WestConnex
Rozelle Interchange

JOHN HOLLAND | CPB CONTRACTORS

JHCPB Joint Venture

Ground Water Monitoring Report

Reporting Period: May 2021- November 2021

Project	Rozelle Interchange and WHT Enabling Works – Design and Construct
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Document Approval

Rev	Date	Prepared by	Reviewed by	Remarks
00	10/01/2022	C Moriarty	C Scarf	For DPIE
01	24/03/2022	C Moriarty	C Scarf	Addressing DPE comment

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1. Introduction

1.1. Project Background

WestConnex is one of the NSW Government's key infrastructure projects which aims to ease congestion, create jobs and connect communities. Together with the other components of the WestConnex Program of Works and the proposed future Sydney Gateway, the WestConnex M4-M5 Link will facilitate improved connections between western Sydney, Sydney Airport and Port Botany and south and south-western Sydney, as well as better connectivity between the important economic centres along Sydney's Global Economic Corridor and local communities (refer to Figure 1). Due to its importance, the WestConnex M4-M5 Link project was declared to be critical state significant infrastructure (CSSI) by the Minister for Planning on 15 August 2017.

This Construction Environmental Management Plan (CEMP) has been prepared in accordance with the Conditions of Approval which were granted to the Project on 17 April 2018, as well as subsequent Approved Modification Reports.
The WestConnex M4-M5 Link is being delivered in two stages:

- Stage 1, the Mainline Tunnels which includes the construction and operation of the M4-M5 Link Tunnel between the New M4 at Haberfield and the New M5 at St Peters, and
- Stage 2, the Rozelle Interchange, which will connect the Stage 1 mainline tunnels to the surrounding surface road network and includes the construction and operation of (see Figure 1)
  - An interchange at Lilyfield and Rozelle, including a connection to the proposed future Western Harbour Tunnel and Beaches Link project, and
  - A tunnel connection between the Anzac Bridge and Victoria Road, east of Iron Cove Bridge.

This Construction Environmental Management Plan (CEMP) applies only to Stage 2 of the M4-M5 Link, the Rozelle Interchange Project (the Project), which is being managed by Transport for New South Wales (TfNSW)

A detailed description of the Project is presented in Section 1.3 Construction Environmental Management Plan (CEMP).

1.2. Purpose of Construction Monitoring Report

The Groundwater Monitoring Program (the Program, RIC-JHC-MPL-00-PL-300-002 Revision 03) was prepared to satisfy Minister's Condition of Approval (CoA) C12 and its purpose is to monitor the extent and nature of the potential impacts to groundwater quality and levels during construction of the Project. This Program was approved as a part of the Groundwater Management Plan, which was approved on the 20th November 2019. As a part of this Program, a Groundwater Construction Monitoring Report (CMR) must be produced to address CoA C17. This CMR has been developed to satisfy this requirement.

This CMR will present information outlined in Table 9 of the Groundwater Monitoring Program. An extract can be found below in Table 1. It also includes the distribution list of who will receive the CMR.

Table 1 Extract of Table 9 from Groundwater Monitoring Program

Schedule (during construction)	Requirements	Recipient (relevant authority)	Where this is addressed
Reporting			
Water monitoring reports (every six months)	Data summary reports presenting tabulated groundwater monitoring data collected during the reporting period. Groundwater level hydrographs (including rainfall) and water quality (EC) results will be presented and SSTV exceedances will be highlighted. Metres of ground excavated and flow rates during construction will be presented. Applicable management responses will be documented. Compliance against discharge criteria will also be presented. Report will present validation of groundwater modelling and determine the need for any necessary adjustments to the GWMP (this document).	DPE, DPIE Water Water, Sydney Water, Port Authority of NSW	CMR
EPL Monitoring Reports and Annual Returns	EPL monitoring reports will be prepared in accordance with the requirements of the EPL. An EPL Annual Return will be prepared in respect of each EPL reporting period (typically 12 months).	EPA	Does not form part of CMR
Construction Compliance Reports (every six months)	A results summary an analysis of environmental monitoring	DPE, RMS, ER	Does not form part of CMR
Monthly Environmental Report (every month)	Commentary on monitoring program performance will be documented in the Monthly Environmental Report. Any incidents and key environmental issues will be documented.	RMS	Does not form part of CMR
Data provision			
Quarterly (every 3 months)	WTP discharge water quality and flow data (raw data collated and tabulated in Excel) To demonstrate compliance with the CoA (C12(f)), Project discharge criteria (defined in Section 3.3 of this GWMP, EPL, and if applicable JHCPB's trade waste licence.	Sydney Water	Does not form part of CMR. Has been completed.
Quarterly (every 3 months)	Groundwater level and groundwater quality (EC) monitoring data (raw data collated and tabulated in Excel) To demonstrate compliance with the CoA (C12(g)).	DPIE Water	Does not form part of CMR. Has been completed.

Based on the requirements outlined in Table 1, Water Monitoring Reports, the scope the CMR is outlined in Table 2.

Table 2 Scope and outline of Groundwater Monitoring Report

Water Monitoring Report Requirement	Section Reference
Data summary reports presenting tabulated groundwater monitoring data collected during the reporting period.	Attachment to this Report
Groundwater level hydrographs (including rainfall).	Annexure A
Water quality (EC) results will be presented, and SSTV exceedances will be highlighted.	Section 3.2 and Annexure B

Metres of ground excavated and flow rates during construction will be presented.	Section 3.3
Applicable management responses will be documented.	Section 3
Compliance against discharge criteria will also be presented.	Section 3.4
Report will present validation of groundwater modelling and determine the need for any necessary adjustments to the GWMP (this document).	Section 3

As outlined in Table 1, this CMR will present the findings of the Program for the reporting period of May 2021 through to November 2021. This reporting timeframe is accordance with the commencement of underground tunnel excavation at the Rozelle Rail Yards.

1.3. Project milestones during reporting period

Construction of the Project commenced on the 15th August 2019. The tunnelling and bulk excavation construction update for the reporting period (May 2021 to November 2021) is present in Table 3 along with the progress of tunnel excavation in Figure 1.

Table 3 Tunnel construction update for reporting period

Construction Compound	Construction update
Rozelle Rail Yards (RRY)	▪ Completion of Diaphragm Walls within WHT Cut and Cover and Ventilation Shafts. ▪ Excavation of substation and WHT decline ▪ M4 C&C excavation
Site A (RRY)	▪ All roadheaders operating. ▪ Back End Works commenced. ▪ Continued use of WTP-A.
Site B (RRY)	▪ All roadheaders operating. ▪ Back End Works commenced.
Site C (RRY)	▪ All roadheaders operating. ▪ Back End Works commenced. ▪ Continued use of WTP C.
Iron Cove Link	Ventilation Tunnel Completed

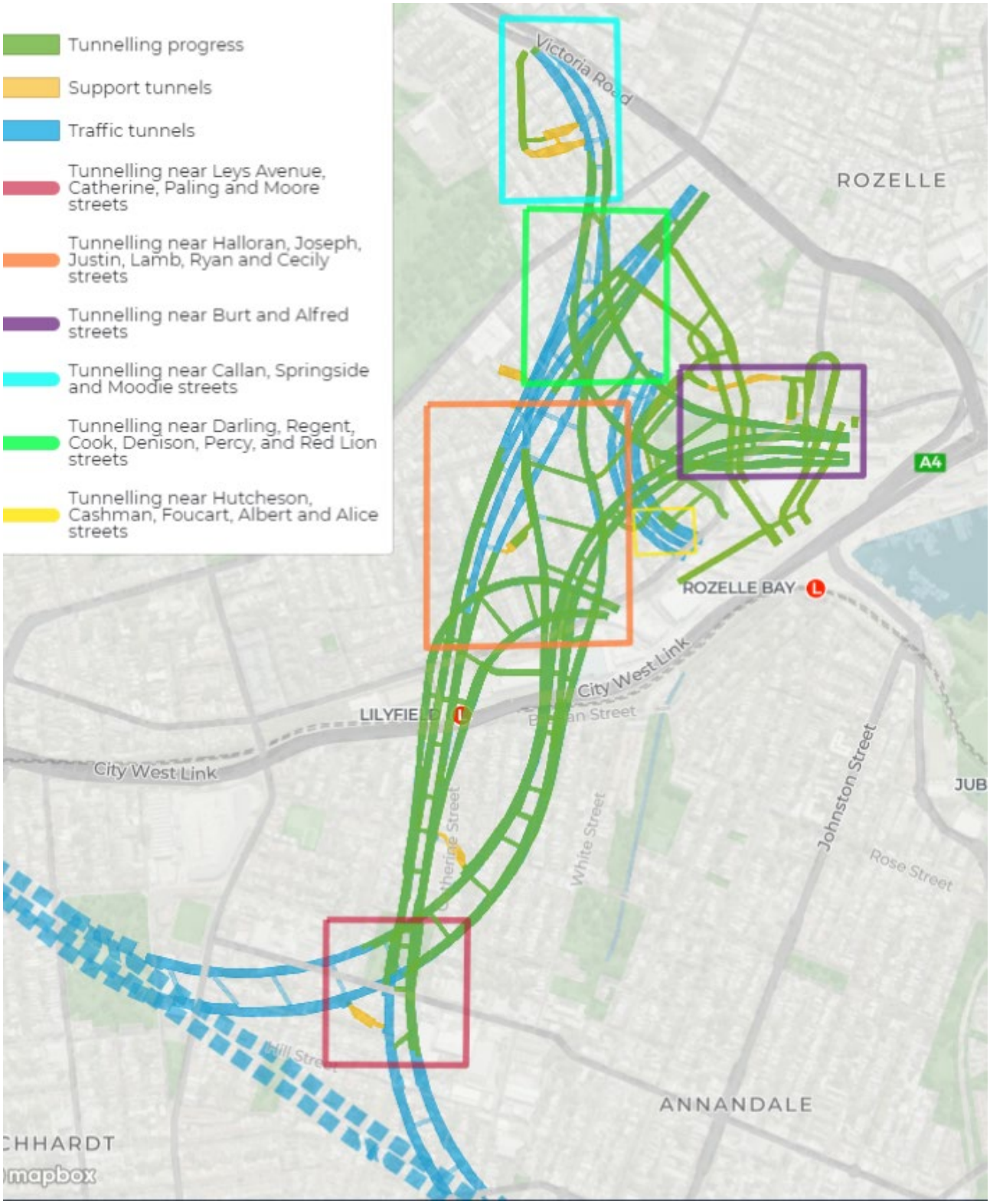


Figure 1 Approximate Tunnel Excavation Progress on 31st May 2021.

2. Groundwater Monitoring

This section presents a summary of the Program.

2.1. Monitoring Network

Groundwater monitoring was carried out within the following areas:

- Rozelle area to the north of Rozelle Bay,
- Annandale and Lilyfield area to the west of Rozelle Bay,
- Rozelle area to the south east of Iron Cove, and
- Iron Cove.

2.2. Groundwater Level Monitoring Network

In accordance with Section 3.2.2 of the Program, this CMR will present groundwater level data from:

- Four (4) Alluvium bores
- Eight (8) Hawkesbury Sandstone bores

Therefore, the selected reporting bores are presented in Table 4 and Figure 2. These bores were selected for reporting based on tunnel excavation progress and the commissioning of additional groundwater bores within the reporting period.

Table 4 Location of construction groundwater level monitoring bores

Bore ID	Location	Easting	Northing	Elevation (mAHD)	Lithology	Type	Parameters
RZ_BH60 Log	Justin St, Lilyfield	330994	6250766	24.96	Hawkesbury Sandstone	SP	GWL, GWQ (EC)
TC_BH01d Log	RailCorp, Lilyfield	330660.6	6250304.9	2.54	Hawkesbury Sandstone	SP	GWL, GWQ (EC)
TC_BH01s Log	RailCorp, Lilyfield	330660.6	6250304.9	2.55	Alluvium	SP	GWL, GWQ (EC)
TC_BH06_Log	Railway Pde, Annandale	330611.4	6250298.3	2.65	Alluvium	SP	GWL, GWQ (EC)
TC_BH08_Log	Railway Pde, Annandale	330818.3	6250435.9	2.24	Alluvium	SP	GWL, GWQ (EC)
IC_BH01 Log	Waterloo St, Rozelle	330514.2	6251505	26.77	Hawkesbury Sandstone	SP	GWL, GWQ (EC)
RIC_JHCPB_ VWP06_01	National St, Rozelle	330875.4	6251485	10.03	Hawkesbury Sandstone	VWP	Pore pressure/ GWL
RIC_JHCPB_ VWP06_02	National St, Rozelle	330875.4	6251485	0.03	Hawkesbury Sandstone	VWP	Pore pressure/ GWL
RIC_JHCPB_ VWP06_03	National St, Rozelle	330875.4	6251485	-9.97	Hawkesbury Sandstone	VWP	Pore pressure/ GWL
RIC_JHCPB_ VWP06_04	National St, Rozelle	330875.4	6251485	-39.97	Hawkesbury Sandstone	VWP	Pore pressure/ GWL
RIC_JHCPB_ VWP06_05	National St, Rozelle	330875.4	6251485	-79.97	Hawkesbury Sandstone	VWP	Pore pressure/ GWL
RIC_JHCPB_ VWP8_01	Balmain Rd, Lilyfield	330150.8	6250888	10.04	Hawkesbury Sandstone	VWP	Pore pressure/ GWL

RIC_JHCPB_VWP8_02	Balmain Rd, Lilyfield	330150.8	6250888	-9.9593	Hawkesbury Sandstone	VWP	Pore pressure/ GWL
RIC_JHCPB_VWP8_03	Balmain Rd, Lilyfield	330150.8	6250888	-29.9593	Hawkesbury Sandstone	VWP	Pore pressure/ GWL
RIC_JHCPB_VWP10_01	Fred St, Lilyfield	330357.2	6250996	10	Hawkesbury Sandstone	VWP	Pore pressure/ GWL
RIC_JHCPB_VWP10_02	Fred St, Lilyfield	330357.2	6250996	-10	Hawkesbury Sandstone	VWP	Pore pressure/ GWL
RIC_JHCPB_VWP10_03	Fred St, Lilyfield	330357.2	6250996	-30	Hawkesbury Sandstone	VWP	Pore pressure/ GWL
RIC_JHCPB_VWP10_04	Fred St, Lilyfield	330357.2	6250996	-50	Hawkesbury Sandstone	VWP	Pore pressure/ GWL
RIC_JHCPB_VWP10_05	Fred St, Lilyfield	330357.2	6250996	-80	Hawkesbury Sandstone	VWP	Pore pressure/ GWL
RIC_JHCPB_VWP11_01	Paling St, Lilyfield	330360.6	6249979	-0.0473	Hawkesbury Sandstone	VWP	Pore pressure/ GWL
RIC_JHCPB_VWP11_02	Paling St, Lilyfield	330360.6	6249979	-10.0473	Hawkesbury Sandstone	VWP	Pore pressure/ GWL
RIC_JHCPB_VWP11_03	Paling St, Lilyfield	330360.6	6249979	-20.0473	Hawkesbury Sandstone	VWP	Pore pressure/ GWL
RIC_JHCPB_VWP11_04	Paling St, Lilyfield	330360.6	6249979	-40.0473	Hawkesbury Sandstone	VWP	Pore pressure/ GWL
RIC_JHCPB_VWP11_05	Paling St, Lilyfield	330360.6	6249979	-60.0473	Hawkesbury Sandstone	VWP	Pore pressure/ GWL
RIC_PSM_BH014_VMP_01[1]	Starling St, Lilyfield	330456.4	6250242	-0.17	Hawkesbury Sandstone	VWP	Pore pressure/ GWL
RIC_PSM_BH014_VMP_02[1]	Starling St, Lilyfield	330456.4	6250242	-14.17	Hawkesbury Sandstone	VWP	Pore pressure/ GWL
RIC_PSM_BH055_VWP01[1]	Rozelle Rail Yard	330665.9	6250403	-2.7	Alluvium	VWP	Pore pressure/ GWL
RIC_PSM_BH055_VWP02[1]	Rozelle Rail Yard	330665.9	6250403	-4.3	Alluvium	VWP	Pore pressure/ GWL
RIC_PSM_BH055_VWP03[1]	Rozelle Rail Yard	330665.9	6250403	-5.3	Alluvium	VWP	Pore pressure/ GWL
RIC_PSM_BH055_VWP04[1]	Rozelle Rail Yard	330665.9	6250403	-9.7	Alluvium	VWP	Pore pressure/ GWL
RIC_PSM_BH055_VWP05[1]	Rozelle Rail Yard	330665.9	6250403	-11.9	Alluvium	VWP	Pore pressure/ GWL
RIC_PSM_BH008_VMP01_	Rozelle Rail Yard	330337.9	6250772	-5.54	Hawksbury Sandstone	VWP	Pore pressure/ GWL

RIC_PSM_BH008_VMP02_	Rozelle Rail Yard	330337.9	6250772	-26.53	Hawksbury Sandstone	VWP	Pore pressure/ GWL
RIC_PSM_BH008_VMP03_	Rozelle Rail Yard	330337.9	6250772	-47.54	Hawksbury Sandstone	VWP	Pore pressure/ GWL

GWL = Groundwater level; GWQ = Groundwater quality; SP = Standpipe piezometer; VWP = Vibrating Wire Piezometer

[1] New well installed prior to commencement of adjacent tunnelling works.

Dataloggers installed in all bore holes presented in Table 4 ensure data on groundwater levels are continuously collected and stored. These dataloggers are programmed to record at hourly intervals. Those bores fitted with Vibrating Wire Piezometer (VWP) will record pore pressures at six-hourly intervals. Data collected from the dataloggers and VWP will be assessed against local rainfall records and trends assessed to determine whether the observed decrease is attributed to the Project and if so, whether it aligns with approved predictions.

Bore hole BH_60 on Justin Street has been damaged in September 2021 and is currently not a reporting bore. RIC_PSM_BH008 will replace BH_60 as a a reporting bore as it is the nearest piezometer to RZ_BH60, around 200m north of RZ_BH60. Data from RIC_PSM_BH008 for September 2021 and November 2021 is included in this report.

2.2.1. Iron Cove Monitoring Wells

Two monitoring wells have been installed in the north Rozelle/Lilyfield area to the west of the ventilation tunnel at Iron Cove to monitor groundwater levels as per CoA C12 (h) in Modification 3 of SSI 7485 which was determined on the 28th July 2020. Subsequently, consultation with The Water Group (DPIE Water) was undertaken for the locations of these wells.

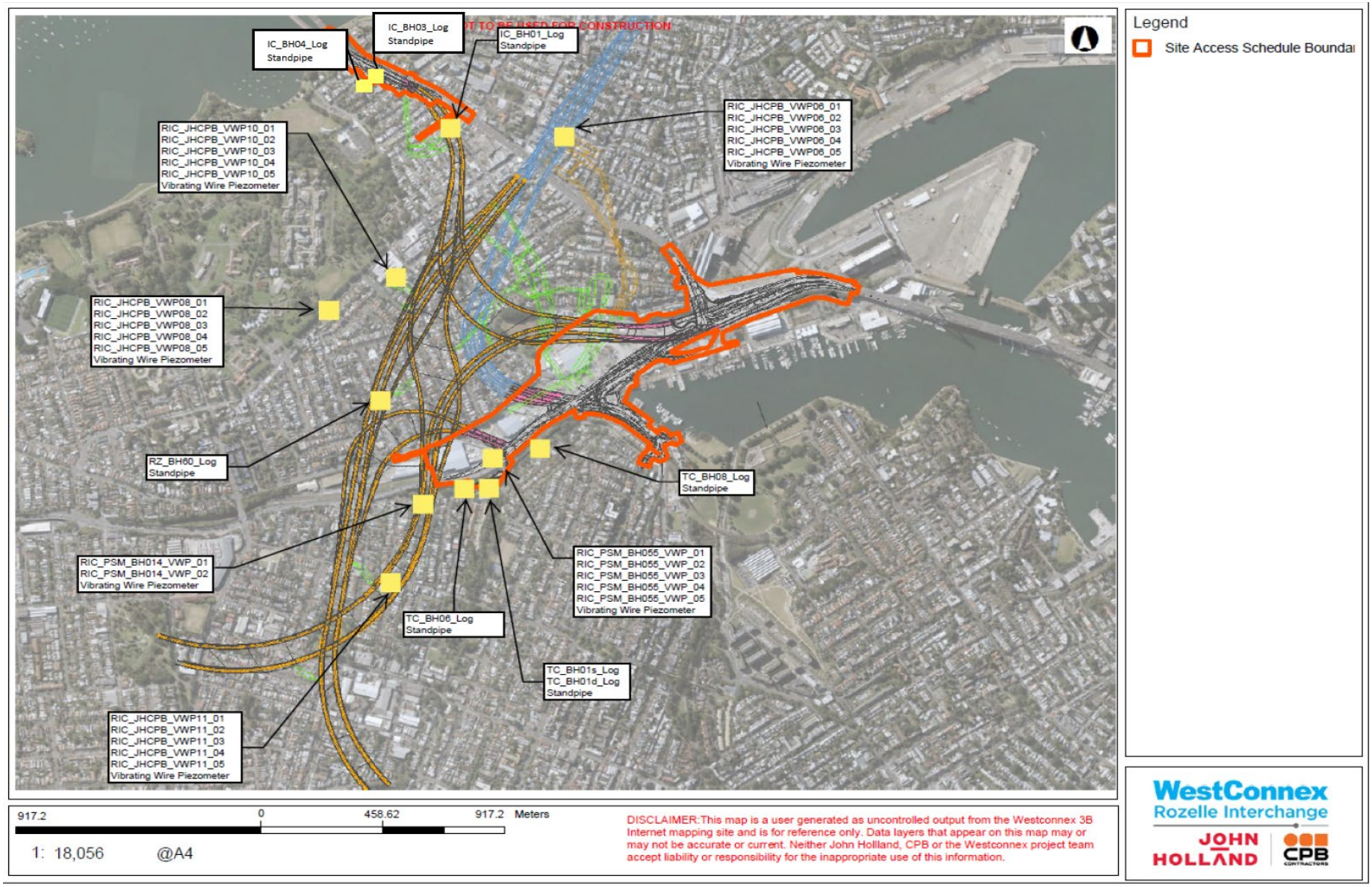


Figure 2 Map of the construction groundwater monitoring bores

2.3. Groundwater salinity and performance criteria

As detailed in Section 3.2.3.1 of the Program, baseline monitoring determined that some groundwater quality parameters exceed the default ANZECC (2000) water quality trigger values for slightly to moderately disturbed ecosystems. This is not unexpected given the highly disturbed and urbanised Project area. Site-Specific Trigger Values (SSTV) for EC developed for each water quality monitoring bore using the baseline data on EIS (AECOM 2017) is adopted as the criteria for measuring field data. These values are presented in Table 5.

The SSTV's provide an easily identifiable indication of a potential change in salinity. A management response would be initiated if any of the following occurs:

- The EC data continuously exceeds the SSTV over a period of three months and depicts a rising trend
- The EC data exceeds the SSTV at any time by more than 100%

If one or both above EC triggers are observed a review will be initiated to determine the significance of the exceedance(s) and possible causes. The review will assess the historical and surrounding monitoring bore data, and modelling predictions.

If the exceedance is determined to be attributable to Project works and outside of approved model predictions for saline intrusion the groundwater model will be reviewed and updated. The updated model will be used to assess potential impacts and inform potential mitigation measures.

As a result of design and construction activities several bores required relocation. Relocation IDs for these new bores are included below in Table 5. All relocated bores are identified by the Environment and Sustainability Manager in consultation with a suitably qualified hydrogeologist.

Locations of all salinity loggers are in Figure 3 and Figure 4.

Table 5 Groundwater salinity performance criteria

Region	Monitoring bore[1]	Lithology	Sample count	EC min (µS/cm)	EC max (µS/cm)	SSTV[2] (µS/cm)	Relocation bore
Rozelle	RZ_BH01s	Alluvium	22	397	2,174	600	RZ_GW24
	RZ_BH01d	Hawkesbury Sandstone	23	307	3,650	2,000	N/A
	RZ_BH015		22	368	1,470	1,100	RZ_GW22
	RZ_BH44d		22	161	1,925	1,400	SB_BH01
	RZ_BH51		19	239	4,100	1,800	RZ_GW01
	RZ_BH52		21	526	1,317	1,000	RZ_GW05b
	RZ_BH60		13	172	4,910	3,900	N/A
	RZ_BH67		9	507	773	600	GC01_GW01b
The Crescent	TC_BH01s	Alluvium	22	6,899	74,800	30,100	N/A
	TC_BH06s		23	1,175	4,723	2,400	N/A
	TC_BH08s		22	3,170	42,730	13,500	N/A
	TC_BH01d	Hawkesbury Sandstone	22	1,126	9,910	3,900	N/A
Iron Cove	IC_BH01	Hawkesbury Sandstone	14	516	7,980	2,100	N/A
	IC_BH03		N/A	N/A	N/A	710	N/A
	IC_BH04		N/A	N/A	N/A	590	N/A

Two monitoring wells are installed in the north Rozelle/Lilyfield area to the west of the ventilation tunnel at Iron Cove to monitor salinity as per CoA12 (h) in consultation with The Water Group (DPIE Water). These are identified as IC_BH03 and IC_BH04 and locations shown in Figure 4 below. In the absence of background monitoring data for these bores and based on the

groundwater model and HIR, no significant fluctuations in the levels recorded are expected and any changes that occur from the initial time of installation will be monitored.

At the time of installation, the value has been recorded and is used as the salinity quality trigger value.

Due to delays in finding suitable locations, gaining approvals and consultation of these bores, they were installed in April 2021 but have not recorded a substantial set of data to date that is suitable for analyses. These bores will be monitored bi-monthly and assessed against their nominated SSTV values in Table 5. The same management responses will be in place as for all the other monitoring results

Bore hole BH_60 on Justin Street has been damaged in September 2021 and is currently not a reporting bore. Data from May 2021 to September 2021 is included in this report. There is no suitable existing replacement bore however tunnelling in this area is complete and a review of all salinity data will be included within the updated HIR. Any recommendations from the updated HIR for salinity will be considered in the next 6 monthly report.

Figure 3 Map of the salinity groundwater monitoring bores

Figure 4 Map of the salinity groundwater monitoring bore IC

2.4. Groundwater inflows and performance criteria

Groundwater inflows into tunnels during construction, will be estimated using a simple water balance approach:

- Groundwater inflow = Construction Water Treatment Plant (WTP) Discharge – Project water inputs

The purpose of estimating groundwater inflows into tunnels during construction is to determine and assess trends. The results will be used to inform the groundwater model updates to increase the confidence level in the model predictions. Results for groundwater inflows are presented in Section 3.3.

2.5. Construction WTP and performance criteria

Construction WTPs have been utilised on site to process groundwater and construction water. The final construction WTP (WTP-C) was commissioned in July 2020. Figure 5 below outlines the location of the licensed discharge points under the Project's Environmental Protection Licence (EPL) and the WTP's which utilise these discharge points. Each discharge event is identified by the licensed discharge point used.

Figure 5 Location of Licenced Discharge Points at RRY and associated WTPs

The water quality discharged from each WTP must comply with the discharge concentrations featured in the Projects Environmental Protection Licence (EPL). Discharge results for this reporting period are presented in Section 3.4.

Table 6 EPL discharge concentrations for groundwater from 15/05/2020

Parameter	Unit	WTP performance criteria
pH	pH	6.5-8.5
Turbidity	mg/L	<50
Oil and Grease	visible	Not visible
Cadmium	mg/L	0.014
Chromium (hexavalent)*	mg/L	0.07
Chromium (trivalent)	mg/L	0.15
Copper*	mg/L	0.04

Iron	mg/L	1.5
Lead	mg/L	0.03
Mercury	mg/L	0.0007
Nickel	mg/L	0.2
Zinc*	mg/L	0.15
Arsenic	mg/L	0.05

*90th Percentile Concentration

3. Results from Program and Management Responses

3.1. Results for groundwater level monitoring

The groundwater level monitoring results for the reporting period May 2021 to November 2021 is presented in graphs along with the rainfall recorded during the reporting period. Refer to Annexure A. Groundwater level monitoring results are reviewed as the data is collected and the vibrating wire piezometer pore pressure data converted to inferred groundwater levels. Groundwater level data and pore pressure is a key input into the settlement monitoring program to ensure compliance with settlement related conditions, E103. As a component of reviewing settlement, groundwater levels detailed in Annexure A have been reviewed. All groundwater drawdown identified during the reporting period (refer to Annexure A) are within ranges that ensure settlement is at or below predicted values and compliant with condition E103. During the reporting period, drawdown identified in Annexure A appears to stabilise.

Generally, all piezometers across the whole of the project are in line with predictions. The Project's hydrogeological designers will be undertaking a comprehensive review of all data, updating the hydrogeological report and groundwater modelling once 24 months of construction groundwater monitoring data is available. The updates to the hydrogeological report and modelling are due in the first quarter of 2022.

During this reporting period five bores recorded lower than predicted values:

- TC_BH01d
- TC_BH01s
- RIC_PSM_BH055_VWP01 to 05 (i.e., five VWP sensors)
- RIC_JHCPB_VMP06_05
- RIC_JHCPB_VWP10_04

The groundwater levels for RIC_PSM_BH055_VMP01 to 05 have steadily increased and recovered over the reporting period. The shallower of the VWP sensors, VMP01, VMP02 and VMP03, have recovered to a level above the long term predicted GWL, with the deeper two sensors, VMP04 and 05, recovering to a level that remains below the long term predicted GWL (i.e., approximately 1.0 and 2.0m below respectively). Whilst VMP04 and 05 remain below the long term predicted GWL, their levels have increased by approximately 1.5 and 2.0m respectively over the 6-month reporting period. This is in line with construction activities seeing tunnelling spread out away from the railyards, lowering the inflow rate. Completion of surface grouting programs and completion of M5 and Western Harbour Tunnel (WHT) cut and cover excavations would also see significant reductions in groundwater inflow or drawdown. Settlement monitoring for this area shows up to 10mm of settlement, which is within the approved levels outlined in E103.

The TC_BH01s GWL has remained stable over the reporting period and continues to sit approximately 1.0m below the long term predicted GWL. Settlement monitoring for this area shows up to 15mm of settlement, which is within the approved levels outlined in E103.

The GWL for TC_BH01d has recovered somewhat during the reporting period. The GWL has gone from approximately –15.0 to –9.5m. Settlement monitoring for this area shows up to 15mm of settlement, which is within the approved levels outlined in E103.

RIC_JHCPB_VMP06_05's GWL has continued to gradually decrease throughout the reporting period. There is no settlement monitoring adjacent to this bore as it is outside the tunnelling zone of influence, nearest tunnels being M130 and M140. The nearest settlement monitoring to this area however shows settlement of up to 5mm, which is within the approved levels outlined in E103. No settlement has been identified outside of this historical shrink swell movements which indicates that

this impact may not be project related. In addition to the routine analysis detailed above, the groundwater model will be updated once 24 months of construction groundwater monitoring data is available and the results of the updated modelling will be provided to the Secretary and DPI Water. These updates to the hydrogeological report and modelling are due in the first quarter of 2022.

RIC_JHCPB_VWP10_04's GWL decreased by approximately 26m from -6.5 to -32.5m between the start of the reporting period and the middle of November, after which the readings began to stabilise. The reduction in GWL corresponds with the excavation of the nearby M440 (Substation 2) tunnel over the same period. The nearest surface settlement monitoring data to these instruments show up to 7mm of settlement, which is within the approved levels outlined in E103.

As seen in Annexure A, some gaps in data collected during the reporting period were identified. The causes of these gaps were from:

- Faulty sensors.
- Battery or power failure.
- Faulty antennas.
- Installation of new sensors; and
- Construction of the borehole.

Repairs were undertaken on the affected instruments and monitoring has since recommenced.

The raw data for groundwater levels are presented in Annexure C.

In line with GWMM10 the Groundwater Management Plan (GMP) Section 5.6.3 notes there are no registered bores or bores subject to the Aquifer Interference Policy in the zone of depression. Therefore, there are no other bore water users subject to impacts and no further assessments or measures are required.

3.2. Results from groundwater salinity monitoring

Continuous groundwater electrical conductivity (EC) monitoring was undertaken on 14 bores on an hourly basis following the installation of dataloggers. Groundwater quality data is collected from dataloggers on a bi-monthly basis. Results from the salinity dataloggers is presented in Annexure B. The performance criteria and locations of these dataloggers is in Section 2.2

During the reporting period, there were instances where 100% of nominated exceedance criteria occurred. A review was undertaken of EIS, background data from the HIR and predicted groundwater modelling for the identified bores. This management response undertaken determined the exceedances recorded are consistent with levels and fluctuations that had been reported in the EIS and background data and predicted as in the HIR. Therefore, fluctuations in results and exceedances of nominated SSTV's are not deemed to be attributed to project works and further monitoring will be undertaken and reviewed by groundwater specialists.

Results from this reporting period have been fed back to design teams for consideration in updating the HIR. The HIR as per CoA 194 is currently being updated after 24 months of construction monitoring.

Comments on specific dataloggers and management responses for exceedances are below:

- GC01_GW01 was damaged in July 2021 and the logger was missing. Due to delivery issues from the logger supplier due to COVID-19 a replacement logger was installed in September 2021. The logger malfunctioned and was relaunched in November 2021. Therefore, there is no usable data for this bore for this reporting period.

- RZ_GW05b saw 100% exceedances toward the end of the monitoring period. These results are in line with the excavation of the M4 Westbound C&C excavation which is 25m from the logger and is at 18m BGL and as predicted.
- TC_BH01d has fluctuated as predicted in the EIS and background data and has not exceeded max. EC of 9910 µS/cm.
- RZ_BH60 has been destroyed by tunnelling directly under the bore as of 22nd September 2021. Prior to this the readings were lower than previously recorded due to the low levels or absence of groundwater in this area as tunnelling passed directly underneath. There are no existing suitable wells in proximity to Bh_60 to use as a replacement. This bore will be replaced in consultation with hydrologists. To install a new bore in a suitable location will take a minimum of 3-4 months to complete with the inclusion of a road closure and further disruption to the local community.
- RZ_GW24 and Rz_GW22 loggers malfunctioned between 20th Sept 2021 and 15th Nov 2021. Once the issue was identified the loggers were relaunched and malfunction corrected.
- TC_BH08 saw slightly elevated readings but maintained consistent results over the past few months. These results are in line with what was recorded during baseline line data collection.
- TC_BH06 saw slightly elevated results for a period of time which did not span longer than a 3-month period, so no further investigation was required.
- IC_BH01 logger malfunctioned however, access to this well has been limited with lack of traffic controllers as a result of COVID-19 restrictions and Sydney Metro works. Therefore, repair/replacement could not be completed within this reporting period.

3.3. Results for groundwater inflow estimates

The vast majority of the Rozelle Interchange are positioned within Rozelle and has multiple tunnels positioned on top of each other. This is unlike a linear tunnel design found in the other WestConnex Stages. Due to this unique configuration and design, the estimated groundwater inflows have been combined across all three tunnelling areas and presented in a Table 9. This summary estimates groundwater inflow rates for the mainline, cross passages and ventilation tunnels excavated from May 2021 to November 2021.

Tunnel excavation undertaken during this reporting period intercepted dykes and encountered faulted or fractured zones. Where required, a grouting program was implemented to reduce groundwater inflows. Surface grouting into sandstone was also undertaken at the ventilation and intake shafts to prevent groundwater inflows during excavation of these shafts. Diaphragm wall construction (within alluvium soils) has been undertaken within the RRY at the WHT Tunnel and Ventilation Shafts.

Requirements outlined in E190 of the Ministers Conditions of Approval require the Proponent to take all practical measures to limit operational groundwater inflows to 1L/sec/km. Therefore, estimated groundwater inflows into tunnels during construction presented in Table 7 are not subject to this condition. Groundwater inflows during construction will reduce and stabilise as the system moves towards equilibrium. Groundwater inflows will continue to be closely monitored by the Project and will continue to be reported in subsequent CMRs.

Table 7 Estimated Groundwater Inflows

Month	Groundwater Inflow (l/sec)	Linear Meters Excavated (m)	Estimated Groundwater Inflow (l/sec/km)
June	4.47	19432.00	0.93

July	19.4	23069.00	3.16
August	10.59	23480.00	1.72
September	4.08	24224.00	0.55
October	5.65	24878.00	0.96
November	6.80	25598.00	0.82

3.4. Results for construction WTP monitoring

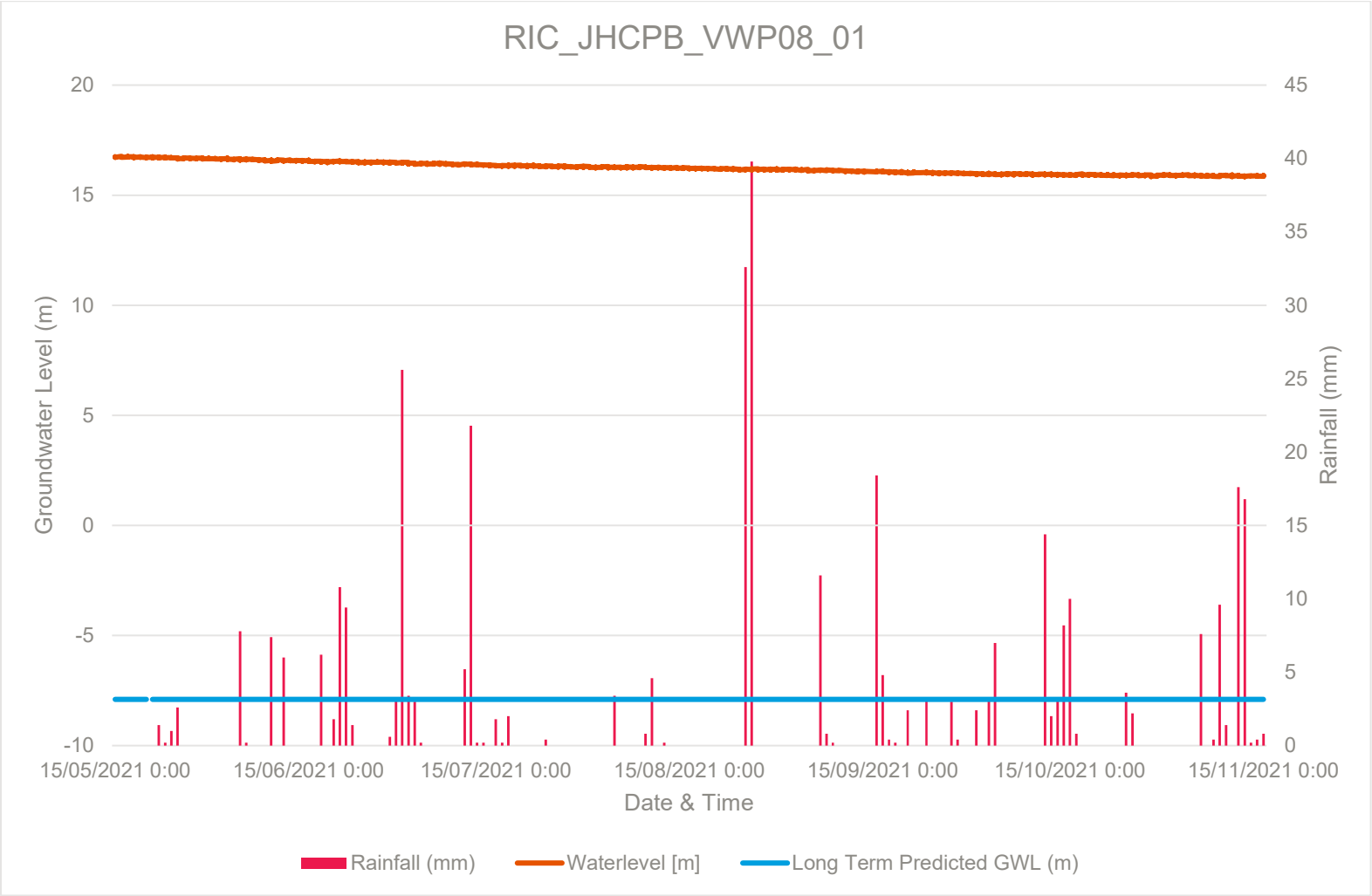
The water quality of WTP discharges for the reporting period May 2021 through to November 2021 are listed in Table 8. All discharges from WTPs on the Project were compliant with the Projects EPL.

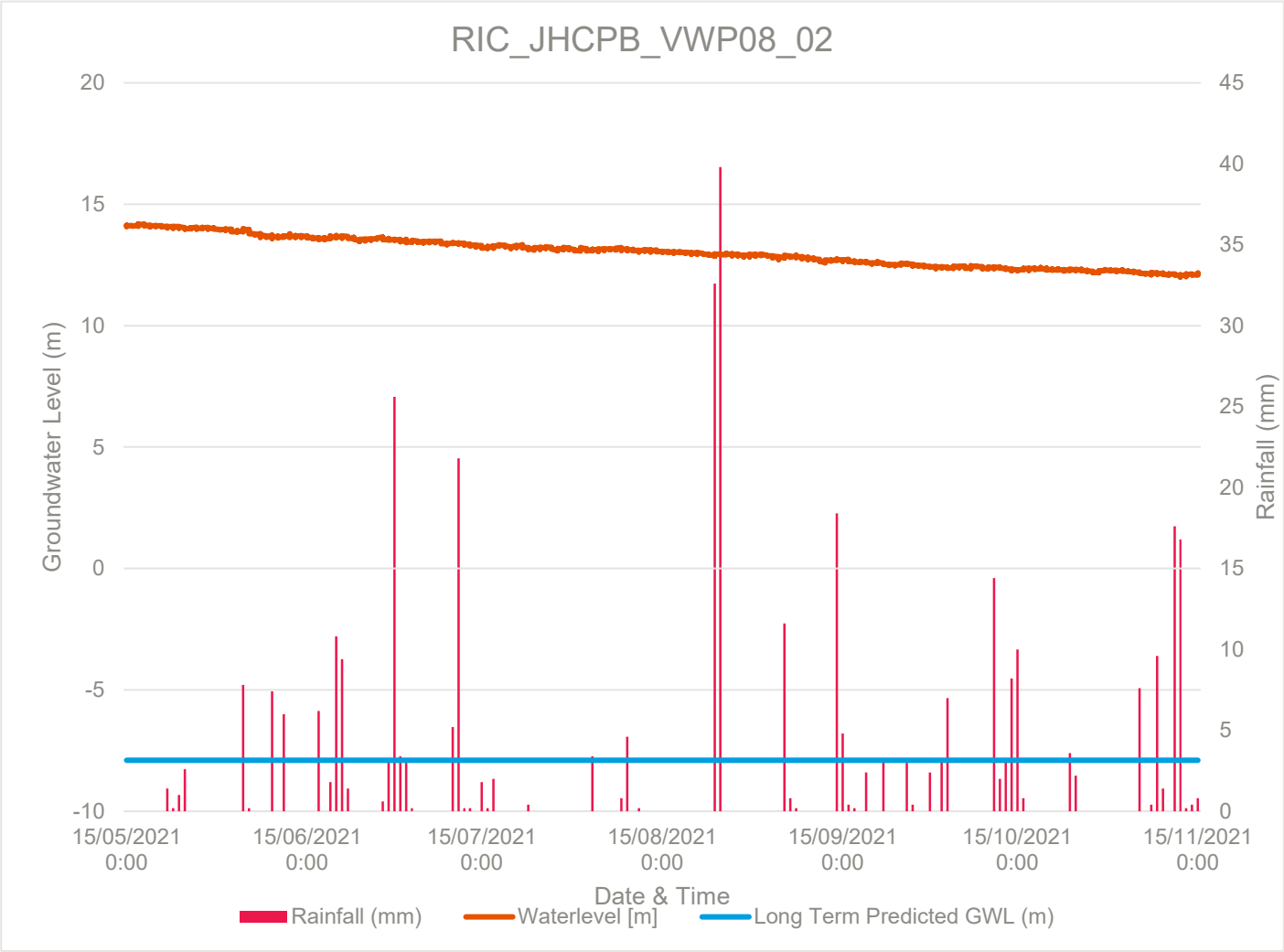
Table 8 WTP discharge water quality results

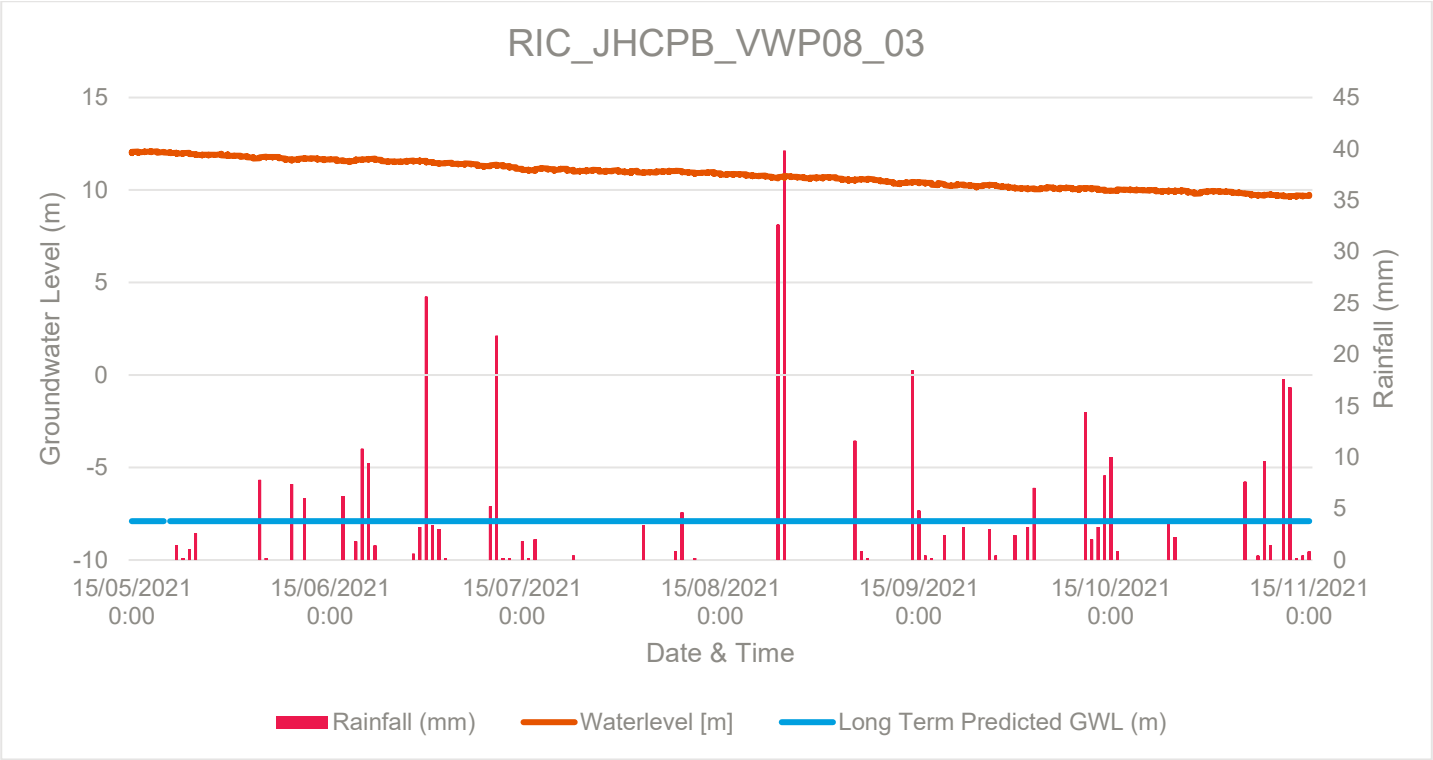
Date	License Discharge Point	Turbidity (NTU)	pH	Oil & Grease	Arsenic	Cadmium	Chromium hexavalent	Chromium trivalent	Copper	Iron	Lead	Manganese	Mercury	Nickel	Zinc	Comments
Discharge Concentrations after 15/05/2020		<50	6.5-8.5	None visible	0.05	0.014	0.07*	0.15	0.04*	1.5	0.03	2.5	0.0007	0.2	0.15*	
01/06/2021	RRY-A	0.7	7.1	None visible	0.0005	<0.00005	0.014	0.001	0.0007	0.004	<0.0001	0.318	<0.0001	0.0007	0.002	Compliant
01/06/2021	RRY-C	0.4	7.08	None visible	0.0006	<0.00005	0.032	<0.001	0.0008	0.006	<0.0001	0.0368	<0.0001	0.0016	0.002	Compliant
01/06/2021	RRY-C	4.5	6.8	None visible	0.0006	0.00008	0.033	<0.001	0.001	0.004	<0.0001	0.018	<0.0001	0.0006	<0.001	Compliant
01/07/2021	RRY-A	0.9	7.21	None visible	0.0007	<0.00005	0.041	<0.001	0.0009	<0.002	<0.0001	0.285	<0.0001	0.0005	0.002	Compliant
01/07/2021	RRY-C	0.3	7.09	None visible	0.0004	<0.00005	0.026	<0.001	0.002	0.003	<0.0001	0.0286	<0.0001	0.0005	0.001	Compliant
01/07/2021	RRY-C	0.3	6.63	None visible	0.0008	<0.00005	0.033	<0.001	0.0011	0.003	<0.0001	0.0108	<0.0001	<0.0005	0.001	Compliant
04/08/2021	RRY-A	0.4	7.14	None visible	0.0007	<0.00005	0.001	0.002	0.0013	0.011	0.0004	0.183	<0.0001	0.0016	0.008	Compliant
05/08/2021	RRY-C	0.8	7.09	None visible	0.0004	<0.00005	0.01	<0.001	0.001	0.003	<0.0001	0.045	<0.0001	0.0016	0.002	Compliant
05/08/2021	RRY-C	1.2	7.22	None visible	0.0004	<0.00005	0.011	<0.001	0.001	0.005	<0.0001	0.0365	<0.0001	0.09	0.002	Compliant
02/09/2021	RRY-A	1.1	7.45	None visible	0.001	<0.00005	0.024	<0.001	0.0012	0.006	<0.0001	1.76	0.0002	0.0008	0.006	Compliant
02/09/2021	RRY-C	0.4	7.34	None visible	0.0004	<0.00005	0.031	<0.001	0.001	<0.002	<0.0001	0.081	0.0003	0.0008	0.004	Compliant
02/09/2021	RRY-C	3.6	6.86	None visible	0.0036	<0.00005	0.064	<0.001	0.0011	0.002	<0.0001	0.0092	0.0003	0.0007	0.004	Compliant
01/10/2021	RRY-A	1.1	7.25	None visible	0.0015	<0.00005	0.031	<0.001	0.0014	0.002	0.0001	0.174	<0.0001	0.0007	0.006	Compliant
01/10/2021	RRY-C	1	7.47	None visible	0.0008	<0.00005	0.034	<0.001	0.001	<0.002	<0.0001	0.0134	<0.0001	0.0006	0.004	Compliant
01/10/2021	RRY-C	0.9	6.58	None visible	0.0007	<0.00005	0.034	<0.001	0.001	0.006	<0.0001	0.0157	<0.0001	0.0006	0.005	Compliant
02/11/2021	RRY-A	0.4	6.71	None visible	0.0008	<0.00005	0.016	<0.001	0.0013	0.016	0.0002	0.01	<0.00004	0.0007	0.006	Compliant
02/11/2021	RRY-C	0.3	6.67	None visible	0.0004	<0.00005	0.014	<0.001	0.0007	<0.002	<0.0001	0.0732	<0.00004	0.0007	0.003	Compliant
02/11/2021	RRY-C	1.3	6.67	None visible	0.0006	<0.00005	0.042	<0.001	0.0015	<0.002	0.0001	0.0073	0.00028	0.0043	0.005	Compliant

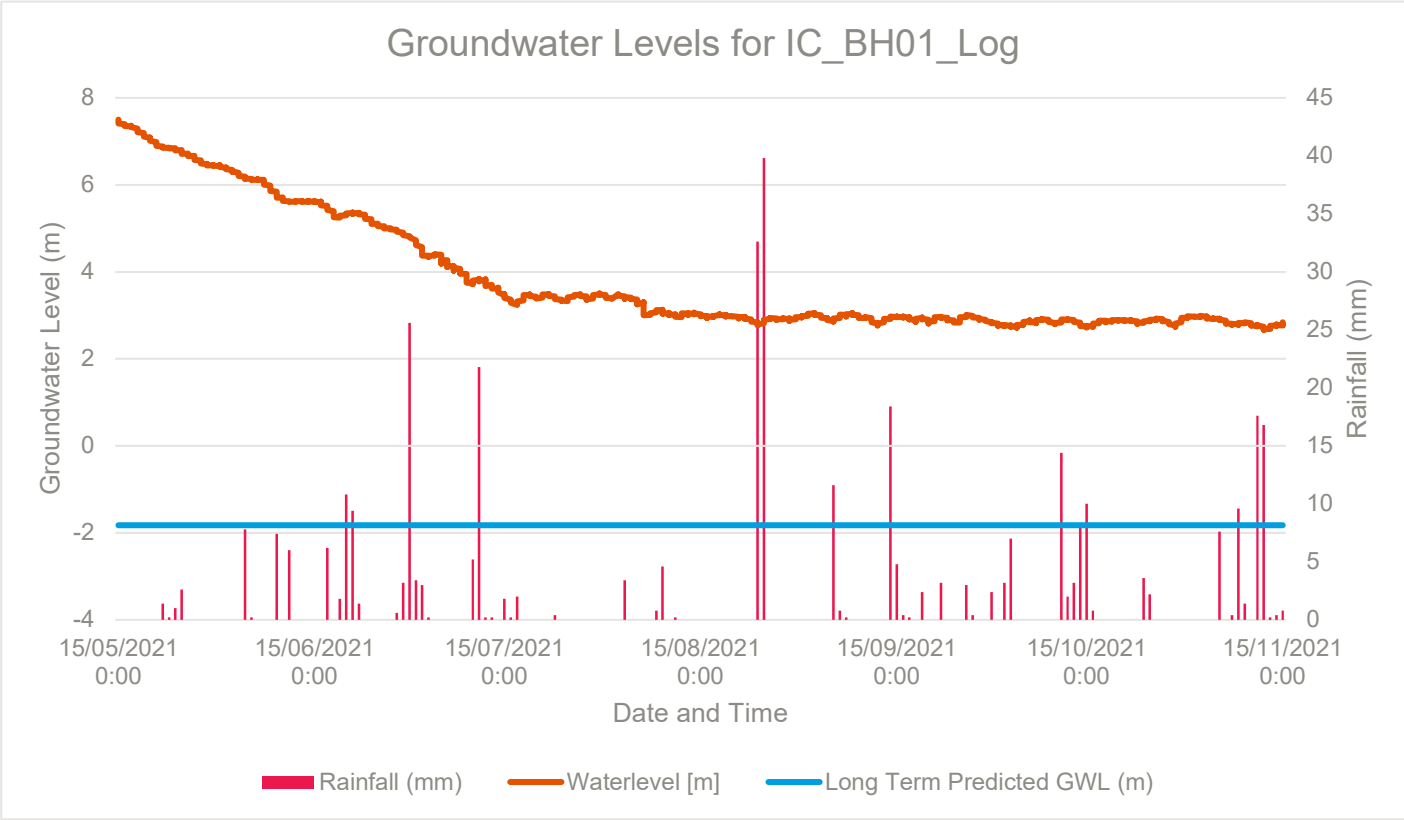
*90th Percentile Concentration

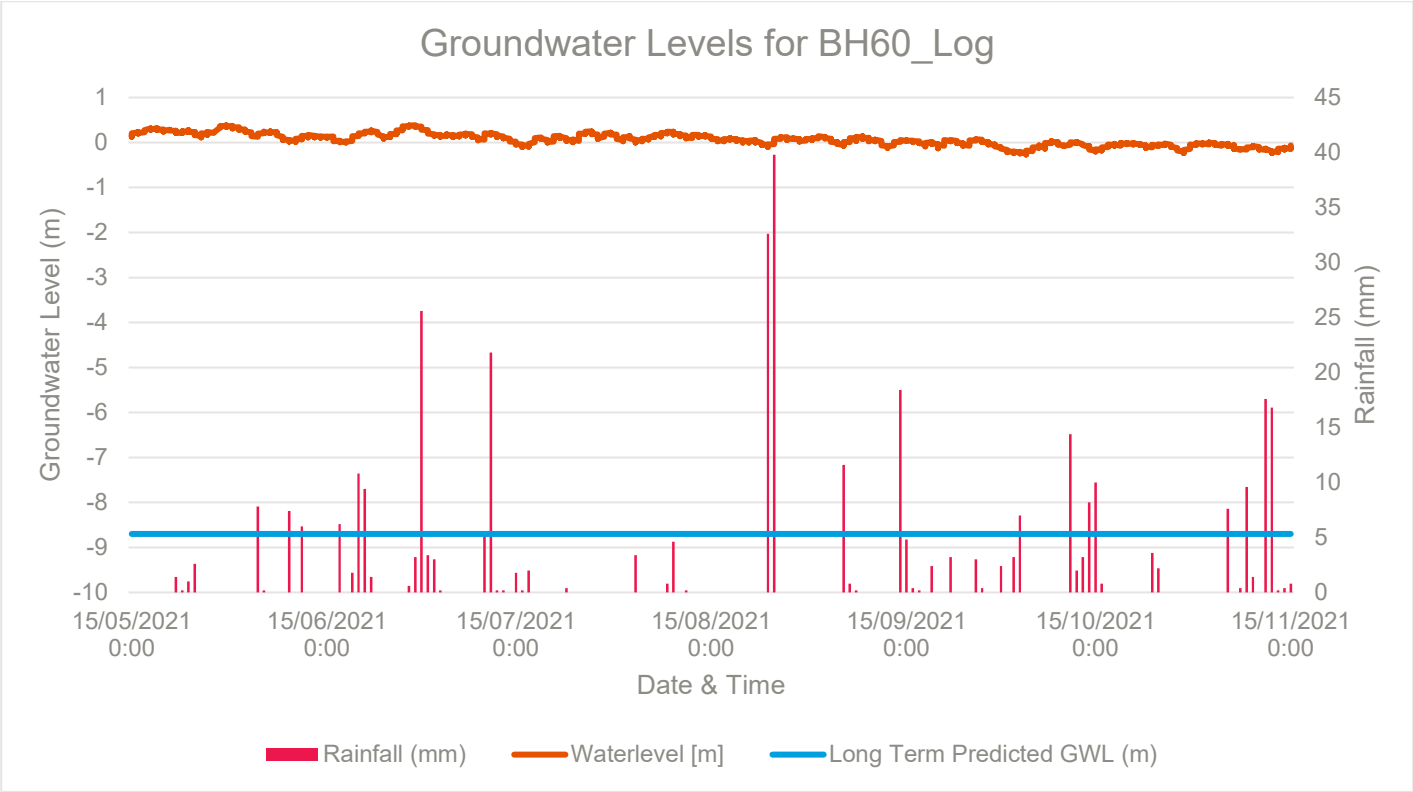
Annexure A Groundwater Level Graphs

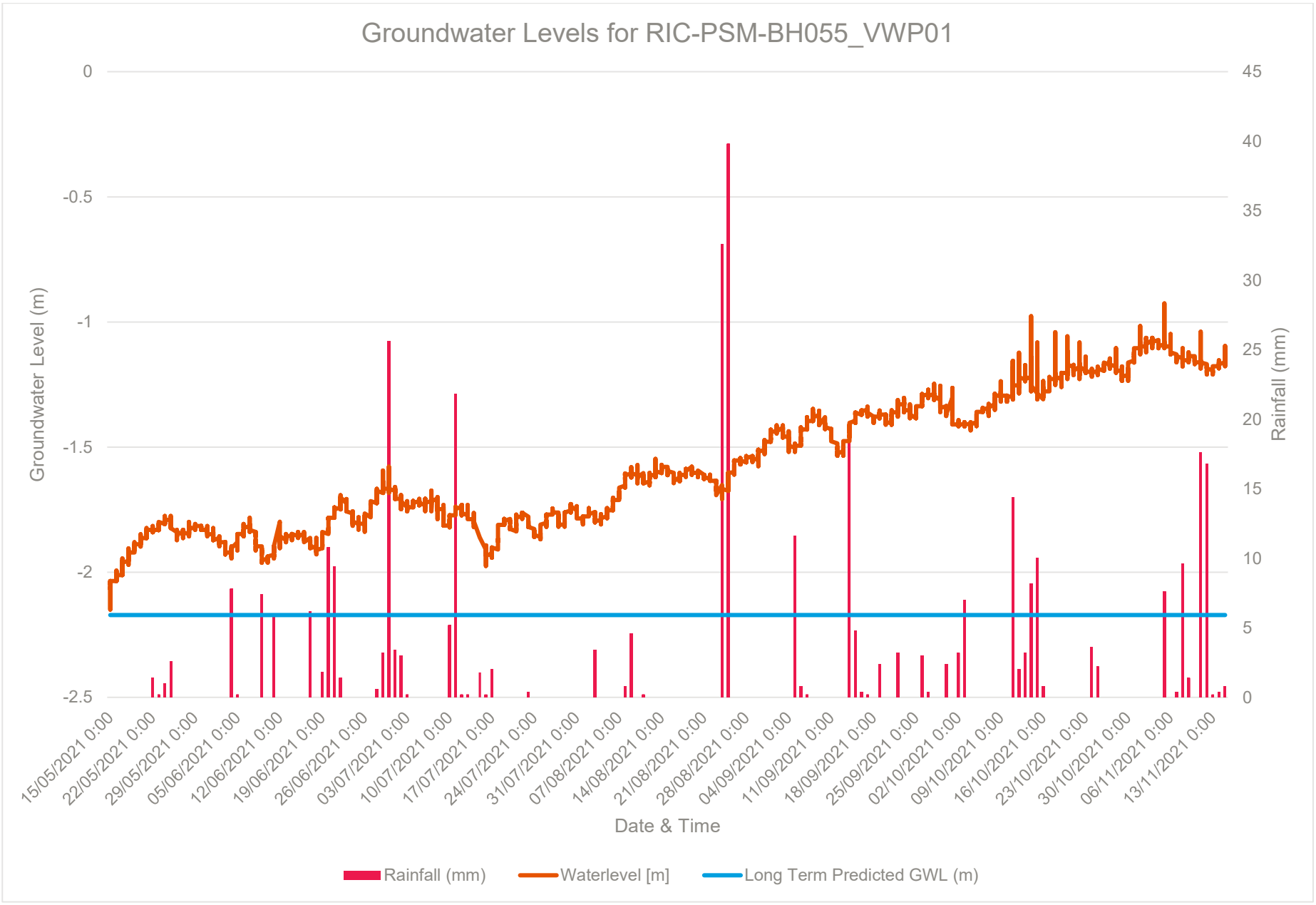

RIC_JHCPB_VWP08_01
Groundwater Level (m)
Rainfall (mm)
20
15
10
5
0
-5
-10
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
15/06/2021 0:00
15/07/2021 0:00
15/08/2021 0:00
15/09/2021 0:00
15/10/2021 0:00
15/11/2021 0:00
Date & Time
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)

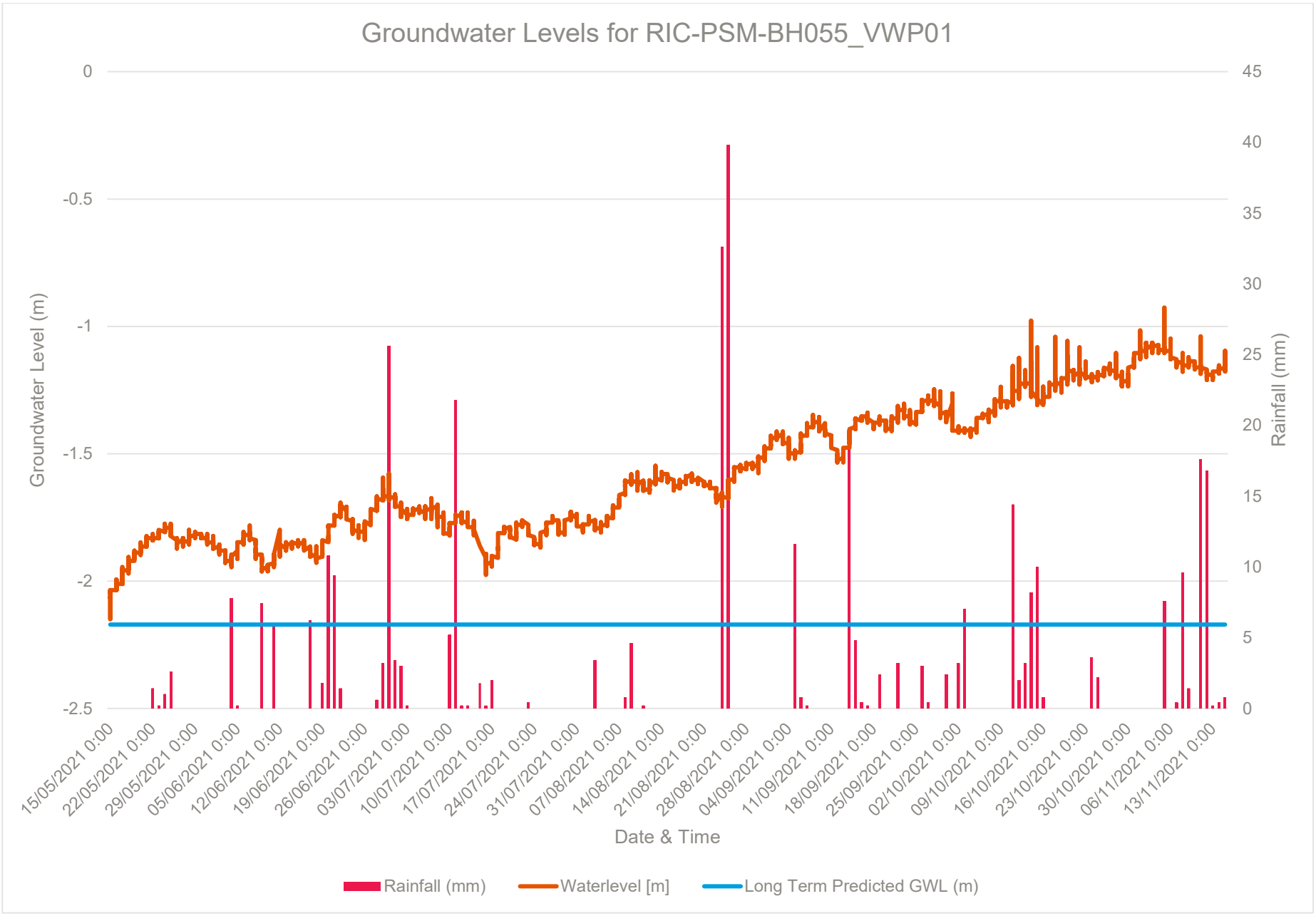

RIC_JHCPB_VWP08_02
Groundwater Level (m)
Rainfall (mm)
20
15
10
5
0
-5
-10
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
15/06/2021 0:00
15/07/2021 0:00
15/08/2021 0:00
15/09/2021 0:00
15/10/2021 0:00
15/11/2021 0:00
Date & Time
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)

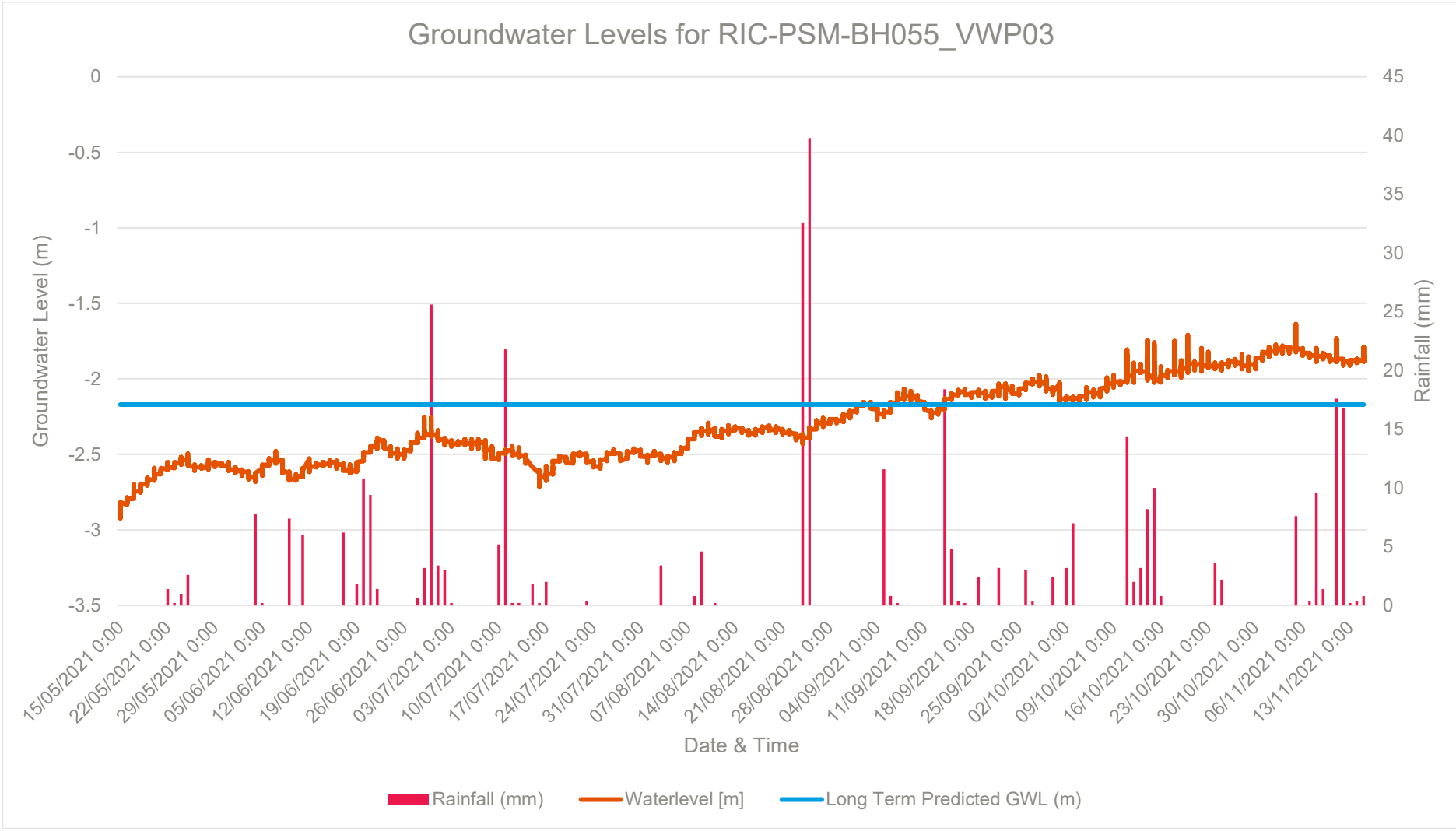

RIC_JHCPB_VWP08_03
Groundwater Level (m)
Rainfall (mm)
15
10
5
0
-5
-10
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
15/06/2021 0:00
15/07/2021 0:00
15/08/2021 0:00
15/09/2021 0:00
15/10/2021 0:00
15/11/2021 0:00
Date & Time
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)

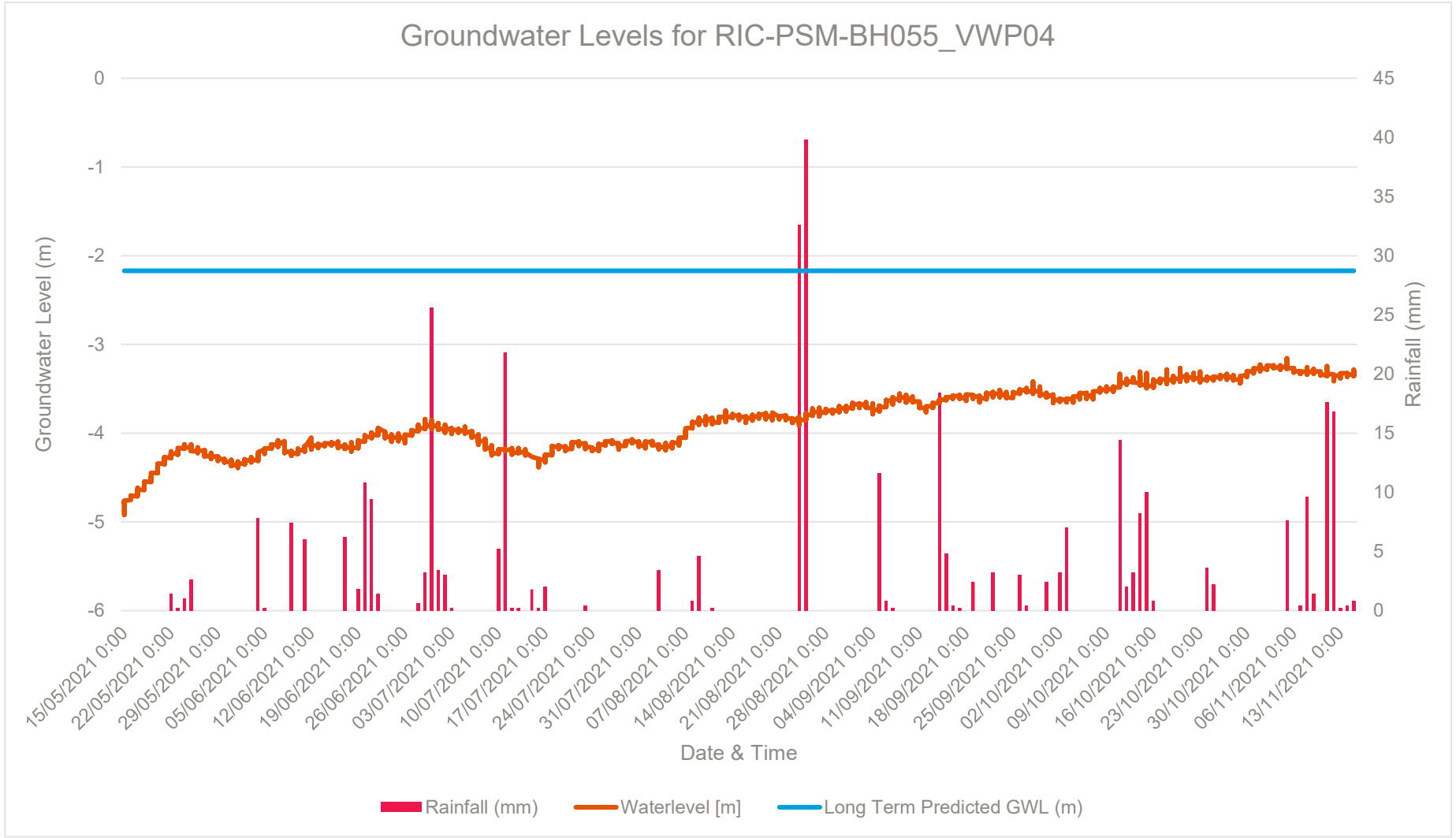

Groundwater Levels for IC_BH01_Log
Groundwater Level (m)
8
6
4
2
0
-2
-4
Rainfall (mm)
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
15/06/2021 0:00
15/07/2021 0:00
15/08/2021 0:00
15/09/2021 0:00
15/10/2021 0:00
15/11/2021 0:00
Date and Time
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)

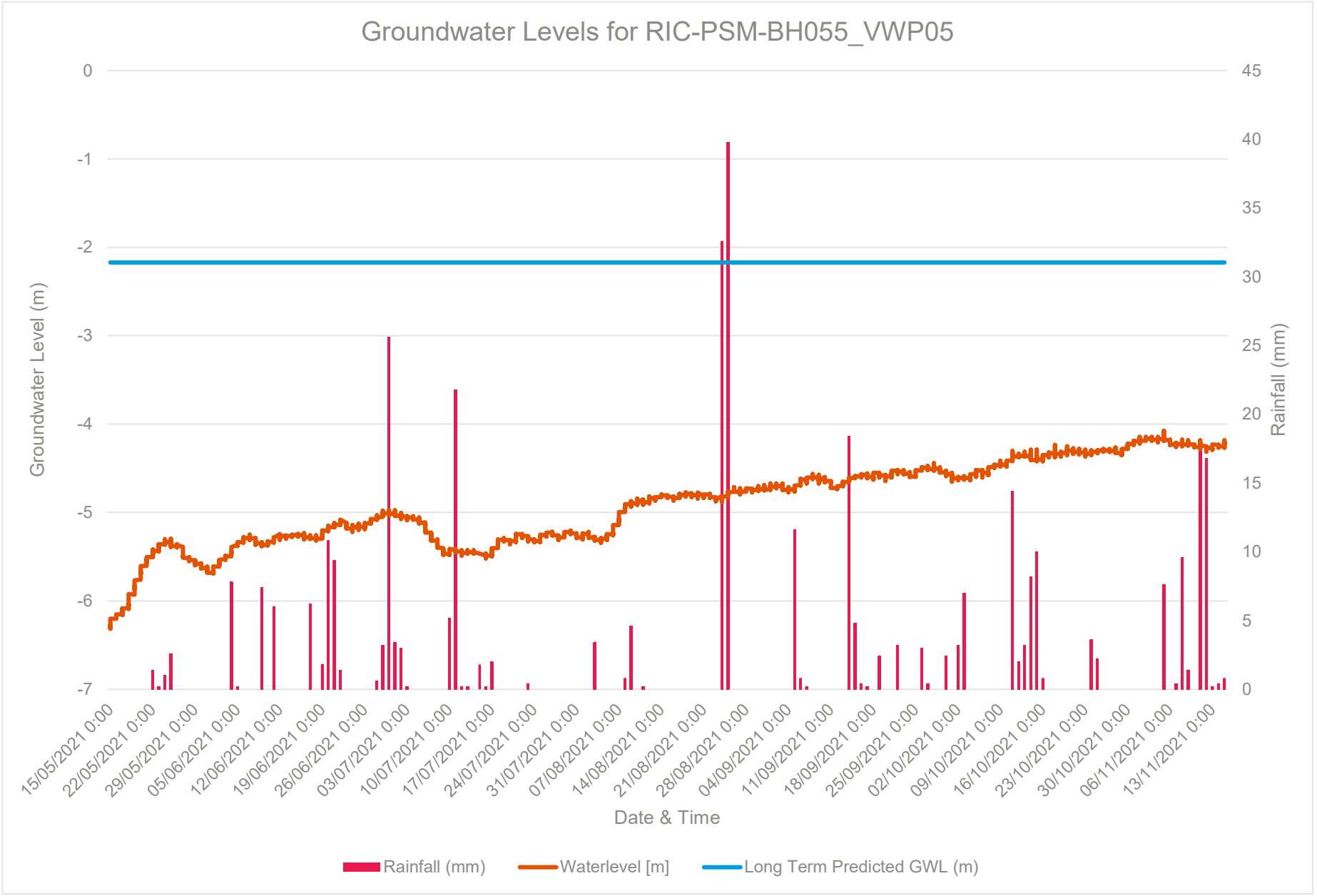

Groundwater Levels for BH60_Log
Groundwater Level (m)
Rainfall (mm)
1
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
15/06/2021 0:00
15/07/2021 0:00
15/08/2021 0:00
15/09/2021 0:00
15/10/2021 0:00
15/11/2021 0:00
Date & Time
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)

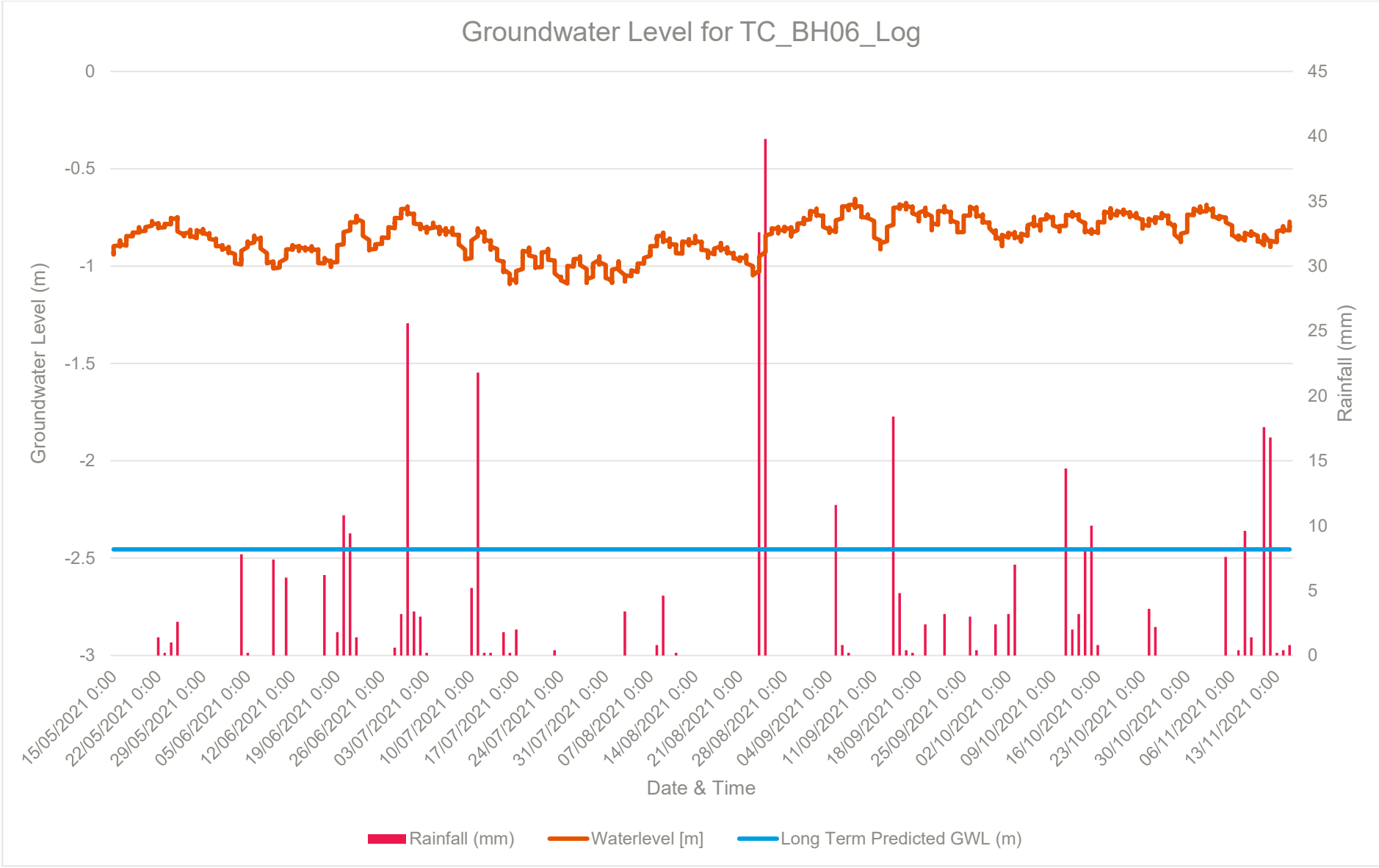

Groundwater Levels for RIC-PSM-BH055_VWP01
Groundwater Level (m)
Rainfall (mm)
Date & Time
0
-0.5
-1
-1.5
-2
-2.5
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
22/05/2021 0:00
29/05/2021 0:00
05/06/2021 0:00
12/06/2021 0:00
19/06/2021 0:00
26/06/2021 0:00
03/07/2021 0:00
10/07/2021 0:00
17/07/2021 0:00
24/07/2021 0:00
31/07/2021 0:00
07/08/2021 0:00
14/08/2021 0:00
21/08/2021 0:00
28/08/2021 0:00
04/09/2021 0:00
11/09/2021 0:00
18/09/2021 0:00
25/09/2021 0:00
02/10/2021 0:00
09/10/2021 0:00
16/10/2021 0:00
23/10/2021 0:00
30/10/2021 0:00
06/11/2021 0:00
13/11/2021 0:00
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)

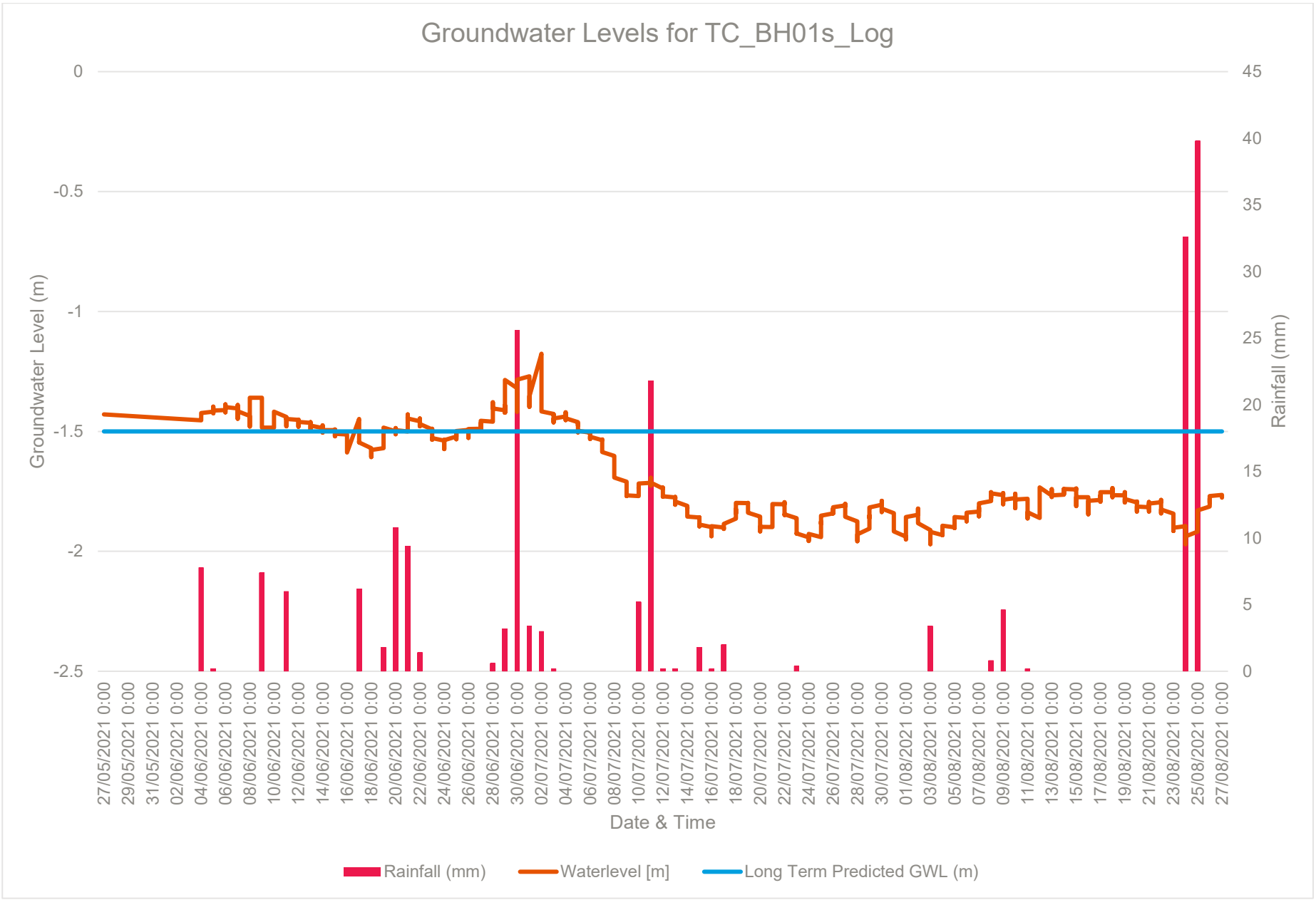

Groundwater Levels for RIC-PSM-BH055_VWP01
Groundwater Level (m)
Rainfall (mm)
Date & Time
0
-0.5
-1
-1.5
-2
-2.5
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
22/05/2021 0:00
29/05/2021 0:00
05/06/2021 0:00
12/06/2021 0:00
19/06/2021 0:00
26/06/2021 0:00
03/07/2021 0:00
10/07/2021 0:00
17/07/2021 0:00
24/07/2021 0:00
31/07/2021 0:00
07/08/2021 0:00
14/08/2021 0:00
21/08/2021 0:00
28/08/2021 0:00
04/09/2021 0:00
11/09/2021 0:00
18/09/2021 0:00
25/09/2021 0:00
02/10/2021 0:00
09/10/2021 0:00
16/10/2021 0:00
23/10/2021 0:00
30/10/2021 0:00
06/11/2021 0:00
13/11/2021 0:00
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)


Groundwater Levels for RIC-PSM-BH055_VWP03
Groundwater Level (m)
Rainfall (mm)
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
22/05/2021 0:00
29/05/2021 0:00
05/06/2021 0:00
12/06/2021 0:00
19/06/2021 0:00
26/06/2021 0:00
03/07/2021 0:00
10/07/2021 0:00
17/07/2021 0:00
24/07/2021 0:00
31/07/2021 0:00
07/08/2021 0:00
14/08/2021 0:00
21/08/2021 0:00
28/08/2021 0:00
04/09/2021 0:00
11/09/2021 0:00
18/09/2021 0:00
25/09/2021 0:00
02/10/2021 0:00
09/10/2021 0:00
16/10/2021 0:00
23/10/2021 0:00
30/10/2021 0:00
06/11/2021 0:00
13/11/2021 0:00
Date & Time
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)


Groundwater Levels for RIC-PSM-BH055_VWP04
Groundwater Level (m)
Rainfall (mm)
Date & Time
0
-1
-2
-3
-4
-5
-6
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
22/05/2021 0:00
29/05/2021 0:00
05/06/2021 0:00
12/06/2021 0:00
19/06/2021 0:00
26/06/2021 0:00
03/07/2021 0:00
10/07/2021 0:00
17/07/2021 0:00
24/07/2021 0:00
31/07/2021 0:00
07/08/2021 0:00
14/08/2021 0:00
21/08/2021 0:00
28/08/2021 0:00
04/09/2021 0:00
11/09/2021 0:00
18/09/2021 0:00
25/09/2021 0:00
02/10/2021 0:00
09/10/2021 0:00
16/10/2021 0:00
23/10/2021 0:00
30/10/2021 0:00
06/11/2021 0:00
13/11/2021 0:00
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)


Groundwater Levels for RIC-PSM-BH055_VWP05
Groundwater Level (m)
Rainfall (mm)
0
-1
-2
-3
-4
-5
-6
-7
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
22/05/2021 0:00
29/05/2021 0:00
05/06/2021 0:00
12/06/2021 0:00
19/06/2021 0:00
26/06/2021 0:00
03/07/2021 0:00
10/07/2021 0:00
17/07/2021 0:00
24/07/2021 0:00
31/07/2021 0:00
07/08/2021 0:00
14/08/2021 0:00
21/08/2021 0:00
28/08/2021 0:00
04/09/2021 0:00
11/09/2021 0:00
18/09/2021 0:00
25/09/2021 0:00
02/10/2021 0:00
09/10/2021 0:00
16/10/2021 0:00
23/10/2021 0:00
30/10/2021 0:00
06/11/2021 0:00
13/11/2021 0:00
Date & Time
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)


Groundwater Level for TC_BH06_Log
Groundwater Level (m)
Rainfall (mm)
Date & Time
0
-0.5
-1
-1.5
-2
-2.5
-3
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
22/05/2021 0:00
29/05/2021 0:00
05/06/2021 0:00
12/06/2021 0:00
19/06/2021 0:00
26/06/2021 0:00
03/07/2021 0:00
10/07/2021 0:00
17/07/2021 0:00
24/07/2021 0:00
31/07/2021 0:00
07/08/2021 0:00
14/08/2021 0:00
21/08/2021 0:00
28/08/2021 0:00
04/09/2021 0:00
11/09/2021 0:00
18/09/2021 0:00
25/09/2021 0:00
02/10/2021 0:00
09/10/2021 0:00
16/10/2021 0:00
23/10/2021 0:00
30/10/2021 0:00
06/11/2021 0:00
13/11/2021 0:00
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)


Groundwater Levels for TC_BH01s_Log
Groundwater Level (m)
Rainfall (mm)
Date & Time
0
-0.5
-1
-1.5
-2
-2.5
45
40
35
30
25
20
15
10
5
0
27/05/2021 0:00
29/05/2021 0:00
31/05/2021 0:00
02/06/2021 0:00
04/06/2021 0:00
06/06/2021 0:00
08/06/2021 0:00
10/06/2021 0:00
12/06/2021 0:00
14/06/2021 0:00
16/06/2021 0:00
18/06/2021 0:00
20/06/2021 0:00
22/06/2021 0:00
24/06/2021 0:00
26/06/2021 0:00
28/06/2021 0:00
30/06/2021 0:00
02/07/2021 0:00
04/07/2021 0:00
06/07/2021 0:00
08/07/2021 0:00
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16/07/2021 0:00
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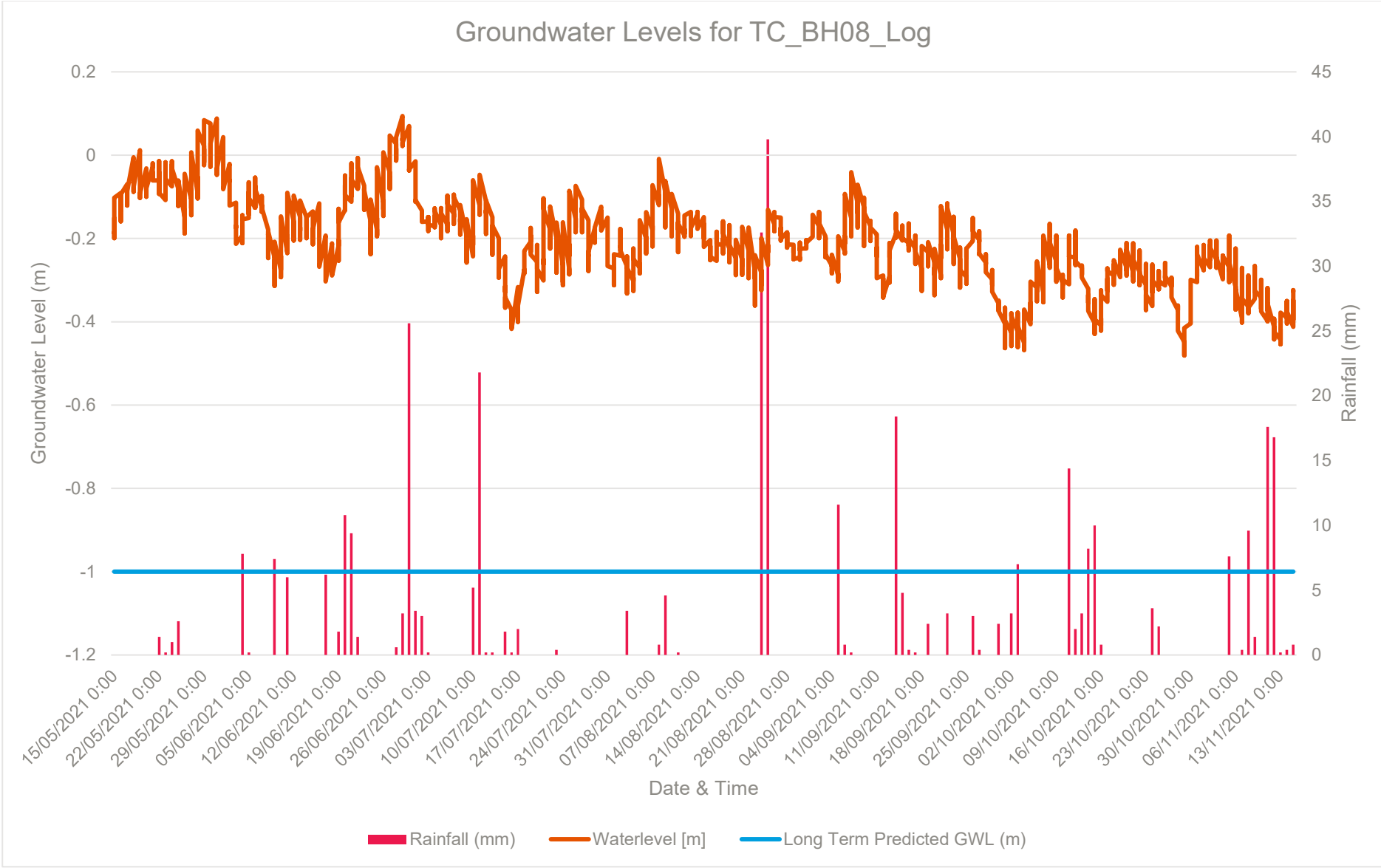
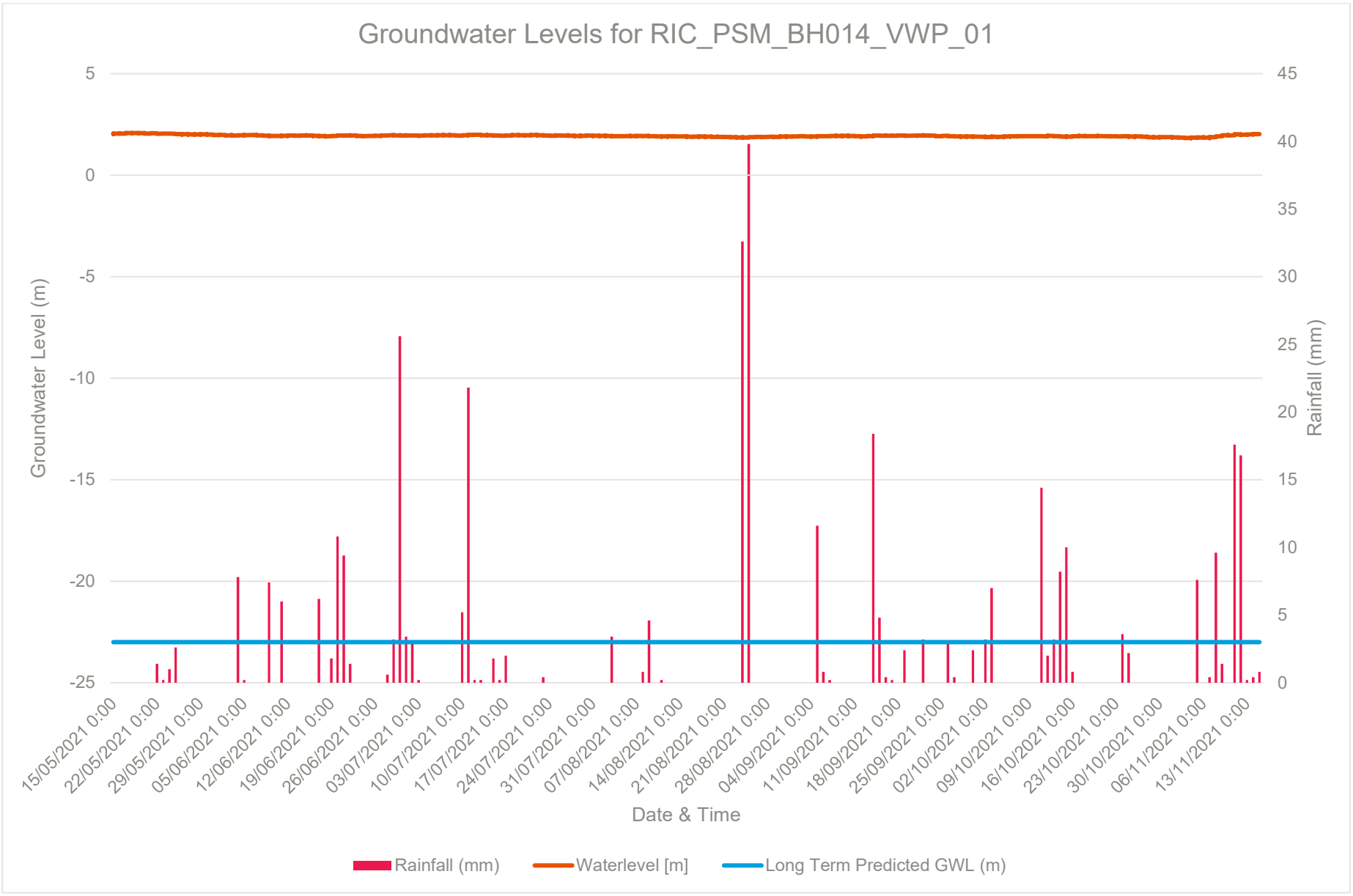
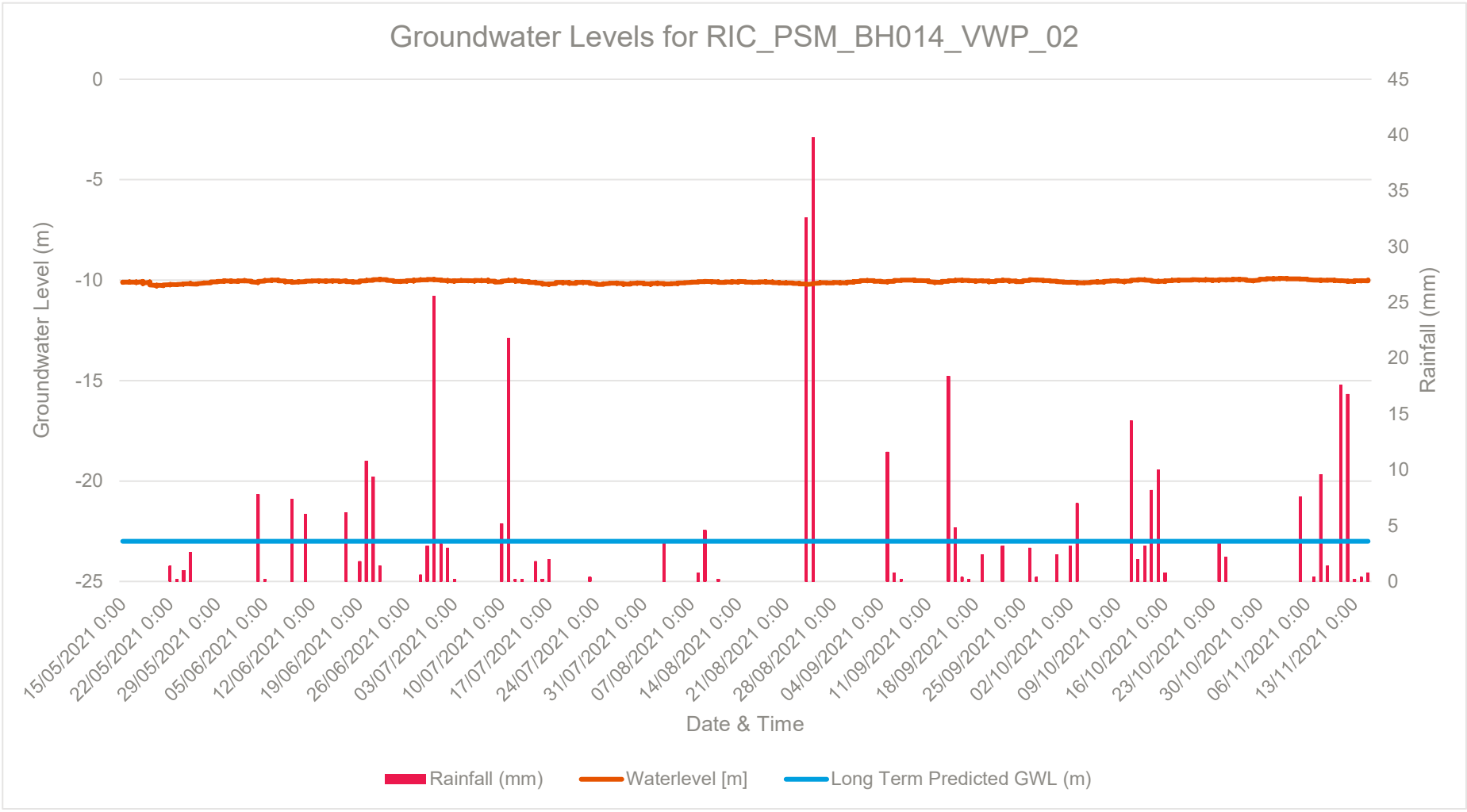
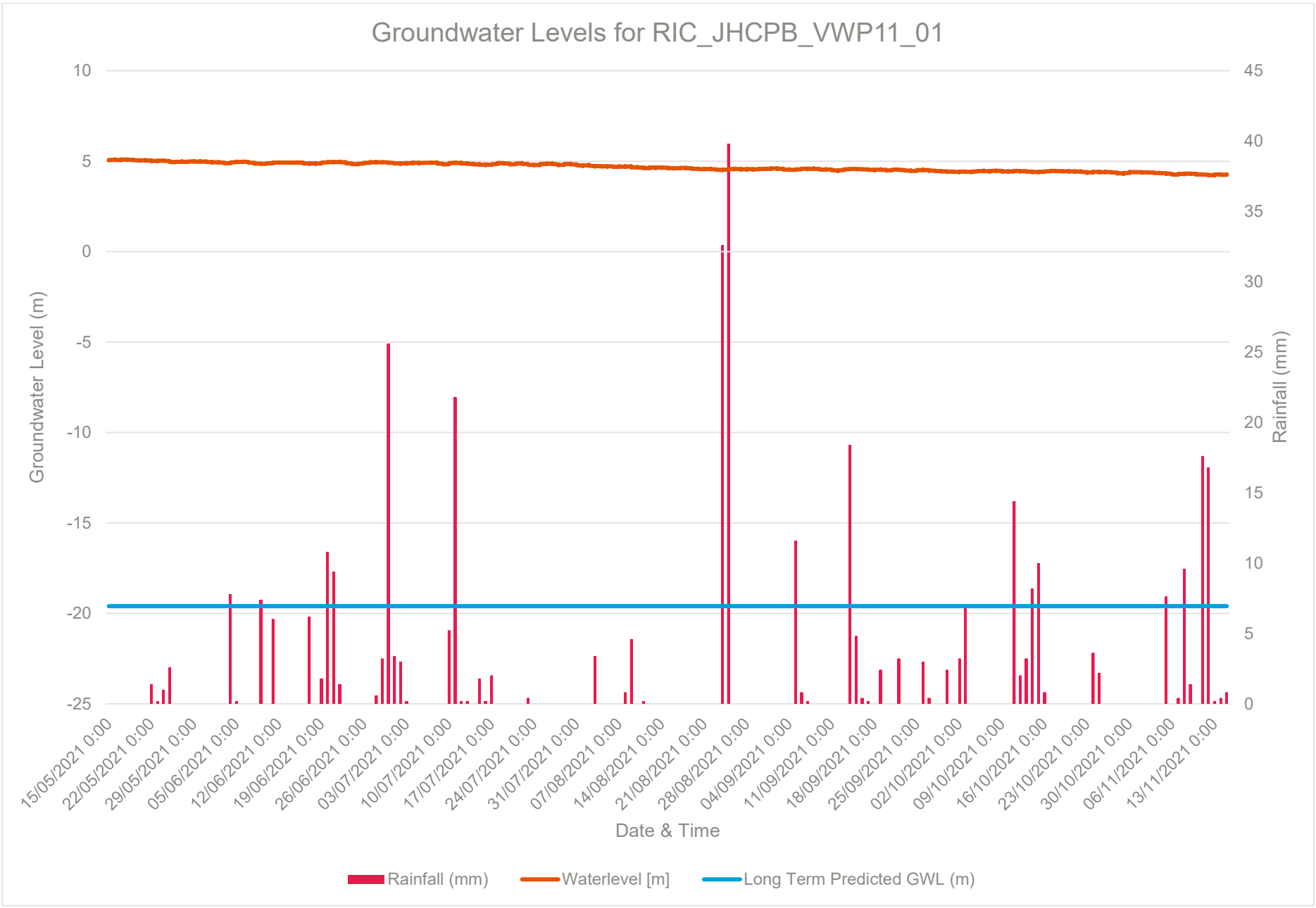
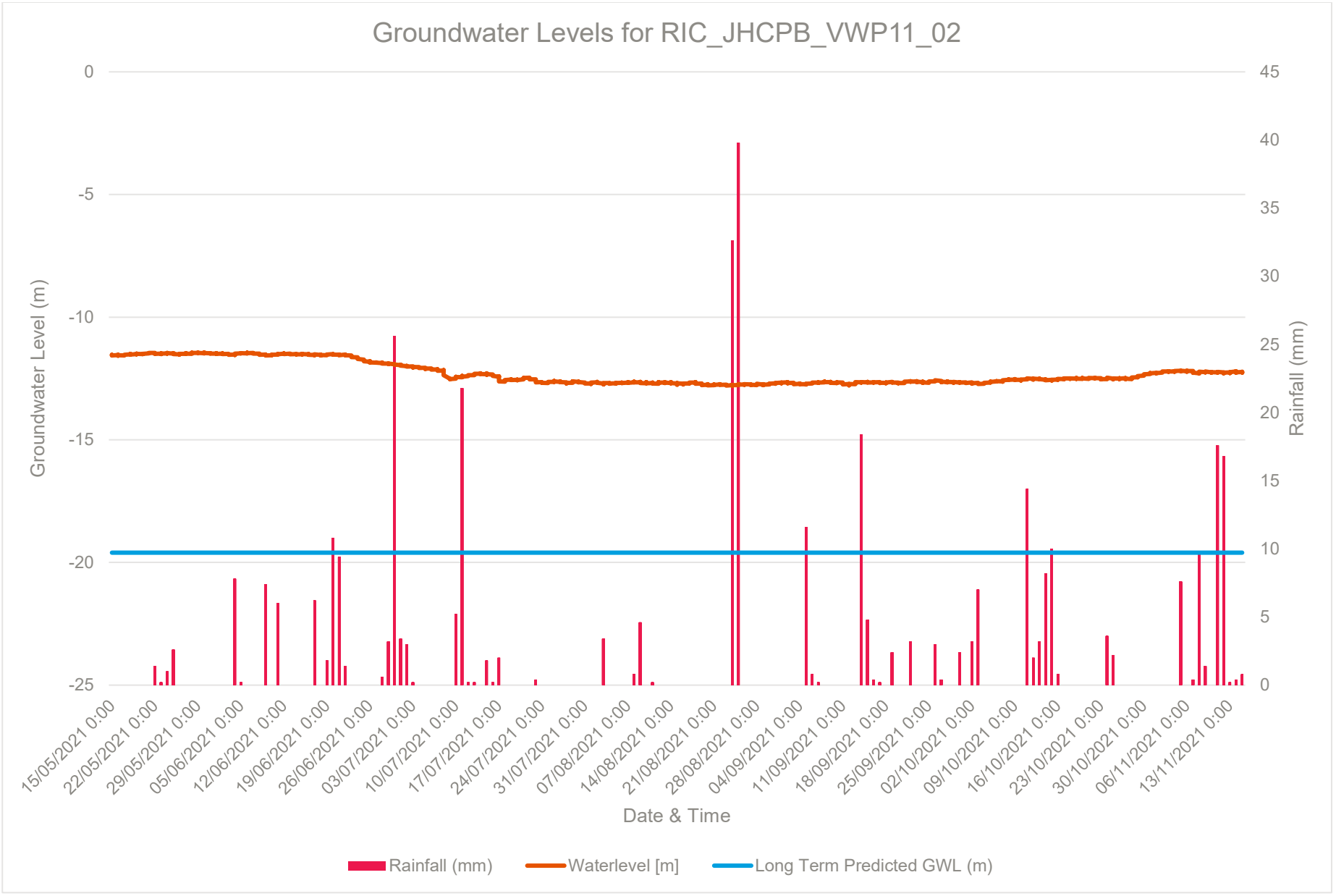
22/07/2021 0:00
24/07/2021 0:00
26/07/2021 0:00
28/07/2021 0:00
30/07/2021 0:00
01/08/2021 0:00
03/08/2021 0:00
05/08/2021 0:00
07/08/2021 0:00
09/08/2021 0:00
11/08/2021 0:00
13/08/2021 0:00
15/08/2021 0:00
17/08/2021 0:00
19/08/2021 0:00
21/08/2021 0:00
23/08/2021 0:00
25/08/2021 0:00
27/08/2021 0:00
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)

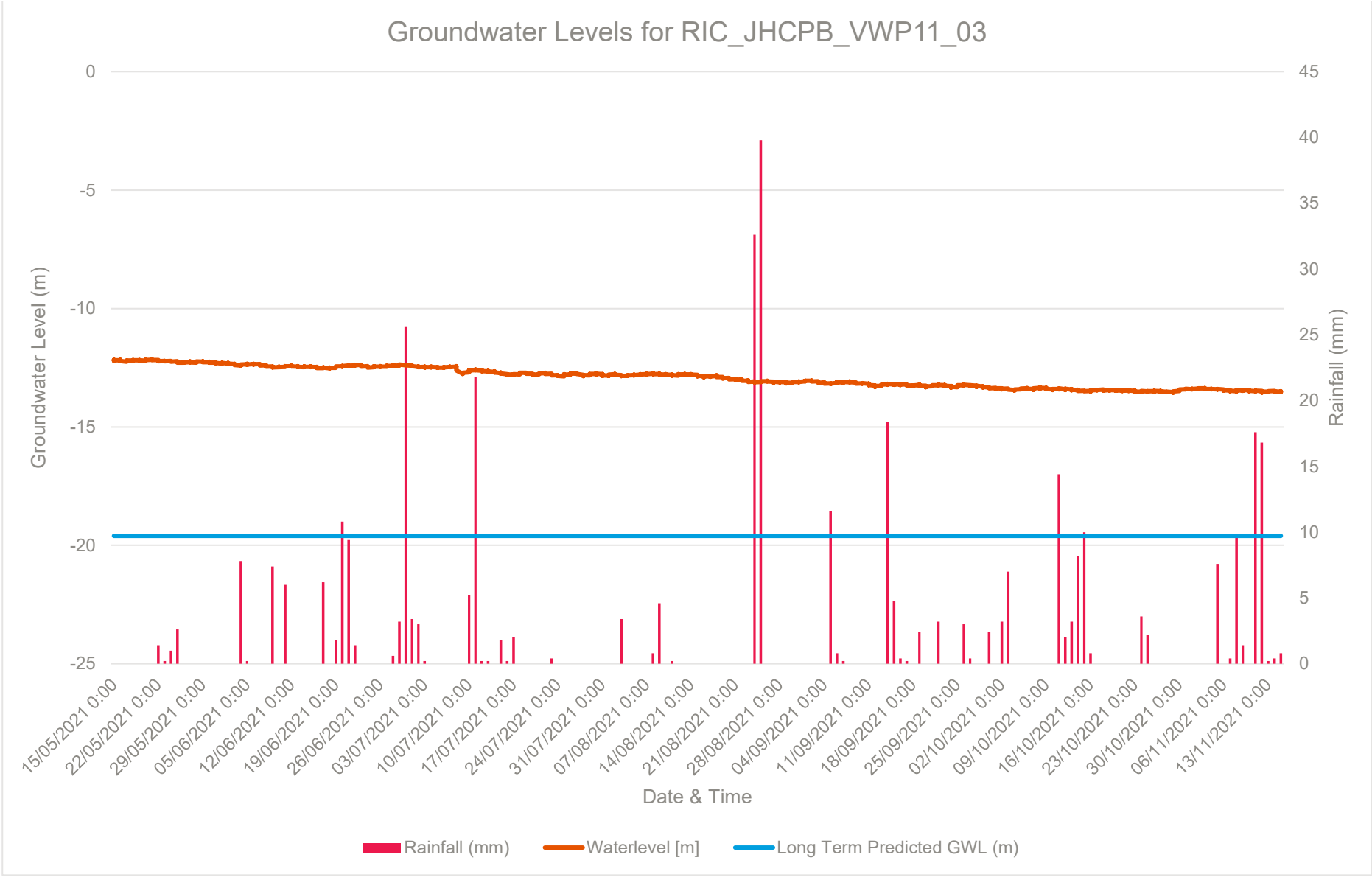

Groundwater Levels for TC_BH08_Log
Groundwater Level (m)
Rainfall (mm)
Date & Time
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
22/05/2021 0:00
29/05/2021 0:00
05/06/2021 0:00
12/06/2021 0:00
19/06/2021 0:00
26/06/2021 0:00
03/07/2021 0:00
10/07/2021 0:00
17/07/2021 0:00
24/07/2021 0:00
31/07/2021 0:00
07/08/2021 0:00
14/08/2021 0:00
21/08/2021 0:00
28/08/2021 0:00
04/09/2021 0:00
11/09/2021 0:00
18/09/2021 0:00
25/09/2021 0:00
02/10/2021 0:00
09/10/2021 0:00
16/10/2021 0:00
23/10/2021 0:00
30/10/2021 0:00
06/11/2021 0:00
13/11/2021 0:00
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)

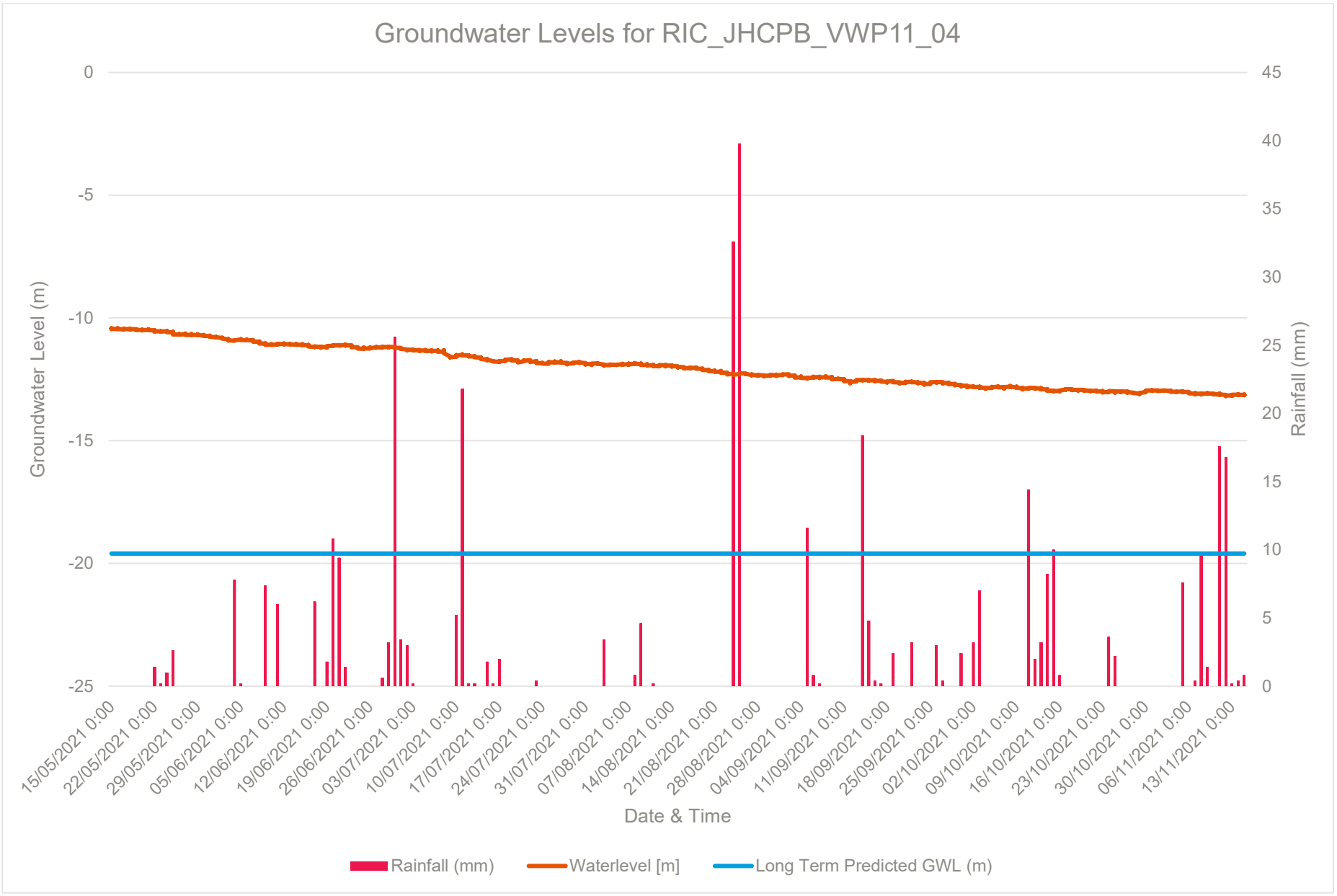

Groundwater Levels for RIC_PSM_BH014_VWP_01
Groundwater Level (m)
Rainfall (mm)
Date & Time
5
0
-5
-10
-15
-20
-25
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
22/05/2021 0:00
29/05/2021 0:00
05/06/2021 0:00
12/06/2021 0:00
19/06/2021 0:00
26/06/2021 0:00
03/07/2021 0:00
10/07/2021 0:00
17/07/2021 0:00
24/07/2021 0:00
31/07/2021 0:00
07/08/2021 0:00
14/08/2021 0:00
21/08/2021 0:00
28/08/2021 0:00
04/09/2021 0:00
11/09/2021 0:00
18/09/2021 0:00
25/09/2021 0:00
02/10/2021 0:00
09/10/2021 0:00
16/10/2021 0:00
23/10/2021 0:00
30/10/2021 0:00
06/11/2021 0:00
13/11/2021 0:00
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)

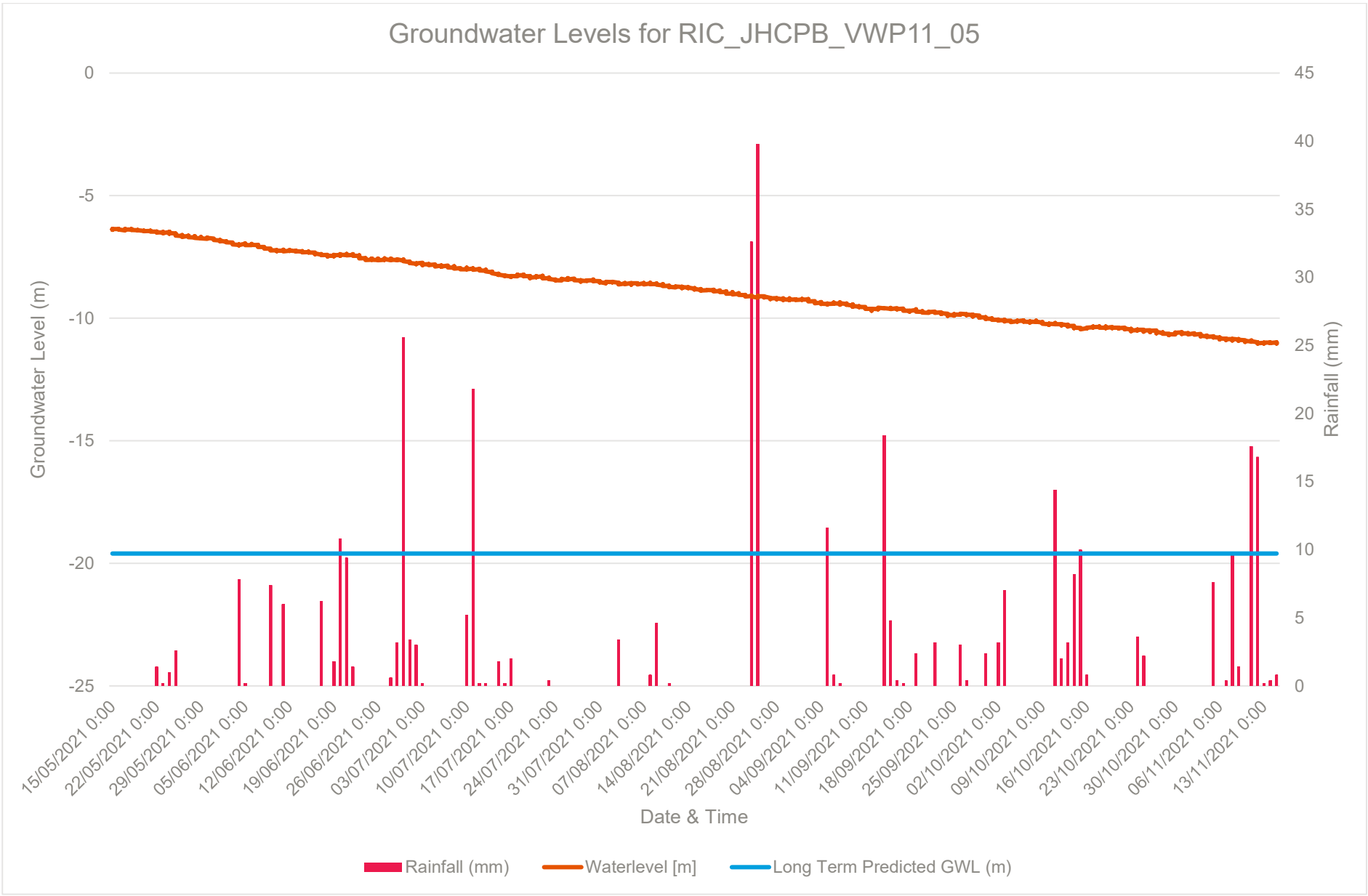

Groundwater Levels for RIC_PSM_BH014_VWP_02
Groundwater Level (m)
Rainfall (mm)
Date & Time
0
-5
-10
-15
-20
-25
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
22/05/2021 0:00
29/05/2021 0:00
05/06/2021 0:00
12/06/2021 0:00
19/06/2021 0:00
26/06/2021 0:00
03/07/2021 0:00
10/07/2021 0:00
17/07/2021 0:00
24/07/2021 0:00
31/07/2021 0:00
07/08/2021 0:00
14/08/2021 0:00
21/08/2021 0:00
28/08/2021 0:00
04/09/2021 0:00
11/09/2021 0:00
18/09/2021 0:00
25/09/2021 0:00
02/10/2021 0:00
09/10/2021 0:00
16/10/2021 0:00
23/10/2021 0:00
30/10/2021 0:00
06/11/2021 0:00
13/11/2021 0:00
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)

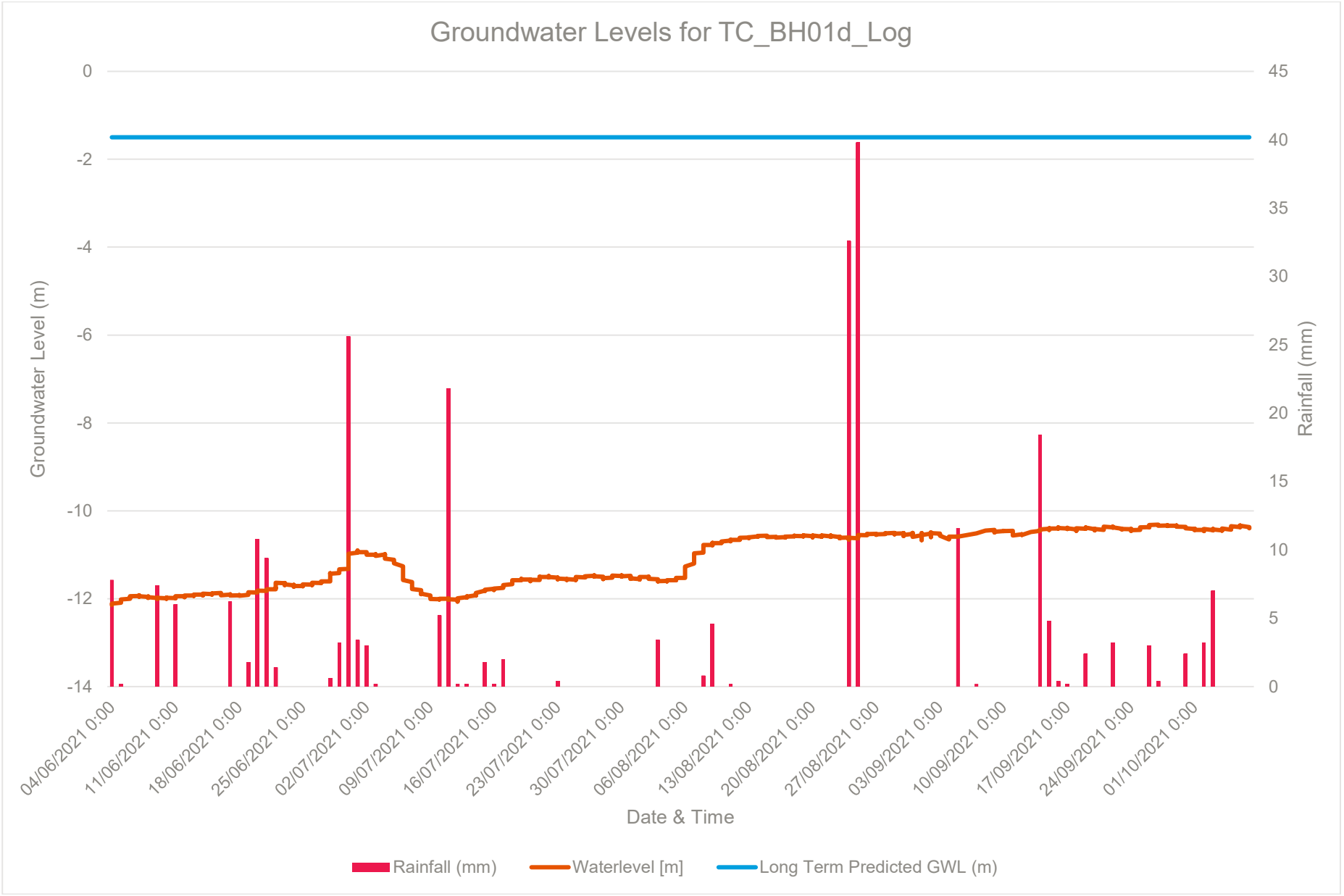

Groundwater Levels for RIC_JHCPB_VWP11_01
Groundwater Level (m)
Rainfall (mm)
Date & Time
10
5
0
-5
-10
-15
-20
-25
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
22/05/2021 0:00
29/05/2021 0:00
05/06/2021 0:00
12/06/2021 0:00
19/06/2021 0:00
26/06/2021 0:00
03/07/2021 0:00
10/07/2021 0:00
17/07/2021 0:00
24/07/2021 0:00
31/07/2021 0:00
07/08/2021 0:00
14/08/2021 0:00
21/08/2021 0:00
28/08/2021 0:00
04/09/2021 0:00
11/09/2021 0:00
18/09/2021 0:00
25/09/2021 0:00
02/10/2021 0:00
09/10/2021 0:00
16/10/2021 0:00
23/10/2021 0:00
30/10/2021 0:00
06/11/2021 0:00
13/11/2021 0:00
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)

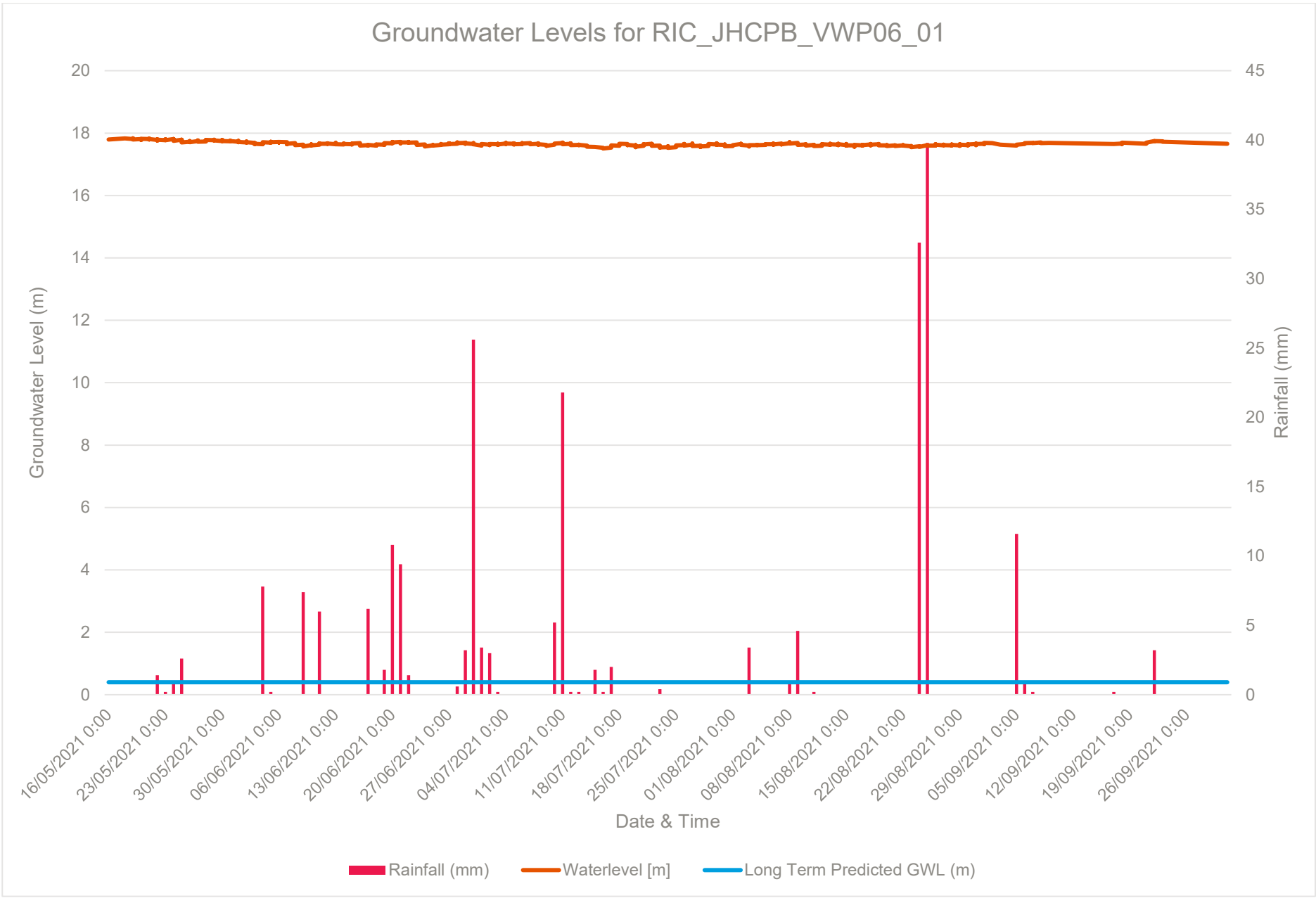

Groundwater Levels for RIC_JHCPB_VWP11_02
Groundwater Level (m)
Rainfall (mm)
0
-5
-10
-15
-20
-25
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
22/05/2021 0:00
29/05/2021 0:00
05/06/2021 0:00
12/06/2021 0:00
19/06/2021 0:00
26/06/2021 0:00
03/07/2021 0:00
10/07/2021 0:00
17/07/2021 0:00
24/07/2021 0:00
31/07/2021 0:00
07/08/2021 0:00
14/08/2021 0:00
21/08/2021 0:00
28/08/2021 0:00
04/09/2021 0:00
11/09/2021 0:00
18/09/2021 0:00
25/09/2021 0:00
02/10/2021 0:00
09/10/2021 0:00
16/10/2021 0:00
23/10/2021 0:00
30/10/2021 0:00
06/11/2021 0:00
13/11/2021 0:00
Date & Time
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)

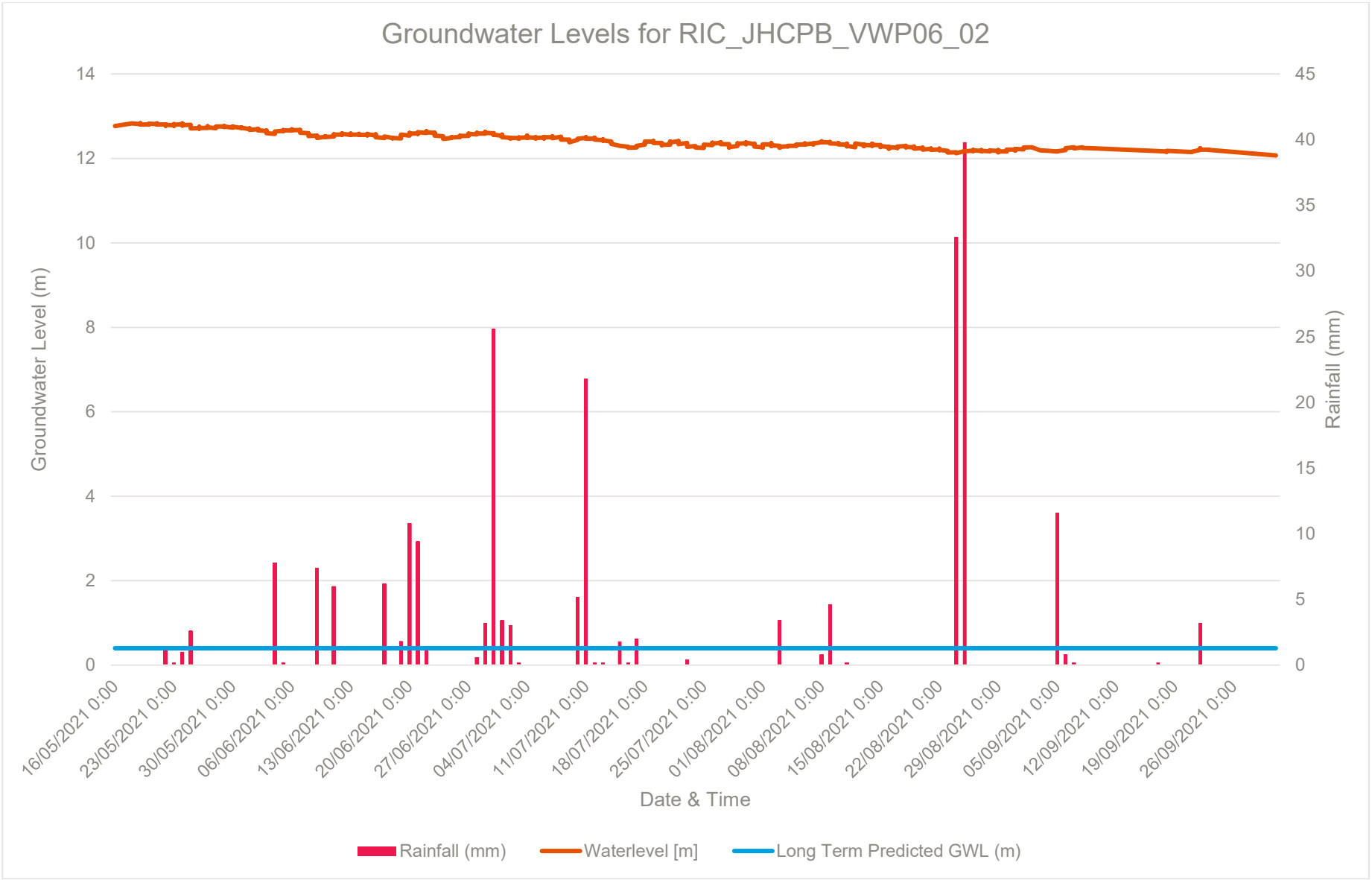

Groundwater Levels for RIC_JHCPB_VWP11_03
Groundwater Level (m)
Rainfall (mm)
0
-5
-10
-15
-20
-25
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
22/05/2021 0:00
29/05/2021 0:00
05/06/2021 0:00
12/06/2021 0:00
19/06/2021 0:00
26/06/2021 0:00
03/07/2021 0:00
10/07/2021 0:00
17/07/2021 0:00
24/07/2021 0:00
31/07/2021 0:00
07/08/2021 0:00
14/08/2021 0:00
21/08/2021 0:00
28/08/2021 0:00
04/09/2021 0:00
11/09/2021 0:00
18/09/2021 0:00
25/09/2021 0:00
02/10/2021 0:00
09/10/2021 0:00
16/10/2021 0:00
23/10/2021 0:00
30/10/2021 0:00
06/11/2021 0:00
13/11/2021 0:00
Date & Time
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)

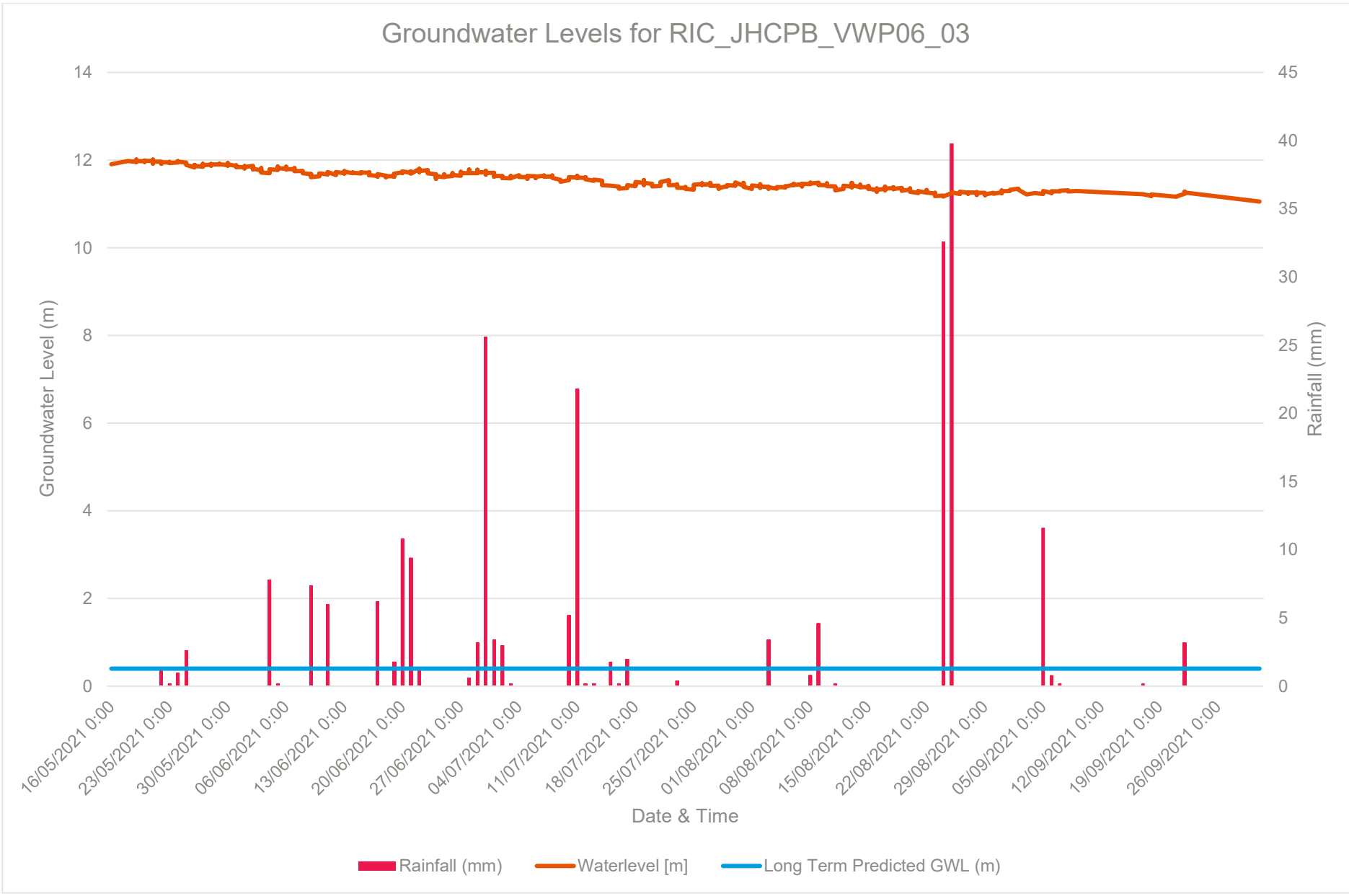

Groundwater Levels for RIC_JHCPB_VWP11_04
Groundwater Level (m)
Rainfall (mm)
Date & Time
0
-5
-10
-15
-20
-25
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
22/05/2021 0:00
29/05/2021 0:00
05/06/2021 0:00
12/06/2021 0:00
19/06/2021 0:00
26/06/2021 0:00
03/07/2021 0:00
10/07/2021 0:00
17/07/2021 0:00
24/07/2021 0:00
31/07/2021 0:00
07/08/2021 0:00
14/08/2021 0:00
21/08/2021 0:00
28/08/2021 0:00
04/09/2021 0:00
11/09/2021 0:00
18/09/2021 0:00
25/09/2021 0:00
02/10/2021 0:00
09/10/2021 0:00
16/10/2021 0:00
23/10/2021 0:00
30/10/2021 0:00
06/11/2021 0:00
13/11/2021 0:00
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)

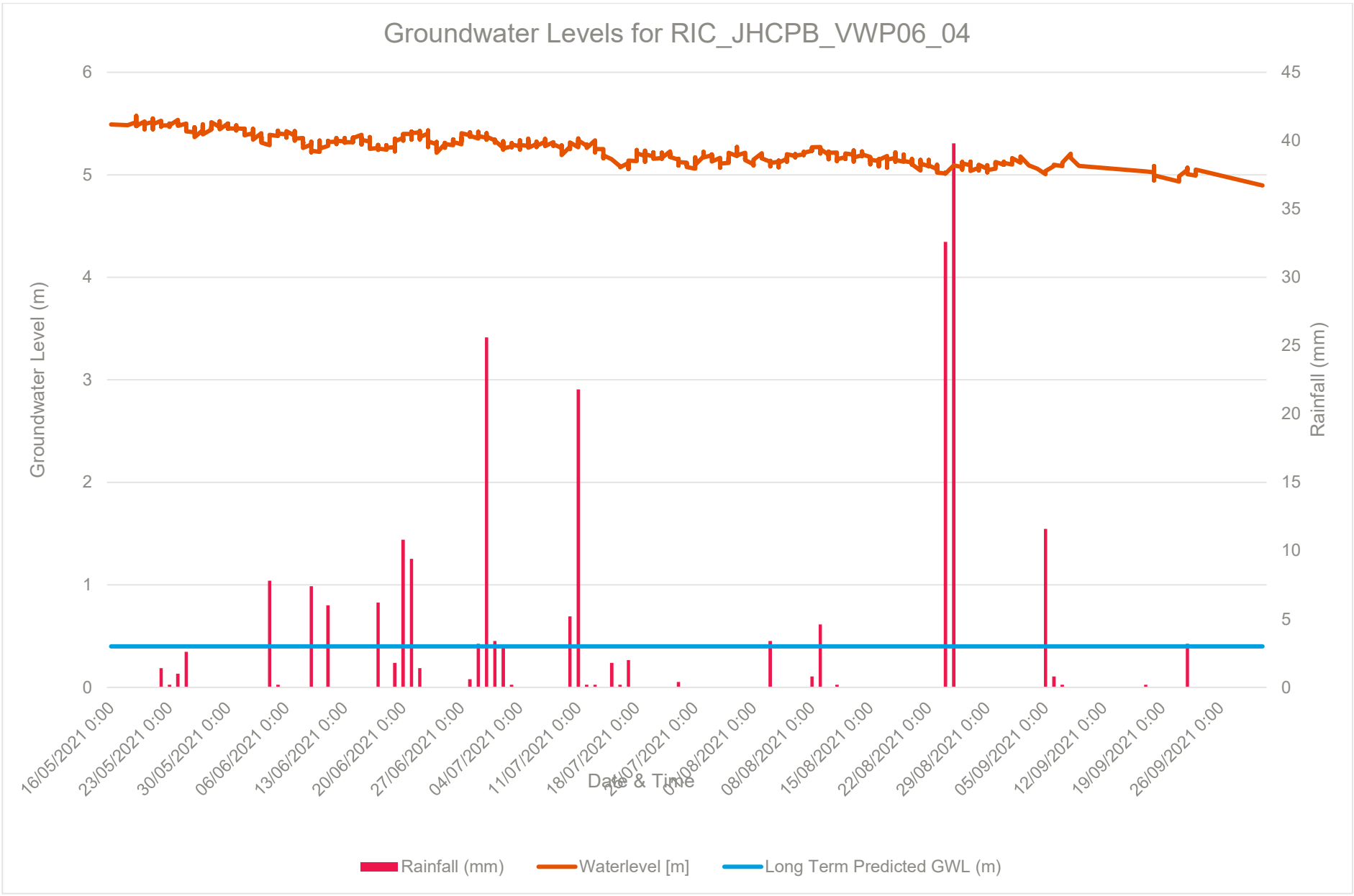

Groundwater Levels for RIC_JHCPB_VWP11_05
Groundwater Level (m)
Rainfall (mm)
Date & Time
0
-5
-10
-15
-20
-25
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
22/05/2021 0:00
29/05/2021 0:00
05/06/2021 0:00
12/06/2021 0:00
19/06/2021 0:00
26/06/2021 0:00
03/07/2021 0:00
10/07/2021 0:00
17/07/2021 0:00
24/07/2021 0:00
31/07/2021 0:00
07/08/2021 0:00
14/08/2021 0:00
21/08/2021 0:00
28/08/2021 0:00
04/09/2021 0:00
11/09/2021 0:00
18/09/2021 0:00
25/09/2021 0:00
02/10/2021 0:00
09/10/2021 0:00
16/10/2021 0:00
23/10/2021 0:00
30/10/2021 0:00
06/11/2021 0:00
13/11/2021 0:00
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)

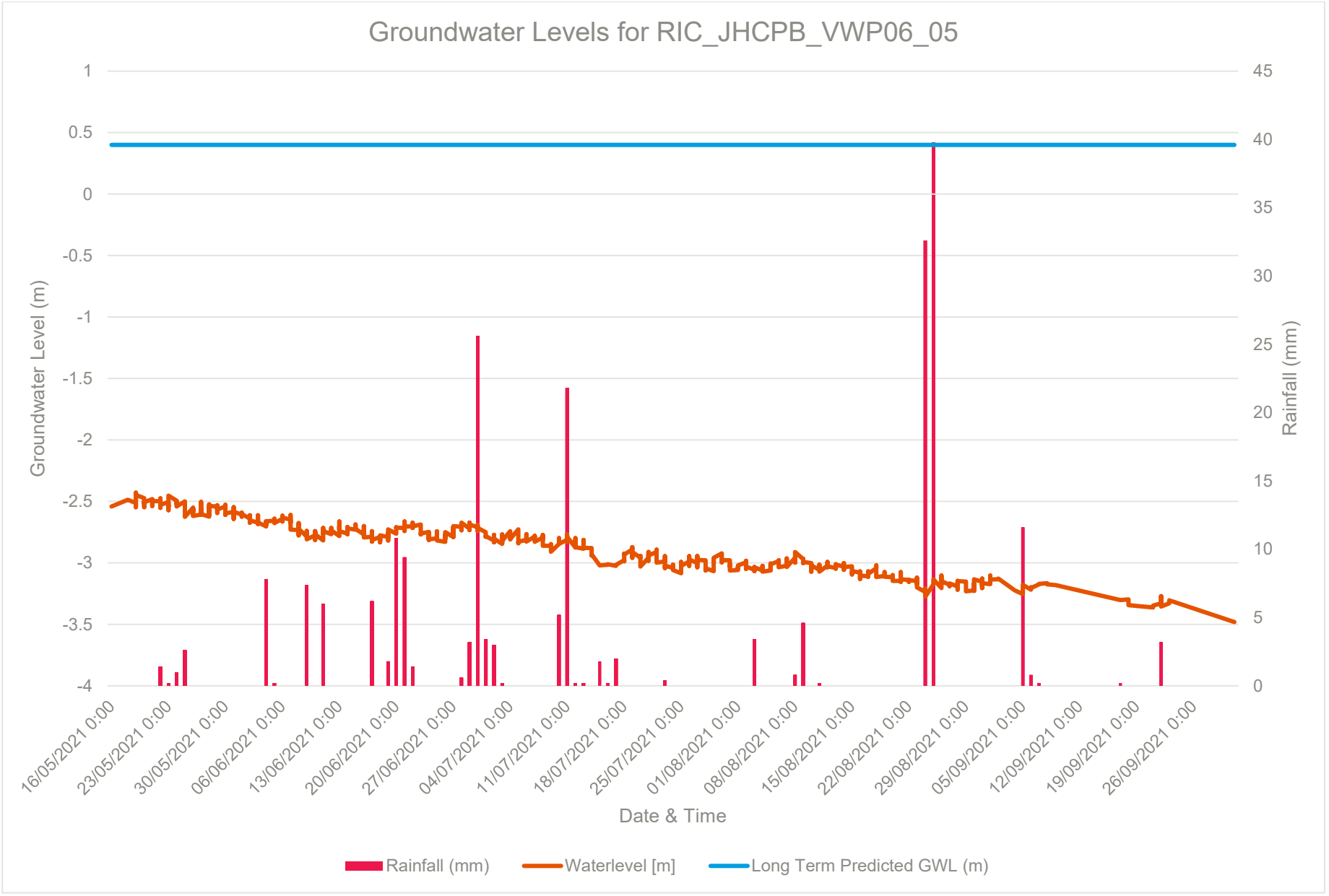

Groundwater Levels for TC_BH01d_Log
Groundwater Level (m)
Rainfall (mm)
0
-2
-4
-6
-8
-10
-12
-14
45
40
35
30
25
20
15
10
5
0
04/06/2021 0:00
11/06/2021 0:00
18/06/2021 0:00
25/06/2021 0:00
02/07/2021 0:00
09/07/2021 0:00
16/07/2021 0:00
23/07/2021 0:00
30/07/2021 0:00
06/08/2021 0:00
13/08/2021 0:00
20/08/2021 0:00
27/08/2021 0:00
03/09/2021 0:00
10/09/2021 0:00
17/09/2021 0:00
24/09/2021 0:00
01/10/2021 0:00
Date & Time
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)

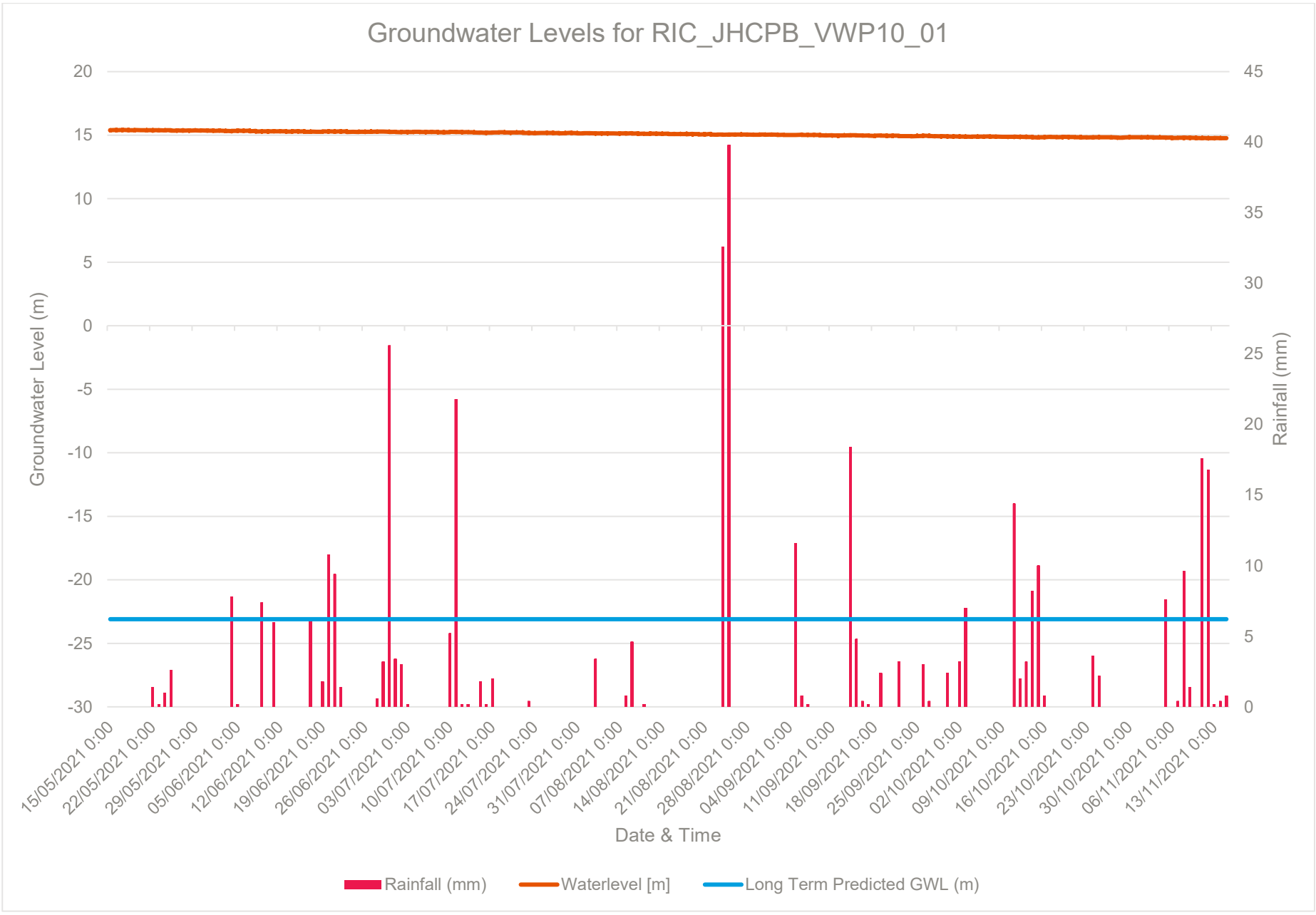

Groundwater Levels for RIC_JHCPB_VWP06_01
Groundwater Level (m)
Rainfall (mm)
Date & Time
20
18
16
14
12
10
8
6
4
2
0
45
40
35
30
25
20
15
10
5
0
16/05/2021 0:00
23/05/2021 0:00
30/05/2021 0:00
06/06/2021 0:00
13/06/2021 0:00
20/06/2021 0:00
27/06/2021 0:00
04/07/2021 0:00
11/07/2021 0:00
18/07/2021 0:00
25/07/2021 0:00
01/08/2021 0:00
08/08/2021 0:00
15/08/2021 0:00
22/08/2021 0:00
29/08/2021 0:00
05/09/2021 0:00
12/09/2021 0:00
19/09/2021 0:00
26/09/2021 0:00
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)

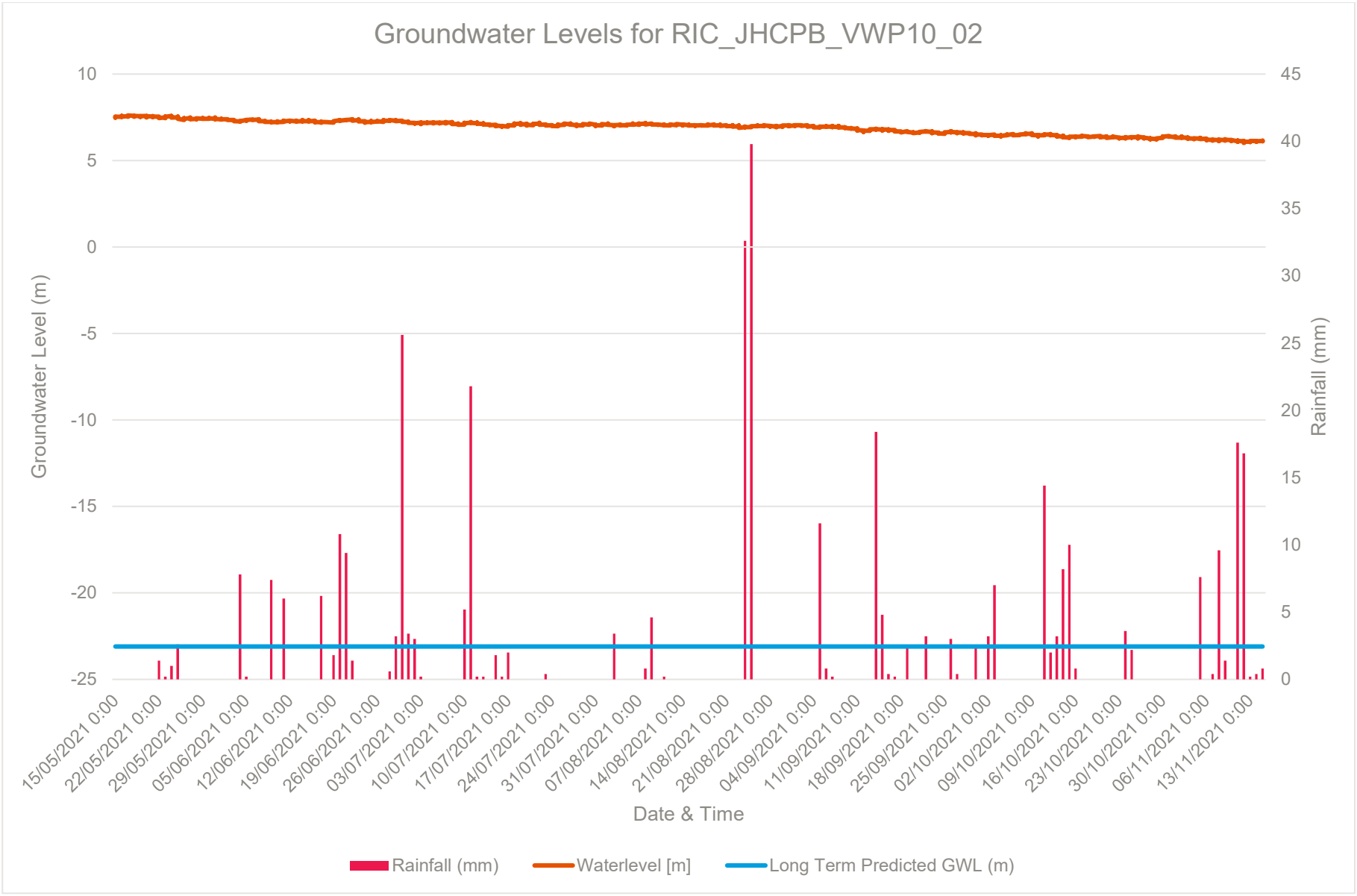

Groundwater Levels for RIC_JHCPB_VWP06_02
Groundwater Level (m)
Rainfall (mm)
Date & Time
14
12
10
8
6
4
2
0
45
40
35
30
25
20
15
10
5
0
16/05/2021 0:00
23/05/2021 0:00
30/05/2021 0:00
06/06/2021 0:00
13/06/2021 0:00
20/06/2021 0:00
27/06/2021 0:00
04/07/2021 0:00
11/07/2021 0:00
18/07/2021 0:00
25/07/2021 0:00
01/08/2021 0:00
08/08/2021 0:00
15/08/2021 0:00
22/08/2021 0:00
29/08/2021 0:00
05/09/2021 0:00
12/09/2021 0:00
19/09/2021 0:00
26/09/2021 0:00
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)

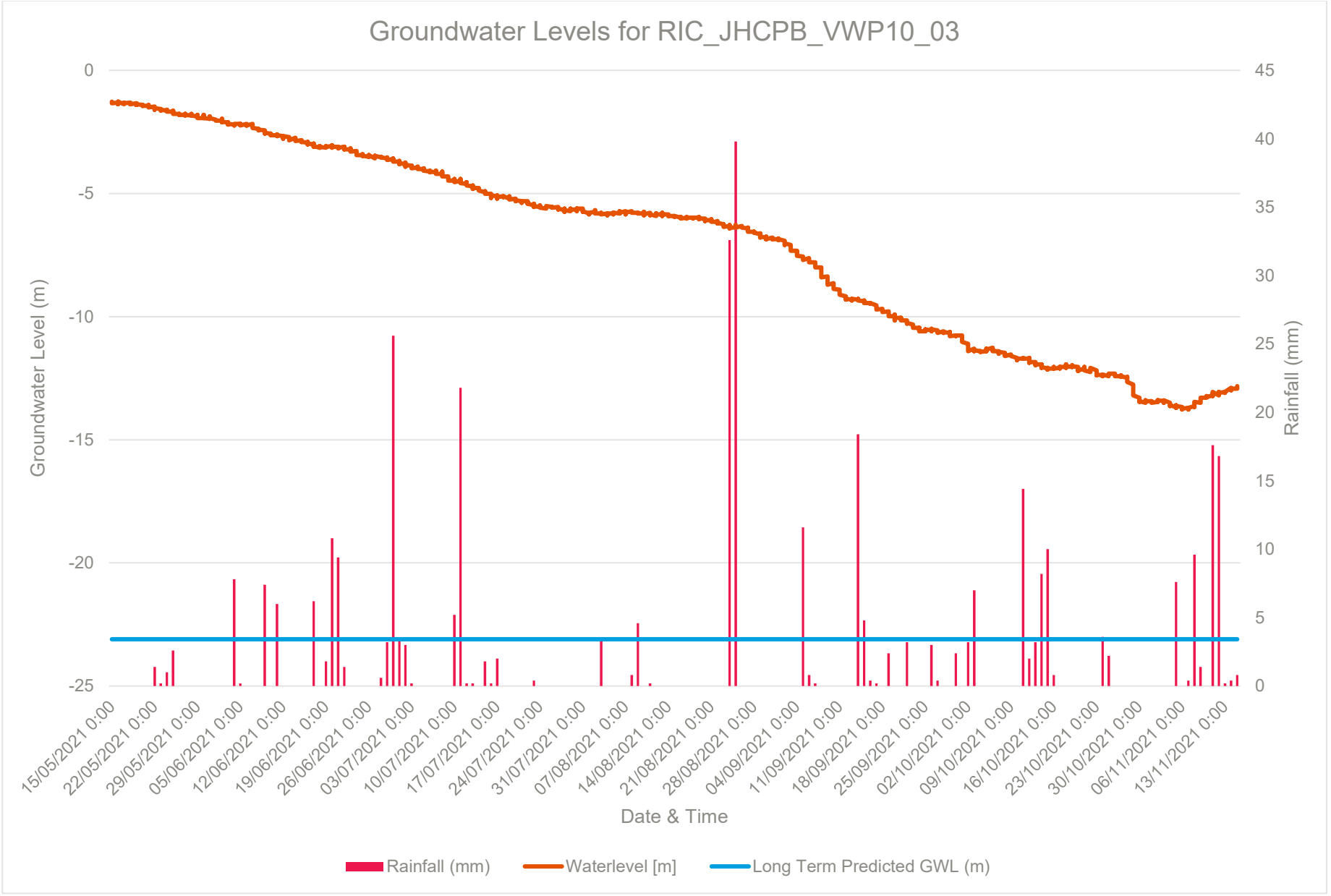

Groundwater Levels for RIC_JHCPB_VWP06_03
Groundwater Level (m)
Rainfall (mm)
Date & Time
14
12
10
8
6
4
2
0
45
40
35
30
25
20
15
10
5
0
16/05/2021 0:00
23/05/2021 0:00
30/05/2021 0:00
06/06/2021 0:00
13/06/2021 0:00
20/06/2021 0:00
27/06/2021 0:00
04/07/2021 0:00
11/07/2021 0:00
18/07/2021 0:00
25/07/2021 0:00
01/08/2021 0:00
08/08/2021 0:00
15/08/2021 0:00
22/08/2021 0:00
29/08/2021 0:00
05/09/2021 0:00
12/09/2021 0:00
19/09/2021 0:00
26/09/2021 0:00
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)

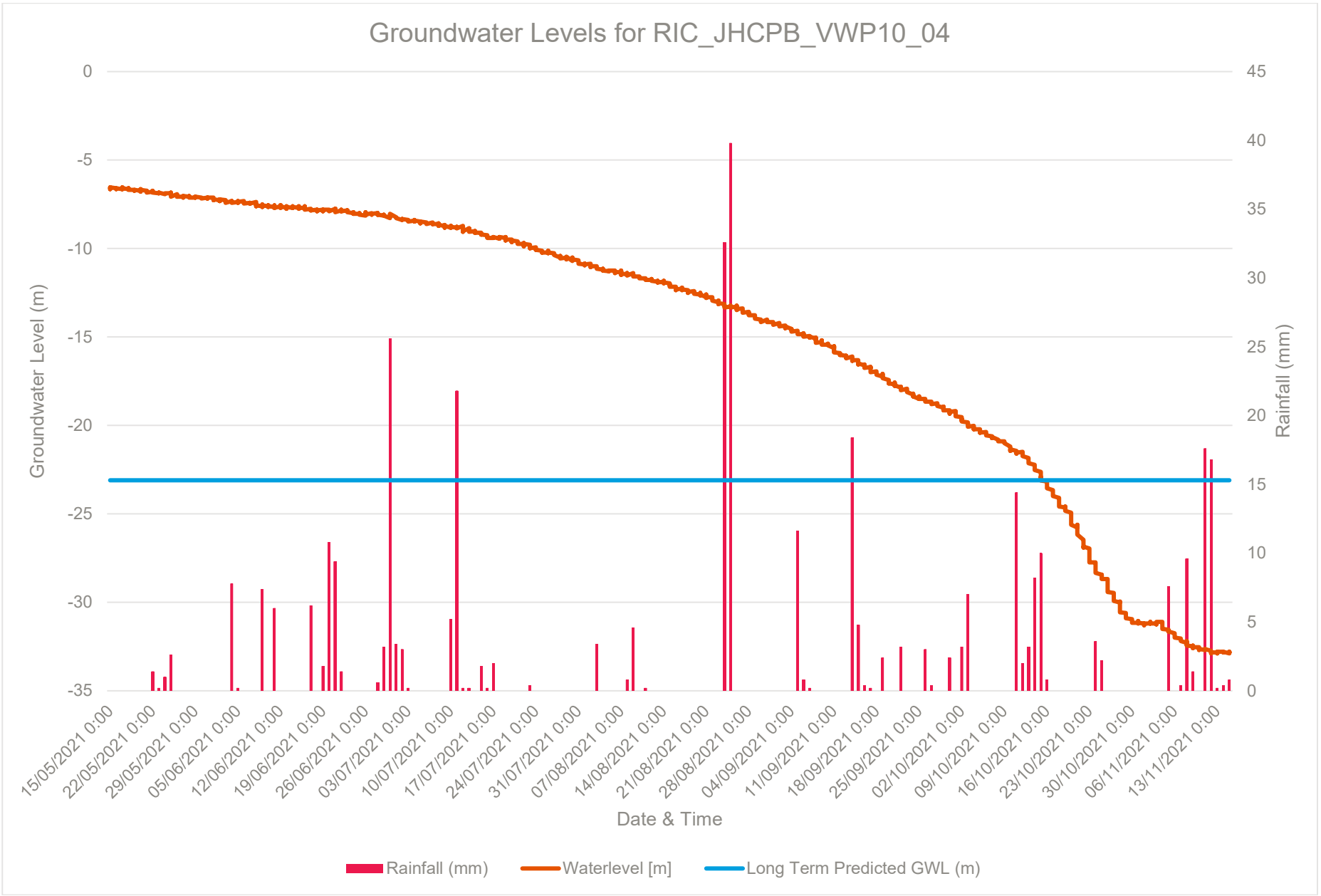

Groundwater Levels for RIC_JHCPB_VWP06_04
Groundwater Level (m)
Rainfall (mm)
Date & Time
6
5
4
3
2
1
0
45
40
35
30
25
20
15
10
5
0
16/05/2021 0:00
23/05/2021 0:00
30/05/2021 0:00
06/06/2021 0:00
13/06/2021 0:00
20/06/2021 0:00
27/06/2021 0:00
04/07/2021 0:00
11/07/2021 0:00
18/07/2021 0:00
25/07/2021 0:00
01/08/2021 0:00
08/08/2021 0:00
15/08/2021 0:00
22/08/2021 0:00
29/08/2021 0:00
05/09/2021 0:00
12/09/2021 0:00
19/09/2021 0:00
26/09/2021 0:00
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)

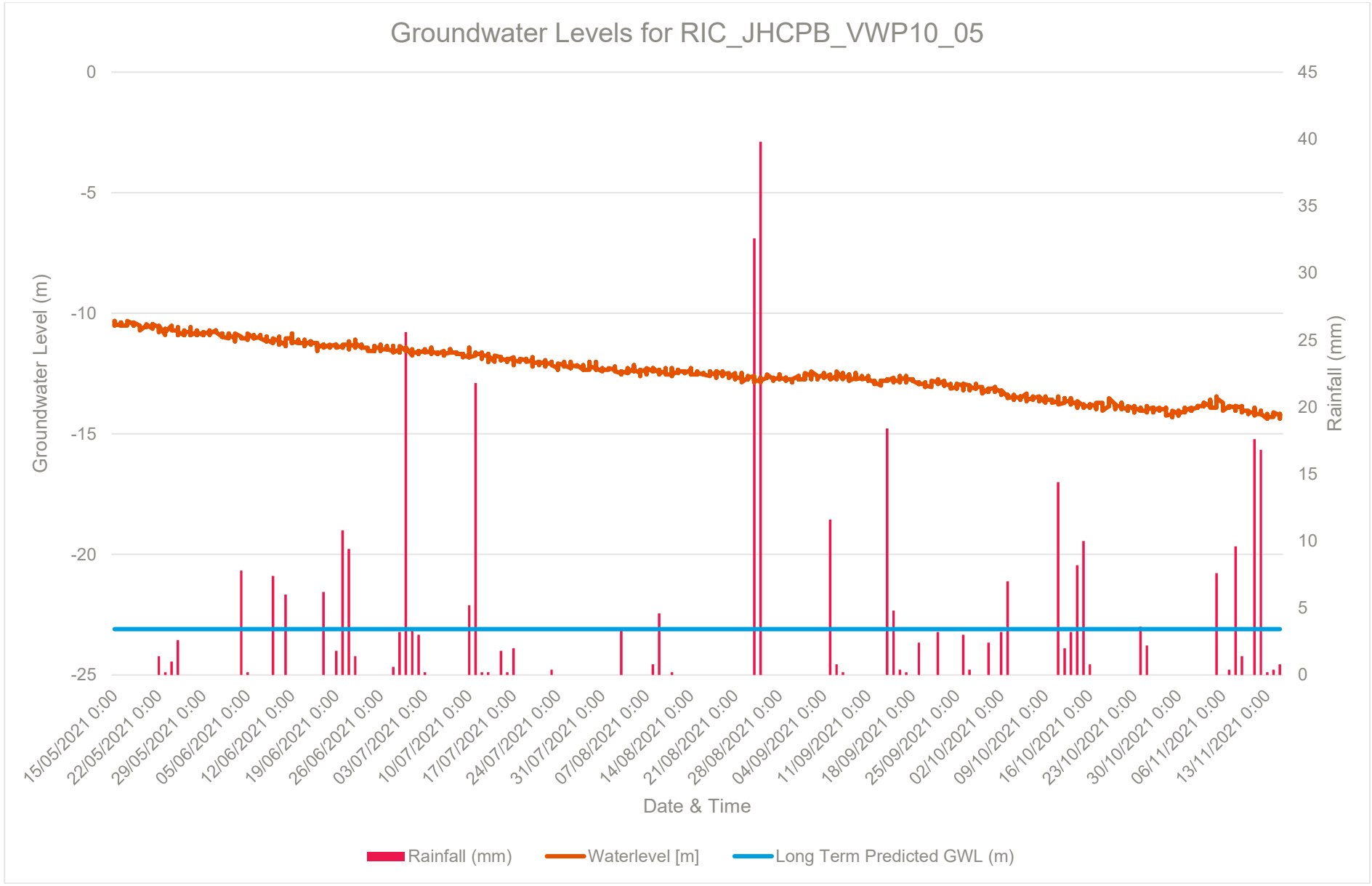

Groundwater Levels for RIC_JHCPB_VWP06_05
Groundwater Level (m)
Rainfall (mm)
Date & Time
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
-4
45
40
35
30
25
20
15
10
5
0
16/05/2021 0:00
23/05/2021 0:00
30/05/2021 0:00
06/06/2021 0:00
13/06/2021 0:00
20/06/2021 0:00
27/06/2021 0:00
04/07/2021 0:00
11/07/2021 0:00
18/07/2021 0:00
25/07/2021 0:00
01/08/2021 0:00
08/08/2021 0:00
15/08/2021 0:00
22/08/2021 0:00
29/08/2021 0:00
05/09/2021 0:00
12/09/2021 0:00
19/09/2021 0:00
26/09/2021 0:00
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)

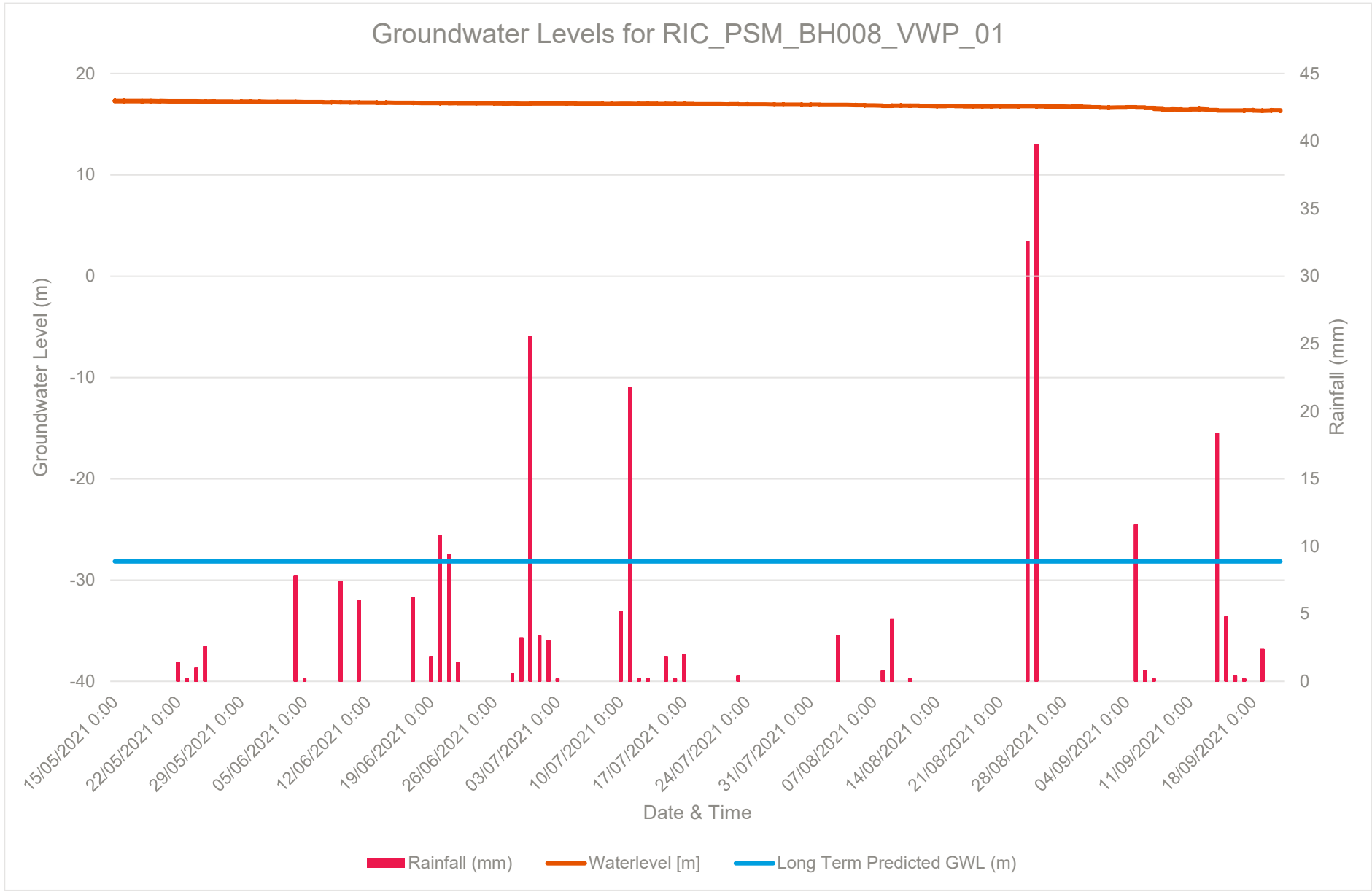

Groundwater Levels for RIC_JHCPB_VWP10_01
Groundwater Level (m)
Rainfall (mm)
Date & Time
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)

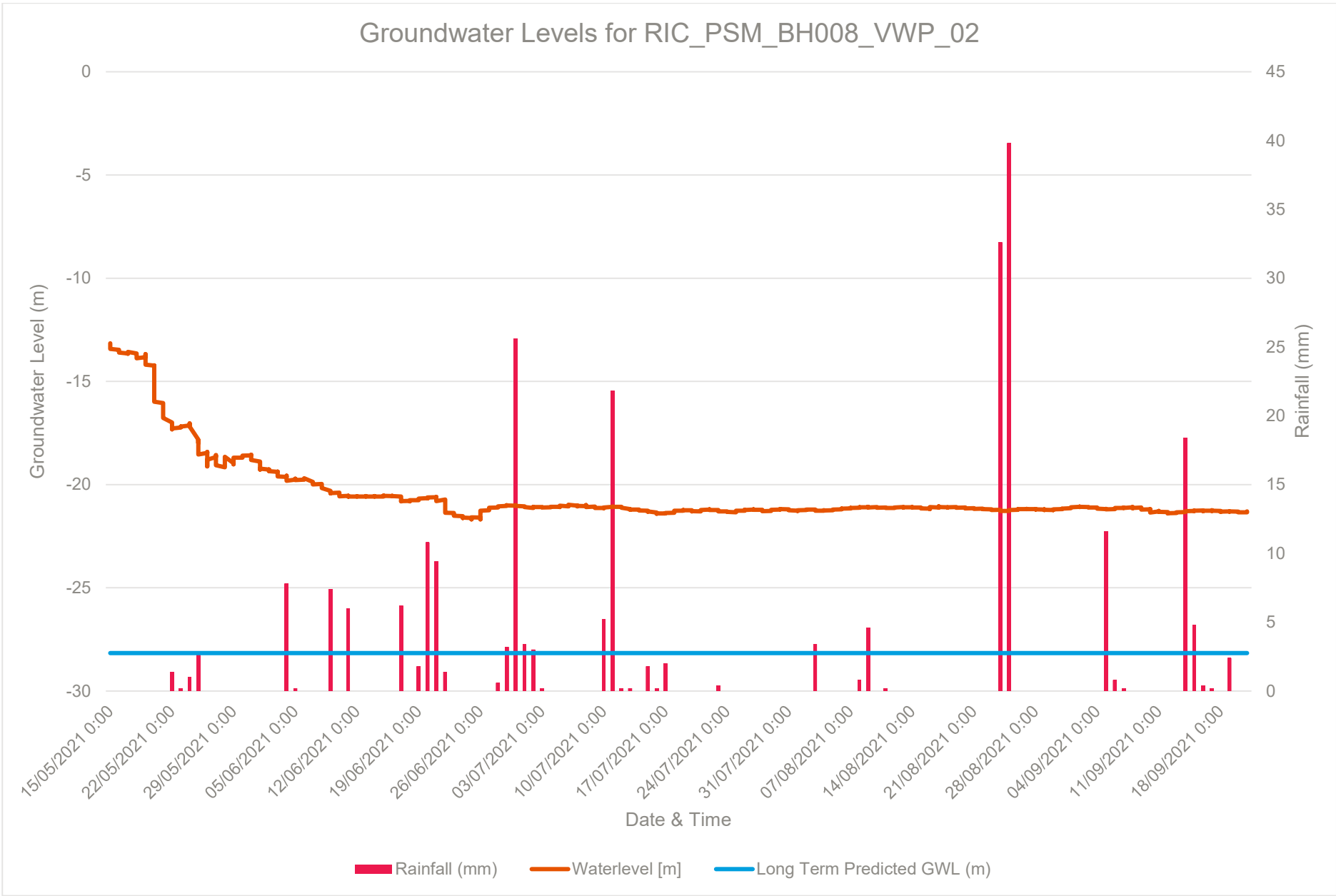

Groundwater Levels for RIC_JHCPB_VWP10_02
Groundwater Level (m)
Rainfall (mm)
Date & Time
10
5
0
-5
-10
-15
-20
-25
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
22/05/2021 0:00
29/05/2021 0:00
05/06/2021 0:00
12/06/2021 0:00
19/06/2021 0:00
26/06/2021 0:00
03/07/2021 0:00
10/07/2021 0:00
17/07/2021 0:00
24/07/2021 0:00
31/07/2021 0:00
07/08/2021 0:00
14/08/2021 0:00
21/08/2021 0:00
28/08/2021 0:00
04/09/2021 0:00
11/09/2021 0:00
18/09/2021 0:00
25/09/2021 0:00
02/10/2021 0:00
09/10/2021 0:00
16/10/2021 0:00
23/10/2021 0:00
30/10/2021 0:00
06/11/2021 0:00
13/11/2021 0:00
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)

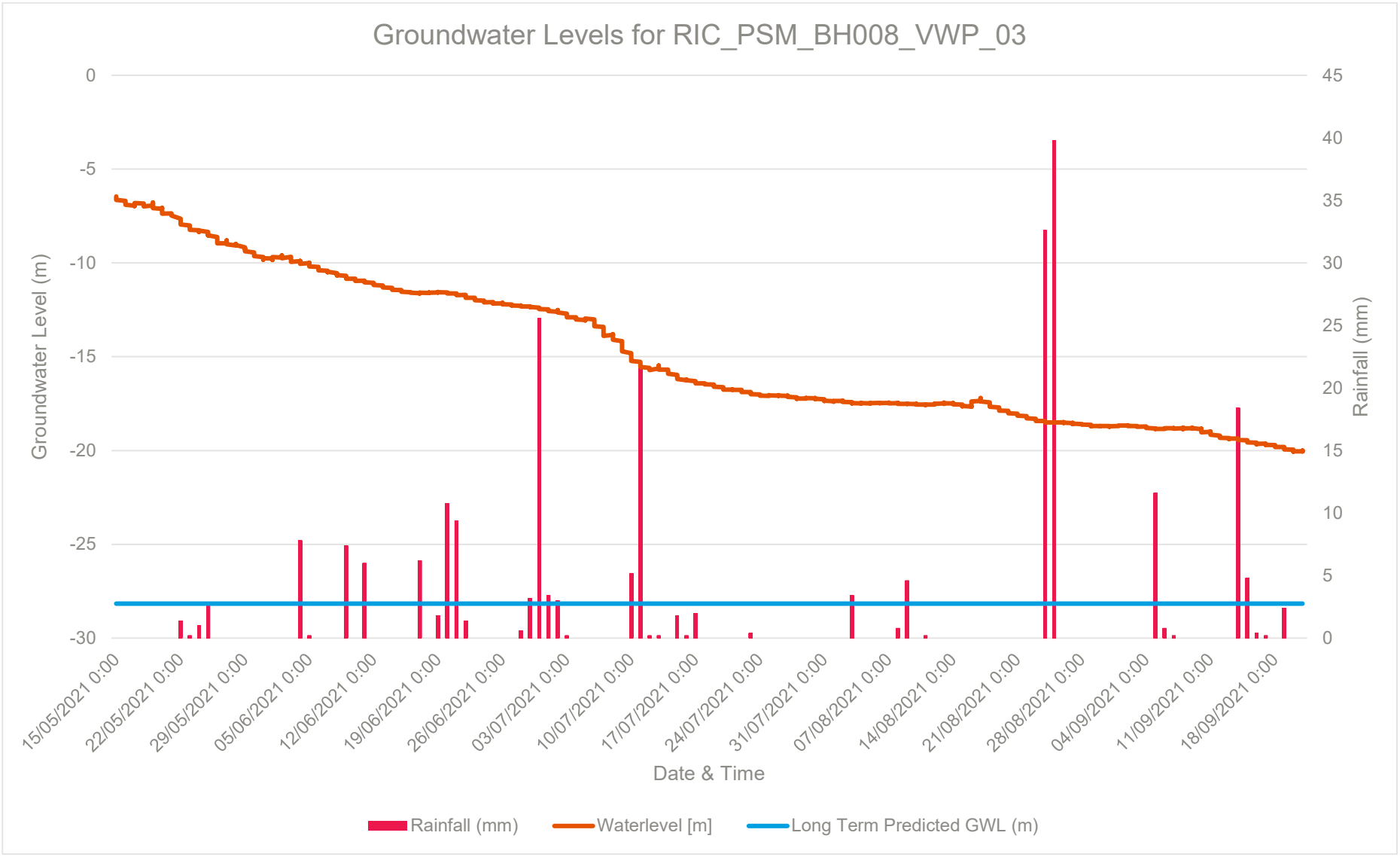

Groundwater Levels for RIC_JHCPB_VWP10_03
Groundwater Level (m)
Rainfall (mm)
0
-5
-10
-15
-20
-25
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
22/05/2021 0:00
29/05/2021 0:00
05/06/2021 0:00
12/06/2021 0:00
19/06/2021 0:00
26/06/2021 0:00
03/07/2021 0:00
10/07/2021 0:00
17/07/2021 0:00
24/07/2021 0:00
31/07/2021 0:00
07/08/2021 0:00
14/08/2021 0:00
21/08/2021 0:00
28/08/2021 0:00
04/09/2021 0:00
11/09/2021 0:00
18/09/2021 0:00
25/09/2021 0:00
02/10/2021 0:00
09/10/2021 0:00
16/10/2021 0:00
23/10/2021 0:00
30/10/2021 0:00
06/11/2021 0:00
13/11/2021 0:00
Date & Time
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)


Groundwater Levels for RIC_JHCPB_VWP10_04
Groundwater Level (m)
Rainfall (mm)
0
-5
-10
-15
-20
-25
-30
-35
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
22/05/2021 0:00
29/05/2021 0:00
05/06/2021 0:00
12/06/2021 0:00
19/06/2021 0:00
26/06/2021 0:00
03/07/2021 0:00
10/07/2021 0:00
17/07/2021 0:00
24/07/2021 0:00
31/07/2021 0:00
07/08/2021 0:00
14/08/2021 0:00
21/08/2021 0:00
28/08/2021 0:00
04/09/2021 0:00
11/09/2021 0:00
18/09/2021 0:00
25/09/2021 0:00
02/10/2021 0:00
09/10/2021 0:00
16/10/2021 0:00
23/10/2021 0:00
30/10/2021 0:00
06/11/2021 0:00
13/11/2021 0:00
Date & Time
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)


Groundwater Levels for RIC_JHCPB_VWP10_05
Groundwater Level (m)
Rainfall (mm)
0
-5
-10
-15
-20
-25
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
22/05/2021 0:00
29/05/2021 0:00
05/06/2021 0:00
12/06/2021 0:00
19/06/2021 0:00
26/06/2021 0:00
03/07/2021 0:00
10/07/2021 0:00
17/07/2021 0:00
24/07/2021 0:00
31/07/2021 0:00
07/08/2021 0:00
14/08/2021 0:00
21/08/2021 0:00
28/08/2021 0:00
04/09/2021 0:00
11/09/2021 0:00
18/09/2021 0:00
25/09/2021 0:00
02/10/2021 0:00
09/10/2021 0:00
16/10/2021 0:00
23/10/2021 0:00
30/10/2021 0:00
06/11/2021 0:00
13/11/2021 0:00
Date & Time
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)


Groundwater Levels for RIC_PSM_BH008_VWP_01
Groundwater Level (m)
Rainfall (mm)
Date & Time
20
10
0
-10
-20
-30
-40
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
22/05/2021 0:00
29/05/2021 0:00
05/06/2021 0:00
12/06/2021 0:00
19/06/2021 0:00
26/06/2021 0:00
03/07/2021 0:00
10/07/2021 0:00
17/07/2021 0:00
24/07/2021 0:00
31/07/2021 0:00
07/08/2021 0:00
14/08/2021 0:00
21/08/2021 0:00
28/08/2021 0:00
04/09/2021 0:00
11/09/2021 0:00
18/09/2021 0:00
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)


Groundwater Levels for RIC_PSM_BH008_VWP_02
Groundwater Level (m)
Rainfall (mm)
0
-5
-10
-15
-20
-25
-30
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
22/05/2021 0:00
29/05/2021 0:00
05/06/2021 0:00
12/06/2021 0:00
19/06/2021 0:00
26/06/2021 0:00
03/07/2021 0:00
10/07/2021 0:00
17/07/2021 0:00
24/07/2021 0:00
31/07/2021 0:00
07/08/2021 0:00
14/08/2021 0:00
21/08/2021 0:00
28/08/2021 0:00
04/09/2021 0:00
11/09/2021 0:00
18/09/2021 0:00
Date & Time
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)


Groundwater Levels for RIC_PSM_BH008_VWP_03
Groundwater Level (m)
Rainfall (mm)
0
-5
-10
-15
-20
-25
-30
45
40
35
30
25
20
15
10
5
0
15/05/2021 0:00
22/05/2021 0:00
29/05/2021 0:00
05/06/2021 0:00
12/06/2021 0:00
19/06/2021 0:00
26/06/2021 0:00
03/07/2021 0:00
10/07/2021 0:00
17/07/2021 0:00
24/07/2021 0:00
31/07/2021 0:00
07/08/2021 0:00
14/08/2021 0:00
21/08/2021 0:00
28/08/2021 0:00
04/09/2021 0:00
11/09/2021 0:00
18/09/2021 0:00
Date & Time
Rainfall (mm)
Waterlevel [m]
Long Term Predicted GWL (m)

Annexure B Salinity Monitoring Results

Annexure C Groundwater Level Raw Data