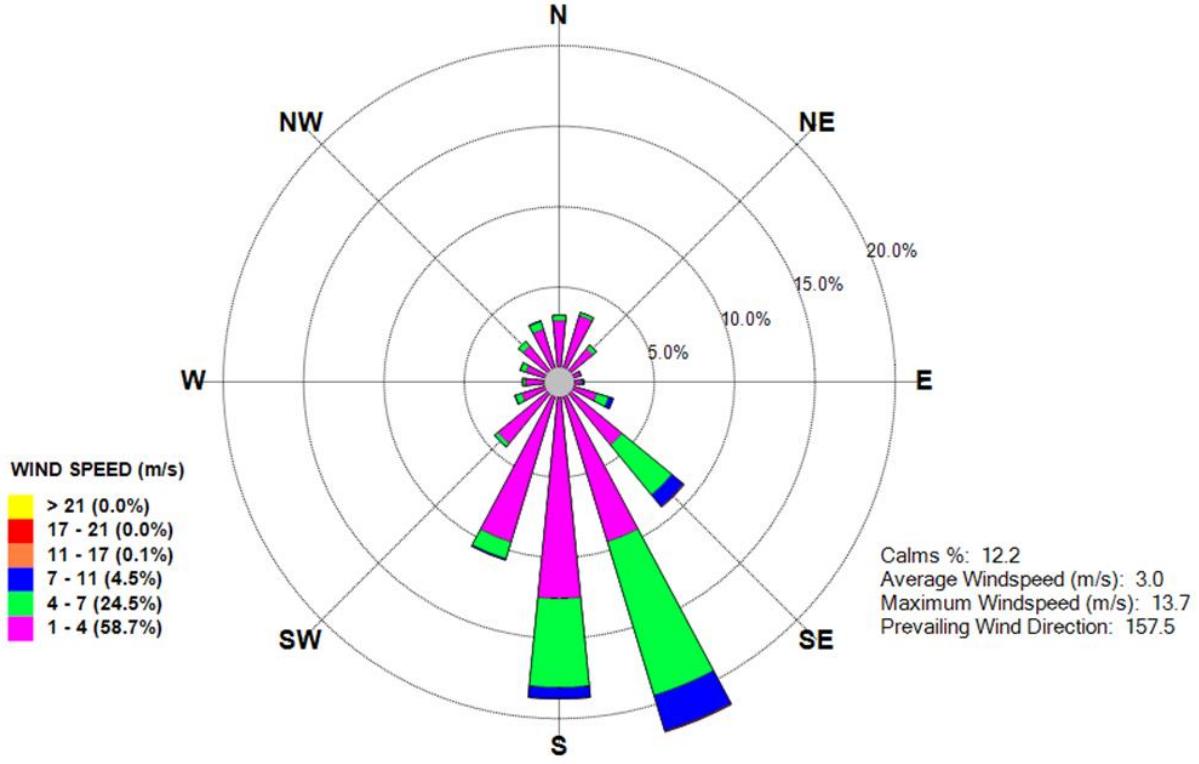
Dartbrook Met01 - Windrose

February 2022



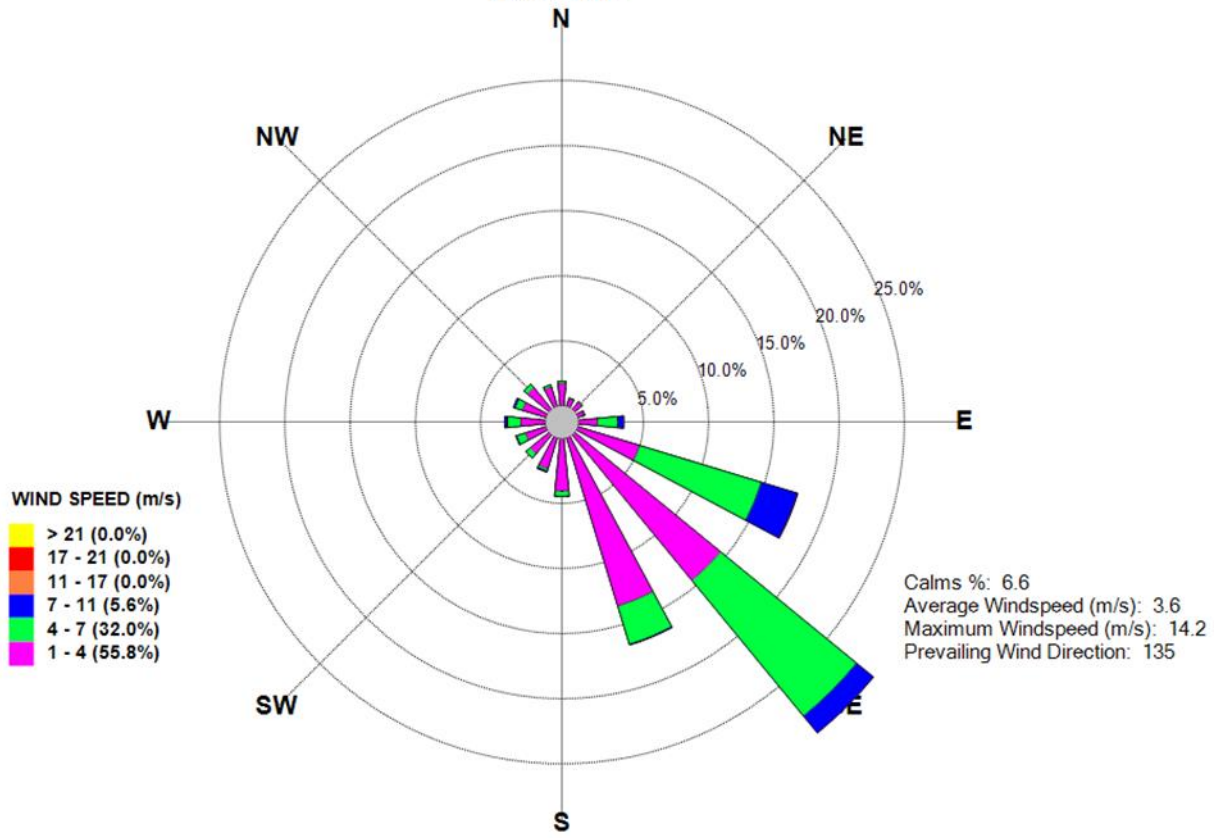
Dartbrook Met02 - Windrose

February 2022



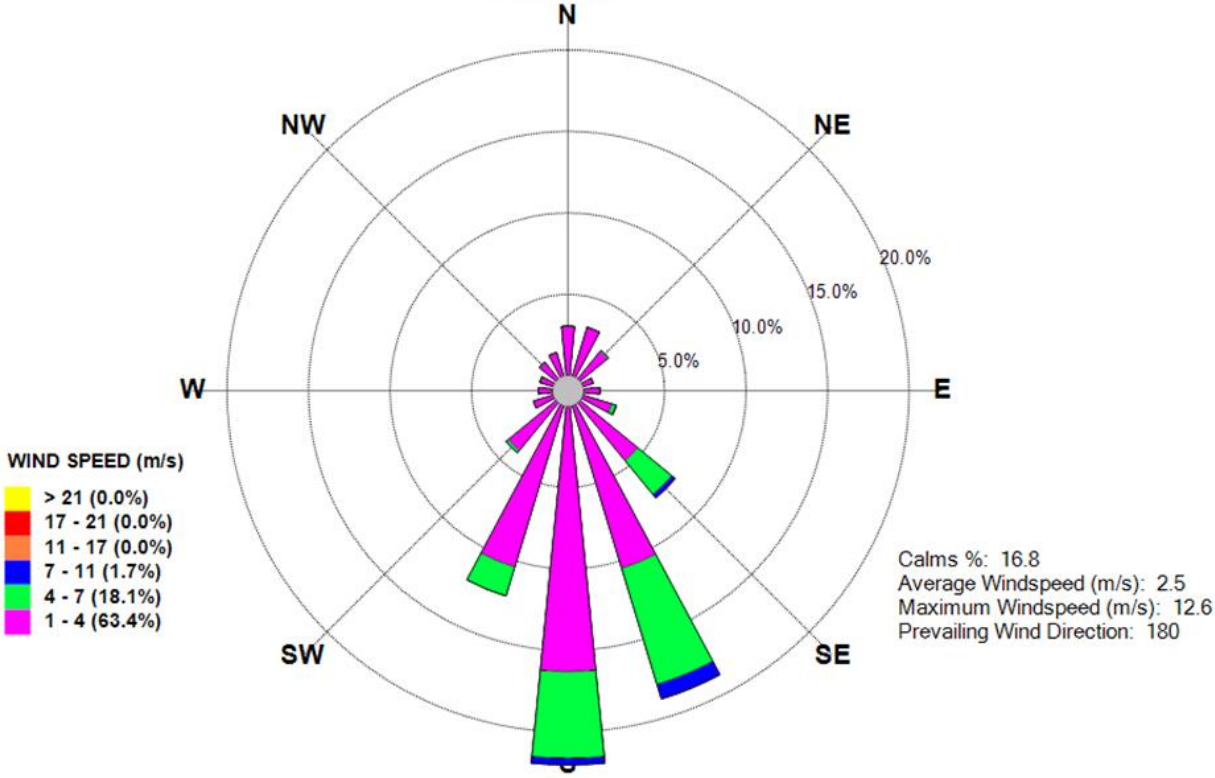
Dartbrook Met01 - Windrose

March 2022



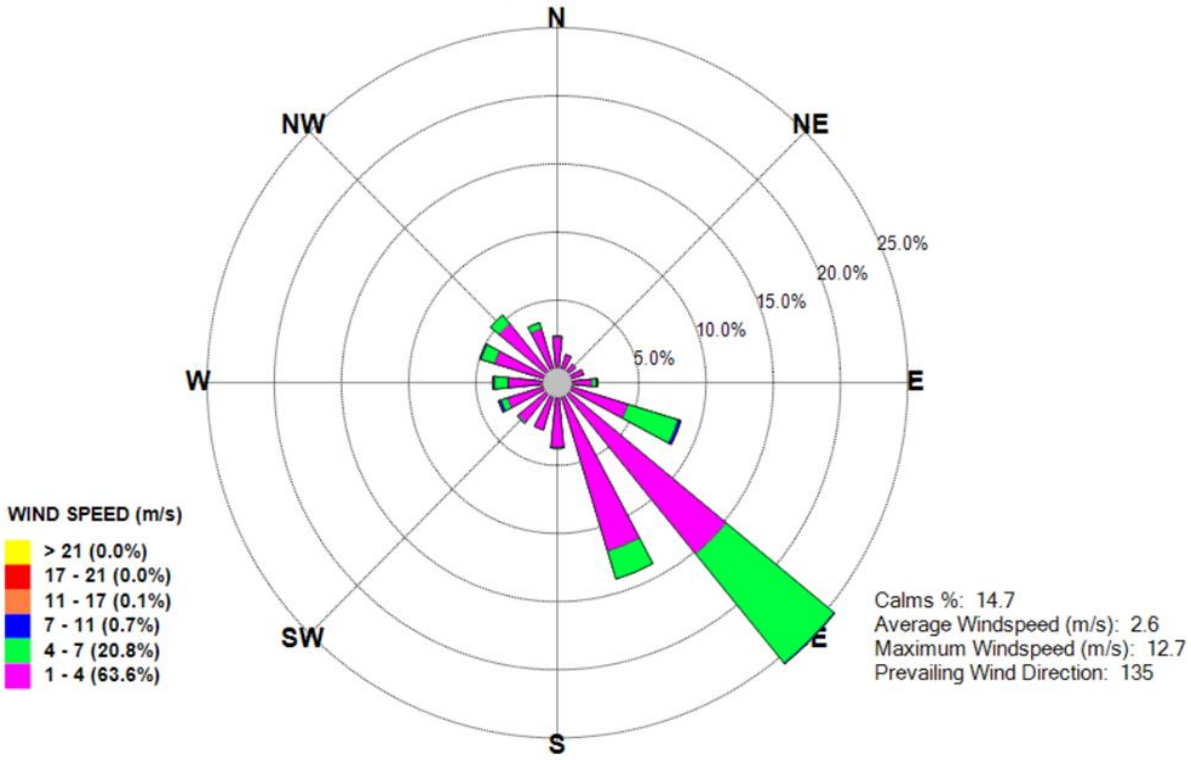
Dartbrook Met02 - Windrose

March 2022



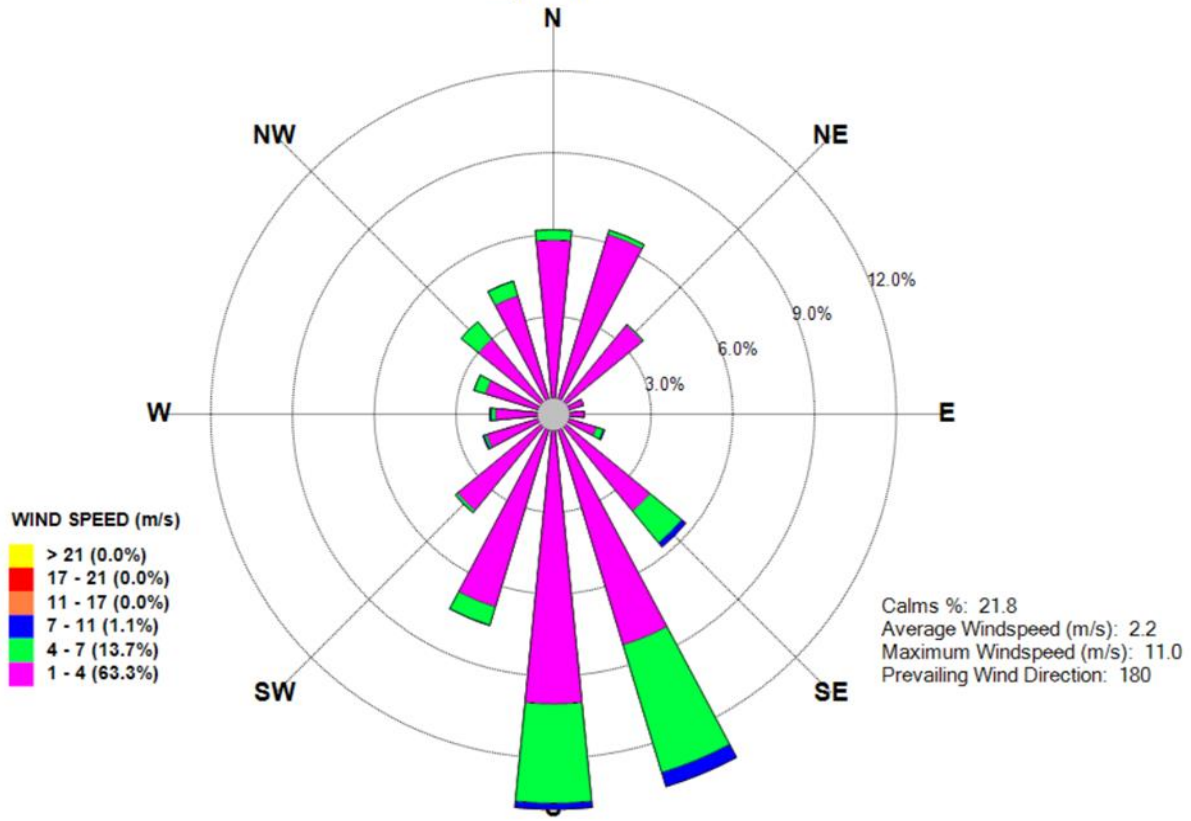
Dartbrook Met01 - Windrose

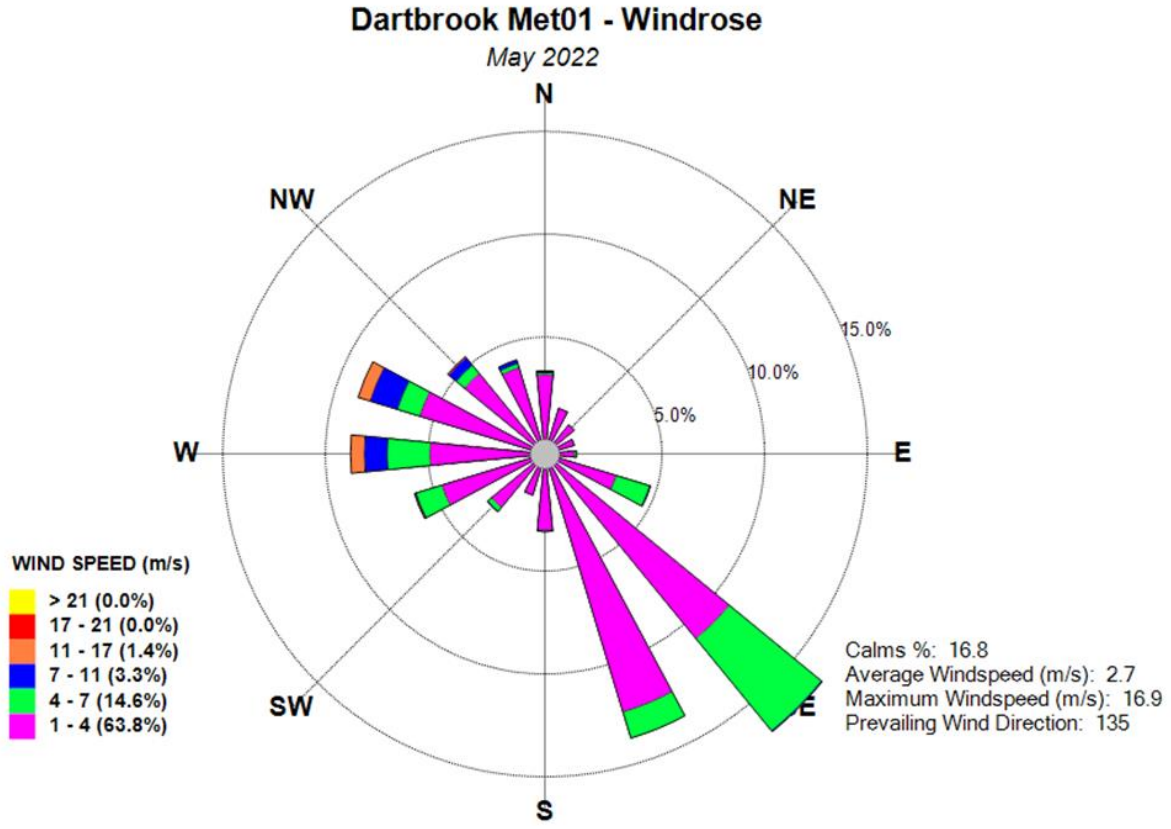
April 2022

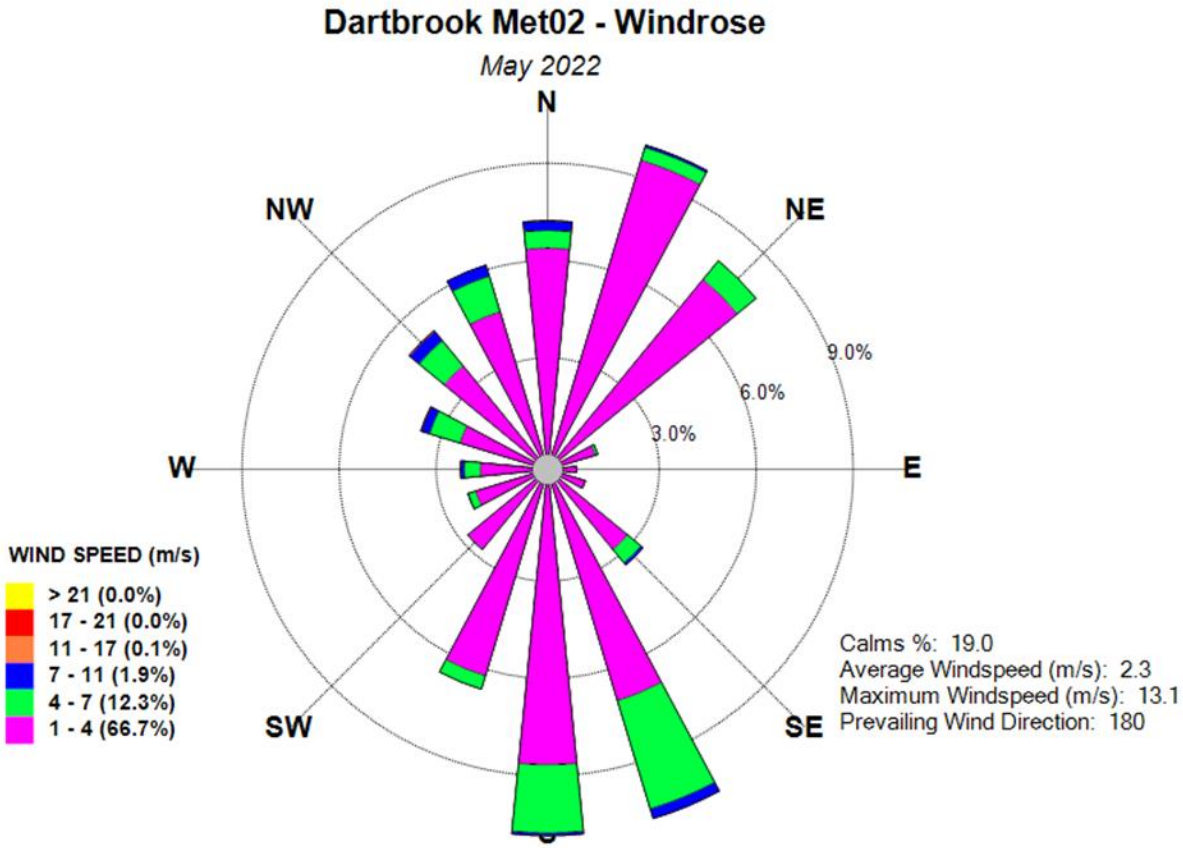


Dartbrook Met02 - Windrose

April 2022

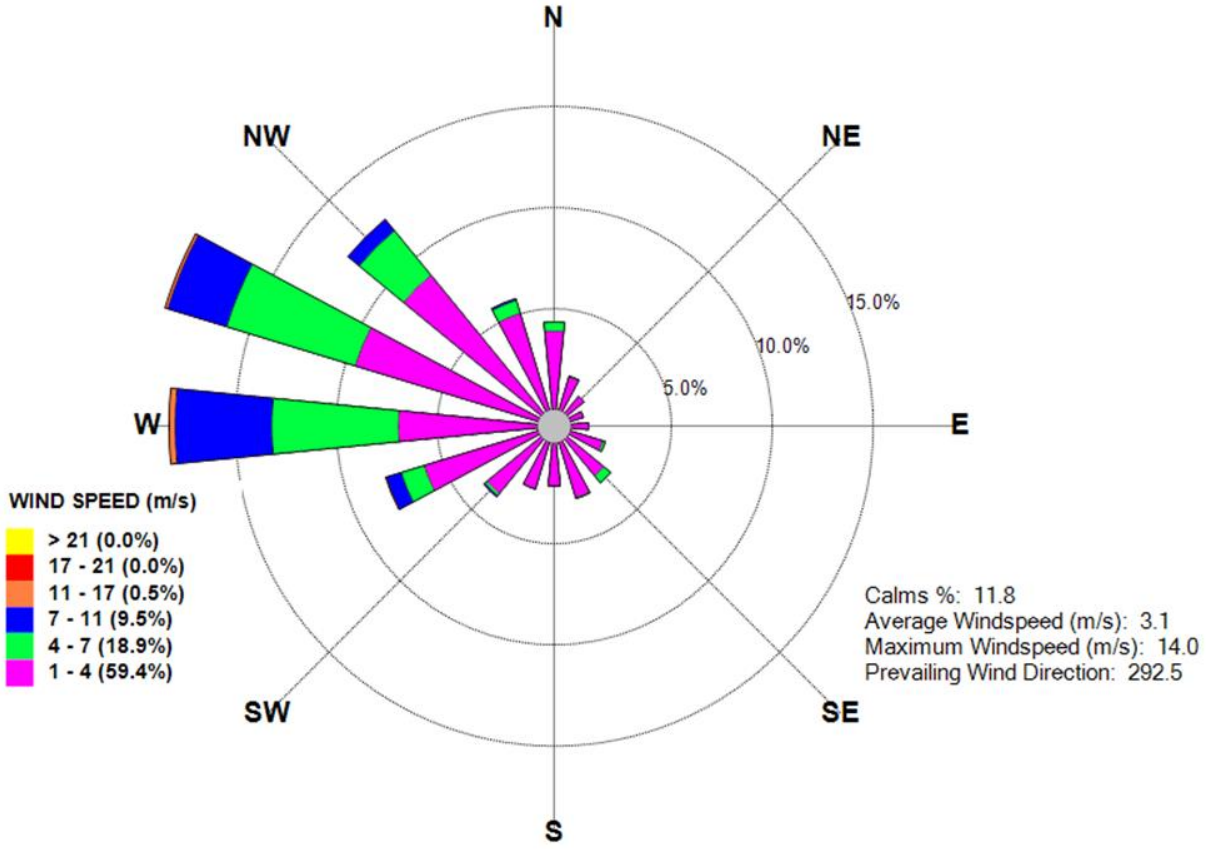



Dartbrook Met01 - Windrose
May 2022
N
NW
NE
W
E
SW
S
15.0%
10.0%
5.0%
WIND SPEED (m/s)
> 21 (0.0%)
17 - 21 (0.0%)
11 - 17 (1.4%)
7 - 11 (3.3%)
4 - 7 (14.6%)
1 - 4 (63.8%)
Calms %: 16.8
Average Windspeed (m/s): 2.7
Maximum Windspeed (m/s): 16.9
Prevailing Wind Direction: 135


Dartbrook Met02 - Windrose
May 2022
N
NW
NE
W
E
SW
SE
9.0%
6.0%
3.0%
WIND SPEED (m/s)
> 21 (0.0%)
17 - 21 (0.0%)
11 - 17 (0.1%)
7 - 11 (1.9%)
4 - 7 (12.3%)
1 - 4 (66.7%)
Calms %: 19.0
Average Windspeed (m/s): 2.3
Maximum Windspeed (m/s): 13.1
Prevailing Wind Direction: 180

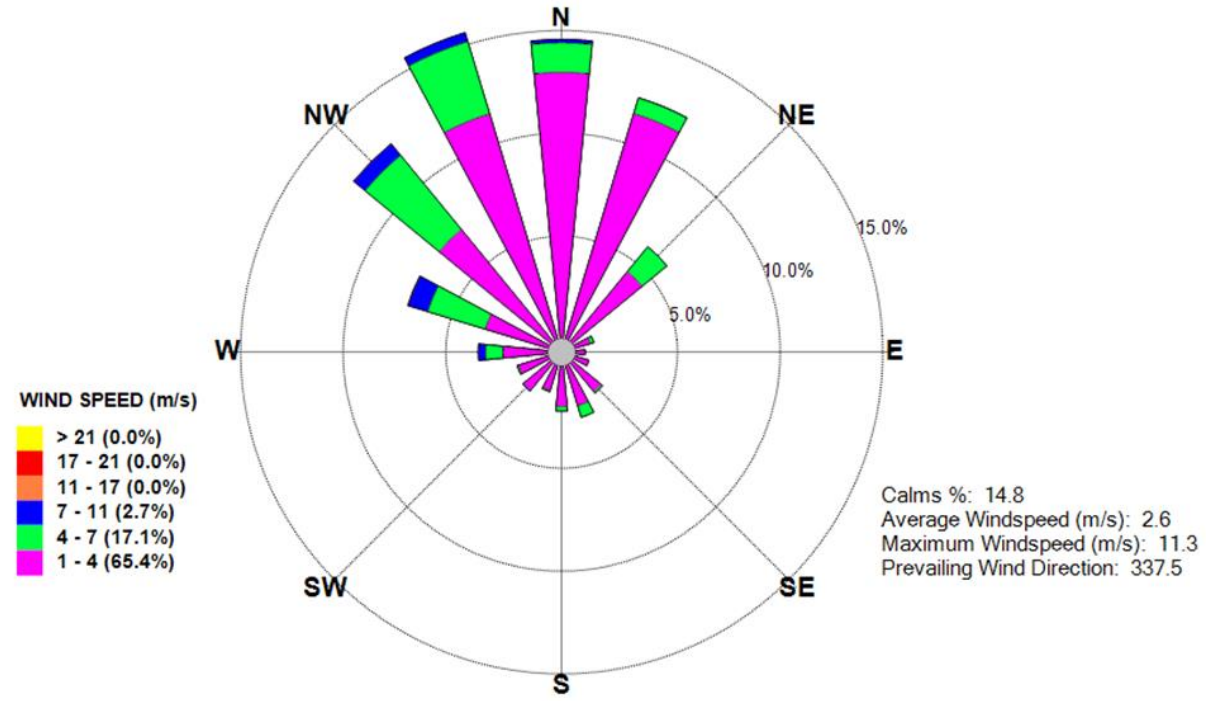
Dartbrook Met01 - Windrose

June 2022



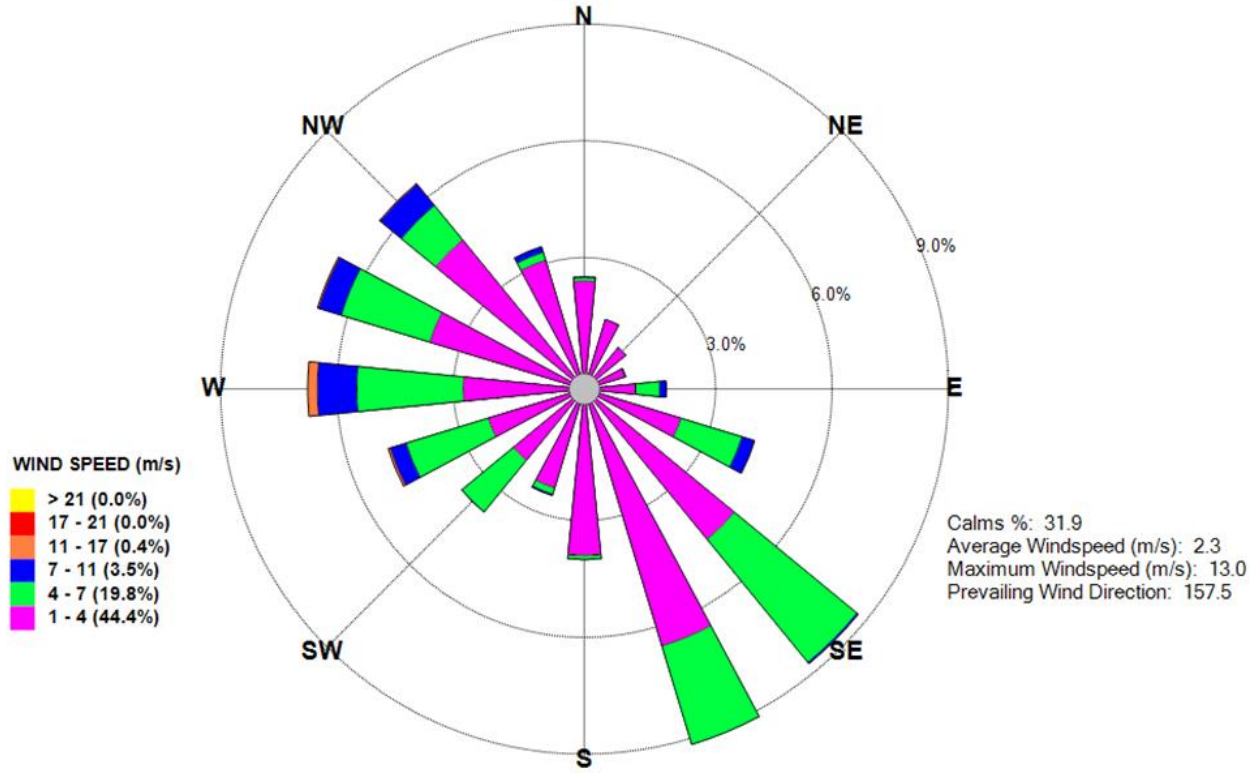
Dartbrook Met02 - Windrose

June 2022



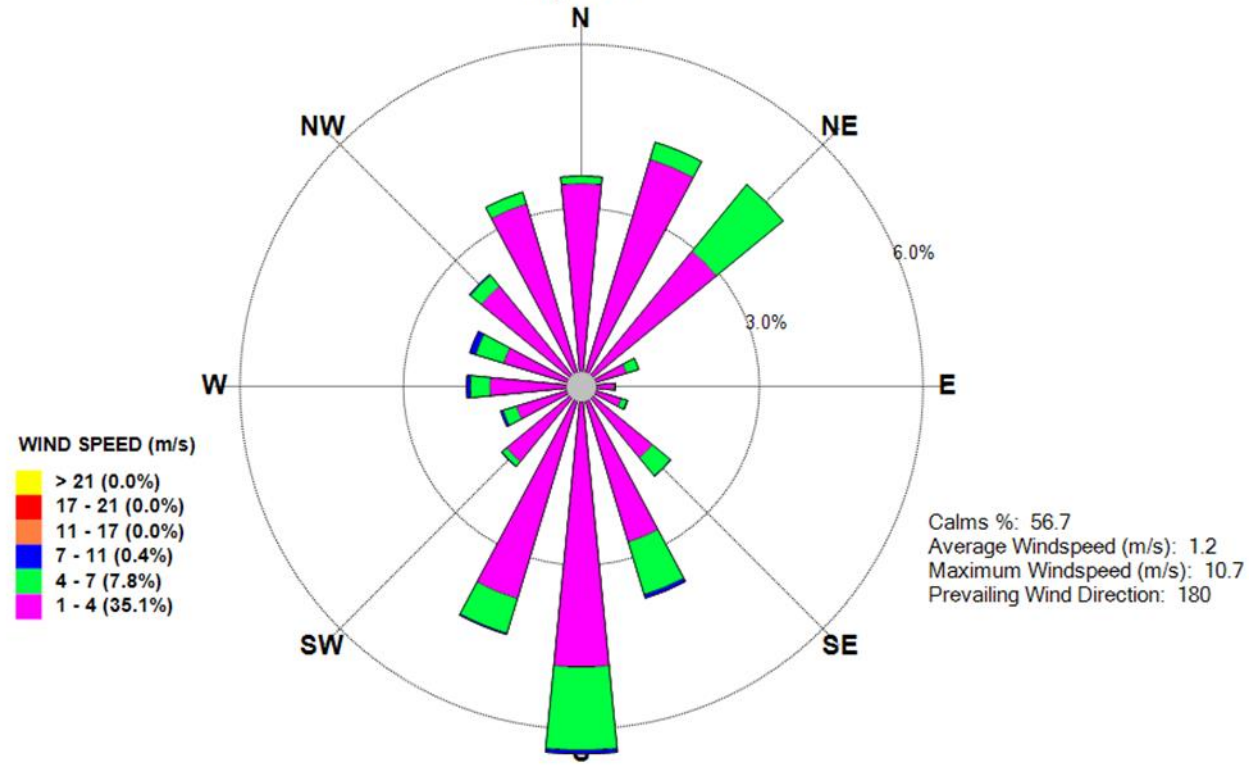
Dartbrook Met01 - Windrose

July 2022



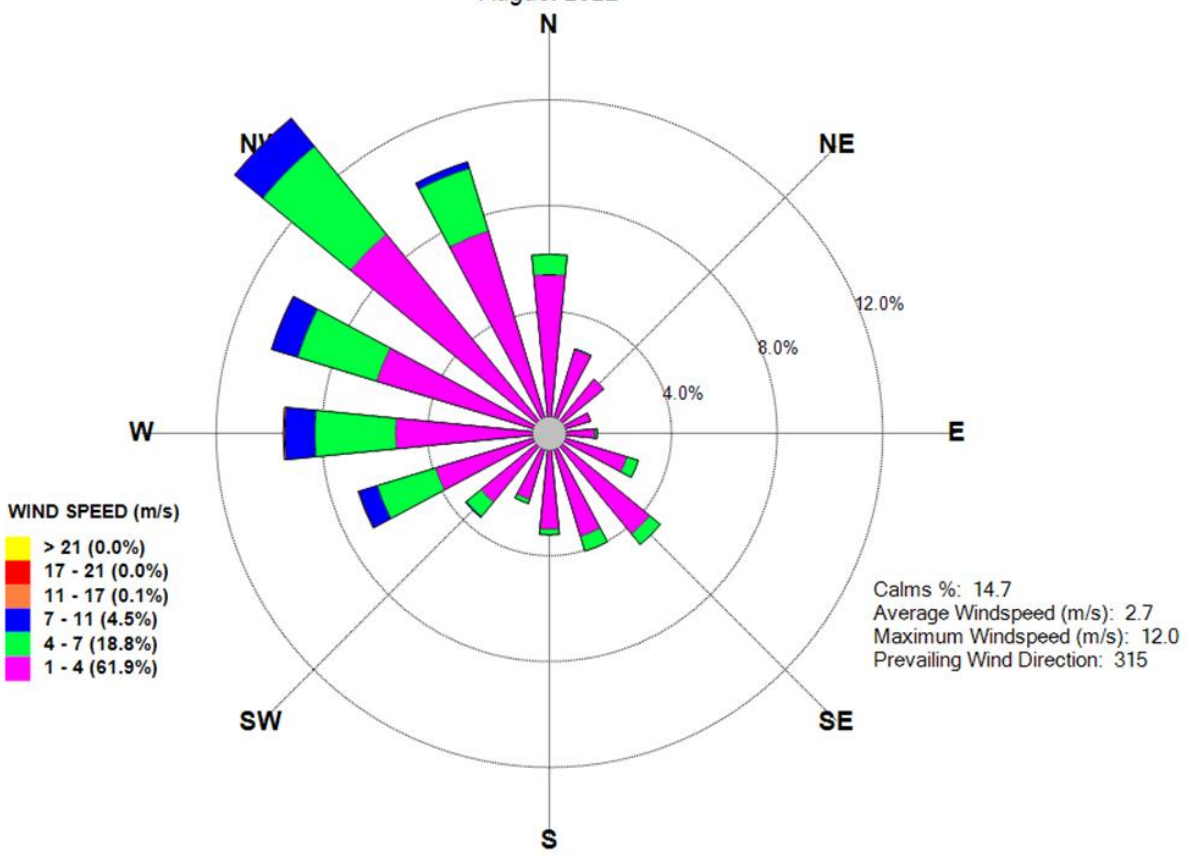
Dartbrook Met02 - Windrose

July 2022



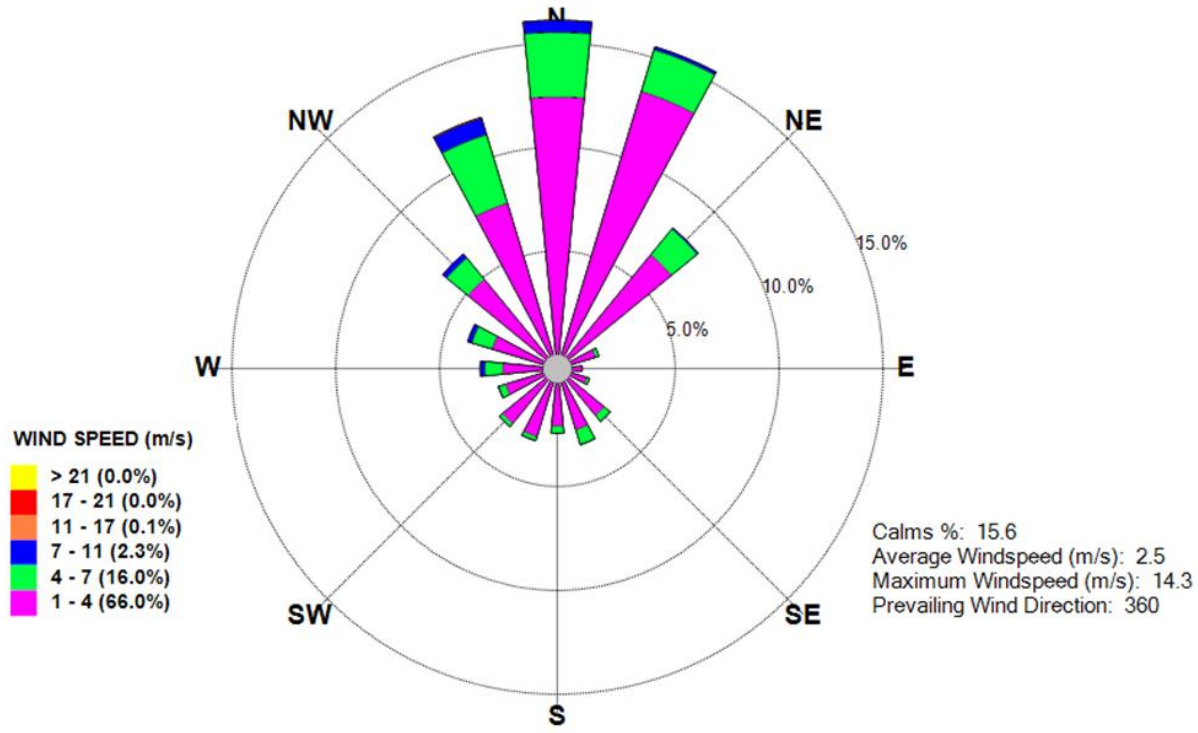
Dartbrook Met01 - Windrose

August 2022



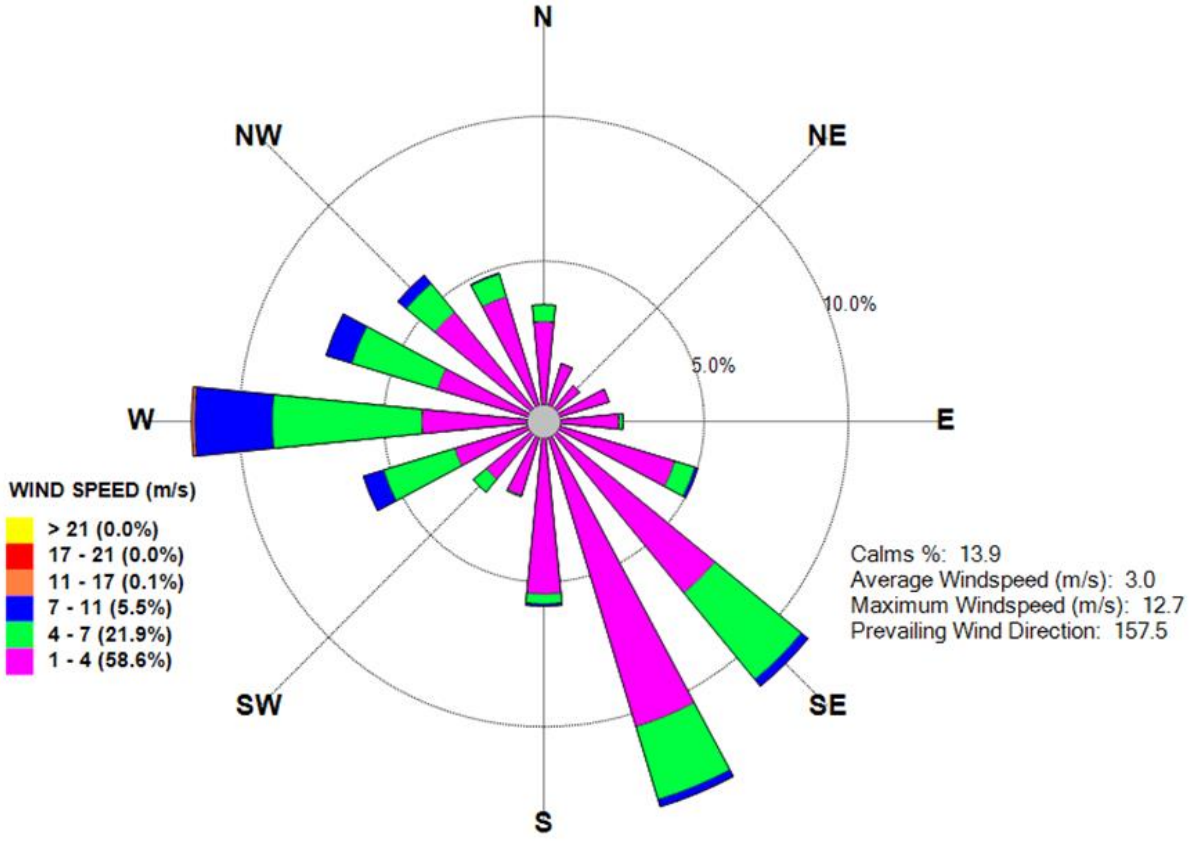
Dartbrook Met02 - Windrose

August 2022



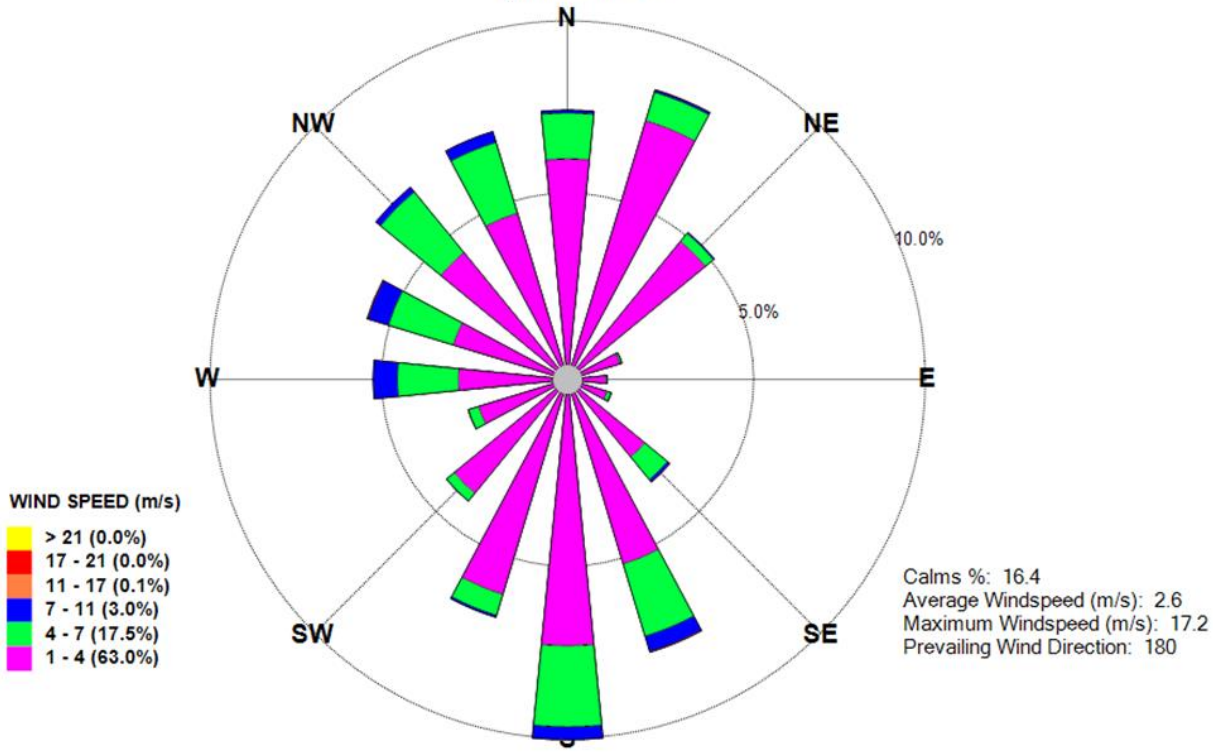
Dartbrook Met01 - Windrose

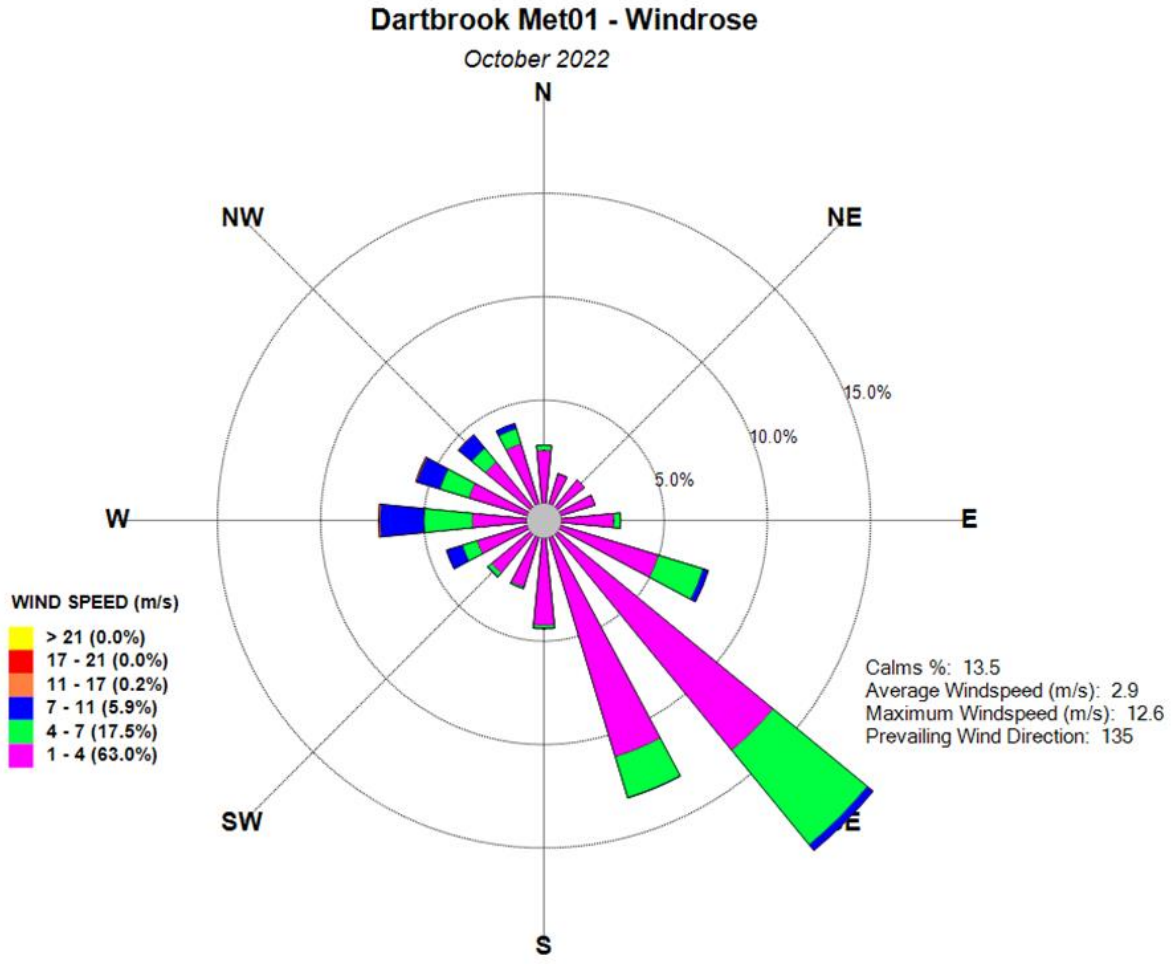
September 2022

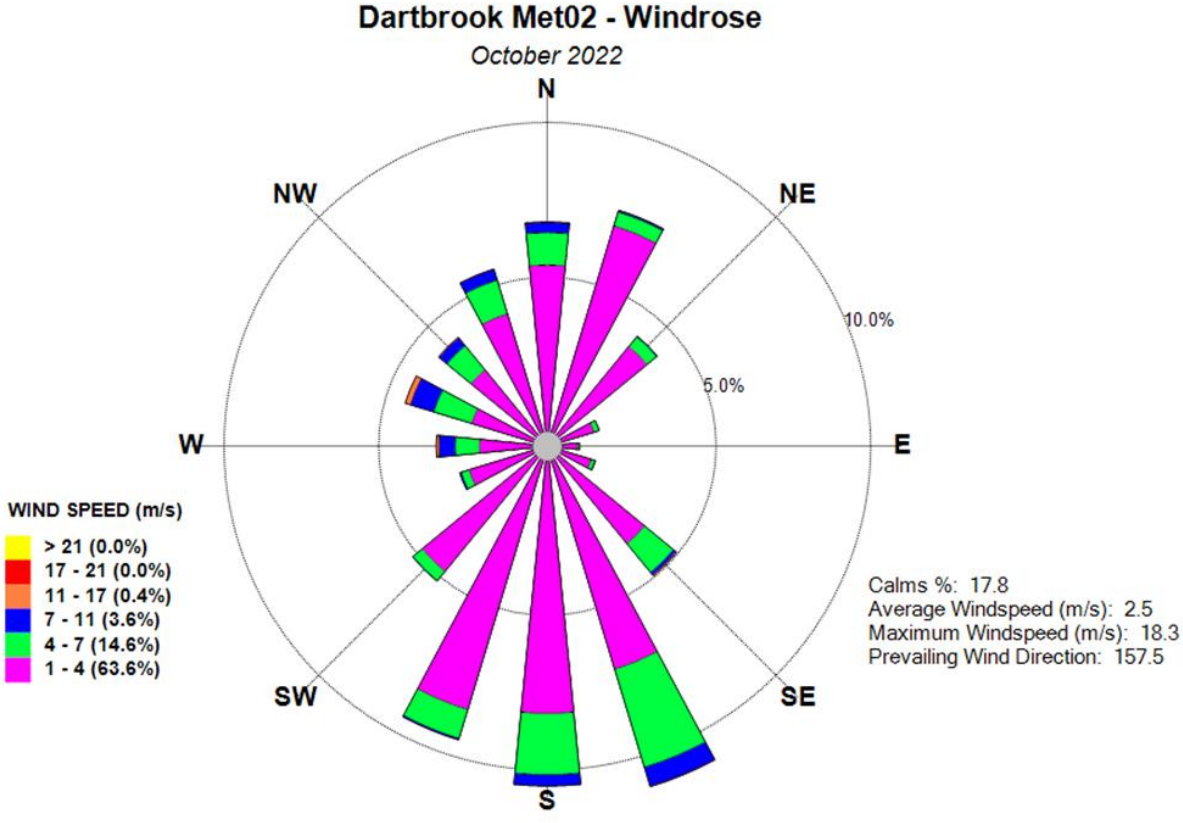


Dartbrook Met02 - Windrose

September 2022

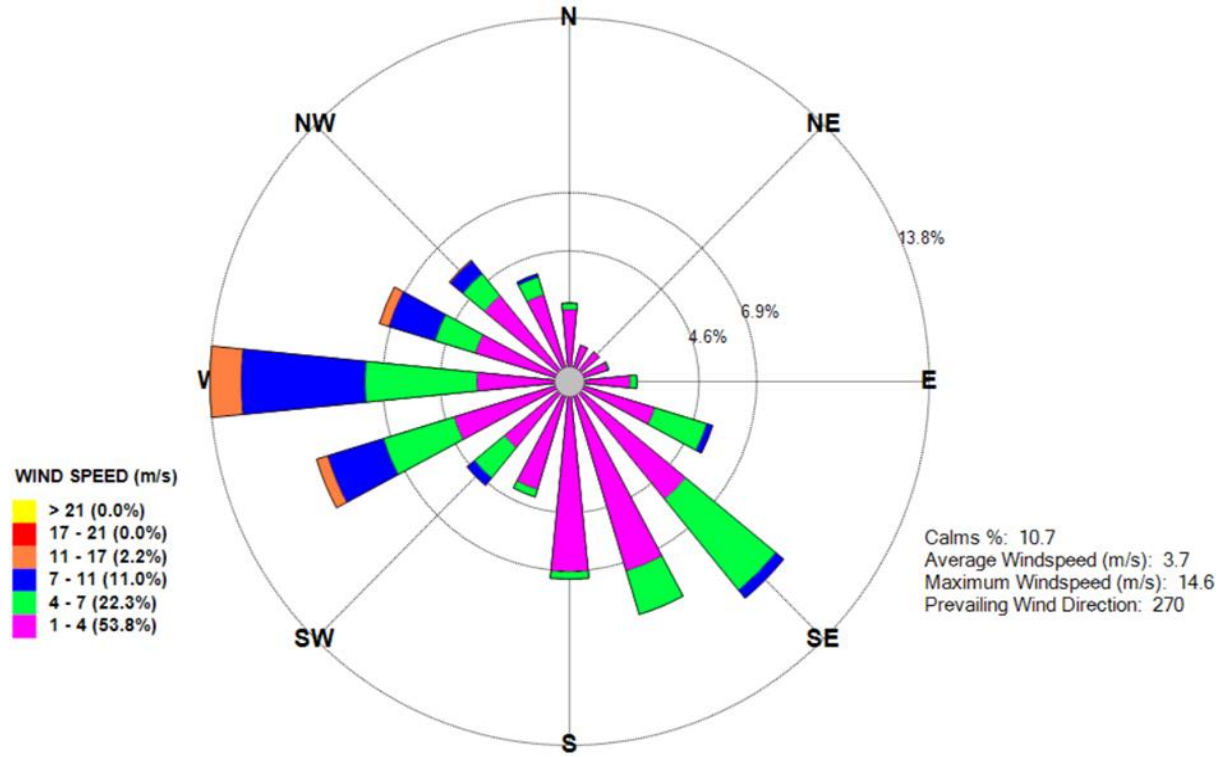



Dartbrook Met01 - Windrose
October 2022
N
NE
E
SE
S
SW
W
NW
5.0%
10.0%
15.0%
WIND SPEED (m/s)
> 21 (0.0%)
17 - 21 (0.0%)
11 - 17 (0.2%)
7 - 11 (5.9%)
4 - 7 (17.5%)
1 - 4 (63.0%)
Calms %: 13.5
Average Windspeed (m/s): 2.9
Maximum Windspeed (m/s): 12.6
Prevailing Wind Direction: 135


Dartbrook Met02 - Windrose
October 2022
N
NE
E
SE
S
SW
W
NW
5.0%
10.0%
WIND SPEED (m/s)
> 21 (0.0%)
17 - 21 (0.0%)
11 - 17 (0.4%)
7 - 11 (3.6%)
4 - 7 (14.6%)
1 - 4 (63.6%)
Calms %: 17.8
Average Windspeed (m/s): 2.5
Maximum Windspeed (m/s): 18.3
Prevailing Wind Direction: 157.5

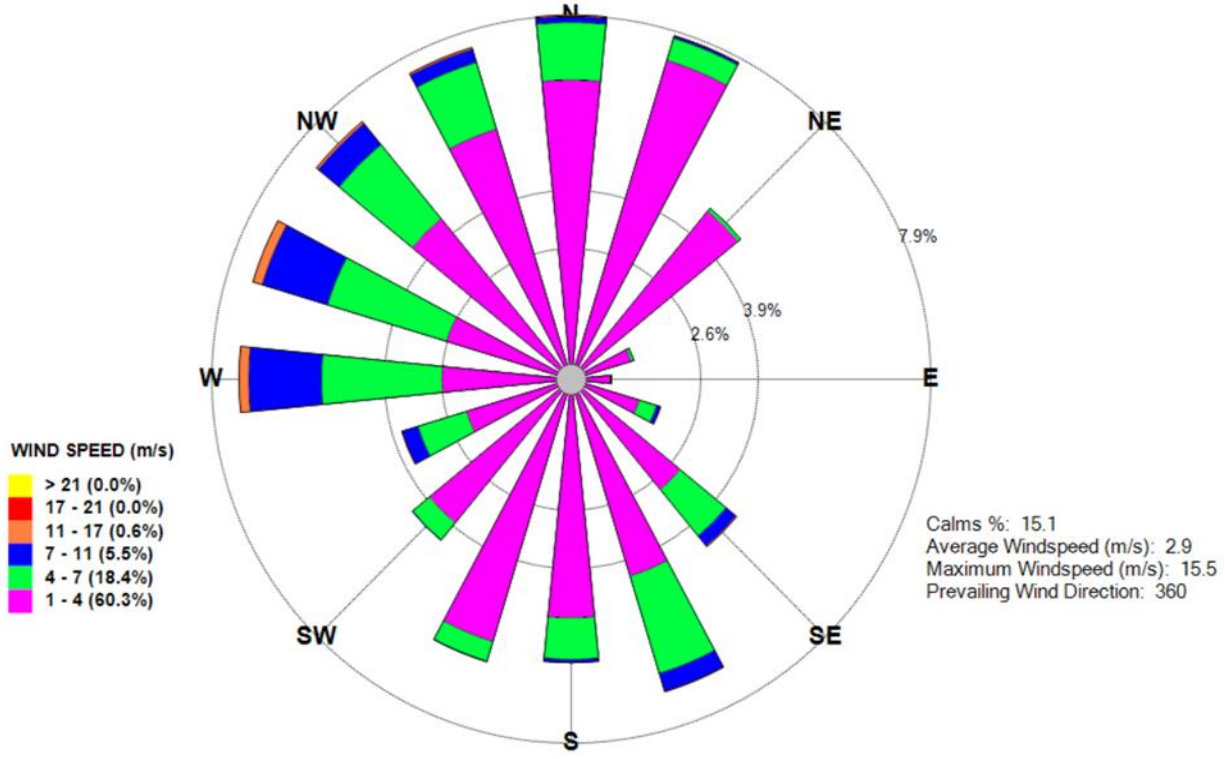
Dartbrook Met01 - Windrose

November 2022



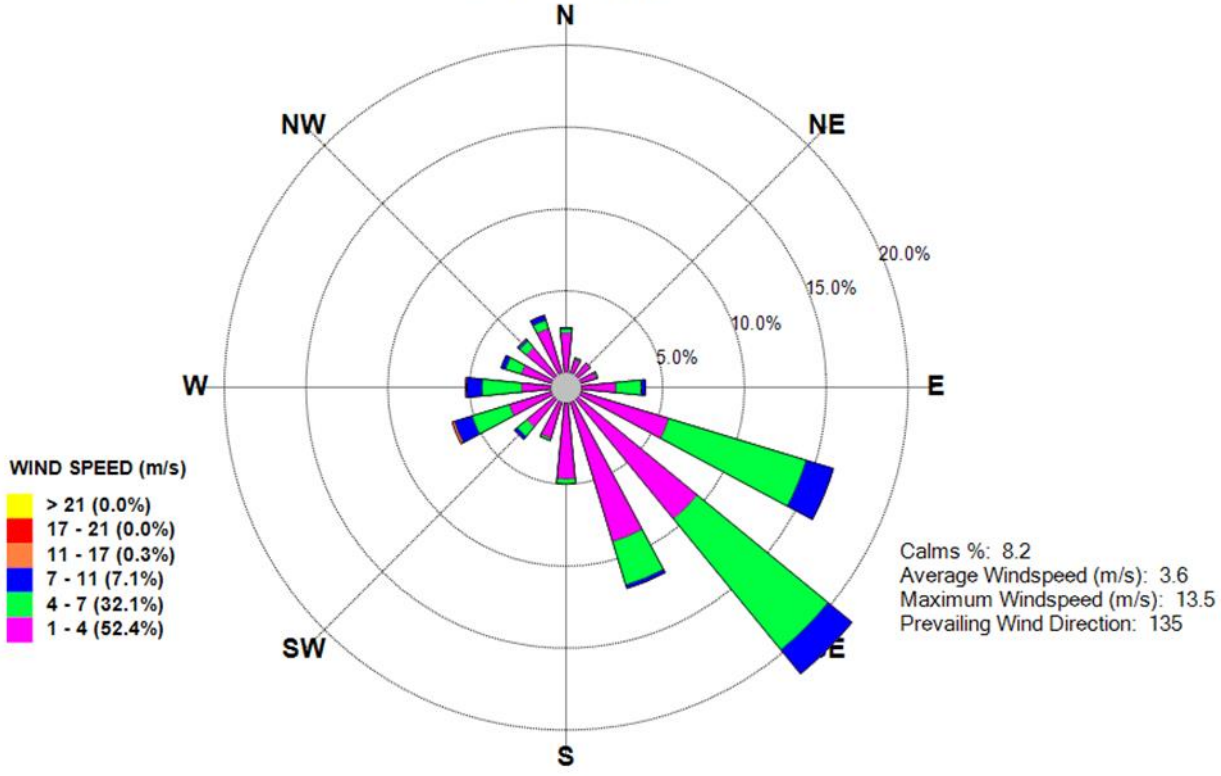
Dartbrook Met02 - Windrose

November 2022



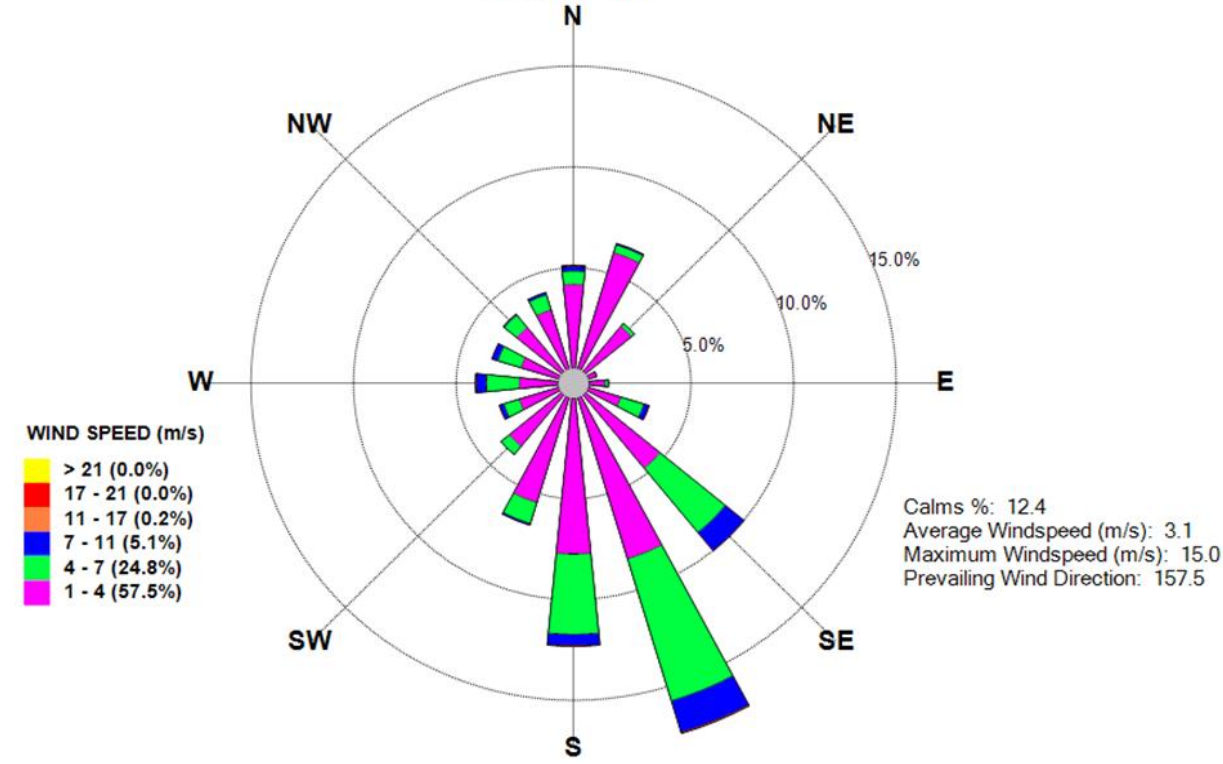
Dartbrook Met01 - Windrose

December 2022



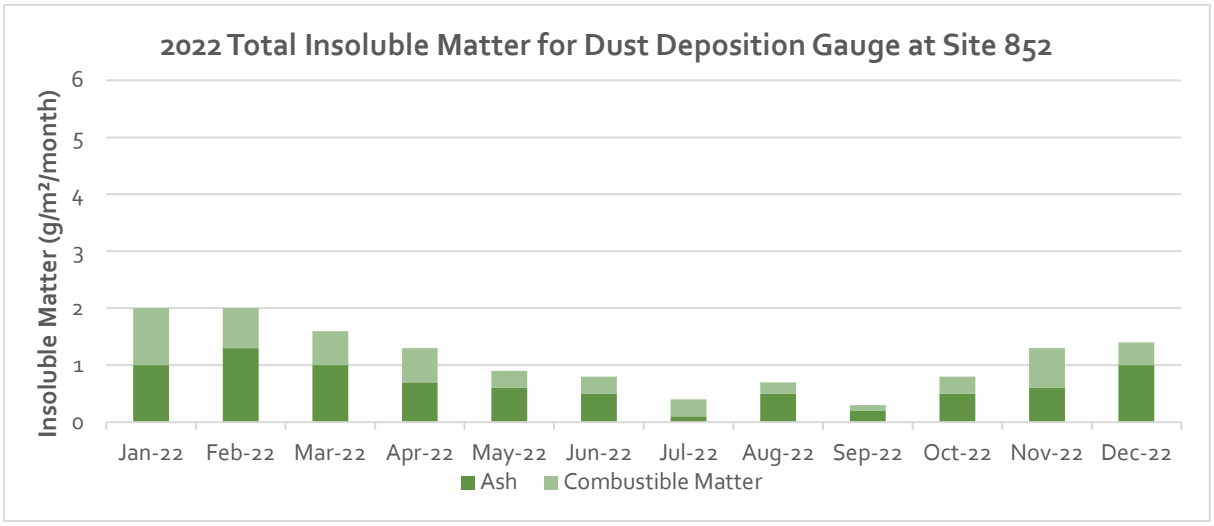
Dartbrook Met02 - Windrose

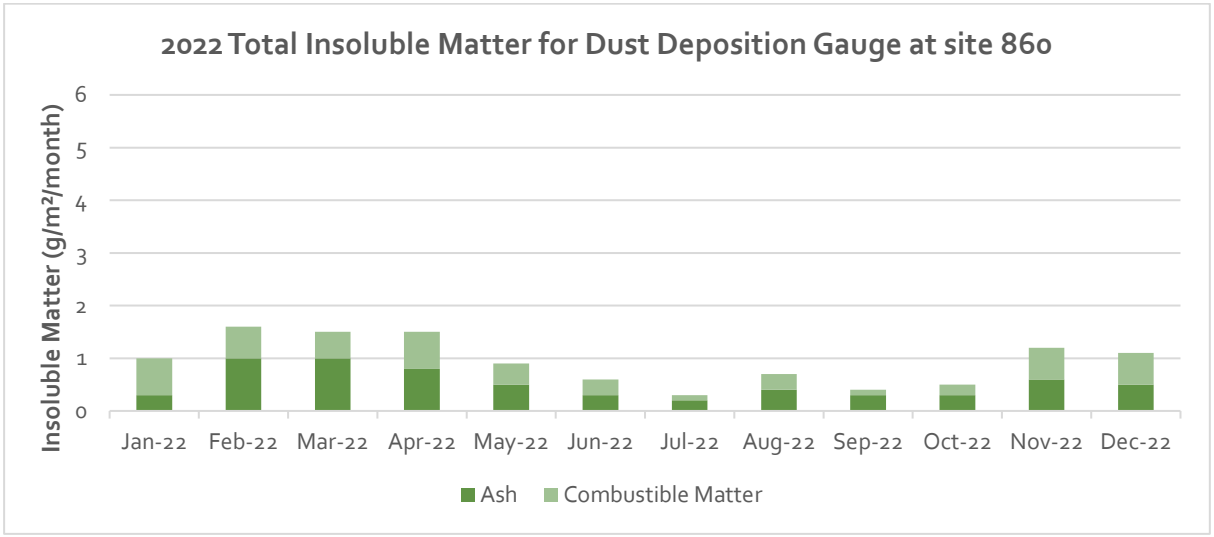
December 2022

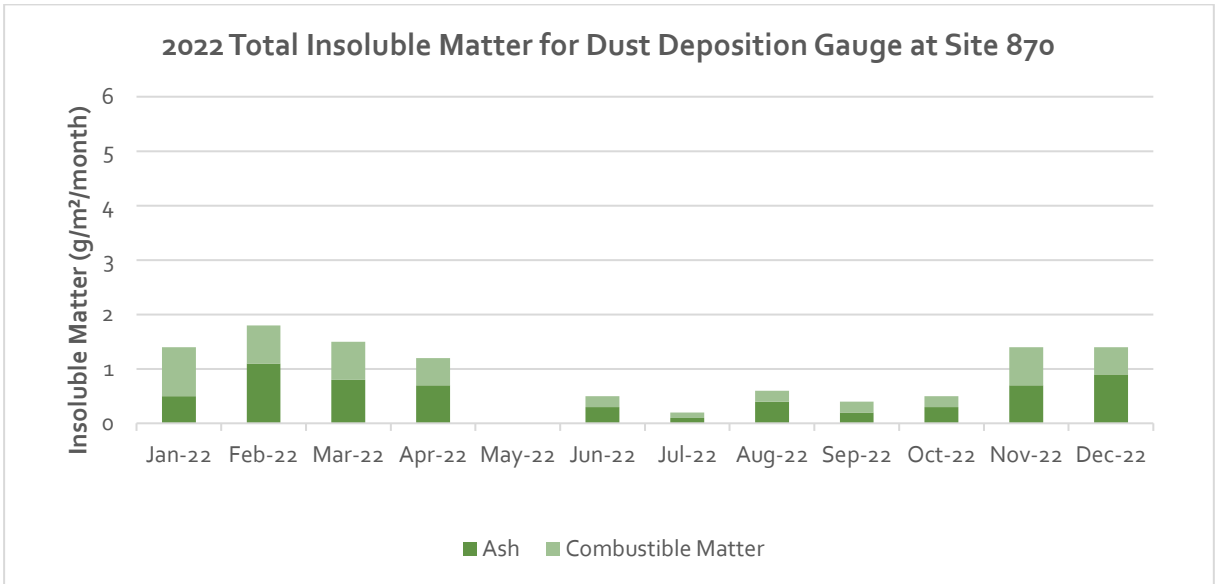


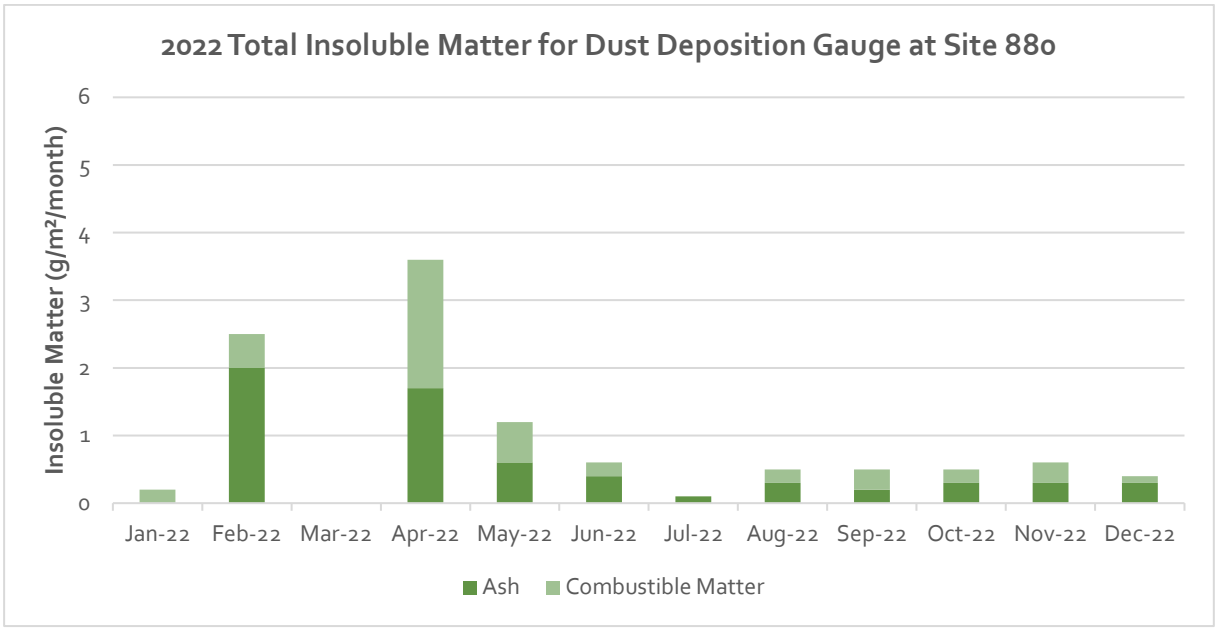
Appendix C

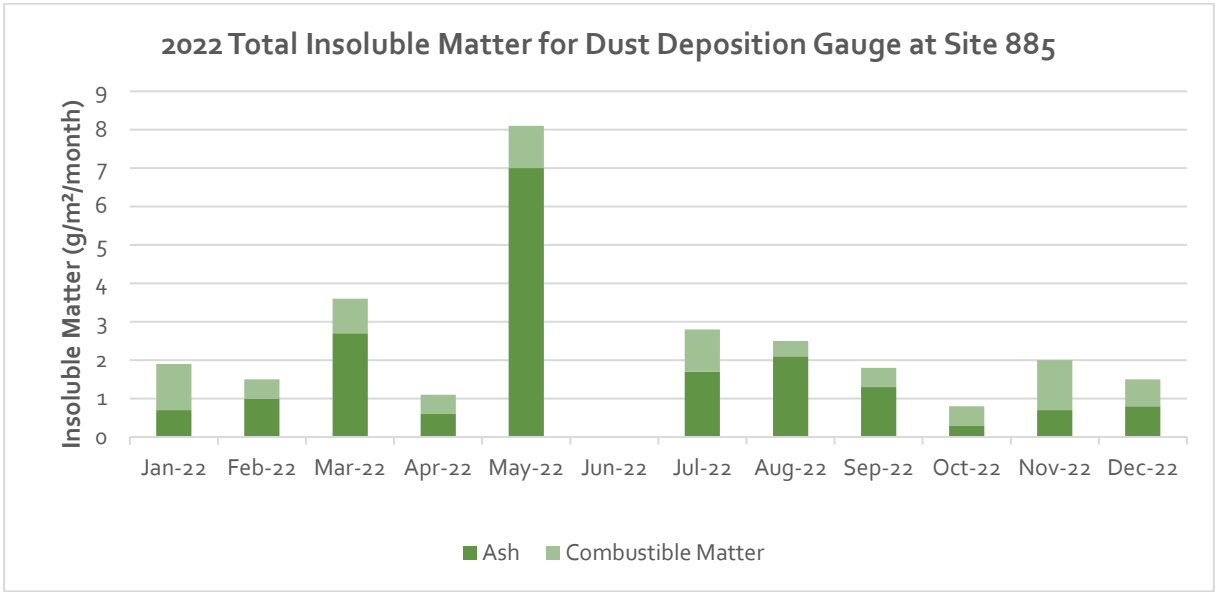
Air Quality Monitoring Summary

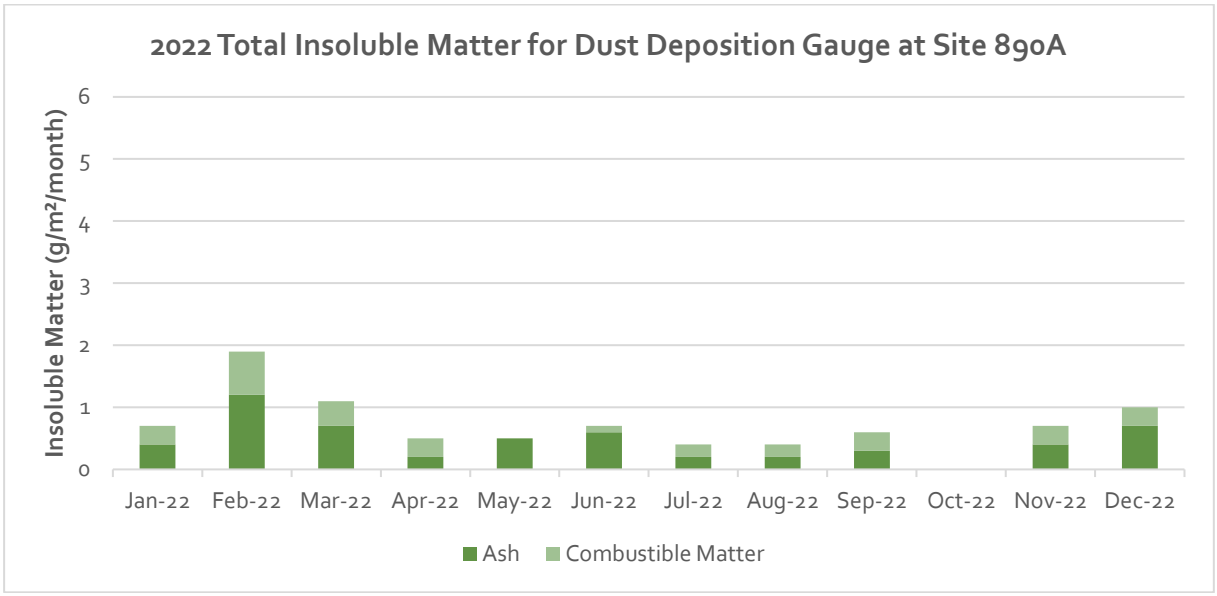

2022 Total Insoluble Matter for Dust Deposition Gauge at Site 852
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
Jul-22
Aug-22
Sep-22
Oct-22
Nov-22
Dec-22
Ash
Combustible Matter

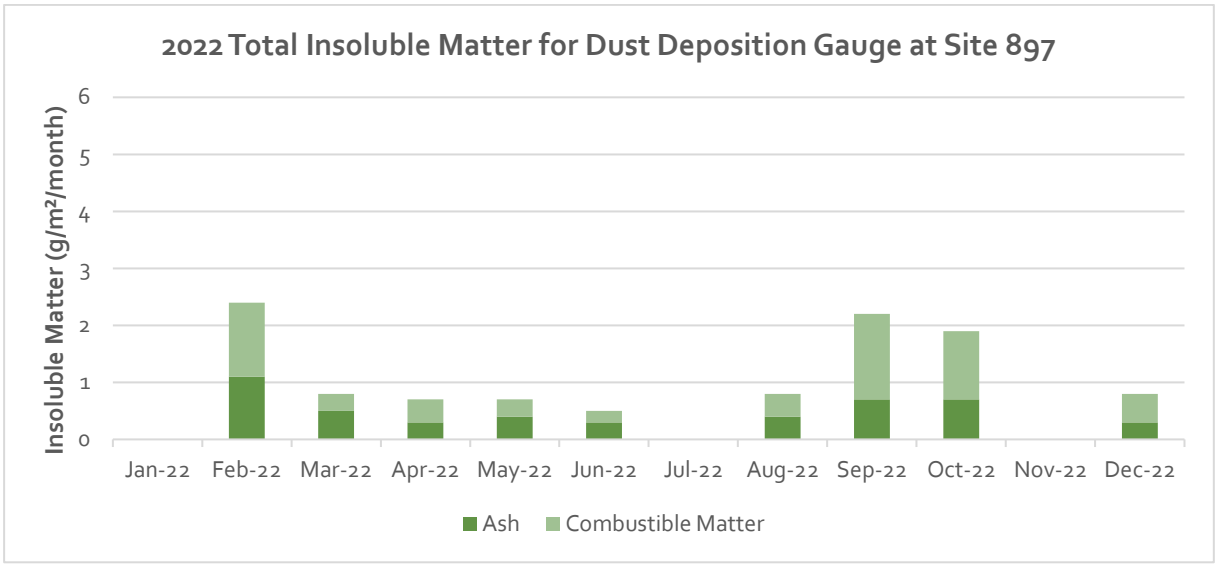

2022 Total Insoluble Matter for Dust Deposition Gauge at site 860
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
Jul-22
Aug-22
Sep-22
Oct-22
Nov-22
Dec-22
Ash
Combustible Matter

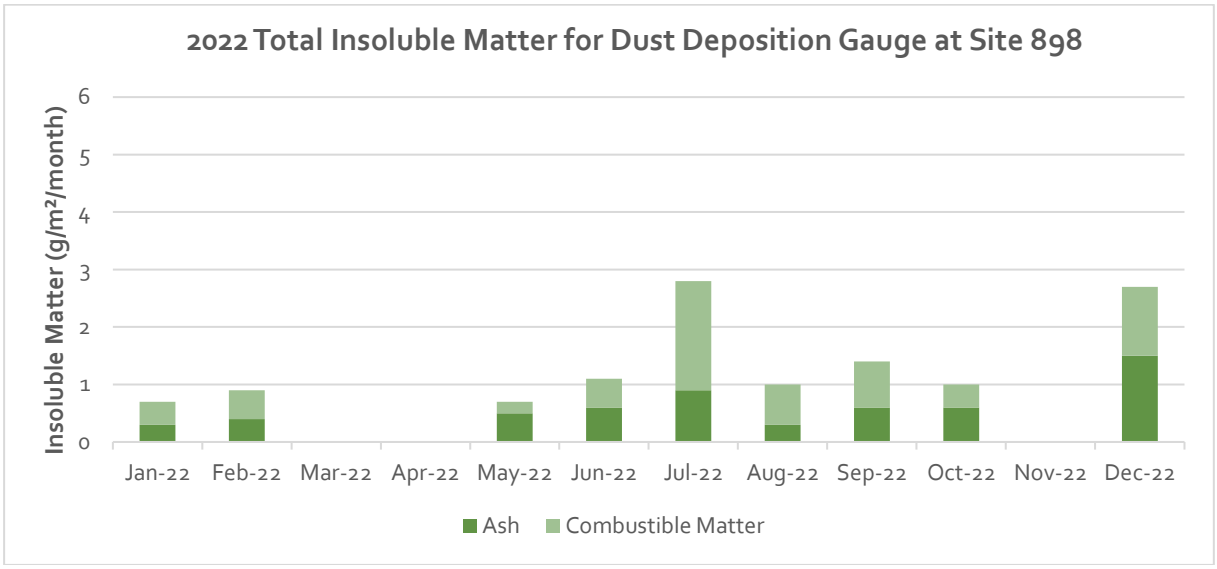

2022 Total Insoluble Matter for Dust Deposition Gauge at Site 870
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
Jul-22
Aug-22
Sep-22
Oct-22
Nov-22
Dec-22
Ash
Combustible Matter

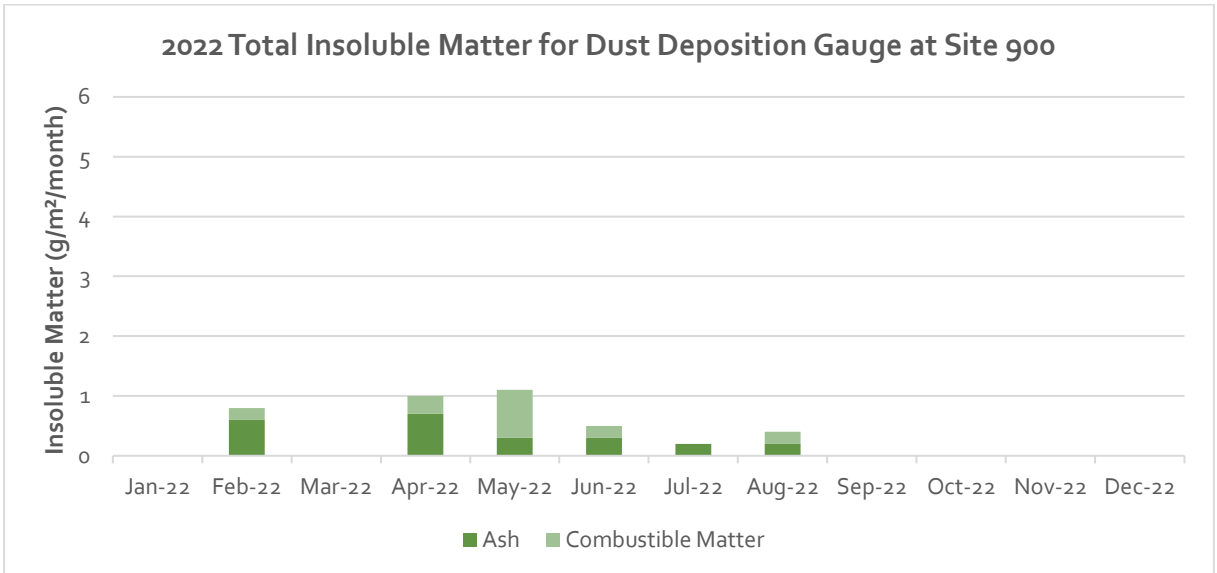

2022 Total Insoluble Matter for Dust Deposition Gauge at Site 880
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
Jul-22
Aug-22
Sep-22
Oct-22
Nov-22
Dec-22
Ash
Combustible Matter

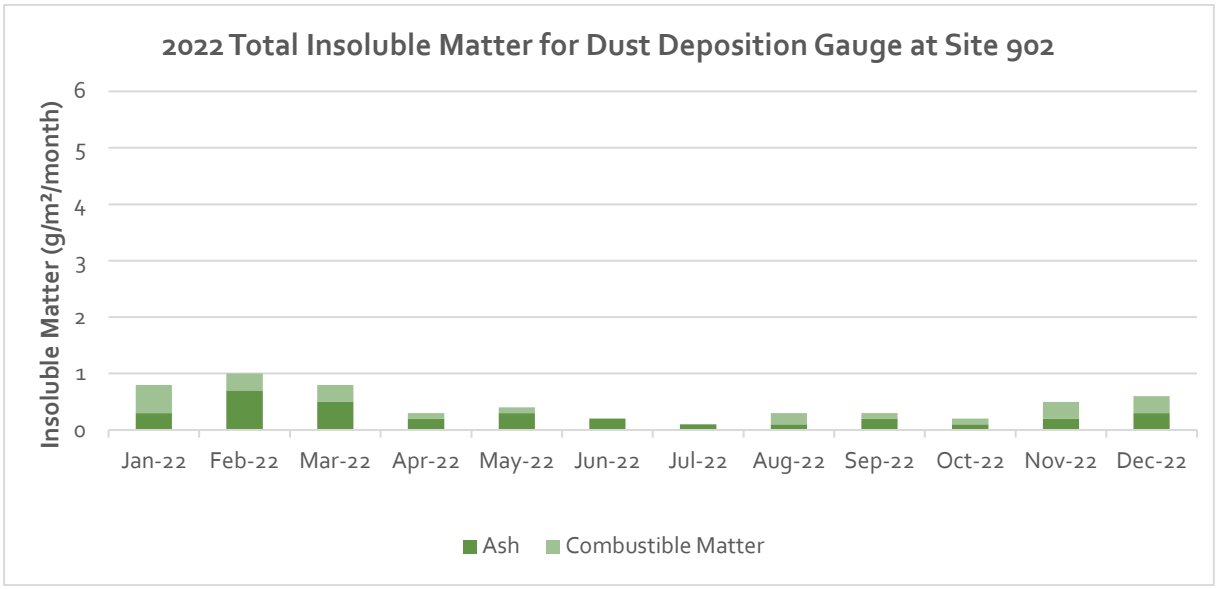

2022 Total Insoluble Matter for Dust Deposition Gauge at Site 885
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
7
8
9
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
Jul-22
Aug-22
Sep-22
Oct-22
Nov-22
Dec-22
Ash
Combustible Matter

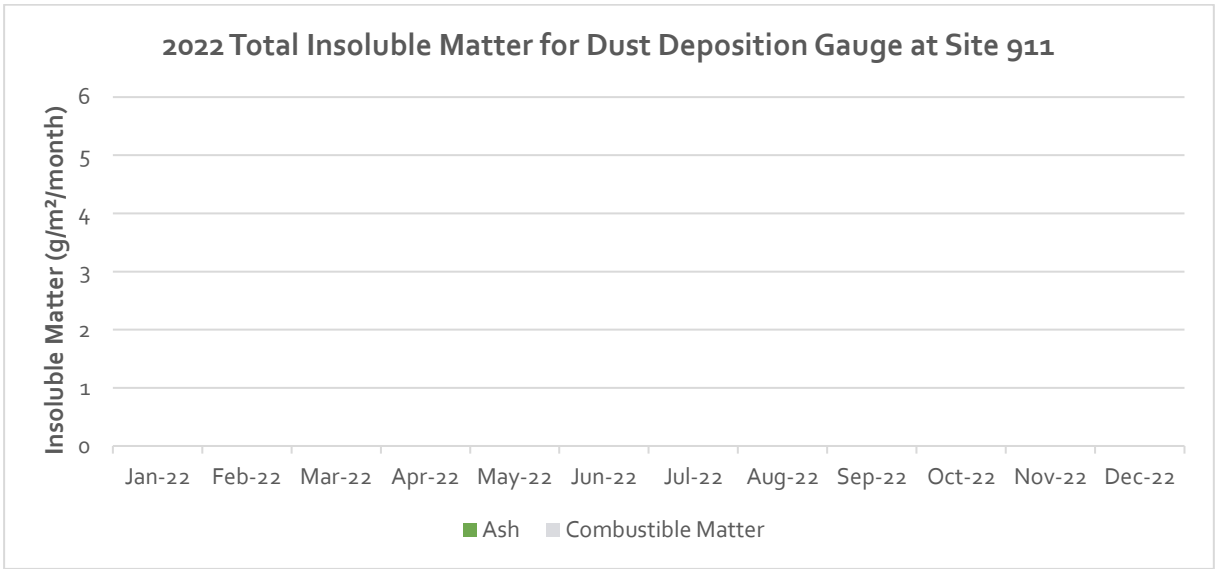

2022 Total Insoluble Matter for Dust Deposition Gauge at Site 890A
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
Jul-22
Aug-22
Sep-22
Oct-22
Nov-22
Dec-22
Ash
Combustible Matter

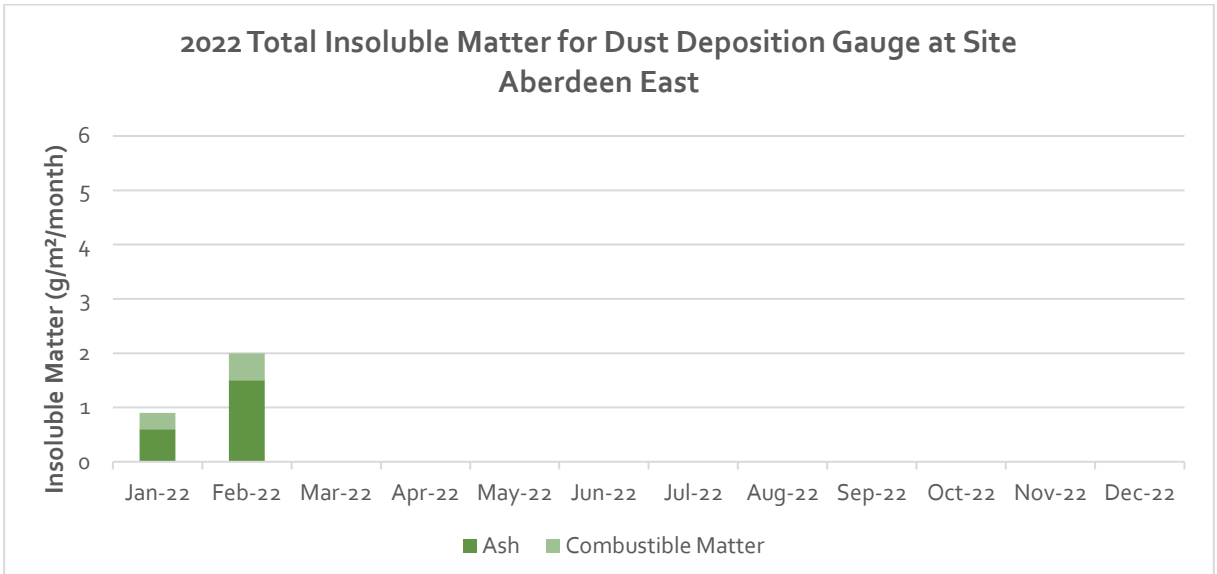

2022 Total Insoluble Matter for Dust Deposition Gauge at Site 897
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
Jul-22
Aug-22
Sep-22
Oct-22
Nov-22
Dec-22
Ash
Combustible Matter

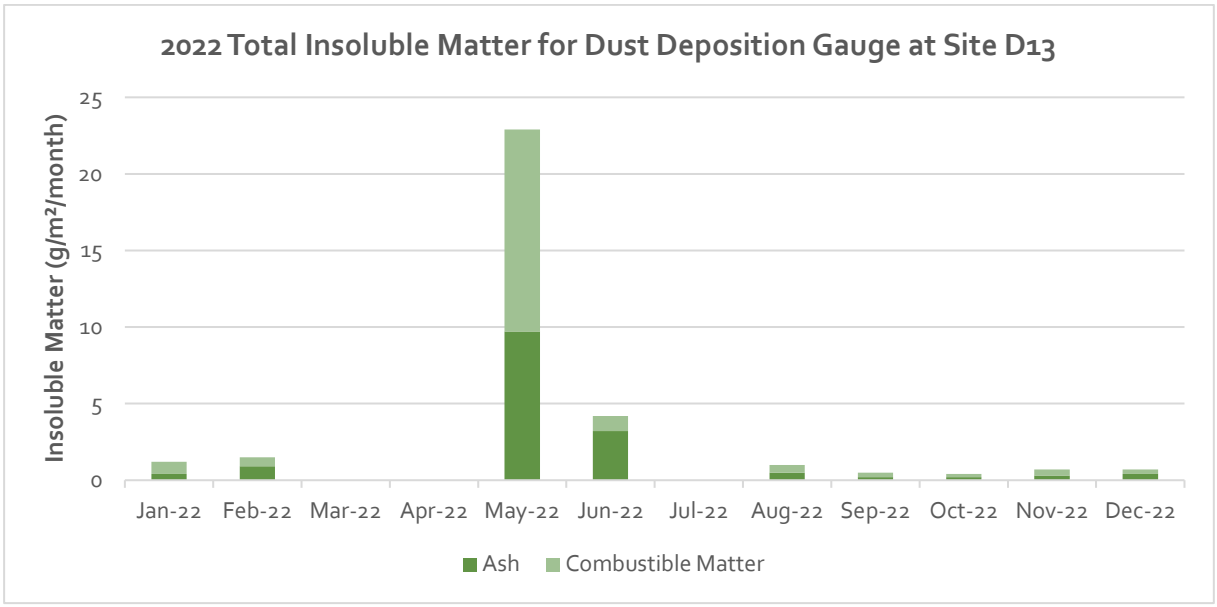

2022 Total Insoluble Matter for Dust Deposition Gauge at Site 898
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
Jul-22
Aug-22
Sep-22
Oct-22
Nov-22
Dec-22
Ash
Combustible Matter

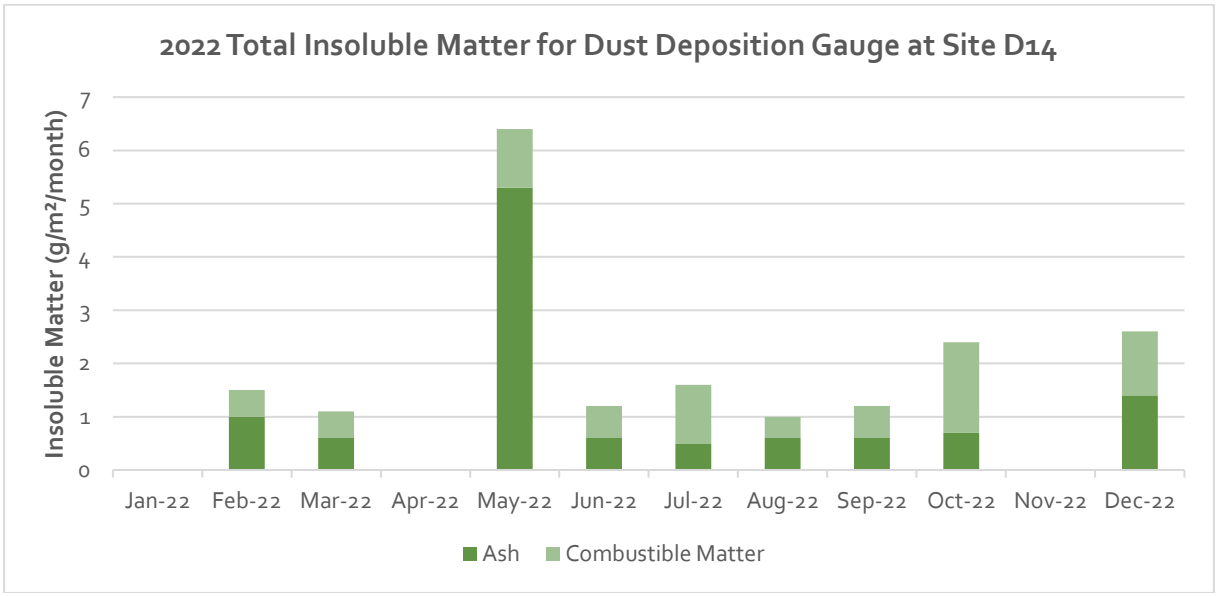

2022 Total Insoluble Matter for Dust Deposition Gauge at Site 900
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
Jul-22
Aug-22
Sep-22
Oct-22
Nov-22
Dec-22
Ash
Combustible Matter

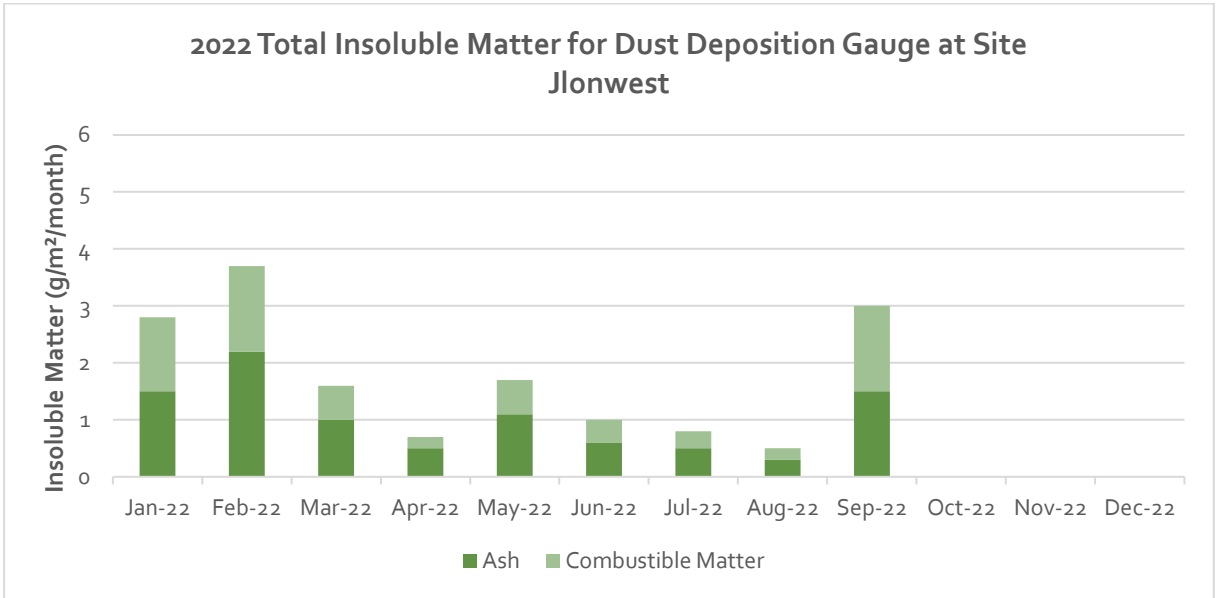

2022 Total Insoluble Matter for Dust Deposition Gauge at Site 902
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
Jul-22
Aug-22
Sep-22
Oct-22
Nov-22
Dec-22
Ash
Combustible Matter

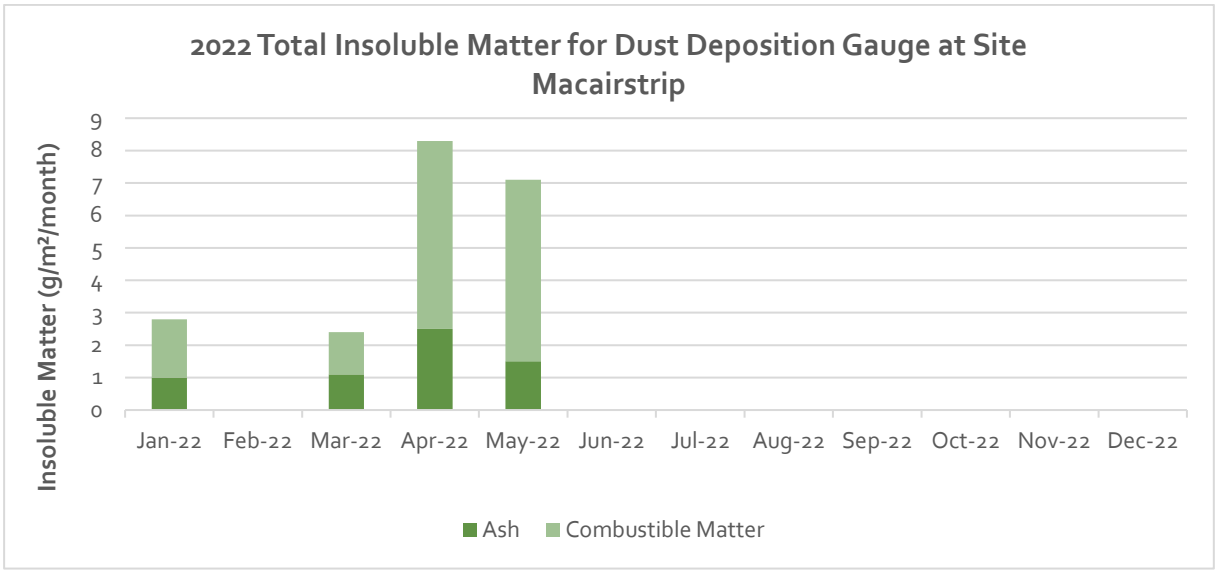

2022 Total Insoluble Matter for Dust Deposition Gauge at Site 911
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
Jul-22
Aug-22
Sep-22
Oct-22
Nov-22
Dec-22
Ash
Combustible Matter


2022 Total Insoluble Matter for Dust Deposition Gauge at Site Aberdeen East
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
Jul-22
Aug-22
Sep-22
Oct-22
Nov-22
Dec-22
Ash
Combustible Matter


2022 Total Insoluble Matter for Dust Deposition Gauge at Site D13
Insoluble Matter (g/m²/month)
25
20
15
10
5
0
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
Jul-22
Aug-22
Sep-22
Oct-22
Nov-22
Dec-22
Ash
Combustible Matter


2022 Total Insoluble Matter for Dust Deposition Gauge at Site D14
Insoluble Matter (g/m²/month)
7
6
5
4
3
2
1
0
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
Jul-22
Aug-22
Sep-22
Oct-22
Nov-22
Dec-22
Ash
Combustible Matter


2022 Total Insoluble Matter for Dust Deposition Gauge at Site Jlonwest
Insoluble Matter (g/m²/month)
6
5
4
3
2
1
0
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
Jul-22
Aug-22
Sep-22
Oct-22
Nov-22
Dec-22
Ash
Combustible Matter


2022 Total Insoluble Matter for Dust Deposition Gauge at Site Macairstrip
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
7
8
9
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
Jul-22
Aug-22
Sep-22
Oct-22
Nov-22
Dec-22
Ash
Combustible Matter

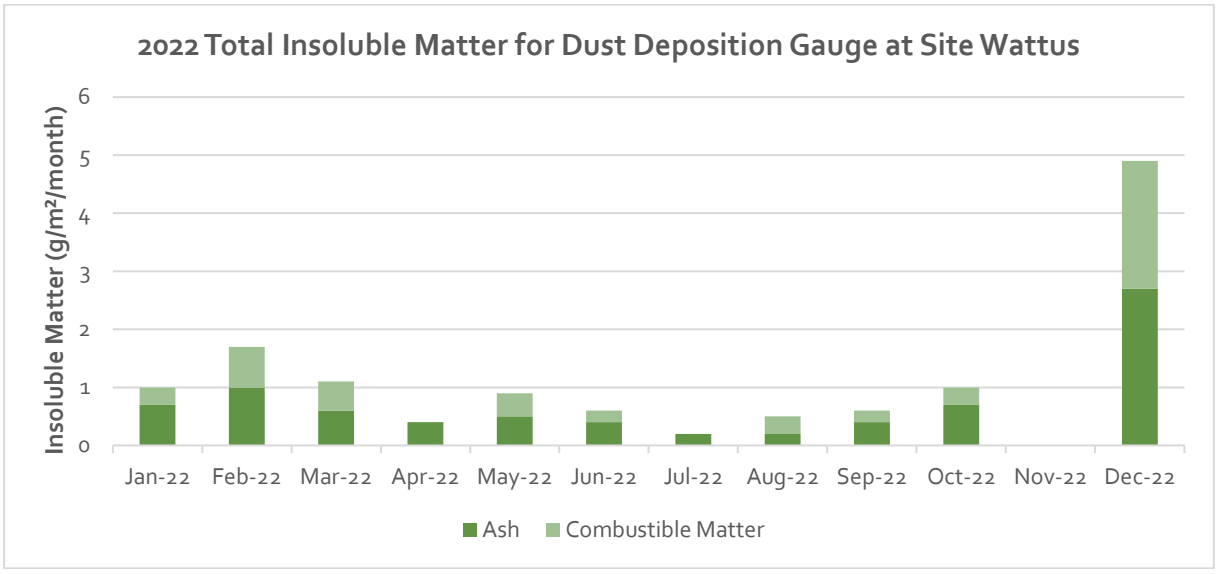

2022 Total Insoluble Matter for Dust Deposition Gauge at Site Wattus
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
Jul-22
Aug-22
Sep-22
Oct-22
Nov-22
Dec-22
Ash
Combustible Matter

Table 31 Contaminated Monthly Depositional Dust Results in 2022

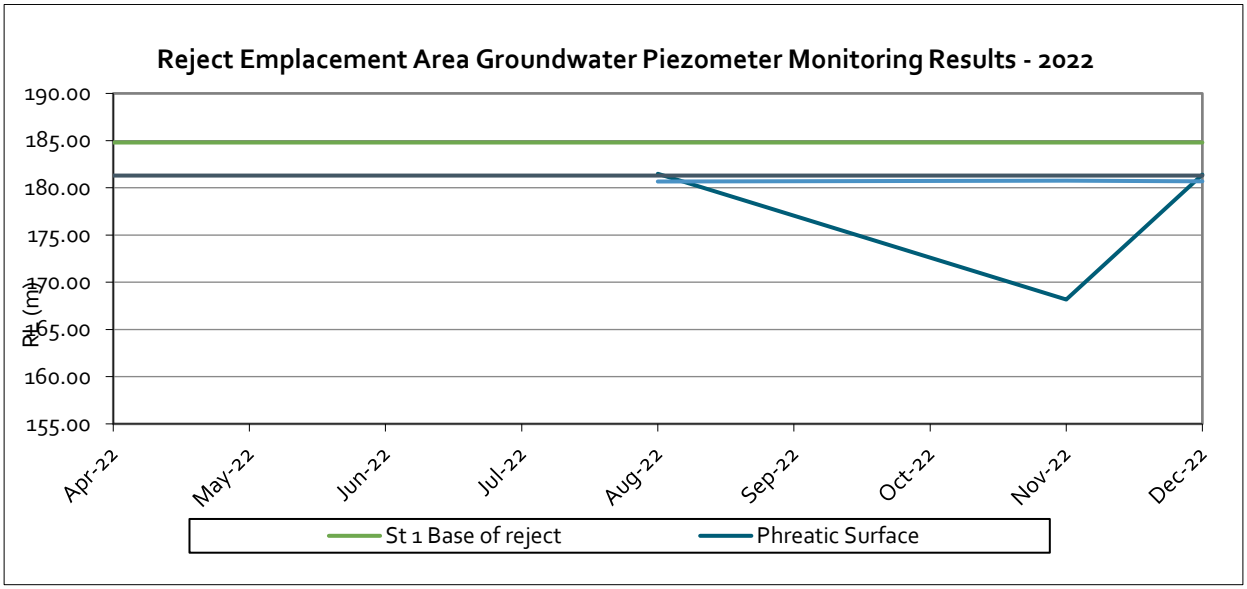
Site	Month	Insoluble Solids (g/m²/month)	Combustible Matter (g/m²/month)	Ash Component (g/m²/month)	Reason for High Reading
880	Mar	5	3.4	1.6	Deemed contaminated due to high levels of insects present, sample turbid, low Ash/IM% low, CM high
885	Jun	9.7	2.6	7.1	Insects, vegetation, bird droppings. Sample deemed contaminated with insects, bird droppings and vegetation. Slightly turbid and brown in colour
897	Jan	5.4	3.6	1.8	Deemed contaminated due to elevated levels of insects present, sample turbid and brown, low Ash/IM% low, CM high
900	Jan	6.7	3.5	3.2	Deemed contaminated due to high levels of insects present, sample turbid and brown, low Ash/IM% low, CM high
900	Sep	25	8.6	16.4	Contaminated with insects and bird droppings. Sample turbid and green. High CM. Track needs slashing.
900	Oct	30.8	15.6	15.2	Deemed contaminated due to elevated levels of insects and bird droppings present, sample turbid and green, low Ash/IM% and high combustible matter.
900	Dec	4.1	2.8	1.3	Contaminated with insects. Sample turbid and green. High CM, low IM/AR ratio. Area very overgrown including track access. On date 29/9/22
D13	Mar	5.9	4.3	1.6	Deemed contaminated due to elevated levels of insects present, sample turbid and brown. Ash/Insol% low, CM high.
D13	Apr	5.3	2.6	2.7	Deemed contaminated. Sample grey in colour, slightly turbid with inspects and vegetation present. Low Ash/IM% and high combustible matter.
D13	Jul	11.5	2.8	8.7	Sample deemed contaminated with insects and vegetation. Turbid and green in colour.

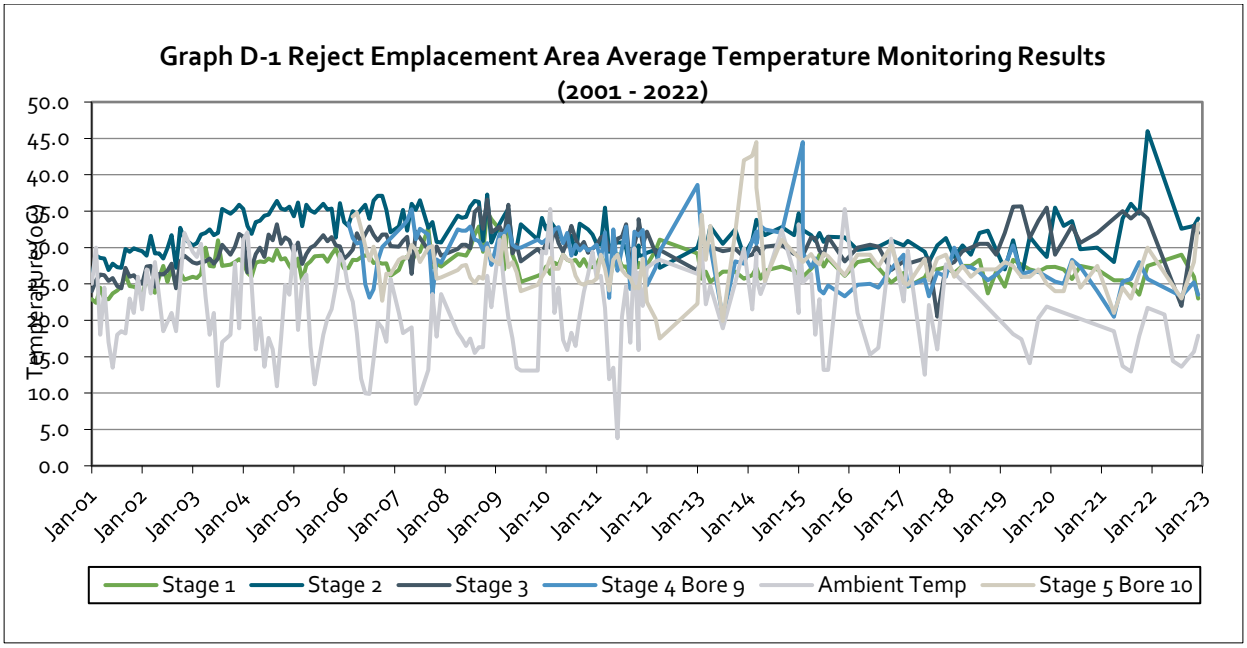
Site	Month	Insoluble Solids (g/m²/month)	Combustible Matter (g/m²/month)	Ash Component (g/m²/month)	Reason for High Reading
D14	Jan	12.5	10.7	1.8	Contaminated with insects. Sample turbid and green. High CM, low IM/AR ratio. Area very overgrown including track access. On date 29/9/22
D14	Apr	5.3	2.6	2.7	Deemed contaminated with insects, bird droppings and vegetation. Sample brown in colour and turbid with low Ash/IM% and high combustible matter. Jar replacement was too big (the brim). Funnel and lid just sitting on top.
D14	Nov	3.1	2	1.1	Contaminated with insects and bird droppings. Sample turbid and grey. Low AS/IS %.
Macairstrip	Feb	18.6	13.7	4.9	Deemed contaminated with insects, bird droppings and vegetation. Sample brown in colour and turbid with low Ash/IM% and high combustible matter. Jar replacement was too big (the brim). Funnel and lid just sitting on top.
Macairstrip	Jun	4.2	3.2	1	Insects, vegetation, bird droppings. Major bird dropping problem. Sample deemed contaminated with insects, bird droppings and vegetation. Turbid and brown in colour. Low Ash/IM %.
Macairstrip	Jul	9.7	2.6	7.1	Sample deemed contaminated with insects, bird droppings and vegetation. Turbid and brown in colour. Low Ash/IM %.
Macairstrip	Aug	5.9	4.8	1.1	Sample deemed contaminated with insects, bird droppings and vegetation. Turbid and brown in colour. Low Ash/IM %.
Macairstrip	Sep	6.8	3.9	2.9	Contaminated with insects and bird droppings. Sample turbid and brown. High CM, low Ash/IS Ratio.
Macairstrip	Oct	39.6	9.5	30.1	Contaminated with insects and bird droppings. Sample turbid and green. High CM. Track needs slashing.
Macairstrip	Nov	37.6	14.1	23.5	Contaminated with insects and bird droppings. Sample turbid and brown. High CM.

Site	Month	Insoluble Solids (g/m²/month)	Combustible Matter (g/m²/month)	Ash Component (g/m²/month)	Reason for High Reading
Macairstrip	Dec	7.8	5.4	2.4	Contaminated with insects and bird droppings. Sample turbid and brown. High CM, low IS/AR ratio.
Wattus	Nov	14.8	11.1	0.89	Contaminated with insects and bird droppings. Sample turbid and brown. High CM.

Appendix D

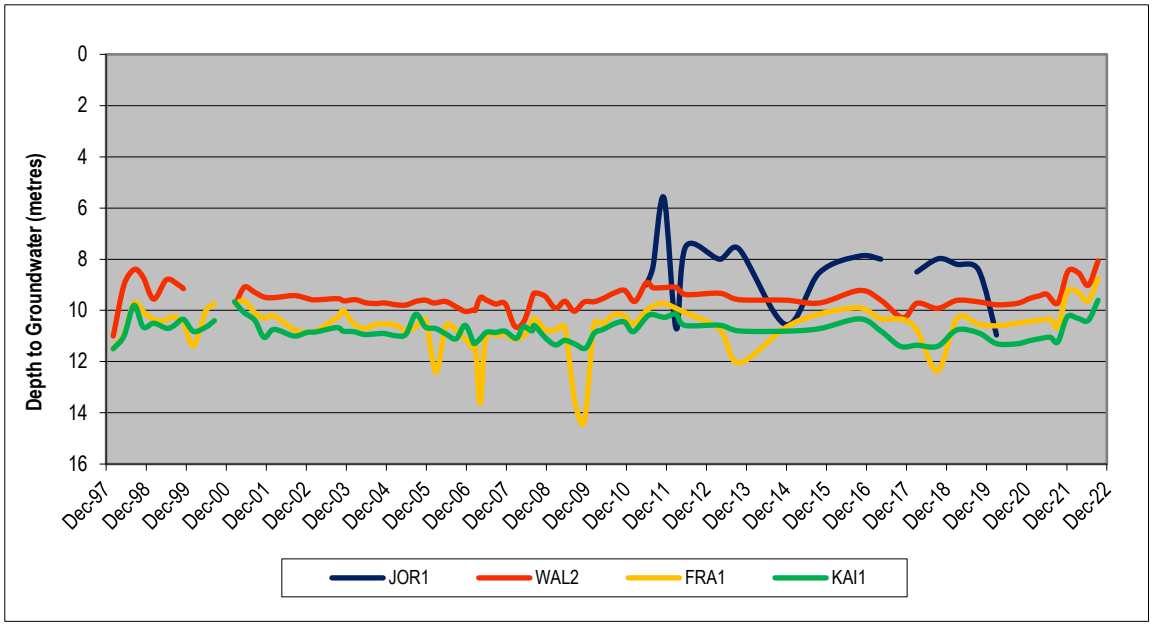
REA Monitoring Summary


Reject Emplacement Area Groundwater Piezometer Monitoring Results - 2022
190.00
185.00
180.00
175.00
170.00
165.00
160.00
155.00
RL (m)
Apr-22
May-22
Jun-22
Jul-22
Aug-22
Sep-22
Oct-22
Nov-22
Dec-22
St 1 Base of reject
Phreatic Surface

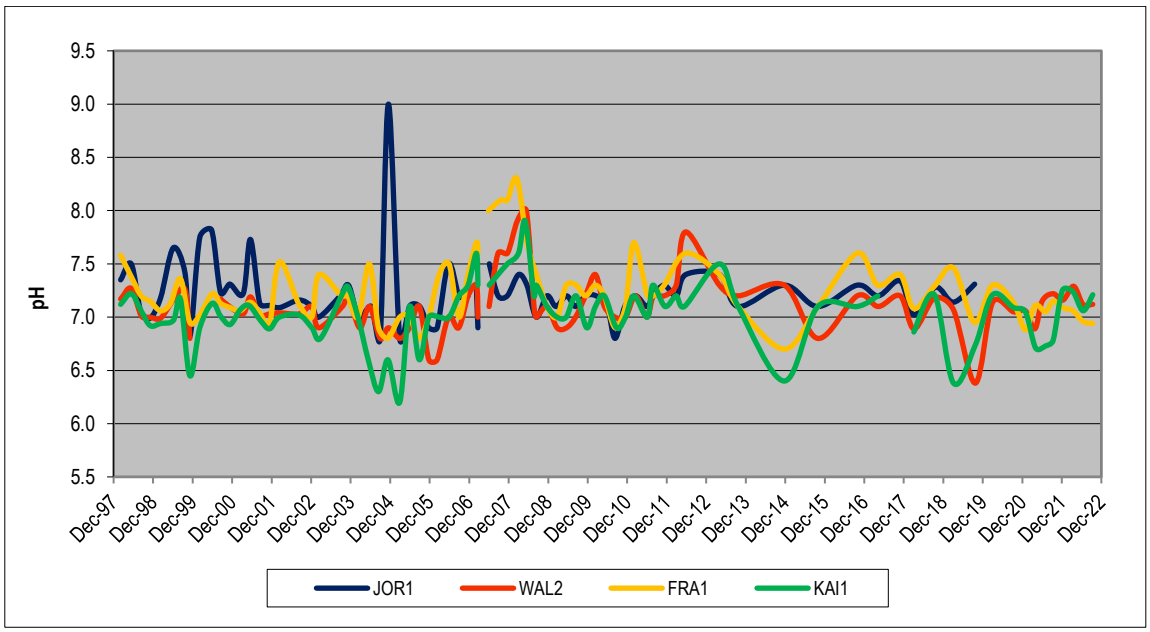

Graph D-1 Reject Emplacement Area Average Temperature Monitoring Results
(2001 - 2022)
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Temperature (oC)
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Stage 1
Stage 2
Stage 3
Stage 4 Bore 9
Ambient Temp
Stage 5 Bore 10

Appendix E

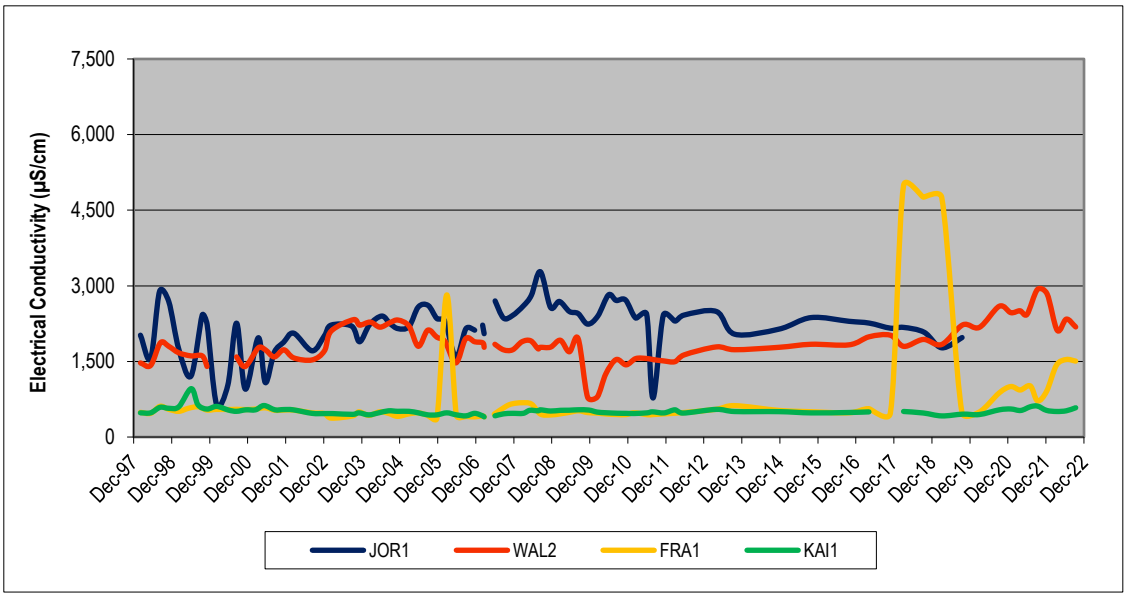
Groundwater Monitoring Summary



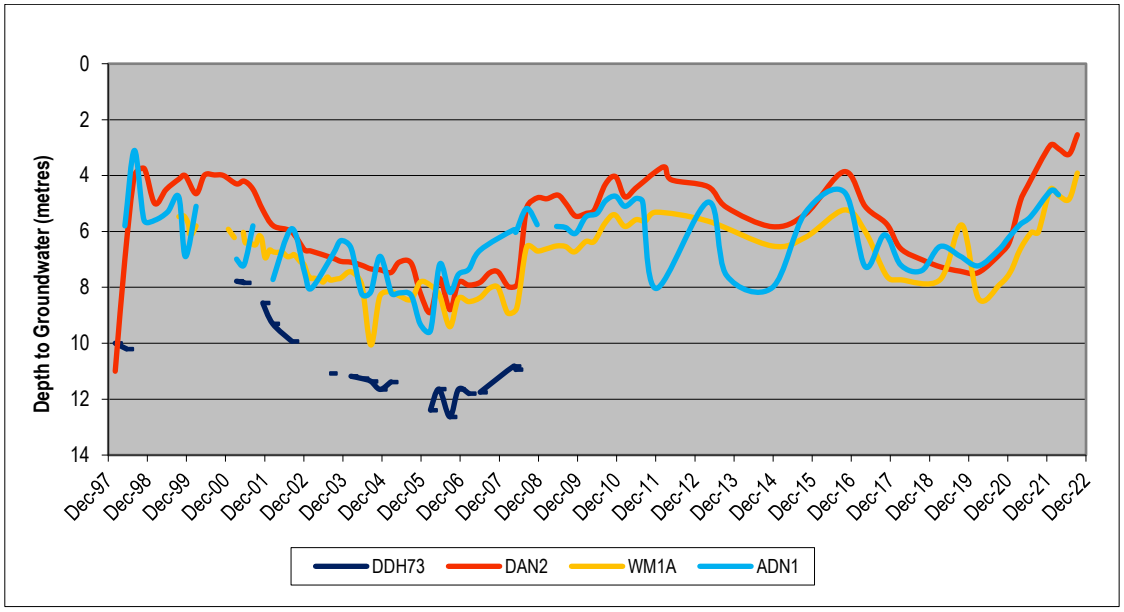
Graph E-1
Groundwater Level for Hunter River Alluvium Bores (1998-2022)



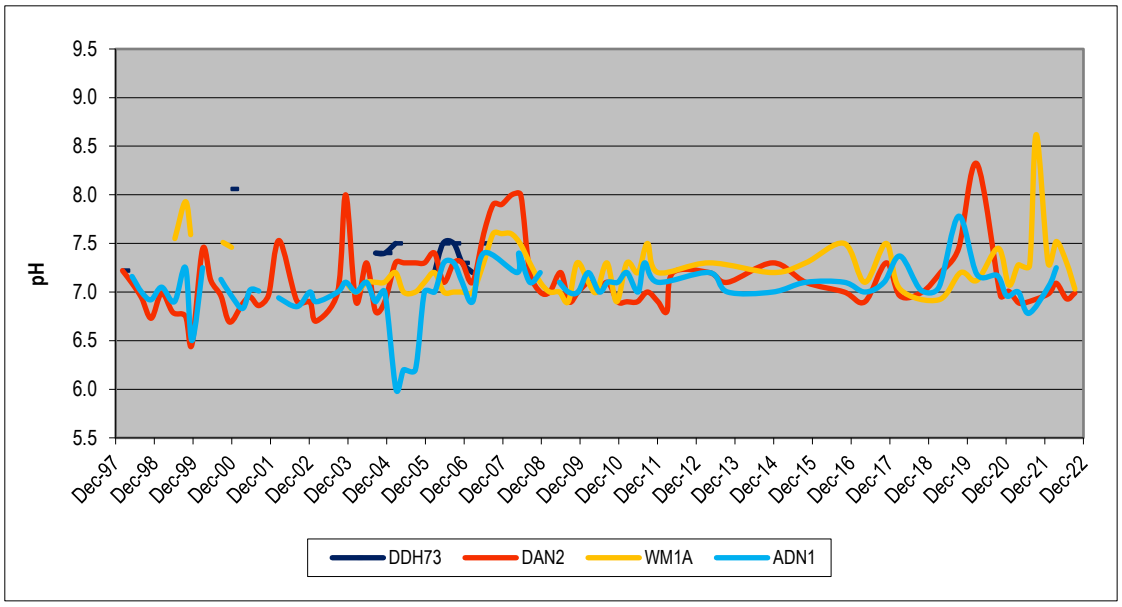
Graph E-2
pH for Hunter River Alluvium Bores (1998-2022)



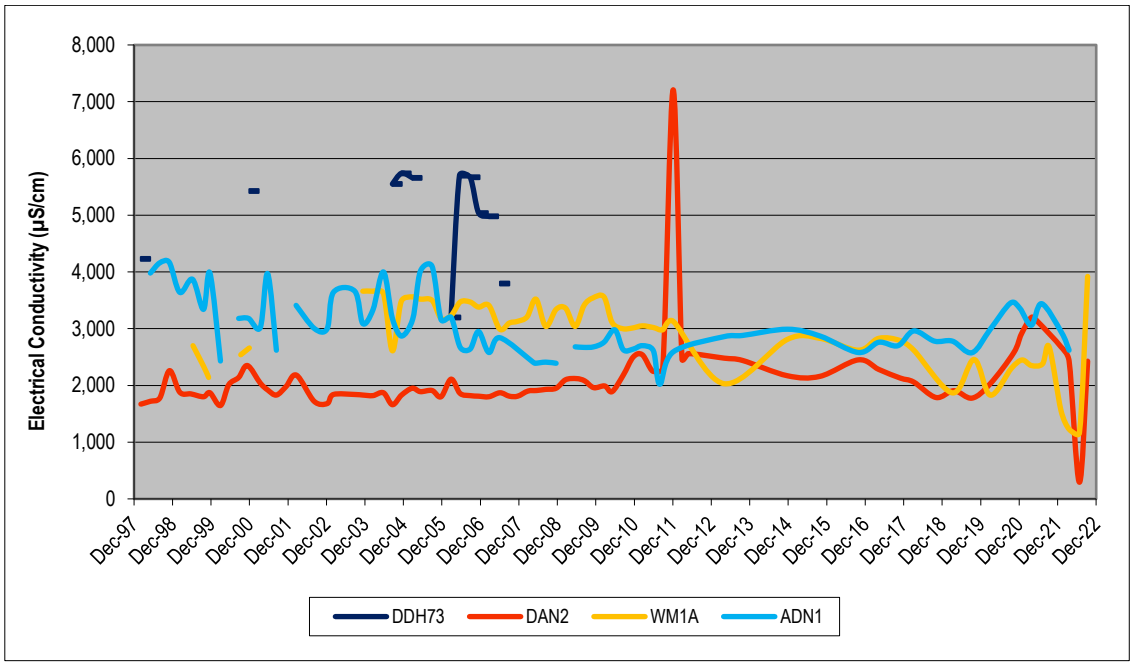
Graph E-3
Electrical Conductivity for Hunter River Alluvium Bores (1998-2022)



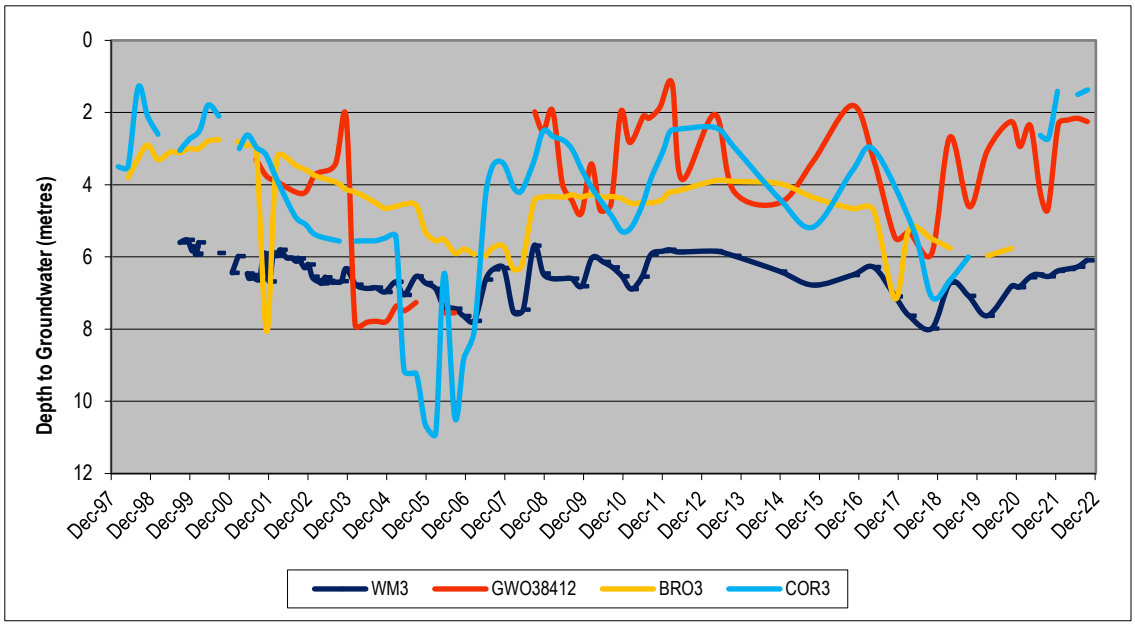
Graph E-4
Groundwater Level for Dart Brook Alluvium Bores (1998-2022)



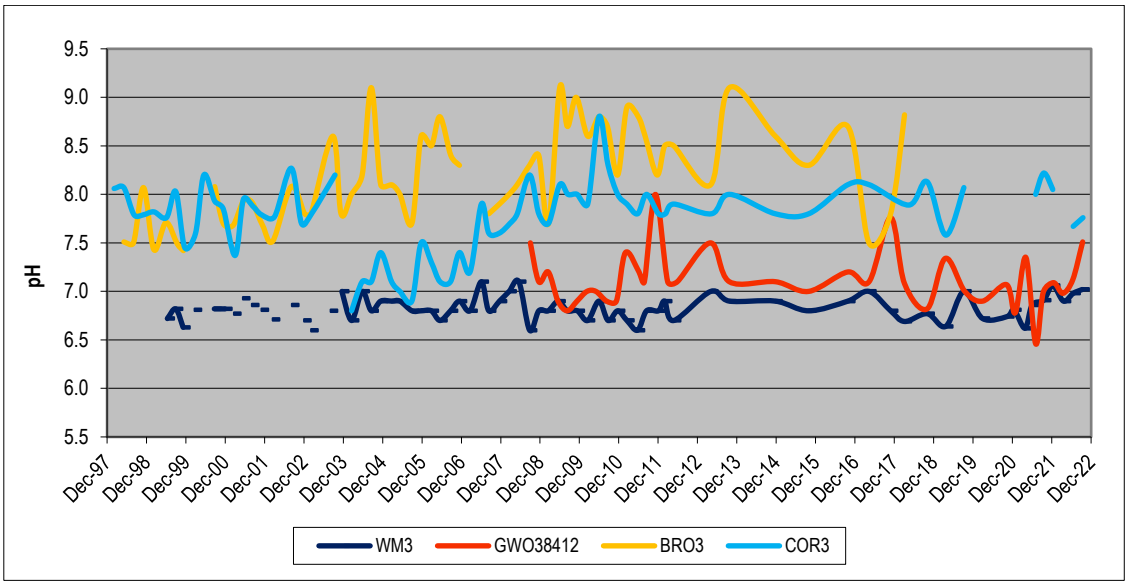
Graph E-5
pH for Dart Brook Alluvium Bores (1998-2022)



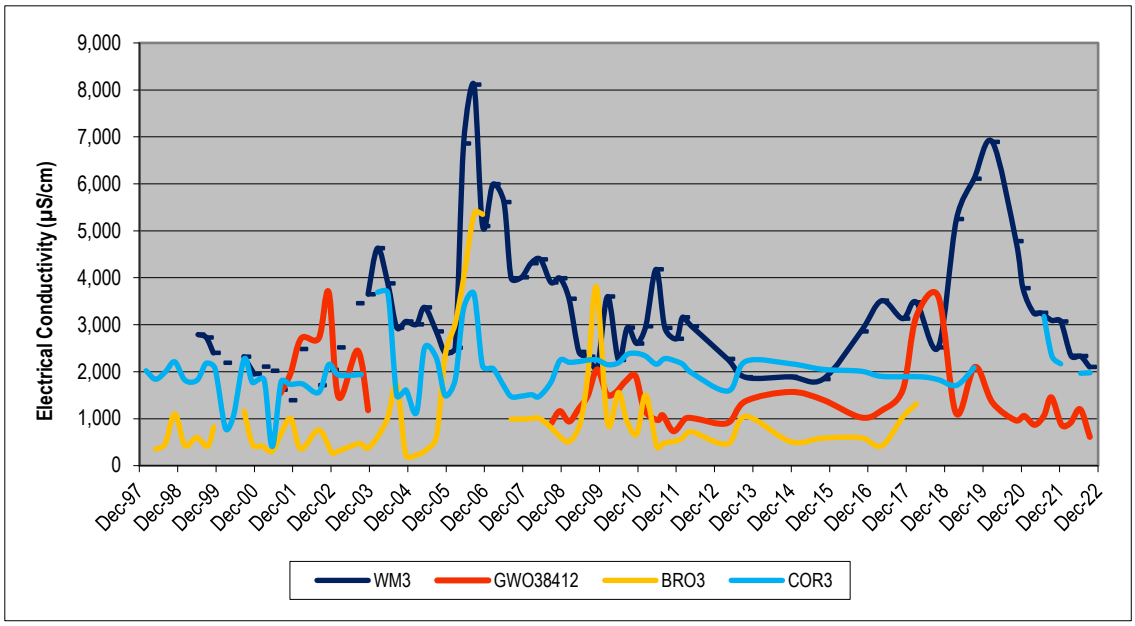
Graph E-6
Electrical Conductivity for Dart Brook Alluvium Bores (1998-2022)



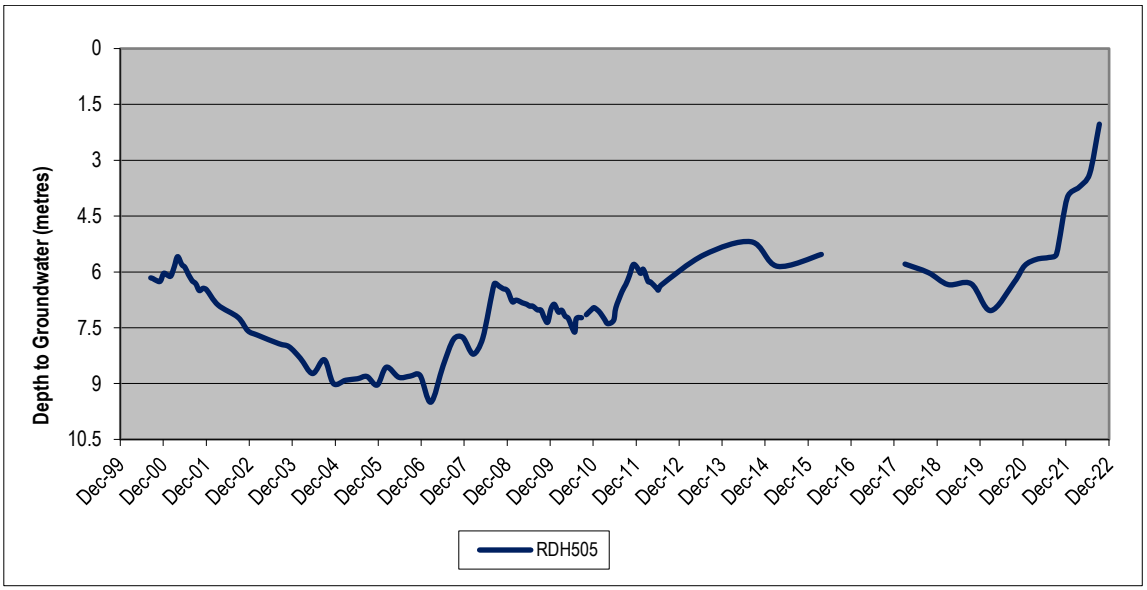
Graph E-7
Groundwater Level for Sandy Creek Alluvium Bores (1998-2022)



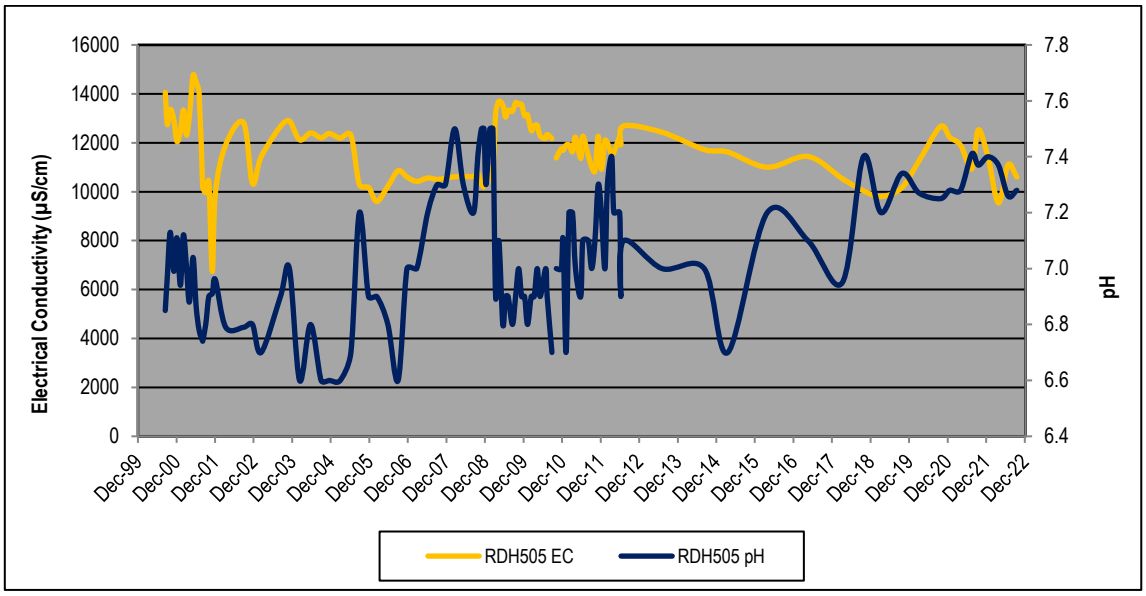
Graph E-8
pH for Sandy Creek Alluvium Bores (1998-2022)



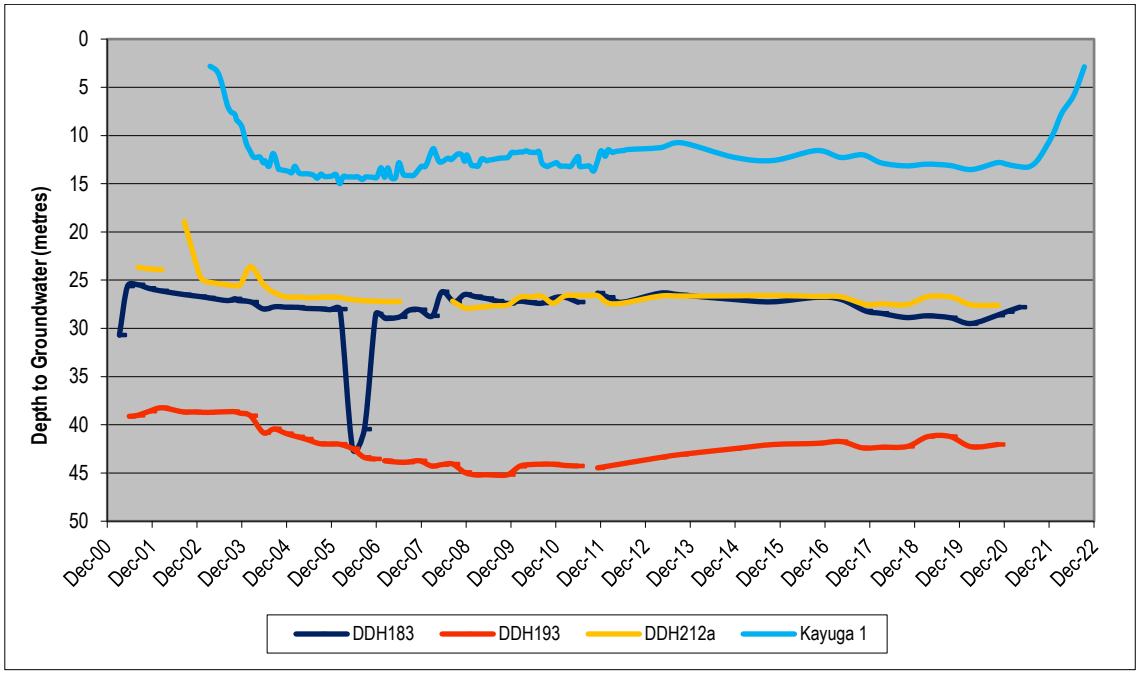
Graph E-9
Electrical Conductivity for Sandy Creek Alluvium Bores (1998-2022)



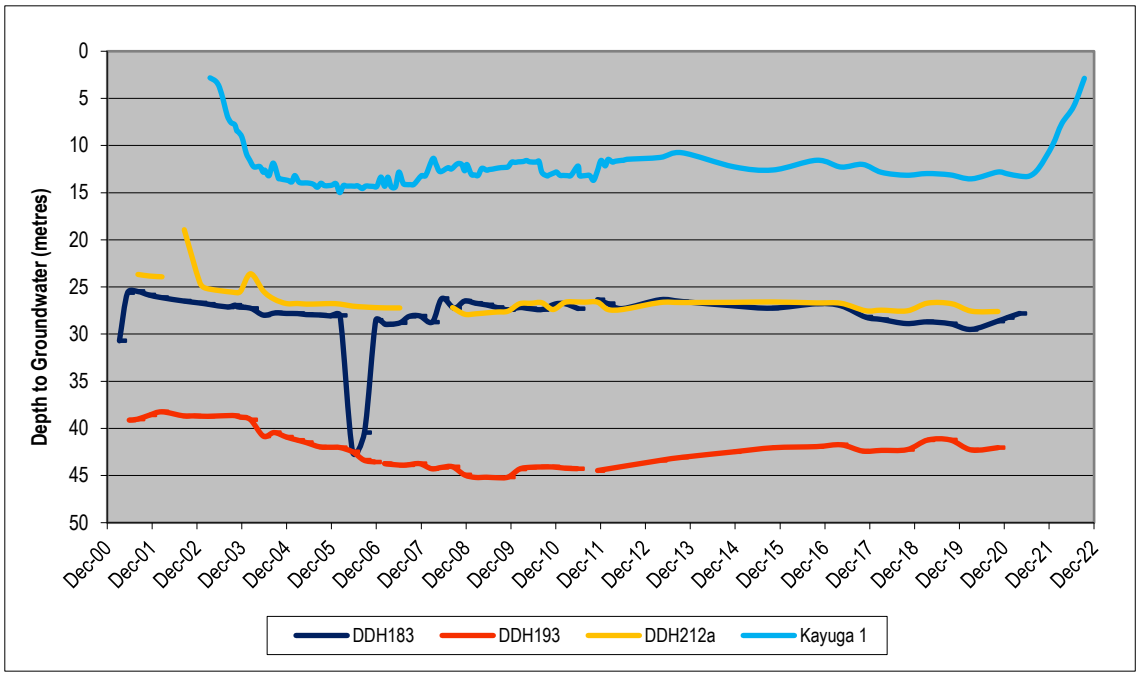
Graph E-10
Groundwater Level for Staged Discharge Dam Bore (2000-2022)



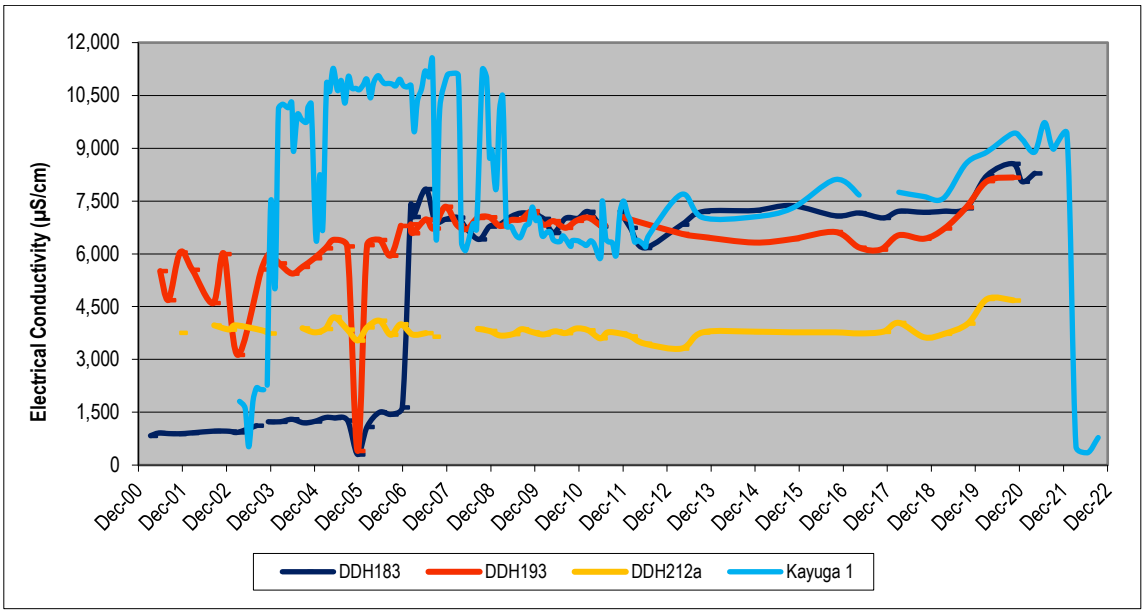
Graph E-11
pH and Electrical Conductivity for Staged Discharge Dam Bore (2000-2022)



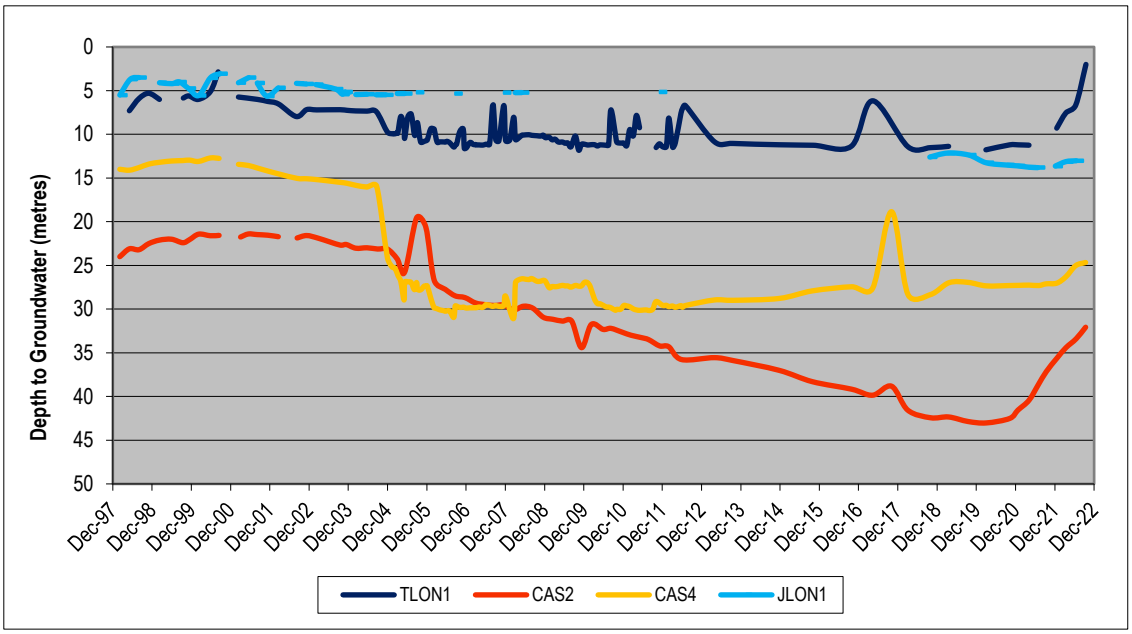
Graph E-12
Groundwater Level for Coal Seam Bores (2001-2022)



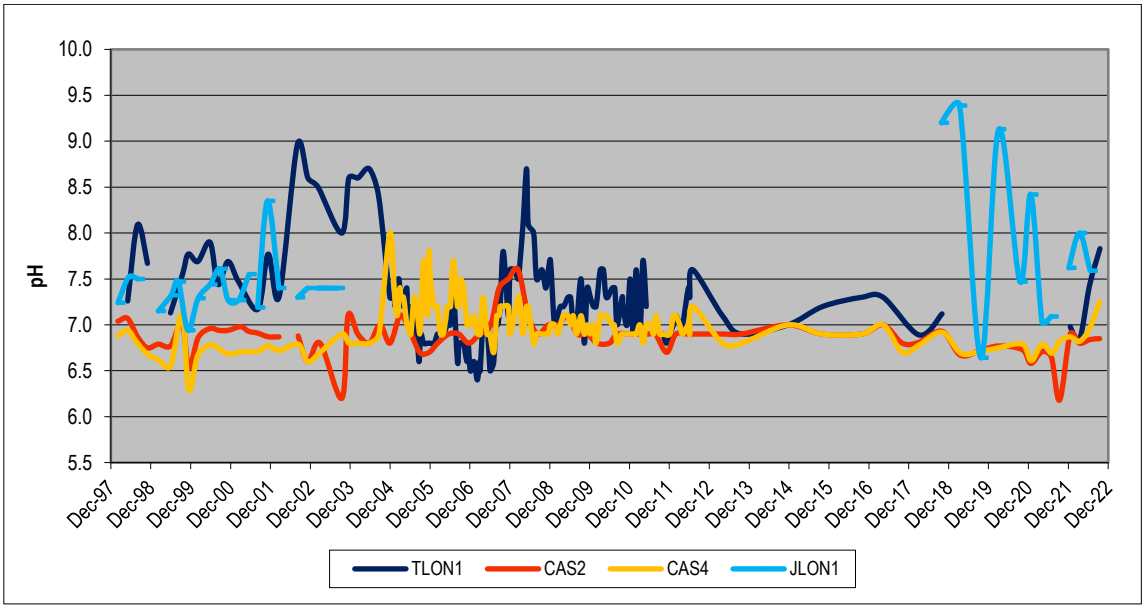
Graph E-13
pH for Coal Seam Bores (2001-2022)



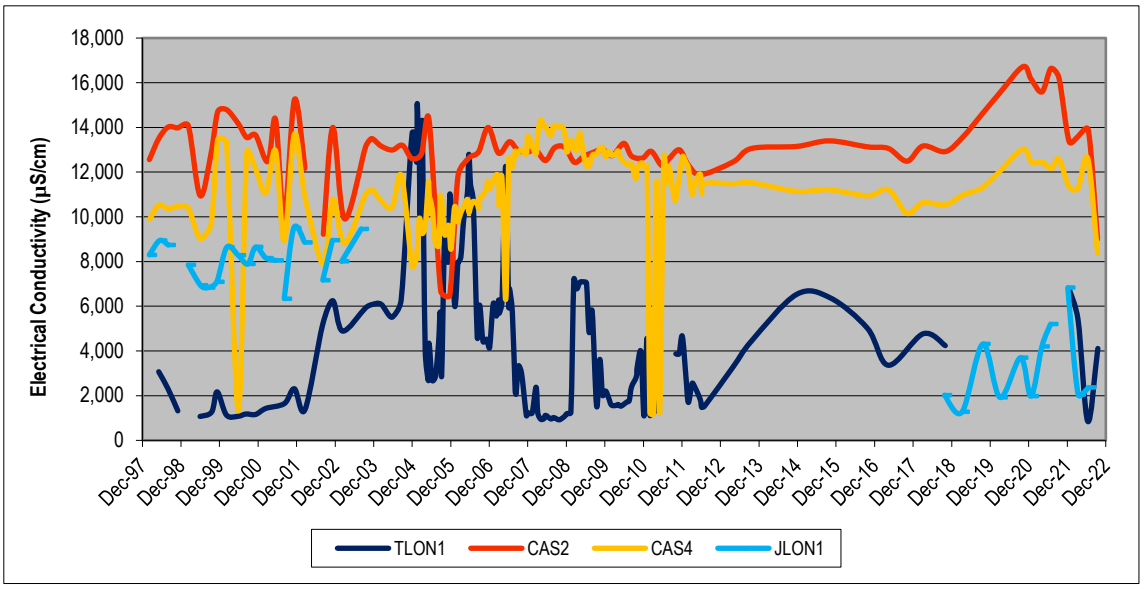
Graph E-14
Electrical Conductivity for Coal Seam Bores (2001-2022)



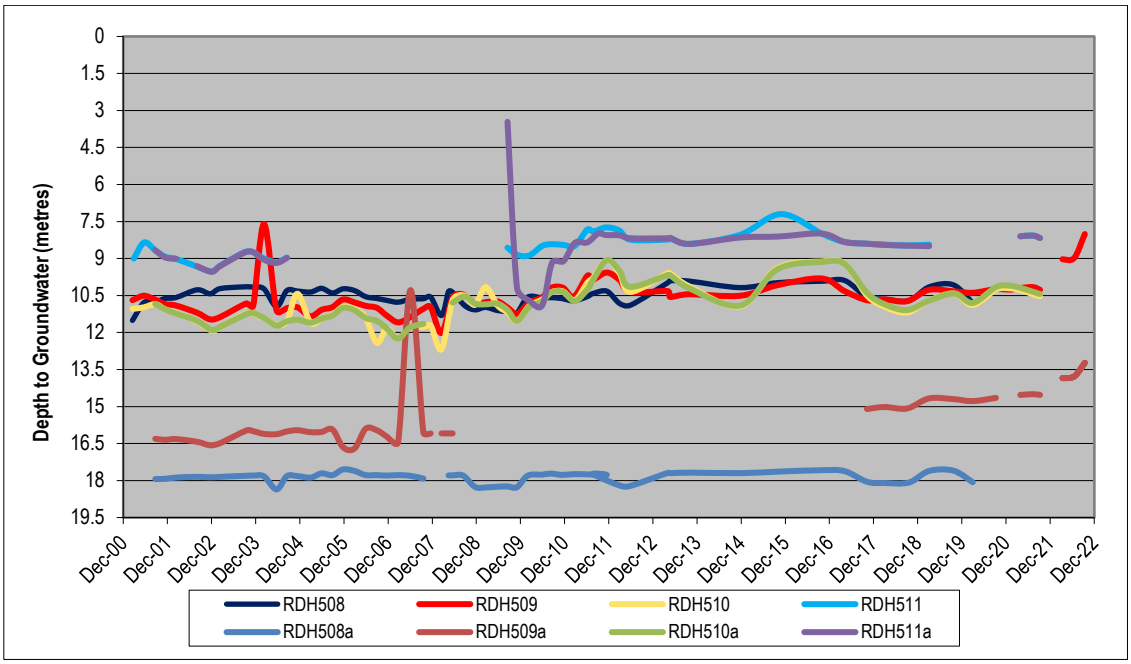
Graph E-15
Groundwater Levels for Regolith Bores (1998-2022)



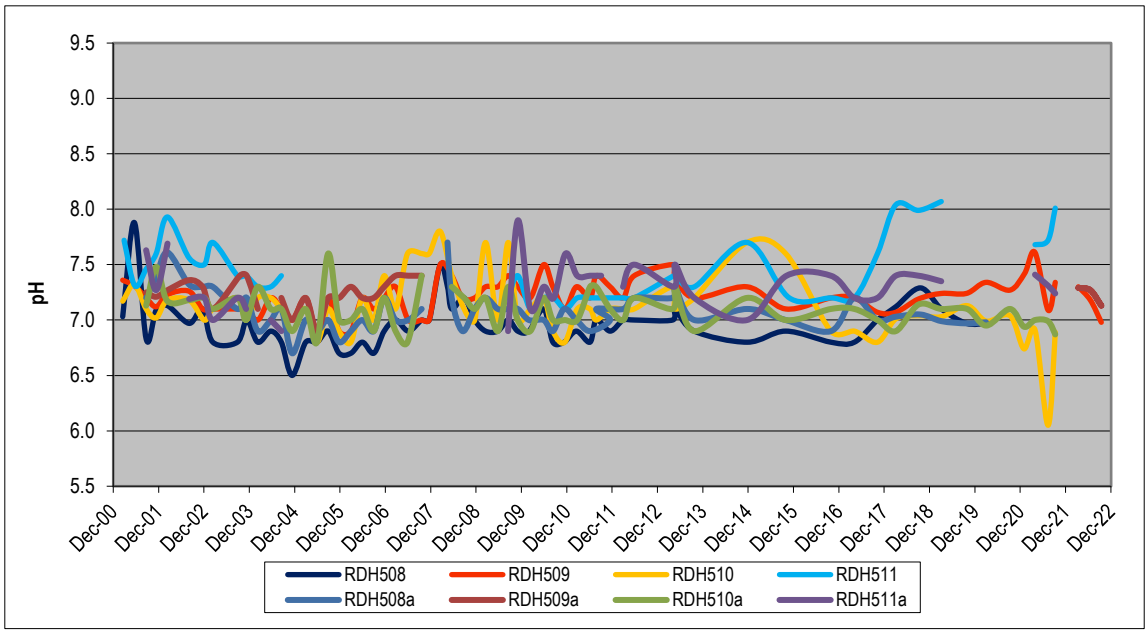
Graph E-16
pH for Regolith Bores (1998-2022)



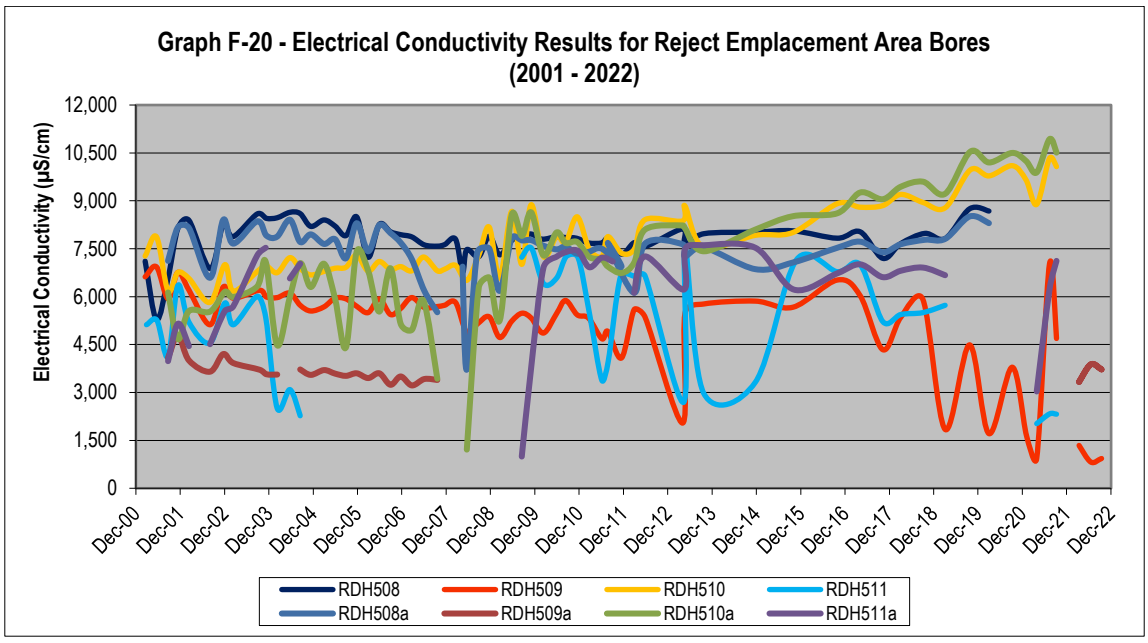
Graph E-17
Electrical Conductivity for Regolith Bores (1998-2022)



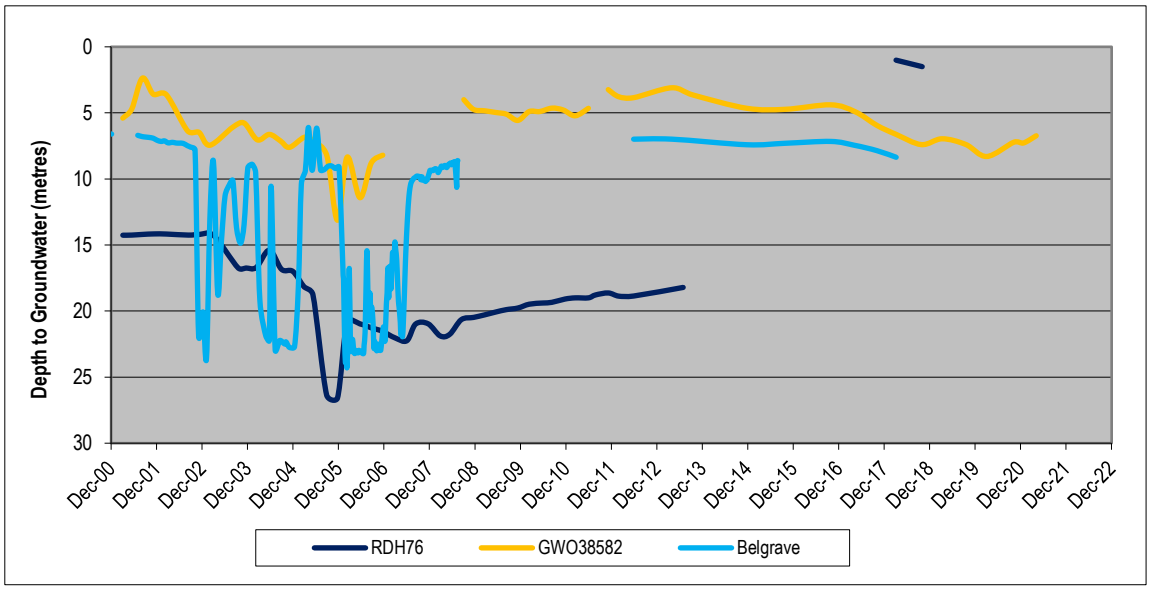
Graph E-18
Groundwater Level for Rejects Emplacement Area Bores (2001-2022)



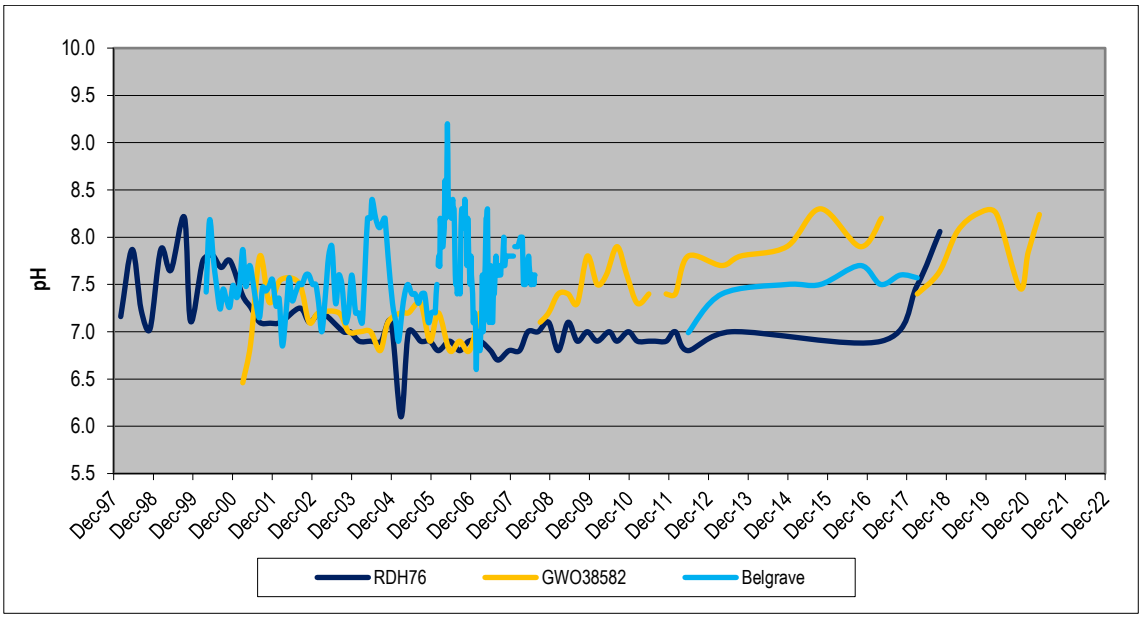
Graph E-19
pH for Rejects Emplacement Area Bores (2001-2022)



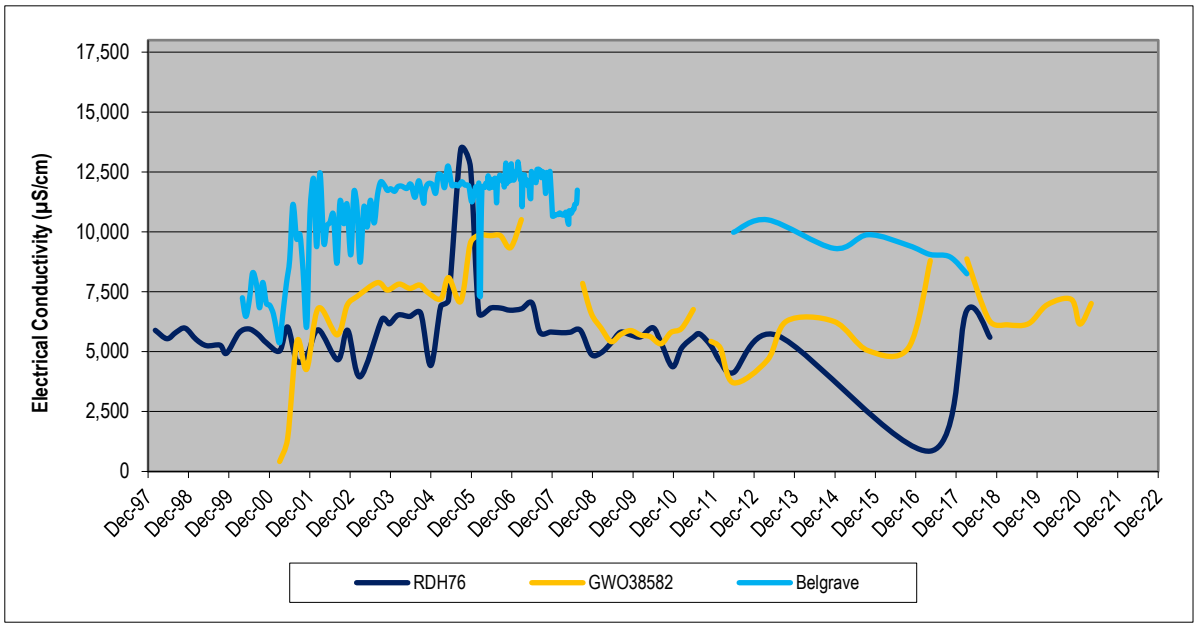
Graph E-20
Electrical Conductivity for Rejects Emplacement Area Bores (2001-2022)



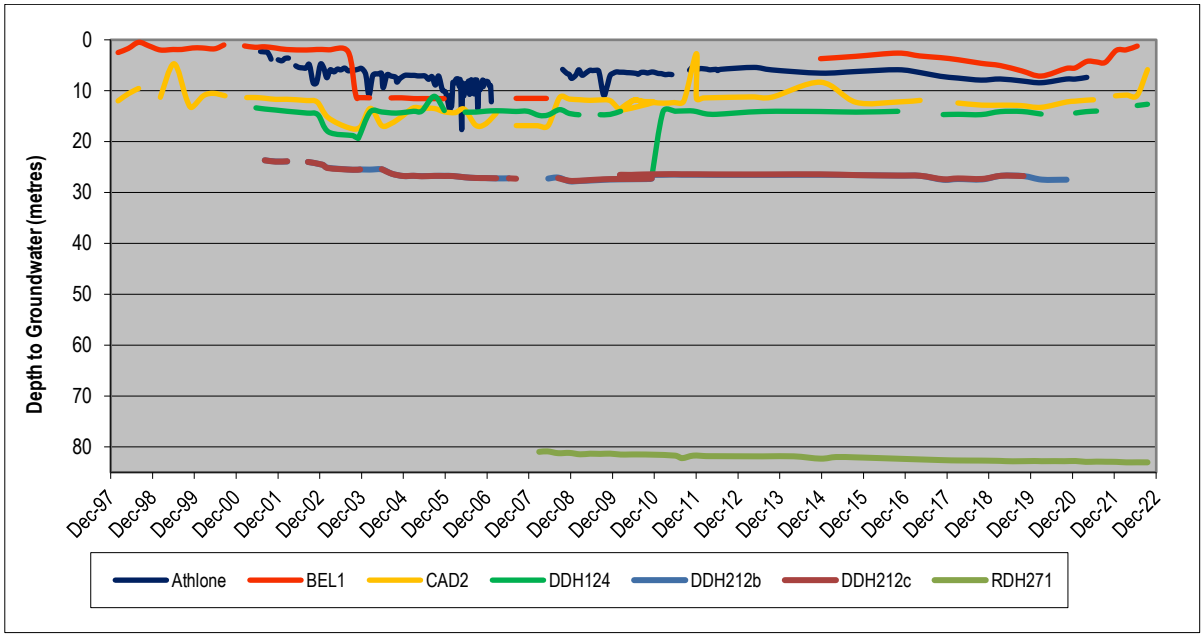
Graph E-21
Groundwater Level for Landowner Property Bores (2001-2022)



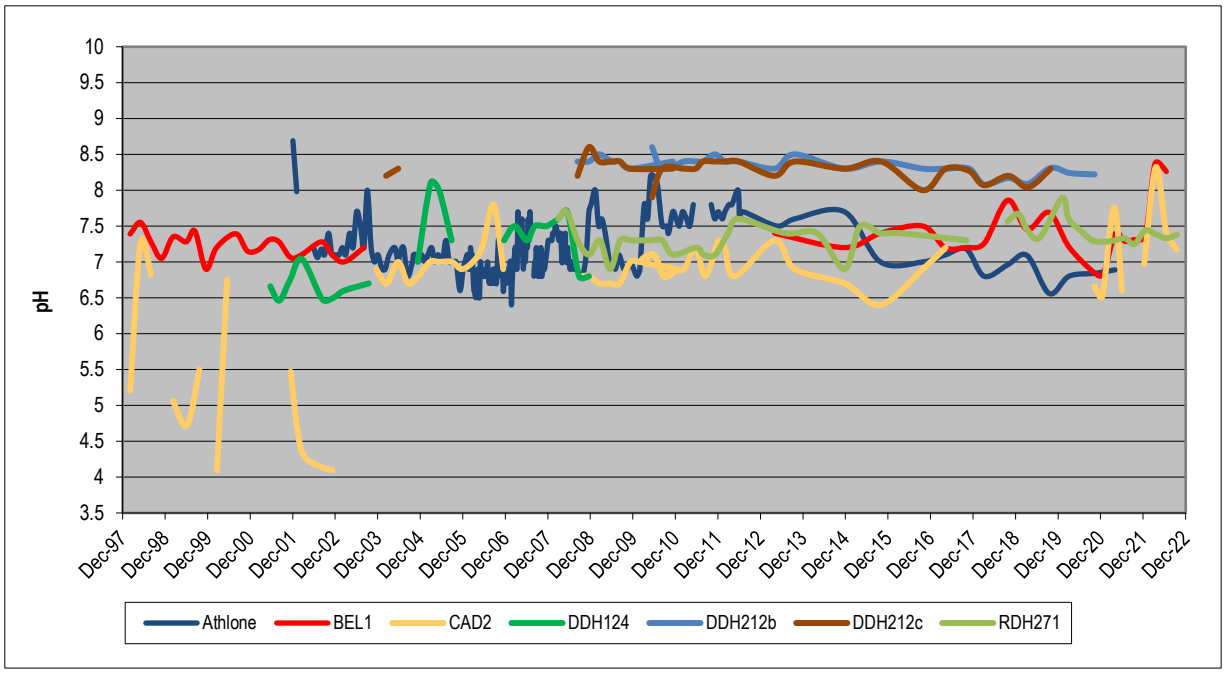
Graph E-22
pH for Landowner Property Bores (1998-2022)



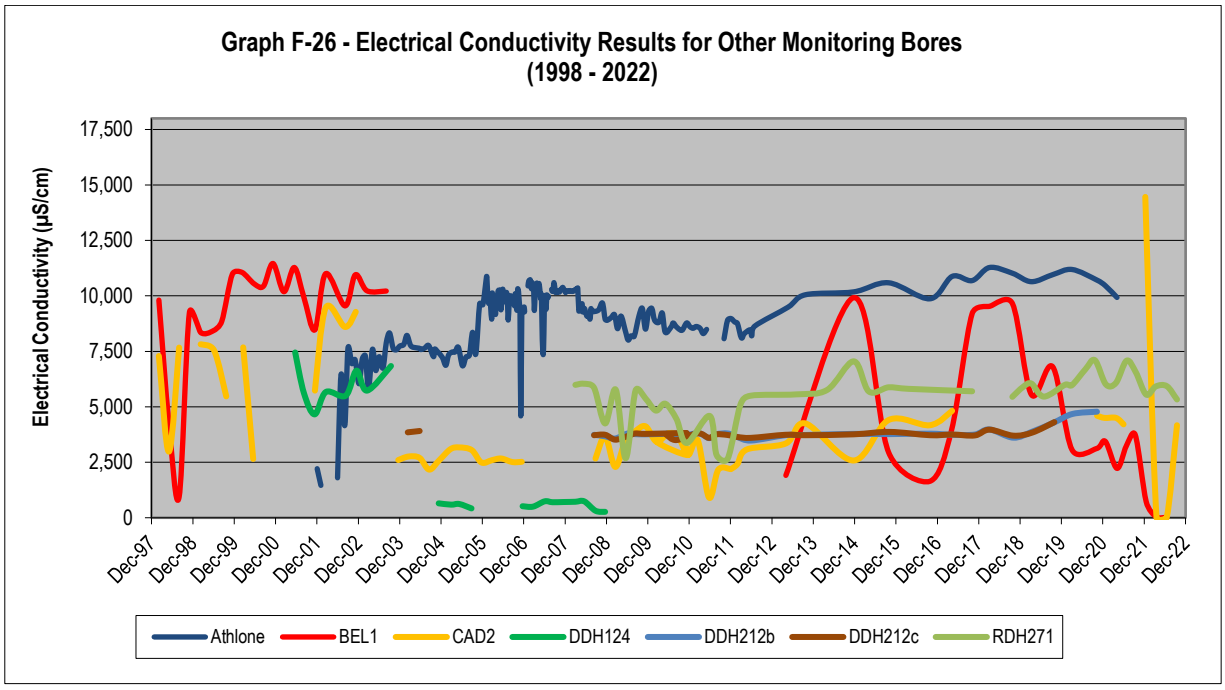
Graph E-23
Electrical Conductivity for Landowner Property Bores (1998-2022)



Graph E-24
Groundwater level for Other Monitoring Bores (1998-2022)



Graph E-25
pH for Other Monitoring Bores (1998-2022)



Graph E-26
Electrical Conductivity for Other Monitoring Bores (1998-2022)

Table E-1 – Groundwater Monitoring Summary

Sample Location	Sample Date	Field EC (µS/cm)	Field pH	Depth to Water (m)
Hunter River Alluvium				
FRA1	06-Jan-22	905	7.09	9.26
FRA1	12-Apr-22	1428	7.06	9.28
FRA1	14-Jul-22	1538	6.96	9.63
FRA1	10-Oct-22	1506	6.94	8.75
JOR1*				
JOR1*				
JOR1*				
JOR1*				
KAl1	06-Jan-22	529	7.25	10.25
KAl1	12-Apr-22	507.1	7.24	10.31
KAl1	15-Jul-22	521	7.06	10.39
KAl1	13-Oct-22	614	6.8	11.23
WAL2	11-Jan-22	2840	7.16	8.47
WAL2	19-Apr-22	2116	7.29	8.54
WAL2	15-Jul-22	2339	7.12	9.02
WAL2	13-Oct-22	2184	7.12	8.07
Dart Brook Alluvium				
ADN1	07-Feb-22	2930	7.06	4.54
ADN1	19-Apr-22	2620	7.25	4.69
ADN1				
ADN1				
DAN2	01-Feb-22	2680	6.98	2.92
DAN2	19-Apr-22	2430	7.09	3.04
DAN2	26-Jul-22	293	6.93	3.24
DAN2	12-Oct-22	2427	6.99	2.54
WM1A	01-Feb-22	1558	7.3	4.5
WM1A	19-Apr-22	1228	7.52	4.71
WM1A	26-Jul-22	1163	7.3	4.85
WM1A	12-Oct-22	3920	7.03	3.91
Sandy Creek Alluvium				
BRO3				
BRO3				

Sample Location	Sample Date	Field EC (µS/cm)	Field pH	Depth to Water (m)
BRO3				
BRO3	14-Oct-22			
COR3	10-Jan-22	2167	8.05	1.41
COR3	19-Apr-22			
COR3	18-Jul-22	1966	7.67	1.5
COR3	17-Oct-22	1977	7.76	1.37
GWO38412	18-Jan-22	867	7.09	2.32
GWO38412	13-Apr-22	909.3	6.98	2.21
GWO38412	14-Jul-22	1201	7.12	2.16
GWO38412	14-Oct-22	611	7.51	2.25
WM3	10-Jan-22	3071	7.06	6.39
WM3	19-Apr-22	2337	6.9	6.33
WM3	18-Jul-22	2330	6.98	6.27
WM3	10-Oct-22	2103	7.02	6.09
Staged Discharge Dam				
RDH505	07-Jan-22	11400	7.4	4
RDH505	19-Apr-22	9540	7.37	3.73
RDH505	19-Jul-22	11100	7.26	3.37
RDH505	10-Oct-22	10600	7.28	2.03
Coal Seams				
DDH183	07-Feb-22			
DDH183				
DDH183	29-Jul-21			
DDH183				
DDH193				
DDH193				
DDH193				
DDH193				
DDH212a	11-Aug-21			
DDH212a				
DDH212a				
DDH212a				
Kayuga 1	18-Jan-22	9410	6.9	9.95
Kayuga 1	13-April-22	525.7	6.78	7.68
Kayuga 1	19-Jul-22	351	6.6	5.84

Sample Location	Sample Date	Field EC (µS/cm)	Field pH	Depth to Water (m)
Kayuga 1	14-Oct-22	782	7.7	2.87
Regolith				
CAS2	18-Jan-22	13370	6.9	35.64
CAS2	05-May-21	13600	6.8	34.42
CAS2	18-Jul-22	13900	6.84	33.39
CAS2	14-Oct-22	9010	6.85	32.07
CAS4	18-Jan-22	11340	6.87	27.03
CAS4	13-April-22	11300	6.82	26.3
CAS4	14-Jul-22	12600	6.96	25.02
CAS4	14-Oct-22	8390	7.25	24.66
JLON1	05-Jan-22	6830	7.62	13.63
JLON1	13-Apr-22	2060	8.0	13.12
JLON1	19-Jul-22	2362	7.59	13.02
JLON1				
TLON1	18-Jan-22	6760	6.98	9.29
TLON1	13-Apr-22	5380	6.84	7.55
TLON1	14-Jul-22	848.5	7.43	6.65
TLON1	17-Oct-22	4110	7.83	2
Rejects Emplacement Area				
RDH508	07-Feb-22			
RDH508				
RDH508	18-Jul-22			
RDH508				
RDH508a				
RDH508a				
RDH508a	18-Jul-22			
RDH508a				
RDH509				
RDH509	12-Apr-22	1340	7.3	9.03
RDH509	18-Jul-22	820	7.18	8.98
RDH509	14-Oct-22	932	6.98	
RDH509a	01-Feb-22			
RDH509a	12-Apr-22	3330	7.29	13.85
RDH509a	18-Jul-22	3880	7.27	13.78
RDH509a	14-Oct-22	3720	7.13	13.23

Sample Location	Sample Date	Field EC (µS/cm)	Field pH	Depth to Water (m)
RDH510	01-Feb-22	9660	6.7	10.21
RDH510	12-Apr-22	7170	7.0	8.37
RDH510	18-Aug-22			
RDH510	14-Oct-22			
RDH510a	01-Feb-22			
RDH510a	12-Apr-22	7590	7.01	8.29
RDH510a	11-Aug-21	10930	7.0	10.35
RDH510a	14-Oct-22			
RDH511	11-Jan-22			
RDH511	19-Apr-22			
RDH511	18-Jul-22			
RDH511	14-Oct-22			
RDH511a	11-Jan-22			
RDH511a	19-Apr-22			
RDH511a	18-Jul-22			
RDH511a	14-Oct-22			
Property Subsidence Management Plans				
Belgrave				
Belgrave				
Belgrave	19-Jul-22			
Belgrave	14-Oct-22			
GWO38582	18-Jan-22			
GWO38582				
GWO38582				
GWO38582				
Other Monitoring Bores				
Athlone	18-Jan-22			
Athlone	13-Apr-22			
Athlone				
Athlone				
BEL1	18-Jan-22	723	7.36	2.07
BEL1	13-Apr-21	51.4	8.37	1.97
BEL1	19-Jul-22	10.9	8.26	1.23
BEL1	14-Oct-22			
CAD2	10-Jan-22	14460	6.97	11.01

Sample Location	Sample Date	Field EC (µS/cm)	Field pH	Depth to Water (m)
CAD2	19-Apr-22	20.6	8.32	10.86
CAD2	18-Jul-22	10.43	7.42	10.95
CAD2	17-Oct-22	4170	7.17	5.86
DDH124	02-Jan-22			13.39
DDH124	13-Apr-22			
DDH124	19-Jul-22			12.91
DDH124	17-Oct-22	1704	7.18	12.66
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	7.1	0.12
FRA1	EC	905	1344.3	1538	633
JOR1*	pH				
JOR1*	EC				
KAI1	pH	7.1	7.2	7.3	0.2
KAI1	EC	507.1	534.5	581	73.9
WAL2	pH	7.1	7.2	7.3	0.2
WAL2	EC	2116	2369.8	2840	724
Dart Brook Alluvium					
ADN1	pH	7.1	7.2	7.3	0.2
ADN1	EC	2390	2505	2620	230
DAN2	pH	6.9	7.0	7.1	0.2
DAN2	EC	293	3072	2680	2387
WM1A	pH	7.0	7.3	7.5	0.5
WM1A	EC	1163	1967	3920	2757
Sandy Creek Alluvium					
BRO3*	pH				
BRO3*	EC				
COR3	pH	7.7	7.8	8.1	0.4
COR3	EC	1966	2036	2167	201
GWO38412	pH	7.1	7.2	7.5	0.4
GWO38412	EC	611	893	1201	590
WM3	pH	7.0	7.0	7.1	0.1
WM3	EC	909	2103	3071	2162
Staged Discharge Dam					
RDH505	pH	7.3	7.8	7.4	0.1
RDH505	EC	9540	10660	11400	1860
Coal Seams					
DDH183*	pH				
DDH183*	EC				
DDH193*	pH				
DDH193*	EC				
DDH212(a)*	pH				

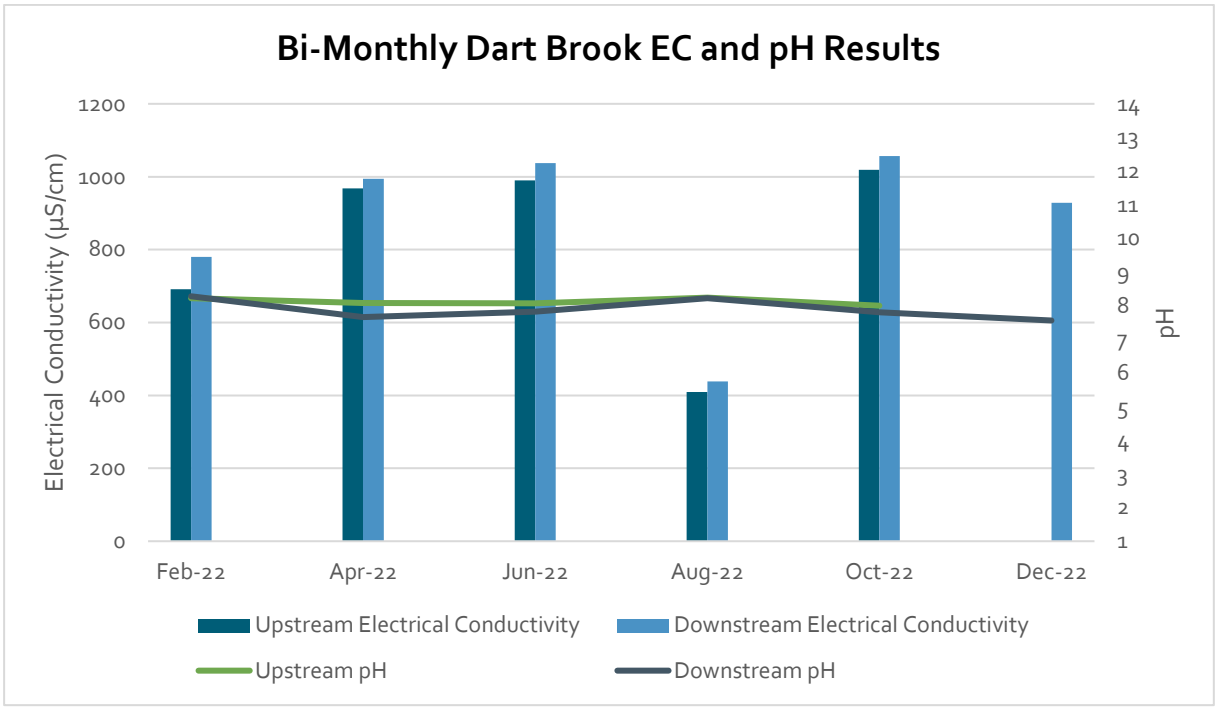
Sample Location	Parameter	Minimum	Mean	Maximum	Variance
DDH212(a)*	EC				
Kayuga 1	pH	6.6	7.0	7.7	1.1
Kayuga 1	EC	351	2767	9410	9059
Regolith					
CAS2	pH	6.8	6.8	6.9	0.1
CAS2	EC	9010	12470	13900	4890
CAS4	pH	6.8	7.0	7.3	0.4
CAS4	EC	8390	10907	12600	4210
JLON1	pH	7.5	7.7	8.0	0.4
JLON1	EC	2060	3750	6830	4770
TLON1*	pH	6.8	6.8	6.9	0.1
TLON1*	EC	848	4275	6760	5912
Rejects Emplacement Area					
RDH508*	pH				
RDH508*	EC				
RDH508a*	pH				
RDH508a*	EC				
RDH509	pH	7.2	7.2	7.3	0.1
RDH509	EC	820	1030	1340	520
RDH509a	pH	7.1	7.2	7.3	0.2
RDH509a	EC	3330	3643	3880	550
RDH510	pH	7.0	7.0	7.0	0.0
RDH510	EC	7170	7170	7170	0.0
RDH510a	pH	7.0	7.0	7.0	0.0
RDH510a	EC	7590	7590	7590	0
RDH511*	pH				
RDH511*	EC				
RDH511a*	pH				
RDH511a*	EC				
Property Subsidence Management Plans					
Belgrave*	pH				
Belgrave*	EC				
GWO38582*	pH				
GWO38582*	EC				

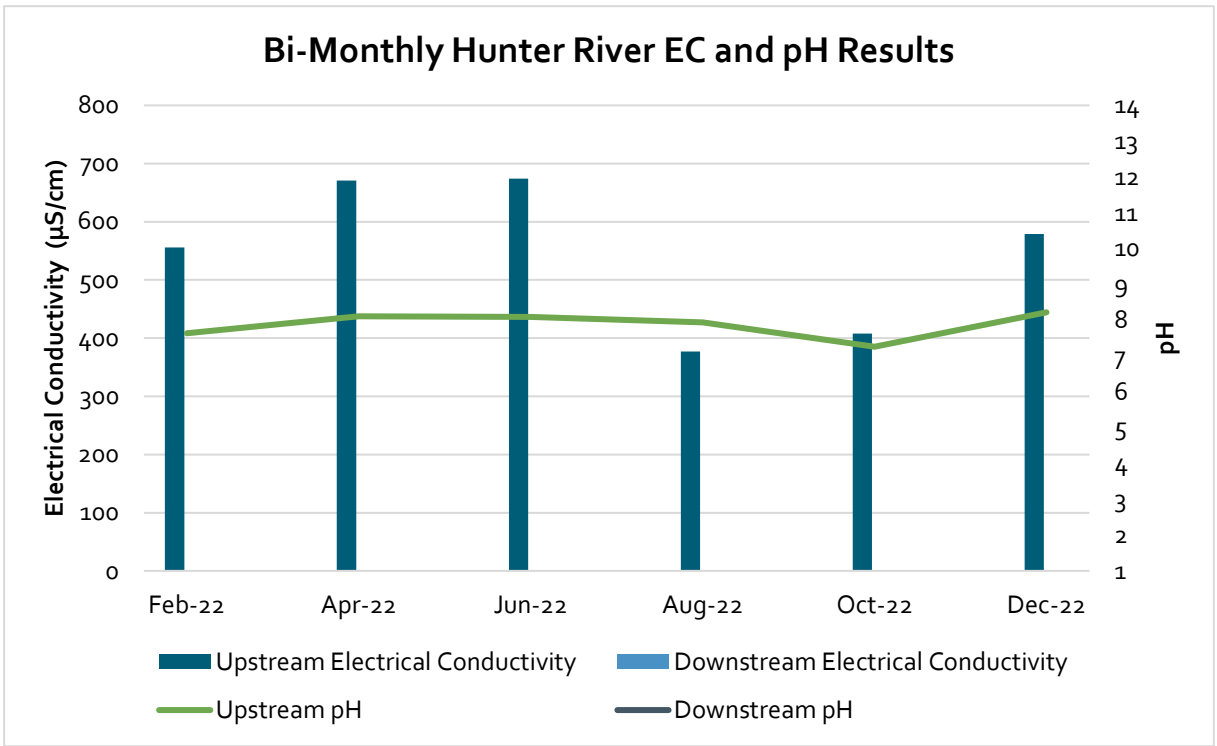
Sample Location	Parameter	Minimum	Mean	Maximum	Variance
Other Bore Holes					
Athlone*	pH				
Athlone*	EC				
BEL1	pH	7.4	8.0	8.4	1.0
BEL1	EC	10.9	262	723	712.1
CAD2	pH	7.0	7.5	8.3	1.4
CAD2	EC	10.4	4665	14460	14449
DDH124*	pH				
DDH124*	EC				
DDH212b*	pH				
DDH212b*	EC				
DDH212c*	pH				
DDH212c*	EC				

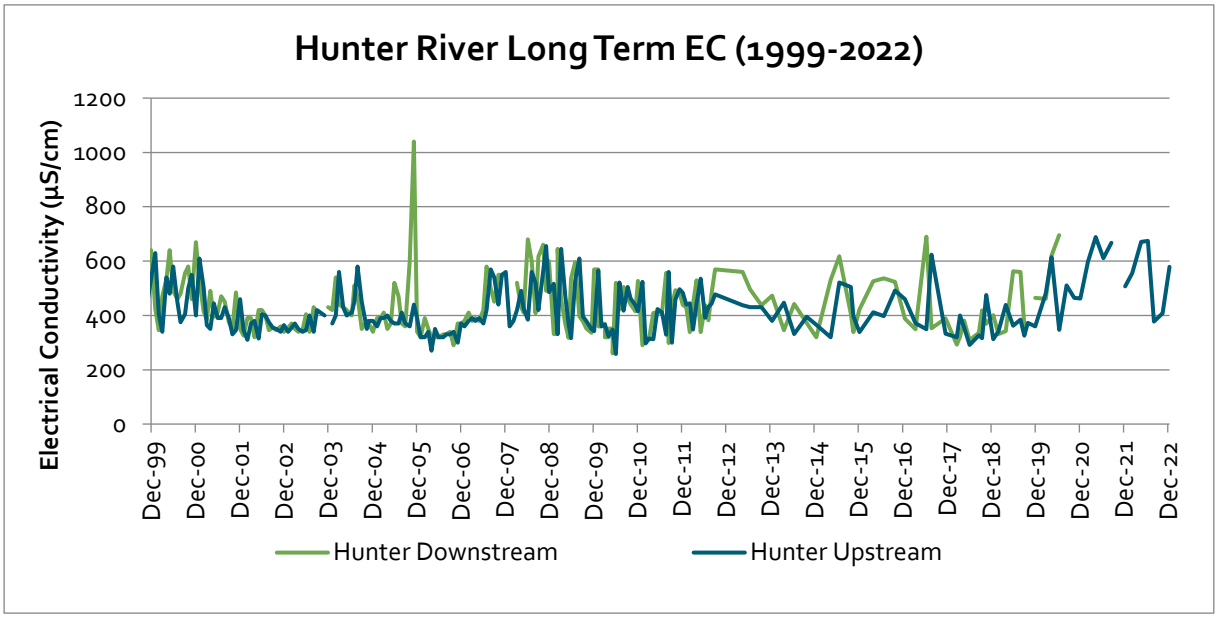
** Bore was dry or otherwise unable to be sampled in 2022*

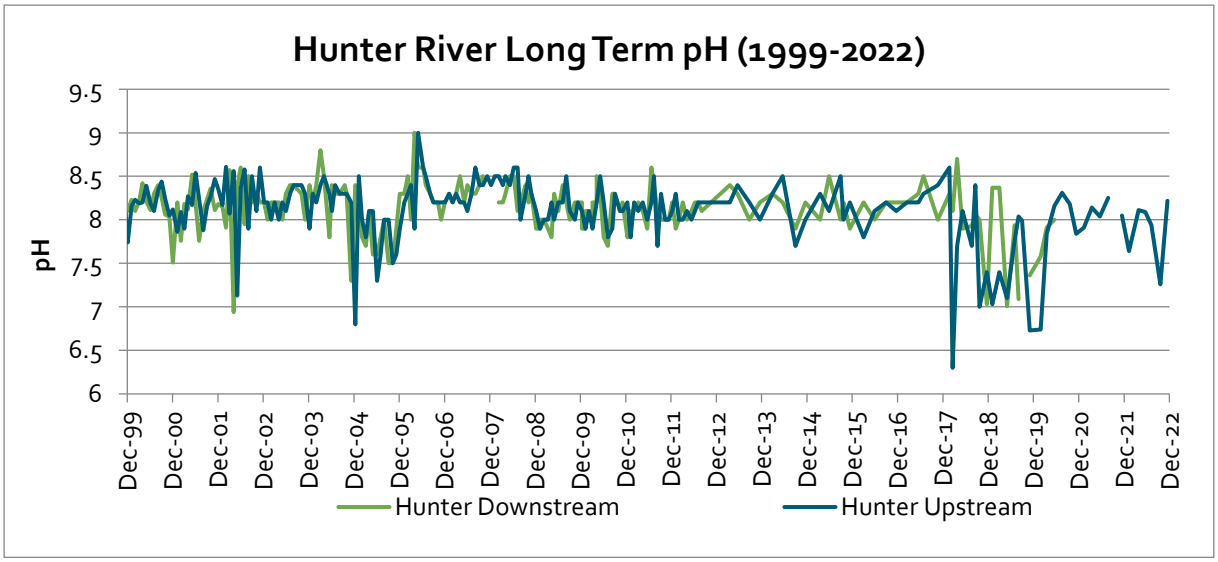
Appendix F

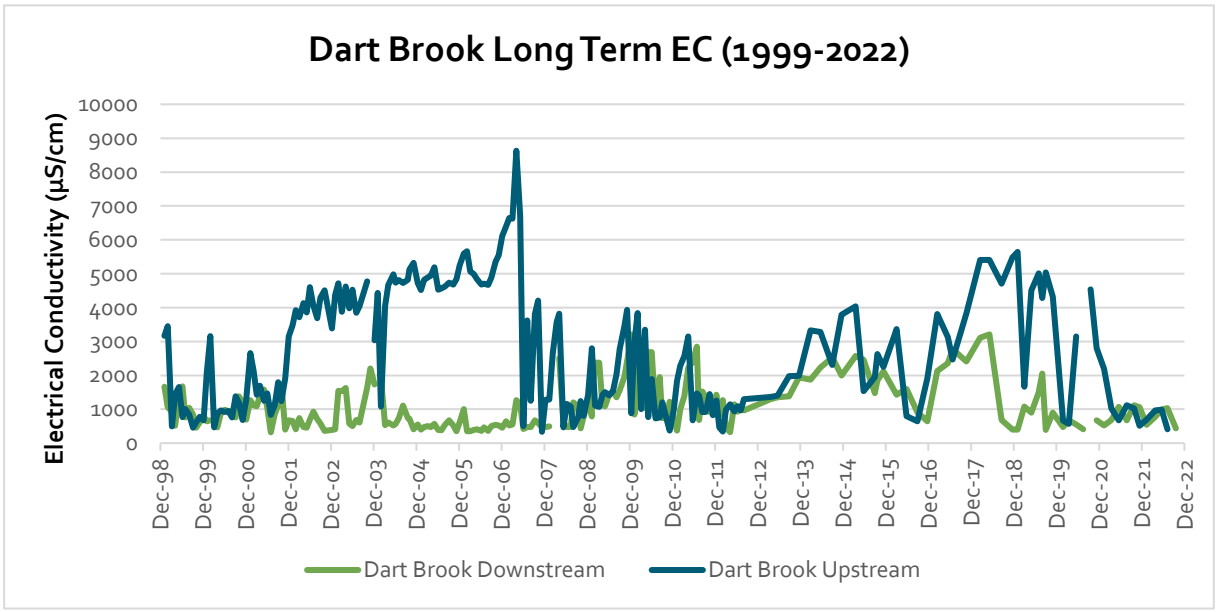
Surface Water Monitoring Summary


Bi-Monthly Dart Brook EC and pH Results
Electrical Conductivity (µS/cm)
1200
1000
800
600
400
200
0
pH
14
13
12
11
10
9
8
7
6
5
4
3
2
1
Feb-22
Apr-22
Jun-22
Aug-22
Oct-22
Dec-22
Upstream Electrical Conductivity
Downstream Electrical Conductivity
Upstream pH
Downstream pH


Bi-Monthly Hunter River EC and pH Results
Electrical Conductivity (µS/cm)
800
700
600
500
400
300
200
100
0
pH
14
13
12
11
10
9
8
7
6
5
4
3
2
1
Feb-22
Apr-22
Jun-22
Aug-22
Oct-22
Dec-22
Upstream Electrical Conductivity
Downstream Electrical Conductivity
Upstream pH
Downstream pH


Hunter River Long Term EC (1999-2022)
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
Dec-22
Hunter Downstream
Hunter Upstream


Hunter River Long Term pH (1999-2022)
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
Dec-21
Dec-22
Hunter Downstream
Hunter Upstream


Dart Brook Long Term EC (1999-2022)
Electrical Conductivity (µS/cm)
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
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
Dec-22
Dart Brook Downstream
Dart Brook Upstream

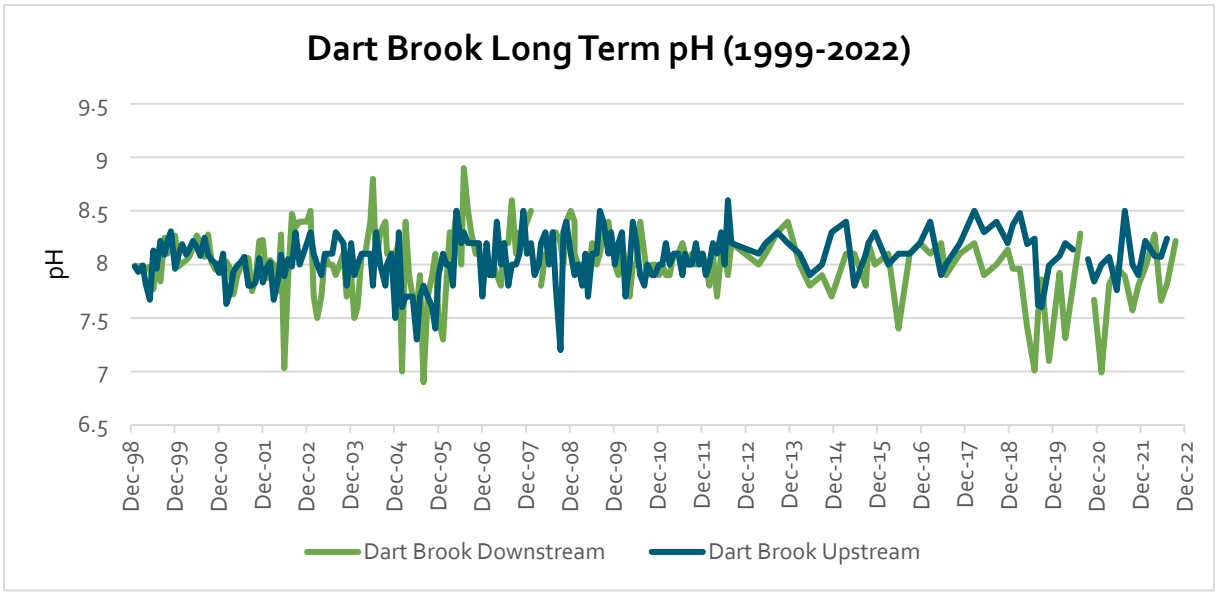

Dart Brook Long Term pH (1999-2022)
pH
9·5
9
8.5
8
7·5
7
6.5
Dec-98
Dec-99
Dec-00
Dec-01
Dec-02
Dec-03
Dec-04
Dec-05
Dec-06
Dec-07
Dec-08
Dec-09
Dec-10
Dec-11
Dec-12
Dec-13
Dec-14
Dec-15
Dec-16
Dec-17
Dec-18
Dec-19
Dec-20
Dec-21
Dec-22
Dart Brook Downstream
Dart Brook Upstream

Table 1 Annual Surface Water Monitoring Results (August 2022)

Sample Location 2022	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	8.22	438	<1	<1	166	46	26	23	18	34	3	1.22	0.23	N/A	N/A	~700	69	290
Dartbrook Upstream	8.24	409	<1	<1	165	48	27	24	18	34	3	1.27	0.22	N/A	N/A	~500	56	270
E2	9.48	4690	<1	1900	3060	718	4	5	<10	2670	23	0.03	N/A	N/A	N/A	N/A	30	6280
Eastern Holding Dam	8.44	710	<1	47	249	60	8	4	40	147	4	0.07	0.02	N/A	<0.1	N/A	<5	480
Evaporation Tailing Dam	9.47	1994	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.05	N/A	N/A	N/A	N/A	36	1340
Hunter Downstream	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hunter Upstream	7.94	377	<1	<1	182	20	33	20	23	26	2	0	0.04	N/A	N/A	<9	18	250
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	9.63	1486	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<0.01	N/A	N/A	N/A	N/A	55	1000
SDD	9.46	11300	<1	2320	4150	912	7	9	33	3540	36	0	0.1	N/A	<0.1	N/A	24	7570
WHD	8.75	808	<1	38	310	84	8	6	32	202	4	0.25	0.05	N/A	<0.1	N/A	16	540
WSD	8.76	898	<1	<1	446	116	23	11	18	221	11	<0.01	N/A	N/A	N/A	N/A	8	600

Appendix G

Water Balance Schematic

Water Balance Schematic