DARTBROOK MINE

ANNUAL REVIEW 2023

for Dartbrook Operations Pty Ltd

30 March 2024

DOCUMENT CONTROL

Document Status

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Our Reference	*240330 Dartbrook Mine Annual Review*

Annual Review Distribution

Distribution List	
1.	NSW Department of Planning, Housing and Infrastructure (DPHI)
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

Title Block

Name of Operation	Dartbrook Mine
Name of Operator	AQC Dartbrook Management Pty Ltd
Name of Manager	Dartbrook Operations 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 2023
Annual Review End Date	31 December 2023
I, Jeff Beatty, certify that this audit report is a true and accurate record of the compliance status of Dartbrook Operations Pty Ltd for the period (CY2023) and that I am authorised to make this statement on behalf of Dartbrook Operations Pty Ltd. *Note.* *a) The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000.* *b) The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications / information/documents—maximum penalty 2 years imprisonment or $22,000, or both).*	
Name of Authorised Reporting Officer	Jeff Beatty
Title of Authorised Reporting Officer	Manager Planning & Approvals
Signature of Authorised Reporting Officer	
Date	30 March 2024

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 2023 (the reporting period).

The compliance status of Dartbrook against relevant approvals is summarised in **Table 1**.

One non-compliance with the conditions of DA 231-07-2000 occurred during the reporting period. The high volume air sampler (HVAS) known as Hulbert (see **Figure 6**) was non-operational during the reporting period due to the landowner inadvertently disconnecting the power supply. Monitoring at the Hulbert HVAS is a requirement of the Air Quality and Greenhouse Gas Management Plan prepared in accordance with Condition 6.1(f) of DA 231-07-2000. The interruption to monitoring at the Hulbert HVAS is therefore an administrative non-compliance with this condition.

Exceedances of the 24-hour average PM_{10} criterion under Condition 6.1(a) of DA 231-07-2000 were recorded in December. The investigation into these exceedances (conducted by an air quality specialist) determined that Dartbrook Mine was not the cause of these exceedances. Accordingly, these exceedances are not deemed to be non-compliances with DA 231-07-2000.

Table 1 Statement of Compliance

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

2. INTRODUCTION

2.1 BACKGROUND

Dartbrook Mine is owned by an unincorporated Joint Venture (Dartbrook Joint Venture) between Australian Pacific Coal (AQC) and Tetra Resources Pty Ltd. Dartbrook Operations Pty Ltd (Dartbrook Operations) is the appointed operating management company and the Mine Operator for the purposes of the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2022*.

The Development Consent is held by AQC Dartbrook Management Pty Ltd (ABN 62 007 377 577) and the relevant mining and coal authorities are held by AQC Dartbrook Pty Ltd (ABN 46 000 012 813). Both these corporate entities have been acquired by the Dartbrook Joint Venture.

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.

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 mining has been undertaken since that time.

In 2023, Dartbrook commenced a program of infrastructure refurbishments and upgrades to prepare the site for recommencement of mining. Accordingly, the environmental management plans were updated to reflect the transition from care and maintenance back to construction, as required by the Development Consent (as outlined in **Section 3.2**). A Compliance Report, which confirmed that all pre-requisites for recommencement of construction had been satisfied, was submitted to DPE on 11 April 2023.

AQC owns the land on which the East Site is located (see **Figure 2**). It has sold the remainder of its former landholdings to a private party but has entered into a land access agreement with the new landowner that enables mining operations to be undertaken. Dartbrook Mine continues to undertake the necessary land and environmental management practices on the land subject to an access agreement.

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 Leases (MLs) and Exploration Licences (ELs); 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 Dartbrook'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**
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**

Condition	Requirement	Where Addressed
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**
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 following works were undertaken to prepare the site for recommencement of mining in the future:

- Initial dewatering of the Hunter Tunnel, with a reliable system established to recycle and reuse this underground mine water;
- Re-supporting the roof and sides of underground roadways using shotcrete and other reinforcing techniques;
- Reinstallation of the Hunter Tunnel conveyor system;
- Installation of a portion of the inter-seam drift conveyor; and
- Preparations for the Coal Handling & Preparation Plant (CHPP) refurbishment.

The specific aspects of Dartbrook's environmental performance for the reporting period are described further in **Section 6** to **Section 8**.

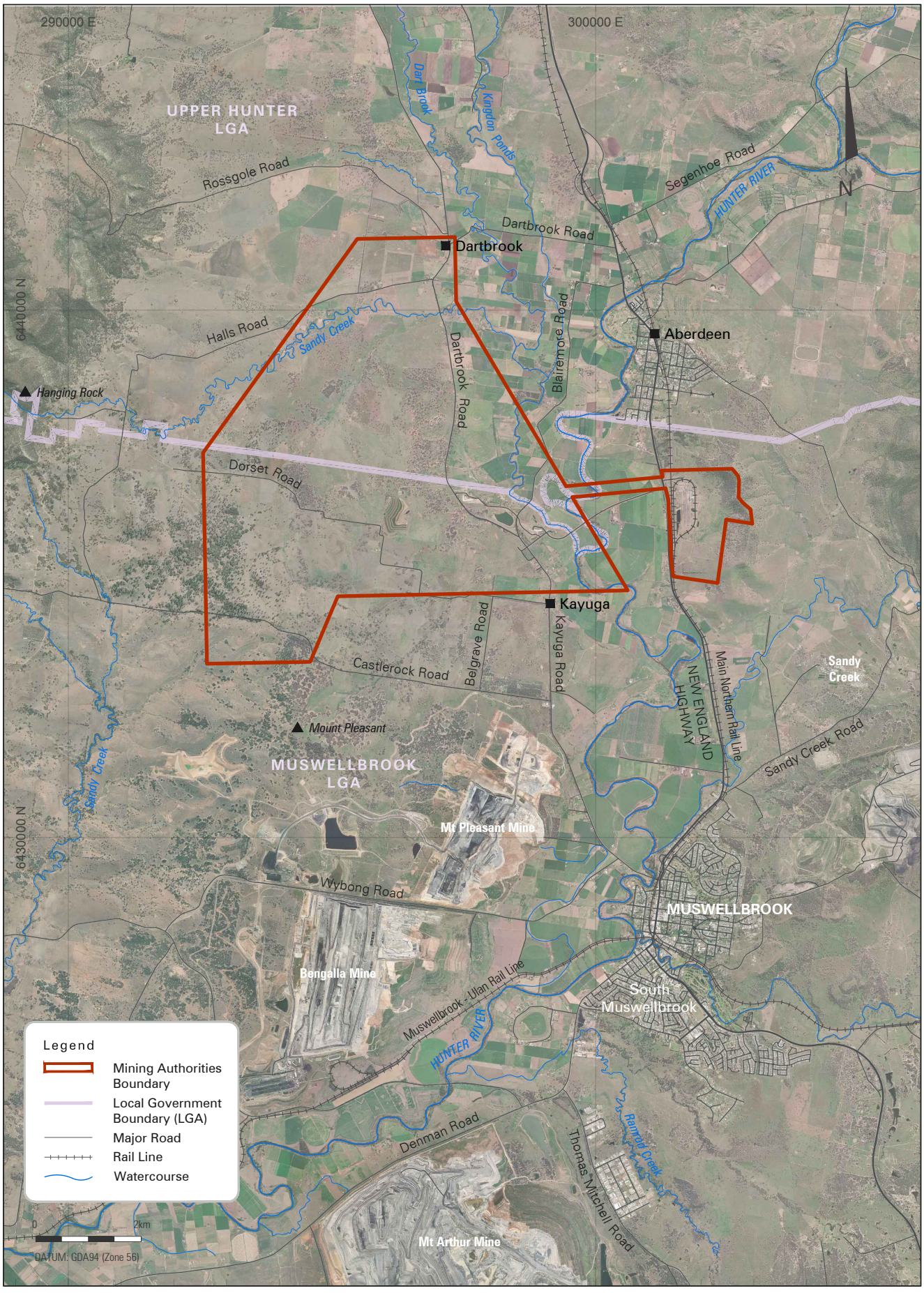
Other consultation with neighbours and community stakeholders continued during 2023 as discussed in **Section 9**. The Dartbrook Mine Community Consultative Committee (CCC) continued to meet during the reporting period, with meetings held in March, June, September and December 2023. As noted in **Section 9.1**, no complaints were received during the reporting period.

2.4 DARTBROOK MINE CONTACTS

Dartbrook Operations 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

Key Personnel	
General Manager	David Sykes
Statutory Mine Manager	John Swan
HSEC Manager	Geoff Mackenzie
Site Contact Details	
Dartbrook Mine Address	Stair Street, Kayuga NSW 2333
Dartbrook Postal Address	PO Box 517, Muswellbrook NSW 2333
Phone No.	02 6540 8875
Facsimile No.	02 6541 1935
Dartbrook 24-hour Environment & Community Hotline	1300 131 058



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

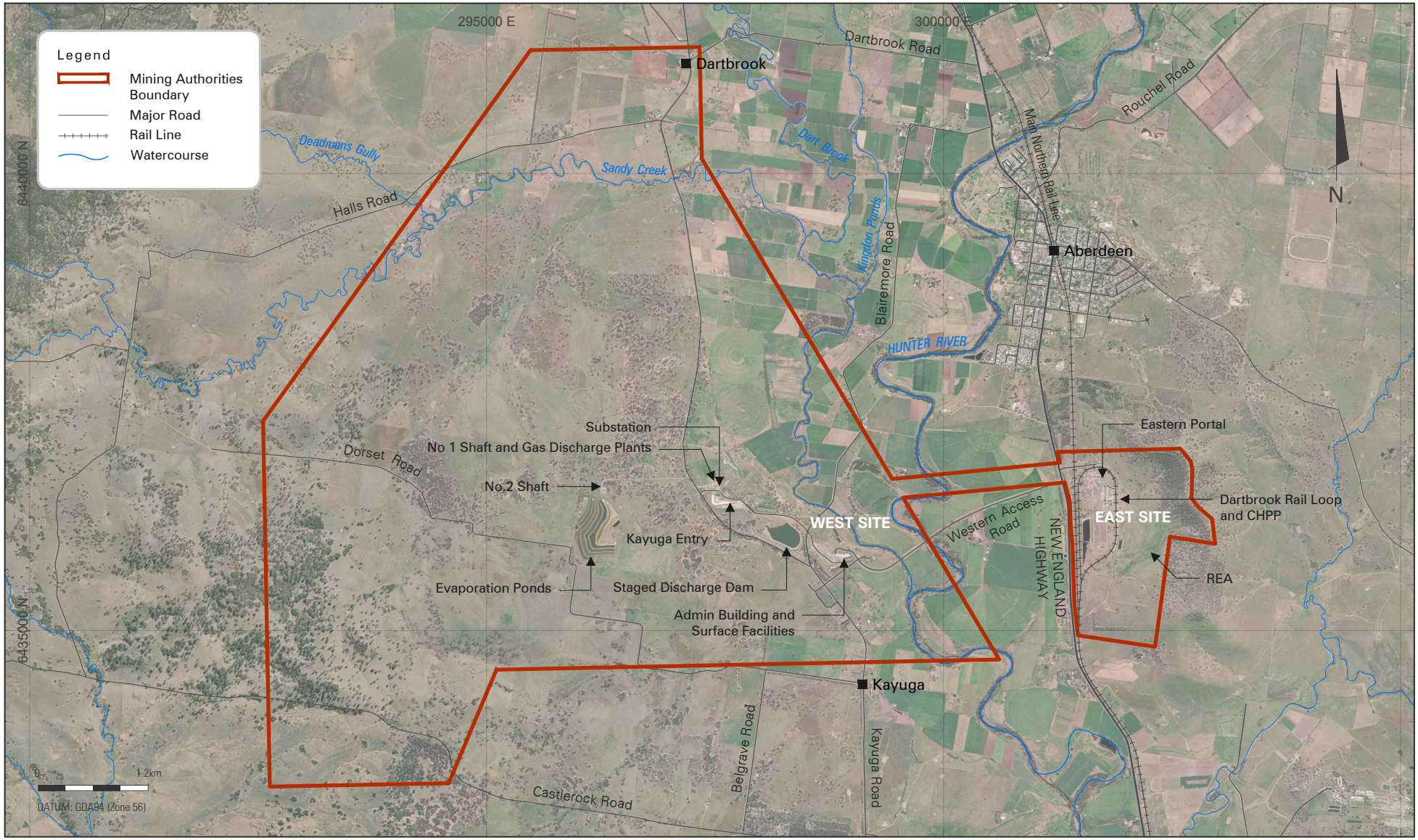
DARTBROOK MINE

DARTBROOK

JAMES BAILEY & ASSOCIATES
Environmental and Planning Consultants

Site Locality

FIGURE 1



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

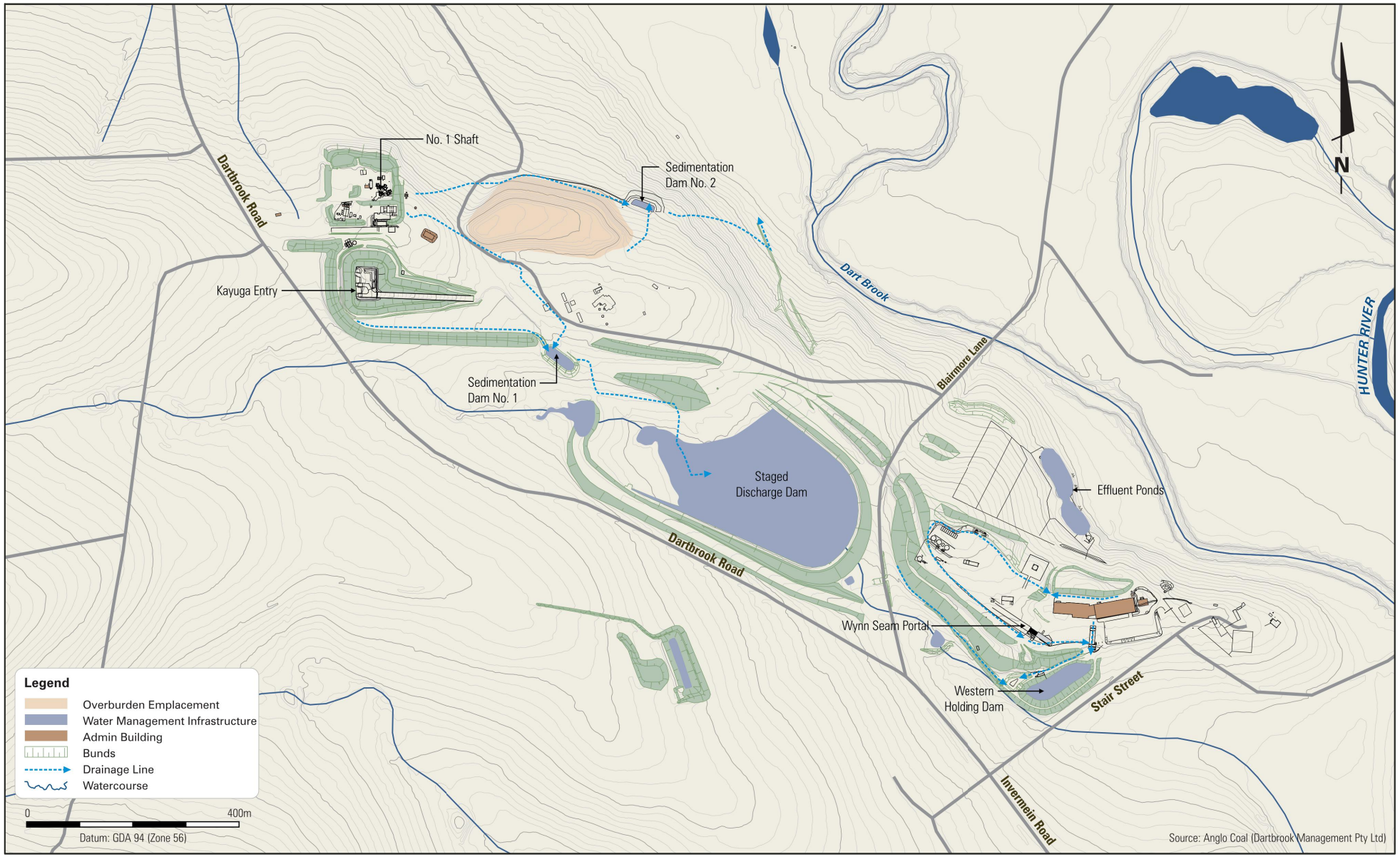
DARTBROOK MINE

DARTBROOK

JAMES BAILEY & ASSOCIATES
Environmental and Planning Consultants

Existing Site Layout

FIGURE 2



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

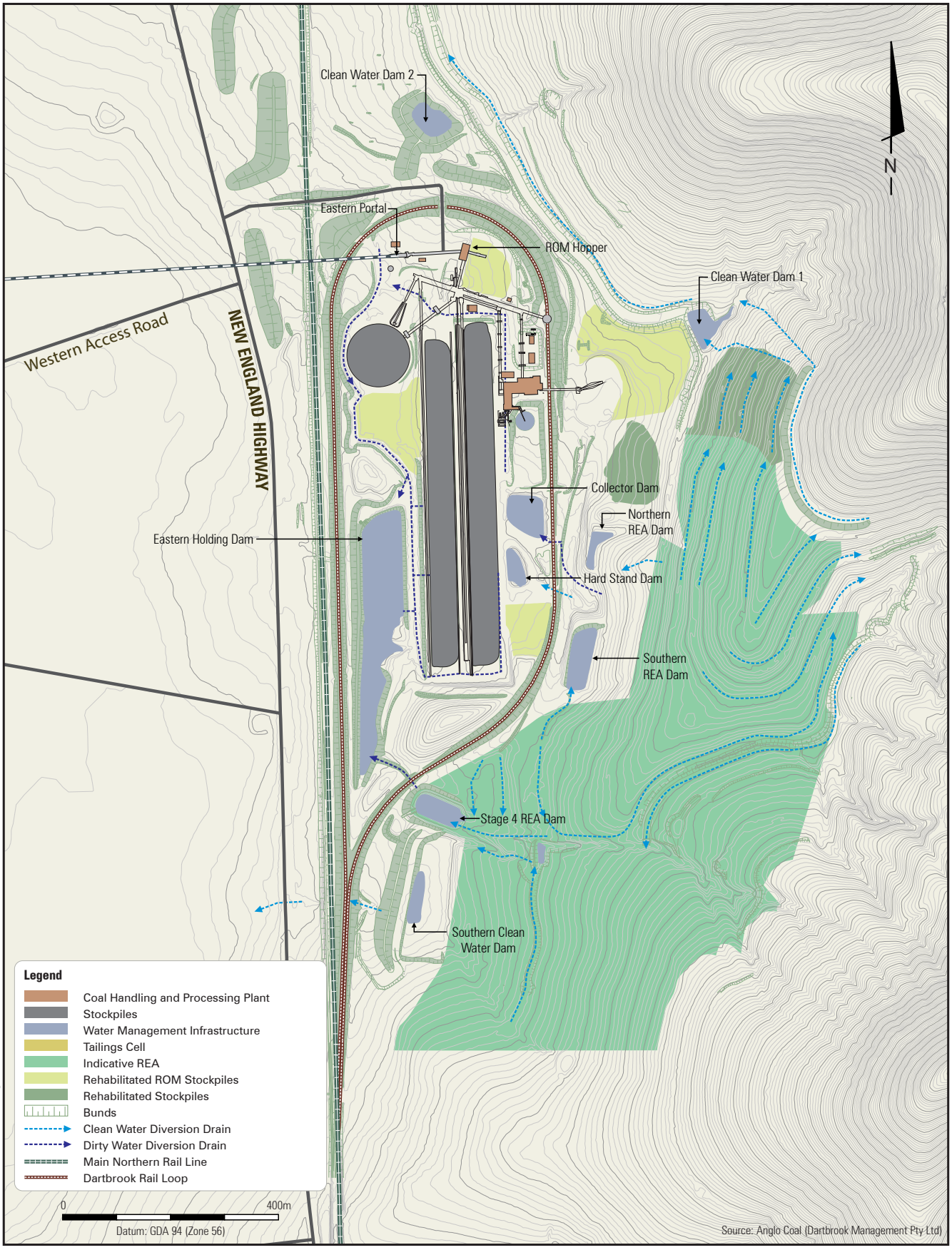
DARTBROOK MINE

DARTBROOK

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

DARTBROOK MINE

DARTBROOK

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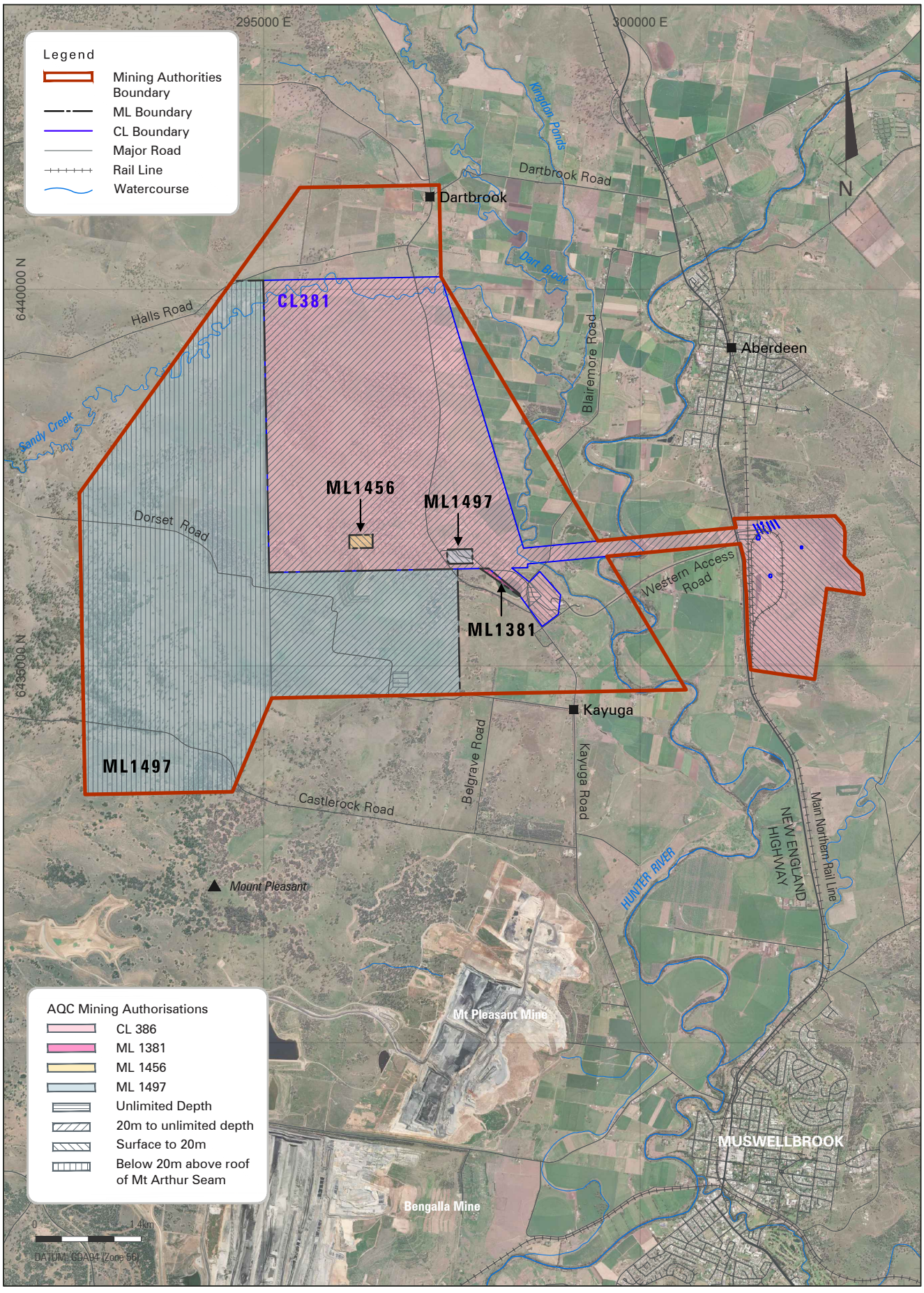
Environmental and Planning Consultants

Existing East Site Infrastructure

FIGURE 4



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

DARTBROOK MINE

DARTBROOK

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Environmental and Planning Consultants

Existing Mining Leases

FIGURE 5

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
Mining Authorisations			
Authorisation 256	16/12/1980	16/12/2025	Active
Coal Lease (CL) 386	19/12/1991	19/12/2033	Active
Mining Lease (ML) 1381	23/10/1995	23/10/2033	Active
ML 1456	27/09/1999	27/09/2043	Active
ML 1497	06/12/2001	5/12/2043	Active
Exploration Licence (EL) 4574	13/08/1993	13/08/2024	Active
EL 4575	13/08/1993	13/08/2027	Active
EL 5525	22/09/1998	22/09/2027	Active
Development Consent			
DA 231-07-2000 (as modified)	28/08/2001	05/12/2027	Active
Emplacement Area Approvals			
Approval for an Emplacement Area (s126 approval)	13/03/1996	N/A	Active
Stage 4 Reject Emplacement Approval C95/2265 (s126 approval)	02/01/2000	N/A	Active
Approval for 14° slopes in the REA Stage 4 (s126 approval)	18/12/2003	N/A	Active
Application for Discontinuance of Use of Emplacement Areas (s101 approval)	13/08/2007	Ongoing	Active
Licences			
Environmental Protection Licence 4885	Granted 30/11/2000	N/A	Active
Notification to Work Cover for storage and handling of Dangerous Goods	10/11/2005	N/A	Active

Description	Approval Date	Expiry Date	Status/ Renewal Date
Notification and Declaration to WorkCover that no dangerous goods stored or handled at Dartbrook Mine	Submitted 13/12/2006	N/A	Active
Radiation Licence 5061080	1/07/2013	14/08/2024	Active
Water Access Licence WAL 30213*	14/11/2012	N/A	Active

Note: Dartbrook Operations also has an agreement with the holder of WAL 18210 and WAL 41524 allowing use of the water entitlements under those licences.

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 approved by DPE during the reporting period:

- Air Quality and Greenhouse Gas Management Plan;
- Archaeology and Cultural Heritage Management Plan;
- Erosion and Sediment Control Plan;
- Flora and Fauna Management Plan;
- Site Water Management Plan (including a Flood Response Plan);
- Landscape and Lighting Management Plan; and
- Noise Management Plan.

The Spontaneous Combustion Management Plan was also updated and submitted to the Resources Regulator for approval. The Regulator's approval is currently pending.

The Air Quality and Greenhouse Gas Management Plan was approved in March 2023, although DPE requested a further update to include further information on greenhouse gas emissions and controls. This further update will be completed during the next reporting period.

A number of other management plans will be updated prior to recommencement of mining; however those plans do not require the approval of the Planning Secretary. **Table 5** lists the latest version of Dartbrook's environmental management plans as at the end of 2023.

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	25/01/2023
Blast Management Plan	09/12/2002
Bushfire Management Plan	19/05/2011
Construction Noise Management Plan	7/11/2001
Air Quality and Greenhouse Gas Management Plan	5/04/2023
Erosion and Sediment Control Management Plan	18/01/2023
Flora and Fauna Management Plan	25/01/2023

Management Plan/Program	Approval Date
Land Management Plan	27/01/2002
Landowner Communication and Consultation Plan	09/12/2002
Landscape and Lighting Management Plan	30/01/2023
Longwall Subsidence Management Plan(s)	22/13/2003
Noise Management Plan	18/01/2023
Property Subsidence Management Plans	22/12/2003
Pollution Incident Response Management Plan	16/08/2018
Rehabilitation Management Plan	N/A
Site Water Management Plan (including Flood Response Plan)	16/08/2023
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

4. OPERATIONS SUMMARY

4.1 EXPLORATION

No exploration activities were undertaken during the reporting period.

4.2 MINING OPERATIONS

Dartbrook Mine transitioned from care and maintenance into the construction phase during 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

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 2023. Topsoil and overburden continue to be stockpiled at suitable locations onsite. No topsoil or overburden was moved or actively used in 2023.

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 (2022)	Actual Quantity (2023)	Forecast Quantity (2024)
Waste Rock / Overburden	Mbcm	N/A	0	0	0
ROM Coal	Mt	6 Mtpa	0	0	0.23
Coarse Reject	Mt	N/A	0	0	0.05
Fine Reject	Mt	N/A	0	0	0
Product Coal	Mt	N/A	0	0	0.18

Table 7 Topsoil and Overburden Stockpile Status

Activity / Area	Cumulative Production (t)		
	Start of Period 01/01/2023	End of Period 31/12/2023	End of next period 31/12/2024
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 Construction and Maintenance

In April 2023, Dartbrook Operations commenced a program of infrastructure refurbishments and upgrades in preparation for recommencement of mining in the future. The works conducted to date include:

- Initial dewatering of the Hunter Tunnel, with a reliable system established to recycle and reuse this underground mine water;
- Re-supporting the roof and sides of underground roadways using shotcrete and other reinforcing techniques;
- Reinstallation of the Hunter Tunnel conveyor system;
- Installation of a portion of the inter-seam drift conveyor; and
- Preparations for the Coal Handling & Preparation Plant (CHPP) refurbishment.

In addition to these upgrades and refurbishments, Dartbrook Operations continued to undertake routine servicing and maintenance of equipment such as pumps, mine ventilation fans, electrical apparatus, underground mine vehicles and CHPP components. Other routine tasks include 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 and has been increased as the mine transitions into operations during the reporting period. The diesel fleet includes the following surface & underground vehicles:

- Four (4) Drfitrunners (SMV) – underground diesel vehicles;
- Three (3) Coal Tram 10t Load Haul Dump (LHD);
- One (1) Titan 10t Load Haul Dump (LHD);
- One (1) Merlo 6t Integrated Tool Carrier; and
- Light vehicles.

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 2023. 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 and construction phases.

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 2022	Quantity in 2023
General Waste - Non-hazardous (t)	Landfill	9.995	75.145
Scrap Metal (t)	Recycled	1.5	116.22
Office Paper and Co-mingled Recyclables (t)	Recycled	0.015	0.285
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 2023.

Table 9 Coal Stockpile Status

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

4.5 NEXT REPORTING PERIOD

Further infrastructure refurbishments and upgrades will be undertaken in the next reporting period. It is Dartbrook Operations' goal to recommence mining in the next reporting period.

5. ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

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 has been updated to reflect the upcoming transition back to an operational phase. Internal operational inspections of rehabilitation, water, biodiversity and hydrocarbon management components of the EMS were undertaken regularly in 2023.

Table 10 provides a summary of the environmental management actions undertaken during 2023.

Table 10 Environmental Management Overview

Aspect	Performance during 2023	Trends	Management Actions
Air Quality	Dust concentrations measured during the reporting period were within all relevant air quality criteria.	Dartbrook Mine continued to comply with the relevant air quality criteria. Exceedances of the 24-hr average PM_{10} criterion were recorded in December, but these were determined to be caused by external factors.	Continuation of air quality monitoring in accordance with the Air Quality and Greenhouse Gas Management Plan (see **Section 6.2**).
Greenhouse	Scope 1 & 2 greenhouse emissions for the 2022/23 reporting period were estimated at 91,886 tonnes of CO_2 equivalent (CO_2-e).	Increase in CO_2-e emissions on site compared to 2021/22 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.	The requirement to undertake noise monitoring is not triggered until mining recommences (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 occurred during the reporting 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 stations 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 periods of 2023 that affected its rainfall and temperature measurements. For this Annual Review, rainfall and temperature data for 2023 has been sourced from Met-02, and supplemented by data 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 448.8 mm of rainfall was recorded by Met-02 and the BOM's Scone Airport meteorological station over the 85 rain days. This was lower than the total rainfall recorded by Met-02 in 2022 (826 mm) and 2021 (1,028.2 mm). The total rainfall in 2023 was below 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 A**.

Temperature

Table 12 presents a summary of the daily maximum temperatures measured by Met-02 and the BOM's Scone Airport meteorological station. December was the warmest month in 2023 with a mean daily maximum of 32.8°C whereas June was the coldest month with a mean daily maximum of 18.1°C.

Table 11 Rainfall Summary

Month	Rainfall (mm)	Cumulative Rainfall (mm)
January	55.0	55.0
February	44.2	99.2
March*	32.6	131.8
April	40.8	172.6
May	1.2	173.8
June	8.6	182.4
July	11.0	193.4
August	43.2	236.6
September	12.4	249.0
October	38.0	287.0
November	51.6	338.6
December	110.2	448.8

** 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 *	21.8	31.7	38.6
February *	18.9	32.6	39.3
March *	23.2	31.6	40.9
April	17.6	23.3	27.1
May	15.4	19.7	24.1
June	13.0	18.1	23.7
July	12.6	18.5	24.0
August	15.8	20.9	25.8
September	18.0	25.6	33.4
October	16.6	27.5	35.1
November	23.8	28.7	35.9
December	21.5	32.8	40.5
Average	**18.2**	**25.9**	**32.4**

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

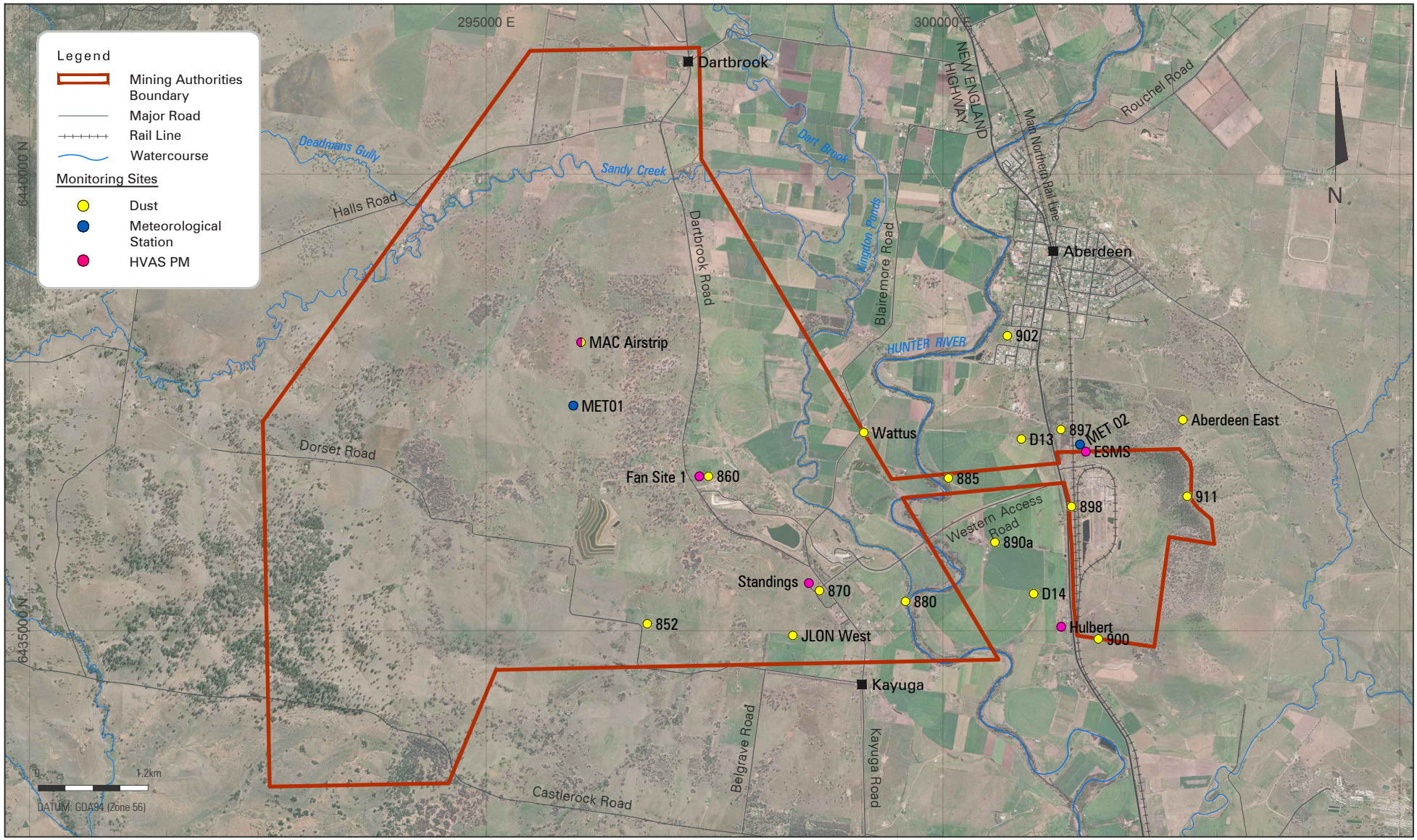
Wind Speed & Direction

In 2023, prevailing winds were generally consistent with long term regional trends.

Table 13 provides a summary of the data captured at Dartbrook Mine in 2023. Monthly wind roses compiled from Met-02 are provided in **Appendix A**.

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	59.8	40.2	SSE
February	60.1	39.9	SSE
March	68.8	31.2	SSE
April	72.5	27.5	SSE
May	75.1	24.9	NNE
June	73.3	26.7	N
July	76.7	23.3	N
August	82.5	17.5	N
September	73.6	26.4	NNE
October	56.2	43.8	SSE
November	64.0	36.0	SSE
December	58.5	41.5	SSE



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

DARTBROOK MINE

DARTBROOK

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 Air Quality and Greenhouse Gas Management Plan (AQGGMP). The AQGGMP 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.

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. 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 remain in the AQGGMP.

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 AQGGMP.

The compliance monitoring network in the approved AQGGMP 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 PM_{10} 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**).

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, vegetation and insects.

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.

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
Depositional Dust (g/m²/month) [d]	Annual (total)	4 (g/m²/month)
	Annual (increase over existing levels)	2 (g/m²/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 AQGGMP.

Appendix B 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/m²/month, with the exception of the Macairstrip monitor which was impacted by activities outside of Dartbrook Mine and recorded several contaminated samples. The annual average dust deposition levels for the Macairstrip monitor were recalculated in May 2023 and remained below the criterion for the remainder of the reporting period.

'Contaminated samples' (listed in **Appendix B**) 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 sites 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 sites are illustrated in **Figure 6** and described in **Table 16**.

The data recovery rate was 100% for the Fan Site 1 and the East Site Meteorological Station (ESMS) HVAS sites, 97% for Standings HVAS and 89% for Macairstrip HVAS in 2023. There were no program re-runs undertaken during 2023 for the Standings or Macairstip HVAS. The Hulbert HVAS experienced ongoing technical issues from November 2022 to December 2023, resulting in a recovery rate of 0% 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%.

As shown on **Figure 8,** PM10 concentrations recorded at Macairstrip and Fan Site 1 HVAS sites in December 2023 exceeded the criterion of 50 µg/m³. An investigation into these exceedances was conducted by an air quality specialist. This investigation concluded that the exceedances were caused by a regional event rather than activities at Dartbrook Mine.

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 at the Dartbrook Mine HVAS sites were less than the levels predicted in the EIS, except for Macairstrip HVAS. All of the Dartbrook Mine HVAS sites remained below 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**. The monitored annual average for the reporting period illustrated an increasing trend, but remained within the relevant air quality criterion for TSP.

Table 15 Annual Rolling Average Dust Deposition for 2023

Site	Location Description	Insoluble Solids (g/m^2/month)	Number of Samples
852	Dorset Road	1.20	12
860	No. 1 Vent Shaft	1.35	12
870	Kayuga Village	0.93	12
880	Hunter River / Dart Brook Junction	1.07	12
885	Frazer Farm paddock near Hunter River	3.11	11
890a	Garoka Dairy	0.92	12
897	Eastern Site North	0.81	11
898	Eastern Site West	0.78	12
900	Eastern Site South	0.86	10
902	Aberdeen Tree Screen	0.58	12
911	Browns Mountain	0.38	9
Aberdeen East	South east of Aberdeen	0.40	8
D13	Residence northwest of CHPP	1.70	10
D14	Southwest of CHPP	1.21	9
JLON West	Residence south of West Site	2.03	9
Macairstrip	Northwest of West site	1.93	7
Wattus	Between Dart Brook and Hunter River	1.65	11

Figure 7 **Depositional Dust Annual Averages 2023**

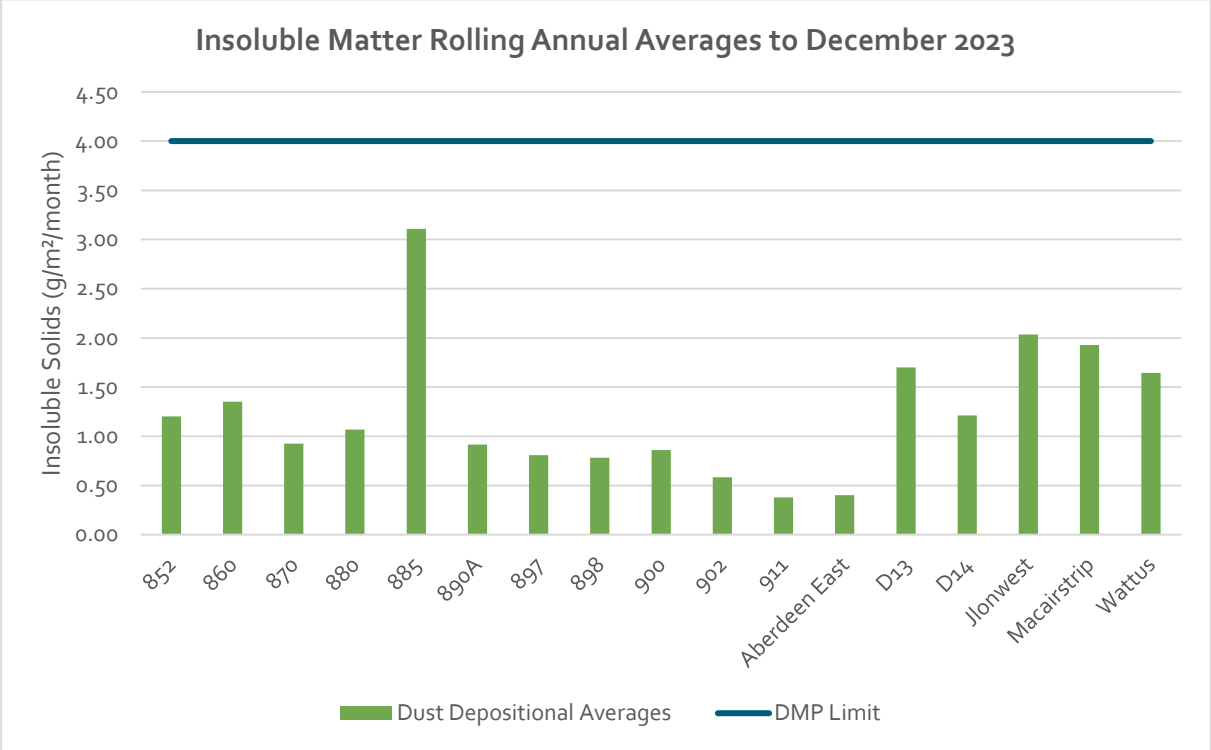


Table 16 **HVAS Monitoring Sites for PM10 and TSP**

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 2023
ESMS	µg/m³	20.1	11.75
Fan site 1	µg/m³	18.7	17.11
Hulbert*	µg/m³	17.4	-
Standings	µg/m³	17.3	14.50
Macairstrip	µg/m³	17.0	17.14

** No average available due to absence of results*

Figure 8 **HVAS 24-hr Average PM10 Results 2023**

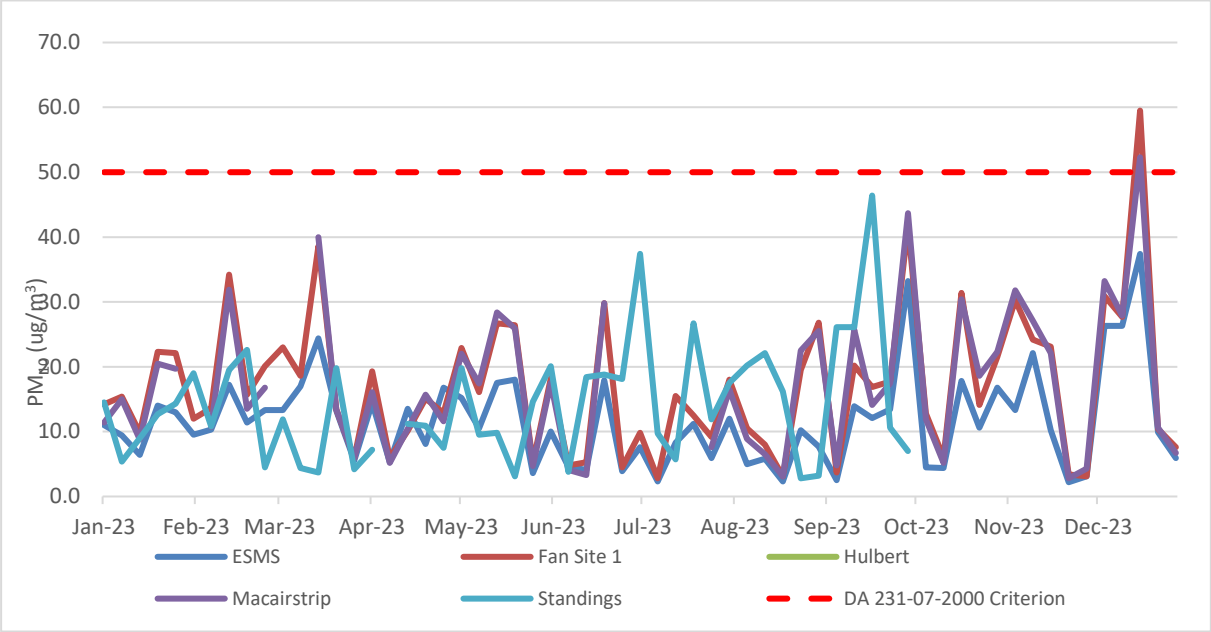
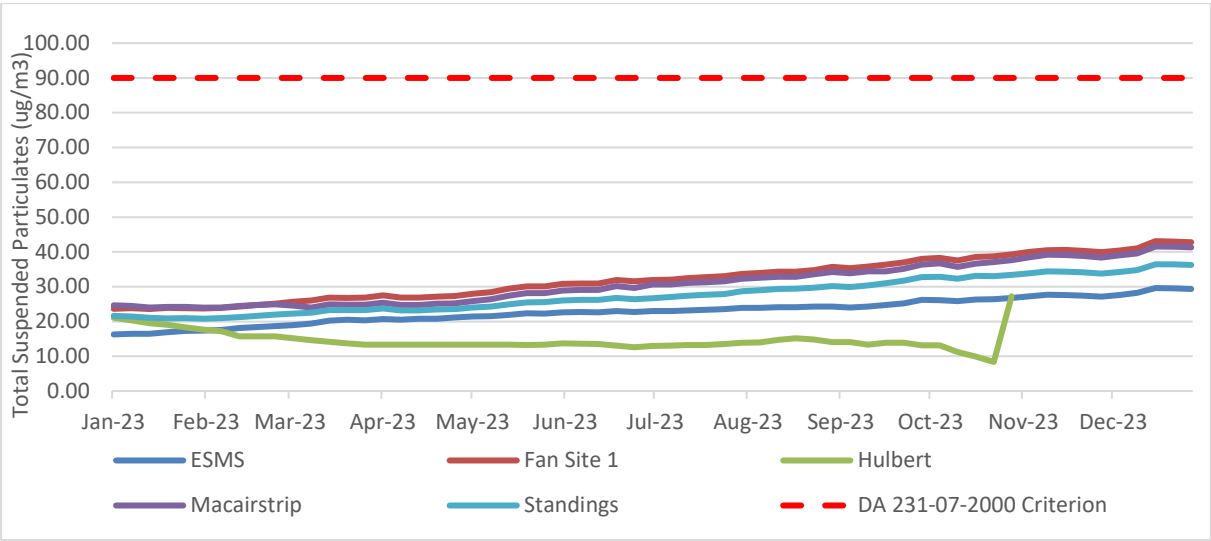


Figure 9 **Calculated Rolling Annual Average TSP Concentrations 2023**



6.3.3 Next Reporting Period

Dartbrook prepared an Air Quality and Greenhouse Gas Management Plan (AQGGMP) prior to recommencing construction activities in accordance with Condition 6.1(f) of DA 231-07-2000. The AQGGMP was approved by the Secretary of DPE in March 2023. The AQGGMP has undergone additional updates to address additional comments from DPE and is expected to be approved by the Secretary in the next reporting period. Dust management and monitoring measures will be undertaken in accordance with the approved AQGGMP.

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.

6.4.2 Next Reporting Period

It is not anticipated that significant land disturbance will occur during the ongoing infrastructure works. However, if required, 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. 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.

Dartbrook continues to manage noxious weeds on AQC owned land as well as private land which it has an access agreement over. Weed control on the remainder of the land within the mining authorities is the responsibility of the private landholder.

Feral and Pest Animal Management

Feral and pest animal control within the operational areas at Dartbrook Mine continued during 2023 and was largely focused on kangaroos, feral dogs and pigs.

6.5.2 Next Reporting Period

Site personnel 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 requirement to recommencement noise monitoring will be triggered by the recommencement of mining operations. As such, no noise monitoring was conducted during the reporting period.

6.6.2 Environmental Performance

The Noise Management Plan was updated in preparation for the future recommencement of mining operations. Noise monitoring will recommence when Dartbrook recommences mining operations.

6.7 VISUAL AND LIGHTING

6.7.1 Environmental Management and Performance

Dartbrook Mine's surface facilities have the potential to generate visual and stray light impacts for sensitive receivers located in the surrounding environment. 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. The LLMP was updated and approved during the reporting period.

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

The updated LLMP included additional plantings to supplement the already constructed tree screens. These plantings will progressively been undertaken in the next reporting period, as well maintenance of the existing screens.

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**, Dartbrook 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

Ground disturbance activities are not anticipated to be undertaken in the next reporting period. Notwithstanding, 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 2023 to protect the European heritage items under Dartbrook's control. Such areas include continued work around the Riverview Homestead, Kayuga Homestead and the Dartbrook and Kayuga Cemeteries.

6.9.2 Next Reporting Period

No European heritage items are expected to be impacted by the construction or mining activities proposed for the next reporting period. Dartbrook will continue existing efforts for the upkeep of the various European heritage sites under its management.

6.10 SPONTANEOUS COMBUSTION

6.10.1 Environmental Management

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

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

6.10.2 Environmental Performance

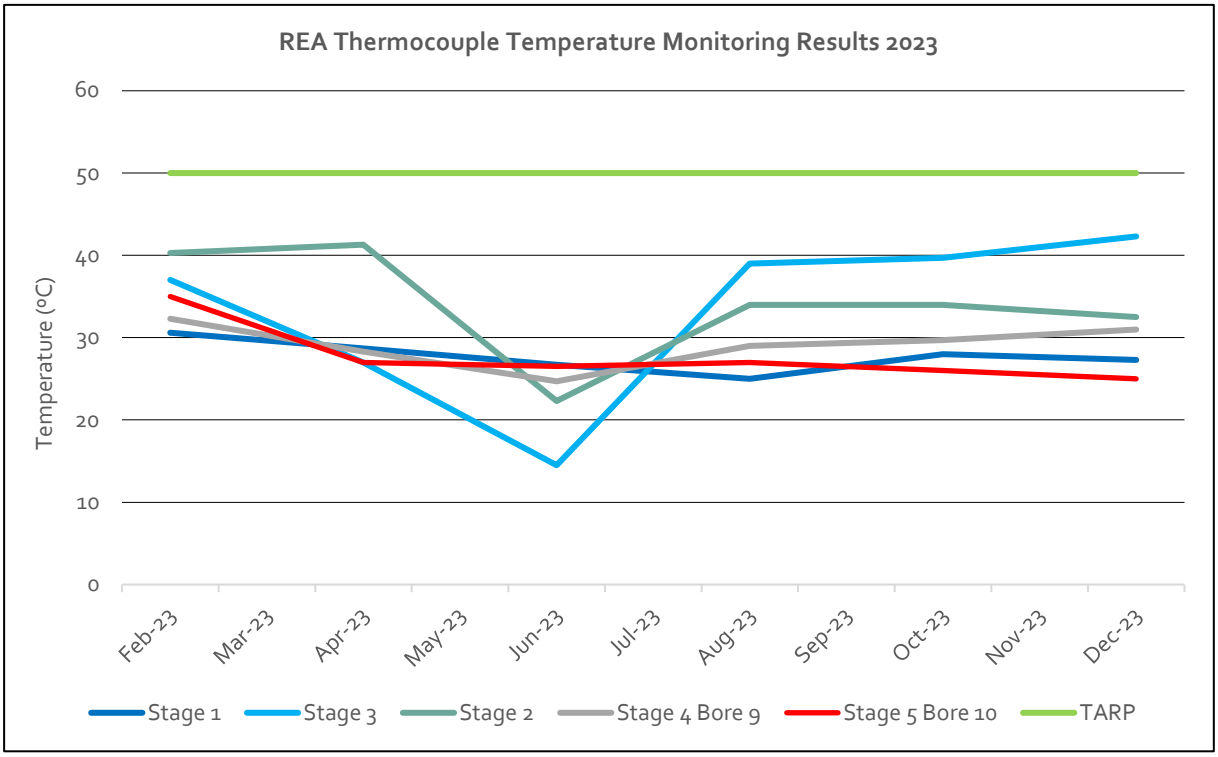
The REA underground temperature is monitored using 13 thermocouples installed in boreholes to measure the temperature of the reject's material. **Figure 10** provides the results of REA thermocouple monitoring from the reporting period.

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

Borehole 9 recorded elevated temperatures in April, June, October and December of 2023. These elevated readings were determined to be caused by a faulty thermocouple. Temperatures remained generally stable and below the site Trigger Action Response Plan (TARP) value of 50 °C (as provided in the approved REA Plan) at the remainder of the REA temperature monitoring bores. There were no incidents of spontaneous combustion during the reporting period.

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

Figure 10 REA Thermocouple Temperature Monitoring Results 2023



6.10.3 Next Reporting Period

The Spontaneous Combustion Management Plan was updated and submitted for approval during the reporting period. The updated plan is currently pending the approval of the Resources Regulator.

The coal stockpile areas and underground workings have remained static throughout the care and maintenance and construction periods, but will become active work areas once mining operations recommence. The updated Spontaneous Combustion Management Plan includes 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

The Bushfire Management Plan has been updated to reflect the change in land ownership. Although Dartbrook no longer owns the land on which the surface facilities are situated, it remains responsible for fire management within operational areas. Bushfire management on lands used for grazing are the responsibility of the landowner.

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 are kept clear of combustible materials to minimise the risk of a fire within these areas. Fuel loads are managed in accordance with 'Planning for Bush Fire Protection'(RFS, 2019), including maintenance of asset protection zones around mining infrastructure.

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 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

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 returning 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 and construction activities 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 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 2022/2023 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**, an estimated total of 91,886 tonnes of CO_2 equivalent gas (CO_2-e) was emitted during the 2022/2023 NGER period. The main contributor to total emissions was CH_4 gas emitted from the underground mine (82,139 tonnes CO_2-e). The total greenhouse gas emissions value for the 2022/23 NGER period is similar to the 91,680 tonnes CO_2-e for the previous NGER reporting period.

Table 18 Greenhouse Gas Emissions during 2022/2023 NGER period

Scope 1 Emissions (tCO_2-e)		Scope 2 Emissions (tCO_2-e)	Total Emissions (tCO_2-e)
CO_2	CH_4		
6,718	82,139	2,972	**91,866**

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.

Dartbrook Operations continues to explore feasible controls to reduce greenhouse gas emissions in the future. Further details will be provided in the next revision of the AQGGMP.

6.15 PUBLIC SAFETY

6.15.1 Environmental Management and Performance

Dartbrook 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.

The security measures implemented at Dartbrook include:

- 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
- 24-hr attendance by .

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

Current security measures 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 as 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 D**.

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 11.6 megalitres (ML) of potable water was sourced from the Aberdeen town water supply during the reporting period. Approximately 11.9 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**.

For most of the care and maintenance phase, water that accumulated in the Hunter Tunnel was pumped to the Wynn seam goaf for storage. These pumping volumes are monitored, thereby providing a reasonable estimate of inflows to the Hunter Tunnel. Previous experience has indicated that seepage into the Hunter Tunnel is typically in the order of 180 ML/year. For licensing purposes, this passive take is assumed to be from the Hunter River alluvial water source.

In late 2020, a weir was installed in the Hunter Tunnel and dewatering was discontinued. As a result, there has been significant accumulation of water in recent years. As part of the program to recommence mining operations, the weir was removed in 2023 and an extensive pumping schedule was implemented to dewater the tunnel. The volume of water pumped out of the Hunter Tunnel in 2023 is not representative of the annual take, as this volume included water accumulated from previous years.

WAL18210 permits the taking of up to 235 ML/year from the Hunter River alluvial water source. Although the actual take from this water source was unable to be monitored in 2023, long-term data indicates that Hunter Tunnel inflows will not exceed 235 ML/year.

Groundwater seepage to the Wynn and Kayuga Seam workings was estimated by the groundwater assessment undertaken for MOD7. This assessment determined that total inflow to the completed mine workings is less than 20 ML/year (AGE, 2018).

7.1.3 Sewage

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

Table 19 Dartbrook Mine Water Take

Water Licence	Water Sharing Plan	Water Source	Entitlement	2023 Water Take
WAL 18210	*Hunter River Unregulated and Alluvial Water Sources 2022*	Hunter River alluvial water source	235	180 *
WAL 30213		Dartbrook water source	105	11.9
WAL 41524	*North Coast Fractured and Porous Rock Groundwater Sources 2016*	Sydney Basin – North Coast water source	150	20**

** Estimated based on previous monitoring*
***Inflow rates predicted by the MOD7 groundwater assessment (AGE, 2018)*

7.1.4 Surface Water Dams

As explained in **Section 6.2.2**, below average rainfall was experienced during the 2023 reporting period. As a result, there was a decrease in dam storage volumes from the 2022 reporting period (see **Table 20**), which was a relatively wet year.

Table 20 Dartbrook Mine Stored Water Summary

Storage	Location	Volume Held (ML)		
		End of Previous Period Dec 2022	End of Period Dec 2023	Storage Capacity
Clean Water				
Clean Water Dam 1	East Site	10,000	4,000	10,000
Clean Water Dam 2	East Site	7,100	4,500	10,000
Clean Water Dam 3	East Site	10,000	0	10,000
Southern Clean Water Dam	East Site	21,200	0	53,000
Dirty Water (runoff)				
Sediment Dam 1	West Site	1,000	1,000	1,000
Sediment Dam 2	West Site	232	0	400
Northern Dam REA	East Site	2,300	920	2,300
Southern Dam REA	East Site	8,000	0	8,000
Stage 4 REA Dam	East Site	7,742	0	7,900
Mine Water				
SDD	West Site	300,000	182,700	400,000
Western Holding Dam	West Site	5,390	6,930	15,400
Eastern Holding Dam	East Site	69,520	44,000	88,000
Evaporation Ponds	West Site	128,040	79,200	132,000
Wynn Seam Goaf	Underground	~3,446,000	~3,520,000	>4,356,000

Hunter River Salinity Trading Scheme

Dartbrook Mine did not discharge under the HRSTS during the reporting period.

Groundwater

The main groundwater management task during the reporting period was the dewatering of the Hunter Tunnel to facilitate its refurbishment. Accumulated water in the Hunter Tunnel was pumped to the Wynn Seam Goaf for storage or to surface dams for evaporation.

Site Inventory

During the reporting period, the total dam storage decreased from 570.5 ML to 323.3 ML whilst the estimated storage in the Wynn Seam goaf increased from 3,446 ML to 3,520 ML. Therefore, the total site inventory decreased from approximately 4,017 ML to 3,843 ML during the reporting period. This change is consistent with the below average rainfall experienced during the reporting period.

Table 21 Estimated Dartbrook Mine Water Balance

Component	2023 Volumes (ML)
Inputs	
Fresh Water (Blairmore bore)	11.9
Groundwater Seepage In (including Hunter Tunnel)	200
Rainfall Runoff	30
Recycled to CHPP from Tailings & Storage (not included in total)	0
Imported Potable (Aberdeen)	11.6
Total Inputs	253.5
Outputs	
Groundwater Seepage Out	68
Water Use	207
Evaporation (mine water)	129
Entrained in Process Waste	0
Discharged (HRSTS)	0
Potable Usage	23.5
Total Outputs	427.5
Net Change in Total Storage	-174

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.

Dartbrook Operations 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 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; and
- Any concerns or complaints from surrounding landholders regarding groundwater matters, and any ensuing actions, which are to be recorded and be available to the Department of Climate Change, Energy, the Environment and Water (DCCEEW)-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.

The Site Water Management Plan was updated in preparation for the recommencement of mining operations. Details of the groundwater bores currently included in the groundwater monitoring program are provided in **Table 22**.

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**.

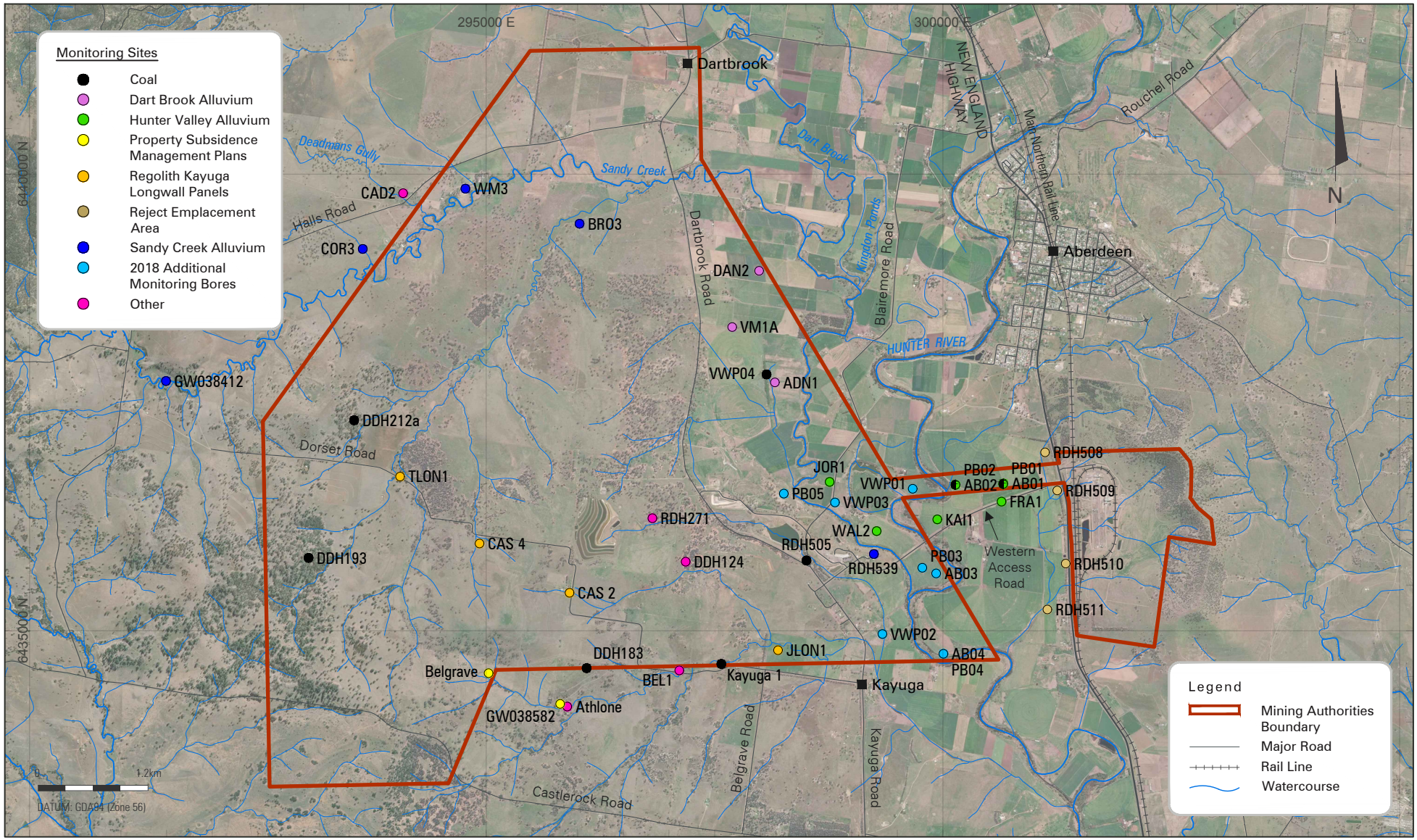
Table 22 Groundwater Monitoring Bores

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.
KAl1	Well			
WAL2	Well			
Dart Brook Alluvium Monitoring Bores				
ADN1	Well		Monitor water levels and quality within the Dart Brook alluvium.	Water depth, pH and EC are monitored on a

Bore	Bore Type	Aquifer Monitored	Details	Parameter / Frequency
DAN2	Well	Dart Brook alluvium	These bores are located between the underground mining area and the Hunter River alluvium.	quarterly basis. Additional parameter suite is monitored every six months.
WM1A	Bore			
Sandy Creek Alluvium Monitoring Bores				
COR3	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.
WM3	Bore			
GW038412	Well			
Coal Seam Monitoring Bores				
Kayuga1	Bore	Kayuga Seam	Monitor the Kayuga and Wynn Seam aquifers.	Water depth, pH and EC are monitored on a quarterly basis. Additional parameter suite is monitored every six months.
DDH183	Bore			
DDH193	Bore			
DDH212a	Bore	Wynn Seam		
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			Water depth, pH and EC are monitored on a

Bore	Bore Type	Aquifer Monitored	Details	Parameter / Frequency
GW038582	Bore	Regolith – shallow overburden	Located on private properties near the southern extent of the site.	quarterly basis. Additional parameter suite is monitored every six months.
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			
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.



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DARTBROOK MINE

DARTBROOK

JAMES BAILEY & ASSOCIATES
Environmental and Planning Consultants

Groundwater Monitoring Locations

FIGURE 11

7.2.2 Cumulative Rainfall Departure

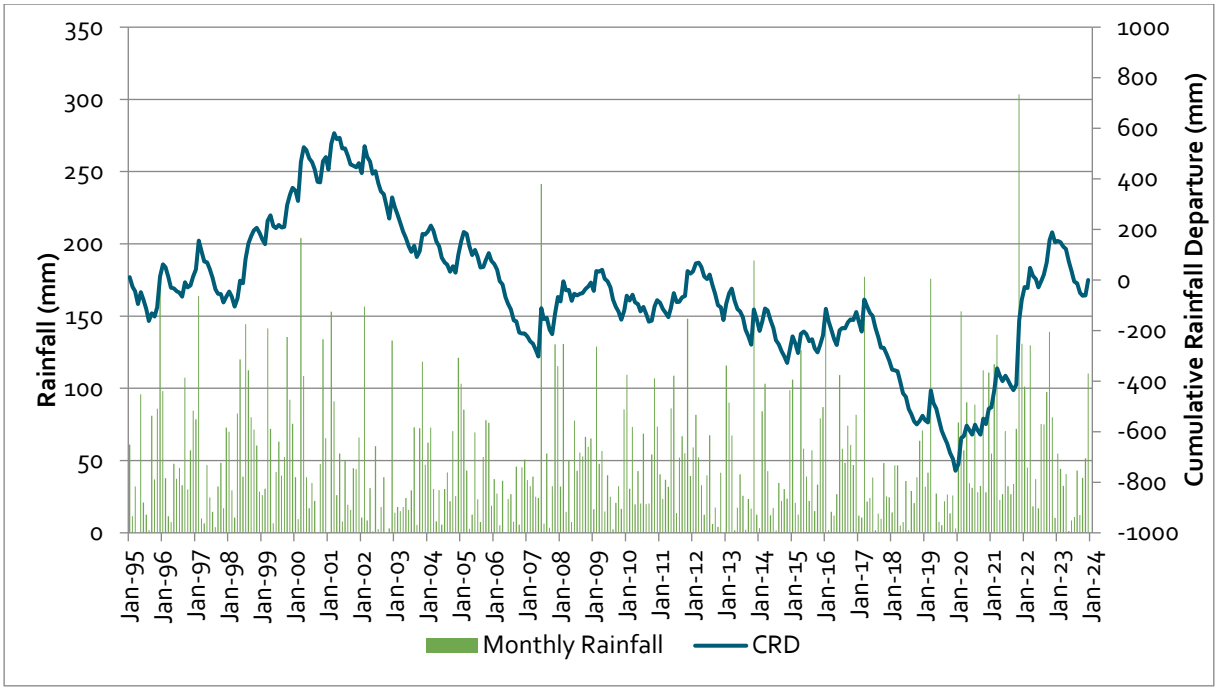
Groundwater levels in relatively shallow wells or bores constructed in alluvium are generally highly dependent on rainfall recharge and can rise or decline quite rapidly in response to rainfall events.

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

Monthly rainfall data for 2023 was sourced from Met-02, with the exception of March for which the data was sourced from the BOM's Scone Airport station. This data was added to the long-term rainfall dataset to calculate the CRD (shown in **Figure 12**).

As reported in **Section 6.2**, Dartbrook experienced below average rainfall in 2023, as reflected by the declining 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 FRA1, KAI1 and WAL2. KAI1, FRA1 and WAL2 recorded slightly lower water levels when compared to the previous reporting period. This trend is consistent with the below average rainfall experienced during the year.

No water level measurements for the Hunter River alluvium monitoring bores exceeded the water level trigger values 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 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 trigger values under the SWMP.

FRA1, KAI1 and WAL2 exhibited differing EC trends over the reporting period. FRA1 exhibited a minor rise in EC compared to the previous reporting period, but these values remained within the historic range for the bore. WAL2 recorded decreasing EC values but remained within the historic range for the bore. KAI1 recorded an EC value of 1,608 µS/cm in January. This represents a new maximum value and an exceedance of the stage 2 trigger (960 µS/cm) for this bore. EC values at KAI1 returned to its typical range for the remainder of the reporting period.

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 a decline in water levels compared to the previous reporting period. These trends are consistent with the below average rainfall experienced during the reporting period. Water levels at DAN2, WM1A and ADN1 remained within their historical ranges.

No water level measurements for the Dart Brook alluvium monitoring bores exceeded the trigger values 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. There were no exceedances of the pH trigger values in the SWMP.

The EC values recorded at DAN2 in January and April were above the stage 1 trigger value (2,736 µS/cm) for this bore. Given that the stage 1 trigger value was exceeded on two consecutive monitoring rounds, an investigation will be conducted as required by the SWMP. Results of investigations into trigger exceedances will included in the routine monitoring reports to be published on the Dartbrook website. EC values at ADN1 were within the historical range for the bore. WM1A recorded declining EC values during the reporting period, including values lower than its historic range.

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 and GW038412. These bores have historically exhibited wide variability in their water levels.

During the reporting period, bores COR3, GW038412 and WM3 recorded decreases in water level compared to the last reporting period. This observation is consistent with the below average rainfall experienced during the previous reporting period. Water levels for these bores remained within their historical ranges.

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 and GW038412.

Bores COR3, WM3 and GWO38412 all recorded similar pH values to the previous reporting period. There were no exceedances of the trigger values for pH.

The Sandy Creek alluvium bores have historically exhibited large variations in EC (see Graph E-9 in **Appendix E**). EC values at COR3 remained similar to the previous reporting period. EC values at GW038412 increased relative to the previous reporting period, but remained within the bore's historical range. WM3 experienced an overall decline in EC values over the reporting period. The EC measurements at WM3 in July and October were below the previous historical range for this bore. There were no exceedances of the trigger values 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).

RDH505 recorded a consistent decline in water levels during the reporting period, consistent with the below average rainfall conditions. All water level measurements during the reporting period were within the historical range for the bore. There were no exceedances of the water level triggers specified in the SWMP.

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 the bore's 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.

Kayuga 1 recorded a minor decline in water levels from the relatively high level recorded in October 2022. Water levels at Kayuga 1 remained well above the average level for this bore, but within the historical range. Water levels at bore DDH183 were higher than the typical range for the bore. However, there was no data from the previous reporting period to compare these levels to. Based on the CRD, it is inferred that water levels in Kayuga1 and DDH183 increased significantly in 2022 due to the very wet conditions, and that 2023 represented a slow recession back to the typical levels for these bores. The SWMP only specifies trigger values for low water levels, as high water levels are generally not an environmental concern. As such, the relatively high water levels observed during the reporting period do not exceed any trigger values.

Bores DDH193 and DDH212a were unable to be accessed during the monitoring period. Dartbrook Operations 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 have previously recorded substantial deviations in pH. During the reporting period, pH values at Kayuga 1 increased to 7.7 and 7.6 in July and October, respectively. These values exceeded the upper limit trigger (pH = 7.2) for this bore. Given that the trigger value was exceeded on two consecutive monitoring rounds, an investigation will be undertaken as required by the SWMP and reporting on the Dartbrook website. Bore DDH183 exhibited similar pH values to the previously reporting period. The trigger values for DDH183 were not exceeded.

The coal seam monitoring bores have previously recorded large fluctuations in EC. The EC values recorded at Kayuga 1 in January, July and October were well below the long-term average for this bore but within the historical range. Bore DDH183 also recorded EC values below the long-term average but within the historical range. There were no exceedances of the EC trigger values in the SWMP.

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.

Due to the very wet conditions in 2022, water levels at the beginning of the reporting period were relatively high compared to historical trends. The water level at TLON1 in January (1.36 mbgl) represents a new historical maximum for this bore. Water levels declined during the reporting period but remained relatively high compared to the long-term averages for these bores.

CAS2 recorded a minor increase in water levels during the reporting period, whereas water levels at CAS4 remained relatively static.

There were no exceedances of the water level triggers 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.

The 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 levels at JLON1 and TLON1 also remained relatively stable during the reporting period. There were no exceedances of the trigger values for pH.

CAS2, CAS4 and TLON1 have historically exhibited large variability in EC. Bore CAS2 recorded relatively stable EC values during the reporting period with minor decreases experienced in July and October. The CAS4 bore exhibited decreasing values across the reporting period, but remained within the bore's historical range. There were no exceedances of the EC trigger values at these bores.

TLON1 recorded decreasing EC values during the reporting period, including values below the previous historical range. These lower EC values do not represent a negative environmental outcome.

JLON1 recorded increasing 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. These bores recorded declining water levels during the reporting period. However, due to the relatively high levels observed during the previous reporting period, water levels remained above the long-term averages. Bore RDH508 was unable to be sampled during the reporting period.

Water Quality

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

The pH levels for these bores generally range from slightly acidic to slightly alkaline (pH 6.5 to 8.0). The pH values for the REA monitoring bores were relatively stable, except for RDH509 which recorded pH values above the upper pH trigger value of 7.5 in January and March. Due to these exceedances occurring in consecutive monitoring rounds, an investigation will be conducted as required by the SWMP.

The REA monitoring bores have historically exhibited large variability in EC. RDH509 and RDH511 recorded increasing EC levels compared to the previous year, but these values remained within those bores' historical ranges. RDH510 exhibited a decrease in EC, with values falling outside of the historical range.

There were no exceedances of the EC 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 bore GW038582 and Belgrave.

The data recorded at Belgrave during the reporting period was the first data collected at this location since 2018. Water levels at Belgrave have significantly increased compared to the 2018 water levels. These water levels are above the historical average, which is attributable to multiple years of above average rainfall after 2018. The pH monitoring at Belgrave returned similar values to the previous results. Belgrave exhibited lower EC values compared to the 2018 values, but these values remained within the historical range.

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, subsiding water levels during Care and Maintenance and the Construction phases were correlated with decreases in the CRD. In recent years, recorded water levels have correlated with very wet conditions in 2022, followed by drier conditions in 2023. 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. Since the cessation of longwall mining, groundwater levels have stabilised in bores CAS4, JLON1 and TLON1, albeit at a lower level than pre-mining conditions. Unlike the other regolith monitoring bores, the water level in CAS2 continued to decline for a considerable period after longwall mining. 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 in the regolith monitoring bores have risen significantly since 2022, coincident with the above average rainfall in recent years. The recovery in water levels has even been evident in bore CAS2, which had previously shown a consistent decline. The recent upward trend suggests that water levels in the regolith are still more strongly correlated with rainfall than the effects of previous longwall mining; and

- 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). Groundwater levels stabilised during care and maintenance, and due to the wet conditions in recent years, levels in Kayuga 1 and DDH183 almost recovered to levels observed prior to mining of the Kayuga Seam.

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 update of the SWMP in 2023 included changes to the groundwater monitoring network to reflect current land access arrangements. Dartbrook Operations also sought a variation to EPL 4885 to align the groundwater monitoring requirements with the latest approved SWMP. It is anticipated this variation will be approved in the next reporting period.

Groundwater monitoring will be undertaken in accordance with the approved SWMP and EPL 4885 (subject to the pending variation).

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. 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 along 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 disturbed areas at the East Site 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 storage is maintained at 50 – 70%.

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.

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. There were no exceedances of the water quality triggers under the SWMP.

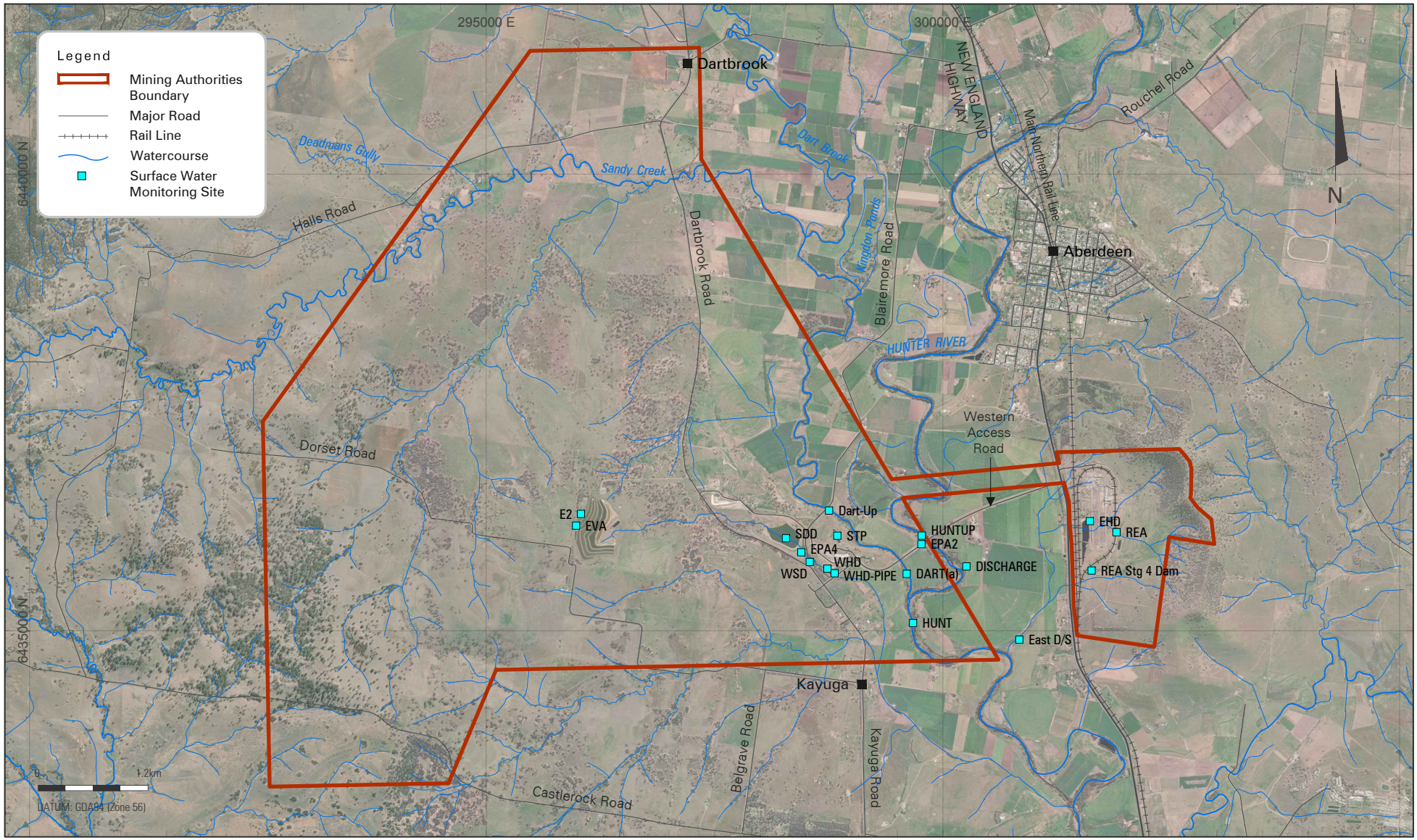
Appendix F also presents water quality data for the on-site dams and storages. The water quality in surface storages generally reflects the quality of the dewatered groundwater or of surface runoff that has concentrated due to evaporation. All storages were operated to maximise the evaporation potential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

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

Site	EC Range (µS/cm)	pH Range
Hunter River Upstream	373 – 779	7.6 – 8.5
Hunter River Downstream	266 – 785	7.62 – 8.3
Dart Brook Upstream	1,169– 2,750	8.0 – 8.2
Dart Brook Downstream	1,732– 3,030	7.9 – 8.1

7.3.3 Next Reporting Period

Water management at Dartbrook will continue to be undertaken in accordance with the SWMP, which has been updated to reflect operational water management (rather than care and maintenance).



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

DARTBROOK MINE

DARTBROOK

JAMES BAILEY & ASSOCIATES
Environmental and Planning Consultants

Surface Water Monitoring Locations

FIGURE 13

7.4 EROSION & SEDIMENT

7.4.1 Environmental Management

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

- 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, which was updated to reflect the change from the care and maintenance phase back to a construction phase.

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

No additional ground disturbance is anticipated to occur in the next reporting period. As such, the existing erosion and sediment controls will remain sufficient. The existing erosion and sediment control structures will continue to be maintained.

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. The active 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	%	18.61

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	99.65
Established Rehabilitation for Native Ecosystem Final Land Uses	0
Established Rehabilitation for Other/Non-Vegetated Final Land Uses	0.02

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 in 2022. 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. 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 continued 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 continued 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)

Grazing was re-introduced to the rehabilitated REA in 2023 for the purposes of managing bushfire fuel loads.

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

Dartbrook Mine maintains 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 Dartbrook website and provided to CCC members during meetings.

9.1.2 Complaints

No environmental complaints were received during the reporting period. In recent years, Dartbrook Mine received 2 complaints in 2019, no complaints in 2017, 2018, 2020 or 2021 and one complaint in 2022.

9.2 COMMUNITY LIAISON

9.2.1 Dartbrook Community Consultative Committee

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

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 2023 community representatives on the CCC were Arthur Mitchell, Annette Rahn, Tony Lonergan and Jennifer Lecky.

Dartbrook Mine held four meetings with the Community Consultative Committee (CCC) members in 2023 (March, June, September and December).

Table 28 lists the dates of meetings held during 2023 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
15/03/2023	The presentation described the activities that occurred since the previous meeting, including: • Groundwater monitoring network; • CHPP operation and noise attenuation; • Update on restart schedule; • 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: • Transport of windfarm components through Muswellbrook Shire; and • Recently published Hunter Regional Plan 2041.
14/06/2023	The presentation described the activities that occurred since the previous meeting, including: • Proposed noise monitoring program; • Update on restart schedule; • Conceptual plans for use of underground gas to improve water quality; • 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: • Transport of wind farm components; • Wanaruah Aboriginal Land Council update; and • Water storage capacity of the Wynn Seam goaf.
20/09/23	The presentation described the activities that occurred since the previous meeting, including: • Update on restart schedule; • Use of Dartbrook mine access road for wind farm components; • Bushfire management; • 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. This included: • Workforce size during mining.
20/12/23	The presentation described the activities that occurred since the previous meeting, including: • Update on restart schedule; • Use of Dartbrook mine access road for wind farm components; • Employment; • Environmental monitoring and results;

Date	Topics Discussed
	• Complaints and incidents; • Land management; and • Stakeholder consultation. Questions, comments and responses were received from representatives in relation to the presentation. These included: • Extension to mining beyond 2027; • Coal processing after recommencement of mining; • Construction of the Hunter Tunnel conveyor; • Water volumes in the Hunter Tunnel;

9.2.2 Community Participation

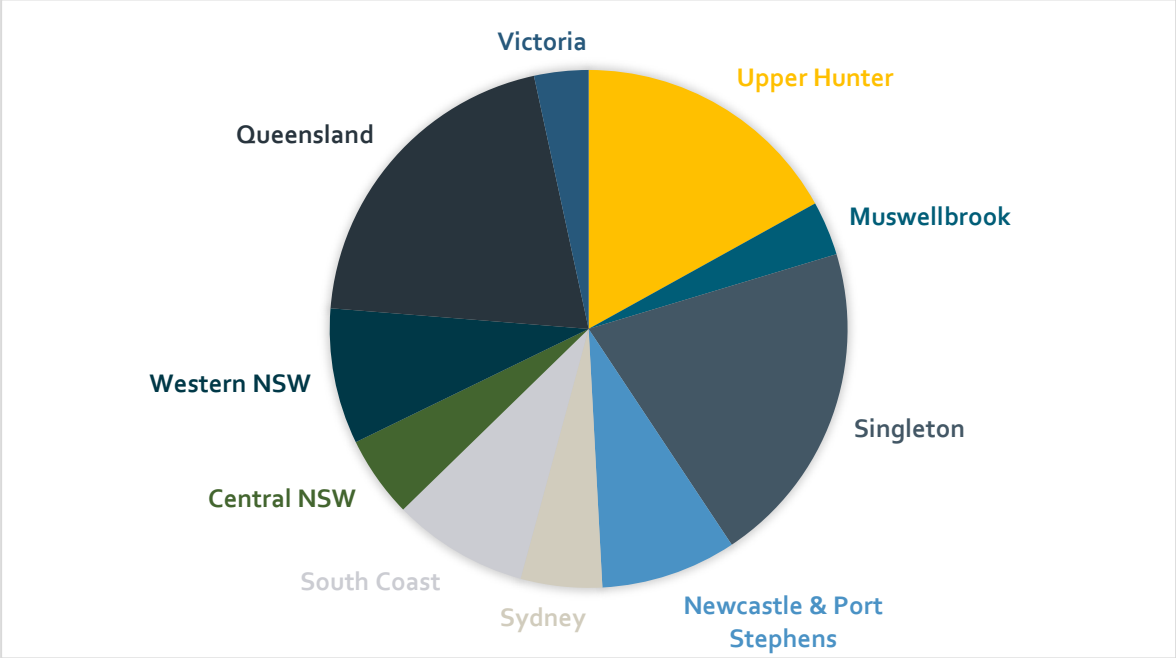
AQC continued to advertise its support and sponsorship of community-based programs and events on its website, at CCC meetings and in its regular community newsletters. AQC did not enter into any sponsorship arrangements during the reporting period. However, AQC continues to welcome sponsorship applications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

9.2.3 Workforce Characteristics

Dartbrook Mine currently maintains a workforce of 59 persons residing in the following areas (also see **Figure 14**):

- Muswellbrook (2);
- Upper Hunter (10)
- Singleton (12);
- Newcastle and Port Stephens (5);
- Sydney (3);
- South Coast NSW (5);
- Central NSW (3);
- Western NSW (5)
- Queensland (12) and
- Victoria (2)

Figure 14 **Breakdown of Current Workforce by Place of Residence**



10. INDEPENDENT ENVIRONMENTAL AUDIT

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. Mining is anticipated to recommence in the next reporting period, and the next IEA will be scheduled accordingly based on the recommencement date.

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 1**, the Hulbert HVAS was non-operational for part of the reporting period, which constituted a non-compliance with Condition 6.1(a) of DA 231-07-2000. No other environmental non-compliances occurred during the reporting period.

12. ACTIVITIES PROPOSED IN THE NEXT REPORTING PERIOD

Dartbrook's activities during the current reporting period were focused on preparing the site for recommencement of mining operations. Such activities included updates of the environmental management system, infrastructure works and building the workforce. It is anticipated that mining will recommence in the next reporting period.

Dartbrook Operations has updated all management plans that are required to be updated prior to recommencement of mining operations. The management actions in these plans will be implemented for future mining operations.

The activities proposed to be undertaken in 2024 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	• Further infrastructure upgrades and refurbishments to return the site to operating conditions; and • Commencement of mining in the Kayuga Seam.
Air Quality	• Further update of the AQGGMP to include additional detail on greenhouse gas management; and • Dust mitigation and monitoring activities will be employed in accordance with the AQGGMP.
Erosion and Sediment	• Water runoff from previously disturbed areas will continue to be directed into sediment dams.
Surface Water Management	• Water management and monitoring in accordance with the SWMP.
Groundwater Management	• Groundwater monitoring will be conducted in accordance with the SWMP.
Rehabilitation	• Ongoing monitoring of rehabilitation areas on site, with maintenance work as required.
Threatened Flora and Fauna	• Further disturbance (if required) 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 and pest controls will continue to be conducted within infrastructure areas (when required)
Visual / Stray Light	• Implementation of the additional plantings described in the Landscape and Lighting Management Plan. • Maintenance and improvement of the existing tree screens (as required).
Aboriginal Heritage	• The existing GDP system will continue to be implemented prior to further ground disturbance (if required).
European Heritage	• Ongoing maintenance of European heritage items will be conducted (where necessary)
Spontaneous Combustion	• REA thermocouple temperatures will continue to be monitored.

Area	Proposed Activity
Bushfire	• Fuel loads across the site will continue to be monitored and managed as required.
Mine Subsidence	• Future mining is not expected to result in perceptible 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

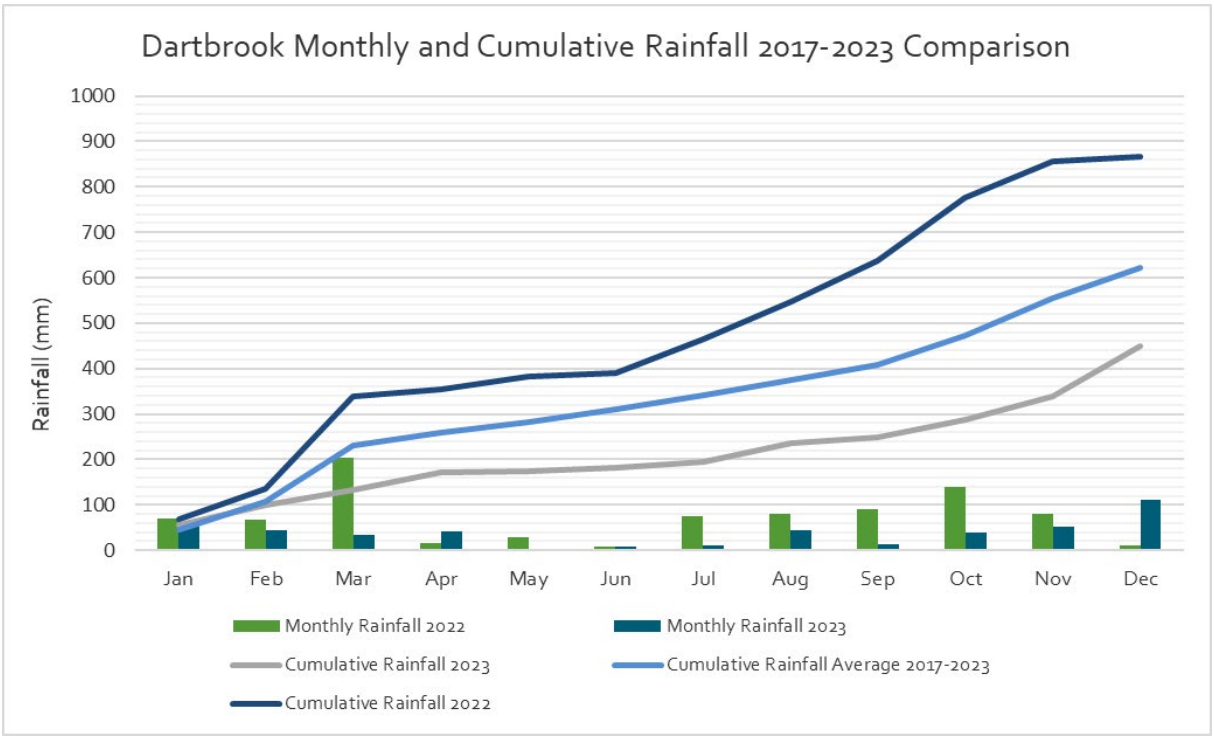
Abbreviation	Meaning
AQC	AQC Dartbrook Management Pty Limited
BC Act	*Biodiversity Conservation Act 2016*
BOM	Bureau of Meteorology
CCC	Community Consultative Committee
DCCC	Dartbrook Community Consultative Committee
CHPP	Coal Handling and Preparation Plant
CRD	Cumulative rainfall departure
CL	Coal Lease
DA	Development Application
°C	Degrees Celsius
DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
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

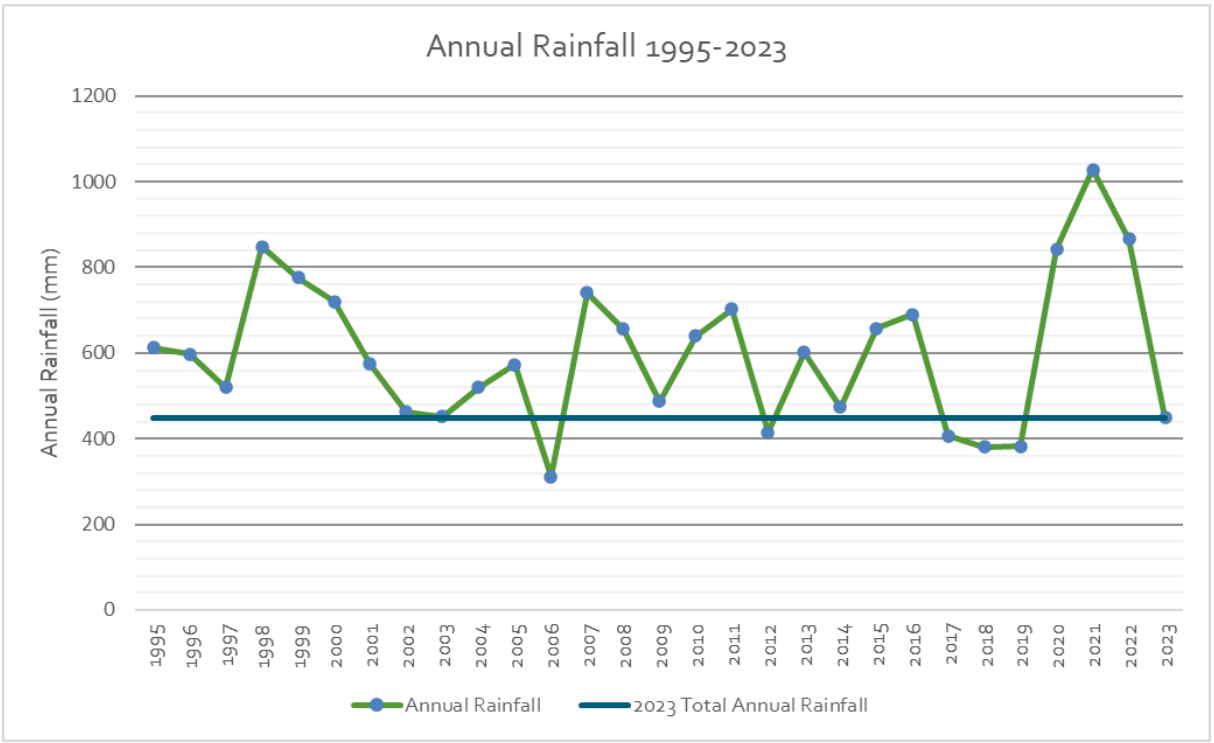
Abbreviation	Meaning
ML	megalitres
MEG	Regional NSW – Department of Mining, Exploration and Geoscience
Mining Act	*Mining Act 1992*
ML	Mining Lease
MSC	Muswellbrook Shire Council
Mtpa	Million tonnes per annum
NGER	National Greenhouse Energy Reporting
PM10	Particulate Matter less than 10 microns
REA	Reject 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 (2018), *Dartbrook Modification 7 Groundwater Assessment*.
- 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.*

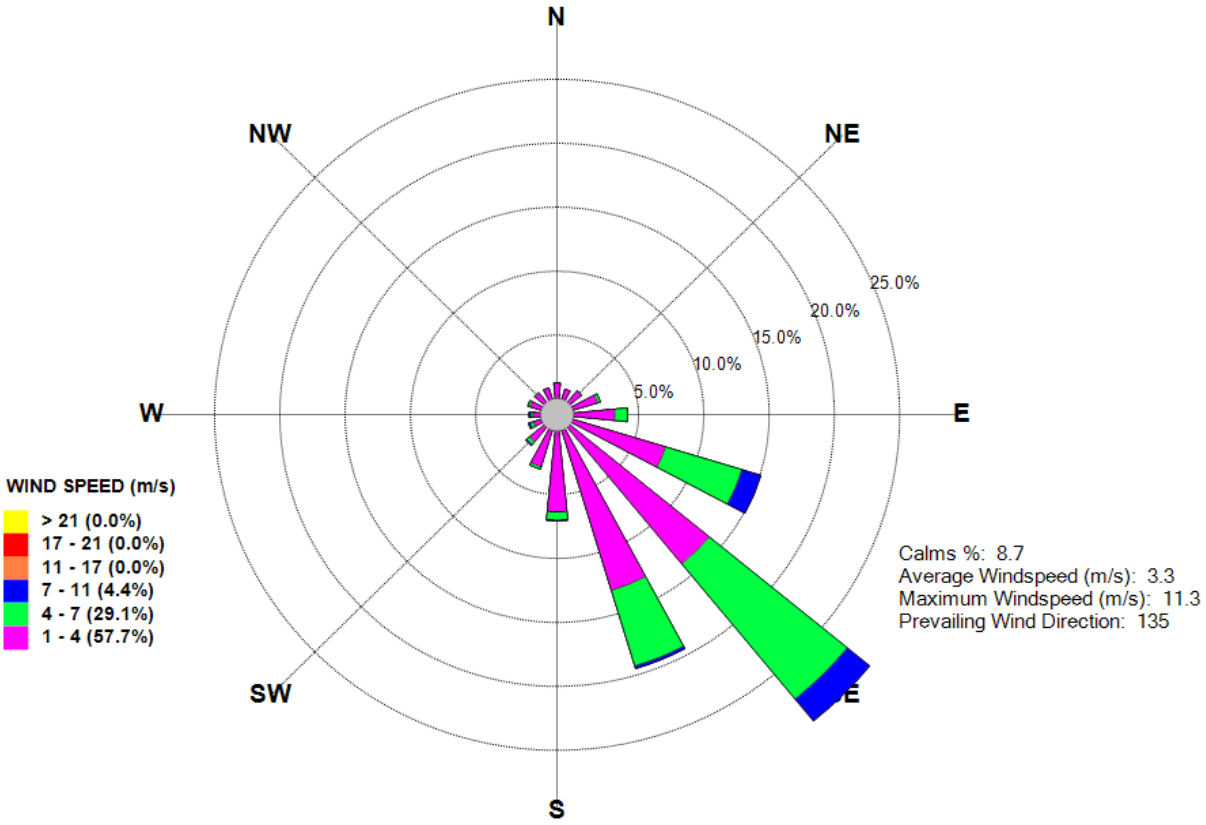
Appendix A
Meteorological Summary


Dartbrook Monthly and Cumulative Rainfall 2017-2023 Comparison
Rainfall (mm)
1000
900
800
700
600
500
400
300
200
100
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Monthly Rainfall 2022
Monthly Rainfall 2023
Cumulative Rainfall 2023
Cumulative Rainfall Average 2017-2023
Cumulative Rainfall 2022


Annual Rainfall 1995-2023
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
2023
Annual Rainfall
2023 Total Annual Rainfall

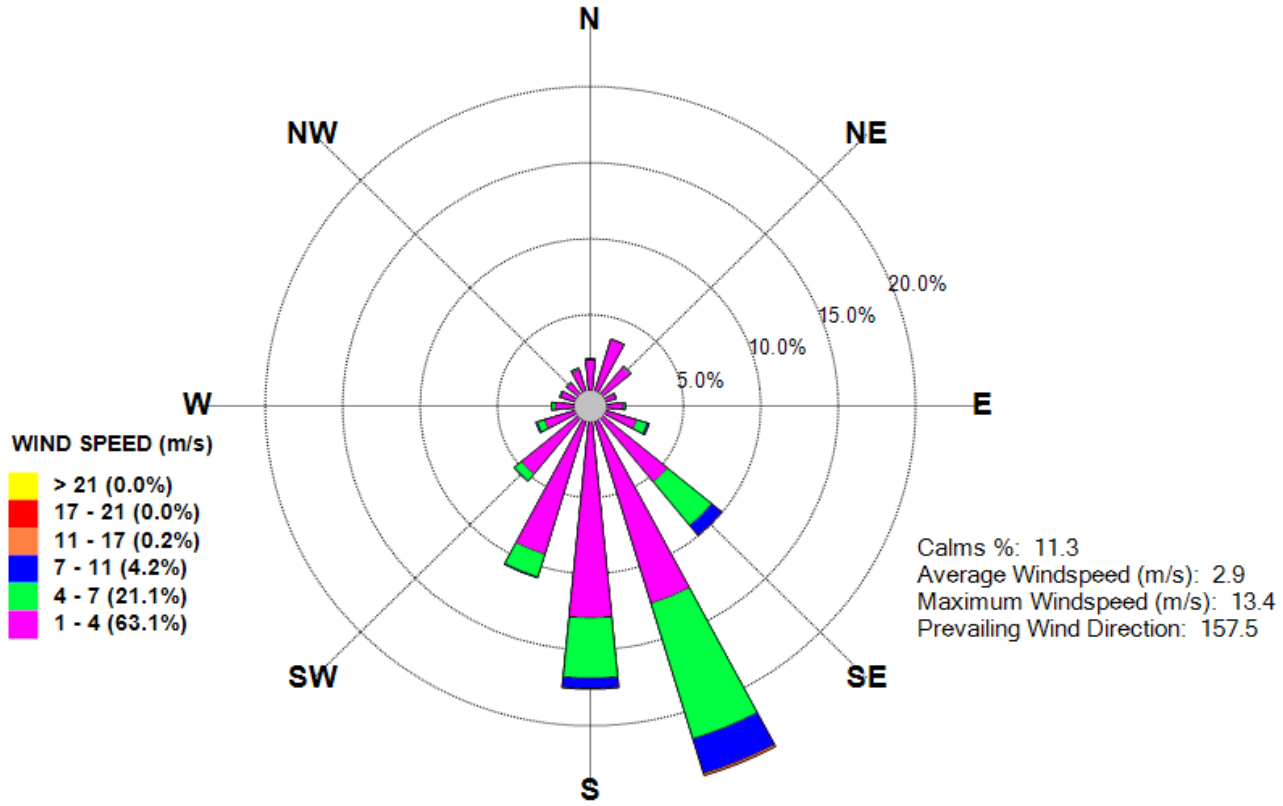
Dartbrook Met01 - Windrose

January 2023



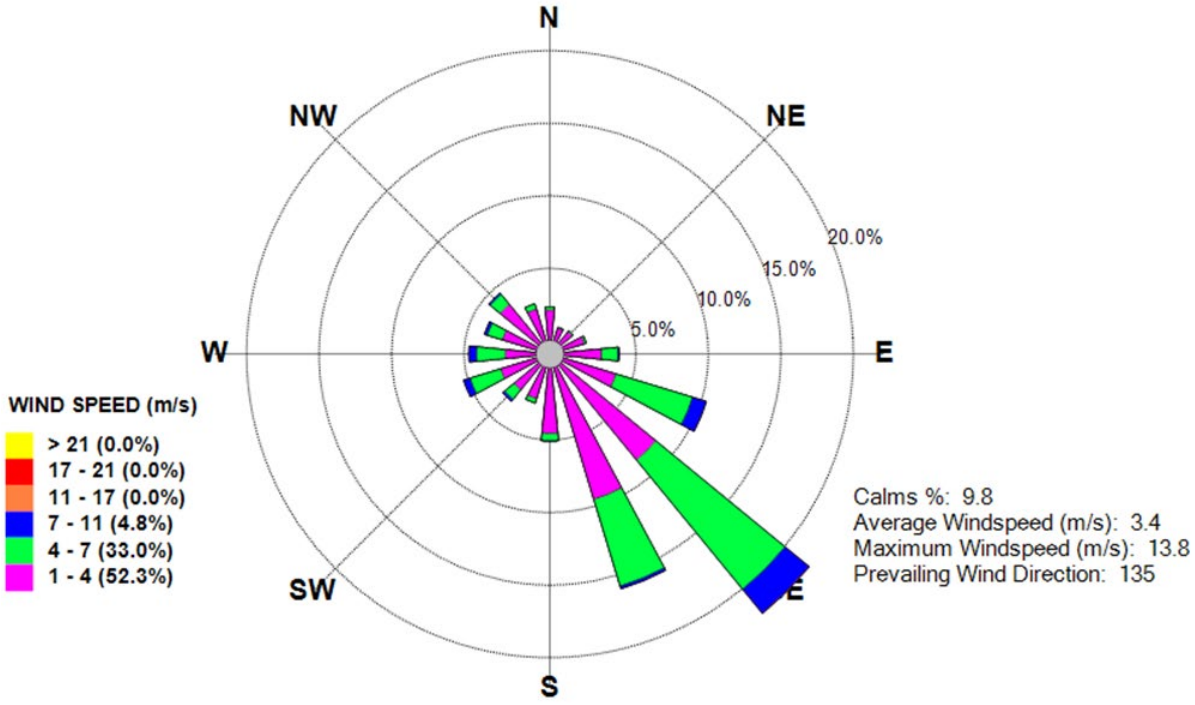
Dartbrook Met02 - Windrose

January 2023



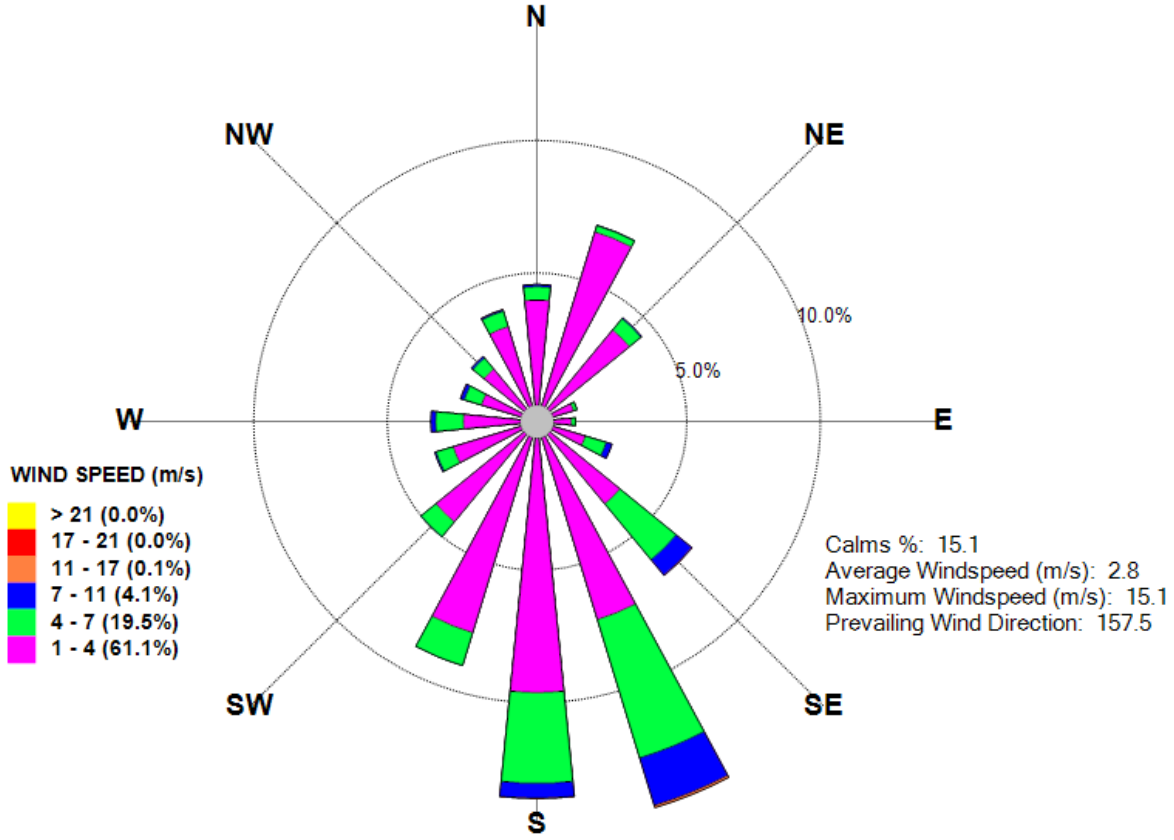
Dartbrook Met01 - Windrose

February 2023



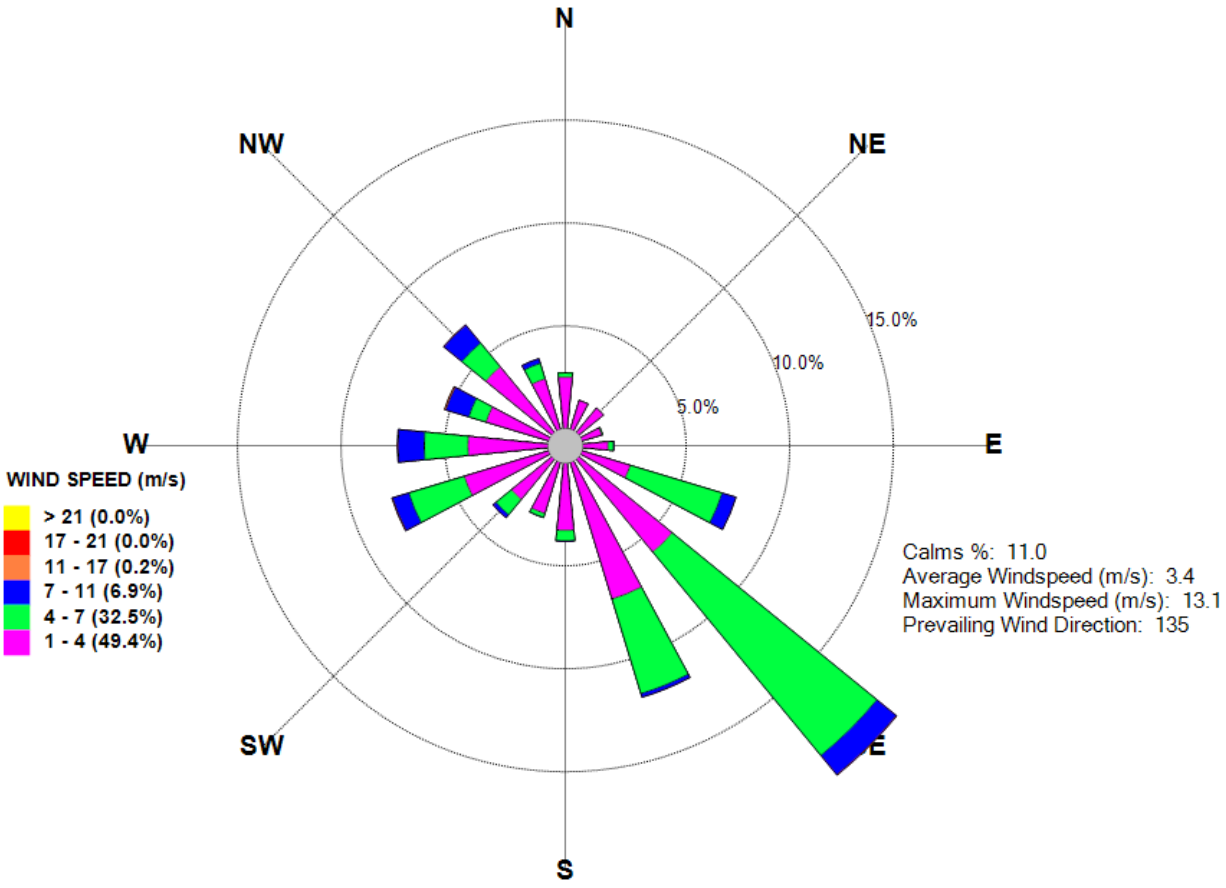
Dartbrook Met02 - Windrose

February 2023



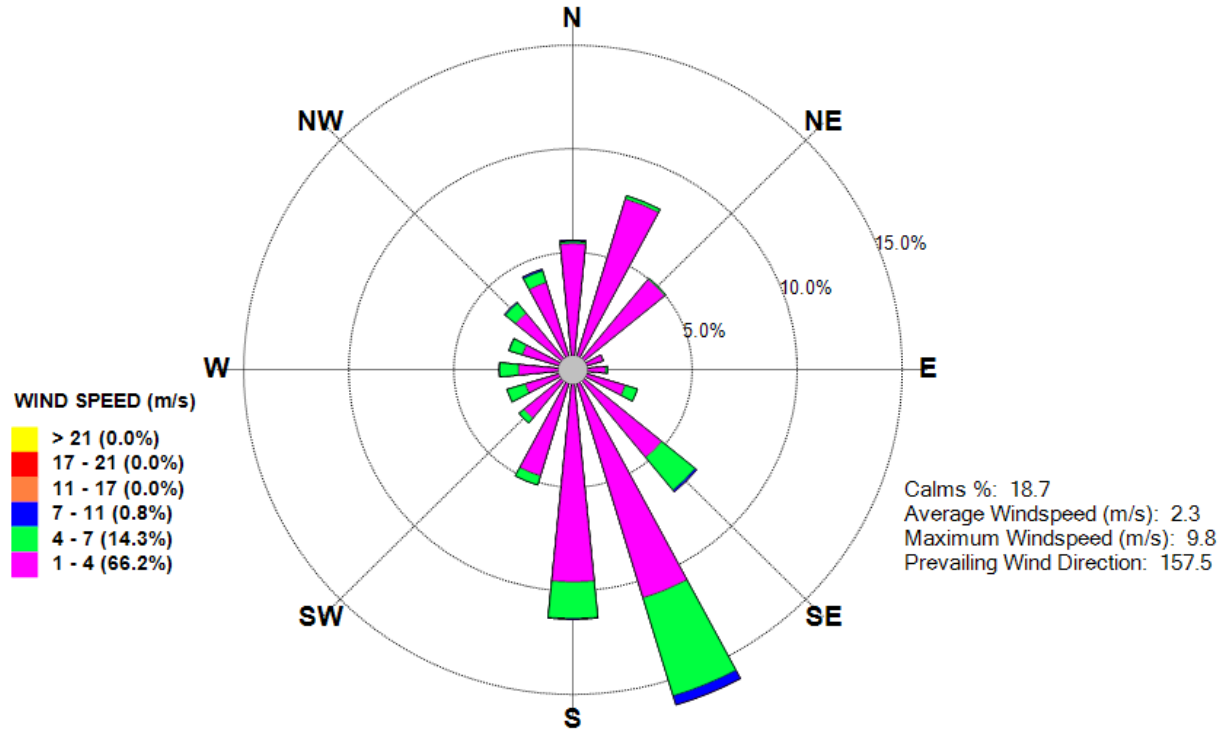
Dartbrook Met01 - Windrose

March 2023



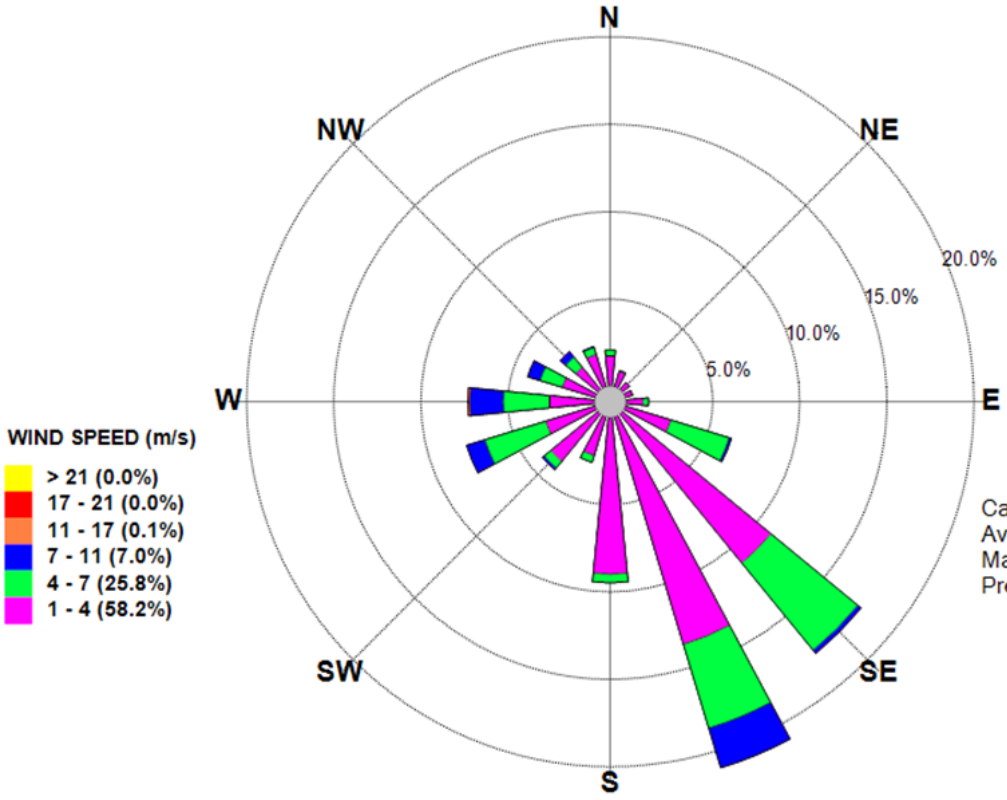
Dartbrook Met02 - Windrose

10 March 2023 to 31 March 2023



Dartbrook Met01 - Windrose

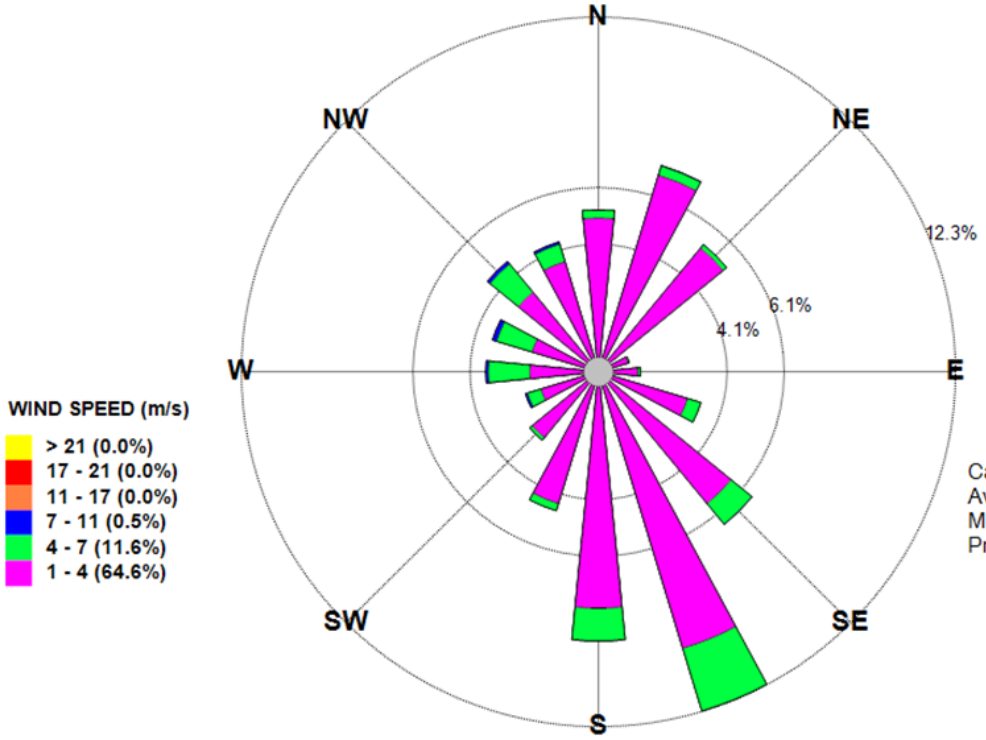
April 2023



Calms %: 8.8
Average Windspeed (m/s): 3.4
Maximum Windspeed (m/s): 12.1
Prevailing Wind Direction: 157.5

Dartbrook Met02 - Windrose

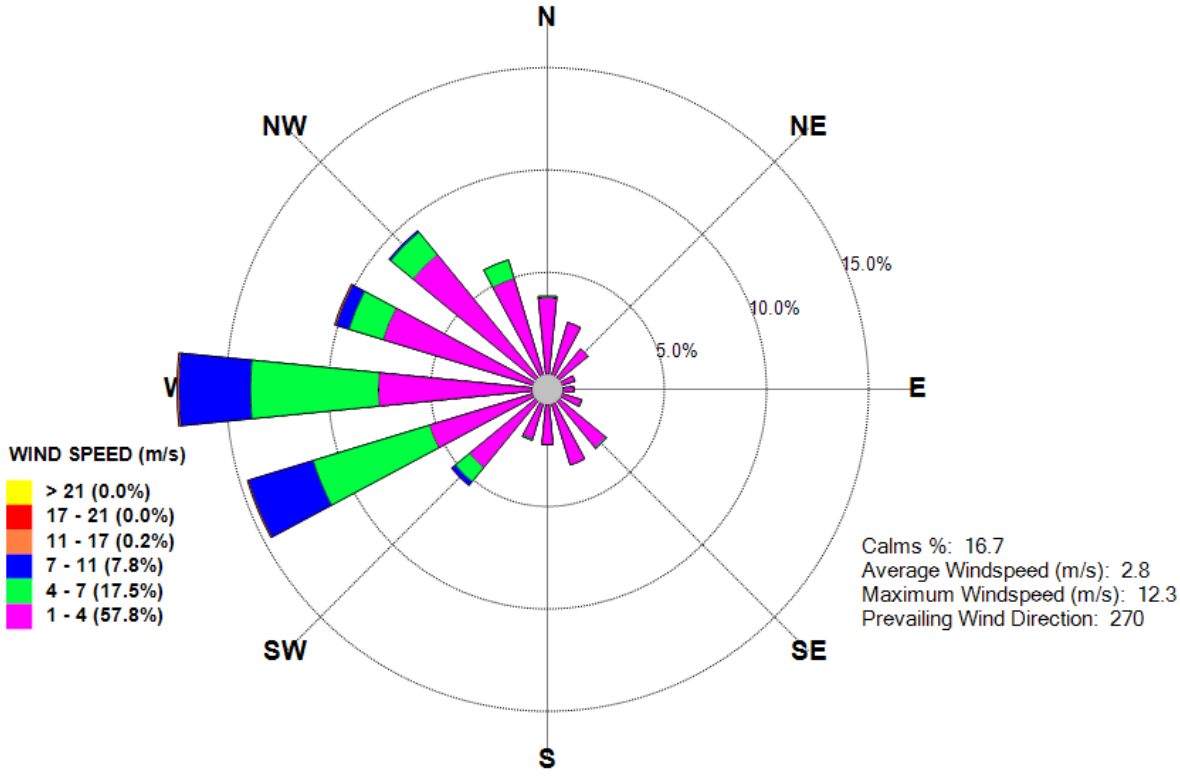
April 2023



Calms %: 23.3
Average Windspeed (m/s): 2.1
Maximum Windspeed (m/s): 8.4
Prevailing Wind Direction: 157.5

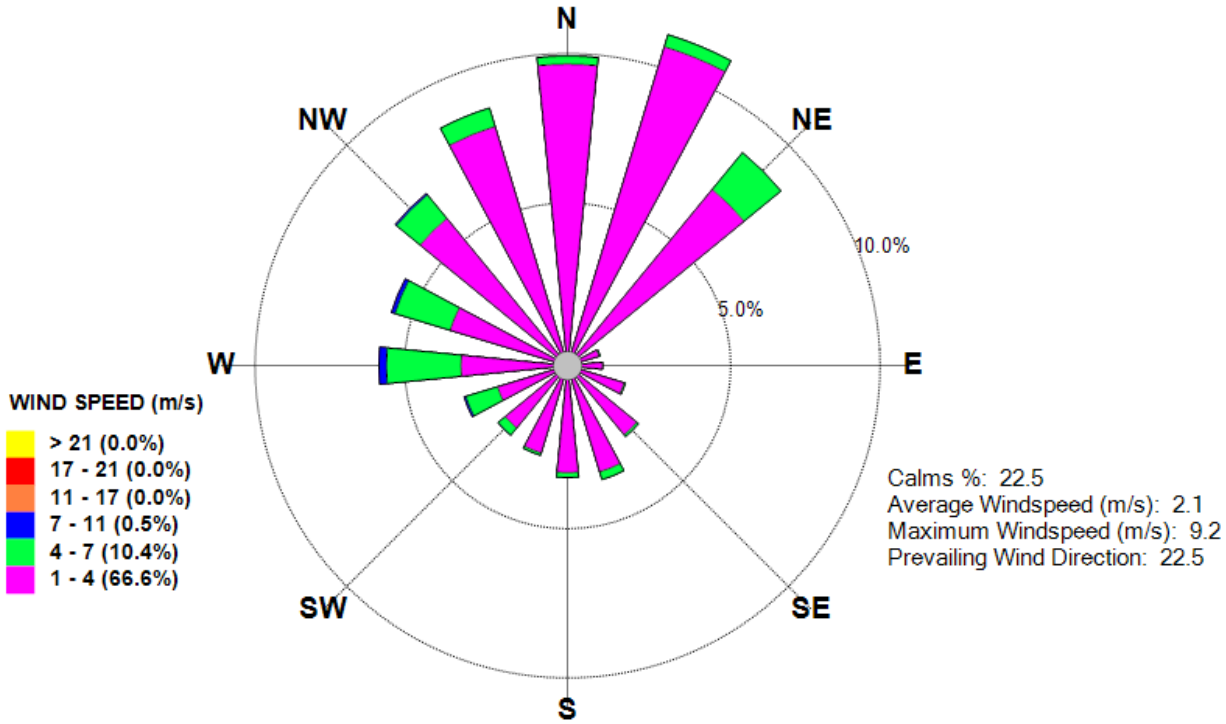
Dartbrook Met01 - Windrose

1 May 2023 to 13 May 2023, 23 May 2023 to 31 May 2023



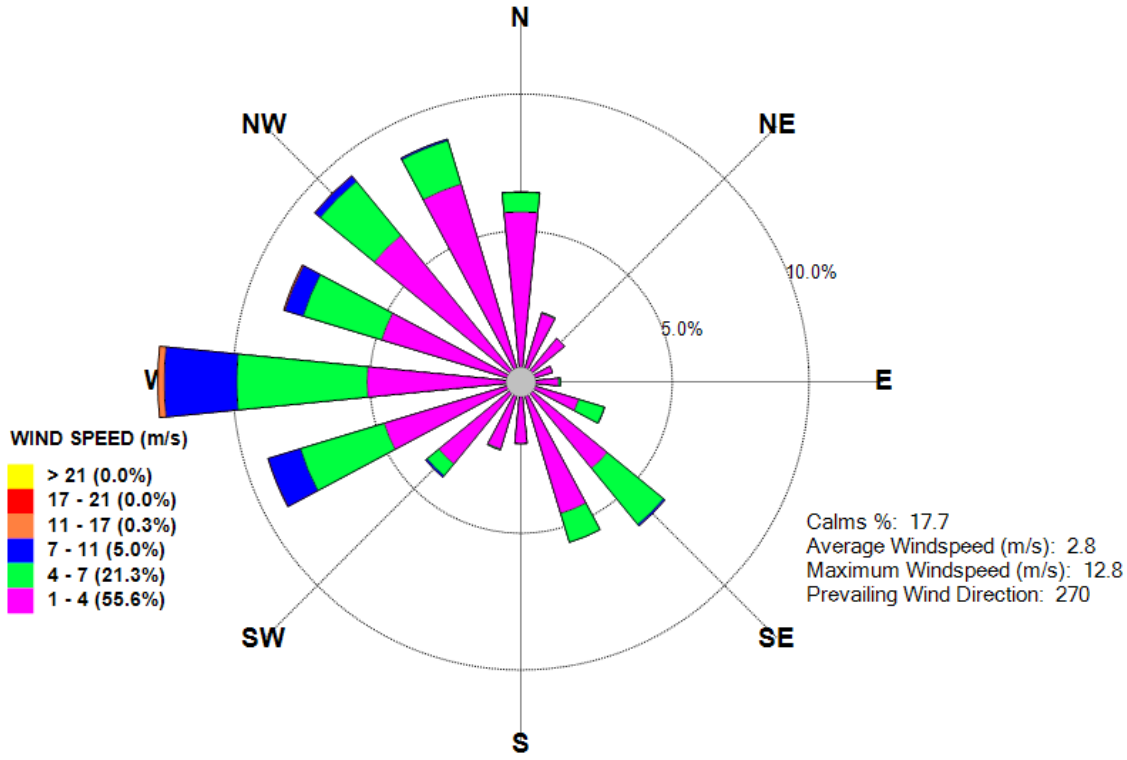
Dartbrook Met02 - Windrose

May 2023



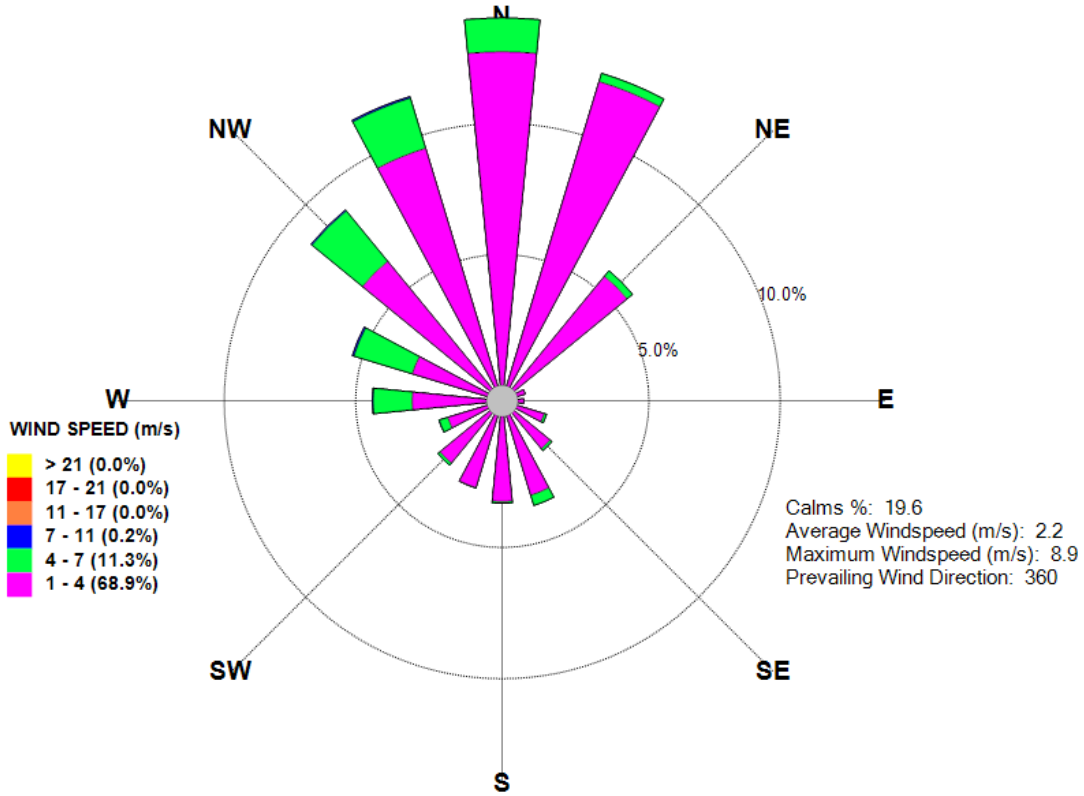
Dartbrook Met01 - Windrose

June 2023



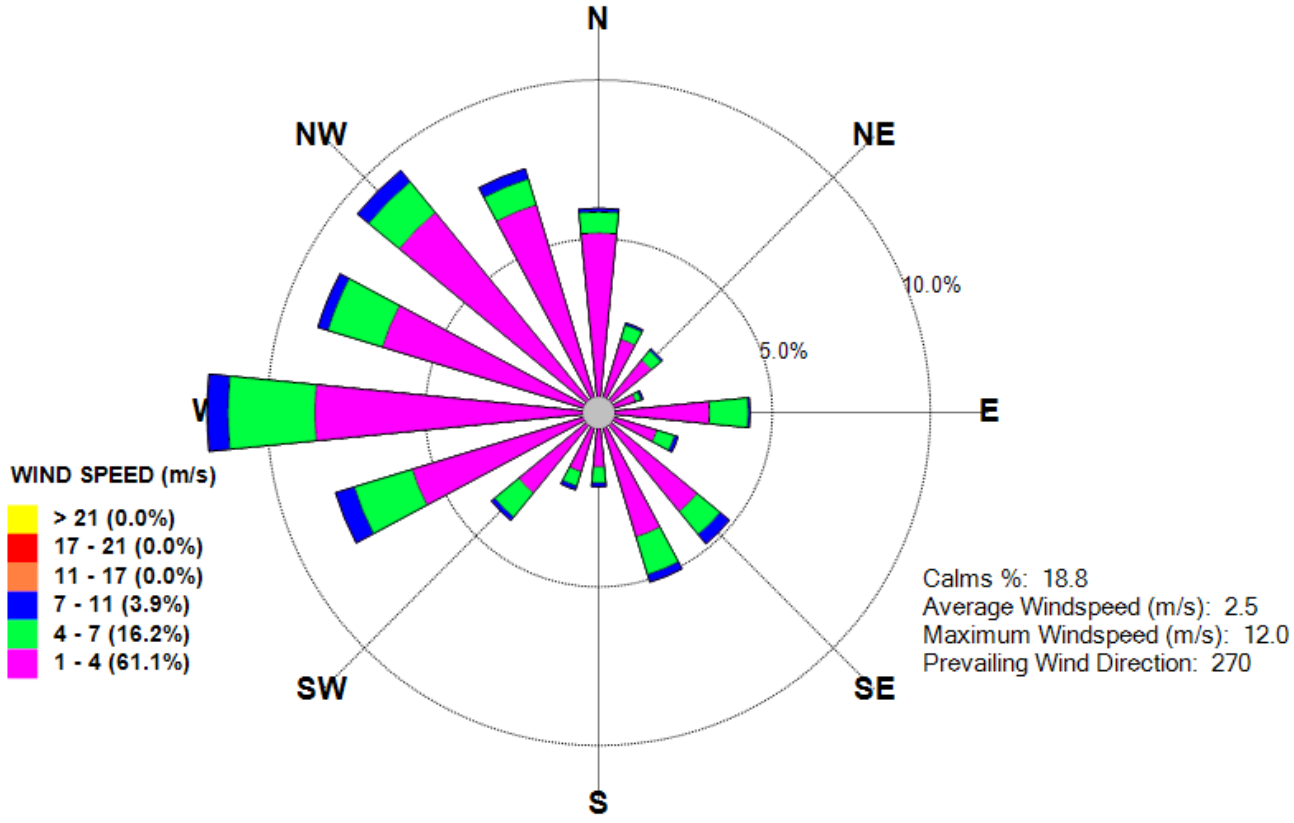
Dartbrook Met02 - Windrose

June 2023



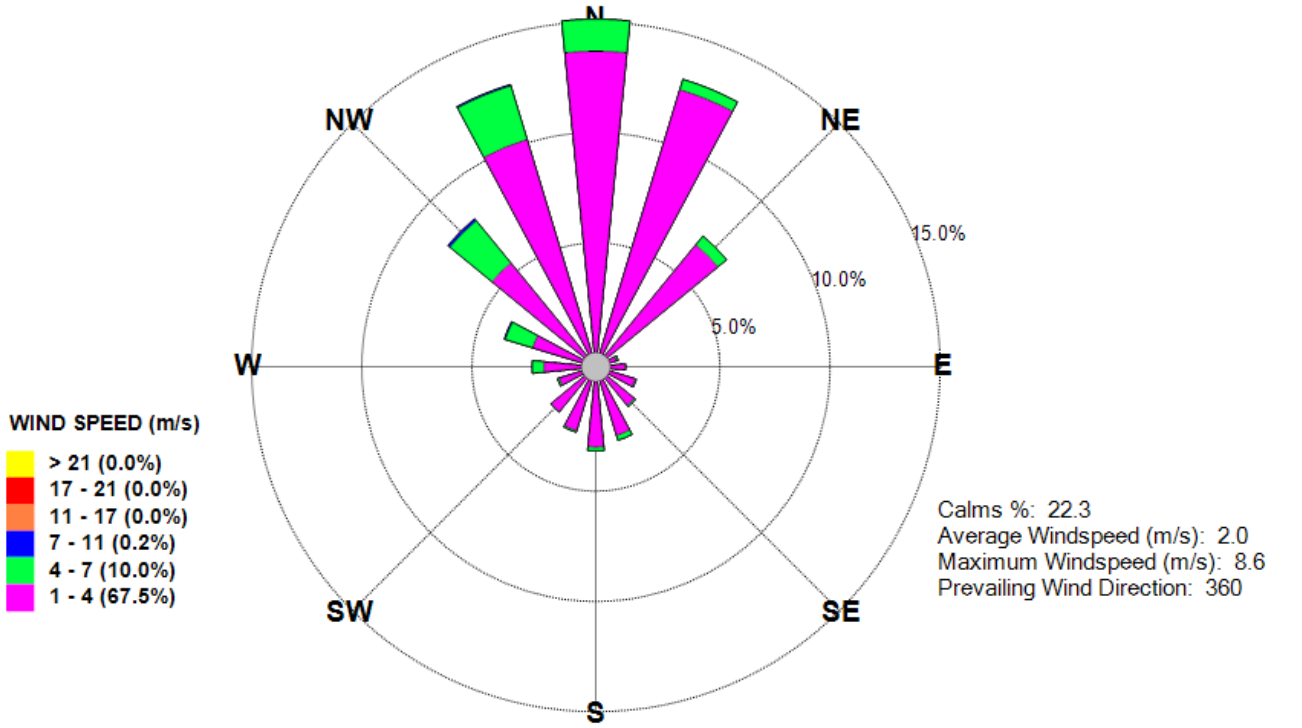
Dartbrook Met01 - Windrose

July 2023



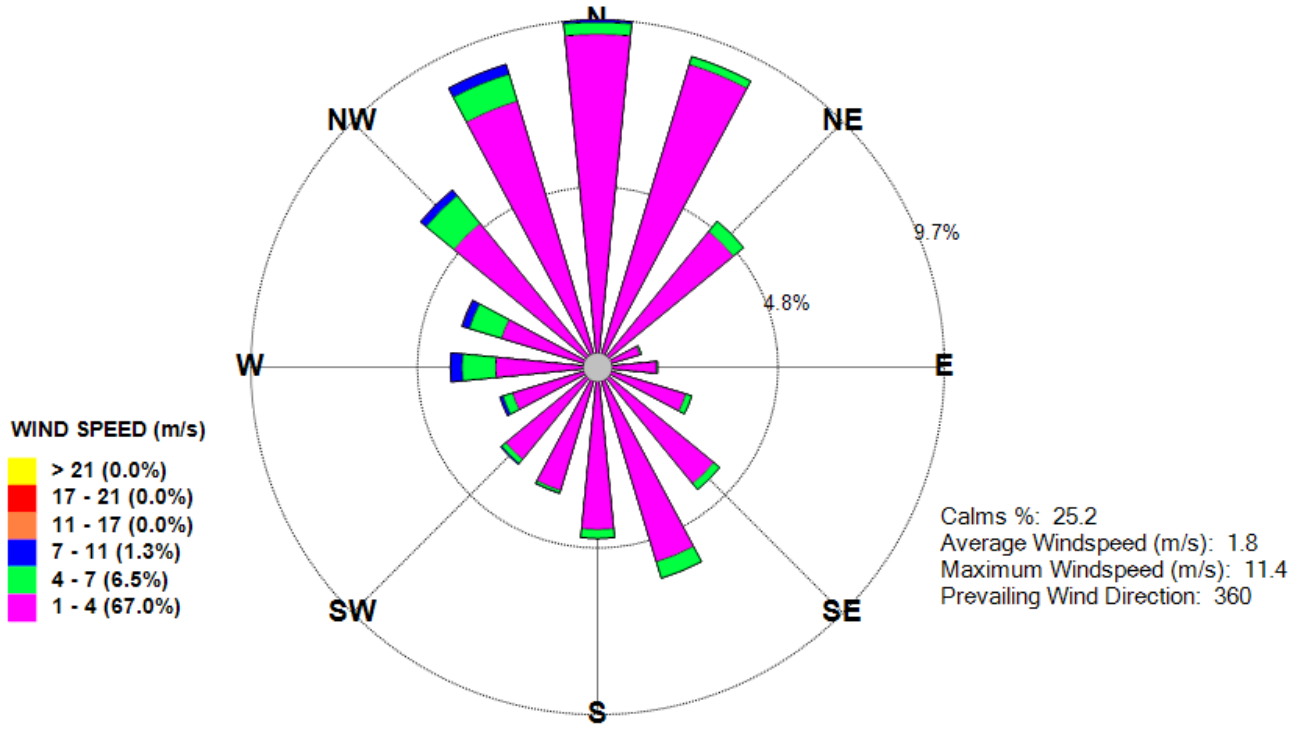
Dartbrook Met02 - Windrose

July 2023



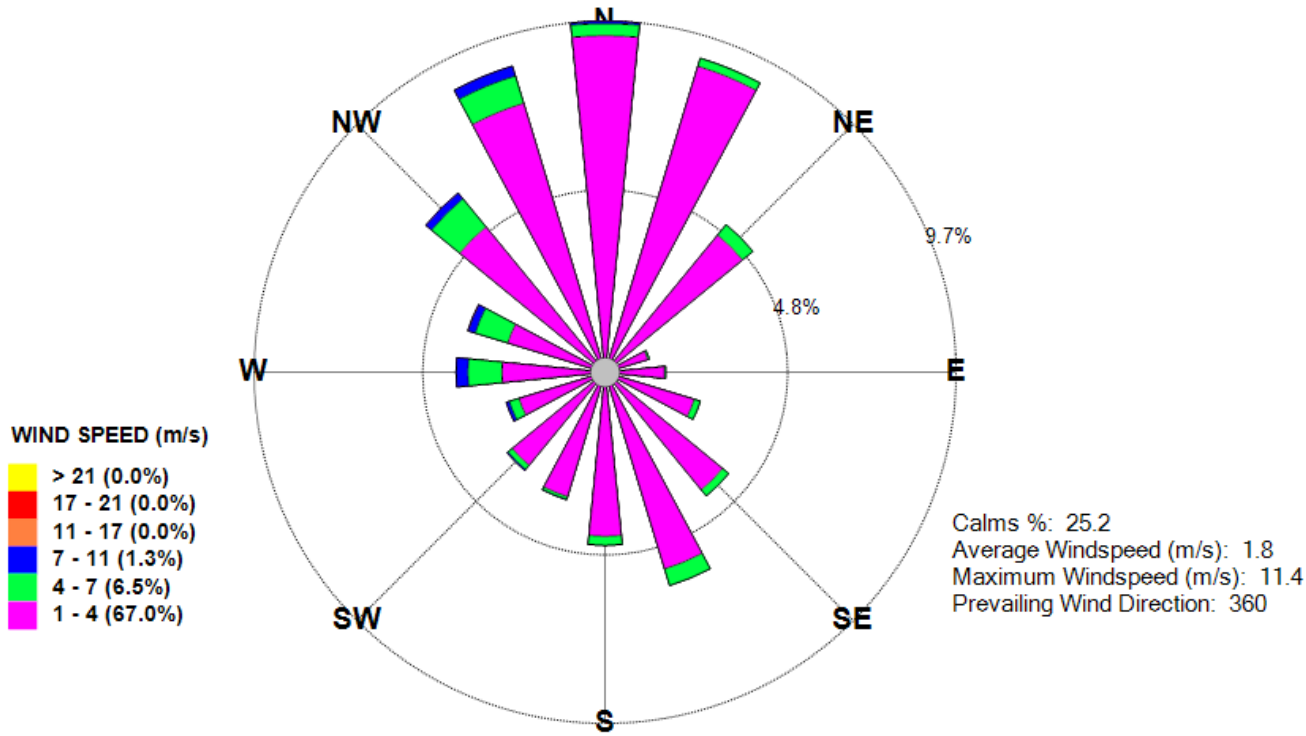
Dartbrook Met02 - Windrose

August 2023



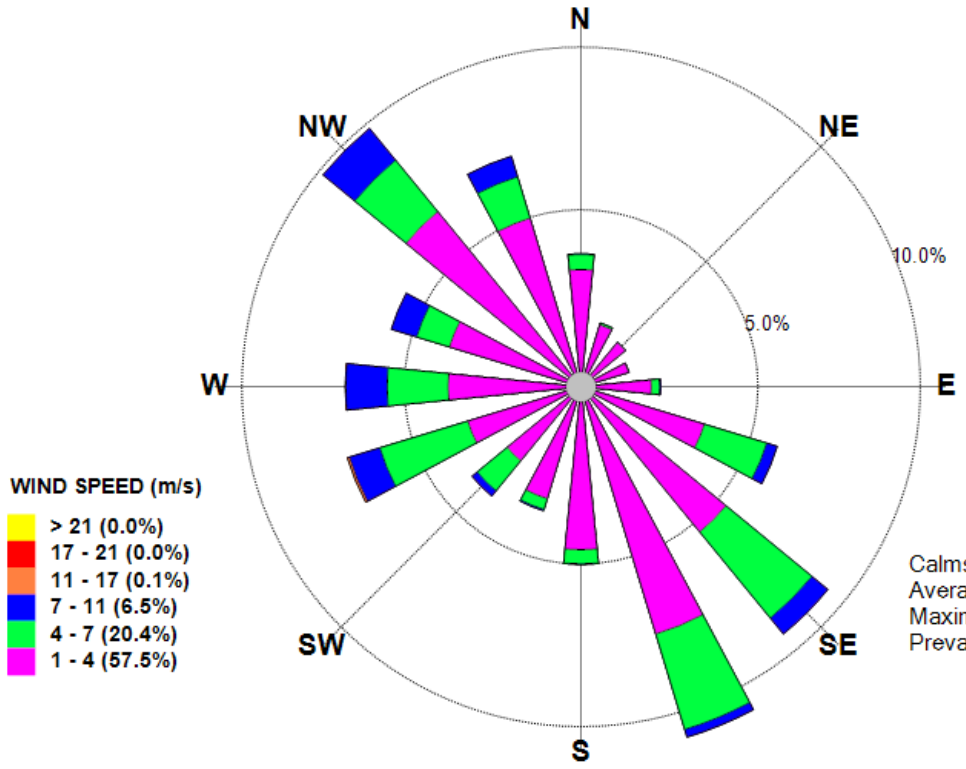
Dartbrook Met02 - Windrose

August 2023



Dartbrook Met01 - Windrose

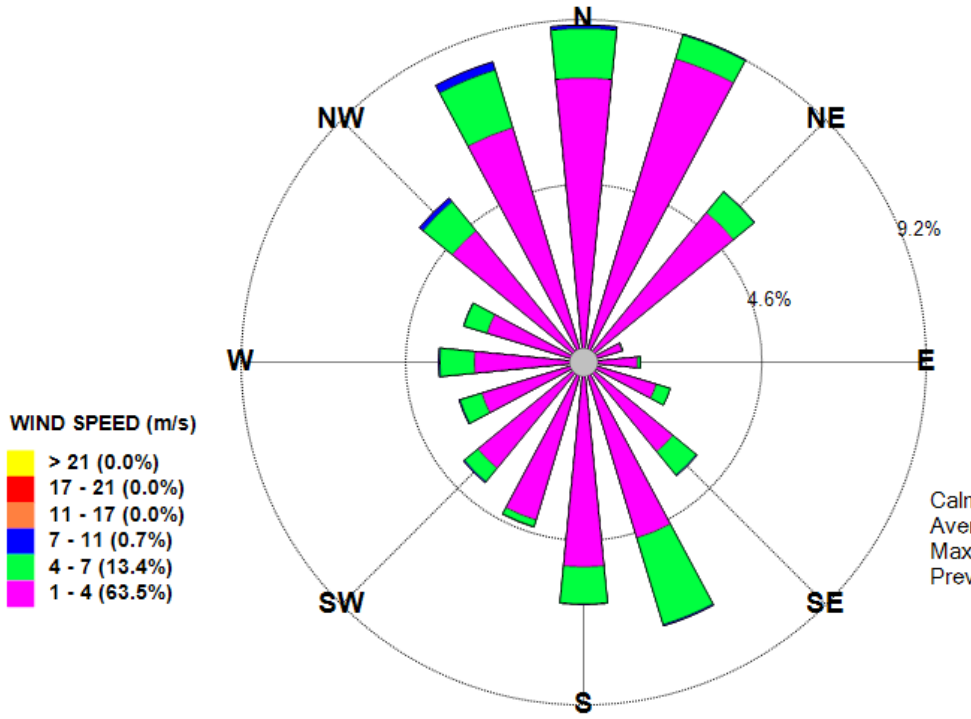
1 September 2023 to 27 September 2023



Calms %: 15.5
Average Windspeed (m/s): 2.9
Maximum Windspeed (m/s): 13.1
Prevailing Wind Direction: 157.5

Dartbrook Met02 - Windrose

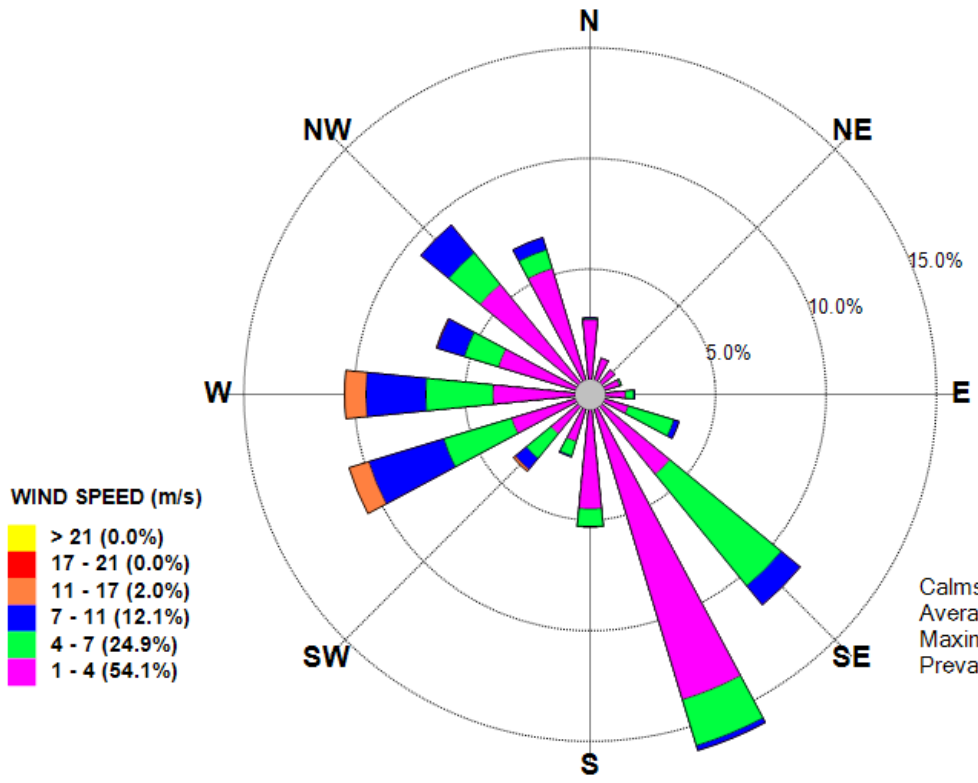
September 2023



Calms %: 22.4
Average Windspeed (m/s): 2.1
Maximum Windspeed (m/s): 11.3
Prevailing Wind Direction: 22.5

Dartbrook Met01 - Windrose

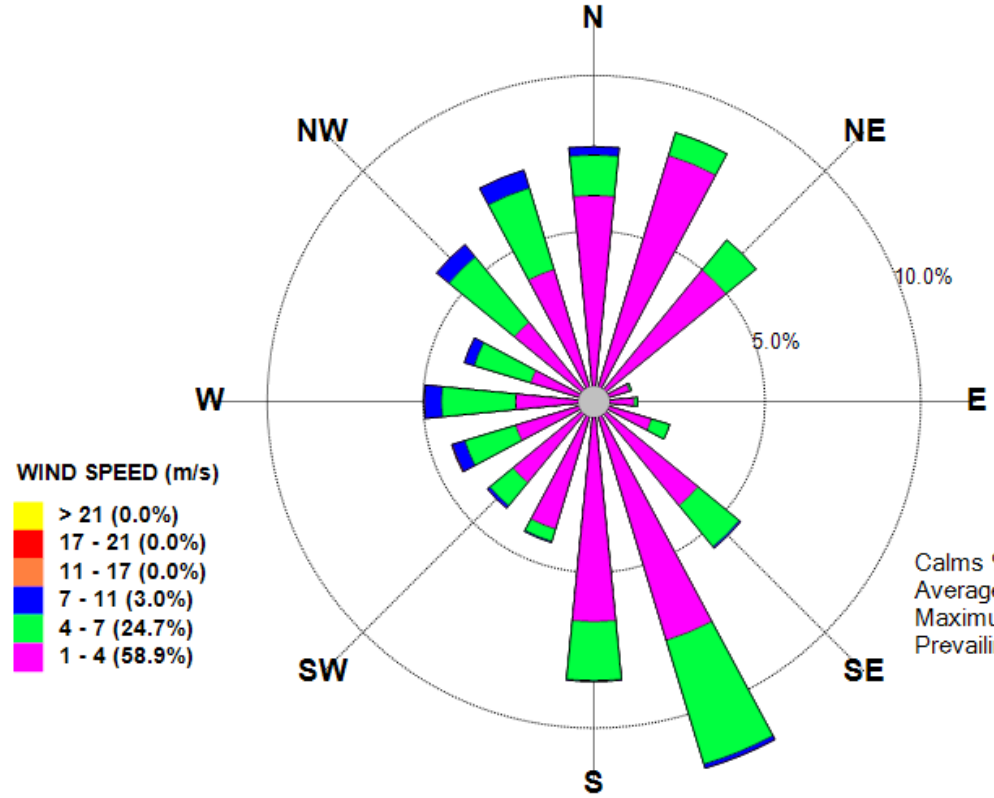
12 October 2023 to 31 October 2023



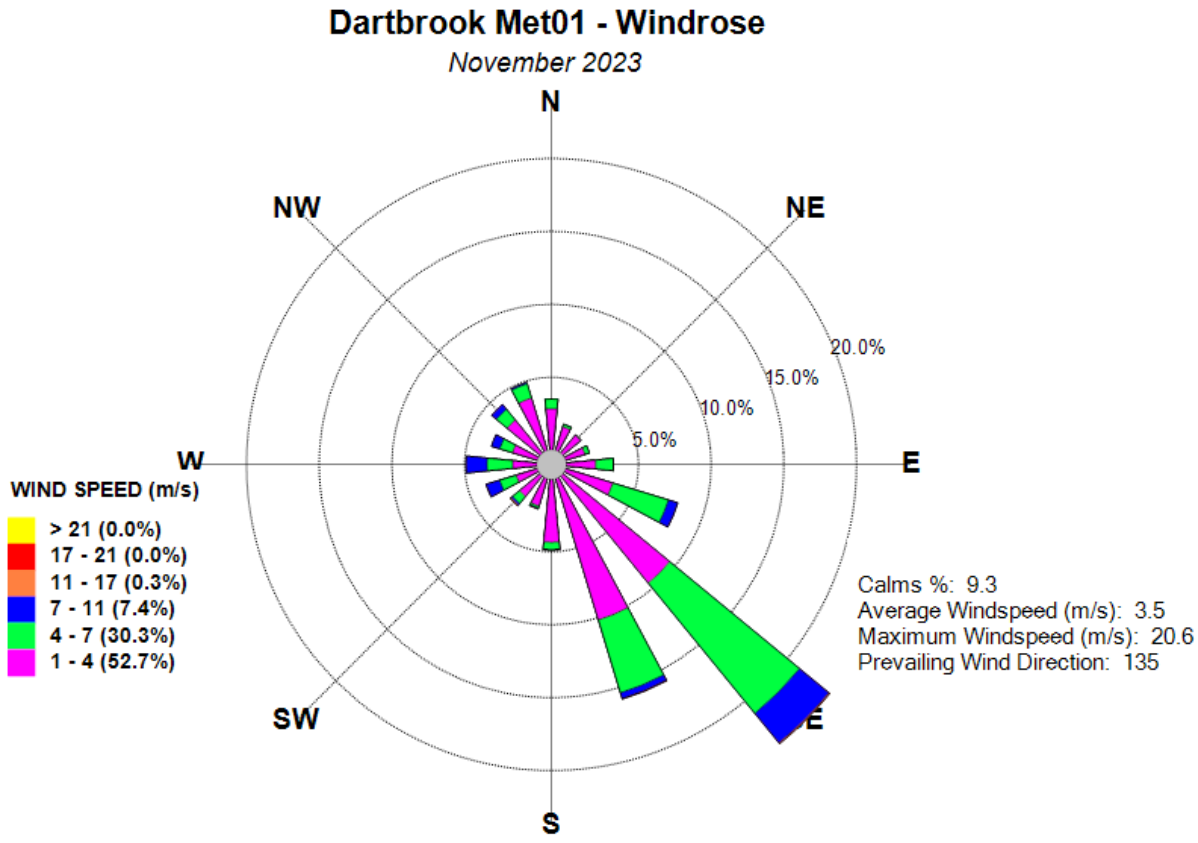
Calms %: 6.9
Average Windspeed (m/s): 4.0
Maximum Windspeed (m/s): 16.3
Prevailing Wind Direction: 157.5

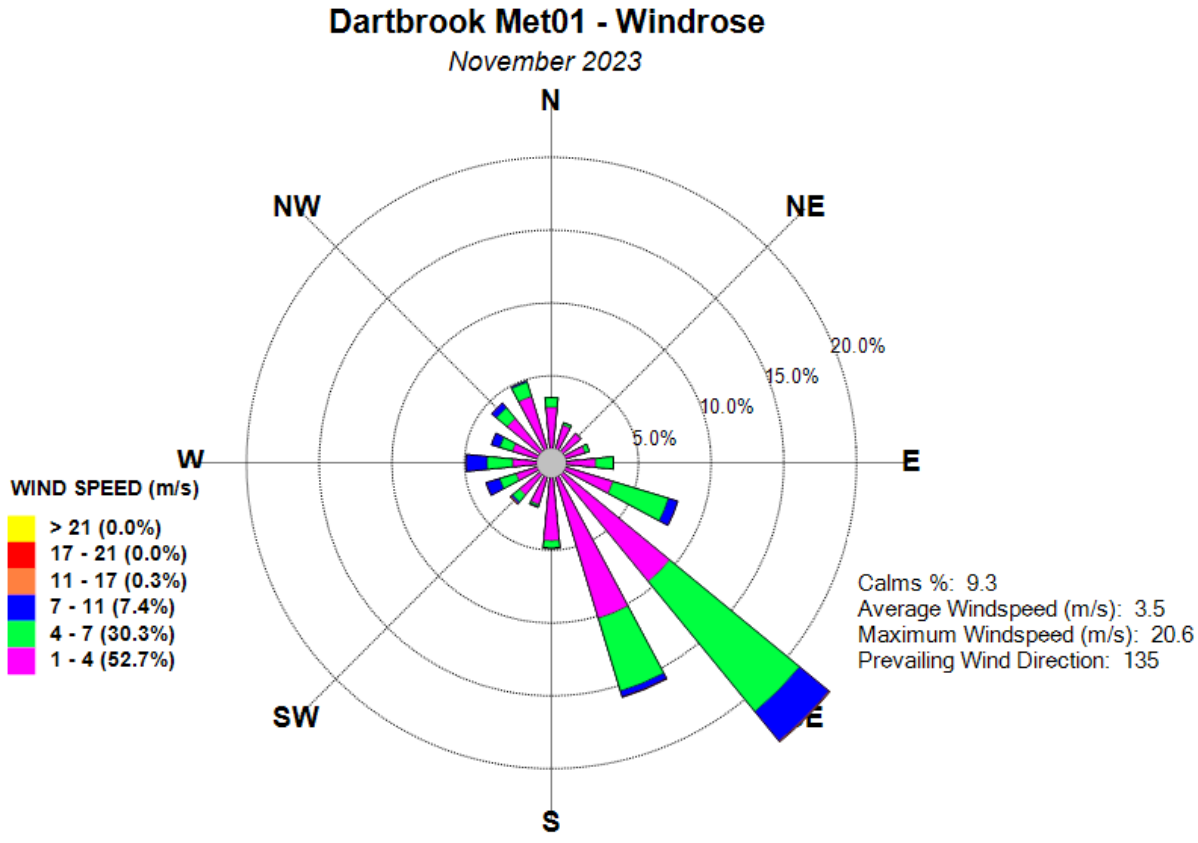
Dartbrook Met02 - Windrose

October 2023



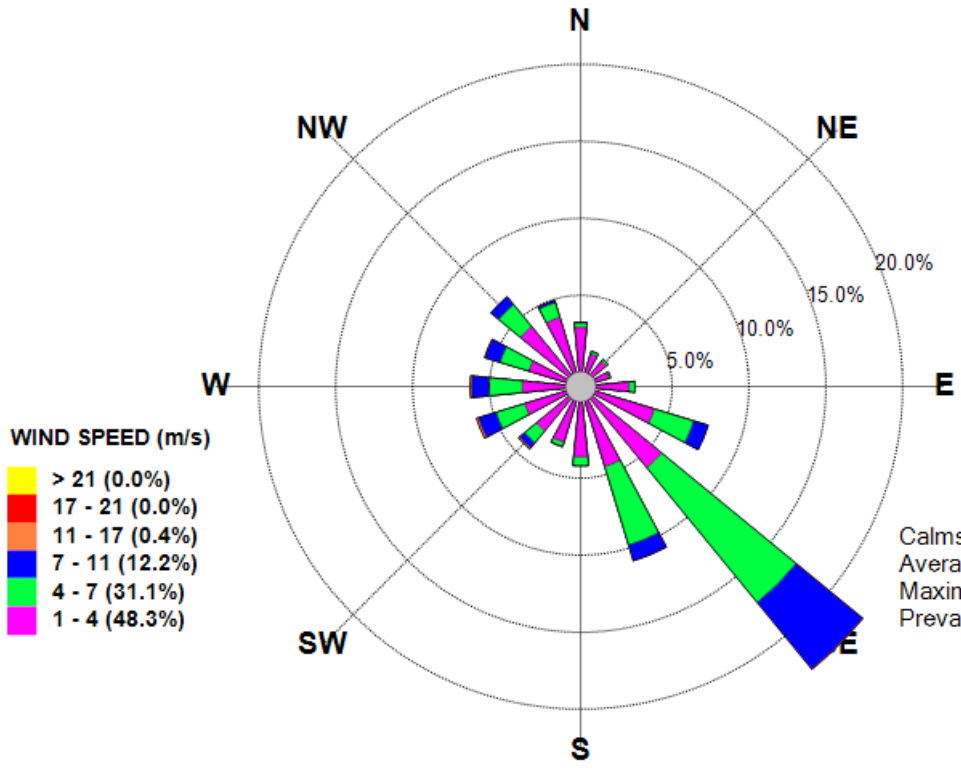
Calms %: 13.4
Average Windspeed (m/s): 2.9
Maximum Windspeed (m/s): 12.0
Prevailing Wind Direction: 157.5


Dartbrook Met01 - Windrose
November 2023
N
NW
NE
W
E
SW
S
5.0%
10.0%
15.0%
20.0%
WIND SPEED (m/s)
> 21 (0.0%)
17 - 21 (0.0%)
11 - 17 (0.3%)
7 - 11 (7.4%)
4 - 7 (30.3%)
1 - 4 (52.7%)
Calms %: 9.3
Average Windspeed (m/s): 3.5
Maximum Windspeed (m/s): 20.6
Prevailing Wind Direction: 135


Dartbrook Met01 - Windrose
November 2023
N
NW
NE
W
E
SW
S
5.0%
10.0%
15.0%
20.0%
WIND SPEED (m/s)
> 21 (0.0%)
17 - 21 (0.0%)
11 - 17 (0.3%)
7 - 11 (7.4%)
4 - 7 (30.3%)
1 - 4 (52.7%)
Calms %: 9.3
Average Windspeed (m/s): 3.5
Maximum Windspeed (m/s): 20.6
Prevailing Wind Direction: 135

Dartbrook Met01 - Windrose

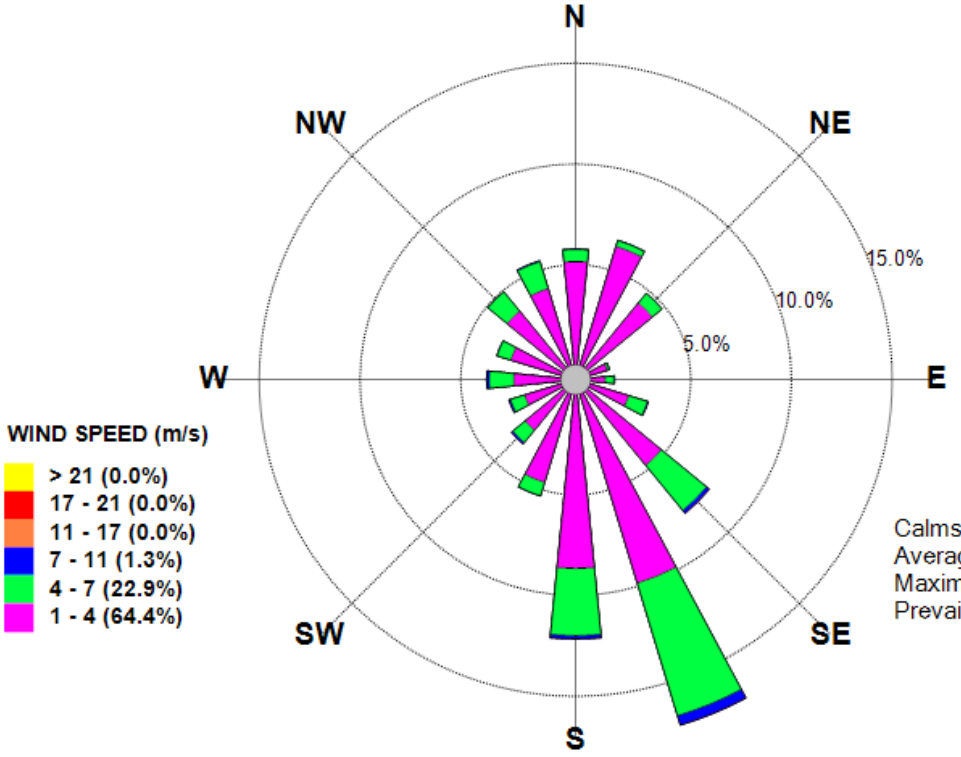
December 2023



Calms %: 8.0
Average Windspeed (m/s): 3.8
Maximum Windspeed (m/s): 15.0
Prevailing Wind Direction: 135

Dartbrook Met02 - Windrose

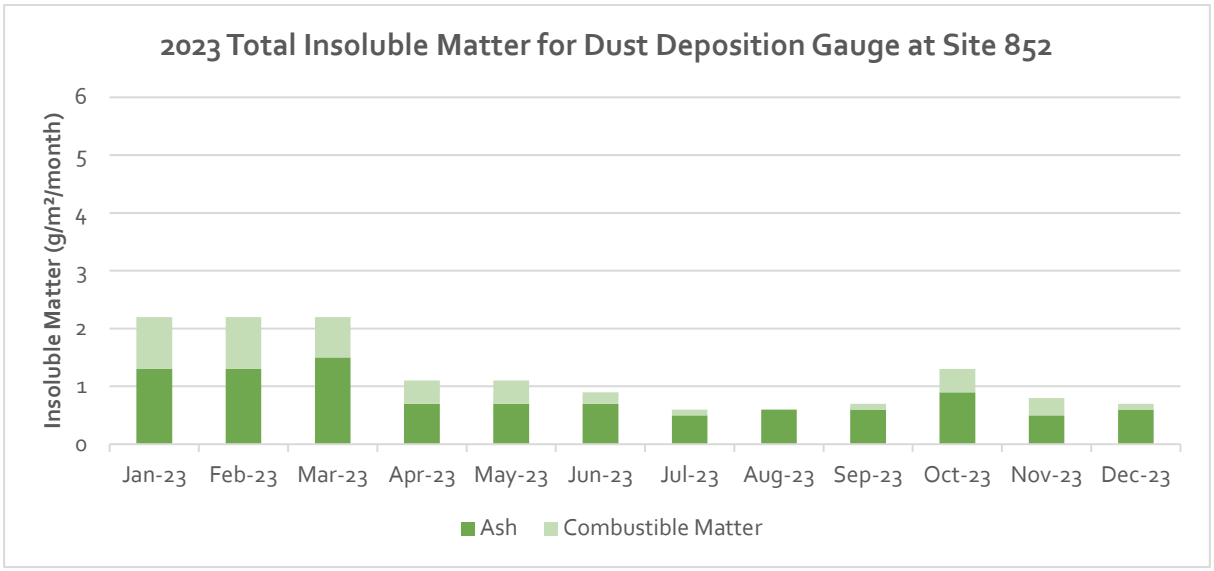
December 2023

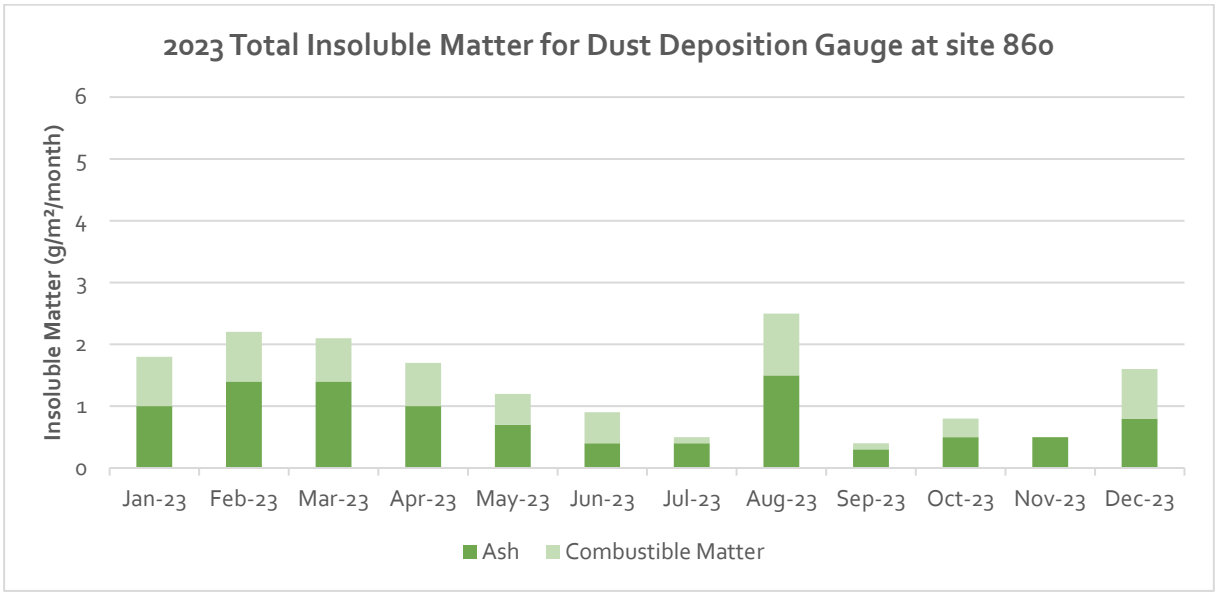


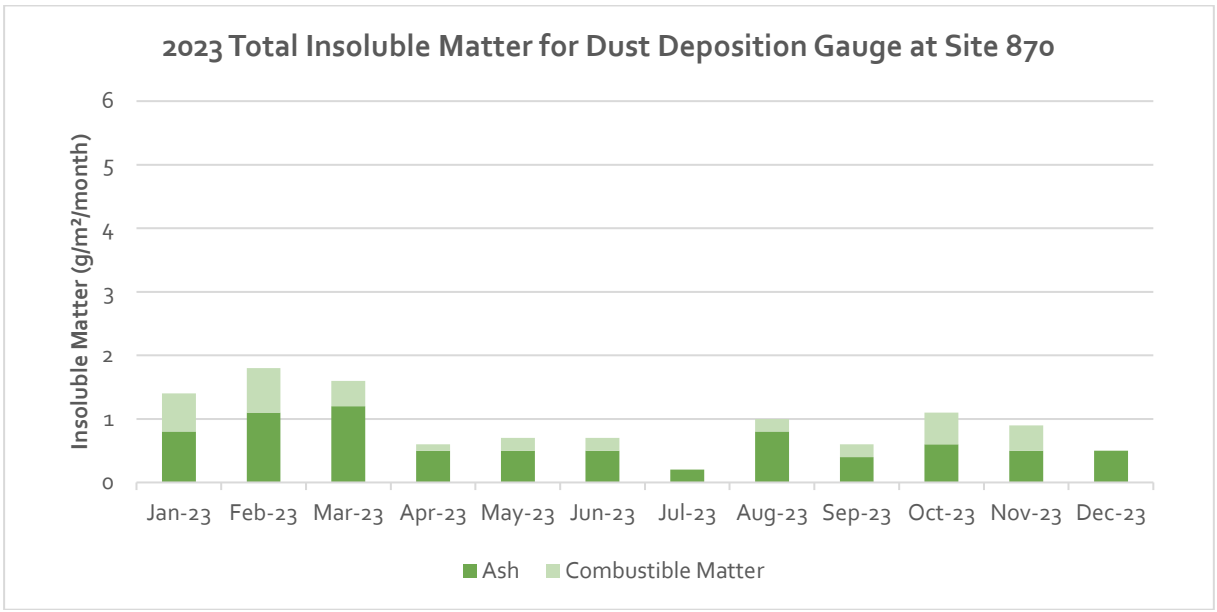
Calms %: 11.4
Average Windspeed (m/s): 2.8
Maximum Windspeed (m/s): 10.6
Prevailing Wind Direction: 157.5

Appendix B

Air Quality Monitoring Summary

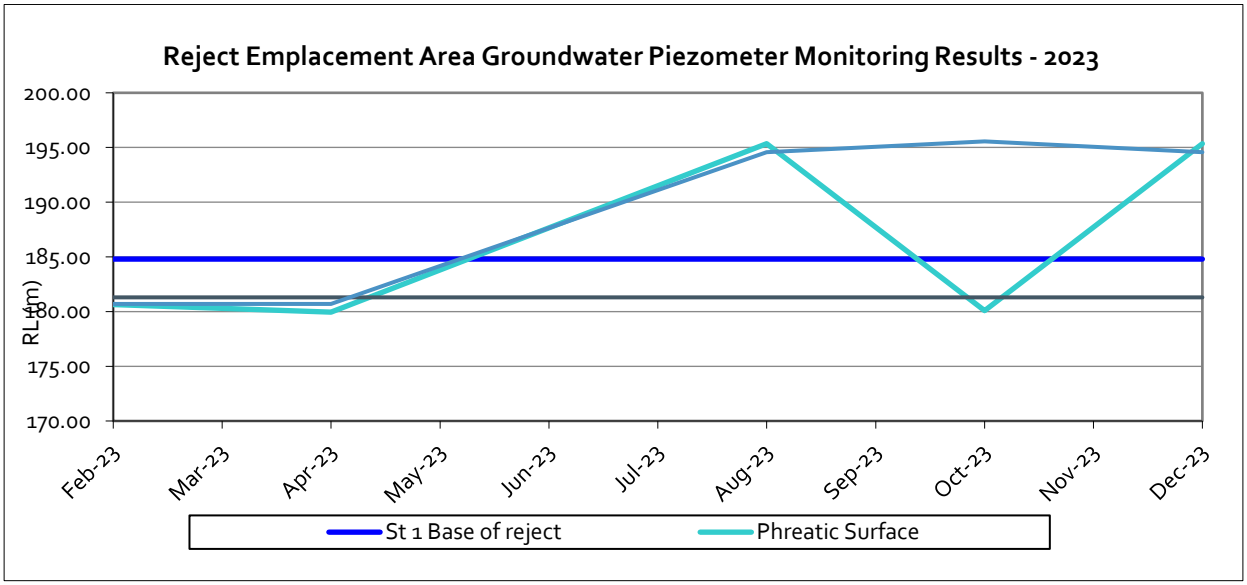

2023 Total Insoluble Matter for Dust Deposition Gauge at Site 852
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-23
Feb-23
Mar-23
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Ash
Combustible Matter

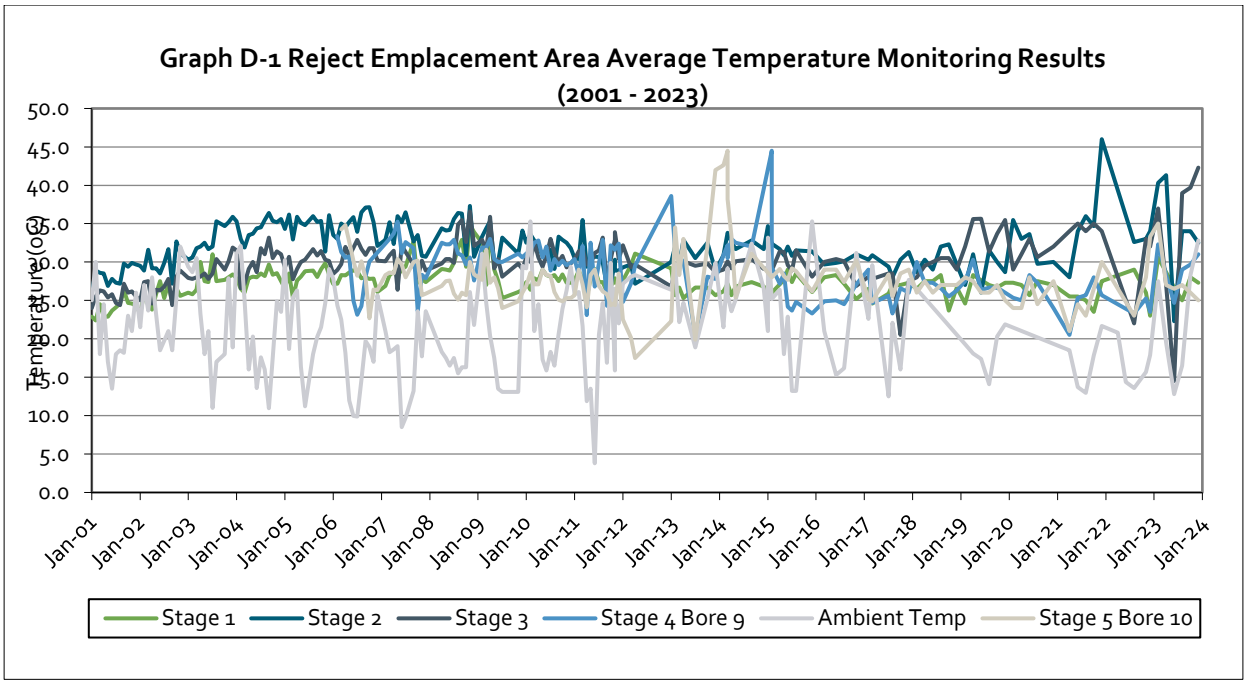

2023 Total Insoluble Matter for Dust Deposition Gauge at site 860
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-23
Feb-23
Mar-23
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Ash
Combustible Matter


2023 Total Insoluble Matter for Dust Deposition Gauge at Site 870
Insoluble Matter (g/m²/month)
0
1
2
3
4
5
6
Jan-23
Feb-23
Mar-23
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Ash
Combustible Matter

Appendix C

REA Monitoring Summary

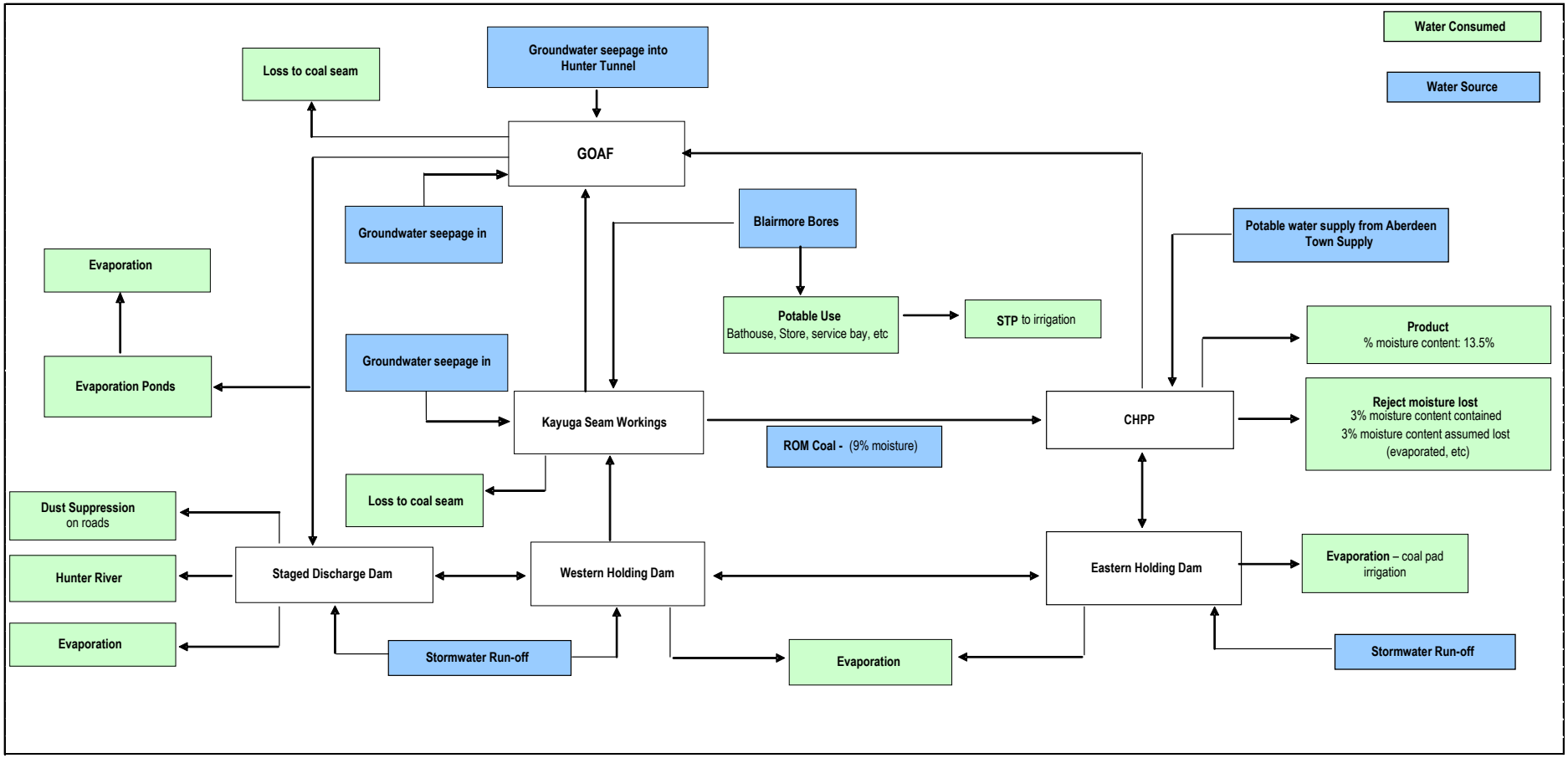

Reject Emplacement Area Groundwater Piezometer Monitoring Results - 2023
200.00
195.00
190.00
185.00
180.00
175.00
170.00
RL (m)
Feb-23
Mar-23
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
St 1 Base of reject
Phreatic Surface


Graph D-1 Reject Emplacement Area Average Temperature Monitoring Results
(2001 - 2023)
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
Jan-24
Stage 1
Stage 2
Stage 3
Stage 4 Bore 9
Ambient Temp
Stage 5 Bore 10

Appendix D

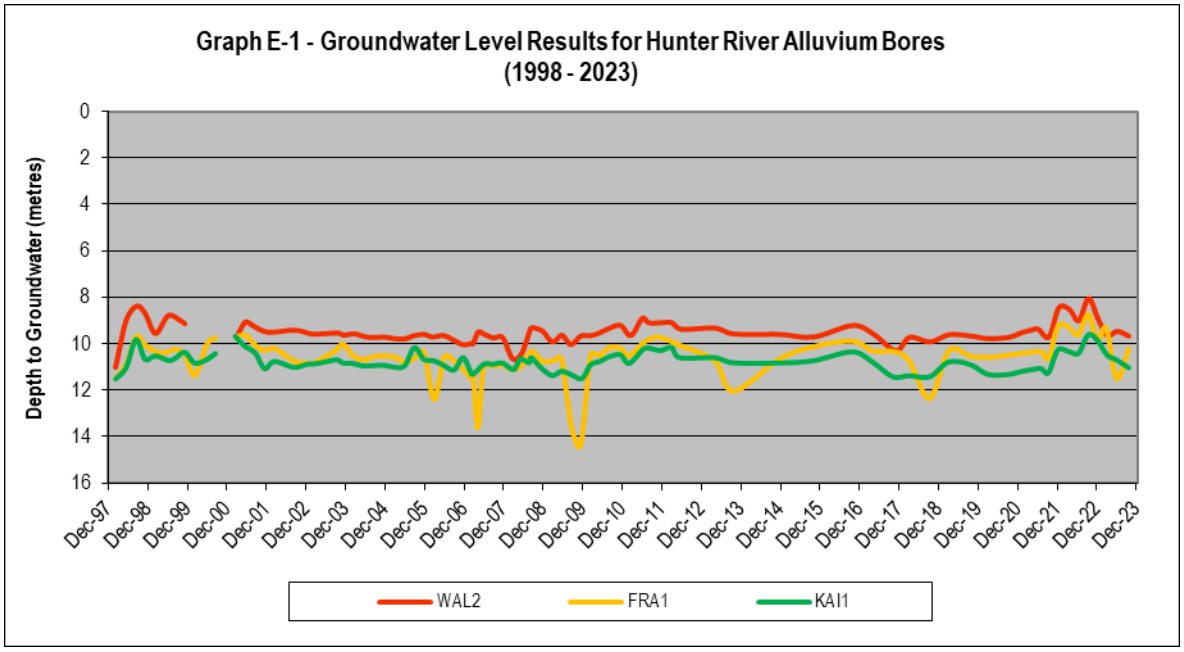
Water Management Schematic

Water Balance Schematic

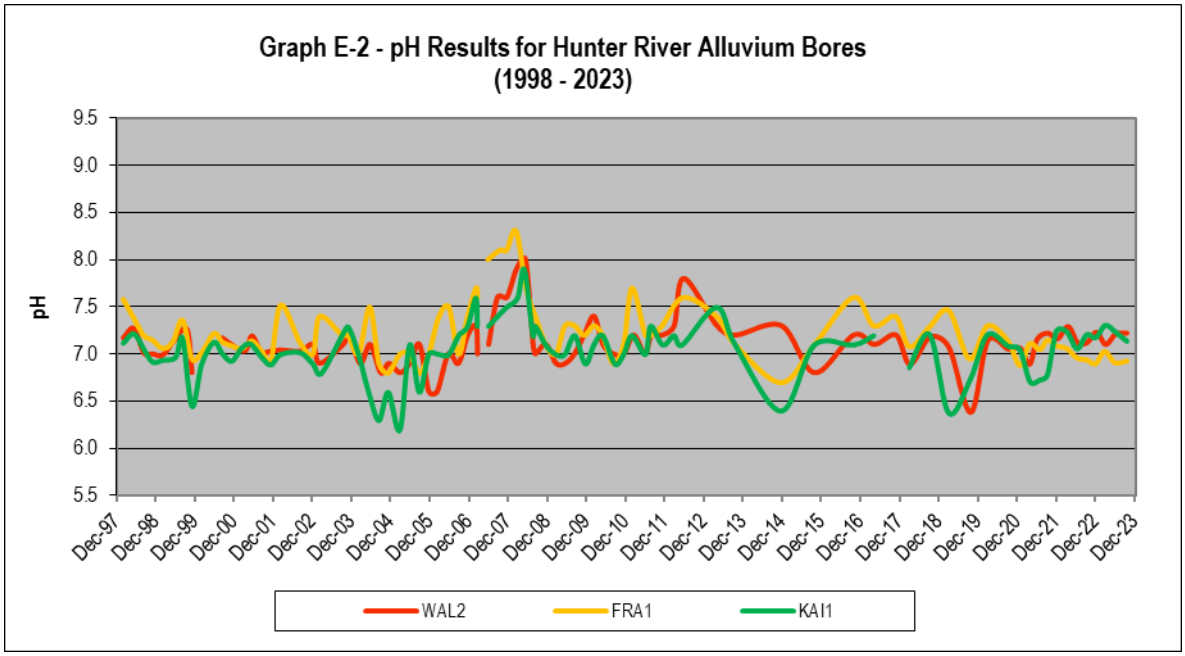


Appendix E

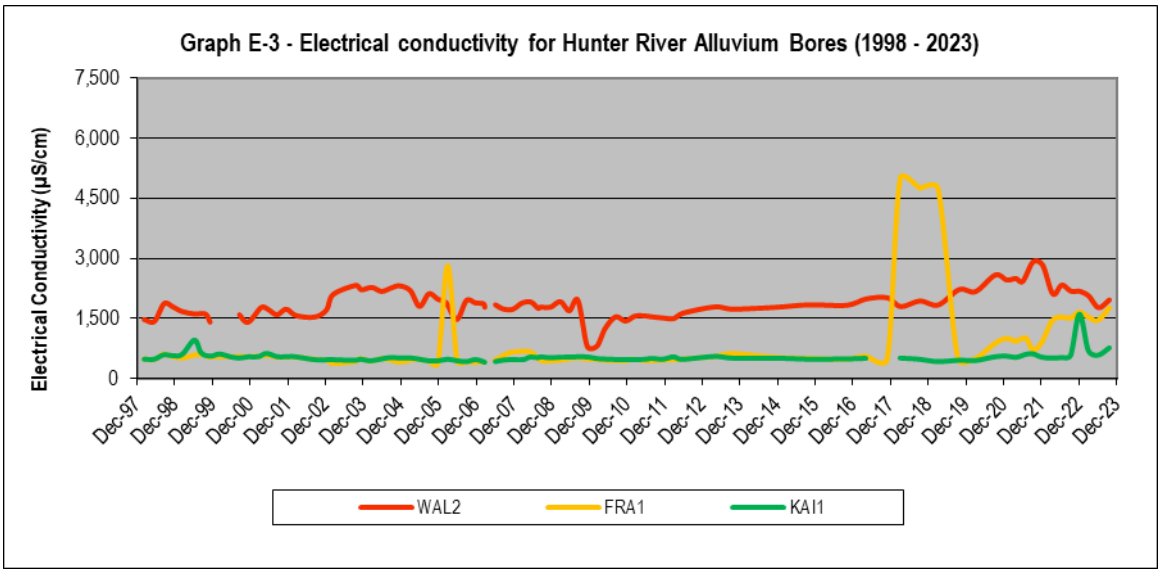
Groundwater Monitoring Summary



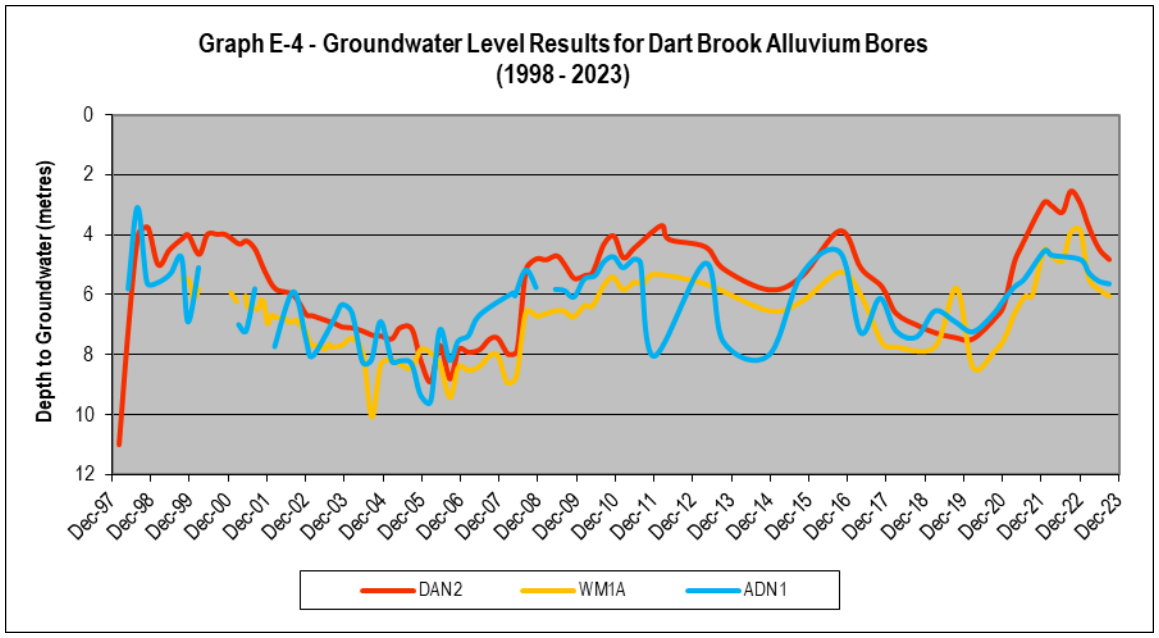
Graph E-1
Groundwater Level for Hunter River Alluvium Bores (1998-2023)



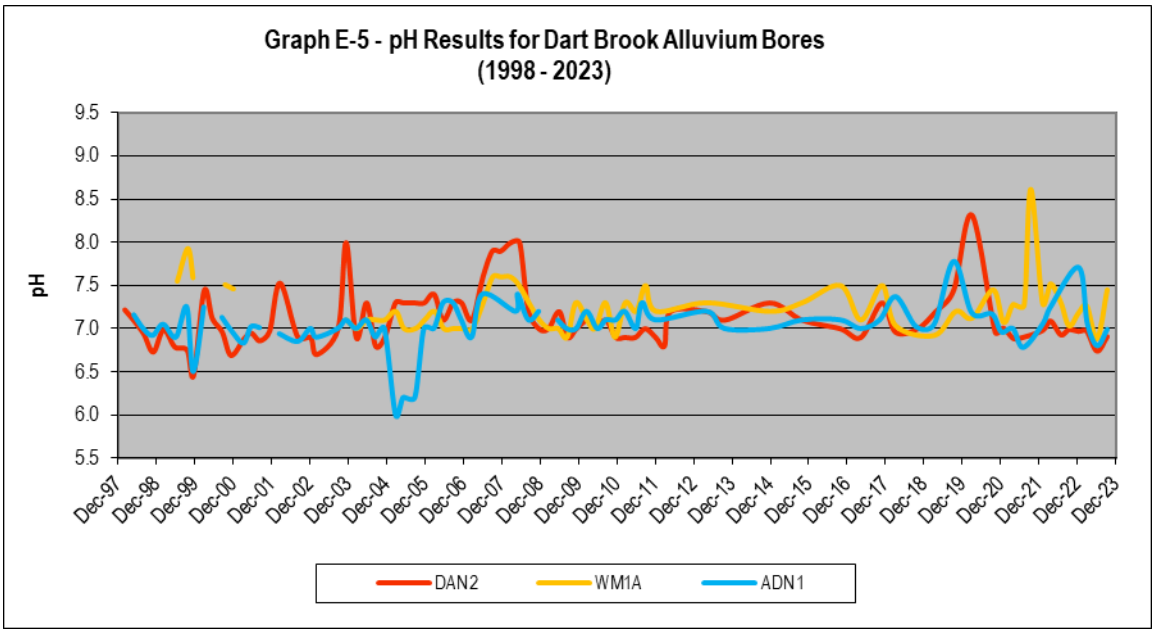
Graph E-2
pH for Hunter River Alluvium Bores (1998-2023)



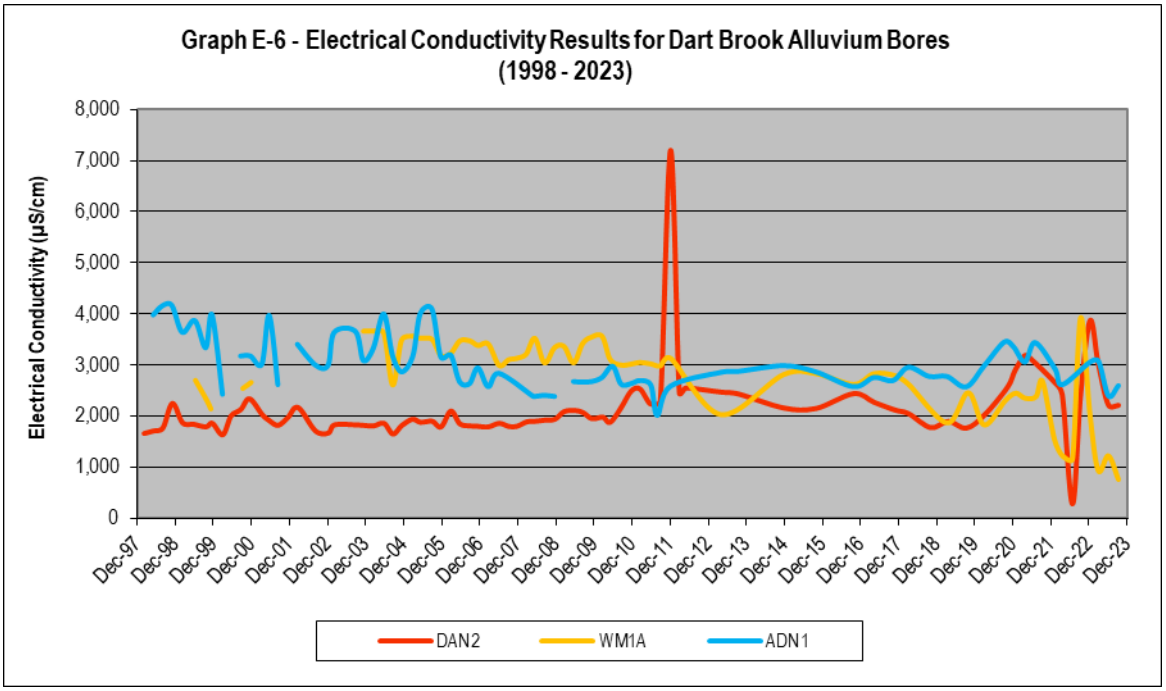
Graph E-3
Electrical Conductivity for Hunter River Alluvium Bores (1998-2023)



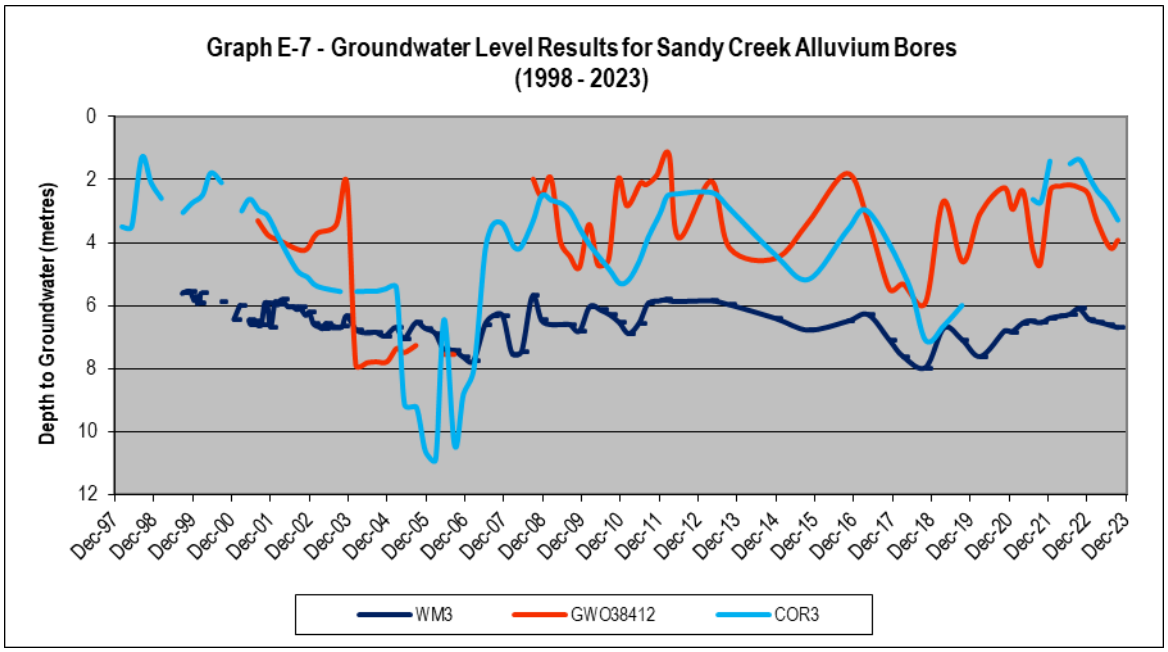
Graph E-4
Groundwater Level for Dart Brook Alluvium Bores (1998-2023)



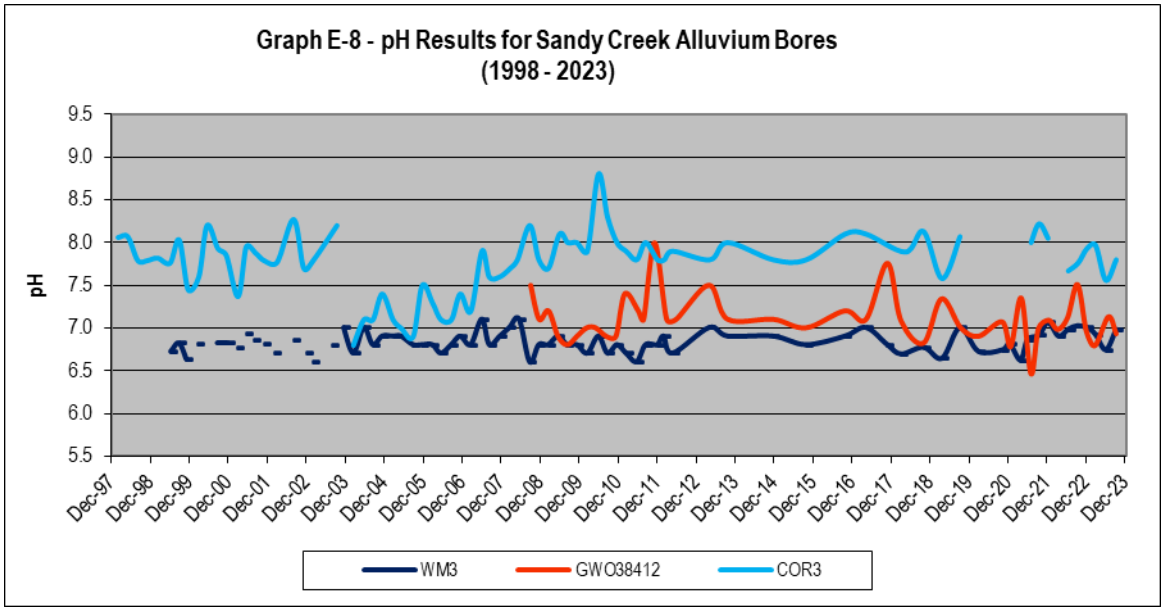
Graph E-5
pH for Dart Brook Alluvium Bores (1998-2023)



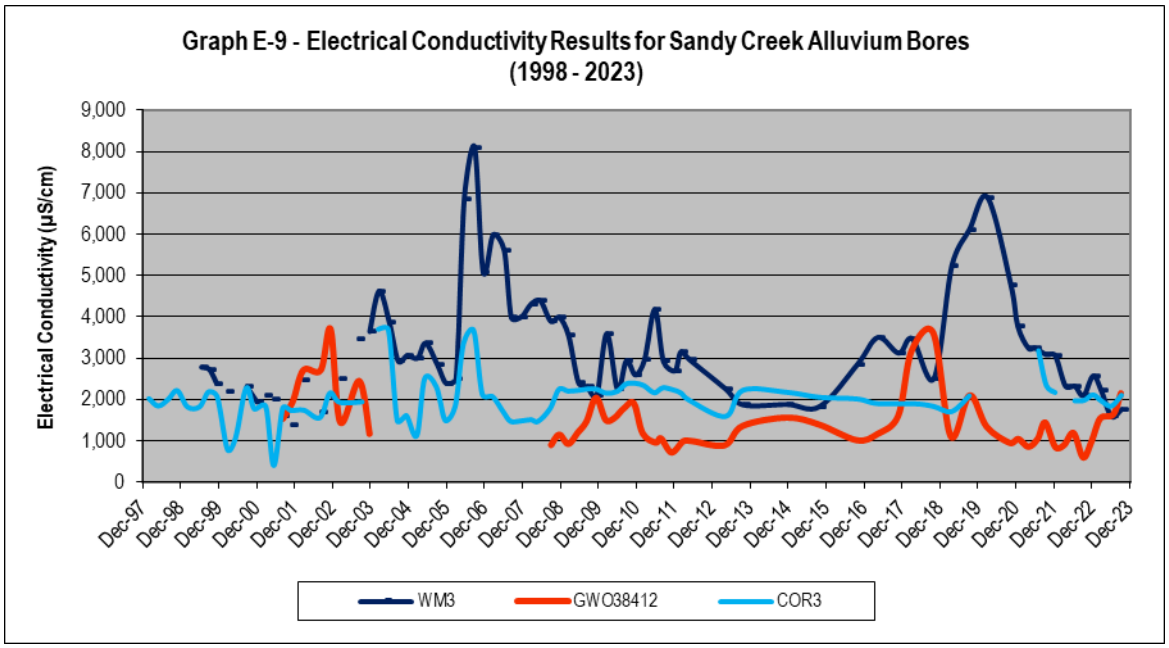
Graph E-6
Electrical Conductivity for Dart Brook Alluvium Bores (1998-2023)



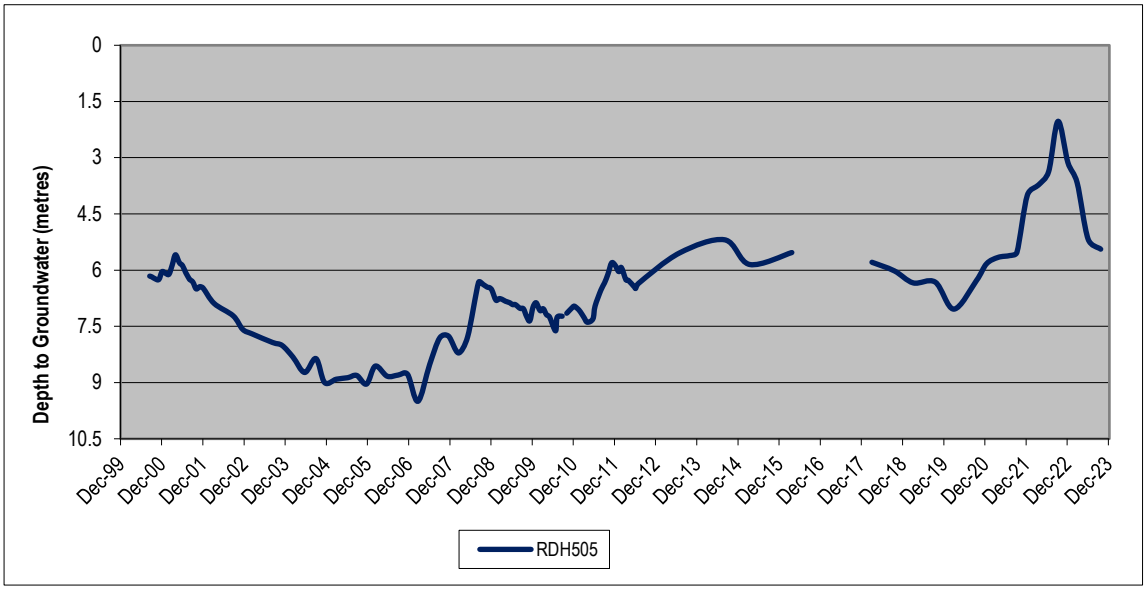
Graph E-7
Groundwater Level for Sandy Creek Alluvium Bores (1998-2023)



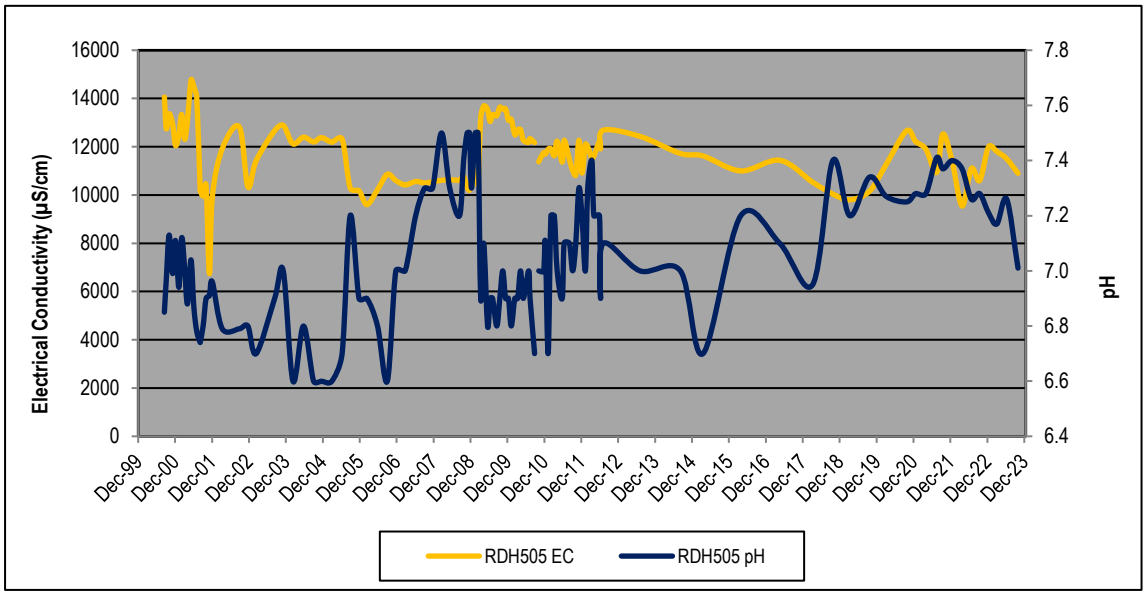
Graph E-8
pH for Sandy Creek Alluvium Bores (1998-2023)



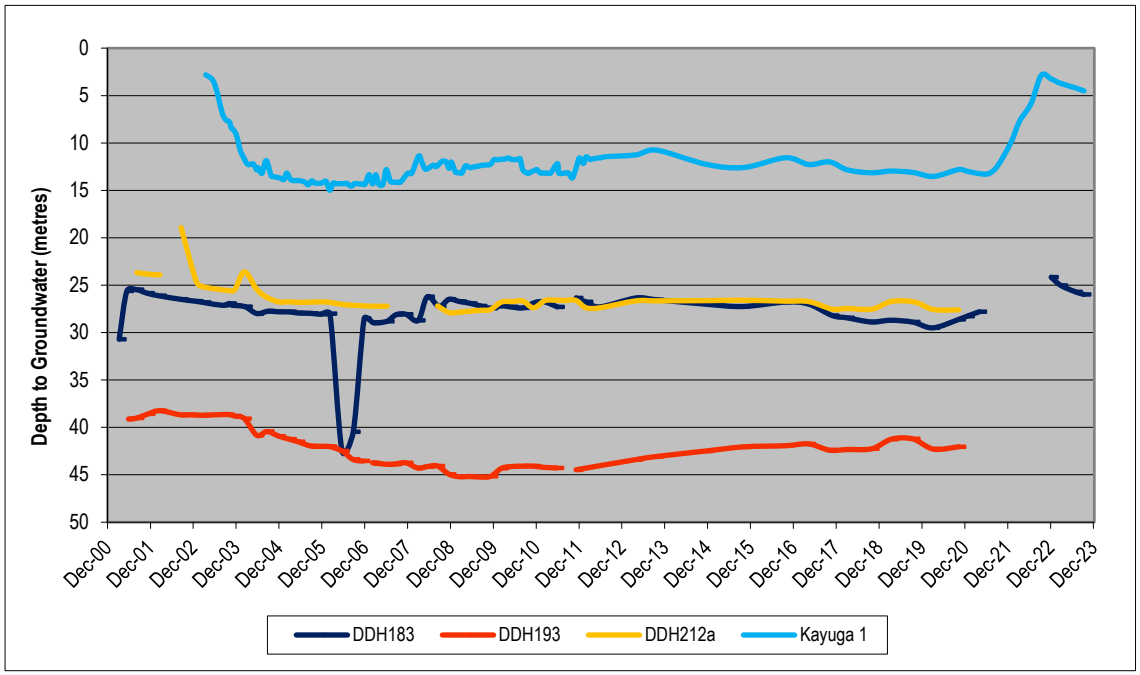
Graph E-9
Electrical Conductivity for Sandy Creek Alluvium Bores (1998-2023)



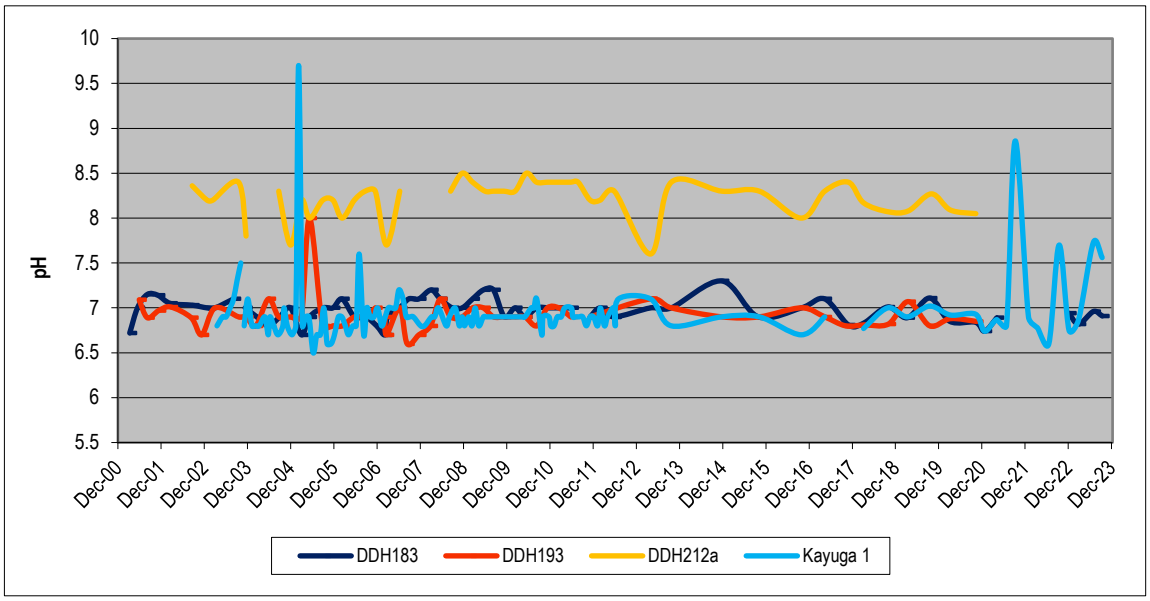
Graph E-10
Groundwater Level for Staged Discharge Dam Bore (2000-2023)



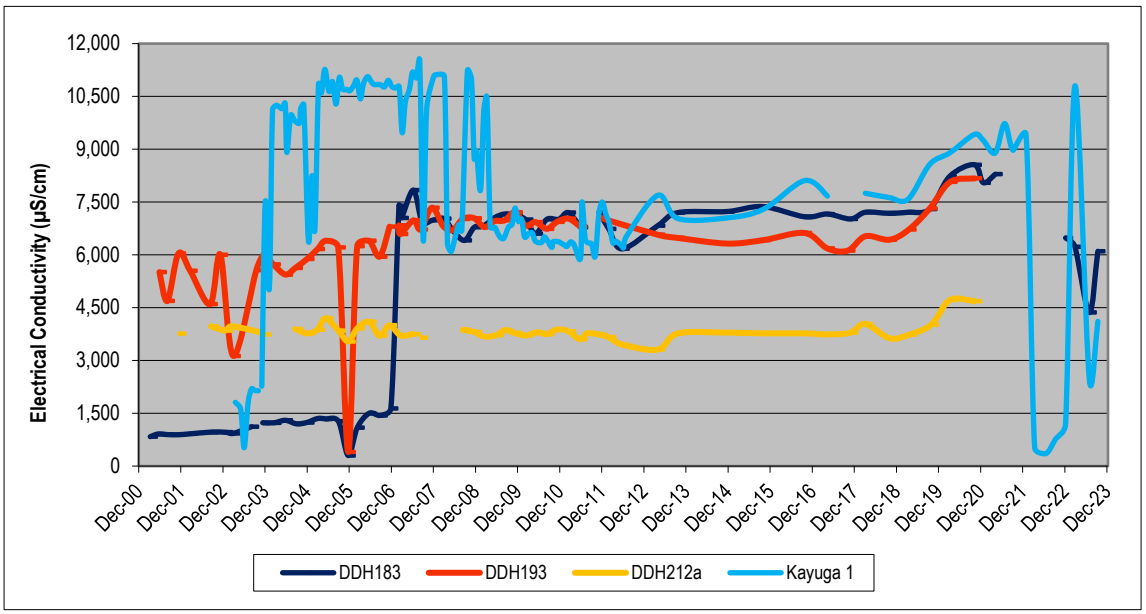
Graph E-11
pH and Electrical Conductivity for Staged Discharge Dam Bore (2000-2023)



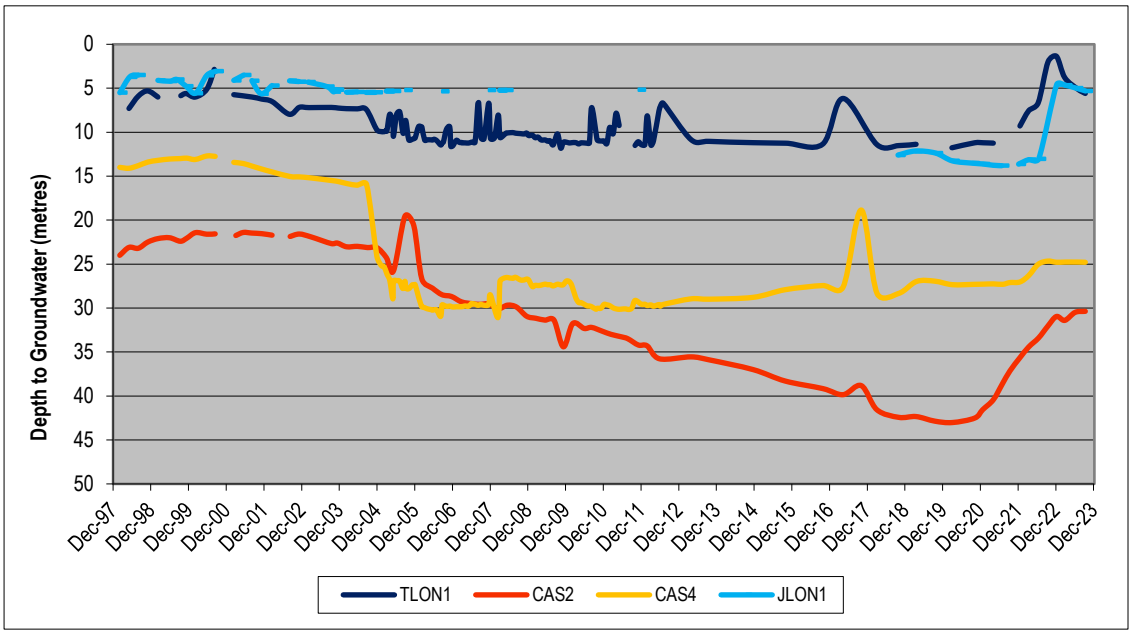
Graph E-12
Groundwater Level for Coal Seam Bores (2001-2023)



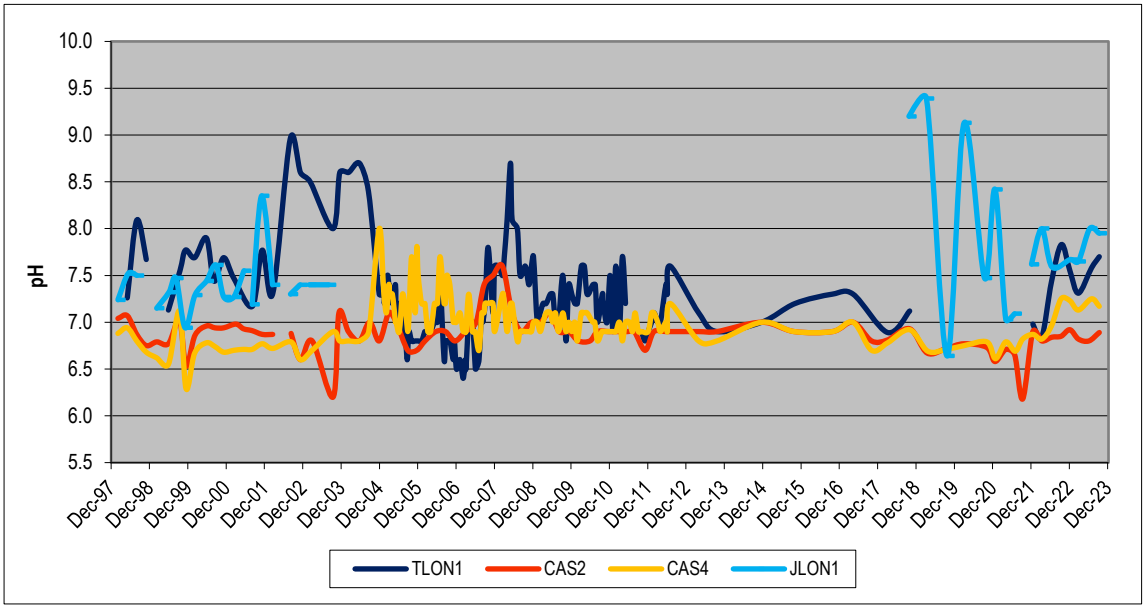
Graph E-13
pH for Coal Seam Bores (2001-2023)



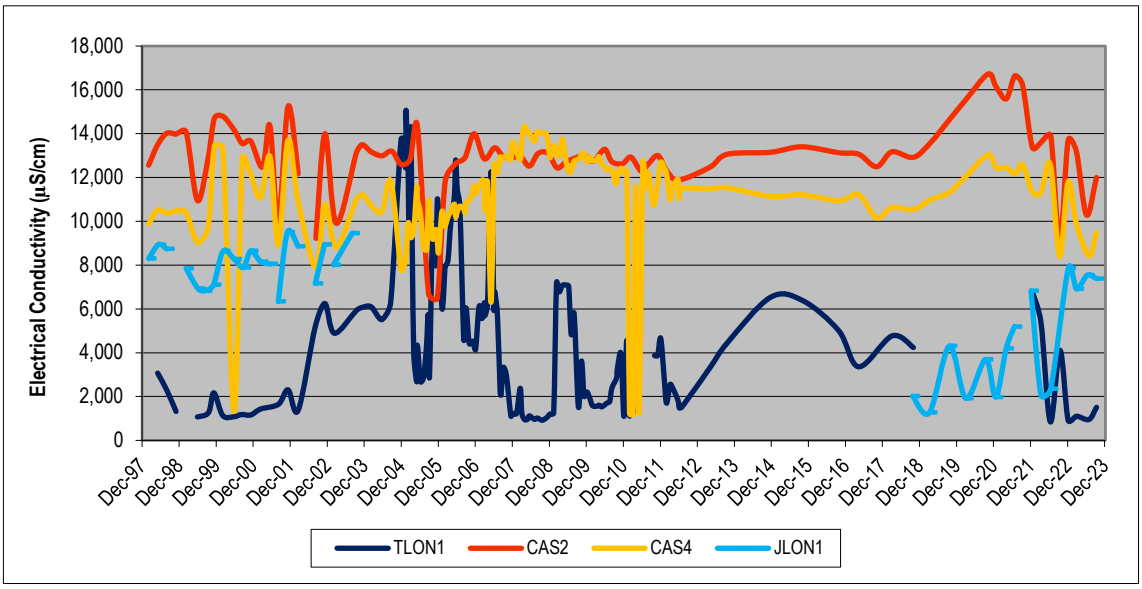
Graph E-14
Electrical Conductivity for Coal Seam Bores (2001-2023)



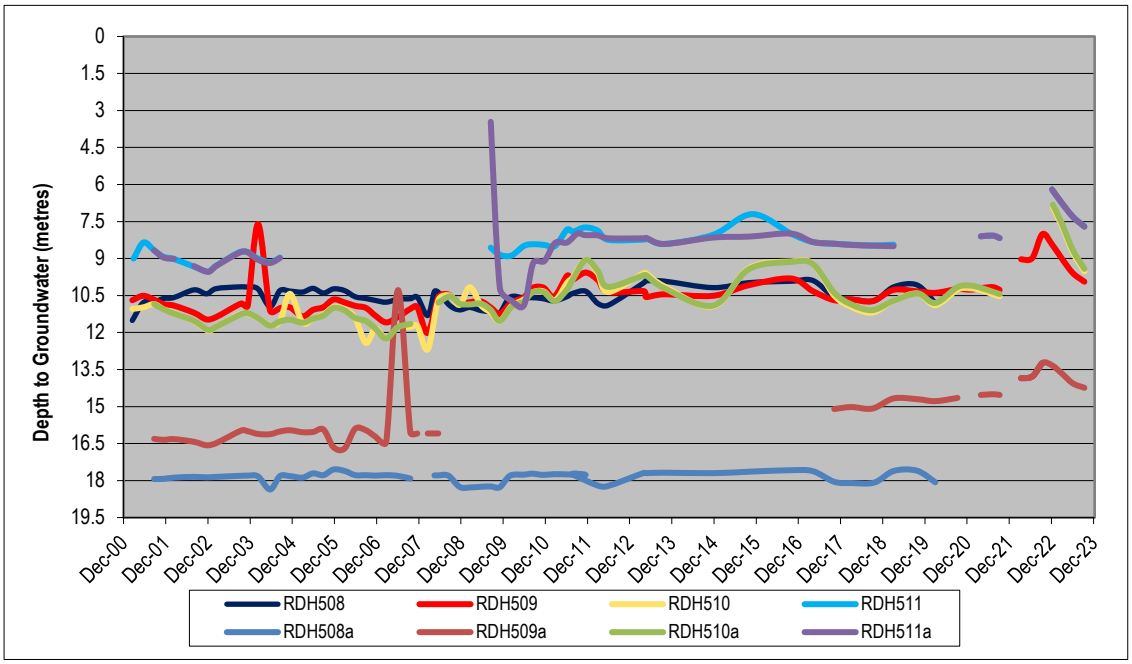
Graph E-15
Groundwater Levels for Regolith Bores (1998-2023)



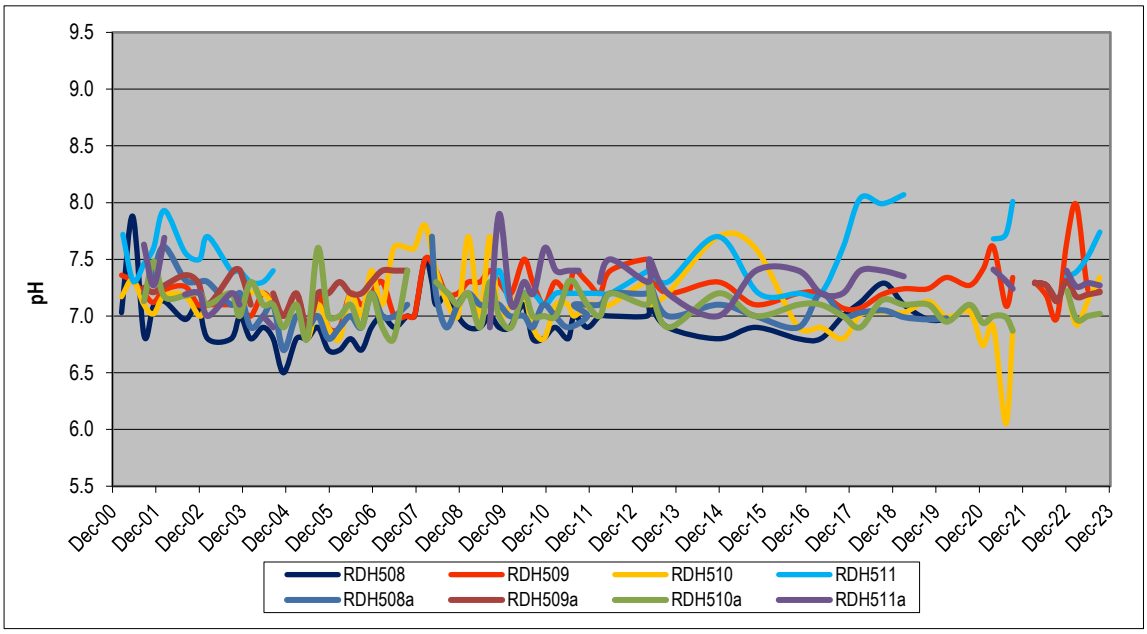
Graph E-16
pH for Regolith Bores (1998-2023)



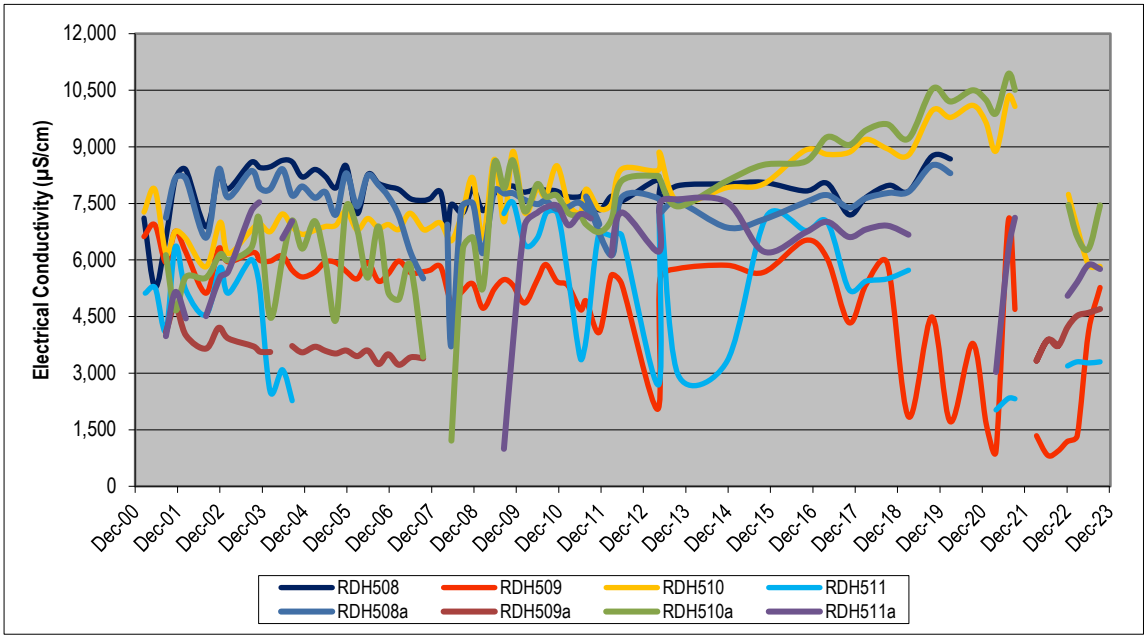
Graph E-17
Electrical Conductivity for Regolith Bores (1998-2023)



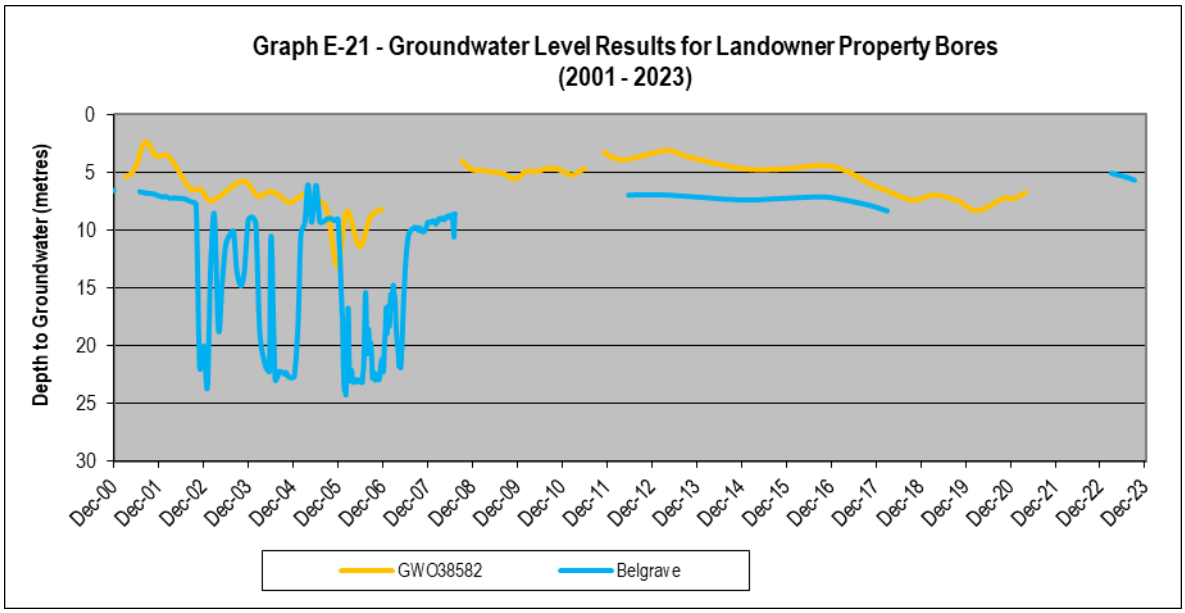
Graph E-18
Groundwater Level for Rejects Emplacement Area Bores (2001-2023)



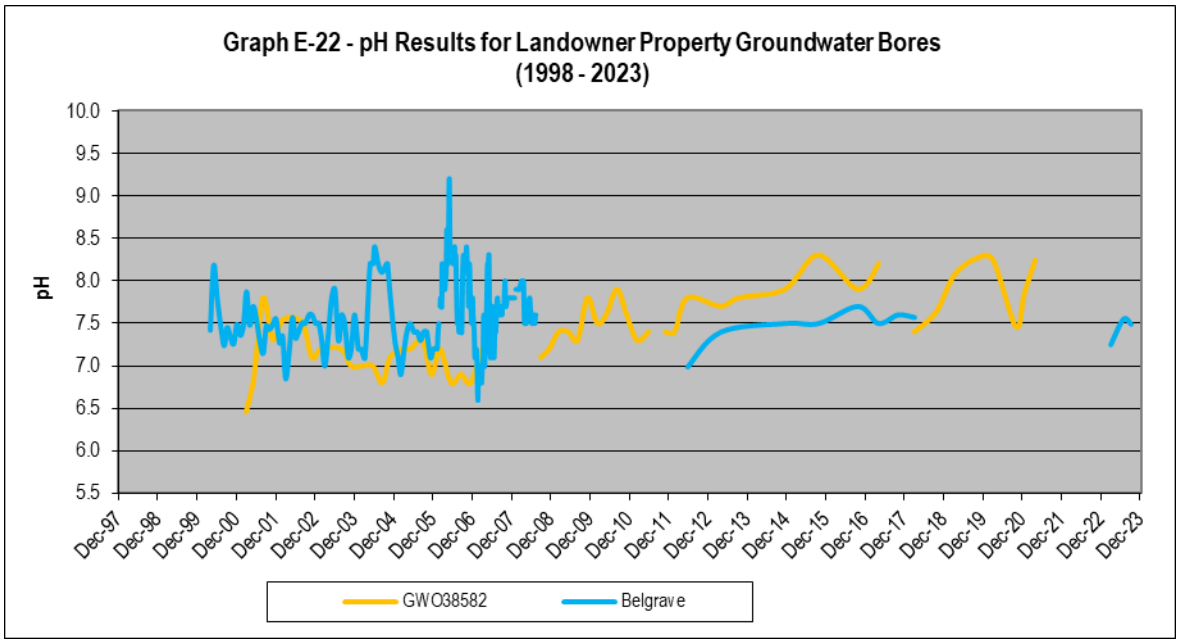
Graph E-19
pH for Rejects Emplacement Area Bores (2001-2023)



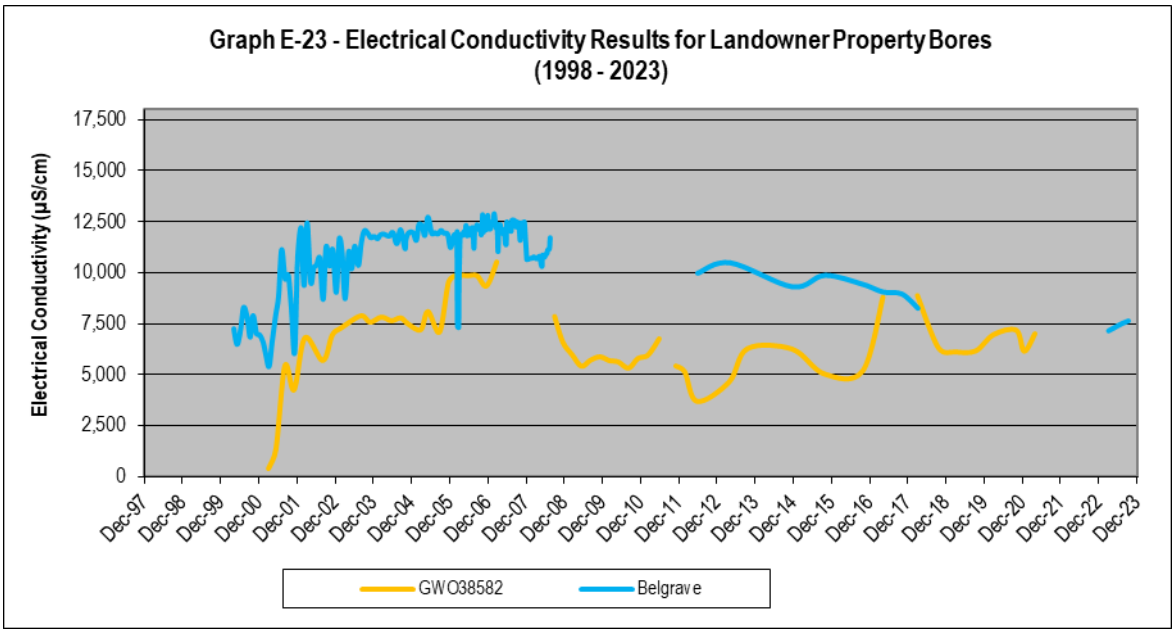
Graph E-20
Electrical Conductivity for Rejects Emplacement Area Bores (2001-2023)



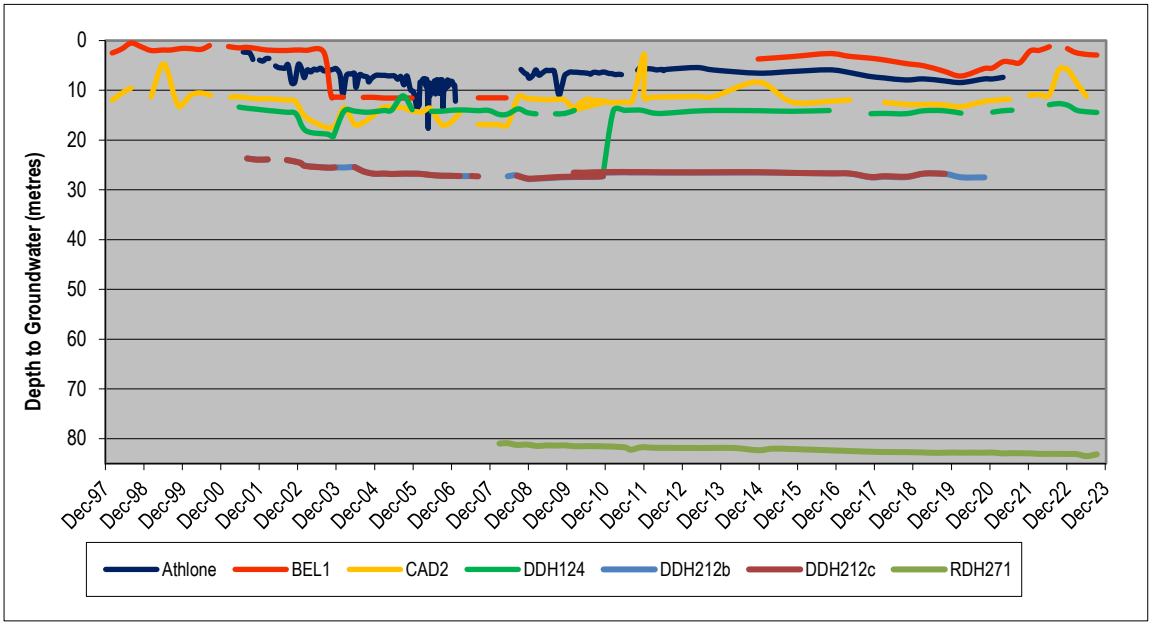
Graph E-21
Groundwater Level for Landowner Property Bores (2001-2023)



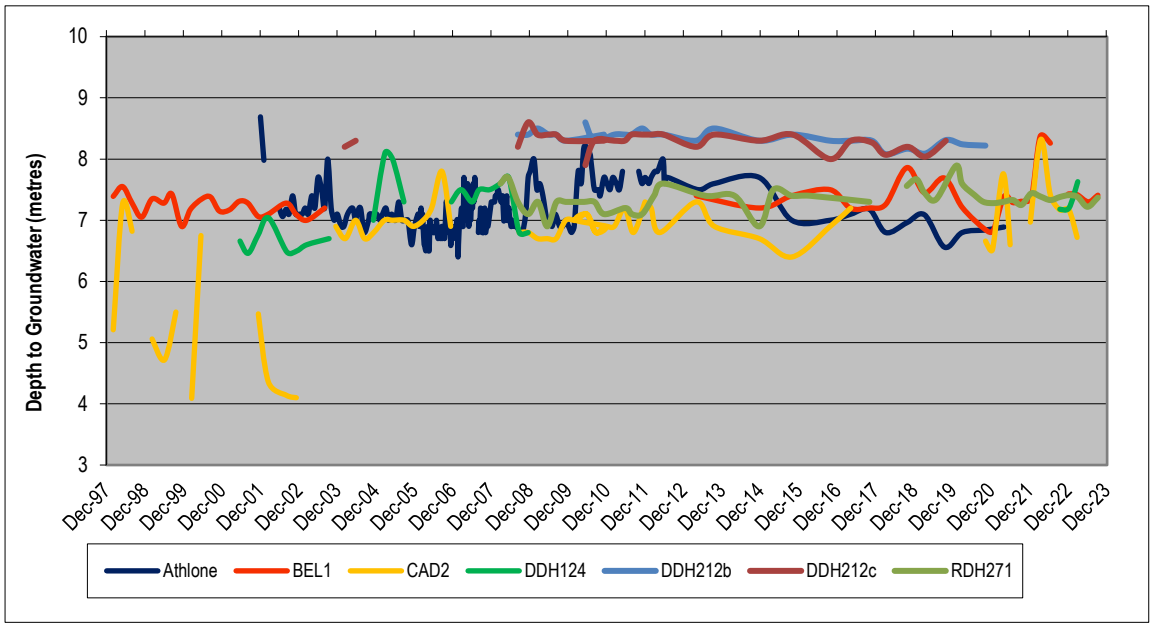
Graph E-22
pH for Landowner Property Bores (1998-2023)



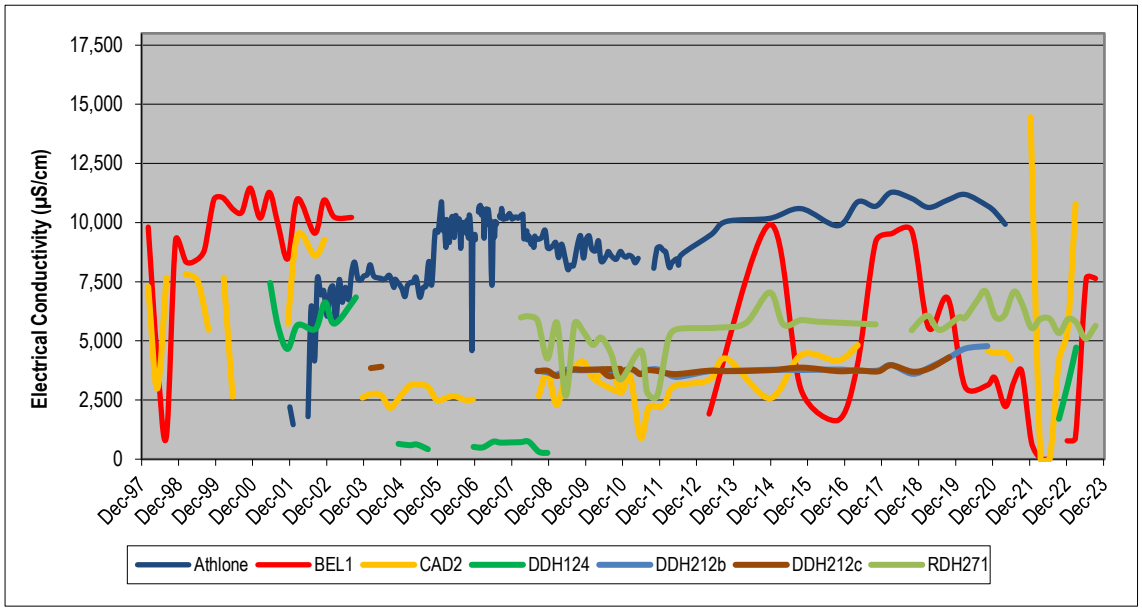
Graph E-23
Electrical Conductivity for Landowner Property Bores (1998-2023)



Graph E-24
Groundwater level for Other Monitoring Bores (1998-2023)



Graph E-25
pH for Other Monitoring Bores (1998-2023)



Graph E-26
Electrical Conductivity for Other Monitoring Bores (1998-2023)

Table E-1 – Groundwater Monitoring Summary

Sample Location	Sample Date	Depth to Water (m)	Field pH	Field EC (µS/cm)
Hunter River Alluvium				
FRA1	05-Jan-23	9.86	6.9	1663
FRA1	29-Mar-23	9.36	7.0	1544
FRA1	04-Jul-23	11.51	6.9	1453
FRA1	24-Oct-23	10.24	6.9	1766
JOR1*	09-Jan-23	7.73	7.3	2027
JOR1*	04-Apr-23	8.24	7.3	1892
JOR1*	14-Jul-23	10.10	7.2	2031
JOR1*	20-Oct-23	10.8	7.1	1941
KAl1	06-Jan-23	9.83	7.2	1608
KAl1	04-Apr-23	10.46	7.3	689
KAl1	07-Jul-23	10.69	7.2	581
KAl1	24-Oct-23	11.02	7.1	766
WAL2	09-Jan-23	8.95	7.2	2181
WAL2	04-Apr-23	9.64	7.1	2059
WAL2	07-Jul-23	9.47	7.2	1769
WAL2	20-Oct-23	9.67	7.2	1965
Dart Brook Alluvium				
ADN1	11-Jan-23	4.83	7.7	3060
ADN1	04-Apr-23	5.29	7.1	3070
ADN1	06-Jul-23	5.55	6.8	2400
ADN1	11-Oct-23	5.64	7.0	2600
DAN2	11-Jan-23	2.95	7.0	3880
DAN2	30-Mar-23	3.72	7.0	3040
DAN2	05-Jul-23	4.46	6.7	2231
DAN2	11-Oct-23	4.82	6.9	2222
WM1A	10-Jan-23	3.84	7.2	2029
WM1A	30-Mar-23	5.43	7.3	937.4
WM1A	06-Jul-23	5.82	6.9	1224
WM1A	11-Oct-23	6.03	7.5	760
Sandy Creek Alluvium				
BRO3	07-Feb-23	3.27	7.5	824.1
BRO3	30-Mar-23	3.24	7.1	1945
BRO3	31-Jul-23			
BRO3	31-Oct-23	3.59	8.4	2249

Sample Location	Sample Date	Depth to Water (m)	Field pH	Field EC (µS/cm)
COR3	09-Jan-23	1.89	7.9	2111
COR3	30-Mar-23	2.36	8.0	1965
COR3	05-Jul-23	2.73	7.6	1840
COR3	11-Oct-23	3.29	7.8	2102
GWO38412	06-Jan-23	2.45	7.0	1021
GWO38412	28-Mar-23	3.30	6.8	1553
GWO38412	31-Jul-23	4.16	7.1	1647
GWO38412	13-Oct-23	3.92	6.9	2156
WM3	11-Jan-23	6.43	7.0	2580
WM3	30-Mar-23	6.51	6.9	2223
WM3	05-Jul-23	6.6	6.7	1600
WM3	11-Oct-23	6.7	7.0	1769
Staged Discharge Dam				
RDH505	06-Jan-23	3.13	7.2	12000
RDH505	29-Mar-23	3.67	7.2	11800
RDH505	04-Jul-23	5.17	7.3	11500
RDH505	24-Oct-23	5.44	7.0	10900
Coal Seams				
DDH183	06-Jan-23	24.16	6.9	6480
DDH183	28-Mar-23	25.02	6.8	6230
DDH183	31-Jul-23	25.70	7.0	4360
DDH183	13-Oct-23	25.98	6.9	6101
DDH193				
DDH193				
DDH193				
DDH193				
DDH212a				
DDH212a				
DDH212a				
DDH212a				
Kayuga 1	06-Jan-23	3.25	6.8	1188
Kayuga 1	28-Mar-23	3.72	6.9	10800
Kayuga 1	31-Jul-23	4.19	7.7	2470
Kayuga 1	13-Oct-23	4.51	7.6	4110
Regolith				
CAS2	06-Jan-23	30.96	6.9	13700

Sample Location	Sample Date	Depth to Water (m)	Field pH	Field EC (µS/cm)
CAS2	28-Mar-23	31.4	6.8	13200
CAS2	06-Jul-23	30.49	6.8	10290
CAS2	13-Oct-23	30.37	6.9	12000
CAS4	06-Jan-23	24.79	7.2	11800
CAS4	28-Mar-23	24.77	7.1	9900
CAS4	31-Jul-23	24.77	7.3	8420
CAS4	13-Oct-23	24.79	7.2	9490
JLON1	09-Jan-23	4.58	7.7	7870
JLON1	28-Mar-23	4.64	7.7	6910
JLON1	14-Jul-23	4.98	8.0	7540
JLON1	13-Oct-23	5.30	8.0	7390
TLON1	06-Jan-23	1.36	7.6	918.9
TLON1	28-Mar-23	3.79	7.3	1104
TLON1	31-Jul-23	5.09	7.6	956
TLON1	13-Oct-23	5.59	7.7	1510
Rejects Emplacement Area				
RDH508	05-Jan-23			
RDH508	29-Mar-23			
RDH508	01-Aug-23			
RDH508	24-Oct-23			
RDH508a	05-Jan-23			
RDH508a	29-Mar-23			
RDH508a	01-Aug-23			
RDH508a	24-Oct-23			
RDH509	05-Jan-23	8.43	7.6	1195
RDH509	29-Mar-23	8.99	8.0	1340
RDH509	04-Jul-23	9.59	7.2	4080
RDH509	12-Oct-23	9.94	7.2	5270
RDH509a	05-Jan-23	13.33	7.3	4220.0
RDH509a	29-Mar-23	13.65	7.2	4520.0
RDH509a	04-Jul-23	14.06	7.2	4600.0
RDH509a	12-Oct-23	14.24	7.2	4700.0
RDH510	12-Jan-23	6.93	7.2	7740
RDH510	30-Mar-23	7.67	6.9	6860
RDH510	05-Jul-23	8.76	7.1	5870
RDH510	12-Oct-23	9.52	7.3	5830

Sample Location	Sample Date	Depth to Water (m)	Field pH	Field EC (µS/cm)
RDH510a	12-Jan-23	6.82	7.2	7460
RDH510a	30-Mar-23	7.57	7.0	6610
RDH510a	05-Jul-23	8.66	7.0	6300
RDH510a	12-Oct-23	9.42	7.0	7450
RDH511	05-Jan-23	6.20	7.4	3190
RDH511	29-Mar-23	6.74	7.4	3300
RDH511	05-Jul-23	7.31	7.5	3270
RDH511	12-Oct-23	7.7	7.7	3300
RDH511a	05-Jan-23	6.2	7.4	5050
RDH511a	29-Mar-23	6.74	7.3	5410
RDH511a	05-Jul-23	7.31	7.3	5870
RDH511a	12-Oct-23	7.71	7.3	5760
Property Subsidence Management Plans				
Belgrave	06-Jan-23			
Belgrave	05-Apr-23	5.10	7.3	7140
Belgrave	01-Aug-23	5.43	7.6	7470
Belgrave	13-Oct-23	5.72	7.5	7630
GWO38582	06-Jan-23			
GWO38582	05-Apr-23			
GWO38582	31-Jul-23			
GWO38582	13-Oct-23			
Other Monitoring Bores				
Athlone				
Athlone				
Athlone				
Athlone				
BEL1	06-Jan-23	1.62	7.4	779
BEL1	28-Mar-23	2.43	7.4	887
BEL1	14-Jul-23	2.80	7.3	7650
BEL1	13-Oct-23	2.91	7.4	7640
CAD2	11-Jan-23	5.91	7.2	5490
CAD2	30-Mar-23	8.29	6.7	10800
CAD2	05-Jul-23	11.20		
CAD2	11-Oct-23			
DDH124	12-Jan-23	13.02	7.2	3150
DDH124	05-Apr-23	14.00	7.6	4720

Sample Location	Sample Date	Depth to Water (m)	Field pH	Field EC (µS/cm)
DDH124	06-Jul-23	14.3.0		
DDH124	13-Oct-23	14.45		
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	6.9	7.0	0.1
FRA1	EC	1453	1607	1766	313
JOR1	pH	7.1	7.2	7.3	0.2
JOR1	EC	1892	1972.8	2031	139
KAI1	pH	7.1	7.2	7.3	0.2
KAI1	EC	581	911	1608	1027
WAL2	pH	7.1	7.2	7.2	0.1
WAL2	EC	1769	1994	2181	412
Dart Brook Alluvium					
ADN1	pH	6.8	7.1	7.7	0.9
ADN1	EC	2400	2783	3070	670
DAN2	pH	6.7	6.9	7.1	0.4
DAN2	EC	2222	2843	3880	1658
WM1A	pH	6.9	7.2	7.5	0.6
WM1A	EC	760	1238	2029	1269
Sandy Creek Alluvium					
BRO3	pH	7.1	7.3	7.5	0.4
BRO3	EC	824.1	1384.6	1945.0	1120.9
COR3	pH	7.6	7.8	8.0	0.4
COR3	EC	1840	2005	2111	271
GWO38412	pH	6.8	7.0	7.1	0.3
GWO38412	EC	1021	1594	2156	1135
WM3	pH	6.7	6.9	7.0	0.3
WM3	EC	1600	2043	3071	2580
Staged Discharge Dam					
RDH505	pH	7.0	7.2	7.3	0.3
RDH505	EC	10900	11550	12000	1100
Coal Seams					
DDH183	pH	6.8	6.9	7.0	0.1
DDH183	EC	4360	5793	12000	7640
DDH193*	pH				
DDH193*	EC				
DDH212(a)*	pH				

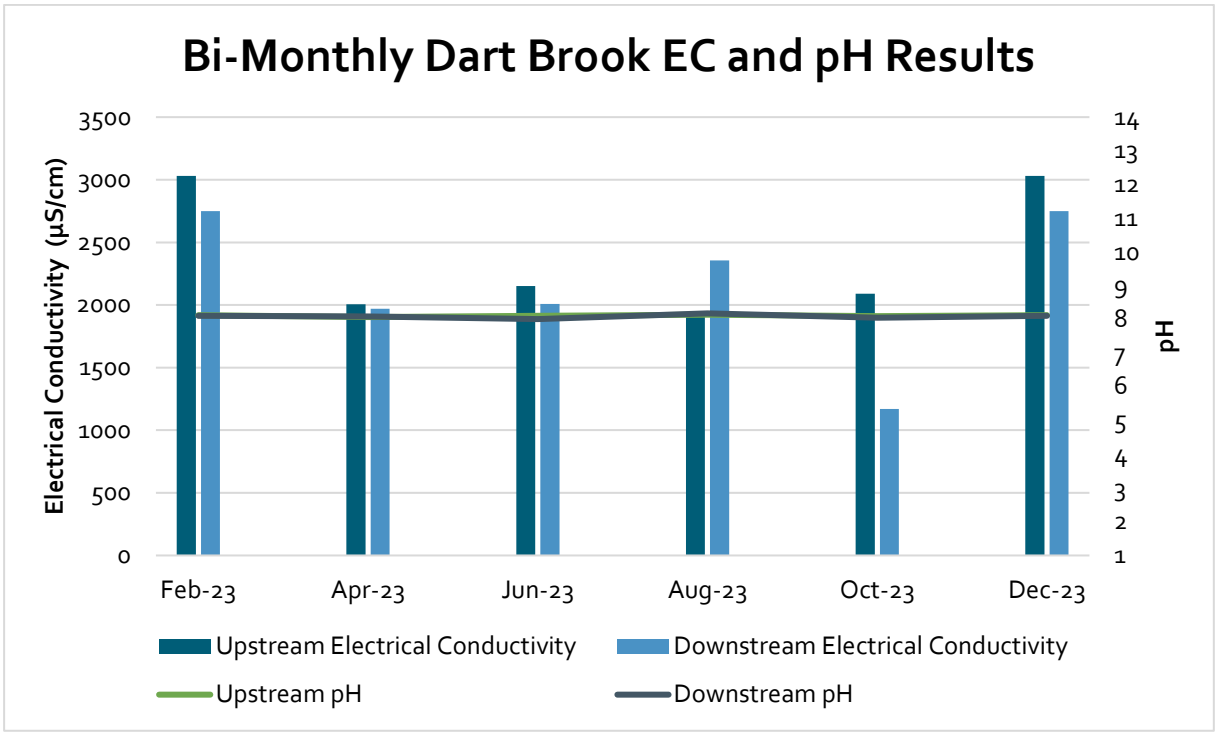
Sample Location	Parameter	Minimum	Mean	Maximum	Variance
DDH212(a)*	EC				
Kayuga 1	pH	6.8	7.2	7.7	1.0
Kayuga 1	EC	1188	4642	10800	9612
Regolith					
CAS2	pH	6.8	6.9	6.9	0.1
CAS2	EC	10290	12298	13700	3410
CAS4	pH	7.1	7.2	7.3	0.1
CAS4	EC	8420	9903	11800	3380
JLON1	pH	7.7	7.8	8.0	0.4
JLON1	EC	6910	7428	7870	960
TLON1*	pH	6.8	7.5	7.7	0.9
TLON1*	EC	918.9	1122.2	1510	591.1
Rejects Emplacement Area					
RDH508*	pH				
RDH508*	EC				
RDH508a*	pH				
RDH508a*	EC				
RDH509	pH	7.2	7.5	8.0	0.8
RDH509	EC	1195	2971	5270	4075
RDH509a	pH	7.2	7.2	7.3	0.1
RDH509a	EC	4220	4510	4700	480
RDH510	pH	6.9	7.2	7.3	0.4
RDH510	EC	5830	6575	7740	1910
RDH510a	pH	7.0	7.1	7.2	0.3
RDH510a	EC	6300	6955	7460	1160
RDH511	pH	7.4	7.5	7.7	0.4
RDH511	EC	3190	3265	3300	110
RDH511a	pH	7.3	7.3	7.4	0.1
RDH511a	EC	5050	5523	5870	820
Property Subsidence Management Plans					
Belgrave	pH	7.3	7.4	7.6	0.3
Belgrave	EC	7140	7413.3	7630	490
GWO38582*	pH				
GWO38582*	EC				

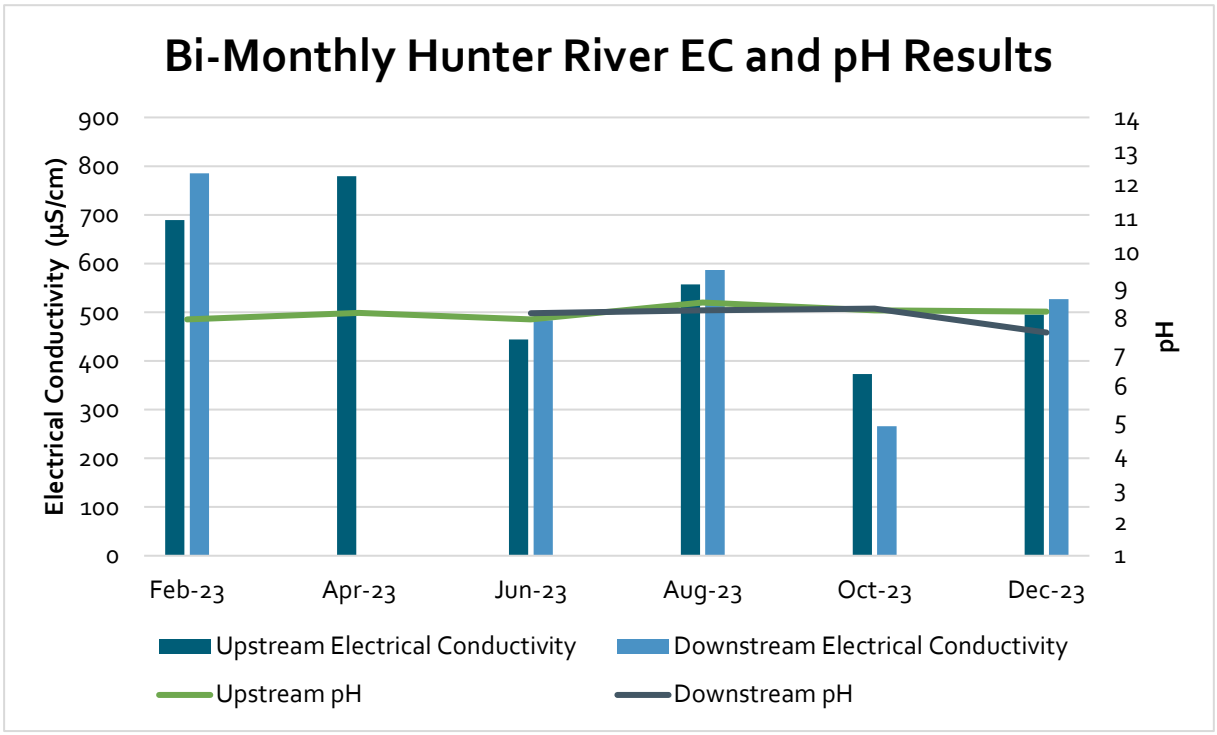
Sample Location	Parameter	Minimum	Mean	Maximum	Variance
Other Bore Holes					
Athlone*	pH				
Athlone*	EC				
BEL1	pH	7.3	7.4	7.4	0.1
BEL1	EC	779	4239	7650	6871
CAD2	pH	6.7	6.9	7.2	0.5
CAD2	EC	5490	8145	10800	5310
DDH124	pH	7.2	7.4	7.6	0.4
DDH124	EC	3150	3935	4720	1570
DDH212b*	pH				
DDH212b*	EC				
DDH212c*	pH				
DDH212c*	EC				

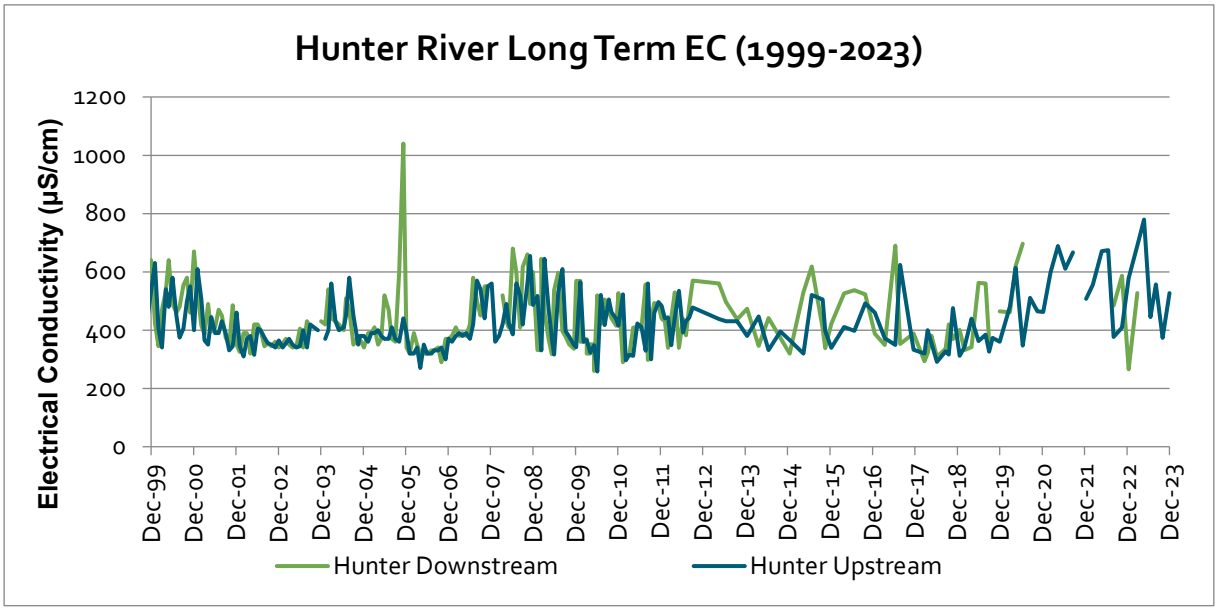
** Bore was dry or otherwise unable to be sampled in 2023*

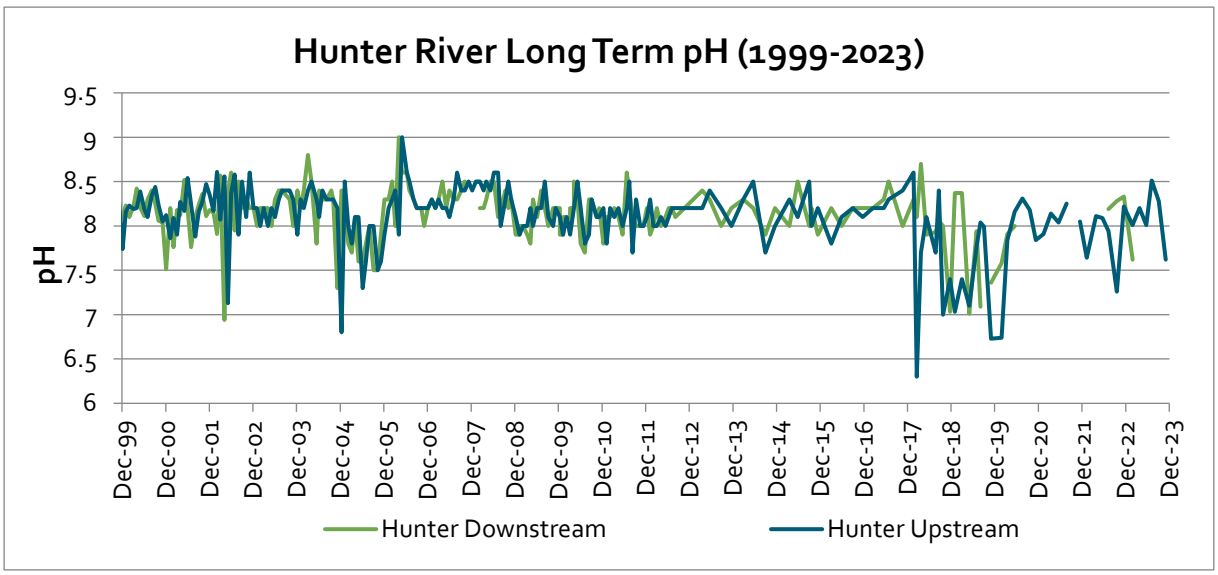
Appendix F

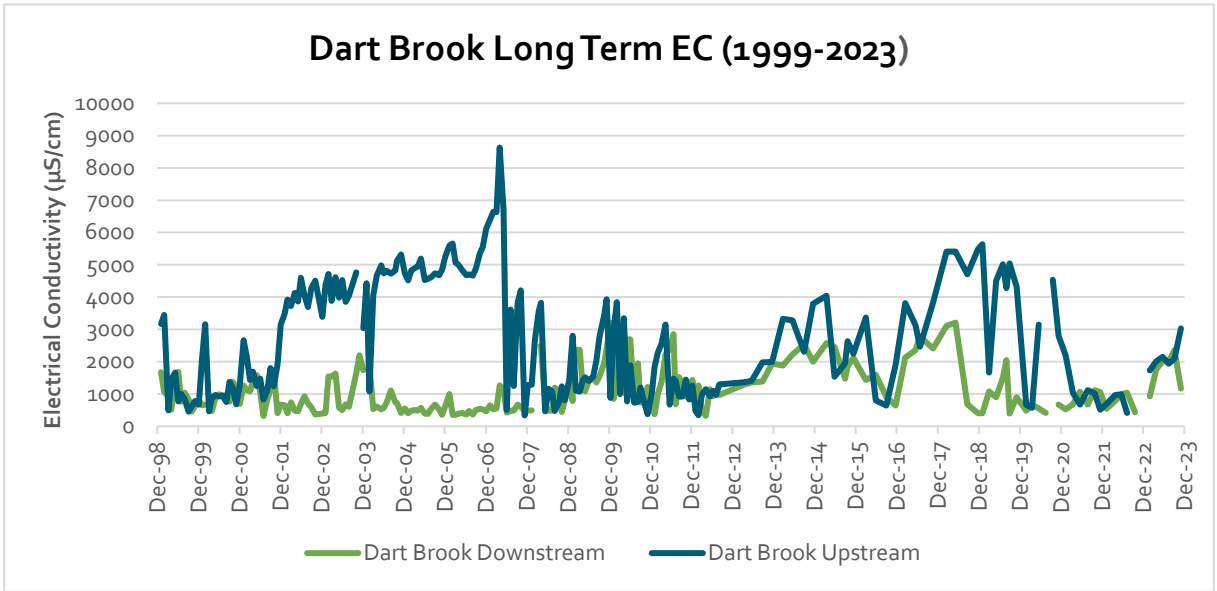
Surface Water Monitoring Summary


Bi-Monthly Dart Brook EC and pH Results
Electrical Conductivity (µS/cm)
3500
3000
2500
2000
1500
1000
500
0
pH
14
13
12
11
10
9
8
7
6
5
4
3
2
1
Feb-23
Apr-23
Jun-23
Aug-23
Oct-23
Dec-23
Upstream Electrical Conductivity
Downstream Electrical Conductivity
Upstream pH
Downstream pH


Bi-Monthly Hunter River EC and pH Results
Electrical Conductivity (µS/cm)
900
800
700
600
500
400
300
200
100
0
pH
14
13
12
11
10
9
8
7
6
5
4
3
2
1
Feb-23
Apr-23
Jun-23
Aug-23
Oct-23
Dec-23
Upstream Electrical Conductivity
Downstream Electrical Conductivity
Upstream pH
Downstream pH


Hunter River Long Term EC (1999-2023)
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
Dec-23
Hunter Downstream
Hunter Upstream


Hunter River Long Term pH (1999-2023)
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
Dec-23
Hunter Downstream
Hunter Upstream


Dart Brook Long Term EC (1999-2023)
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
Dec-23
Dart Brook Downstream
Dart Brook Upstream

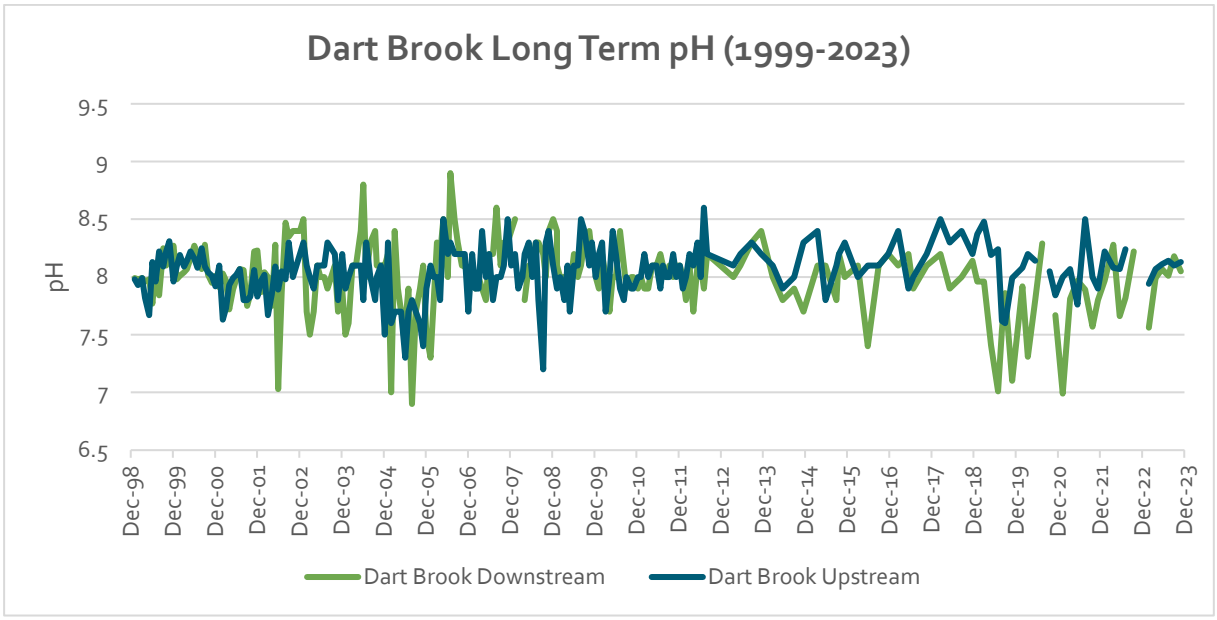

Dart Brook Long Term pH (1999-2023)
9·5
9
8.5
8
7·5
7
6.5
pH
Dec-98
Dec-99
Dec-00
Dec-01
Dec-02
Dec-03
Dec-04
Dec-05
Dec-06
Dec-07
Dec-08
Dec-09
Dec-10
Dec-11
Dec-12
Dec-13
Dec-14
Dec-15
Dec-16
Dec-17
Dec-18
Dec-19
Dec-20
Dec-21
Dec-22
Dec-23
Dart Brook Downstream
Dart Brook Upstream

Table 1 **Annual Surface Water Monitoring Results (August 2023)**

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	8.18	2356	<1	<1	416	605	131	133	61	212	2	2.87	0.16	N/A	N/A	~73	29	1580
Dartbrook Upstream	8.14	1942	<1	<1	392	644	140	133	65	218	2	3.38	0.04	N/A	N/A	~9	16	1300
E2	9.09	14800	<1	2600	7100	1220	10	11	5	5120	48	0.01	N/A	N/A	N/A	N/A	10	9920
Eastern Holding Dam	9.33	2600	<1	331	1060	301	9	12	75	912	10	<0.01	<0.01	<0.01	<0.1	N/A	22	1740
Evaporation Tailing Dam	9.96	48900	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.02	0.8	N/A	N/A	N/A	49	32760
Hunter Downstream	8.28	586.5	<1	<1	201	51	47	29	36	38	2	2	<0.01	N/A	N/A	170	12	590
Hunter Upstream	8.51	557.3	<1	<1	190	41	42	25	30	34	2	0.09	<0.01	N/A	N/A	570	10	370
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	9.48	2344	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<0.01	N/A	11	N/A	N/A	46	1570
SDD	9.24	10100	<1	1800	4250	814	6	8	6	3460	34	0.1	0.03	N/A	<0.1	N/A	51	6770
WHD	9.45	2510	<1	336	755	239	5	10	30	648	8	<0.01	<0.01	N/A	<0.1	N/A	22	1680
WSD	9.48	8890	<1	1840	3090	762	6	18	<1	2780	23	<0.01	0.5	N/A	N/A	N/A	36	5960