MALABAR

ANNUAL REVIEW 2023

MAXWELL UNDERGROUND MINE

Annual Review 2023

Name of operation	Maxwell Underground Mine
Name of operator	Maxwell Ventures (Management) Pty Ltd
Development consent / project approvals	SSD 9526, DA 106-04-00
Name of holder of development consent / project approval	Maxwell Ventures (Management) Pty Ltd
Mining leases	A173, CL229, CL395, ML1531, ML1820, ML1822
Name of holder of mining leases	Maxwell Ventures (Management) Pty Ltd
Water licences	WAL41559, WAL41491*, WAL41234, WAL43166, WAL39739, WAL43160, WAL39792, 20BL171953, 20BL171954, 20BL171955, 20BL171956, 20BL171957, 20BL174016, 20BL174017, 20BL174018
Name of holder of water licences	Maxwell Ventures (Management) Pty Ltd *WAL 41491 is held by AGL Macquarie Pty Ltd
Forward Program start date	3 February 2023
Forward Program end date	2 February 2026
Annual Review start date	1 January 2023
Annual Review end date	31 December 2023

I, James Johnson, certify that this audit report is a true and accurate record of the compliance status of the Maxwell Underground Coal Mine Project for the period 1 January 2023 to 31 December 2023 and that I am authorised to make this statement on behalf of Maxwell Ventures (Management) 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	James Johnson
Title of authorised reporting officer	General Manager Development & Operations
Signature of authorised reporting officer	
Date	27 March 2024

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1 STATEMENT OF COMPLIANCE

A statement of compliance is provided in **Table 1** and further details regarding any non-compliance is provided in **Table 2**.

Table 3 includes the compliance status key as per the Annual Review Guideline published by the Department of Planning, Housing and Infrastructure (DPHI) in October 2015.

Table 1. Statement of compliance

Were all conditions of the relevant approvals complied with?	
SSD 9526	No
DA 106-04-00	Yes
CL229	Yes
CL395	Yes
ML1531	Yes
ML1820	Yes
ML1822	Yes
A173	Yes
EPL 1323	Yes
EPBC 2018/8287	No

Table 2. Non-compliance

Relevant approval	Condition	Condition description	Compliance status	Relevant section of the Annual Review
SSD 9526	B16	$PM_{2.5}$ Air quality criteria	Low	7.4
EPBC 2018/8287	3, 4, 18 and 19	Provision of the Water Management Plan to the Department of Climate Change, Energy, the Environment and Water (DEECCW)	Administrative non-compliance	8.3

Table 3. Compliance status key

Risk level	Colour code	Description
High	Non- compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence
Medium	Non- compliant	Non-compliance with: • potential for serious environmental consequences, but is unlikely to occur; or • potential for moderate environmental consequences, but is likely to occur
Low	Non- compliant	Non-compliance with: • potential for moderate environmental consequences, but is unlikely to occur; or • potential for low environmental consequences, but is likely to occur
Administrative non-compliance	Non- compliant	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g., submitting a report to government later than required under approval conditions)

2 ACRONYMS

Acronym	Definition
A	Authorisation issued under the *Mining Act 1973*
AC	Alternating current
ACHP	Aboriginal Cultural Heritage Management Plan
AQGGMP	Air Quality and Greenhouse Gas Management Plan
Antiene MOD1	Antiene Modification 1
ANZEC	Australia and New Zealand Environment Council
ANZG	Australian and New Zealand Guidelines
APZ	Asset Protection Zone
As	Arsenic
AS	Australian Standard
AWS	Automatic Weather Station
BAM	Biodiversity Assessment Methodology
bcm	Bank cubic metres
BCT	Biodiversity Conservation Trust
BFMP	Bushfire Management Plan
BMP	Biodiversity Management Plan
BRMP	Bioremediation Management Plan
BOM	Bureau of Meteorology
$CaCO_3$	Calcium carbonate
CCC	Community Consultative Committee
Cl	Chloride
CL	Coal Lease issued under the *Mining Act 1973.*
CMP	Contaminated Materials Protocol
CO_2	Carbon dioxide
dB(A)	A-weighted decibels
DA	Development Approval
DEM	Digital Elevation Model
D/S	Downstream
DPHI	NSW Department of Planning, Housing and Infrastructure
EA	Drayton Mine Expansion Environmental Assessment 2007
EC	Electrical conductivity
EIS	Environmental Impact Statement
EL	Exploration Licence

Acronym	Definition
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC	*Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environment Protection Licence
FY	Financial year (from 1 July to 30 June each year)
GHG	Greenhouse gas
g/m^2/month	Grams per square metre per month
GJ	Gigajoules
GW	Groundwater
ha	Hectares
HTE	High Threat Exotic weed
HVEC	Hunter Valley Energy Coal
IEA	Independent Environmental Audit
IPC	Independent Planning Commission
K	Potassium
$L_{A1\ (1\ min)}$	A-weighted sound pressure level that is exceeded for one per cent of the 1-minute measurement period
$L_{Aeq\ (time\ period)}$	A-weighted equivalent continuous sound pressure level over the time period
LEM	Landform Evolution Model
Ltd	Limited
m	Metres
m^2	Square metres
m³	Cubic metres
mAHD	Elevation in metres in respect to the Australian Height Datum
Mb	Molybdenum
MB	Monitoring bore
Mg	Magnesium
mg/L	Milligrams per litre
MEA	Mine entry area
MEG	Regional NSW – Mining, Exploration and Geoscience
MI	Maxwell Infrastructure
ML	Megalitres
ML	Mining Lease issued under the *Mining Act 1992*
MLA	Mining Lease Application
Maxwell MOD1	Maxwell Modification 1
Maxwell MOD2	Maxwell Modification 2

Acronym	Definition
MOP	Mining Operations Plan
m/s	Metres per second
mS/cm	Microsiemens per centimetre
MSC	Muswellbrook Shire Council
Mt	Million tonnes
MP	Management Plan
NBMP	Noise and Blasting Management Plan
NC	No change
Na	Sodium
NGER	National GHG and Energy Reporting
NM	Noise monitor
NR	Not reported
NSW	New South Wales
NTU	Nephelometric turbidity unit
OEH	NSW Office of Environment and Heritage
OPC	Oil pollution control (dam)
PA	Project Approval
pH	Potential of hydrogen (a measure of acidity/alkalinity)
PM_{10}	Particulate matter 10 micrometres or less in diameter
$PM_{2.5}$	Particulate matter 2.5 micrometres or less in diameter
POEO Act	Protection of the Environment Operations Act 1997
Pty	Proprietary
Q	Quarter of a year
REC	Recommendation
RCE	Rehabilitation Cost Estimate
RMP	Rehabilitation Management Plan
ROM	Run of mine
Sb	Antimony
SCMP	Spontaneous Combustion Management Plan
Se	Selenium
SEARs	Secretary's Environmental Assessment Requirements
SO4	Sulphate
sp.	Species
SSD	State Significant Development
STP	Sewage treatment plant

Acronym	Definition
SW	Surface water
t	Tonnes
tCO_2-e	Tonnes of carbon dioxide equivalent
TDS	Total dissolved solids
TEOM	Tapered Element Oscillating Microbalance
TLTS	Too low to sample
TMP	Traffic Management Plan
TSP	Total suspended particulates
TSS	Total suspended solids
UG	Underground
µg/L	Micrograms per litre
$\mu g/m^3$	Micrograms per cubic metre
µS/cm	Microsiemens per cm
UHAQMN	Upper Hunter Air Quality Monitoring Network
U/S	Upstream
VIMP	Visual Impact Management Plan
VWP	Vibrating wire piezometer
WAL	Water Access Licence issued under the *Water Management Act 2000*
WMP	Water Management Plan

3 INTRODUCTION

Maxwell Ventures (Management) Pty Ltd, a wholly owned subsidiary of Malabar Resources Limited (Malabar) owns and operates the Maxwell Underground Mine (Maxwell UG Mine). The site is located in the Upper Hunter Valley of New South Wales (NSW), east-southeast of Denman and south-southwest of Muswellbrook. The site is approved to extract a maximum of 8 million tonnes of run-of-mine (ROM) coal per year over a period of 26 years.

Construction of the Maxwell UG Mine commenced in May 2022 and first workings in the Whynot Seam commenced in March 2023.

The site consists of the following areas:

- Underground area comprising the area of underground mining operations and the mine entry area (MEA) to support underground mining and coal handling activities and provide for personnel and materials access;
- Maxwell Infrastructure (formerly Drayton mine) comprising previous open cut mining areas, coal handling and preparation plant (CHPP), train load-out facilities and rail loop, Antiene rail spur and other infrastructure and services; and
- Transport and services corridor between the MEA and Maxwell Infrastructure comprising the site access road, an overland conveyor (to be constructed), power supply and other ancillary infrastructure and services.

The area within and surrounding the site, which has previously been known as Mt Arthur South, Saddlers Creek and Drayton South, has long been identified as having a significant in-situ coal resource. The regional context of the site is shown in **Figure 1**.

Prospecting for coal commenced in the late 1940s, with exploration intensifying during the 1960s and 1970s. Open cut coal extraction and mining activities commenced at Maxwell Infrastructure in 1983 and ceased in October 2016. The previous open cut mining area is currently in the rehabilitation phase of the mine operations.

The site is bordered by Mt Arthur Coal to the west and AGL Macquarie's Bayswater Power Station and AGL Macquarie's de-commissioned Liddell Power Station adjoining the eastern and southern boundaries. The Antiene rural residential area exists to the north of the site. The relevant approval boundaries, lease boundaries and biodiversity offset areas for the site are shown in **Figure 2**.

The development consent for State Significant Development 9526 (SSD 9526) was granted on 22 December 2020 under clause 8A of the *State Environmental Planning Policy (State and Regional Development) 2011* and section 4.5(a) of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The development consent was modified on 19 November 2021 (Maxwell MOD1) to allow for the repositioning of infrastructure primarily at the MEA and realignment of a section of the site access road. The development consent was further modified (Maxwell MOD2) on 19 October 2022 to allow for the following:

- Re-orientation of the longwall panels in the Woodlands Hill, Arrowfield and Bowfield Seams resulting in a minor increase in the approved underground mining extent.
- Reduction in the width of some of the longwall panels in the Woodlands Hill Seam.
- Repositioning of the upcast ventilation shaft site and associated infrastructure with no increase of the total area disturbed.
- Other minor works and ancillary infrastructure components (e.g. access road and ancillary water management infrastructure for the repositioned ventilation shaft site) with no increase of the total area disturbed.

Development Consent DA 106-04-00 for the existing rail loop and Antiene Rail Spur was granted on 2 November 2000 under Section 76(A)9 and 80 of the EP&A Act and is still

current. DA 106-04-00 was modified on 18 September 2023 (Antiene MOD1) to align with the approved operating life of the Maxwell Underground Project (i.e. until 2047).

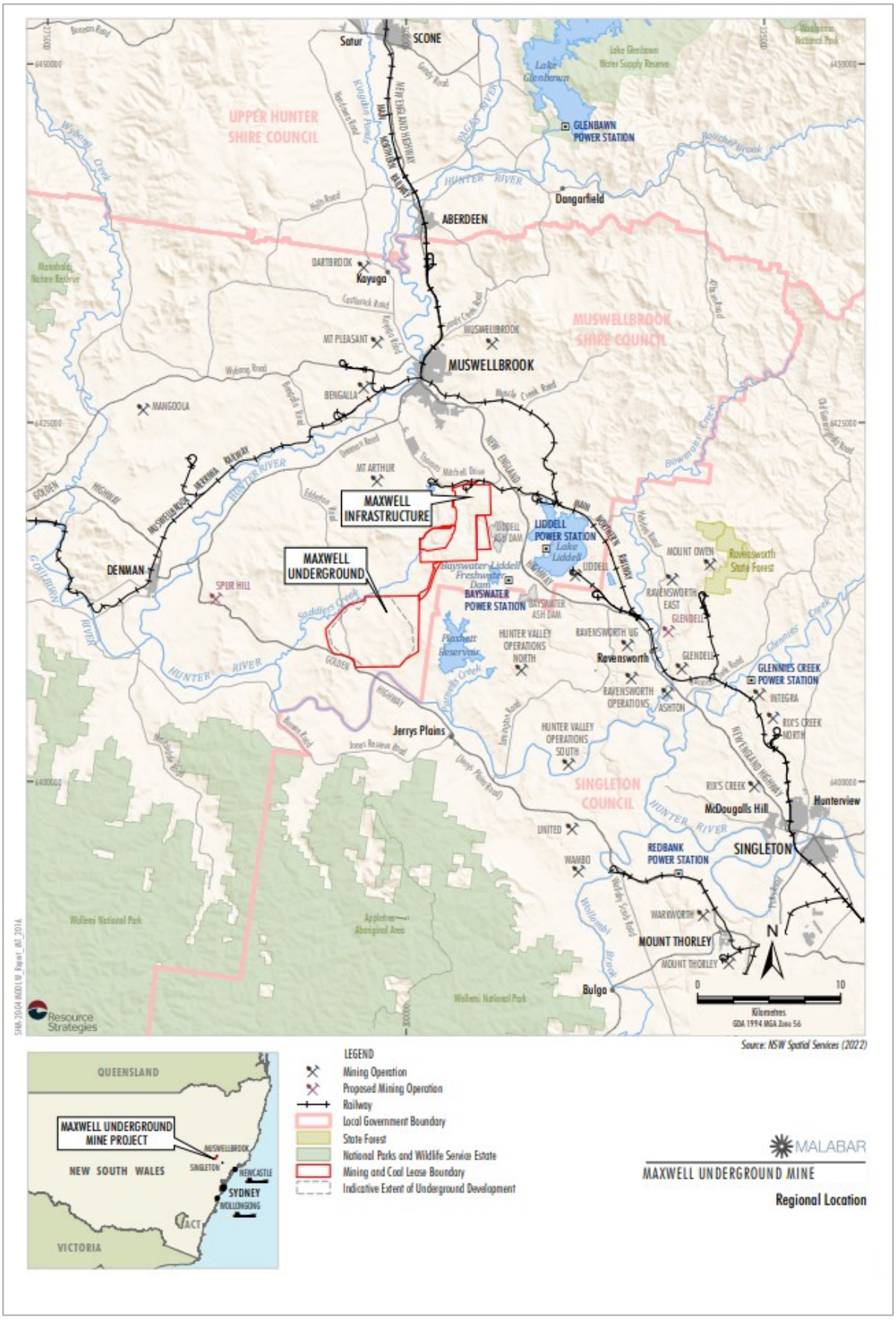


Figure 1. Regional context

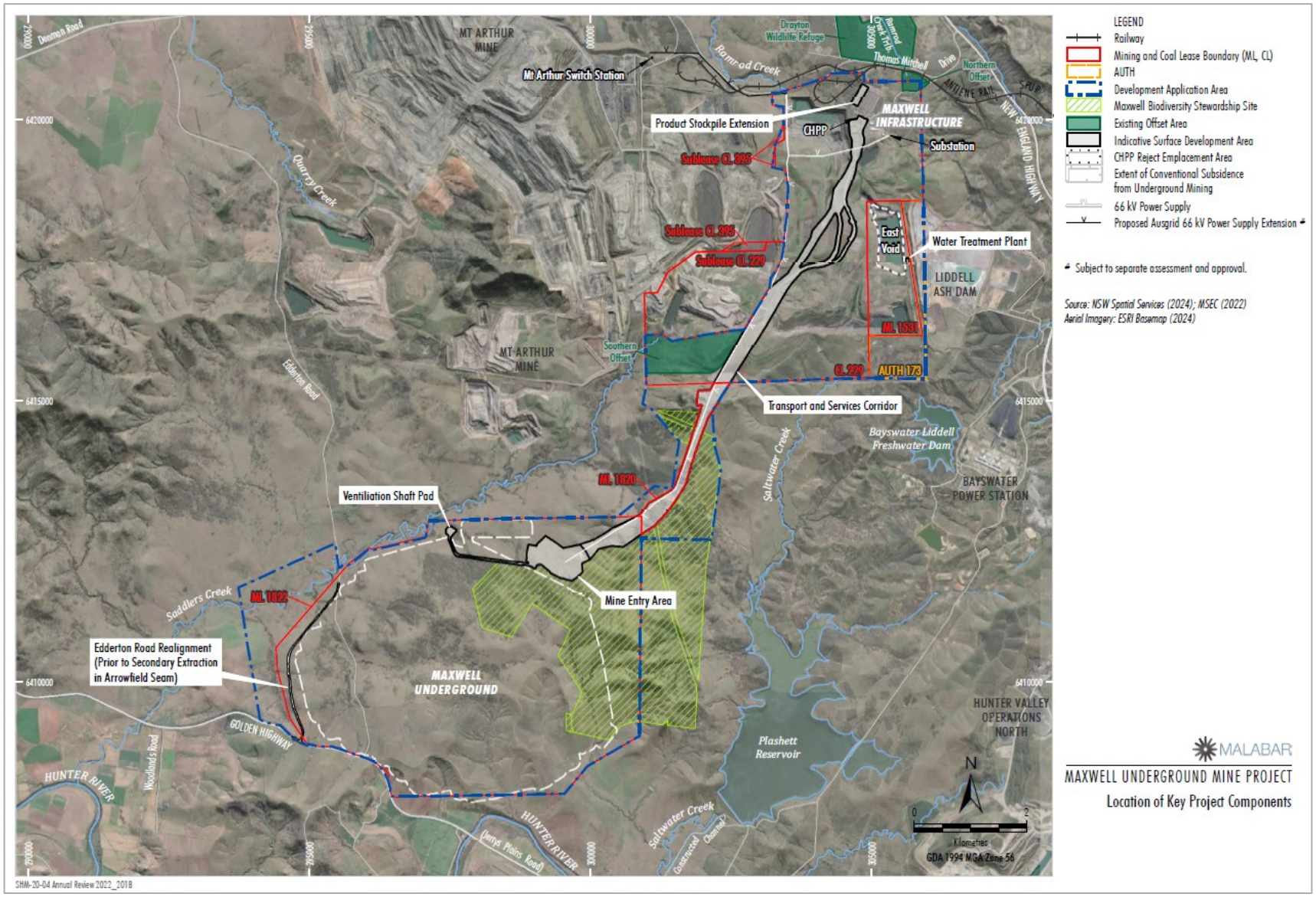


Figure 2. Maxwell UG Mine boundaries

This report details the compliance status of the site with respect to development consents and mining leases from 1 January 2023 to 31 December 2023. It has been prepared in accordance with the Annual Review Guideline published by the DPHI in October 2015. It also fulfils the Annual Review requirements under the conditions of development consent SSD 9526. These conditions and where they have been addressed in the report are listed in **Appendix 1**.

Names and contact details of the key personnel who are responsible for environmental management at the site are provided in **Table 4**.

Table 4. Site contacts

Name	Role	Contact details
James Johnson	General Manager Development and Operations	(02) 6542 0283 jjohnson@malabarresources.com.au
Donna McLaughlin	Health, Safety, Environment and Community Manager	(02) 6542 0283 dmclaughlin@malabarresources.com.au
Alex Newton	Environment and Approvals Coordinator	(02) 6542 0283 anewton@malabarresources.com.au
Chris Donohue	Land and Property Coordinator	(02) 6542 0283 cdonohue@malabarresources.com.au
Teagan Rutter	Community Officer	(02) 6542 0283 trutter@malabarresources.com.au

4 APPROVALS

Operations at the Maxwell Infrastructure site commenced in 1983. A Development Consent granted by Muswellbrook Shire Council in 2002 (DA 163/2002) allowed for the production of up to 5.5 million tonnes per annum (Mtpa) of ROM coal. The Antiene Rail Spur was utilised to transport export thermal coal to the Port of Newcastle via the Main Northern Railway.

On 1 February 2008, PA 06_0202 was granted for the extension of open cut mining operations with a maximum extraction rate of 8 Mtpa of ROM coal, and for the continued use and maintenance of surface infrastructure. A modification to PA 06_0202 was granted by the then Minister for Planning on 16 October 2009 to allow for an extension of the approved mining disturbance footprint and establishment of a new conservation area. A second modification to PA 06_0202 was granted by the then Minister for Planning and Infrastructure on 17 February 2012 to facilitate the development of an explosives storage facility and allow the disposal of tailings within the East Void.

Open cut mining at the Maxwell Infrastructure site ceased in October 2016 under the ownership of Anglo-American. Approval for coal extraction subsequently lapsed on 31 December 2017. On 26 February 2018, the ownership of the Maxwell Infrastructure site was formally transferred to Maxwell and PA 06_0202 was surrendered in July 2022.

In August 2018, Maxwell submitted a request to the DPHI for Secretary's Environmental Assessment Requirements for the Maxwell UG Mine. Maxwell proposed to develop an underground coal mine and utilise substantial existing facilities at the Maxwell Infrastructure site. Development consent for the Maxwell UG Mine SSD 9526 was granted on 22 December 2020 under clause 8A of the *State Environmental Planning Policy (State and Regional Development) 2011* and section 4.5(a) of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Maxwell MOD1 was approved on 19 November 2021 to allow for the following:

- Repositioning of the underground portal;
- Realignment of a small section of the proposed access road at the Maxwell Infrastructure site to utilise an existing haul road and minimise impacts to established mine rehabilitation;
- Repositioning of an approved clean water diversion for the MEA;
- Repositioning of the water treatment facility from the MEA to the Maxwell Infrastructure site; and
- Other minor works and ancillary infrastructure components within the existing approved surface development areas (e.g. works associated with the reconfiguration of the MEA, pumps/pipelines associated with the water treatment facility).

Maxwell MOD2 was approved on 19 October 2022 to allow for the following:

- Re-orientation of the longwall panels in the Woodlands Hill, Arrowfield and Bowfield Seams resulting in a minor increase in the approved underground mining extent;
- Reduction in the width of some of the longwall panels in the Woodlands Hill Seam;
- Repositioning of the upcast ventilation shaft site and associated infrastructure with no increase of the total area disturbed; and
- Other minor works and ancillary infrastructure components (e.g. access road and ancillary water management infrastructure for the repositioned ventilation shaft site) with no increase of the total area disturbed.

The Antiene Rail Spur has been servicing the former Drayton Mine since 1983, the Mt Arthur Mine since 2001 and the Maxwell Underground Project since 2023. The Antiene Rail Spur is used to transport coal from these operations via the Main Northern Railway Line to the Port

of Newcastle for export. Development Consent DA 106-04-00 for the existing rail loop and Antiene Rail Spur was granted on 2 November 2000 under Section 76(A)9 and 80 of the EP&A Act. DA 106-04-00 was modified on 18 September 2023 (Antiene MOD1) to align with the approved operating life of the Maxwell Underground Project (i.e. until 2047).

Maxwell holds Environment Protection Licence (EPL) 1323 for the Maxwell Underground Project. No variations were made to the EPL during the reporting period.

Open cut mining operations previously occurred within Mining Lease (ML) 1531, Coal Lease (CL) 229 and CL 395, targeting the Broughams, Grasstrees, Thiess, Puxtrees and Balmoral Seams within the Rowan Formation of the Greta Coal Measures. Maxwell now holds pre-existing leases CL 229, CL 395 and ML 1531. On 10 November 2021, Maxwell was granted ML 1820 for ancillary mining activities and ML 1822 was granted on 18 November 2021 for underground coal mining.

A sub-lease is executed between Maxwell and Hunter Valley Energy Coal (HVEC) and registered against a portion of CL 229 and CL 395. In accordance with the sub-lease, HVEC is responsible for the rehabilitation of the area under the sub-lease, and it is therefore excluded from the scope of this Annual Review.

On 19 August 2020, Maxwell received development consent SSD 9820 under the State Significant Development provisions of the EP&A Act for the Maxwell Solar Farm. The approved Maxwell Solar Farm activities include the development of a ground-mounted photovoltaic solar panels with an installed capacity of approximately 25 Megawatts (AC). The solar farm would be located on approximately 130 hectares (ha) of rehabilitated open cut mine land within the site.

Current development consents, leases and licences relevant to the site are listed in **Table 5**.

Table 5. Statutory approvals

Statutory Approval Reference	Description
SSD 9526	Development Consent issued under Section 4.36 of the *Environmental Planning and Assessment Act 1979* for the Maxwell UG Mine
DA 106-04-00	Development Consent issued under Section 4.55(2) of the *Environmental Planning and Assessment Act 1979* for use of the existing Drayton Rail Loop and Antiene Rail Spur.
CL229	Coal Lease issued under the *Mining Act 1973.*
CL395	Coal Lease issued under the *Mining Act 1973.*
ML1531	Mining Lease issued under the *Mining Act 1992.*
ML1820	Mining Lease issued under the *Mining Act 1992* for ancillary mining activities.
ML1822	Mining Lease issued under the *Mining Act 1992* for underground coal mining.
A173	Authorisation issued under the *Mining Act 1992.*

Statutory Approval Reference	Description
EPL 1323	Environment Protection Licence (EPL) issued under Section 55 of the *Protection of the Environment Operations Act 1997* (POEO Act) for mining for coal and coal works.
EPBC 2018/8287	Approval under sections 130(1) and 133(1) of the *Environment Protection and Biodiversity Conservation Act 1999*.
WAL41559	Water Access Licence issued under the *Water Management Act 2000* for aquifer water extraction.
WAL41491	Water Access Licence issued under the *Water Management Act 2000* for aquifer water extraction.
WAL41234	Water Access Licence issued under the *Water Management Act 2000* for aquifer water extraction.
WAL43166	Water Access Licence issued under the *Water Management Act 2000* for aquifer water extraction.
WAL39739	Water Access Licence issued under the *Water Management Act 2000* for aquifer water extraction.
WAL43160	Water Access Licence issued under the *Water Management Act 2000* for aquifer water extraction.
WAL39792	Water Access Licence issued under the *Water Management Act 2000* for aquifer water extraction.
20BL171953	Bore licence issued under the *Water Act 1912* for a test bore.
20BL171954	Bore licence issued under the *Water Act 1912* for a test bore.
20BL171955	Bore licence issued under the *Water Act 1912* for a test bore.
20BL171956	Bore licence issued under the *Water Act 1912* for a test bore.
20BL171957	Bore licence issued under the *Water Act 1912* for a test bore.
20BL174016	Bore licence issued under the *Water Act 1912* for a monitoring bore.
20BL174017	Bore licence issued under the *Water Act 1912* for a monitoring bore.
20BL174018	Bore licence issued under the *Water Act 1912* for a monitoring bore.

5 OPERATIONS SUMMARY

5.1 Mining Operations

The Maxwell UG Mine is an underground mining operation that will produce high-quality coal over a period of approximately 26 years. It is approved to extract up to 8 Mtpa of ROM coal from four seams within the Wittingham Coal Measures, using the following underground mining methods:

- Underground bord and pillar mining with partial pillar extraction in the Whynot Seam; and
- Underground longwall extraction in the Woodlands Hill Seam, Arrowfield Seam and Bowfield Seam.

At least 75 per cent of product coal produced would be capable of being used in the making of steel (coking coals). The balance would be export thermal coals suitable for the new-generation High Efficiency, Low Emissions power generators.

Substantial existing infrastructure at the Maxwell Infrastructure site is used for the handling, processing and transportation of coal. This includes the existing CHPP, train load-out facilities and other infrastructure and services including water management infrastructure, administration buildings and workshops.

Construction of the Maxwell UG Mine continued during the reporting period including the following activities:

- Construction of the Whynot and Woodlands Hill portal entries.
- Maintenance of the temporary access road including an interim seal.
- Construction of the permanent access road.
- Installation of dams, temporary buildings and services to the MEA.
- Installation of the Whynot entry conveyor and portal fan.
- Insitu waste rock was removed as part of construction works at the MEA and along the transport corridor.

The CHPP was recommissioned during the reporting period and electrical, mechanical and structural repairs were undertaken on the stacker and reclaimer. The train load out facility was also recommissioned and the rail loop was brought back into service with improvements including ballast renewal, sleeper replacement and culvert repair.

A contract was awarded to PIMS Mining during the reporting period to provide services for underground bord and pillar mining in the Whynot Seam. First workings commenced in the Whynot Seam in March 2023 and first coal was produced from the bord and pillar operation at the end of March 2023. Mining operations were staged during the initial onboarding process (i.e. until all crews could be manned) and now occurs on a continuous basis, 24 hours a day, seven days a week. The first train was loaded and departed the mine site in June 2023.

In July 2023, the portal entries for the Woodlands Hill Seam were completed and a contract was awarded to Pybar for construction of the surface to seam drifts. Drift construction commenced during the reporting period and is expected to be completed during the next reporting period.

By the end of 2023 the depth of the workings for the Whynot mine was 142 metres Australian Height Datum (mAHD) and the drift for the Woodlands Hill mine had progressed 794 m in length to a depth of 97 mAHD. A production summary is presented in **Table 6.**

Table 6. Production summary (extraction)

Material	Approved limit	Previous reporting period (actual)	This reporting period (actual)	Next reporting period (forecast)
Waste rock / overburden (bcm)	N/A	385,372	715,354	190,000
ROM coal / ore (t)	8,000,000	0	109,862	726,113
Coarse reject (t)	N/A	0	22,518	137,923
Fine reject (tailings) (t)	N/A	0	20,056	68,962
Saleable product (t)	7,000,000 (by rail)	0	33,962	519,228

5.2 Other Operations

A drilling program was undertaken within ML1822 during the reporting period and included the following:

- One geotechnical borehole was drilled for the purpose of ground support design for the Whynot Bord and Pillar underground operation.
- Nine geotechnical boreholes were drilled within the MEA to provide geotechnical design parameters for the conveyor installation.
- Three boreholes were drilled to determine if material could be excavated for the Woodlands Hill Drift Entry portal.
- Three boreholes were drilled for the design of the ventilation shaft for longwall operation.
- One bore hole was drilled for the determination of volatile matter content of the Blakefield Seam to assist in design of the Woodlands Hill Drift construction methodology.

A ground magnetic survey was also undertaken to identify igneous dykes and associated faults associated with the underground bord and pillar operation.

Although open cut mining operations have ceased at the Maxwell Infrastructure site, rehabilitation of the completed mining areas along with ancillary activities, including upkeep of roads and maintenance of equipment continued during the reporting period. These works were focused on final landform development and rehabilitation and are discussed in more detail in **Section 9**.

5.3 Next Reporting Period

During the next reporting period, construction works will be focussed on earthworks and installation of the conveyor trace, permanent access road and vent shaft. The Water Treatment Plant will also be installed.

The operation of the underground bord and pillar mine in the Whynot Seam will continue with second workings expected to commence during the next reporting period, following approval

of the Whynot Extraction Plan. It is also expected that the drifts to the Woodlands Hill Seam will be completed during the next reporting period and development in the Woodlands Hill Seam will commence.

Surface trenching, magnetic surveys, test pits and the drilling of cored and non-cored holes are proposed to be undertaken within ML 1822. These exploration activities will assist with further defining the geological model and will provide reservoir (gas testing) characterisation. A geochemistry assessment may also be undertaken if required.

6 ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

DPHI provided a letter in October 2023 stating that they had reviewed the 2022 Annual Review and considered the report to generally satisfy the reporting requirements of the consent and the Department's *Annual Review Guideline* (October 2015).

In addition, the letter requested that blasting conducted for the development is assessed against the relevant criteria set out in Schedule 2, Condition B5 of development consent SSD 9526 and included in future Annual Reviews. This action has been included in **Table 7** below. **Table 7** lists the actions required from previous reviews, regulatory notices, improvement actions and outstanding IEA actions.

Table 7. Actions required from previous reviews, regulatory notices, improvement actions and outstanding IEA actions

Action required	Requested by	Action taken	Section in Annual Review
For future Annual Reviews, under the provisions of Schedule 2 Condition A3 of the consent, please ensure that any blasting conducted for the development is assessed against the relevant criteria set out in Schedule 2 Condition B5 of the consent.	DPHI	Completed. Blasting monitoring results have been assessed against the relevant criteria set out in Schedule 2 Condition B5 of SSD 9526.	7.3
Engage a suitably qualified expert to undertake an assessment (the Assessment) that sets out the design of modifications to the rehabilitated landform and surface water management structures (Measures) on the rehabilitated landform to address the instability and erosion risks identified in 'Point M, background' above. The Assessment must take into account and build upon the Landform Evolution Model and Surface Water Assessments reports provided to address notice NTCE0008542 (refer to Point H in 'Background' above) as well as the revised "Report to Address NTCE0008542, Maxwell Infrastructure"(refer to Point J in 'Background' above). The Assessment must include the following:	Resources Regulator – Notice NTCE0011420	Completed. Assessment report prepared and submitted to the Resources Regulator in May 2023.	9.1

Action required	Requested by	Action taken	Section in Annual Review
a. design (including size, construction methodology and location) of the measures to the rehabilitated landform and surface water management structures to address the instability risks and the previous Landform Evolution Assessment. b. for measures that include the construction or modifications to surface water management structures, information on how the design of these structures will remain stable based on peak flows of the surface water flows determined from the hydrological assessment (i.e. maintain sufficient capacity as well as channel stability when conveying peak surface water flows, in terms of peak velocity and bed shear stress - including drain/channel dimensions and rock armour sizing). c. design criteria and testing procedure to be used to determine the selection of rock armouring to ensure rock used in surface water management structures is competent and not subject to excessive weathering that may compromise the stability of the structures. d. construction quality control requirements including requirements for subsequent validation modelling e.g. static erosion modelling. e. an implementation schedule for the works and subsequent quality control/validation requirements. Submit a final report prepared by the suitably qualified expert to the Resources Regulator electronically to nswresourcesregulator@service-now.com that details the Assessment undertaken.			

Action required	Requested by	Action taken	Section in Annual Review
Conduct a rehabilitation risk assessment for the Authorisations, that meets the requirements of the standard conditions of mining leases set out in clause 7 of Schedule 8A of the Mining Regulation, including to address the risks and measures set out in the report prepared under Direction 1.	Resources Regulator – Notice NTCE0011420	Completed. Rehabilitation risk assessment updated in May 2023.	9.1
Prepare a rehabilitation management plan for the Authorisations that meets the requirements of the standard conditions of mining leases set out in clauses 9, 10 and 11 in Schedule 8A of the Mining Regulation, including to address the measures set out in the report prepared under Direction 1.	Resources Regulator – Notice NTCE0011420	Completed. Rehabilitation Management Plan updated in May 2023.	9.1
a. Prepare a forward program for the Authorisations that meets the requirements of the standard conditions of mining leases set out in clauses 9 and 13(1) in Schedule 8A of the Mining Regulation. The forward program must incorporate the schedule of measures set out in the report prepared under Direction 1. b. Give the forward program to the Secretary in accordance with the standard condition of mining leases set out in clause 13(4) of the Mining Regulation	Resources Regulator – Notice NTCE0011420	Completed. Forward Program updated and submitted to the Resources Regulator in June 2023.	9.1

Action required	Requested by	Action taken	Section in Annual Review
a. Prepare an annual rehabilitation report for the Authorisations that meets the requirements of the standard conditions of mining leases set out in clauses 9 and 13(2) of Schedule 8A of the Mining Regulation, including reporting on the measures set out in Direction 1. b. Give the annual rehabilitation report to the Secretary in accordance with the standard condition of mining leases set out in clause 13(4) of the Mining Regulation.	Resources Regulator – Notice NTCE0011420	Completed. Annual Rehabilitation Report prepared and submitted to the Resources Regulator in August 2023.	9.1
Provide a progress report to detail the progress of the implementation of the measures identified in Direction 1, which includes the following: a. List of measures required and the progress of implementation for each measure, b. Verification of measures implemented, and c. Results of quality assurance and validation of measures implemented.	Resources Regulator – Notice NTCE0011420	This will be addressed during the next reporting period.	9.1
Real-time noise monitoring data will be calibrated with the attended noise monitoring data.	2022 Annual Review	Not completed. The mine was inaudible at all times and at all locations throughout the reporting period therefore the calibration could not be undertaken.	7.2
Additional infill planting at the MEA tree planting area with tube stock during the optimal planting periods.	2022 Annual Review	Completed. Infill planting at the MEA tree planting area was undertaken during April 2023.	7.8

Action required	Requested by	Action taken	Section in Annual Review
Maxwell will look to install additional noise mitigation measures at three privately owned receivers in accordance with Schedule 2, Condition D1 of Development Consent SSD 9526.	2022 Annual Review	Completed. Maxwell signed agreements with four privately owned receivers (landholder ID 402, 403, 411 and 538) to install noise mitigation measures in accordance with Schedule 2, Condition D1 of Development Consent SSD 9526. Noise mitigation measures were installed at landholder ID 538 during the reporting period.	7.2
An archaeological salvage will be undertaken within the MOD2 disturbance areas during the next reporting period.	2022 Annual Review	Completed. An archaeological salvage program, involving surface collection and open area excavation was undertaken during the reporting period for the Maxwell MOD2 areas.	7.5
Preventative and corrective maintenance work on sections of the Antiene Rail Spur, including rail grinding, condition assessments, inspections and testing will be undertaken during the next reporting period to prepare for coal export from site.	2022 Annual Review	Completed. Various preventative and corrective maintenance activities were undertaken on the Antiene Rail Spur during the reporting period.	7.7
Evaluation of the long-term large-scale potential of solar following the execution of formal agreements with EDF Renewables to develop large scale renewable energy projects in the Upper Hunter Valley, helping to support the Hunter's transition to a low carbon economy.	2022 Annual Review	Completed. Further evaluation of long-term large-scale solar has been undertaken. A Scoping Report for the Edderton Solar Project will be submitted to DPHI during the next reporting period.	7.9
Malabar will seek to empty one or more of the bioremediation pads during the next reporting period to ensure sufficient capacity in case of future need.	2022 Annual Review	Completed. Cells 1B, 2B, 3A, 3B, 4A and 5A were emptied during the reporting period.	7.11

Action required	Requested by	Action taken	Section in Annual Review
The slashing of all property boundaries will be undertaken during the next reporting period.	2022 Annual Review	Completed. Property boundaries were slashed following the annual inspection in August 2023.	7.12
Weed controls programs at the Southern Offset Area will target Galenia and Golden Wreath Wattle	2022 Annual Review	Completed. Thinning of Golden Wreath Wattle was undertaken within the Southern Offset during the reporting period. General site weed control also targeted Galenia.	7.14
Infill planting will be undertaken at the Southern Offset Area.	2022 Annual Review	Completed. The Autumn tree planting program was undertaken at the Southern Offset Area.	7.14 and 9.1
New mine water storages at the MEA will be commissioned during the next reporting period and monitored on a routine basis.	2022 Annual Review	Completed. The new mine water storages at the MEA, specifically the MEA Sediment Dam, the MEA Mine Water Dam, the MEA Dam and the MEA Treated Water Dam were commissioned during the reporting period.	8.3
In accordance with the SWMP, site specific triggers will be calculated from site data based on the ANZG (2018) method for guideline value derivation where 24 months of baseline observations are available.	2022 Annual Review	Not completed. 24 months of baseline observations are not yet available.	8.3
In accordance with the Groundwater Management Plan, the observed groundwater levels will be reviewed against the model predictions	2022 Annual Review	Completed. Observed groundwater levels have been reviewed against the model predictions and have remained within historic groundwater level ranges.	8.5

Action required	Requested by	Action taken	Section in Annual Review
Two tree planting programs consisting of approximately 21,000 tube stock to be planted on existing mine rehabilitation within the conceptual woodland corridor.	2022 Annual Review	Completed. Two tree planting programs, consisting of approximately 27,500 tube stock were undertaken on existing mine rehabilitation within the conceptual woodland corridor.	9.2
Implement a weed control program focussing on High Threat Exotic weed species.	2022 Annual Review	Completed. Targeted weed management was completed across the site for High Threat Exotic weed species.	9.2
Undertake a kangaroo cull on rehabilitation areas to reduce the impact on grazing on vegetation.	2022 Annual Review	Completed. A kangaroo cull was undertaken during June and August 2023.	7.14 and 9.2
Undertake baiting of rabbits near the Great North Tip and along the main access road (where appropriate).	2022 Annual Review	Completed. Culling of rabbits was undertaken during June and August 2023.	7.14
Where practicable, fallen timber and hollow resources will be reintroduced into woodland rehabilitation areas where there is a low abundance of habitat features.	2022 Annual Review	Completed. Over 100 logs and hollow timber was reintroduced into woodland rehabilitation areas during the reporting period.	7.14

7 ENVIRONMENTAL PERFORMANCE

The Environmental Management Strategy for the Maxwell UG Mine provides an overview of the site's environmental monitoring. Environmental monitoring is a significant indicator of the site's environmental performance. In December 2023, the Environmental Management Strategy was updated to incorporate Antiene MOD1.

The locations of all environmental monitoring sites are shown in **Appendix 2**.

7.1 Meteorological Monitoring

Management

Meteorological conditions such as wind speed, wind direction, temperature, rainfall, solar radiation and humidity are monitored at two automatic weather stations AWS-1 and AWS-2.

Performance

During the reporting period, temperature trends were similar to previous years with a peak in summer and trough in winter. This is shown in **Figure 3** and **Figure 4**.

The monthly mean maximums at AWS-1 were on average higher than the previous five-year average, ranging from 2.9 degrees Celsius (°C) below the average, to 5.1°C above the average in September. January, April and May were below the previous five-year average, the remainder were above. The monthly mean minimums were below the average for all months with the exception of August, November and December.

The monthly mean maximum temperatures for AWS-2 were also generally higher than the previous five-year monthly mean maximums, ranging from 2.9°C below the five-year mean maximum in April to 5.2°C above the five-year mean maximum in September. The monthly mean minimums at AWS-2 were less than the average for January, February, March, May, June, July, September and October and above the average for April, August, November and December.

Analysis showed that these statistics were consistent with records from across Australia and NSW, with the start of 2023 being relatively cool and wet, consistent with the weakening 2022–23 La Niña. Warmer than average temperatures were experienced across southern Australia in winter and spring, consistent with a strong positive Indian Ocean Dipole and developing El Niño (source: Australian Government Bureau of Meteorology (BoM) Annual climate statement 2023).

A summary of wind monitoring over the reporting period is presented in **Figure 5** and **Figure 6**. Consistent with previous years, and consistent with the geography of the Hunter Valley, the predominant winds were from the south-east and north-west.

As in previous years, winds from the south-east generally dominated during the warmer months and winds from the north-west generally dominated during the cooler months. In total 87 per cent of wind speeds throughout the reporting period were up to 4 m/s (identical to 2022) at AWS-1 and 55 per cent at AWS-2. At AWS-2 45 per cent of wind speeds were in excess of 4 m/s. These higher wind speeds at AWS-2 reflect the exposed location of the recording station at the top of a hill, whereas AWS-1 is situated in a wooded area in a less exposed location. The most common 45-degree wind sector at both AWS-1 and AWS-2 was from the southeast (26 per cent and 17 per cent respectively of winds).

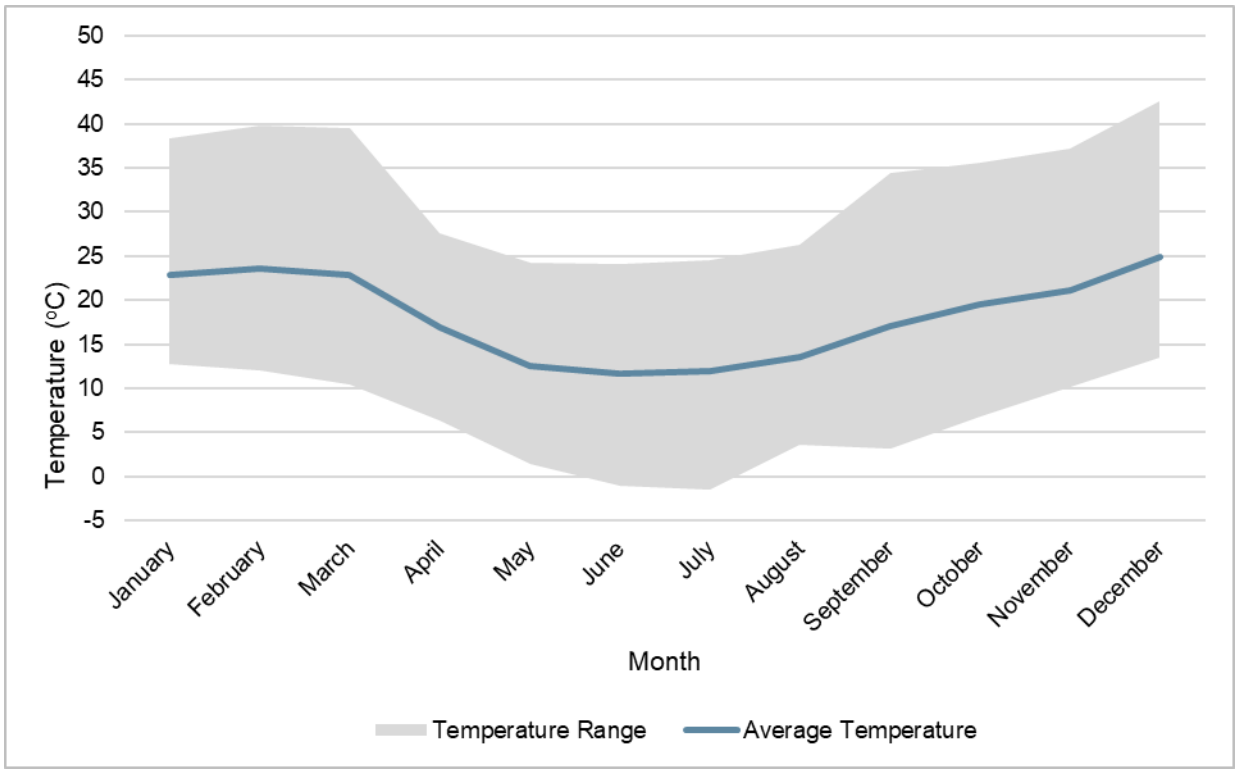


Figure 3. AWS-1 average temperature and temperature range for the reporting period

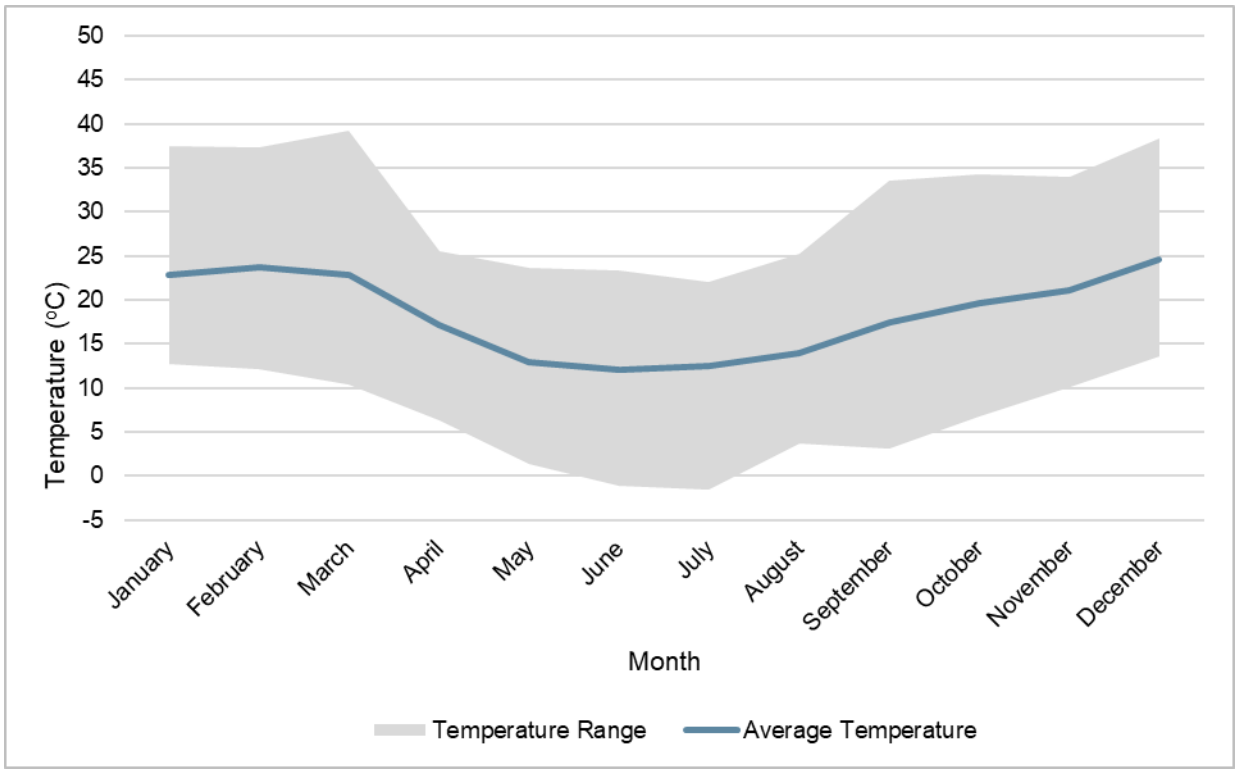


Figure 4. AWS-2 average temperature and temperature range for the reporting period

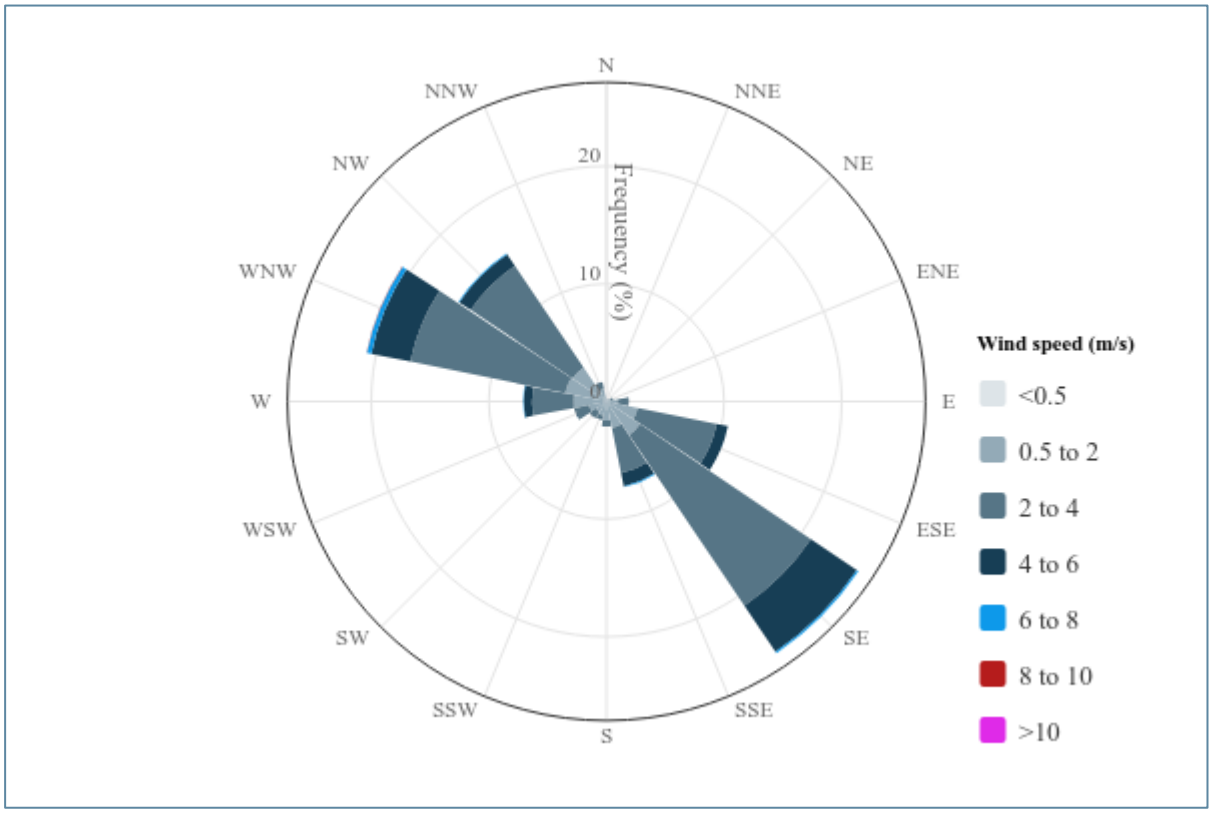


Figure 5. Wind speed and direction for the reporting period at AWS-1

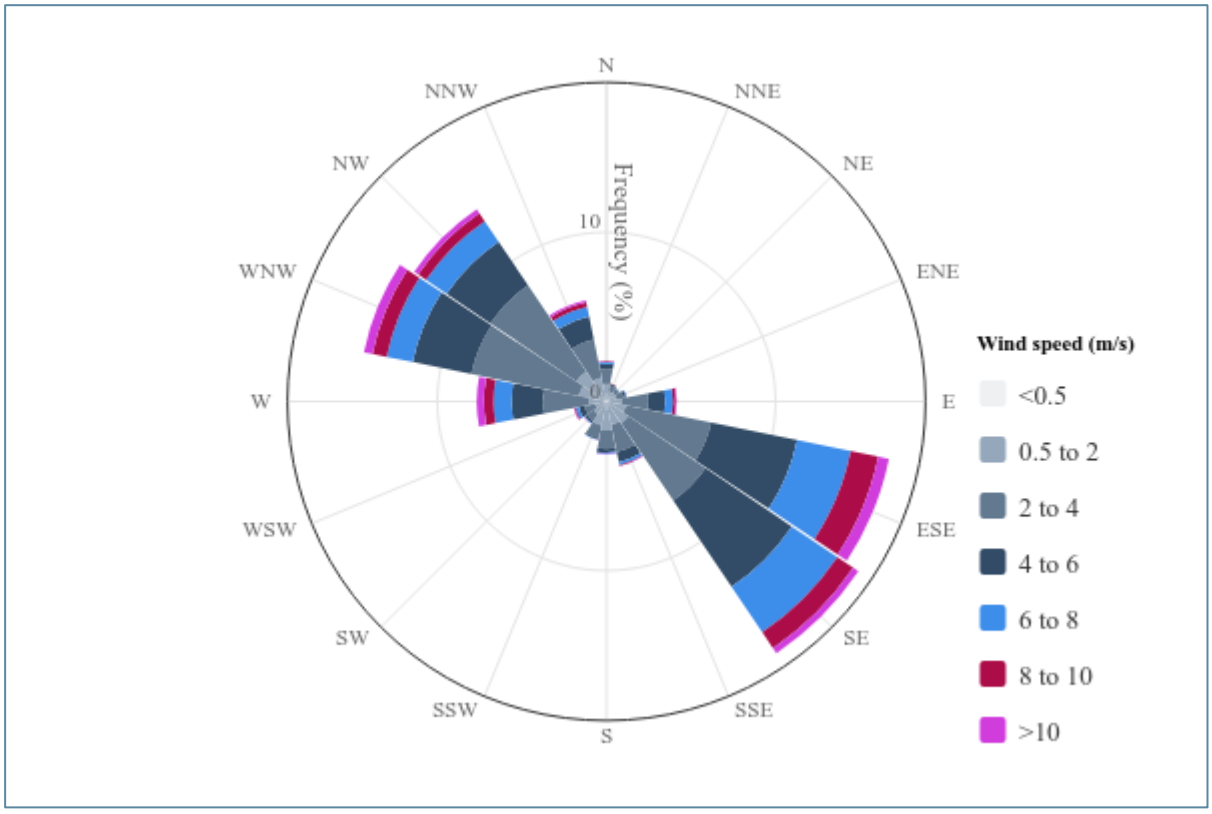


Figure 6. Wind speed and direction for the reporting period at AWS-2

Rainfall recorded during the reporting period was significantly below average. This can be seen in Figure 7 which shows monthly rainfall during the reporting period compared to the average monthly rainfall for the previous 10 years. The decrease in rainfall was consistent with observations made by the Australian Government Bureau of Meteorology in their Annual climate statement 2023, which noted that NSW had a -23 per cent departure from the long term (1961–1990) mean. It should be noted that the March, July and October long term averages in Figure 7 is disproportionately affected by the record rainfalls of 2022, associated with the 2022–23 La Niña.

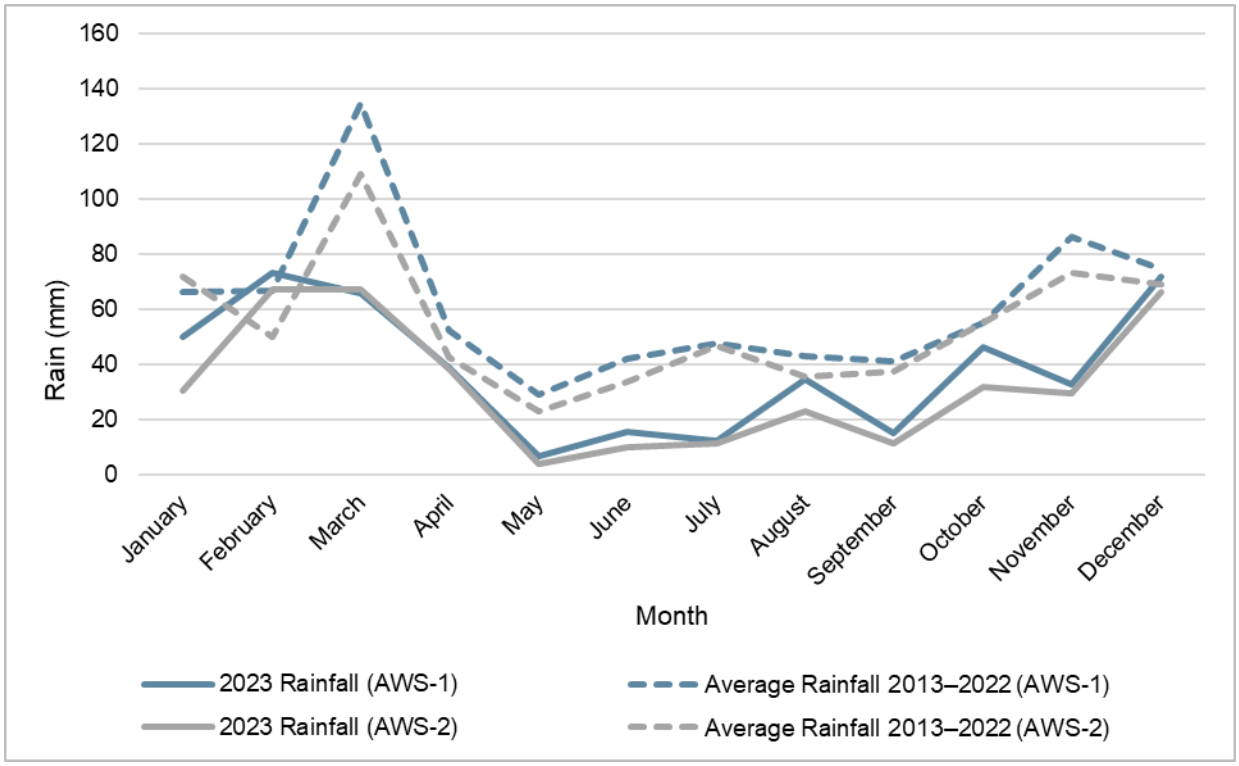


Figure 7. Rain for the reporting period with historic comparison

Proposed Improvements

There are no improvements identified for the next reporting period.

7.2 Noise

Management

Potential noise impacts from the site are managed in accordance with the Noise and Blasting Management Plan (NBMP) for the Maxwell UG Mine. In February 2023, the NBMP was updated to incorporate Maxwell MOD2. The NBMP was again updated in December 2023 following approval of Antiene MOD1. The purpose of the NBMP is to detail statutory requirements and outline the controls to be implemented for the management of noise associated with the site.

The noise monitoring program includes a combination of attended and real-time monitoring at locations representative of residential receivers. Attended monitoring is carried out in accordance with the relevant requirements set out in the Noise Policy for Industry (EPA 2017). Measurement of the noise environment for compliance assessment is conducted by an acoustic consultant. The compliance assessment for the remaining residential sites is determined by the acoustic consultant using the noise model to extrapolate from the measured values.

Real-time noise monitoring is undertaken for operational purposes only and currently involves the use of a BarnOwl directional noise monitoring system.

Performance

Attended noise monitoring and modelling was conducted during the reporting period to assess noise impacts and determine compliance to approval criteria. Monitoring was conducted every month at four locations (NM1 to NM4) in accordance with the NBMP. Noise impacts were assessed each month over three consecutive operating days for a minimum of 1.5 hours during the day, 30 minutes during the evening and 1 hour during the night. Results for the reporting period are summarised in **Appendix 3**.

The approval criteria was not exceeded for any noise monitoring parameter at any location during the reporting period. Noise generated by the site alone was consistently inaudible and or too low to be measured. This is below the EIS predictions but was expected given the location and nature of the construction and operational activity (i.e. primarily at the MEA).

Similarly, cumulative noise impacts were significantly below the approval criteria. Maximum noise levels from the site are compared to maximum noise levels recorded over the previous eight years in **Appendix 3**. Results show that there has been an overall reduction in noise levels since open cut mining operations ceased on site in late 2016.

Field calibration of the real-time Barn Owl data was unable to be undertaken during the reporting period, as the site was inaudible at all monitoring locations. The Barn Owl data will be calibrated with the attended noise monitoring data once the site generates sufficient noise for comparative purposes.

During the reporting period, Maxwell signed agreements with four privately owned receivers (landholder ID 402, 403, 411 and 538) to install noise mitigation measures in accordance with Schedule 2, Condition D1 of Development Consent SSD 9526. Noise mitigation measures were installed at landholder ID 538 during the reporting period. All works were undertaken in consultation with the landowner and the measures were consistent with the Voluntary Land Acquisition and Mitigation Policy (DPIE 2018).

Proposed Improvements

During the next reporting period, Maxwell will complete the installation of noise mitigation measures at the remaining three privately owned receivers (landholder ID 402, 403 and 411) in accordance with Schedule 2, Condition D1 of Development Consent SSD 9526.

7.3 Blasting

Management

Potential blast impacts from the site are managed in accordance with the NBMP for the Maxwell UG Mine. As noted above, in February 2023, the NBMP was updated to incorporate Maxwell MOD2. The NBMP was again updated in December 2023 following approval of Antiene MOD1. The purpose of the NBMP is to detail statutory requirements and outline the controls to be implemented for the management of surface blasts associated with the site.

Any private landholder or occupier of any residence, who registers an interest in being notified about blasting activities at the site are notified of upcoming blast events. An early notification is provided approximately two days before a proposed blast and another notification is provided on the day of the proposed blast. Proposed blast times are also uploaded onto the Muswellbrook Shire Council Blasting Announcements webpage to enable interested members of the public to get up-to-date information. A Pre-Blast Checklist is completed prior to each blast and includes a fume risk assessment and review of environmental conditions on the day of the blast.

Temporary blast monitors were installed at six locations in October 2022, prior to construction surface blasting for the Maxwell UG Mine. Airblast overpressure and ground vibration are recorded in accordance with *AS 2187.2 – 2006 and ANZEC Guidelines*.

Performance

Construction surface blasts were conducted on the following dates during the reporting period:

- 16 March 2023 (one blast)
- 24 May 2023 (one blast)
- 7 June 2023 (one blast)

Blasing criteria is shown in **Table 8**. A summary of the monitoring data is shown in **Table 9**. The recorded levels demonstrate that blast vibration and overpressure levels recorded at the time of the blast were negligible and largely indistinguishable from background levels. The approval criteria were not exceeded for any blast at any location during the reporting period.

The temporary blast monitors were removed during the reporting period as no further construction surface blasting is proposed.

Table 8. Blasting criteria

Date	Airblast overpressure (dB(Lin Peak))	Ground vibration (mm/s)	Allowable exceedance
Residence on privately owned land	120	10	0%
	115	5	5% of the total number of blasts over a calendar year
Electricity Transmission Lines	-	50	0%
Public Roads	-	100	0%
All other infrastructure, including the Liddell Ash Dam Wall	-	50	0%

Table 9. Summary of blast monitoring results

Date	Time	Monitoring site name	Maximum ground vibration (mm/s) with allowable exceedance (1)	Maximum airblast overpressure (dBL) with allowable exceedance[1]
16 March 2023	13:59	Bowfield	0.029	99.4
		Plashett	0.033	103.6
		Antiene	0.105	86.9
		Coolmore	0.114	89.8

Date	Time	Monitoring site name	Maximum ground vibration (mm/s) with allowable exceedance (1)	Maximum airblast overpressure (dBL) with allowable exceedance[1]
		Godolphin	0.046	102.9
		ADL1	0.031	116.0
24 May 2023	15:31	Bowfield	0.060	84.9
		Plashett	0.140	92.5
		Antiene	0.097	88.9
		Coolmore	0.065	86.2
		Godolphin	0.029	108.6
		ADL1	0.090	85.5
7 June 2023	15:30	Bowfield	0.060	97.9
		Plashett	0.066	92.5
		Antiene	0.093	90.5
		Coolmore	0.068	86.2
		Godolphin	0.133	97.4
		ADL1	0.070	91.5

(1) The allowable exceedances are expressed as a percentage of the total number of blasts over a calendar year.

Proposed Improvements

There are no improvements identified for the next reporting period.

7.4 Air Quality

Management

Potential air quality impacts from the site are managed in accordance with the Air Quality and Greenhouse Gas Management Plan (AQGGMP) for the Maxwell UG Mine. In October 2023, the AQGGMP was updated following approval of Antiene MOD1. The purpose of the AQGGMP is to detail statutory requirements and outline the controls to be implemented for the management of air quality associated with the site.

The air quality management system includes a comprehensive set of both proactive and reactive control measures and monitoring tools to maintain compliance with the air quality criteria for particulate matter less than 10 µm (PM_{10}) and particulate matter less than 2.5 µm ($PM_{2.5}$). These measures and tools are designed to minimise the potential for generation of

wind-blown dust from disturbed surfaces and mining activities, and to enable effective control of episodic dust events. In accordance with the AQGGMP, a combination of depositional dust gauges, E-Samplers and tapered element oscillating microbalance (TEOM) monitors were used for the site during the reporting period to:

- monitor air quality surrounding the site;
- assist in air quality management; and
- assess compliance to air quality impact limits specified by approval conditions.

Performance

A summary of air quality monitoring results during the reporting period are presented below including an assessment of compliance to approval criteria, a comparison to predictions made in the Maxwell UG Mine EIS and consideration of long-term trends.

Total Suspended Particulates (TSP)

In accordance with the AQGGMP, TSP levels were calculated during the reporting period based on PM_{10} results recorded at each TEOM monitor. As shown in **Table 10**, the annual TSP level was lower than the impact assessment criterion and the highest maximum EIS prediction for year 1 of operations.

Table 10. Monitoring summary – TSP (µg/m^3)

Monitor	Averaging period	Approval criterion	Highest maximum EIS year 1 prediction	Current reporting period result (2023)
TEOM-1	Annual	90	42.1	33.2
TEOM-2	Annual		36.3	26.9

The long-term trend for the annual TSP levels, over a 10-year period, is shown in **Figure 8.** The data shows a slight uplift in concentrations relative to the most recent years. This reflects the lower overall rainfall of 2023 as described in **Section 7.1**.

The TSP result recorded in 2018 was particularly high. An investigation at the time into the 2018 result found the elevated levels were being influenced by a lessee feeding cattle in an exposed area immediately adjacent to the monitor and were not attributable to impacts from the site nor indicative of regional conditions.

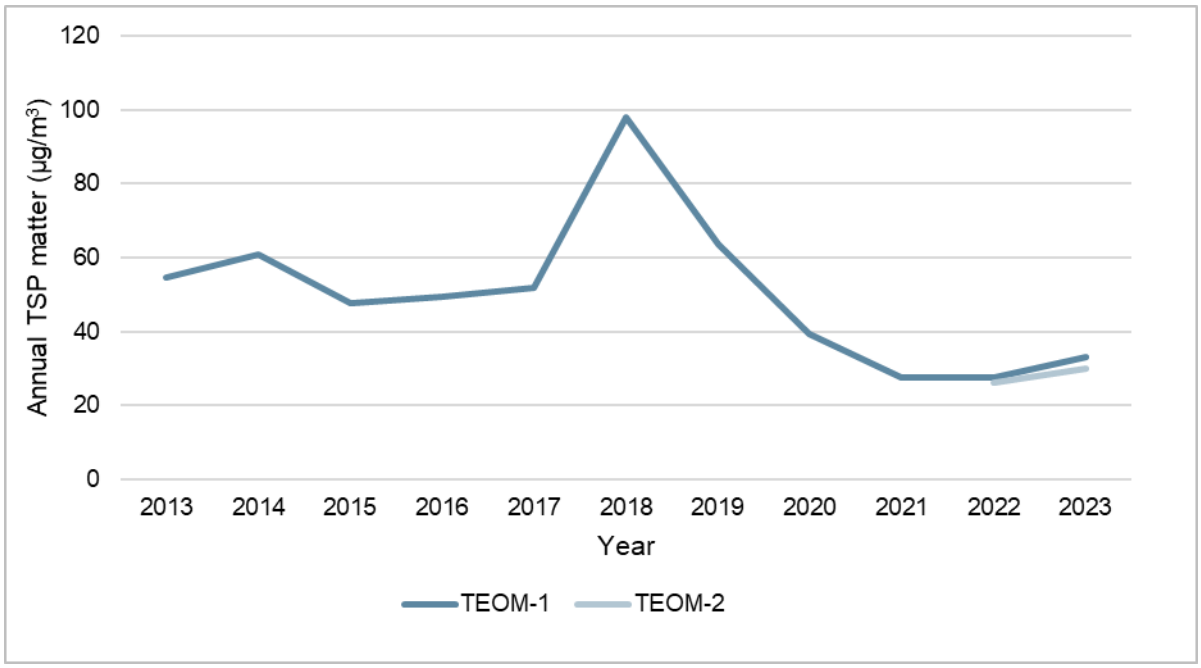


Figure 8. Long-term results for TSP calculated from PM_{10} results at TEOM-1 and TEOM-2

Note: Following investigations, it was determined that the elevated 2018 result was not attributable to impacts from the Maxwell Infrastructure site. Monitoring at TEOM-2 commenced in December 2021, hence the limited long-term trend shown above.

PM_{10}

As shown in **Table 11**, the annual PM_{10} level remained below the annual impact assessment criterion and the EIS prediction for year 1 of operations.

PM_{10} levels, as shown in **Figure 9**, were slightly higher than recent years, this reflects the lower-than-average rainfall of the reporting period. PM_{10} levels monitored by the UHAQMN have shown a similar trend across the region since 2015.

Table 11. Monitoring summary – annual PM_{10} concentrations (µg/m³)

Monitor	Averaging period	Approval criterion	Highest maximum EIS year 1 prediction	Current reporting period result (2023)
TEOM-1	Annual	25	17.5	13.3
TEOM-2	Annual		13.0	12.0

All 24-hour PM_{10} levels for the reporting period are presented in **Appendix 4**. The 24-hour criterion of 50 micrograms per cubic metre (µg/m³) was not exceeded on any day during the reporting period.

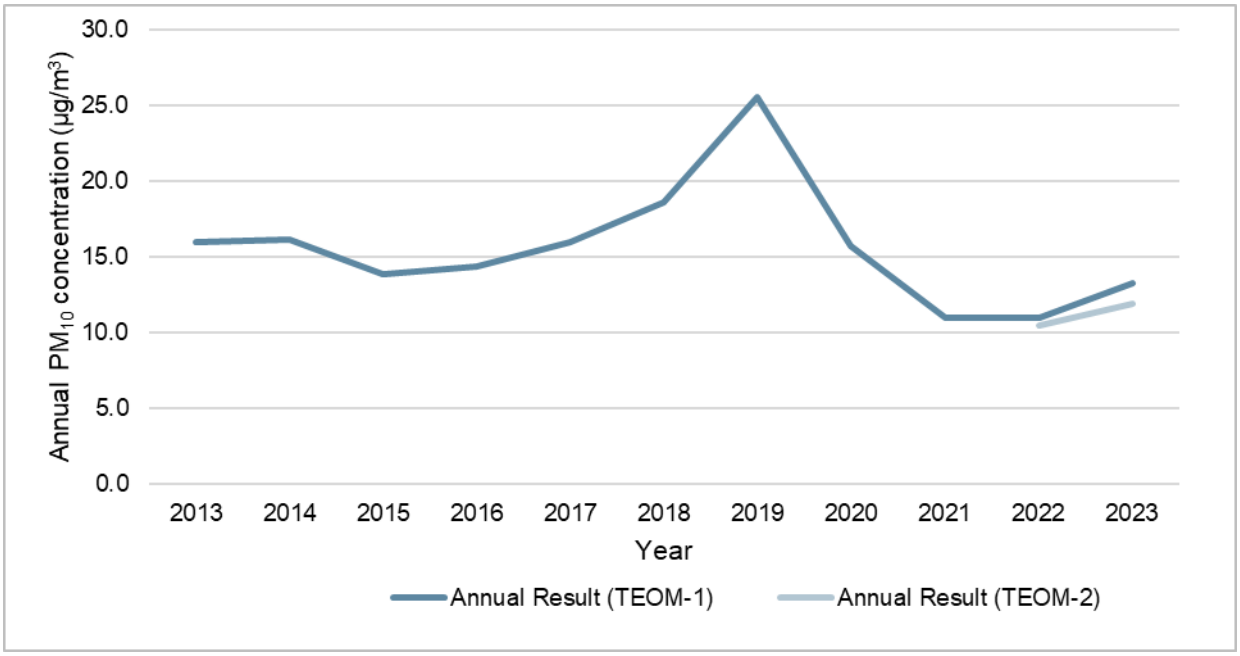


Figure 9. Long-term results for PM_{10} at TEOM-1 and TEOM-2

Note: (monitoring commenced at TEOM-2 in December 2021 and hence long-term trend information at this location is limited to two years)

$PM_{2.5}$

As shown in **Table 12**, the annual $PM_{2.5}$ level remained below the annual impact assessment criterion and the EIS prediction for year 1 of operations.

As shown in **Figure 10, m**onitoring of $PM_{2.5}$ commenced at TEOM-1 on 9 March 2021 and at TEOM-2 on 12 December 2021. Hence there is an insufficient long-term data record to describe trends. However historical concentrations are judged likely to exhibit similar trends to the other airborne particulate fractions and to that recorded by the UHAQMN.

Table 12. Monitoring summary – annual $PM_{2.5}$ concentrations (µg/m^3)

Monitor	Averaging period	Approval criterion	Highest maximum EIS year 1 prediction	Current reporting period result (2023)
TEOM-1	Annual	8	5.3	5.0
TEOM-2	Annual		4.9	5.1

All 24-hour $PM_{2.5}$ levels for the reporting period are presented in **Appendix 4**. The 24-hour criterion of 25 micrograms per cubic metre (µg/m^3) was not exceeded at TEOM-1 however it was exceeded once at TEOM-2 during the reporting period. This was a concentration of 34.9µg/m^3 on 22 September 2023 and coincided with alerts received for high internal operating temperatures.

The TEOM was restarted, and this resolved the internal temperature issue however the removal of significant negative hourly concentrations as required by the data validation process combined with the high positive hourly concentrations resulted in an elevated 24-hour average. $PM_{2.5}$ concentrations at the nearby Upper Hunter Air Quality Monitoring Network stations were not elevated (Muswellbrook 6.2µg/m^3 and Singleton 5.2µg/m^3)

indicating that a regional $PM_{2.5}$ episode had not occurred and providing additional evidence to support the equipment malfunction.

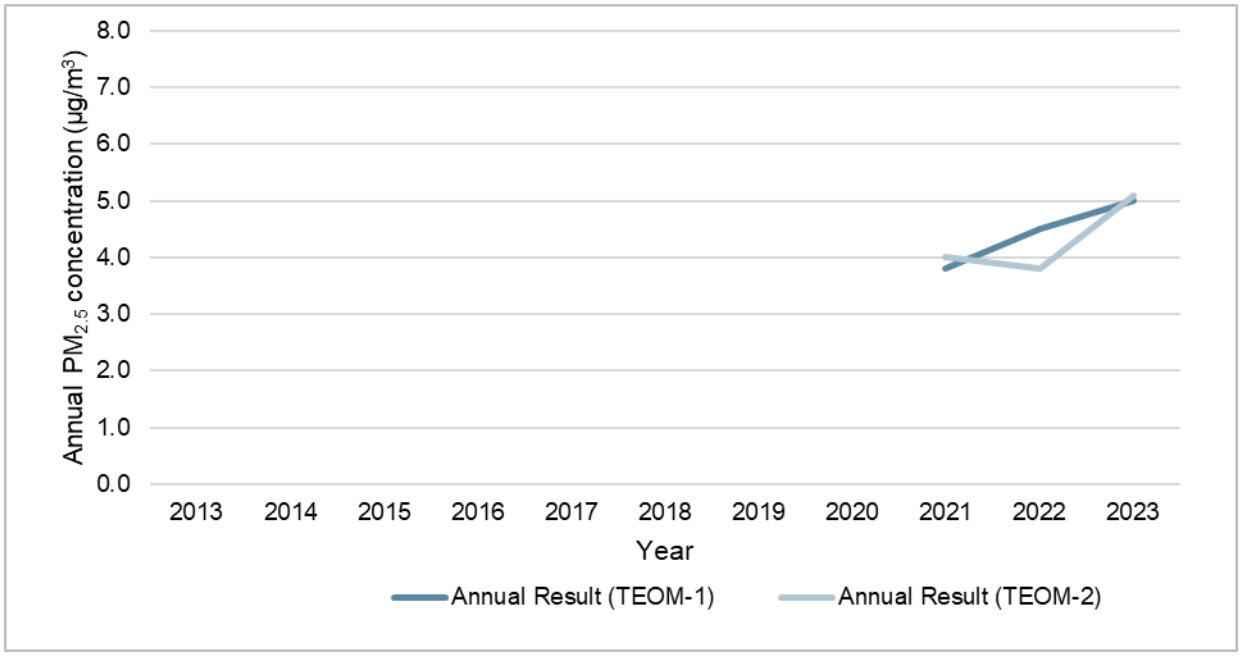


Figure 10. Long-term results for $PM_{2.5}$ at TEOM-1 and TEOM-2

Note: Monitoring of $PM_{2.5}$ at TEOM-1 commenced 9 March 2021 hence a 298 day average for 2021; Monitoring of $PM_{2.5}$ at TEOM-2 commenced 12 December 2021 hence a 20 day average for 2021.

Deposited Dust

Deposited dust results were significantly less than the impact assessment criteria for both the maximum increase in dust level and maximum total deposited dust. This can be seen in the summary of results presented in **Table 13** and **Table 14**.

Table 14 shows that the annual average deposited dust results were slightly higher than the EIS predictions for sites 2230 and 2235 during the reporting period for year 1 of operations. This reflects the very dry conditions across NSW consistent with the developing El Niño described in **Section 7.1**.

The long-term trend in annual average deposited dust levels is shown in **Figure 11**. Like other air quality parameters, deposited dust has been trending down since 2018 consistent with the end of drought conditions and not attributable to impacts from the Maxwell UG Mine, as activities are significantly lower relative to when open cut mining ceased in October 2016. The slight increase for the reporting period for sites 2230, 2247 and 2235 is again due to the very low rainfall during the year, associated with the developing El Niño.

Results for 2018 to 2022 show a long-term reduction in deposited dust levels. The exception is for site 2230 in 2021, for which the annual mean is heavily influenced by one result in July 2021 (11.8 g/m^2/month). Sampling notes from July 2021 indicate that this was a contaminated sample (contamination can include soil deposited by birds). Without this result, the annual mean would be 1.8 g/m^2/month.

Table 13. Monitoring summary – incremental deposited dust (g/m^2/month)

Monitor	Averaging period	Approval criterion	Previous reporting period result (2022)	Current reporting period result (2023)
2230	Annual	2	-0.1	0.1
2247			-0.1	-0.1
2235			0.0	0.0
2175			0.0	-0.1

Table 14. Monitoring summary - total deposited dust (g/m^2/month)

Monitor	Averaging period	Approval criterion	EIS year 1 prediction	Current reporting period result (2023)
2230	Annual	4	1.6	1.9
2247			1.7	1.6
2235			1.7	2.0
2175			1.7	1.7

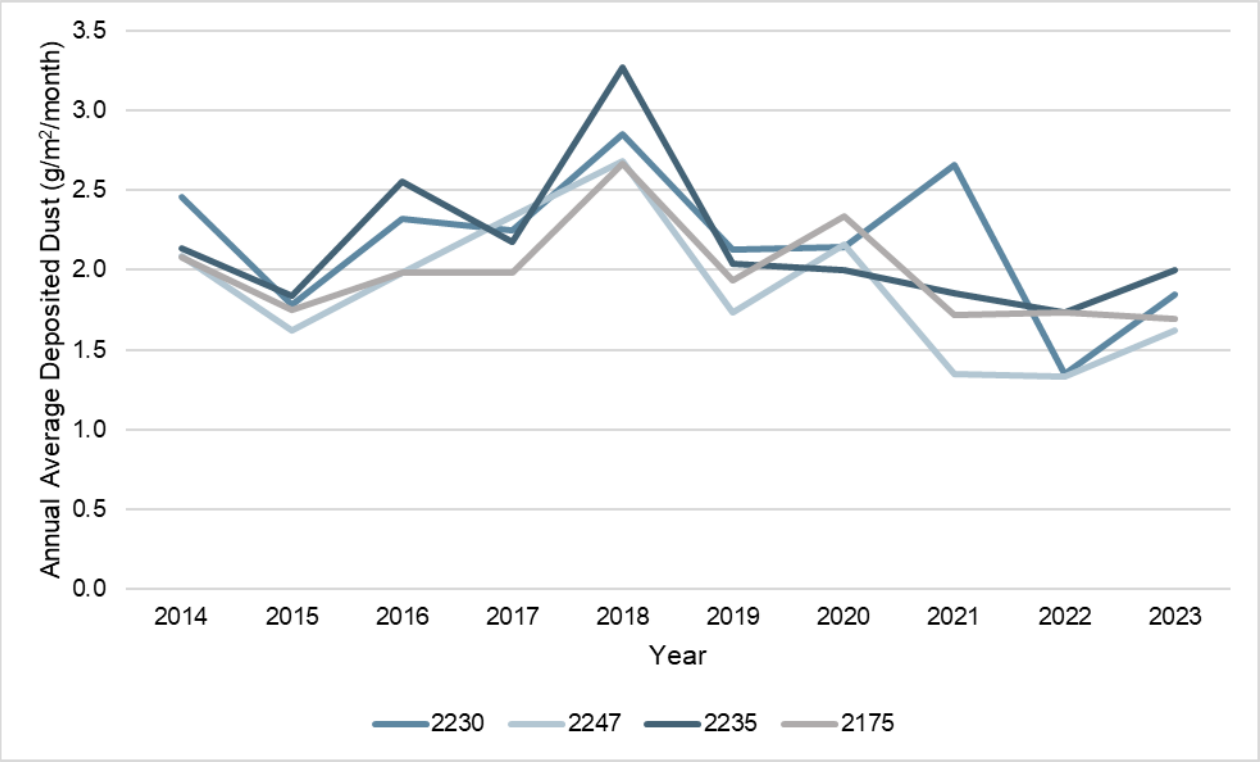


Figure 11. Long-term results for deposited dust

Proposed Improvements

Modem upgrades at remote monitoring stations (inclusive of the TEOMs and meteorological recording stations) will occur during the next reporting period.

7.5 Aboriginal Cultural Heritage

Management

Aboriginal cultural heritage at the Maxwell UG Mine is managed in accordance with the Aboriginal Cultural Heritage Management Plan (ACHMP). In November 2023, the ACHMP was updated to incorporate Antiene MOD1.The purpose of the ACHMP is to detail the statutory requirements and provide a framework for the management of Aboriginal cultural heritage associated with the site and accompanying offset areas.

Performance

An archaeological salvage program, involving surface collection and open area excavation was undertaken during the reporting period for the Maxwell MOD2 areas. Surface collection of the three impacted surface artefact scatters was undertaken in February 2023.

Open area excavation was undertaken over a period of seven days in February and March 2023. A total 190 artefacts which satisfied technical criteria for identification of artefacts were recovered during the Phase 1 excavations. Phase 1 excavations included 64 x 1 square meter (m²) test pits, in addition to 23 heat shatters.

Phase 2 of the works was to include up to 100 m² of open area excavation centred on test units where artefact counts were equal to or above 30 artefacts/m², archaeological features, or the test pit with high richness values were intercepted. Phase 2 works were not triggered during Phase 1 as the highest density of lithics recovered from any one test pit was 16 artefacts/m² and no archaeological features or test pits with high richness values were intercepted.

In December 2023, the scheduled three yearly inspection was undertaken of the Aboriginal archaeological sites surrounding the CHPP and train loading facility that were conserved under preceding PA 06_0202 and stone quarry Aboriginal Heritage Information Management System (AHIMS) site 3-37-2-1954 and the previously recorded location of stone quarry AHIMS site 37- 2-1955. The inspection identified three improvement actions which have been discussed below.

Proposed Improvements

The following actions were identified during the scheduled three yearly inspection and will be implemented during the next reporting period:

- Signage for AHIMS coordinate locations of sites R5, R10, R15, R16 should be updated to include their respective site names.
- AHIMS coordinates for sites R7, R11, R12, R13, and R14 should be updated on the AHIMS register to reflect the fenced areas.
- Signage, including site name, for AHIMS coordinate location of site R8, R9 and R17 should be placed on the existing fencing.

7.6 Non-Aboriginal Heritage

Management

The land that comprises the Maxwell UG Mine and surrounds has primarily been used for pastoral activities since the early period of European settlement. The land within the Maxwell Infrastructure site was part of the historic Edinglassie Estate and originally part of Pringle's Station, owned by Robert Pringle and James White in 1839. The majority of the underground area was originally part of the historic Plashett Estate, with a small part to the east forming part of the historic Bowfield Estate. An Historic Heritage Assessment was undertaken for the Maxwell UG Mine EIS. The assessment noted that no items listed on local, regional, State or national historic registers are located within the site boundary.

Performance

The Maxwell UG Mine will not result in any material adverse impacts on any non-Aboriginal heritage places and as such no specific measures are required to manage or mitigate any impacts.

Proposed Improvements

There are no improvements identified for the next reporting period.

7.7 Transport

Management

The Antiene Rail Spur has been servicing the former Drayton Mine since 1983, the Mt Arthur Mine since 2001 and the Maxwell UG Mine since 2023. The Antiene Rail Spur is used to transport coal via the Main Northern Railway Line to the Port of Newcastle for export. The section of the Antiene Rail Spur used to service the Maxwell UG Mine is approved to operate under Development Consent DA 106-04-00 until June 2047.

Performance

Four trains were loaded with coal and left the site during the reporting period. The number of train movements and the date and time of each train movement is provided in **Appendix 5**.

A number of activities associated with Development Consent DA 106-04-00 were undertaken during the reporting period including:

- Site inspections of the rail loop;
- Various corrective and preventative maintenance activities including lifting and repacking of the track, replacement of sleepers and ballast, repairs to drainage infrastructure, track grinding and vegetation and weed removal;
- Testing and condition assessments, and
- Level crossing works on the Antiene Road Level Crossing.

Preventative and corrective maintenance work on sections of the Antiene Rail Spur will continue to be undertaken during the next reporting period.

Proposed Improvements

There are no improvements identified for the next reporting period.

7.8 Visual Impact

Management

Potential visual impacts from the site are managed in accordance with the Visual Impact Management Plan (VIMP) for the Maxwell UG Mine. In February 2023, the VIMP was updated to incorporate Maxwell MOD2. The VIMP was again updated in October 2023 to incorporate Antiene MOD1. The purpose of the VIMP is to detail the statutory requirements and controls to be implemented for the management of visual amenity associated with the site.

A Landscape and Visual Impact Assessment was undertaken for the Maxwell UG Mine EIS and found that the site will have inherently low visual impacts because the mining operation is underground and the MEA is located in a natural valley.

The MEA tree screen (planted in 2019 along ridge lines and contours to the west of the MEA) is monitored on an annual basis for at least the first five years after planting. This includes an inspection of the tree screen to ensure the planted trees are establishing to become self-sustaining. The following information is recorded:

- An assessment of the survival rate;
- Tree height and tree width; and
- Any impacts from weeds, feral animals or grazing.

Once the tree screen has been established (i.e. five years after planting), additional monitoring will be undertaken from offsite locations to determine the effectiveness of the tree screen.

Night-time lighting inspections are undertaken on a monthly basis at monitoring locations VP7, VP9 and VP10 to determine if there are any direct lighting impacts. In addition, an annual inspection is undertaken of the MEA, transport and services corridor and Maxwell Infrastructure.

Performance

The MEA tree screen was inspected during the reporting period. The inspection found the tree screen was performing well with an estimated 80 per cent survival rate across the various areas. Overall tree growth was good with the majority of trees being recorded at a height of 2.5 metres. Infill planting was undertaken in April 2023 with a total of 160 trees

planted at the MEA tree screen during the reporting period. A summary of the monitoring results is provided in **Appendix 6**.

Favourable weather conditions during the reporting period have improved vegetation growth and coverage, therefore over time it is expected that this area will improve the visual amenity to complement the natural landscape.

No direct light was visible during the monthly night-time lighting inspections. Light spillage, shielding, type of light and direction of lighting were assessed as part of the annual inspection of the MEA, transport and services corridor and Maxwell Infrastructure however no issues were identified.

Proposed Improvements

There are no improvements identified for the next reporting period.

7.9 Greenhouse Gas and Energy Efficiency

Management

Greenhouse gas (GHG) and energy efficiency for the site are managed in accordance with the AQGGMP for the Maxwell UG Mine. In October 2023, the AQGGMP was updated following approval of Antiene MOD1. GHG emissions attributable to the Maxwell UG Mine include emissions from fuel and energy consumption which are regularly quantified. This information is then used to manage GHG emissions and energy consumption to the minimum practicable level.

Performance

Greenhouse gas emissions from the Maxwell UG Mine have been calculated for Year 1 of the Project using the same methodology used for the EIS. Year 1 represents the continuation of the construction phase of the Project, development coal from the Whynot and Woodlands Hill portals and bord and pillar production coal from the Whynot operation. The emissions from Maxwell Infrastructure (i.e. diesel and electricity use in 2023) have also been added to the emissions from the mine (noting the EIS only included emissions from the additional activities associated with the mine).

With the inclusion of the emissions from Maxwell Infrastructure, the calculated total site emissions were 0.060 Mt CO2-e. This represents 35 per cent of the 0.17 Mt CO2-e calculated for the EIS for the site for Year 1. The primary difference from that calculated for the EIS is due to the absence of Scope 1 (fugitive emissions) during the reporting period which were assumed in the EIS to come from some coal extraction from the Woodlands Hill seam, which did not occur in 2023. Note: coal was mined from the Whynot Seam, processed, railed and sold in 2023. The Whynot Seam produced no detectable fugitive emissions.

Relative to the estimated annual average greenhouse emissions for the site of 0.41 Mt over the duration of the operating life of the mine (CO2-e (Scope 1 and 2) from the EIS), the calculated actual emissions during Year 1 for the reporting period (2023) were 0.06 Mt CO2-e.

Emission reduction activities during the reporting period have included:

- progressive transition of lighting to LED bulbs within the CHPP and at the Maxwell Infrastructure wash bays;
- installing thermostats to bath house heating (previously there was nothing so heaters would run 24/7); and

- sealing of the main access road to remove watercart usage, road maintenance and improve rolling resistance for heavy vehicles.

Edderton Solar Farm

EDF Renewables Australia Pty Ltd (EDF Renewables) and Malabar have established a Joint Venture to develop the Edderton Solar Project. The solar project is located within the Hunter-Central Coast Renewable Energy Zone and in close proximity to existing regional transmission infrastructure.

The Edderton Solar Project would be situated largely on land owned by Malabar, adjacent to the existing Maxwell UG Mine. It would comprise three “power islands”, which are areas of photovoltaic (PV) solar panels, known as Mayfield, Bowfield and Plashett. These three power islands would have a combined power generation capacity of 350 megawatts (ac). A Battery Energy Storage System would also be developed as part of the Project.

Proposed Improvements

Continuation of studies to further understand the gas content of the coal seams, which will enable quantification of emissions and hence identification of potential opportunities for GHG mitigation.

A Scoping Report for the Edderton Solar Project will be submitted to DPHI during the next reporting period.

7.10 Waste

Management

Waste is managed at the Maxwell UG Mine in accordance with the Waste Management Procedure. In accordance with the waste hierarchy, the generation of waste is minimised and spent resources are reused or recycled in preference to being disposed of as waste. During the reporting period, the focus for waste management was on removing unused resources, particularly around infrastructure areas and recycling materials where possible.

Performance

Waste and recycling streams are monitored on a monthly basis. Quantities of the major waste and recycling streams over the past 10 years are shown in **Figure 12**. This comparison shows that waste significantly reduced with the cessation of open cut mining in late 2016. This is commensurate with the reduction in resource use associated with the reduced operational activity at the site.

During this reporting period, there was an increase in all major waste streams compared to the previous reporting period. This was commensurate with the commencement of operations in March 2023 and ongoing construction activities. The initiative to realise the value of cans and bottles via the NSW container deposit scheme Return and Earn resulted in continued contributions to a local charity.

No predictions were made in the EIS in relation to waste quantities.

The Maxwell UG Mine has an existing sewage treatment plant (STP) for effluent generated on-site. This is located at the Maxwell Infrastructure site. From the STP, treated effluent is pumped to settlement ponds. When sufficient flows are available overflow from the ponds will be applied to land. However, due to the relatively low number of people on site and low volume of effluent, the treated effluent currently evaporates from the first and second ponds.

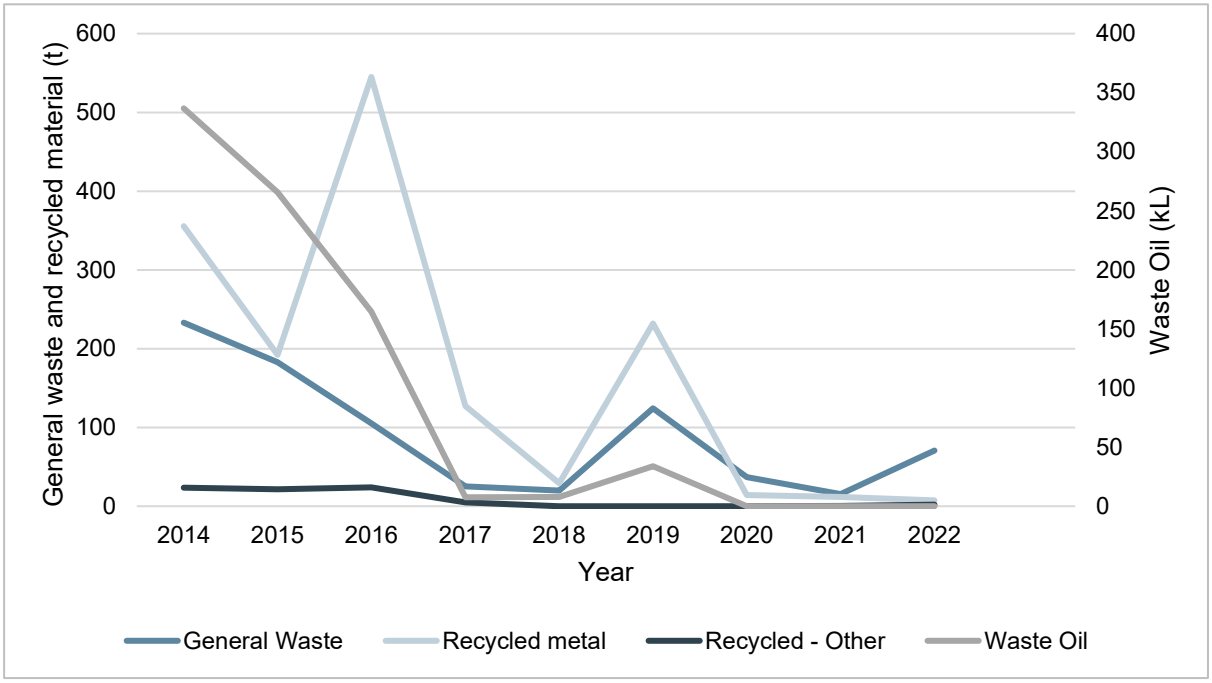


Figure 12. Long-term waste stream quantities

Proposed Improvements

There are no improvements identified for the next reporting period.

7.11 Contaminated Land

Management

Contaminated land is managed in accordance with the Contaminated Materials Protocol (CMP) for the Maxwell UG Mine. In January 2023, the CMP was updated to incorporate Maxwell MOD2. The CMP was again updated in October 2023 following approval of Antiene MOD1. The purpose of the CMP is to describe the procedures to be implemented in the event that potentially contaminated material is identified during construction, and to outline the measures to ensure compliance with the requirements of SafeWork NSW and relevant guidelines.

Maxwell Infrastructure also maintains a bioremediation area for the remediation of material contaminated by hydrocarbons. The Bioremediation Management Plan (BRMP) was updated in February 2023 following approval of Maxwell MOD1 and Maxwell MOD 2. The BRMP was again updated in October 2023 following approval of Antiene MOD1.

Performance

No new areas of contaminated land were identified during the reporting period.

The bioremediation area was utilised during the reporting period. Potentially contaminated soil from site was placed in the in the bioremediation cells. The material was generally sourced from sumps and non-destructive excavations.

Soil samples were taken from cells 1B, 2B, 3A, 3B, 4A and 5A prior to the reporting period. Analysis of the samples showed that the soil met the target criteria specified in the BRMP. As such these cells were emptied during the reporting period and the soil was placed in pit. In addition, cell 1A was treated for weeds during the reporting period.

Proposed Improvements

There are no improvements identified for the next reporting period.

7.12 Bushfire

Management

Potential bushfire impacts from the site are managed in accordance with the Bushfire Management Plan (BFMP) for the Maxwell UG Mine. This plan was prepared in consultation with the Rural Fire Service. In February 2023, the BFMP was updated to incorporate Maxwell MOD2. The BFMP was again updated in October 2023 following approval of Antiene MOD1. The purpose of the BFMP is to detail statutory requirements and outline the controls to be implemented to manage bushfires on the site.

Where possible a minimum 10 m Asset Protection Zone (APZ) is provided around all key infrastructure and along boundary fences (within approved disturbance areas) to act as a fire break. The vegetation in APZs is limited to grass that is mowed on a regular basis. Non-operational grassed areas are also mowed and/or grazed to reduce fuel loads. Access tracks that can be used as fire trails are monitored annually in August to assess if there are sufficient tracks for fire-fighting access and if tracks require maintenance.

Fire-fighting equipment is available on site and is available for use in the event of a bushfire. The equipment includes a fire trailer, mine site water cart, fire hose reels and pumps, fire extinguishers on a mobile plant and light vehicles.

Performance

There were no bushfires recorded at the Maxwell UG Mine during the reporting period.

All equipment was serviced and maintained in accordance with the relevant Australian Standards. Inspection and testing was performed by on-site personnel and appropriate service providers according to the electrical and mechanical maintenance management plans. Hand-held fire extinguishers were inspected by trained personnel and maintained by an external fire service provider.

Vegetation was maintained during the reporting period to minimise the risk of bushfire occurring. An inspection was undertaken in August 2023 of the APZ's, access tracks and boundary fences prior to the commencement of the bushfire season. Following the inspection, some areas at the CHPP, fuel farm and along the boundary fences were mowed or slashed to reduce the fuel load. Non-operational grassed areas were mowed on a regular basis.

Proposed Improvements

There are no improvements identified for the next reporting period.

7.13 Spontaneous Combustion

Management

Potential spontaneous combustion at the site is managed in accordance with the Spontaneous Combustion Management Plan (SCMP) for the Maxwell UG Mine. In October 2023 the SCMP was updated following approval of Antiene MOD1. The purpose of the SCMP is to detail statutory requirements and outline the controls to be implemented for the management of spontaneous combustion associated with the site. The management of

spontaneous combustion is focused on the monitoring of previously capped areas along with the capping of any new outbreaks.

Along with regular inspections conducted as part of the general site activities, formal monthly spontaneous combustion inspections are conducted. A thermal imaging camera is utilised to assist the identification of areas where ground surface temperatures are above background levels. The surface area exhibiting smoke or steam emissions is estimated for each detected outbreak. In addition, an annual aerial survey using a fixed wing aircraft fitted with infrared detection is used to identify the presence of hot spots on a site-wide basis. This survey was conducted on 14 June 2023

Spontaneous combustion monitoring supports the planning of activities to prevent and remediate spontaneous combustion outbreaks. These management activities include reprofiling, track rolling and the application of inert capping.

Performance

Spontaneous combustion locations are categorised in accordance with the following intensity criteria:

- Minor - visible steam or smoke exists, however, the area affected is 200 m² or less.
- Moderate - exhibiting continuous visible smoke or steam and / or has an area of greater than 200 m².
- Major - exhibiting naked flames, regardless of the area affected.

During August and December 2023, an area of approximately 0.5 hectares (ha) at site 286 was capped with 1 metre of inert material. This area will be topsoiled and seeded during the next reporting period. As shown in **Figure 13**, all spontaneous combustion outbreaks identified during the reporting period were inactive or of a minor intensity. All locations continue to be monitored.

As shown in **Table 15,** approximately 37 m^2 was estimated to be affected by spontaneous combustion outbreaks across the site at the end of the reporting period. This is only slightly higher than last year and generally consistent with the last three years suggesting no major outbreaks during that time. The annual aerial infrared survey in June 2023 allowed confirmation of the success of mitigation works to date, in addition to informing planning for future activity.

Table 15. Long-term area affected by spontaneous combustion

Year	Area Affected (m²)
2010	1,170
2011	1,070
2012	1,160
2013	1,180
2014	810
2015	870
2016	810
2017	1,150
2018	1,170
2019	320

Year	Area Affected (m²)
2020	50
2021	55
2022	28
2023	37

Proposed Improvements

During the next reporting period, the recently capped area at site 286 will be topsoiled and seeded.

Figure 13. Locations affected by spontaneous combustion at the end of the reporting period

7.14 Biodiversity

Management

Biodiversity at the Maxwell UG Mine is managed in accordance with the Biodiversity Management Plan (BMP). In May 2023, the BMP was updated to incorporate Maxwell MOD2. The BMP was again updated in November 2023 following approval of Antiene MOD1. The purpose of the BMP is to detail statutory requirements and to outline the short, medium and long-term management measures for vegetation and fauna habitat within:

- the Drayton Wildlife Refuge, Northern Offset Area and Southern Offset Area (jointly referred to as the Maxwell Infrastructure Biodiversity Offset Areas) required under Schedule 2, Conditions B45 and B46 of Development Consent SSD 9526;
- the approved disturbance areas in accordance with Schedule 2, Condition A12 of Development Consent SSD 9526; and
- remnant vegetation and fauna habitat in areas not likely to be impacted by the project.

Routine ecological monitoring is conducted across the Maxwell UG Mine including the offset areas and rehabilitated lands. The ecological monitoring program is detailed within the Rehabilitation Management Plan (RMP). The RMP was updated in November and December 2023 following approval of Antiene MOD1 and to align the monitoring requirements to the Biodiversity Assessment Methodology (BAM).

Monitoring sites, as shown in **Appendix 2**, are located within woodland rehabilitation, pasture rehabilitation and offset areas. Sites located in offset areas are used as a reference site to measure remnant vegetation and fauna habitat in areas not likely to be impacted by mining, these sites are referenced against the woodland rehabilitation, to provide ecological targets for ecosystem integrity and species diversity. Monitoring is undertaken annually, with each site monitored every second year.

Improvements within the reporting period within offset areas included:

- Planting locally-occurring tree and shrub species targeted at specific vegetation communities as defined in Condition B50 of SSD-9526. A total of 8,200 plants installed over seven hectares;
- Thinning invasive Golden Wreath Wattle and Sugar Gum within the Southern Offset Area;
- Placement of more than 100 logs and hollow timber on the ground throughout the Southern Offset Area (undertaken after the ecological monitoring); and
- Weed control targeting Prickly Pear and exotic perennial grass species.

Maxwell Infrastructure Biodiversity Offsets

Existing offsets including the Drayton Wildlife Refuge, Northern Offset Area and Southern Offset Area (jointly referred to as the Maxwell Infrastructure Biodiversity Offset Areas) were already in place prior to Development Consent SSD 9526. These areas have been incorporated into the BMP and a conservation and biodiversity bond has been provided to DPHI for the continued management of these offsets.

Maxwell UG Mine Biodiversity Offsets

In accordance with Conditions B47, B48, B50A and B50B of Development Consent SSD 9526, Maxwell has a requirement to retire credits for Stage 1, Stage 2 (associated with the Edderton Road realignment), Maxwell MOD1 and Maxwell MOD 2.

In December 2022, Maxwell applied to have the date for retirement extended. DPHI consulted with the Credits Supply Taskforce regarding the time required to process the application and an extension was granted until 30 August 2023. Despite attempts by the Credits Supply Taskforce and Maxwell to finalise the application, DHPI in consultation with the Credits Supply Taskforce, granted a further extension until 14 December 2023.

During the reporting period, Maxwell established a land-based offset known as the Maxwell Stewardship Site (ID number BS0129) under Part 5 Division 2 of the *Biodiversity Conservation Act 2016*. A Biodiversity Stewardship Agreement was finalised on 23 November 2023. A total of 3066 ecosystem and species credits were retired from the Maxwell Stewardship Site on 12 December 2023 for Development Consent SSD 9526.

An extension for the remaining credits required for Development Consent SSD 9526 was granted until 29 February 2024 (in next reporting period) so that Maxwell can purchase 411 credits through the Biodiversity Conservation Fund and 4 credits through the Government's reverse auction process. These remaining credits will satisfy the requirements of Conditions B47, B48, B50A and B50B of Development Consent SSD 9526.

Biodiversity Credit Reduction

In accordance with Condition B49 of Development Consent SSD 9526, Maxwell commissioned additional flora surveys and an expert report to demonstrate a reduction in credits. The supplementary surveys did not identify any of the target species within the Maxwell UG Mine areas, supporting the survey outcomes described in the Biodiversity Assessment Report (Hunter Eco, 2019). In addition, the expert report also concluded that *Diuris tricolor*, *Prasophyllum petilum* and *Pterostylis chaetophora* are unlikely to be present within the Maxwell UG Mine areas. As such, Maxwell requested that the biodiversity credit requirements for *Diuris tricolor*, *Ozothamnus tesselatus*, *Prasophyllum petilum*, *Pterostylis chaetophora* and *Thesium australe* be reduced to zero as these species are not likely to be impacted by the Maxwell UG Mine. DPHI reviewed and approved the request to reduce biodiversity credit requirements to the following:

- The offset requirements for stage 1 and stage 2 for *Pterostylis chaetophora*, *Ozothamnus tesselatus* and *Thesium australe* are reduced to zero.
- The offset requirements for stage 1 for *Diuris tricolor* are changed from 1,474 credits to 5 credits, and for *Prasophyllum petilum* are changed from 1,114 credits to 6 credits.
- The offset requirements for stage 2 for *Diuris tricolor* and *Prasophyllum petilum* are reduced to zero.

Performance

During the reporting period the following measures were implemented to improve biodiversity at the Maxwell UG Mine:

- regular walkover inspections of rehabilitation;
- tubestock infill planting within woodland vegetation communities;
- culling of kangaroos prior to infill planting to reduce grazing pressure on tubestock;
- continuation of the grazing trial on mine pasture rehabilitation;
- implementation of a targeted weed management program; and
- installation of nest boxes and woody debris to improve fauna habitat in the woodland vegetation communities.

Ecological monitoring was undertaken during November and December 2023. Monitoring consisted of BAM sampling, walkover inspections, fauna monitoring, assessment of pest animals and topsoil assessment.

The RMP defines rehabilitation into primary and secondary domains, the primary domains are based on land management units with unique operational and functional purposes whereas the secondary domains are defined on land management units with a similar post mining land use objective. The rehabilitation phases within each domain show the progress towards the post mining land use goals. All areas of existing pasture and woodland rehabilitation are currently within the ecosystem and land use establishment phase. All further rehabilitation activities will focus on enhancing the rehabilitation to meet the relevant phase objectives and completion criteria.

Biodiversity Assessment Methodology Sampling

BAM vegetation sampling was adopted during the 2021 ecological monitoring program to comply with the BMP. BAM provides a direct comparison of sampling results based on attributes such as foliage cover, stem size, tree regeneration, length of logs and litter cover. The values collected at a site are compared against benchmark values for the target Plant Community Type. The results provide a value for composition, structure and function for each site. A summary value of the three combined is provided as an Integrity score, out of 100. The BAM sampling was undertaken at four woodland reference sites and seven woodland rehabilitation sites.

Results indicate that the woodland reference sites had an Integrity score from between 42 and 54. These are low values for a reference site, likely to be the result of drought conditions in the lead up to the field surveys. No direct impact from mining activities was observed during the field surveys. No recommendations were provided to improve the woodland reference sites, other than continued weed and pest control.

As with the drought impact to the reference sites, the rehabilitated woodland and pasture sites showed significantly lower values to previous years, with no direct impact as a result of mining activities observed. Integrity values from the woodland sites ranged from 4 to 31, with the older sites providing a higher value due to a developing canopy and litter cover. Pasture rehabilitation sites are progressing well towards closure criteria. Recommendations to continue weed and pest control were provided for woodland and pasture rehabilitation sites and grazing livestock is recommended for pasture sites.

Fauna Monitoring

Fauna monitoring occurred at three sites (two reference sites and one rehabilitation site) to measure the occurrence of terrestrial vertebrate animals, including bird, mammal, reptile and amphibian species.

A total of 48 fauna species were recorded during the 2023 monitoring program, including 29 bird species, 15 mammal species, two reptile species and two amphibian species. A total of three threatened species were recorded, being the speckled warbler (*Chthonicola sagittata*), the little bentwing-bat (*Miniopterus australis)* and eastern bentwing-bat (*Miniopterus schreibersii oceanensis*).

Comparison of the average number of fauna species data showed a decline in fauna species abundance in 2023, with no direct impact as a result of mining activities observed. The low results are likely due to drought conditions in the lead up to the field surveys.

Pest Animals

Pest animals recorded in 2023 include hare, pig, eastern grey kangaroo, wild dog, European fox and cat. Total pest animals numbers controlled (i.e. culled) include 249 rabbit/hares, 30 pigs, 36 eastern grey kangaroos, 1 cat and 60 baits taken by target species during the autumn and spring 1080 baiting program. Eastern grey kangaroos were noted to be over grazing rehabilitation areas and creating nesting beds under established trees and shrubs. During the reporting period a kangaroo cull was undertaken in the southern offset area and west of the southern void.

Pest animal sightings and control efforts (excluding kangaroos) are recorded in the FeralScan database - a third party pest animal recording and management tool administered by the Centre for Invasive Species Solutions and supported by NSW Local Land Services (amongst others).

Soil Assessment

Topsoil samples at the ten monitoring sites were analysed in accordance with the RMP, with results compared to DPI standards for the North Coast of NSW and the Environmental Analysis Laboratory.

The results of topsoil samples from reference sites show that the soils pH, Electrical Conductivity (EC), cation exchange capacity and phosphorus were in line with indicative guidelines, other analytes such as exchangeable calcium, magnesium and potassium are lower than guidelines and the carbon-nitrogen ratio and sulphur were generally higher than the guidelines.

The pasture rehabilitation topsoil analysis indicates that results are generally in line with indicative guidelines and reference sites. The calcium-magnesium ratio is low and the carbon-nitrogen ratio is high however, these results will not restrict the growth of vegetation and are similar to previous years results. The vegetation at these sites is in good condition.

The woodland rehabilitation sites topsoil analyses were in line with indicative guidelines, with no significant issues to be addressed. However, the addition of mulch in areas of bare ground would act to improve the organic matter in those locations.

Proposed Improvements

Table 16 identifies the management measures planned for offset areas during the next reporting period. Measures planned for rehabilitation areas are discussed in **Section 9.3**.

Table 16. Measures planned for offset areas in the next reporting period

Location	Management measure
Southern Offset Area	Weed control program targeting Prickly Pear and exotic perennial grass species.
Wildlife Refuge and Northern Offset Area	Weed control targeting Spiny Rush and Prickly Pear.

8 WATER MANAGEMENT

8.1 Water Take

During the reporting period, the Maxwell UG Mine did not actively draw water from any ground or surface water sources. Maxwell holds Water Access Licence (WAL) 41559 and WAL41491 for the passive intake of aquifer water associated with the mine excavation at the Maxwell Infrastructure site.

Although open cut mining has ceased, Maxwell UG Mine EIS predicts that groundwater will continue to flow into the mine voids until it stabilises. Predicted values in the EIS have been sourced from the Groundwater Impact Assessment within the Drayton Mine Extension Environmental Assessment.

Table 17 shows the calculated passive water take in accordance with the conditions of WAL41559 and WAL41491. This estimated passive inflow was calculated by consultants specialising in water management and modelling. The inflow of 880 Megalitres (ML) estimated for the reporting period is less than the 985 ML per year (or 2.7 ML/day) that was predicted for year 10 of operations in the previous EA. It is also less than the total entitlement of 1,387 ML held under WAL41559 and WAL41491.

Table 17. Water take July 2021 to June 2023 (WAL reporting period)

Water Licence #	Water sharing plan, source and management zone	Entitlement (ML)	Passive take inflows (ML)	Active pumping (ML)	TOTAL (ML)
WAL 41559	Sharing Plan: North Coast Fractured and Porous Rock Groundwater Sources Water Source: New England Fold Belt Coast Groundwater Source	985	424	0	424
WAL 41491		402			
WAL 41234	Sharing Plan: North Coast Fractured and Porous Rock Groundwater Sources 2016 Water Source: Sydney Basin-North Coast Groundwater Source	806	0	0	0
WAL 43166	Sharing Plan: North Coast Fractured and Porous Rock Groundwater Sources 2016 Water Source: Sydney Basin-North Coast Groundwater Source	28	0	0	0

Water Licence #	Water sharing plan, source and management zone	Entitlement (ML)	Passive take inflows (ML)	Active pumping (ML)	TOTAL (ML)
WAL 39739	Sharing Plan: North Coast Fractured and Porous Rock Groundwater Sources 2016 Water Source: Sydney Basin-North Coast Groundwater Source	23	0	0	0
WAL 43160	Sharing Plan: Hunter Unregulated and Alluvial Water Sources 2009 Water Source: Jerrys Water Source.	50	0	0	0
WAL 39792	Sharing Plan: North Coast Fractured and Porous Rock Groundwater Sources 2016 Water Source: Sydney Basin-North Coast Groundwater Source	55	0	0	0

8.2 Water Consumption

During the reporting period, the site consumed approximately 334 ML of raw water from dams on site. This water was primarily used for:

- dust suppression on unsealed roads and areas
- within vehicle washdown bays
- at the MEA during construction (for compaction etc)
- to fill the fire water tanks
- use within the CHPP, on coal stockpiles and within tailings.

A total of 4.2 ML of potable water from the town supply was used:

- in administration facilities for toilets, washing and consumption
- within the underground workings (for fire and explosion hazard reduction, cooling of machinery and dust management)
- for the cement batching plant
- to assist seedlings post-planting and for weed spraying.

As **Figure 14** shows, water consumption has increased significantly during 2023, reflecting the increase in personnel, construction activity and the commencement of underground mining. Both raw and potable water usage are expected to continue to increase significantly as construction continues and operational phases expand.

Due to an updated bathymetric survey of the water storages conducted in late 2023, the recorded water stored on site at the commencement of the reporting period was 20,843 ML versus 19,715 ML that was recorded for the end of 2022. Taking this revision into account, the calculated amount of water stored on site increased from 20,843 ML to 21,915 ML during the reporting period. This indicates that water consumption was well within the limits required to maintain the site's closed raw water system, with no active intake or output of water.

This is also demonstrated by the input-output statement of the water accounting framework in **Appendix 7**. In addition, it is likely that the extreme rainfall events of 2022 as described in **Section 7** have continued to contribute to the increase in water stored on site as a result of a delay in groundwater response.

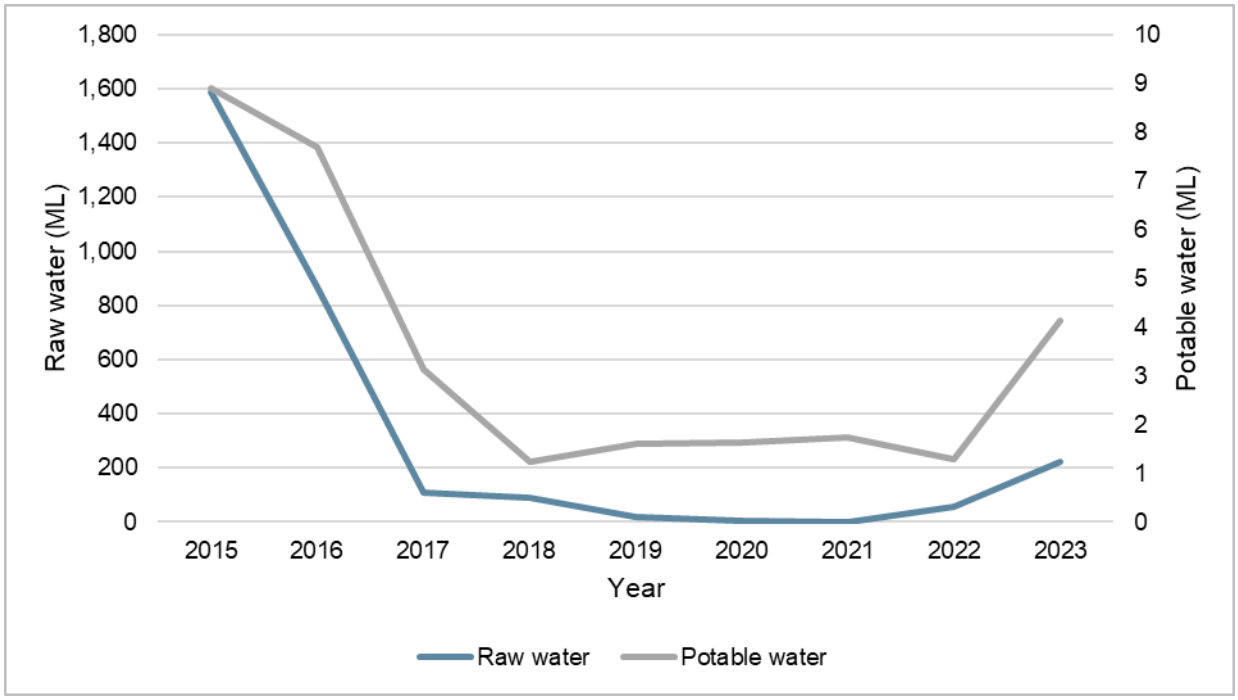


Figure 14. Long-term water consumption

8.3 Surface Water

Management

Surface water at the site is managed in accordance with the Water Management Plan (WMP) for the Maxwell UG Mine. In February 2023, the WMP was updated following approval of Maxwell MOD2. Maxwell did not provide DEECCW with the final version of the WMP within two days of its approval by the NSW Planning Secretary, resulting in a non-compliance with Conditions 3, 4, 18 and 19 of EPBC Approval 2018/8287. On 24 March 2023, Maxwell became aware of the oversight and a copy of the revised WMP was provided to the DEECCW promptly on the same day.

The WMP was again updated in December 2023 following approval of Antiene MOD1.

The purpose of the WMP is to detail statutory requirements and outline the water management controls to be implemented for the site. This WMP includes the following sub-plans that are relevant to the management of surface water:

- Site Water Balance and Salt Balance
- Erosion and Sediment Control Plan
- Surface Water Management Plan (SWMP).

The SWMP includes the requirement for quarterly water quality monitoring and following rainfall events.

EPBC 2018/8287

The Water Management Plan was further revised in February 2023 following the approval of Modification 2 of SSD 9526. Maxwell did not provide the Department with the final version of the Water Management Plan within two days of its approval by the NSW Planning Secretary.

On 24 March 2023, Maxwell became aware of the abovementioned oversights and a copy of the revised Water Management Plan was provided to the Department promptly on the same day.

The Water Management Plan was further revised in December 2023. Maxwell provided the Department with the approved revised Water Management Plan (on 25 January 2024) within two days of its approval by the NSW Planning Secretary (23 January 2024).

Performance

In accordance with the current SWMP, the quality of surface water at Maxwell UG Mine is analysed quarterly and following rainfall events >25mm in a 24-hour period midnight to midnight. Annual average surface water quality results for the reporting period are provided as graphs in **Appendix 8.** Surface Water Quality Results along with a comparison to the average results recorded for the previous five years.

Generally, results from mine water storage monitoring locations for all variables in the reporting period were more concentrated to those recorded for 2022. This is likely due to the significantly lower than average rainfall during 2023. Concentrations during the reporting period were within long term ranges. The notable exception to this is the relatively large annual average increase in the majority of analyte concentrations at site 2109 (DC2 Dam). This increase is coincident with the increased use of the adjacent coal product stockpile area following commencement of coal processing in 2023. The DC2 dam collects run off from this area following rainfall events. It should be noted that all water onsite is retained on site, in accordance with the WMP.

Due to the low rainfall during the reporting period, none of the downstream surface water monitoring locations were available for sampling as all were either dry or stagnant (i.e. not flowing) during scheduled or post-rainfall sampling visits. Hence there are no results for these locations during the reporting period. Prior to the reporting period and in the future when sites are flowing, downstream surface water monitoring results (median over three consecutive samples) will be compared to the trigger values in the SWMP (which have been set using preliminary guideline values), once sufficient monitoring data is available.

The access to some surface water monitoring sites is difficult following heavy rain; hence the locations of those sites has been reviewed. Alternative monitoring locations, for example upstream of the same creek, closer to sealed roads or upgraded tracks, have been established with the monitoring contractor in such instances.

New mine water storages at the MEA, specifically the MEA Sediment Dam, the MEA Mine Water Dam, the MEA Dam and the MEA Treated Water Dam were commissioned during the reporting period, and samples were taken from those locations on a biennial basis (where water was present) in accordance with the SWMP.

Proposed Improvements

New permanent sediment dams along the Transport and Services Corridor will be commissioned during the next reporting period and will be monitored on a routine basis in accordance with the SWMP.

If the downstream surface water monitoring locations are flowing at the time of sampling, in accordance with the SWMP, site specific triggers will be calculated from site data based on the ANZG (2018) method for guideline value derivation, during the next reporting period. This will be dependent on 24 months of baseline observations being available, following approval of the first version of the WMP in August 2021.

8.4 Stream Health

Management

Stream health impacts at the site are managed in accordance with the current WMP. This includes quarterly stream health monitoring at each of the three locations along Saddlers Creek.

The extent of riparian vegetation, the extent of erosion and sedimentation deposits and Swamp Oak health is used as an indicator of stream health and to provide supplementary information on potential geomorphic impacts to drainage lines. Monitoring is undertaken by taking photographs and recording observations at each site.

Performance

The results of the stream health monitoring are shown in **Appendix 9**.

Changes since the commencement of monitoring in Q3 2020 reflect changes that can be expected following the end of the extended drought in 2020. The significantly higher rainfall (in 2022) has resulted in an increase in water levels, a general improvement in vegetation size and health including of weeds along the broader banks. During the reporting period, the significantly below average rainfall has resulted in the reduction in growth rates of in-channel vegetation, the swamp oaks and in-channel water levels. Effects are also noted from cattle, who presumably have targeted the lush vegetation closer to the creek during the dryer conditions. Apart from a decrease in pool depths, no changes have been observed in relation to the physical characteristics at all three monitoring locations.

Proposed Improvements

There are no improvements identified for the next reporting period.

8.5 Groundwater

Management

Groundwater at the site is managed in accordance with the WMP for the Maxwell UG Mine. As previously mentioned, in February 2023 the WMP was updated following approval of Maxwell MOD1. The WMP was again updated in December 2023 following approval of Antiene MOD1. The purpose of the WMP is to detail statutory requirements and outline the water management controls to be implemented for the site. The WMP includes the Groundwater Management Plan (GWMP).

In accordance with the GWMP:

- the observed groundwater levels from the Maxwell UG Mine groundwater monitoring program have been reviewed against the model predictions; and

- a suitably qualified hydrogeologist[1] has determined when water levels deviate significantly from that predicted by the groundwater assessment for the Project EIS and determined the reason (if any) for this deviation.

The groundwater monitoring network is presented in **Table 18** and **Figure 15**.

Table 18. Groundwater Monitoring Bore Network – Maxwell UG Mine

Monitoring bore or VWP ID	Easting [1] (GDA94)	Northing [1] (GDA94)	Geology	Bore screen or VWP sensor depth (mBGL)	Status
Maxwell Infrastructure - standpipes					
DS1	305592	6420380	Shallow bedrock aquifer	15	Open
F1162	301045	6420755	Greta Coal Measures	274	Open
F1164	304223	6420406	Greta Coal Measures	190.5	Open
R4241	305793	6416224	Jurassic Volcanics	150	Open
GW01S	303386	6420691	Base Regolith	12–15	Open
GW01D	303391	6420683	Greta Coal Measures	29–32	Open
GW02S	305592	6420380	Base Regolith	8–14	Open
GW02D	301045	6420755	Greta Coal Measures	69–72	Open
GW04	304223	6420406	Permian Sequence	101–104	Open
Maxwell Underground – standpipes					
MB1 - Redbank	297930	6407453	Redbank Seam	51–57	Open
MB1 - Whybrow	297928	6407448	Whybrow Seam	25–28	Open
MB1A	297933	6407459	Hunter River Alluvium	8–11	Open
MB2R	295004	6411675	Regolith	20–29	Open
MB2A	294998	6411669	Saddlers Creek Alluvium	5–7	Open
MB3R	297328	6412729	Regolith	27–30	Open
MB3A	297269	6412850	Saddlers Creek Alluvium (upslope)	8.5–14.5	Open
MB4 - Coal	300302	6406234	JPS-Coal	42–47	Open
MB4A	300307	6406231	Hunter River Alluvium	10–18	Open
MB03	299649	6408297	Saltwater Creek Alluvium	5–8	Open
MW1	297254	6412760	Saddlers Creek Alluvium (upslope)	6–9	Open
MW2	294977	6411419	Saddlers Creek Alluvium	4–9.5	Open
MW3	297904	6407652	Hunter River Alluvium	2.9–6.9	Problem [2]

[1] SLR Consulting Australia Pty Ltd, 202 Submarine School, Sub Base Platypus, North Sydney, NSW, Australia, 2060.

Monitoring bore or VWP ID	Easting [1] (GDA94)	Northing [1] (GDA94)	Geology	Bore screen or VWP sensor depth (mBGL)	Status
MB04	295755	6410371	Unnamed Creek Regolith	10–13	Open
MB05	292546.7	6409857	Saddlers Creek alluvium	1.8–3.8	Open
MB06_S	292980.2	6412335	Woodland Hill Overburden	29–32	Open
MB06_D	292980.2	6412335	Bowfield Seam	95–101	Open
MB07	296070.3	6412297	Saddlers Creek Alluvium	3–5.5	Open
DD1005	298799	6410901	Blakefield Overburden	138.6	Open
DD1014	296799	6410864	Blakefield Overburden	90.5	Open
DD1015	298815	6409900	Blakefield Overburden	162.5	Problem [3]
DD1016	297801	6410882	Blakefield Overburden	126.4	Open
DD1025	298764	6411901	Blakefield Overburden	44.6	Decommissioned [4]
DD1027	301133	6410960	Edderton Seam	252.8	Open
DD1032	297143	6412495	Piercefield Overburden	276.5	Open
DD1043	295200	6409458	Woodlands Hill Overburden	182–203	Open
DD1052	296274	6408513	Whynot Seam Overburden	105–127	Open
DD1057	295181	6410458	Arrowfield Overburden	164–188	Open
Maxwell Underground – Vibrating Wire Piezometers (VWPs)					
RD1189 (SD1_DD001)	299896	6412419	Woodlands Hill Seam	78.9	Open
			AZZBF	145.5	Problem [5]
			WW12	186.2	Open
			MAL	230	Open
			PF2	255.5	Problem [5]
			BY2	315	Open
			WY2	322	Problem [5]
RD1192 (RBR2)	296092	6409038	Wambo Seam	61.2	Open
			Redbank Seam	80	Open
			Blakefield Seam	148.5	Open
BLK6R12 (RD1220)	293653	6409558	WB2 Seam	25	Open
			Redbank Seam	40.5	Open
			Whynot Seam	86.5	Open
			Blakefield Seam	148.5	Open
VWP1 (RD1221) (RDW006A)	297926	6407444	Interburden	21	Open
			Interburden	40	Open
			Interburden	73	Open

Monitoring bore or VWP ID	Easting [1] (GDA94)	Northing [1] (GDA94)	Geology	Bore screen or VWP sensor depth (mBGL)	Status
			Whybrow Seam	87	Open
			Whynot Seam	109.2	Open
			Blakefield Seam	138	Problem [6]
RBD1 (DD1170)	295178	6409246	Whybrow Seam	24.65	Open
			Redbank Seam	33.55	Open
			Whynot Seam	79.5	Open
			Blakefield Seam	103.3	Open
WND16 (DD1188)	298122	6408842	Wambo Seam	33.75	Open
			Whynot Seam	59.25	Problem [7]
			Blakefield Seam	90.15	Problem [7]
			Blakefield Seam	110.5	Open
WND26 (DD1187)	299487	6409044	Whybrow Seam	77.3	Open
			Redbank Seam	84.6	Open
			Wambo Seam	123.45	Open
			Whynot Seam	144.25	Problem [7]

1 Coordinates in metres (GDA 1994 MGA Zone 56).

2 MW3 are recorded dry during the reporting period. As per the recommendations in the 2022 Annual Review, it is proposed that MW3 will be removed from the reporting, once the next version of the Management Plan is approved.

3 DD1015 is reported blocked during the reporting period; DD1027 is deemed to bring no significant value to future groundwater assessments as it monitors the Edderton Seam which is not targeted by the Maxwell UG Mine. As per the recommendations in the 2022 Annual Review, these monitoring locations will be removed from the reporting, once the next version of the Management Plan is approved.

4 DD1025 was decommissioned in December 2022 for safety reasons (to prevent inrush to the upcoming underground mining operations). As per the recommendations in the 2022 Annual Review, it is proposed that this site will be replaced by a replacement bore] for the purposes of the TARP assessment, once a revised GWMP has been approved.

5 Groundwater levels at RD1189 VWP2, VWP7 & VWP9 appear unstable hence are not reported. As per the recommendations in the 2022 Annual Review, these monitoring datasets will be removed from the reporting, once the next version of the Management Plan is approved.

6 VWP1 sensor 6 indicates no data and not reported.

7 The following VWPs wires are considered disabled: WND16-VWP2 and WND16-VWP3 (unstable and disabled respectively), WND26-VWP4 (disabled).

VWP – vibrating wire piezometer

mBGL – metres below ground level

EX – Existing

A – Alluvium

R – Regolith

JPS – Jerry's Plain Subgroup

Open – Functional for pressure/water level measurements and/or quality sampling.

Closed – Decommissioned/To be removed.

Problem – Blocked/Dry/Issue detected during monitoring period.

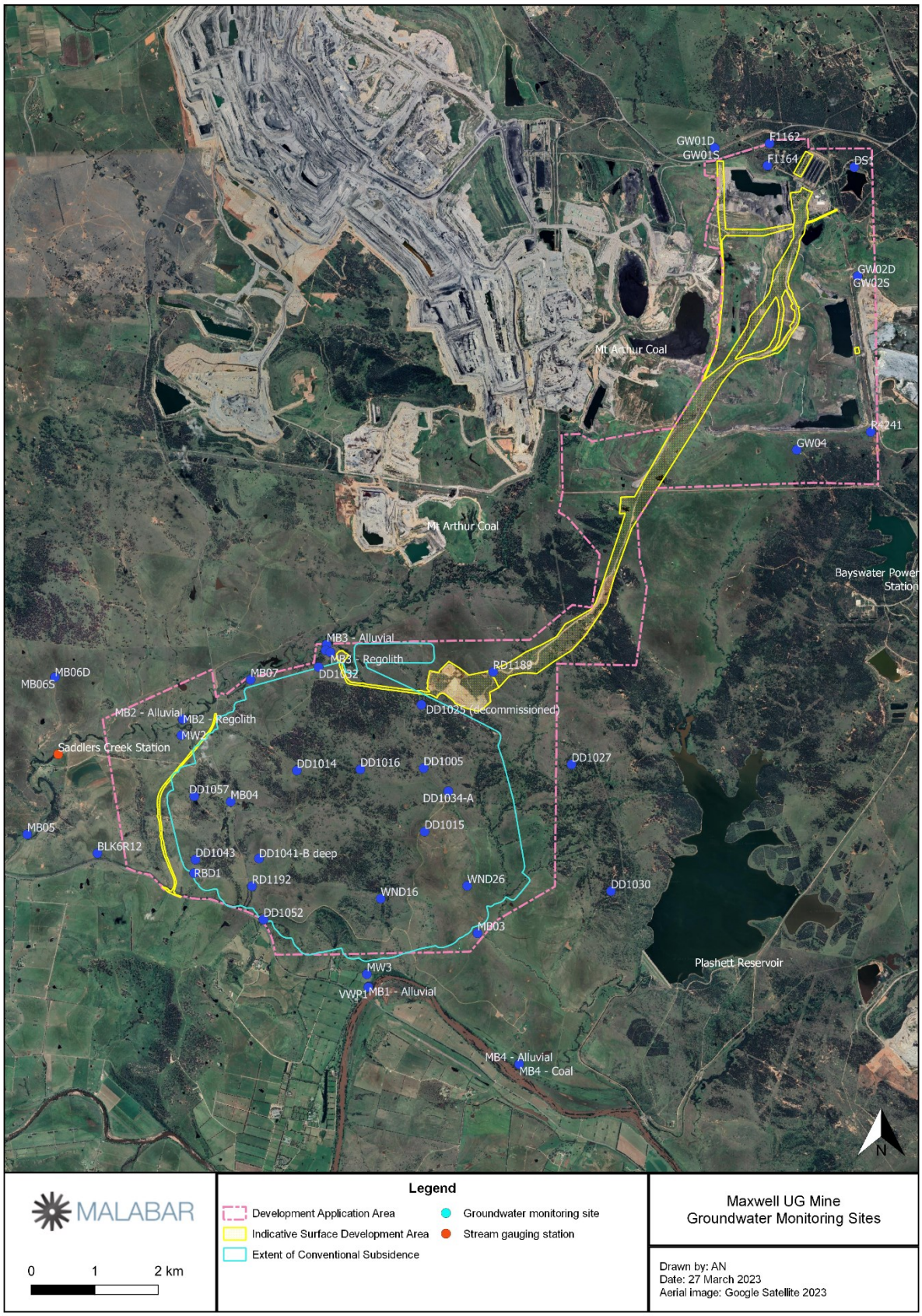


Figure 15. Groundwater Monitoring Network

Performance

Groundwater Levels

Groundwater levels, measured quarterly using a water level meter and at least daily where loggers are installed, have remained within historic groundwater level ranges. Changes in groundwater level trends for the Maxwell site during the reporting period are discussed below in more detail. Groundwater hydrographs at monitoring locations are displayed in **Figure 16** to **Figure 22**, in combination with the cumulative rainfall departure (CRD). In the legend displayed on each groundwater hydrograph, the depth of the base of the screen and the associated aquifer monitored is also presented.

The CRD trend has been generated from SILO[2] (grid point:32.40; 150.90, latitude and longitude) from 1900 to 2023**.** Positive gradients on this curve confirm wetter conditions than normal, while negative gradients indicate dry conditions. If rainfall recharge is a significant source of groundwater, the temporal variability in recorded groundwater levels can be expected to mimic the pattern of the CRD curve. That is, natural fluctuations in the groundwater table result from temporal changes in rainfall recharge to groundwater systems. Typically, changes in groundwater elevation reflect the deviation between the long-term monthly average rainfall and the actual rainfall, illustrated by the CRD (HydroSimulations, 2019).

Maxwell Underground Mine

Groundwater levels in the Jerrys Plains Subgroup have remained relatively stable during 2023 (**Figure 16**). Groundwater levels in the upper Blakefield overburden aquifer (DD1014) remained stable during 2023, showing a general increase in groundwater levels since July 2022. However, no significant change over the reporting period was observed and the average groundwater level was 135.6 m Australian Height Datum (AHD). Groundwater levels in the mid to lower Blakefield overburden aquifer (DD1005 and DD1016) have remained stable during the reporting period, showing no significant change. However, DD1005 has continued to show a consistent decreasing groundwater level trend since measurements started in October 2009. DD1016 has shown a slight increase in average groundwater levels compared to the previous reporting period. DD1016 had an average groundwater level of 141.6 mAHD in 2022 and 142.0 mAHD in 2023.

In the Whynot overburden (DD1052), groundwater levels responded to rainfall recharge up to 6 m and are observed at 122.9 mAHD in late 2023. The change in groundwater levels for DD1052 are confirmed by manual and datalogger measurements for 2023. Groundwater levels in the Woodlands Hill overburden (DD1043) have decreased by 1.2 m during 2023 and are observed at 128.2 mAHD in December 2023. In the lower aquifer, the groundwater levels in the Arrowfield overburden aquifer (DD1057) decreased by 0.88 m at approximately 123.4 mAHD.

In the deeper geological units, groundwater levels in the Piercefield overburden (DD1032) continued to show a long-term declining trend since measurements started in 2008. During the reporting period, groundwater levels gradually decreased by up to 0.6 m. Groundwater levels in the Edderton seam (DD1027) showed an increase of approximately ~0.3 m during 2023. However, measurements were only available for January–March 2023, after which the bore was not monitored due unsafe and unstable ground conditions at the bore site location.

[2] SILO database of Australian climate data: https://www.longpaddock.qld.gov.au/silo/

Groundwater levels in DD1027 showed a similar increasing in groundwater level trend since July 2022 as DD1014. The groundwater level difference of the Piercefield overburden and Edderton seam remained stable at approximately 8 m difference during the reporting period. No significant changes in the vertical hydraulic head gradient between the major aquifers of the Jerrys Plains Subgroup were observed in 2023.

Monitoring bores MB06-S and MB06-D in the upper and lower Jerrys Plains Sub-Group, located between the Indicative Underground Mining Area and privately-owned bores (i.e. approximately 2.8 km to GW029660, aim to understand groundwater conditions further in the upper and lower Jerrys Plains Sub-Group. Groundwater levels in MB06-S increased by 0.2 m during the reporting period, compared to a decrease of 1.1 m in MB04. MB04 is located in the shallow regolith and the lowering in groundwater level is consistent with a general decrease in rainfall and CRD over the reporting period. MB06-D showed a gradual increase of 0.3 m in groundwater level during the reporting period.

Observed groundwater levels from bores from deep Jerry Plains Subgroup bores indicate possible regional depressurisation related to surrounding mining during the review. Bores DD1005 (138.6 m – Blakefield overburden), DD1015 (162.5 m – Blakefield overburden), DD1032 (276.5 m – Piercefield overburden) and DD1057 (188 m – Arrowfield overburden) aimed at monitoring the deep Jerrys Plains Subgroup aquifers show a consistent decrease in groundwater levels with very limited response to rainfall conditions. This may suggest potential regional impact on the deep aquifer from surrounding mining activities. It is not expected to be caused from the Maxwell Underground Mine as initial mining activities only started in early 2023 and a consistent decreasing trend has been observed since monitoring started in 2008.

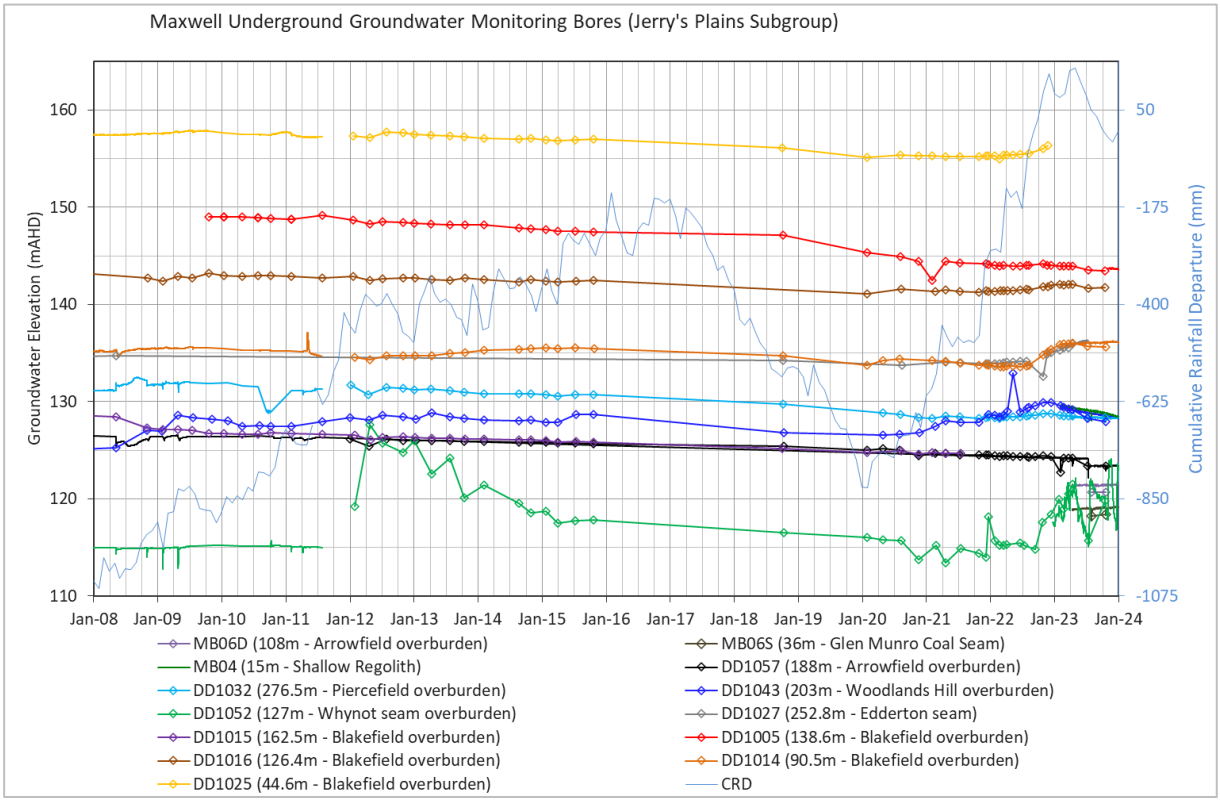


Figure 16. Groundwater Levels – Maxwell Underground Bores (Jerrys Plains Subgroup) (both manual measurements and datalogger recordings shown where applicable)

Note: Depth of the base of the screen and the associated aquifer shown in the legend; CRD = cumulative rainfall departure.

Saddlers Creek Catchment

In 2023, groundwater levels across the Saddlers Creek catchment have been responsive to below average rainfalls conditions (**Figure 17**).

The open standpipes MB3-Alluvial, MB3-Regolith, MB07 and MW1 located across the upper reach of Saddlers Creek and within the indicative extent of the underground development have responded to rainfall in the range of 0.3–1.2 m (**Figure 17**). MB3-Alluvial and MB3-Regolith continue to show the same general groundwater trends and correlate well to the CRD. In addition, a downward vertical gradient between MB3-Alluvial and MB3-Regolith remains during 2023, as observed during 2022, with a head separation of less than 0.5 m. This suggests that the shallow bedrock (regolith) is likely recharged by the overlain alluvium formation.

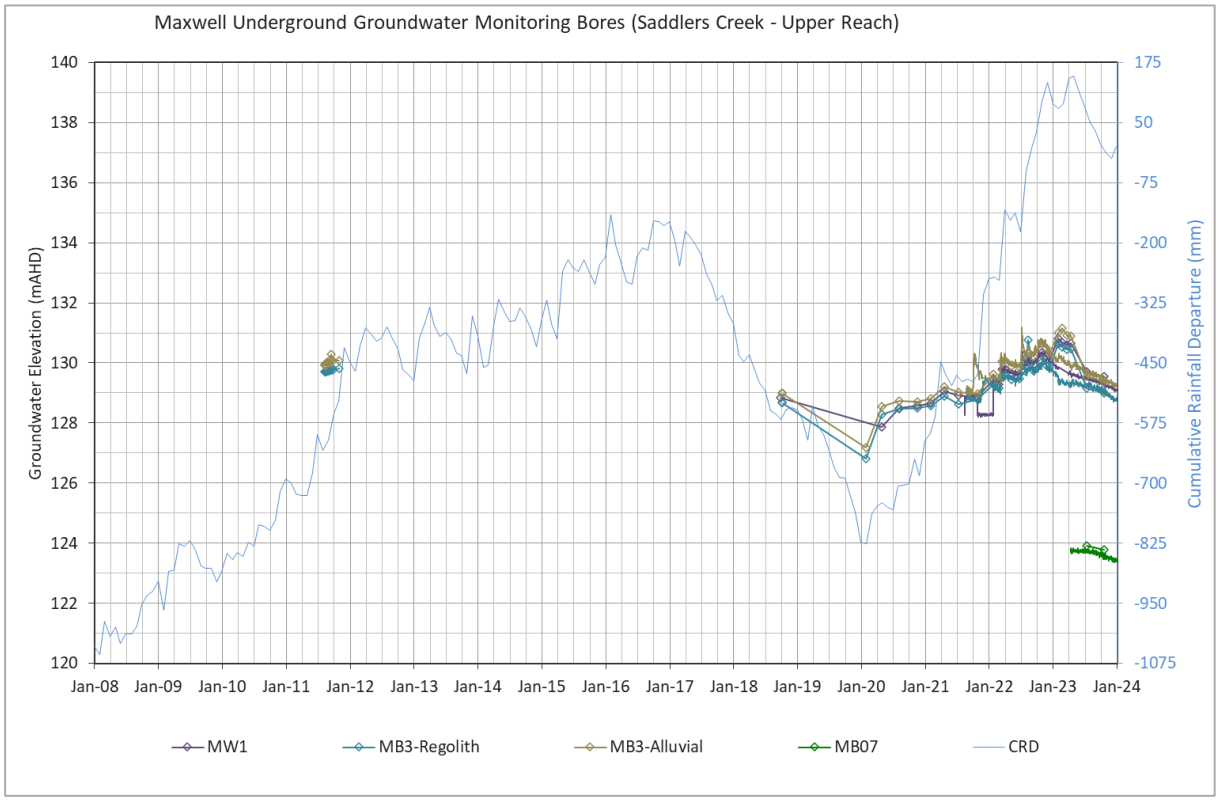


Figure 17. Groundwater Levels – Saddlers Creek (upper reach) (both manual measurements and datalogger recordings shown where applicable)

The open-stand pipes MB2-Alluvial, MB2-Regolith, MB05, and MW2 are located along the mid-to-lower reaches of Saddlers Creek, approximately 2.4 km downstream to MB3-Alluvial. The Maxwell gauging station installed along Saddlers Creek is located approximately 2.3 km downstream from MB2-Alluvial. In 2023, groundwater levels observed along the mid reach of Saddlers Creek have responded to below average rainfall conditions, with MW2 decreasing by 0.8 m (**Figure 18**). Groundwater levels in MB2-Alluvial, MB2-Regolith, and MB05 decreased between 0.2–0.4 m. The upward vertical head gradient between MB2-Alluvial and MB2-Regolith decreased by 0.4 m over the reporting period and had a head separation of 1.1 m. This suggests that groundwater still flows from the shallow bedrock (regolith) to the alluvium formation and are less responsive to rainfall recharge compared to upstream groundwater sites (i.e. MB3-Alluvium and MB3-Regolith).

Saddlers Creek water levels recorded at the Maxwell gauge station is presented in **Figure 18** alongside the groundwater levels recorded at the nearest groundwater monitoring sites. The

logger for the gauge station was replaced after corrosion damage and did not record readings between 20 February and 6 June 2023. During 2023 Saddlers Creek did not record flow or any significant water level above the creek bed during the reporting period.

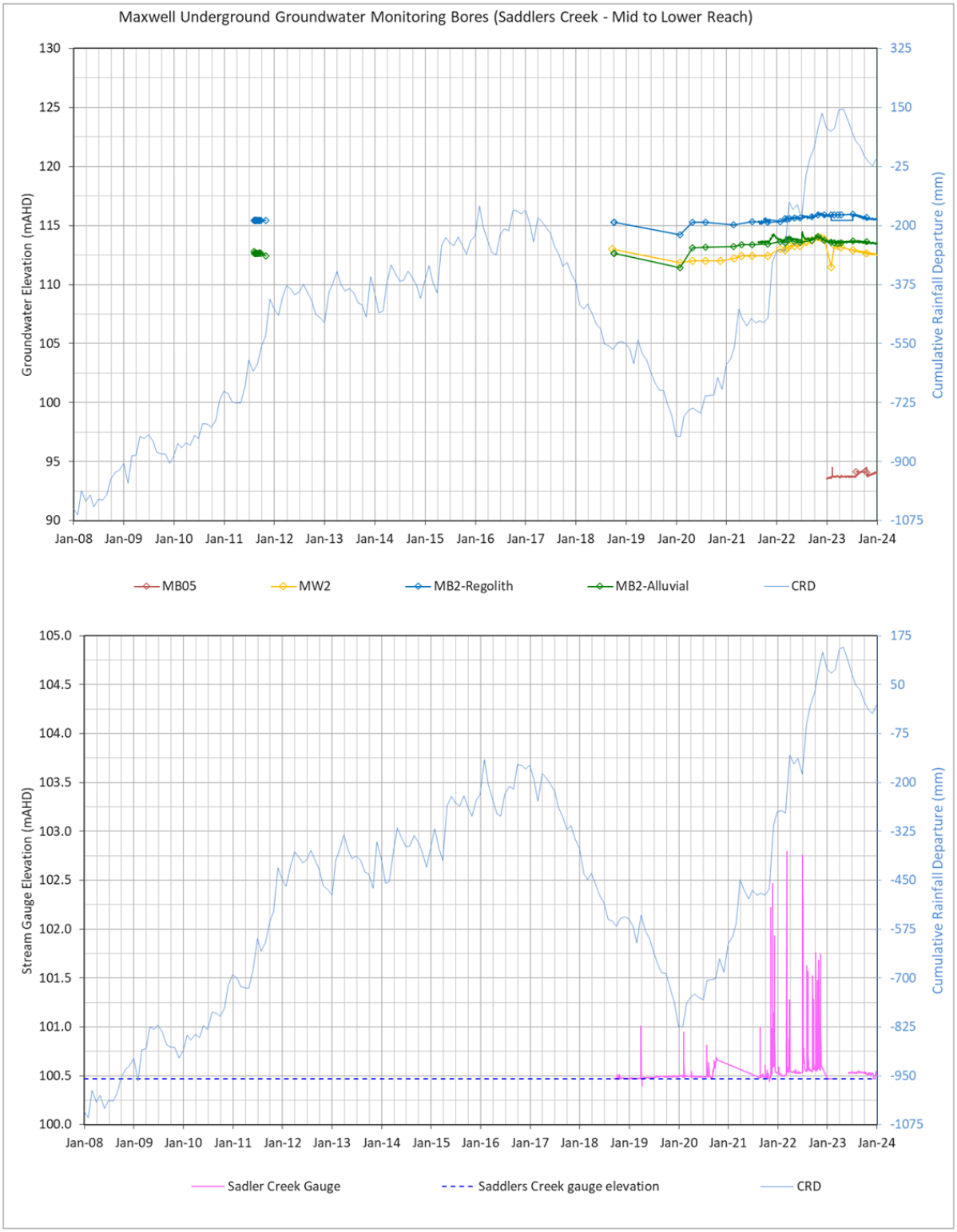


Figure 18. Groundwater levels at bores close to Saddlers Creek (mid-reach) and depth readings at the Saddlers Creek gauging station (both manual measurements and datalogger recordings shown where applicable)

Hunter River Catchment

Groundwater levels at groundwater monitoring sites located along the Hunter River responded to below average rainfall conditions during 2023 and decreased slightly from December 2022 levels (**Figure 19**).

Groundwater levels in MB1-Alluvial responded to below average rainfall conditions and decreased by approximately 1 m during 2023. MB1-Whybrow and MB1-Redbank also showed similar decreasing trend in groundwater levels of up to 1 m during 2023. The nested open standpipes at sites MB1, located south of Maxwell site, indicated an upward vertical head gradient with a head separation of approximately 1.7 m between the alluvium and the Whybrow overburden and 2.3 m with the Redbank overburden. This suggests that during 2023 groundwater continued to flow from the Permian to the Hunter River alluvium as noted in 2022. MW3 was not monitored during 2023 after continually being recorded as dry during 2022.

Approximately 2.6 km downstream, MB4-Alluvial and MB4-Coal also show responses to below average rainfall conditions during 2023. It was noted from changes in groundwater levels and the minor groundwater head separation between these two sites, that the Permian (MB4-Coal) is most likely recharged by groundwater in the alluvium formation.

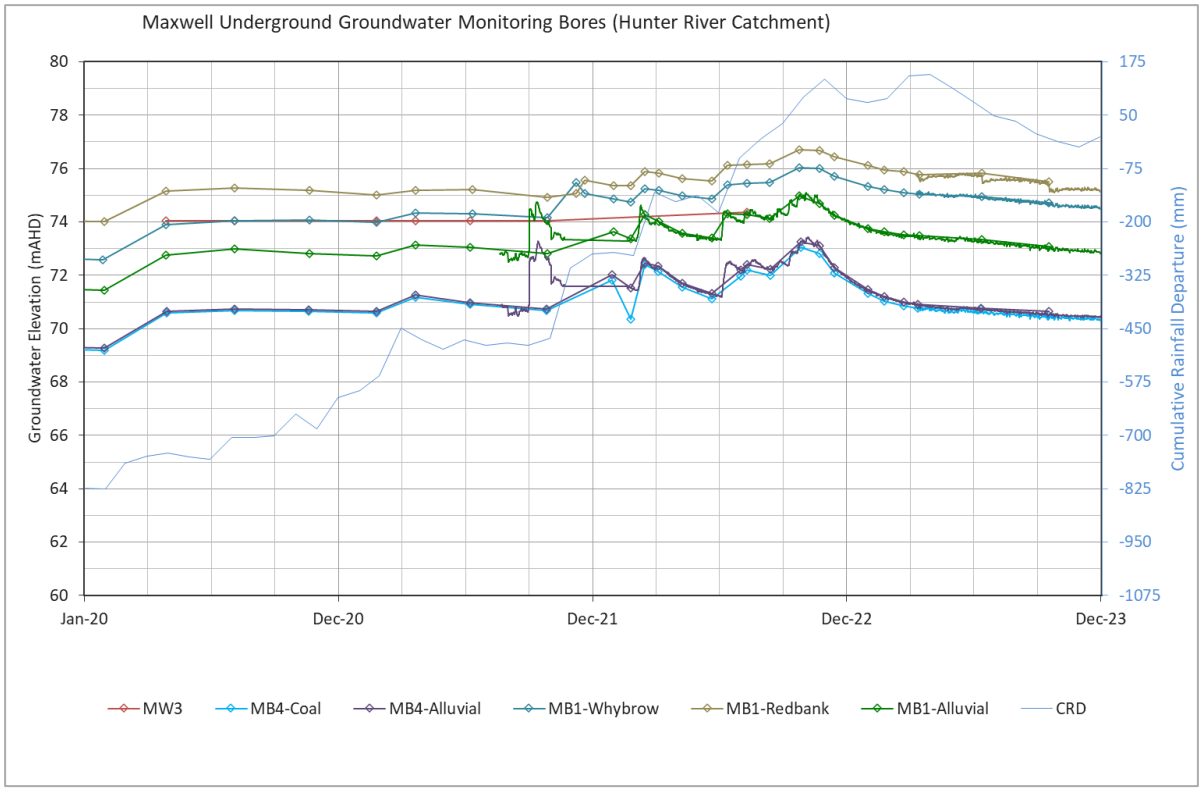


Figure 19. Groundwater Levels – Hunter River Catchment (both manual measurements and datalogger recordings shown where applicable)

Hydrometric analysis of groundwater-surface water interaction was undertaken using groundwater levels in bore GW080077 (which is screened in the Hunter River alluvium close to Denman) and Hunter River stage elevations at the Denman gauge (#210055) located approximately 18.5 km upstream from the Hunter River and Saddlers Creek confluence

(source of data: Water NSW[3]). The analysis is presented in **Figure 20**. In 2023, river water levels were consistently 2 m or more above adjacent groundwater levels, indicating a losing river surface water source with flow into the Hunter River alluvium at these locations, however spatial and temporal changes in surface water and groundwater interactions along the Hunter River can be influenced by water abstraction from private users (i.e. irrigation). A similar groundwater trend was observed for Bore GW080077 as Maxwell monitoring bores with a general decreasing trend during 2023, most likely due to below average rainfall conditions. No change in surface and groundwater interactions is observed along the Hunter River and upstream to the Maxwell Underground Mine during the review period.

Also, there is no evidence of observed groundwater depressurisation related to mining (i.e. neighbouring mines) along the Hunter River in the vicinity of the Maxwell UG Mine in 2023.

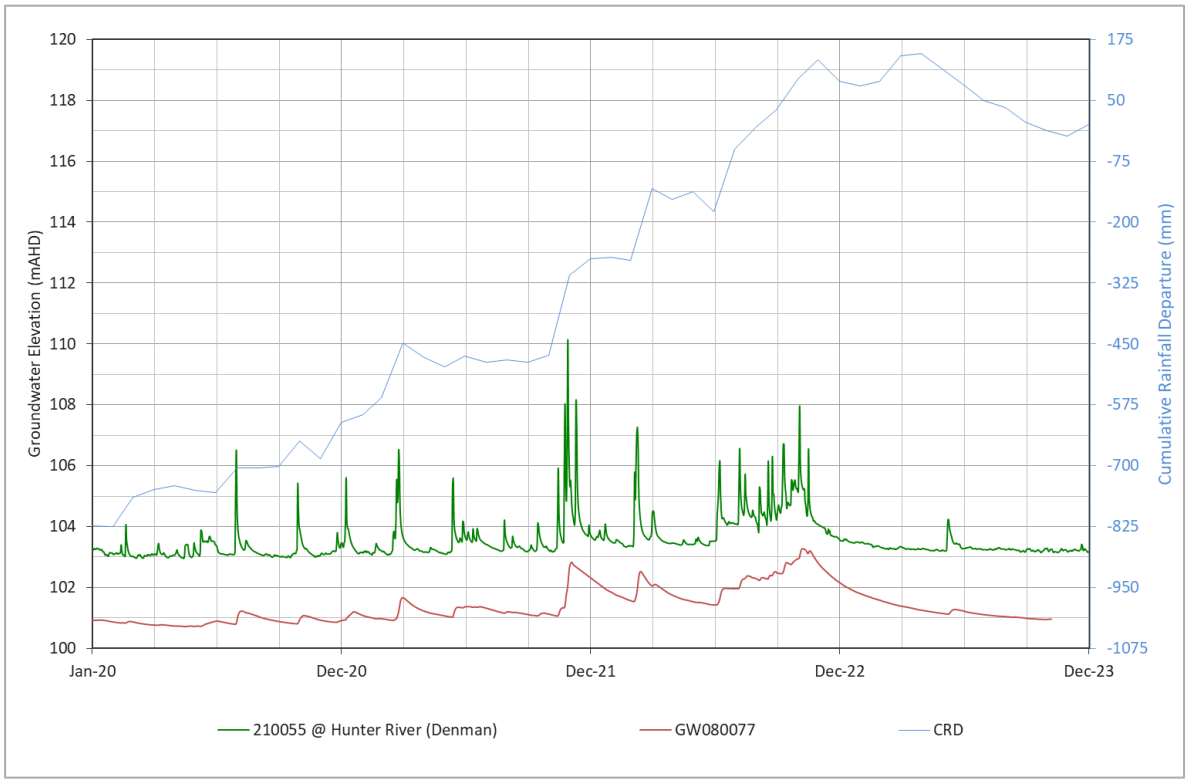


Figure 20. Groundwater Levels at GW080077 and Surface Water Level at 210055 (Hunter River)

Maxwell Infrastructure

Figure 21 presents the SE15 Void (known as the South Void) and ES27 Void (known as the East Void) water levels plotted alongside the groundwater levels recorded at the nearby groundwater monitoring sites GW04 and R4241 located south of the Maxwell Infrastructure and GW02S and GW02D located to the north of the ES27 Void.

In 2023, SE15 Void and ES27 Void water levels increased by 0.97 m and 1.22 m respectively, less than the 4 m increase observed in 2022. The two voids are known to be hydraulically connected, as is demonstrated by the same surface water level elevations during the reporting period.

R4241 is located approximately 1.2 km to the south of ES27 and 200 m to the south-east of SE15 Void. R4241 monitors groundwater levels in the Jurassic Volcanics, mapped to the

[3] WaterNSW Real Time Data website: https://realtimedata.waternsw.com.au/

south of the Maxwell Infrastructure. The groundwater level responses and low hydraulic conductivities of the Jurassic Volcanics (in the vicinity of R4241) likely results in limited interactions between the voids and groundwater present in the Jurassic Volcanics. Groundwater in the Jurassic Volcanics is considered as perched groundwater, likely disconnected from the Greta Coal Measures. Groundwater levels in R4241 remained approximately 40 m higher than the void water levels in 2023.

Groundwater levels in GW04 are observed approximately 10 m above the void water levels. This suggests that in the southern edge of the Maxwell Infrastructure area, the two voids (ES27 and SE15) remained a groundwater sink in 2023.

Groundwater monitoring sites GW02S and GW02D are considered appropriate groundwater monitoring sites to assess the interactions between groundwater and surface water in the ES27 Void.

Groundwater levels in GW02D decreased by approximately 1.1 m in 2023 and the groundwater level was consistently below the ES27 void water levels. Limited groundwater responses to rainfall in GW02D is observed in 2023. Water levels in ES27 Void increased to from 2.3 m in 2022 to approximately 4 m above the GW02D groundwater levels during 2023. Groundwater levels in the shallow regolith at GW02S decreased by 3.1 m during 2023, most likely due to below average rainfall conditions. Groundwater levels in GW02S were observed to be 50 m above the ES27 Void water level which suggests that ES27 Void remained a groundwater sink with groundwater likely flowing into the voids during 2023.

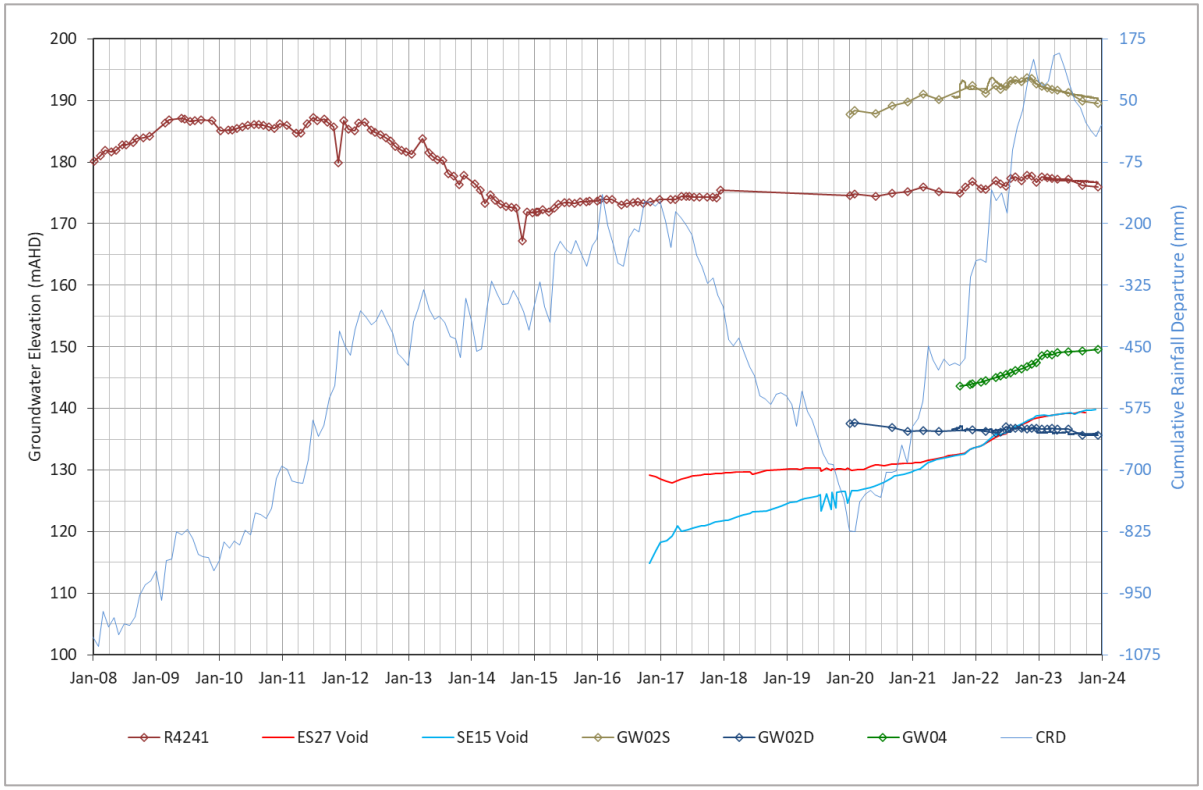


Figure 21. Groundwater Levels – Maxwell Infrastructure (in the vicinity of ES27 and SE15 Voids) (both manual measurements and datalogger recordings shown where applicable)

Figure 22 presents the NN Void (known as the North Void) surface water levels plotted alongside the groundwater levels recorded at the nearby groundwater monitoring sites F1162, F1164, GW01S and GW01D.

F1162 and F1164 are the closest groundwater monitoring sites to the NN Void and monitor the unmined Greta Coal Measures. Groundwater levels at these two locations increased up to 7 m during 2023, following a similar increasing trend in surface water levels in the NN Void. Groundwater levels at F1162 and F1164 were consistent with measured surface water levels in NN Void during 2023. Further to the north-west, GW01S and GW01D are located approximately 830 m from the NN Void. GW01S and GW01D monitor groundwater in the upper and lower regolith. The groundwater levels at these two sites show the same general decreasing trend during 2023 with a minor upward vertical head gradient between GW01S and GW01D. Groundwater levels in GW01S and GW02 remained approximately 53 m above the NN Void surface water levels. Hence in 2023, the NN Void continued to act as a groundwater sink with limited likelihood of groundwater discharge from the NN Void to Ramrod Creek.

The elevation of groundwater levels has remained at or above the elevation of the water surface in the voids, indicating that there is likely to be an inflow of aquifer water into the voids as predicted in the site EA.

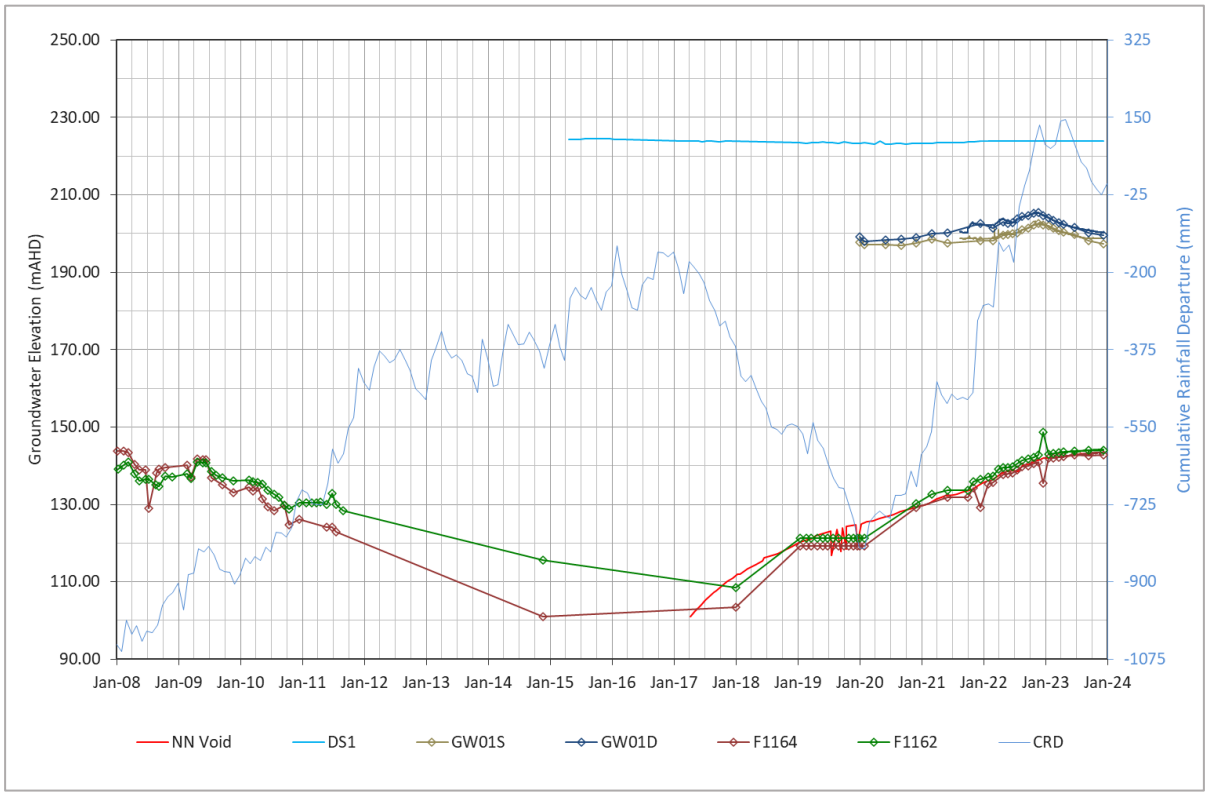


Figure 22. Groundwater Levels – Maxwell Infrastructure (in the vicinity of NN Void) (both manual measurements and datalogger recordings shown where applicable)

Groundwater Quality

The quality of groundwater at the site is analysed regularly in accordance with the current GWMP. Average groundwater quality results for the reporting period along with a comparison to average results recorded for the previous five years, where available, are provided in **Appendix 10.** Groundwater Results in the reporting period were generally consistent with those recorded previously.

Electrical Conductivity and pH

Figure 23 presents EC and pH recorded at the groundwater monitoring sites located along Saddlers Creek (**Figure 23a** and **Figure 23b**) and along the Hunter River (**Figure 23c** and **Figure 23d**).

pH in the Saddlers Creek alluvium and shallow regolith has remained relatively stable during 2023, ranging between 7.0 and 8.2 . In 2023, EC recorded along Saddlers Creek ranges from 3,700 µS/cm to 8,800 µS/cm with the alluvium bores having a higher salinity than bores screened within the shallow regolith, consistent with measurements during 2022. EC in the Saddlers Creek alluvium has generally decreased and shallow regolith bores remaining stable during 2023.

In 2023, pH in the Hunter River alluvium and shallow regolith has also remained relatively stable and fluctuated between 7.1 and 8.1 pH units. EC in the Hunter River alluvium bores has remained stable during 2023, apart from MB1-Alluvial showing an increase by approximately 2,000 µS/cm but remains within baseline measurements. In the deeper geological units EC has remained stable at approximately ~6,000 µS/cm (MB1-Redbank and MB1-Whybrow).

Figure 24 presents EC and pH recorded at the groundwater monitoring sites located across Maxwell Underground (**Figure 24a** and **Figure 24b**) and Maxwell Infrastructure (**Figure 24c** and **Figure 24d**).

pH in the Jerrys Plain Subgroup within the Maxwell Underground sites generally remained stable over 2023 ranging from 6.3–8.6. DD1052 showed a decrease in pH from 8.6 to 8.1 during 2023. In 2023, EC recorded in the Jerrys Plain Subgroup ranged from 1,100 µS/cm to 10,300 µS/cm, and shows no significant changes compared to previous years.

pH across the Maxwell Infrastructure groundwater monitoring sites has remained stable in 2023, ranging between 6.2 and 7.4. In 2023, groundwater EC across the Maxwell Infrastructure sites ranged from 1,900 µS/cm to 13,500 µS/cm and remained relatively stable. The exceptions are:

- at GW01S, EC increased from 265 µS/cm (laboratory measurement) in December 2022 to an average of 7,000 µS/cm during 2023. Field measurements taken in December 2022 were 263 µS/cm, and confirming the value was not erroneous. However, majority of monitoring data for GW01S averages around 7,000 µS/cm and the December 2022 measurement was considered a single temporary decrease, suggested during the 2022 Annual Review to be a temporary freshening of groundwater influenced by rainfall recharge.
- at GW02S, EC decreased from a high of 13,000 µS/cm in December 2022 and returned to concentrations observed by historic data, averaging 7,200 µS/cm.
- at GW02D, EC increased from 6,870 µS/cm in December 2022 to ~13,500 µS/cm during 2023. Prior to December 2022, levels were elevated, from December 2021 (11,500 µS/cm), June 2022 (12,000 µS/cm) and September 2022 (11,700 µS/cm) and have steadily increased during 2023. In December 2023, EC at ES27 Void was recorded at 7,500 µS/cm which suggest that there are limited interactions between groundwater in GW02D and ES27 Void. It was noted during monitoring in 2023 that the groundwater level in GW02D remained stable and within historic measurements. However, during January 2023 water level measured in GW02D was less than 2m from the bottom of the bore, with the logger requiring cleaning in November 2023 from significant mud observed on the logger and at the bottom of the bore. Taking into account no major changes in groundwater level trend for GW02D, static water levels close to the bottom of the bore, limited interaction with ES27 Void, and observations of mud at the bottom of the bore and monitoring equipment, it is not expected that this increase is due to any mining activities.

The raw groundwater quality results for the Maxwell Underground and Maxwell Infrastructure groundwater monitoring sites are presented in the quarterly Environmental Monitoring Data reports; these are available on the Malabar Resources website[4], and hence are not repeated in this Annual Review. The quarterly reports include the 2023 average for each parameter at each groundwater monitoring site presented alongside the long-term average for comparison.

In 2023, groundwater quality including dissolved metal concentrations remained within baseline levels.

[4] Malabar Resources website: https://malabarresources.com.au/

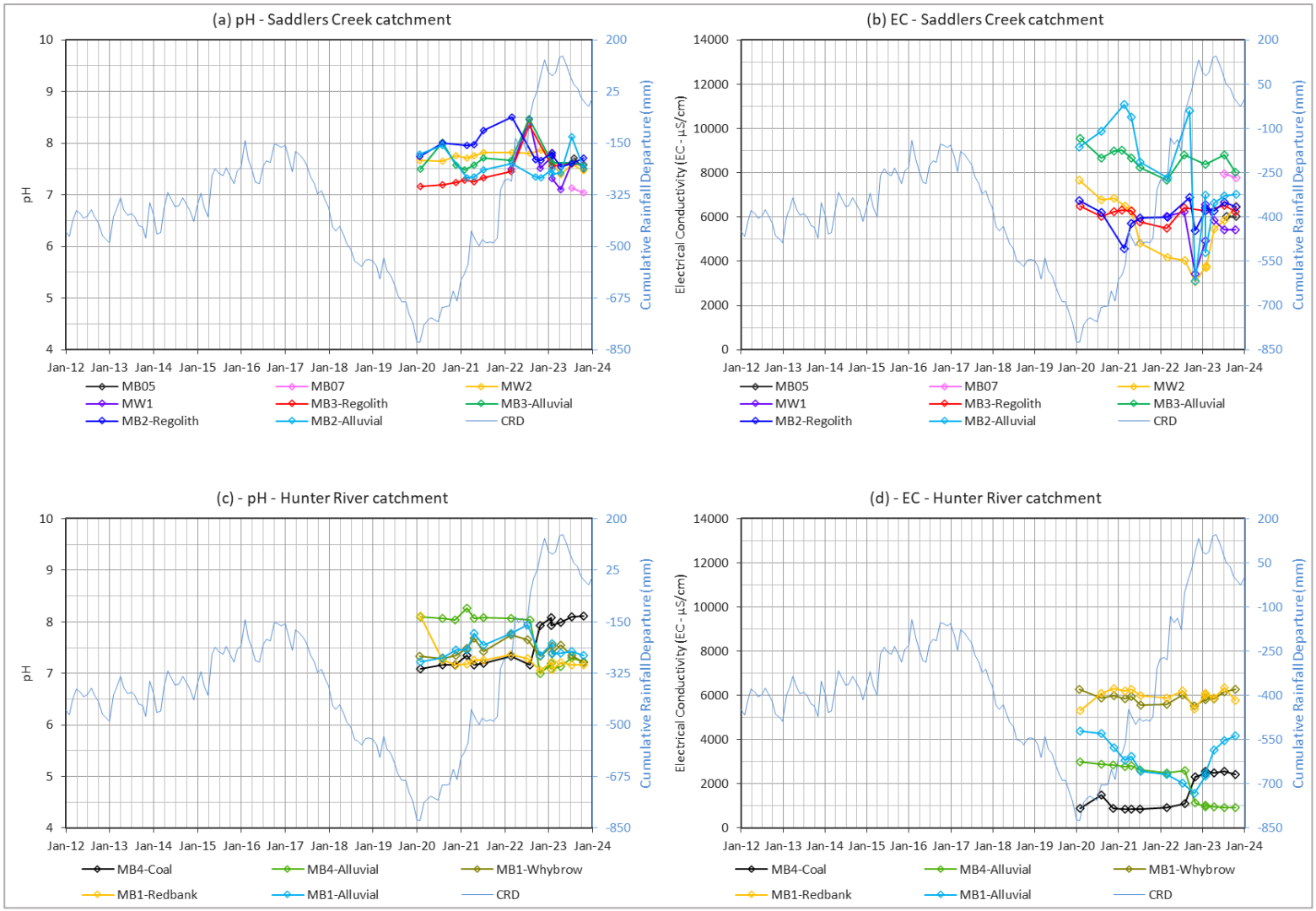


Figure 23. Groundwater pH and Electrical Conductivity (EC) along Saddlers Creek and the Hunter River

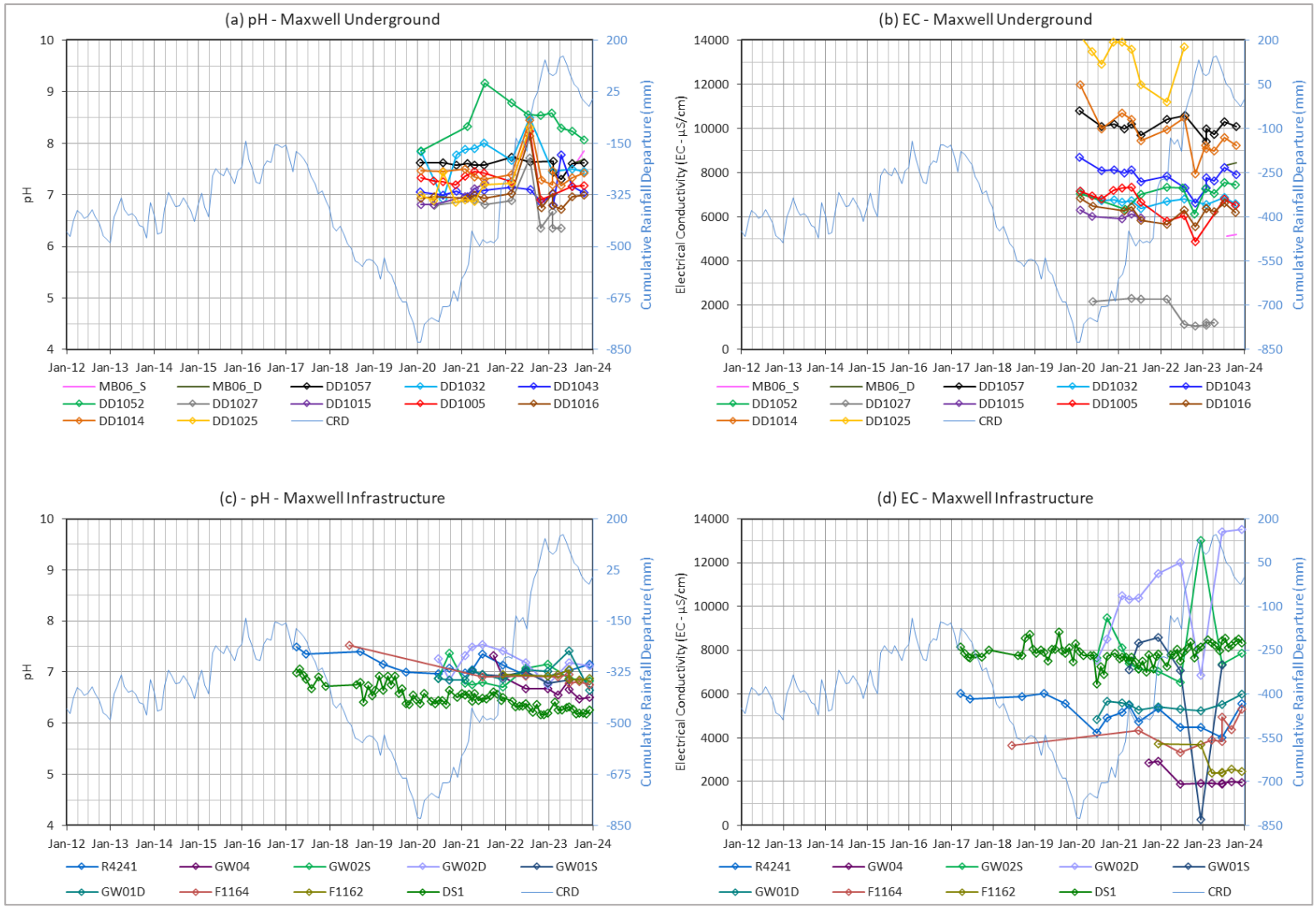


Figure 24. Groundwater pH and Electrical Conductivity (EC) across Maxwell Underground Mine and Maxwell Infrastructure

TARP Assessment

The following section assesses the groundwater data (i.e. groundwater levels and quality) against the Trigger Action Response Plan (TARP) trigger levels presented in the GWMP.

Groundwater Levels

Groundwater levels at the Maxwell Infrastructure groundwater monitoring sites R4241, GW01D, GW01S, GW02D, GW02S and at the Maxwell UG Mine sites MB3-Alluvial and MB3-Regolith (**Appendix 10**) have not exceeded the trigger levels and hence are deemed at Normal status. **Table 19** identifies any groundwater level trigger exceedances during the review period.

During 2022, DD1025 and DD1032 declined below the trigger level of 157.3 mAHD and 130.6 mAHD, respectively. This was deemed due to over conservative trigger levels rather than being mining-related, given mining did not commence during 2022. From Q3-2023 the groundwater level in DD1032 declined below the trigger level after being above the trigger level during Q1-2023 and Q2-2023. It is not expected to be caused from the Maxwell UG Mine as initial mining activities only started in early 2023 and a consistent decreasing trend has been observed since monitoring started in 2008. In total, groundwater levels in DD1032 declined by a total of 0.6 m in 2023. DD1032 does not show any significant response to changes in rainfall trends, as no significant change in groundwater level trend is observed during the increase in CRD between January 2020 and December 2022.

The consistent decrease in groundwater levels since 2008 is possibly linked to regional mining in the long-term. It is expected that continual progression of surrounding mining activities in the Permian coal measures would depressurise the aquifer unit. Comparison between modelled and observed levels predicted depressurisation to occur at DD1032, and modelled levels at the end of 2023 were predicted at 115.1 mAHD, which is much lower than observed groundwater levels during the reporting period. Average observed groundwater level for 2023 in DD1032 were 128.3 mAHD. The difference in the timing may relate to how the model represents actual mine progression at site and surrounding mining activities.

DD1025 was decommissioned in December 2022 for safety reasons (to prevent inrush to the upcoming underground mining operations) and excluded from the TARP assessment for 2023. As per the recommendations in the 2022 Annual Review, it is proposed that this site be replaced by a replacement bore for the purposes of the TARP assessment, once a revised GWMP has been approved. DD1014 is considered a suitable replacement within the Maxwell Underground area, is located within the upper Blakefield overburden, and groundwater level responses are similar to that observed historically for DD1025.

The 2022 Annual Review recommended a new trigger level for DD1032. The 5th percentile of the groundwater dataset for the period March 2020 to December 2022 (i.e. period following the NSW 2017–19 drought) was used to calculate the revised trigger levels of 128.3 mAHD, revised from 130.6 mAHD. The revised trigger level remains unchanged after calculating the 5th percentile of groundwater levels up to December 2023. Following a Level 1 exceedance, if the trigger exceedances are not caused by site activities and have not resulted in an exceedance of a Water Performance Measure in Table 4 of Development Consent for SSD 9526, then the GMMP requires a review of the monitoring frequency.

DD1032 has been installed with a datalogger in April 2023 and records readings daily and this is considered appropriate to fulfil the TARP requirements. Despite the trigger exceedance not likely being caused by site mining activities, it is recommended the site consider undertaking a TARP trigger investigation to confirm if the decline in deep monitoring bores are potentially related to bore performance and/or possible regional cumulative impacts from surrounding mining activities. It is expected that the decreasing groundwater level trend will continue in the long-term as the groundwater model predicted depressurisation to occur at DD1032 during the operation phase of the project, causing

continual TARP trigger exceedance. Additionally, it is recommended to confirm the potential cause in groundwater level decrease before mining at the site progresses to deeper levels.

Considering the approved TARP exceedance level of 130.6 mAHD, groundwater levels at DD1032 were observed below the trigger levels in 2023, but remained at a TARP Level 1 exceedance, as the cause is not likely caused by site mining activities.

Table 19. Groundwater Level Exceedances – shallow and deep open standpipes

Bore	Trigger Level Exceedances											
	Jan 23	Feb 23	Mar 23	Apr 23	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23	Nov 23	Dec 23
Maxwell Infrastructure	**Groundwater Management Plan (Feb 2023)**											
R4241	N	N	N	N	N	N	N	N	N	N	N	N
GW01D	N	N	N	N	N	N	N	N	N	N	N	N
GW01S	N	N	N	N	N	N	N	N	N	N	N	N
GW02D	N	N	N	N	N	N	N	N	N	N	N	N
GW02S	N	N	N	N	N	N	N	N	N	N	N	N
Maxwell Underground Mine												
DD1025	*Decommissioned*											
DD1032	N	N	N	N	N	N	L1	L1	L1	L1	L1	L1
MB3-Alluvial	N	N	N	N	N	N	N	N	N	N	N	N
MB3-Regolith	N	N	N	N	N	N	N	N	N	N	N	N
Private Bores												
GW029660	-	-	-	-	-	-	-	-	-	-	-	-
GW029647	-	-	-	-	-	-	-	-	-	-	-	-
GW029648	-	-	-	-	-	-	-	-	-	-	-	-

LX: maximum trigger level exceedances recorded N: Normal Level L1: TARP Level 1 L2: TARP Level 2

"-" no data available for this period – no access due to Landowner permission not being obtained for the Private Bores. GW01S was noted to be dry during Q4-2023.

Groundwater Quality

An assessment of groundwater quality (EC and pH) at each of the monitored bore locations against the TARP trigger levels has been undertaken. EC and pH plots for groundwater monitoring locations with the approved groundwater quality trigger levels are presented in **Appendix 10.** A summary is presented in **Table 20**.

No groundwater quality results were available for the private bores for the reporting period.

In 2023, EC and pH are all within Normal levels. The exceptions are the exceedance of the EC trigger level at GW01D and MB3-Regolith during Q3-2023. These were single exceedances and returned to below the trigger level during Q4-2023. During Q4-2023 GW02D exceeded three consecutive exceedances from Q2-2023 to Q4-2023. EC levels at GW02D ranged from 12,400 µS/cm during Q2-2023 to 13,500 µS/cm during Q4-2023. During 2022 the EC measurements also exceeded the trigger values for three consecutive readings, but lowered during Q4-2022, most likely due to higher-than-average rainfall during that period.

GW02D is located north of the ES27 Void. The latest EC measurement of the ES27 Void is 7,500 µS/cm which indicates that the increase in EC at GW02D is not due to seepage of surface water from the ES27 Void to GW02D.

The increase in EC could be influenced by a build-up of sediment at the bottom of standpipe GW02D, with the water level less than 2 m from the bottom of the bore, and limited rainfall recharge, as field sampling noted that the logger was suspended in mud in January 2023 and the removal of mud from the water level datalogger was required during November 2023.

It is therefore judged likely that the increase in EC above the trigger level at GW02D is not caused by site activities and does not result in an exceedance of a Water Management Performance Measure in Table 4 of Development Consent SSD 9526. Continual monitoring at GW02D is required to confirm the EC trend per the site's GWMP together with the groundwater level trend. Should the bore dry up during 2024, as the latest groundwater level is less than 2 m above the bottom of the bore, additional investigations may be required.

Table 20. Trigger Exceedances for pH and EC in 2023

Bore	Period	Trigger Level Exceedance		
		EC (µS/cm)	pH lower	pH upper
R4241	Q1-2023	N	N	N
	Q2-2023	N	N	N
	Q3-2023	N	N	N
	Q4-2023	N	N	N
GW01S	Q1-2023	N	N	N
	Q2-2023	N	N	N
	Q3-2023	N	N	N
	Q4-2023	-	-	-
GW01D	Q1-2023	N	N	N
	Q2-2023	N	N	N
	Q3-2023	Y	N	N
	Q4-2023	N	N	N
GW02S	Q1-2023	N	N	N
	Q2-2023	N	N	N

Bore	Period	Trigger Level Exceedance		
		EC (µS/cm)	pH lower	pH upper
	Q3-2023	N	N	N
	Q4-2023	N	N	N
GW02D	Q1-2023	N	N	N
	Q2-2023	Y	N	N
	Q3-2023	Y	N	N
	Q4-2023	Y	N	N
DD1025	Q1-2023	N	N	N
	Q2-2023	N	N	N
	Q3-2023	N	N	N
	Q4-2023	N	N	N
DD1032	Q1-2023	N	N	N
	Q2-2023	N	N	N
	Q3-2023	N	N	N
	Q4-2023	N	N	N
MB3-Alluvial	Q1-2023	N	N	N
	Q2-2023	N	N	N
	Q3-2023	N	N	N
	Q4-2023	N	N	N
MB3-Regolith	Q1-2023	N	N	N
	Q2-2023	N	N	N
	Q3-2023	Y	N	N
	Q4-2023	N	N	N
Private Bores	No data available	-	-	-

"-" no data available for this period – no access due to Landowner permission not being obtained for the Private Bores. GW01S was noted to be dry during Q4-2023.

Proposed Improvements

Following the decommissioning of DD1025 in December 2022, it is planned to incorporate an existing groundwater monitoring bore into the TARP assessment as a replacement to DD1025. DD1014 is considered a suitable replacement within the Maxwell Underground area and is located within the upper Blakefield overburden and groundwater level responses are similar to that observed historically for DD1025.

There are seven bores equipped with VWPs across the Maxwell UG Mine which includes RD1189, RD1192, VWP1, BKL6R12, WND16, WND26, RBD1. The following VWPs sensors were suggested to be removed from the GWMP during the 2022 Annual Review:

- RD1189-VWP2, RD1189 VWP7, RD1189-VWP9 (unstable)
- RD1192-VWP1 (disabled, no data past August 2011)
- WND16-VWP3, WND16-VWP4 (unstable and disabled respectively)
- MB1VWP1 (VWP5 only) (unstable).

Further to the 2022 Annual Review recommendations, it is first recommended the site conduct a VWP inspection investigation to confirm the status of all VWP sensors on site and recommend potential repair, replacement or decommissioning of each VWP sensor.

It is also proposed to remove the following open-stand pipes from the GWMP:

- DD1015 due to a blockage of the bore, suspected to have collapsed.
- DD1027 as it monitors the Edderton Seam (i.e. not targeted by the Maxwell UG Mine). Groundwater data at this monitoring sites bring no significant value for future assessment in groundwater level and quality analysis for the Maxwell Project; in addition, access to this bore poses safety concerns for sampling as it is in an isolated location, across a steep gully.
- MW3 as it is reported dry since early 2020.
- DD1025 as it was decommissioned in December 2022 due to the requirement to mitigate risks to the underground mine workings.

During June 2022 the groundwater model calibration was verified for the updated groundwater monitoring data as part of the process for Maxwell MOD2. The updated data set showed that the EIS groundwater model remains calibrated and is fit for purpose for prediction. The updates to the baseline groundwater data set showed that the groundwater level trends, and groundwater quality are generally consistent with the outcomes presented in the EIS Groundwater Assessment. Modest declines in groundwater levels and changes to groundwater quality have been attributed to the drought conditions (2017–2019), with some subsequent recovery following a period of above average rainfall in between 2020 and 2022.

In accordance with the GWMP, the observed groundwater levels were reviewed against the latest model predictions. The site GWMP (Section 5.1 and Section 5.6) commits to periodic recalibration of the groundwater model every three years and if the monitoring data indicates significant deviation from the model predictions. It is recommended the model be recalibrated in Q4-2024 (three years after the previous model calibration dataset).

9 REHABILITATION

9.1 Management

Rehabilitation at the Maxwell UG Mine is managed in accordance with the Rehabilitation Strategy, RMP and the Forward Program. The Rehabilitation Strategy was prepared in March 2023 and describes the overall rehabilitation outcomes for the site in regard to mine closure, final landform and final land use.

Consistent with the requirements of the *NSW Mining Amendment (Standard Conditions of Mining Leases) – Rehabilitation Regulation 2021* under the *Mining Act 1992*, Maxwell also has a RMP for the site which provides further detail on final land use, rehabilitation implementation, ecological monitoring programs and research. As previously mentioned, the RMP was updated in November and December 2023 following approval of Antiene MOD1 and to align the monitoring requirements to the BAM.

Each year an Annual Rehabilitation Report and Forward Program are prepared for Maxwell UG Mine and are submitted via the Resources Regulator Portal. The Annual Rehabilitation Report describes the key activities (operations and rehabilitation) that occurred during the reporting period and progress against the three-year forecast in the Forward Program.

Post Mining Land Use

Maxwell UG Project EIS describes a post-mining land use as a combination of agriculture and nature conservation. The rehabilitation objectives in Condition B76 of SSD 9526 describes the final land use features as woodland biodiversity corridors and areas proposed for agricultural or pastoral use.

The post mining land use goal is to deliver a safe, stable, non-polluting and sustainable post-mining landform that is consistent with the surrounding natural topography and fit for sustaining the intended post-mining land use. As an underground mine, the project would result in minimal changes to existing landforms. Consistent with previous approvals, the vision is to create a landscape with areas capable of productive land use, alongside woodland corridors to support biodiversity.

Rehabilitation Objectives

Rehabilitation objectives for the site are provided in the RMP and describe the outcomes required to achieve the post-mining land use. The rehabilitation objectives are consistent with the rehabilitation objectives outlined in Schedule 2, Condition B76 of SSD 9526 and apply to the entire site. These rehabilitation objectives take into account relevant strategic land use objectives in the region and the potential benefits of the post-mining land use to the environment, future landholders and the community.

Completion criteria are objective target levels assigned to a variety of indicators which can be measured to demonstrate progress and ultimate success of rehabilitation. They provide a defined end point, at which rehabilitation can be deemed successful and the lease relinquishment process can proceed. These indicators and criteria will be refined over time as more information is obtained from monitoring programs or knowledge gained from industry and operational experience.

The rehabilitation objectives are further defined in the Rehabilitation Objectives Statement which is submitted via the Resources Regulator Portal. In March 2023, Maxwell received feedback from the Resources Regulator on our Rehabilitation Objectives Statement. Subsequently, these were updated and resubmitted in April 2023.

Rehabilitation Cost Estimate

A revised RCE was submitted to the Resources Regulator in August 2022 following submission of an updated Forward Program. As assessment of the security bond was

undertaken by the Resources Regulator in March 2023 and the bond was updated in May 2023.

Targeted Assessment Program - Landform Establishment and Section 240 Notice

On 2 March 2021, the Resources Regulator performed a planned inspection of landform establishment activities at Maxwell Infrastructure site. This targeted assessment was undertaken to identify risks and assess performance of associated controls associated with landform establishment activities, as well as assess compliance with statutory obligations. Based on the observations during the inspection, the Resources Regulator formed the view that there is a potential risk of adverse impact to the environment due to the uncertainty of the long-term erosional stability of the final landform.

Subsequently, on the 28 June 2021, Maxwell was issued with a notice under Section 240 of the *Mining Act 1992* (Section 240 Notice) to undertake an assessment of the long-term erosional stability of the final landforms that have been constructed as part of the rehabilitation of the mine and listed as Pasture and Woodland rehabilitation in Figure 14 of the Annual Environmental Management Report 2020. The notice also required Maxwell to undertake an assessment of the surface water management structures located in the rehabilitated landform. The assessment report was submitted to the Resources Regulator in January 2022.

In March 2022, Maxwell received a commencement of investigation letter from the Resources Regulator. Maxwell provided a response in April 2022. In November 2022, the Resources Regulator determined that no breach had occurred.

In December 2022, Maxwell was issued with a notice under Section 240 of the *Mining Act 1992* (Section 240 Notice) to engage a suitably qualified expert to undertake an assessment that sets out the design of modifications to the rehabilitated landform and surface water management structures on the rehabilitated landform to address the instability and erosion risks. The notice also includes further directions to conduct a risk assessment, prepare a rehabilitation management plan, forward program and rehabilitation report.

An Assessment Report to address Direction 1 of the Section 240 Notice was submitted to the Resource Regulators in May 2023. This report verified previous studies into the rehabilitated landform and surface water structures, measured the erosion rates throughout the rehabilitated landform, provided further detail into capacity of existing rock structures and investigated options for erosion points identified during the Resource Regulator inspection. The rehabilitation risk assessment was reviewed and the RMP and Forward Program were updated during the reporting period to capture the measure set out in the Assessment Report to address Direction 1 of the Section 240 Notice.

In July 2023, Maxwell was notified of the commencement of an investigation into an alleged contravention (i.e. that the titleholder failed to incorporate the schedule of measures set out in the Assessment Report in a new Forward Program as required by Direction 4a of the Section 240 Notice). Maxwell provided a response and further investigations determined that the allegations were unsustained and no further action was taken.

A report quantifying on-ground work requirements was developed in September 2023 and the following on-ground works were undertaken during the reporting period:

- Widening of rock drains ID7 and ID8 as scheduled.
- Widening of rock drain ID9 more than 12 months ahead of schedule.
- Diversion of water away from an erosion point at the Northern Void highwall.
- Re-directing contour banks and remediating severe gully erosion at the East Void.
- Removal of redundant contour banks west of the Southern Void.

A Progress Report to address Direction 6 of the Section 240 Notice and outlined works undertaken to date will be prepared and submitted to the Resource Regulators during the next reporting period.

Soil Amelioration

Due to historic site practices, good quality topsoil for use during rehabilitation is minimal. Previously on site, soil ameliorants have been used to increase soil organic matter, improve soil nutrient levels and promote vegetation growth.

Biosolids, which are a by-product of the wastewater treatment process, have been used on site as a soil ameliorant in pasture areas. Compost made up of garden organics and biosolids has also been used as a soil ameliorant in some woodland areas. Where required gypsum is also applied at a rate of five tonnes per hectare.

Topsoil stripped during the construction of the Maxwell UG Mine (i.e. from the transport corridor and mine entry area) will be recovered using dozers, excavators or scrapers. It will then be placed into dedicated stockpiles. Where possible, stockpiles will be no greater than three metres in height and will be located away from drainage lines, operational areas and proposed disturbance areas. Surface drainage in the vicinity of stockpiles will be diverted to minimise run-on and managed to minimise sediment laden run-off. All stockpiles will be ripped and sown with a cover crop/pasture mix once their construction is completed.

A combination of topsoil, subsoil and ameliorants will be used for future rehabilitation. A soil balance is provided in **Table 21**. These numbers do not include topsoil and subsoil currently in-situ. Maxwell considers that there is sufficient material for the rehabilitation of the Maxwell UG Mine.

Table 21. Soil balance (stockpiled)

Type	Estimated Amount (m^3)
Topsoil	185,506
Subsoil	1,0252,276

9.2 Performance

Approximately 838 hectares of previously open cut mined land associated with the Maxwell Infrastructure site has been rehabilitated. No new areas of rehabilitation were completed during the reporting period. A total of approximately 29 hectares of land was disturbed for construction activities (this included 15 hectares of existing rehabilitation), primarily for the construction of the permanent access road and conveyor trace earthworks.

No buildings or infrastructure were decommissioned or demolished during the reporting period. Rehabilitation activities focussed on enhancing existing areas of rehabilitation. These activities included:

- Infill planting in the woodland rehabilitation corridor to increase species diversity;
- Targeted weed management across the site for High Threat Exotic weed species;
- Management of pest animal species in consultation with the Local Land Services and near neighbours; and
- Continued cattle grazing on pastured rehabilitated paddocks.

The location of rehabilitation activities is shown in **Figure 25**.

All areas of rehabilitation are within the ecosystem and land use establishment phase. This phase incorporates revegetated lands and habitat augmentation, focusing on species selection, presence and growth, together with weed and pest animal management. Whilst the

rehabilitation is progressing, no areas of rehabilitation have been formally signed off as meeting the land use objectives and completion criteria.

Approximately 2 hectares of mine rehabilitation will be disturbed during the next reporting period to allow for the construction of an all weather access road for the Water Treatment Plant.

A summary of the rehabilitation status is provided in **Table 22.** These numbers have been reviewed and updated to align with the Resources Regulator Mine Rehabilitation Portal.

Table 22. Rehabilitation status

Mine Area Type	Previous reporting period (actual) Year 2022 (ha)	This reporting period (actual) Year 2023 (ha)	Next reporting period (forecast) Year 2024 (ha)
A. Total mine footprint[1a]	1,334	1,362	1,388
B. Total active disturbance[2]	480	524	551
C. Land being prepared for rehabilitation[3]	0	0	0
D. Land under active rehabilitation[4]	854	838	836
E. Completed rehabilitation[5]	0	0	0

[1] Total mine footprint includes all areas within the mining lease that either have at some point in time or continue to pose a rehabilitation liability due to mining and associated activities.

[2] Total active disturbance includes all areas ultimately requiring rehabilitation.

[3] Land being prepared for rehabilitation includes the sum of mine disturbed land that is under the following rehabilitation phases – decommissioning, landform establishment and growth medium development.

[4] Land under active rehabilitation includes areas under rehabilitation and being managed to achieve relinquishment.

[5] Completed rehabilitation requires formal sign-off by the Resource Regulator that the area has successfully met the rehabilitation land use objectives and completion criteria.

[a] Excludes sublease area – surface disturbance activities and rehabilitation of the sublease is managed by Hunter Valley energy Coal Pty Ltd who operated the Mt Arthur Mine.

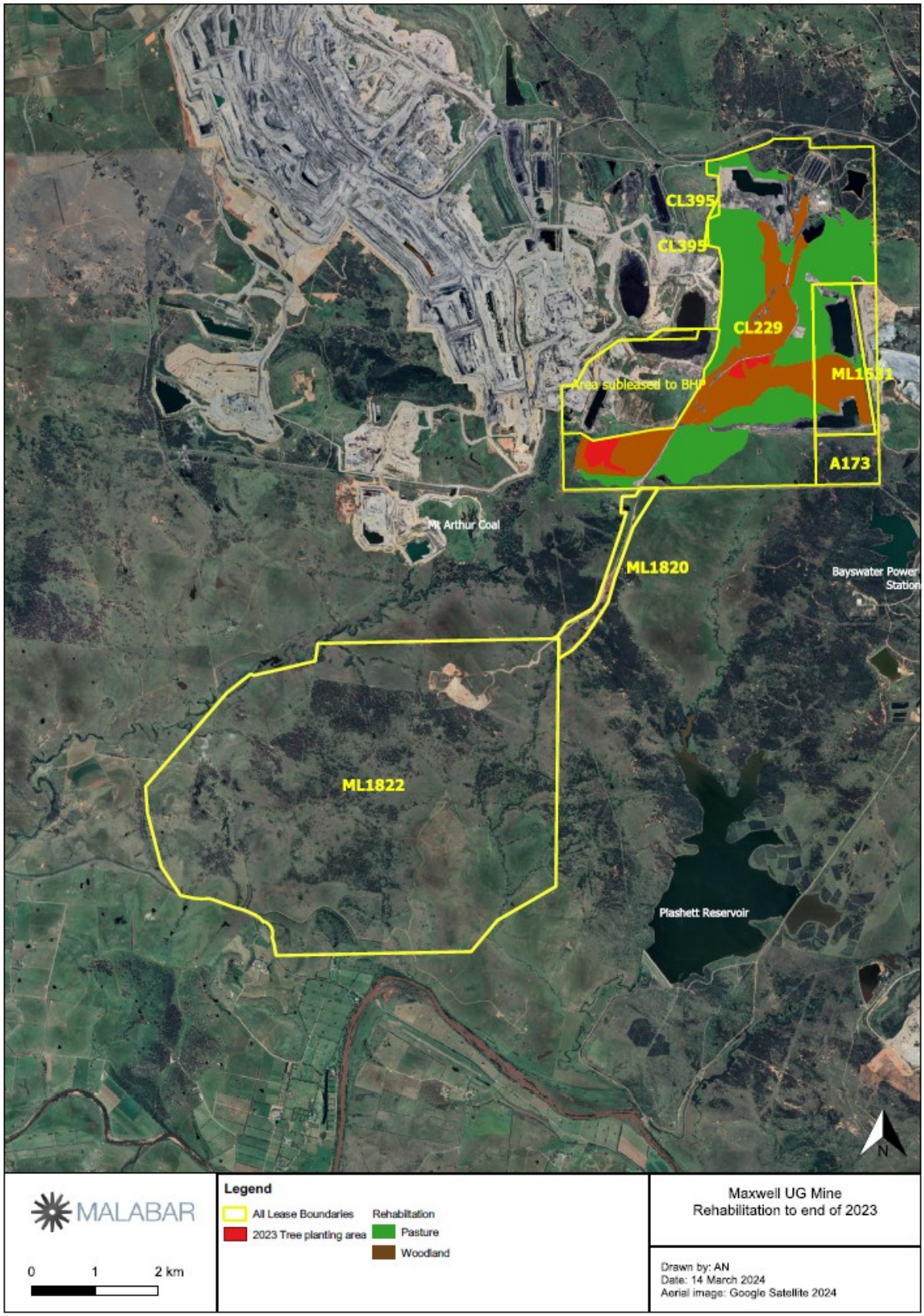


Figure 25. Location of rehabilitation activities

Other Rehabilitation Activities

Tree Planting

Two tree planting programs were undertaken during the reporting period, in autumn and spring. The programs targeted a total of 26.5 hectares of existing mine rehabilitation within the conceptual woodland corridor. Ground preparation works for optimal tree propagation were undertaken and included:

- slashing of grass to safely define the work area as well as improve the success of spraying activities to prevent competition to tree growth;
- single deep rip lines (minimum 400 mm deep) to break up the surface to allow tube stock to be planted and establish. The rip lines also help capture water, reduce erosion and improve soil moisture levels; and
- spraying of rip lines with glyphosate to reduce competition for growth from grass species.

Tree and shrub species consistent with the Spotted Gum Ironbark Woodland, Red Gum Woodland and Yellow Box Woodland vegetation communities were planted. A total of 27,500 plants were installed using a growth promoting compound and a browsing deterrent applied directly to the plants to reduce impact of herbivores on plant success. Plants were thoroughly watered at the time of planting and follow up watering occurred for several weeks following the planting effort. Planting areas are monitored periodically, and maintenance undertaken as required.

Spontaneous Combustion Capping

During August and December 2023, an area of rehabilitation approximately 0.5 ha was capped with 1 metre of inert material. This area will be topsoiled and seeded during the next reporting period.

Kangaroo Cull

Culling of eastern grey kangaroos was undertaken during June and August 2023 in the Southern Offset Area with a total of 36 individuals taken. Eastern grey kangaroos were noted to be over grazing rehabilitation areas and creating nesting beds under established trees and shrubs. Programs were targeted prior to planting activities on rehabilitated land.

Weed Management

Weed management activities were undertaken during the reporting period as specified in the Annual Weed Action Plan, shown in **Figure 26**. Weed control occurs during all seasons targeting specific weeds based on optimal time for control. Weed activities are undertaken in accordance with NSW Weed Control Handbook and Hunter Regional Strategic Weed Management Plan. Weed type, density, distribution and access were taken into account when planning weed management activities. Primary areas of focus were:

- offsets and conservation areas;
- areas adjacent to private land;
- areas of rehabilitation
- tree planting areas;
- areas of high infestations of weeds of national significance; and
- areas identified for weed control in the annual Ecological Monitoring Reports.

Nest Boxes

A total of 90 nest boxes have been installed on site to date, including 40 boxes in 2021, 20 boxes in 2022 and 30 boxes in 2023. Box designs installed are targeted at species with potential to use the Woodland Corridor as refuge or nesting. Box designs currently installed include:

- Micro-bat;

- Feathertail glider;
- Rear entry glider;
- Pardalote;
- Parrot; and
- Treecreeper.

Monitoring of nest box condition and position in the tree occurs 12 months after installation and content monitoring occurs every three years during the annual ecological monitoring program. Condition monitoring was undertaken from ground level in August 2023. Content monitoring was not undertaken in 2023.

Trials

Cattle Grazing Trial

A grazing trial commenced on rehabilitation at the Southern Tip in 2018. The trial continued throughout the reporting period. Cattle were strategically rotated between four paddocks of which three were located on mine rehabilitation. Some of the cattle were sold to market during the reporting period and the paddocks were rested (i.e. cattle removed or grazed at reduced numbers) during Spring and Summer to encourage new vegetation growth and diversity. Results so far are demonstrating that Maxwell can create a post mining landscape that is compatible with the surrounding landscape and capable of sustaining productive land use.

Native Grass Trial

A native grassland establishment trial was undertaken at Maxwell Infrastructure during 2013. The trial involved seeding a small area in the north with locally collected grassland species from Dartbrook. The seed mix was dominated by Red Grass (*Bothriochloa macra*) and Queensland Blue Grass (*Dichanthium sericeum*). The trial was monitored in 2013 and determined to be unsuccessful due to poor germination. A follow-up inspection during 2018 showed the area to be dominated by native grasses, particularly Lobed Bluegrass (*Bothriochla biloba*) and Queensland Bluegrass. Queensland Blue Grass was then included into the pasture mix as a trial on a 24-hectare parcel of land that was rehabilitated during 2018. Due to the dry conditions at the time, only a small number of Queensland Blue Grass was identified in the area.

The area was inspected by an ecologist in July 2022 and results showed evidence of native grass species such as Lobed Bluegrass (*Bothriochla biloba*), Queensland Bluegrass (*Dichanthium sericeum*) and Purple Wiregrass (*Aristida ramosa*). The area was inspected in April 2023 with results indicating poor cover of native grasses. This may have been due to dry conditions prior to the surveys. Further monitoring will assist in understanding the establishment of native grass species on site.

9.3 Actions for the Next Reporting Period

The following activities will occur during the next reporting period:

- two tree planting programs consisting of approximately 8,000 tube stock to be planted on existing mine rehabilitation within the conceptual woodland corridor;
- a weed control program focussing on High Threat Exotic weed species;
- a kangaroo cull on rehabilitation areas to reduce the impact on grazing on vegetation;
- continued wild dog and fox controls in association with the Local Land Services; and
- continue to thin Golden Wreath Wattle (*Acacia saligna*) and Sugar Gum (*Eucalyptus cladocalyx*) on the Great North Tip where target native trees and shrubs are being suppressed.

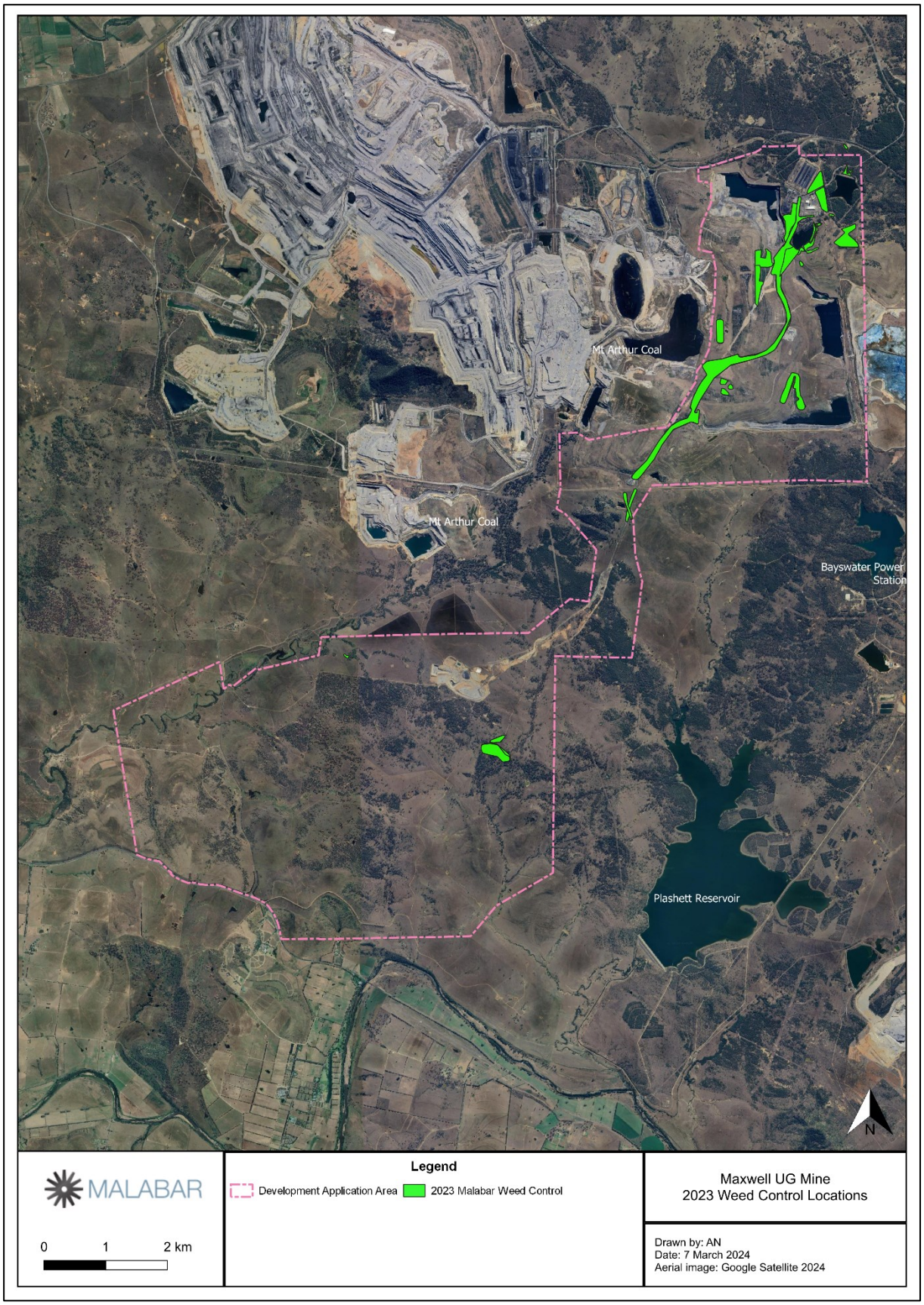


Figure 26. Weed control for the reporting period

10 COMMUNITY

10.1 Complaints

The Maxwell UG Mine maintains a 24-hour community hotline (1800 653 960) for any issues or enquiries. The community hotline number is advertised in the local newspapers and on the Malabar Resources website (https://malabarresources.com.au). In addition to the community hotline, the Maxwell site can also be contacted by email (info@malabarresources.com.au). Complaints received are recorded on the Community Complaints register found on the Malabar Resources website, the register is updated on a monthly basis.

During the reporting period, there were no complaints received. The number of complaints received has continued to decrease since 2015 (as shown in **Figure 27**) in line with a decrease in activities since open cut mining ceased in October 2016.

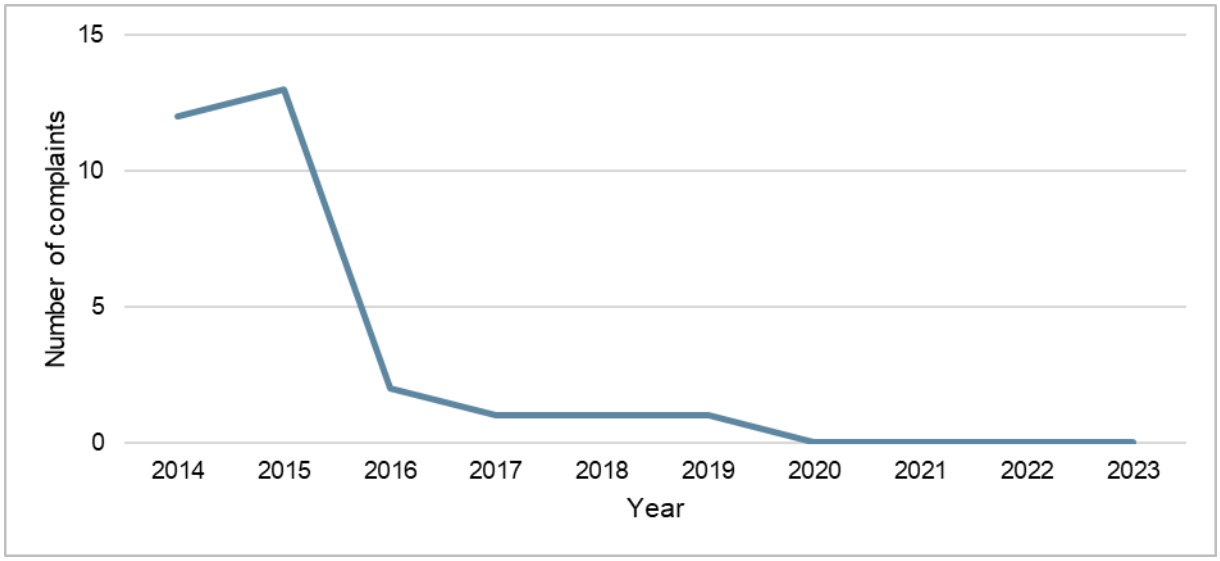


Figure 27. Long-term number of complaints

10.2 Engagement

Community Consultative Committees (CCCs) provide a forum for discussion between Maxwell and representatives of the local community, key stakeholder groups and the local council on issues relating directly to the Maxwell UG Mine. Although the CCC is not a decision-making or regulatory body, it performs an important advisory and consultative role.

The Maxwell CCC held meetings on four occasions during the reporting period including the 15 March 2023, 21 June 2023, 13 September 2023 and 15 November 2023. During the meetings the CCC reviewed the sites environmental performance and discussed community issues.

Two meetings were held during the reporting period for the Antiene Rail Spur Joint CCC (JCCC). An extra-ordinary JCCC meeting was held on 15 March to discuss the proposed Antiene MOD1. A regular meeting was held on the 21 June 2023. Subsequently, the requirement to hold the JCCC was removed from DA 106-04-00 by the DPHI as part of the Antiene MOD1.

All meeting minutes, information on environmental management and performance, as well as relevant approvals, can be accessed by the community through the Malabar Resources website.

10.3 Contributions

Malabar donated to local community groups, charities, aged care, schools, scholarships and sporting teams within Muswellbrook, Denman, Scone, Singleton and the surrounding areas. During the reporting period, over $54,000 was donated to the local community. Categories of the contributions are detailed below in **Figure 28**.

Total contributions by Malabar to the end of 2023 are over $586,000.

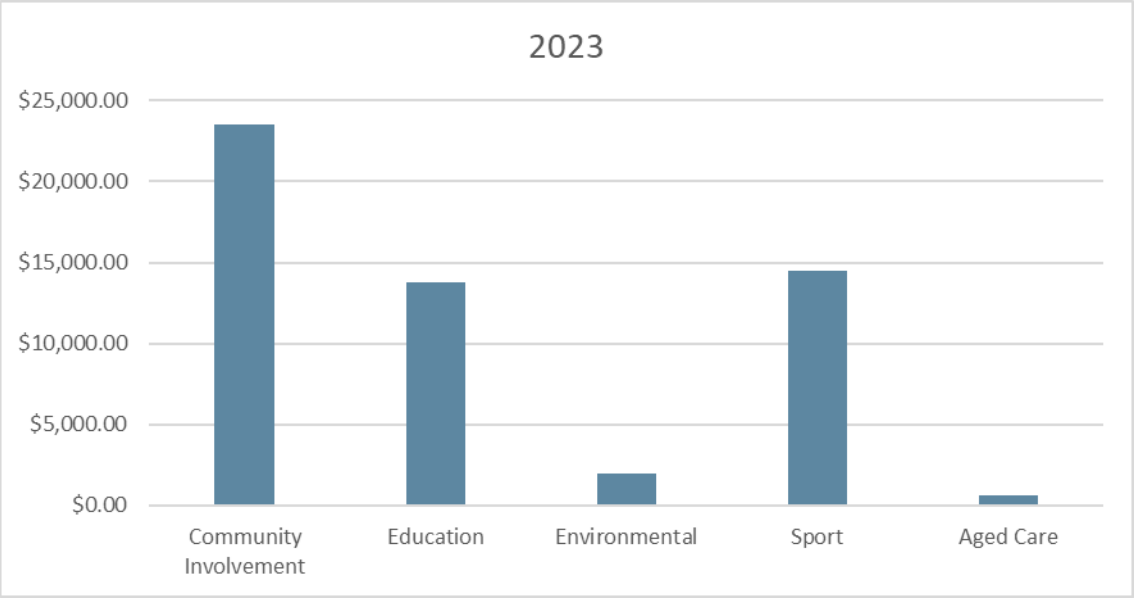


Figure 28. Community contributions for the reporting period

11 INCIDENTS AND NON-COMPLIANCES

11.1 Incidents

There were no incidents during the reporting period.

11.2 Exceedances

As discussed in **Section 7.4**, the 24-hour criterion of 25 µg/m^3 was exceeded at TEOM-2 during the reporting period. This was a concentration of 34.9 µg/m^3 on 22 September 2023 and coincided with alerts received for high internal operating temperatures. The TEOM was restarted, and this resolved the internal temperature issue however the removal of significant negative hourly concentrations as required by the data validation process combined with the high positive hourly concentrations resulted in an elevated 24-hour average. $PM_{2.5}$ concentrations at the nearby Upper Hunter Air Quality Monitoring Network stations were not elevated (Muswellbrook 6.2 µg/m^3 and Singleton 5.2 µg/m^3).

11.3 Non-Compliances

As discussed in **Section 8.3**, in February 2023, the WMP was updated following approval of Maxwell MOD1. Maxwell did not provide DEECCW with the final version of the WMP within two days of its approval by the NSW Planning Secretary, resulting in a non-compliance with Conditions 3, 4,18 and 19 of EPBC Approval 2018/8287. On 24 March 2023, Maxwell became aware of the oversight and a copy of the revised WMP was provided to the DEECCW promptly on the same day.

12 ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

The measures listed in **Table 23** will be implemented during the next reporting period to continue to improve the environmental and community performance at the Maxwell Infrastructure site.

Table 23. Improvement measures planned for next reporting period

Reference Number	Measure	Planned Timing
1	Provide a progress report to detail the progress of the implementation of the measures identified in Direction 1, which includes the following: a. List of measures required and the progress of implementation for each measure, b. Verification of measures implemented, and c. Results of quality assurance and validation of measures implemented.	February 2024
2	Real-time noise monitoring data will be calibrated with the attended noise monitoring data.	October 2024
3	In accordance with the SWMP, site specific triggers will be calculated from site data based on the ANZG (2018) method for guideline value derivation where 24 months of baseline observations are available.	December 2024
4	Maxwell will complete the installation of noise mitigation measures at the remaining three privately owned receivers (landholder ID 402, 403 and 411) in accordance with Schedule 2, Condition D1 of Development Consent SSD 9526.	May 2024
5	Modem upgrades at remote monitoring stations (inclusive of the TEOMs and meteorological recording stations) will occur during the next reporting period.	December 2024
6	The following actions were identified during the scheduled three yearly inspection and will be implemented during the next reporting period: • Signage for AHIMS coordinate locations of sites R5, R10, R15, R16 should be updated to include their respective site names. • AHIMS coordinates for sites R7, R11, R12, R13, and R14 should be updated on the AHIMS register to reflect the fenced areas. • Signage, including site name, for AHIMS coordinate location of site R8, R9 and R17 should be placed on the existing fencing.	December 2024
7	A Scoping Report for the Edderton Solar Project will be submitted to DPHI during the next reporting period.	June 2024

Reference Number	Measure	Planned Timing
8	During the next reporting period, the recently capped area at site 286 will be topsoiled and seeded.	March 2024
9	Weed control program targeting Prickly Pear and exotic perennial grass species at the Southern Offset Area.	December 2024
10	Weed control targeting Spiny Rush and Prickly Pear at the Wildlife Refuge and Northern Offset Area.	December 2024
11	Incorporate an existing groundwater monitoring bore into the TARP assessment as a replacement to DD1025.	December 2024
12	Conduct a VWP inspection investigation to confirm the status of all VWP sensors on site and recommend potential repair, replacement or decommissioning of each VWP sensor.	December 2024
13	The groundwater model will be recalibrated in Q4-2024 (three years after the previous model calibration dataset).	December 2024
14	Two tree planting programs consisting of approximately 8,000 tube stock to be planted on existing mine rehabilitation within the conceptual woodland corridor.	October 2024
15	A weed control program focussing on High Threat Exotic weed species.	December 2024
16	A kangaroo cull on rehabilitation areas to reduce the impact of grazing on vegetation.	December 2024
17	Continued wild dog and fox controls in association with the Local Land Services.	December 2024
18	Continue to thin Golden Wreath Wattle (*Acacia saligna*) and Sugar Gum (*Eucalyptus cladocalyx*) on the Great North Tip where target native trees and shrubs are being suppressed.	December 2024

APPENDIX 1. APPROVAL CONDITIONS RELEVANT TO THE ANNUAL REVIEW

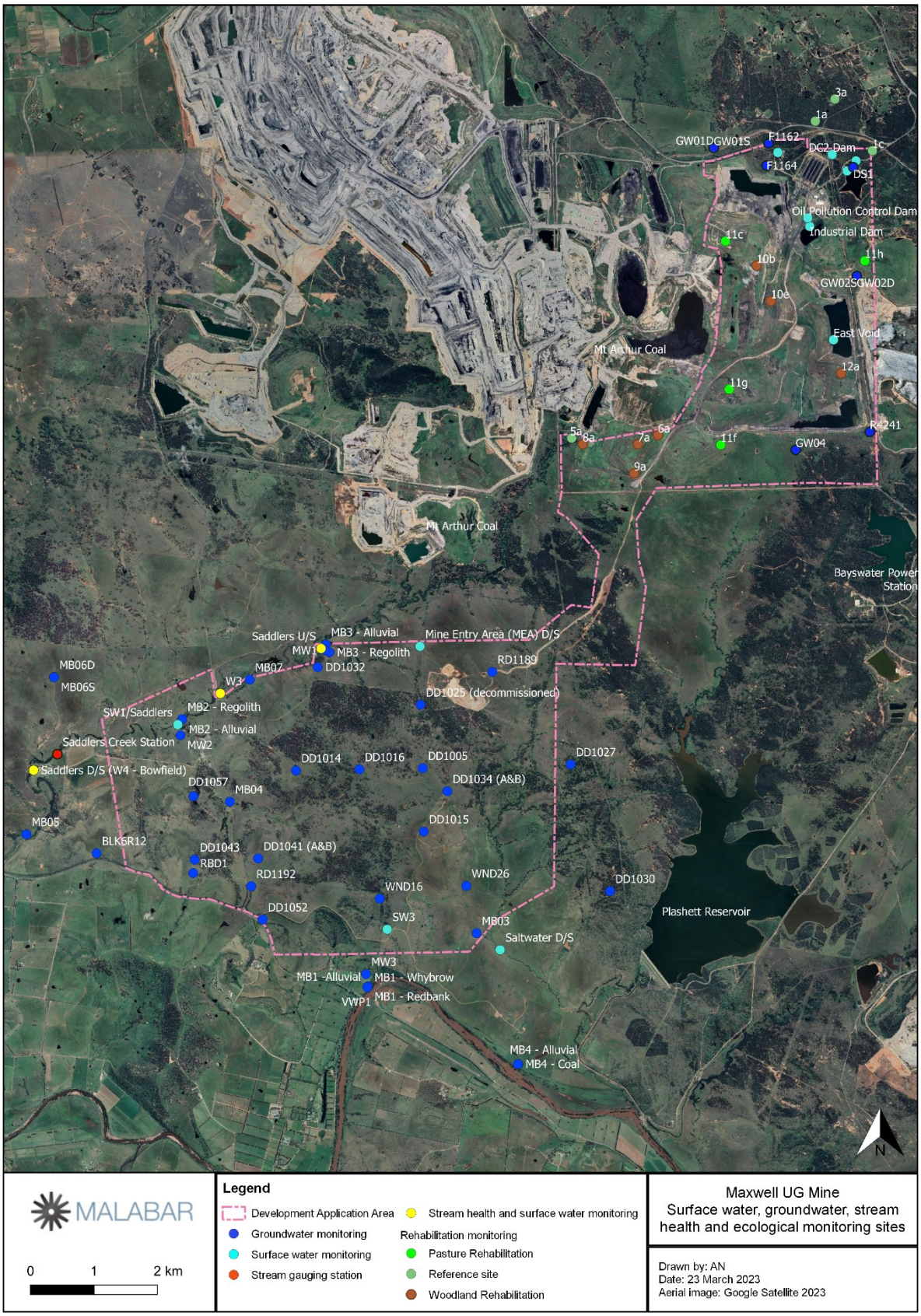
Condition	Description	Report Section
SSD 9526		
Schedule 2 **Condition B28**	The applicant must report on water captured, intercepted or extracted from the site each year (direct and indirect) in the Annual Review, including water taken under each water licence.	8.1 and Appendix 8
Schedule 2 **Condition B64 (e)**	The applicant must: (e) monitor and report on the effectiveness of the waste minimisation and management measures in the Annual Review referred to in condition E11.	7.10
Schedule 2 **Condition B83**	The Applicant must: keep accurate records of the: Amount of coal transported from the site (on a daily basis); and Date and time of each train movement generated by the development; and publish these results in the Annual Review.	7.7 and Appendix 5
Schedule 2 **Condition E7**	Within three months of: (b) the submission of an Annual Review under condition E11; The suitability of existing strategies, plans and programs required under this consent must be reviewed by the Applicant	To be conducted within three months of the submission of this Annual Review

Condition	Description	Report Section
Schedule 2 Condition E11	By the end of March in each year after the commencement of the development, or other timeframe agreed by the Planning Secretary, a report must be submitted to the Department reviewing the environmental performance of the development, to the satisfaction of the Planning Secretary. This review must:	2022 Annual Review to be submitted by 31 March 2023
	(a) describe the development (including any rehabilitation) that was carried out in the previous calendar year,	3, 9
	and the development that is proposed to be carried out over the current calendar year;	7, 8, 9
	(b) 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:	Appendix 3 Appendix 4 Appendix 5 Appendix 6 Appendix 7 Appendix 9 Appendix 10
	(i) relevant statutory requirements, limits or performance measures/criteria;	
	(ii) requirements of any plan or program required under this consent;	
	(iii) monitoring results of previous years; and	
	(iv) relevant predictions in the document/s listed in condition A2(c).	11
	(c) 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 and avoid reoccurrence;	7
	(d) evaluate and report on:	
	(i) the effectiveness of the noise and air quality management systems; and	1, 7, 8, 9
	(ii) compliance with the performance measures, criteria and operating conditions of this consent;	7, 8, 9
	(e) identify any trends in the monitoring data over the life of the development;	7, 8, 9
	(f) identify any discrepancies between the predicted and actual impacts of the development, and analyse the	7, 8, 9,
	potential cause of any significant discrepancies; and	
	(g) describe what measures will be implemented over the next calendar year to improve the environmental performance of the development.	12

Condition	Description	Report Section
E12	Copies of the Annual Review must be submitted to Council and made available to the CCC and any interested person upon request.	Copies of the Annual Review will be submitted to Council and made available to the CCC and any interested persons upon request.
E17(a)(xi)	Before commencement of construction until the completion of all rehabilitation required under this consent, the Applicant must: Make the following information and documents (as they are obtained, approved or as otherwise stipulated within the conditions of this consent) publicly available on its website: (xi) the Annual Reviews of the development.	The Annual Review will be made publicly available on the Malabar Resources website.

APPENDIX 2. ENVIRONMENTAL MONITORING LOCATIONS

Air quality, noise and meteorological monitoring locations



Surface water, groundwater, stream health and ecological monitoring locations

APPENDIX 3. NOISE MONITORING RESULTS

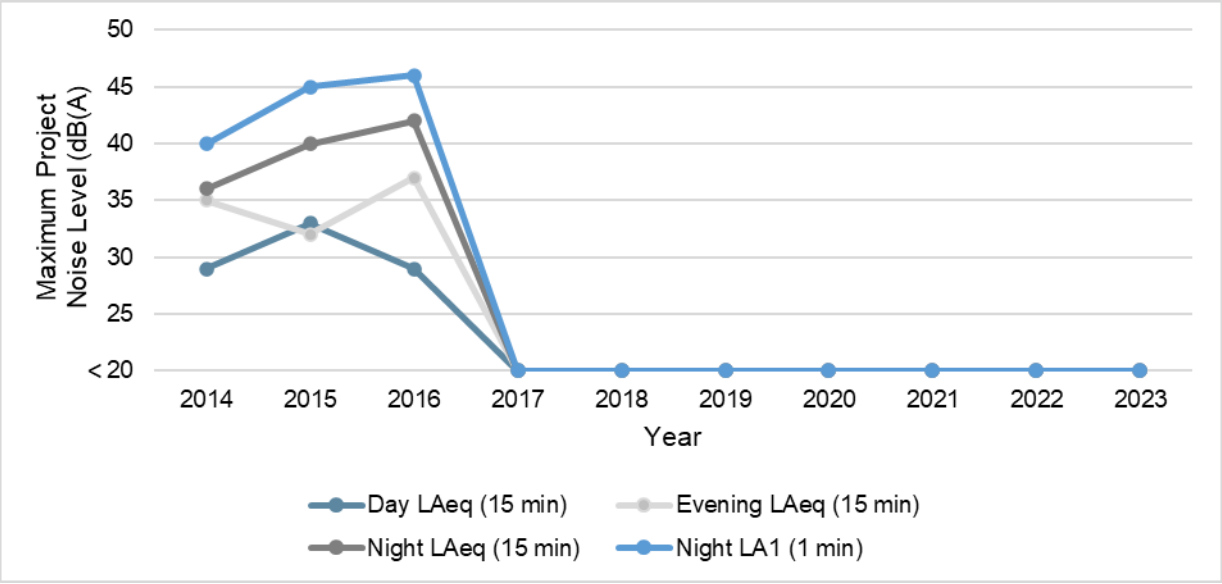
Monitored noise generated by the project alone (results under the Maxwell Underground Mine Noise and Blasting Management Plan)

Location	Maxwell UG Mine Operational noise criteria (dB(A))				Rail loop and Antiene Rail Spur development consent operational noise criteria (db(A) (from September 2023)			2023 maximum result (dB(A))		
	Day ($L_{Aeg\ (15\ min)}$) Years 1 to 3)	Evening ($L_{Aeg\ (15\ min)}$)	Night ($L_{Aeg\ (15\ min)}$)	Night (L_{max})	Day $L_{Aeg\ (15\ min)}$)	Evening $L_{Aeg\ (15\ min)}$)	Night $L_{Aeg\ (15\ min)}$)	Day ($L_{Aeg\ (11\ hr)}$)	Evening ($L_{Aeg\ (4\ hr)}$)	Night ($L_{Aeg\ (9\ hr)}$)
390, 398, 402	44	39	39	52	40	40	40	<20	<20	<20
425, 427	40	37	37	52				<20	<20	<20
399	42	37	37	52				<20	<20	<20
400	41	36	36	52				<20	<20	<20
403	44	40	40	52				<20	<20	<20
411	45	41	41	52				<20	<20	<20
418	44	39	39	52				<20	<20	<20
419, 420, 539	42	38	38	52				<20	<20	<20
421, 424	41	38	38	52				<20	<20	<20
423	42	39	39	52				<20	<20	<20
538	42	38	38	52				<20	<20	<20
All other privately-owned properties	40	35	35	52				<20	<20	<20

Monitoring summary - cumulative noise (results under the Maxwell Underground Project Noise and Blasting Management Plan) for the period January to August, under the Rail Loop and Antiene Rail Spur operational noise criteria from Development Consent (DA 106-04-00), granted 2 November 2000.

Location	Rail loop and Antiene Rail Spur development consent cumulative noise criteria (db(A) (to August 2023)			2023 maximum result (dB(A))		
	Day ($L_{Aeg\ (11\ hour)}$)	Evening ($L_{Aeg\ (4\ hour)}$)	Night ($L_{Aeg\ (9\ hour)}$)	Day ($L_{Aeg\ (11\ hour)}$)	Evening ($L_{Aeg\ (4\ hour)}$)	Night ($L_{Aeg\ (9\ hour)}$)
NM1[1]	40	40	40	<20	<20	31
NM2				<20	36	32
NM3				<20	<20	<20
NM4				<20	20	<20

1. Incorporating distance, ground, and atmospheric losses totalling 22dB from the monitoring location NM1 to the more distant residential assessment point



Long-term maximum project noise levels

APPENDIX 4. AIR QUALITY MONITORING RESULTS

PM_{10} and $PM_{2.5}$ 24-hour average concentrations in µg/m^3 for the reporting period.

See Notes below table.

Date	TEOM-1		TEOM-2	
	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
1/01/2023	15.01	5.25	11.88	4.09
2/01/2023	18.34	6.28	13.58	4.22
3/01/2023	23.14	7.86	16.90	4.67
4/01/2023	20.83	6.98	16.89	5.72
5/01/2023	11.72	4.71	4.59	1.88
6/01/2023	9.20	1.99	4.08	2.41
7/01/2023	9.29	2.85	2.90	0.76
8/01/2023	15.07	4.67	9.64	3.81
9/01/2023	20.57	6.64	15.27	6.43
10/01/2023	18.00	5.94	11.86	3.53
11/01/2023	16.69	4.85	14.21	4.87
12/01/2023	22.28	8.00	15.75	3.68
13/01/2023	18.40	6.49	15.51	4.98
14/01/2023	15.97	6.27	11.59	4.03
15/01/2023	16.73	5.69	15.33	7.30
16/01/2023	12.05	1.95	14.18	4.91
17/01/2023	12.74	4.59	11.39	2.88
18/01/2023	19.16	6.76	15.89	6.57
19/01/2023	12.36	5.04	3.72	1.17
20/01/2023	11.71	2.13	8.37	3.43
21/01/2023	12.74	3.15	11.10	3.99
22/01/2023	8.77	2.26	5.30	1.67
23/01/2023	18.06	7.32	8.51	2.81
24/01/2023	20.18	8.67	11.03	4.93
25/01/2023	25.37	12.41	13.08	6.79
26/01/2023	23.95	11.35	15.89	7.88
27/01/2023	26.43	14.25	17.68	8.21

Date	TEOM-1		TEOM-2	
	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
28/01/2023	25.04	12.35	17.55	7.38
29/01/2023	21.95	7.84	14.42	4.76
30/01/2023	16.26	9.40	9.13	6.37
31/01/2023	12.85	5.46	6.61	2.94
1/02/2023	20.57	8.05	11.33	5.36
2/02/2023	16.67	4.49	12.07	4.68
3/02/2023	18.91	2.96	8.74	2.06
4/02/2023	14.77	2.36	6.22	1.81
5/02/2023	17.37	2.79	11.39	2.69
6/02/2023	24.14	8.87	17.19	4.60
7/02/2023	16.55	5.01	20.97	10.41
8/02/2023	13.57	4.64	17.99	8.01
9/02/2023	12.14	5.80	8.18	3.82
10/02/2023	10.12	4.91	9.98	4.81
11/02/2023	14.73	5.80	12.84	6.12
12/02/2023	23.39	6.96	17.68	5.87
13/02/2023	24.01	9.13	18.67	5.91
14/02/2023	12.04	2.74	11.10	3.82
15/02/2023	12.30	2.59	15.76	3.79
16/02/2023	18.51	5.70	15.69	3.33
17/02/2023	19.21	6.01	22.30	6.88
18/02/2023	20.91	7.02	19.66	6.74
19/02/2023	17.45	7.05	12.67	4.91
20/02/2023	18.64	7.40	15.50	5.87
21/02/2023	16.87	5.10	16.27	5.67
22/02/2023	5.43	0.85	2.54	-0.29
23/02/2023	9.86	1.53	7.96	2.29

Date	TEOM-1		TEOM-2	
	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
24/02/2023	8.43	-0.07	9.01	2.11
25/02/2023	12.15	3.21	11.99	4.26
26/02/2023	13.44	3.46	11.09	3.42
27/02/2023	12.45	3.49	15.31	6.88
28/02/2023	13.75	2.35	15.64	5.64
1/03/2023	16.59	5.89	12.57	5.19
2/03/2023	12.14	2.48	12.10	4.30
3/03/2023	11.23	2.86	13.68	7.24
4/03/2023	12.44	2.41	10.35	4.60
5/03/2023	13.14	2.94	14.45	5.00
6/03/2023	17.54	6.46	14.94	4.36
7/03/2023	19.93	6.16	16.50	7.43
8/03/2023	27.09	6.28	17.13	6.60
9/03/2023	38.57	8.98	20.92	11.32
10/03/2023	25.65	8.26	15.83	5.33
11/03/2023	17.23	4.45	13.01	6.67
12/03/2023	19.25	8.70	13.08	7.55
13/03/2023	12.42	3.17	11.30	5.74
14/03/2023	12.61	3.20	7.98	2.91
15/03/2023	14.83	5.70	13.13	6.74
16/03/2023	19.47	5.69	16.13	8.88
17/03/2023	18.26	5.28	17.71	6.63
18/03/2023	25.94	8.96	19.30	7.77
19/03/2023	22.71	5.29	19.63	7.85
20/03/2023	29.74	8.44	20.30	7.38
21/03/2023	14.39	1.75	13.33	3.85
22/03/2023	16.22	3.31	13.18	4.64

Date	TEOM-1		TEOM-2	
	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
23/03/2023	12.11	1.96	8.50	3.81
24/03/2023	10.02	1.84	7.72	3.92
25/03/2023	10.1	4.51	7.91	3.23
26/03/2023	8.40	-0.20	11.18	2.96
27/03/2023	7.90	0.68	4.97	1.26
28/03/2023	11.60	3.83	6.60	3.50
29/03/2023	9.64	2.75	6.71	3.07
30/03/2023	8.15	2.83	4.81	2.28
31/03/2023	6.17	0.31	4.34	1.86
1/04/2023	8.20	2.66	5.95	3.73
2/04/2023	12.11	4.38	7.92	3.47
3/04/2023	8.64	1.88	14.37	10.13
4/04/2023	6.98	1.57	14.80	4.77
5/04/2023	10.57	1.72	12.60	4.06
6/04/2023	9.77	2.81	14.70	4.73
7/04/2023	10.34	3.00	27.00	3.19
8/04/2023	10.06	2.39	6.54	1.03
9/04/2023	10.97	2.39	3.42	-0.12
10/04/2023	10.19	2.83	0.09	-2.06
11/04/2023	11.73	2.69	10.70	3.45
12/04/2023	8.26	3.14	12.50	3.57
13/04/2023	6.40	1.88	8.10	1.47
14/04/2023	8.66	2.30	8.60	2.20
15/04/2023	8.39	2.30	6.40	2.90
16/04/2023	19.09	4.39	11.54	4.42
17/04/2023	10.31	1.45	8.30	2.90
18/04/2023	16.76	4.03	15.70	5.20

Date	TEOM-1		TEOM-2	
	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
19/04/2023	17.82	5.18	25.50	8.21
20/04/2023	11.60	2.63	9.16	4.08
21/04/2023	10.86	2.34	7.94	2.59
22/04/2023	11.52	2.30	7.61	4.29
23/04/2023	8.30	1.48	7.14	3.85
24/04/2023	10.77	3.21	8.80	3.93
25/04/2023	13.02	1.51	12.00	4.90
26/04/2023	7.40	0.28	9.17	3.36
27/04/2023	15.71	4.65	9.20	3.40
28/04/2023	13.86	4.97	22.70	11.90
29/04/2023	13.24	4.66	13.52	8.26
30/04/2023	3.31	2.30	4.01	2.34
1/05/2023	5.77	1.50	4.29	2.59
2/05/2023	7.62	2.37	5.12	2.65
3/05/2023	8.86	0.38	8.57	5.36
4/05/2023	14.68	2.67	8.67	3.84
5/05/2023	13.32	3.82	8.55	3.17
6/05/2023	11.22	3.94	8.11	4.72
7/05/2023	8.08	1.85	3.97	1.99
8/05/2023	6.00	-0.10	1.81	1.07
9/05/2023	6.19	1.49	5.18	2.75
10/05/2023	7.66	1.79	6.04	1.72
11/05/2023	12.88	4.92	7.60	2.23
12/05/2023	8.13	2.78	9.28	6.57
13/05/2023	13.03	6.51	14.12	6.55
14/05/2023	11.42	6.22	6.98	3.28

Date	TEOM-1		TEOM-2	
	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
15/05/2023	13.77	5.53	8.77	3.51
16/05/2023	15.26	7.80	7.33	2.93
17/05/2023	11.29	3.98	4.50	2.55
18/05/2023	7.65	1.80	12.00	3.86
19/05/2023	6.00	2.49	7.40	2.38
20/05/2023	10.19	3.97	11.00	3.54
21/05/2023	7.11	0.12	12.80	4.12
22/05/2023	9.84	2.17	1.27	1.65
23/05/2023	14.88	3.58	8.12	3.52
24/05/2023	17.06	6.38	10.36	6.03
25/05/2023	14.21	5.88	20.24	8.31
26/05/2023	13.15	4.73	13.73	4.73
27/05/2023	12.49	5.51	2.35	1.90
28/05/2023	7.83	3.57	1.77	0.96
29/05/2023	6.27	0.76	10.60	3.41
30/05/2023	10.38	3.38	15.30	4.93
31/05/2023	1.68	3.00	13.50	4.35
1/06/2023	10.18	3.67	13.40	4.31
2/06/2023	19.51	4.44	27.90	8.98
3/06/2023	14.11	6.69	18.50	5.96
4/06/2023	12.54	5.19	25.20	8.11
5/06/2023	12.70	3.73	21.60	6.96
6/06/2023	19.51	6.11	25.80	8.31
7/06/2023	14.26	3.86	11.31	7.14

Date	TEOM-1		TEOM-2	
	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
8/06/2023	6.26	4.29	7.40	2.38
9/06/2023	5.95	3.41	8.00	2.58
10/06/2023	6.71	3.71	9.30	2.99
11/06/2023	19.04	5.48	12.50	4.03
12/06/2023	11.74	7.78	7.33	3.31
13/06/2023	5.29	4.05	6.86	3.12
14/06/2023	5.70	1.66	4.44	1.12
15/06/2023	4.22	1.42	4.43	2.10
16/06/2023	6.09	2.87	5.82	3.78
17/06/2023	6.68	4.22	9.01	5.34
18/06/2023	30.16	2.94	6.66	3.13
19/06/2023	3.62	0.47	3.98	1.26
20/06/2023	8.90	3.60	5.25	2.58
21/06/2023	19.89	2.62	15.01	6.18
22/06/2023	14.22	9.70	18.89	5.31
23/06/2023	6.61	4.14	4.49	1.33
24/06/2023	2.41	-0.07	3.46	2.58
25/06/2023	No data	No data	3.80	1.92
26/06/2023	No data	No data	6.78	3.54
27/06/2023	No data	No data	9.16	5.70
28/06/2023	No data	No data	4.81	1.05
29/06/2023	No data	No data	2.85	1.81
30/06/2023	No data	No data	2.39	0.64
1/07/2023	0.56	-1.56	2.89	1.56

Date	TEOM-1		TEOM-2	
	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
2/07/2023	8.08	3.53	14.50	4.67
3/07/2023	12.88	3.56	24.40	7.86
4/07/2023	11.75	6.63	12.00	3.86
5/07/2023	5.35	3.34	3.98	1.62
6/07/2023	2.78	0.91	4.20	3.12
7/07/2023	3.13	0.00	4.06	3.03
8/07/2023	5.38	0.69	8.40	2.70
9/07/2023	10.36	2.56	13.60	4.38
10/07/2023	6.11	2.07	8.70	2.80
11/07/2023	6.38	1.52	11.50	3.70
12/07/2023	10.65	4.30	13.60	11.08
13/07/2023	11.04	5.22	12.05	10.76
14/07/2023	10.25	5.96	17.01	13.57
15/07/2023	5.96	2.06	13.90	13.68
16/07/2023	13.98	4.84	13.52	12.25
17/07/2023	13.16	5.67	21.95	16.16
18/07/2023	10.06	4.27	12.87	12.84
19/07/2023	10.33	2.47	9.83	8.89
20/07/2023	10.05	3.17	17.51	10.83
21/07/2023	12.70	4.50	10.02	10.33
22/07/2023	10.15	3.91	9.07	7.57
23/07/2023	9.31	4.42	9.61	5.08
24/07/2023	6.07	0.53	8.20	5.59
25/07/2023	6.71	1.11	5.32	2.96

Date	TEOM-1		TEOM-2	
	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
26/07/2023	12.86	5.71	6.66	4.55
27/07/2023	9.12	2.40	6.65	3.85
28/07/2023	9.80	4.18	7.99	3.56
29/07/2023	8.01	2.45	13.66	5.73
30/07/2023	13.53	4.56	9.92	6.31
31/07/2023	10.85	2.50	4.18	2.84
1/08/2023	10.98	2.17	8.55	2.79
2/08/2023	16.53	3.77	17.96	5.27
3/08/2023	11.99	4.09	7.38	3.16
4/08/2023	13.75	6.31	10.71	4.13
5/08/2023	13.01	4.25	8.53	3.37
6/08/2023	15.46	4.34	6.35	1.09
7/08/2023	13.34	3.27	9.14	0.78
8/08/2023	9.68	4.00	10.33	0.93
9/08/2023	9.17	2.67	8.96	1.18
10/08/2023	13.67	3.69	8.65	1.68
11/08/2023	15.91	3.84	5.85	0.34
12/08/2023	17.72	7.54	9.90	2.34
13/08/2023	15.56	4.95	8.54	1.03
14/08/2023	12.38	6.05	4.83	1.15
15/08/2023	5.15	1.71	-0.26	-2.07
16/08/2023	8.80	3.35	4.16	-1.21
17/08/2023	12.36	5.82	2.52	-2.02
18/08/2023	4.63	1.20	-0.02	-1.93

Date	TEOM-1		TEOM-2	
	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
19/08/2023	5.33	1.22	-0.69	-3.15
20/08/2023	5.44	1.27	0.82	-1.97
21/08/2023	6.56	1.57	1.35	-2.07
22/08/2023	9.16	5.21	6.98	0.88
23/08/2023	8.94	3.04	5.52	0.04
24/08/2023	10.48	2.90	12.87	3.77
25/08/2023	12.51	4.81	25.20	8.11
26/08/2023	11.52	5.15	27.00	8.69
27/08/2023	12.63	5.60	17.20	5.54
28/08/2023	No data	No data	26.10	8.40
29/08/2023	No data	No data	12.59	7.83
30/08/2023	15.01	8.09	14.36	7.53
31/08/2023	8.89	4.60	6.31	4.80
1/09/2023	9.35	3.63	5.44	3.11
2/09/2023	9.67	2.62	15.80	5.09
3/09/2023	11.64	4.33	20.70	6.67
4/09/2023	14.78	6.62	20.40	6.57
5/09/2023	17.28	5.59	27.50	8.86
6/09/2023	15.73	5.42	14.50	4.67
7/09/2023	23.76	10.75	27.30	8.79
8/09/2023	9.53	5.40	2.34	0.46
9/09/2023	9.03	3.47	3.12	10.00
10/09/2023	12.85	5.20	4.62	10.00
11/09/2023	12.19	5.02	8.93	2.22

Date	TEOM-1		TEOM-2	
	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
12/09/2023	18.48	7.61	10.38	3.12
13/09/2023	23.47	13.43	17.55	7.95
14/09/2023	18.54	7.75	22.78	7.77
15/09/2023	20.11	9.46	23.25	8.42
16/09/2023	14.86	6.71	14.57	2.35
17/09/2023	22.94	7.52	13.49	2.10
18/09/2023	21.69	11.18	31.85	5.83
19/09/2023	18.48	8.88	26.76	3.54
20/09/2023	17.61	7.18	19.18	2.87
21/09/2023	19.69	6.03	22.42	13.87
22/09/2023	13.29	4.51	49.60	34.90
23/09/2023	13.77	2.61	9.22	1.55
24/09/2023	12.77	4.63	12.47	1.79
25/09/2023	13.48	4.06	9.48	1.42
26/09/2023	16.52	5.35	22.04	7.31
27/09/2023	22.82	10.94	23.60	7.60
28/09/2023	13.78	5.85	19.10	6.15
29/09/2023	15.55	6.02	12.84	6.74
30/09/2023	19.51	11.08	23.18	10.03
1/10/2023	20.64	7.67	26.02	7.60
2/10/2023	36.16	13.81	34.07	12.43
3/10/2023	24.70	10.09	24.87	9.77
4/10/2023	16.03	7.93	23.08	7.58
5/10/2023	7.93	3.01	3.64	1.57

Date	TEOM-1		TEOM-2	
	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
6/10/2023	7.47	1.99	6.54	1.96
7/10/2023	10.46	3.26	18.10	5.83
8/10/2023	9.70	1.73	21.50	6.92
9/10/2023	17.91	4.97	20.40	6.57
10/10/2023	17.75	6.10	17.60	7.61
11/10/2023	19.75	6.60	19.09	8.51
12/10/2023	20.51	6.99	19.59	6.75
13/10/2023	12.23	1.63	4.52	2.22
14/10/2023	14.00	3.79	4.05	0.46
15/10/2023	19.98	4.86	7.85	2.40
16/10/2023	20.93	5.61	10.11	-0.45
17/10/2023	15.21	3.02	27.90	8.98
18/10/2023	10.21	1.90	12.15	3.88
19/10/2023	13.49	3.17	14.76	3.70
20/10/2023	20.52	5.52	15.03	4.26
21/10/2023	21.48	9.79	29.47	12.11
22/10/2023	33.34	8.91	24.16	10.84
23/10/2023	23.24	4.37	10.84	2.37
24/10/2023	22.46	6.69	22.24	4.54
25/10/2023	32.58	10.82	16.49	3.04
26/10/2023	16.32	4.64	10.23	3.88
27/10/2023	7.68	2.59	6.41	4.09
28/10/2023	8.23	2.93	13.36	10.27
29/10/2023	10.34	3.41	11.16	3.98

Date	TEOM-1		TEOM-2	
	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
30/10/2023	12.41	7.22	13.28	2.70
31/10/2023	26.13	9.72	14.70	5.70
1/11/2023	30.14	8.41	22.35	8.36
2/11/2023	7.55	4.50	16.67	7.56
3/11/2023	8.30	5.61	14.12	7.46
4/11/2023	8.50	5.91	14.41	7.06
5/11/2023	7.92	5.70	9.21	4.45
6/11/2023	6.99	3.93	8.75	1.00
7/11/2023	7.21	3.99	8.97	1.44
8/11/2023	5.86	2.72	13.67	6.06
9/11/2023	6.50	4.27	13.24	4.99
10/11/2023	7.87	5.06	9.33	5.72
11/11/2023	10.35	7.46	18.40	8.82
12/11/2023	9.49	8.95	16.60	7.86
13/11/2023	10.59	6.57	25.50	10.60
14/11/2023	8.77	5.32	20.41	6.56
15/11/2023	10.43	6.97	21.75	9.23
16/11/2023	11.21	7.71	18.50	10.06
17/11/2023	5.62	3.33	11.83	6.11
18/11/2023	5.09	2.71	12.77	3.70
19/11/2023	4.99	2.52	19.21	5.62
20/11/2023	10.15	7.20	20.06	7.56
21/11/2023	18.77	17.55	10.97	2.33
22/11/2023	No data	No data	13.33	5.30

Date	TEOM-1		TEOM-2	
	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
23/11/2023	No data	No data	14.10	5.91
24/11/2023	5.30	3.66	4.69	2.25
25/11/2023	3.24	2.28	5.41	3.65
26/11/2023	4.51	3.09	7.90	4.70
27/11/2023	8.56	6.73	10.87	6.35
28/11/2023	10.57	7.39	13.78	9.02
29/11/2023	9.16	6.35	13.51	6.71
30/11/2023	5.64	4.17	7.53	5.06
1/12/2023	6.67	4.99	7.54	4.01
2/12/2023	5.49	4.29	7.06	3.43
3/12/2023	6.99	5.52	10.26	5.19
4/12/2023	7.35	4.96	15.37	4.93
5/12/2023	12.08	8.56	17.71	7.59
6/12/2023	15.33	10.90	34.64	12.81
7/12/2023	20.07	12.82	34.08	15.13
8/12/2023	16.72	11.13	25.27	11.79
9/12/2023	18.21	13.88	19.36	12.87
10/12/2023	13.24	9.12	17.50	7.61
11/12/2023	22.55	16.18	30.04	11.68
12/12/2023	14.12	8.79	17.10	5.77
13/12/2023	18.46	11.99	19.71	6.87
14/12/2023	17.96	11.87	15.51	5.82
15/12/2023	20.05	12.81	29.75	10.21
16/12/2023	16.84	9.14	21.98	7.69

Date	TEOM-1		TEOM-2	
	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
17/12/2023	16.65	9.51	26.21	7.29
18/12/2023	24.83	15.78	25.44	9.09
19/12/2023	27.39	20.61	35.40	17.96
20/12/2023	15.18	12.58	6.00	6.60
21/12/2023	6.46	3.23	4.57	2.78
22/12/2023	14.84	7.98	14.25	4.54
23/12/2023	9.32	5.08	11.62	3.01
24/12/2023	7.04	4.45	3.79	3.48
25/12/2023	9.94	7.13	6.71	5.90
26/12/2023	8.27	5.24	7.39	4.56
27/12/2023	9.90	6.40	9.24	5.66
28/12/2023	21.30	5.00	5.62	2.25
29/12/2023	19.00	6.40	9.31	5.93
30/12/2023	18.40	5.90	8.31	3.90
31/12/2023	16.30	4.60	11.95	5.51

Notes:

TEOM-1

Due to a 'frozen' TEOM datalogger between 25/6/23 and 30/6/23 there was insufficient data to calculate 24-hour averages for those days. The unit required a manual restart.

On 28&29/8/23 the scheduled annual calibration required a 'zero' filter to be placed on the TEOM for 24-hours. This resulted in insufficient (<75% of 1-hour averages) data availability to calculate the 24-hour average in accordance with the Validation Process.

On 22&23/11/23 strongly negative concentrations followed a scheduled calibration; the filter papers were replaced and the TEOM was restarted and the issue was resolved. However there were insufficient valid 1-hour averages to calculate the 24-hour average in accordance with the Validation Process.

For the period 28/12/23 to 9/1/24, extremely high ambient humidity following periods of rain and high temperatures resulted in the air-conditioning unit being overloaded and the power tripping on multiple occasions. This resulted in insufficient valid data being available to calculate the 24-hour average in accordance with the Validation Process. Supplementary data has been obtained for this period from the BHP monitoring station (DC07) located on Balmoral Road (2km to the northwest of TEOM-1) and are shown in ***amber*** *in the Table of Appendix 4. This approach of supplementing data with the data from a nearby monitoring station was agreed by the CCC during the CCC meeting of 13 September 2023.*

TEOM-2

TEOM-2 experienced multiple power trips from April to October 2023. These resulted in insufficient data being recorded to calculate a valid 24-hour average in accordance with the Validation Process on the following dates: 4–6/4/23, 11/4/23, 13&14/4/23, 18&19/5/23, 29/5–6/6/23, 8/6–11/6/23, 2/7–4/7/23, 8/7–11/7/23, 25–28/8/23, 2/9/23–7/9/23, 27&28/9/23, 7–9/10/23. The primary issue was diagnosed as being due to a faulty air conditioner which caused the TEOM to overheat and shut down (the air conditioner was eventually replaced). However due to the location being in the bottom of a valley adjacent to a river and shielded from the mobile phone mast by nearby hills, it proved difficult to determine the cause of the failures as alerts were not being received consistently by the monitoring platform and hence it was difficult to respond and hence diagnose in a timely manner. Additional issues were a fault on the Transgrid pole and also some loose wiring, also causing power trips to occur. Where gaps in the data occurred, these were replaced by data from the nearby Jerrys Plains Station 1.7 km to the southeast and are shown in ***amber*** *in the Table of Appendix 4. This approach was agreed at the Maxwell CCC meeting of 13 September 2023.*

Some minor negative 24-hour $PM_{2.5}$ results were recorded at both TEOMs during 2022, however this is considered a normal function of the TEOM equipment and are not discounted.

Some 24-hour averages that were presented in CCC meetings as being invalid have subsequently been replaced with data validated by the monitoring contractor.

APPENDIX 5. TRAIN MOVEMENTS

Date	Total train movements per day	Time of train movements (24 hour)	Total tonnage per day
01-Jan-23	0	-	0
02-Jan-23	0	-	0
03-Jan-23	0	-	0
04-Jan-23	0	-	0
05-Jan-23	0	-	0
06-Jan-23	0	-	0
07-Jan-23	0	-	0
08-Jan-23	0	-	0
09-Jan-23	0	-	0
10-Jan-23	0	-	0
11-Jan-23	0	-	0
12-Jan-23	0	-	0
13-Jan-23	0	-	0
14-Jan-23	0	-	0
15-Jan-23	0	-	0
16-Jan-23	0	-	0
17-Jan-23	0	-	0
18-Jan-23	0	-	0
19-Jan-23	0	-	0
20-Jan-23	0	-	0
21-Jan-23	0	-	0
22-Jan-23	0	-	0
23-Jan-23	0	-	0
24-Jan-23	0	-	0
25-Jan-23	0	-	0
26-Jan-23	0	-	0
27-Jan-23	0	-	0
28-Jan-23	0	-	0
29-Jan-23	0	-	0
30-Jan-23	0	-	0
31-Jan-23	0	-	0
01-Feb-23	0	-	0
02-Feb-23	0	-	0
03-Feb-23	0	-	0
04-Feb-23	0	-	0
05-Feb-23	0	-	0
06-Feb-23	0	-	0
07-Feb-23	0	-	0
08-Feb-23	0	-	0
09-Feb-23	0	-	0
10-Feb-23	0	-	0
11-Feb-23	0	-	0
12-Feb-23	0	-	0

Date	Total train movements per day	Time of train movements (24 hour)	Total tonnage per day
13-Feb-23	0	-	0
14-Feb-23	0	-	0
15-Feb-23	0	-	0
16-Feb-23	0	-	0
17-Feb-23	0	-	0
18-Feb-23	0	-	0
19-Feb-23	0	-	0
20-Feb-23	0	-	0
21-Feb-23	0	-	0
22-Feb-23	0	-	0
23-Feb-23	0	-	0
24-Feb-23	0	-	0
25-Feb-23	0	-	0
26-Feb-23	0	-	0
27-Feb-23	0	-	0
28-Feb-23	0	-	0
01-Mar-23	0	-	0
02-Mar-23	0	-	0
03-Mar-23	0	-	0
04-Mar-23	0	-	0
05-Mar-23	0	-	0
06-Mar-23	0	-	0
07-Mar-23	0	-	0
08-Mar-23	0	-	0
09-Mar-23	0	-	0
10-Mar-23	0	-	0
11-Mar-23	0	-	0
12-Mar-23	0	-	0
13-Mar-23	0	-	0
14-Mar-23	0	-	0
15-Mar-23	0	-	0
16-Mar-23	0	-	0
17-Mar-23	0	-	0
18-Mar-23	0	-	0
19-Mar-23	0	-	0
20-Mar-23	0	-	0
21-Mar-23	0	-	0
22-Mar-23	0	-	0
23-Mar-23	0	-	0
24-Mar-23	0	-	0
25-Mar-23	0	-	0
26-Mar-23	0	-	0
27-Mar-23	0	-	0
28-Mar-23	0	-	0
29-Mar-23	0	-	0

Date	Total train movements per day	Time of train movements (24 hour)	Total tonnage per day
30-Mar-23	0	-	0
31-Mar-23	0	-	0
01-Apr-23	0	-	0
02-Apr-23	0	-	0
03-Apr-23	0	-	0
04-Apr-23	0	-	0
05-Apr-23	0	-	0
06-Apr-23	0	-	0
07-Apr-23	0	-	0
08-Apr-23	0	-	0
09-Apr-23	0	-	0
10-Apr-23	0	-	0
11-Apr-23	0	-	0
12-Apr-23	0	-	0
13-Apr-23	0	-	0
14-Apr-23	0	-	0
15-Apr-23	0	-	0
16-Apr-23	0	-	0
17-Apr-23	0	-	0
18-Apr-23	0	-	0
19-Apr-23	0	-	0
20-Apr-23	0	-	0
21-Apr-23	0	-	0
22-Apr-23	0	-	0
23-Apr-23	0	-	0
24-Apr-23	0	-	0
25-Apr-23	0	-	0
26-Apr-23	0	-	0
27-Apr-23	0	-	0
28-Apr-23	0	-	0
29-Apr-23	0	-	0
30-Apr-23	0	-	0
01-May-23	0	-	0
02-May-23	0	-	0
03-May-23	0	-	0
04-May-23	0	-	0
05-May-23	0	-	0
06-May-23	0	-	0
07-May-23	0	-	0
08-May-23	0	-	0
09-May-23	0	-	0
10-May-23	0	-	0
11-May-23	0	-	0
12-May-23	0	-	0
13-May-23	0	-	0

Date	Total train movements per day	Time of train movements (24 hour)	Total tonnage per day
14-May-23	0	-	0
15-May-23	0	-	0
16-May-23	0	-	0
17-May-23	0	-	0
18-May-23	0	-	0
19-May-23	0	-	0
20-May-23	0	-	0
21-May-23	0	-	0
22-May-23	0	-	0
23-May-23	0	-	0
24-May-23	0	-	0
25-May-23	0	-	0
26-May-23	0	-	0
27-May-23	0	-	0
28-May-23	0	-	0
29-May-23	0	-	0
30-May-23	0	-	0
31-May-23	0	-	0
01-Jun-23	0	-	0
02-Jun-23	0	-	0
03-Jun-23	0	-	0
04-Jun-23	0	-	0
05-Jun-23	0	-	0
06-Jun-23	0	-	0
07-Jun-23	0	-	0
08-Jun-23	0	-	0
09-Jun-23	0	-	0
10-Jun-23	0	-	0
11-Jun-23	0	-	0
12-Jun-23	0	-	0
13-Jun-23	0	-	0
14-Jun-23	0	-	0
15-Jun-23	0	-	0
16-Jun-23	0	-	0
17-Jun-23	0	-	0
18-Jun-23	0	-	0
19-Jun-23	0	-	0
20-Jun-23	0	-	0
21-Jun-23	2	16:30	8,353.60
22-Jun-23	0	-	0
23-Jun-23	0	-	0
24-Jun-23	0	-	0
25-Jun-23	0	-	0
26-Jun-23	0	-	0
27-Jun-23	0	-	0

Date	Total train movements per day	Time of train movements (24 hour)	Total tonnage per day
28-Jun-23	0	-	0
29-Jun-23	0	-	0
30-Jun-23	0	-	0
01-Jul-23	0	-	0
02-Jul-23	0	-	0
03-Jul-23	0	-	0
04-Jul-23	0	-	0
05-Jul-23	0	-	0
06-Jul-23	0	-	0
07-Jul-23	0	-	0
08-Jul-23	0	-	0
09-Jul-23	0	-	0
10-Jul-23	0	-	0
11-Jul-23	0	-	0
12-Jul-23	0	-	0
13-Jul-23	0	-	0
14-Jul-23	0	-	0
15-Jul-23	0	-	0
16-Jul-23	0	-	0
17-Jul-23	0	-	0
18-Jul-23	0	-	0
19-Jul-23	0	-	0
20-Jul-23	0	-	0
21-Jul-23	0	-	0
22-Jul-23	0	-	0
23-Jul-23	0	-	0
24-Jul-23	0	-	0
25-Jul-23	0	-	0
26-Jul-23	0	-	0
27-Jul-23	0	-	0
28-Jul-23	0	-	0
29-Jul-23	0	-	0
30-Jul-23	0	-	0
31-Jul-23	0	-	0
01-Aug-23	0	-	0
02-Aug-23	0	-	0
03-Aug-23	0	-	0
04-Aug-23	0	-	0
05-Aug-23	0	-	0
06-Aug-23	0	-	0
07-Aug-23	0	-	0
08-Aug-23	0	-	0
09-Aug-23	0	-	0
10-Aug-23	0	-	0
11-Aug-23	0	-	0

Date	Total train movements per day	Time of train movements (24 hour)	Total tonnage per day
12-Aug-23	0	-	0
13-Aug-23	0	-	0
14-Aug-23	0	-	0
15-Aug-23	0	-	0
16-Aug-23	0	-	0
17-Aug-23	0	-	0
18-Aug-23	0	-	0
19-Aug-23	0	-	0
20-Aug-23	0	-	0
21-Aug-23	0	-	0
22-Aug-23	0	-	0
23-Aug-23	0	-	0
24-Aug-23	0	-	0
25-Aug-23	0	-	0
26-Aug-23	0	-	0
27-Aug-23	0	-	0
28-Aug-23	0	-	0
29-Aug-23	0	-	0
30-Aug-23	0	-	0
31-Aug-23	0	-	0
01-Sep-23	0	-	0
02-Sep-23	0	-	0
03-Sep-23	0	-	0
04-Sep-23	0	-	0
05-Sep-23	0	-	0
06-Sep-23	0	-	0
07-Sep-23	0	-	0
08-Sep-23	0	-	0
09-Sep-23	0	-	0
10-Sep-23	0	-	0
11-Sep-23	0	-	0
12-Sep-23	0	-	0
13-Sep-23	2	11:38	8,586.00
14-Sep-23	2	10:21	8,300.00
15-Sep-23	0	-	0
16-Sep-23	0	-	0
17-Sep-23	0	-	0
18-Sep-23	0	-	0
19-Sep-23	2	19:06	8,722.20
20-Sep-23	0	-	0
21-Sep-23	0	-	0
22-Sep-23	0	-	0
23-Sep-23	0	-	0
24-Sep-23	0	-	0
25-Sep-23	0	-	0

Date	Total train movements per day	Time of train movements (24 hour)	Total tonnage per day
26-Sep-23	0	-	0
27-Sep-23	0	-	0
28-Sep-23	0	-	0
29-Sep-23	0	-	0
30-Sep-23	0	-	0
01-Oct-23	0	-	0
02-Oct-23	0	-	0
03-Oct-23	0	-	0
04-Oct-23	0	-	0
05-Oct-23	0	-	0
06-Oct-23	0	-	0
07-Oct-23	0	-	0
08-Oct-23	0	-	0
09-Oct-23	0	-	0
10-Oct-23	0	-	0
11-Oct-23	0	-	0
12-Oct-23	0	-	0
13-Oct-23	0	-	0
14-Oct-23	0	-	0
15-Oct-23	0	-	0
16-Oct-23	0	-	0
17-Oct-23	0	-	0
18-Oct-23	0	-	0
19-Oct-23	0	-	0
20-Oct-23	0	-	0
21-Oct-23	0	-	0
22-Oct-23	0	-	0
22-Oct-23	0	-	0
23-Oct-23	0	-	0
24-Oct-23	0	-	0
25-Oct-23	0	-	0
26-Oct-23	0	-	0
27-Oct-23	0	-	0
28-Oct-23	0	-	0
29-Oct-23	0	-	0
30-Oct-23	0	-	0
31-Oct-23	0	-	0
01-Nov-23	0	-	0
02-Nov-23	0	-	0
03-Nov-23	0	-	0
04-Nov-23	0	-	0
05-Nov-23	0	-	0
06-Nov-23	0	-	0
07-Nov-23	0	-	0
08-Nov-23	0	-	0

Date	Total train movements per day	Time of train movements (24 hour)	Total tonnage per day
09-Nov-23	0	-	0
10-Nov-23	0	-	0
11-Nov-23	0	-	0
12-Nov-23	0	-	0
13-Nov-23	0	-	0
14-Nov-23	0	-	0
15-Nov-23	0	-	0
16-Nov-23	0	-	0
17-Nov-23	0	-	0
18-Nov-23	0	-	0
19-Nov-23	0	-	0
20-Nov-23	0	-	0
21-Nov-23	0	-	0
22-Nov-23	0	-	0
23-Nov-23	0	-	0
24-Nov-23	0	-	0
25-Nov-23	0	-	0
26-Nov-23	0	-	0
27-Nov-23	0	-	0
28-Nov-23	0	-	0
30-Nov-23	0	-	0
01-Dec-23	0	-	0
02-Dec-23	0	-	0
03-Dec-23	0	-	0
04-Dec-23	0	-	0
05-Dec-23	0	-	0
06-Dec-23	0	-	0
07-Dec-23	0	-	0
08-Dec-23	0	-	0
09-Dec-23	0	-	0
10-Dec-23	0	-	0
11-Dec-23	0	-	0
12-Dec-23	0	-	0
13-Dec-23	0	-	0
14-Dec-23	0	-	0
15-Dec-23	0	-	0
16-Dec-23	0	-	0
17-Dec-23	0	-	0
18-Dec-23	0	-	0
19-Dec-23	0	-	0
20-Dec-23	0	-	0
21-Dec-23	0	-	0
22-Dec-23	0	-	0
23-Dec-23	0	-	0
24-Dec-23	0	-	0

Date	Total train movements per day	Time of train movements (24 hour)	Total tonnage per day
25-Dec-23	0	-	0
26-Dec-23	0	-	0
27-Dec-23	0	-	0
28-Dec-23	0	-	0
29-Dec-23	0	-	0
30-Dec-23	0	-	0
31-Dec-23	0	-	0

APPENDIX 6. VISUAL IMPACT RESULTS

Plant ID No.	Year Planted	Plant Height (m) (2021)	Plant Height (m) (2022)	Plant Height (m) (2023)	Plant Width (m) (2021)	Plant Width (m) (2022)	Plant Width (m) (2023)
1	2019	2.0	2.2	2.5	0.8	1.0	2.3
2	2019	1.8	2.0	2.4	1.0	1.2	2.0
3	2019	2.1	2.3	2.5	1.7	1.9	2.4
4	2019	1.4	1.6	2.4	1.1	1.3	2.0
5	2019	1.5	1.7	2.4	0.9	1.0	2.2
6	2019	2.4	2.6	2.7	1.3	1.5	3.3
7	2019	0.8	1.0	2.0	0.5	0.7	1.9
8	2019	1.5	1.7	2.3	1.3	1.5	2.8
9	2019	1.6	1.8	2.5	0.9	1.0	2.0
10	2019	0.9	1.1	1.5	0.4	0.5	1.9
11	2019	2.2	2.4	3.3	1.5	1.7	2.5
12	2019	2.4	2.6	3.0	1.8	2.0	2.3
13	2019	1.6	1.8	2.8	1.1	1.2	2.4
14	2019	1.2	1.4	2.2	0.9	1.1	2.0
15	2019	1.6	1.8	2.5	1.0	1.2	2.4
16	2019	0.9	1.1	1.8	0.6	0.7	1.6
17	2019	1.5	1.7	3.0	0.8	0.9	3.4
18	2019	1.5	1.8	4.0	1.1	1.3	3.2
19	2021	0.4	1.6	2.0	0.1	0.2	1.6
20	2019	1.3	1.4	2.1	1.3	1.4	1.5
21	2019	1.8	2.0	2.6	1.2	1.3	1.8
22	2019	1.6	1.8	2.5	0.9	1.1	2.0
23	2019	1.6	1.8	2.4	1.3	1.5	2.2
24	2019	1.9	2.1	3.3	1.0	1.5	2.6

Plant ID No.	Year Planted	Plant Height (m) (2021)	Plant Height (m) (2022)	Plant Height (m) (2023)	Plant Width (m) (2021)	Plant Width (m) (2022)	Plant Width (m) (2023)
25	2019	2.3	2.5	2.7	1.4	1.5	2
26	2019	1.6	1.8	3	1.0	1.2	2.8
27	2019	1.0	1.1	2.2	0.50	0.80	2.1
28	2021	0.50	0.6	1.9	0.10	0.30	2
29	2019	1.3	1.5	2	0.40	0.60	1.8
30	2019	1.5	1.7	2.2	0.70	0.90	2
31	2019	0.80	1.0	1.8	0.30	0.50	2

APPENDIX 7. WATER ACCOUNTING FRAMEWORK INPUT – OUTPUT STATEMENT

Reporting Period	Date	Storage (ML)
Start	01/01/2023	20,843[(1)]
Finish	31/12/2023	21,915

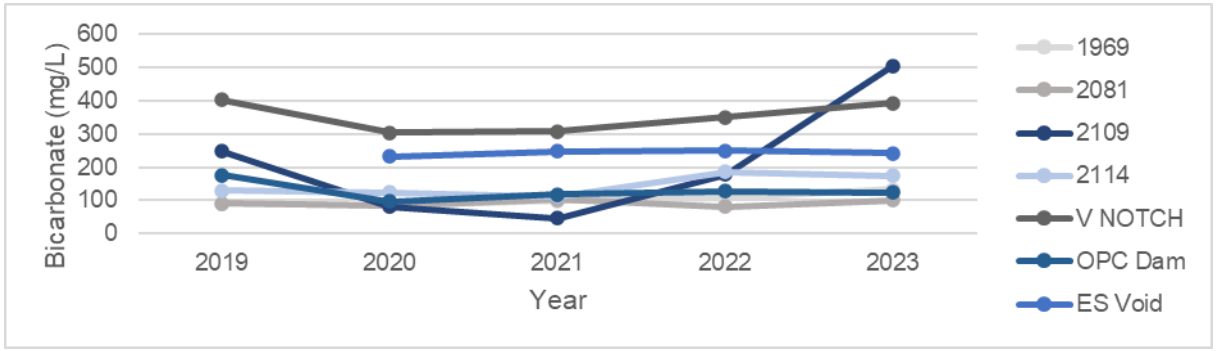
INPUTS-OUTPUTS

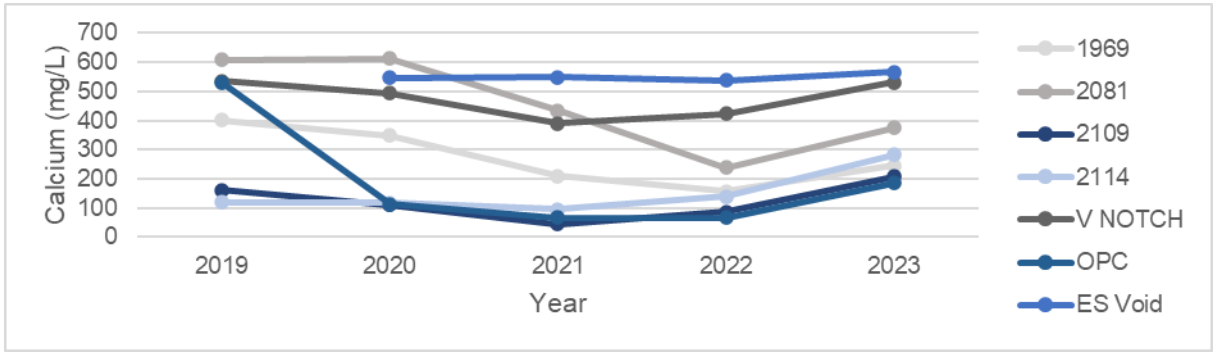
Input-Output	Element (Source / Destination)	Sub-element (Inputs/Outputs)	Water Quality			Sub-element Total (ML)	Measured, Estimated, Simulated	Accuracy
			Category 1 (ML)	Category 2 (ML)	Category 3 (ML)			
Inputs	Surface Water	*Precipitation and Runoff*	386.7	373.9		**760.6**	Simulated	Medium
		Rivers and Creeks						
		External Surface Water Storage						
	Groundwater	*Aquifer Interception*			1,726	**1726.0**	Simulated	Low
		Bore Fields						
		Entrainment			6.6	**6.6**	Estimated	Low
	Seawater	*Estuary*						
		Sea/Ocean						
	Third Party Water	*Contract*	31.9			**31.9**	Simulated	Low
		Wastewater						
		Other						
	TOTAL INPUTS		**418.6**	**373.9**	**1,732.6**	**2,525.1**		
Outputs	Surface Water	*Discharge*						
		Environmental Flows						
	Groundwater	*Seepage*						
		Reinjection						
	Seawater	*Discharge to Estuary*						
		Discharge to Sea/Ocean						
	Supply to Third Party							
	Other	*Evaporation – operational*	42.6			**42.6**	Estimated	Low
		Evaporation - dams	558.4			**558.4**	Simulated	Medium
		Entrainment			42.9	**42.9**	Estimated	Low
		Other (potable, misc)			291.3	**291.3**	Measured	Medium
	TOTAL OUTPUTS		**1,21.6**		**334.2**	**1,455.8**		

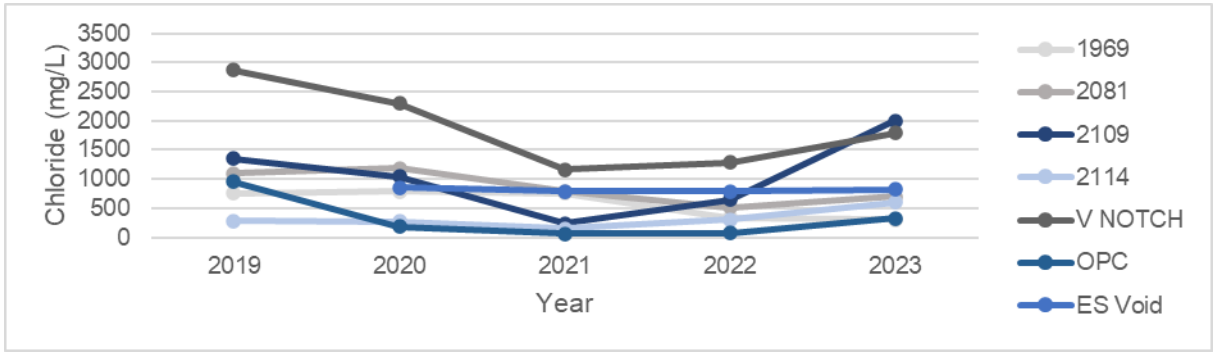
(1) The value of 20,843 ML does not match the 19,715 ML that was the value presented for the end of 2022 due to a resurvey of the water storages conducted in late 2023.

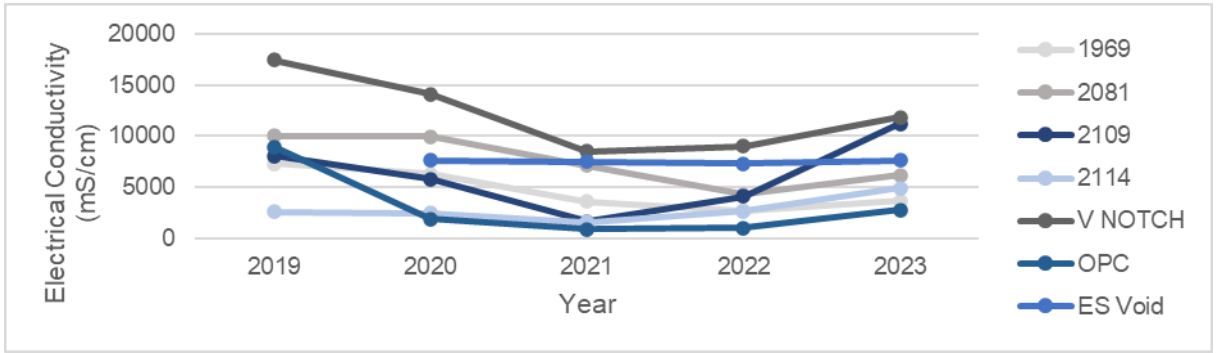
APPENDIX 8. SURFACE WATER QUALITY RESULTS

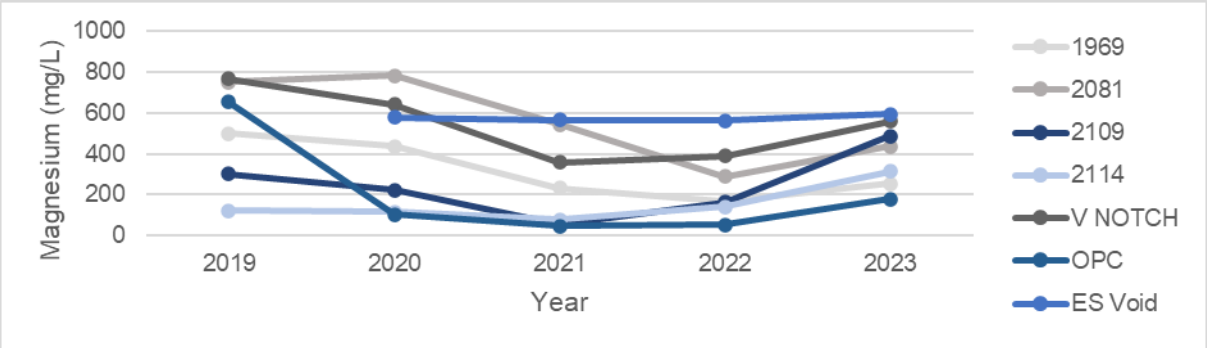
Mine water storage monitoring locations

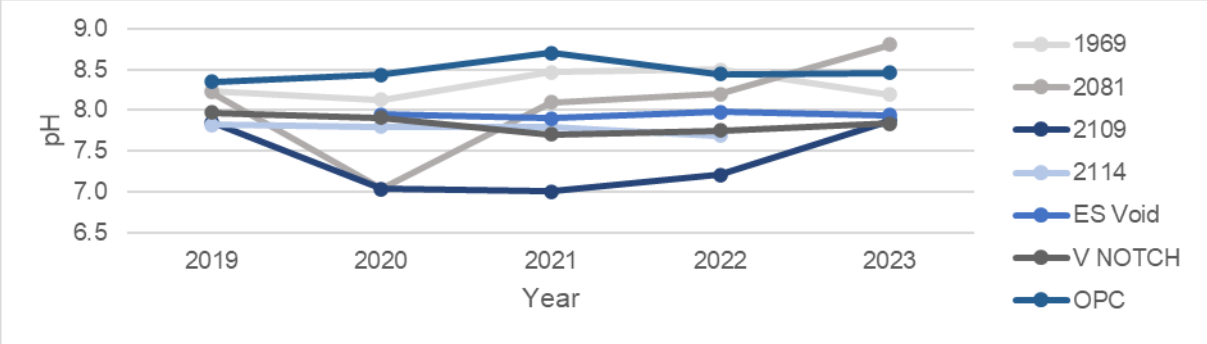


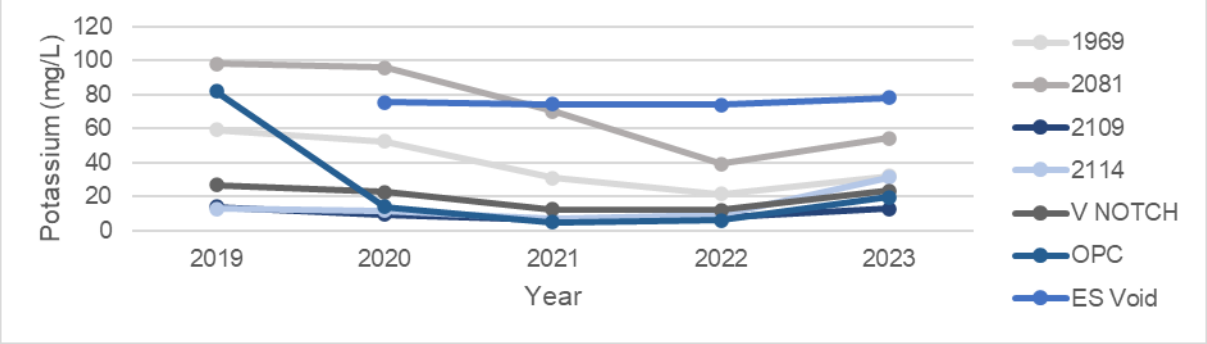


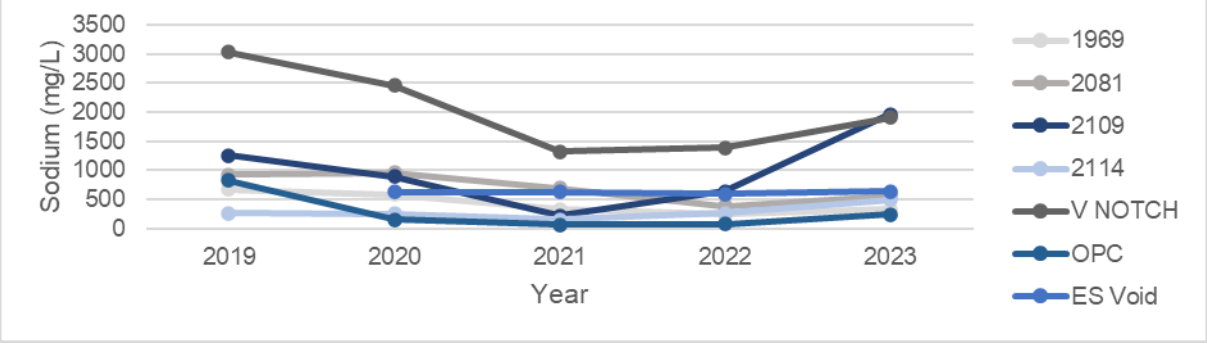


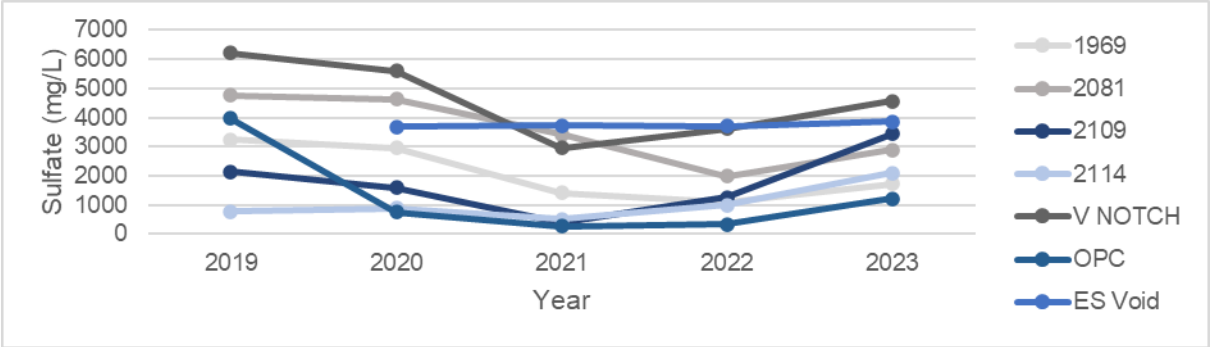


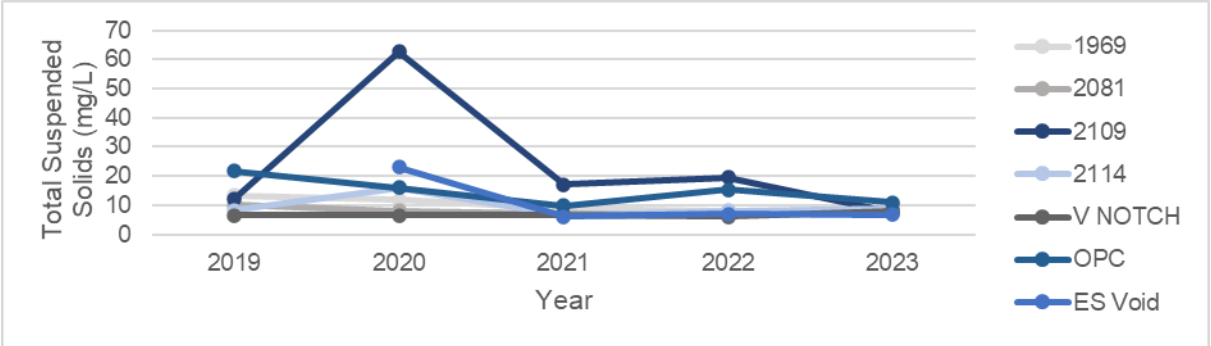

Magnesium (mg/L)
1000
800
600
400
200
0
2019
2020
2021
2022
2023
Year
1969
2081
2109
2114
V NOTCH
OPC
ES Void

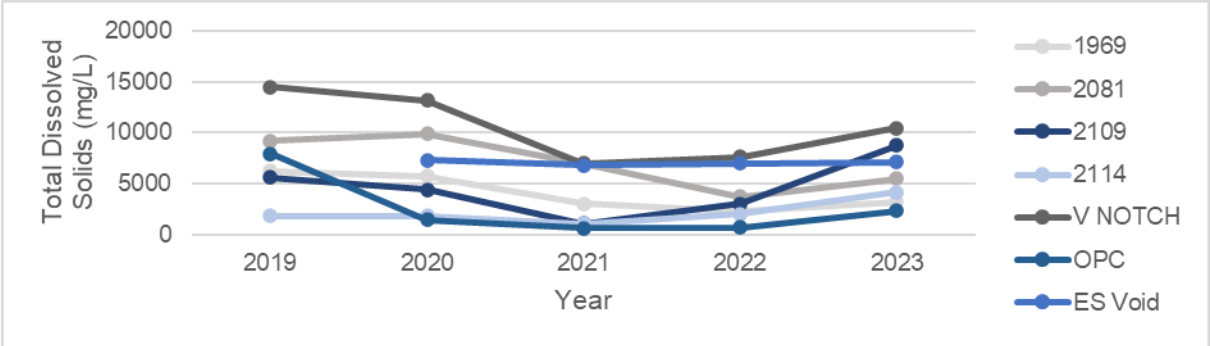

pH
9.0
8.5
8.0
7.5
7.0
6.5
2019
2020
2021
2022
2023
Year
1969
2081
2109
2114
ES Void
V NOTCH
OPC


Potassium (mg/L)
120
100
80
60
40
20
0
2019
2020
2021
2022
2023
Year
1969
2081
2109
2114
V NOTCH
OPC
ES Void

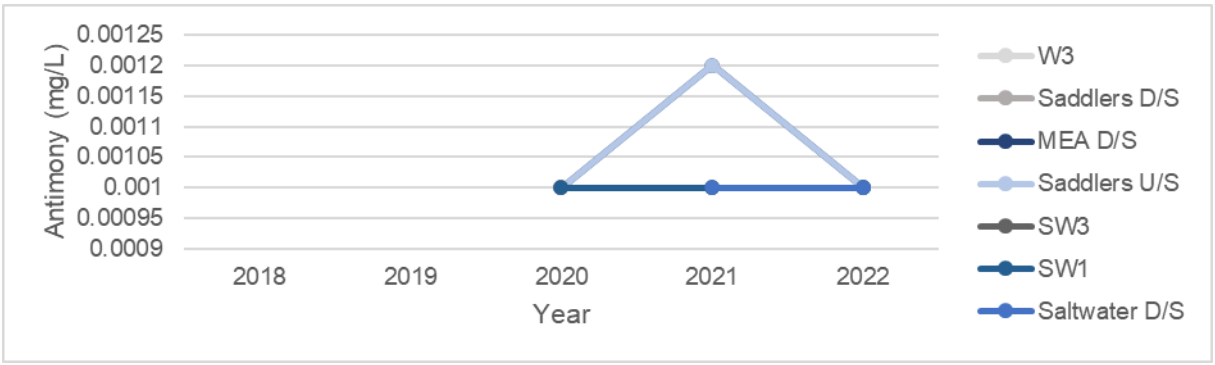

Sodium (mg/L)
3500
3000
2500
2000
1500
1000
500
0
2019
2020
2021
2022
2023
Year
1969
2081
2109
2114
V NOTCH
OPC
ES Void

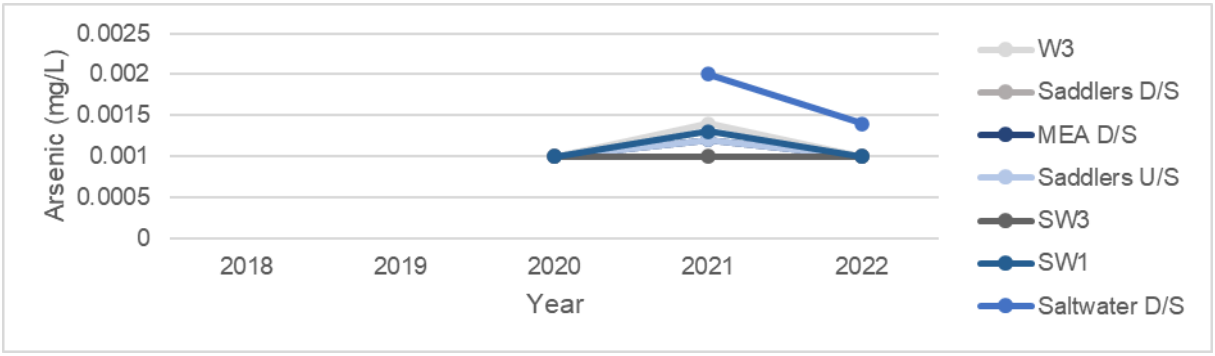

Sulfate (mg/L)
7000
6000
5000
4000
3000
2000
1000
0
2019
2020
2021
2022
2023
Year
1969
2081
2109
2114
V NOTCH
OPC
ES Void

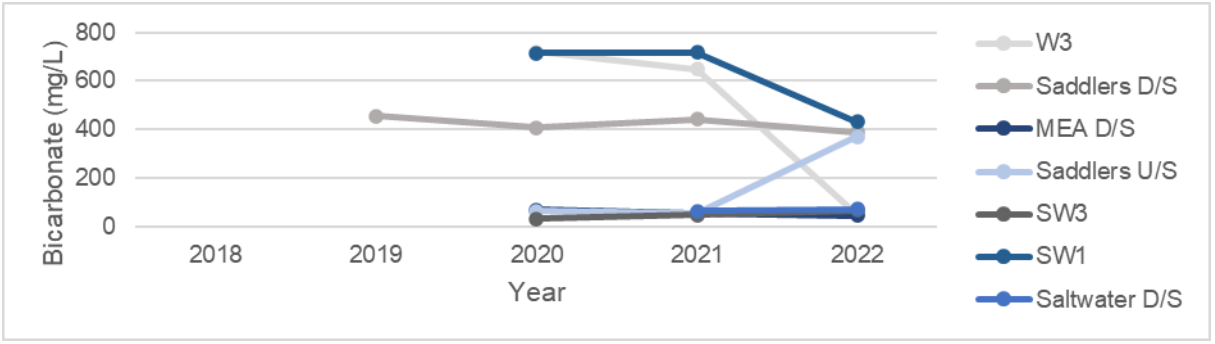

Total Suspended Solids (mg/L)
70
60
50
40
30
20
10
0
2019
2020
2021
2022
2023
Year
1969
2081
2109
2114
V NOTCH
OPC
ES Void

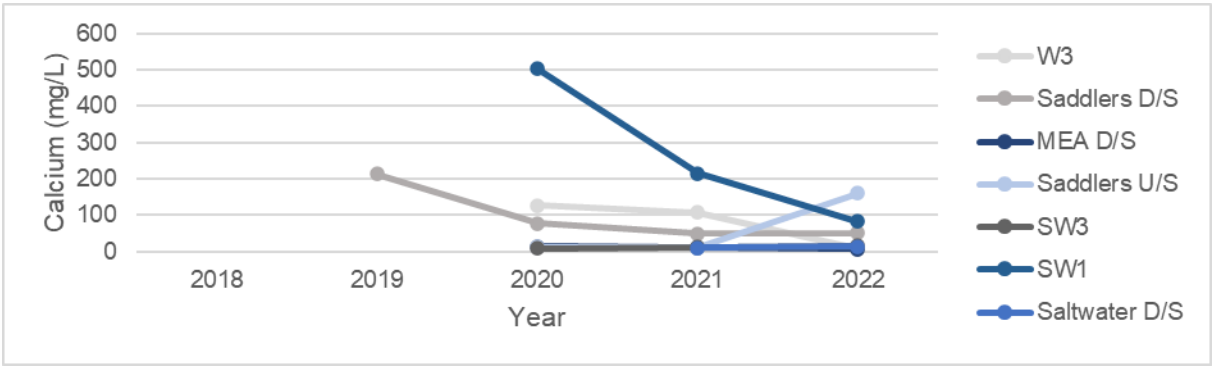

Total Dissolved Solids (mg/L)
20000
15000
10000
5000
0
2019
2020
2021
2022
2023
Year
1969
2081
2109
2114
V NOTCH
OPC
ES Void

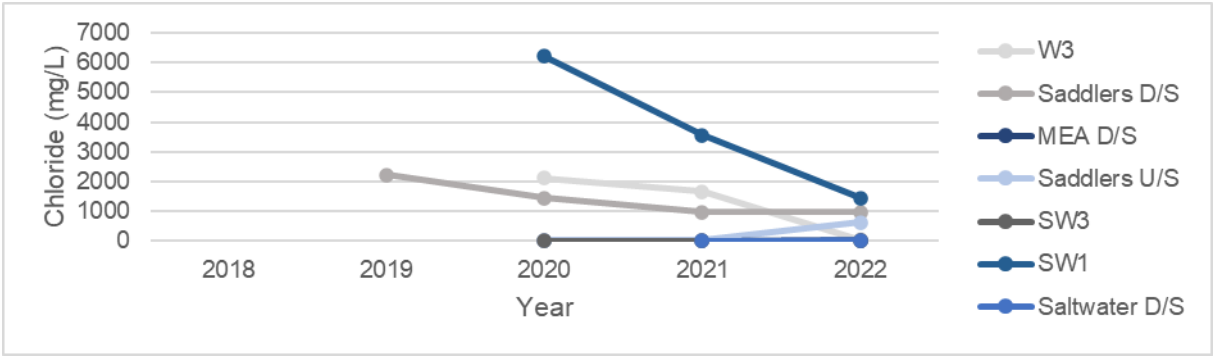
Downstream Surface Water Monitoring Locations (no results in 2023 due to dry conditions)

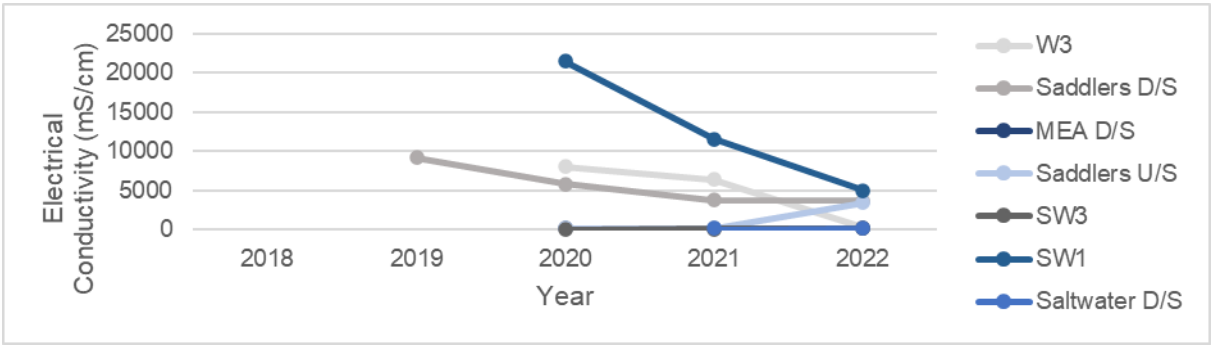


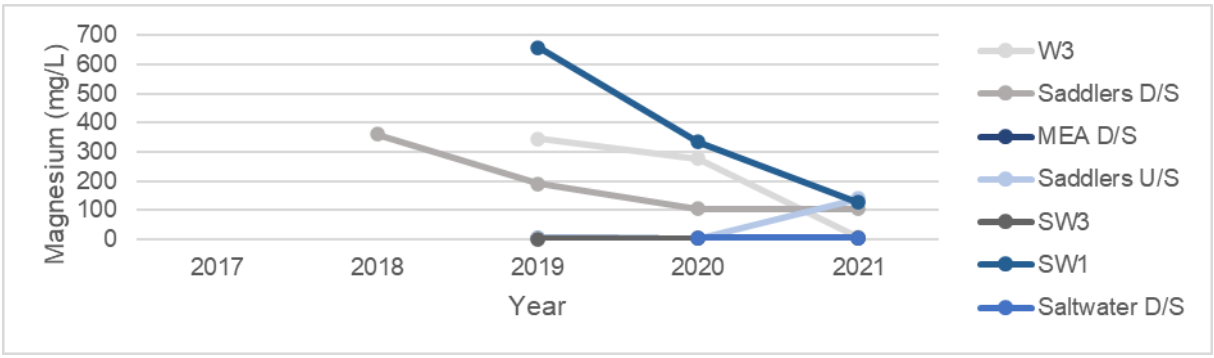


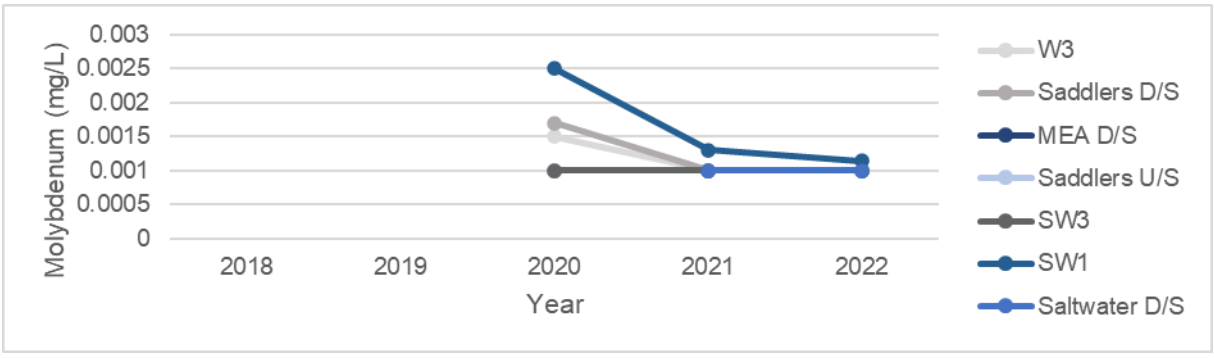


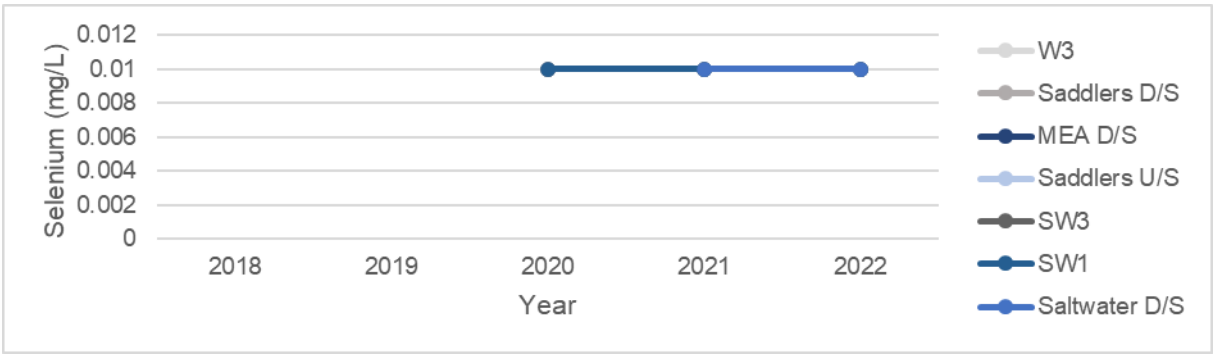


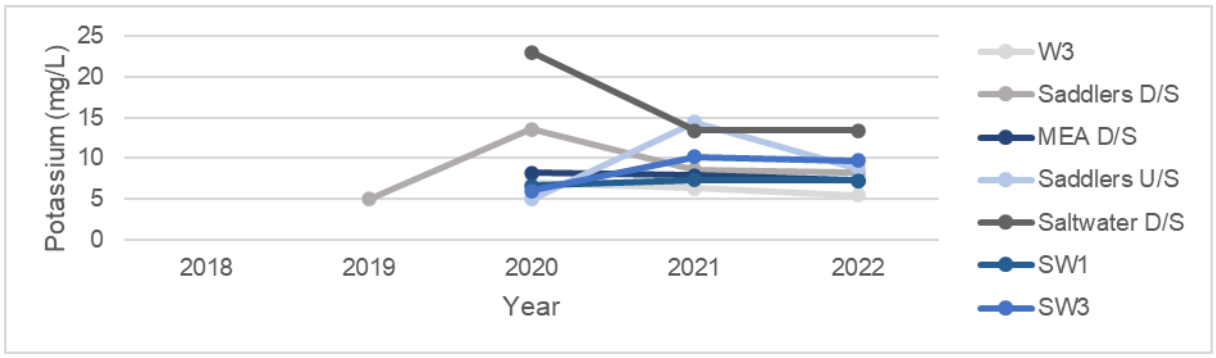

Chloride (mg/L)
7000
6000
5000
4000
3000
2000
1000
0
2018
2019
2020
2021
2022
Year
W3
Saddlers D/S
MEA D/S
Saddlers U/S
SW3
SW1
Saltwater D/S

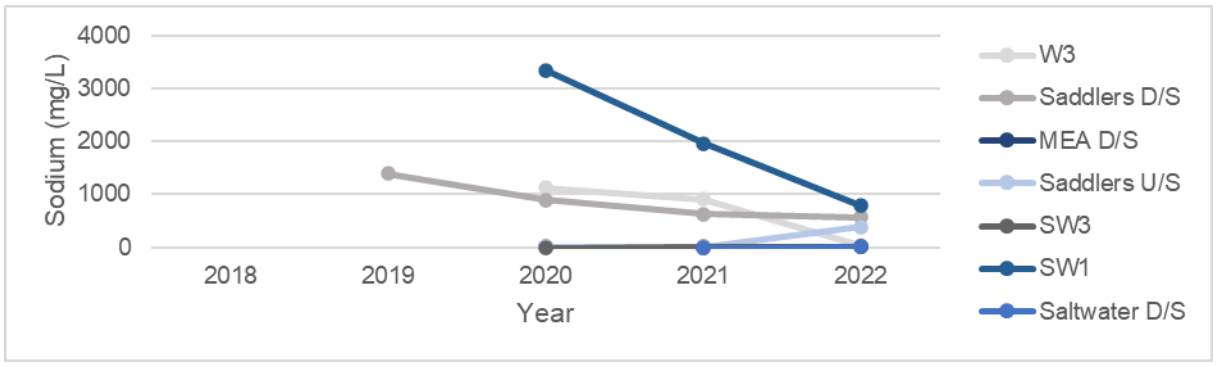

Electrical Conductivity (mS/cm)
25000
20000
15000
10000
5000
0
2018
2019
2020
2021
2022
Year
W3
Saddlers D/S
MEA D/S
Saddlers U/S
SW3
SW1
Saltwater D/S

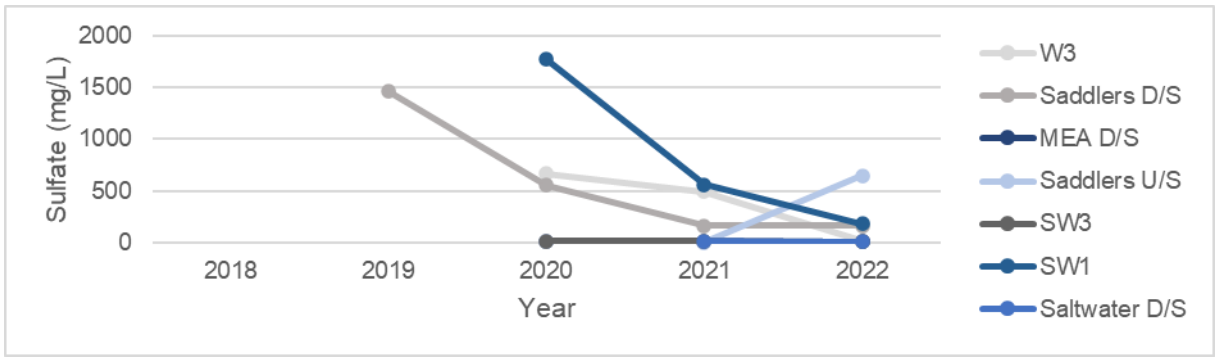

Magnesium (mg/L)
700
600
500
400
300
200
100
0
2017
2018
2019
2020
2021
Year
W3
Saddlers D/S
MEA D/S
Saddlers U/S
SW3
SW1
Saltwater D/S

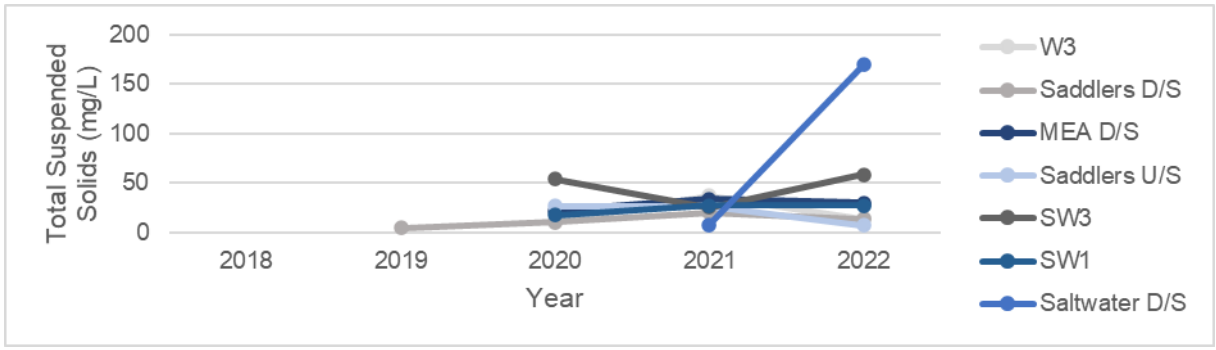

Molybdenum (mg/L)
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
2018
2019
2020
2021
2022
Year
W3
Saddlers D/S
MEA D/S
Saddlers U/S
SW3
SW1
Saltwater D/S

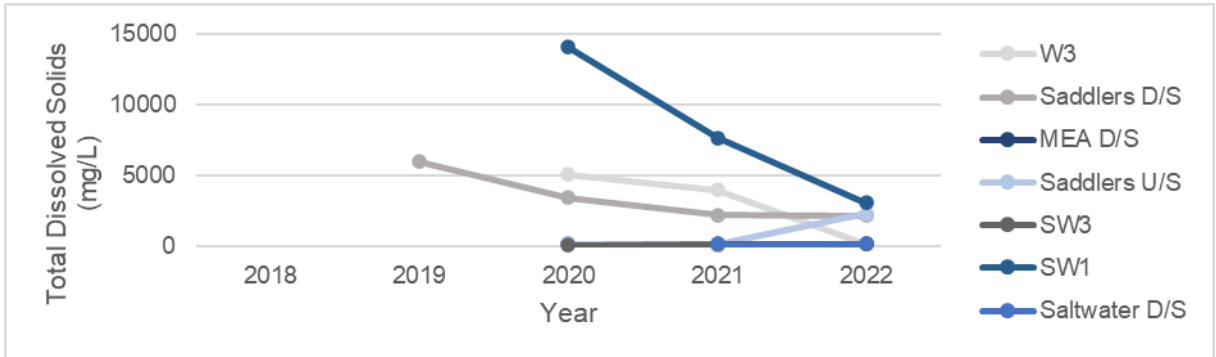

Selenium (mg/L)
0.012
0.01
0.008
0.006
0.004
0.002
0
2018
2019
2020
2021
2022
Year
W3
Saddlers D/S
MEA D/S
Saddlers U/S
SW3
SW1
Saltwater D/S

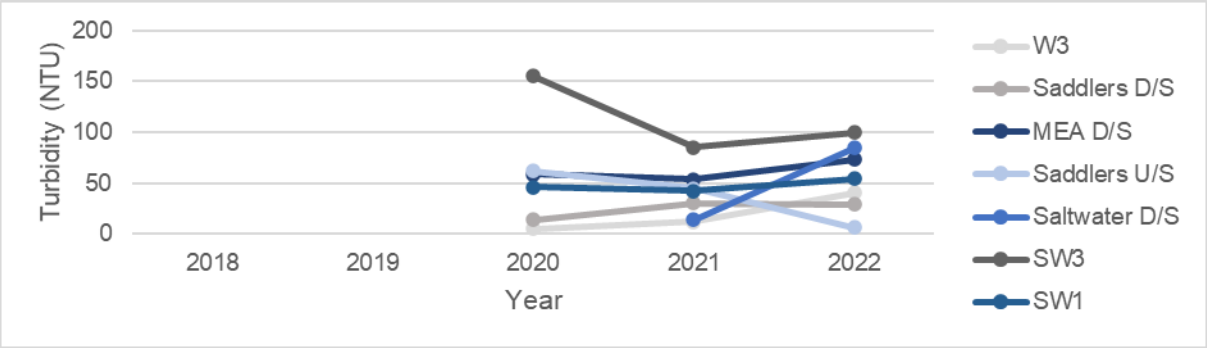

Potassium (mg/L)
25
20
15
10
5
0
2018
2019
2020
2021
2022
Year
W3
Saddlers D/S
MEA D/S
Saddlers U/S
Saltwater D/S
SW1
SW3


Sodium (mg/L)
4000
3000
2000
1000
0
2018
2019
2020
2021
2022
Year
W3
Saddlers D/S
MEA D/S
Saddlers U/S
SW3
SW1
Saltwater D/S


Sulfate (mg/L)
2000
1500
1000
500
0
2018
2019
2020
2021
2022
Year
W3
Saddlers D/S
MEA D/S
Saddlers U/S
SW3
SW1
Saltwater D/S


Total Suspended Solids (mg/L)
200
150
100
50
0
2018
2019
2020
2021
2022
Year
W3
Saddlers D/S
MEA D/S
Saddlers U/S
SW3
SW1
Saltwater D/S


Total Dissolved Solids (mg/L)
15000
10000
5000
0
2018
2019
2020
2021
2022
Year
W3
Saddlers D/S
MEA D/S
Saddlers U/S
SW3
SW1
Saltwater D/S



Notes:

Laboratory results only included. Field measurements are not included as these are deemed for use for investigatory purposes only and there are no trigger levels set.

Results include all sampling events including post-rainfall. As all downstream surface water monitoring locations were either dry or stagnant in 2023 during scheduled and post-rainfall sampling, no additional results for 2023 are presented here.

Surface water scheduled field measurements at sites along Saddlers Creek for Q1 to Q4 2023 and comparison against trigger levels.

If an exceedance of the trigger level occurs for three consecutive readings, this is highlighted in red. As all downstream surface water monitoring locations were either dry or stagnant in 2023 during scheduled and post-rainfall sampling, no results for 2023 are presented here.

Site		Field result											
		pH				EC				Turbidity			
	Units	pH				µS/cm				NTU			
	Trigger	6.5–8.5				7,600				64			
		Q1 2023	Q2 2023	Q3 2023	Q4 2023	Q1 2023	Q2 2023	Q3 2023	Q4 2023	Q1 2023	Q2 2023	Q3 2023	Q4 2023
W3		All sites either dry or stagnant during reporting period											
Saddlers D/S (W4 – Bowfield)													
MEA D/S													
Saddlers U/S													
Saltwater D/S													
SW1/ Saddlers													
SW2													
SW3													

Surface water laboratory results at sites along Saddlers Creek (scheduled and post-rainfall sampling) during Q1 to Q4 2023 and comparison against trigger levels.

If an exceedance of the trigger level occurs for three consecutive readings, this is highlighted in red. As all downstream surface water monitoring locations were either dry or stagnant in 2023 during scheduled and post-rainfall sampling, no results for 2023 are presented here.

Site	Sample date	Sampling type	Laboratory result													
			Sb	As (V)	As (III)	$CaCO_3$	Ca	Cl	Mg	Mb	K	Se	Na	SO_4	TSS	TDS
Units			mg/L	mg/L mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Trigger			9(c)	13(c)	24 (b) (c)	(a)	(a)	(a)	(a)	34(c)	(a)	11(c)	(a)	(a)	50	4900
All sites (W3, Saddlers D/S (W4 – Bowfield), MEA D/S, Saddlers U/S, Saltwater D/S, SW1/Saddlers, SW2, SW3	27/1/23	Scheduled*	All sites either dry or stagnant during reporting period													
	23/2/23	Rainfall*														
	13/4/23	Scheduled*														
	11/7/23	Scheduled*														
	18/10/23	Scheduled*														

(a) No trigger; for interpretation purposes only

(b) Result is a combination of As (V) and As (III)

(c) Trigger set as a preliminary guideline value

APPENDIX 9. STREAM HEALTH MONITORING RESULTS

Stream Health Monitoring Records – Site: W3

Measured variable	Baseline condition (Q3 2020)	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Q1 2023	Q2 2023	Q3 2023	Q4 2023
Flow conditions	No flow.	NC	NC	NC	-	NC	NC	NC	NC	NC	NC	NC	NC	NC
Channel setting	Flow (when present) will be heavily constrained by weeds; singular channel, contained within shallow valley.	NC	NC	NC	-	NC	NC	NC	NC	NC	NC	NC	NC	NC
Valley shape	Steep unconsolidated walls, no cliffs.	NC	NC	NC	-	NC	NC	NC	NC	NC	NC	NC	NC	NC
Channel shape variability	Regular	NC	NC	NC	-	NC	NC	NC	NC	NC	NC	NC	NC	NC
Bed material	Mud (silt and clay)	NC	NC	NC	-	NC	NC	NC	NC	NC	NC	NC	NC	NC
Large wood and log jams	None	NC	NC	NC	-	NC	NC	NC	NC	NC	NC	NC	NC	NC
Pool dimensions	No pools visible	NC	NC	NC	-	NC	NC	NC	NC	NC	NC	NC	NC	NC
Pool hydraulic control	No pools visible	NC	NC	NC	-	NC	NC	NC	NC	NC	NC	NC	NC	NC
Exposed	None	NC	NC	NC	-	NC	NC	NC	NC	NC	NC	NC	NC	NC

Measured variable	Baseline condition (Q3 2020)	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Q1 2023	Q2 2023	Q3 2023	Q4 2023
bedrock feature														
Channel dimensions	~12m	NC	NC	NC	-	NC	NC	NC	NC	NC	NC	NC	NC	NC
Knickpoint type and dimensions	None	NC	NC	NC	-	NC	NC	NC	NC	NC	NC	NC	NC	NC
In-channel vegetation	Heavily and continuously infested with Juncus acutus (90%)	Increase in weed variety: phragmities australis and thistle (~10% combined)	NC	Increased in height and thickness	-	NC	Increased height thickness	Increased height & thickness of juncus acutus also native phragmities australis present in approx. 30% of area monitored	Increased thickness and height of juncus acutus Due to higher rainfall during 3mths	Higher Rainfall Increased thickness	Taller thicker, no rain Height & thickness slowed in growth	Thicker grasses height increase	NC	NC
Width of riparian vegetation	~30m	~30m	NC	NC	-	NC	<50cm wider	<30cm wider	<20cm wider	NC	NC	NC	NC	Less due to dry conditions
Composition and cover of riparian vegetation	Grass exotics on lower banks; upper banks have Acacia saligna or similar.	Thistles have appeared (~10% cover)	NC	Thicker growth	-	NC	Thicker	Thicker	Thicker	Slightly Thicker	NC	NC	NC	NC

Measured variable	Baseline condition (Q3 2020)	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Q1 2023	Q2 2023	Q3 2023	Q4 2023
Swamp Oak health	Baseline assessment commenced Q2 2021.	-	-	None present in locality	-	NC	NC	NC	NC	NC	NC	Excellent healthy and growing	NC	NC
Other observations	Some slippage of mid-bank due to cattle and of upper bank due to steepness.	Stake with blue marker added	NC	Small trees on bank have increased in height	-	NC	Cattle present	Small trees grown Wetter summer	Wetter winter. Small trees grown in height	Higher rainfall Surfaces wetter / boggier	Little rainfall, Growth slowed. Drier conditions	NC	Cattle present	Dryer conditions

NC = No change. Q3 2021 Survey was not undertaken due to COVID-19 restrictions

Stream Health Monitoring Records – Site: Saddlers Downstream

Measured variable	Baseline condition (Q3 2020).	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Q1 2023	Q2 2023	Q3 2023	Q4 2023
Flow conditions	No flow.	NC	NC	NC	-	NC	NC	Low flow	Low flow	Medium flow	Low flow	Low flow	Low Flow	No flow
Channel setting	One confined channel consisting of large stagnant pools.	NC	NC	NC	-	NC	NC	Low flow in channel	Low flow into channel	Medium flow through channel	NC	NC	NC	No flow into channel
Valley shape	Moderate to steep/rocky banks: gorge on one side, low slope on other	NC	NC	NC	-	NC	NC	NC	NC	NC	NC	NC	NC	NC
Channel shape variability	Irregular: V and U shape; meandering	NC	NC	NC	-	NC	NC	NC	NC	NC	NC	NC	NC	NC
Bed material	Sandy gravel to silt and clay, exposed bedrock	NC	NC	NC	-	NC	NC	NC	NC	NC	NC	NC	NC	NC
Large wood & log jams	None	NC	NC	NC	-	NC	NC	NC	Some small / medium branches.	Vegetation flatter due to large	Vegetation debris – smaller	NC	NC	NC

Measured variable	Baseline condition (Q3 2020).	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Q1 2023	Q2 2023	Q3 2023	Q4 2023
									Due to recent flooding in area.	rainfall even recently	branches			
Pool dimensions	Not measured	6.37m width w x ongoing x 0.5m deep	Rain pool ~ 70cm deep	60mm rain within past week; water level increased by 20+cm	-	Deeper water. Risen by ~20cm.	Deeper water	Deeper water approx. 1m	Deeper flowing water. Could not measure but >1m	Deeper faster flowing water, due to large rainfall event. Unable to measure. Approx. 1.8 – 2mt deep & approx. 6mt wide	Can't measure due to vegetation growth	NC	NC	NC
Pool hydraulic control	Rock bar to one side	NC	NC	NC	-	NC	NC	NC	NC	NC	NC	NC	NC	NC
Exposed bedrock feature	Bedrock visible on one bank	NC	NC	NC	-	NC	More veg.	NC	NC	NC	Vegetation growth covering so not as visible	Visible again on 1 bank	visible	Visible
Channel dimensions	~5m	6.73m	NC	NC	-	NC	NC	NC	NC	NC	NC	NC	NC	NC
Knickpoint type and dimensions	None	NC	NC	NC	-	NC	NC	NC	NC	NC	NC	NC	NC	NC

Measured variable	Baseline condition (Q3 2020).	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Q1 2023	Q2 2023	Q3 2023	Q4 2023
In-channel vegetation	Juncus, exotic grasses, thistle, she oak.	Thistle increase (annual species)	NC	Thicker and taller	-	Thicker and taller	Thicker /taller	Taller vegetation, also present phragmities australis. Approx. 50% of area monitored	Thicker/Taller	Vegetation flatter due to large rain event	Vegetation growth thicker / taller	NC	NC	No growth – dry conditions
Width of riparian vegetation	~30m	~30m	NC	35+m	-	NC	Wider.	Vegetation spreading in width	Vegetation spread in width	Spread in width	Vegetation Thicker	NC	NC	NC
Composition and cover of riparian vegetation	She oak: range of heights to >10m, exotic grasses	Bamboo and thistle newly present	More shrubs / grasses grown	More growth in shrubs & grasses	-	NC	Taller /thicker due to flooding in Nov 21	NC	Thicker/Taller due to flooding in June/July		Vegetation cover thicker	NC	NC	NC
Swamp Oak health	Baseline assessment commenced Q2 2021.	-	-	She oaks have grown, no damage, looking healthy	-	NC	Good growth, approx. 1m higher & <50cm wider. Healthy.	More growth, looking healthy grown taller and wider, more saplings present	More growth. Very healthy	More growth - healthy	Good growth, healthy. New smaller saplings growing now	Taller & Thicker. Healthier	Dry condition. Growth slowed. But healthy	NC
Other observations		Site relocated (due to high	NC	Increased water level	-	Increased water level from	Blue marker missing due to	NC	Post with blue marker replaced.	Overgrown &increased water	Water level has receded, more	Cattle in area. Eaten down	Clearer vegetation. Cattle	Dry conditions.

Measured variable	Baseline condition (Q3 2020).	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Q1 2023	Q2 2023	Q3 2023	Q4 2023
		water). Blue markers added.				recent rains	flooding .		Flooding went through approx. 1m to 1.5m up bank then receded, leaving debris	level	growth visible in whole of area.	around location	present	

Stream Heath Monitoring Records – Site: Saddlers Upstream

Measured variable	Baseline condition (Q3 2020)	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Q1 2023	Q2 2023	Q3 2023	Q4 2023
Flow conditions	No flow – dry.	NC	NC	NC	-	NC	NC	Pools of water present now	Pools of water larger	Slow flow to a trickle due to large rain event	No Flow	No Flow	No Flow	No flow
Channel setting	Part of a wider braided (3) creek network; channels confined, moderate depth.	NC	NC	NC	-	NC	NC	NC	NC	NC	NC	NC	NC	NC
Valley shape	Moderate to steep V-shape banks.	NC	NC	NC	-	NC	NC	NC	NC	NC	NC	NC	NC	NC
Channel shape variability	Meandering, no cliffs, varying depths	NC	NC	NC	-	NC	NC	NC	NC	NC	NC	NC	NC	NC
Bed material	Mud (silt and clay)	NC	NC	NC	-	NC	NC	NC	NC	NC	NC	NC	NC	NC
Large wood and log jams	Some small logs/branches	NC	NC	NC	-	NC	More branches /logs due to Nov 21 flooding	NC	Logs & Branches moved due to larger flooding in June / July 2022	NC	NC	NC	NC	NC
Pool dimensions	3.5 x 1.8 x 0.5m depth	NC	NC	Pools have	-	More water in	No pools	Pools have	Pools now ~	NC	Pools of water	NC	NC	Some mud – no

Measured variable	Baseline condition (Q3 2020)	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Q1 2023	Q2 2023	Q3 2023	Q4 2023
	(dry)			30cm water due to recent rains		pools		more water in them. Approx. 20 – 40cm	40cm - > 1m.		smaller as evaporating			water
Pool hydraulic control	Cohesive material	NC	NC	NC	-	NC	NC	NC	NC	NC	NC	NC	NC	NC
Exposed bedrock feature	None	NC	NC	NC	-	NC	NC	NC	NC	NC	NC	NC	NC	NC
Channel dimensions	2.5 + wide x 3.5m depth	NC	NC	NC	-	NC	NC	NC	NC	NC	NC	NC	NC	NC
Knickpoint type and dimensions	None.	NC	NC	NC	-	NC	NC	NC	NC	NC	NC	NC	NC	NC
In-channel vegetation	Mainly exotic grasses, some small she oak, some weeds (Juncus, thistle).	NC	NC	Grass has died off in channel	-	Grasses thicker, trees taller	More grass, trees higher, thicker	Longer grasses she oaks taller wider	Grasses thicker & longer. Good coverage	Grass thicker	NC	NC	NC	NC
Width of riparian vegetation	~80m.	NC	NC	NC	-	NC	NC	NC	NC	NC	Thicker / taller grasses	NC	NC	NC
Composition and cover of riparian vegetation	Exotic grasses, she oak of varying heights: <3 to >3m.	Thistle newly present	NC	NC	-	NC	NC	NC	Much denser	Denser	Thicker	NC	NC	NC

Measured variable	Baseline condition (Q3 2020)	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Q1 2023	Q2 2023	Q3 2023	Q4 2023
Swamp Oak health	Baseline condition commenced Q2 2021: Good general health likely due to high rainfall in Q1 2021, no apparent stress. Multiple smaller specimens are seen around the bank line, ranging in height from 20cm to approximately 1m. No evidence of disease or livestock damage.	-	-	See baseline	-	She oak health good, taller, no damage, smaller saplings starting to grow	Taller, thicker, healthy	Taller wider, health very good, newer saplings emerging	Healthy growth.	Healthy growth, more saplings present	Healthy – New saplings growth healthy to approx. 20cm to 1m Larger trees thicker and taller	Growing. More saplings growing – starting to overgrow site. Health excellent	Growth slowed due to winter frosts and little rain	Slow growth -no rain. Conditions drier
Other observations		Stake with blue marker required	Stake with blue marker added	General area looks healthy and good native grasses.	-	NC	NC	NC	NC	Vegetation thicker surrounding area & tracks. Much wetter on tracks	Vegetation thicker – track overgrown somewhat.	NC	NC	Cattle present – dry conditions

Photos of Quarterly Stream Health Monitoring at commencement of monitoring in Q3 2020, to the end of the reporting period (Q4 2022).

Site: W3

Quarter	Date	Upstream photo	Downstream photo
Q3 2020	21/07/20		

Quarter	Date	Upstream photo	Downstream photo
Q4 2020	15/12/20		
Q1 2021	17/03/2021		

Quarter	Date	Upstream photo	Downstream photo
Q2 2021	15/06/2021		
Q3 2021	-	Survey not undertaken due to COVID-19 restrictions	Survey not undertaken due to COVID-19 restrictions

Quarter	Date	Upstream photo	Downstream photo
Q4 2021	26/10/21		
Q1 2022	31/1/22		

Quarter	Date	Upstream photo	Downstream photo
Q2 2022	27/4/22		
Q3 2022	25/7/22		

Quarter	Date	Upstream photo	Downstream photo
Q4 2022	27/10/22		

Quarter	Date	Upstream photo	Downstream photo
Q1 2023	24/01/2023		

Quarter	Date	Upstream photo	Downstream photo
Q2 2023	25/04/2023		

Quarter	Date	Upstream photo	Downstream photo
Q3 2023	26/07/23		

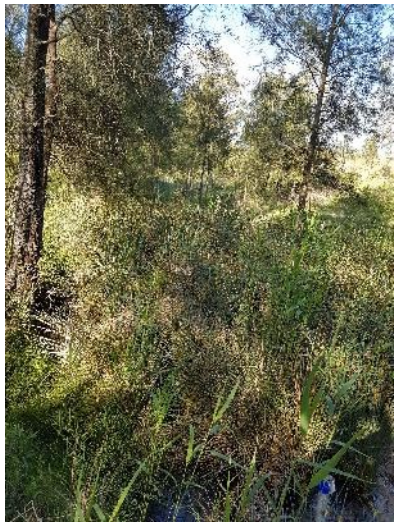
Quarter	Date	Upstream photo	Downstream photo
Q4 2023	26/10/23		

Site: Saddlers Downstream

Quarter	Date	Upstream photo	Downstream photo
Q3 2020	21/07/20		

Quarter	Date	Upstream photo	Downstream photo
Q4 2020	15/12/20 (sites relocated for Q4 2020)		
Q1 2021	17/03/21		

Quarter	Date	Upstream photo	Downstream photo
Q2 2021	15/06/2021		
Q3 2021	-	Survey not undertaken due to COVID-19 restrictions	Survey not undertaken due to COVID-19 restrictions

Quarter	Date	Upstream photo	Downstream photo
Q4 2021	26/10/21		
Q1 2022	31/1/22		

Quarter	Date	Upstream photo	Downstream photo
Q2 2022	27/4/22		
Q3 2022	25/7/22		

Quarter	Date	Upstream photo	Downstream photo
Q4 2022	27/10/22		
Q1 2023	24/01/2023		

Quarter	Date	Upstream photo	Downstream photo
Q2 2023			

Quarter	Date	Upstream photo	Downstream photo
Q3 2023	26/07/23		

Quarter	Date	Upstream photo	Downstream photo
Q4 2023	26/10/2023		

Site: Saddlers Upstream

Quarter	Date	Upstream photo	Downstream baseline photo
Q3 2020	21/07/20		
Q4 2020	15/12/20		

Quarter	Date	Upstream photo	Downstream baseline photo
Q1 2021	17/03/21		
Q2 2021	15/06/21		
Q3 2021	-	Survey not undertaken due to COVID-19 restrictions	Survey not undertaken due to COVID-19 restrictions

Quarter	Date	Upstream photo	Downstream baseline photo
Q4 2021	26/10/21		
Q1 2022	31/1/22		

Quarter	Date	Upstream photo	Downstream baseline photo
Q2 2022	27/4/22		
Q3 2022	25/07/22		

Quarter	Date	Upstream photo	Downstream baseline photo
Q4 2022	27/10/22		

Quarter	Date	Upstream photo	Downstream baseline photo
Q1 2023	24/01/2023		

Quarter	Date	Upstream photo	Downstream baseline photo
Q2 2023			

Quarter	Date	Upstream photo	Downstream baseline photo
Q3 2023	26/07/23		

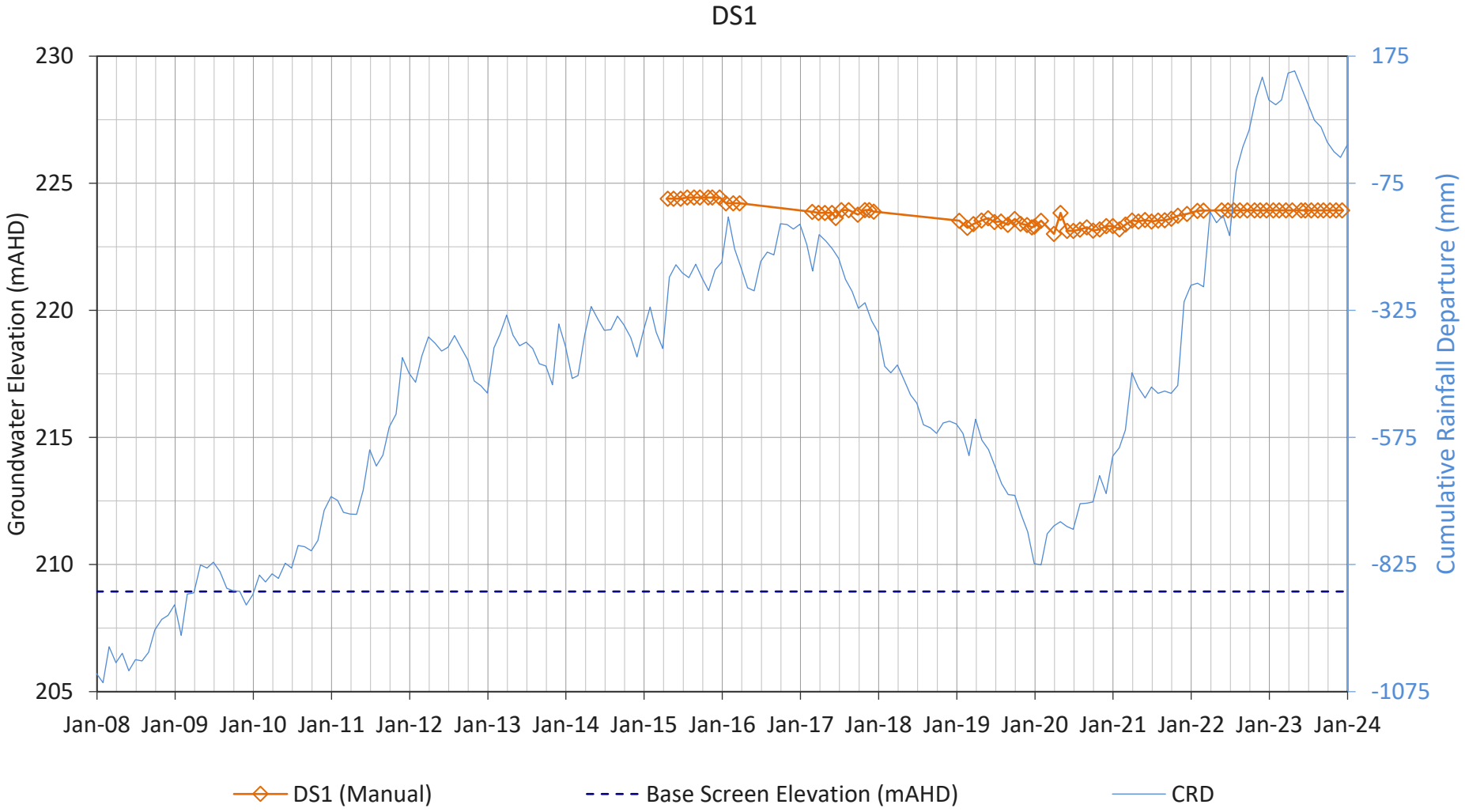
Quarter	Date	Upstream photo	Downstream baseline photo
Q4 2023	26/10/2023		

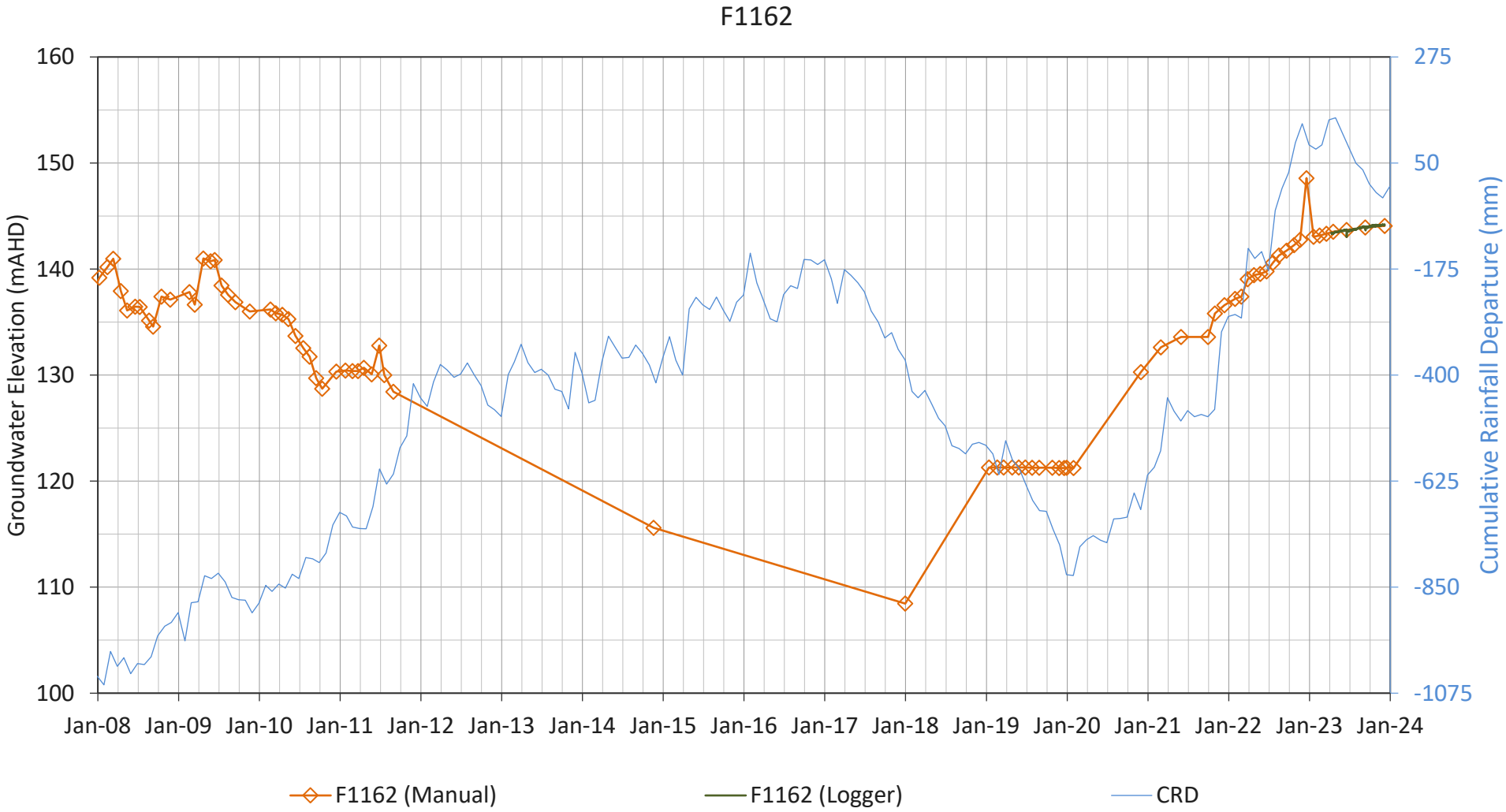
APPENDIX 10. GROUNDWATER RESULTS

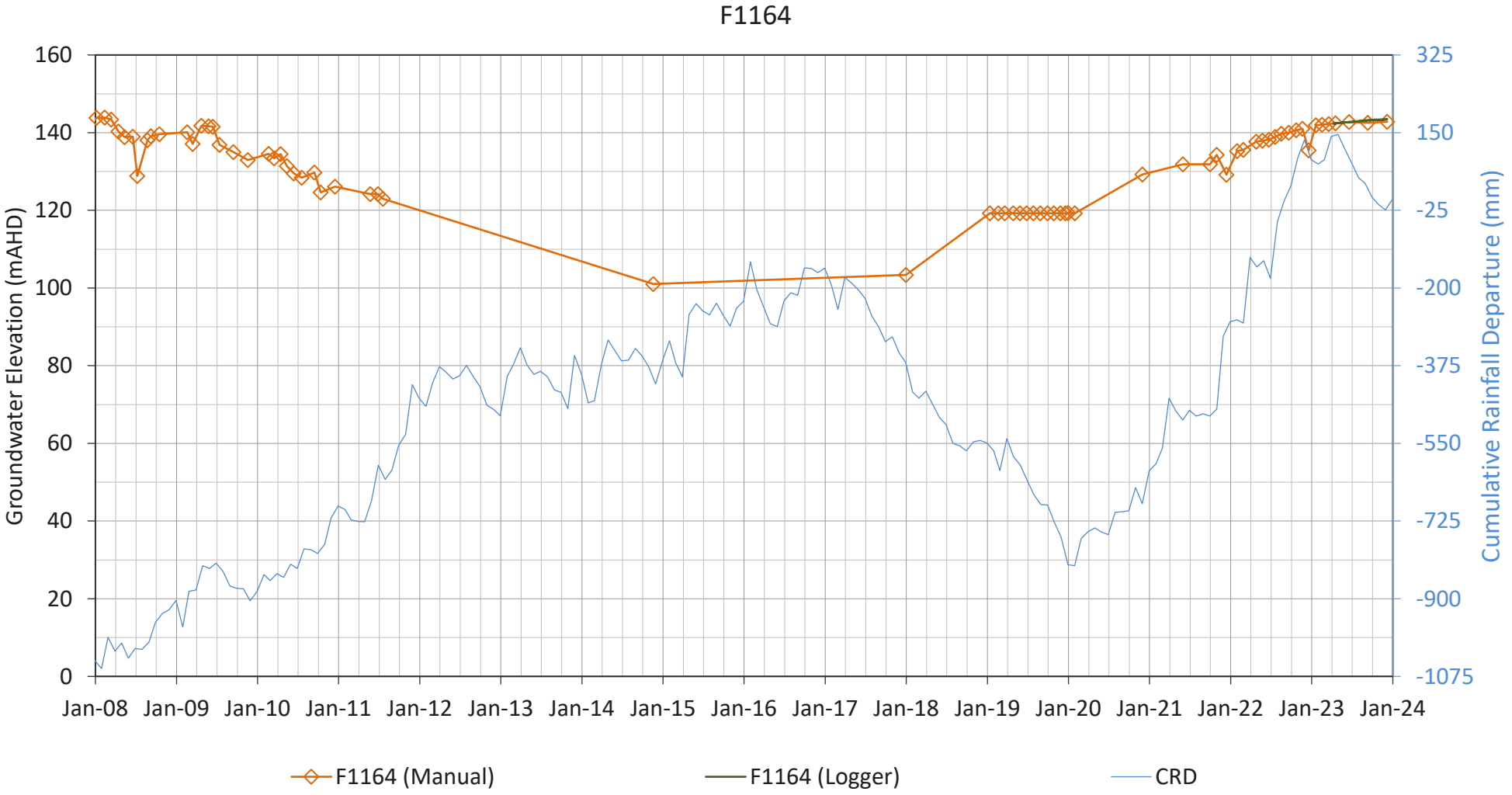
Appendix 10 is structured as follows:

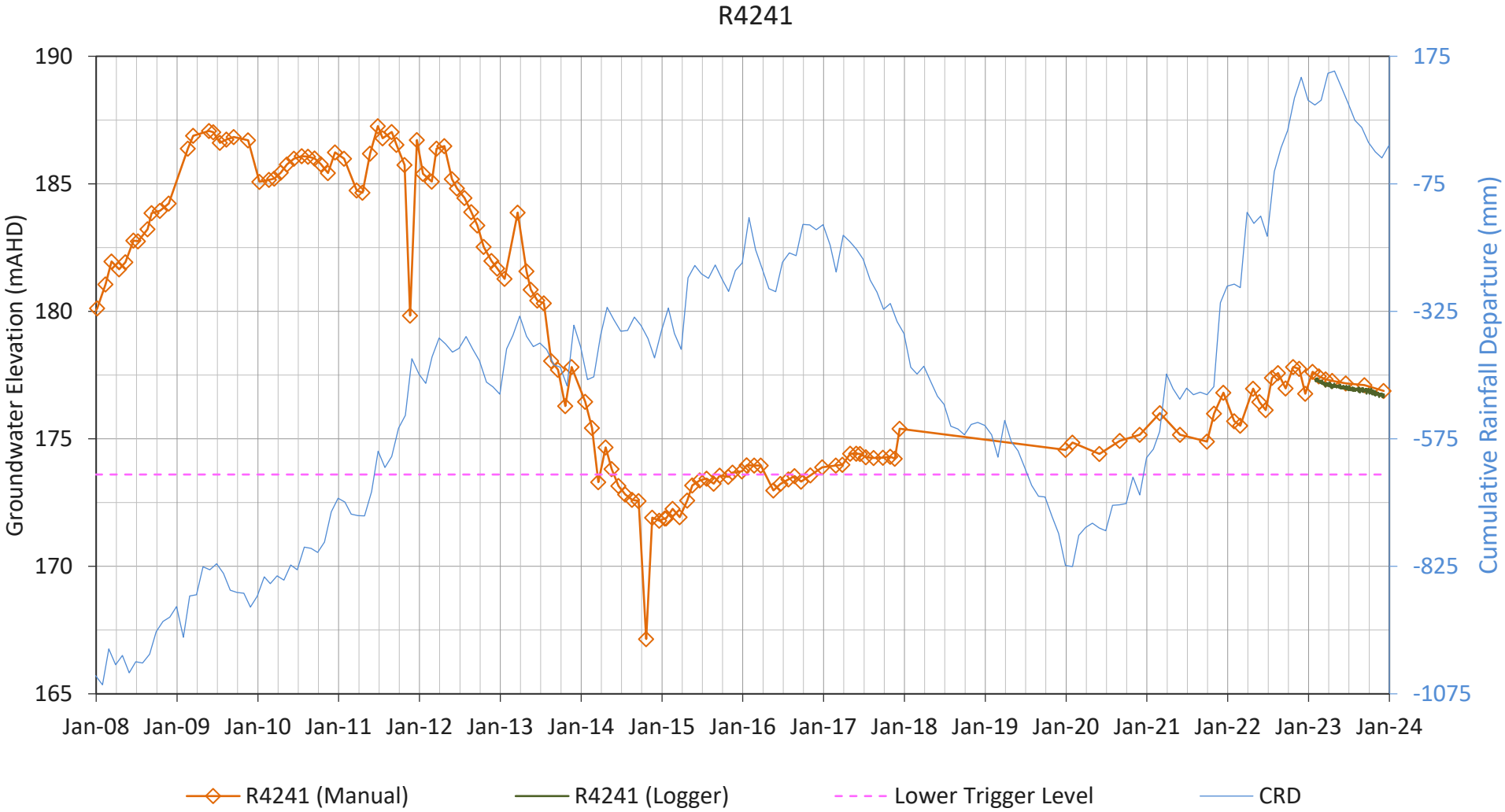
- Hydrographs from Maxwell Infrastructure bores (9 bores)
- Hydrographs from Maxwell Underground (MUG) bores (25 bores)
- Hydrographs from MUG vibrating wire piezometers (VWPs) (7 bores)
- Simulated groundwater levels against the latest observed groundwater levels
- Water quality graphs for MI bores with Trigger Levels (5 bores)

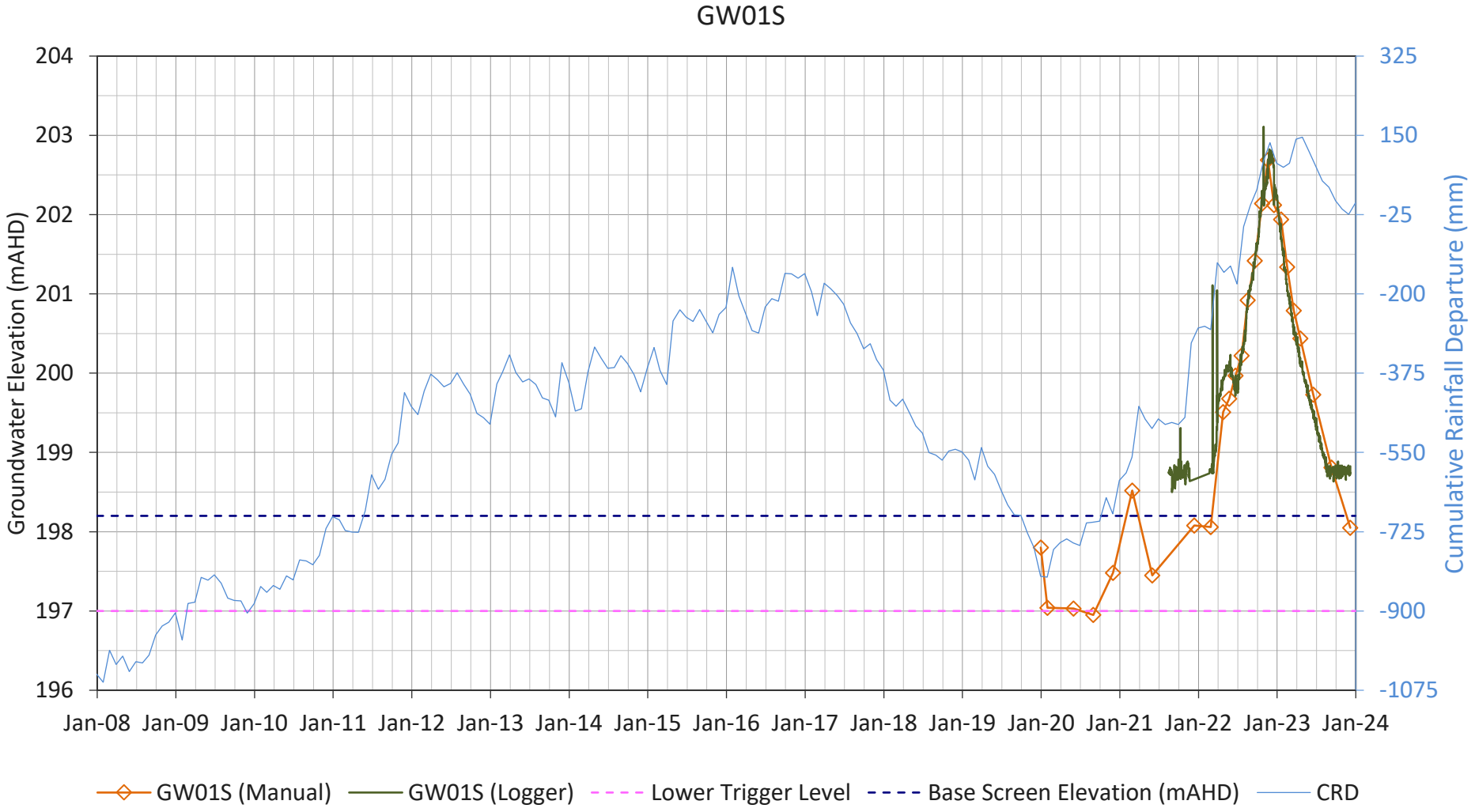
  Water quality graphs for MUG bores with Trigger Levels (3 bores; excludes DD1025 which has been decommissioned)

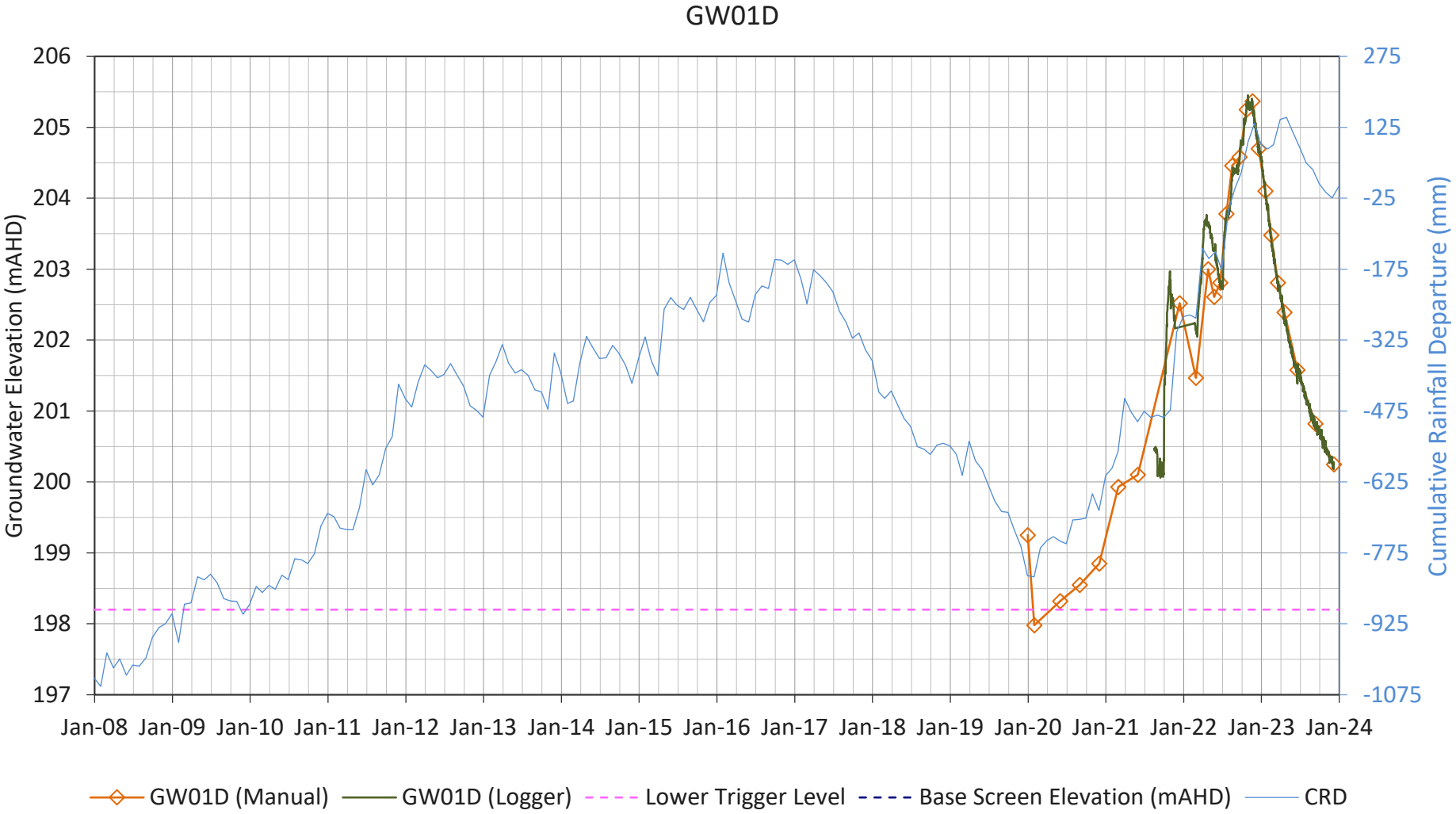

DS1
Groundwater Elevation (mAHD)
Cumulative Rainfall Departure (mm)
230
225
220
215
210
205
175
-75
-325
-575
-825
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
DS1 (Manual)
Base Screen Elevation (mAHD)
CRD

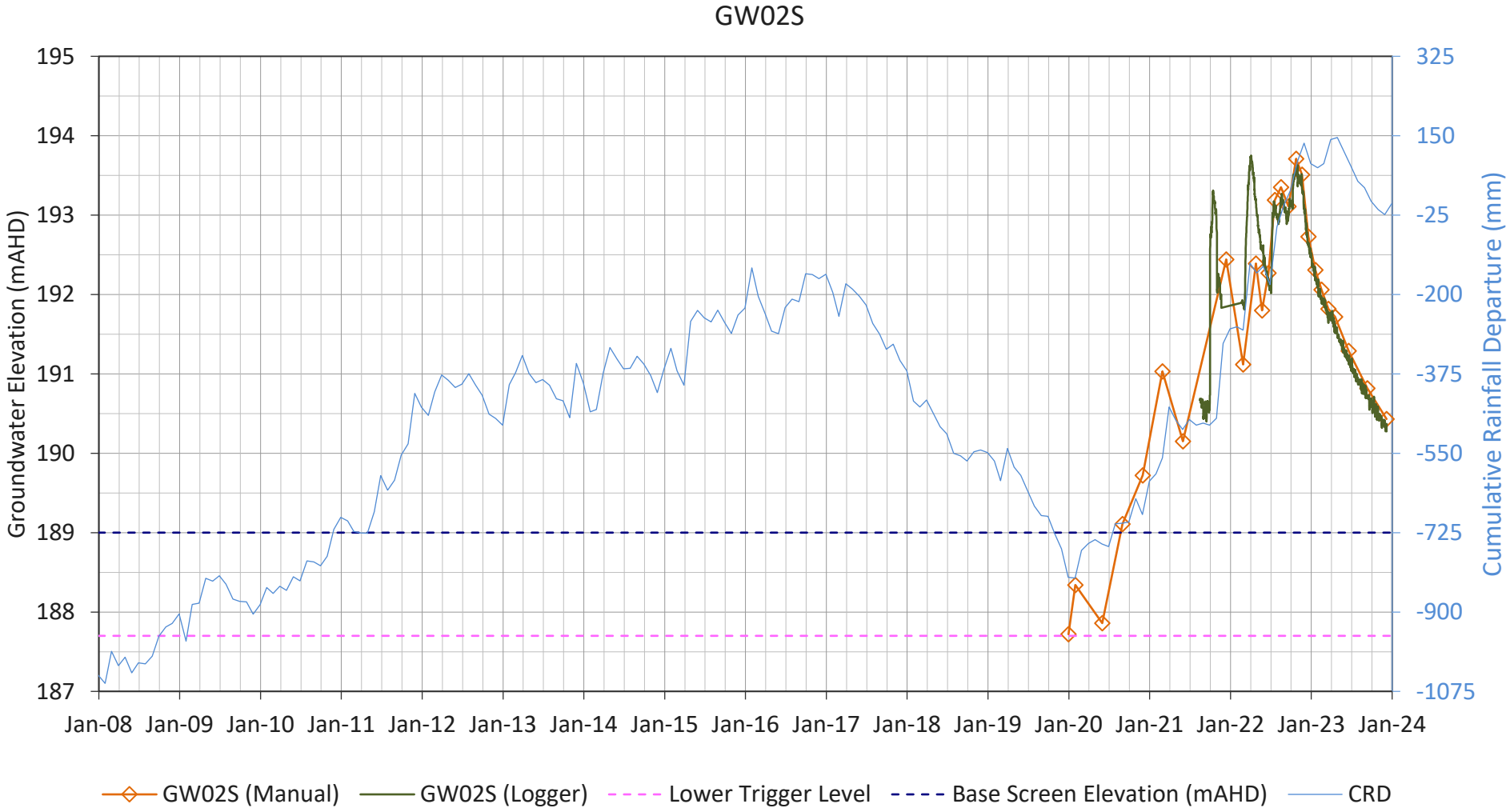

F1162
Groundwater Elevation (mAHD)
Cumulative Rainfall Departure (mm)
160
150
140
130
120
110
100
275
50
-175
-400
-625
-850
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
F1162 (Manual)
F1162 (Logger)
CRD

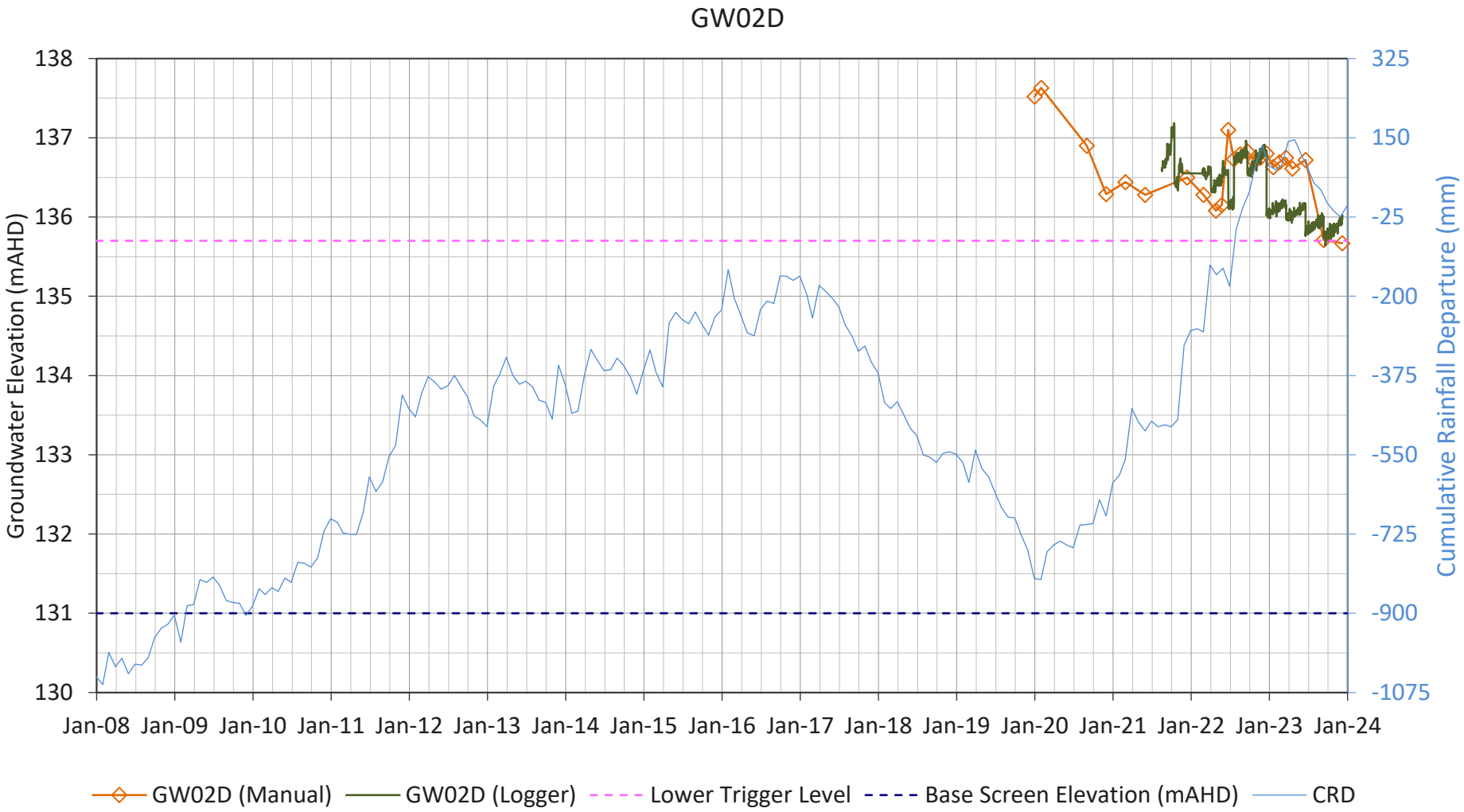

F1164
Groundwater Elevation (mAHD)
Cumulative Rainfall Departure (mm)
160
140
120
100
80
60
40
20
0
325
150
-25
-200
-375
-550
-725
-900
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
F1164 (Manual)
F1164 (Logger)
CRD

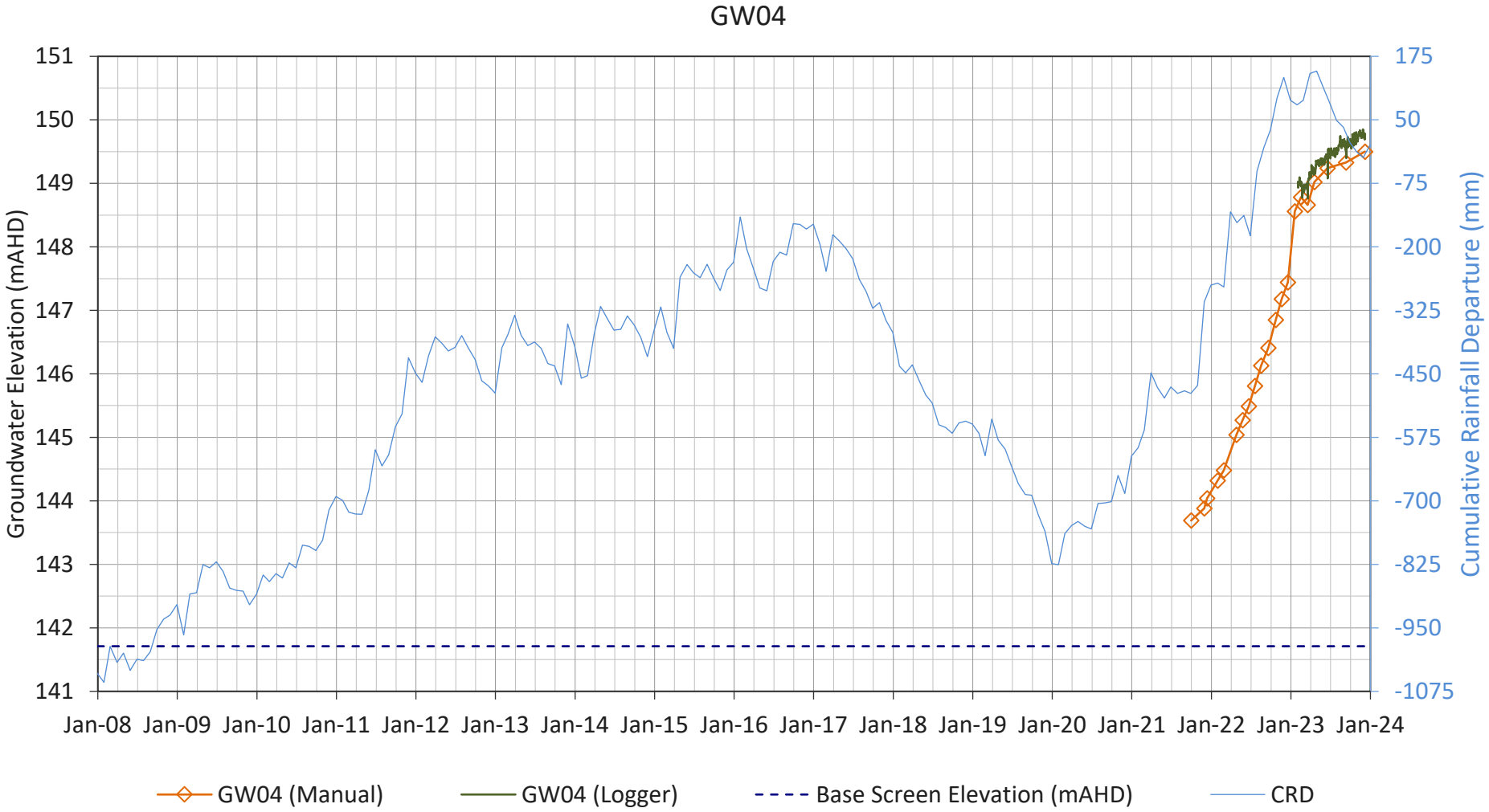

R4241
Groundwater Elevation (mAHD)
Cumulative Rainfall Departure (mm)
190
185
180
175
170
165
175
-75
-325
-575
-825
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
R4241 (Manual)
R4241 (Logger)
Lower Trigger Level
CRD

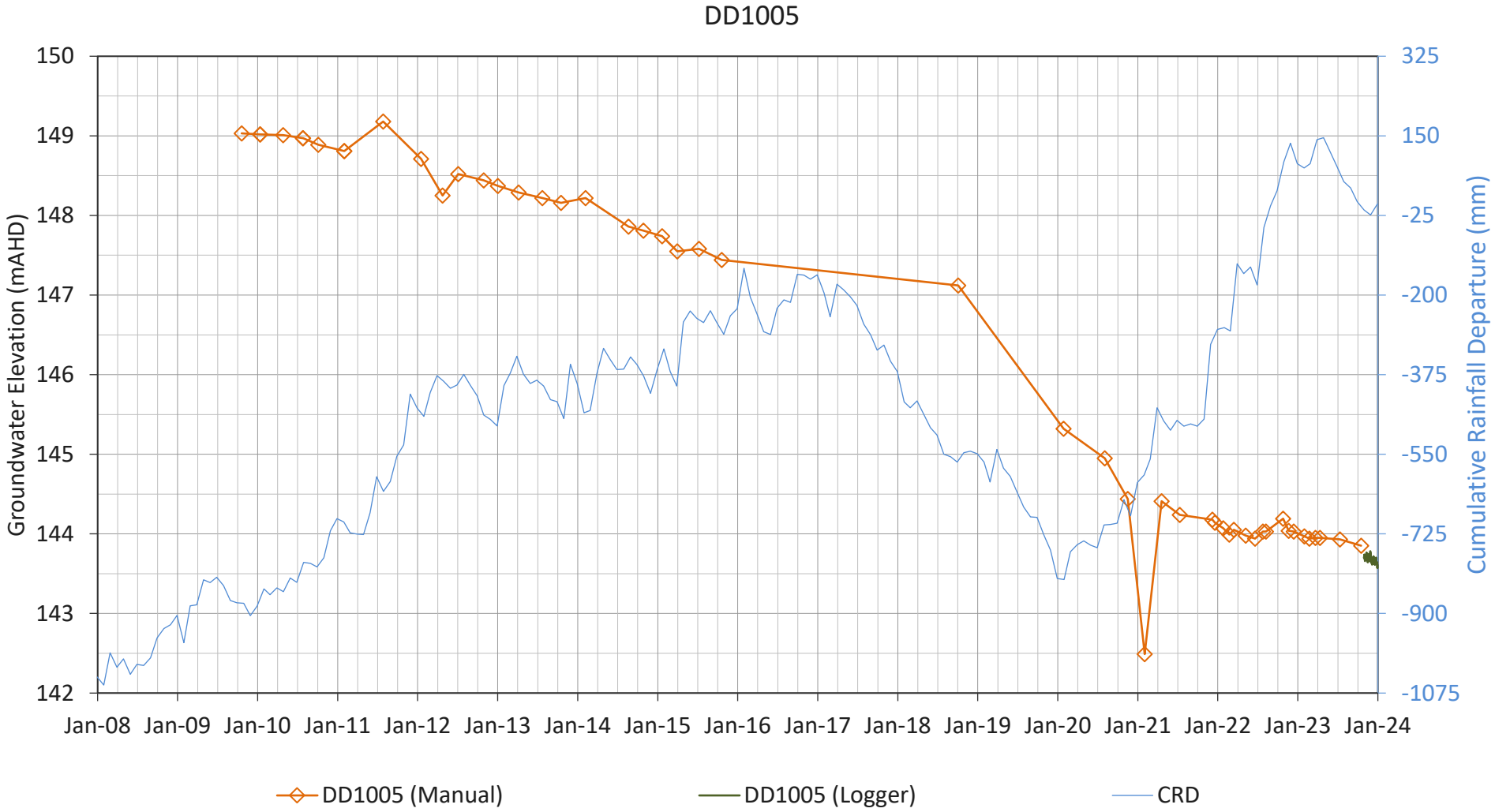

GW01S
Groundwater Elevation (mAHD)
Cumulative Rainfall Departure (mm)
204
203
202
201
200
199
198
197
196
325
150
-25
-200
-375
-550
-725
-900
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
GW01S (Manual)
GW01S (Logger)
Lower Trigger Level
Base Screen Elevation (mAHD)
CRD

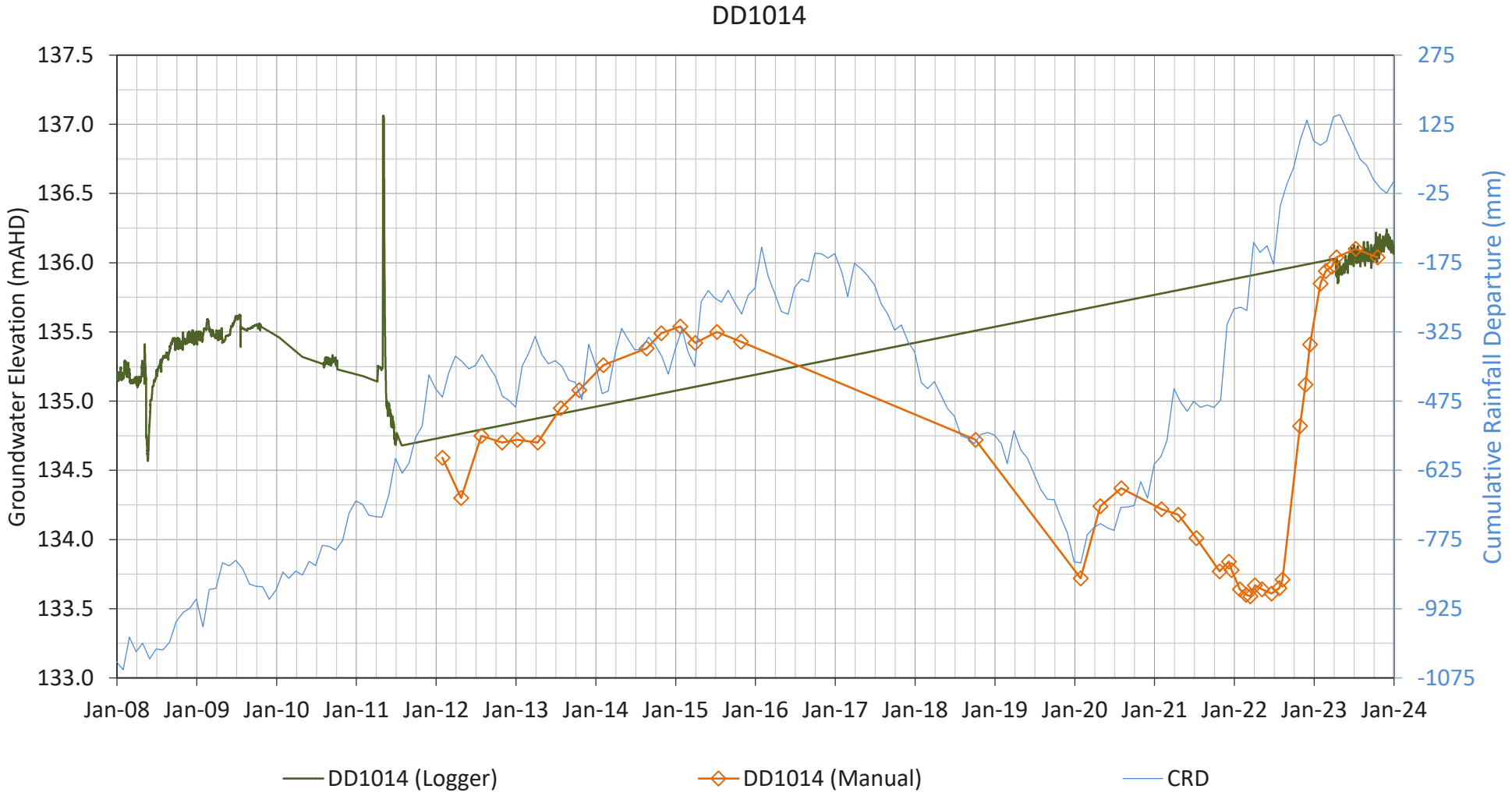

GW01D
Groundwater Elevation (mAHD)
206
205
204
203
202
201
200
199
198
197
Cumulative Rainfall Departure (mm)
275
125
-25
-175
-325
-475
-625
-775
-925
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
GW01D (Manual)
GW01D (Logger)
Lower Trigger Level
Base Screen Elevation (mAHD)
CRD

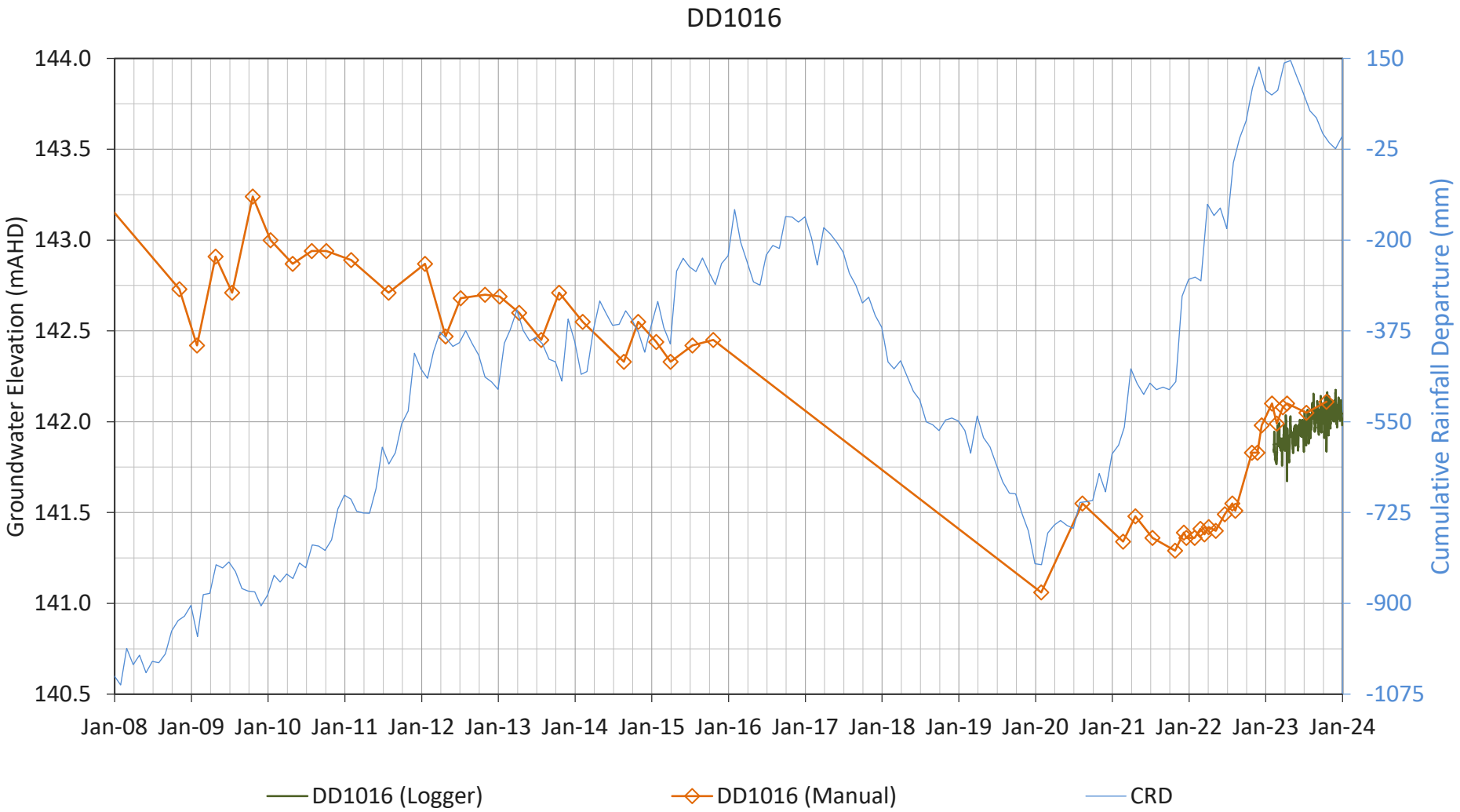

GW02S
Groundwater Elevation (mAHD)
195
194
193
192
191
190
189
188
187
Cumulative Rainfall Departure (mm)
325
150
-25
-200
-375
-550
-725
-900
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
GW02S (Manual)
GW02S (Logger)
Lower Trigger Level
Base Screen Elevation (mAHD)
CRD

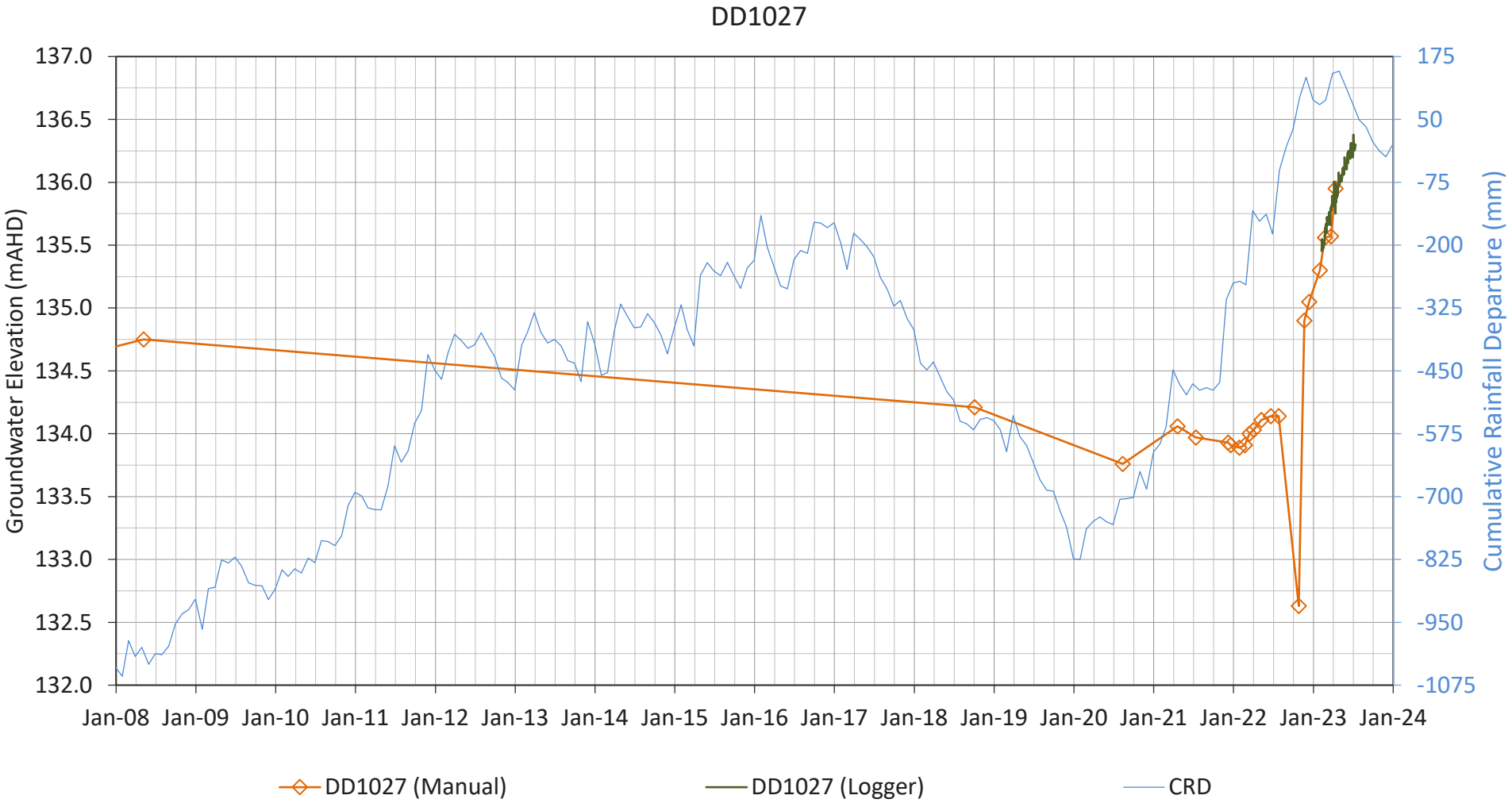

GW02D
Groundwater Elevation (mAHD)
Cumulative Rainfall Departure (mm)
138
137
136
135
134
133
132
131
130
325
150
-25
-200
-375
-550
-725
-900
-1075
Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19 Jan-20 Jan-21 Jan-22 Jan-23 Jan-24
GW02D (Manual)
GW02D (Logger)
Lower Trigger Level
Base Screen Elevation (mAHD)
CRD

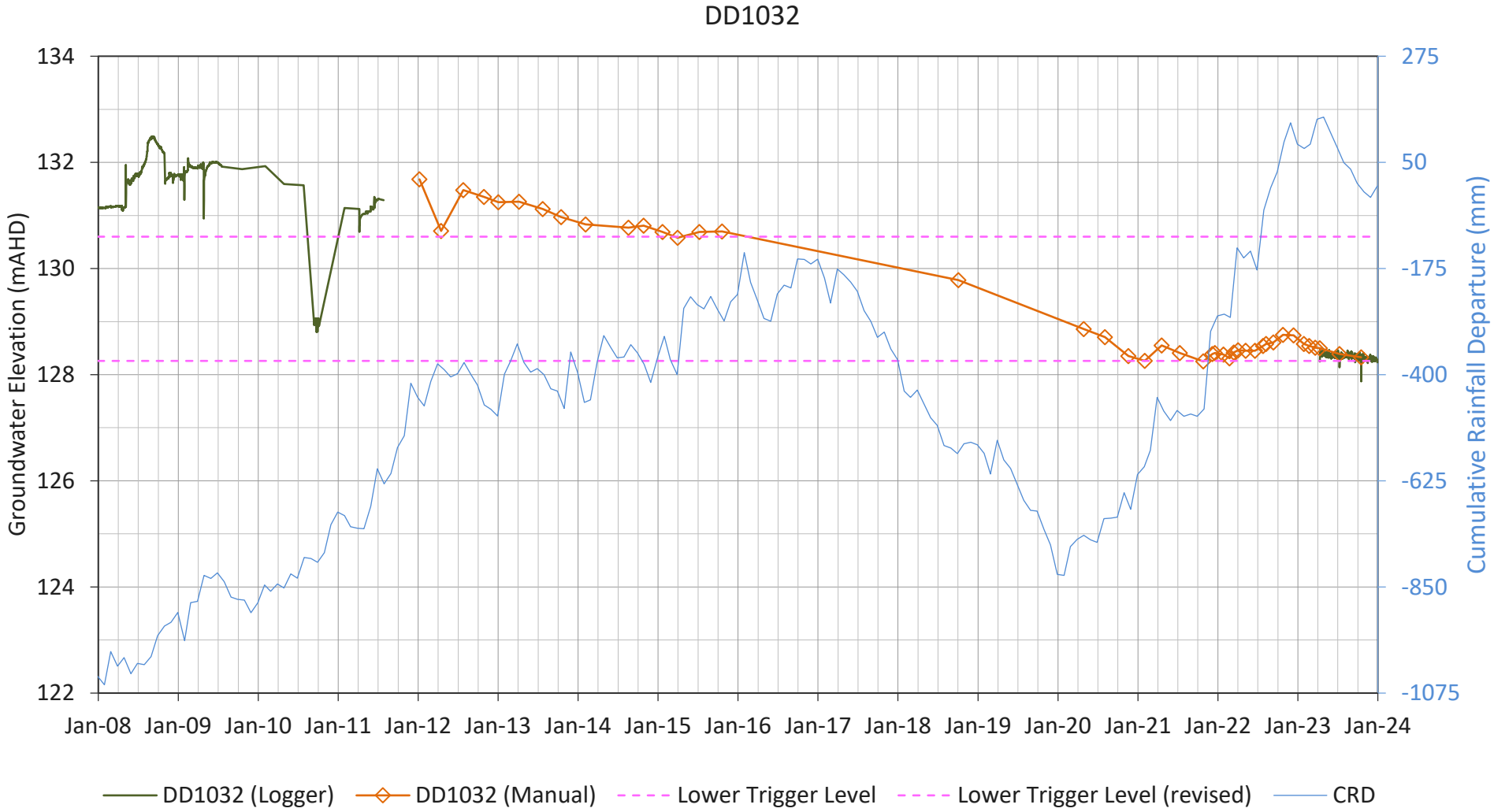

GW04
Groundwater Elevation (mAHD)
Cumulative Rainfall Departure (mm)
151
150
149
148
147
146
145
144
143
142
141
175
50
-75
-200
-325
-450
-575
-700
-825
-950
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
GW04 (Manual)
GW04 (Logger)
Base Screen Elevation (mAHD)
CRD

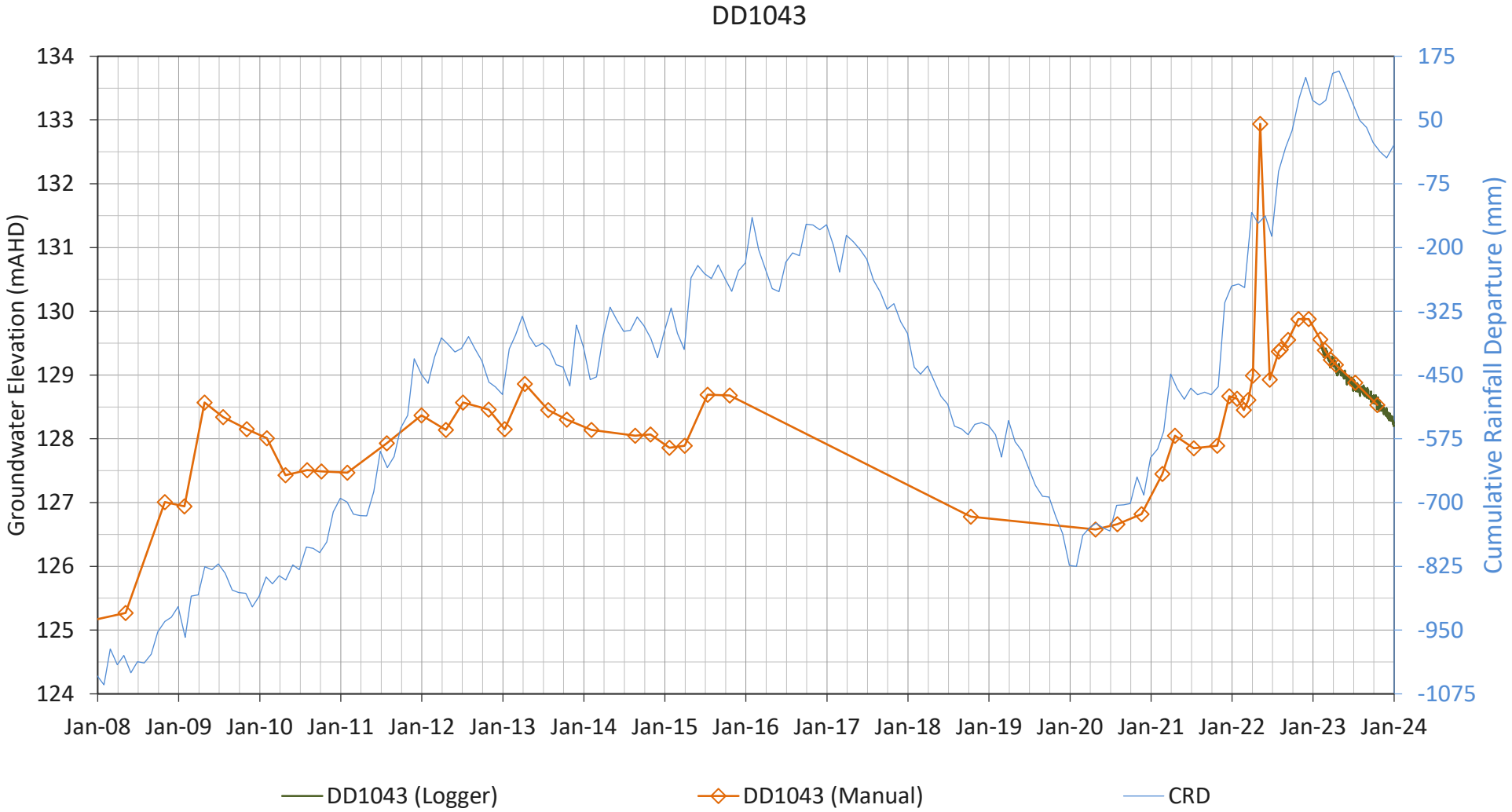

DD1005
Groundwater Elevation (mAHD)
Cumulative Rainfall Departure (mm)
150
149
148
147
146
145
144
143
142
325
150
-25
-200
-375
-550
-725
-900
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
DD1005 (Manual)
DD1005 (Logger)
CRD

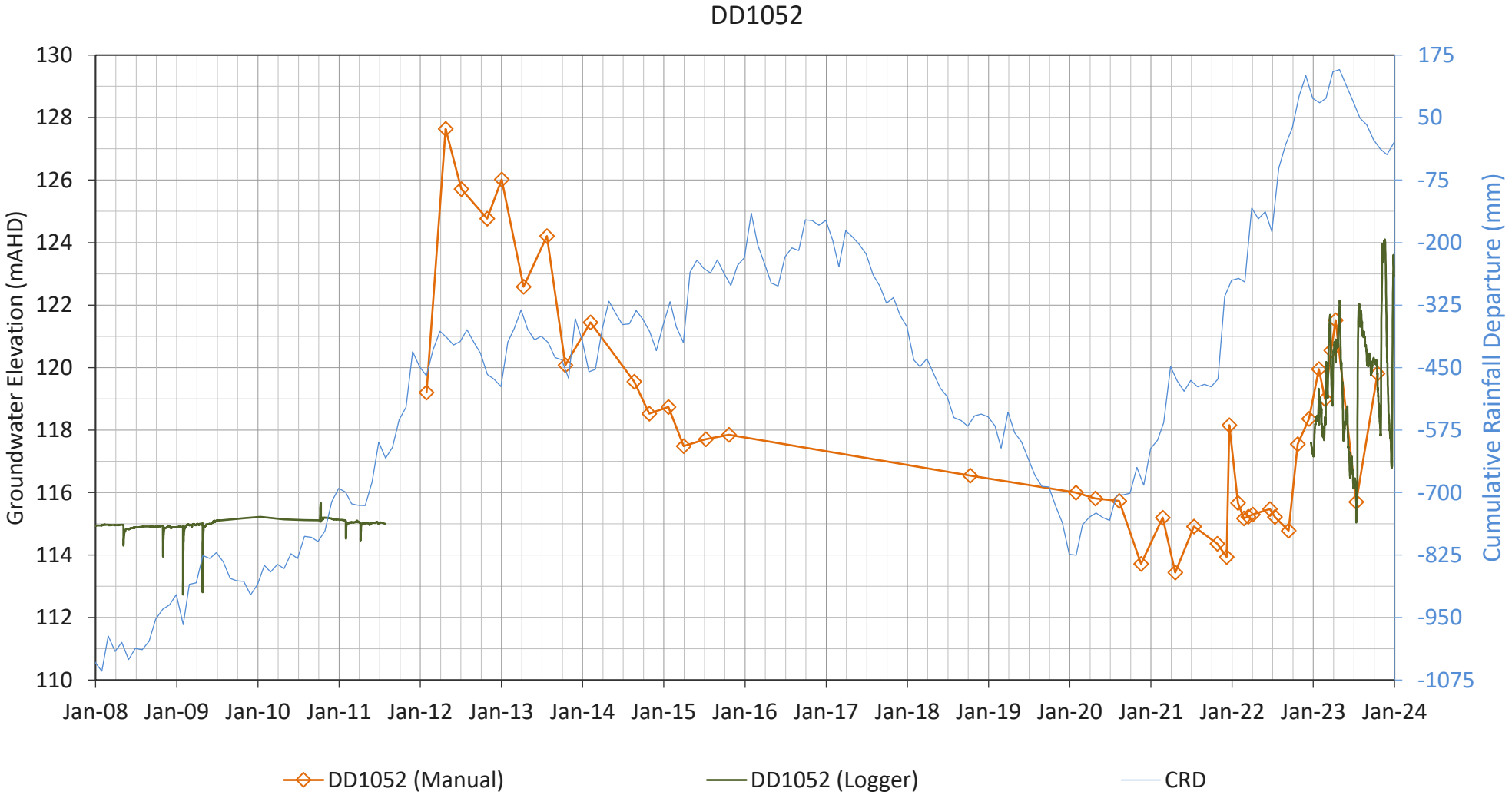

DD1014
Groundwater Elevation (mAHD)
137.5
137.0
136.5
136.0
135.5
135.0
134.5
134.0
133.5
133.0
Cumulative Rainfall Departure (mm)
275
125
-25
-175
-325
-475
-625
-775
-925
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
DD1014 (Logger)
DD1014 (Manual)
CRD

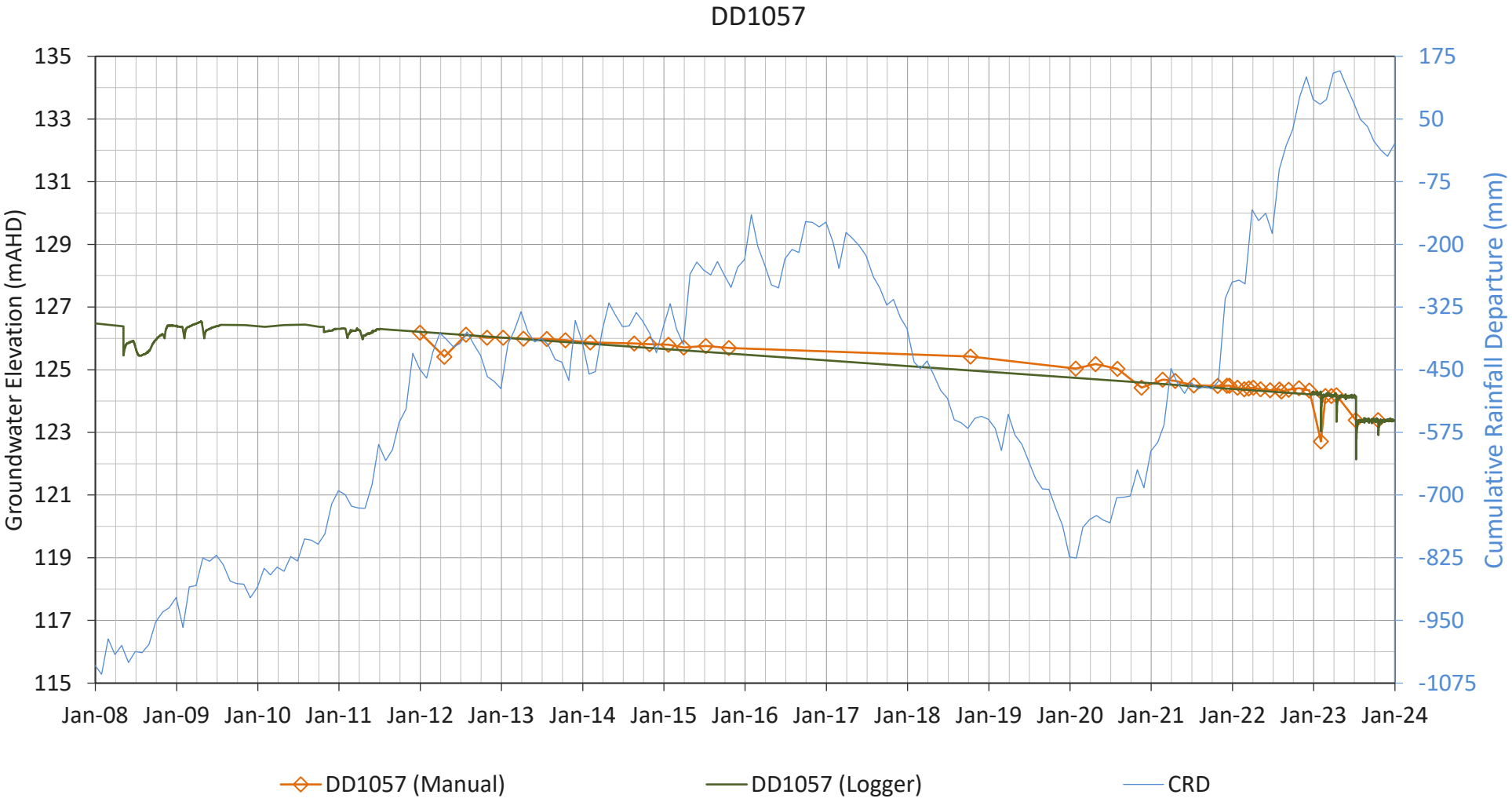

DD1016
144.0
143.5
143.0
142.5
142.0
141.5
141.0
140.5
Groundwater Elevation (mAHD)
150
-25
-200
-375
-550
-725
-900
-1075
Cumulative Rainfall Departure (mm)
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
DD1016 (Logger)
DD1016 (Manual)
CRD

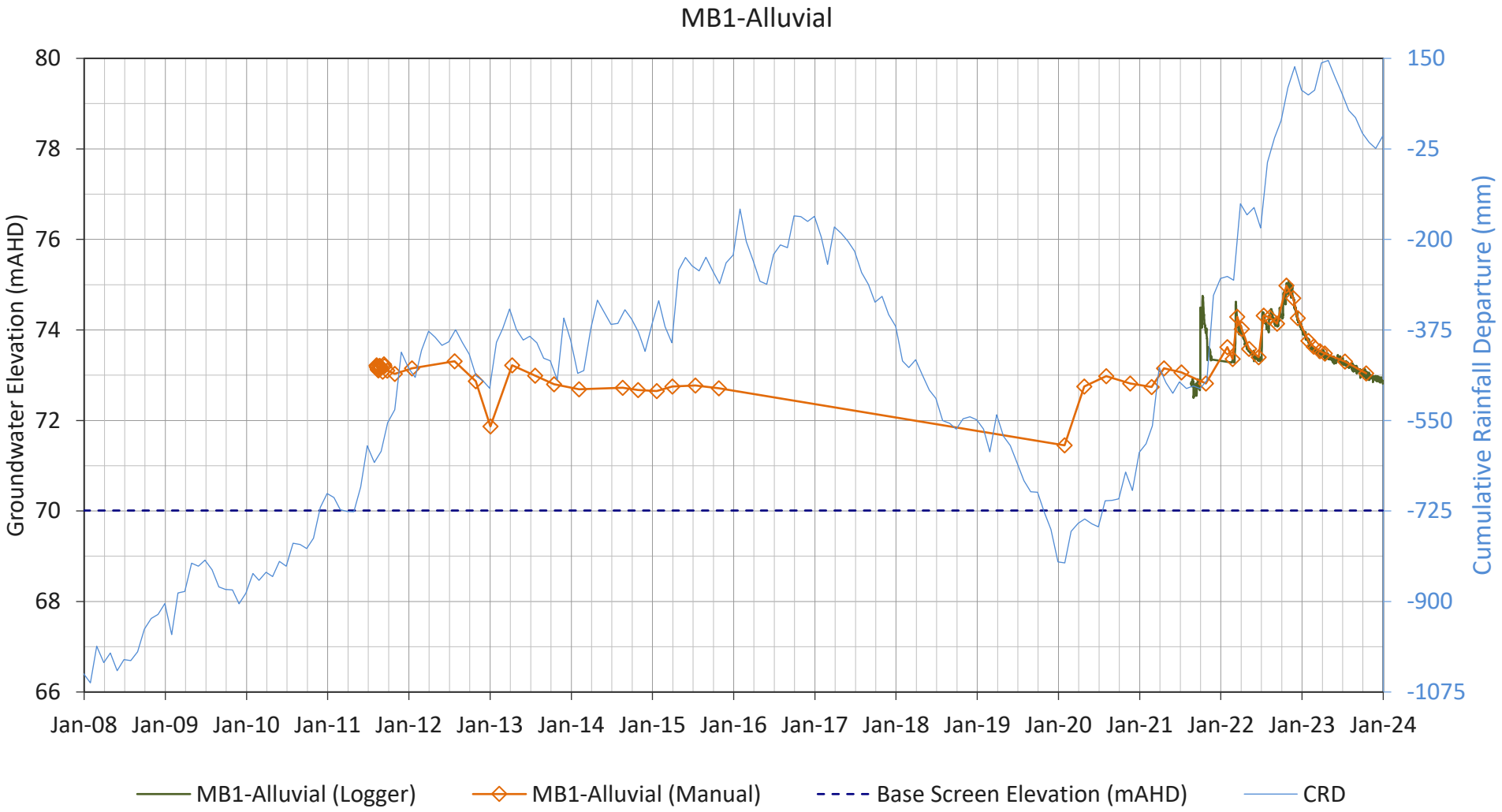

DD1027
Groundwater Elevation (mAHD)
137.0
136.5
136.0
135.5
135.0
134.5
134.0
133.5
133.0
132.5
132.0
Cumulative Rainfall Departure (mm)
175
50
-75
-200
-325
-450
-575
-700
-825
-950
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
DD1027 (Manual)
DD1027 (Logger)
CRD

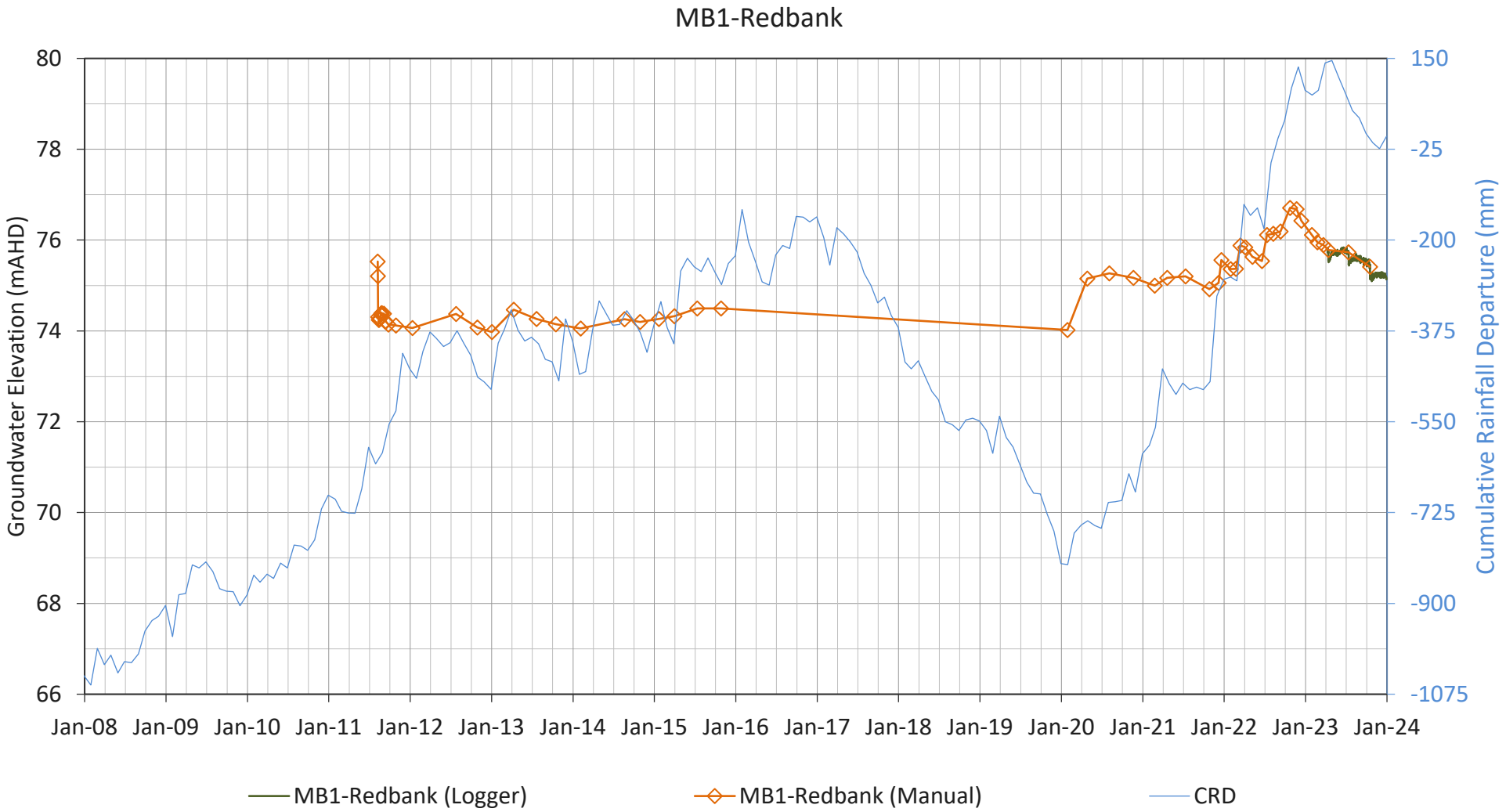

DD1032
Groundwater Elevation (mAHD)
Cumulative Rainfall Departure (mm)
134
132
130
128
126
124
122
275
50
-175
-400
-625
-850
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
DD1032 (Logger)
DD1032 (Manual)
Lower Trigger Level
Lower Trigger Level (revised)
CRD

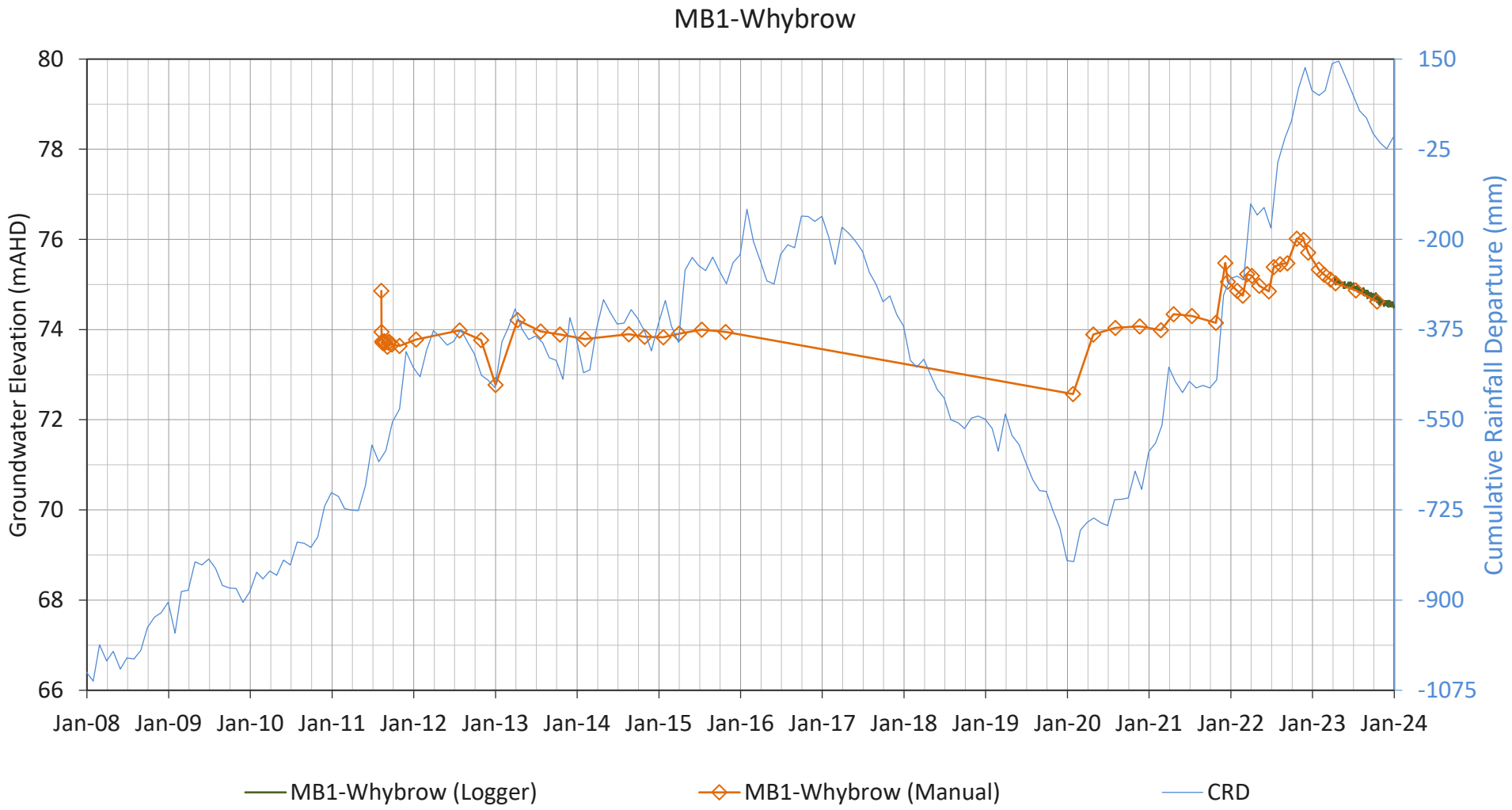

DD1043
Groundwater Elevation (mAHD)
134
133
132
131
130
129
128
127
126
125
124
Cumulative Rainfall Departure (mm)
175
50
-75
-200
-325
-450
-575
-700
-825
-950
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
DD1043 (Logger)
DD1043 (Manual)
CRD

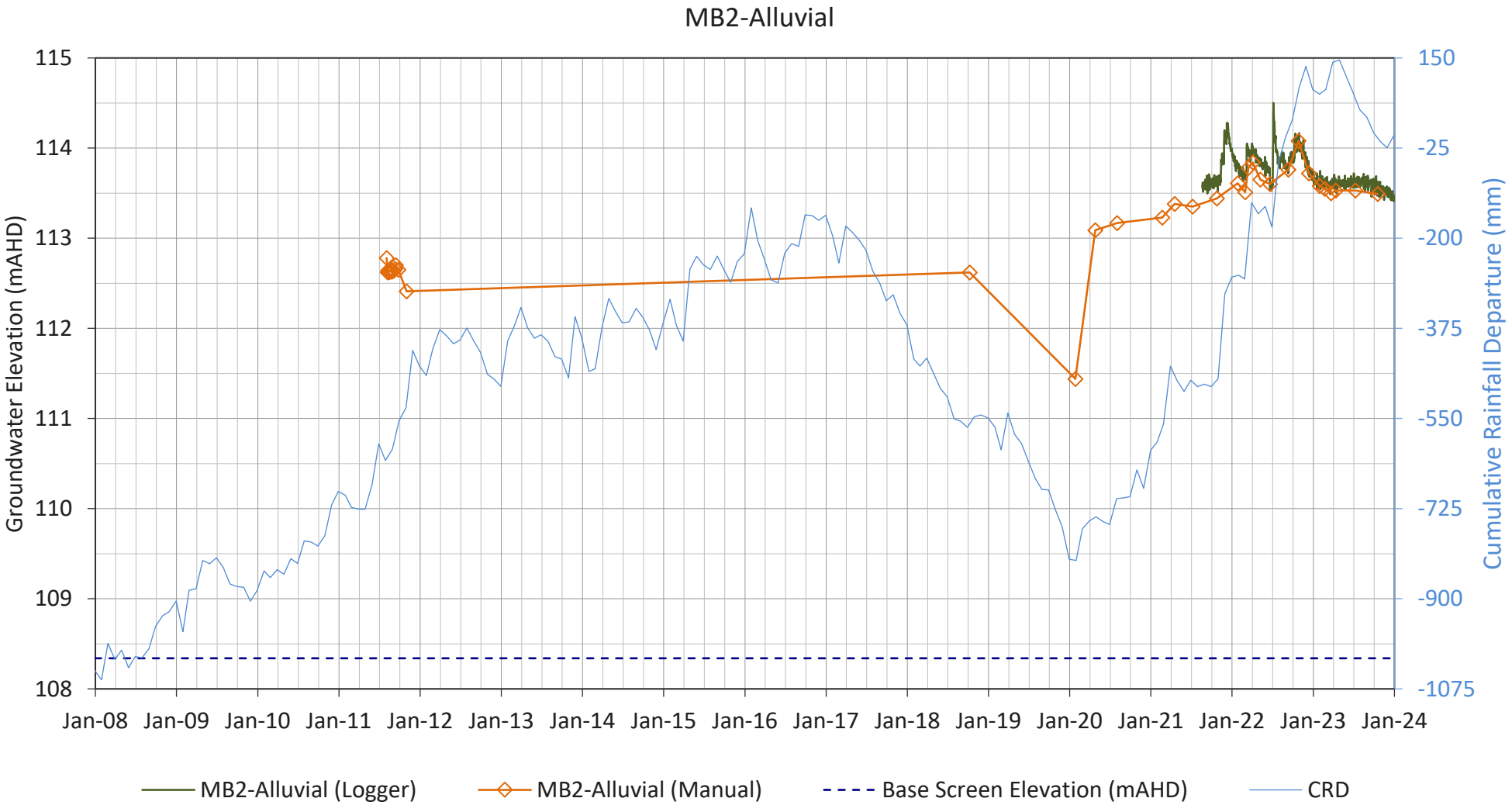

DD1052
Groundwater Elevation (mAHD)
130
128
126
124
122
120
118
116
114
112
110
Cumulative Rainfall Departure (mm)
175
50
-75
-200
-325
-450
-575
-700
-825
-950
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
DD1052 (Manual)
DD1052 (Logger)
CRD

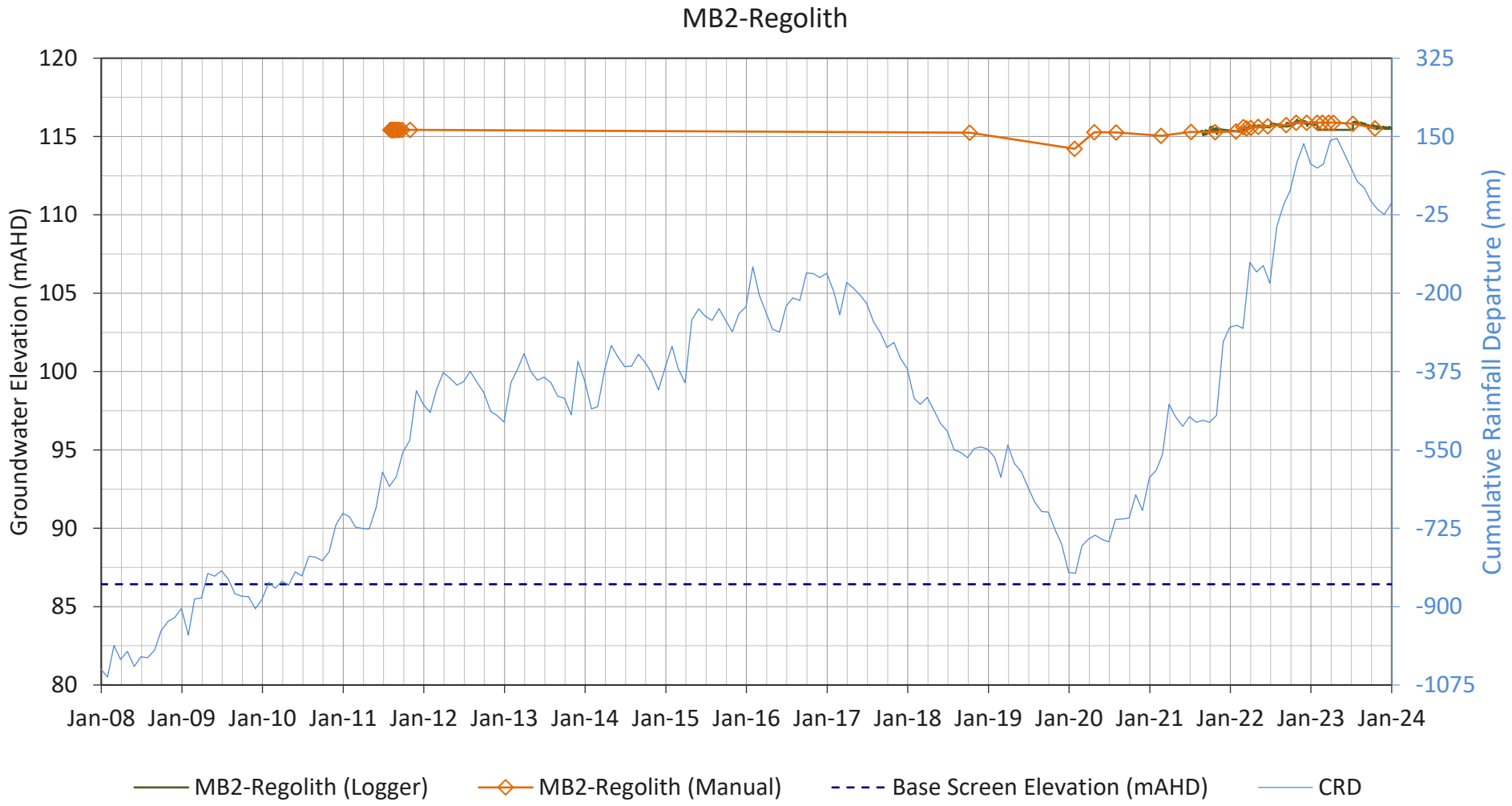

DD1057
Groundwater Elevation (mAHD)
135
133
131
129
127
125
123
121
119
117
115
Cumulative Rainfall Departure (mm)
175
50
-75
-200
-325
-450
-575
-700
-825
-950
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
DD1057 (Manual)
DD1057 (Logger)
CRD

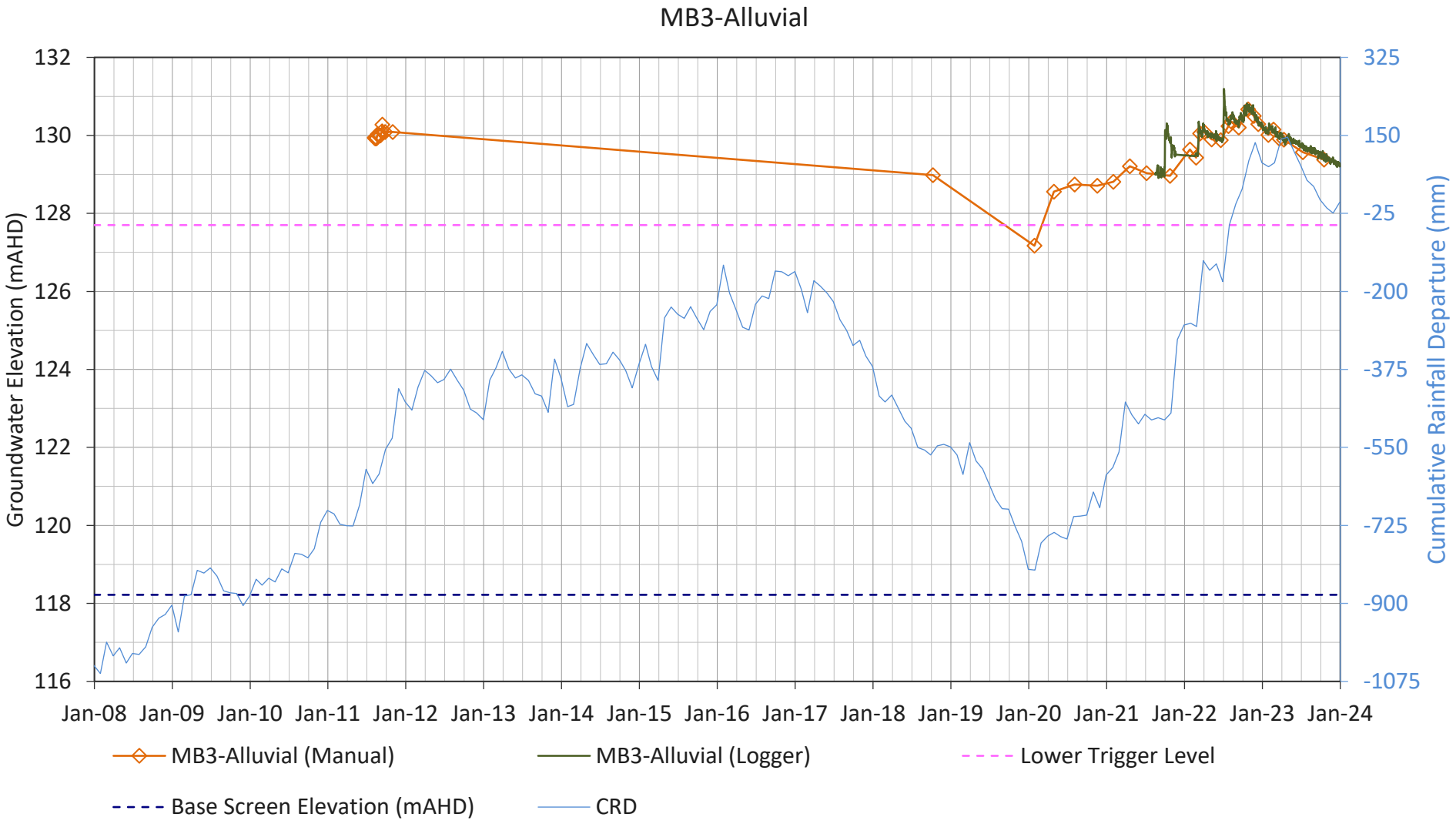

MB1-Alluvial
Groundwater Elevation (mAHD)
Cumulative Rainfall Departure (mm)
80
78
76
74
72
70
68
66
150
-25
-200
-375
-550
-725
-900
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
MB1-Alluvial (Logger)
MB1-Alluvial (Manual)
Base Screen Elevation (mAHD)
CRD

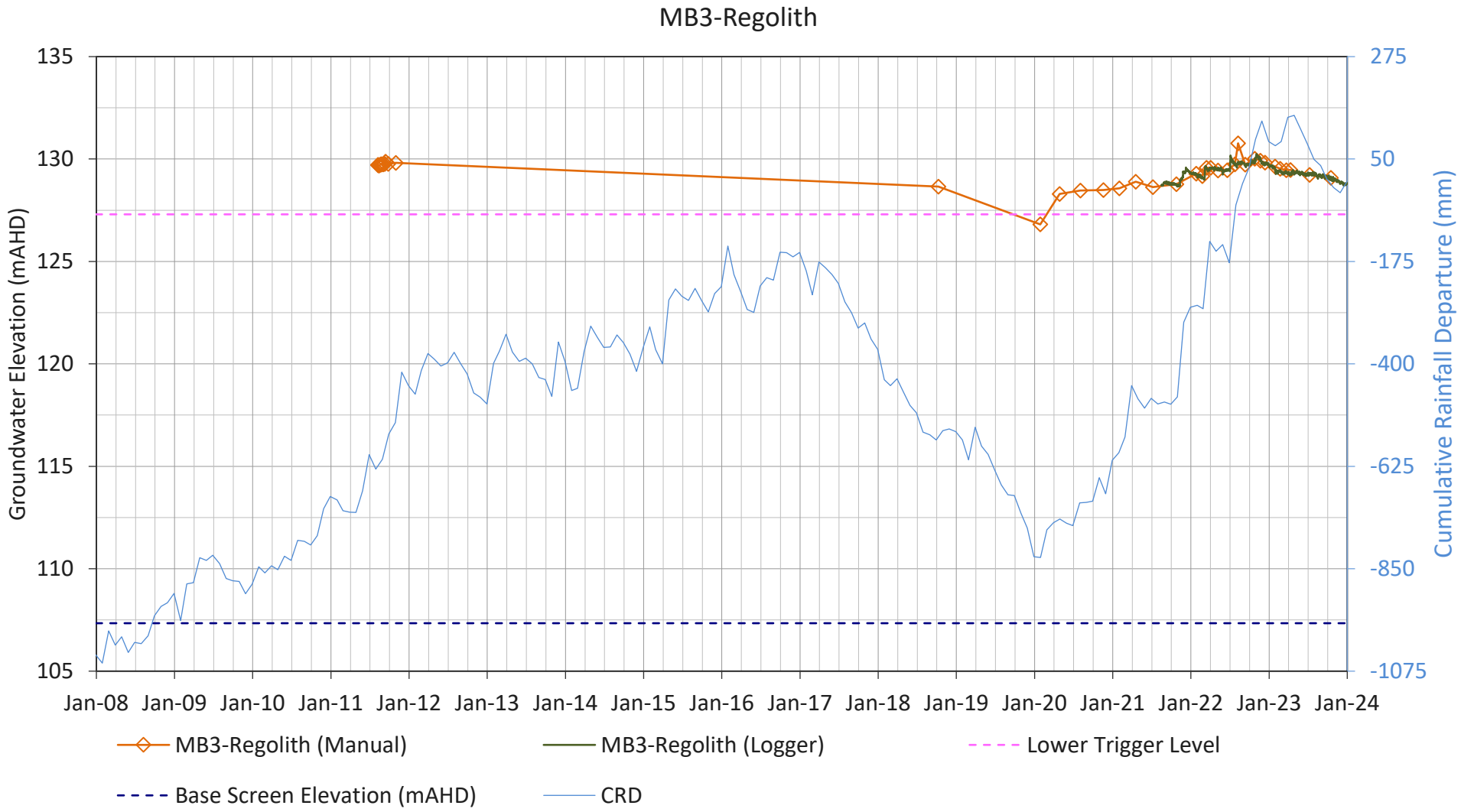

MB1-Redbank
Groundwater Elevation (mAHD)
80
78
76
74
72
70
68
66
Cumulative Rainfall Departure (mm)
150
-25
-200
-375
-550
-725
-900
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
MB1-Redbank (Logger)
MB1-Redbank (Manual)
CRD

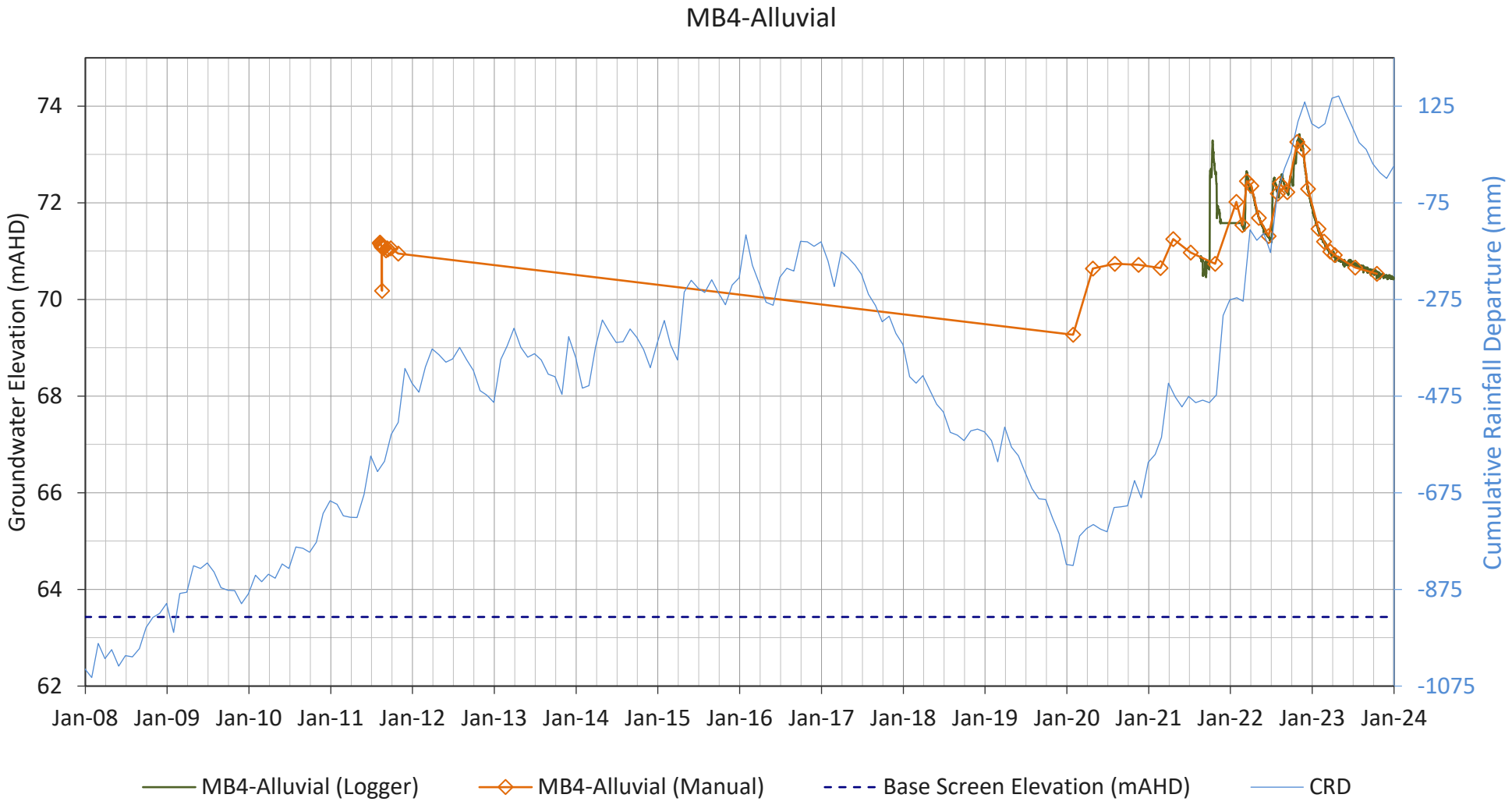

MB1-Whybrow
Groundwater Elevation (mAHD)
80
78
76
74
72
70
68
66
Cumulative Rainfall Departure (mm)
150
-25
-200
-375
-550
-725
-900
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
MB1-Whybrow (Logger)
MB1-Whybrow (Manual)
CRD

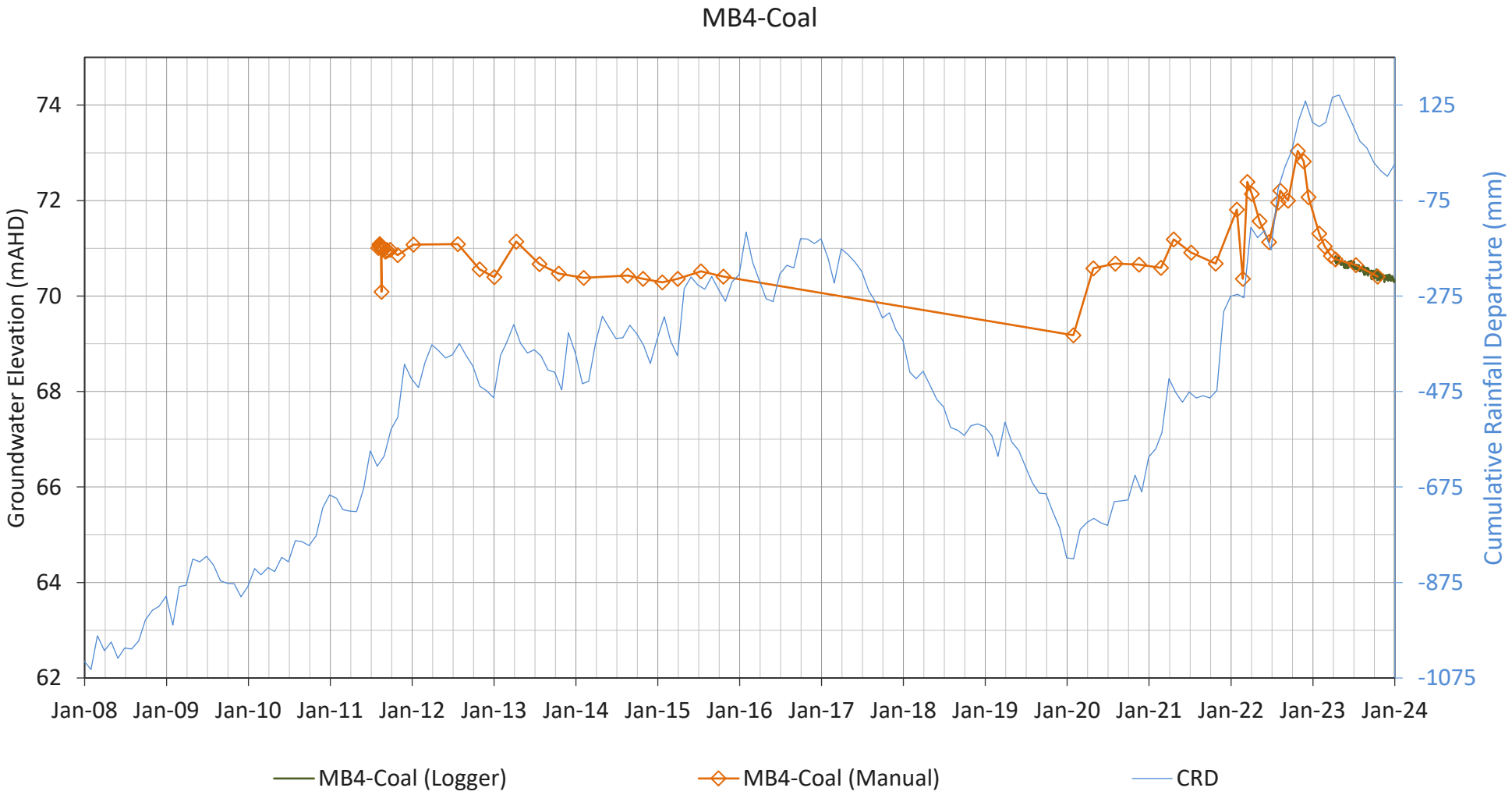

MB2-Alluvial
Groundwater Elevation (mAHD)
Cumulative Rainfall Departure (mm)
115
114
113
112
111
110
109
108
150
-25
-200
-375
-550
-725
-900
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
MB2-Alluvial (Logger)
MB2-Alluvial (Manual)
Base Screen Elevation (mAHD)
CRD

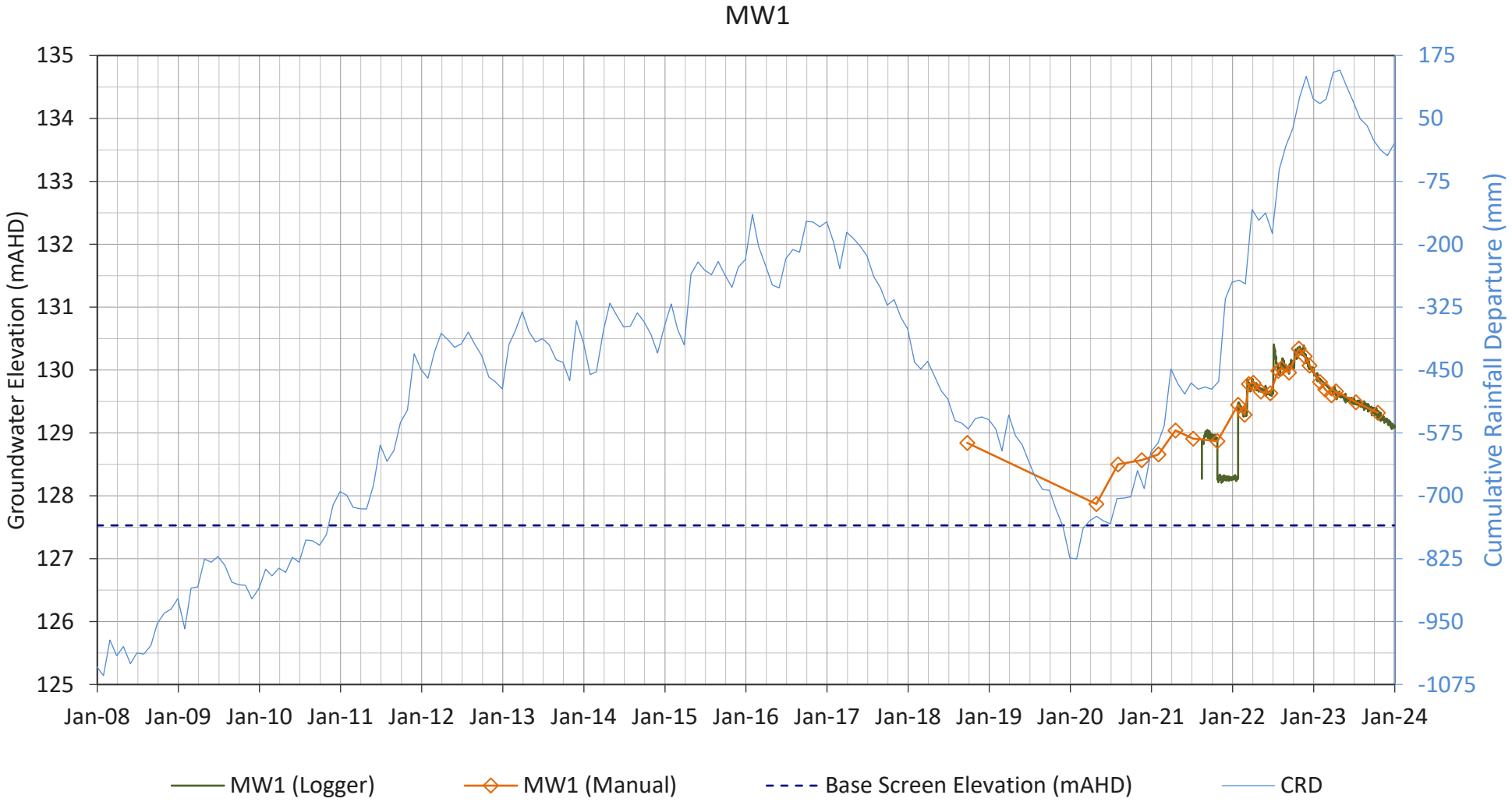

MB2-Regolith
Groundwater Elevation (mAHD)
Cumulative Rainfall Departure (mm)
120
115
110
105
100
95
90
85
80
325
150
-25
-200
-375
-550
-725
-900
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
MB2-Regolith (Logger)
MB2-Regolith (Manual)
Base Screen Elevation (mAHD)
CRD

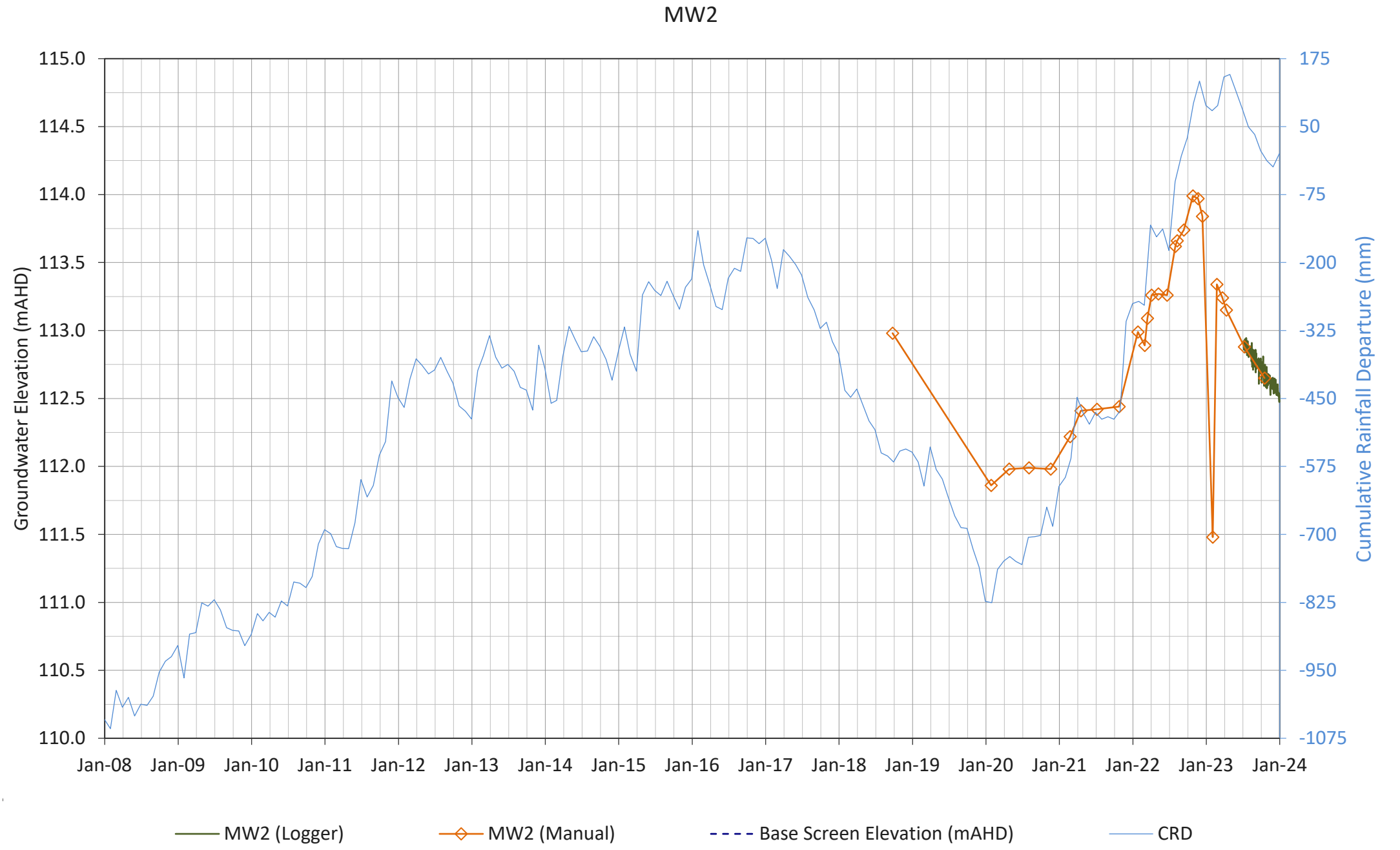

MB3-Alluvial
Groundwater Elevation (mAHD)
Cumulative Rainfall Departure (mm)
132
130
128
126
124
122
120
118
116
325
150
-25
-200
-375
-550
-725
-900
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
MB3-Alluvial (Manual)
MB3-Alluvial (Logger)
Lower Trigger Level
Base Screen Elevation (mAHD)
CRD

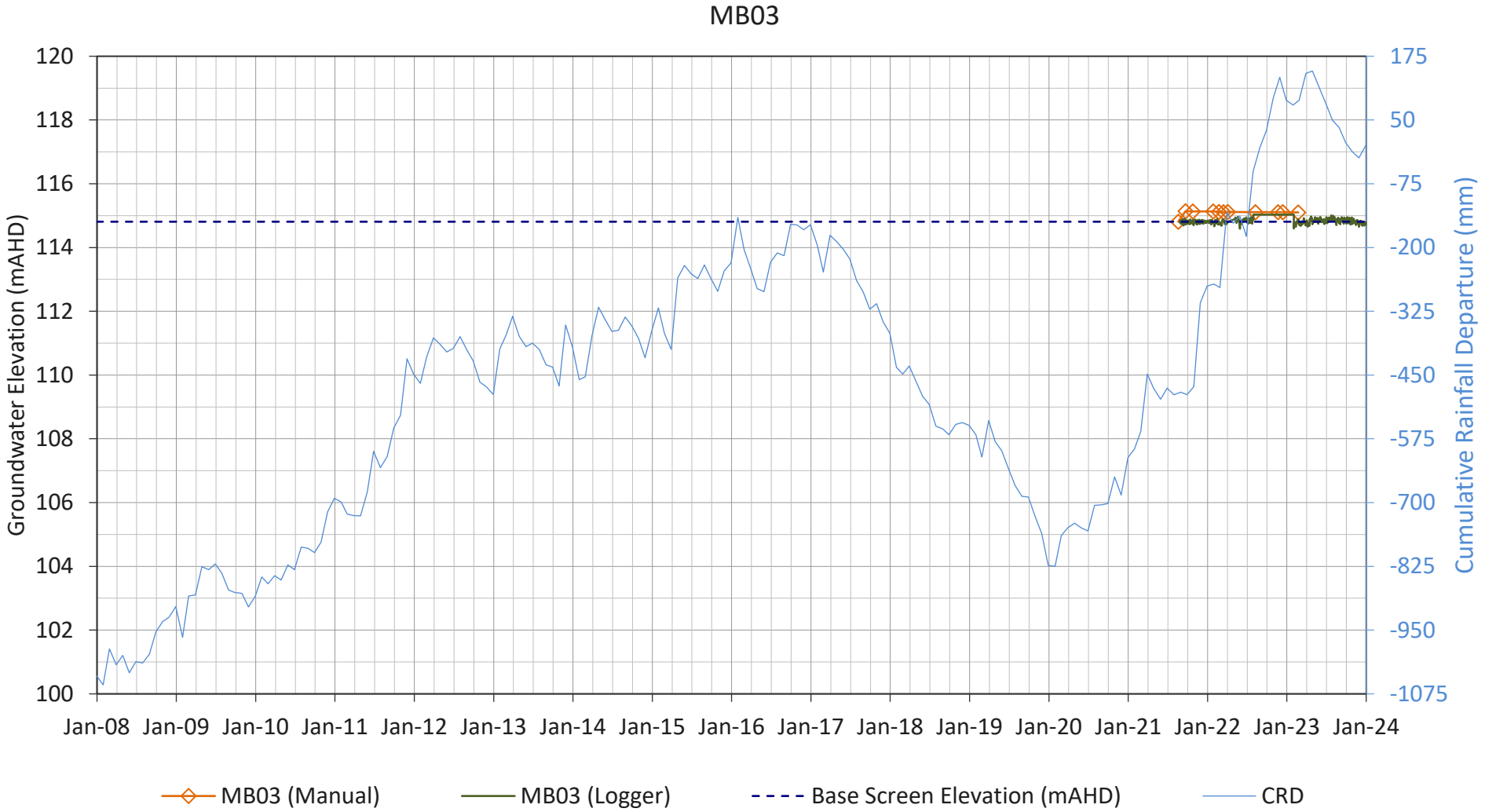

MB3-Regolith
Groundwater Elevation (mAHD)
Cumulative Rainfall Departure (mm)
135
130
125
120
115
110
105
275
50
-175
-400
-625
-850
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
MB3-Regolith (Manual)
MB3-Regolith (Logger)
Lower Trigger Level
Base Screen Elevation (mAHD)
CRD

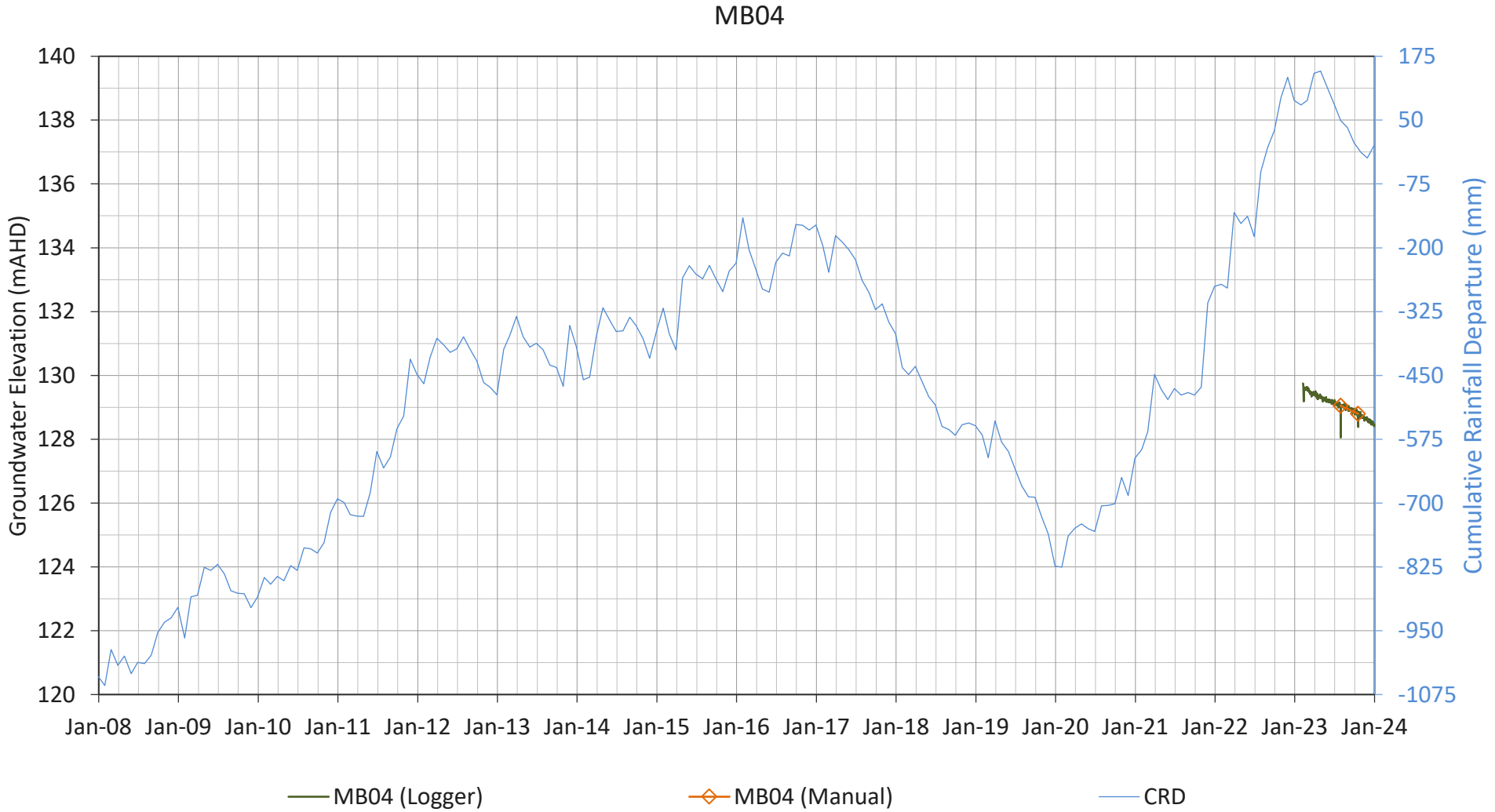

MB4-Alluvial
Groundwater Elevation (mAHD)
74
72
70
68
66
64
62
Cumulative Rainfall Departure (mm)
125
-75
-275
-475
-675
-875
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
MB4-Alluvial (Logger)
MB4-Alluvial (Manual)
Base Screen Elevation (mAHD)
CRD

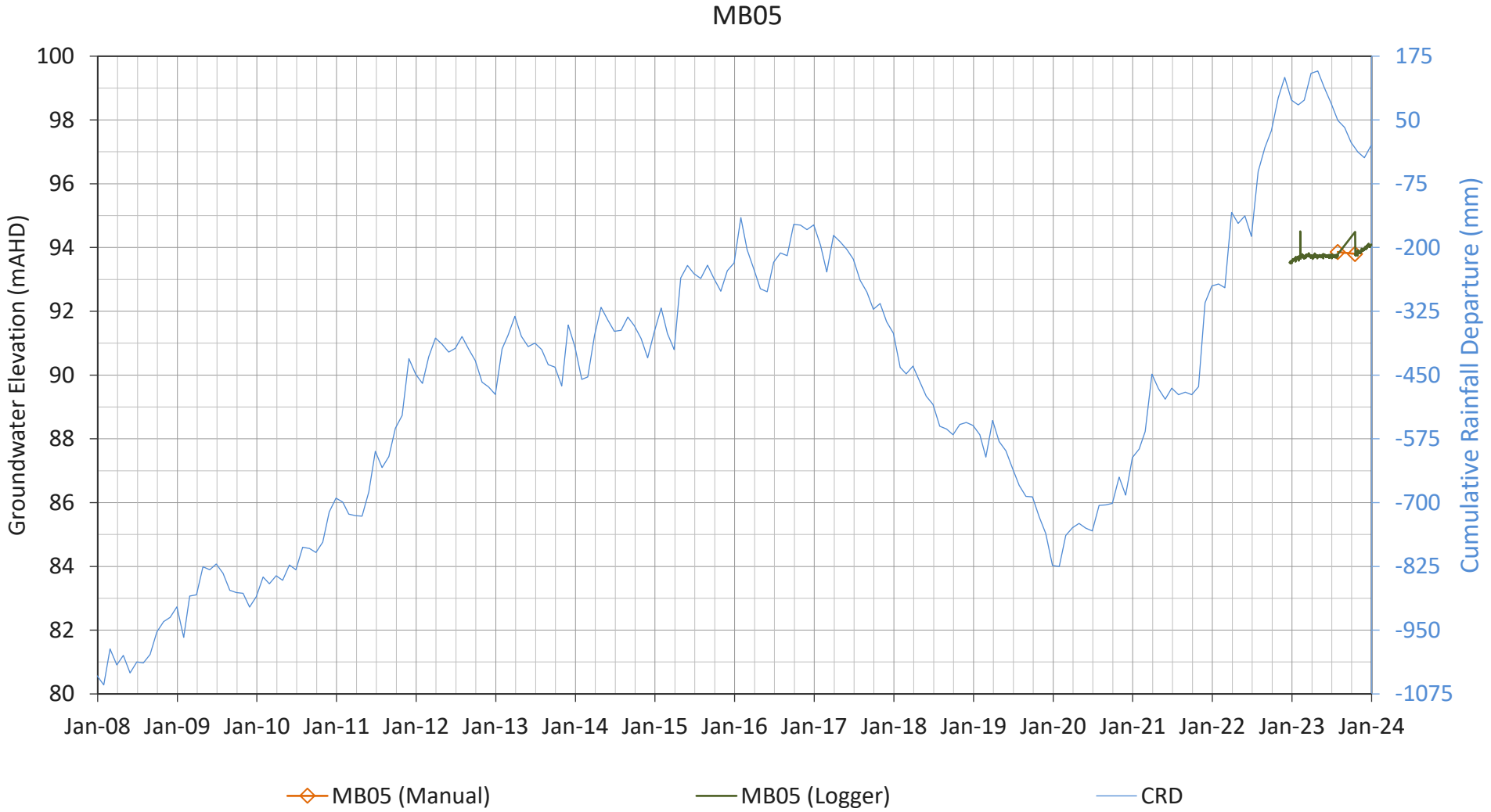

MB4-Coal
Groundwater Elevation (mAHD)
74
72
70
68
66
64
62
Cumulative Rainfall Departure (mm)
125
-75
-275
-475
-675
-875
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
MB4-Coal (Logger)
MB4-Coal (Manual)
CRD

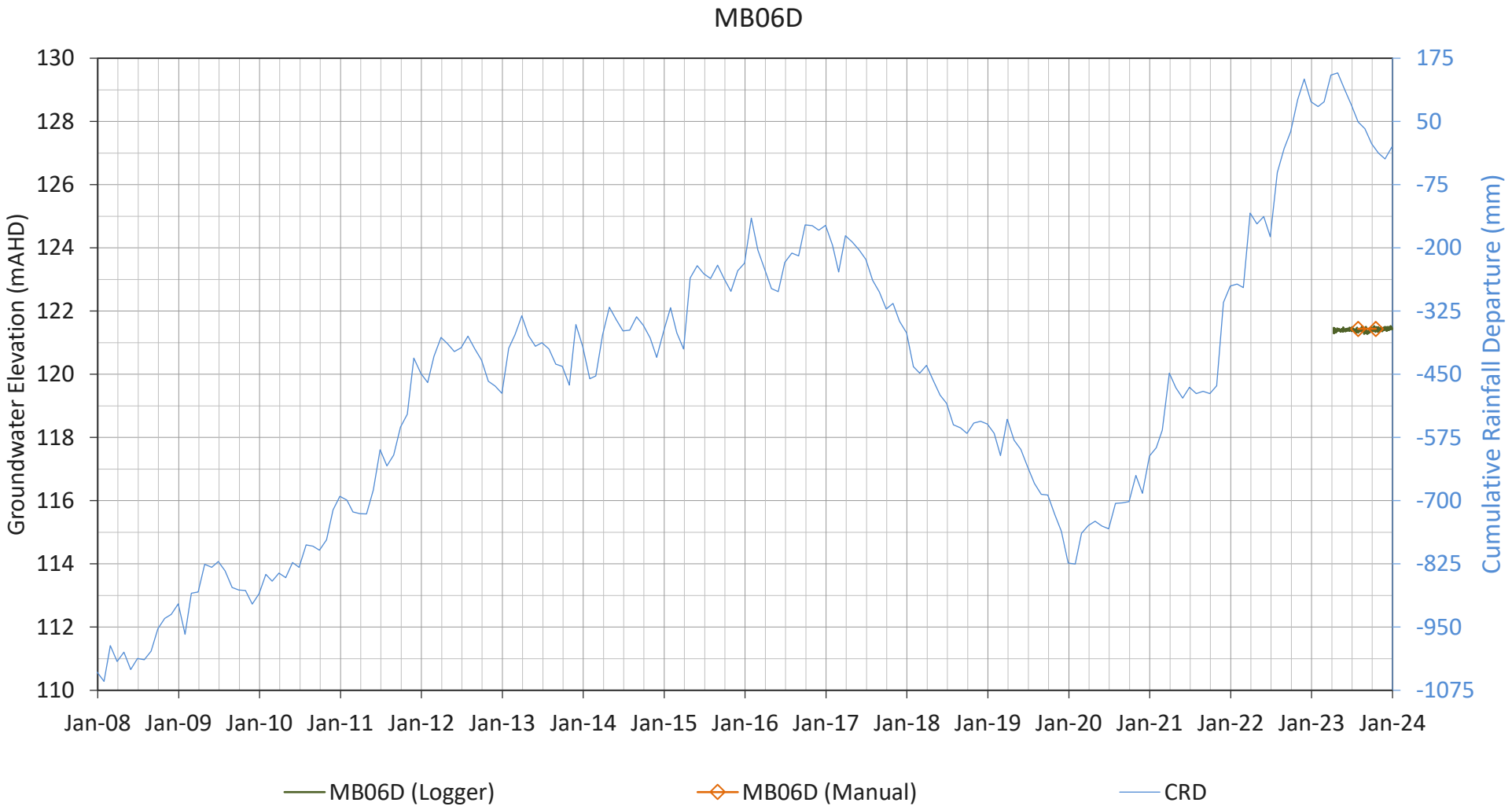

MW1
Groundwater Elevation (mAHD)
Cumulative Rainfall Departure (mm)
135
134
133
132
131
130
129
128
127
126
125
175
50
-75
-200
-325
-450
-575
-700
-825
-950
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
MW1 (Logger)
MW1 (Manual)
Base Screen Elevation (mAHD)
CRD

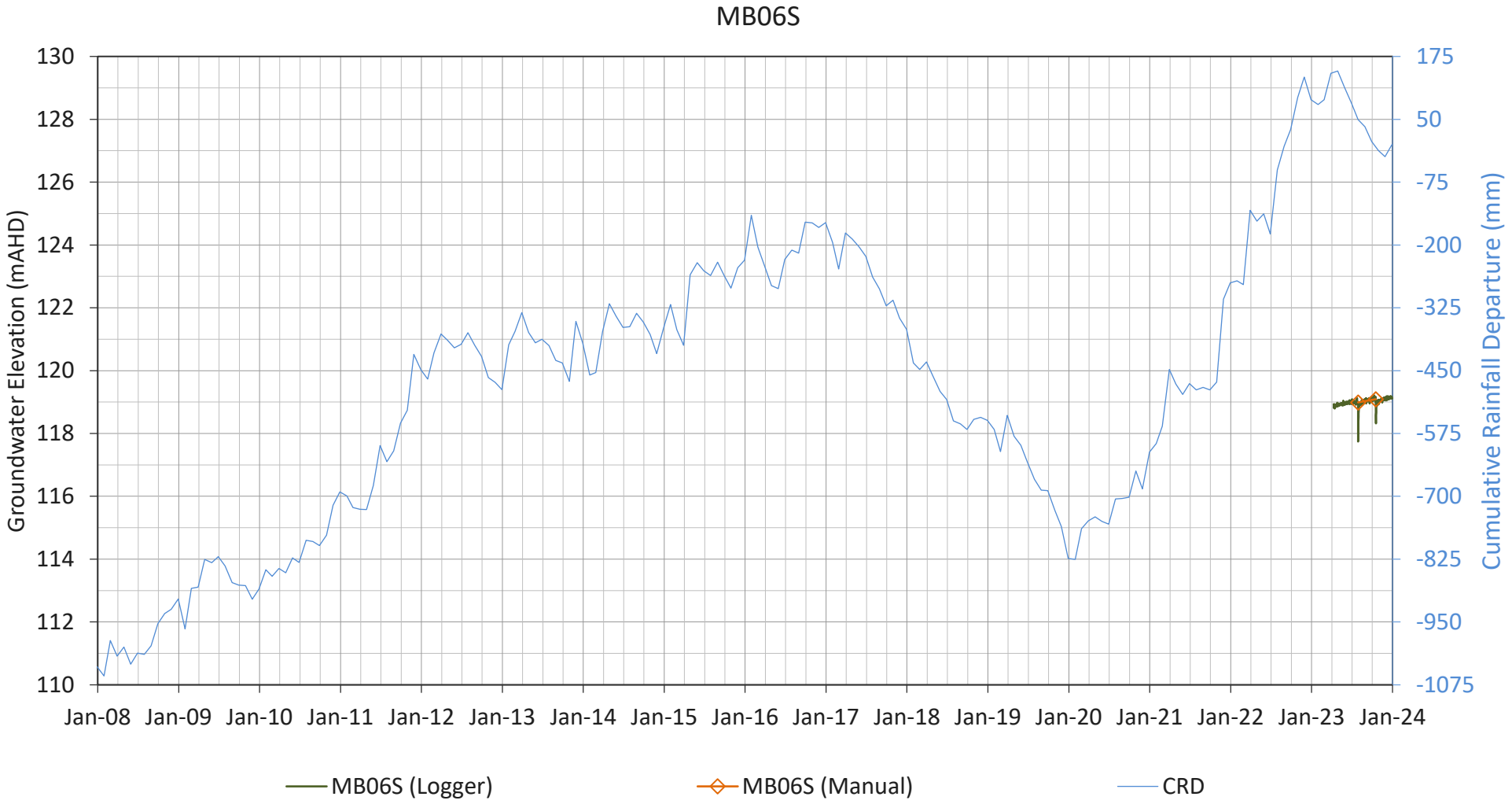

MW2
Groundwater Elevation (mAHD)
Cumulative Rainfall Departure (mm)
115.0
114.5
114.0
113.5
113.0
112.5
112.0
111.5
111.0
110.5
110.0
175
50
-75
-200
-325
-450
-575
-700
-825
-950
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
MW2 (Logger)
MW2 (Manual)
Base Screen Elevation (mAHD)
CRD

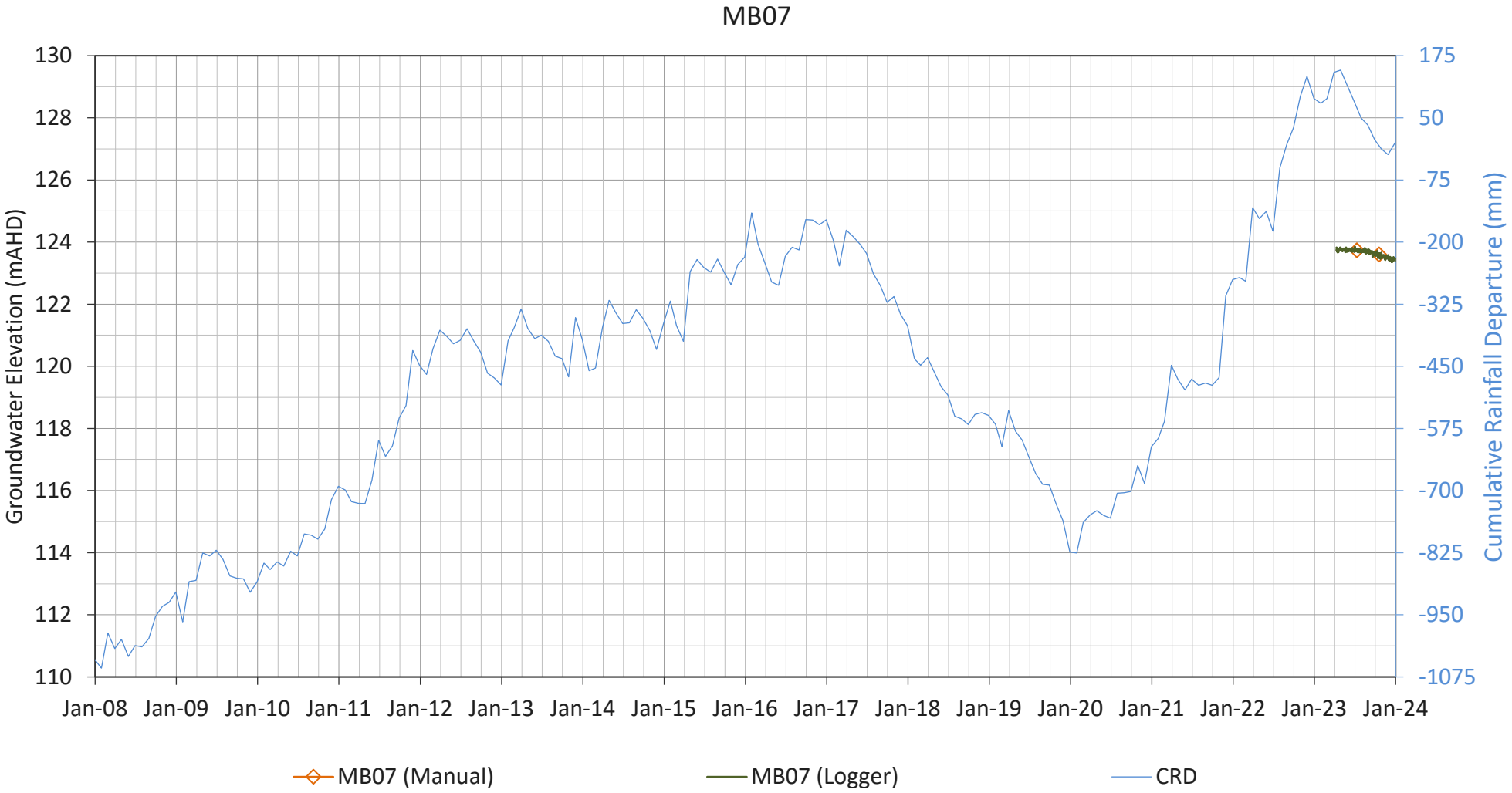

MB03
Groundwater Elevation (mAHD)
120
118
116
114
112
110
108
106
104
102
100
Cumulative Rainfall Departure (mm)
175
50
-75
-200
-325
-450
-575
-700
-825
-950
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
MB03 (Manual)
MB03 (Logger)
Base Screen Elevation (mAHD)
CRD

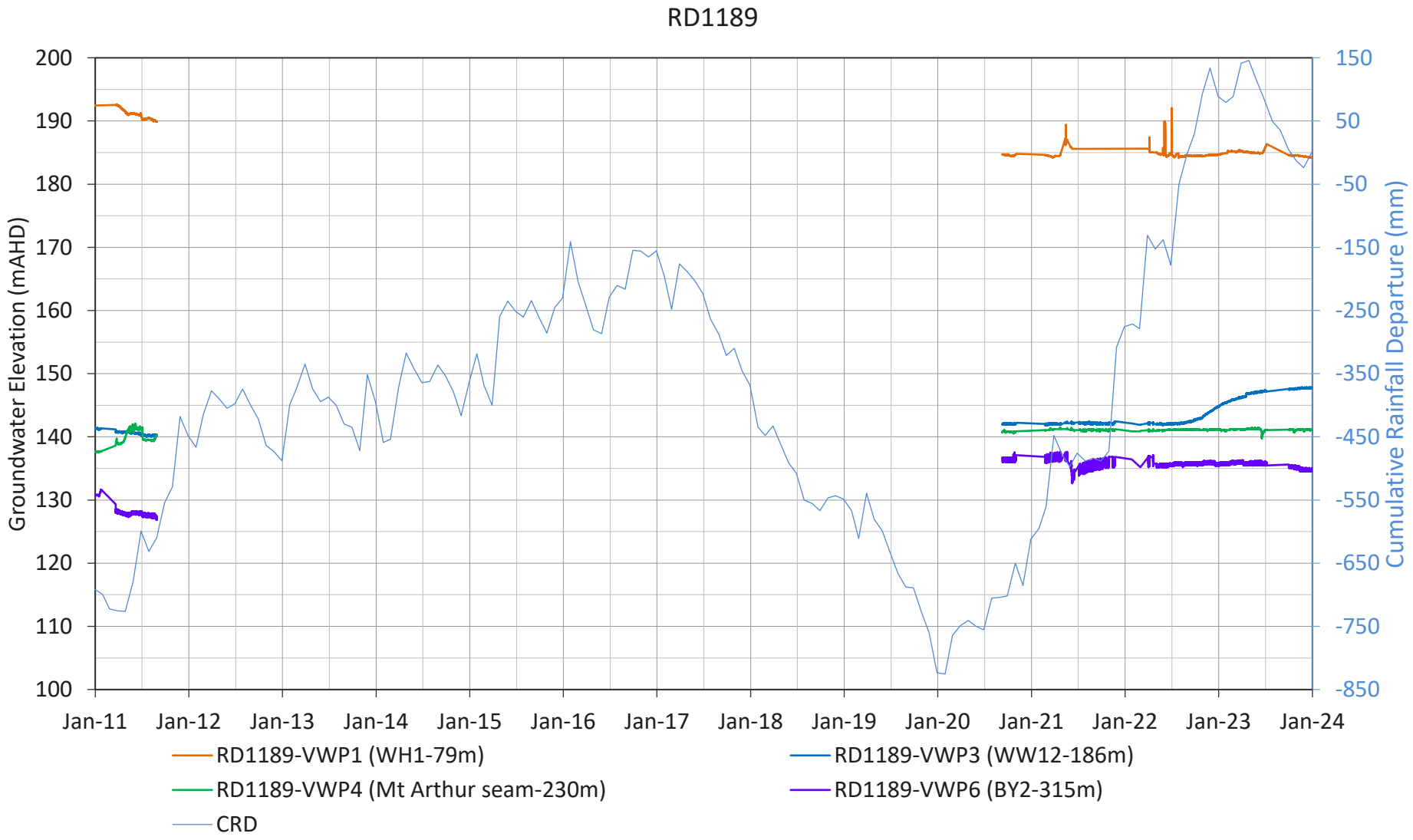

MB04
Groundwater Elevation (mAHD)
Cumulative Rainfall Departure (mm)
140
138
136
134
132
130
128
126
124
122
120
175
50
-75
-200
-325
-450
-575
-700
-825
-950
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
MB04 (Logger)
MB04 (Manual)
CRD

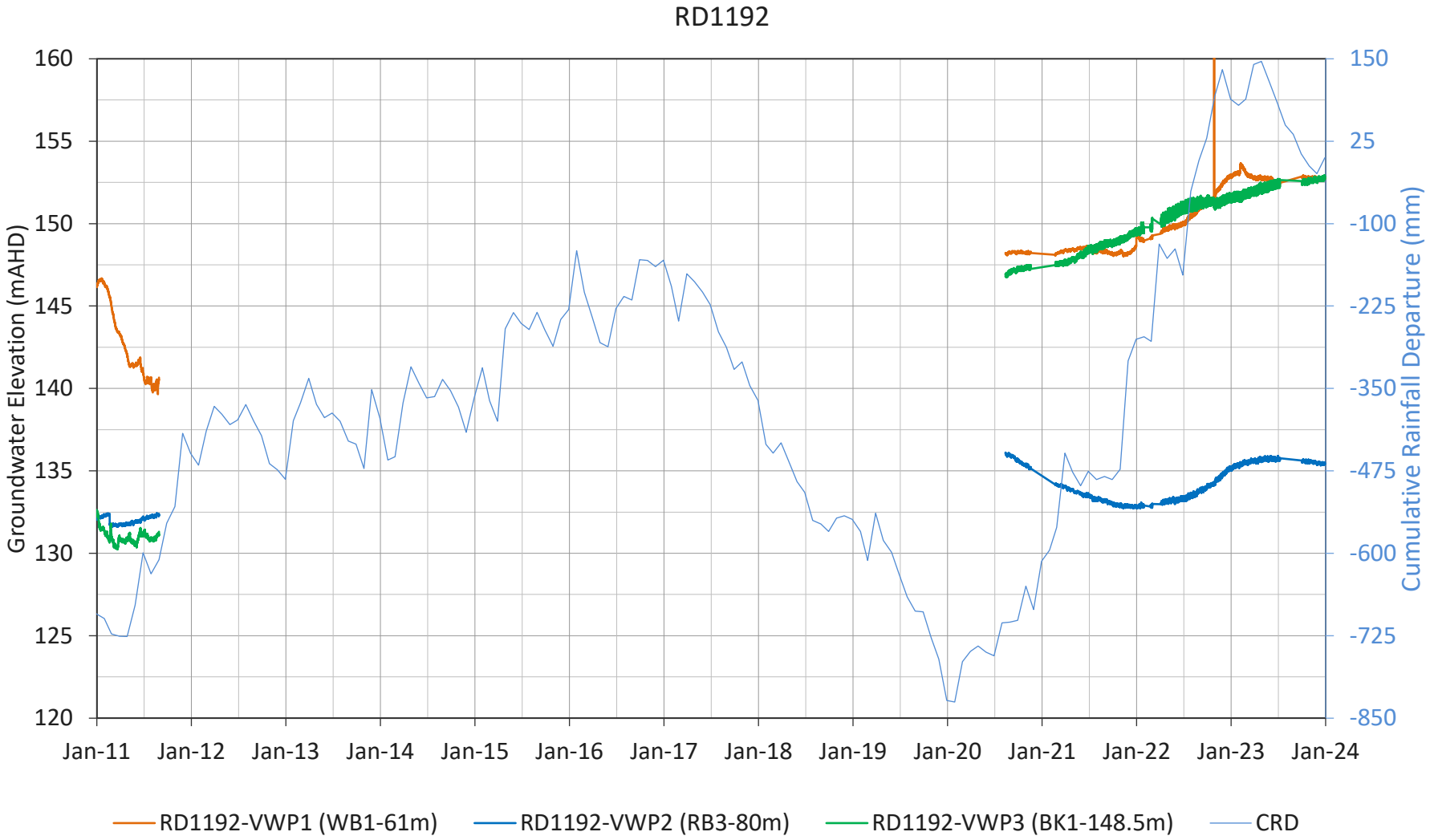

MB05
Groundwater Elevation (mAHD)
Cumulative Rainfall Departure (mm)
100
98
96
94
92
90
88
86
84
82
80
175
50
-75
-200
-325
-450
-575
-700
-825
-950
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
MB05 (Manual)
MB05 (Logger)
CRD

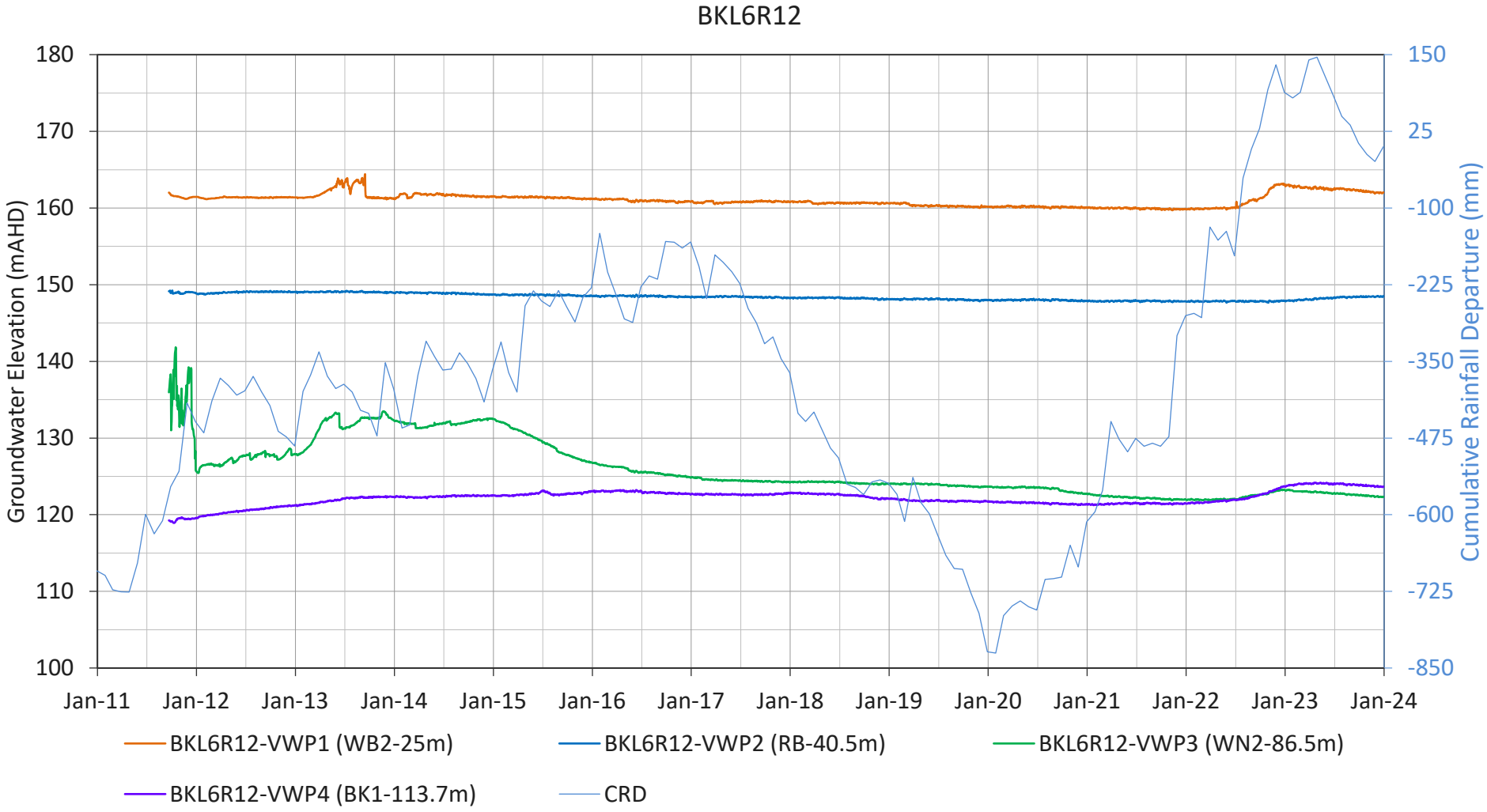

MB06D
Groundwater Elevation (mAHD)
130
128
126
124
122
120
118
116
114
112
110
Cumulative Rainfall Departure (mm)
175
50
-75
-200
-325
-450
-575
-700
-825
-950
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
MB06D (Logger)
MB06D (Manual)
CRD

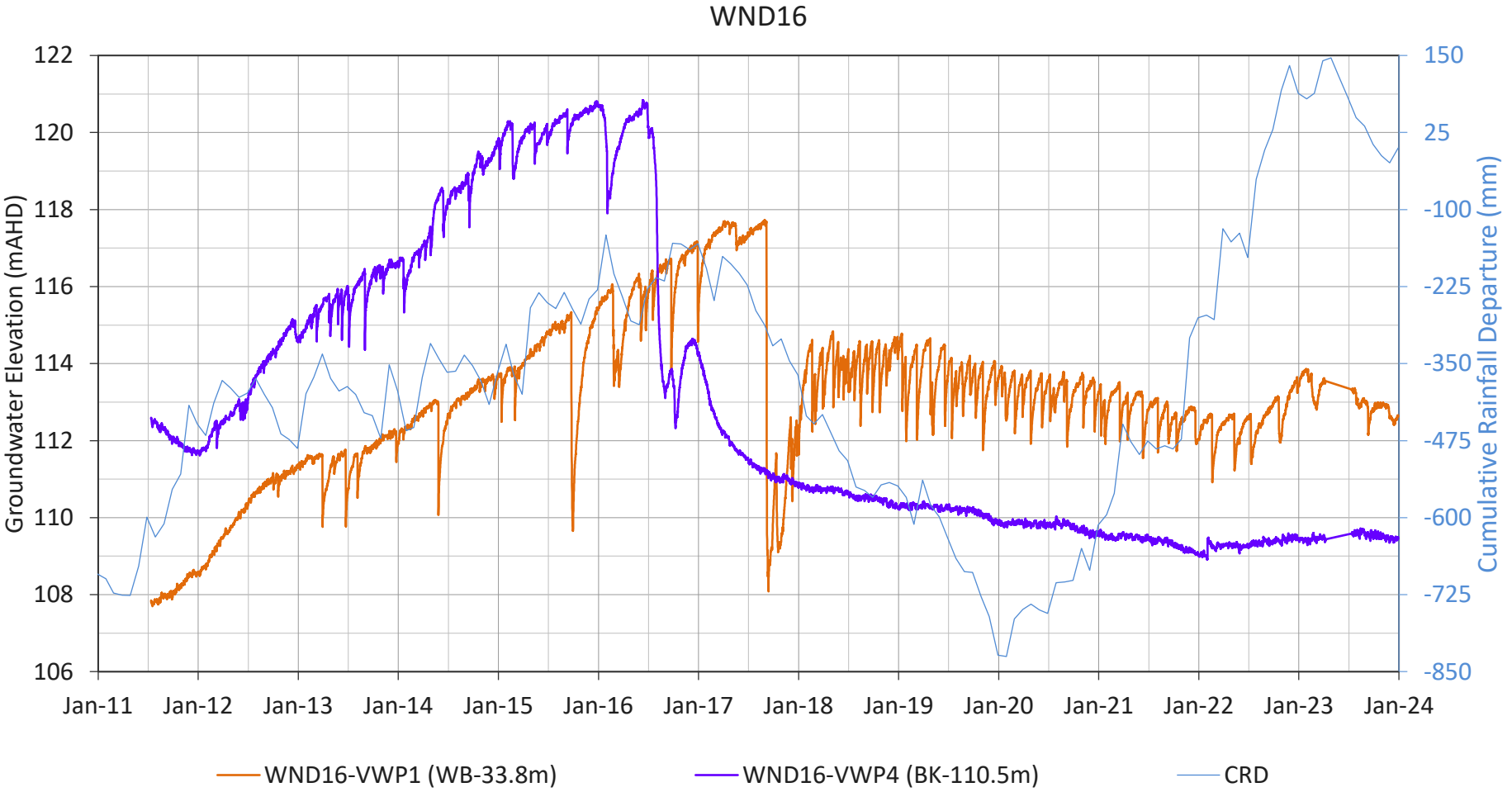

MB06S
Groundwater Elevation (mAHD)
130
128
126
124
122
120
118
116
114
112
110
Cumulative Rainfall Departure (mm)
175
50
-75
-200
-325
-450
-575
-700
-825
-950
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
MB06S (Logger)
MB06S (Manual)
CRD

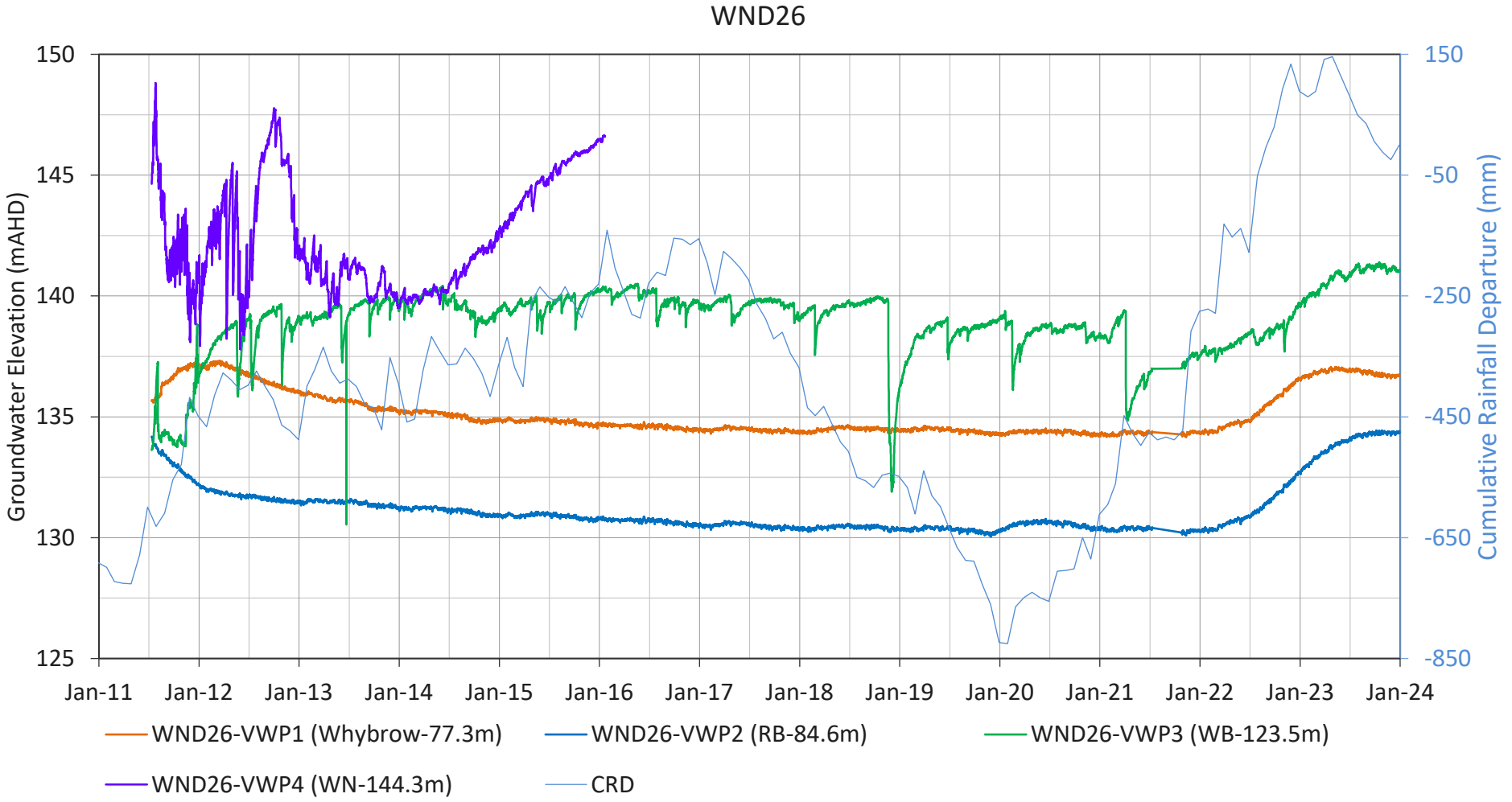

MB07
Groundwater Elevation (mAHD)
130
128
126
124
122
120
118
116
114
112
110
Cumulative Rainfall Departure (mm)
175
50
-75
-200
-325
-450
-575
-700
-825
-950
-1075
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
MB07 (Manual)
MB07 (Logger)
CRD

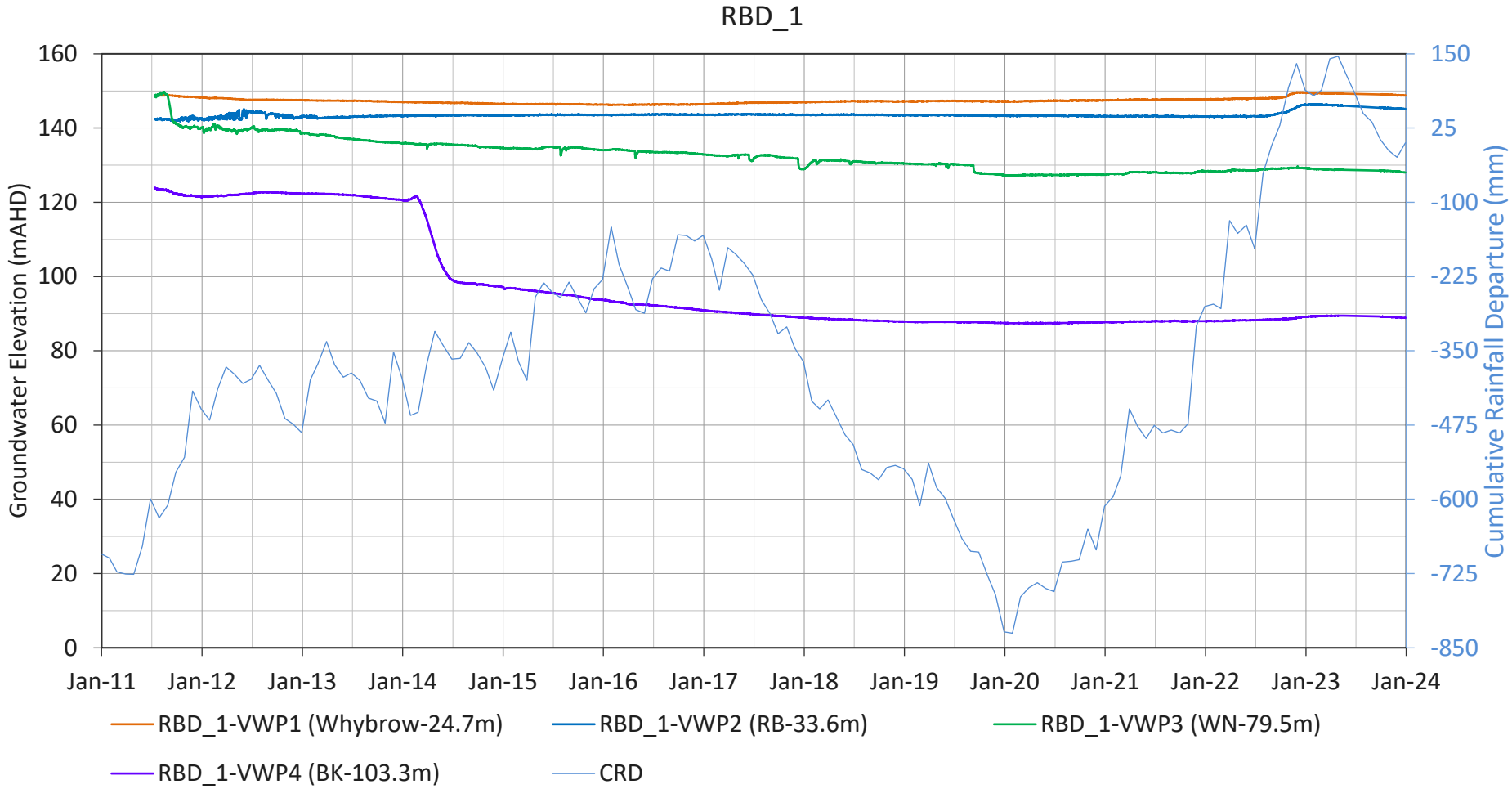

RD1189
Groundwater Elevation (mAHD)
Cumulative Rainfall Departure (mm)
200
190
180
170
160
150
140
130
120
110
100
150
50
-50
-150
-250
-350
-450
-550
-650
-750
-850
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
RD1189-VWP1 (WH1-79m)
RD1189-VWP3 (WW12-186m)
RD1189-VWP4 (Mt Arthur seam-230m)
RD1189-VWP6 (BY2-315m)
CRD

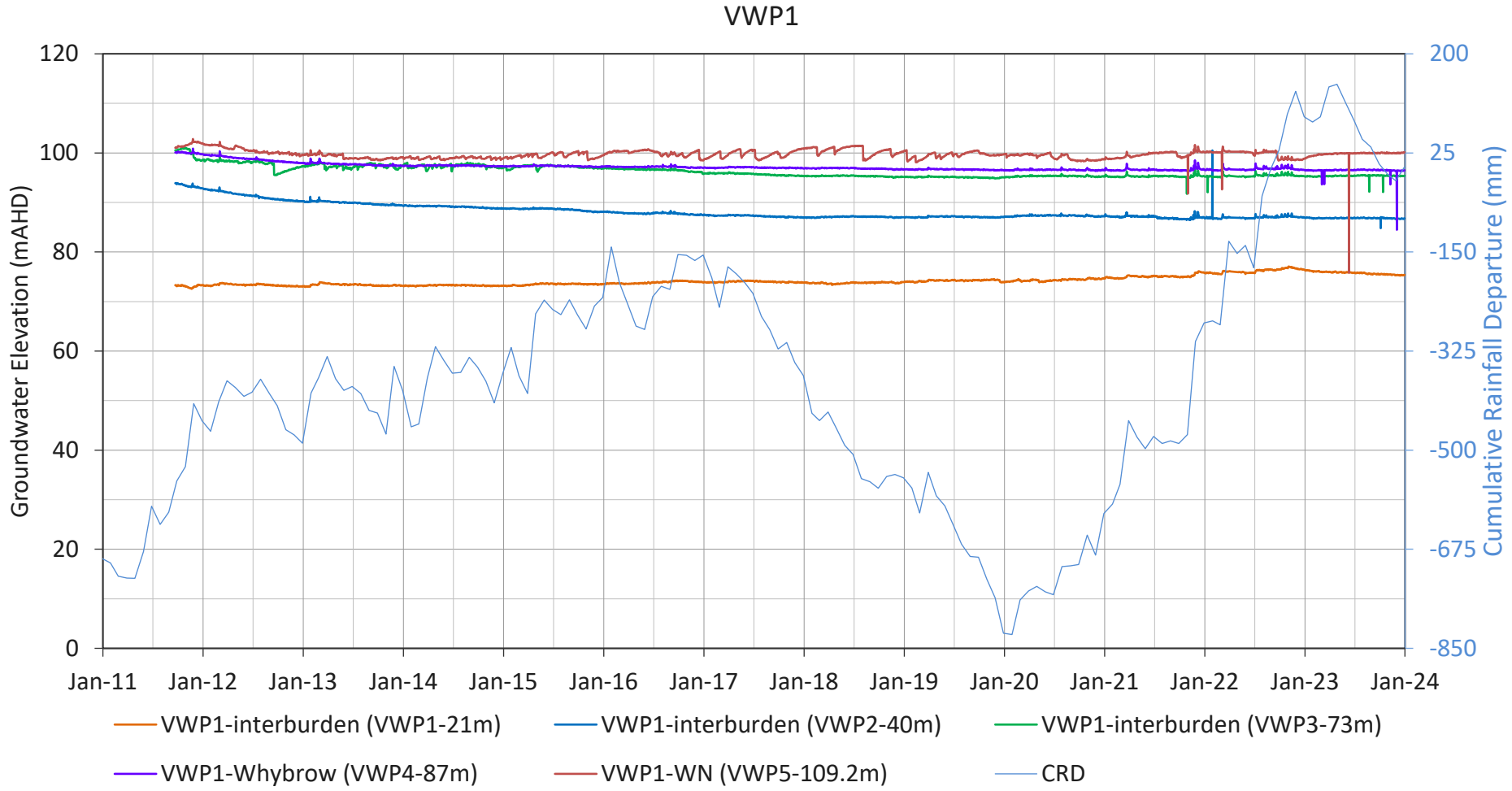

RD1192
Groundwater Elevation (mAHD)
Cumulative Rainfall Departure (mm)
160
155
150
145
140
135
130
125
120
150
25
-100
-225
-350
-475
-600
-725
-850
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
RD1192-VWP1 (WB1-61m)
RD1192-VWP2 (RB3-80m)
RD1192-VWP3 (BK1-148.5m)
CRD

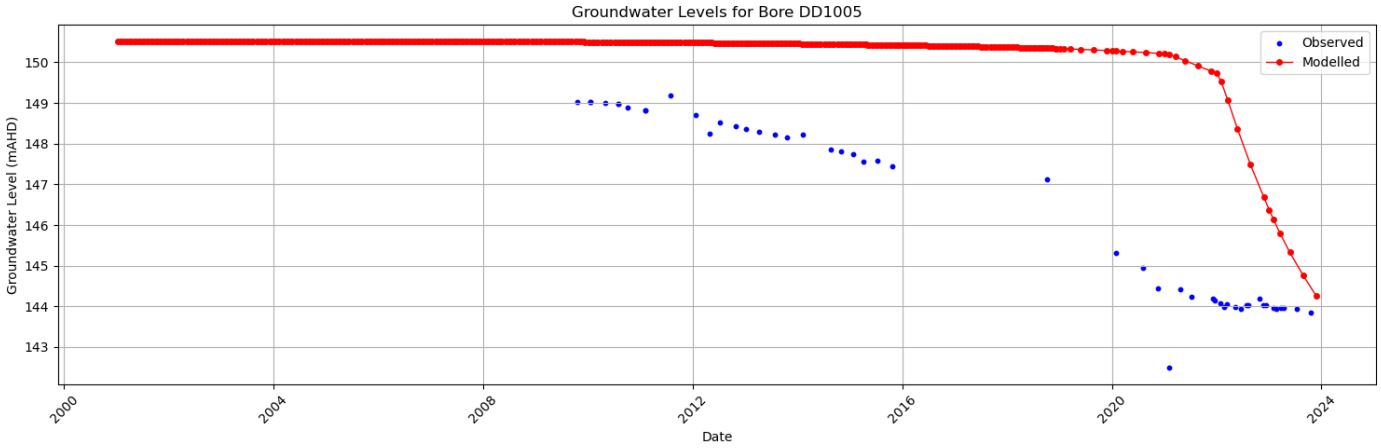

BKL6R12
Groundwater Elevation (mAHD)
Cumulative Rainfall Departure (mm)
180
170
160
150
140
130
120
110
100
150
25
-100
-225
-350
-475
-600
-725
-850
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
BKL6R12-VWP1 (WB2-25m)
BKL6R12-VWP2 (RB-40.5m)
BKL6R12-VWP3 (WN2-86.5m)
BKL6R12-VWP4 (BK1-113.7m)
CRD

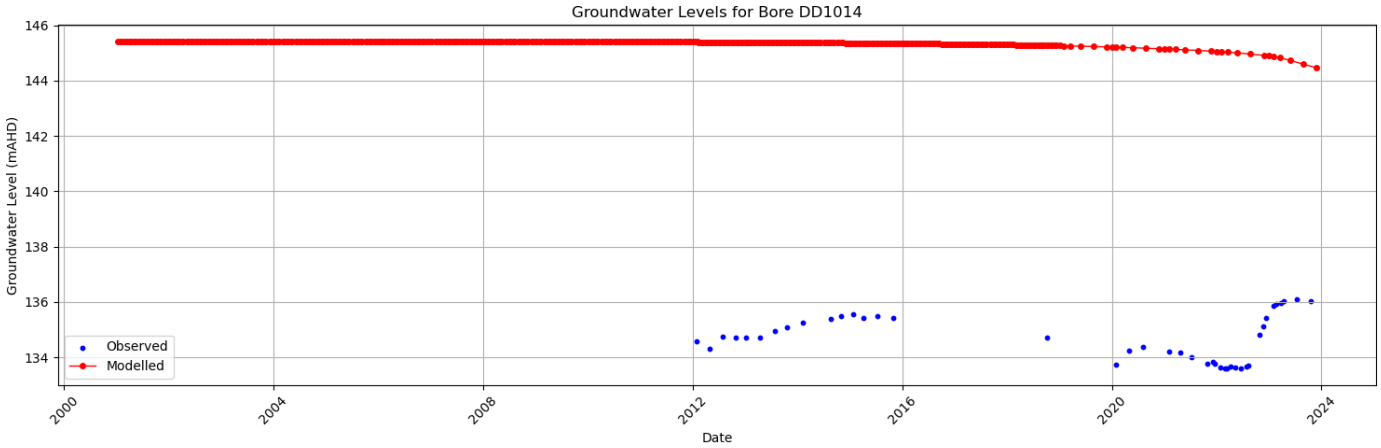

WND16
Groundwater Elevation (mAHD)
122
120
118
116
114
112
110
108
106
Cumulative Rainfall Departure (mm)
150
25
-100
-225
-350
-475
-600
-725
-850
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
WND16-VWP1 (WB-33.8m)
WND16-VWP4 (BK-110.5m)
CRD

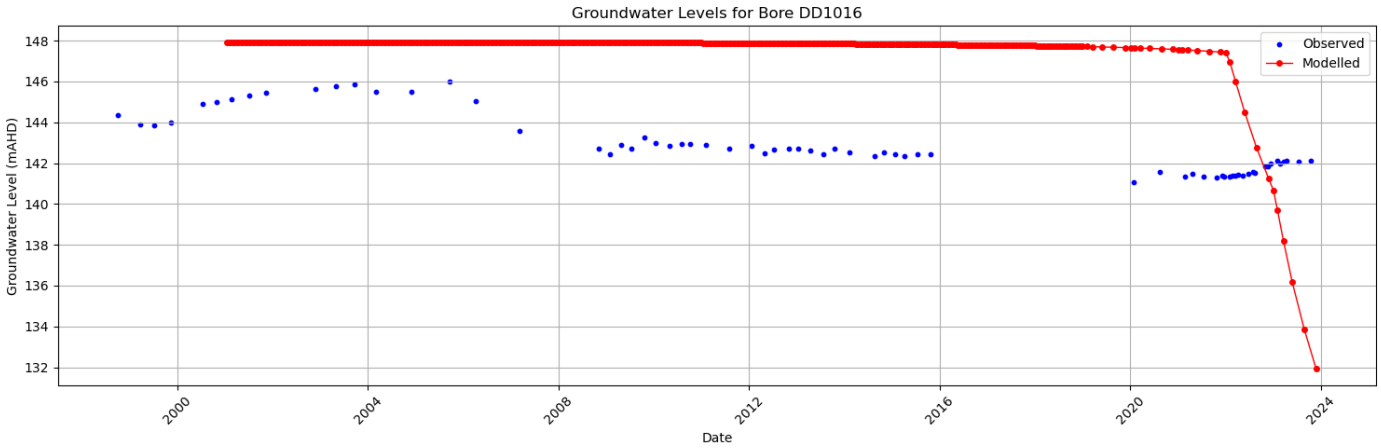

WND26
Groundwater Elevation (mAHD)
Cumulative Rainfall Departure (mm)
150
145
140
135
130
125
-50
-250
-450
-650
-850
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
WND26-VWP1 (Whybrow-77.3m)
WND26-VWP2 (RB-84.6m)
WND26-VWP3 (WB-123.5m)
WND26-VWP4 (WN-144.3m)
CRD

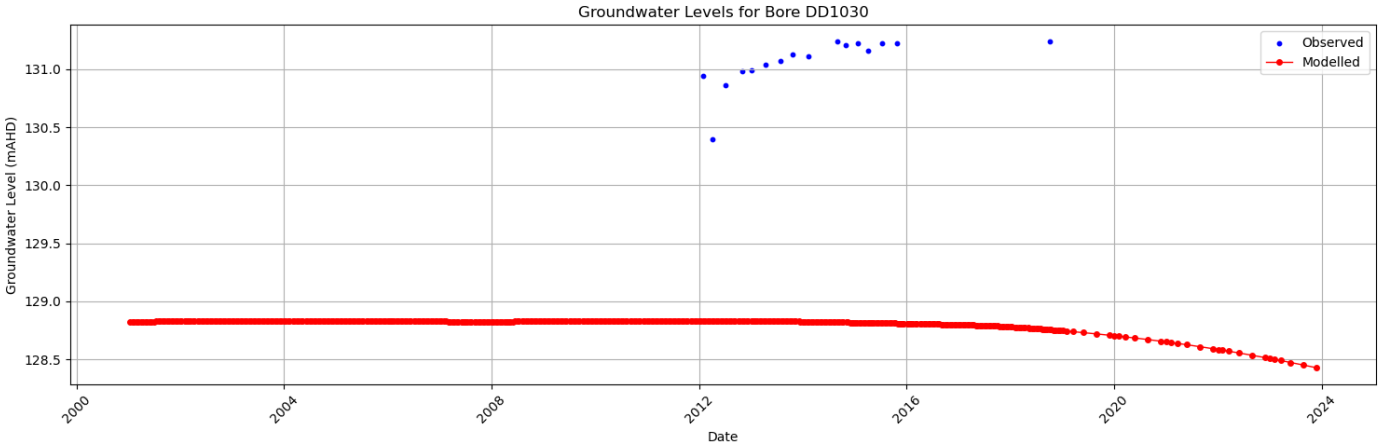

RBD_1
Groundwater Elevation (mAHD)
Cumulative Rainfall Departure (mm)
160
140
120
100
80
60
40
20
0
150
25
-100
-225
-350
-475
-600
-725
-850
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
RBD_1-VWP1 (Whybrow-24.7m)
RBD_1-VWP2 (RB-33.6m)
RBD_1-VWP3 (WN-79.5m)
RBD_1-VWP4 (BK-103.3m)
CRD

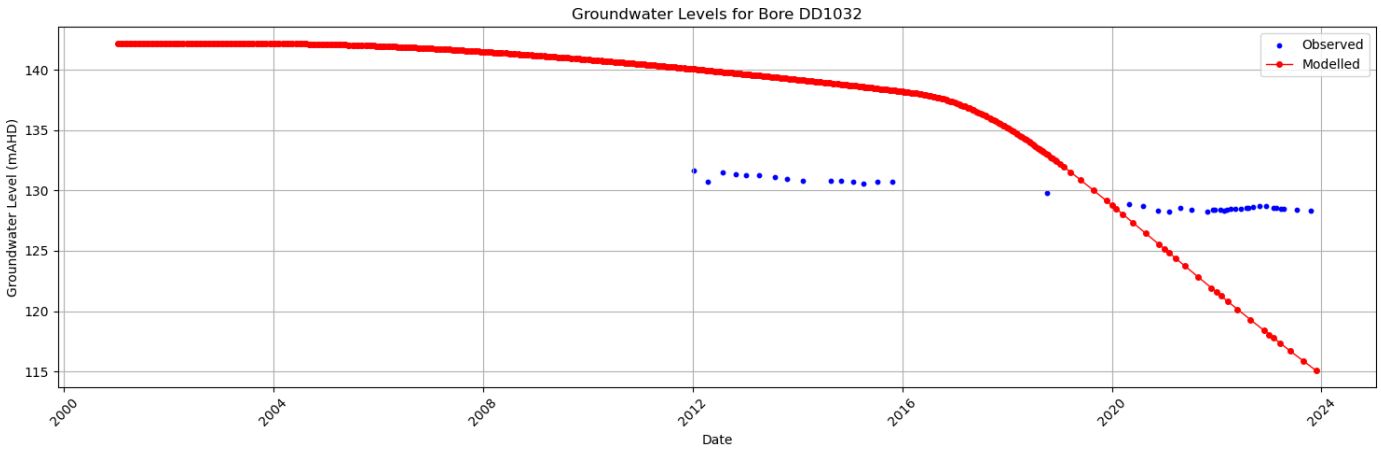

VWP1
Groundwater Elevation (mAHD)
Cumulative Rainfall Departure (mm)
120
100
80
60
40
20
0
200
25
-150
-325
-500
-675
-850
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
VWP1-interburden (VWP1-21m)
VWP1-interburden (VWP2-40m)
VWP1-interburden (VWP3-73m)
VWP1-Whybrow (VWP4-87m)
VWP1-WN (VWP5-109.2m)
CRD

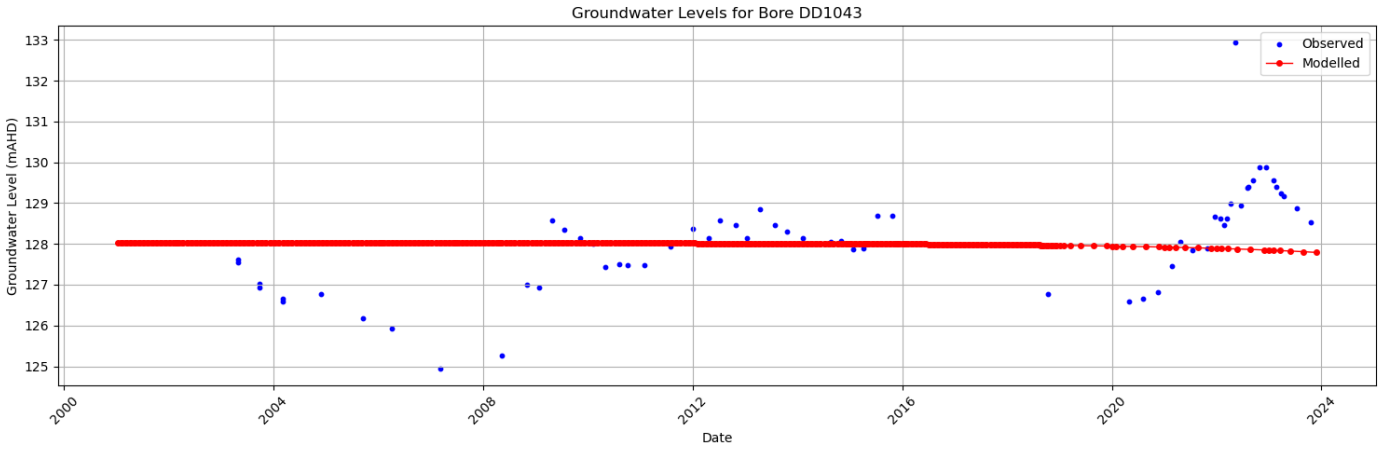

Groundwater Levels for Bore DD1005
Observed
Modelled
Groundwater Level (mAHD)
Date

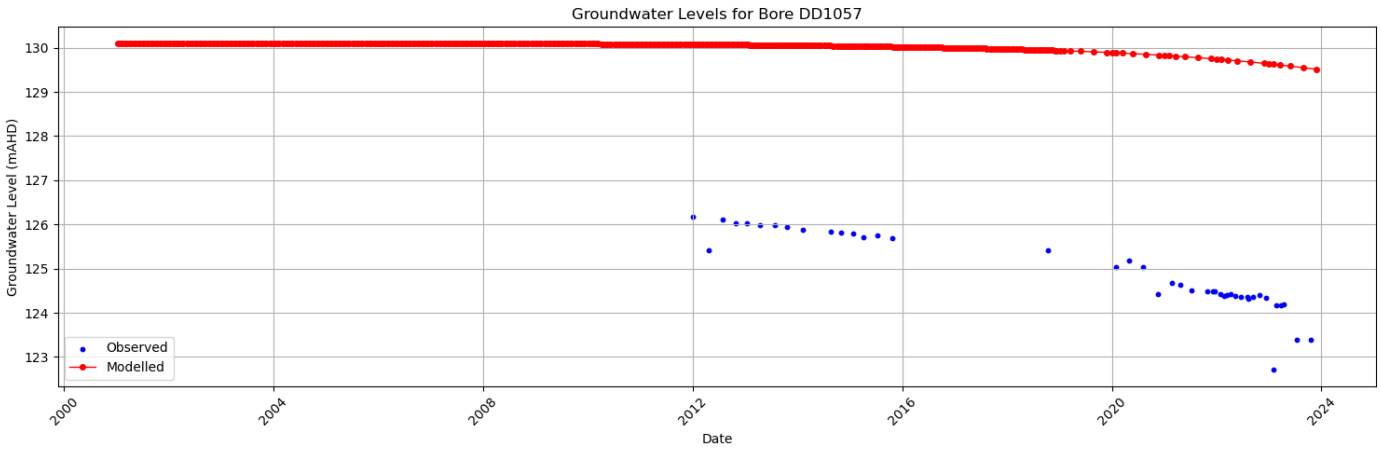

Groundwater Levels for Bore DD1014
Observed
Modelled
Groundwater Level (mAHD)
Date

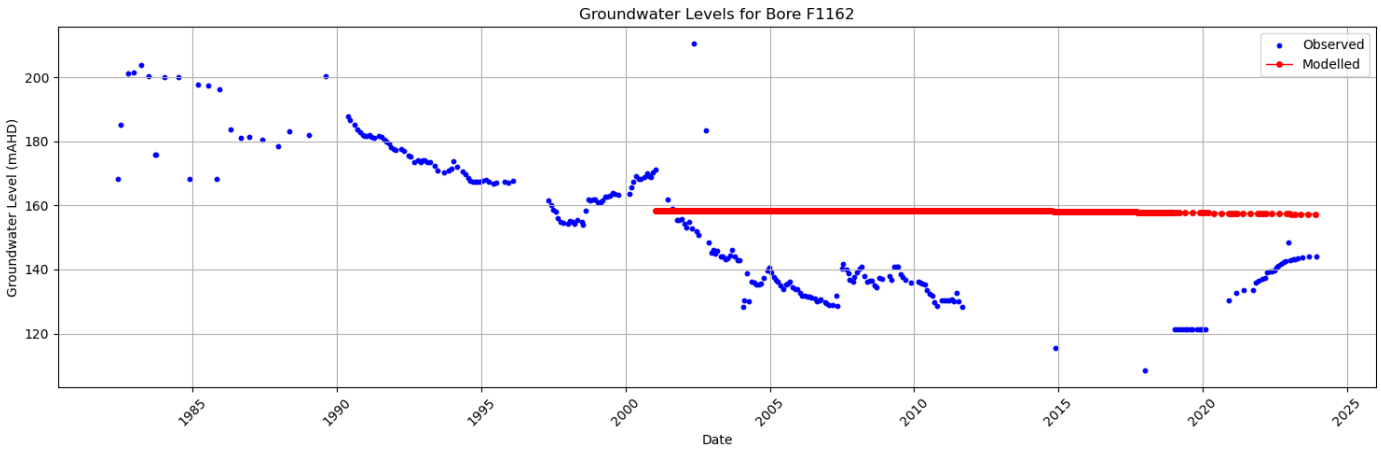

Groundwater Levels for Bore DD1016
Observed
Modelled
Groundwater Level (mAHD)
Date

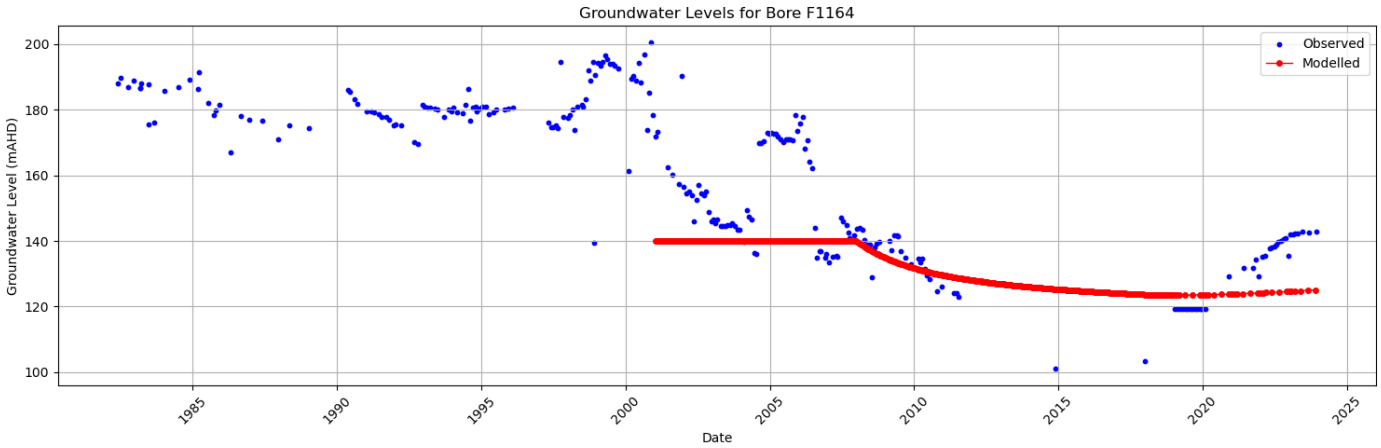

Groundwater Levels for Bore DD1030
Observed
Modelled
Groundwater Level (mAHD)
131.0
130.5
130.0
129.5
129.0
128.5
2000
2004
2008
2012
2016
2020
2024
Date

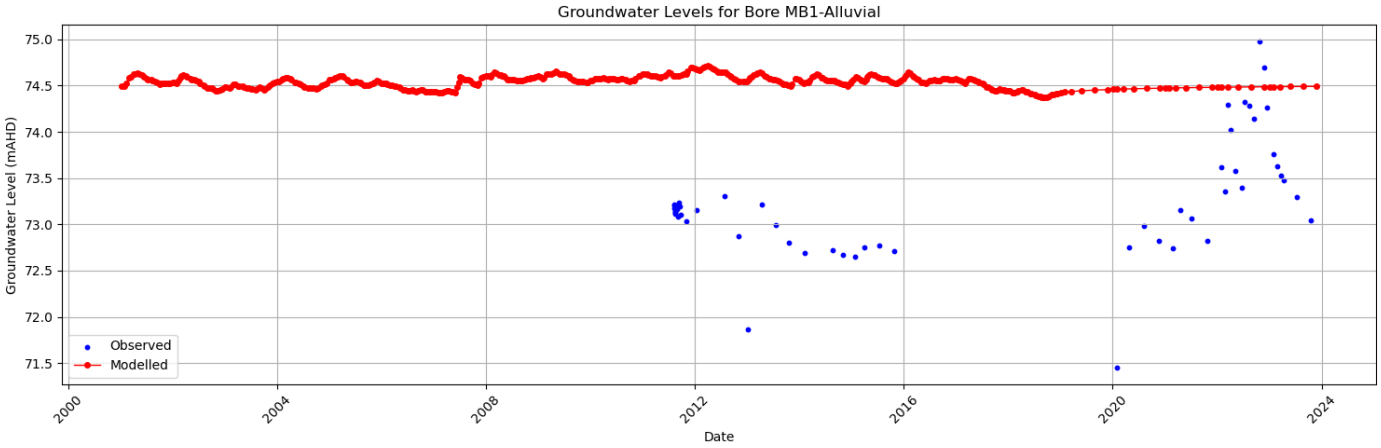

Groundwater Levels for Bore DD1032
Observed
Modelled
Groundwater Level (mAHD)
140
135
130
125
120
115
2000
2004
2008
2012
2016
2020
2024
Date

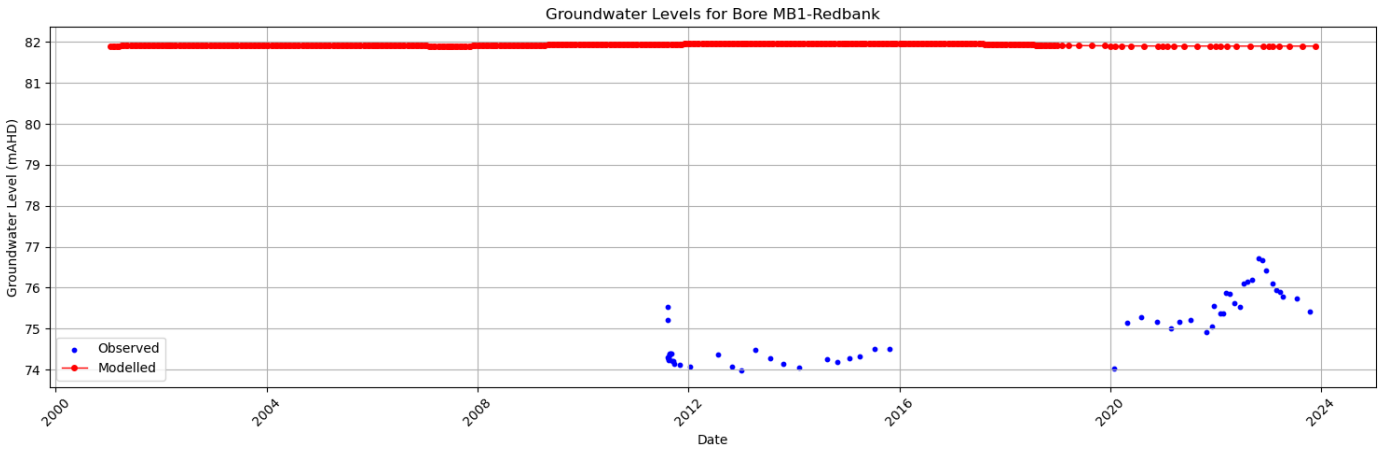

Groundwater Levels for Bore DD1043
Observed
Modelled
Groundwater Level (mAHD)
133
132
131
130
129
128
127
126
125
2000
2004
2008
2012
2016
2020
2024
Date

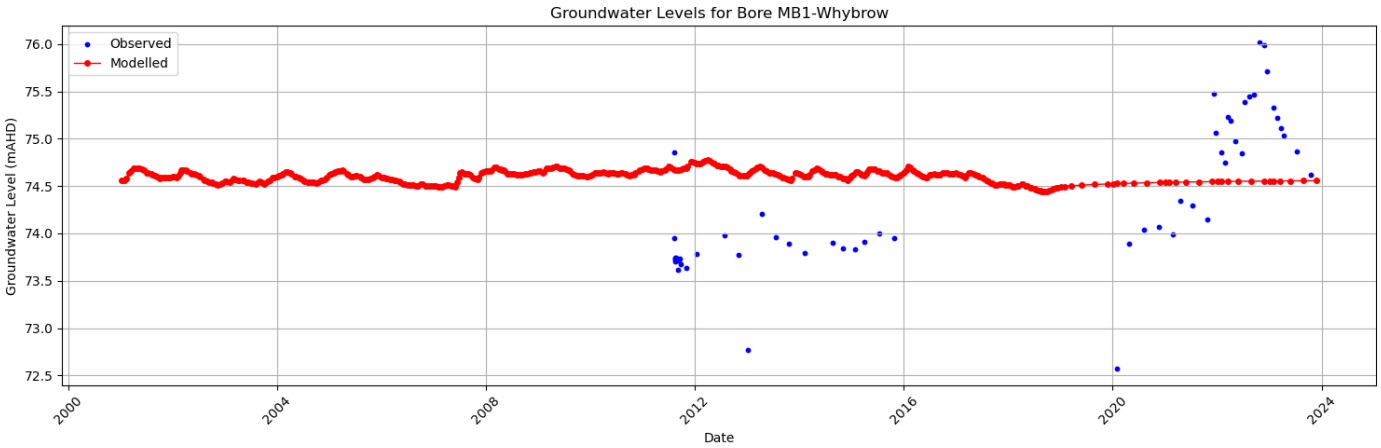

Groundwater Levels for Bore DD1057
Groundwater Level (mAHD)
Date
Observed
Modelled

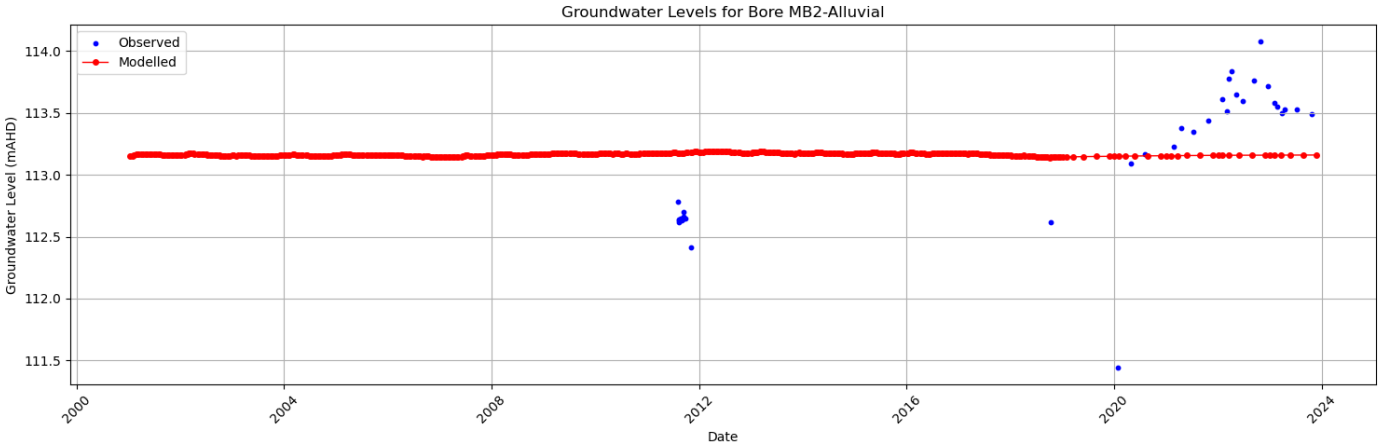

Groundwater Levels for Bore F1162
Groundwater Level (mAHD)
Date
Observed
Modelled

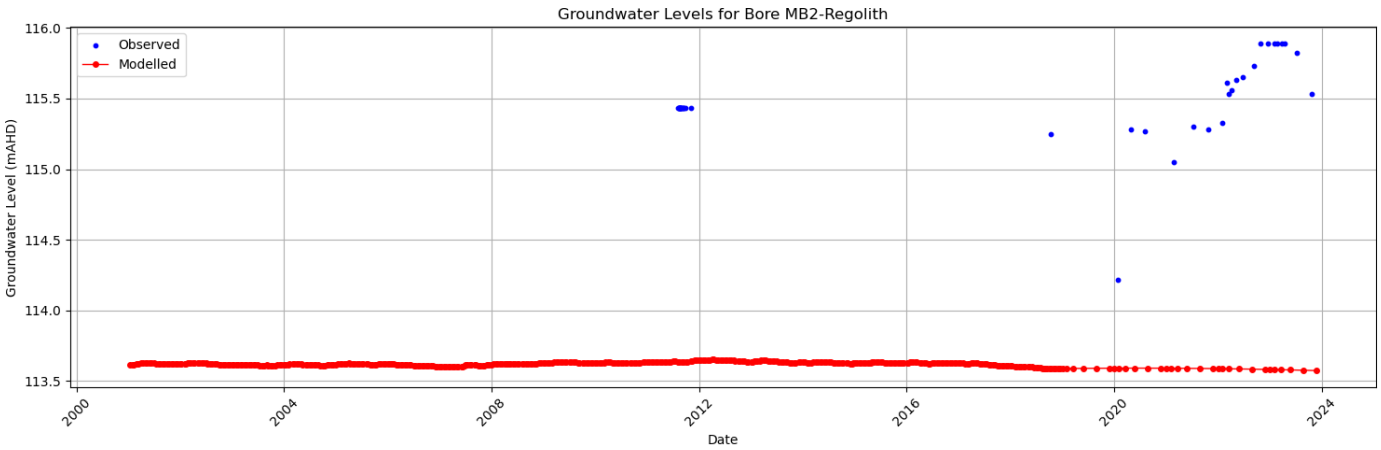

Groundwater Levels for Bore F1164
Groundwater Level (mAHD)
Date
Observed
Modelled

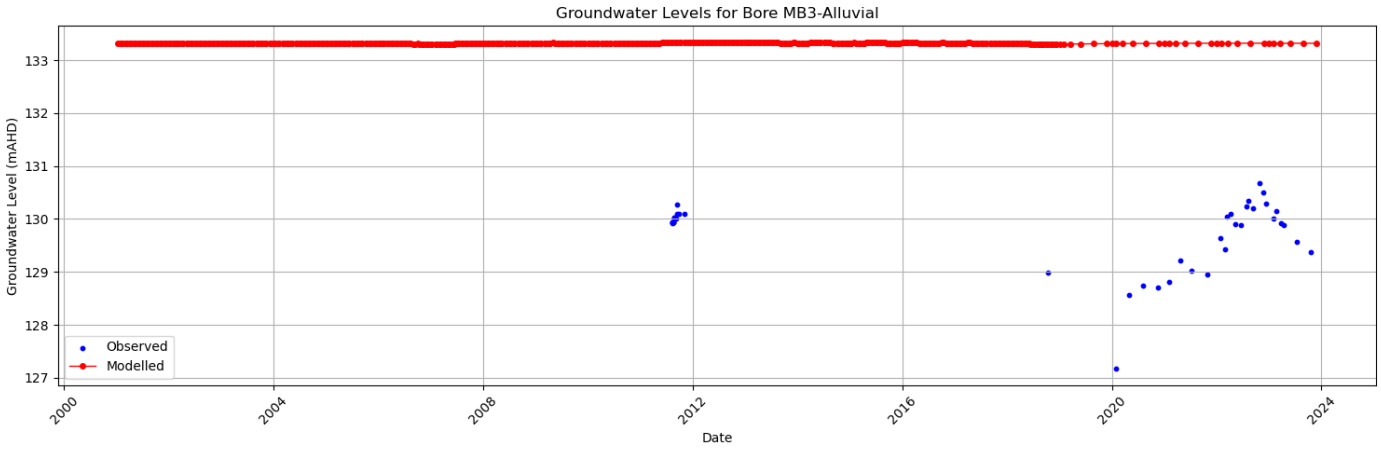

Groundwater Levels for Bore MB1-Alluvial
Groundwater Level (mAHD)
Date
Observed
Modelled

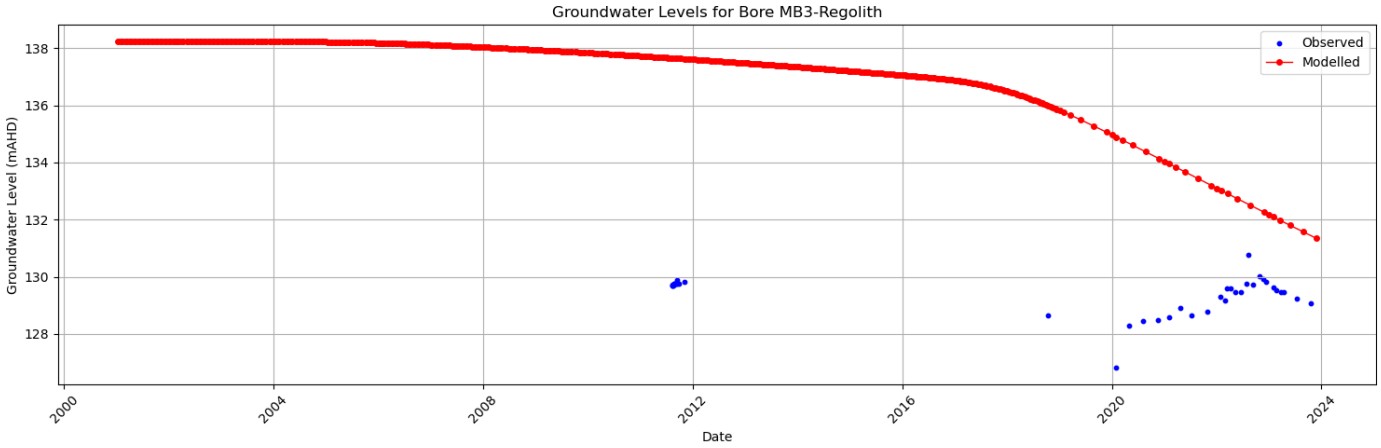

Groundwater Levels for Bore MB1-Redbank
Groundwater Level (mAHD)
Date
Observed
Modelled

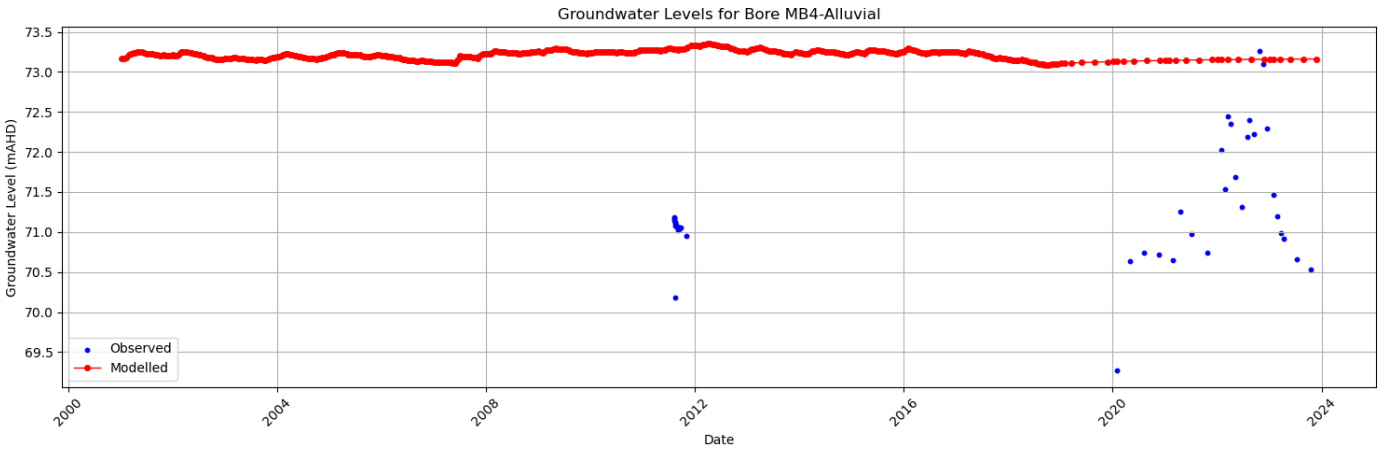

Groundwater Levels for Bore MB1-Whybrow
Groundwater Level (mAHD)
Date
Observed
Modelled

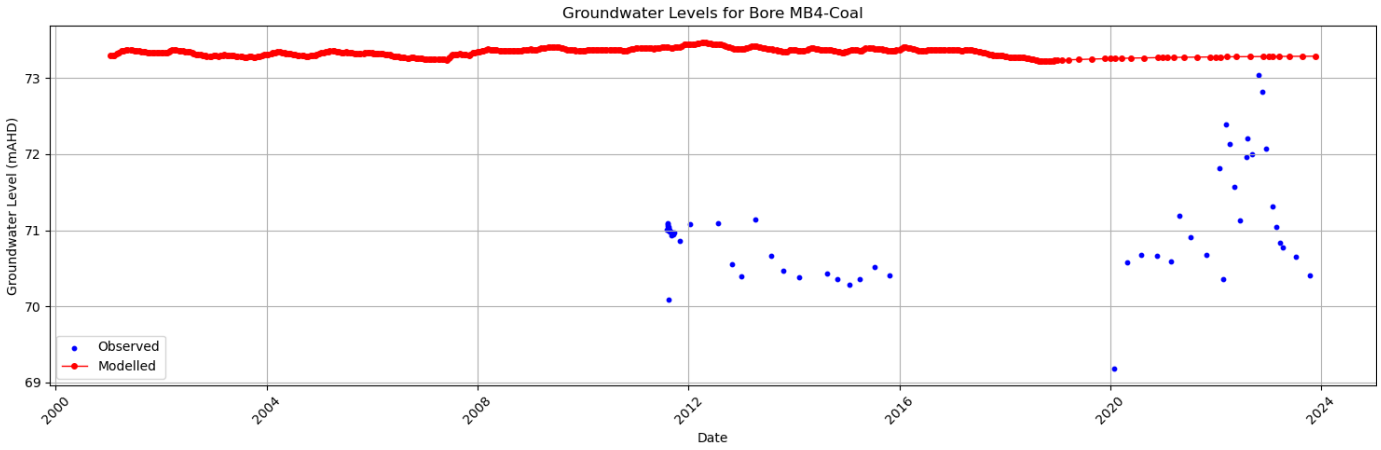

Groundwater Levels for Bore MB2-Alluvial
Observed
Modelled
Groundwater Level (mAHD)
Date

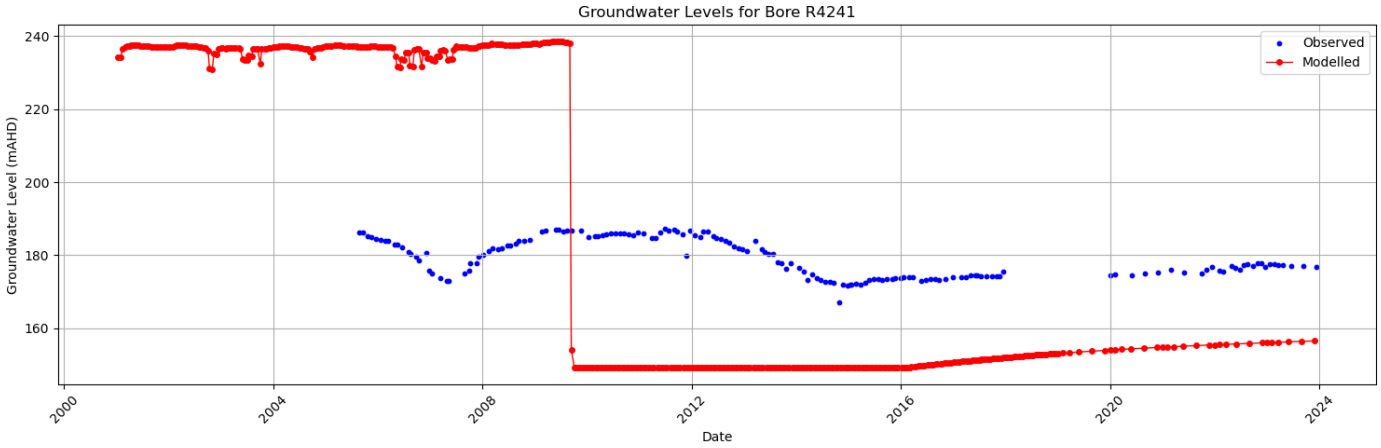

Groundwater Levels for Bore MB2-Regolith
Observed
Modelled
Groundwater Level (mAHD)
Date

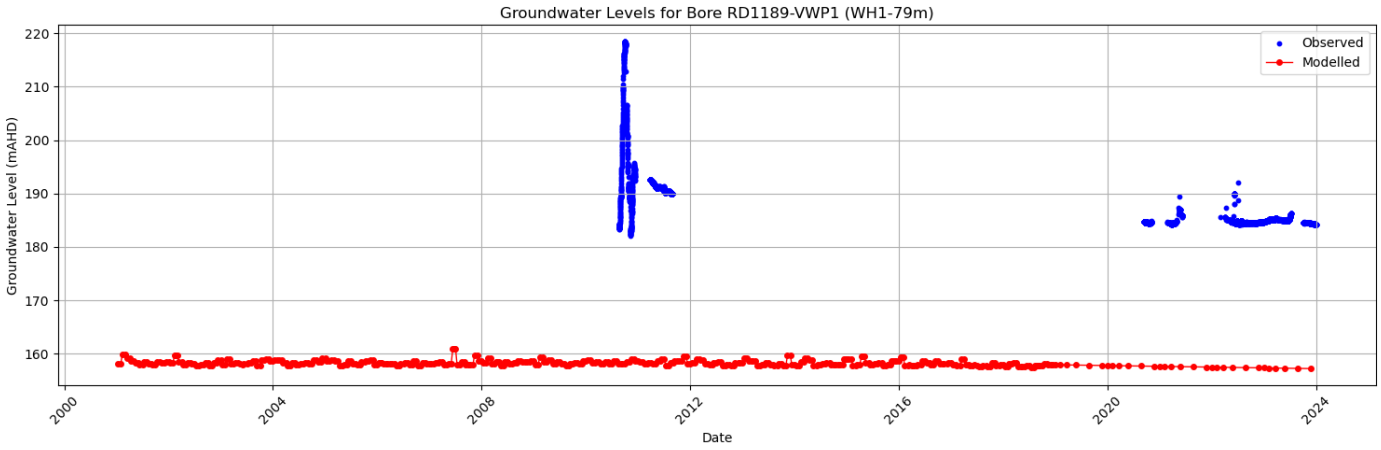

Groundwater Levels for Bore MB3-Alluvial
Observed
Modelled
Groundwater Level (mAHD)
Date

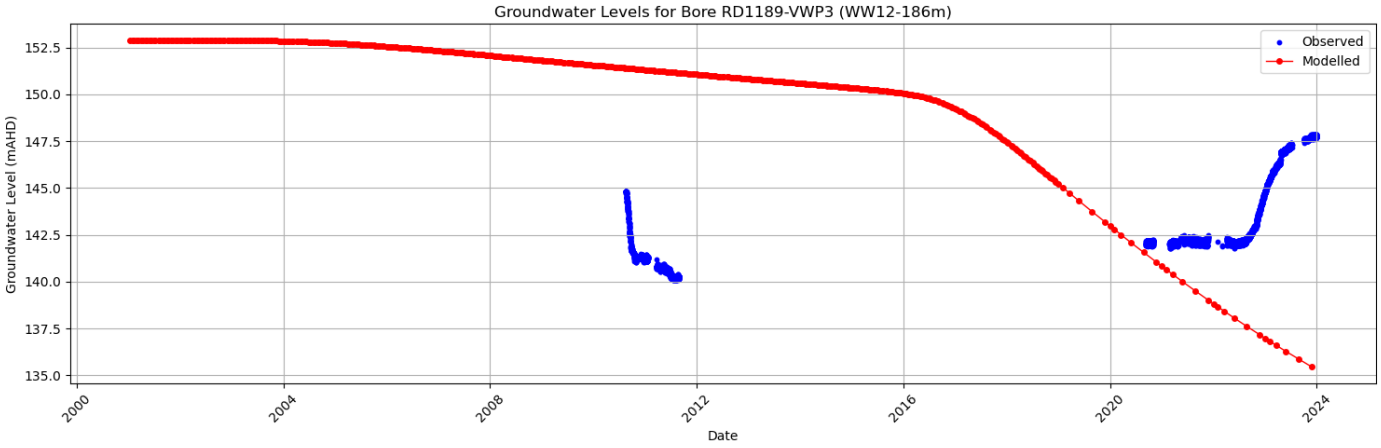

Groundwater Levels for Bore MB3-Regolith
Observed
Modelled
Groundwater Level (mAHD)
Date

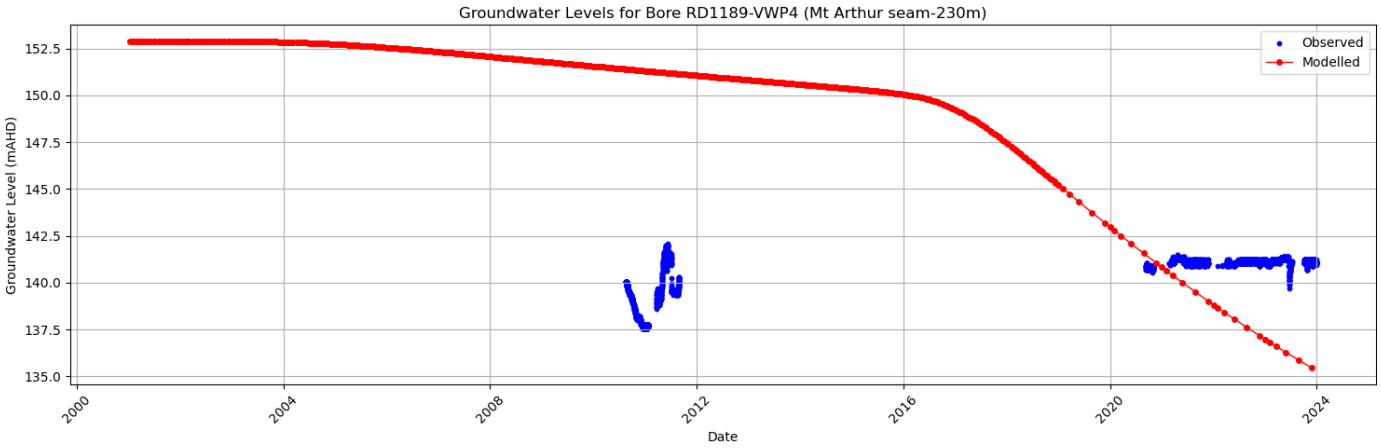

Groundwater Levels for Bore MB4-Alluvial
Observed
Modelled
Groundwater Level (mAHD)
Date

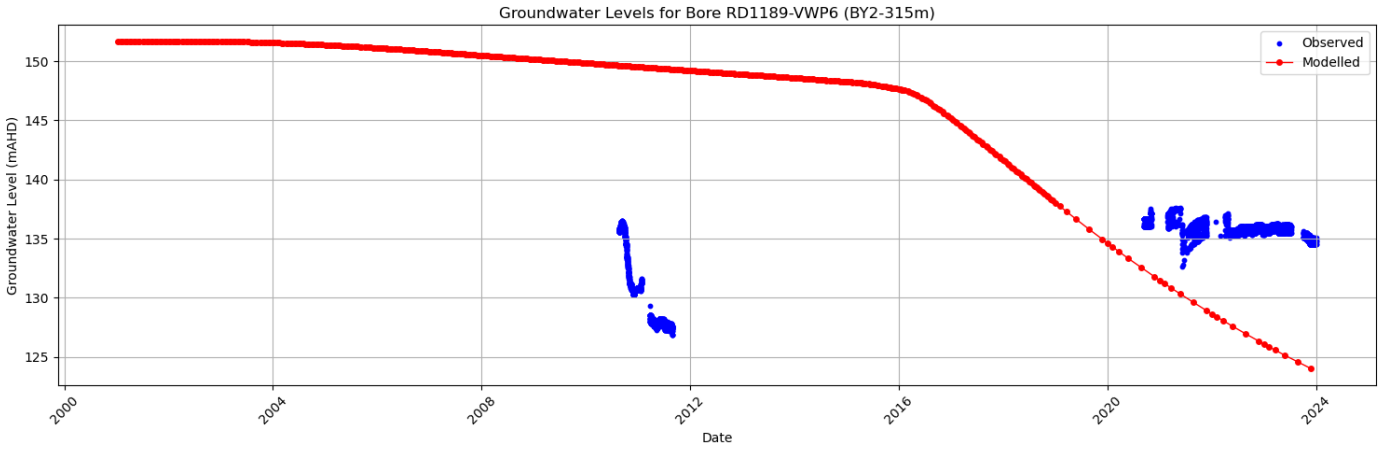

Groundwater Levels for Bore MB4-Coal
Observed
Modelled
Groundwater Level (mAHD)
Date

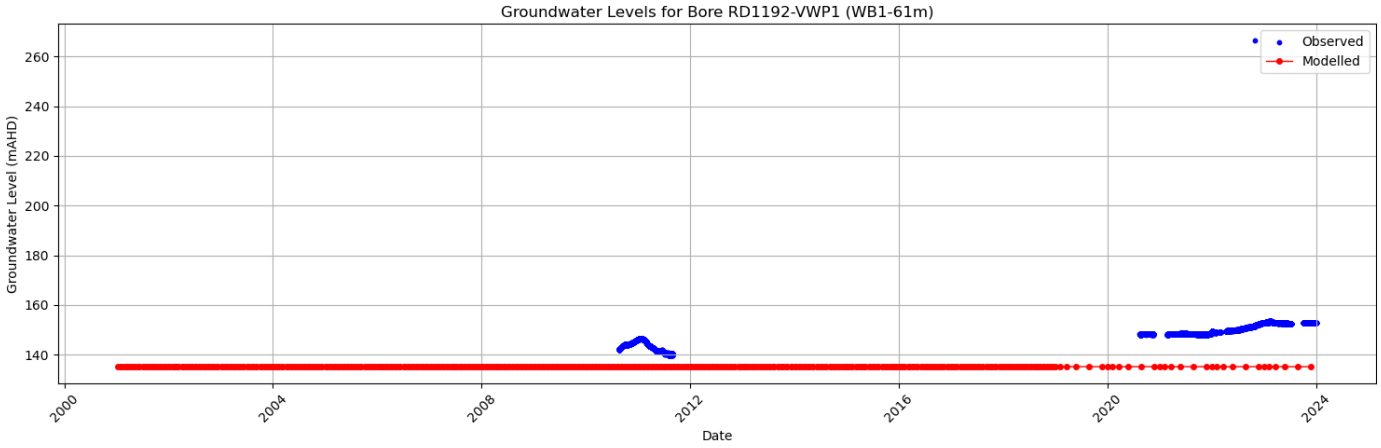

Groundwater Levels for Bore R4241
Observed
Modelled
Groundwater Level (mAHD)
240
220
200
180
160
2000
2004
2008
2012
2016
2020
2024
Date

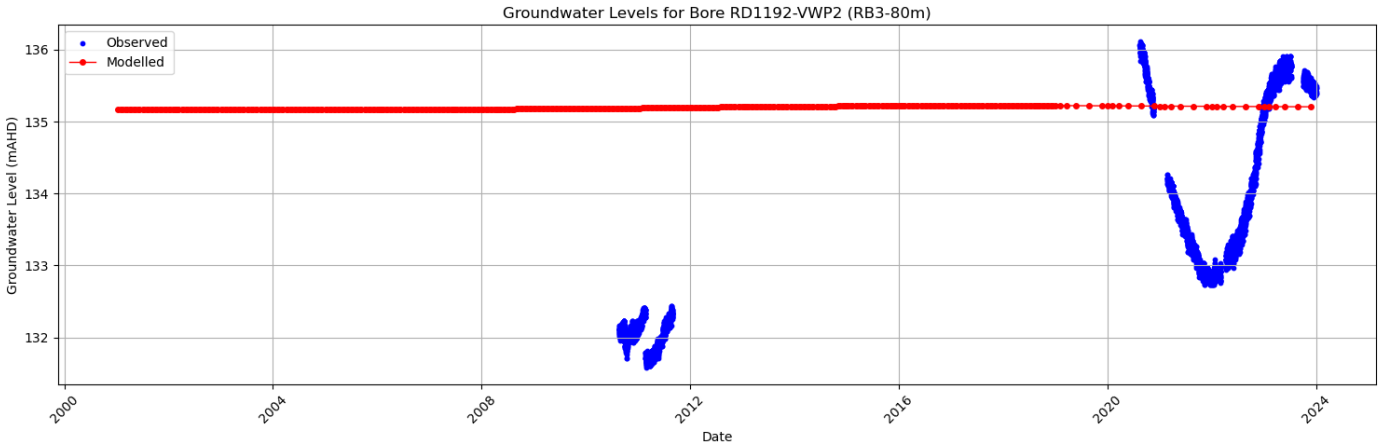

Groundwater Levels for Bore RD1189-VWP1 (WH1-79m)
Observed
Modelled
Groundwater Level (mAHD)
220
210
200
190
180
170
160
2000
2004
2008
2012
2016
2020
2024
Date

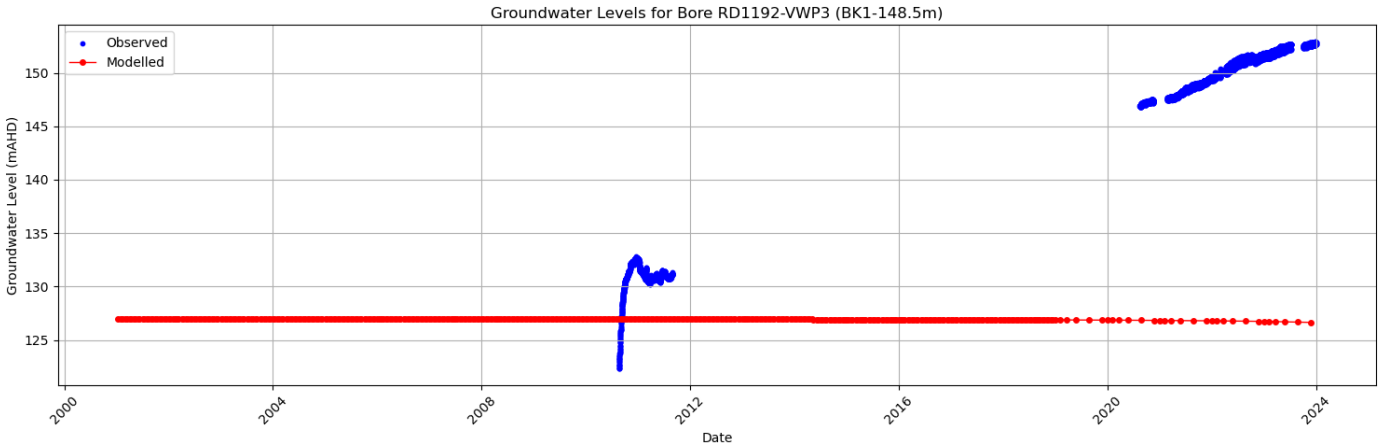

Groundwater Levels for Bore RD1189-VWP3 (WW12-186m)
Observed
Modelled
Groundwater Level (mAHD)
152.5
150.0
147.5
145.0
142.5
140.0
137.5
135.0
2000
2004
2008
2012
2016
2020
2024
Date

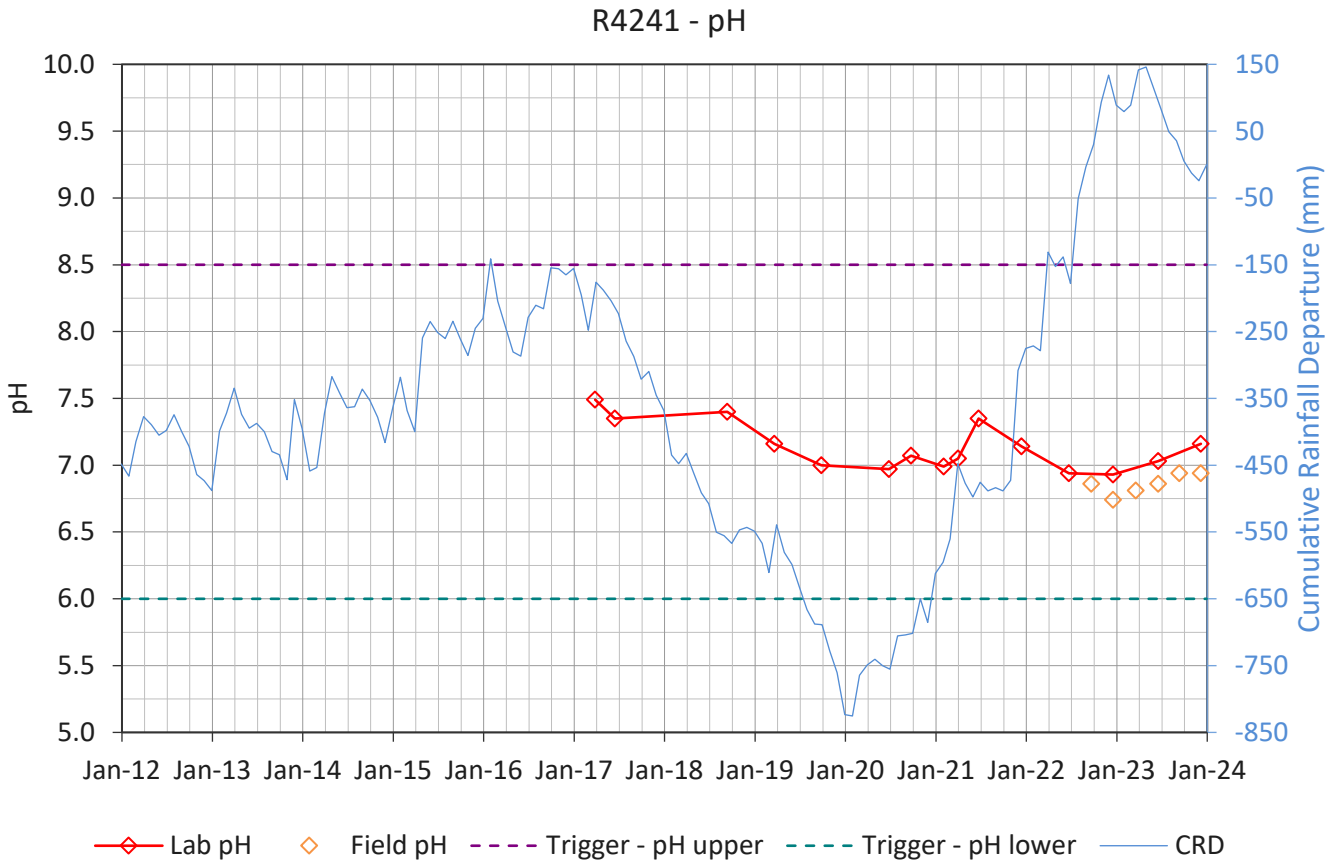

Groundwater Levels for Bore RD1189-VWP4 (Mt Arthur seam-230m)
Observed
Modelled
Groundwater Level (mAHD)
152.5
150.0
147.5
145.0
142.5
140.0
137.5
135.0
2000
2004
2008
2012
2016
2020
2024
Date

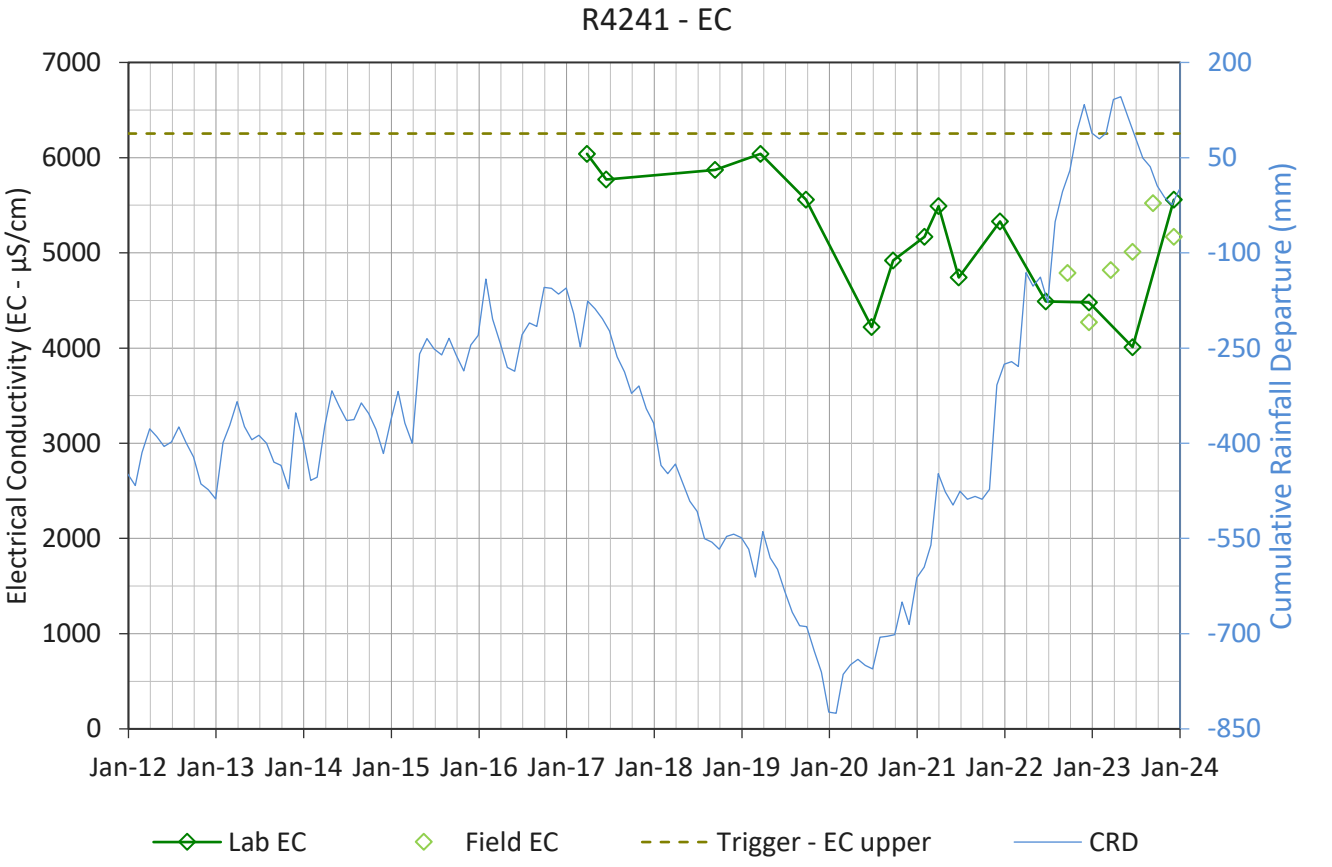

Groundwater Levels for Bore RD1189-VWP6 (BY2-315m)
Observed
Modelled
Groundwater Level (mAHD)
150
145
140
135
130
125
2000
2004
2008
2012
2016
2020
2024
Date

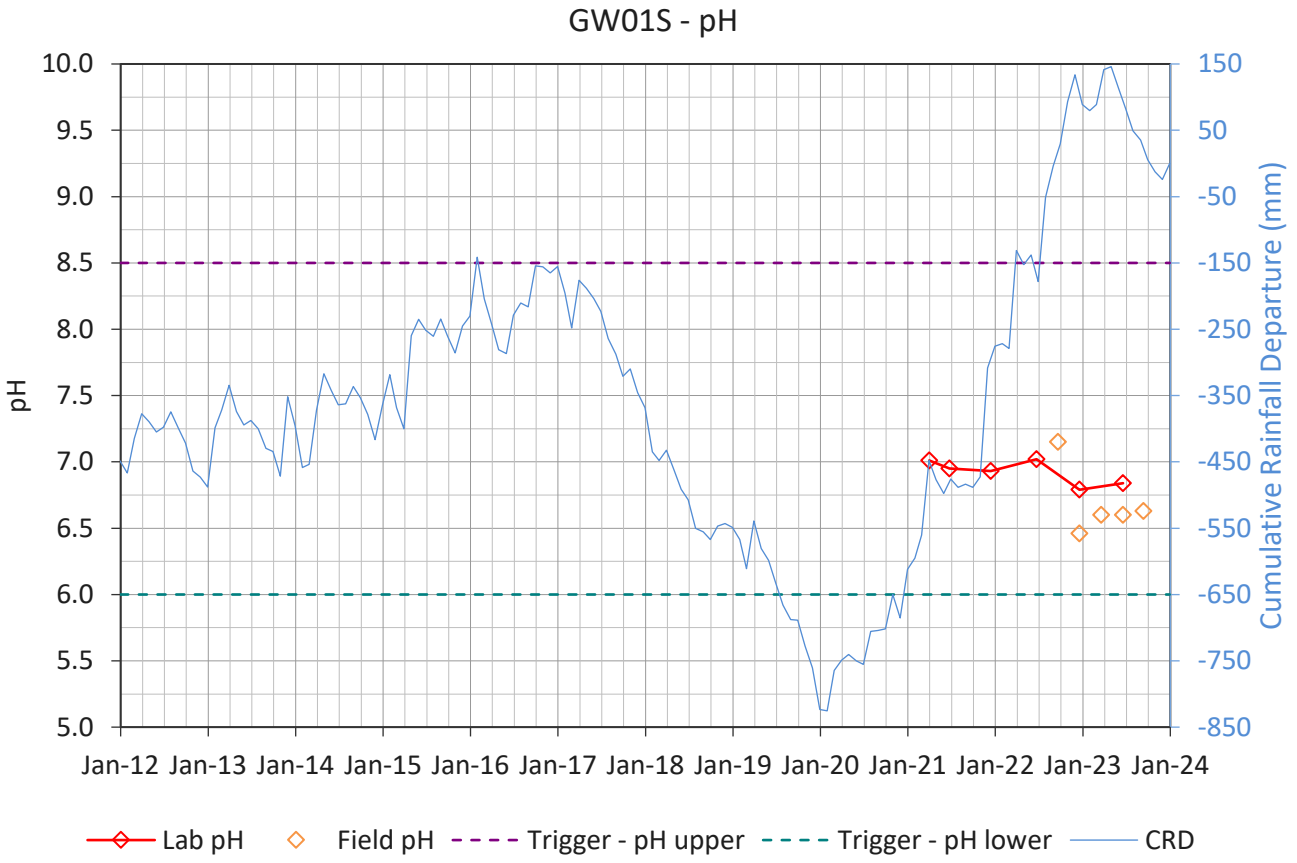

Groundwater Levels for Bore RD1192-VWP1 (WB1-61m)
Observed
Modelled
Groundwater Level (mAHD)
260
240
220
200
180
160
140
2000
2004
2008
2012
2016
2020
2024
Date

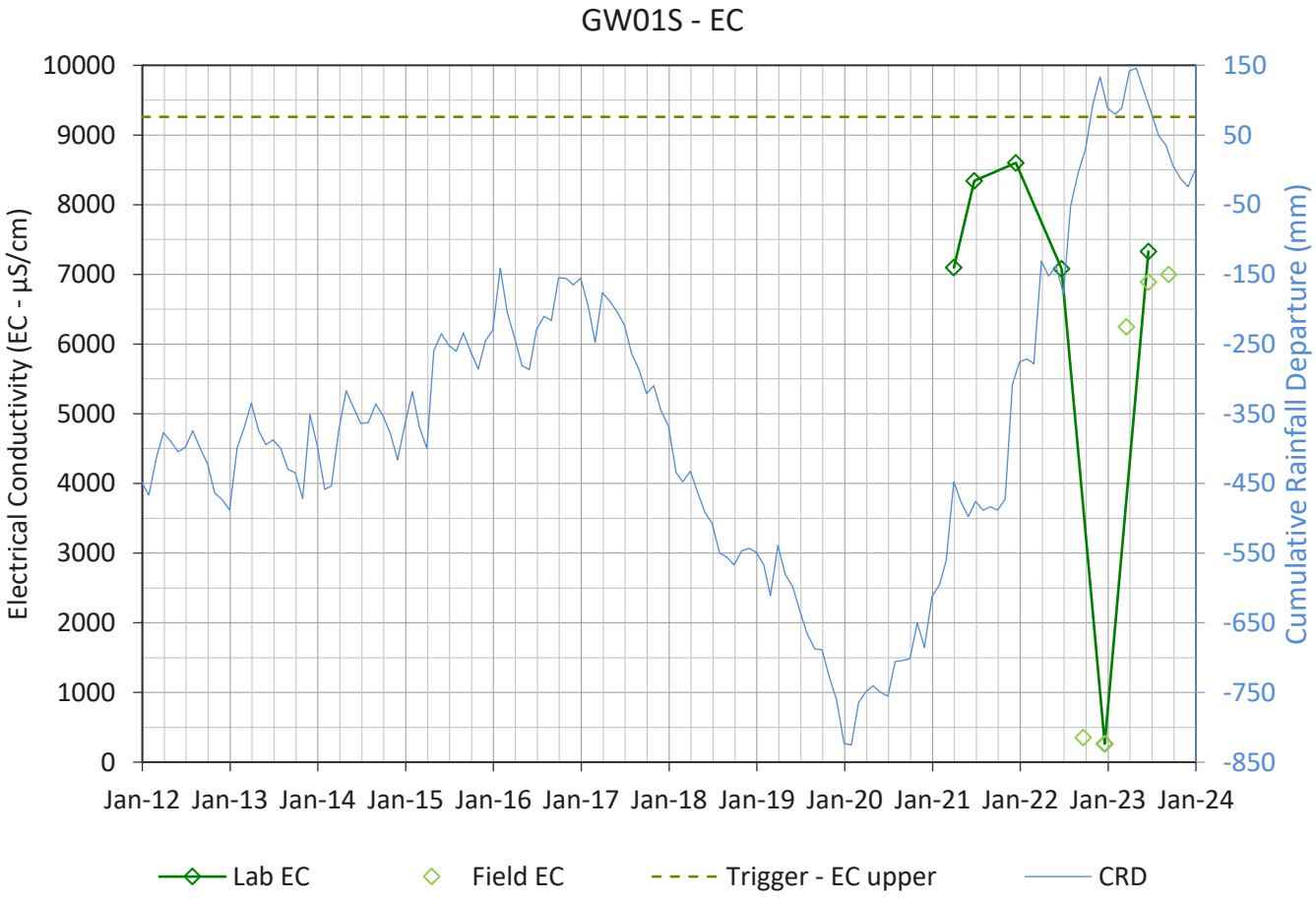

Groundwater Levels for Bore RD1192-VWP2 (RB3-80m)
Observed
Modelled
Groundwater Level (mAHD)
136
135
134
133
132
2000
2004
2008
2012
2016
2020
2024
Date

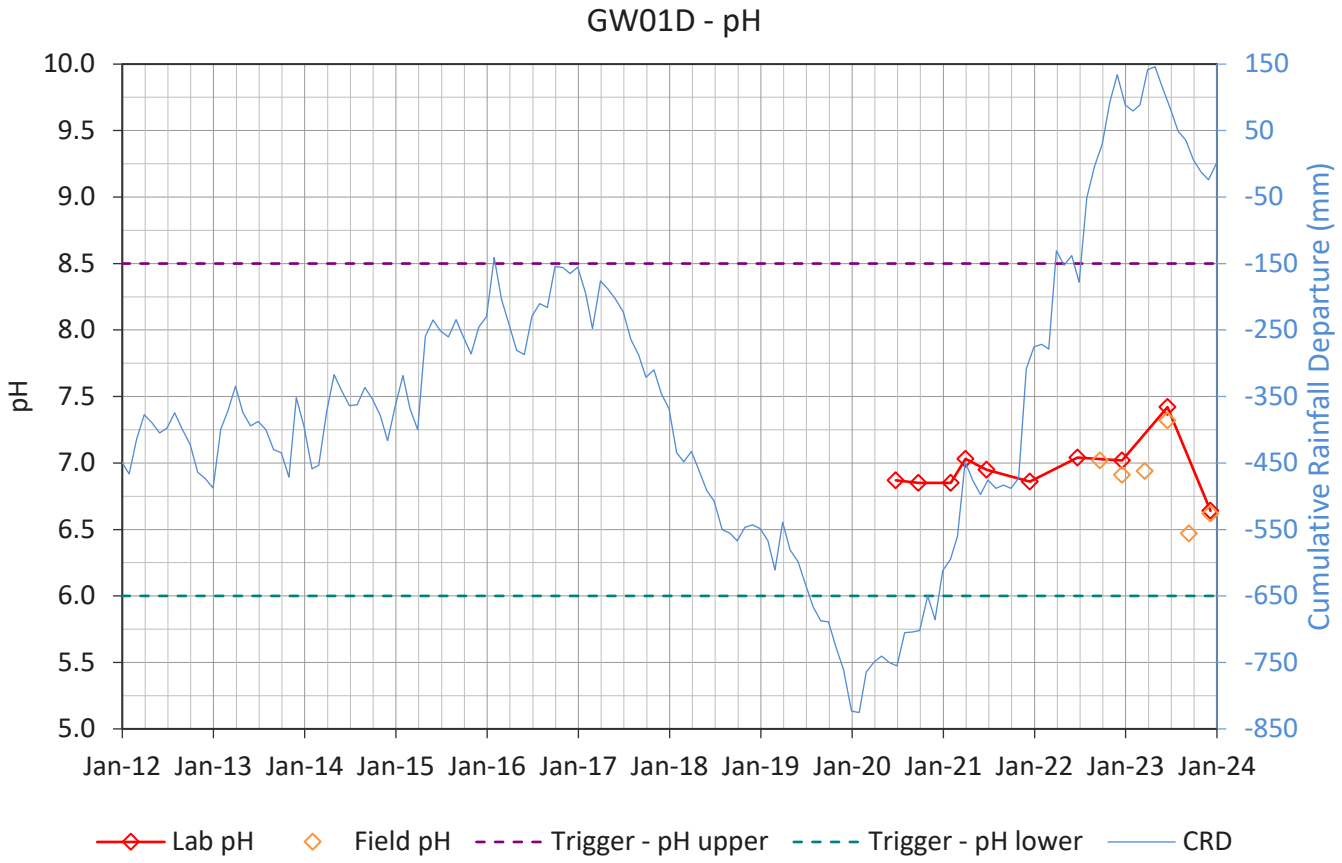

Groundwater Levels for Bore RD1192-VWP3 (BK1-148.5m)
Observed
Modelled
Groundwater Level (mAHD)
150
145
140
135
130
125
2000
2004
2008
2012
2016
2020
2024
Date

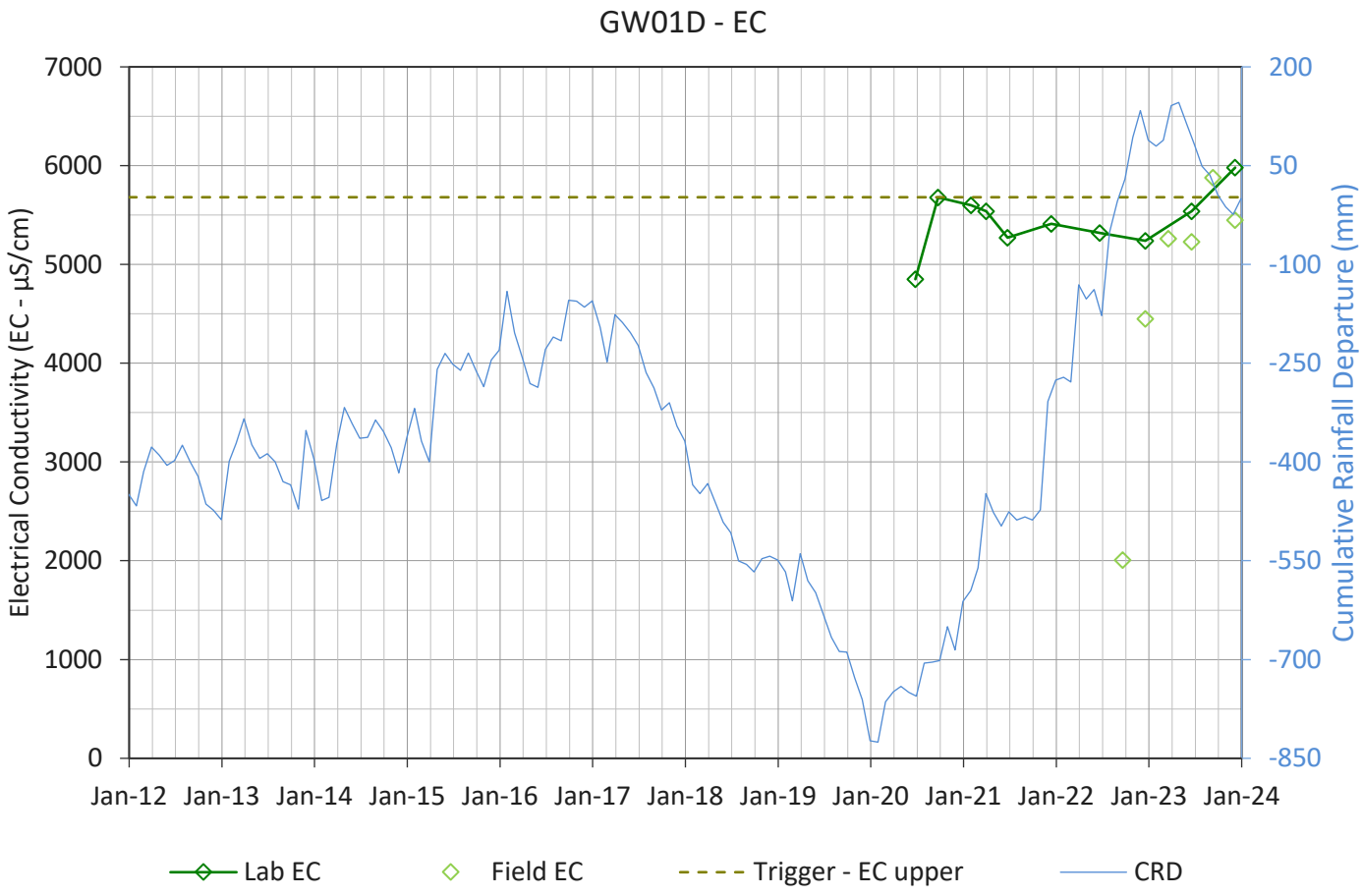

R4241 - pH
pH
Cumulative Rainfall Departure (mm)
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
150
50
-50
-150
-250
-350
-450
-550
-650
-750
-850
Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19 Jan-20 Jan-21 Jan-22 Jan-23 Jan-24
Lab pH
Field pH
Trigger - pH upper
Trigger - pH lower
CRD

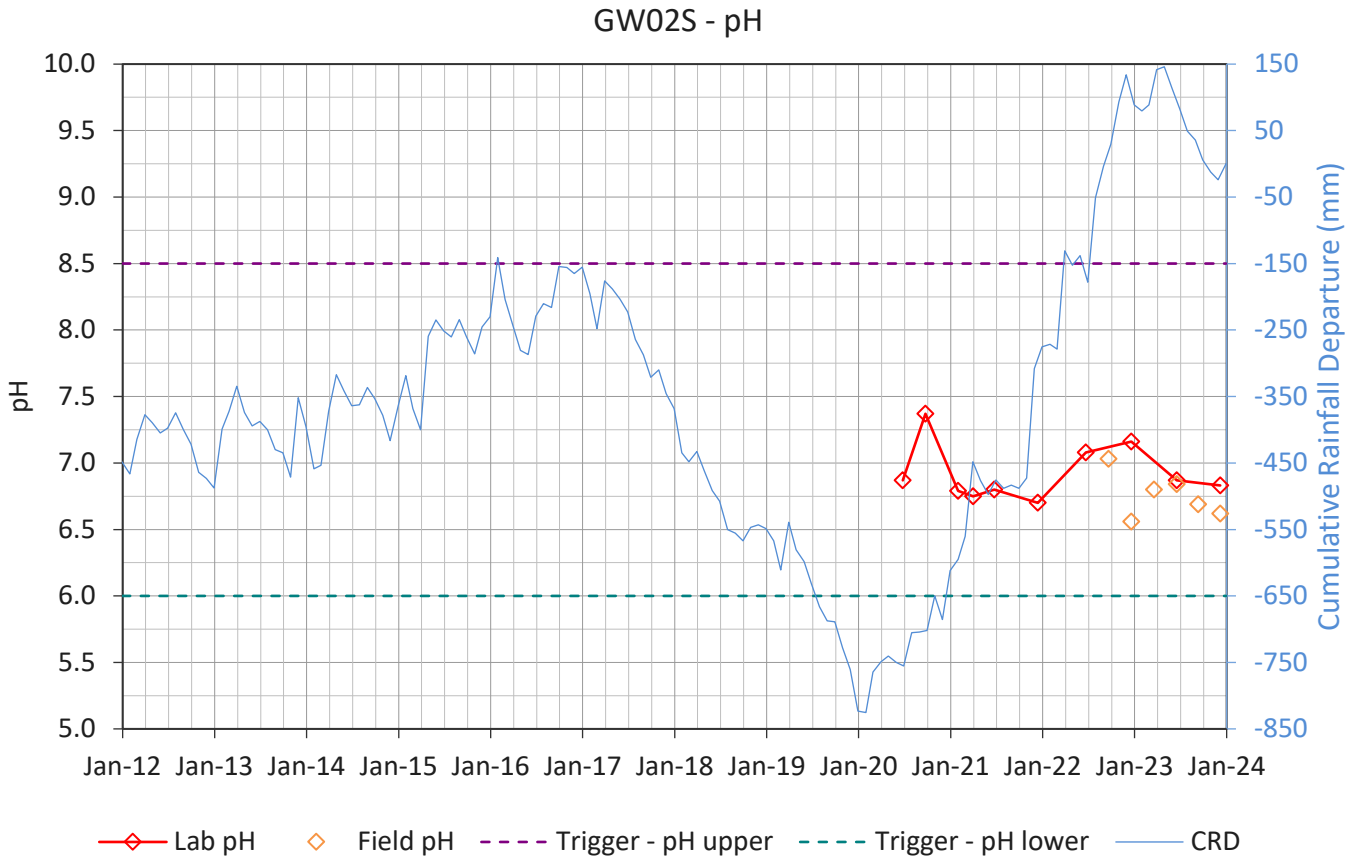

R4241 - EC
Electrical Conductivity (EC - µS/cm)
Cumulative Rainfall Departure (mm)
7000
6000
5000
4000
3000
2000
1000
0
200
50
-100
-250
-400
-550
-700
-850
Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19 Jan-20 Jan-21 Jan-22 Jan-23 Jan-24
Lab EC
Field EC
Trigger - EC upper
CRD

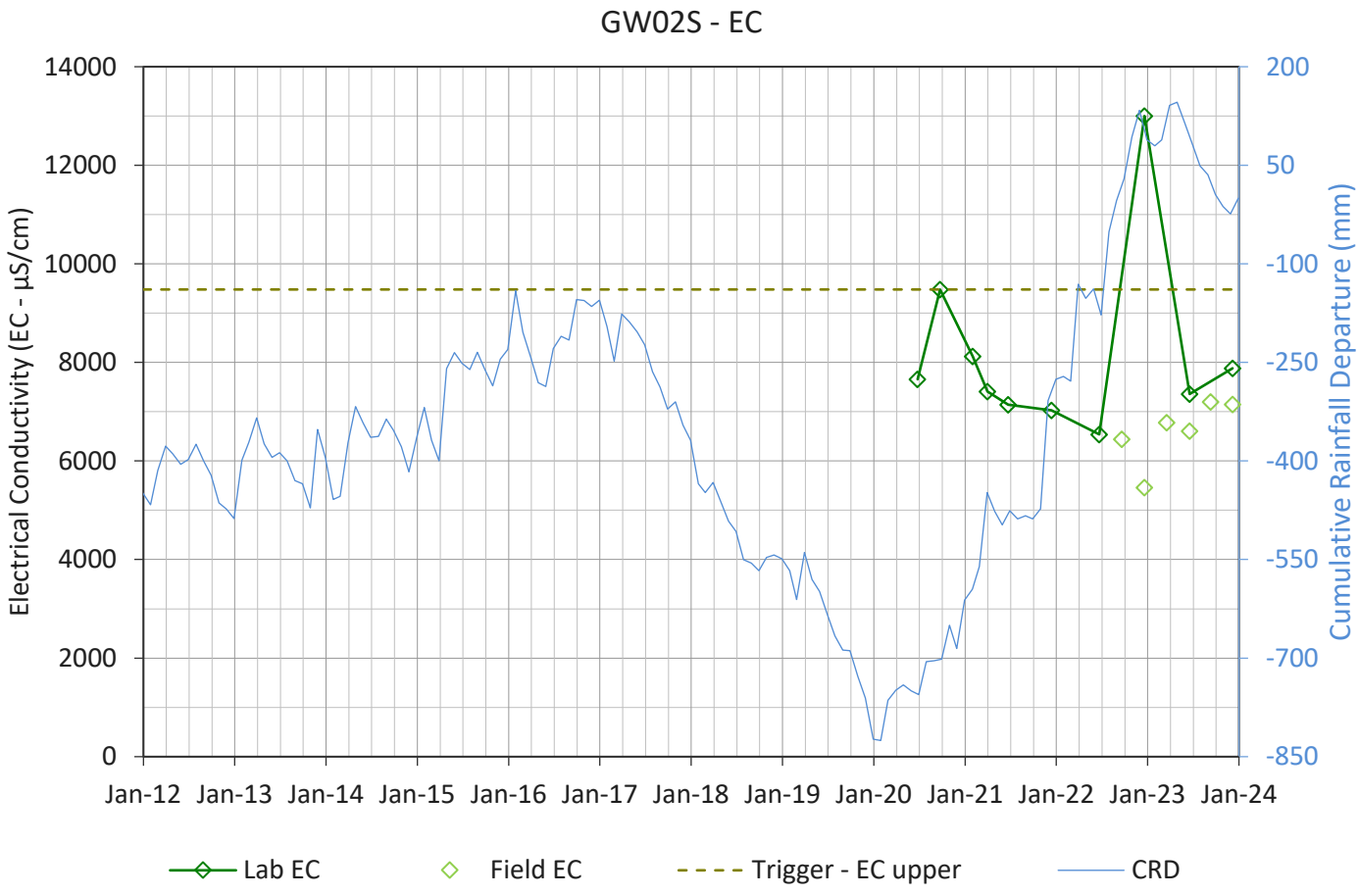

GW01S - pH
pH
Cumulative Rainfall Departure (mm)
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
150
50
-50
-150
-250
-350
-450
-550
-650
-750
-850
Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19 Jan-20 Jan-21 Jan-22 Jan-23 Jan-24
Lab pH
Field pH
Trigger - pH upper
Trigger - pH lower
CRD

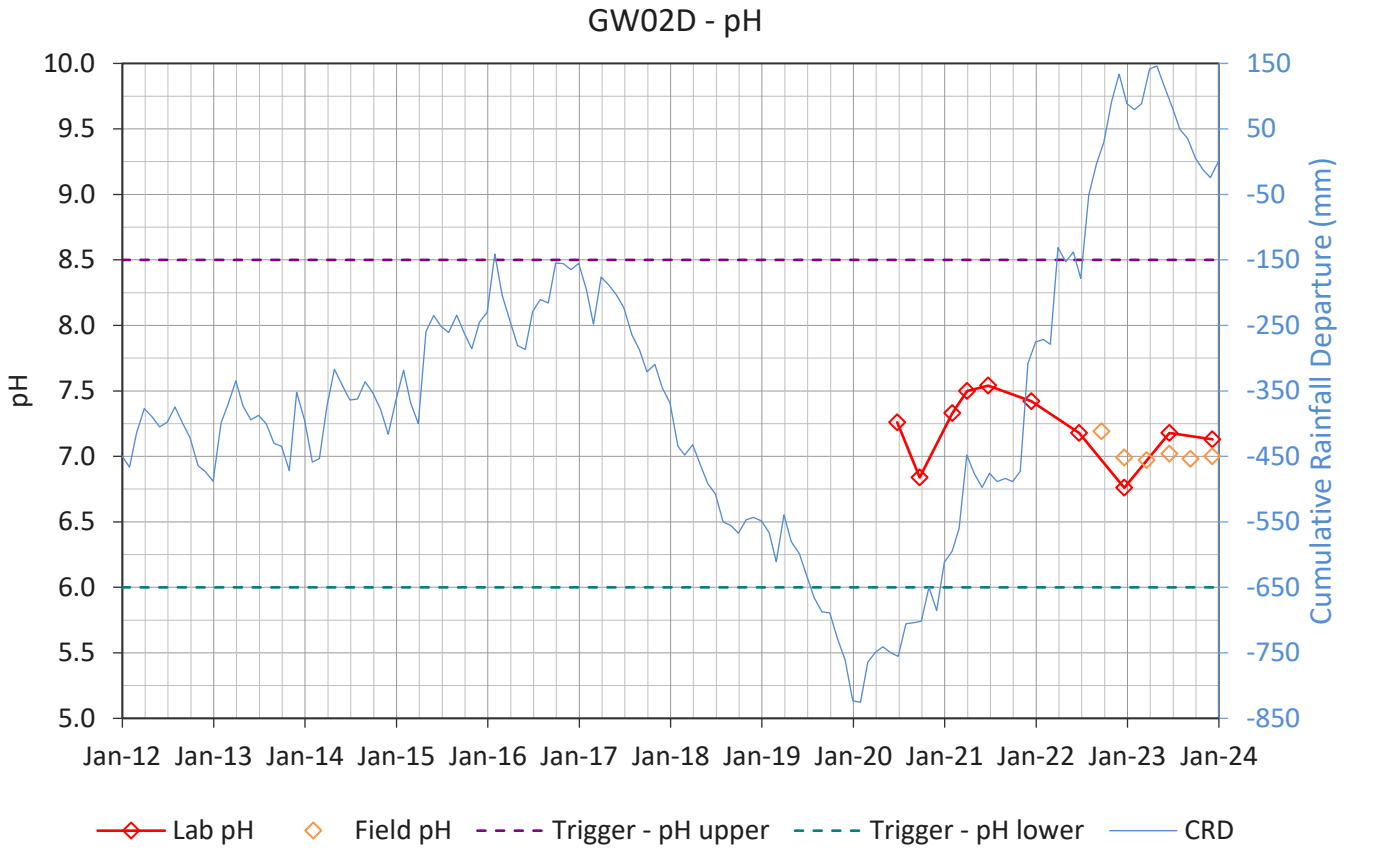

GW01S - EC
Electrical Conductivity (EC - µS/cm)
Cumulative Rainfall Departure (mm)
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
150
50
-50
-150
-250
-350
-450
-550
-650
-750
-850
Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19 Jan-20 Jan-21 Jan-22 Jan-23 Jan-24
Lab EC
Field EC
Trigger - EC upper
CRD

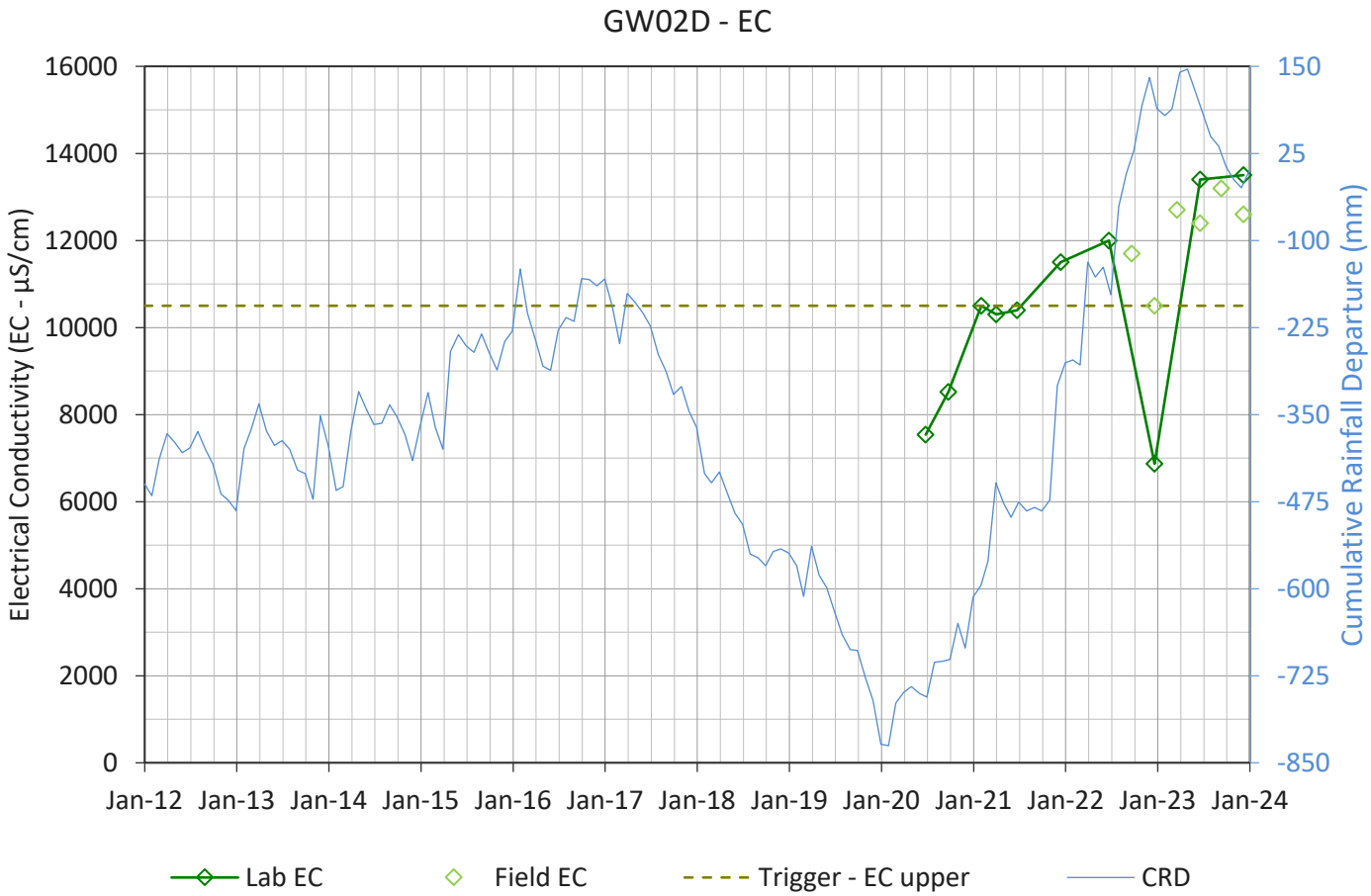

GW01D - pH
pH
Cumulative Rainfall Departure (mm)
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
150
50
-50
-150
-250
-350
-450
-550
-650
-750
-850
Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19 Jan-20 Jan-21 Jan-22 Jan-23 Jan-24
Lab pH
Field pH
Trigger - pH upper
Trigger - pH lower
CRD

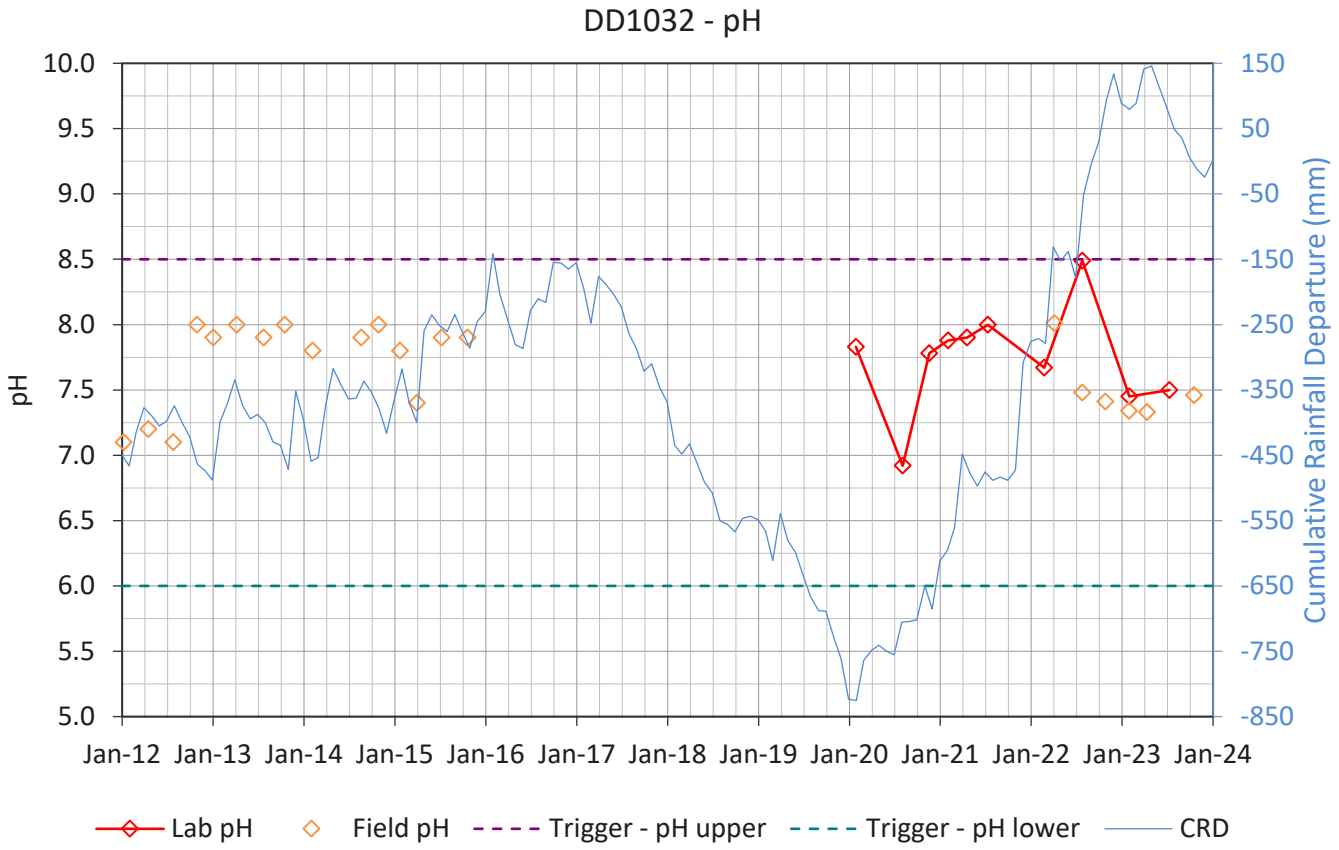

GW01D - EC
Electrical Conductivity (EC - µS/cm)
Cumulative Rainfall Departure (mm)
7000
6000
5000
4000
3000
2000
1000
0
200
50
-100
-250
-400
-550
-700
-850
Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19 Jan-20 Jan-21 Jan-22 Jan-23 Jan-24
Lab EC
Field EC
Trigger - EC upper
CRD

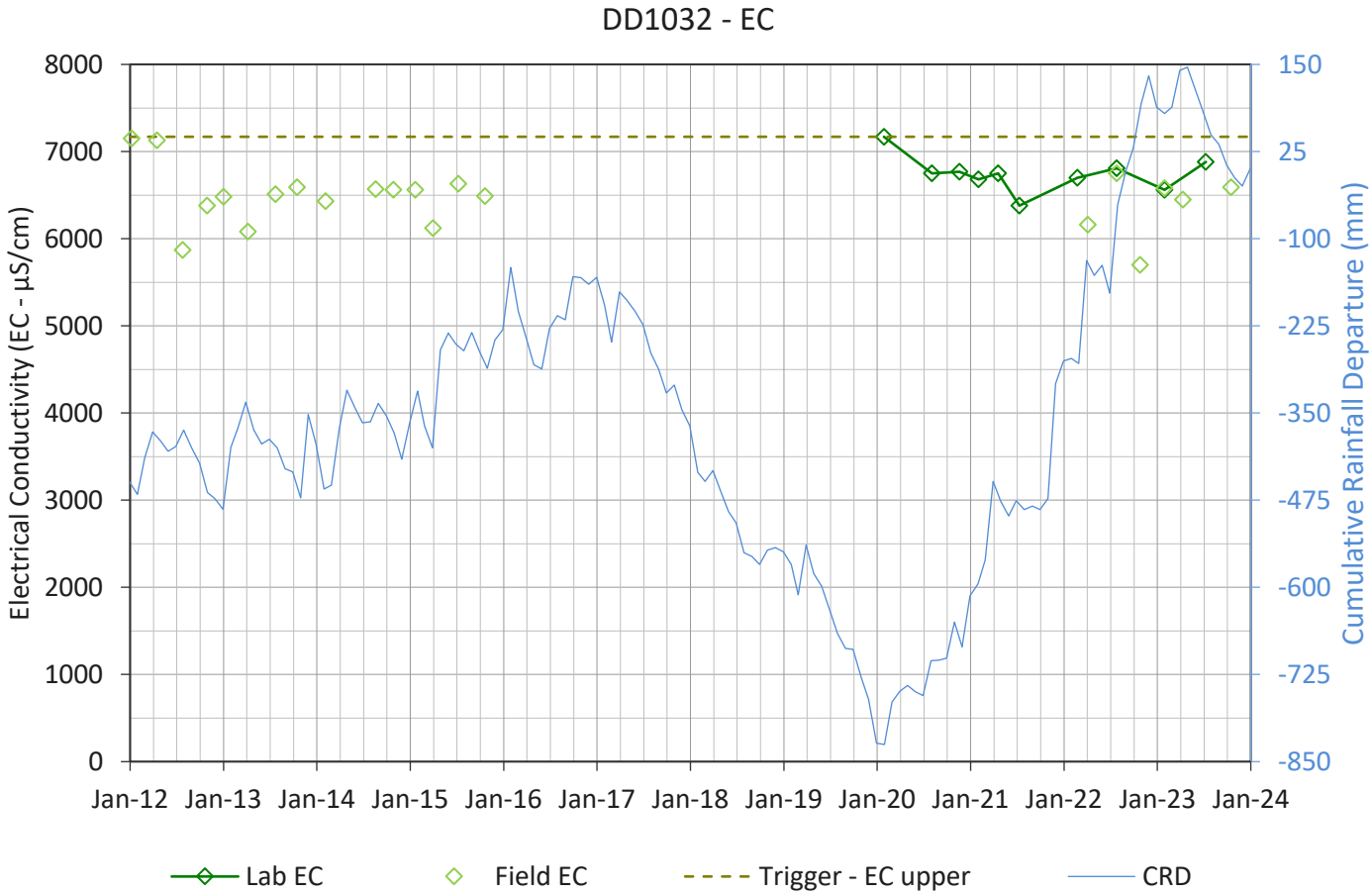

GW02S - pH
pH
Cumulative Rainfall Departure (mm)
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
150
50
-50
-150
-250
-350
-450
-550
-650
-750
-850
Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19 Jan-20 Jan-21 Jan-22 Jan-23 Jan-24
Lab pH
Field pH
Trigger - pH upper
Trigger - pH lower
CRD

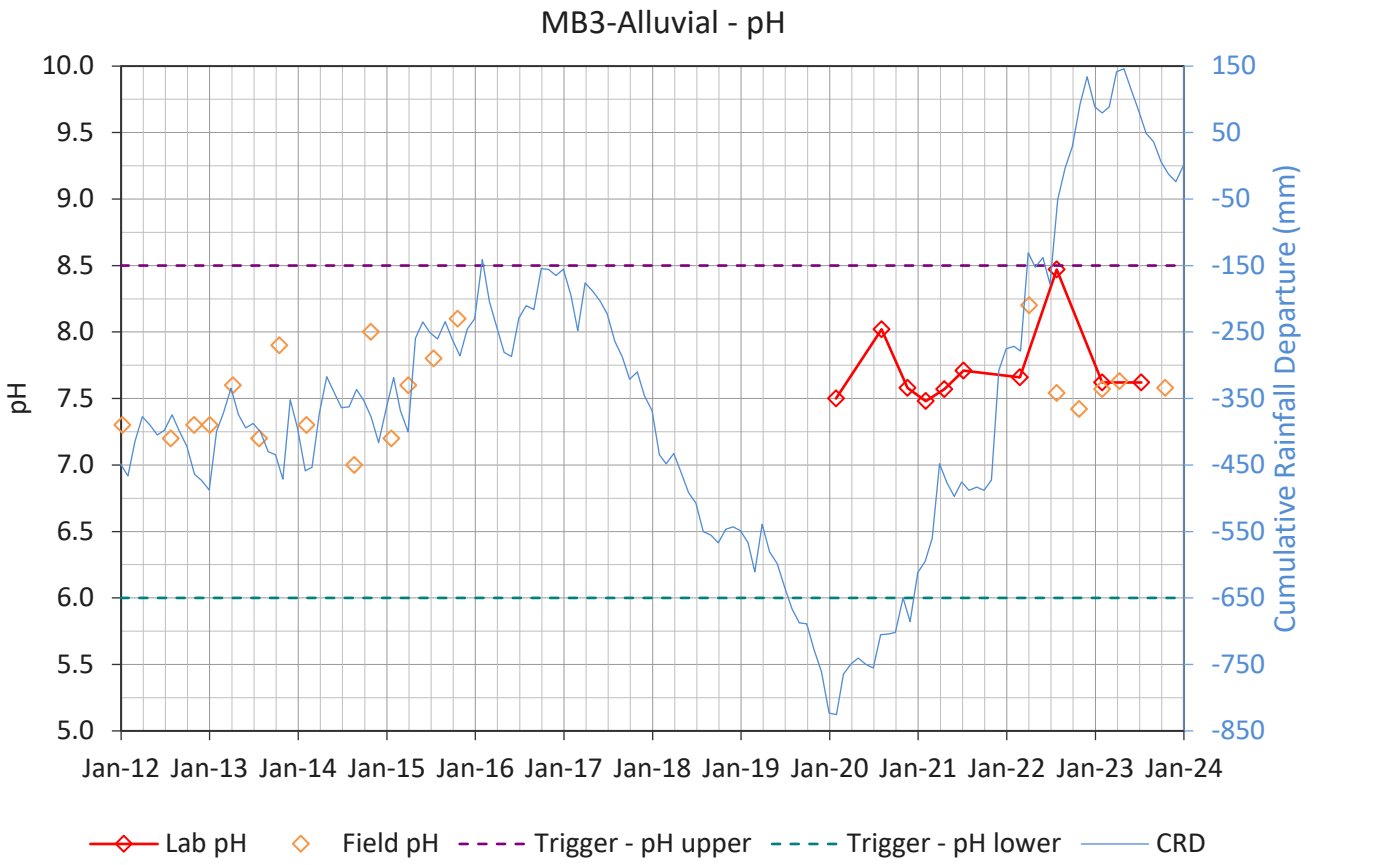

GW02S - EC
Electrical Conductivity (EC - µS/cm)
Cumulative Rainfall Departure (mm)
14000
12000
10000
8000
6000
4000
2000
0
200
50
-100
-250
-400
-550
-700
-850
Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19 Jan-20 Jan-21 Jan-22 Jan-23 Jan-24
Lab EC
Field EC
Trigger - EC upper
CRD

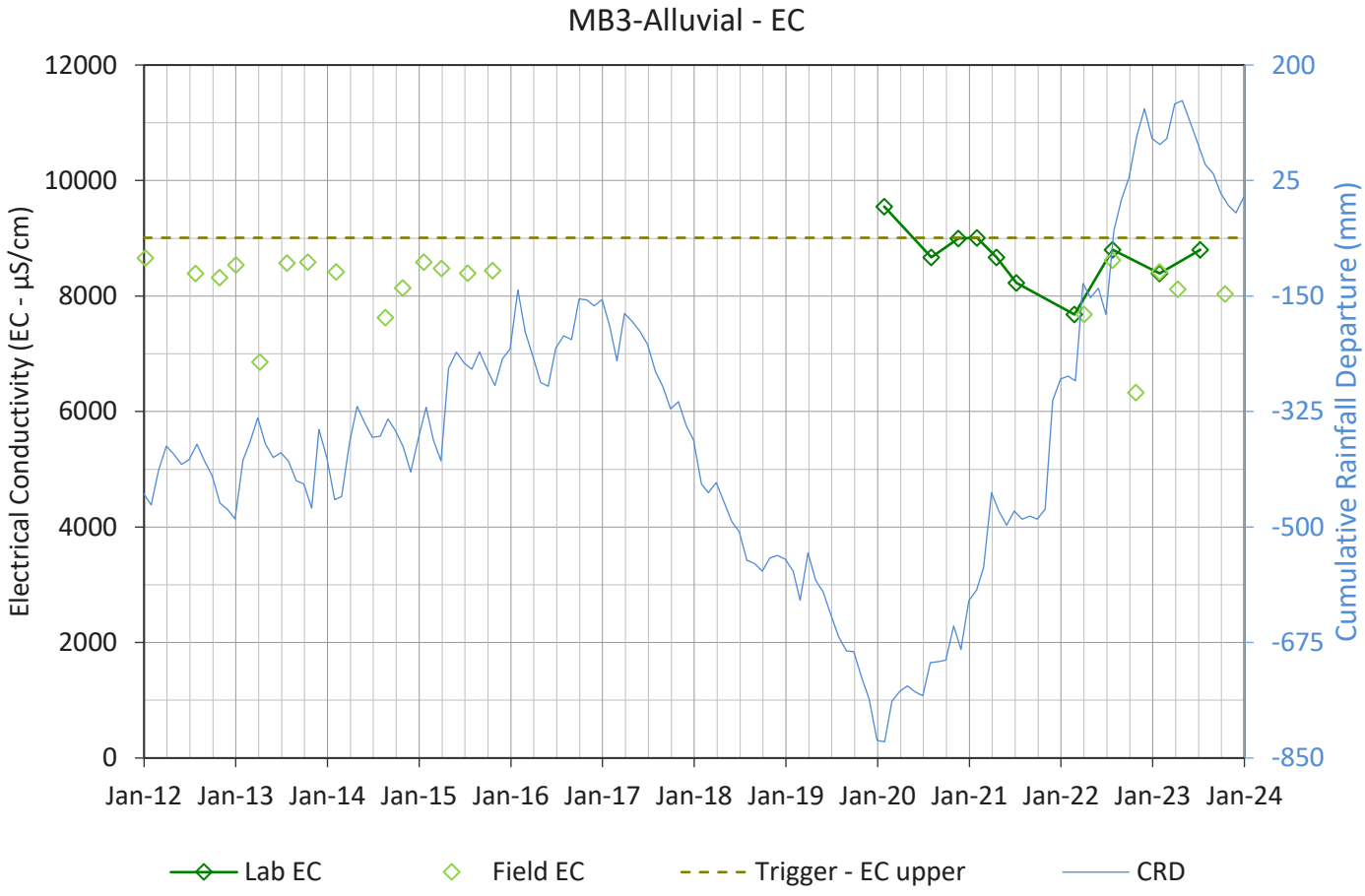

GW02D - pH
pH
Cumulative Rainfall Departure (mm)
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
150
50
-50
-150
-250
-350
-450
-550
-650
-750
-850
Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19 Jan-20 Jan-21 Jan-22 Jan-23 Jan-24
Lab pH
Field pH
Trigger - pH upper
Trigger - pH lower
CRD

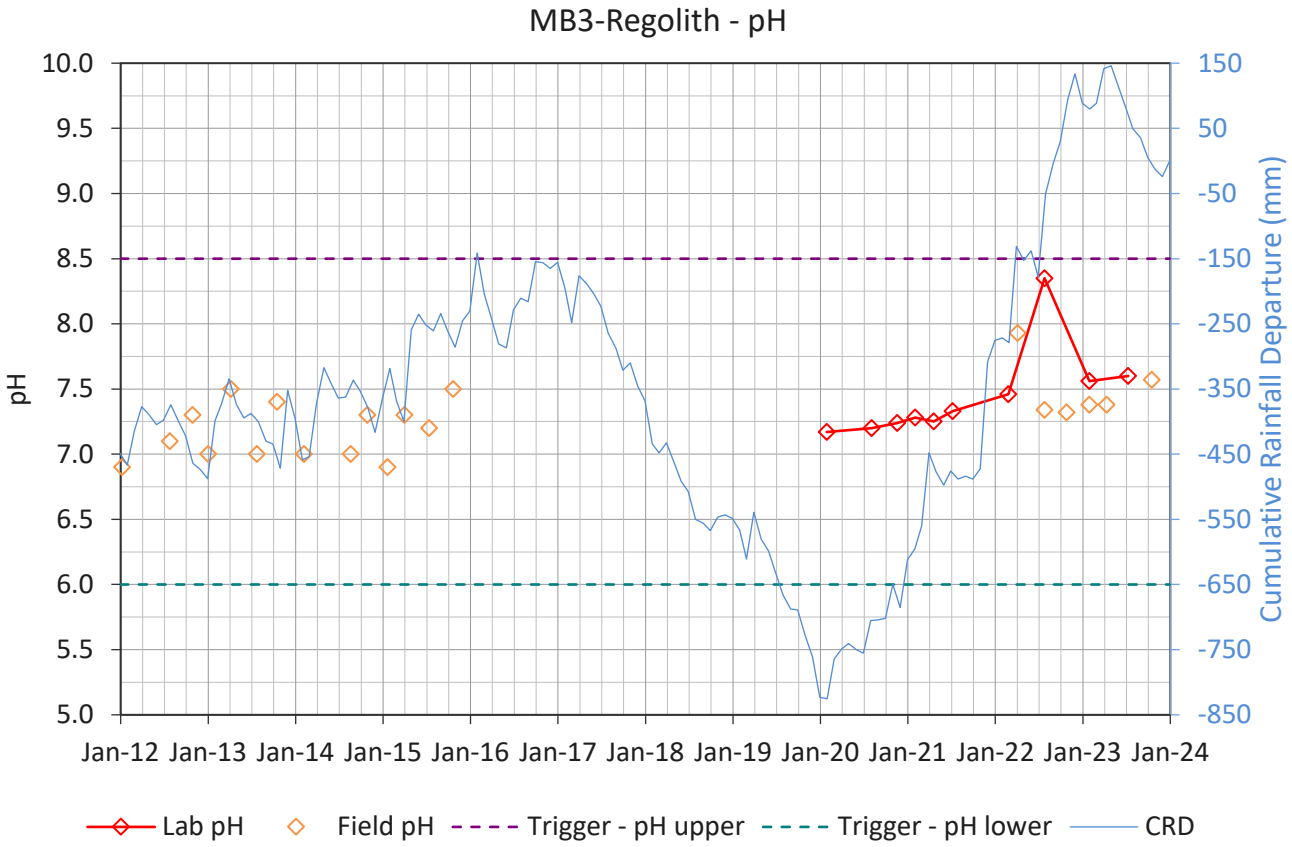

GW02D - EC
Electrical Conductivity (EC - µS/cm)
Cumulative Rainfall Departure (mm)
16000
14000
12000
10000
8000
6000
4000
2000
0
150
25
-100
-225
-350
-475
-600
-725
-850
Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19 Jan-20 Jan-21 Jan-22 Jan-23 Jan-24
Lab EC
Field EC
Trigger - EC upper
CRD

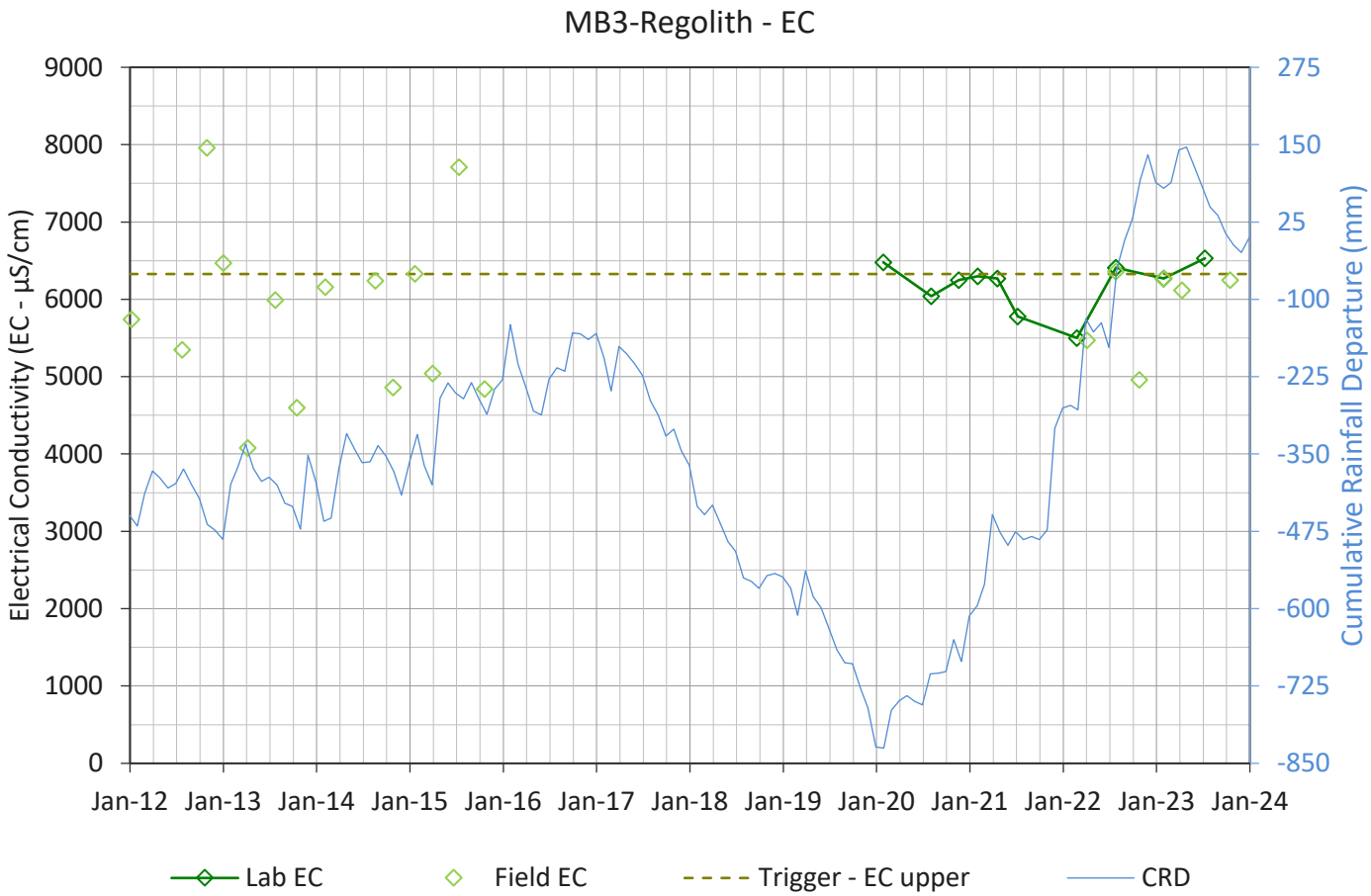

DD1032 - pH
pH
Cumulative Rainfall Departure (mm)
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
150
50
-50
-150
-250
-350
-450
-550
-650
-750
-850
Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19 Jan-20 Jan-21 Jan-22 Jan-23 Jan-24
Lab pH
Field pH
Trigger - pH upper
Trigger - pH lower
CRD


DD1032 - EC
Electrical Conductivity (EC - µS/cm)
Cumulative Rainfall Departure (mm)
8000
7000
6000
5000
4000
3000
2000
1000
0
150
25
-100
-225
-350
-475
-600
-725
-850
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
Lab EC
Field EC
Trigger - EC upper
CRD


MB3-Alluvial - pH
pH
Cumulative Rainfall Departure (mm)
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
150
50
-50
-150
-250
-350
-450
-550
-650
-750
-850
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
Lab pH
Field pH
Trigger - pH upper
Trigger - pH lower
CRD


MB3-Alluvial - EC
Electrical Conductivity (EC - µS/cm)
Cumulative Rainfall Departure (mm)
12000
10000
8000
6000
4000
2000
0
200
25
-150
-325
-500
-675
-850
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
Lab EC
Field EC
Trigger - EC upper
CRD


MB3-Regolith - pH
pH
Cumulative Rainfall Departure (mm)
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
150
50
-50
-150
-250
-350
-450
-550
-650
-750
-850
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
Lab pH
Field pH
Trigger - pH upper
Trigger - pH lower
CRD


MB3-Regolith - EC
Electrical Conductivity (EC - µS/cm)
Cumulative Rainfall Departure (mm)
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
275
150
25
-100
-225
-350
-475
-600
-725
-850
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
Lab EC
Field EC
Trigger - EC upper
CRD