Groundwater &
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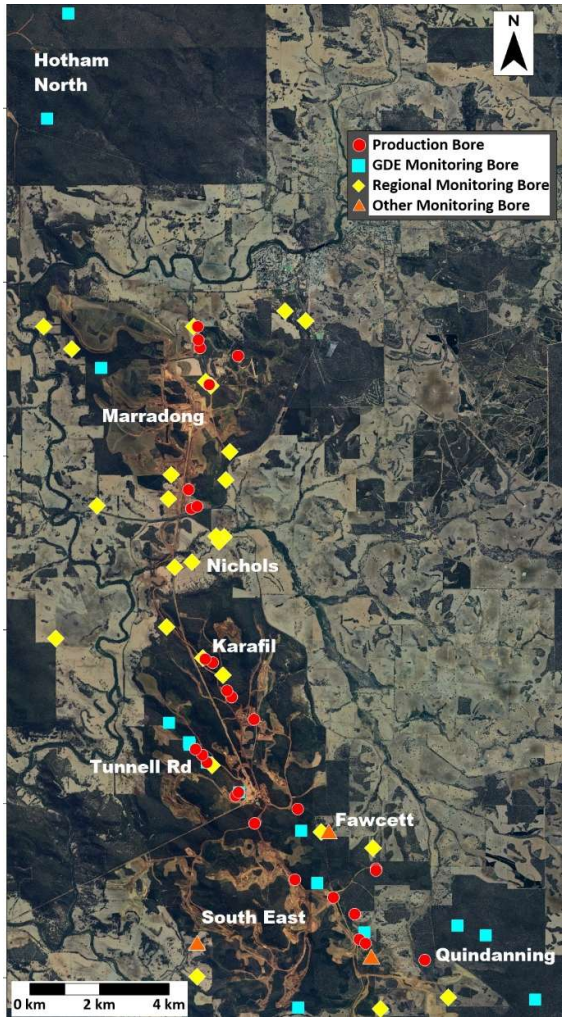
REPORT

TO

SOUTH32 WORSLEY ALUMINA PTY LTD

BODDINGTON BAUXITE MINE TRIENNIAL AQUIFER REVIEW

JULY 2023 – JUNE 2026



K.A. Green & G.T. Dalton

September 2026

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SUMMARY

Over the 2023 to 2026 triennial review period the Ministerial Statement that legislates Worsley's groundwater management and monitoring commitments was superseded with the Ministerial Statement No. 1237 replacing No.719. The most significant change for aquifer management is an increase in water that can be used for mining operations from 500 ML/annum to 900 ML/annum. In addition to this ongoing mining operations allowance the statement permits an additional 580 ML/annum for up to three years for use in the construction of the Worsley Mine Development Envelope and Bauxite Transport Corridor haul roads and conveyor system.

Worsley's Water Management Plan defines the monitoring program established to meet the legislative requirements. This plan was revised during the review period and now contains three monitoring programs for the Boddington Bauxite Mine area: a Targeted GDE Groundwater Monitoring Program; a Regional Groundwater Monitoring Program; and a Production Bore Monitoring Program.

The targeted GDE Groundwater Monitoring Program involves quarterly field monitoring and logger data downloads from key bores at locations identified as potential Groundwater Dependent Ecosystems (GDEs). Trigger and threshold water levels for groundwater rises and/or declines at these bores are defined in the management plan, and if a level is exceeded then this should be investigated and action taken where appropriate following the Trigger Action Response Plan (TARP).

During the review period two bores in the South-East area exceeded their groundwater rise trigger since the approval of the current water management plan in February 2025, A04 and B01. The groundwater level at B01 has historically been shallow, with levels within a meter of the surface in 1975, prior to mining. It is recommended that the potential risks that led to the inclusion of B01 in the targeted GDE program be reviewed along with the trigger and threshold level. The level at B01 was declining at the end of the review period so no action is needed in the current mine site management and climatic conditions, however an extended high rainfall period could result in another rise.

Bore A04 exceeded the trigger level and has continued to rise, albeit at a slower rate than in the previous review period, and this has coincided with an increase in salinity. The rising water level was investigated by expanding monitoring to two existing bores down valley from A04 near the boundary between the Saddleback Timber Reserve and agricultural land. The groundwater level and salinity at these bores, E03 and E01/04 was stable or declining since they were commissioned in 2005. The stable water level at these bores suggests that the water mounding at A04 is localised so there is not a high risk of saline groundwater discharge in the current conditions. The growth of vegetation in the rehabilitation areas upslope of A04 may further slow or stop the groundwater rise in the next review period.

There were no other exceedances of trigger and threshold levels or concerning trends in the water level and water quality from the other bores in the Targeted GDE Groundwater Monitoring Program and the Regional Groundwater Monitoring Program.

Groundwater abstraction over the review period was significantly below the volume permitted in the new Ministerial Statement. Abstraction from some individual bores exceeded their recommended yields, however no significant adverse effects were noted in the surrounding monitoring bores. The current recommended yields for production bores do not reflect the potential volume that can be abstracted without adverse effects. Some bores have recommended yields several times higher than has ever been achieved, while other bores have been operated at double their recommended yield with no adverse effects.

The recommended yields of the production bores were reviewed in this report, and it is suggested that these are reviewed at least every three years taking into consideration the surrounding monitoring bore data as well as the production bore data. Bauxite mining involves large changes to the vegetation cover that significantly affect the recharge of the aquifer, which along with variable climatic conditions and abstraction from other bores, will affect the potential yield of bores.

It is recommended that the production bores are grouped based on their location and target aquifer, with eleven groups in total of between one and five production bores. The total recommended yields for each of these groups would be used in the Water Management Plan rather than individual recommended yields. These group-based recommended yields allow for operational flexibility while managing the potential risk for the aquifer. The monitoring programs are the key mechanism for noticing and responding to changes in the aquifers, these responses could include adjustments to a group yield or limiting an individual bore yield as required.

Several bores were drilled into the fractured rock aquifer across the mining area as potential new water supply bores for the construction and general mining operations. Four of these new bores were used during the review. The placement of the new bores in the fractured rock aquifer is ideal as it draws from a deep level, and the fractures allow rapid flow from a wide area, so the effect of the abstraction is less localised in time and space. This is particularly important in years of low rainfall when the groundwater may already be depleted by stressed vegetation and the water requirements for dust suppression tend to be higher.

Overall, the Boddington Bauxite Mine Aquifer is being well managed, with no observations of high concern. The Water Management Plan is aiding in the identification and investigation of groundwater movements in areas identified as high risk. Given the dynamic system of surface mining in a changing climate, it is important to continuously review and revise both the abstraction yields and the groundwater monitoring plan to ensure they are appropriate for the current conditions and mine-site plans.

INTRODUCTION

South32 Worsley Alumina Pty Ltd (Worsley) operates the Boddington Bauxite Mine (BBM) in the north-eastern section of the Darling Plateau, approximately 120 km SSE of Perth, near the township of Boddington (Figure 1). The BBM site is situated in the northern jarrah forest with the majority of the mine site falling within the Saddleback and Marradong Timber Reserves. The site is surrounded mostly by cleared agricultural land. The elevation of the site varies from 200 m at the south-west river to 590 m at the top of Mt Saddleback. The major drainage from the site is into the Hotham River which runs along the northern and western edges of the site and Williams River in the south. Marradong Creek is a tributary to Hotham River, which cuts through between the Marradong and Saddleback mining areas, and drains the eastern side. Hotham and Williams Rivers combine in the south-west corner of the site to form the confluence of the Murray River which meanders westward, outflowing in the Peel-Harvey Estuary next to Mandurah. Mining in Saddleback commenced in the late 1970's, while mining activities in Marradong commenced in 2009.

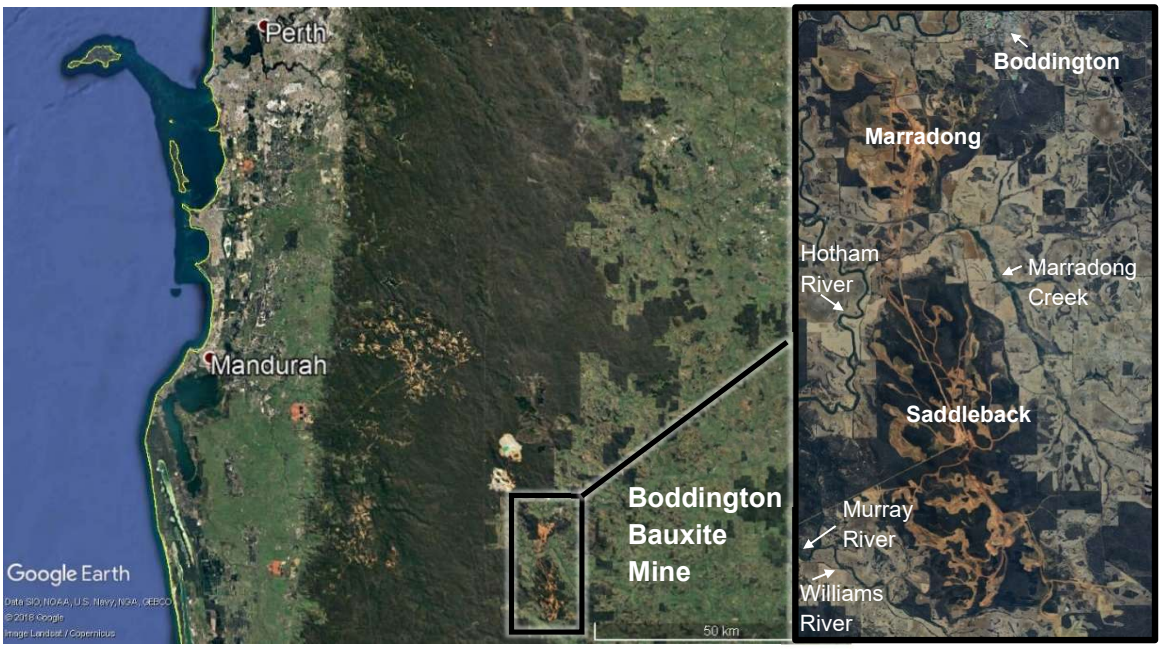

Figure 1: Location of Boddington Bauxite Mine

Worsley has commissioned Groundwater & Environmental Consultants to undertake the July 2023 – June 2026 BBM triennial aquifer review to assess the effect of bauxite-mining activities on the aquifer level and quality as set out in their current Water Management Plan (Version 6.0, 10th Feb. 2025). The aquifers in Saddleback and Marradong are used to abstract groundwater for mining activities (primarily dust suppression) through a network of production bores. The aquifer catchments are also subject to clearing for mining activities. Land-clearing induced water-table rises have created many salinity problems in south-west Western Australia, and this is the major risk associated with the mining. Worsley has established a network of piezometers across the site to monitor the effects of mining (clearing,

mining, water abstraction, haul roads, etc.) on the water-table and on groundwater quality. The heathland in the Tunnell Rd borefield is an identified Groundwater Dependent Ecosystem (GDE), which is sensitive to changes in groundwater level and quality, therefore more extensive monitoring occurs in this catchment. Parts of the Quindanning Timber Reserve have been identified as key habitat for threatened flora including *Caladenia hopperiana, Caladenia caesarea* subsp. Mooradung and more recently *Caladenia dorrienii*; groundwater monitoring has been expanded in this area over this review period to monitor for changes in groundwater that may impact this ecosystem. The objective of this report is to review the rainfall, groundwater-abstraction, and groundwater-monitoring data from across the BBM site and to interpret these data, with a focus on trends emerging in the last three years. The report provides a summary of the current understanding of aquifer status; and gives recommendations for the ongoing groundwater-management to meet legislative requirements and guide future decision-making.

BACKGROUND

Groundwater Monitoring Program & Commitments

The Ministerial Statement that legislated Worsley's groundwater management and monitoring commitments changed during the review period with Ministerial Statement 719 (MS719) applying up to 20th December 2024, when it was superseded by Ministerial Statement 1237 (MS1237). The major change with regards to groundwater is an increase in the volume of water that can be extracted from an average of 500 ML per annum in MS719, to a volume of up to 900 ML per annum in MS1237, with an additional 580 ML per annum temporarily allowed (up to three years) for the duration of the construction of Worsley Mine Development Envelope (WMDE) and Bauxite Transport Corridor (BTC) haul roads and the conveyor system.

Worsley's Water Management Plan (WMP) defines the monitoring program established to meet the legislative requirements. The WMP was revised during the review period with the current plan approved by the Department of Water and Environmental Regulation (DWER) as part of the MS1237 in February 2025. There are three components to the current WMP groundwater monitoring program: a Targeted GDE Groundwater Monitoring Program; a Regional Groundwater Monitoring Program; and a Production Bore Monitoring Program.

The Targeted GDE Groundwater Monitoring Program targets key monitoring bores in areas identified as GDEs or at risk from significant changes in the groundwater level, these bores have water level loggers deployed and quarterly field water level and electrical conductivity measurements to regular monitor the water level and water quality at these critical sites. There is groundwater rise and/or groundwater decline trigger and threshold water levels set for these bores with a Trigger Action Response Plan (TARP) set out in the Water Management Plan.

The Regional Groundwater Monitoring Program includes all the monitoring bores in the targeted GDE program and additional monitoring bores distributed across the mining area to monitor changes in groundwater level and quality. This monitoring program includes the use of water level loggers at a large subset of the bores, and six-monthly field water level and water quality monitoring, with sample collection and laboratory water quality analysis of all bores in the program.

The Production Bore Monitoring Program involves annual field water level and quality monitoring with sample collection and laboratory water quality analysis of all production bores. The three groundwater monitoring programs are summarised in Table 1 the bores involved in each program are subject to change and not all bores listed have been monitored for the entire review period, actual monitoring will be discussed in the relevant sections.

Table 1 Summary of Groundwater Monitoring Programs

Program	Monitoring	Bores
Targeted GDE Groundwater Monitoring Program	Water Level – Logger Quarterly Field – WL, EC	P12, T05, T07C, T11, T11A, A04, B01, Q03, Q05, Q06, Q07, Q08, Q09, Q11, MP21, H12D, H12S, H13D, H13S
Regional Groundwater Monitoring Program	Water Level – Logger	T06C, K04, K05, K14, F06-D, SW01, Q01, Q02, B04/20, M01, M01/18, M03, M04, M06, MP03, MP10, MP17, MP26, N01, N04, N05, N07, N10
Regional Groundwater Monitoring Program	Biannual Lab.: pH, EC, TDS, Alk, Si, F^-, NO_X NH_3, NH_4^+, Tot. N, Ca^{2+}, Mg^{2+}, Na^+, K^+, Cl^-, SO_4^{2-}, Tot. Metals: Al, As, Cd, Cr, Cu, Fe, Hg, Mn, Ni, Pb, Se, Zn. Biannual Field: WL, EC, Temp., pH, DO	P12, T05, T07C, T11, T11A, A04, B01, Q03, Q05, Q06, Q07, Q08, Q09, Q11, MP21, H12D, H12S, H13D, H13S T06C, K04, K05, K14, F06-D, SW01, Q01, Q02, B04/20, M01, M01/18, M03, M04, M06, MP03, MP10, MP17, MP26, N01, N04, N05, N07, N10, K13, E01/04, MP14, MP27
Production Bore Monitoring Program	Annual Lab.: pH, EC, TDS, Alk, Si, F^-, N, Ca^{2+}, Mg^{2+}, Na^+, K^+, $Fe^{2+/3+}$, Cl^-, SO_4^{2-}, Filtered Metals: Al, As, Cd, Cr, Fe, Hg, Mn, Ni, Pb, Se, Zn. Annual Field: WL, EC, Temp., pH, DO	T07A, T08, T10, T12, T13, K01, K06, K07, K08, K09, E01/06, SE01/01, SE01/03, SE01/04, SE02/03, SE02/06, T14, SE02/01, SE03/01, M01/08, M01/11, M01/18, M02/08, M03/09, M02/09, M03/08

Climate

BBM is located in the Low Rainfall Zone (LRZ, <900 mm/yr) of the northern jarrah forest, the climate is Mediterranean with warm dry summers and much of the rainfall occurring in winter. The rainfall has declined in recent decades by over 15%, from a 1900-1974 average of 760 mm/yr to a 1975-2024 average of 636 mm/yr (BOM Marradong, Station No. 9575). The BOM Marradong rainfall record is incomplete for 2025, so the rainfall at Boddington North gauging station (No. 109516) has been considered for this review. The rainfall at Boddington North Station is generally lower than at Marradong Station and likely underestimates the rainfall at BBM, but generally shows similar inter-annual trends. Figure 2 shows the annual rainfall over the monitoring record, with the three review years highlighted, and monthly rainfall displayed in Figure 3. The annual (calendar year) rainfall in 2023 and 2024 are slightly below the recent average, with 2025 being an average year. There was an extended low rainfall period from October 2023 to May 2024.

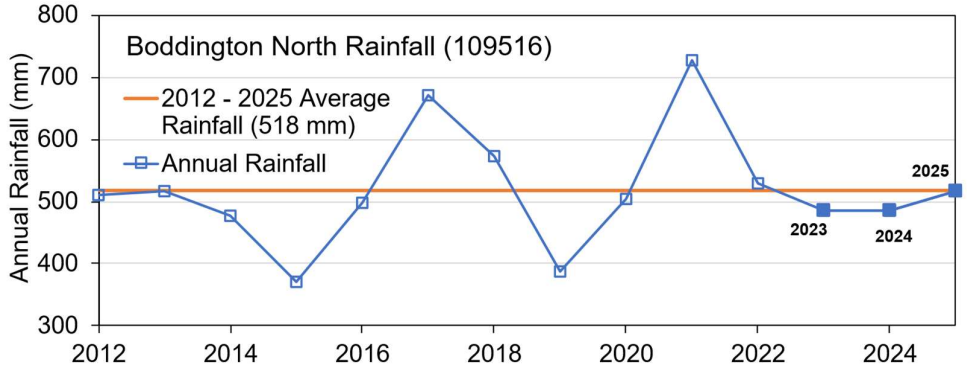

Figure 2: Annual Rainfall Plot for Boddington North 2012 – 2025 (calendar years)

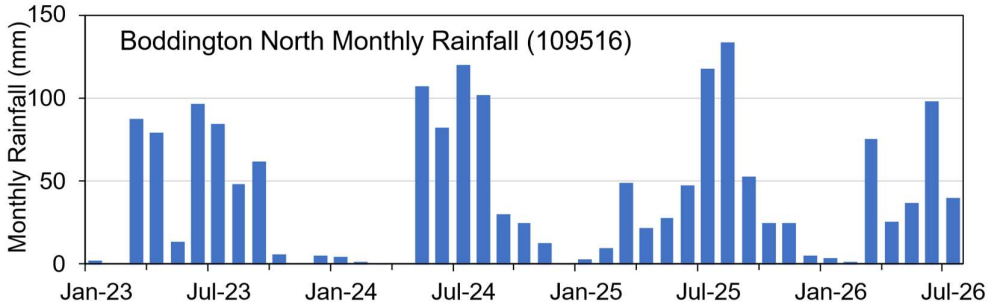

Figure 3: Monthly Rainfall at Boddington North Jan 2023 – Jul 2026

Hydrogeology

The BBM site has up to three aquifer-layers: a shallow seasonal-aquifer, a deep weathered-zone aquifer, and a fractured-bedrock aquifer. The existence and extent of these three aquifers varies across the groundwater catchments. The soil profile in BBM typically varies from 10 m to over 50 m but averages around 25 m. The typical soil-profile in the upper- and mid-slopes involves: a shallow top layer of gravelly sand (0-2 m), in which can form a superficial aquifer; a low-permeability duricrust underlies this layer (0-3 m thick) which forms the upper section of a bauxite layer (0-10 m thick); next come the mottled and pallid zones; followed by a saprolite layer, which forms the second aquifer; below this is the fractured-rock aquifer within the bedrock. The saprolite and fractured-rock aquifers are in hydraulic-continuity and are distinguished from each other by their material properties. In the lower slopes and valley-floor the duricrust can be absent; the top-layer of gravel and the bauxite layer can form a single entity which in total is usually thinner than the mid and upper-slope layers. The bedrock on the eastern edge of Saddleback and Marradong areas is composed of granites and granitic gneisses, typical of the Darling Plateau. The centre and western side of these areas has a mafic bedrock of the Saddleback group commonly known by the term “greenstone”. The fractured-rock aquifer is the most productive, and is the aquifer targeted by most abstraction-bores. The yield from this aquifer varies considerably from bore to bore due to the non-uniform nature and preferred-pathways of the fractured rock. The saprolite aquifer has considerable storage-capacity, but only moderate permeability and this makes it less suited to abstraction.

The near-surface soils are highly permeable, so streamflow is usually generated from lateral flows in the upper layer and in the superficial aquifer. The salinity is usually low in these upper layers and the low volume and high permeability of the superficial aquifer generally results in ephemeral streams, with flow periods dependent on the catchment area and superficial-aquifer thickness. As well as generating streamflow some water penetrates to the connected saprolite and fractured-rock aquifers. In forested areas these aquifers are usually disconnected from surface water with their water-table remaining at depth, even in the stream zone. Rises of this water-table can result in discharge of saline groundwater to streams, significantly affecting the stream and riparian ecosystems, as has been observed following historical clearing for agriculture in the region.

Bauxite Mining Aquifer Risks

Bauxite mining can potentially affect the aquifers via: changes to the groundwater recharge caused by clearing and revegetation, and drawdown from groundwater abstraction. There is also a risk of hydrocarbons and other chemicals entering the groundwater system from localised spills from mining related activities.

The risk of hydrocarbons and other chemicals is managed by appropriate spill prevention and management measures and by regular sampling of two hydrocarbon-monitoring bores located within the main operational area (HMB01/03 and HMB02/03). A review of the data from these hydrocarbon-monitoring bores is conducted separately and not included in this report.

The risk of excessive drawdown from groundwater abstraction is managed by: a regular review of the sustainable yields of production bores; continuous monitoring of groundwater-abstraction volumes via flowmeters; and groundwater-level observations from nearby monitoring bores. The abstraction volumes and surrounding monitoring will be discussed in this review.

Clearing and revegetation can affect groundwater levels, due to the significant role of evapotranspiration (ET) in the water balance accounting for up to 98% of rainfall in the Low Rainfall Zone (LRZ) (Croton & Dalton, 2004). The removal of vegetation for mining and associated activities (e.g. haul roads) significantly reduces the ET, which increases groundwater recharge and often raises the water-table (Croton & Dalton, 2003). This increased recharge is similar to that seen when land is cleared for agriculture; however, clearing within the bauxite mine is temporary, with prompt revegetation of most areas (with the exception of haul roads and other operational areas). The revegetation as it grows can also affect the groundwater recharge, with potential for a long-term effect if the vegetation is significantly different in composition and/or density to the pre-mining conditions.

Changes to groundwater levels are a concern both for groundwater dependent ecosystems (GDEs) and for streamflow quantity and quality where the groundwater discharges into the streamzone. The Tunnell Rd heathland in STR is a recognised GDE where changes to the groundwater level and/or quality may significantly affect this recognised ecosystem. A high

level of monitoring is conducted in the Tunnell Rd heath area to examine the effect of groundwater abstraction and surrounding mining activities on the heath, which will be discussed in this review.

While changes to streamflow volumes is somewhat of a concern; the greatest surface-water risk is posed by the discharge of saline groundwater to the surface caused by a rising water-table after clearing. Dry-land salinity is a recognised problem in South-West W.A., in many places clearing for agriculture has caused the surface discharge of saline water. Due to the temporary nature of its clearing, the risk of dry-land salinity from bauxite mining is much lower than from agriculture. The risk and potential impact of dry-land salinity is dependent on the amount of salt in the soil and groundwater as well on the water-table level change.

A soil-salt storage analysis of 438 boreholes was conducted in 2007 (Croton & Dalton) to evaluate the salinity risk of mining activities. This study determined a mean volumetric total soluble salt (VTSS) of 0.94 and 1.18 kg/m^3 in STR and MTR respectively, with no significant difference between the granite and greenstone bedrocks. These results were significantly lower than the 1.94 kg/m^3 suggested by previous broad studies (Tyskin & Croton, 1988).

A review of the effect of bauxite mining on the groundwater and streamflow was carried out in 2004 (Croton & Dalton, 2004) comparing two catchments, a control catchment (Hunt A, a.k.a. Bee Farm) and a mined catchment (Hunt B, a.k.a. Tunnel Rd) with monitoring commencing in both catchments in 1976. The review found mining resulted in an increase in both streamflow and salinity (from 100-200 mg/L to 200-500 mg/L), however the runoff from both catchments was very low at 0.06 and 0.08 % of rainfall in Hunt A and B respectively. Because the runoff is so small these changes are unlikely to have a significant effect at the water-resources scale. The effect is also likely to be temporary with the water table receding after rehabilitation thereby lowering the stream salt-load to pre-mining conditions. After the study was completed mining was conducted in the control catchment.

Several studies modelling the potential effect of mining on groundwater at BBM have been conducted including Groundwater Flow Analysis (GFA) conducted as part of the recent groundwater monitoring review (Croton, et al., 2020). These types of studies have guided both the placement of piezometers and prioritising the monitoring of existing ones.

The drying climate discussed previously has significantly reduced the risk of dry-land salinity at BBM. Current groundwater-levels of forested catchments are significantly below historic levels. Figure 4 shows the groundwater level at A04 (in Hunt A control catchment), and Q08 (in the Quindanning Timber Reserve). Groundwater level at A04 declined steadily from 1976 levels until the commencement of mining activities in Hunt A catchment, groundwater levels have continued to decline in the forested catchment of Q08.

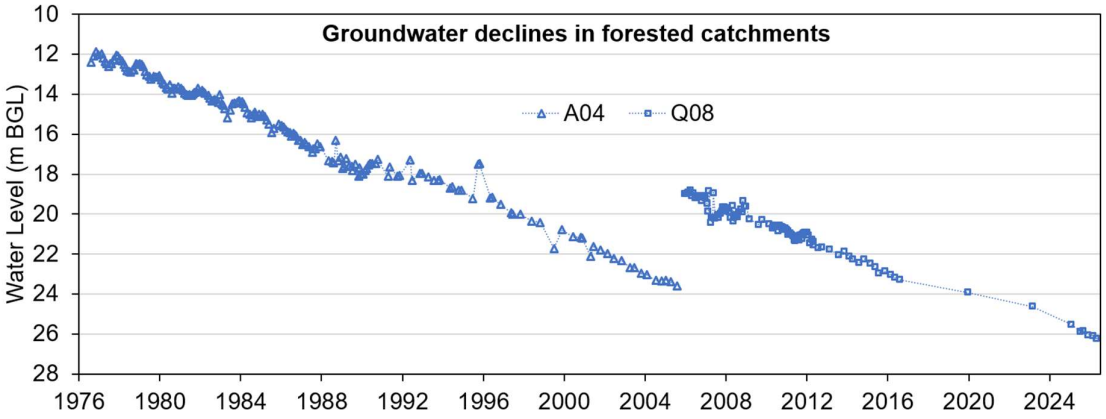

Figure 4: Groundwater level plot for A04 and Q08

The saprolite aquifer is the most important aquifer for monitoring, due to its large storage capacity and ability to discharge into the streamzone. Some monitoring of the fractured-rock aquifer is also useful, to observe the varied effect on this aquifer. Due to its seasonality and limited volume the shallow superficial aquifer is of little interest to general studies but may be relevant to understanding localised ecosystems of interest. Some shallow bores have been installed in this review period at sites identified as potential Groundwater Dependent Ecosystems (GDEs).

BOREFIELD OVERVIEW

There are eight major abstraction and monitoring areas within BBM area, shown in Figure 5: Hotham North (baseline monitoring), Marradong, Nichols (no abstraction), Karafil, Tunnell Rd; Fawcett; South-East; and Quindanning.

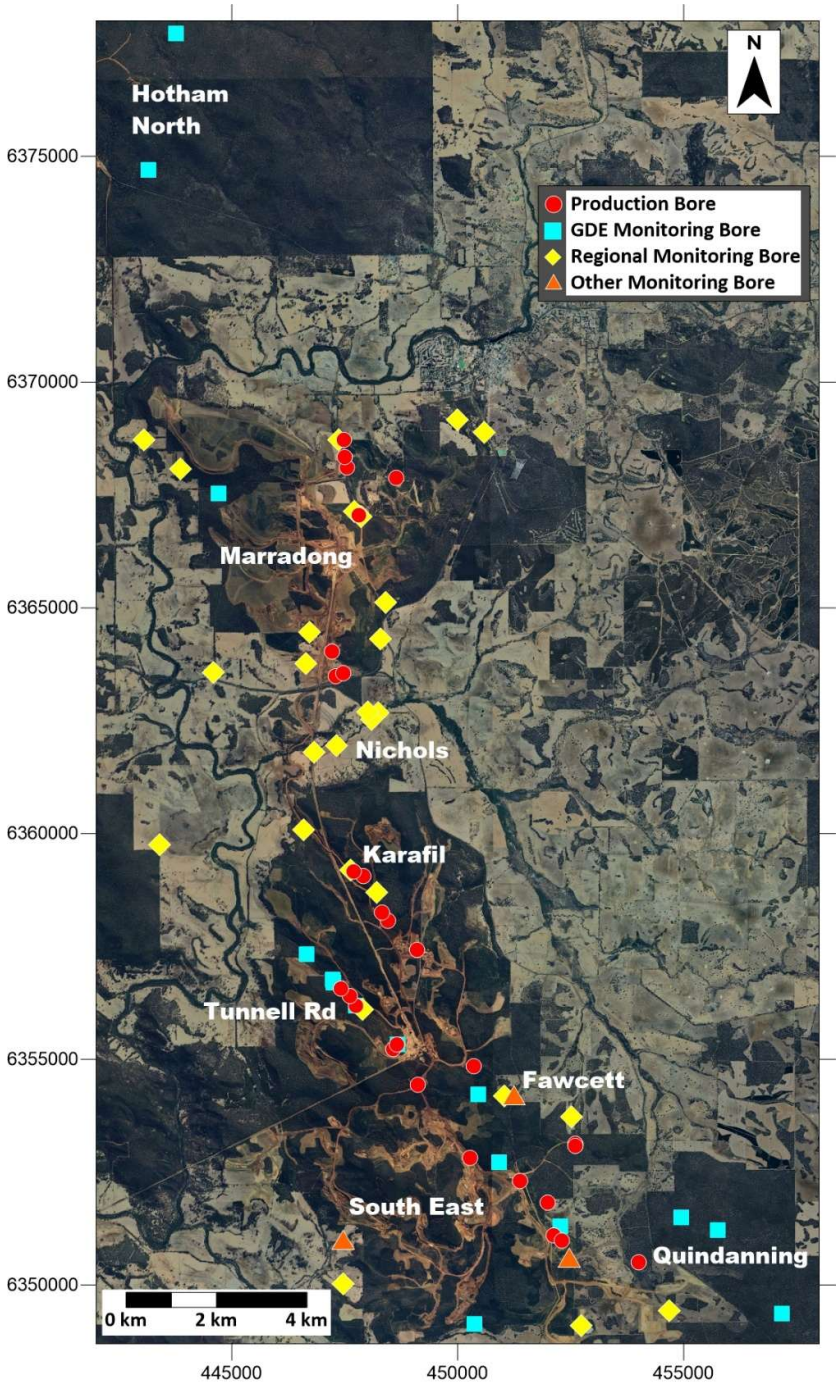

Figure 5: Map of BBM operational areas and bore locations

Groundwater was abstracted from 28 production bores over the review period (red circles), this included three newly commissioned bores in Marradong area and one in Quindanning area, while abstraction from SE02/01 ceased over the last review period (last abstraction

November 2020). There were 27 regional monitoring bores (yellow diamonds) and 19 targeted GDE monitoring bores (blue squares) including four new monitoring bores in the Hotham North area, and two in the Quindanning area. Three other bores not included in the current Water Management Plan were also monitored in the review period (orange triangles). The abstraction and monitoring data for each area will be discussed separately in detail in the following sections, tabulated details for all bores are given in Appendix A.

Most of the current monitoring-bores are screened in the saprolite aquifer, with a few screened in the fractured-rock aquifer. The monitoring network was established with bores near abstraction fields, bores within mining and operational catchment-areas; targeted GDE monitoring bores and control bores that are removed from all mining activity. The oldest monitoring-bores are the "A" and "B" series of bores in the South-East area, which were commissioned in 1975-1976. The new bores in Hotham North area are gathering baseline data for this future mining area, while the new bores in Quindanning target shallow groundwater monitoring in the threatened flora GDE.

Water is used in the BBM area primarily for dust suppression; water is abstracted from a network of bores and pumped into dams and other holding vessels before use. The majority of the abstraction bores are targeting the fractured-rock aquifer, including all new bores, some of the Karafil and Tunnell Rd bores target the saprolite aquifer in these valleys. Over the review period twelve additional potential production bores were drilled in the mining area, with four bores each in the Quindanning, Marradong, and Hotham North areas. Only four of the new bores, three in Marradong and one in Quindanning, were used in this review period.

The total annual abstraction from the seven borefields since 1994-95 are shown in Figure 6. The abstraction data is reported on a July to June year as the demand for dust suppression is greater in summer due to the lower rainfall and higher evaporation. The total abstraction-volume has increased over the review period with 2025-26 being the highest abstraction years on record, but below the new abstraction limit from MS1237. Abstraction for the Nullaga Project commenced in 2026 from three new bores in the Marradong area and an existing Marradong bore (M03/09). This abstraction of 80 ML, shown in yellow on Figure 6, is for the construction work and is accounted for as the designated additional temporary allowance of (580 ML/annum for up to three years).

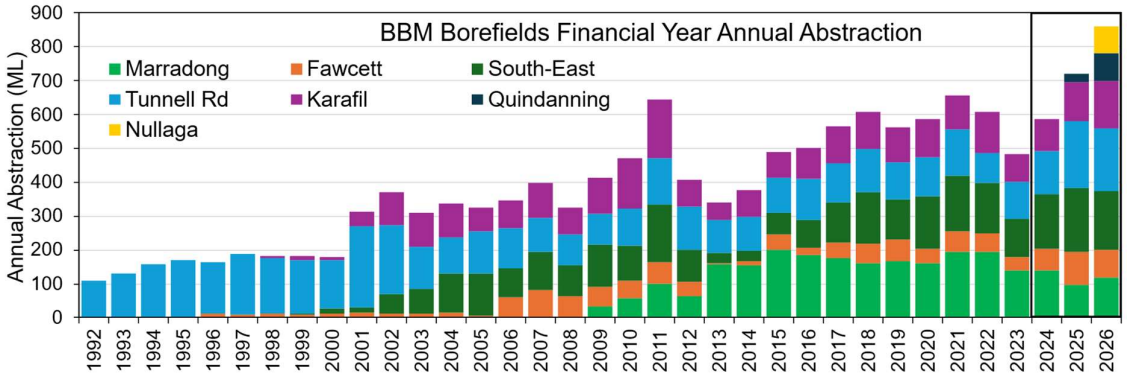

Figure 6: BBM Borefields Financial Year Annual Abstraction

KARAFIL

Borefield Description

Kararfil borefield is situated along a valley in the north-west of the Mt Saddleback mining area and timber reserve. There are five production-bores in use along the valley, two targeting the saprolite aquifer (K01 and K07), and three targeting the fractured rock aquifer (K06, K08, and K09). The four regional groundwater monitoring bores are all screended in the saprolite aquifer with two in the borefield area (K04 and K05), one below the borefield (K13) and a control bore in an agricultural valley on the western side of Hotham River outside the mining area (K14). The location of all the bores are shown in Figure 7, with key details summarised in Table 2.

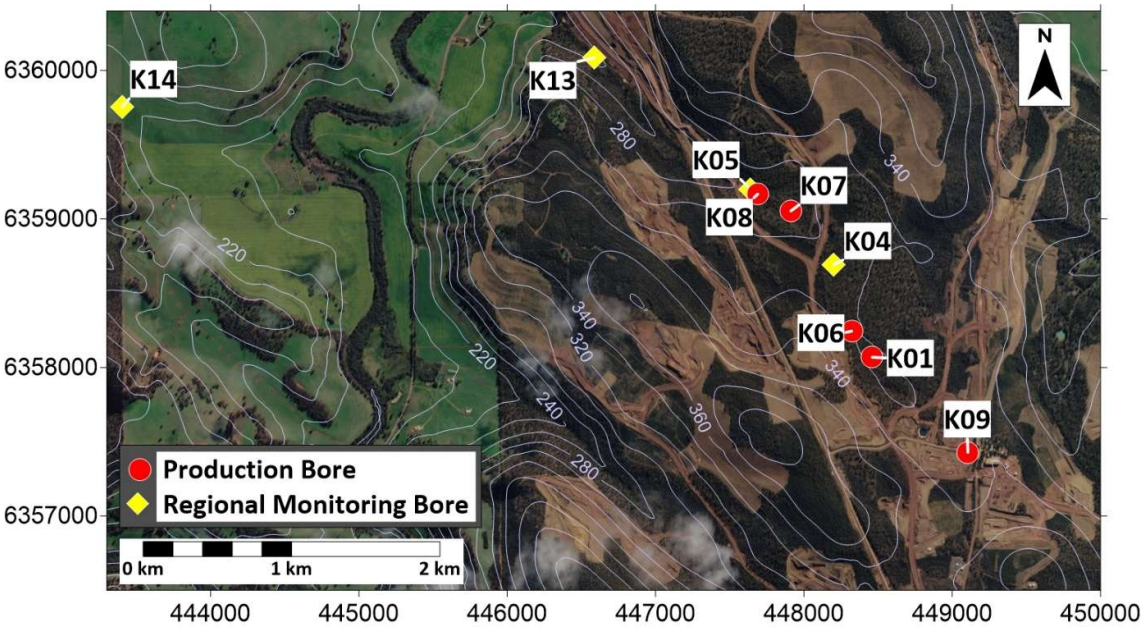

Figure 7: Location of production and monitoring bores in Karafil area

Table 2: Screening details of Karafil production and monitoring bores

Bore		Depth (m BGL)	Screening Interval (m BGL)	Screening Aquifer	Commission Year
Production Bores	**K01**	51.75	19.75 – 51.75	Saprolite/Saprock	1982
	K06	73.8	? – 73.8	Fractured Rock	1993
	K07	43.8	? – 43.8	Saprolite/Saprock	1993
	K08	97.0	28.5 – 97.0	Fractured Rock	1998
	K09	100.0	28.6 – 100.0	Fractured Rock	1998
Regional Monitoring Bores	**K04**	49.52	0 – 49.45	Saprolite	1982
	K05	28.77	0 – 29.47	Saprolite	1982
	K13	39.1	19.94 – 37.94	Saprolite	2005
	K14	28.06	16.06 – 28.06	Saprolite	2005

The Karafil borefield valley has been significantly disturbed by mining related activities, as can be seen in Figure 7 (imagery from 9th August 2026). Along the streamzone and lower slopes there is some remnant-vegetation and several cleared operational-areas (haul roads and

conveyor), the mid and upper slope have large cleared mining areas, and revegetation areas, there are cleared areas for operational infrastructure at the head of the valley. There has been an increase in cleared areas in both the south-east and north west sides of the valley over the review period with some of the clearing being previously revegetated areas. Monitoring of the Karafil bores K04 and K05 commenced in 1994, pre-dating abstraction which commenced in December 1997; K14 monitoring-bore was commisioned in 2005. Monitoring of K13 restarted in 2025, its location, below the borefield and the majority of the mining disturbance, provides monitoring of the overall effect of mining activities in the Karafil catchment, the bore was previously monitored from 2005 to 2016.

Groundwater Abstraction

The groundwater abstraction from Karafil borefield has increased slightly compared to the previous review period, in line with the general increase in water abstraction across BBM. Groundwater abstraction from Karafil borefield continued to be seasonal with low abstraction in winter, as shown in Figure 8.

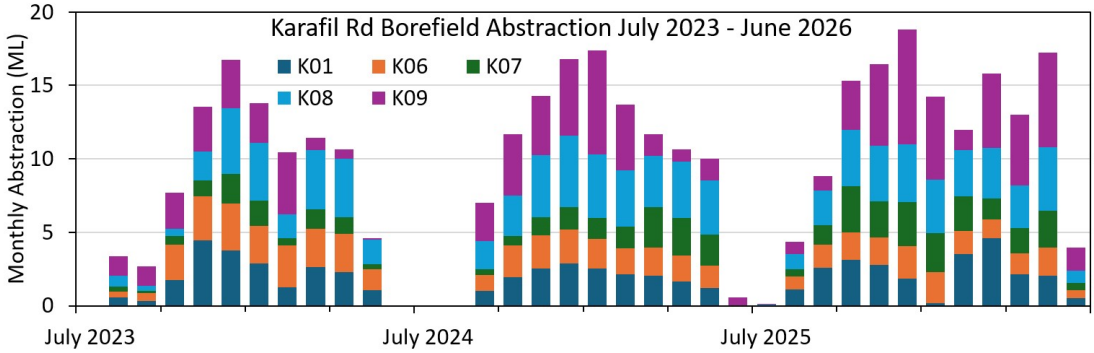

Figure 8: Karafil borefield monthly abstraction

The recommended yields and annual abstraction-volumes for Karafil production bores over each year of the review are given in Table 3. The saprolite aquifer provided approximately a third of the water each year, with the remaining two-thirds from the fractured rock aquifer. There were no exceedances of the annual recommended yield of each bore over the review period.

Table 3: Annual abstraction from Karafil production-bores

Aquifer	Bore	Recommended Yield (ML/yr)	Abstraction (1st July to 30th June) (ML/yr)		
			2023-24	2024-25	2025-26
Saprolite	**K01**	29	21	18	25
	K07	46	9	14	22
	Total	**75**	**30**	**32**	**46**
Fractured Rock	**K06**	29	22	17	17
	K08	33	23	33	33
	K09	128	20	32	43
	Total	**190**	**65**	**82**	**94**
Borefield Total		**265**	**95**	**114**	**140**

The weekly abstraction from Karafil production bores over the review period is plotted in Figure 9 with their recommended yields. The recommended yields are based on constant rate abstraction 365 days a year, in practice none of the BBM bores are operated at a constant rate. When abstraction is not constant then higher rates may be achieved over shorter periods, but the annualised rate achieved will be lower than the constant rate under the same conditions. Plots of the daily abstraction rate provide insight into the rates achievable over shorter time periods and identify recommended yields that are too high, or lower than may be possible. Abstraction from K07 and K09 has been consistently below the recommended yield over the review period with all weekly rates below the recommended yield, the annual yields for both bores less than half the recommended yield (see Table 3). These recommended yields appear to be much higher than what is achievable with the current conditions and infrastructure. In contrast the abstraction at K08 was at the recommended yield in two of the review years and has previously exceeded this, it can be seen that when the bore is operational the abstraction rate is significantly higher than the recommended yield and it is likely that a higher yield could be sustained at this bore if it does not have significant adverse effects on the groundwater level and quality.

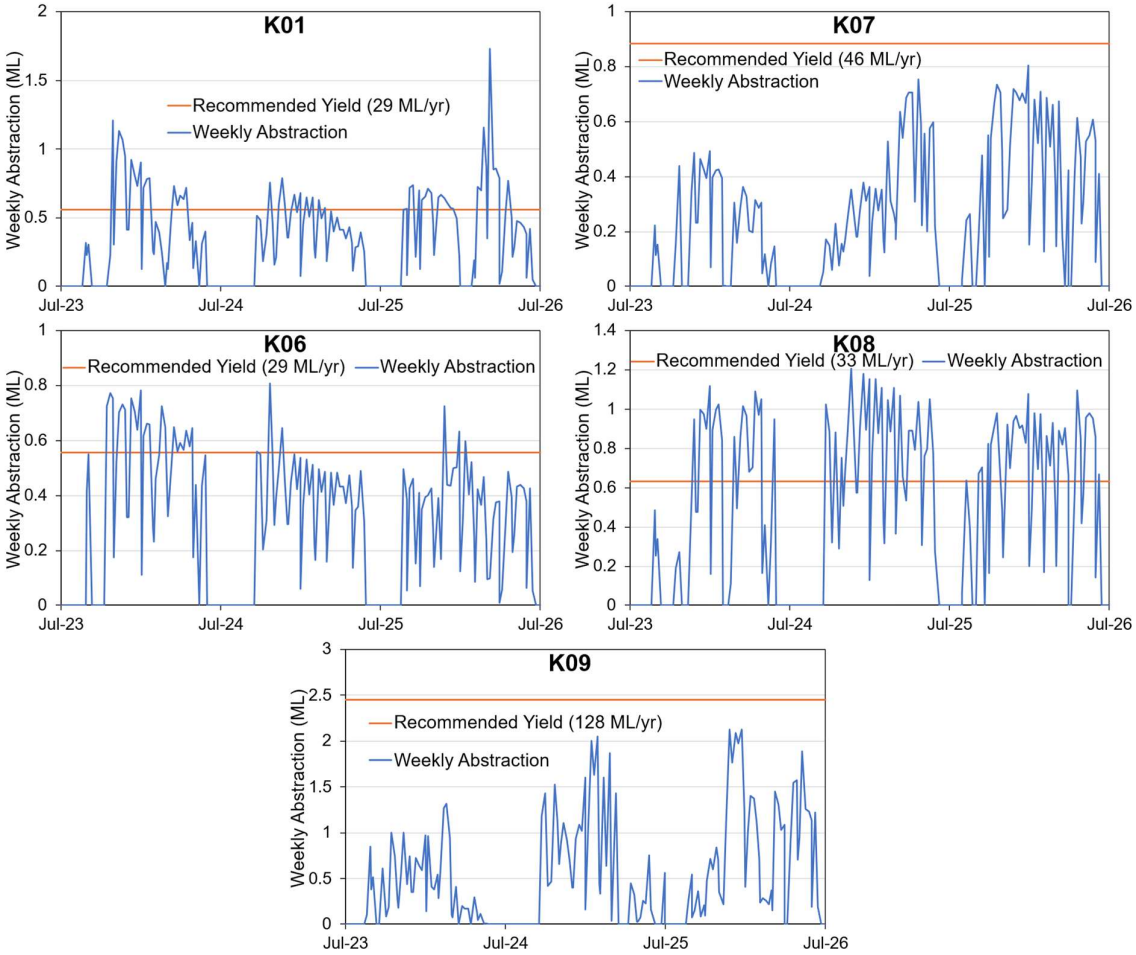

Figure 9: Plots of Karafil production bores weekly groundwater abstraction rates

Groundwater Monitoring

Groundwater monitoring of the Karafil borefield was expanded with monitoring recommencing at K13, located near the bottom of the Karafil valley (see Figure 7). K13 provides useful monitoring of the overall effect of water abstraction and mining activities in the Karafil valley on groundwater levels and water quality. The groundwater-level and salinity plots for the four regional monitoring bores in the Karafil area are shown in Figure 10. The groundwater-level has declined slightly over the review period, which is likely due to the lower rainfall and the catchment recovering from the high rainfall of 2021. The salinity is stable or declining at all bores.

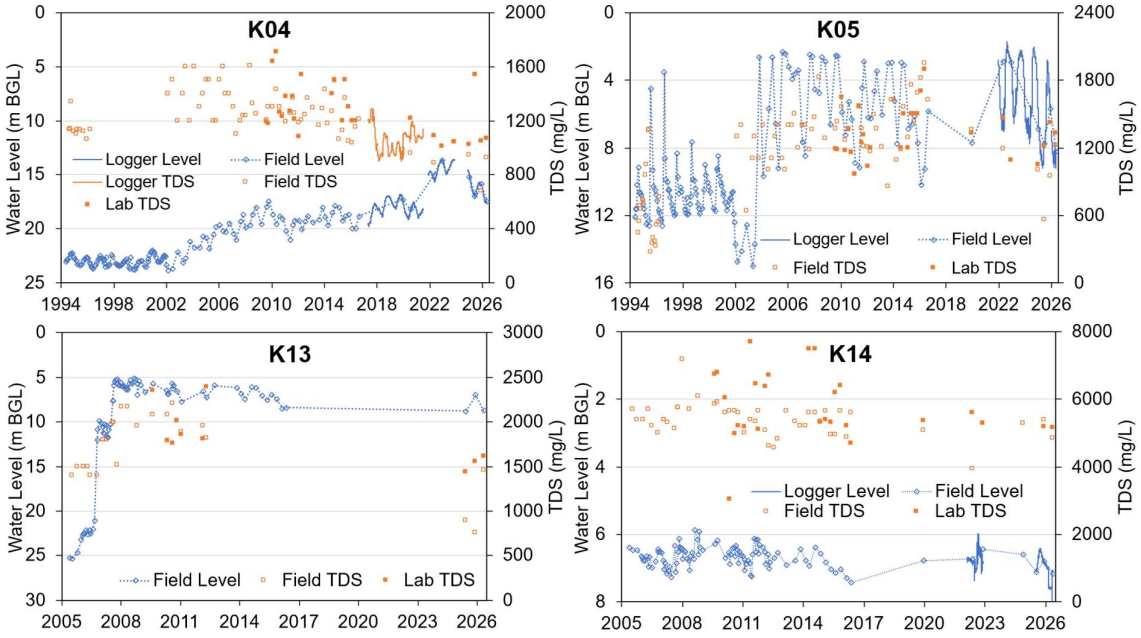

Figure 10: Groundwater-level and salinity plots for monitoring bores in Karafil area

K05 is located within 60 m of production bore K08 and has larger seasonal fluctuations than the other monitoring bores. Figure 11 plots the logger level at K05 with the weekly abstraction from K08, there are some associated changes in the water level suggesting that the level at K05 is affected by abstraction from K08. K05 is screened in the saprolite aquifer, while production-bore K08 is screened in the fractured-rock aquifer. The two aquifers are generally hydraulically connected, however the saprolite aquifer usually has lower hydraulic-conductivity, which may contribute to the delayed and subdued response seen. The water level at K05 recovers in winter when abstraction stops and the aquifer is recharged by rainfall. While there has been a decline in the water level over the review period, the level remains significantly higher than that in the 1990's and early 2000's (see Figure 10).

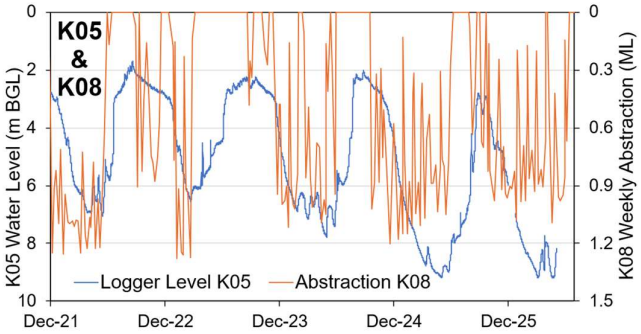

Figure 11: Plot of groundwater-level at K05 and abstraction volume from K08

The laboratory testing results from the monitoring and production bores is presented in Appendix B, there was no significant change to the groundwater quality parameters over the review period.

Borefield & Monitoring Assessment

Overall, the abstraction of groundwater from Karafil borefield appears to be conducted in a sustainable way, abstraction from all bores was at or below the recommended yields. Water levels declined slightly over the review period but remain above historical levels. The decline is likely due to the below average rainfall over the review period, the higher groundwater abstraction in 2025-26 may also have contributed to the decline.

The recommended yields of all production bores were reviewed, taking into consideration yields achieved over the review period and historically, as well as groundwater monitoring; the revised recommended yields are summarised in Table 4. The recommended yields for K07 and K09 were lowered as the yields achieved by these bores has been significantly below the recommended yield even at the weekly rate. The recommended yield for K08 has been increased as higher yields are likely possible and the groundwater level of nearby monitoring bore K05 remains above historical levels. While higher yields seem achievable, the potential long-term effects of a higher abstraction rate are less clear and will depend also on the rainfall and vegetation coverage in the catchment. The current groundwater monitoring program should be able to assess the effect of these changed yields. It is important to note that these are tentative adjustments based on the current available data. Recommended yields should be reviewed every three years because changes in vegetation cover and precipitation may alter the effect of this abstraction. Concerning trends in the monitoring bore water levels could also warrant a review of abstraction rates. It is recommended that the total yield for each aquifer in the Karafil borefield be used as the overall recommended rate because varying the bore of abstraction is not likely to significantly affect groundwater levels outside the mining area. The total yield for both aquifers has declined from these recommendations, however the actual abstraction may increase as the lowered yields at some bores were not achieved and the aquifer based recommended yields allow greater operational flexibility. It is important that regular monitoring of observational bores continues and any concerning trends be investigated promptly, including a review of recommended yields if relevant.

Table 4: Revised recommended yields for Karafil production-bores

Aquifer	Bore	Current Rec. Yield (ML/yr)	Revised Rec. Yield (ML/yr)	Comment
Saprolite	K01	29	29	Unchanged
	K07	46	30	Yield consistently low
	Total	**75**	**59**	
Fractured Rock	K06	29	29	Unchanged
	K08	33	40	Higher yield possible
	K09	128	90	Yield consistently low
	Total	**190**	**159**	
Borefield Total		**265**	**218**	

TUNNELL RD

Borefield Description

The Tunnell Rd borefield is situated in the next valley south of the Karafil borefield and is within the Saddleback mining-area and timber reserve. The location of production and monitoring bores within the Tunnell Rd borefield are shown in Figure 12, with key details summarised in Table 5.

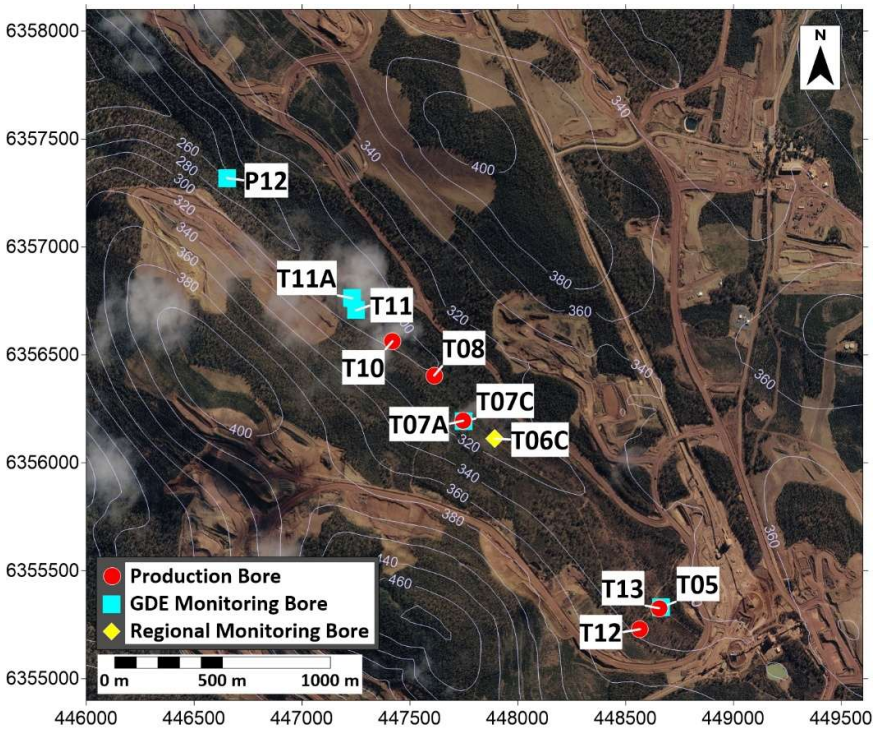

Figure 12: Location of production and monitoring bores in Tunnell Rd area

Table 5: Screening details of Tunnell Rd production and monitoring bores

	Bore	Depth (m BGL)	Screening Interval (m BGL)	Screened Aquifer	Commission Year
Production Bores	**T07A**	57.0	3.0 – 57.0	Saprolite/Saprock	1981
	T08	40.3	22.3 – 40.3	Saprolite/Saprock	1981
	T10	35.3	11.3 – 35.3	Saprolite/Saprock	1990
	T12	77.29	34.63 – 76.63	Saprolite/Saprock & Fractured Rock	1992
	T13	58.0	37.2 – 58	Saprolite/Saprock & Fractured Rock	1995
GDE Monitoring Bores	**T05**	41.5	28.0 – 41.5	Saprolite	1981
	T07C	92.0	unknown	unknown	1981
	T11A	26.1	13.03 – 25.03	Saprolite	1991
	T11	32.4	unknown	Saprolite	1991
	P12	28.5	6.43 – unknown	Saprolite	1992
Regional Monitoring Bore	**T06C**	24.7	16.0 – 24.7	Saprolite	1981

The Tunnell Rd borefield consists of five production bores, five GDE monitoring bores and one regional monitoring bore. All the monitoring bores and four of the production bores are located along the valley floor, with the five prodruction bore, T12, located in the lower slopes at the head of the catchment. The upper and midslopes are a mix of mine-revegetation and areas recently cleared for mining; there are haul-roads and operational areas in the lower slopes along with areas of remanant vegetation. The heathland ecosystem in the lower Tunnell Rd valley is identified as a groundwater dependent ecosystem (GDE). Over the review period there has been an increase in areas cleared for mining in the south-eastern and north-western slopes. Abstraction from Tunnell Rd borefield commenced in 1981, pre-dating regular monitoring-records by over ten years. Most of the production-bores in Tunnell Rd are abstracting from the saprolite aquifer with only T12 and T13 drawing from the fractured-rock aquifer.

Groundwater Abstraction

The groundwater abstraction from Tunnell Rd borefield over the review period is shown in Figure 13. The abstraction from Tunnell Rd is less seasonal than other borefields. Tunnell Rd abstraction has increased over the review period with the majority of the increase coming from T12. The recommended yields and annual abstraction-volumes for each year of the review are given in Table 6. The abstraction from T07A in the saprolite aquifer exceeded the recommended yield in 2024-25, however the combined yield from the saprolite aquifer bores was well below their combined recommended yields. The abstraction from T12 in the fractured rock aquifer exceeded the recommended yield in 2024-25 and 2025-26, but again the combined yield from this aquifer was only a third of the combined recommended yields.

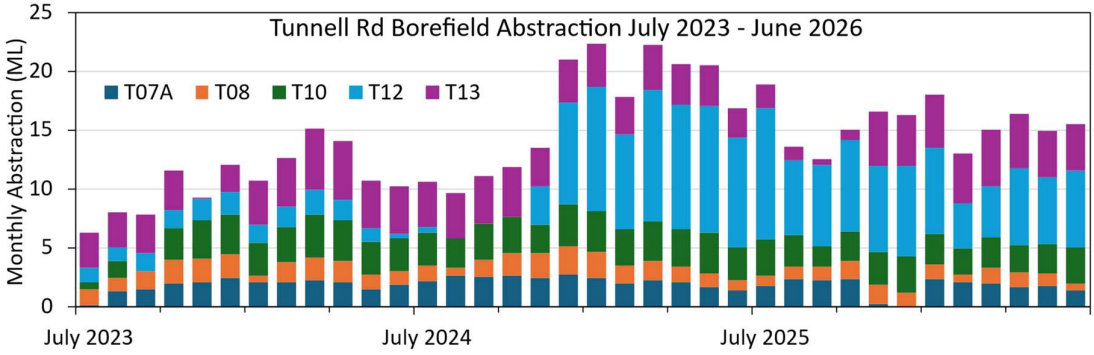

Figure 13: Tunnell Rd borefield monthly abstraction

Table 6: Annual abstraction from Tunnell Rd production bores

Aquifer	Bore	Recommended Yield (ML/yr)	Abstraction (1st July to 30th June) (ML/yr)		
			2023-24	2024-25	2025-26
Saprolite	T07A	22	21	**27**	20
	T08	42	19	19	14
	T10	55	30	37	31
	Total	**119**	**69**	**82**	**65**
Fractured Rock	T12	55	18	**73**	**81**
	T13	128	41	43	40
	Total	**183**	**59**	**116**	**121**
Borefield Total		**302**	**128**	**198**	**186**

The weekly abstraction volumes from the five production bores are plotted in Figure 14. The abstraction from T07A is regularly higher than the recommended yield and it is likely that a higher yield is achievable if there are no adverse effects of the aquifer. The groundwater abstraction from T12 was well below the recommended yield for the first part of the review period and then was significantly above the recommended rate frequently from November 2024. The original recommended yield on commissioning of T12 was 128 ML/yr (2.5 ML/week), this was lowered in the 2006 review by Global Groundwater due only to the low yields achieved at the time. The recommended yields for T08, T10 and T13 are all higher than has been achieved and likely over-estimate the current capacity of these bores.

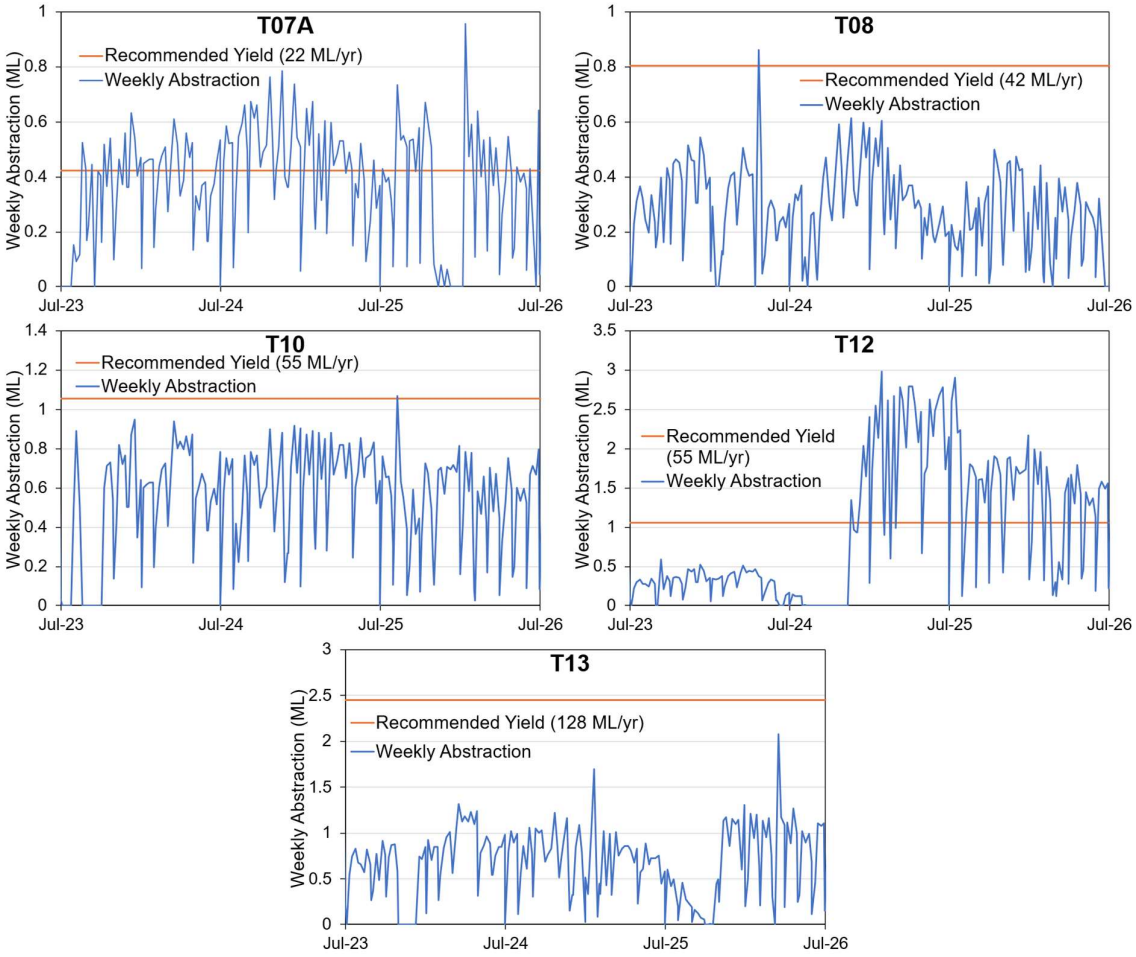

Figure 14: Plots of Tunnell Rd production bores weekly groundwater abstraction rates

Groundwater Monitoring

There are five bores in the Tunnell Rd area monitoring for potential groundwater mounding and groundwater decline that may affect the Tunnell Rd GDE heathland. The trigger and threshold levels for these monitoring bores are summarised in Table 7 with the minimum and maximum levels observed in the review period. The water level did not cross the trigger or threshold level at any of the Tunnell Rd bores over the review period.

Table 7: Trigger and threshold levels for Tunnell Rd GDE monitoring bores

Bore	Groundwater Rise (m BGL)			Groundwater Decline (m BGL)		
	Trigger Level	Threshold Level	Min Level FY24-26	Trigger Level	Threshold Level	Max Level FY24-26
T05	1.00	0.80	1.45	11.85	12.35	5.11
T07C	2.30	1.95	3.15	16.15	16.65	9.25
T11	3.40	2.90	8.51	17.10	17.60	13.47
T11A	3.30	2.80	3.44	16.30	16.80	13.43
P12	1.50	1.30	3.00	10.85	11.35	8.11

Plots of the groundwater levels and salinity for the GDE monitoring bores over their entire monitoring period are shown in Figure 15, alongside a plot of the water level over the last six years. The groundwater has been declining slightly over the review period at most bores, following a peak water level in the high rainfall year of 2021. The declining water levels remain within the historical range.

Monitoring-bore T07C is located close to production-bore T07A, the short-term fluctuations in level at T07C are due to switching of the pump at T07A. Smaller fluctuations are also noticeable in the logger level of T05 which is close to T13. Tunnell Rd has a more seasonally responsive water-table than other areas, with large fluctuations between summer and winter levels. This suggests high vertical-permeability allowing the recharge to infiltrate more rapidly, resulting in a strong seasonal-trend. The salinity is stable or declining across the GDE monitoring bores.

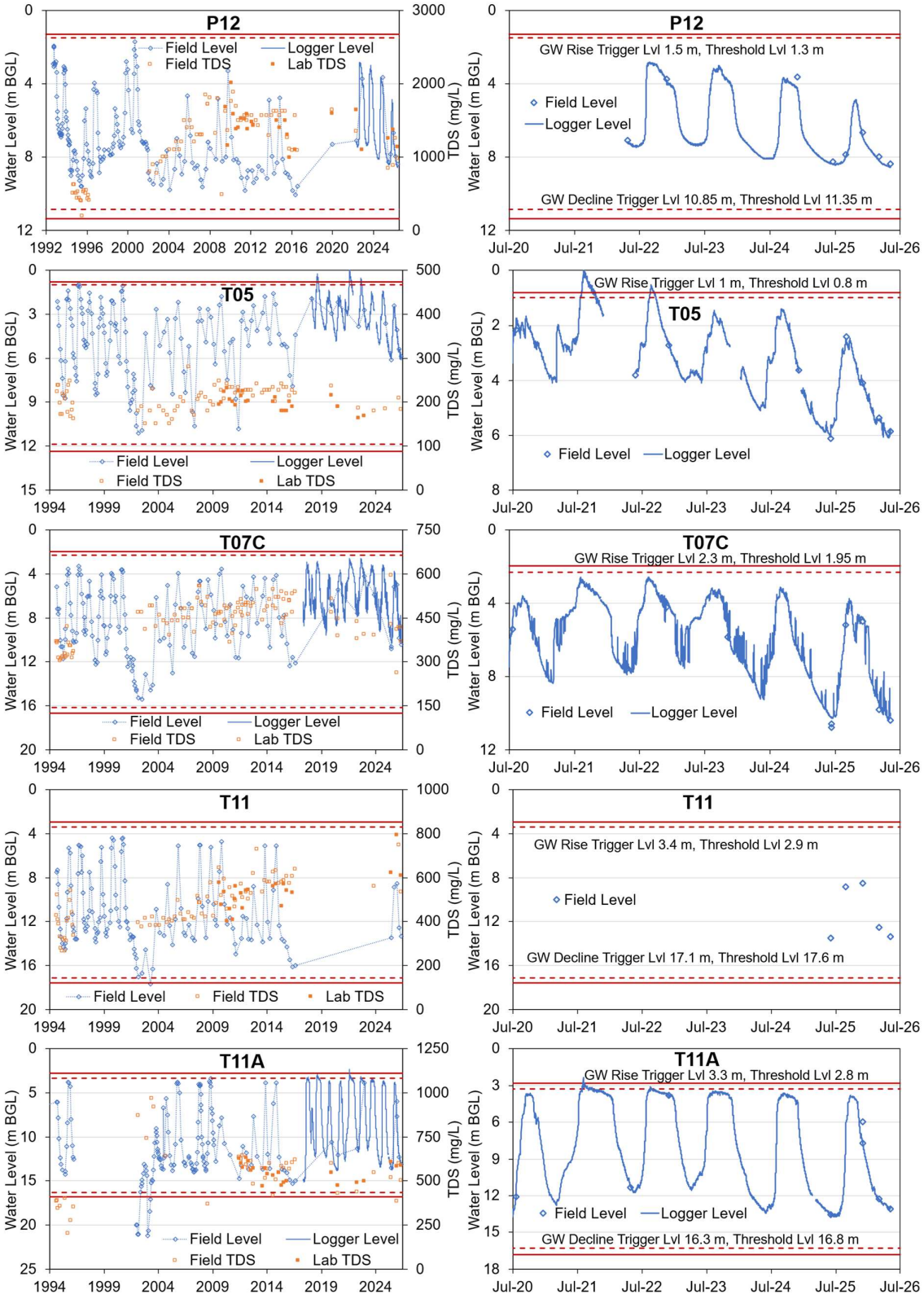

Figure 15: Groundwater level and salinity plots for Tunnell Rd GDE monitoring bores

There is one additional regional monitoring bore in the Tunnell Rd area, T06C, a plot of the water level and salinity of T06C is shown in Figure 16. The groundwater has been declining at T06C, and the seasonal fluctuations have been increasing. Groundwater laboratory data for

the Tunnell Rd monitoring and production bores is summarised in Appendix B, there was no significant change to the groundwater chemistry over the review period.

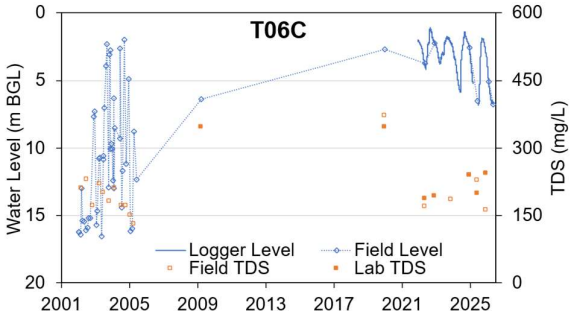

Figure 16: Groundwater level and salinity plot for Tunnell Rd regional monitoring bore T06C

Borefield & Monitoring Assessment

The recommended yields of all production bores were reviewed, taking into consideration yields achieved over the review period and historically, and groundwater monitoring; the revised recommended yields are summarised in Table 8. The recommended yields for T08, T10 and T13 were lowered as the yields achieved by these bores has been significantly below the recommended yield even at the weekly rate. The recommended yield for T07A has been increased slightly as higher yields are likely possible and the groundwater level of nearby monitoring bore T07C remains above historical levels. The increase at T07A is modest as there has been a small decline in the water level at T07C and so changes should be gradual with continued monitoring to prevent any adverse effects on the heathland ecosystem. While higher yields seem achievable, the potential long-term effects of a higher abstraction rate is less clear and will depend also on the rainfall and vegetation coverage in the catchment. The current groundwater monitoring program should be able to assess the effect of these changed yields. As in the Karafil borefield, it is recommended that aquifer total recommended yields be used as the recommended yields in the WMP and recommended yields be reviewed every three years. The quarterly monitoring of the targeted GDE observational bores will allow for rapid identification of any concerning trends in the aquifer, and investigations should include a review of the sustainable yields if relevant. The total recommended yield for both aquifers has declined in these revised recommended yields, however the actual abstraction may increase as the lowered yields were not achieved.

Table 8: Revised recommended yields for Tunnell Rd production-bores

Aquifer	Bore	Current Rec. Yield (ML/yr)	Revised Rec. Yield (ML/yr)	Comment
Saprolite	T07A	22	28	Higher yield possible
	T08	42	30	Yield consistently low
	T10	55	44	Yield consistently low
	Total	**119**	**102**	
Fractured Rock	T12	55	122	Unchanged
	T13	128	70	Yield consistently low
	Total	**183**	**192**	
Borefield Total		**302**	**294**	

The abstraction of groundwater from the Tunnell Rd borefield appears to have been conducted sustainably over the review period. The abstraction from T07A slightly exceeded the annual recommended yield in 2024-25 but was below the recommended yield in other years, with the average over the review period being below this rate. The groundwater levels and quality have generally remained stable across the monitoring period suggesting that the aquifer is being well managed and the GDE is protected.

FAWCETT

Borefield Description

Fawcett Borefield is in the east of Mt Saddleback Timber reserve in an historically mined and rehabilitated area. There are currently two operational production-bores (SE01/04 and F12) near the head of the valley, and one monitoring-bore (F06D) in the lower slopes to the north, the location of these bores are shown in Figure 17. SE01/04 was commissioned in 2004 and abstracts from the fractured-rock aquifer, nearby F12 was commissioned in 1994, and the screening interval is unknown, but it is significantly shallower, details of all the bores are summarised in Table 9.

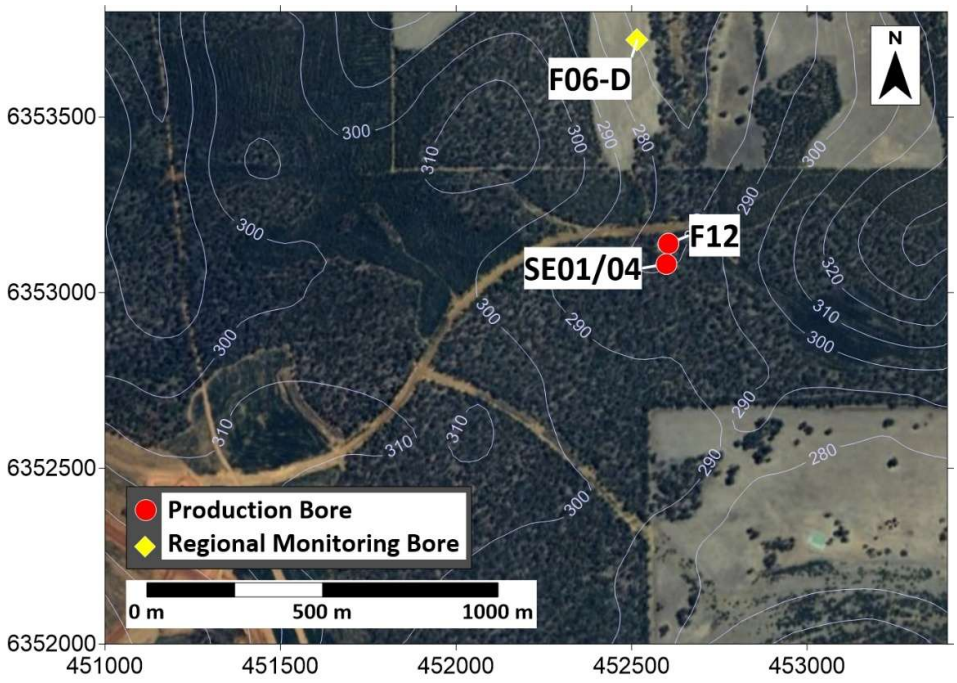

Figure 17: Location of production and monitoring bores in Fawcett area

Table 9: Screening details of Fawcett production and monitoring bores

Bore		Depth (m BGL)	Screening Interval (m BGL)	Screening Aquifer	Commission Year
Production Bores	**SE01/04**	120.0	60 – 120	Fractured Rock	2004
	F12	38	unknown	unknown	1994
Monitoring Bore	**F06D**	13.94	unknown	unknown	unknown

Groundwater Abstraction

The groundwater abstraction from Fawcett borefield over the review period is shown in Figure 18. The abstraction from SE01/04 has been fairly consistent most months with lower abstraction in winter of 2023 and 2024, but not in 2025, abstraction from F12 was highest in the summer of 2024-25.

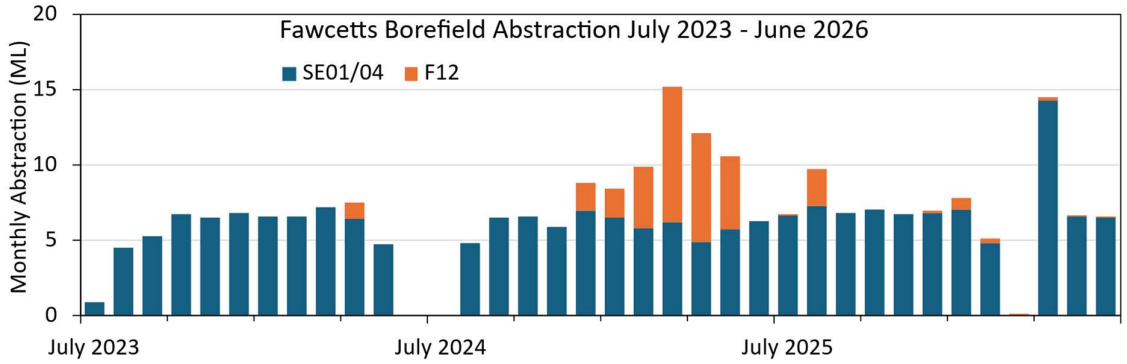

Figure 18: Fawcett borefield monthly abstraction

The recommended yield and annual abstraction-volume for each year of the review are given in Table 10. The abstraction from SE01/04 exceeded its recommended yield in 2025-26, while abstraction from F12 reached the recommended yield in 2024-25, but was low in the other years.

Table 10: Annual abstraction from Fawcett production bore

Bore	Recommended Yield (ML/yr)	Abstraction (1st July to 30th June) (ML/yr)		
		2023-24	2024-25	2025-26
SE01/04	73	62	66	**80**
F12	29	1	29	4
Total	102	63	95	84

The weekly abstraction volumes from SE01/04 and F12 are plotted in Figure 19. The abstraction from SE01/04 is frequently above the annual recommended rate, and a higher rate is achievable if there are no adverse effects of the aquifer. F12 was not used for most weeks of the review period, when it was used over the summer of 2024-25 the abstraction rate was well above the annualised recommended yield and previous abstraction rates, however the rates in the following summer were well below the annual recommend rate. The two production bores may be interacting with pumping at SE01/04 affecting the water level and pumping rate at F12. The periods with higher abstraction from F12 sometimes coincided with low abstraction from SE01/04. It is unclear why such high yields were achieved at F12 in 2024-25 and not in other years, so it is difficult to determine what yield is achievable at F12 with the current data.

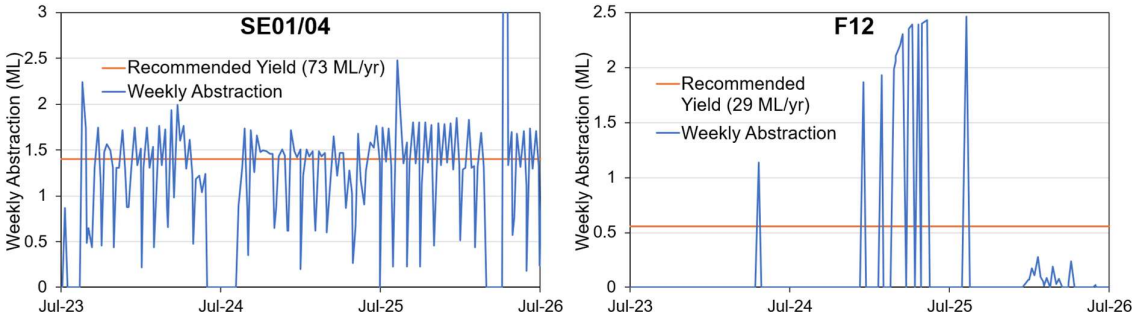

Figure 19: Plots of Fawcet production bores weekly groundwater abstraction rates

Groundwater Monitoring

There is one regional monitoring bore in the Fawcett area, F06D, the groundwater level and salinity data for F06D is shown in Figure 20. The logger groundwater-level at F06D show high seasonal fluctuations and a small decline over the monitoring period. The large seasonal fluctuations may be partially due to the abstraction from the production bores accentuating seasonal trends, there are some short-term fluctuations in the logger level suggesting it is somewhat affected by pumping from these bores. The groundwater levels are the lowest recorded at this bore, but peak winter levels are similar to those in the 2000's. Declining rainfall is also likely contributing to the general decline in summer groundwater minima since 2000. The salinity levels have remained low over the review period, and there was no significant change to the groundwater quality, with the full laboratory results given in Appendix B.

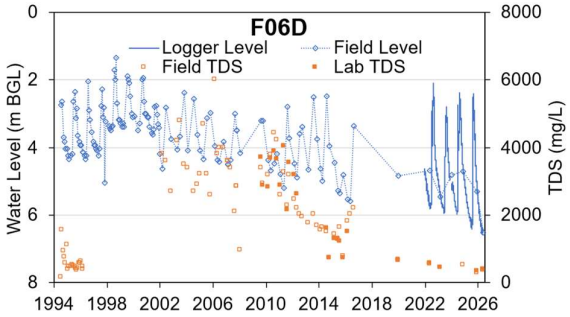

Figure 20: Groundwater level and salinity plot for Fawcett area bore F06D

Borefield & Monitoring Assessment

The recommended yield for production bore SE01/04 was reviewed and has been increased slightly, the recommended yield for F12 was not revised due to the unusual abstraction patterns over the review period, the revised yield is summarised in Table 11. Abstraction from SE01/04 exceeded the recommended yield in 2025-26 but was below this level when averaged across the three years. The summer groundwater minima at F06D declined slightly over the review period with large seasonal fluctuations continuing, water levels should be monitored if the abstraction rate is increased.

Table 11: Revised recommended yields for Fawcett production-bores

Aquifer	Bore	Current Rec. Yield (ML/yr)	Revised Rec. Yield (ML/yr)	Comment
Fractured Rock	**SE01/04**	73	**86**	Higher yield possible
Saprolite	**F12**	29	**29**	Unchanged
	Borefield Total	**102**	**115**	

QUINDANNING

Borefield Description

The Quindanning area was included in the South-East area in previous reviews but has been separated here to allow more discussion of the area with the identified threatened flora and the new production bores. Figure 21 shows the groundwater production and monitoring bores included in this area, with their details summarised in Table 12. Note that bores Q03 and Q05 will remain in the South-East area due to their proximity to that area.

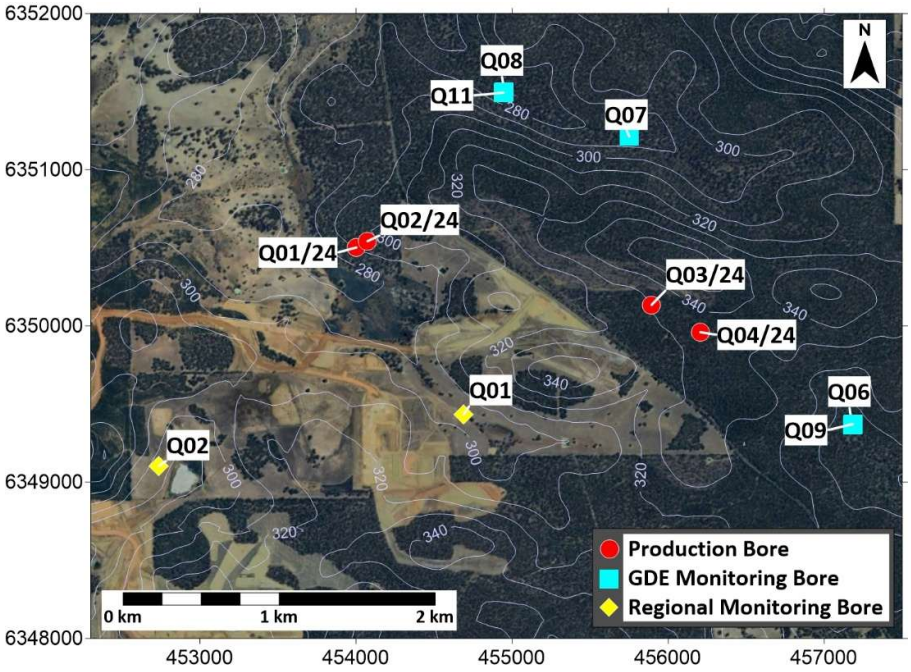

Figure 21: Location of production and monitoring bores in Quindanning area

Table 12: Screening details of Quindanning production and monitoring bores

	Bore	Depth (m BGL)	Screening Interval (m BGL)	Screened Aquifer	Commission Year
Production Bores	**Q01/24**	223	150 – 223 (open)	Fractured Rock	2024
	Q02/24	223	17 – 223 (open)	Fractured Rock	2024
	Q03/24	211	80 – 211	Fractured Rock	2024
	Q04/24	204	41 – 204 (open)	Fractured Rock	2024
GDE Monitoring Bores	**Q06**	27.06	14.83 – 26.83	Saprolite	2005
	Q07	34.67	16.05 – 34.05	Saprolite	2005
	Q08	42.84	24.76 – 42.76	Saprolite	2005
	Q09	7		Perched	2024
	Q11	8		Perched	2024
Regional Monitoring Bore	**Q01**	32.5	11.09 – 29.09	Saprolite	2005
	Q02	47.5	22.77 – 46.77	Saprolite	2005

Four new potential production bores were drilled in the fractured rock aquifer of Quindanning in 2024 (Q01/24 to Q04/24), only Q01/24 and Q03/24 were recommended as production bores at this stage. The new bores Q01/24 and Q02/24 showed significant interference from pumping between the sites, and they are likely tapping into the same fractures. Q01/24 had a higher yield from testing, and this one was developed as a production bore. Q02/24 could be developed as a lower yielding bore if issues occur with Q01/24 in the future. Bore Q04/24 was dry when drilled, it could be used as a monitoring bore. There are five GDE monitoring bores in the Quindanning threatened flora area, Q06 to Q08 are screened in the saprolite aquifer, while Q09 and Q11 target a shallower perched aquifer. There are also two regional monitoring bores, Q01 and Q02 in cleared agricultural land.

Groundwater Abstraction

Only bore Q01/24 has been used so far as a production bore in the Quindanning area, with pumping starting in January 2025. Figure 22 shows the monthly abstraction from Q01/24, with the details of the abstraction and estimated yields summarise in Table 13, along with the details of the lower yielding Q03/24 which has not yet been used. For both bores two estimated yields are given, a lower yield assuming only linear flow along fractures, and a higher yield assuming pseudo-radial flow with a highly interconnected fracture system, it is anticipated that the obtainable yield will be within this range. The abstraction from Q01/24 was seasonal over the short period of use, with low abstraction in winter, the yield from the first full year of use, 2025-26 was significantly below the lower limit of the estimated yield. The weekly abstraction from Q01/24 is plotted in Figure 23 with the rate when pumping usually below the lower estimated yield for the bore.

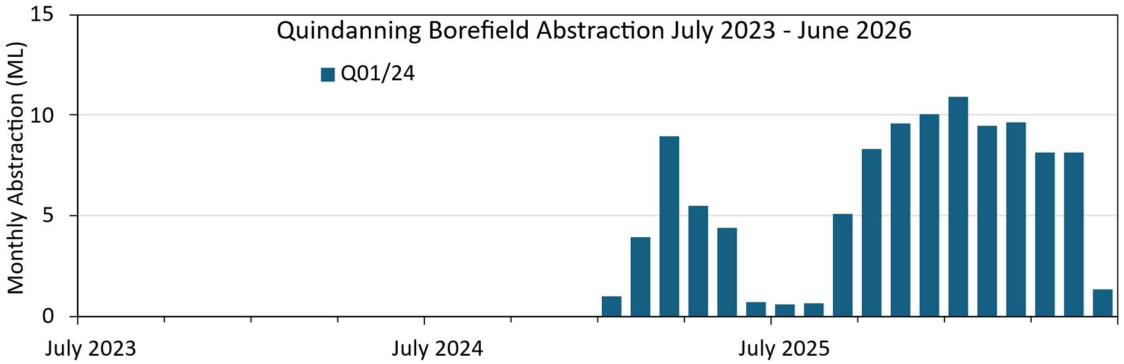

Figure 22: Quindanning borefield monthly abstraction

Table 13: Annual abstraction from Quindanning production bore

Bore	Min. Estimated Yield (ML/yr)	Max. Estimated Yield (ML/yr)	Abstraction (1st July to 30th June) (ML/yr)	
			2024-25	2025-26
Q01/24	153	280	25	82
Q03/24	20	57	-	-
Total	173	337	25	82

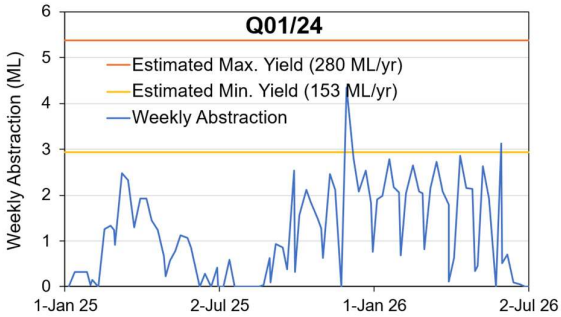

Figure 23: Plot of Quindanning production bore weekly groundwater abstraction rates

Groundwater Monitoring

There are five bores in the Quindanning area included in the GDE groundwater monitoring program to protect the threatened flora and associated ecosystem. The threatened flora occurs at locations with deep groundwater levels, but it is likely that moisture is retained higher in the soil profile to support the flora. Shallower bores Q09 and Q11 were commissioned in 2024 next to bores Q06 and Q08 respectively. These new bores target a perched aquifer that may be supporting the threatened flora.

The trigger and threshold levels for the GDE monitoring bores are summarised in Table 14 with the minimum and maximum levels observed in the review period. Trigger and threshold values have not yet been set for the new shallow bores Q09 and Q11, these bores have been monitored with field measurements and level loggers since they were commissioned but have always been dry. Q06, the deeper bore next to Q09 has also been dry since it was commissioned in 2005. The water level and salinity for bores Q07 and Q08 are shown in Figure 24 with plots of the entire monitoring period and the last six years. The water level at these bores continued to decline remaining well below the threshold levels for groundwater rise. Loggers at these two bores had gone missing and were replaced recently so the monitoring has been less than intended, however given the low water level and limited fluctuations this was sufficient to monitor the water table here.

Table 14: Trigger and threshold levels for Quindanning GDE monitoring bores

Bore	Groundwater Rise (m BGL)			Groundwater Decline (m BGL)		
	Trigger Level	Threshold Level	Min Level FY24-26	Trigger Level	Threshold Level	Max Level FY24-26
Q06	20.60	13.80	DRY	-	-	DRY
Q07	18.20	12.15	27.35	-	-	27.46
Q08	14.60	9.70	25.80	-	-	26.23
Q09	-	-	DRY	-	-	DRY
Q11	-	-	DRY	-	-	DRY

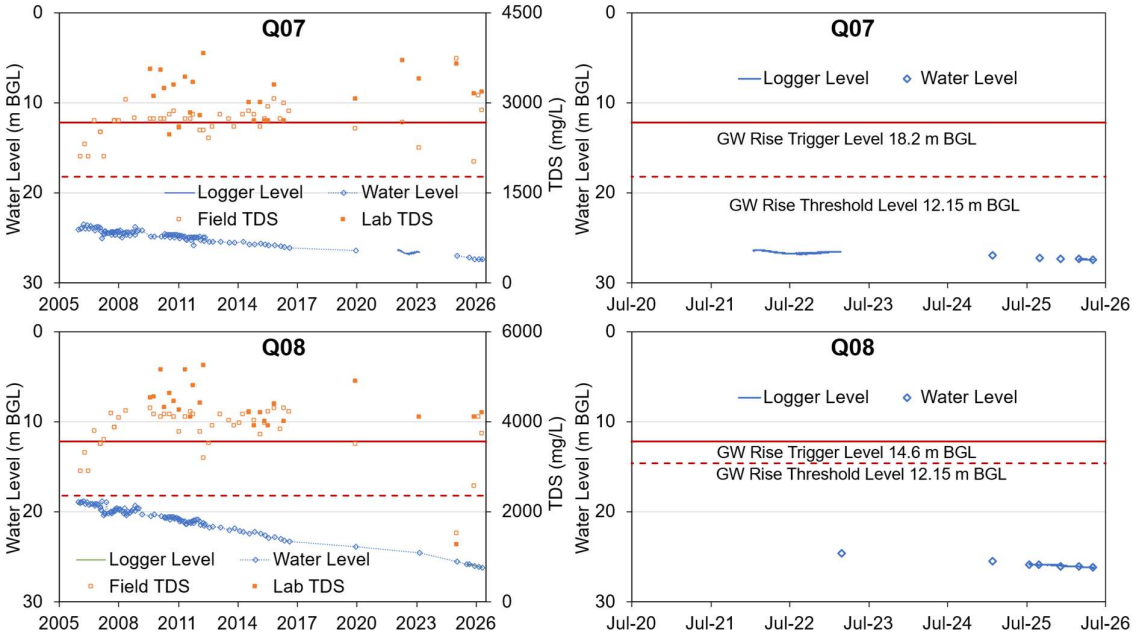

Figure 24: Groundwater level and salinity plots for Quindanning GDE monitoring bores

The groundwater level and salinity of the two regional monitoring bores in the Quindanning area are plotted in Figure 25. Q01 is in the valley of agricultural land and have had high salinity and shallow groundwater since monitoring commenced in 2005, prior to mining activities. This shallow saline groundwater is due to historical clearing for agriculture and the maintenance of the land as cleared for many decades which has resulted in the raising of the groundwater table and release of salt stored in the soil profile. The groundwater at Q01 was within 50 cm of the surface at the three observations over the review period. There has been some clearing for mining on the southwest slope which may have contributed to the shallow groundwater, however the levels are generally within the historical range. The water level on 3rd December 2025 was above the historically observed range by 13 cm; this followed a period of rain at the end of November which may have caused a temporary rise in the water level. . A water-level monitoring logger was deployed at Q01 in May 2026, data from this logger may provide more insight into the variability and trends in water level here. At Q02 there was no significant change to the groundwater level or salinity over the review period. There was no significant change to the groundwater quality at any of the Quindanning bores, the full laboratory results given in Appendix B.

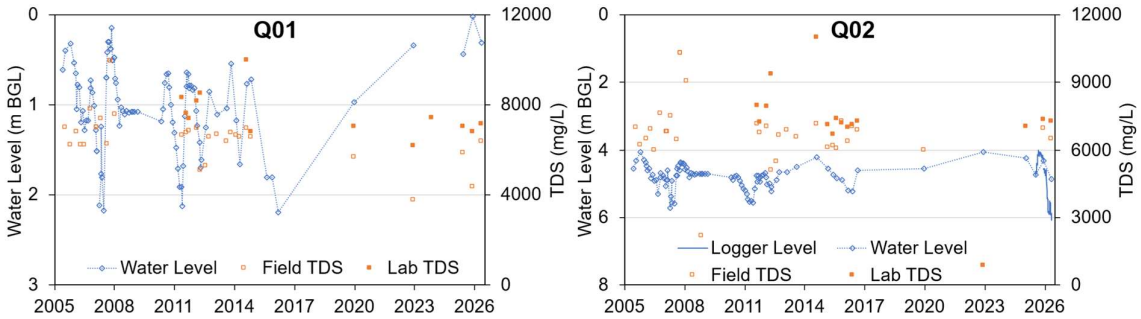

Figure 25: Groundwater level and salinity plots for Quindanning regional monitoring bores

Borefield & Monitoring Assessment

Four bores were drilled deep into the fractured rock aquifer in Quindanning in 2024, two of these were deemed suitable for water supply, with abstraction from the higher yielding bore commencing in 2025. It is recommended that the combined higher estimated rate for the two bores, 337 ML/yr be used as the recommended yield for the fractured rock aquifer in Quindanning until more data is available to revise this. The achievable yield is likely to be significantly lower so this yield should not be used in water supply planning. Additional shallow monitoring bores were commissioned in the threatened flora area, however these have been dry since commissioning. The groundwater level in the Quindanning Timber Reserve has continued to decline over the monitoring period.

SOUTH-EAST

Borefield Description

The South-East borefield and monitoring area covers a large area and includes all Saddleback production and monitoring bores not attributed to the other bore areas. Figure 26 shows the location of the production and monitored bores in this area. The area consists of seven production-bores, four GDE monitoring program bores, two regional monitoring program bores, and one other bore that was monitored in the review period. Details of the screening of the bores is summarised in Table 15. All South-East production bores are screened in the fractured rock aquifer, SE01/03 also includes a second shallower screened interval in the laterite and pallid zone.

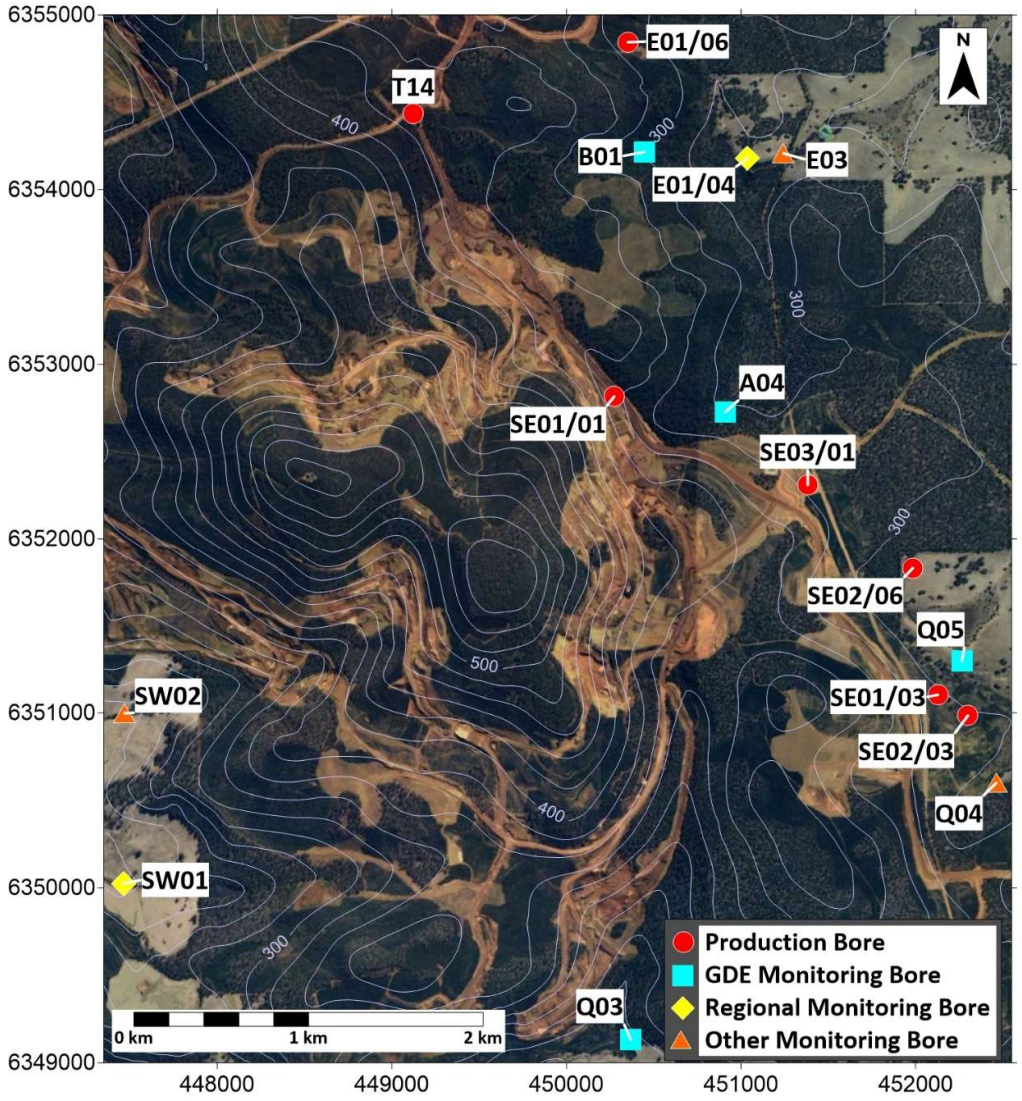

Figure 26: Location of production and monitoring bores in South-East area

Table 15: Screening details of South-East production and monitoring bores

Bore		Depth (m BGL)	Screening Interval (m BGL)	Screening Aquifer	Commission Year
Production Bores	T14	86.0	26.4 – 86.0	Fractured Rock	1998
	SE01/01	99.40	33.70 – 99.40	Fractured Rock	2001
	SE03/01	101.50	23.50 – 101.50	Fractured Rock	2001
	SE01/03	90.48	0.48 – 18.48 48.48 – 90.48	Laterite/Pallid & Fractured Rock	2003
	SE02/03	100.24	46.19 – 82.19 92.24 – 100.24	Fractured Rock	2003
	SE02/06	92.0	33.79 – 90.95	Fractured Rock	2006
	E01/06	91.38	41 – 91.38	Fractured Rock	2006
GDE Monitoring Bores	A04	40.72	5.83 – 41.83	Saprolite	1976
	B01	14.17	4.95 – 14.17	unknown	1975
	Q03	39.00	8.20 – 32.20	Saprolite	2005
	Q05	40.30	20.73 – 38.73	Saprolite	2005
Regional Monitoring Bores	E01/04	81.58	29.53 – 77.53	Fractured Rock	2005
	SW01	36.50	23.28 – 35.28	Saprolite	2005
Other Monitoring Bores	Q04	44.10	26.10 – 44.10	Saprolite	2005
	E03	24.0	11.52 – 23.52	Saprolite	2005
	SW02	45.50	19.10 – 40.10	Saprolite	2005

Groundwater Abstraction

The monthly abstraction-volumes from the eight production-bores over the review period are shown in Figure 27. The abstraction is seasonal with lower abstraction during winter. The recommended-yields and annual abstraction-volumes for each year of the review are given in Table 16. The abstraction from SE01/03 exceeded the annualised recommended-yield in 2024-25 and the abstraction from SE01/01 slightly exceeded the recommended yield in 2005-26. The abstraction from the other bores remained below their annualised recommended-yield.

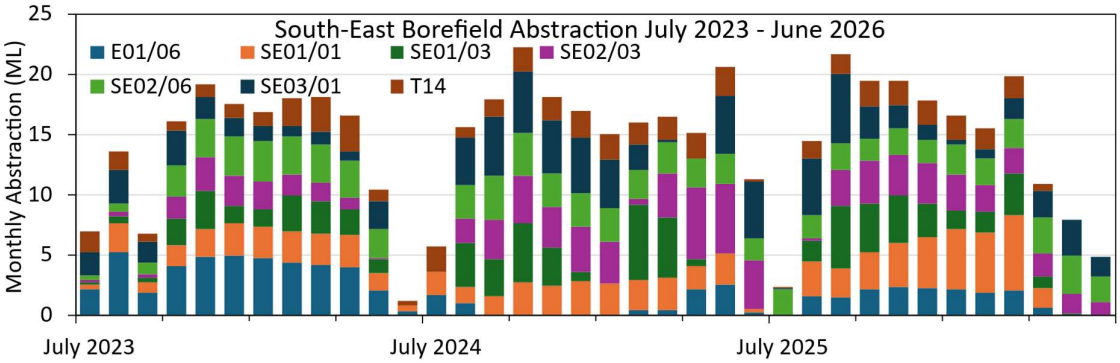

Figure 27: South-East borefield monthly abstraction

Table 16 Annual abstraction from South-East production bores

Aquifer	Bore	Recommended Yield	Abstraction (1st July to 30th June) (ML/yr)		
		(ML/yr)	2023-24	2024-25	2025-26
Fractured Rock	**T14**	110	18	21	15
	SE01/01	33	23	25	**34**
	SE03/01	29	18	27	26
	SE01/03	29	19	**39**	26
	SE02/03	55	15	40	25
	SE02/06	37	26	30	28
	E01/06	110	43	9	16
	Total	**403**	**161**	**191**	**171**

The weekly abstraction from South-East production bores over the review period is plotted in Figure 28 with their recommended yields. The recommended yields of T14 and E01/06 are significantly higher than the achieved yields from these bores and it is likely that these yields are not achievable under the current conditions and infrastructure. Several of the other bores frequently achieve yields higher than the annualised recommended yield, and it is likely that higher yields could be achieved if it does not have significant adverse effects on the groundwater level and quality.

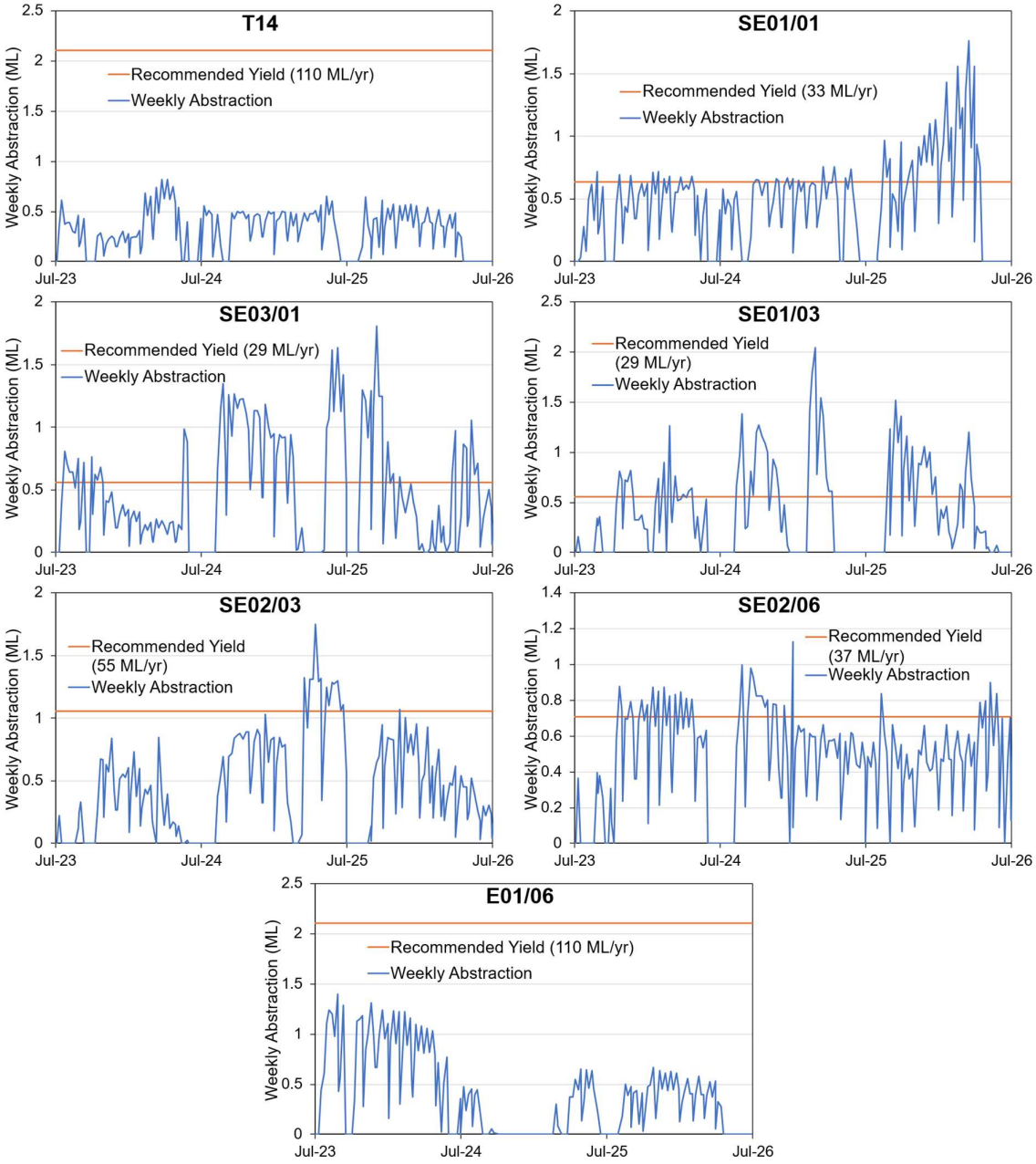

Figure 28: Plots of South-East production bores weekly groundwater abstraction rates

Groundwater Monitoring

There are four bores in the South-East area in the targeted GDE monitoring program, the trigger and threshold levels for these monitoring bores are summarised in Table 17, with plots of with plots of the water level and salinity over the whole monitoring period, and the last six years shown in Figure 29.

Table 17: Trigger and threshold levels for South-East GDE monitoring bores

Bore	Groundwater Rise (m BGL)				Groundwater Decline (m BGL)		
	Trigger Level	Threshold Level	Min Level FY24-26	Min Level Feb 2025+	Trigger Level	Threshold Level	Max Level FY24-26
A04	9.6	6.4	8.02	**8.02**	-	-	10.29
B01	0.70	0.60	0.45	**0.61**	15.40	15.90	1.97
Q03	2.20	1.80	2.36	2.36	4.25	4.75	3.52
Q05	2.60	2.20	2.23	2.63	10.55	11.05	4.63

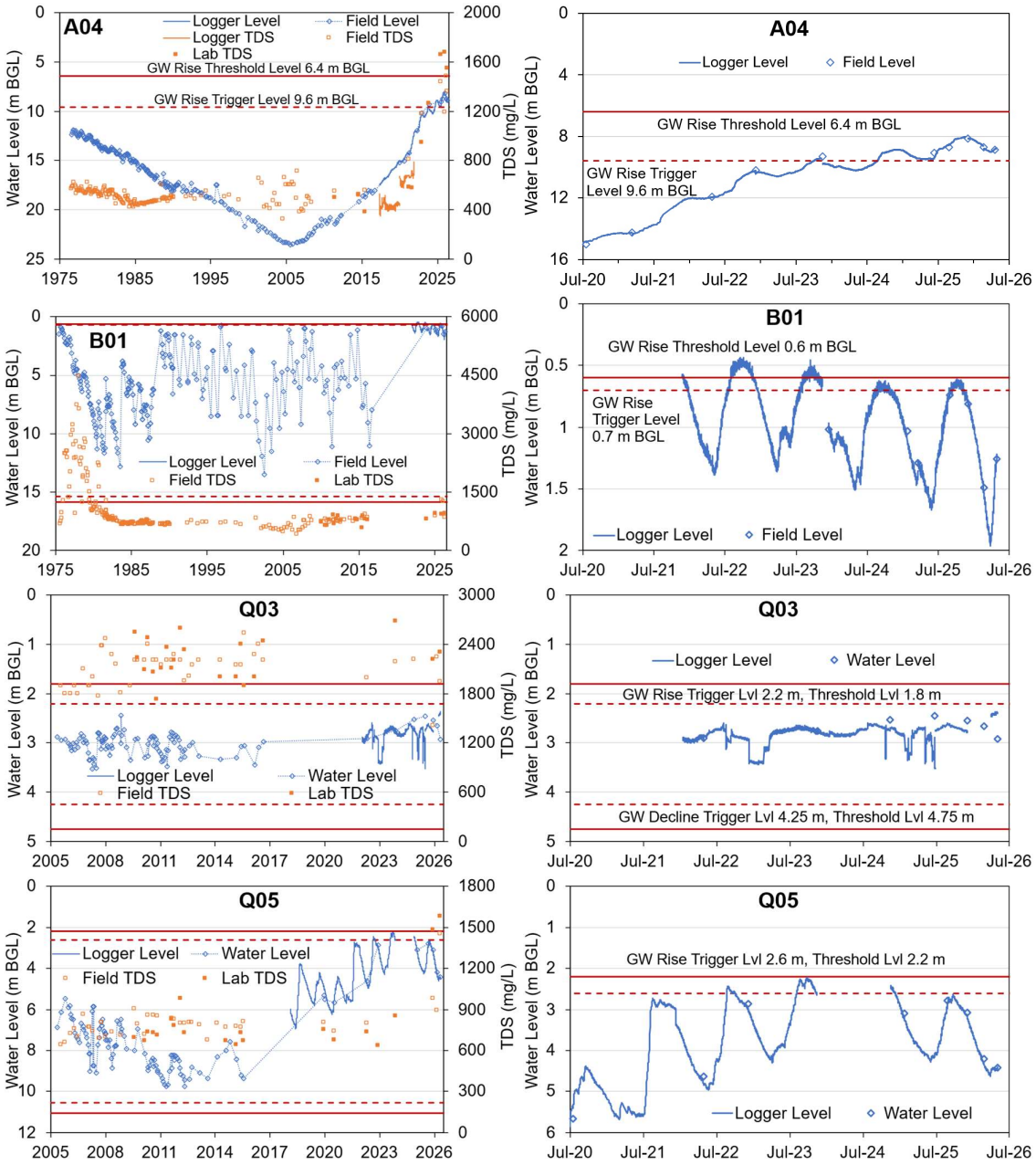

Figure 29: Groundwater level and salinity plots for South-East GDE monitoring bores

The water level at A04 has risen above the trigger level in the review period and continues to rise, however the rate of rise has slowed significantly. The salinity at A04 has also increased over the review period, which may be due to the higher water level mobilising the stored salt in the soil profile. In response to crossing the trigger level and the increased salinity two recommendations were made. Firstly, the resumption of monitoring existing bores E03 and E01/04 was suggested as these bores are located further down valley from A04 near the boundary between forest and agricultural land. Monitoring of E01/04 and E03 will help to understand whether the groundwater mounding at A04 is a localised response to mining activities or a more widespread raising of the water table and to determine how close the water table is to the surface at this agricultural land boundary, as the risk of water logging and salinity is higher on cleared land. The monitoring data from E01/04 and E03 will be discussed below as part of the regional and other monitoring bores.

The second recommendation was to measure the electrical conductivity (as a proxy for salinity) with depth going down the water column in the bore. A strong salinity gradient in the water column may identify parts of the profile with high salt loads and may result in significantly different field and laboratory water quality measurements depending on the sampling method used. The conductivity profile found a gradual increase in the salinity in the top seven meters of the bore water column by about 20%, after which it was stable.

While the continued groundwater rise at A04 is of concern, the rate of increase has slowed over the review period, and the water level is still at least 8 m below the surface so there is a low risk of surface discharge over the next review period. There have been some areas of rehabilitation up slope of A04 over this review period and continued growth of this vegetation may further slow or stop this groundwater rise. Continued revegetation of cleared areas upslope of A04 and avoiding any more clearing upslope is the most effective way to manage the risk from this groundwater rise.

The water level at B01 exceeded the current threshold level at the start of the review period, prior to the approval of the Water Management Plan by DWER in February 2025. The water level declined over the review period, reducing the potential risk from this raised level, and has only reached the trigger level since the WMP was approved. The high level at B01 during the last review period and the start of this review period is likely partially due to the high rainfall in 2021. Historically the groundwater level at B01 has been close to the surface on several occasions, it was within one meter of the surface when monitoring commenced in 1975. It would be useful to review the potential risks identified at this site and determine whether it is appropriate to be included in the targeted GDE program and the trigger and threshold values are suitable. Rehabilitation has commenced in much of the mined area closest to B01, so this should reduce the mounding of groundwater at B01 as the vegetation grows.

The water level and salinity at Q03 have been fairly stable over the review period. The logger level data has some issues with several jumps in the level value. The logger was missing in February 2026 with damage also noted to the bore casing, probably caused by livestock in the

field. While these difficulties may limit the accuracy of the data, the regular field measurements maintain a good check on the water table when the logger is disturbed or missing from a bore.

The groundwater level at Q05 exceeded the current trigger level and came close to the threshold level at the start of the review period, prior to the approval of the WMP. The groundwater level has since declined and has remained below the trigger level since December 2024. Similar to B01, there has been a lot of rehabilitation occurring upslope of Q05, and if this vegetation continues to grow then the risk from groundwater rises at Q05 should diminish. The salinity at Q05 has approximately doubled over the review period so continued monitoring of this bore is important.

The groundwater level and salinity at the regional and other monitoring bores is shown in Figure 30. The water level at E01/04 and E03 are below their initial levels in 2005, while their salinities are stable. These two bores are located down valley from A04 on the edge of agricultural land, so their stable or declining level suggests that the groundwater mounding at A04 is localised and is at lower risk of causing surface expression of groundwater at the edge of the Saddleback Timer Reserve.

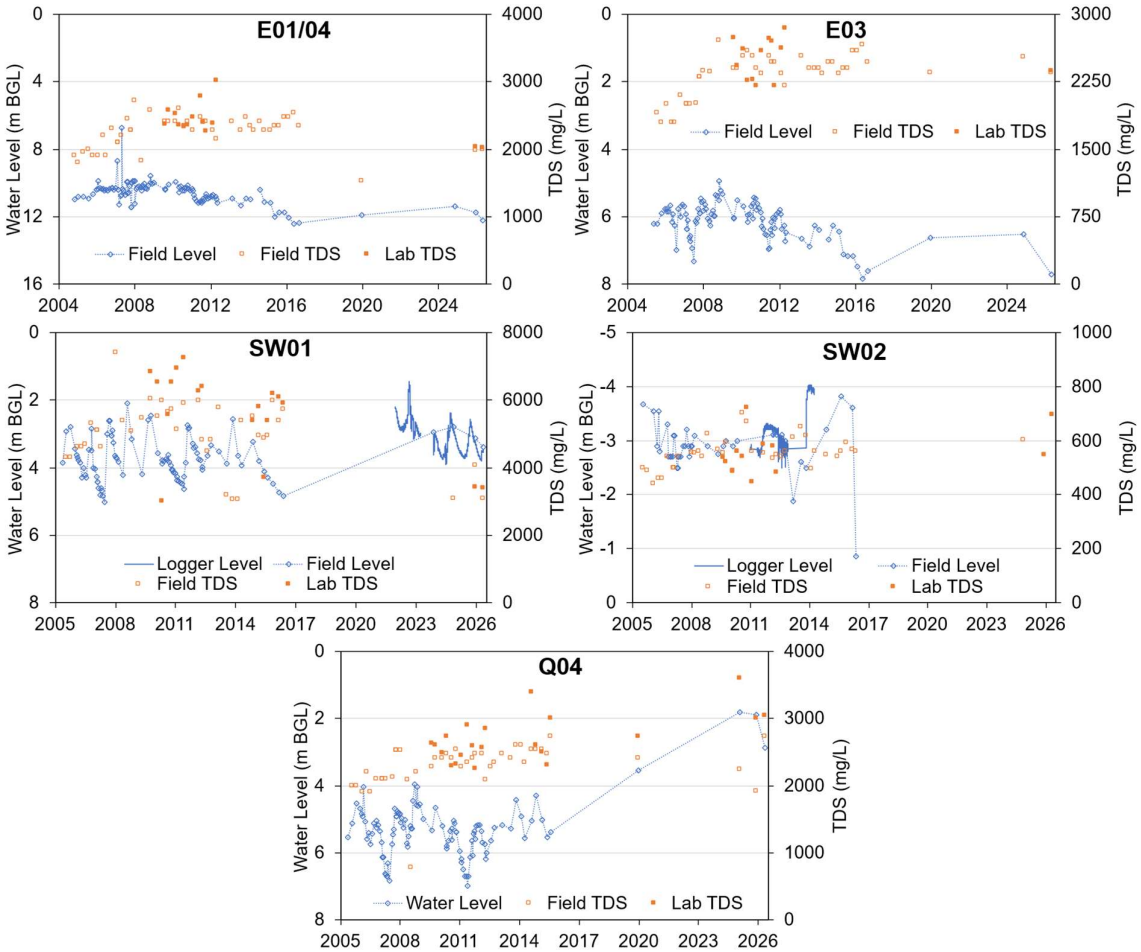

Figure 30: Groundwater level and salinity plots for regional and other monitoring bores

The SW01 and SW02 bores are located in agricultural land south-west of the Saddleback mining area. The water level at SW01 has been stable over the review period while the salinity has declined significantly since it was last tested in 2016. SW02 has always been artesian, and no water pressure readings have been obtained recently, the salinity is stable.

Bore Q04 is located on the south-eastern edge of the Saddleback Timber Reserve, near cleared agricultural land about 750 m south of Q05. It was last routinely monitored in 2016, with one additional monitoring in 2019 before monitoring in this review period. A significant area upslope of Q04 was cleared for mining since it was last regularly monitored and this has likely contributed to the groundwater rise observed. Most of this cleared area is currently being rehabilitated so groundwater levels may recede as this vegetation grows. While a larger groundwater rise was observed at Q05 the water level at Q04 is closer to the surface so there is a greater risk of groundwater discharge here. The salinity has also increased slightly at Q04, which has always been higher than Q05 so continued monitoring of this bore is recommended due to the shallow saline groundwater.

There were no significant changes to the groundwater quality in the South-East production and monitoring bores over the review period other than the salinity changes discussed. The laboratory water quality results are summarised in Appendix B.

Borefield & Monitoring Assessment

The groundwater abstraction from the South-East borefield exceeded the recommended level from SE01/03 in 2024-25 and SE01/02 in 2025-26, however the total abstraction was less than half the combined recommended yield for the aquifer every year. The production bores are located downslope of mining areas where there has been rises in groundwater level. While groundwater abstraction is not likely to significantly contribute to limiting groundwater rises, increased abstraction from these bores is not likely to have an adverse effect on the groundwater level or quality. The recommended yields from the seven production bores were reviewed based on the available information and the revised recommended yields are summarised in Table 18. It is recommended that the bores be separated into two groups with T14 and E01/06 in the Central area and the remainder in the South-East area, and then a combined yield be used for each area, this will allow flexibility in water supply. These yields should be reviewed every three years, or sooner if concerning trends emerge in the monitoring bore data that warrant a review of the water abstraction rates.

Table 18: Revised recommended yields for South-East production-bores

Aquifer	Bore	Current Rec. Yield (ML/yr)	Revised Rec. Yield (ML/yr)	Comment
Central Fractured Rock	**T14**	110	40	Yield consistently low
	E01/06	110	70	Yield consistently low
	Total	**220**	**110**	
South-East Fractured Rock	**SE01/01**	33	50	Higher yield possible
	SE03/01	29	50	Higher yield possible
	SE01/03	29	70	Higher yield possible
	SE02/03	55	55	Unchanged
	SE02/06	37	50	Higher yield possible
	Total	**183**	**275**	

Groundwater rises at two of the GDE monitoring bores, B01 and A04, exceeded the trigger level since the approval of the current WMP in February 2025. The groundwater levels at B01 has been declining over the review period. The groundwater level at A04 has continued to rise since exceeding the trigger level, however the rate of groundwater rise has slowed. There has been rehabilitation in the catchments of both these bores, and continued growth of this vegetation is likely to reduce the risk of groundwater mounding at these sites. Monitoring of E03 and E01/04 down valley of A04 was recommended and this showed that the groundwater is stable or declining at the boundary between the timber reserve and agricultural land. Continued biannual monitoring of the groundwater level and electrical conductivity at E03 and E01/04 is recommended over the next triennial period. It is recommended that the quarterly monitoring of A04, B01 and Q05 continues and the risk of groundwater rise is taken into consideration if significant decreases to the vegetation coverage are planned in the catchment of these bores.

Monitoring of bore Q04, which is not included in the WMP was conducted in the review period and showed a rise in the groundwater level at this site. It is recommended that biannual groundwater level and conductivity monitoring of this bore continues over the next triennial period as the groundwater is fairly shallow and saline at this boundary between the timber reserve and agricultural land.

MARRADONG

Borefield Description

The Marradong mining area and timber reserve is located to the north of the Mt Saddleback area. The location of the production and monitoring bores in the Marradong area are shown in Figure 31. The borefield consists of nine production bores, one GDE monitoring bore and eleven regional monitoring bores. All production bores are screened in the fracture rock aquifer, with the majority of monitoring bores screened in the saprolite aquifer, screening details of the production and monitoring bores are given in Table 19. Five of the production bores were used for the Nullaga Project, four of which were drilled in this review period, while water from the other four Marradong production bores were used for general mining activities.

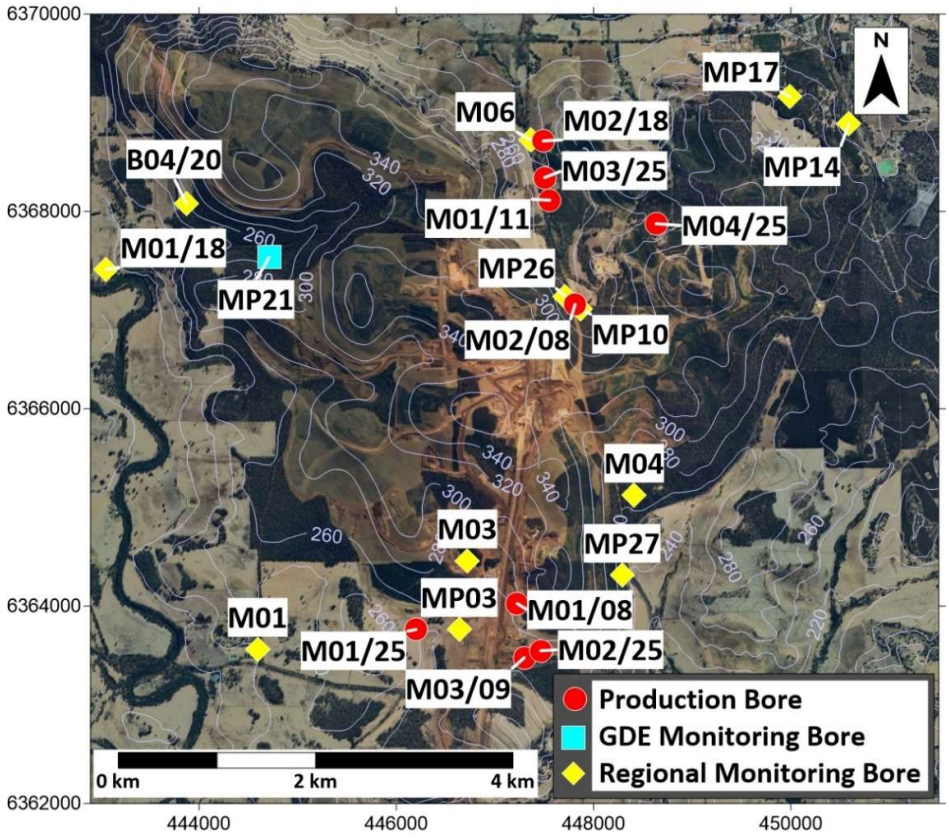

Figure 31: Location of production and monitoring bores in Marradong area

Table 19 Screening details of Marradong production and monitoring bores

Bore		Depth (m BGL)	Screening Interval (m BGL)	Screening Aquifer	Commission Year
Production Bores (General)	**M01/08**	119.15	29.86 – 119.15	Fractured Rock	2008
	M02/08	126.4	62.50 – 124.48	Fractured Rock	2008
	M01/11	96.3	30.36 – 96.30	Fractured Rock	2011
	M02/18	101.90	27.22 – 83.88	Saprolite & Fractured Rock	2018
Nullaga Production Bores	**M03/09**	120.4	42.24 – 120.40	Fractured Rock	2009
	M01/25	210	78 – 210	Fractured Rock	2025
	M02/25	198	54 – 198	Fractured Rock	2025
	M03/25	120	66 – 120	Fractured Rock	2025
	M04/25	212	152 – 212	Fractured Rock	2025
GDE Monitoring Bore	**MP21**	29.57	23.57 – 29.57	Saprolite	2008
Regional Monitoring Bores	**M01**	23.56	10.9 – 22.9	Saprolite	2005
	M03	11.52	5 – 11	Saprolite	2005
	M04	35	15.75 – 33.75	Saprolite	2005
	M06	44.2	24.72 – 42.72	Saprolite	2005
	MP03	20	14 – 20	Saprolite	2008
	MP10	32.64	26.64 – 32.64	Pallid Zone	2008
	MP14	14.47	8.47 – 14.47	Saprolite	2008
	MP17	15.36	9.36 – 15.36	Saprolite	2008
	MP26	18.12	12.12 – 18.12	Saprolite	2008
	M01/18	102	30.70 – 36.67 44.69 – 88.56	Saprolite & Fractured Rock	2018
	B04/20	173.85	149.85 – 173.85	Fractured Rock	2020

Groundwater Abstraction

The groundwater abstraction from the four general-use production bores in Marradong was lower than in the previous review period. The monthly abstraction is shown in Figure 32, with similar seasonal trends to those at other borefields. The recommended-yields and annual abstraction-volumes for each bore are given in **Error! Reference source not found.**. The abstraction from M02/08 was about double the recommended yield every year, while the abstraction from the other bores was below their recommended yield.

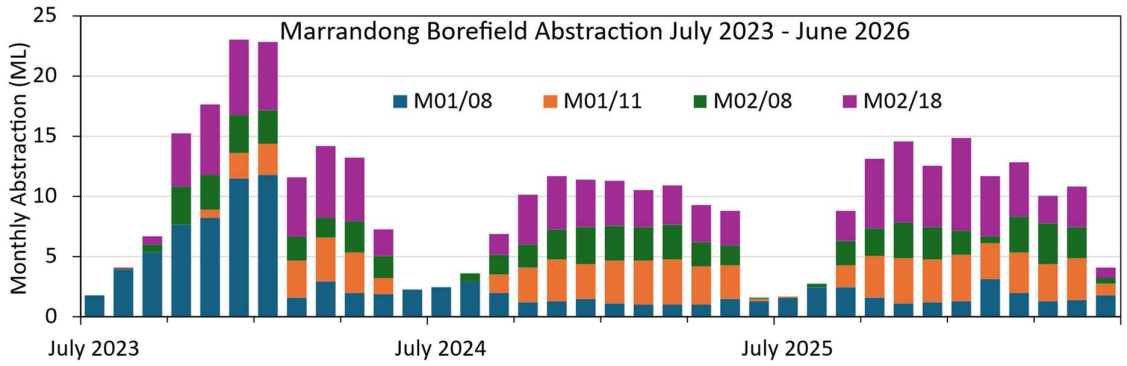

Figure 32: Marradong borefield monthly abstraction

Table 20: Annual abstraction from Marradong production bores

Aquifer	Bore	Recommended Yield (ML/yr)	Abstraction (1st July to 30th June) (ML/yr)		
			2023-24	2024-25	2025-26
Fractured Rock	**M01/08**	**110**	61	18	21
	M02/08	**11**	**21**	**22**	**22**
	M01/11	**31**	17	28	30
	M02/18	**79**	41	30	44
	Total	**231**	139	98	117

The weekly abstraction volumes from the four general-use Marradong production bores are plotted in Figure 33. The abstraction from M02/08 is regularly significantly higher than the recommended yield and it is likely that a higher yield is achievable if there are no adverse effects of the aquifer. Abstraction from M01/11 was close to the recommended yield in 2025-26 and it is possible that a higher yield could be sustained at this bore as well.

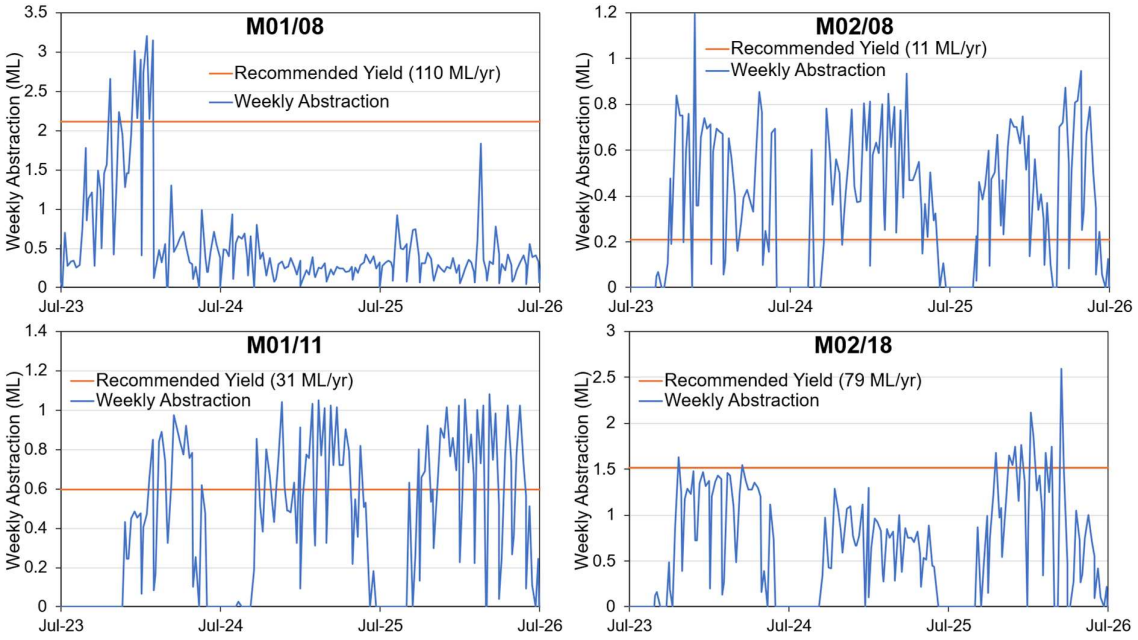

Figure 33: Plots of Marradong production bores weekly groundwater abstraction rates

Groundwater was abstracted from three of the four new Marradong production bores (M02/25, M03/25 & M04/25) and M03/09 for the Nullaga Project construction in 2026. The abstraction volumes and estimated yields for the bores are summarised in Table 21, the new bores have estimated yields for linear (min) and radial (max) flow, for M03/09 the highest annual abstraction rate recorded is used as the min. estimated yield, while the recommended yield is used as the max. estimated yield. Further monitoring of these bores is necessary before the yields can be reviewed and refined.

Table 21: Annual abstraction from Nullaga Project production bores

Bore	Min. Estimated Yield (ML/yr)	Max. Estimated Yield (ML/yr)	Abstraction (1st July to 30th June) (ML/yr)
			2025-26
M02/25	**28**	**73**	24
M03/25	**19**	**60**	16
M04/25	**13**	**79**	34
M03/09	**23**	**139**	7
Total	**83**	**351**	80

Groundwater Monitoring

MP21 is the only bore in the Marradong area that is part of the GDE Groundwater Monitoring Program. The trigger and threshold levels for MP21 are summarised in Table 22 with the minimum and maximum levels observed in the review period, with the water level and salinity over the entire monitoring period and the last six years shown in Figure 34. The water level at MP21 remained stable and deep over the review period, well below the trigger level, while the salinity declined slightly. Revegetation has commenced in many of the mining areas within the catchment area of MP21, so the risk of groundwater rise at this bore is low. Monitoring of this bore could be changed to the regional monitoring bore program given the deep level of the groundwater and the low risk of future groundwater rises in this catchment.

Table 22: Trigger and threshold levels for Marradong GDE monitoring bore MP21

Bore	Groundwater Rise (m BGL)			Groundwater Decline (m BGL)		
	Trigger Level	Threshold Level	Min Level FY24-26	Trigger Level	Threshold Level	Max Level FY24-26
MP21	14.85	9.9	23.73	-	-	24.97

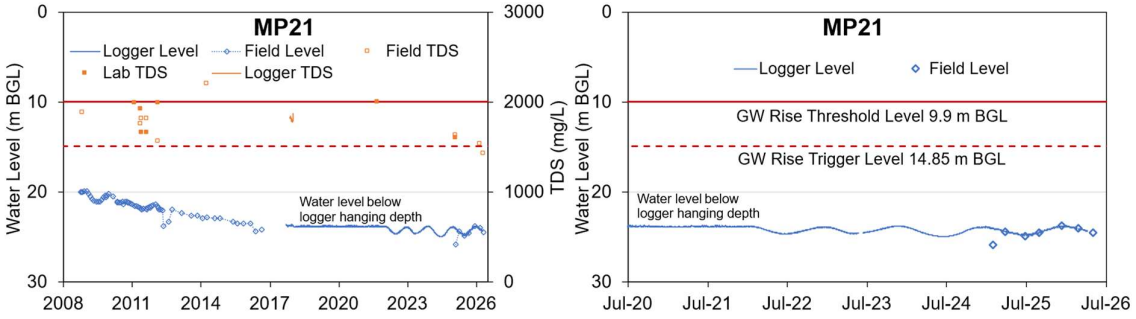

Figure 34: Groundwater level and salinity plots for Marradong GDE monitoring bore MP21

The groundwater level and salinity of monitoring bores M01, M03 and MP03 in the south-west of Marradong area are plotted in Figure 35. The groundwater level at M01, which is in agricultural land below the Marradong mining area, has declined since it was last monitored, the lower rainfall and commencement of revegetation in some upslope areas likely contributed to this decline. The water level increased at M03 since it was last monitored in 2017, this is likely driven by the increased clearing in the catchment for mining. The water level at M03 was stable during the review period, as was the water level at MP03, downslope of M03. The salinity at all these bores has been stable over the review period.

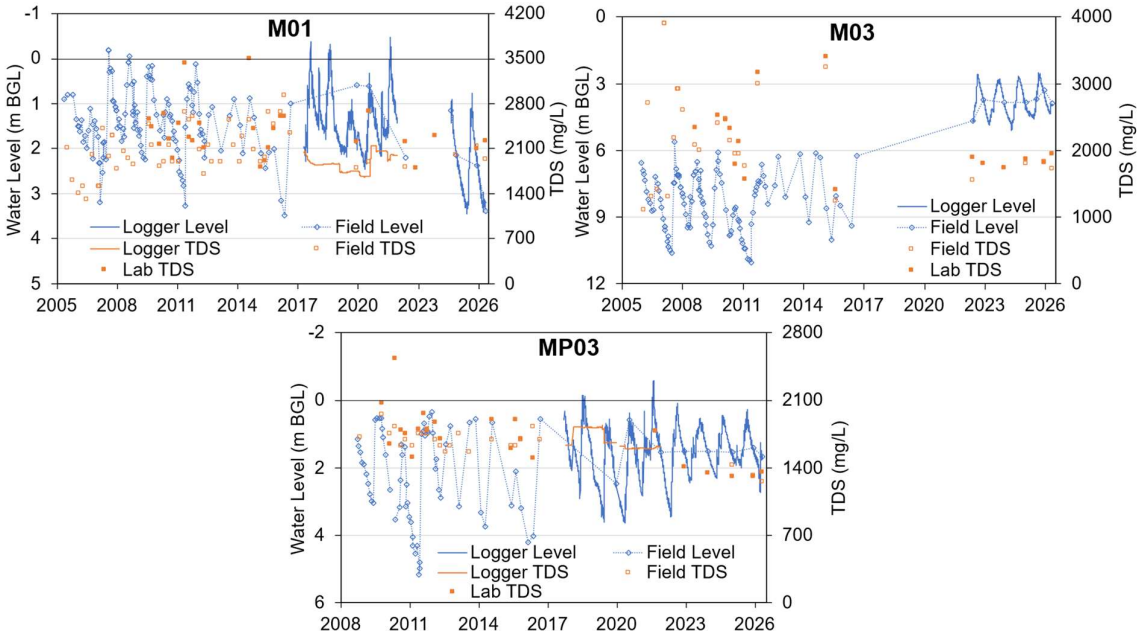

Figure 35: Groundwater level and salinity plots for Marradong bores M01, M03 and MP03

Figure 36 shows the water level and salinity at M04 and MP27, both in the south-west of the Marradong area. The water level at both bores has increased since they were last monitored, but the water level has been fairly stable over the review period and remains deep, the salinity is also stable.

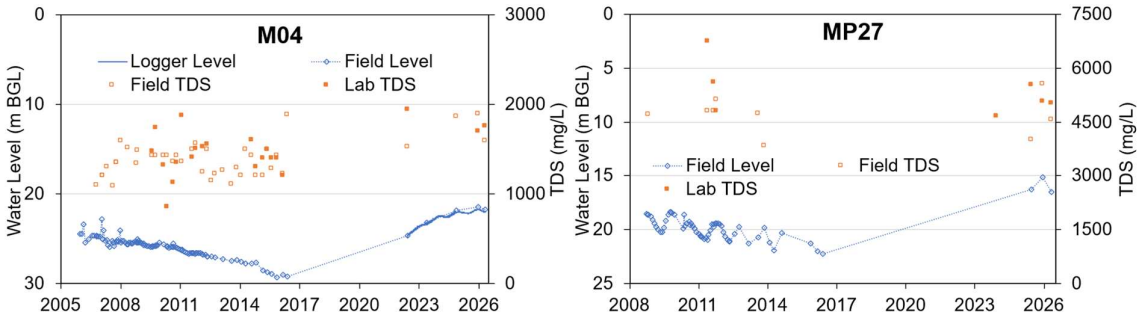

Figure 36: Groundwater level and salinity plots for Marradong bores M04 and MP27

Groundwater monitoring of bores in the centre north of Marradong mining area are shown in Figure 37. MP10 and MP26 are both near production bore M02/08, with MP10 being the closest, while M06 is near production bore M01/18. All three bores show short-term fluctuations in water levels from the production bore pump switching, with the largest fluctuations at MP10. The groundwater has declined at these bores over the review period; however, it still remains above historical levels at MP10 and MP26. The salinity has increased at MP26 while remaining stable at the other bores, this may be due to the shallower screening interval of MP26 as the soil salt storage tend to be higher at these depths, the salinity of MP26 has always been higher than the other bores.

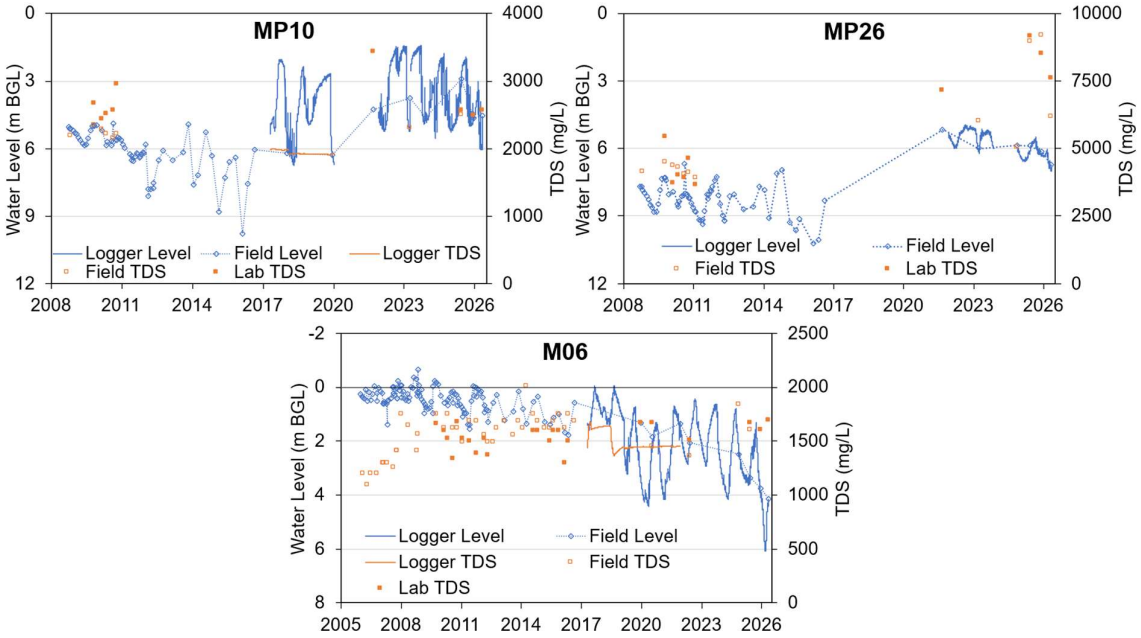

Figure 37: Groundwater level and salinity plots for Marradong bores MP10, MP26 and M06

Monitoring bores MP14 and MP17 are on the north-eastern side of the Marradong mining area. MP17 became blocked by roots during the review period preventing any measurements or sampling of this bore so monitoring of MP14 was resumed. Figure 38 shows the groundwater level and salinity of these bores, it can be seen that the groundwater level of both bores has declined since monitoring commenced. These bores are within pine plantations that were planted in 2007, and the growth of these plantations, along with the drying climate, will have contributed to the observed groundwater decline. From the limited monitoring over the review period, it is unclear whether the water level is stable or declining, the salinity at MP14 is similar to in the initial monitoring period.

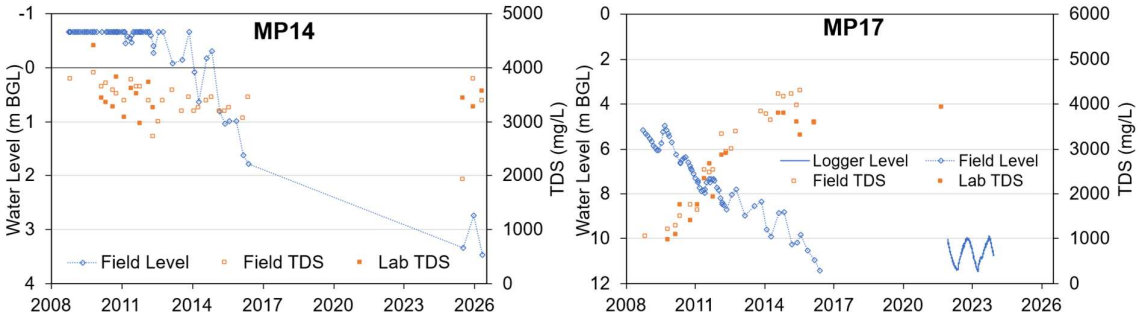

Figure 38: Groundwater level and salinity plots for Marradong bores MP14 and MP17

Monitoring bores M01/18 and B04/20 in the north-west of the Marradong mining area were both drilled for production bores but were converted to monitoring bores due to their low yields. Figure 39 shows the groundwater level and salinity at these bores, M01/18 is screened in both the saprolite and fractured rock aquifer while B04/20 is screened in the fractured rock aquifer at a significantly deeper depth. The water level at both bores was stable over the review period. B04/20 was destroyed in 2025, the water table is deep here, and the area is

being rehabilitated so this bore can be removed from the regional groundwater monitoring program.

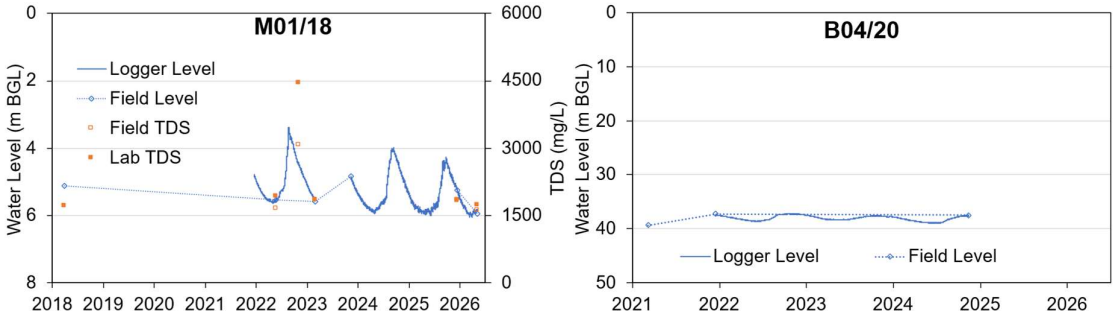

Figure 39: Groundwater level and salinity plot for M01/18 and B04/20

Borefield & Monitoring Assessment

Groundwater abstraction from M02/08 significantly exceeded the recommended yield every year in the review period. These high abstraction rates did not significantly affect the resting water level at nearby MP10, where the water level remains above the initial monitoring level. The recommended yields of the production bores were reviewed and were increased for M02/08 and M01/11 based on the available information. It is recommended that the Marradong bores be divided into northern and southern areas with a total recommended yield for each area to be used in the WMP.The revised yields are summarised in Table 23. The yields for M03/09 and M02/25 – M04/25 have not been reviewed due to the limited data on these bores, the achievable yields of these bores is likely to be lower than their recommended yield.

Table 23: Revised recommended yields for Marradong production-bores

Aquifer	Bore	Current Rec. Yield (ML/yr)	Revised Rec. Yield (ML/yr)	Comment
Marradong North Fractured Rock	**M02/08**	11	31	Higher yield possible
	M01/11	31	42	Higher yield possible
	M02/18	79	70	Unchanged
	M03/25	19-60	60	Unchanged
	M04/25	13-79	79	Unchanged
	Total	**153-260**	**282**	
Marradong South Fractured Rock	**M01/08**	110	110	Unchanged
	M03/09	139	139	Unchanged
	M02/25	28-73	73	Unchanged
	Total	**277-322**	**322**	**Unchanged**

The water level at MP21, a GDE groundwater monitoring program bore, remained deep and stable over the review period. It is recommended that MP21 be removed from the GDE groundwater monitoring program and kept in the regional monitoring program as the risk of adverse effects from a groundwater rise at this bore are low given the current conditions and planned activity in the area. Monitoring of the Marradong bores in the regional groundwater

monitoring program found no concerning trends. Monitoring of MP17 ceased due to roots blocking the borehole, monitoring of MP14 in the same area was resumed and this is a suitable substitute to monitor this region. Bore B04/20 was destroyed in the review period, the current coverage of the monitoring program is sufficient in relation to the planned activity in the area that no additional monitoring is recommended.

NICHOLS

Borefield Description

The Nichols monitoring-borefield is located on private property to the south of the Marradong mining-area, and north of the Mt Saddleback mining-area. There are five monitoring bores in the area that are included in the regional groundwater monitoring program. The locations of these monitoring bores are shown in Figure 40, with their details summarized in Table 24. The catchment of most bores is limited to agricultural land and small areas of remanant vegetation, except for N10 whose catchment extends to the north including two production bores (M03/09 and M01/08) and mining areas.

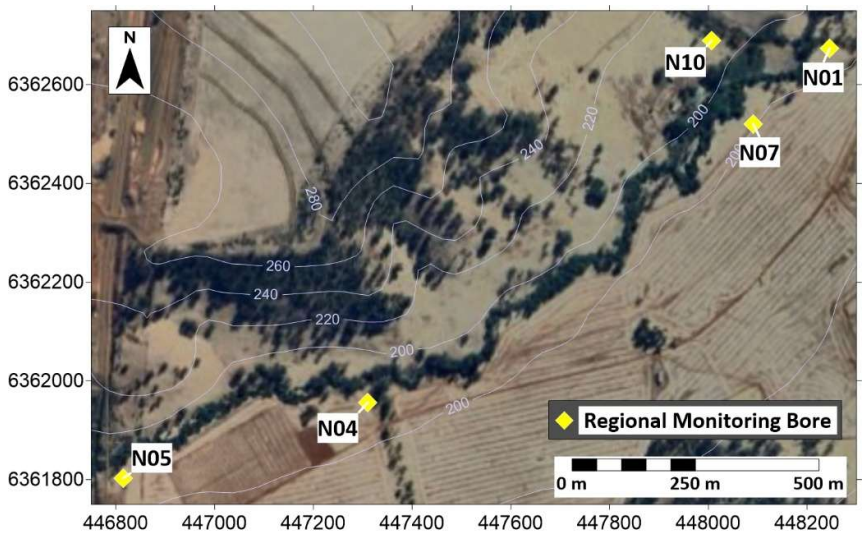

Figure 40: Location of monitoring bores in Nichols area

Table 24: Screening details of Nichols monitoring bores

Bore		Depth (m BGL)	Screening Interval (m BGL)	Screening Aquifer	Commission Year
Monitoring Bores	**N01**	11.45	3.45 – 9.45	Saprolite	2001
	N04	8.96	2.96 – 8.96	Saprolite	2001
	N05	11.47	5.47 – 11.47	Saprolite	2001
	N07	29.5	23.5 – 29.5	Saprolite	2001
	N10	31.14	12.41 – 30.41	Saprolite	2005

Groundwater Monitoring

Groundwater level and salinity plots for the Nichols monitoring-bores are shown in Figure 41. Overall, there is little change to the groundwater levels and salinities over the entire monitoring period including the review period. The water chemistry for these bores is similarly unremarkable and is tabulated in Appendix B. Rehabilitation of most of the mined area upslope of N10 commenced in 2017 so mining activities are not expected to significantly affect this valley in the coming years.

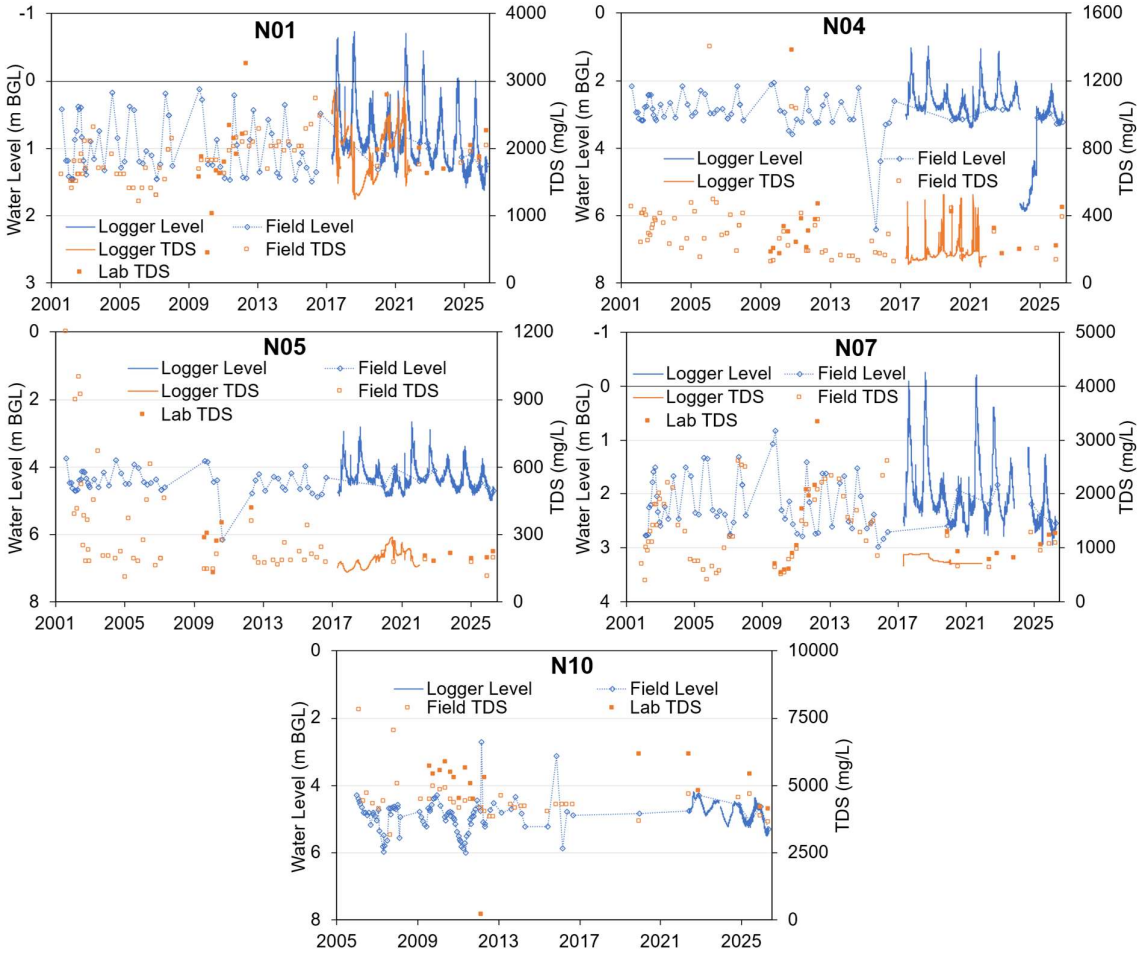

Figure 41: Groundwater level and salinity plots for Nichols bores

Borefield & Monitoring Assessment

The groundwater depths and salinities at all Nichols monitoring bores have been quite stable over the entire monitoring period. Overall, the aquifer appears to be stable in the Nichols area, and mining activities do not appear to be adversely affecting groundwater conditions at this property.

HOTHAM NORTH

Borefield Description

The Hotham North area is located to the north of Marradong; two pairs of shallow and deep groundwater monitoring bores, H12S/D and H13S/D, were commissioned in the area over the review period, the locations of these bores are shown in Figure 42, with their screening details summarised in Table 25.

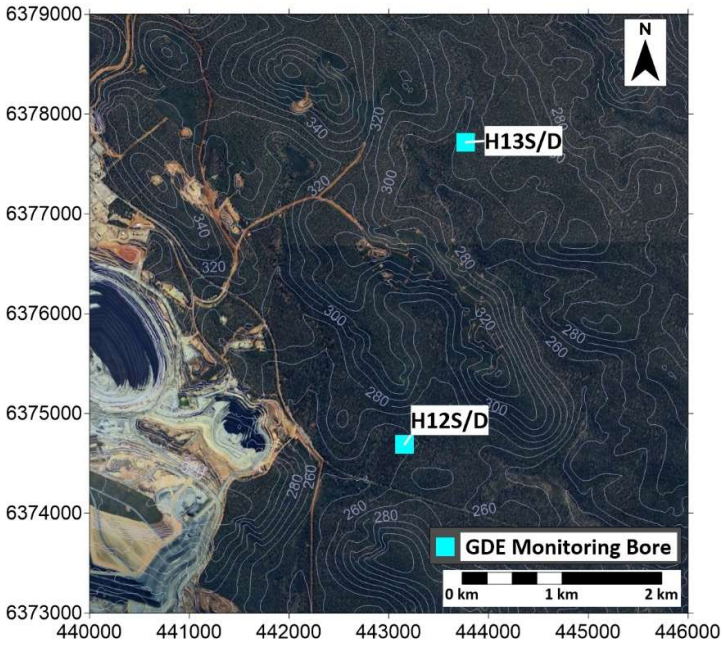

Figure 42: Location of monitoring bores in Hotham North area

Table 25: Screening details of Hotham North monitoring bores

Bore		Depth (m BGL)	Screening Interval (m BGL)	Screening Aquifer	Commission Year
Monitoring Bores	H12S	16.5		Perched	2025
	H12D	47	34-47	Saprolite	2025
	H13S	7.13	3 – 6	Perched	2024
	H13D	31.4	24 - 30	Saprolite	2024

Groundwater Monitoring

The four Hotham North bores are included in the Targeted GDE Groundwater Monitoring Program. These bores are currently collecting baseline monitoring data, so no trigger or threshold values have been set. The shallow monitoring bores have been dry for all measurements so there is no data for these bores, plots of the groundwater level and salinity for the deep bores is shown in Figure 43. The groundwater level at both bores was deep and

has been stable over the short monitoring period, the laboratory analysis results for these bores was unremarkable and is included in Appendix B.

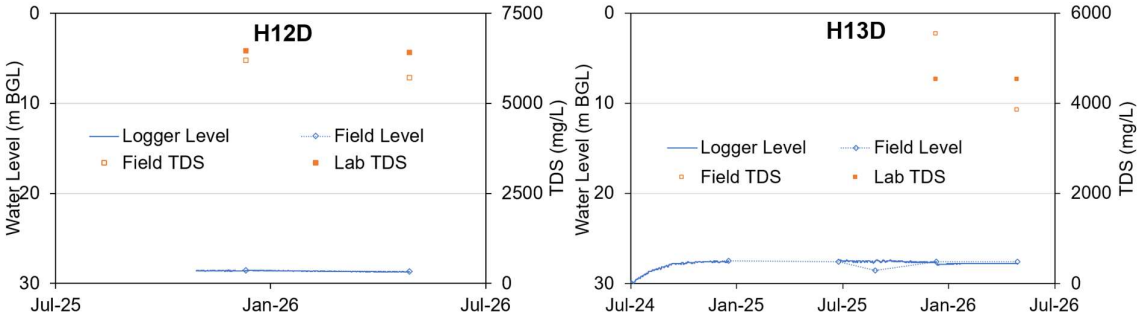

Figure 43: Groundwater level and salinity plots for Hotham North GDE monitoring bores

CONCLUSION & RECOMMENDATIONS

The Boddington Bauxite Mine aquifer has been well managed overall in the triennial review period. This review period involved significant changes with a large increase in the allowed abstraction from the aquifer, and modifications to the water management plan that targets high risk locations.

The abstraction from several of the production bores exceeded their recommended yield, yet the total abstraction from the borefield was within the overall recommended yield for each reporting period and no significant adverse findings were observed at monitoring bores. The recommended yields of production bores have been reviewed using the available weekly flow rates and monitoring bore data, the recommended rates are summarised in Table 26.

The production bores have been placed into eleven groups based on their location and target aquifer, with between one and five production bores in each group. It is recommended that the total abstraction from each group be used in the WMP for the recommended yield, this will allow for greater flexibility to water supply while managing the potential risk for the aquifer. These recommended yields are based on constant abstraction rates; seasonally higher rates are acceptable if the total annual yield remains within the recommended limit. The groundwater monitoring programs in the WMP, along with monitoring of threatened vegetation communities, are the key mechanisms for noticing and responding to changes in the aquifers and their dependent ecosystems, these responses could include adjustments to a group yield or limiting an individual bore yield as required.

These new yields are tentative and should be reviewed triennially, or earlier if groundwater monitoring data raises concerns or there are exceedances in the total recommended abstraction from a borefield aquifer. The reviews should consider monitoring data from observational bores and any relevant changes to vegetation. More accurate yields could be determined with pressure loggers in the production bores to monitor both the pumping and resting water level, ideally combined with flow rates or pump operational hours.

Several new bores were drilled into the fractured rock aquifer across the mining area as potential new water supply bores for the construction and general mining operations. Four of these new bores were used during the review. The placement of the new bores in the fractured rock aquifer is ideal as it draws from a deep level, and the fractures allow rapid flow from a wide area, so the effect of the abstraction is less localised in time and space. This is particularly important in years of low rainfall when the groundwater may already be depleted by stressed vegetation and the water requirements for dust suppression tend to be higher.

Table 26: Revised recommended yields for BBM Production Borefield

Area	Aquifer	Bore	Current Recommended. Yield (ML/yr)	Revised Recommended Yield (ML/yr)
Karafil	Saprolite	K01	29	29
		K07	46	30
		Total	**75**	**59**
	Fractured Rock	K06	29	29
		K08	33	40
		K09	128	90
		Total	**190**	**159**
Tunnel Rd	Saprolite	T07A	22	28
		T08	42	30
		T10	55	44
		Total	**119**	**102**
	Fractured Rock	T12	55	122
		T13	128	70
		Total	**183**	**192**
Fawcett	Fractured Rock	SE01/04	**73**	**86**
	Saprolite	F12	**29**	**29**
Quindanning	Fractured Rock	Q01/24	153-280	208
		Q03/24	20-57	57
		Total	**173-337**	**337**
Central	Fractured Rock	T14	110	40
		E01/06	110	70
		Total	**220**	**110**
South-East	Fractured Rock	SE01/01	33	50
		SE03/01	29	50
		SE01/03	29	70
		SE02/03	55	55
		SE02/06	37	50
		Total	**183**	**275**
Marradong North	Fractured Rock	M02/08	11	31
		M01/11	31	42
		M02/18	79	70
		M03/25	19-60	60
		M04/25	13-79	79
		Total	**153-260**	**282**
Marradong South	Fractured Rock	M01/08	110	110
		M03/09	139	139
		M02/25	28-73	73
		Total	**277-322**	**322**

The targeted groundwater monitoring program identified two exceedances of trigger levels since the current WMP was approved in February 2025. These exceedances were investigated. The inclusion of B01 in the targeted GDE program and its trigger and threshold levels should be reviewed as this bore has had periods of shallow groundwater including prior to mining

when it was commissioned in 1975. The water level of B01 was declining towards the end of the monitoring period, so no immediate action is necessary for this exceedance.

The groundwater rise at A04 which crossed the trigger level resulted in monitoring of two additional bores down valley from A04. The water level and salinity were stable or declining at the additional bores, which means the risk from groundwater rises at A04 may be quite localised, and given the water table is 8 m below the surface at A04 the current risk is low. It is recommended that monitoring of bores E03 and E01/04 continues biannually while the water level at A04 remains high. Continued monitoring of Q04 is also recommended due to the shallow saline water here.

Consideration should be given to moving MP21 from the Targeted GDE Monitoring Program to just the Regional Monitoring Program due to the low risk here because the groundwater is deep and the vegetation coverage in the catchment is increasing.

Overall, the Boddington Bauxite Mine Aquifer is being well managed, with no observations of high concern. The Water Management Plan is aiding in the identification and investigation of groundwater movements in areas identified as high risk. Given the dynamic system of surface mining in a changing climate, it is important to continuously review and revise both the abstraction yields and the groundwater monitoring plan to ensure they are appropriate for the current conditions and mine-site plans.

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Appendix A

TABULATED BORE DETAILS

Production Bores		
Bore	**Easting**	**Northing**
E01/06	450352	6354844
K01	448461	6358069
K06	448323	6358245
K07	447912	6359053
K08	447689	6359167
K09	449106	6357428
F12	452606	6353140
M01/08	447226	6364026
M01/11	447556	6368114
M02/08	447812	6367058
M03/09	447297	6363478
M02/18	447489	6368715
SE01/01	450273	6352815
SE01/03	452128	6351103
SE01/04	452600	6353081
SE02/03	452300	6350985
SE02/06	451984	6351828
SE03/01	451382	6352309
T07A	447746	6356195
T08	447612	6356404
T10	447419	6356564
T12	448567	6355229
T13	448655	6355327
T14	449124	6354434
Q01/24	454003	6350503
M02/25	447464	6363547
M03/25	447503	6368343
M04/25	448633	6367876

Regional Monitoring Program Bores		
Bore	**Easting**	**Northing**
K04	448200.9	6358692
K05	447639	6359200
K13	446587	6360084
K14	443405	6359753
T06C	447893	6356112
F06-D	452516	6353719
E01/04	451037	6354181
Q01	454690	6349434
Q02	452738	6349104
SW01	447462	6350024
B04/20	443871	6368082
M01	444594	6363563
M03	446721	6364459
M04	448410	6365125
M06	447360	6368724
M01/18	443052	6367412
MP03	446637	6363763
MP10	447863	6367013
MP14	450588	6368888
MP17	449988	6369163
MP26	447713	6367138
MP27	448288	6364313
N01	448246	6362674
N04	447310	6361956
N05	446815	6361803
N07	448091	6362520
N10	448007	6362689

Targeted GDE Monitoring Program Bores		
Bore	**Easting**	**Northing**
T05	448665	6355330
T07C	447749	6356192
T11	447250.3	6356706
T11A	447233	6356762
P12	446652	6357319
A04	450910.1	6352727
B01	450448	6354216
Q03	450368	6349132
Q05	452265	6351297
Q06	457180	6349365
Q07	455751	6351213
Q08	454950	6351498
Q09	457183	6349372
Q11	454946	6351494
MP21	444712	6367538
H12S/D	443158	6374691
H13S/D	443770	6377717

Other Monitoring Bores		
Q04	452461	6350599
E03	451242	6354208
SW02	447469	6350998

Appendix B

LABORATORY GROUNDWATER CHEMISTRY

KARAFIL MONITORING BORES

			µS/cm	(mg/L)	as N (mg/L)							as P (mg/L)	as SiO_2 (mg/L)
Bore	**Date**	**pH**	**EC**	**TDS**	**NH_3**	**NH_3^+**	**NO_3^-**	**NO_2^-**	**NO_3^-+NO_2^-**	**Tot. Kjeldahl N**	**Total N**	**Total P**	**Si**
	Nov-23	7.31	1670	1090			<0.01	<0.01	<0.01				59
	Jan-25	7.04	1570	1020									
K04	Jun-25	7.39	2370	1540	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	0.05	59.2
	Dec-25	7.73	1610	1050	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	0.04	59.4
	May-26	7.37	1640	1070	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	0.08	57
	Nov-23	6.85	1920	1250			<0.01	0.04	0.04				17.2
	Jan-25	7.01	1620	1050									
K05	Jun-25	7.20	1860	1210	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	0.05	56
	Dec-25	7.13	2180	1420	<0.01	<0.01	<0.01	0.05	0.05	<0.1	<0.1	<0.01	20.9
	May-26	6.22	2050	1330	<0.01	<0.01	<0.01	0.02	0.02	<0.1	<0.1	<0.01	17.6
	Jun-25	6.87	2220	1440	2.08	2.07	<0.01	0.39	0.39	2.3	2.7	0.72	19
K13	Dec-25	6.69	2390	1550	0.49	0.49	<0.01	0.18	0.18	1.1	1.3	0.19	22.1
	Apr-26	7.35	2470	1610	0.31	0.31	<0.01	0.15	0.15	0.8	1	0.1	22.6
	Nov-24												
K14	Dec-25	6.45	7980	5190	0.02	0.02	<0.01	<0.01	<0.01	<0.1	<0.1	0.14	30.5
	May-26	6.27	7920	5150	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	0.08	30.4

KARAFIL MONITORING BORES

		(mg/L)							(meq)		(%)	as $CaCO_3$ (mg/L)				
Bore	**Date**	**Na^+**	**K^+**	**Mg^{2+}**	**Ca^{2+}**	**Cl^-**	**SO_4^{2-}**	**F^-**	**Total Anions**	**Total Cations**	**Ionic Balance**	**OH^-**	**CO_3^{2-}**	**HCO_3^-**	**Total Alkalinity**	**Total Hardness**
K04	Nov-23	138	5	46	123	434	28	<0.1	18.7	16	7.56	<1	<1	293	293	
	Jan-25	122	6	43	108	395	28		16.9	14.4	7.91	<1	<1	257	257	447
	Jun-25	218	5	74	129	597	36	<0.1	23.2	22.1	2.4	<1	<1	282	282	627
	Dec-25	153	5	48	109	377	27	<0.1	16	16.2	0.44	<1	<1	242	242	470
	May-26	142	5	48	113	370	29	<0.1	16.2	15.9	0.82	<1	<1	256	256	480
K05	Nov-23	269	2	36	36	599	60	0.1	19.3	16.5	7.7	<1	<1	56	56	
	Jan-25	139	6	43	98	446	30		17.7	14.6	9.56	<1	<1	226	226	422
	Jun-25	170	5	51	117	443	30	<0.1	18.5	17.6	2.6	<1	<1	269	269	502
	Dec-25	321	3	54	63	659	57	<0.1	21.1	21.6	1.34	<1	<1	64	64	380
	May-26	255	2	50	62	616	51	<0.1	19.5	18.4	3.03	<1	<1	53	53	361
K13	Jun-25	287	4	54	67	637	63	<0.1	20.8	20.4	1.08	<1	<1	77	77	390
	Dec-25	318	2	66	77	709	63	<0.1	22.7	23.2	0.93	<1	<1	71	71	464
	Apr-26	305	2	60	82	686	70	<0.1	22.2	22.3	0.23	<1	<1	72	72	452
K14	Nov-24	854	1	304	270	2560	186		79.1	75.7	2.25	<1	<1	153	153	1930
	Dec-25	975	<1	319	289	2780	180	0.2	84.9	83.1	1.09	<1	<1	138	138	2040
	May-26	864	<1	270	243	2690	181	0.2	82.6	71.9	6.92	<1	<1	149	149	1720

		Total Metals (mg/L)													
Bore	**Date**	**Al**	**As**	**B**	**Cd**	**Cr**	**Cu**	**Fe**	**Hg**	**Mn**	**Mo**	**Ni**	**Pb**	**Se**	**Zn**
	Nov-23	<0.01[1]	<0.001[1]		<0.0001[1]	<0.001[1]	0.003[1]	0.08[1]	<0.0001[1]	0.660[1]		0.003[1]	<0.001[1]	<0.01[1]	0.005[1]
	Jan-25		<0.001	<0.05	<0.0001	<0.001	0.024			0.671	<0.001	0.006	<0.001		0.049
K04	Jun-25	0.03	<0.001		<0.0001	<0.001	0.002	1.26	<0.0001	0.667		0.009	<0.001	<0.01	0.015
	Dec-25	<0.01	<0.001		<0.0001	<0.001	0.005	2.51	<0.0001	0.641		0.004	<0.001	<0.004	0.02
	May-26	0.04	<0.001		<0.0001	<0.001	0.004	3.34	<0.0001	0.652		0.004	3.34	<0.004	0.009
	Nov-23	0.01[1]	<0.001[1]		<0.0001[1]	<0.001[1]	0.003[1]	<0.05[1]	<0.0001[1]	0.001[1]		0.002[1]	<0.001[1]	<0.01[1]	0.005[1]
	Jan-25		<0.001	<0.05	<0.0001	<0.001	0.018			0.276	<0.001	0.004	<0.001		0.04
K05	Jun-25	0.04	<0.001		<0.0001	0.002	0.002	0.74	<0.0001	0.389		0.008	<0.001	<0.01	0.018
	Dec-25	0.02	<0.001		<0.0001	<0.001	0.003	<0.05	<0.0001	0.001		0.002	<0.001	<0.004	<0.005
	May-26	0.02	<0.001		<0.0001	0.002	0.003	<0.05	<0.0001	0.008		0.003	<0.05	<0.004	<0.005
	Jun-25	1.5	<0.001		<0.0001	0.005	0.005	1.62	<0.0001	0.019		0.006	0.061	<0.01	0.018
K13	Dec-25	1.39	<0.001		<0.0001	0.006	0.007	1.91	0.0004	0.051		0.008	0.042	<0.004	0.014
	Apr-26	0.7	<0.001		<0.0001	0.003	0.006	1.01	<0.0001	0.018		0.007	1.01	<0.004	0.031
	Nov-24		0.004	0.05	0.0018	0.004	0.063			0.103	0.001	0.006	0.008		0.055
K14	Dec-25	1.76	0.002		0.0005	0.003	0.028	2.18	<0.0001	0.088		0.033	0.004	<0.004	0.022
	May-26	1.19	0.002		0.0005	0.002	0.028	2.09	<0.0001	0.092		0.016	2.09	<0.004	0.016

[1] Dissolved metals

KARAFIL PRODUCTION BORES

			µS/cm	(mg/L)	as N (mg/L)						as P (mg/L)	as SiO_2 (mg/L)
Bore	**Date**	**pH**	**EC**	**TDS**	**NH_3**	**NO_3^-**	**NO_2^-**	**NO_3^-+NO_2^-**	**Tot. Kjeldahl N**	**Total N**	**Total P**	**Si**
K01	Jun-25	7.74	1330	860	0.05	<0.01	<0.01	<0.01				61.4
	May-26	7.56	1380	900	<0.01	<0.01	0.01	0.01	<0.1			71.6
K06	Jun-25	7.15	813	530	0.02	<0.01	<0.01	<0.01				44
	May-26	7.69	1940	1260	0.02	<0.01	<0.01	<0.01	<0.1	<0.1	0.04	66.8
K07	Jun-25	7.82	2920	1900	<0.01	<0.01	<0.01	<0.01				70.6
	May-26	7.58	3040	1980	0.01	<0.01	<0.01	<0.01	0.1	0.1	0.01	48.9
K08	Jun-25	7.64	2810	1830	0.02	<0.01	<0.01	<0.01				58.8
	May-26	7.67	2670	1740	0.02	<0.01	<0.01	<0.01	<0.1	<0.1	0.02	65
K09	Jun-25	6.87	1720	1120	<0.01	<0.01	0.77	0.77				28.5
	May-26	7.48	2010	1310	0.04	<0.01	0.23	0.23	<0.1	0.2	0.02	63.5

		(mg/L)							(meq)		(%)	as $CaCO_3$ (mg/L)			
Bore	**Date**	**Na^+**	**K^+**	**Mg^{2+}**	**Ca^{2+}**	**Cl^-**	**SO_4^{2-}**	**F^-**	**Total Anions**	**Total Cations**	**Ionic Balance**	**OH^-**	**CO_3^{2-}**	**HCO_3^-**	**Total Alkalinity**
K01	04-Jun-25	100	3	34	106	324	13	<0.1	13.5	12.5	1.97	<1	<1	206	206
	25-May-26	89	4	34	113	318	13	<0.1	13.9	12.4	3.89	<1	<1	231	231
K06	04-Jun-25	92	2	19	35	213	10	<0.1	7.88	7.36	5.5	<1	<1	83	83
	25-May-26	118	5	51	180	496	19	<0.1	19.3	18.4	3.36	<1	<1	246	246
K07	04-Jun-25	220	9	74	247	792	61	<0.1	29.3	28.2	2.28	<1	<1	286	286
	25-May-26	297	5	73	158	856	82	<0.1	29.6	26.9	1.93	<1	<1	188	188
K08	04-Jun-25	240	6	74	212	795	45	<0.1	28.2	27.3	4.72	<1	<1	240	240
	25-May-26	185	5	72	188	716	46	<0.1	26.2	23.5	1.62	<1	<1	253	253
K09	04-Jun-25	249	2	30	36	532	32	<0.1	16.7	15.1	5.49	<1	<1	50	50
	25-May-26	167	3	65	119	527	34	<0.1	19.7	18.6	4.79	<1	<1	208	208

KARAFIL PRODUCTION BORES

		Dissolved Metals (mg/L)											
Bore	**Date**	**Al**	**As**	**Cd**	**Cr**	**Cu**	**Fe**	**Hg**	**Mn**	**Ni**	**Pb**	**Se**	**Zn**
K01	Jun-25	0.06	0.007	<0.0001	<0.001		0.10	<0.0001	0.003	<0.001	<0.001	<0.01	<0.005
	May-26	<0.01	<0.001	<0.0001	<0.001	<0.001	2.29	<0.0001	0.38	<0.001	<0.001	<0.004	<0.005
K06	Jun-25	<0.01	<0.001	<0.0001	<0.001		<0.05	<0.0001	0.306	0.005	<0.001	<0.01	<0.005
	May-26	<0.01	<0.001	<0.0001	<0.001	<0.001	0.97	<0.0001	0.505	0.001	<0.001	<0.004	<0.005
K07	Jun-25	<0.01	<0.001	<0.0001	<0.001		<0.05	<0.0001	0.477	<0.001	<0.001	<0.01	<0.005
	May-26	<0.01	<0.001	<0.0001	<0.001	<0.001	0.64	<0.0001	0.233	0.007	<0.001	<0.004	<0.005
K08	Jun-25	<0.01	<0.001	<0.0001	<0.001		0.15	<0.0001	1.04	<0.001	<0.001	<0.01	<0.005
	May-26	<0.01	<0.001	<0.0001	<0.001	<0.001	2.34	<0.0001	0.83	0.001	<0.001	<0.004	<0.005
K09	Jun-25	<0.01	<0.001	<0.0001	<0.001		<0.05	<0.0001	0.054	0.008	<0.001	<0.01	0.019
	May-26	<0.01	<0.001	<0.0001	<0.001	<0.001	0.24	<0.0001	0.407	0.003	<0.001	<0.004	<0.005

TUNNELL RD MONITORING BORES

			µS/cm	(mg/L)	as N (mg/L)							as P (mg/L)	as SiO_2 (mg/L)
Bore	**Date**	**pH**	**EC**	**TDS**	**NH_3**	**NH_3^+**	**NO_3^-**	**NO_2^-**	**NO_3^-+NO_2^-**	**Tot. Kjeldahl N**	**Tot. N**	**Total P**	**Si**
	Nov-23	6.09	333	220			<0.01	0.22	0.22				11.3
	Dec-24												
T05	Jun-25	6.05	354	230	<0.01	<0.01	<0.01	0.17	0.17	<0.1	0.2	0.07	10.3
	Dec-25	6.44	334	217	<0.01	<0.01	<0.01	0.25	0.25	0.1	0.4	<0.01	12.6
	May-26	5.77	331	215	<0.01	<0.01	<0.01	0.22	0.22	<0.1	0.2	<0.01	11.9
	Dec-24												
T06C	Jun-25	7.12	306	199	<0.01	<0.01	0.02	0.05	0.07	0.2	0.3	<0.01	9.6
	Dec-25	6.77	374	243	0.02	0.02	<0.01	0.4	0.4	<0.1	0.4	<0.01	8.7
	Jun-25	7.47	657	427	<0.01	<0.01	<0.01	0.06	0.06	<0.1	0.2	<0.01	46
T07C	Dec-25	7.60	633	411	0.01	<0.01	<0.01	0.04	0.04	<0.1	<0.1	<0.01	50.6
	May-26	7.52	644	419	<0.01	<0.01	<0.01	0.03	0.03	<0.1	<0.1	0.02	48.5
	Jun-25	7.14	955	621	<0.01	<0.01	<0.01	0.01	0.01	<0.1	<0.1	0.13	62.7
T11	Dec-25	6.74	1220	793	0.01	<0.01	<0.01	0.15	0.15	0.2	0.4	0.03	18.5
	May-26	7.51	935	608	<0.01	<0.01	<0.01	0.01	0.01	<0.1	<0.1	0.02	66.1
	Jun-25	6.28	935	608	<0.01	<0.01	<0.01	0.08	0.08	<0.1	<0.1	0.02	13.1
T11A	Dec-25	6.75	898	584	<0.01	<0.01	<0.01	0.12	0.12	0.1	0.2	0.01	12.2
	May-26	6.47	904	588	<0.01	<0.01	<0.01	0.09	0.09	0.1	0.2	0.01	12.3
	Jun-25	6.68	1920	1250	<0.01	<0.01	0.01	0.12	0.12	0.3	0.4	0.04	16.7
P12	Dec-25	6.79	2110	1370	<0.01	<0.01	<0.01	0.1	0.1	0.3	0.4	0.1	17.5
	May-26	6.49	1760	1140	<0.01	<0.01	<0.01	0.12	0.12	0.2	0.3	0.05	16.3

TUNNELL RD MONITORING BORES

		(mg/L)							(meq)		(%)	as $CaCO_3$ (mg/L)				
Bore	**Date**	**Na^+**	**K^+**	**Mg^{2+}**	**Ca^{2+}**	**Cl^-**	**SO_4^{2-}**	**F^-**	**Total Anions**	**Total Cations**	**Ionic Balance**	**OH^-**	**CO_3^{2-}**	**HCO_3^-**	**Total Alkalinity**	**Total Hardness**
T05	Nov-23	46	<1	7	6	104	5	<0.1	3.38	2.88	8.01	<1	<1	17	17	
	Dec-24	53	1	6	5	76	6		2.55	3.05	8.94	<1	<1	14	14	37
	Jun-25	55	<1	5	4	80	14	<0.1	2.97	3	0.6	<1	<1	21	21	30
	Dec-25	54	<1	7	6	89	5	<0.1	2.95	3.22	4.37	<1	<1	17	17	44
	May-26	47	<1	8	5	87	5	<0.1	2.98	2.95	0.43	<1	<1	21	21	45
T06C	Nov-23															
	Dec-24	60	1	8	6	118	7		3.77	3.59	2.45	<1	<1	15	15	48
	Jun-25	47	<1	6	5	78	5	<0.1	2.62	2.79	3.02	<1	<1	16	16	37
	Dec-25	60	<1	8	6	100	7	<0.1	3.25	3.57	4.72	<1	<1	14	14	48
T07C	Nov-23															
	Jun-25	54	2	24	31	107	6	<0.1	6.18	5.92	2.13	<1	<1	152	152	176
	Dec-25	54	1	24	36	96	6	<0.1	5.49	6.15	5.64	<1	<1	133	133	189
	May-26	52	2	27	39	115	6	<0.1	6.31	6.48	1.37	<1	<1	147	147	209
T11	Jun-25	85	2	30	58	215	8	<0.1	9.43	9.11	1.71	<1	<1	160	160	268
	Dec-25	190	1	31	28	373	20	<0.1	11.8	12.2	1.84	<1	<1	43	43	198
	May-26	77	2	32	65	201	7	0.1	9.21	9.28	0.35	<1	<1	170	170	294
T11A	Jun-25	129	<1	19	18	282	15	<0.1	8.79	8.07	4.23	<1	<1	26	26	123
	Dec-25	139	1	20	17	275	18	<0.1	8.61	8.57	0.27	<1	<1	24	24	125
	May-26	127	1	22	18	264	16	<0.1	8.38	8.26	0.73	<1	<1	30	30	136
P12	Jun-25	251	1	46	38	562	35	<0.1	17.4	16.6	2.28	<1	<1	41	41	284
	Dec-25	304	1	57	48	643	38	<0.1	19.6	20.3	1.72	<1	<1	36	36	355
	May-26	240	1	45	39	524	33	<0.1	16.3	16.1	0.47	<1	<1	40	40	283

		Total Metals (mg/L)													
Bore	**Date**	**Al**	**As**	**B**	**Cd**	**Cr**	**Cu**	**Fe**	**Hg**	**Mn**	**Mo**	**Ni**	**Pb**	**Se**	**Zn**
T05	Nov-23	<0.01[1]	<0.001[1]		<0.0001[1]	0.002[1]	0.009[1]	<0.05[1]	<0.0001[1]	0.012[1]		0.004[1]	<0.001[1]	<0.01[1]	0.015[1]
	Dec-24		0.001	0.05	<0.0001	0.003	0.015			0.008	0.001	0.01	<0.001		0.058
	Jun-25	0.12	<0.001		<0.0001	0.008	0.006	0.25	<0.0001	0.017		0.024	<0.001	<0.01	0.041
	Dec-25	0.19	<0.001		<0.0001	0.003	0.009	0.2	<0.0001	0.005		0.015	<0.001	<0.004	0.02
	May-26	0.04	<0.001		<0.0001	0.002	0.006	<0.05	<0.0001	0.004		0.004	<0.05	<0.004	0.008
T06C	Dec-24		0.001	0.05	<0.0001	<0.001	0.005			0.001	0.001	0.003	<0.001		0.016
	Jun-25	0.04	<0.001		<0.0001	<0.001	<0.001	0.08	<0.0001	0.012		<0.001	<0.001	<0.01	<0.005
	Dec-25	0.07	<0.001		<0.0001	<0.001	0.004	0.37	<0.0001	<0.001		<0.001	<0.001	<0.004	0.045
T07C	Jun-25	<0.01	<0.001		<0.0001	<0.001	<0.001	<0.05	<0.0001	0.001		<0.001	<0.001	<0.01	<0.005
	Dec-25	<0.01	<0.001		<0.0001	<0.001	0.001	0.07	<0.0001	0.002		<0.001	<0.001	<0.004	<0.005
	May-26	0.01	<0.001		<0.0001	<0.001	0.001	<0.05	<0.0001	0.003		<0.001	<0.05	<0.004	<0.005
T11	Jun-25	0.39	<0.001		<0.0001	0.007	0.014	14.6	<0.0001	0.127		0.008	<0.001	<0.01	0.031
	Dec-25	0.07	<0.001		<0.0001	<0.001	0.01	3.36	<0.0001	0.023		0.003	<0.001	<0.004	0.014
	May-26	0.05	<0.001		<0.0001	<0.001	0.002	0.96	<0.0001	0.096		0.002	0.96	<0.004	<0.005
T11A	Jun-25	0.05	<0.001		<0.0001	0.058	0.003	0.35	<0.0001	0.005		0.022	<0.001	<0.01	0.022
	Dec-25	0.05	<0.001		<0.0001	0.166	0.005	0.83	<0.0001	0.002		0.003	<0.001	<0.004	0.009
	May-26	0.12	<0.001		<0.0001	0.173	0.004	0.92	<0.0001	0.003		0.009	0.92	<0.004	0.006
P12	Jun-25	0.14	<0.001		<0.0001	<0.001	0.004	0.16	<0.0001	0.002		0.002	<0.001	<0.01	<0.005
	Dec-25	1.42	<0.001		<0.0001	0.002	0.021	1.28	0.0001	0.007		0.006	0.003	<0.004	0.013
	May-26	0.89	<0.001		<0.0001	0.001	0.012	0.75	0.0001	0.006		0.01	0.75	<0.004	0.015

[1] Dissolved Metals

TUNNELL RD PRODUCTION BORES

			µS/cm	(mg/L)	as N (mg/L)						as P (mg/L)	as SiO_2 (mg/L)
Bore	**Date**	**pH**	**EC**	**TDS**	**NH_3**	**NO_3^-**	**NO_2^-**	**NO_3^-+ NO_2^-**	**Tot.Kjeldahl N**	**Total N**	**Total P**	**Si**
T07A	Oct-23	6.70	368	240				0.09	<0.1	<0.1	<0.01	
	Jun-25	6.60	381	250	0.01	<0.01	0.09	0.09				12.7
	May-26	6.92	377	250	<0.01	<0.01	0.1	0.1	<0.1	0.1	0.03	13.5
T08	Oct-23	6.98	687	450				0.04	<0.1	<0.1	<0.01	
	Jun-25	6.81	701	460	0.05	<0.01	0.04	0.04				19.9
	May-26	7.23	641	420	0.02	<0.01	0.05	0.05	<0.1	<0.1	0.02	20.4
T10	Oct-23	6.74	745	480				0.07	<0.1	<0.1	0.01	
	Jun-25	6.62	812	530	0.01	<0.01	0.07	0.07				17.3
	May-26	7.03	806	520	<0.01	<0.01	0.08	0.08	<0.1	<0.1	0.03	17.3
T12	Oct-23			471				<0.01	<0.1	<0.1	0.02	
	Jun-25	7.17	747	490	0.02	<0.01	0.02	0.02				74.8
	May-26			496	0.06	<0.01	0.01	0.01	<0.1	<0.1	0.07	78.3
T13	Jun-25	7.30	704	460	0.02	<0.01	<0.01	<0.01				76.6
	May-26			460	0.01	<0.01	<0.01	<0.01	0.2	0.2	0.07	78

		(mg/L)							(meq)		(%)	as $CaCO_3$ (mg/L)			
Bore	**Date**	**Na^+**	**K^+**	**Mg^{2+}**	**Ca^{2+}**	**Cl^-**	**SO_4^{2-}**	**F^-**	**Total Anions**	**Total Cations**	**Ionic Balance**	**OH^-**	**CO_3^{2-}**	**HCO_3^-**	**Total Alkalinity**
T07A	Jun-25	51	1	8	7	107	5	<0.1	3.56	3.23	4.95	<1	<1	22	22
	May-26	49	<1	8	7	96	5	<0.1	3.29	3.14	2.37	<1	<1	24	24
T08	Jun-25	88	<1	16	18	198	9	<0.1	6.59	6.04	4.34	<1	<1	41	41
	May-26	80	<1	15	16	171	8	<0.1	5.81	5.51	2.62	<1	<1	41	41
T10	Jun-25	102	<1	18	19	237	9	0.1	7.57	6.87	4.89	<1	<1	35	35
	May-26	103	<1	18	19	203	9	<0.1	6.59	6.91	2.35	<1	<1	34	34
T12	Jun-25	62	2	25	44	156	6	<0.1	7.38	7	2.65	<1	<1	143	143
	May-26	60	2	25	43	142	6	<0.1	7.15	6.86	2.02	<1	<1	151	151
T13	Jun-25	50	2	26	48	134	5	<0.1	7.06	6.76	2.17	<1	<1	159	159
	May-26	45	2	26	42	121	5	<0.1	6.45	6.24	1.66	<1	<1	147	147

		Dissolved Metals (mg/L)											
Bore	**Date**	**Al**	**As**	**Cd**	**Cr**	**Cu**	**Fe**	**Hg**	**Mn**	**Ni**	**Pb**	**Se**	**Zn**
T07A	Oct-23	<0.01	<0.001	<0.0001	<0.001	<0.001	0.07	<0.0001	<0.001	<0.001	<0.001	<0.01	<0.005
	Jun-25	<0.01	<0.001	<0.0001	<0.001		0.05	<0.0001	0.001	0.002	<0.001	<0.01	<0.005
	May-26	<0.01	<0.001	<0.0001	<0.001	<0.001	0.1	<0.0001	<0.001	<0.001	<0.001	<0.004	<0.005
T08	Oct-23	<0.01	<0.001	<0.0001	<0.001	0.013	<0.05	<0.0001	0.008	0.008	<0.001	<0.01	0.018
	Jun-25	<0.01	<0.001	<0.0001	<0.001		0.05	<0.0001	0.012	0.004	<0.001	<0.01	0.015
	May-26	<0.01	<0.001	<0.0001	<0.001	0.005	<0.05	<0.0001	0.009	<0.001	<0.001	<0.004	<0.005
T10	Oct-23	<0.01	<0.001	<0.0001	<0.001	0.013	<0.05	<0.0001	<0.001	0.001	0.004	<0.01	0.013
	Jun-25	<0.01	<0.001	<0.0001	<0.001		0.05	<0.0001	0.001	0.001	0.001	<0.01	0.023
	May-26	<0.01	<0.001	<0.0001	<0.001	0.018	<0.05	<0.0001	<0.001	0.002	<0.001	<0.004	0.072
T12	Oct-23	<0.01	<0.001	<0.0001	<0.001	<0.001	3.9	<0.0001	0.294	0.004	<0.001	<0.01	<0.005
	Jun-25	<0.01	<0.001	<0.0001	<0.001		3.88	<0.0001	0.251	0.002	<0.001	<0.01	<0.005
	May-26	<0.01	<0.001	<0.0001	<0.001	<0.001	2.43	<0.0001	0.221	0.001	<0.001	<0.004	<0.005
T13	Jun-25	<0.01	<0.001	<0.0001	<0.001		3.39	<0.0001	0.204	0.002	<0.001	<0.01	<0.005
	May-26	<0.01	<0.001	<0.0001	<0.001	<0.001	2.02	<0.0001	0.187	0.001	<0.001	<0.004	<0.005

FAWCETT MONITORING BORE

			µS/cm	(mg/L)	as N (mg/L)							as P (mg/L)	as SiO_2 (mg/L)
Bore	**Date**	**pH**	**EC**	**TDS**	**NH_3**	**NH_3^+**	**NO_3^-**	**NO_2^-**	**$NO_3^- + NO_2^-$**	**Tot. Kjeldahl N**	**Total N**	**Total P**	**Si**
F06-D	Nov-24												
	Dec-25	5.85	523	340	0.71	0.71	<0.01	5.82	5.82	2.7	8.5	0.13	6
	May-26	5.32	589	380	<0.01	<0.01	<0.01	5.88	5.88	1.4	7.3	0.08	6.2

		(mg/L)							(meq)		(%)	as $CaCO_3$ (mg/L)				
Bore	**Date**	**Na^+**	**K^+**	**Mg^{2+}**	**Ca^{2+}**	**Cl^-**	**SO_4^{2-}**	**F^-**	**Total Anions**	**Total Cations**	**Ionic Balance**	**OH^-**	**CO_3^{2-}**	**HCO_3^-**	**Total Alkalinity**	**Total Hardness**
F06-D	Nov-24	93	1	22	14	242	26		7.37	6.55	5.84	<1	<1	<1	<1	126
	Dec-25	68	<1	17	11	128	24	0.2	4.57	4.91	3.59	<1	<1	2	2	97
	May-26	75	<1	17	11	147	23	0.1	5.07	5.21	1.41	<1	<1	1	1	97

		Total Metals (mg/L)													
Bore	**Date**	**Al**	**As**	**B**	**Cd**	**Cr**	**Cu**	**Fe**	**Hg**	**Mn**	**Mo**	**Ni**	**Pb**	**Se**	**Zn**
F06-D	Nov-24		<0.001	<0.05	<0.0001	<0.001	0.012			0.025	<0.001	0.002	0.003		0.037
	Dec-25	1.04	0.002		<0.0001	0.002	0.015	0.57	<0.0001	0.025		0.018	0.008	<0.004	0.058
	May-26	0.86	<0.001		<0.0001	0.002	0.004	0.45	<0.0001	0.024		0.004	0.45	<0.004	0.051

FAWCETT PRODUCTION BORES

			µS/cm	(mg/L)	as N (mg/L)						as P (mg/L)	as SiO_2 (mg/L)
Bore	**Date**	**pH**	**EC**	**TDS**	**NH_3**	**NO_3^-**	**NO_2^-**	**$NO_3^-+NO_2^-$**	**Tot. Kjeldahl N**	**Total N**	**Total P**	**Si**
F12	Jun-25	6.77	12500	8130	0.4	<0.02	<0.01	<0.01				16.7
	May-26	7.26	11900	7740	0.03	<0.01	<0.01	<0.01	<0.1	<0.1	0.05	37.2
SE01/04	Jun-25	7.11	8050	5230	0.03	<0.01	<0.01	<0.01				57.5
	May-26	7.34	7660	4980	0.02	<0.01	<0.01	<0.01	<0.1	<0.1	0.02	62.2

		(mg/L)							(meq)		(%)	as $CaCO_3$ (mg/L)			
Bore	**Date**	**Na^+**	**K^+**	**Mg^{2+}**	**Ca^{2+}**	**Cl^-**	**SO_4^{2-}**	**F^-**	**Total Anions**	**Total Cations**	**Ionic Balance**	**OH^-**	**CO_3^{2-}**	**HCO_3^-**	**Total Alkalinity**
F12	Jun-25	1600	3	413	304	4120	276	0.2	127	119	3.2	<1	<1	237	237
	May-26	1490	3	413	306	3990	327	0.2	123	114	3.59	<1	<1	164	164
SE01/04	Jun-25	884	11	267	274	2560	171	0.2	78.7	74.4	2.82	<1	<1	146	146
	May-26	809	10	256	258	2570	155	0.2	79	69.4	6.48	<1	<1	164	164

		Dissolved Metals (mg/L)													
Bore	**Date**	**Al**	**As**	**B**	**Cd**	**Cr**	**Cu**	**Fe**	**Hg**	**Mn**	**Mo**	**Ni**	**Pb**	**Se**	**Zn**
F12	Jun-25	<0.01	<0.001		<0.0001	<0.001		58.5	<0.0001	0.868		0.002	<0.001	<0.01	0.016
	May-26	<0.01	<0.001		0.0002	<0.001	<0.001	0.22	<0.0001	0.194		0.007	<0.001	<0.004	0.009
SE01/04	Jun-25	<0.01	<0.001		0.0001	<0.001		6.6	<0.0001	1.02		0.005	<0.001	<0.01	0.022
	May-26	<0.01	<0.001		<0.0001	<0.001	<0.001	6.63	<0.0001	0.917		0.003	<0.001	<0.004	0.007

QUINDANNING MONITORING BORES

			µS/cm	(mg/L)	as N (mg/L)							as P (mg/L)	as SiO_2 (mg/L)
Bore	**Date**	**pH**	**EC**	**TDS**	**NH_3**	**NH_3^+**	**NO_3^-**	**NO_2^-**	**$NO_3^-+NO_2^-$**	**Tot. Kjeldahl N**	**Total N**	**Total P**	**Si**
Q01	Nov-23	6.59	10400	6760			<0.01	<0.01	<0.01	0.3			55.1
	Jun-25	6.54	10800	7020	0.03	0.03	<0.01	0.06	0.07	0.3	0.4	0.05	51.1
	Dec-25	6.34	10500	6820	0.02	0.02	<0.01	0.01	0.01	<0.1	<0.1	0.01	52.2
	May-26	6.79	11000	7150	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.1	<0.01	50.4
Q02	Jan-25	6.54	10800	7020	10.4	10.4	0.03	<0.01	0.03	10.3	10.3	0.83	41.2
	Dec-25	6.62	11300	7340	0.06	0.06	<0.01	<0.01	<0.01	0.1	0.1	0.02	43.9
	May-26	6.72	11200	7280	0.07	0.07	<0.01	<0.01	<0.01	0.1	0.1	0.02	42.7
Q07	Feb-23	6.66	4640	3020			<0.01	<0.01	<0.01				28.5
	Jan-25	6.87	5620	3650	<0.01	<0.01	<0.01	<0.01	<0.01	0.3	0.3	0.2	34.3
	Dec-25	6.78	4840	3150	0.02	0.02	<0.01	<0.01	<0.01	0.3	0.3	0.13	31.1
	May-26	7.13	4900	3180	<0.01	<0.01	<0.01	<0.01	<0.01	0.2	0.2	0.1	30.8
Q08	Feb-23	6.58	6030	3920			<0.01	<0.01	<0.01				37.2
	Jan-25	7.46	1960	1270	<0.01	<0.01	<0.01	<0.01	<0.01	0.2	0.2	0.2	16.9
	Dec-25	6.54	6300	4100	0.02	0.02	<0.01	0.02	0.02	<0.1	<0.1	0.15	37.6
	May-26	6.95	6460	4200	0.01	<0.01	<0.01	0.01	0.01	<0.1	<0.1	0.14	41.5

QUINDANNING MONITORING BORES

		(mg/L)							(meq)		(%)	as $CaCO_3$ (mg/L)				
Bore	**Date**	**Na^+**	**K^+**	**Mg^{2+}**	**Ca^{2+}**	**Cl^-**	**SO_4^{2-}**	**F^-**	**Total Anions**	**Total Cations**	**Ionic Balance**	**OH^-**	**CO_3^{2-}**	**HCO_3^-**	**Total Alkalinity**	**Total Hardness**
Q01	Nov-23	1170	5	472	319	3340	207	0.2	101	106	2.28	<1	<1	127	127	2550
	Jun-25	1200	5	442	292	3610	212	0.2	109	103	2.58	<1	<1	125	125	2550
	Dec-25	1260	5	523	312	3730	200	0.2	112	114	0.81	<1	<1	117	117	2930
	May-26	1240	5	473	315	3640	236	0.2	110	109	0.56	<1	<1	117	117	2730
Q02	Jan-25	1060	18	487	309	3240	324	0.2	101	102	0.59	<1	<1	137	137	2780
	Dec-25	1280	6	558	328	3760	351	0.2	115	118	1.21	<1	<1	96	96	3120
	May-26	1140	5	450	300	3720	336	0.2	114	102	5.59	<1	<1	92	92	2600
Q07	Feb-23	422	3	210	182	1460	86	0.2	46	44.8	1.29	<1	<1	150	150	
	Jan-25	507	7	236	184	1630	116	0.3	50.8	50.8	0.02	<1	<1	123	123	1430
	Dec-25	485	4	256	186	1630	76	0.2	50.5	51.5	1.05	<1	<1	146	146	1520
	May-26	459	3	219	182	1650	86	0.2	51.2	47.1	4.13	<1	<1	144	144	1360
Q08	Feb-23	654	7	237	193	1980	122	0.2	61.1	57.8	2.82	<1	<1	136	136	
	Jan-25	241	5	42	43	606	58	<0.1	19.3	16.2	8.69	<1	<1	50	50	280
	Dec-25	695	7	272	192	1990	126	0.2	61.3	62.4	0.86	<1	<1	128	128	1600
	May-26	730	7	264	205	2180	134	0.3	66.7	63.9	2.14	<1	<1	120	120	1600

		Total Metals (mg/L)											
Bore	**Date**	**Al**	**As**	**Cd**	**Cr**	**Cu**	**Fe**	**Hg**	**Mn**	**Ni**	**Pb**	**Se**	**Zn**
Q01	Nov-23	<0.01[1]	<0.001[1]	0.0004[1]	<0.001[1]	0.014[1]	<0.05[1]	<0.0001[1]	0.268[1]	0.038[1]	0.002[1]	<0.01[1]	0.01[1]
	Jun-25	0.05	<0.001	0.0002	<0.001	0.008	0.17	<0.0001	0.256	0.04	<0.001	<0.01	0.048
	Dec-25	0.03	<0.001	0.0003	0.001	0.02	0.09	0.0001	0.262	0.042	<0.001	<0.004	0.008
	May-26	0.02	<0.001	0.0002	<0.001	0.014	<0.05	0.0001	0.253	0.041	<0.05	<0.004	0.011
Q02	Jan-25	0.14	<0.001	0.0002	<0.001	0.039	0.38	<0.0001	0.054	0.036	0.022	<0.01	0.124
	Dec-25	0.06	<0.001	0.0002	<0.001	0.011	0.26	<0.0001	0.052	0.075	0.002	<0.004	0.024
	May-26	0.05	<0.001	0.0002	<0.001	0.015	0.22	<0.0001	0.059	0.059	0.22	<0.004	0.025
Q07	Feb-23	<0.01[1]	<0.001[1]	0.0001[1]	<0.001[1]	0.003[1]	<0.05[1]	<0.0001[1]	0.054[1]	0.004[1]	<0.001[1]	<0.01[1]	0.013[1]
	Jan-25	1.17	<0.001	0.0001	0.002	0.026	4.01	<0.0001	1.24	0.02	0.002	<0.01	0.208
	Dec-25	6.22	<0.001	0.0002	0.004	0.02	3.81	<0.0001	0.07	0.007	0.013	<0.004	0.023
	May-26	2.86	<0.001	<0.0001	0.001	0.015	2.1	<0.0001	0.058	0.013	2.10	<0.004	0.027
Q08	Feb-23	<0.01[1]	<0.001[1]	<0.0001[1]	<0.001[1]	<0.001[1]	7.43[1]	<0.0001[1]	1.47[1]	0.004[1]	<0.001[1]	<0.01[1]	0.021[1]
	Jan-25	0.37	<0.001	<0.0001	<0.001	0.02	0.36	0.0005	0.016	0.003	0.002	<0.01	0.044
	Dec-25	0.46	0.001	<0.0001	<0.001	0.014	9.37	<0.0001	1.38	0.045	0.002	<0.004	0.014
	May-26	0.31	<0.001	<0.0001	<0.001	0.011	8.96	<0.0001	1.28	0.01	8.96	<0.004	0.018

[1] Dissolved Metals

SOUTH-EAST MONITORING BORES

			µS/cm	(mg/L)	as N (mg/L)							as P (mg/L)	as SiO_2 (mg/L)
Bore	**Date**	**pH**	**EC**	**TDS**	**NH_3**	**NH_3^+**	**NO_3^-**	**NO_2^-**	**NO_3^-+ NO_2^-**	**Tot. Kjeldahl N**	**Total N**	**Total P**	**Si**
A04	Nov-23	5.77	2000	1300			<0.01	<0.01	<0.01				19.8
	Jun-25	5.86	2560	1660	<0.01	<0.01	<0.01	<0.01	<0.01	0.8	0.8	0.14	19.6
	Dec-25	6.23	2580	1680	0.01	<0.01	<0.01	<0.01	<0.01	0.2	0.2	<0.01	21.2
	Apr-26	6.41	2380	1550	0.02	0.02	<0.01	0.03	0.03	0.4	0.4	0.05	20.3
B01	Dec-23	6.40	1480	960			<0.01	0.01	0.01				23.4
	Jan-25	6.49	1440	940	0.43	0.43	0.01	0.02	0.03	0.8	0.8	0.13	24
	Dec-25	6.64	1420	920	0.07	0.07	<0.01	0.02	0.02	1.5	1.5	0.03	24.7
	Apr-26	6.87	1450	940	0.07	0.07	<0.01	<0.01	<0.01	0.3	0.3	<0.01	23.3
E01/04	Dec-25	6.27	3130	2030	0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	0.03	45.3
	May-26	5.99	3100	2020	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	0.03	42.7
E03	Nov-24												
	May-26	5.93	3650	2370	<0.01	<0.01	<0.01	0.08	0.08	0.1	0.2	0.21	44.6
Q03	Nov-23	6.84	3700	2410			<0.01	0.01	0.01				44
	Nov-24												
	Dec-25	6.37	3410	2220	0.02	0.02	<0.01	<0.01	<0.01	<0.1	<0.1	0.03	41.8
	May-26	6.92	3540	2300	<0.01	<0.01	<0.01	0.01	0.01	<0.1	<0.1	0.04	41.9
Q04	Jan-25	6.45	5540	3600	0.82	0.82	<0.01	0.03	0.03	0.8	0.8	0.29	47.9
	Dec-25	6.09	4620	3000	0.01	<0.01	<0.01	0.01	0.01	<0.1	<0.1	0.58	40.3
	May-26	6.54	4670	3040	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	0.27	40.5
Q05	Nov-23	6.75	1510	980			<0.01	<0.01	<0.01	6.2			47
	Jan-25	6.57	11300	7340	6.43	6.42	0.02	<0.01	0.02	6.2	6.2	0.61	41.6
	Dec-25	6.21	2280	1480	0.03	0.03	<0.01	<0.01	<0.01	0.1	0.1	0.16	50
	May-26	6.54	2430	1580	<0.01	<0.01	<0.01	0.02	0.02	0.1	0.1	0.13	51.5
SW01	Nov-24												
	Dec-25	6.76	5270	3430	0.08	0.08	<0.01	0.05	0.05	0.4	0.4	0.09	29.4
	May-26	6.65	5230	3400	<0.01	<0.01	<0.01	0.08	0.08	0.2	0.3	0.23	27.8
SW02	Nov-24												
	Dec-25	6.23	843	548	<0.01	<0.01	<0.01	0.02	0.02	<0.1	<0.1	0.03	34.5
	May-26	6.06	1070	696	<0.01	<0.01	<0.01	0.01	0.01	<0.1	<0.1	0.03	33.7

SOUTH-EAST MONITORING BORES

		(mg/L)							(meq)		(%)	as $CaCO_3$ (mg/L)				
Bore	**Date**	**Na^+**	**K^+**	**Mg^{2+}**	**Ca^{2+}**	**Cl^-**	**SO_4^{2-}**	**F^-**	**Total Anions**	**Total Cations**	**Ionic Balance**	**OH^-**	**CO_3^{2-}**	**HCO_3^-**	**Total Alkalinity**	**Total Hardness**
A04	Nov-23	241	<1	61	43	640	74	<0.1	20.5	17.6	7.5	<1	<1	46	46	
	Jun-25	335	<1	76	49	756	80	<0.1	23.8	23.3	1.06	<1	<1	39	39	435
	Dec-25	358	<1	74	50	780	74	<0.1	24.2	24.2	0.05	<1	<1	32	32	430
	Apr-26	311	1	67	48	675	73	<0.1	21.3	21.5	0.38	<1	<1	37	37	396
B01	Dec-23	188	2	33	28	435	47	<0.1	14.4	12.3	7.66	<1	<1	57	57	
	Jan-25	176	3	35	28	433	46	<0.1	14.5	12	9.43	<1	<1	67	67	214
	Dec-25	230	2	36	30	419	46	<0.1	13.7	14.5	2.76	<1	<1	48	48	223
	Apr-26	197	2	36	29	392	47	<0.1	13	13	0.06	<1	<1	49	49	221
E01/04	Dec-25	376	5	104	99	926	94	0.1	29.6	30	0.71	<1	<1	74	74	675
	May-26	386	4	100	93	939	97	<0.1	29.9	29.8	0.17	<1	<1	68	68	644
E03	Nov-24	397	4	142	104	1140	97		35.5	34.2	1.85	<1	<1	68	68	844
	May-26	421	3	123	93	1140	88	<0.1	35.3	33.2	3.15	<1	<1	66	66	739
Q03	Nov-23	472	3	123	102	1100	87	0.1	34.6	35.8	1.65	<1	<1	91	91	674
	Nov-24	383	3	108	92	1060	84		33.3	30.2	4.93	<1	<1	85	85	674
	Dec-25	459	3	120	89	1020	79	0.1	32	34.4	3.5	<1	<1	81	81	716
	May-26	461	3	111	92	1050	87	0.1	33	33.9	1.24	<1	<1	80	80	687
Q04	Jan-25	605	4	204	124	1670	156	0.2	51.6	49.4	2.14	<1	<1	60	60	1150
	Dec-25	513	4	222	130	1630	72	<0.1	48.7	47.2	1.55	<1	<1	59	59	1240
	May-26	522	3	206	128	1500	78	0.1	45.3	46.1	0.95	<1	<1	66	66	1170
Q05	Nov-23	279	<1	18	8	451	18	0.1	13.9	14	0.29	<1	<1	42	42	2920
	Jan-25	1110	14	513	325	3450	329	0.2	106	107	0.27	<1	<1	117	117	2920
	Dec-25	446	<1	33	10	702	35	0.1	21.3	22.6	3.02	<1	<1	38	38	161
	May-26	441	<1	30	11	747	38	0.2	22.7	22.2	1.03	<1	<1	40	40	151
SW01	Nov-24	739	4	125	118	1480	160		48.8	48.4	0.42	<1	<1	188	188	809
	Dec-25	847	3	133	126	1480	156	<0.1	48.5	54.2	5.51	<1	<1	175	175	862
	May-26	748	2	111	111	1620	159	<0.1	52.8	47.3	5.52	<1	<1	189	189	734
SW02	Nov-24	110	3	18	19	253	23		8.55	7.29	7.98	<1	<1	47	47	122
	Dec-25	125	2	20	20	237	22	<0.1	8.14	8.13	0.06	<1	<1	50	50	132
	May-26	145	2	25	27	303	26	<0.1	10.2	9.76	2.22	<1	<1	56	56	170

SOUTH-EAST MONITORING BORES

		Total Metals (mg/L)													
Bore	**Date**	**Al**	**As**	**B**	**Cd**	**Cr**	**Cu**	**Fe**	**Hg**	**Mn**	**Mo**	**Ni**	**Pb**	**Se**	**Zn**
A04	Nov-23	0.02[1]	<0.001[1]		<0.0001[1]	<0.001[1]	<0.001[1]	9.56	<0.0001[1]	0.027[1]		0.002[1]	0.001[1]	<0.011	0.01[1]
	Jun-25	4.65	<0.001		0.0003	<0.001	0.108	8.23	<0.0001	0.029		0.005	0.062	<0.01	0.025
	Dec-25	0.64	<0.001		<0.0001	<0.001	0.003	5.71	<0.0001	0.027		0.005	0.002	<0.004	<0.005
	Apr-26	1.13	<0.001		<0.0001	<0.001	0.009	5.56	<0.0001	0.029		0.005	5.56	<0.004	0.02
B01	Dec-23	<0.01[1]	<0.001[1]		<0.0001[1]	<0.001[1]	<0.001[1]	4.74[1]	<0.0001[1]	0.399[1]		0.008[1]	<0.001[1]	<0.01[1]	0.006[1]
	Jan-25	0.04	<0.001		<0.0001	0.002	0.003	0.58	<0.0001	0.557		0.008	0.017	<0.01	0.01
	Dec-25	0.52	<0.001		<0.0001	0.006	0.007	1.04	<0.0001	0.492		0.018	0.043	<0.004	0.039
	Apr-26	0.1	<0.001		<0.0001	<0.001	0.003	0.70	<0.0001	0.443		0.009	0.70	<0.004	0.014
E01/04	Dec-25	0.12	<0.001		0.0004	<0.001	0.008	0.68	<0.0001	1.21		0.031	<0.001	<0.004	0.028
	May-26	0.36	<0.001		0.0003	0.002	0.012	0.70	<0.0001	1.23		0.028	0.70	<0.004	0.033
E03	Nov-24		0.003	0.08	0.0001	0.002	0.029			0.217	0.001	0.024	0.019		0.068
	May-26	0.59	<0.001		0.0001	<0.001	0.01	1.23	<0.0001	0.211		0.023	1.23	<0.004	0.016
Q03	Nov-23	<0.01[1]	<0.001[1]		0.0001[1]	<0.001[1]	0.003[1]	<0.05[1]	<0.0001[1]	0.227[1]		0.01[1]	<0.001[1]	<0.01[1]	0.016[1]
	Nov-24		0.002	0.05	0.0001	0.005	0.035			0.279	0.001	0.011	0.004		0.065
	Dec-25	0.12	<0.001		<0.0001	0.001	0.007	0.69	<0.0001	0.221		0.009	<0.001	<0.004	0.028
	May-26	0.02	<0.001		<0.0001	<0.001	0.004	0.43	<0.0001	0.213		0.008	0.43	<0.004	0.016
Q04	Jan-25	0.65	0.002		0.0001	0.001	0.021	3.82	<0.0001	0.273		0.038	0.009	<0.01	0.169
	Dec-25	0.85	<0.001		<0.0001	0.004	0.012	6.15	<0.0001	0.248		0.063	0.002	<0.004	0.015
	May-26	0.18	<0.001		<0.0001	<0.001	0.012	1.83	<0.0001	0.222		0.033	1.83	<0.004	0.022
Q05	Nov-23	<0.01[1]	<0.001[1]		<0.0001[1]	<0.001[1]	0.003[1]	1.67[1]	<0.0001[1]	0.335[1]		0.002[1]	<0.001[1]	<0.01[1]	0.036[1]
	Jan-25	0.26	<0.001		0.0004	0.001	0.048	0.51	0.0001	0.057		0.038	0.016	<0.01	0.13
	Dec-25	0.92	0.001		<0.0001	0.001	0.012	4.72	<0.0001	0.258		0.01	0.003	<0.004	0.043
	May-26	0.46	0.001		<0.0001	<0.001	0.009	3.50	<0.0001	0.225		0.005	3.50	<0.004	0.046
SW01	Nov-24		0.001	0.05	0.0001	0.004	0.019			0.033	0.001	0.006	0.002		0.031
	Dec-25	1.55	<0.001		<0.0001	0.006	0.002	2.71	0.0003	0.04		0.01	0.001	<0.004	0.036
	May-26	5.35	<0.001		<0.0001	0.018	0.003	9.94	0.0004	0.125		0.02	9.94	<0.004	0.053

[1] Dissolved Metals

SOUTH-EAST MONITORING BORES

		Total Metals (mg/L)													
Bore	**Date**	**Al**	**As**	**B**	**Cd**	**Cr**	**Cu**	**Fe**	**Hg**	**Mn**	**Mo**	**Ni**	**Pb**	**Se**	**Zn**
SW02	Nov-24		0.001	0.09	0.0001	0.001	0.006			0.004	0.001	0.002	0.003		0.082
	Dec-25	0.02	<0.001		<0.0001	<0.001	<0.001	<0.05	<0.0001	0.002		0.002	<0.001	<0.004	0.008
	May-26	0.02	<0.001		<0.0001	<0.001	<0.001	0.06	0.0001	0.004		0.002	0.06	<0.004	0.013

SOUTH-EAST PRODUCTION BORES

			µS/cm	(mg/L)	as N (mg/L)						as P (mg/L)	as SiO_2 (mg/L)
Bore	**Date**	**pH**	**EC**	**TDS**	**NH_3**	**NO_3^-**	**NO_2^-**	**NO_3^-+ NO_2^-**	**Tot. Kjeldahl N**	**Total N**	**Total P**	**Si**
SE01/01	Jun-25	7.67	1650	1070	0.02	<0.01	<0.01	<0.01				85.8
	May-26	7.36	1800	1170	0.04	<0.01	0.01	0.01	0.2	0.2	0.21	70.7
SE02/01	Jun-25	7.67	1650	1070	0.02	<0.01	<0.01	<0.01				85.8
SE02/03	Jun-25	7.49	5810	3780	0.01	<0.01	0.06	0.06				78
	May-26	7.41	5230	3400	0.02	<0.01	0.06	0.06	<0.1	<0.1	0.05	78.8
SE02/06	Jun-25	6.89	3490	2270	0.04	<0.01	0.8	0.8				48.8
	May-26	6.96	3280	2130	<0.01	<0.01	0.78	0.78	0.1	0.9	0.04	49.8
SE03/01	Jun-25	7.09	3670	2390	0.02	<0.01	0.17	0.17				70.1
	Jun-25	7.43	3780	2460	0.02	<0.01	0.18	0.18				66.7
	May-26	7.19	4050	2630	0.01	<0.01	0.61	0.61	0.1	0.7	0.02	55.5
T14	Oct-23							0.01	<0.1	<0.1	15.3	
	Jun-25	7.07	1160	750	0.02	<0.01	<0.01	<0.01				89.8
	May-26	3.28	1540	1000	0.02	<0.01	<0.01	<0.01	<0.1	<0.1	0.51	65.2

SOUTH-EAST PRODUCTION BORES

		(mg/L)							(meq)		(%)	as $CaCO_3$ (mg/L)			
Bore	**Date**	**Na^+**	**K^+**	**Mg^{2+}**	**Ca^{2+}**	**Cl^-**	**SO_4^{2-}**	**F^-**	**Total Anions**	**Total Cations**	**Ionic Balance**	**OH^-**	**CO_3^{2-}**	**HCO_3^-**	**Total Alkalinity**
SE01/01	Jun-25	147	3	49	111	381	38	0.1	16.8	16	2.23	<1	<1	262	262
	May-26	200	2	47	59	490	38	0.1	17.6	15.6	6.06	<1	<1	148	148
SE02/01	Jun-25	147	3	49	111	381	38	0.1	16.8	16	2.23	<1	<1	262	262
SE02/03	Jun-25	429	7	202	359	1730	104	0.1	54.9	53.4	1.44	<1	<1	199	199
	May-26	401	6	179	313	1720	87	0.2	54.1	47.9	6	<1	<1	187	187
SE02/06	Jun-25	473	1	82	77	1070	65	0.1	32.4	31.2	1.9	<1	<1	42	42
	May-26	407	1	83	73	1010	57	0.1	30.8	28.2	4.36	<1	<1	55	55
SE03/01	Jun-25	372	5	110	174	1060	103	0.1	35.1	34	1.5	<1	<1	152	152
	Jun-25	374	6	112	176	1090	93	<0.1	35.7	34.4	1.77	<1	<1	149	149
	May-26	439	5	112	134	1200	114	0.1	38.6	35.1	4.76	<1	<1	121	121
T14	Jun-25	95	2	45	55	284	26	0.1	11.4	10.6	3.53	<1	<1	143	143
	May-26	157	2	42	17	401	48	<0.2	12.3	11.2	4.79	<1	<1	<1	<1

		Dissolved Metals (mg/L)											
Bore	**Date**	**Al**	**As**	**Cd**	**Cr**	**Cu**	**Fe**	**Hg**	**Mn**	**Ni**	**Pb**	**Se**	**Zn**
SE01/01	Jun-25	<0.01	<0.001	0.0002	<0.001		0.07	<0.0001	0.395	0.003	<0.001	<0.01	<0.005
	May-26	0.02	<0.001	0.0007	0.018	1.22	<0.05	<0.0001	0.242	0.025	<0.001	<0.004	0.011
SE02/01	Jun-25	<0.01	<0.001	0.0002	<0.001		0.07	<0.0001	0.395	0.003	<0.001	<0.01	<0.005
SE02/03	Jun-25	<0.01	<0.001	<0.0001	<0.001		0.94	<0.0001	0.738	0.002	<0.001	<0.01	<0.005
	May-26	<0.01	<0.001	<0.0001	<0.001	<0.001	3.9	<0.0001	0.623	0.001	<0.001	<0.004	<0.005
SE02/06	Jun-25	<0.01	<0.001	0.0002	<0.001		0.05	<0.0001	0.269	0.016	<0.001	<0.01	0.019
	May-26	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.0001	0.295	0.012	<0.001	<0.004	<0.005
SE03/01	Jun-25	<0.01	<0.001	0.0002	<0.001		0.05	<0.0001	0.89	0.02	<0.001	<0.01	0.083
	Jun-25	<0.01	<0.001	<0.0001	<0.001		<0.05	<0.0001	0.858	0.017	<0.001	<0.01	0.08
	May-26	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.0001	0.519	0.008	<0.001	<0.004	0.047
T14	Oct-23	<0.01	<0.001	<0.0001	<0.001	<0.001	0.1	<0.0001	0.47	0.004	<0.001	<0.01	0.019
	Jun-25	<0.01	<0.001	<0.0001	<0.001		5.35	<0.0001	0.368	0.003	<0.001	<0.01	0.021
	May-26	8.53	0.009	<0.0001	0.052	1.27	52.4	<0.0001	0.899	0.016	<0.001	<0.004	0.02

MARRADONG MONITORING BORES

			µS/cm	(mg/L)	as N (mg/L)							as P (mg/L)	as SiO_2 (mg/L)
Bore	**Date**	**pH**	**EC**	**TDS**	**NH_3**	**NH_3^+**	**NO_3^-**	**NO_2^-**	**$NO_3^-+NO_2^-$**	**Tot. Kjeldahl N**	**Total N**	**Total P**	**Si**
M01	Nov-23	5.57	3100	2020			<0.01	0.15	0.15				18.9
	Dec-25	5.29	3220	2090	0.01	<0.01	<0.01	0.17	0.17	<0.1	0.2	0.01	19.4
	May-26	5.27	3400	2210	<0.01	<0.01	<0.01	0.04	0.04	<0.1	<0.1	<0.01	16.3
M01/18	Dec-25	7.66	2810	1830	<0.01	<0.01	<0.01	0.22	0.22	<0.1	0.2	0.06	41.8
	May-26	7.63	2660	1730	<0.01	<0.01	<0.01	0.15	0.15	0.2	0.4	0.02	40.7
M03	Dec-23	7.08	2990	1940			<0.01	0.01	0.01				73.7
	Jan-25	6.80	2870	1860									
	Dec-25	6.65	2780	1810	<0.01	<0.01	<0.01	0.03	0.03	<0.1	<0.1	0.03	53.6
	May-26	7.24	2980	1940	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	0.04	71.5
M04	Dec-25	6.81	2610	1700	<0.01	<0.01	<0.01	0.28	0.28	0.1	0.4	0.36	37.2
	Apr-26	7.13	2700	1760	0.02	0.02	<0.01	0.26	0.26	0.1	0.4	0.19	35.4
M06	Jun-25	6.63	2570	1670	0.04	0.04	<0.01	0.04	0.04	<0.1	<0.1	0.08	52.8
	Dec-25	6.65	2470	1610	<0.01	<0.01	<0.01	0.02	0.02	<0.1	<0.1	0.35	49.4
	May-26	7.00	2610	1700	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	0.14	46.2
MP03	Dec-23	6.97	2190	1420			0.33	1.78	2.11				30.2
	Jan-25	6.76	2020	1310									
	Dec-25	6.86	2010	1310	0.02	0.02	<0.01	2.71	2.71	0.7	3.4	0.15	27.8
	May-26	7.18	2070	1350	0.01	<0.01	<0.01	2.67	2.67	0.5	3.2	0.06	28
MP10	Jun-25	6.53	3950	2570	0.03	0.03	<0.01	<0.01	<0.01	1.1	1.1	0.06	39.4
	Dec-25	6.73	3830	2490	0.04	0.04	<0.01	0.02	0.02	1.2	1.2	0.08	37.5
	May-26	7.03	3940	2560	0.06	0.06	<0.01	0.02	0.02	0.6	0.6	0.07	36.9
MP14	Jul-25	6.92	5280	3430	1.82	1.81	<0.01	0.01	0.01	4	4	1.24	44.2
	Dec-25	7.05	5050	3280	5.97	5.93	<0.01	0.02	0.02	8.6	8.6	0.86	44.5
	Apr-26	7.34	5480	3560	1.47	1.45	<0.01	0.02	0.02	2.4	2.4	0.21	43.2
MP21	Jan-25	6.31	2460	1600	<0.01	<0.01	<0.01	0.06	0.06	0.3	0.4	0.3	30.8
	Dec-25	6.25	2390	1550	0.02	0.02	<0.01	0.07	0.07	0.6	0.7	2.66	30.8
	May-26	6.67	2450	1590	<.01	<0.01	<0.01	0.03	0.03	0.3	0.3	0.24	28.3
MP26	Jun-25	6.96	14100	9160	0.06	0.06	<0.01	<0.01	<0.01	0.4	0.4	<0.1	10.5
	Dec-25	6.90	13100	8520	0.26	0.26	<0.01	0.03	0.03	0.7	0.7	0.1	11
	May-26	7.28	11700	7600	0.15	0.15	<0.01	0.08	0.08	0.6	0.7	0.07	18

MARRADONG MONITORING BORES

			µS/cm	(mg/L)	as N (mg/L)							as P (mg/L)	as SiO_2 (mg/L)
Bore	**Date**	**pH**	**EC**	**TDS**	**NH_3**	**NH_3^+**	**NO_3^-**	**NO_2^-**	**NO_3^-+NO_2^-**	**Tot. Kjeldahl N**	**Total N**	**Total P**	**Si**
MP27	Dec-23	7.12	7830	5090			<0.01	0.01	0.01				40.9
	Jun-25	6.94	8540	5550	0.05	0.05	0.02	0.51	0.53	1	1.5	0.07	32.5
	Dec-25	6.95	7800	5070	0.07	0.07	<0.01	0.43	0.43	0.4	0.8	0.1	34.8
	Apr-26	7.16	7740	5030	0.03	0.03	<0.01	0.32	0.32	0.5	0.8	0.08	36.2

		(mg/L)							(meq)		(%)	as $CaCO_3$ (mg/L)				
Bore	**Date**	**Na^+**	**K^+**	**Mg^{2+}**	**Ca^{2+}**	**Cl^-**	**SO_4^{2-}**	**F^-**	**Total Anions**	**Total Cations**	**Ionic Balance**	**OH^-**	**CO_3^{2-}**	**HCO_3^-**	**Total Alkalinity**	**Total Hardness**
M01	Nov-23	198	2	148	135	970	8	<0.1	27.6	27.6	0.12	<1	<1	6	6	1020
	Nov-24	198	2	161	144	1030	11		29.4	29.1	0.45	<1	<1	4	4	1020
	Dec-25	243	2	167	150	1020	13	<0.1	29.2	31.9	4.4	<1	<1	6	6	1060
	May-26	280	2	149	137	1110	23	<0.1	31.9	31.3	0.86	<1	<1	4	4	956
M01/18	Mar-23	158	2	104	144	739	40	<0.1	25.2	22.7	5.32	<1	<1	177	177	
	Dec-25	193	3	141	165	803	50	<0.1	26.8	28.3	2.69	<1	<1	157	157	993
	May-26	183	2	127	166	774	48	<0.1	25.7	26.7	2.05	<1	<1	142	142	937
M03	Dec-23	389	<1	62	74	838	34	<0.1	27.2	25.7	2.85	<1	<1	144	144	
	Jan-25	340	<1	66	71	886	32		28.2	23.8	8.5	<1	<1		126	449
	Dec-25	316	1	103	117	863	36	<0.1	26.9	28.1	2.14	<1	<1	91	91	716
	May-26	429	<1	69	73	885	33	<0.1	28.1	28	0.3	<1	<1	125	125	466
M04	Nov-24	146	3	157	122	808	40		26.7	25.4	2.5	<1	<1	156	156	951
	Dec-25	168	3	161	121	807	42	<0.1	26.4	26.7	0.56	<1	<1	137	137	965
	Apr-26	166	5	164	130	814	37	<0.1	26.8	27.3	1.01	<1	<1	153	153	1000
M06	Nov-24	299	5	84	45	771	40		24.8	22.3	5.24	<1	<1	109	109	458
	Jun-25	345	3	79	40	764	38	0.2	24.4	23.6	1.79	<1	<1	105	105	425
	Dec-25	352	4	87	43	762	41	0.2	24.3	24.7	0.8	<1	<1	99	99	466
	May-26	353	4	85	43	761	40	0.2	24.4	24.6	0.49	<1	<1	103	103	457

MARRADONG MONITORING BORES

		(mg/L)							(meq)		(%)	as $CaCO_3$ (mg/L)				
Bore	**Date**	**Na^+**	**K^+**	**Mg^{2+}**	**Ca^{2+}**	**Cl^-**	**SO_4^{2-}**	**F^-**	**Total Anions**	**Total Cations**	**Ionic Balance**	**OH^-**	**CO_3^{2-}**	**HCO_3^-**	**Total Alkalinity**	**Total Hardness**
MP03	Dec-23	214	3	64	87	611	61	<0.1	20.5	19	3.82	<1	<1	100	100	
	Jan-25	188	2	64	80	635	66		21	17.5	9.09	<1	<1		85	463
	Dec-25	234	2	69	86	613	53	<0.1	19.8	20.2	0.91	<1	<1	72	72	499
	May-26	236	1	68	85	608	53	<0.1	19.8	20.1	0.79	<1	<1	78	78	492
MP10	Mar-23	366	3	258	188	1410	74		43.4	46.6	3.51	<1	<1	107	107	1530
	Jun-25	316	2	199	163	1170	45	<0.1	36.7	38.3	2.12	<1	<1	139	139	1230
	Dec-25	312	3	197	163	1180	44	<0.1	36.7	38	1.76	<1	<1	124	124	1220
	May-26	315	2	194	167	1200	45	0.1	37.4	38.1	0.86	<1	<1	131	131	1220
MP14	Jul-25	726	5	144	72	1560	71	0.5	48.3	47.2	1.18	<1	<1	140	140	773
	Jul-25	726	5	144	72	1560	71	0.5	48.3	47.2	1.18	<1	<1	140	140	773
	Dec-25	691	6	150	72	1640	50	0.5	50.5	46.1	4.5	<1	<1	160	160	797
	Apr-26	728	4	158	81	1690	78	0.5	52	48.8	3.19	<1	<1	137	137	853
MP21	Jan-25	204	4	102	84	749	51	<0.1	23.1	21.6	3.55	<1	<1	48	48	630
	Dec-25	247	3	107	89	769	45	<0.1	23.6	24.1	1.01	<1	<1	48	48	663
	May-26	251	3	106	87	745	43	<0.1	23	24.1	2.28	<1	<1	54	54	654
MP26	Mar-23	1620	4	452	374	3610	258		112	126	6.11	<1	<1	233	233	2800
	Nov-24	1380	6	422	367	3660	240		113	113	0.05	<1	<1	244	244	2650
	Jun-25	1820	2	478	392	5050	253	<0.1	154	138	5.51	<1	<1	325	325	2950
	Dec-25	1810	2	480	417	4660	248	0.1	142	139	0.95	<1	<1	258	258	3020
	May-26	1540	3	402	370	3810	250	0.1	117	119	0.59	<1	<1	227	227	2580
MP27	Dec-23	751	3	371	347	2600	240	<0.1	81.4	80.6	0.53	<1	<1	156	156	
	Jun-25	898	<1	349	326	2950	315	<0.1	92.8	84.1	4.92	<1	<1	150	150	2250
	Dec-25	874	2	348	327	2800	269	<0.1	87.1	83	2.37	<1	<1	124	124	2250
	Apr-26	718	2	316	313	2570	265	<0.1	80.8	72.9	5.13	<1	<1	139	139	2080

MARRADONG MONITORING BORES

		Total Metals (mg/L)													
Bore	**Date**	**Al**	**As**	**B**	**Cd**	**Cr**	**Cu**	**Fe**	**Hg**	**Mn**	**Mo**	**Ni**	**Pb**	**Se**	**Zn**
M01	Nov-23	0.07[1]	<0.001[1]		<0.0001[1]	<0.001[1]	0.016[1]	<0.05[1]	<0.0001[1]	0.475[1]		0.104[1]	0.005[1]	<0.01[1]	0.216[1]
	Nov-24		0.001	0.07	0.0002	0.002	0.076			0.472	0.001	0.109	0.005		0.32
	Dec-25	0.14	<0.001		<0.0001	<0.001	0.021	0.16	0.0003	0.403		0.106	0.004	<0.004	0.202
	May-26	0.1	<0.001		0.0001	<0.001	0.019	0.08	0.0002	0.461		0.104	0.08	<0.004	0.164
M01/18	Dec-25	0.06	<0.001		<0.0001	<0.001	0.002	0.66	<0.0001	0.167		0.002	<0.001	<0.004	0.007
	May-26	0.06	<0.001		<0.0001	<0.001	0.003	0.23	<0.0001	0.175		0.003	0.23	<0.004	0.014
M03	Dec-23	<0.01[1]	<0.001[1]		<0.0001[1]	<0.001[1]	0.002[1]	<0.05[1]	<0.0001[1]	0.045[1]		0.01[1]	<0.001[1]	<0.01[1]	0.021[1]
	Jan-25		0.002	<0.05	<0.0001	0.001	0.023			0.062	<0.001	0.013	0.002		0.066
	Dec-25	0.1	<0.001		0.0001	0.001	0.007	0.39	<0.0001	0.04		0.026	<0.001	<0.004	0.035
	May-26	0.05	<0.001		<0.0001	<0.001	0.003	0.39	<0.0001	0.041		0.01	0.39	<0.004	0.008
M04	Nov-24		0.007	0.05	0.0004	0.063	0.03			0.639	0.001	0.066	0.02		0.088
	Dec-25	0.45	<0.001		0.0003	0.005	0.013	3.39	0.0003	0.058		0.041	0.002	<0.004	0.069
	Apr-26	0.35	<0.001		0.0002	0.005	0.007	2.1	<0.0001	0.066		0.038	2.10	<0.004	0.052
M06	Nov-24		0.001	0.05	0.0021	0.009	0.023			0.178	0.001	0.017	0.002		0.056
	Jun-25	0.75	<0.001		<0.0001	0.005	0.005	1.97	<0.0001	0.152		0.017	<0.001	<0.01	0.036
	Dec-25	5.98	<0.001		0.0003	0.035	0.028	13.3	<0.0001	0.187		0.044	0.005	<0.004	0.059
	May-26	2.27	<0.001		<0.0001	0.012	0.01	5.33	<0.0001	0.155		0.024	5.33	<0.004	0.048
MP03	Dec-23	<0.01[1]	<0.001[1]		<0.0001[1]	<0.001[1]	0.007[1]	0.06[1]	<0.0001[1]	0.011[1]		0.006[1]	<0.001[1]	<0.01[1]	0.076[1]
	Jan-25		<0.001	0.07	<0.0001	0.001	0.004			0.006	<0.001	0.008	0.003		0.026
	Dec-25	3.28	<0.001		<0.0001	0.007	0.02	6.61	<0.0001	0.082		0.014	0.003	<0.004	0.055
	May-26	0.82	<0.001		<0.0001	0.001	0.003	1.52	<0.0001	0.026		0.005	1.52	<0.004	0.012
MP10	Jun-25	0.65	<0.001		<0.0001	0.002	0.006	1.68	<0.0001	0.02		0.006	0.002	<0.01	0.029
	Dec-25	0.68	<0.001		<0.0001	0.002	0.006	1.74	<0.0001	0.019		0.005	0.002	<0.004	0.035
	May-26	0.36	<0.001		<0.0001	<0.001	0.004	2.17	<0.0001	0.019		0.004	2.17	<0.004	0.010
MP14	Jul-25	0.12	<0.001		<0.0001	<0.001	0.004	0.8	<0.0001	0.014		<0.001	0.001	<0.01	0.009
	Dec-25	1.56	<0.001		<0.0001	0.002	0.01	0.93	<0.0001	0.034		0.012	0.004	<0.004	0.034
	Apr-26	2.68	<0.001		<0.0001	<0.001	0.005	0.84	<0.0001	0.022		0.002	0.84	<0.004	0.008

[1] Dissolved Metals

MARRADONG MONITORING BORES

		Total Metals (mg/L)													
Bore	**Date**	**Al**	**As**	**B**	**Cd**	**Cr**	**Cu**	**Fe**	**Hg**	**Mn**	**Mo**	**Ni**	**Pb**	**Se**	**Zn**
MP21	Jan-25	0.69	<0.001		<0.0001	0.006	0.012	2.59	<0.0001	0.172		0.014	0.001	<0.01	0.093
	Dec-25	15.6	0.001		<0.0001	0.088	0.065	34.6	<0.0001	0.54		0.053	0.014	<0.004	0.063
	May-26	4.38	<0.001		<0.0001	0.038	0.037	22.3	<0.0001	0.117		0.022	22.3	<0.004	0.039
MP26	Nov-24		0.001	0.1	<0.0001	0.006	0.003			0.012	<0.0001	0.008	<0.0001		0.018
	Jun-25	0.39	<0.001		<0.0001	0.002	0.008	1.19	<0.0001	0.005		0.002	<0.001	<0.01	0.029
	Dec-25	6.05	<0.001		<0.0001	0.042	0.021	11.6	0.0004	0.018		0.009	0.005	<0.004	0.029
	May-26	3.97	<0.001		<0.0001	0.025	0.022	7.31	0.0003	0.028		0.005	7.31	<0.004	0.01
MP27	Dec-23	<0.01[1]	<0.001[1]		<0.0001[1]	<0.001[1]	0.029[1]	<0.05[1]	<0.0001[1]	0.050[1]		0.013[1]	<0.001[1]	<0.01[1]	0.126[1]
	Jun-25	0.11	<0.001		0.0002	0.002	0.016	0.46	<0.0001	0.043		0.005	<0.001	<0.01	0.018
	Dec-25	0.35	<0.001		<0.0001	0.001	0.016	1.24	0.0001	0.069		0.006	0.002	<0.004	0.026
	Apr-26	0.24	<0.001		<0.0001	0.001	0.014	0.58	<0.0001	0.021		0.005	0.58	<0.004	0.031

MARRADONG PRODUCTION BORES

			µS/cm	(mg/L)	as N (mg/L)						as P (mg/L)	as SiO_2 (mg/L)
Bore	**Date**	**pH**	**EC**	**TDS**	**NH_3**	**NO_3^-**	**NO_2^-**	**$NO_3^-+NO_2^-$**	**Tot. Kjeldahl N**	**Total N**	**Total P**	**Si**
M01/08	Apr-25	8.00	4690	3050	0.02	<0.01	<0.01	<0.01				63.6
	May-26	7.82	4600	2990	0.01	<0.01	<0.01	<0.01	<0.1	<0.1	0.04	69.8
M01/11	Apr-25	7.94	3130	2030	<0.01	<0.01	<0.01	<0.01				62.1
	May-26	7.65	3010	1960	0.01	<0.01	<0.01	<0.01	<0.1	<0.1	0.05	65.4
M02/08	Jun-25	7.36	5060	3290	0.05	<0.01	<0.01	<0.01				53.7
	May-26	7.35	4660	3030	0.01	<0.01	0.03	0.03				56
M02/18	Apr-25	7.58	6400	4160	<0.01	<0.02	<0.02	<0.01				54.3

[1] Dissolved Metals

MARRADONG PRODUCTION BORES

		(mg/L)							(meq)		(%)	as $CaCO_3$ (mg/L)			
Bore	**Date**	**Na^+**	**K^+**	**Mg^{2+}**	**Ca^{2+}**	**Cl^-**	**SO_4^{2-}**	**F^-**	**Total Anions**	**Total Cations**	**Ionic Balance**	**OH^-**	**CO_3^{2-}**	**HCO_3^-**	**Total Alkalinity**
M01/08	Apr-25	334	8	175	335	1310	48	<0.1	43.7	45.8	2.42	<1	<1	287	287
	May-26	296	7	159	309	1330	64	<0.1	44.8	41.6	3.73	<1	<1	297	297
M01/11	Apr-25	308	5	112	142	897	36	0.1	29.5	29.8	0.57	<1	<1	172	172
	May-26	267	5	103	130	867	41	0.1	28.4	26.7	3.16	<1	<1	157	157
M02/08	Jun-25	380	3	222	254	1460	93	<0.1	47	47.6	0.59	<1	<1	194	194
	May-26	328	3	209	232	1460	84	<0.1	47.3	43.1	4.63	<1	<1	219	219
M02/18	Apr-25	701	10	259	193	1910	178	0.1	60.7	61.7	0.8	<1	<1	157	157

		Dissolved Metals (mg/L)											
Bore	**Date**	**Al**	**As**	**Cd**	**Cr**	**Cu**	**Fe**	**Hg**	**Mn**	**Ni**	**Pb**	**Se**	**Zn**
M01/08	Apr-25	<0.01	<0.001	<0.0001	<0.001		0.39	<0.0001	0.478	<0.001	<0.001	<0.01	0.009
	May-26	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.0001	0.429	<0.001	<0.001	<0.004	<0.005
M01/11	Apr-25	<0.01	<0.001	<0.0001	<0.001		2.93	<0.0001	0.441	0.004	<0.001	<0.01	0.006
	May-26	<0.01	<0.001	<0.0001	<0.001	<0.001	1.43	<0.0001	0.38	0.003	<0.001	<0.004	<0.005
M02/08	Jun-25	<0.01	<0.001	<0.0001	<0.001		1.13	<0.0001	0.802	0.004	<0.001	<0.01	0.039
	May-26	<0.01	<0.001	<0.0001	<0.001	<0.001	1.07	<0.0001	0.847	0.001	<0.001	<0.004	0.011
M02/18	Apr-25	<0.01	<0.001	<0.0001	<0.001		9.18	<0.0001	1.01	0.006	<0.001	<0.01	0.008

HOTHAM NORTH MONITORING BORES

			µS/cm	(mg/L)	as N (mg/L)							as P (mg/L)	as SiO_2 (mg/L)
Bore	**Date**	**pH**	**EC**	**TDS**	**NH_3**	**NH_3^+**	**NO_3^-**	**NO_2^-**	**$NO_3^-+NO_2^-$**	**Tot. Kjeldahl N**	**Total N**	**Total P**	**Si**
H12D	Dec-25	7.49	9960	6470	0.1	0.1	<0.01	0.01	0.01	0.4	0.4	0.26	35
	Apr-26	7.50	9860	6410	0.48	0.47	<0.01	0.03	0.03	0.7	0.7	0.09	37
H13D	Dec-25	7.36	6970	4530	0.9	0.89	<0.01	0.07	0.07	2.4	2.5	0.18	39.8
	Apr-26	7.45	6960	4520	0.22	0.22	<0.01	0.04	0.04	0.7	0.7	0.02	36.9

		(mg/L)							(meq)		(%)	as $CaCO_3$ (mg/L)				
Bore	**Date**	**Na^+**	**K^+**	**Mg^{2+}**	**Ca^{2+}**	**Cl^-**	**SO_4^{2-}**	**F^-**	**Total Anions**	**Total Cations**	**Ionic Balance**	**OH^-**	**CO_3^{2-}**	**HCO_3^-**	**Total Alkalinity**	**Total Hardness**
H12D	Dec-25	1150	29	337	358	3200	267	0.2	99.5	96.4	1.6	<1	<1	184	184	2280
	Apr-26	1170	26	318	341	3180	249	0.1	99	94.7	2.18	<1	<1	204	204	2160
H13D	Dec-25	886	24	176	264	2090	92	0.5	69.8	66.8	2.19	<1	<1	447	447	1380
	Apr-26	867	22	167	268	2100	90	0.4	72.5	65.4	5.13	<1	<1	568	568	1360

		Total Metals (mg/L)											
Bore	**Date**	**Al**	**As**	**Cd**	**Cr**	**Cu**	**Fe**	**Hg**	**Mn**	**Ni**	**Pb**	**Se**	**Zn**
H12D	Dec-25	5.6	0.001	0.0001	0.035	0.024	7.74	<0.0001	0.927	0.049	0.002	<0.004	0.049
	Apr-26	2.29	<0.001	<0.0001	0.013	0.006	3.01	<0.0001	1.61	0.046	3.01	<0.004	0.024
H13D	Dec-25	3.13	0.002	0.0001	0.005	0.026	4.95	<0.0001	3.11	0.023	0.01	<0.004	0.264
	Apr-26	0.63	<0.001	<0.0001	<0.001	0.005	1.48	<0.0001	3.54	0.007	1.48	<0.004	0.016