Annual Groundwater Monitoring Report - 2023

Dingo Gas Field and Surprise Oil Field

Mereenie Oil and Gas Field

Palm Valley Gas Field

Contents

1 Introduction

Central Petroleum Ltd (CTP) operates four oil and gas fields across the Amadeus Basin in the Northern Territory (NT) on behalf of various interest holders. Conditions of approval of Environmental Management Plans (EMPs) for the field operations required the development of groundwater monitoring plans (GMPs) to demonstrate that there is *no change in the groundwater quality as a result of activities.* The following plans were submitted to the NT Government in accordance with the EMP conditions:

- DIN-630-PLN-0003: Dingo Gas Field and Surprise Oil Field Groundwater Monitoring Plan
- 9900-630-PLN-0002: Mereenie Oil and Gas Field Groundwater Monitoring Plan

In addition, the Operator has proactively developed the following:

- PVL-630-PLN-0001: Palm Valley Gas Field Groundwater Monitoring Plan

The stated reporting requirements of the GMPs require:

- The current monitoring locations, scope and any deviations from the scope
- Presentation and discussion of water quality monitoring results, including:
  - Comparison of water quality results with site-specific performance criteria
  - Presentation of results in graphical formats, identification and discussion of any trends in the water quality
  - Tabulation of field and laboratory chemical data from the reporting period
- Investigation and response actions completed since the previous report.

This document has been prepared to satisfy the annual reporting requirements of the plans for the 2023 calendar year.

2 Monitoring Scope

Table 1 provides a summary of the scope included in the GMPs and the scope completed during the 2023 calendar year. The monitoring locations are shown on Figure 1 to Figure 4.

Most monitoring was undertaken in May and October to ensure compliance with the Mereenie EMP conditions of approval. The May (end of wet season) monitoring at Surprise was undertaken in July 2023.

Deviations from the scope included:

- In May 2023, the following items were not or partially completed:
  - A sample was not collected from RN002943 as the pump was removed and the bore was found to be dry;
  - Samples from RN013861, RN017657 and RN018851 were lost and were therefore not analysed by the laboratory;
  - Water levels could not be measured in RN018851, RN007292 and RN018732 because they could not be accessed; and
  - Duplicate samples were not collected due to operator error.
- In October 2023, the following items were not completed:
  - A sample was not collected from RN002943 as the pump was removed and the bore was found to be dry;
  - A sample was not collected from RN017657 as the bore was not operational;
  - A water level could not be measured in RN018851, RN007292 and RN01873 because they could not be accessed; and
  - Duplicate samples were not collected due to operator error.

Table 1 Groundwater monitoring locations and scope

Field	Location	Water Quality		Water Level		Wellhead Pressure		Field Water Quality and Photograph	
		May	October	May	October	May	October	May	October
Mereenie	RN004620	✓	✓						
	RN018955	✓	✓						
	RN017898	✓	✓						
	RN013861	✓	✓						
	RN017657	✓	×						
Dingo	Dingo 2					✓	✓		
	Dingo 3					✓	✓		
	RN002943	×	×	✓	✓				
	RN010853	✓	✓	✓	✓				
	RN011831	✓	✓	✓	✓				
	RN017540			✓	✓				
Surprise	Surprise 1					✓	✓		
	Johnstone West 1					✓	✓		
	RN018851	✓	✓	×	×				
	RN018397			✓	✓				
	RN018463			✓	✓				
	RN018398			✓	✓				
Palm Valley	Palm Creek Lower Oasis							✓	✓
	Palm Valley Area Spring No 8							✓	✓
	Palm Valley Area Spring No 9							✓	✓
	Pimelia Spring							✓	✓
	RN006503	✓	✓						
	RN012024	✓	✓						
	RN007292			×	×				
	RN018732			×	×				
	RN14165			✓	✓				
	RN018706			✓	✓				
	RN018707			✓	✓				
	RN018708			✓	✓				

* Datum = GD94

Not in scope

✓ Completed

✓ Partially completed

× Not completed

3 Water quality monitoring results

Water quality monitoring results for the 2023 calendar year are provided in Appendix A.

Quality assurance through the calculation of relative percentage differences between primary and duplicate samples could not be performed as duplicate samples were not collected during the 2023 monitoring events.

3.1 Comparison with performance criteria

In accordance with the GMPs, the ANZECC (2000) livestock values have been used as interim performance standards while sufficient data is accumulated to develop site-specific performance standards. DES (2021) suggests that a minimum of eight samples are required to develop site-specific performance standards. Only six monitoring events have been undertaken to date.

The results of the monitoring tabulated in Appendix A identify the following exceedances of the interim performance standards:

- In May 2023:
  - Gross Alpha exceeded the ANZECC (2000) livestock guideline value (0.5 Bq/L) in RN011831 (0.86 Bq/L) and RN006503 (0.65 Bq/L). These bores are in the Dingo and Palm Valley GMP areas respectively.
  - Gross Beta (excluding k-40) exceeded the ANZECC (2000) livestock guideline value (0.5 Bq/L) in RN011831 (0.52 Bq/L). This bore is located at the Surprise oil field.
- In October 2023:
  - Gross Alpha exceeded the ANZECC (2000) livestock guideline value (0.5 Bq/L) in RN013861 (1.21 Bq/L), RN011831 (0.77 Bq/L) and RN006503 (1.81 Bq/L). These bores are in Mereenie, Dingo and Palm Valley GMP areas respectively.
  - Sulphate exceeded the exceeded the ANZECC (2000) livestock guideline value (1,000 mg/L) in RN013861 (1,710 mg/L). This bore is located in the Mereenie field.

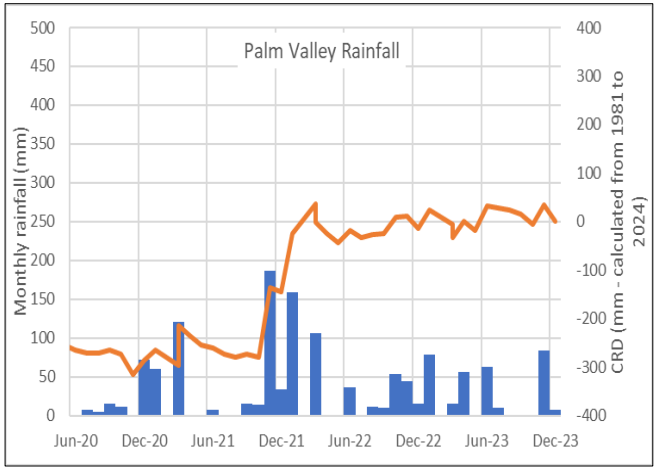
3.2 Trend analysis

A Mann-Kendall test for trend has been performed for all bores and all chemical parameters where there are three or more results. The output of the Mann-Kendall test is included in the bore-by-bore statistical summaries provided as Appendix B. Where the Mann-Kendall test identified a trend (either rising or falling), a timeseries graph of the data was prepared. These graphs are also included in Appendix B.

The trends identified by the Mann-Kendall test are summarised in Table 2. Observations with respect to the total dissolved solids trends have been included. TDS provides an indication of the overall water quality. Despite the trends, none of these parameters exceed the performance criteria.

Table 2 Parameter trends

Field	Location	Parameter	Trend direction	Trend description	Comments
Mereenie	RN018955	Magnesium	Rising	Increase in magnesium concentration from 8mg/L in May 2021 to 10 mg/L in October 2022 and stable thereafter	
	RN017898	Field Electrical conductivity	Falling	Decline in electrical conductivity (EC) from 475 µS/cm in May 2021 to 403 µS/cm October 2023.	RN017898 is regularly used to supply water to site operations. Observed trends suggest a marginal improvement in groundwater quality from this bore. Laboratory chemistry data from the Bore Report reported electrical conductivity of 445 µS/cm which is very similar to the median of the values reported. The trends are attributed to natural variation.
		Gross beta	Falling	Decline in gross beta from 0.98 Bq/L in May 2021 to 0.61 Bq/l in May 2024.	
		Manganese	Falling	Decline in manganese from 0.014 mg/L in May 2021 to 0.001 in October 2023.	
Surprise	RN018851	Field Electrical conductivity	Falling	The EC was effectively stable between May 2021 and May 2022. It declined from ~1,410 µS/cm to 1233 µS/cm in October 2022 before rising to 1,284 µS/cm in October 2023	This bore is located at the Surprise oil field, which has been shut-in since August 2015. The bore is rarely used. The electrical conductivity as measured by the driller was 1,530 µS/cm. The trends are attributed to natural variation, potentially affected by the lack of use and insufficient purging of the bore prior to sample collection.
		Nitrate	Rising	Nitrate rose from 0.01 mg/L in May 2021 to 0.04 mg/L in May 2022, and has been stable since.	
		Calcium	Rising	The calcium concentration has gradually risen from 70mg/L in May 2021 to 75 mg/L in October 2023.	
Dingo	RN011831	Manganese	Falling	Manganese declined from 0.008 mg/L in May 2021 to 0.002 mg/L in May 2022. It was stable until May 2023, and then it declined to <0.001 mg/L (<LOR) in October 2023.	This is a stock bore that is regularly used. It was originally drilled to 373 m and was then deepened to 433 m in 1978. A hydrogeologist's log from the Statement of Bore (SoB) identifies the screened formation as the Hermannsburg Sandstone. The SoB. includes several sets of chemistry results. The most recent data was from 1987 when the total dissolved solids (TDS) (gravimetric) was reported as 880 mg/L, however the maximum reported TDS was 980 mg/L in 1978. The most recent (October 2023) sample reported 949 mg/L TDS. The groundwater chemistry from this bore exhibits some natural variability and the trends are attributed to natural variation.
		Silica	Rising	Silica gradually rose from 16.8 mg/L in May 2021 to 18.6 mg/L in October 2022. It then declined to 17.8 mg/L in May 2023 following which it rose to 18.7 mg/L in October 2023.	
		Zinc	Falling	The zinc concentration gradually declines from 0.105 mg/L in May 2021 to 0.016 mg/L in May 2023. It remained at 0.016 mg/L in October 2023.	

Field	Location	Parameter	Trend direction	Trend description	Comments
Palm Valley	RN006503	Electrical conductivity (Laboratory)	Rising	The EC rose from 1,400 µS/cm in May 2021 to 1,690 µS/cm in May 2022 and then fell to 1,580 µS/cm in October before rising again to 1,690 µS/cm by October 2023.	RN006503 was drilled to ~487 m in 1969 as an exploration water supply bore for the Hermannsburg Misson but is now used for stock watering. The bore was cased to ~30 m and open hole below. The bore was initially recorded as dry, but later started flowing very slightly. Observations of the water level during Monitoring activities show some fluctuation, estimated in the order of 0.5 m, with unobservable flow. A sample record from the Statement of Bore from 1991 reported 800 mg/L TDS. All concentrations of other analytes which were analysed in 1991 were less than the concentrations reported during monitoring activities. The decline in concentrations ~October 2023 may be related to a recharge event associated with above average rainfall in early 2022. It is considered likely that the increasing TDS and associated concentrations are related to climate or bore construction rather than activities. 
		Total dissolved solids	Rising	TDS is directly correlated to EC, rising from 910 mg/L to a maximum of 1,110 mg/L, with a decline to 1,030 mg/L in October 2022.	
		Gross beta (excluding k-40)	Rising	Gros beta shows similar trends to other parameters, starting at 0.26 Bq/L in May 2021 and rising to a maximum of 0.42 in October 2023, with a temporary decline to 0.3 Bq/L in October 2022.	
		Chloride	Rising	Chloride shows similar trends to other parameters, starting at 196 mg/L in May 2021 and rising to 274 mg/L in October 2023, with a temporary decline to 228 mg/L in October 20222	
		Calcium	Rising	Chloride shows similar trends to other parameters, starting at 46 mg/L in May 2021 and rising to 56 mg/L in October 2023, with a temporary decline to 118 mg/L in October 20222	
		Magnesium	Rising	Chloride shows similar trends to other parameters, starting at 108 mg/L in May 2021 and rising to 130 mg/L in October 2023	
		Iron	Falling	Iron's trend does not follow the other parameters. Its initial concentration was 1.83 mg/L which rose to 2 mg/L in October 2022, and then fell to 0.59 mg/L in May 2022. It rose to 1.38 mg/L in October 2022, but was <LOR in the 2023 monitoring events.	
		Lithium	Rising	Lithium was relatively stable from May 2021 (0.048 mg/L) to October 2022 (0.056 mg/L), rising to 0071 mg/L in May 2022. From October 2022 to October 2023 it rose to 0.1 mg/L	

3.3 Exceedance investigations

The following investigation was undertaken in accordance with the exceedance response framework regarding the Gross Alpha and Gross Beta exceedances reported in the 2023 sample results:

- Exceedances of the interim performance standards of Gross Alpha and Gross Beta are consistent with exceedances reported in 2021 and 2022.
- Gross alpha and gross beta levels in excess of the guideline values are not uncommon across the Northern Territory, for example:
  - Power and Water Corporation report that roughly 50% of the communities sampled exceed the radiological guidelines (https://www.powerwater.com.au/__data/assets/pdf_file/0026/26774/2018-Power-and-Water-Drinking-Water-Quality-Report.pdf).
  - Alice Springs, Borroloola and Pine Creek have had exceedances of the guideline values for gross alpha and gross beta from their water supply bores (https://water.australianmap.net/physical_chemical/radionuclides-other-beta-and-gamma-emitting/).
  - The values observed in the groundwater monitoring program are roughly equal to the values reported by the NTG (https://depws.nt.gov.au/__data/assets/pdf_file/0006/726585/betaloo-groundwater-monitoring-report.pdf).

With the exception of RN006503 in the Palm Valley GMP area, none of the bores with Gross Alpha and Gross Beta exceedances of their interim performance standards show rising trends in the concentrations of these parameters which may suggest a new source of a contaminant. It was considered likely that the trends are due to natural variability. The rising trend of Gross Beta in RN006503 is considered to be most likely related to climatic drivers that affect aquifer conditions or the effects of the bore construction, such as partial collapse of the open hole, leading to different zones within the aquifer supply different proportions of water to the bore.

The repeated exceedance of the sulphate concentration in RN013861 was investigated during 2023, with the following findings:

- RN013861 was drilled to 213 m in 1984. The Statement of Bore (SoB) indicates a small supply was encountered at 70 mbgl, which was effectively cased off in the construction of the bore, however, the annulus was not cemented.
- Chemistry records from the SoB identify the TDS as 614 mg/L (by summation) and the sulphate concentration as 192 mg/L in 1984.
- The Operator has monitoring records from RN013861 from 2013 to 2015. The TDS ranged from 2,300 mg/L to 2,900 mg/L and sulphate ranged from 1,620 mg/L to 2,000 mg/L
- RN016889, drilled in 1996, is located within 20 m of RN013861. It was drilled to 71.5 m with a reported TDS of 5,010 mg/L and sulphate concentration of 250 mg/L. These concentrations are considered likely to represent the groundwater quality in the shallower aquifer.
- The increased salinity (as measured by TDS) in RN013861 may be due to inter-aquifer leakage either through the bore annulus or through compromised casing. The source of the sulphate remains unknown.
- The Operator will continue investigate the cause of the sulphate exceedance.

Statistically significant trends, as determined by the Mann-Kendall test for trend and identified in Table 1, are believed to be due to natural variability.

No further investigations or response actions have been performed since the 2022 report was prepared.

4 Water level monitoring

Water level monitoring data is tabulated in Appendix C and timeseries graphs are also provided. These data identify:

- Two of the bores at Dingo are dry and or blocked;
- At Dingo, the water level in RN010853 declined by 5.5 m between the May and October 2021. From October 2021 and through 2022 the water level was relatively stable at approximately 125.35 m below top of casing. In 2023, the water level rose marginally to 124.7 m below top of casing;
- At Surprise the water levels have shown a general decline during the period of monitoring. The greatest decline in water level was 0.55 m over the period May 2021 to October 2023, measured in RN018463; and
- At Palm Valley, the water levels have generally been relatively stable, except for RN014165 which shows a significant decline in water level of over 30 m between October 2021 and October 2022. During 2023, the water level recovered by roughly 28 m to around 22 m below top of casing. These water level responses are most likely related to pumping of the Power and Water Corporation borefield in which the bores that are monitored are situated.

5 Wellhead pressure monitoring

Wellhead pressure monitoring data is tabulated in Appendix C and timeseries graphs are also provided. These data identify:

- Significant reductions in wellhead (tubing) pressures in Dingo 2 and Dingo 3 from May to October 2021. The Dingo 3 tubing pressure was stable from October 2021 through October 2023. The Dingo 2 tubing pressure gradually rose over the period October 2021 to May 2023, and then decreased slightly between May and October 2023;
- The Johnstone West 1 pressure declined between April 2021 and October 2021, but has since recovered and has remained relatively consistent (~2,000 kPa) from October 2021 to October 2023; and
- There was a significant increase in tubing pressure in Surprise 1 between April 2021 and October 2021. The measured pressures in 2022 were significantly lower, but in 2023 they increased to a similar magnitude (~1,500 kPa) as October 2021.

6 Springs Monitoring

The scope of the monitoring for Palm Valley Gas Field includes the monitoring of condition of four spring vents in the Finke Gorge National Park. This includes the collection of field water qualities and photographs of the springs.

Field water quality results are included in the tables in Appendix A.

Photographs of each of the spring pools are included in Appendix D.

Most notably Pimelia Spring and Spring No. 8 were dry in October 2021, May 2022, and October 2023. All the springs had associated pools in the May 2021, October 2022 and May 2023 monitoring events.

Fish were observed in the Palm Creek Lower Oasis spring in March and October 2022 and May 2023, however the pool was almost dried out in October 2023 with no fish recorded. In Spring No 9, fish were observed in May 2022 and May 2023, but not in the October field visits. Algae and aquatic plans were noted in Spring No 8 and Pimelia Spring in May 2023.

There was heavy rainfall (44 mm at the Palm Valley Gas Facility) the night before the October 2022 monitoring event. The water quality in the springs was significantly fresher during the October 2022 event due to the preceding rainfall.

7 Conclusions

There is no evidence of a change in the groundwater quality due to activities at Dingo, Surprise or Palm Valley.

An elevated sulphate concentration in RN013861 at Mereenie is under investigation.

8 References

DES (2021) Using monitoring data to assess groundwater quality and potential environmental impacts. Version 2. Department of Environment and Science (DES), Queensland Government, Brisbane.

Figure 1 Groundwater monitoring locations relative to permit boundary – Dingo Gas Field

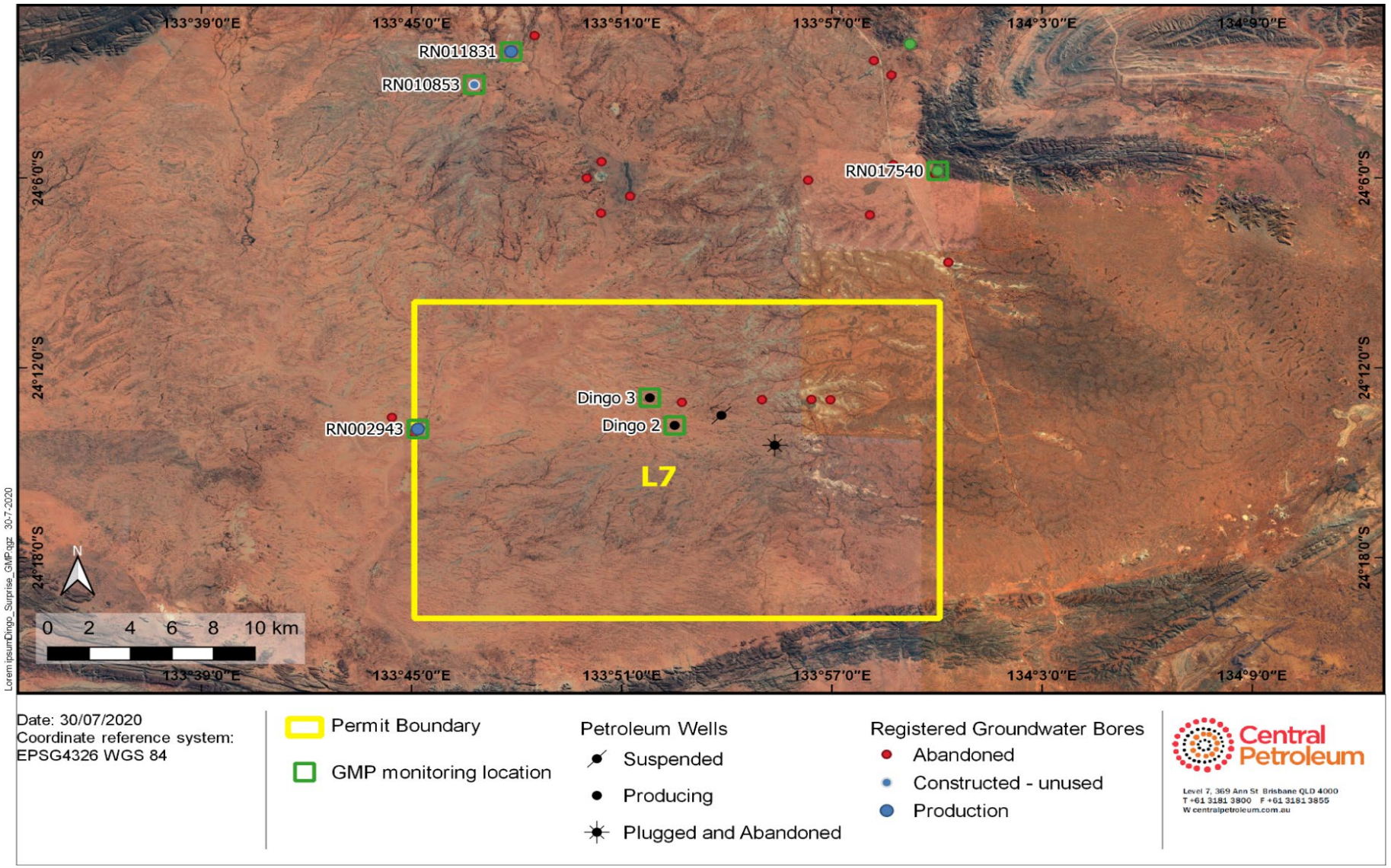


Figure 2 Groundwater monitoring locations relative to permit boundary – Surprise Oil Field

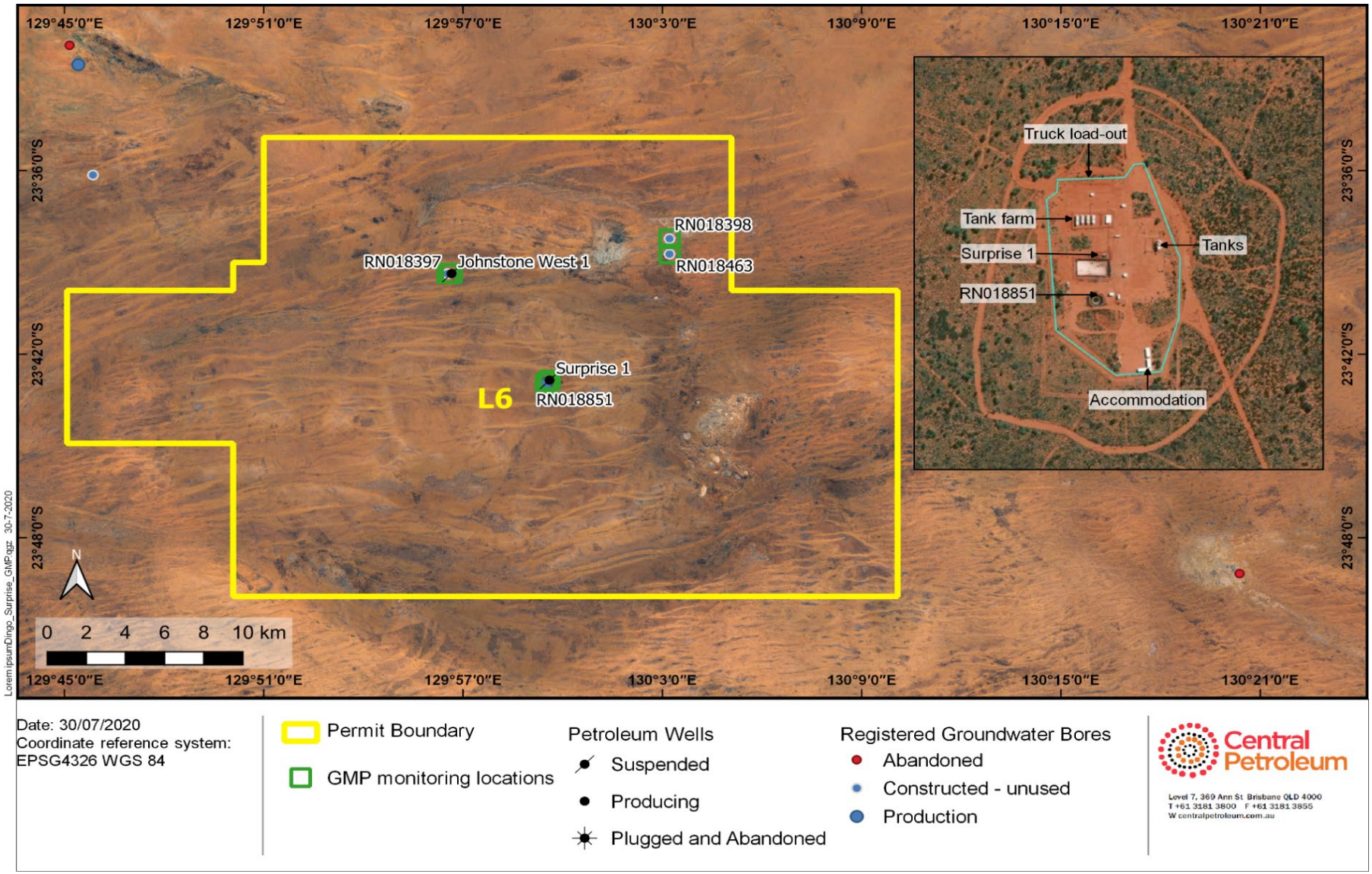


Figure 3 Groundwater monitoring locations relative to permit boundary – Mereenie Oil and Gas Field

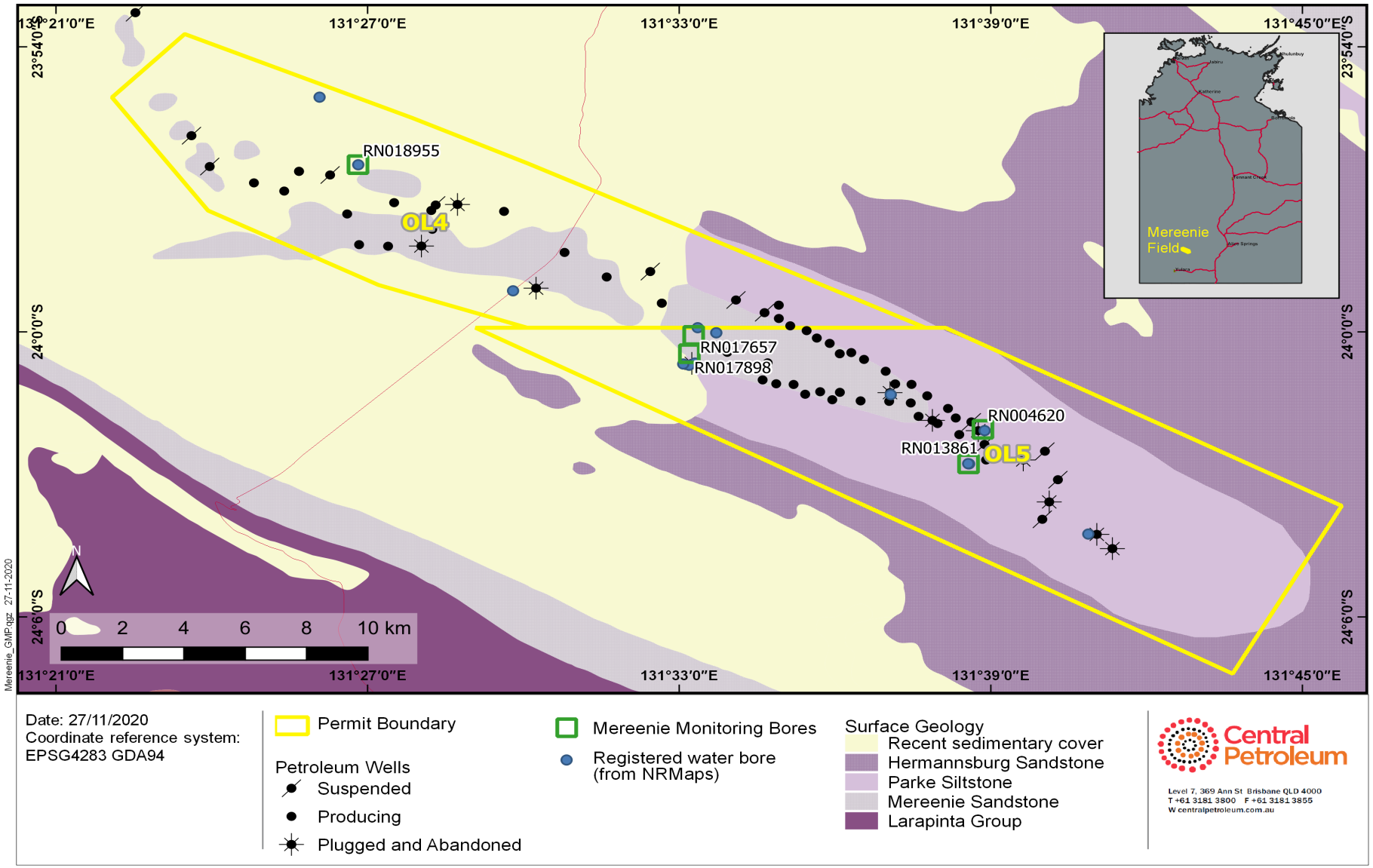
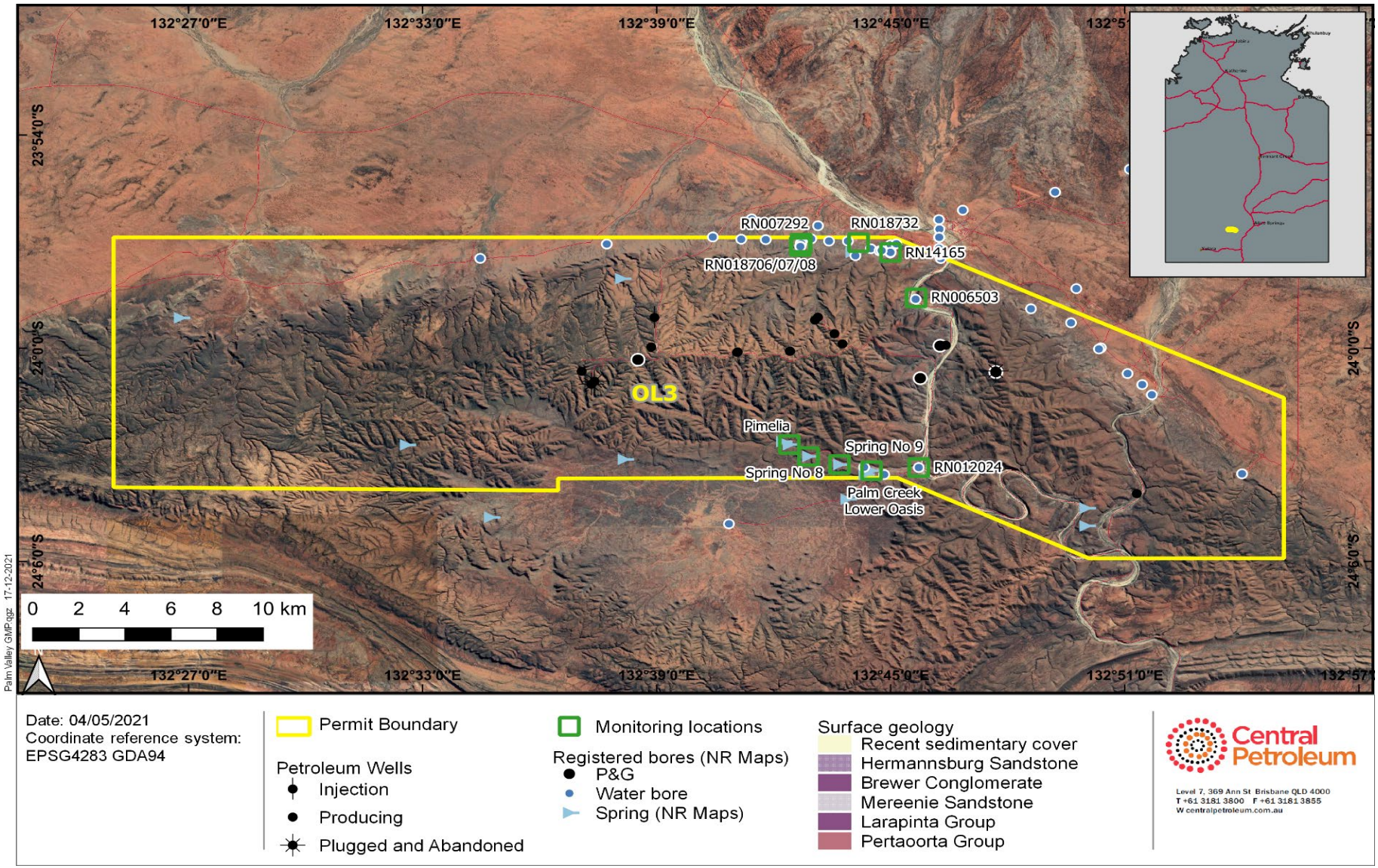


Figure 4 Groundwater monitoring locations relative to permit boundary – Palm Valley Gas Field



Appendix A - Water Quality and Quality Control Results

Monitoring Event:		May-2023	Field	Mereenie					Dingo/Surprise			Palm Valley					
		ANZECC (2000) Livestock	Location	RN004620	RN018955	RN017898	RN013861	RN017657	RN011831	RN002943	RN018851	RN006503	RN012024	Palm Creek Lower Oasis	Palm Valley Area Spring No 8	Palm Valley Area Spring No 9	Pimelia Spring
			Date	29/5/2023	29/5/2023	29/5/2023	29/5/2023	29/5/2023	28/5/2023	28/5/2023	15/7/2023	29/5/2023	29/5/2023	29/5/2023	29/5/2023	29/5/2023	29/5/2023
Field Parameters	**Units**		**LOR**														
Electrical conductivity	µS/cm	-	1	1072	348.8	380	3265	9678	1357	Bore collapsed	1405	1345	1057	1566	1527	1238	967
pH	pH Unit	-	0.01	6.52	6.34	6.38	6.9	7.1	7.35	Bore collapsed	6.8	7.25	7.26	7.7	9	9.2	8.6
Temperature	°C	-	0.1	25.6	24.8	21	24.8	24.2	13.6	Bore collapsed	26.4	22	25.9	17	19	22	21
General Parameters																	
pH (laboratory)	pH Unit	-	0.01	7.65	7.56	7.44	-	-	8.28	-	-	8.06	7.96	-	-	-	-
Electrical conductivity (laboratory)	µS/cm	-	1	1300	409	443	-	-	1470	-	-	1620	1270	-	-	-	-
Total dissolved solids[1]	mg/L	4000	1	845	266	288	-	-	956	-	-	1050	826	-	-	-	-
Total suspended solids	mg/L	-	1	5	4	2	-	-	<LOR	-	-	18	<LOR	-	-	-	-
Gross alpha	Bq/L	0.5	0.05	0.22	0.26	0.2	-	-	**0.86**	-	-	**0.65**	0.34	-	-	-	-
Gross beta	Bq/L	-	0.1	0.82	0.81	0.61	-	-	0.64	-	-	0.45	0.25	-	-	-	-
Gross beta activity - 40K	Bq/L	-	0.1	<LOR	0.45	0.22	-	-	0.12	-	-	<LOR	<LOR	-	-	-	-
Gross beta (excluding k-40)	Bq/L	0.5	0.1	-	0.36	0.39	-	-	**0.52**	-	-	-	-	-	-	-	-
Major Anions and Cations																	
Bicarbonate	mg/L	-	1	128	58	60	-	-	319	-	-	272	370	-	-	-	-
Carbonate	mg/L	-	1	<LOR	<LOR	<LOR	-	-	<LOR	-	-	<LOR	<LOR	-	-	-	-
Chloride	mg/L	-	1	251	65	69	-	-	257	-	-	258	178	-	-	-	-
Sulphate	mg/L	1000	1	151	34	39	-	-	106	-	-	246	72	-	-	-	-
Nitrate	mg/L	400	0.01	<LOR	<LOR	<LOR	-	-	<LOR	-	-	<LOR	<LOR	-	-	-	-
Nitrite	mg/L	30	0.01	1.4	0.51	1.61	-	-	0.31	-	-	<LOR	4.6	-	-	-	-
Fluoride	mg/L	2	0.1	0.5	0.5	0.6	-	-	1.1	-	-	<LOR	0.6	-	-	-	-
Sodium	mg/L	-	1	128	47	50	-	-	145	-	-	142	102	-	-	-	-
Potassium	mg/L	-	1	23	12	13	-	-	16	-	-	11	6	-	-	-	-
Calcium	mg/L	1000	1	59	12	11	-	-	76	-	-	126	85	-	-	-	-
Magnesium	mg/L	-	1	41	10	12	-	-	62	-	-	53	65	-	-	-	-
Iron	mg/L	-	0.05	<LOR	<LOR	<LOR	-	-	<LOR	-	-	<LOR	<LOR	-	-	-	-
Hydrocarbons																	
TRH: C6-C10	µg/L	-	20	<LOR	<LOR	<LOR	-	-	<LOR	-	-	<LOR	<LOR	-	-	-	-
TRH: >C10-C40	µg/L	-	100	<LOR	<LOR	<LOR	-	-	<LOR	-	-	<LOR	<LOR	-	-	-	-
Benzene	µg/L	-	1	<LOR	<LOR	<LOR	-	-	<LOR	-	-	<LOR	<LOR	-	-	-	-
Toluene	µg/L	-	2	<LOR	<LOR	<LOR	-	-	<LOR	-	-	<LOR	<LOR	-	-	-	-
Ethylbenzene	µg/L	-	2	<LOR	<LOR	<LOR	-	-	<LOR	-	-	<LOR	<LOR	-	-	-	-
Total Xylenes	µg/L	-	2	<LOR	<LOR	<LOR	-	-	<LOR	-	-	<LOR	<LOR	-	-	-	-
Naphthalene	µg/L	-	1	<LOR	<LOR	<LOR	-	-	<LOR	-	-	<LOR	<LOR	-	-	-	-
PAH Suite	µg/L	-	0.5	<LOR	<LOR	<LOR	-	-	<LOR	-	-	<LOR	<LOR	-	-	-	-
Dissolved Gases																	
Methane	µg/L	-	10	<LOR	<LOR	<LOR	-	-	<LOR	-	-	<LOR	<LOR	-	-	-	-
Ethane	µg/L	-	10	<LOR	<LOR	<LOR	-	-	<LOR	-	-	<LOR	<LOR	-	-	-	-
Propane	µg/L	-	10	<LOR	<LOR	<LOR	-	-	<LOR	-	-	<LOR	<LOR	-	-	-	-
Dissolved Metals/metalloids																	
Chromium	mg/L	1	0.001	0.007	<LOR	<LOR	-	-	<LOR	-	-	<LOR	<LOR	-	-	-	-
Copper[2]	mg/L	1	0.001	<LOR	<LOR	<LOR	-	-	<LOR	-	-	<LOR	0.009	-	-	-	-
Lead	mg/L	0.1	0.001	<LOR	<LOR	<LOR	-	-	<LOR	-	-	<LOR	<LOR	-	-	-	-
Manganese	mg/L	-	0.001	0.002	0.06	0.002	-	-	0.002	-	-	0.083	<LOR	-	-	-	-
Mercury	mg/L	0.002	0.0001	<LOR	<LOR	<LOR	-	-	<LOR	-	-	<LOR	<LOR	-	-	-	-
Silver	mg/L	-	0.001	<LOR	<LOR	<LOR	-	-	<LOR	-	-	<LOR	<LOR	-	-	-	-
Arsenic	mg/L	0.5	0.001	<LOR	<LOR	<LOR	-	-	<LOR	-	-	<LOR	0.002	-	-	-	-
Barium	mg/L	-	0.001	0.034	0.026	0.065	-	-	0.054	-	-	0.162	0.053	-	-	-	-
Boron	mg/L	5	0.05	0.26	0.22	0.2	-	-	0.27	-	-	0.11	0.28	-	-	-	-
Cadmium	mg/L	0.01	0.0001	<LOR	<LOR	<LOR	-	-	<LOR	-	-	<LOR	<LOR	-	-	-	-
Lithium	mg/L	-	0.001	0.011	<LOR	<LOR	-	-	0.012	-	-	0.084	0.016	-	-	-	-
Selenium	mg/L	0.02	0.01	<LOR	<LOR	<LOR	-	-	<LOR	-	-	<LOR	<LOR	-	-	-	-
Silica	mg/L	-	0.05	17.2	14.3	15	-	-	17.8	-	-	21.3	42.7	-	-	-	-
Strontium	mg/L	-	0.001	0.544	0.133	0.145	-	-	0.776	-	-	3.27	0.382	-	-	-	-
Zinc	mg/L	20	0.005	0.02	<LOR	0.017	-	-	0.016	-	-	<LOR	<LOR	-	-	-	-

1, 2 - guideline value for beef cattle

0.5 Guideline value exceeded

\- Not analysed

Monitoring Event:		Oct-2023	Field	Mereenie					Dingo/Surprise			Palm Valley					
		ANZECC (2000) Livestock	Location	RN004620	RN018955	RN017898	RN013861	RN017657	RN011831	RN002943	RN018851	RN006503	RN012024	Palm Creek Lower Oasis	Palm Valley Area Spring No 8	Palm Valley Area Spring No 9	Pimelia Spring
			Date	29/5/2023	24/10/2023	24/10/2023	24/10/2023	24/10/2023	26/10/2023	23/10/2023	15/7/2023	25/10/2023	25/10/2023	25/10/2023	25/10/2023	25/10/2023	25/10/2023
Field Parameters	**Units**		**LOR**														
Electrical conductivity	µS/cm	-	1	1072	341	403	2870	Not operational	1364	Bore collapsed	1405	1537	1142	1345	Dry	1140	Dry
pH	pH Unit	-	0.01	6.52	7.02	7.2	6.87	Not operational	6.69	Bore collapsed	6.8	7.12	7.09	7.8	Dry	8.5	Dry
Temperature	°C	-	0.1	25.6	24.3	22	25	Not operational	20	Bore collapsed	26.4	24	25.9	23	Dry	24	Dry
General Parameters																	
pH (laboratory)	pH Unit	-	0.01	7.78	7.33	7.15	7.48	-	8.29	-	7.52	7.77	7.74	-	-	-	-
Electrical conductivity (laboratory)	µS/cm	-	1	1270	366	439	3110	-	1460	-	1350	1690	1240	-	-	-	-
Total dissolved solids[1]	mg/L	4000	1	826	238	285	2020	-	949	-	878	1100	806	-	-	-	-
Total suspended solids	mg/L	-	1	<LOR	<LOR	<LOR	<LOR	-	<LOR	-	<LOR	16	<LOR	-	-	-	-
Gross alpha	Bq/L	0.5	0.05	0.13	0.31	0.13	**1.21**	-	**0.77**	-	0.46	**1.81**	0.32	-	-	-	-
Gross beta activity - 40K	Bq/L	0.5	0.1	0.27	**0.64**	0.37	0.27	-	0.2	-	0.37	**1**	0.13	-	-	-	-
Major Anions and Cations																	
Bicarbonate	mg/L	-	1	116	44	54	202	-	314	-	172	274	303	-	-	-	-
Carbonate	mg/L	-	1	<LOR	<LOR	<LOR	<LOR	-	<LOR	-	<LOR	<LOR	<LOR	-	-	-	-
Chloride	mg/L	-	1	221	42	52	68	-	247	-	228	274	155	-	-	-	-
Sulphate	mg/L	1000	1	156	36	41	**1710**	-	121	-	122	254	72	-	-	-	-
Nitrate	mg/L	400	0.01	<LOR	<LOR	<LOR	<LOR	-	<LOR	-	0.04	<LOR	<LOR	-	-	-	-
Nitrite	mg/L	30	0.01	1.12	0.53	1.37	<LOR	-	0.15	-	9.96	<LOR	4.22	-	-	-	-
Fluoride	mg/L	2	0.1	0.5	0.5	0.6	0.8	-	1.2	-	1	<LOR	0.6	-	-	-	-
Sodium	mg/L	-	1	129	44	55	147	-	141	-	133	151	98	-	-	-	-
Potassium	mg/L	-	1	23	11	13	8	-	15	-	31	15	6	-	-	-	-
Calcium	mg/L	1000	1	59	11	13	568	-	71	-	75	130	78	-	-	-	-
Magnesium	mg/L	-	1	41	10	12	112	-	61	-	42	56	61	-	-	-	-
Iron	mg/L	-	0.05	<LOR	0.24	<LOR	0.15	-	<LOR	-	<LOR	<LOR	<LOR	-	-	-	-
Hydrocarbons																	
TRH: C6-C10	µg/L	-	20	<LOR	<LOR	<LOR	<LOR	-	<LOR	-	<LOR	<LOR	<LOR	-	-	-	-
TRH: >C10-C40	µg/L	-	100	<LOR	<LOR	<LOR	<LOR	-	<LOR	-	<LOR	<LOR	<LOR	-	-	-	-
Benzene	µg/L	-	1	<LOR	<LOR	<LOR	<LOR	-	<LOR	-	<LOR	<LOR	<LOR	-	-	-	-
Toluene	µg/L	-	2	<LOR	<LOR	<LOR	<LOR	-	<LOR	-	<LOR	<LOR	<LOR	-	-	-	-
Ethylbenzene	µg/L	-	2	<LOR	<LOR	<LOR	<LOR	-	<LOR	-	<LOR	<LOR	<LOR	-	-	-	-
Total Xylenes	µg/L	-	2	<LOR	<LOR	<LOR	<LOR	-	<LOR	-	<LOR	<LOR	<LOR	-	-	-	-
Naphthalene	µg/L	-	5	<LOR	<LOR	<LOR	<LOR	-	<LOR	-	<LOR	<LOR	<LOR	-	-	-	-
PAH Suite	µg/L	-	0.5	<LOR	<LOR	<LOR	<LOR	-	<LOR	-	<LOR	<LOR	<LOR	-	-	-	-
Dissolved Gases																	
Methane	µg/L	-	10	<LOR	<LOR	<LOR	<LOR	-	<LOR	-	<LOR	<LOR	<LOR	-	-	-	-
Ethane	µg/L	-	10	<LOR	<LOR	<LOR	<LOR	-	<LOR	-	<LOR	<LOR	<LOR	-	-	-	-
Propane	µg/L	-	10	<LOR	<LOR	<LOR	<LOR	-	<LOR	-	<LOR	<LOR	<LOR	-	-	-	-
Dissolved Metals/metalloids																	
Chromium	mg/L	1	0.001	<LOR	<LOR	<LOR	<LOR	-	0.002	-	<LOR	<LOR	<LOR	-	-	-	-
Copper[2]	mg/L	1	0.001	<LOR	<LOR	<LOR	<LOR	-	<LOR	-	<LOR	<LOR	<LOR	-	-	-	-
Lead	mg/L	0.1	0.001	<LOR	<LOR	<LOR	<LOR	-	<LOR	-	<LOR	<LOR	<LOR	-	-	-	-
Manganese	mg/L	-	0.001	0.005	0.008	<LOR	0.087	-	<LOR	-	0.014	0.011	<LOR	-	-	-	-
Mercury	mg/L	0.002	0.0001	<LOR	<LOR	<LOR	<LOR	-	<LOR	-	<LOR	<LOR	<LOR	-	-	-	-
Silver	mg/L	-	0.001	<LOR	<LOR	<LOR	<LOR	-	<LOR	-	<LOR	<LOR	<LOR	-	-	-	-
Arsenic	mg/L	0.5	0.001	<LOR	<LOR	<LOR	0.003	-	<LOR	-	<LOR	<LOR	<LOR	-	-	-	-
Barium	mg/L	-	0.001	0.035	0.07	0.107	0.018	-	0.07	-	0.043	0.054	0.062	-	-	-	-
Boron	mg/L	5	0.05	0.22	0.12	0.16	0.3	-	0.26	-	0.49	0.14	0.25	-	-	-	-
Cadmium	mg/L	0.01	0.0001	<LOR	<LOR	<LOR	<LOR	-	<LOR	-	<LOR	<LOR	<LOR	-	-	-	-
Lithium	mg/L	-	0.001	0.01	<LOR	<LOR	0.045	-	0.012	-	0.009	0.1	0.017	-	-	-	-
Selenium	mg/L	0.02	0.01	<LOR	<LOR	<LOR	<LOR	-	<LOR	-	<LOR	<LOR	<LOR	-	-	-	-
Silica	mg/L	-	0.05	15.7	14	13.6	22.7	-	18.7	-	48.3	20.2	37.6	-	-	-	-
Strontium	mg/L	-	0.001	0.554	0.133	0.16	6.57	-	0.756	-	0.789	1.57	0.367	-	-	-	-
Zinc	mg/L	20	0.005	0.018	0.024	0.028	0.021	-	0.016	-	<LOR	<LOR	0.006	-	-	-	-

1, 2 - guideline value for beef cattle

0.5 Guideline value exceeded

\- Not analysed

Appendix B – Bore-by-bore summary statistics and timeseries graphs

Field	Mereenie		Location:				RN018955			
Field Parameters	**Units**	**ANZECC (2000) Livestock**	**LOR**	**No. Samples**	**Min**	**P20**	**P50**	**P80**	**Max**	**Mann-Kendall Trend**
Electrical conductivity	µS/cm	-	1	5	340	341	349	381	440	No Trend
pH	pH Unit	-	0.01	5	6.34	6.56	6.61	7.09	7.36	No Trend
Temperature	°C	-	0.1	5	23.1	24.1	24.8	26.2	28.3	No Trend
General Parameters										
pH (laboratory)	pH Unit	-	0.01	5	7.23	7.31	7.52	7.63	7.92	No Trend
Electrical conductivity (laboratory)	µS/cm	-	1	5	352	358	366	384	409	No Trend
Total dissolved solids	mg/L	4000 (1)	1	5	229	233	238	250	266	No Trend
Total suspended solids	mg/L	-	1	5	<LOR	<LOR	2	4	5	No Trend
Gross alpha	Bq/L	0.5	0.05	4	0.26	0.29	0.32	0.38	0.46	No Trend
Gross beta	Bq/L	-	0.1	3	0.81	0.83	0.87	0.99	1.07	No Trend
Gross beta activity - 40K	Bq/L	-	0.1	4	0.44	0.45	0.55	0.69	0.77	No Trend
Gross beta (excluding k-40)	Bq/L	0.5	0.1	3	0.30	0.32	0.36	0.40	0.43	No Trend
Major Anions and Cations										
Bicarbonate	mg/L	-	1	5	44	46	47	62	76	No Trend
Carbonate	mg/L	-	1	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Chloride	mg/L	-	1	5	42	51	57	59	65	No Trend
Sulphate	mg/L	1000	1	5	34	36	36	37	37	No Trend
Nitrate	mg/L	400	0.01	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Nitrite	mg/L	30	0.01	5	0.51	0.52	0.53	0.54	0.56	No Trend
Fluoride	mg/L	2	0.1	5	0.5	0.5	0.5	0.5	0.5	No Trend
Sodium	mg/L	-	1	5	40	43	44	46	47	No Trend
Potassium	mg/L	-	1	5	11	11	12	12	12	No Trend
Calcium	mg/L	1000	1	5	10	11	11	11	12	No Trend
Magnesium	mg/L	-	1	5	8	9	10	10	10	Rising
Iron	mg/L	-	0.05	5	<LOR	<LOR	<LOR	0.09	0.24	No Trend
Hydrocarbons										
TRH: C6-C10	µg/L	-	20	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
TRH: >C10-C40	µg/L	-	100	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Benzene	µg/L	-	1	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Toluene	µg/L	-	2	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Ethylbenzene	µg/L	-	2	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Total Xylenes	µg/L	-	2	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Naphthalene	µg/L	-	5	5	1	1	<LOR	<LOR	<LOR	No Trend
PAH Suite	µg/L	-	0.5	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Dissolved Gases										
Methane	µg/L	-	10	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Ethane	µg/L	-	10	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Propane	µg/L	-	10	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Dissolved Metals/metalloids										
Chromium	mg/L	1	0.001	5	<LOR	<LOR	0.004	0.006	0.006	No Trend
Copper	mg/L	1 (2)	0.001	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Lead	mg/L	0.1	0.001	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Manganese	mg/L	-	0.001	5	0.007	0.007	0.008	0.022	0.060	No Trend
Mercury	mg/L	0.002	0.0001	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Silver	mg/L	-	0.001	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Arsenic	mg/L	0.5	0.001	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Barium	mg/L	-	0.001	5	0.026	0.030	0.031	0.045	0.070	No Trend
Boron	mg/L	5	0.05	5	0.12	0.14	0.21	0.22	0.22	No Trend
Cadmium	mg/L	0.01	0.0001	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Lithium	mg/L	-	0.001	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Selenium	mg/L	0.02	0.01	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Silica	mg/L	-	0.05	5	14.00	14.00	14.30	14.64	14.80	No Trend
Strontium	mg/L	-	0.001	5	0.130	0.132	0.133	0.135	0.143	No Trend
Zinc	mg/L	20	0.005	5	<LOR	<LOR	0.008	0.016	0.024	No Trend

(1),(2) - guideline value for beef cattle

0.5	Guideline value exceeded
-	Not analysed
<LOR	Less than the limit of reporting

Field	Mereenie		Location:				RN004620			
Field Parameters	**Units**	**ANZECC (2000) Livestock**	**LOR**	**No. Samples**	**Min**	**P20**	**P50**	**P80**	**Max**	**Mann-Kendall Trend**
Electrical conductivity	µS/cm	-	1	6	1072	1108	1198	1309	1390	No Trend
pH	pH Unit	-	0.01	6	6.52	6.67	6.95	7.05	7.08	No Trend
Temperature	°C	-	0.1	6	25.0	25.5	26.3	27.9	27.9	No Trend
General Parameters										
pH (laboratory)	pH Unit	-	0.01	6	7.65	7.75	7.79	7.97	8.14	No Trend
Electrical conductivity (laboratory)	µS/cm	-	1	6	1230	1270	1280	1300	1300	No Trend
Total dissolved solids	mg/L	4000 (1)	1	6	800	826	832	845	845	No Trend
Total suspended solids	mg/L	-	1	6	<LOR	<LOR	<LOR	5	5	No Trend
Gross alpha	Bq/L	0.5	0.05	5	0.13	0.20	0.26	0.32	0.32	No Trend
Gross beta	Bq/L	-	0.1	4	0.82	0.82	0.86	0.90	0.92	No Trend
Gross beta activity - 40K	Bq/L	-	0.1	5	<LOR	<LOR	0.14	0.27	0.29	No Trend
Gross beta (excluding k-40)	Bq/L	0.5	0.1	4	0.63	0.68	0.72	0.73	0.75	No Trend
Major Anions and Cations										
Bicarbonate	mg/L	-	1	6	112	116	121	125	128	No Trend
Carbonate	mg/L	-	1	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Chloride	mg/L	-	1	6	221	231	247	251	265	No Trend
Sulphate	mg/L	1000	1	6	150	151	155	156	159	No Trend
Nitrate	mg/L	400	0.01	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Nitrite	mg/L	30	0.01	6	1.12	1.36	1.41	1.48	1.51	No Trend
Fluoride	mg/L	2	0.1	6	0.5	0.5	0.5	0.5	0.5	No Trend
Sodium	mg/L	-	1	6	122	123	129	132	136	No Trend
Potassium	mg/L	-	1	6	23	23	23	24	24	No Trend
Calcium	mg/L	1000	1	6	58	59	59	59	61	No Trend
Magnesium	mg/L	-	1	6	37	39	40	41	42	No Trend
Iron	mg/L	-	0.05	6	<LOR	<LOR	0.14	0.20	0.20	No Trend
Hydrocarbons										
TRH: C6-C10	µg/L	-	20	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
TRH: >C10-C40	µg/L	-	100	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Benzene	µg/L	-	1	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Toluene	µg/L	-	2	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Ethylbenzene	µg/L	-	2	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Total Xylenes	µg/L	-	2	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Naphthalene	µg/L	-	5	6	1	1	3	<LOR	<LOR	No Trend
PAH Suite	µg/L	-	0.5	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Dissolved Gases										
Methane	µg/L	-	10	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Ethane	µg/L	-	10	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Propane	µg/L	-	10	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Dissolved Metals/metalloids										
Chromium	mg/L	1	0.001	6	<LOR	0.003	0.003	0.004	0.007	No Trend
Copper	mg/L	1 (2)	0.001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Lead	mg/L	0.1	0.001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Manganese	mg/L	-	0.001	6	0.002	0.005	0.008	0.010	0.013	No Trend
Mercury	mg/L	0.002	0.0001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Silver	mg/L	-	0.001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Arsenic	mg/L	0.5	0.001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Barium	mg/L	-	0.001	6	0.034	0.035	0.036	0.040	0.045	No Trend
Boron	mg/L	5	0.05	6	0.22	0.23	0.26	0.27	0.29	No Trend
Cadmium	mg/L	0.01	0.0001	6	<LOR	<LOR	<LOR	<LOR	0.00	No Trend
Lithium	mg/L	-	0.001	6	0.009	0.010	0.011	0.012	0.013	No Trend
Selenium	mg/L	0.02	0.01	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Silica	mg/L	-	0.05	6	15.70	16.30	16.40	17.10	17.20	No Trend
Strontium	mg/L	-	0.001	6	0.514	0.527	0.537	0.554	0.586	No Trend
Zinc	mg/L	20	0.005	6	0.015	0.015	0.017	0.019	0.020	No Trend

(1),(2) - guideline value for beef cattle

0.5	Guideline value exceeded
-	Not analysed
<LOR	Less than the limit of reporting

Field	Mereenie		Location:				RN017657			
Field Parameters	**Units**	**ANZECC (2000) Livestock**	**LOR**	**No. Samples**	**Min**	**P20**	**P50**	**P80**	**Max**	**Mann-Kendall Trend**
Electrical conductivity	µS/cm	-	1	4	855	886	929	4308	9343	No Trend
pH	pH Unit	-	0.01	4	6.77	6.94	7.13	7.25	7.31	No Trend
Temperature	°C	-	0.1	4	24.4	24.4	25.0	26.5	28.1	No Trend
General Parameters										
pH (laboratory)	pH Unit	-	0.01	4	7.50	7.67	7.91	8.04	8.06	No Trend
Electrical conductivity (laboratory)	µS/cm	-	1	4	900	907	926	942	945	No Trend
Total dissolved solids	mg/L	4000 (1)	1	4	585	590	602	612	614	No Trend
Total suspended solids	mg/L	-	1	4	<LOR	<LOR	<LOR	3	5	No Trend
Gross alpha	Bq/L	0.5	0.05	3	0.35	0.36	0.37	0.41	0.44	No Trend
Gross beta	Bq/L	-	0.1	3	0.81	0.85	0.90	1.07	1.18	No Trend
Gross beta activity - 40K	Bq/L	-	0.1	3	0.23	0.27	0.32	0.55	0.70	No Trend
Gross beta (excluding k-40)	Bq/L	0.5	0.1	3	0.48	0.52	0.58	0.58	0.58	No Trend
Major Anions and Cations										
Bicarbonate	mg/L	-	1	4	91	94	97	98	98	No Trend
Carbonate	mg/L	-	1	4	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Chloride	mg/L	-	1	4	165	170	174	176	179	No Trend
Sulphate	mg/L	1000	1	4	90	91	92	96	100	No Trend
Nitrate	mg/L	400	0.01	4	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Nitrite	mg/L	30	0.01	4	1.42	1.48	1.53	1.54	1.55	No Trend
Fluoride	mg/L	2	0.1	4	0.4	0.5	0.5	0.5	0.5	No Trend
Sodium	mg/L	-	1	4	88	89	94	98	98	No Trend
Potassium	mg/L	-	1	4	18	18	19	19	19	No Trend
Calcium	mg/L	1000	1	4	38	38	39	40	42	No Trend
Magnesium	mg/L	-	1	4	27	28	29	30	32	No Trend
Iron	mg/L	-	0.05	4	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Hydrocarbons										
TRH: C6-C10	µg/L	-	20	4	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
TRH: >C10-C40	µg/L	-	100	4	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Benzene	µg/L	-	1	4	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Toluene	µg/L	-	2	4	<LOR	<LOR	<LOR	2	3	No Trend
Ethylbenzene	µg/L	-	2	4	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Total Xylenes	µg/L	-	2	4	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Naphthalene	µg/L	-	5	4	1	1	3	<LOR	<LOR	No Trend
PAH Suite	µg/L	-	0.5	4	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Dissolved Gases										
Methane	µg/L	-	10	4	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Ethane	µg/L	-	10	4	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Propane	µg/L	-	10	4	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Dissolved Metals/metalloids										
Chromium	mg/L	1	0.001	4	0.003	0.004	0.004	0.004	0.005	No Trend
Copper	mg/L	1 (2)	0.001	4	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Lead	mg/L	0.1	0.001	4	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Manganese	mg/L	-	0.001	4	0.003	0.004	0.004	0.004	0.004	No Trend
Mercury	mg/L	0.002	0.0001	4	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Silver	mg/L	-	0.001	4	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Arsenic	mg/L	0.5	0.001	4	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Barium	mg/L	-	0.001	4	0.047	0.048	0.052	0.066	0.083	No Trend
Boron	mg/L	5	0.05	4	0.20	0.21	0.23	0.25	0.26	No Trend
Cadmium	mg/L	0.01	0.0001	4	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Lithium	mg/L	-	0.001	4	0.003	0.003	0.003	0.004	0.005	No Trend
Selenium	mg/L	0.02	0.01	4	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Silica	mg/L	-	0.05	4	15.70	15.76	15.85	16.06	16.30	No Trend
Strontium	mg/L	-	0.001	4	0.332	0.337	0.342	0.355	0.372	No Trend
Zinc	mg/L	20	0.005	4	0.007	0.011	0.014	0.027	0.046	No Trend

(1),(2) - guideline value for beef cattle

0.5	Guideline value exceeded
-	Not analysed
<LOR	Less than the limit of reporting

Field	Mereenie		Location:				RN013861			
Field Parameters	**Units**	**ANZECC (2000) Livestock**	**LOR**	**No. Samples**	**Min**	**P20**	**P50**	**P80**	**Max**	**Mann-Kendall Trend**
Electrical conductivity	µS/cm	-	1	5	2850	2866	3160	3520	3680	No Trend
pH	pH Unit	-	0.01	5	6.65	6.83	6.94	7.47	7.70	No Trend
Temperature	°C	-	0.1	5	25.0	25.4	25.7	26.7	28.9	No Trend
General Parameters										
pH (laboratory)	pH Unit	-	0.01	5	7.48	7.66	7.90	8.17	8.18	No Trend
Electrical conductivity (laboratory)	µS/cm	-	1	5	3040	3096	3190	3288	3600	No Trend
Total dissolved solids	mg/L	4000 (1)	1	5	1980	2012	2070	2140	2340	No Trend
Total suspended solids	mg/L	-	1	5	<LOR	<LOR	<LOR	2	5	No Trend
Gross alpha	Bq/L	0.5	0.05	4	1.21	1.26	1.32	1.36	1.41	No Trend
Gross beta	Bq/L	-	0.1	3	0.49	0.51	0.53	0.54	0.54	No Trend
Gross beta activity - 40K	Bq/L	-	0.1	4	0.19	0.24	0.29	0.30	0.31	No Trend
Gross beta (excluding k-40)	Bq/L	0.5	0.1	3	0.22	0.23	0.24	0.28	0.30	No Trend
Major Anions and Cations										
Bicarbonate	mg/L	-	1	5	202	202	208	209	214	No Trend
Carbonate	mg/L	-	1	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Chloride	mg/L	-	1	5	68	91	121	208	437	No Trend
Sulphate	mg/L	1000	1	5	1300	1580	1680	1686	1710	No Trend
Nitrate	mg/L	400	0.01	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Nitrite	mg/L	30	0.01	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Fluoride	mg/L	2	0.1	5	0.7	0.8	0.8	0.9	0.9	No Trend
Sodium	mg/L	-	1	5	141	143	147	150	159	No Trend
Potassium	mg/L	-	1	5	8	8	8	8	9	No Trend
Calcium	mg/L	1000	1	5	533	535	565	570	578	No Trend
Magnesium	mg/L	-	1	5	108	110	112	119	139	No Trend
Iron	mg/L	-	0.05	5	0.15	0.24	0.31	0.45	0.69	No Trend
Hydrocarbons										
TRH: C6-C10	µg/L	-	20	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
TRH: >C10-C40	µg/L	-	100	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Benzene	µg/L	-	1	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Toluene	µg/L	-	2	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Ethylbenzene	µg/L	-	2	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Total Xylenes	µg/L	-	2	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Naphthalene	µg/L	-	5	5	1	1	<LOR	<LOR	<LOR	No Trend
PAH Suite	µg/L	-	0.5	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Dissolved Gases										
Methane	µg/L	-	10	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Ethane	µg/L	-	10	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Propane	µg/L	-	10	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Dissolved Metals/metalloids										
Chromium	mg/L	1	0.001	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Copper	mg/L	1 (2)	0.001	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Lead	mg/L	0.1	0.001	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Manganese	mg/L	-	0.001	5	0.087	0.088	0.091	0.116	0.174	No Trend
Mercury	mg/L	0.002	0.0001	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Silver	mg/L	-	0.001	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Arsenic	mg/L	0.5	0.001	5	0.002	0.003	0.003	0.003	0.003	No Trend
Barium	mg/L	-	0.001	5	0.018	0.021	0.023	0.034	0.044	No Trend
Boron	mg/L	5	0.05	5	0.30	0.37	0.43	0.44	0.50	No Trend
Cadmium	mg/L	0.01	0.0001	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Lithium	mg/L	-	0.001	5	0.045	0.055	0.066	0.076	0.100	No Trend
Selenium	mg/L	0.02	0.01	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Silica	mg/L	-	0.05	5	22.20	22.60	23.10	23.64	24.20	No Trend
Strontium	mg/L	-	0.001	5	5.500	6.100	6.260	6.604	6.740	No Trend
Zinc	mg/L	20	0.005	5	<LOR	<LOR	0.009	0.015	0.021	No Trend

(1),(2) - guideline value for beef cattle

0.5	Guideline value exceeded
-	Not analysed
<LOR	Less than the limit of reporting

Field	Mereenie		Location:				RN017898			
Field Parameters	**Units**	**ANZECC (2000) Livestock**	**LOR**	**No. Samples**	**Min**	**P20**	**P50**	**P80**	**Max**	**Mann-Kendall Trend**
Electrical conductivity	µS/cm	-	1	6	380	403	435	461	475	Falling
pH	pH Unit	-	0.01	6	6.38	6.58	6.95	7.23	7.32	No Trend
Temperature	°C	-	0.1	6	21.0	22.0	26.4	26.7	28.1	No Trend
General Parameters										
pH (laboratory)	pH Unit	-	0.01	6	7.15	7.21	7.40	7.52	7.92	No Trend
Electrical conductivity (laboratory)	µS/cm	-	1	6	434	434	441	452	457	No Trend
Total dissolved solids	mg/L	4000 (1)	1	6	282	282	287	294	297	No Trend
Total suspended solids	mg/L	-	1	6	<LOR	<LOR	<LOR	2	5	No Trend
Gross alpha	Bq/L	0.5	0.05	5	0.13	0.19	0.23	0.43	0.43	No Trend
Gross beta	Bq/L	-	0.1	4	0.61	0.65	0.73	0.85	0.98	Falling
Gross beta activity - 40K	Bq/L	-	0.1	5	0.17	0.21	0.35	0.42	0.61	No Trend
Gross beta (excluding k-40)	Bq/L	0.5	0.1	4	0.37	0.38	0.41	0.46	0.51	No Trend
Major Anions and Cations										
Bicarbonate	mg/L	-	1	6	54	54	57	58	60	No Trend
Carbonate	mg/L	-	1	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Chloride	mg/L	-	1	6	52	61	64	69	70	No Trend
Sulphate	mg/L	1000	1	6	39	41	42	43	43	No Trend
Nitrate	mg/L	400	0.01	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Nitrite	mg/L	30	0.01	6	1.37	1.54	1.62	1.66	1.66	No Trend
Fluoride	mg/L	2	0.1	6	0.6	0.6	0.6	0.6	0.6	No Trend
Sodium	mg/L	-	1	6	49	50	52	55	56	No Trend
Potassium	mg/L	-	1	6	13	13	13	14	14	No Trend
Calcium	mg/L	1000	1	6	11	12	13	13	13	No Trend
Magnesium	mg/L	-	1	6	11	12	12	12	12	No Trend
Iron	mg/L	-	0.05	6	<LOR	<LOR	<LOR	<LOR	0.06	No Trend
Hydrocarbons										
TRH: C6-C10	µg/L	-	20	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
TRH: >C10-C40	µg/L	-	100	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Benzene	µg/L	-	1	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Toluene	µg/L	-	2	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Ethylbenzene	µg/L	-	2	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Total Xylenes	µg/L	-	2	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Naphthalene	µg/L	-	5	6	1	1	3	<LOR	<LOR	No Trend
PAH Suite	µg/L	-	0.5	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Dissolved Gases										
Methane	µg/L	-	10	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Ethane	µg/L	-	10	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Propane	µg/L	-	10	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Dissolved Metals/metalloids										
Chromium	mg/L	1	0.001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Copper	mg/L	1 (2)	0.001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Lead	mg/L	0.1	0.001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Manganese	mg/L	-	0.001	6	<LOR	0.002	0.005	0.006	0.014	Falling
Mercury	mg/L	0.002	0.0001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Silver	mg/L	-	0.001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Arsenic	mg/L	0.5	0.001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Barium	mg/L	-	0.001	6	0.065	0.081	0.089	0.107	0.117	No Trend
Boron	mg/L	5	0.05	6	0.16	0.20	0.24	0.27	0.28	No Trend
Cadmium	mg/L	0.01	0.0001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Lithium	mg/L	-	0.001	6	<LOR	<LOR	<LOR	0.004	0.004	No Trend
Selenium	mg/L	0.02	0.01	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Silica	mg/L	-	0.05	6	13.60	13.80	14.20	14.50	15.00	No Trend
Strontium	mg/L	-	0.001	6	0.145	0.156	0.163	0.179	0.337	No Trend
Zinc	mg/L	20	0.005	6	<LOR	0.014	0.022	0.028	0.038	No Trend

(1),(2) - guideline value for beef cattle

0.5	Guideline value exceeded
-	Not analysed
<LOR	Less than the limit of reporting

Field	Surprise		Location:				RN018851			
Field Parameters	**Units**	**ANZECC (2000) Livestock**	**LOR**	**No. Samples**	**Min**	**P20**	**P50**	**P80**	**Max**	**Mann-Kendall Trend**
Electrical conductivity	µS/cm	-	1	5	1223	1272	1406	1412	1413	Falling
pH	pH Unit	-	0.01	5	6.71	6.77	6.93	6.98	7.01	No Trend
Temperature	°C	-	0.1	5	10.0	22.1	27.5	28.6	28.8	No Trend
General Parameters										
pH (laboratory)	pH Unit	-	0.01	5	7.52	7.85	8.05	8.14	8.25	No Trend
Electrical conductivity (laboratory)	µS/cm	-	1	5	1270	1318	1350	1406	1430	No Trend
Total dissolved solids	mg/L	4000 (1)	1	5	826	856	878	914	930	No Trend
Total suspended solids	mg/L	-	1	5	<LOR	<LOR	<LOR	3	5	No Trend
Gross alpha	Bq/L	0.5	0.05	4	0.41	0.42	0.43	0.45	0.46	No Trend
Gross beta	Bq/L	-	0.1	4	1.15	1.18	1.22	1.36	1.56	No Trend
Gross beta activity - 40K	Bq/L	-	0.1	4	<LOR	0.23	0.34	0.52	0.74	No Trend
Gross beta (excluding k-40)	Bq/L	0.5	0.1	4	0.82	0.83	0.88	0.97	1.05	No Trend
Major Anions and Cations										
Bicarbonate	mg/L	-	1	5	91	156	184	193	203	No Trend
Carbonate	mg/L	-	1	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Chloride	mg/L	-	1	5	221	224	228	236	239	No Trend
Sulphate	mg/L	1000	1	5	114	114	115	119	122	No Trend
Nitrate	mg/L	400	0.01	5	<LOR	0.02	0.04	0.04	0.04	Rising
Nitrite	mg/L	30	0.01	5	9.96	10.47	10.80	11.02	11.10	No Trend
Fluoride	mg/L	2	0.1	5	0.9	0.9	1.0	1.0	1.1	No Trend
Sodium	mg/L	-	1	5	125	127	133	138	144	No Trend
Potassium	mg/L	-	1	5	31	31	31	32	34	No Trend
Calcium	mg/L	1000	1	5	70	72	73	73	75	Rising
Magnesium	mg/L	-	1	5	38	39	40	42	42	No Trend
Iron	mg/L	-	0.05	5	<LOR	0.07	0.07	0.11	0.18	No Trend
Hydrocarbons										
TRH: C6-C10	µg/L	-	20	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
TRH: >C10-C40	µg/L	-	100	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Benzene	µg/L	-	1	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Toluene	µg/L	-	2	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Ethylbenzene	µg/L	-	2	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Total Xylenes	µg/L	-	2	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Naphthalene	µg/L	-	5	5	1	1	<LOR	<LOR	<LOR	No Trend
PAH Suite	µg/L	-	0.5	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Dissolved Gases										
Methane	µg/L	-	10	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Ethane	µg/L	-	10	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Propane	µg/L	-	10	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Dissolved Metals/metalloids										
Chromium	mg/L	1	0.001	5	<LOR	<LOR	<LOR	0.002	0.002	No Trend
Copper	mg/L	1 (2)	0.001	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Lead	mg/L	0.1	0.001	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Manganese	mg/L	-	0.001	5	0.014	0.015	0.016	0.020	0.030	No Trend
Mercury	mg/L	0.002	0.0001	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Silver	mg/L	-	0.001	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Arsenic	mg/L	0.5	0.001	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Barium	mg/L	-	0.001	5	0.043	0.045	0.045	0.047	0.053	No Trend
Boron	mg/L	5	0.05	5	0.42	0.48	0.50	0.54	0.58	No Trend
Cadmium	mg/L	0.01	0.0001	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Lithium	mg/L	-	0.001	5	0.008	0.008	0.009	0.009	0.010	No Trend
Selenium	mg/L	0.02	0.01	5	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Silica	mg/L	-	0.05	5	48.30	48.30	49.10	49.40	49.80	No Trend
Strontium	mg/L	-	0.001	5	0.761	0.764	0.789	0.826	0.859	No Trend
Zinc	mg/L	20	0.005	5	<LOR	0.011	0.012	0.016	0.024	No Trend

(1),(2) - guideline value for beef cattle

0.5	Guideline value exceeded
-	Not analysed
<LOR	Less than the limit of reporting

Field	Dingo		Location:	RN011831					
Field Parameters	**Units**	**ANZECC (2000) Livestock**	**LOR**	**No. Samples**	**Min**	**P20**	**P50**	**P80**	**Max**	**Mann-Kendall Trend**
Electrical conductivity	µS/cm	-	1	6	1235	1357	1399	1518	1930	No Trend
pH	pH Unit	-	0.01	6	6.69	7.04	7.36	7.45	7.76	No Trend
Temperature	°C	-	0.1	6	13.6	18.0	23.2	27.4	27.7	No Trend
General Parameters										
pH (laboratory)	pH Unit	-	0.01	6	8.00	8.28	8.30	8.40	8.44	No Trend
Electrical conductivity (laboratory)	µS/cm	-	1	6	1390	1420	1465	1510	1520	No Trend
Total dissolved solids	mg/L	4000 (1)	1	6	904	923	953	982	988	No Trend
Total suspended solids	mg/L	-	1	6	<LOR	<LOR	<LOR	4	5	No Trend
Gross alpha	Bq/L	0.5	0.05	5	0.75	0.77	0.78	0.80	0.86	No Trend
Gross beta	Bq/L	-	0.1	5	0.59	0.62	0.64	0.81	1.49	No Trend
Gross beta activity - 40K	Bq/L	-	0.1	5	<LOR	0.12	0.13	0.38	1.09	No Trend
Gross beta (excluding k-40)	Bq/L	0.5	0.1	5	0.40	0.43	0.49	0.50	0.52	No Trend
Major Anions and Cations										
Bicarbonate	mg/L	-	1	6	265	274	285	314	319	No Trend
Carbonate	mg/L	-	1	6	<LOR	<LOR	2	12	20	No Trend
Chloride	mg/L	-	1	6	236	243	247	257	286	No Trend
Sulphate	mg/L	1000	1	6	105	106	117	123	124	No Trend
Nitrate	mg/L	400	0.01	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Nitrite	mg/L	30	0.01	6	0.12	0.15	0.23	0.55	0.62	No Trend
Fluoride	mg/L	2	0.1	6	1.0	1.1	1.1	1.1	1.2	No Trend
Sodium	mg/L	-	1	6	130	134	143	145	153	No Trend
Potassium	mg/L	-	1	6	15	15	16	16	17	No Trend
Calcium	mg/L	1000	1	6	71	71	73	75	76	No Trend
Magnesium	mg/L	-	1	6	53	58	61	62	64	No Trend
Iron	mg/L	-	0.05	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Hydrocarbons										
TRH: C6-C10	µg/L	-	20	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
TRH: >C10-C40	µg/L	-	100	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Benzene	µg/L	-	1	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Toluene	µg/L	-	2	6	<LOR	<LOR	<LOR	<LOR	4	No Trend
Ethylbenzene	µg/L	-	2	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Total Xylenes	µg/L	-	2	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Naphthalene	µg/L	-	5	6	1	1	3	<LOR	<LOR	No Trend
PAH Suite	µg/L	-	0.5	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Dissolved Gases										
Methane	µg/L	-	10	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Ethane	µg/L	-	10	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Propane	µg/L	-	10	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Dissolved Metals/metalloids										
Chromium	mg/L	1	0.001	6	<LOR	<LOR	<LOR	0.002	0.002	No Trend
Copper	mg/L	1 (2)	0.001	6	<LOR	<LOR	<LOR	0.002	0.003	No Trend
Lead	mg/L	0.1	0.001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Manganese	mg/L	-	0.001	6	<LOR	0.002	0.002	0.005	0.008	Falling
Mercury	mg/L	0.002	0.0001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Silver	mg/L	-	0.001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Arsenic	mg/L	0.5	0.001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Barium	mg/L	-	0.001	6	0.054	0.064	0.071	0.073	0.079	No Trend
Boron	mg/L	5	0.05	6	0.26	0.26	0.29	0.32	0.64	No Trend
Cadmium	mg/L	0.01	0.0001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Lithium	mg/L	-	0.001	6	0.012	0.012	0.013	0.015	0.024	No Trend
Selenium	mg/L	0.02	0.01	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Silica	mg/L	-	0.05	6	16.70	16.80	17.75	18.60	18.70	Rising
Strontium	mg/L	-	0.001	6	0.742	0.750	0.762	0.776	0.825	No Trend
Zinc	mg/L	20	0.005	6	0.016	0.016	0.035	0.095	0.105	Falling

(1),(2) - guideline value for beef cattle

0.5	Guideline value exceeded
-	Not analysed
<LOR	Less than the limit of reporting

Field	Palm Valley	Location:		RN012024						
Field Parameters	**Units**	**ANZECC (2000) Livestock**	**LOR**	**No. Samples**	**Min**	**P20**	**P50**	**P80**	**Max**	**Mann-Kendall Trend**
Electrical conductivity	µS/cm	-	1	6	1057	1142	1172	1186	1313	No Trend
pH	pH Unit	-	0.01	6	6.99	7.06	7.18	7.34	7.37	No Trend
Temperature	°C	-	0.1	6	24.8	25.5	25.9	25.9	27.1	No Trend
General Parameters										
pH (laboratory)	pH Unit	-	0.01	6	7.74	7.94	8.01	8.31	8.33	No Trend
Electrical conductivity (laboratory)	µS/cm	-	1	6	1060	1130	1200	1270	1340	No Trend
Total dissolved solids	mg/L	4000 (1)	1	6	689	734	780	826	871	No Trend
Total suspended solids	mg/L	-	1	6	<LOR	<LOR	<LOR	<LOR	5	No Trend
Gross alpha	Bq/L	0.5	0.05	5	0.26	0.31	0.33	0.35	0.38	No Trend
Gross beta	Bq/L	-	0.1	5	0.22	0.22	0.25	0.46	1.09	No Trend
Gross beta activity - 40K	Bq/L	-	0.1	5	<LOR	<LOR	<LOR	0.29	0.93	No Trend
Gross beta (excluding k-40)	Bq/L	0.5	0.1	5	0.12	0.12	0.15	0.16	0.17	No Trend
Major Anions and Cations										
Bicarbonate	mg/L	-	1	6	295	303	313	321	370	No Trend
Carbonate	mg/L	-	1	6	<LOR	<LOR	<LOR	4	7	No Trend
Chloride	mg/L	-	1	6	114	137	147	177	178	No Trend
Sulphate	mg/L	1000	1	6	62	63	71	72	101	No Trend
Nitrate	mg/L	400	0.01	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Nitrite	mg/L	30	0.01	6	2.42	2.44	4.41	8.00	8.75	No Trend
Fluoride	mg/L	2	0.1	6	0.5	0.6	0.6	0.6	0.7	No Trend
Sodium	mg/L	-	1	6	78	86	94	102	119	No Trend
Potassium	mg/L	-	1	6	6	6	6	6	7	No Trend
Calcium	mg/L	1000	1	6	69	75	77	85	86	No Trend
Magnesium	mg/L	-	1	6	50	55	59	65	68	No Trend
Iron	mg/L	-	0.05	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Hydrocarbons										
TRH: C6-C10	µg/L	-	20	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
TRH: >C10-C40	µg/L	-	100	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Benzene	µg/L	-	1	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Toluene	µg/L	-	2	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Ethylbenzene	µg/L	-	2	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Total Xylenes	µg/L	-	2	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Naphthalene	µg/L	-	5	6	1	1	3	<LOR	<LOR	No Trend
PAH Suite	µg/L	-	0.5	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Dissolved Gases										
Methane	µg/L	-	10	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Ethane	µg/L	-	10	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Propane	µg/L	-	10	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Dissolved Metals/metalloids										
Chromium	mg/L	1	0.001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Copper	mg/L	1 (2)	0.001	6	<LOR	0.002	0.002	0.004	0.009	No Trend
Lead	mg/L	0.1	0.001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Manganese	mg/L	-	0.001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Mercury	mg/L	0.002	0.0001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Silver	mg/L	-	0.001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Arsenic	mg/L	0.5	0.001	6	<LOR	<LOR	0.002	0.002	0.003	No Trend
Barium	mg/L	-	0.001	6	0.053	0.061	0.062	0.063	0.072	No Trend
Boron	mg/L	5	0.05	6	0.19	0.20	0.27	0.36	0.39	No Trend
Cadmium	mg/L	0.01	0.0001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Lithium	mg/L	-	0.001	6	0.015	0.016	0.017	0.020	0.020	No Trend
Selenium	mg/L	0.02	0.01	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Silica	mg/L	-	0.05	6	29.60	31.10	40.15	43.60	48.70	No Trend
Strontium	mg/L	-	0.001	6	0.327	0.338	0.369	0.382	0.425	No Trend
Zinc	mg/L	20	0.005	6	<LOR	<LOR	<LOR	0.006	0.010	No Trend

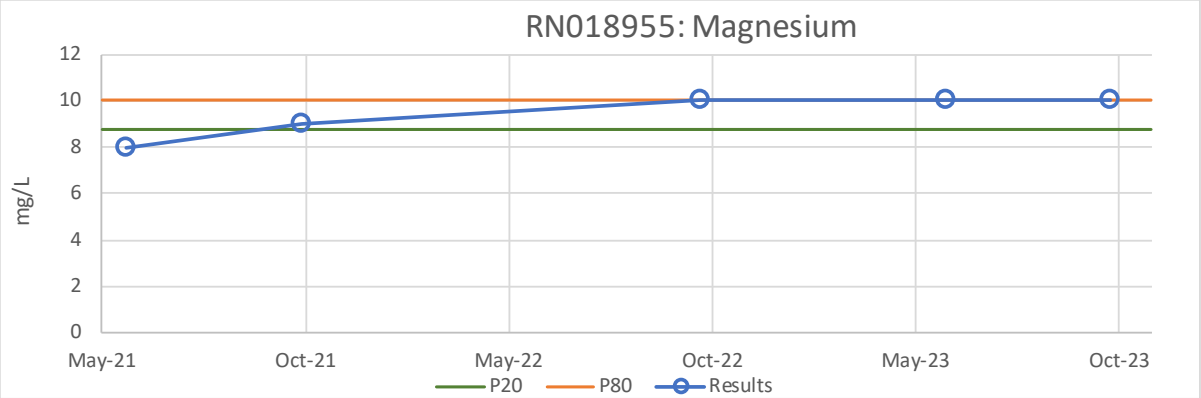
(1),(2) - guideline value for beef cattle

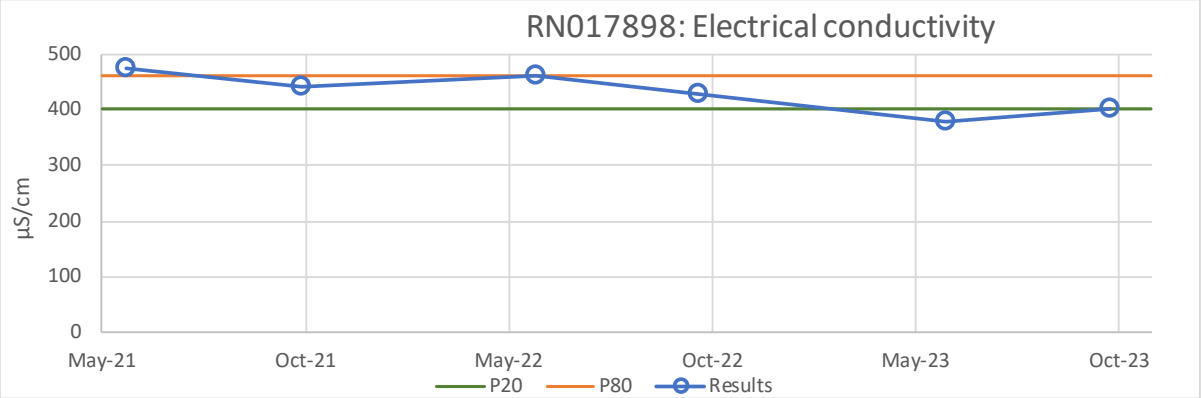
0.5	Guideline value exceeded
-	Not analysed
<LOR	Less than the limit of reporting

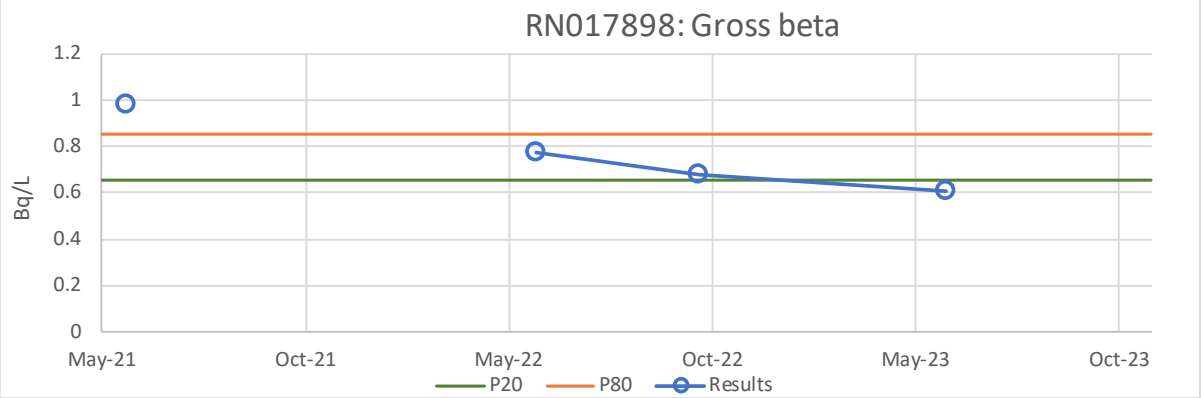
Field	Palm Valley	Location:		RN006503						
Field Parameters	**Units**	**ANZECC (2000) Livestock**	**LOR**	**No. Samples**	**Min**	**P20**	**P50**	**P80**	**Max**	**Mann-Kendall Trend**
Electrical conductivity	µS/cm	-	1	6	1345	1411	1542	1647	1693	No Trend
pH	pH Unit	-	0.01	6	6.93	7.12	7.18	7.25	7.78	No Trend
Temperature	°C	-	0.1	5	22.0	23.6	24.2	24.6	25.5	No Trend
General Parameters										
pH (laboratory)	pH Unit	-	0.01	6	7.77	7.98	8.08	8.17	8.30	No Trend
Electrical conductivity (laboratory)	µS/cm	-	1	6	1400	1500	1600	1690	1690	Rising
Total dissolved solids	mg/L	4000 (1)	1	6	910	975	1040	1100	1100	Rising
Total suspended solids	mg/L	-	1	6	4	8	17	35	39	No Trend
Gross alpha	Bq/L	0.5	0.05	5	0.62	0.64	0.77	1.03	1.81	No Trend
Gross beta	Bq/L	-	0.1	5	0.45	0.51	0.60	0.80	1.42	No Trend
Gross beta activity - 40K	Bq/L	-	0.1	5	<LOR	0.18	0.34	0.48	1.00	No Trend
Gross beta (excluding k-40)	Bq/L	0.5	0.1	5	0.26	0.29	0.33	0.36	0.42	Rising
Major Anions and Cations										
Bicarbonate	mg/L	-	1	6	217	233	257	272	274	No Trend
Carbonate	mg/L	-	1	6	<LOR	<LOR	<LOR	<LOR	3	No Trend
Chloride	mg/L	-	1	6	196	198	239	258	274	Rising
Sulphate	mg/L	1000	1	6	246	248	254	272	280	No Trend
Nitrate	mg/L	400	0.01	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Nitrite	mg/L	30	0.01	6	<LOR	<LOR	<LOR	0.02	0.45	No Trend
Fluoride	mg/L	2	0.1	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Sodium	mg/L	-	1	6	133	139	145	151	154	No Trend
Potassium	mg/L	-	1	6	10	10	11	11	15	No Trend
Calcium	mg/L	1000	1	6	108	118	120	126	130	Rising
Magnesium	mg/L	-	1	6	46	48	53	53	56	Rising
Iron	mg/L	-	0.05	6	<LOR	<LOR	0.99	1.83	2.00	Falling
Hydrocarbons										
TRH: C6-C10	µg/L	-	20	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
TRH: >C10-C40	µg/L	-	100	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Benzene	µg/L	-	1	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Toluene	µg/L	-	2	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Ethylbenzene	µg/L	-	2	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Total Xylenes	µg/L	-	2	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Naphthalene	µg/L	-	5	6	1	1	3	<LOR	<LOR	No Trend
PAH Suite	µg/L	-	0.5	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Dissolved Gases										
Methane	µg/L	-	10	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Ethane	µg/L	-	10	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Propane	µg/L	-	10	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Dissolved Metals/metalloids										
Chromium	mg/L	1	0.001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Copper	mg/L	1 (2)	0.001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Lead	mg/L	0.1	0.001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Manganese	mg/L	-	0.001	6	0.011	0.053	0.058	0.083	0.088	No Trend
Mercury	mg/L	0.002	0.0001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Silver	mg/L	-	0.001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Arsenic	mg/L	0.5	0.001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Barium	mg/L	-	0.001	6	0.052	0.054	0.068	0.113	0.162	No Trend
Boron	mg/L	5	0.05	6	0.09	0.09	0.12	0.13	0.14	No Trend
Cadmium	mg/L	0.01	0.0001	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Lithium	mg/L	-	0.001	6	0.046	0.048	0.064	0.084	0.100	Rising
Selenium	mg/L	0.02	0.01	6	<LOR	<LOR	<LOR	<LOR	<LOR	No Trend
Silica	mg/L	-	0.05	6	20.10	20.20	20.30	20.80	21.30	No Trend
Strontium	mg/L	-	0.001	6	0.910	0.977	1.390	1.610	3.270	No Trend
Zinc	mg/L	20	0.005	6	<LOR	<LOR	0.008	0.012	0.014	No Trend

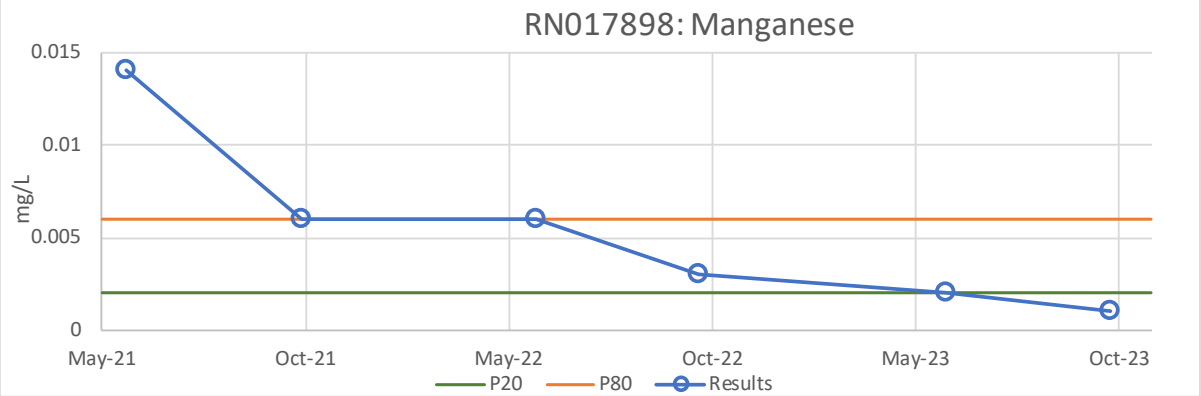
(1),(2) - guideline value for beef cattle

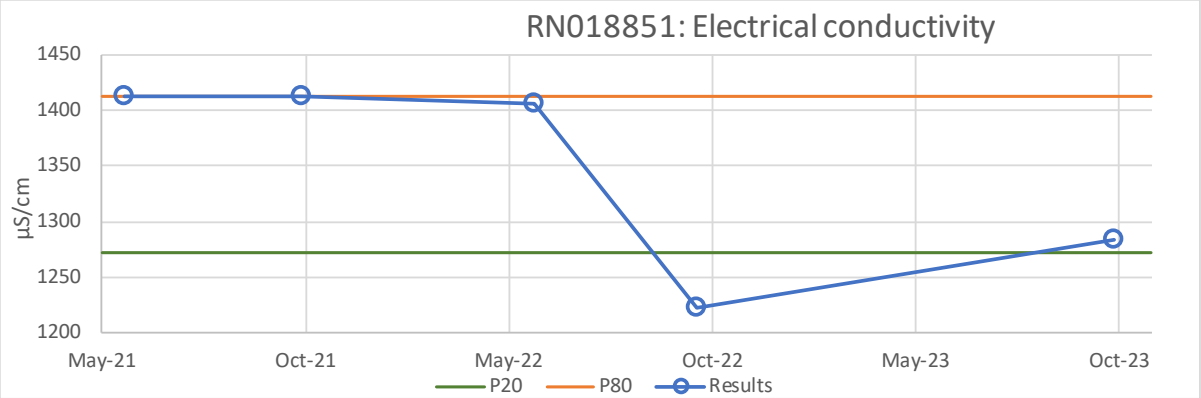
0.5	Guideline value exceeded
-	Not analysed
<LOR	Less than the limit of reporting

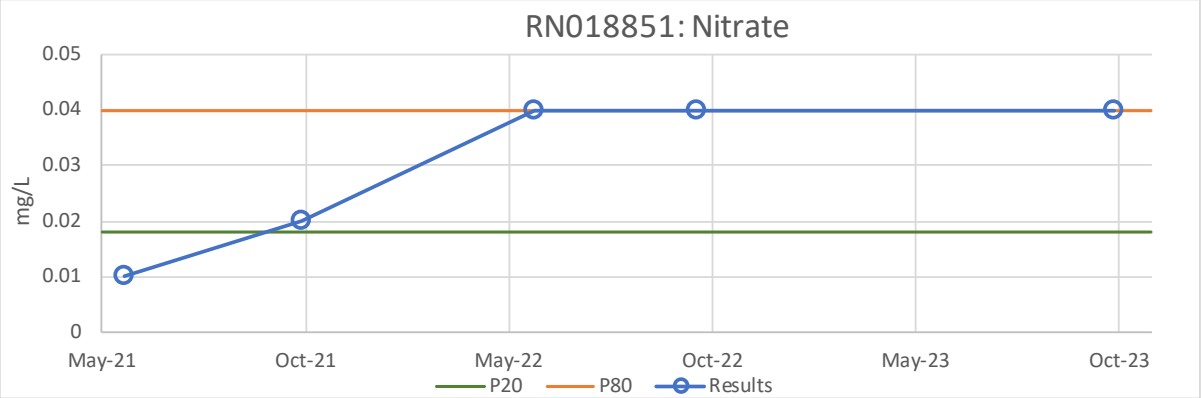

RN018955: Magnesium
12
10
8
6
4
2
0
mg/L
May-21
Oct-21
May-22
Oct-22
May-23
Oct-23
P20
P80
Results

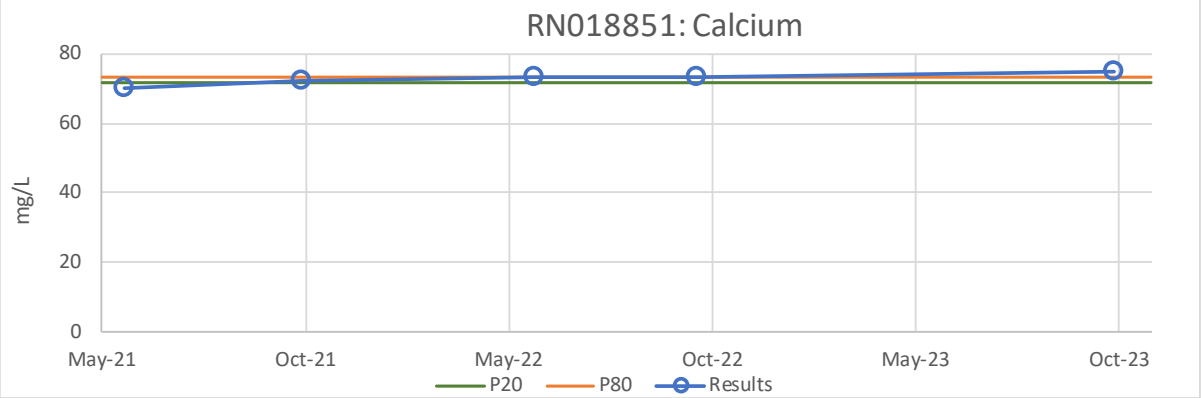

RN017898: Electrical conductivity
500
400
300
200
100
0
µS/cm
May-21
Oct-21
May-22
Oct-22
May-23
Oct-23
P20
P80
Results

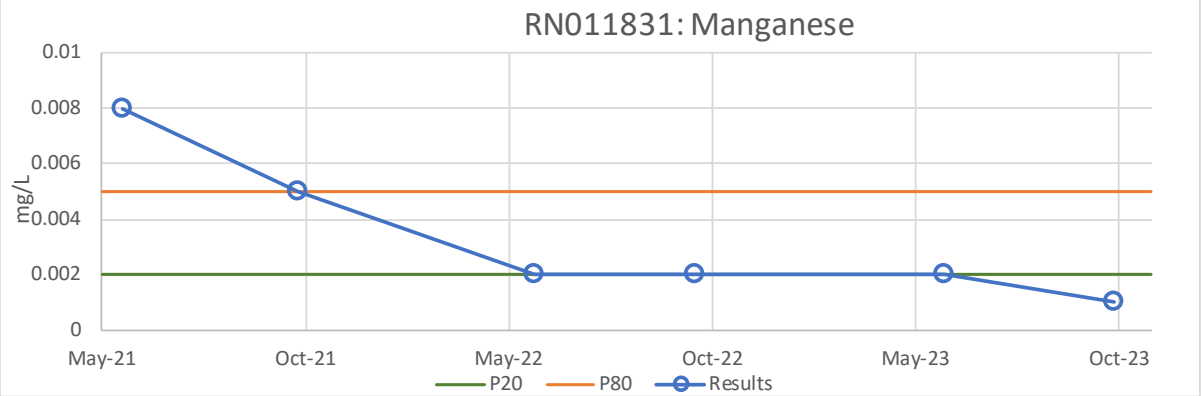

RN017898: Gross beta
1.2
1
0.8
0.6
0.4
0.2
0
Bq/L
May-21
Oct-21
May-22
Oct-22
May-23
Oct-23
P20
P80
Results

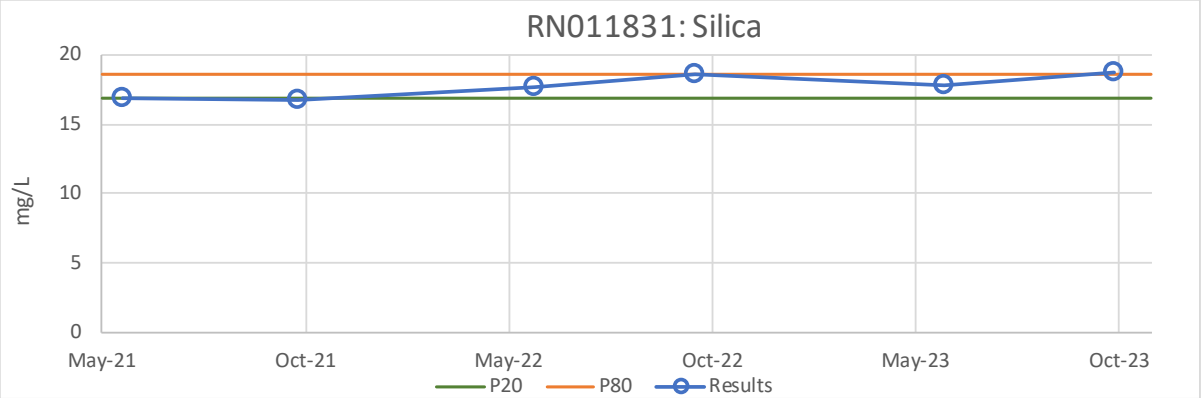

RN017898: Manganese
0.015
0.01
0.005
0
mg/L
May-21
Oct-21
May-22
Oct-22
May-23
Oct-23
P20
P80
Results

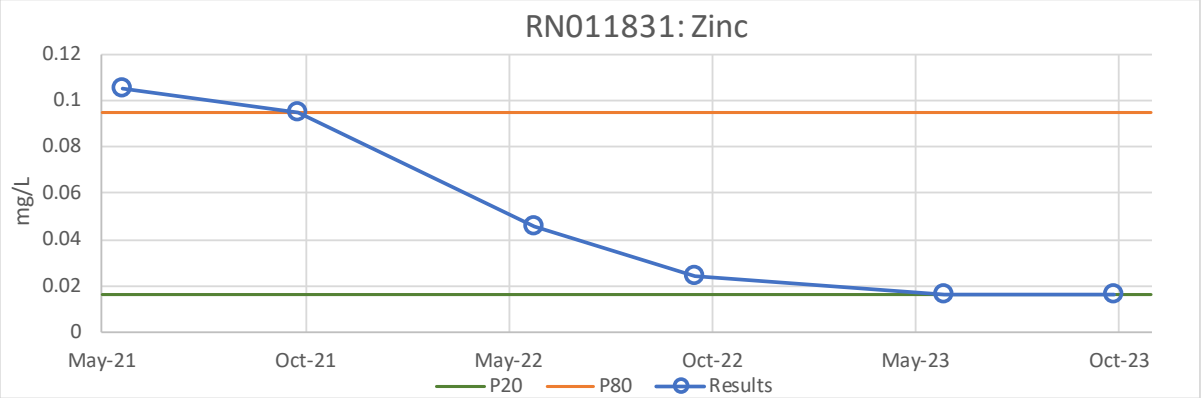

RN018851: Electrical conductivity
1450
1400
1350
1300
1250
1200
µS/cm
May-21
Oct-21
May-22
Oct-22
May-23
Oct-23
P20
P80
Results

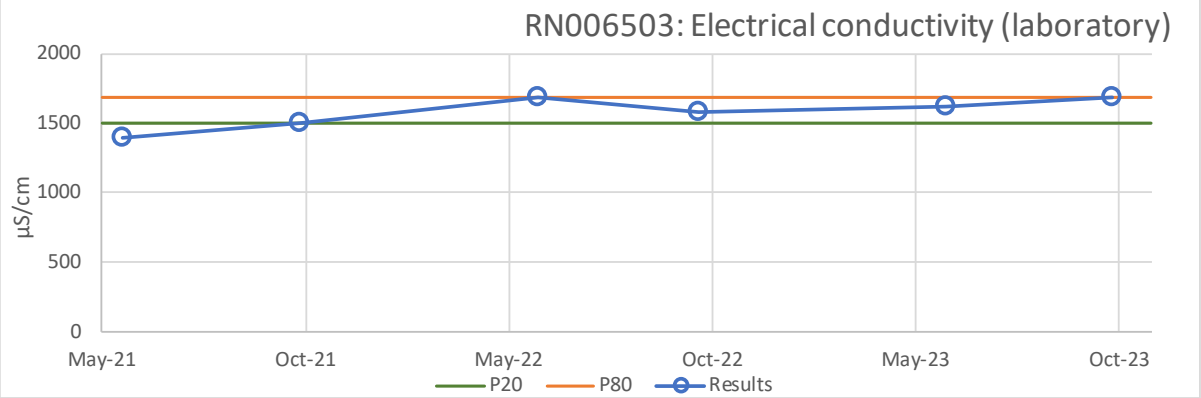

RN018851: Nitrate
0.05
0.04
0.03
0.02
0.01
0
mg/L
May-21
Oct-21
May-22
Oct-22
May-23
Oct-23
P20
P80
Results

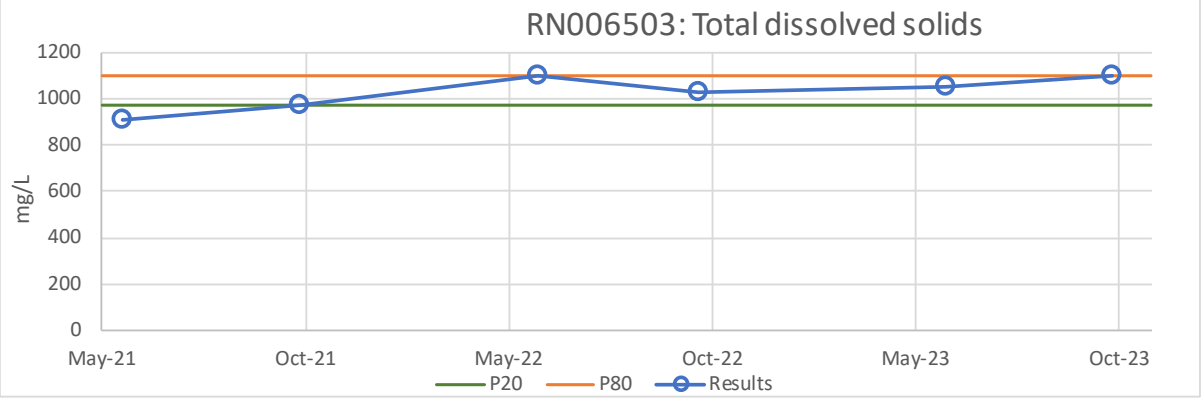

RN018851: Calcium
80
60
40
20
0
mg/L
May-21
Oct-21
May-22
Oct-22
May-23
Oct-23
P20
P80
Results

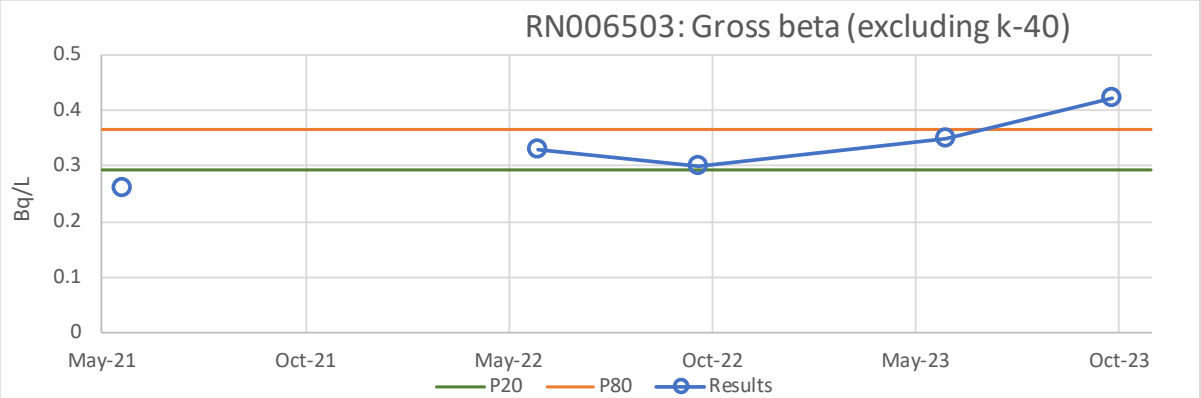

RN011831: Manganese
0.01
0.008
0.006
0.004
0.002
0
mg/L
May-21
Oct-21
May-22
Oct-22
May-23
Oct-23
P20
P80
Results

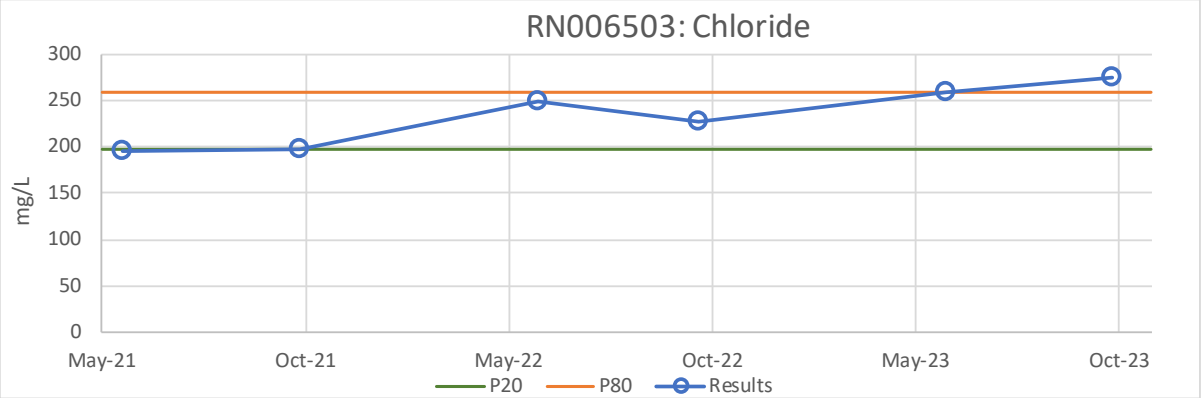

RN011831: Silica
20
15
10
5
0
mg/L
May-21
Oct-21
May-22
Oct-22
May-23
Oct-23
P20
P80
Results

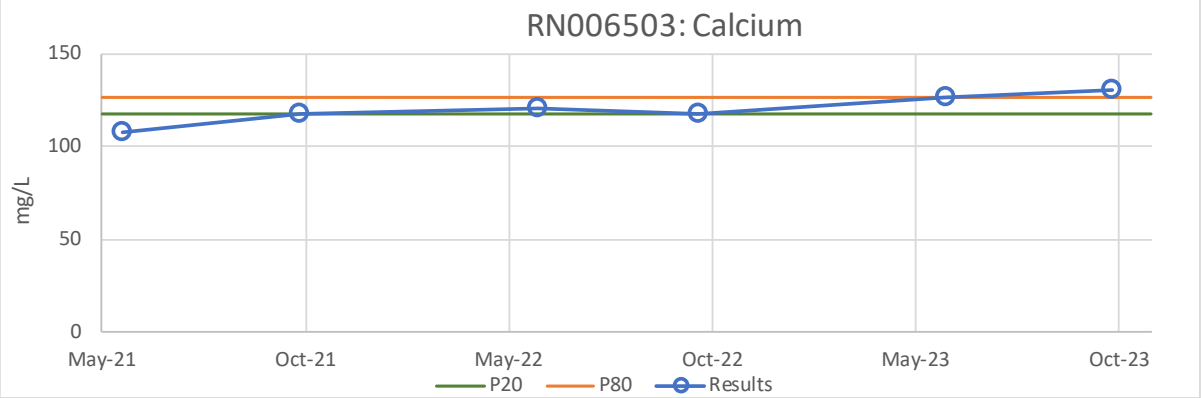

RN011831: Zinc
0.12
0.1
0.08
0.06
0.04
0.02
0
mg/L
May-21
Oct-21
May-22
Oct-22
May-23
Oct-23
P20
P80
Results

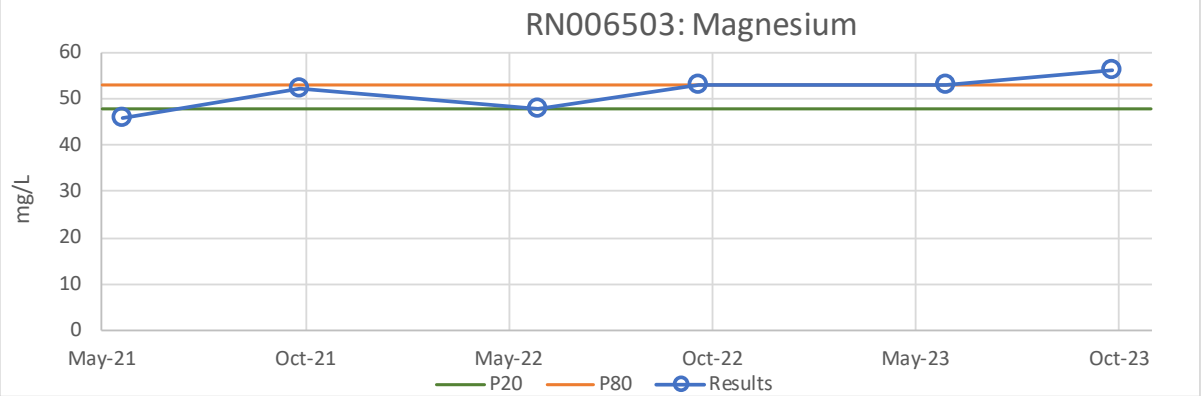

RN006503: Electrical conductivity (laboratory)
2000
1500
1000
500
0
µS/cm
May-21
Oct-21
May-22
Oct-22
May-23
Oct-23
P20
P80
Results

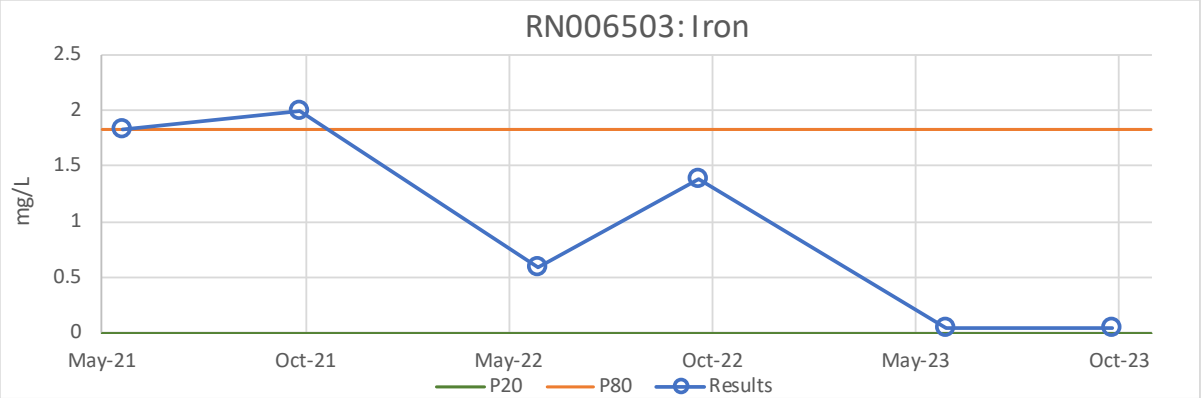

RN006503: Total dissolved solids
1200
1000
800
600
400
200
0
mg/L
May-21
Oct-21
May-22
Oct-22
May-23
Oct-23
P20
P80
Results

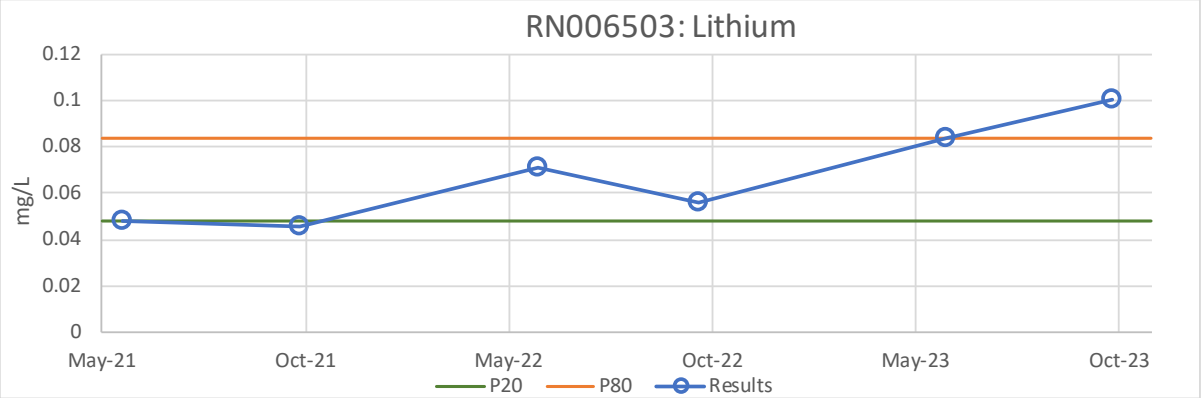

RN006503: Gross beta (excluding k-40)
Bq/L
0.5
0.4
0.3
0.2
0.1
0
May-21
Oct-21
May-22
Oct-22
May-23
Oct-23
P20
P80
Results


RN006503: Chloride
mg/L
300
250
200
150
100
50
0
May-21
Oct-21
May-22
Oct-22
May-23
Oct-23
P20
P80
Results


RN006503: Calcium
mg/L
150
100
50
0
May-21
Oct-21
May-22
Oct-22
May-23
Oct-23
P20
P80
Results


RN006503: Magnesium
mg/L
60
50
40
30
20
10
0
May-21
Oct-21
May-22
Oct-22
May-23
Oct-23
P20
P80
Results


RN006503: Iron
2.5
2
1.5
1
0.5
0
mg/L
May-21
Oct-21
May-22
Oct-22
May-23
Oct-23
P20
P80
Results


RN006503: Lithium
0.12
0.1
0.08
0.06
0.04
0.02
0
mg/L
May-21
Oct-21
May-22
Oct-22
May-23
Oct-23
P20
P80
Results

Field: Palm Valley		Location:	Palm Creek Lower Oasis					
Field Parameters	**Units**	**LOR**	**No. Samples**	**Min**	**P20**	**P50**	**P80**	**Max**
Electrical conductivity	µS/cm	1	4	53	701	1161	1952	3100
pH	pH Unit	0.01	4	7.85	8.01	8.33	8.58	8.63
Temperature	°C	0.1	4	21.0	21.8	24.4	28.3	31.1

Field: Palm Valley		Location:	Palm Valley Area Spring No 8					
Field Parameters	**Units**	**LOR**	**No. Samples**	**Min**	**P20**	**P50**	**P80**	**Max**
Electrical conductivity	µS/cm	1	2	168	376	689	1001	1209
pH	pH Unit	0.01	2	8.37	8.50	8.69	8.88	9.01
Temperature	°C	0.1	2	20.7	22.3	24.7	27.0	28.6

Field: Palm Valley		Location:	Palm Valley Area Spring No 9					
Field Parameters	**Units**	**LOR**	**No. Samples**	**Min**	**P20**	**P50**	**P80**	**Max**
Electrical conductivity	µS/cm	1	4	761	2320	4280	6216	7740
pH	pH Unit	0.01	4	8.66	8.82	9.06	9.23	9.30
Temperature	°C	0.1	4	20.6	21.4	24.7	27.7	28.1

Field: Palm Valley		Location:	Pimelia Spring					
Field Parameters	**Units**	**LOR**	**No. Samples**	**Min**	**P20**	**P50**	**P80**	**Max**
Electrical conductivity	µS/cm	1	2	176	799	1733	2667	3290
pH	pH Unit	0.01	2	7.76	7.98	8.30	8.62	8.84
Temperature	°C	0.1	2	23.2	24.4	26.2	28.0	29.2

Appendix C - Water Level and Wellhead Pressure Monitoring

	RN002943		RN010853		RN017540	
Dingo	18/05/2021	48.09	19/05/2021	119.74	18/05/2021	Blocked at 97.13m
	24/10/2021	dry at 50.6m	24/10/2021	125.33	24/10/2021	dry at 54m
	24/05/2022	Dry at 51m	24/05/2022	125.38	24/05/2022	Dry at 29.6m
	16/10/2022	Dry at 51m	16/10/2022	125.34	16/10/2022	Dry at 28.2m
	28/05/2023	Bore collapsed	28/05/2023	124.5	28/05/2023	Bore collapsed
	23/10/2023	Bore collapsed	23/10/2023	124.8	23/10/2023	Bore collapsed

	RN018851		RN018397		RN018463		RN018398	
Surprise	20/05/2021	No Access	20/05/2021	6.94	20/05/2021	10.595	20/05/2021	5.525
	26/10/2021	14.62	26/10/2021	7.04	26/10/2021	10.7	26/10/2021	5.31
	25/05/2022	Not measured	25/05/2022	7.1	25/05/2022	10.82	25/05/2022	5.34
	19/10/2022	Not measured	19/10/2022	7.2	19/10/2022	10.91	19/10/2022	5.38
	15/07/2023	Not measured	15/07/2023	7.35	15/07/2023	11.06	15/07/2023	5.38
	26/10/2023	Not measured	26/10/2023	7.4	26/10/2023	11.14	26/10/2023	5.43

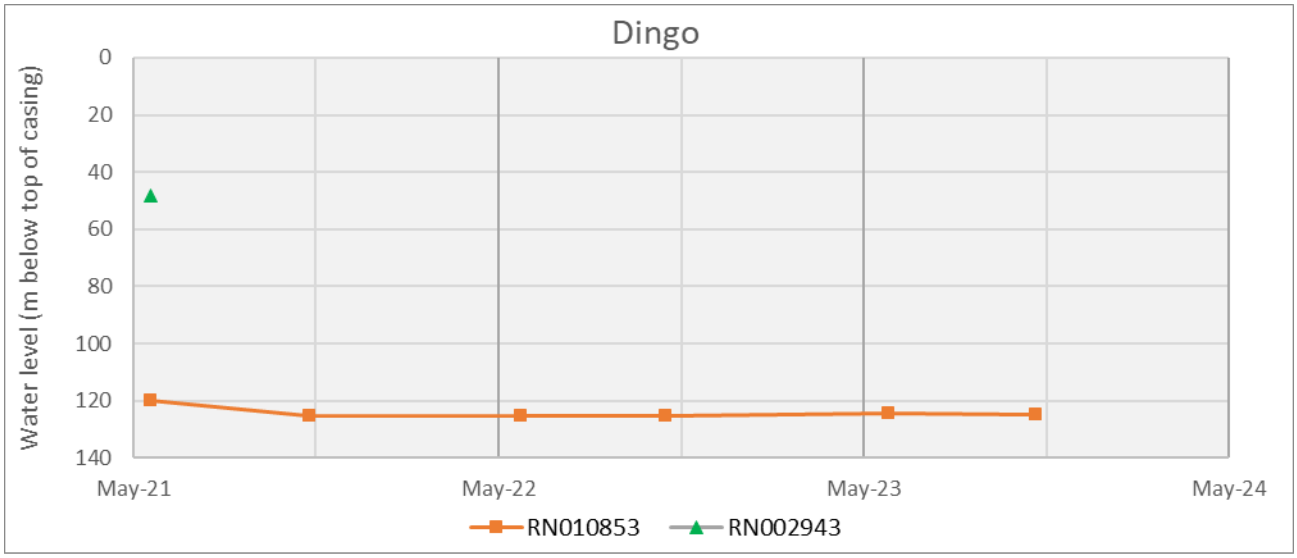
	RN007292		RN018732		RN014165		RN018706		RN018707		RN018708	
Palm Valley	21/05/2021	-1.43	20/05/2021	5.45	20/05/2021	20.56	21/05/2021	-2.14	20/05/2021	1.03	20/05/2021	3.92
	25/10/2021	No access (subartesian)	25/10/2021	6.15	25/10/2021	14.02	25/10/2021	-1.63	25/10/2021	1.01	25/10/2021	4.27
	27/05/2022	No access	27/05/2022	No access	27/05/2022	28.73	27/05/2022	-1.6	27/05/2022	1.2	27/05/2022	3.16
	18/10/2022	Locked	18/10/2022	5.97	18/10/2022	51.84	18/10/2022	-2	18/10/2022	0.73	18/10/2022	3.8
	29/05/2023	No access	29/05/2023	No access	29/05/2023	23.05	29/05/2023	-2.03	29/05/2023	1	29/05/2023	4.4
	25/10/2023	No access	25/10/2023	No access	25/10/2023	22.15	25/10/2023	-1.93	25/10/2023	1.1	25/10/2023	4.8

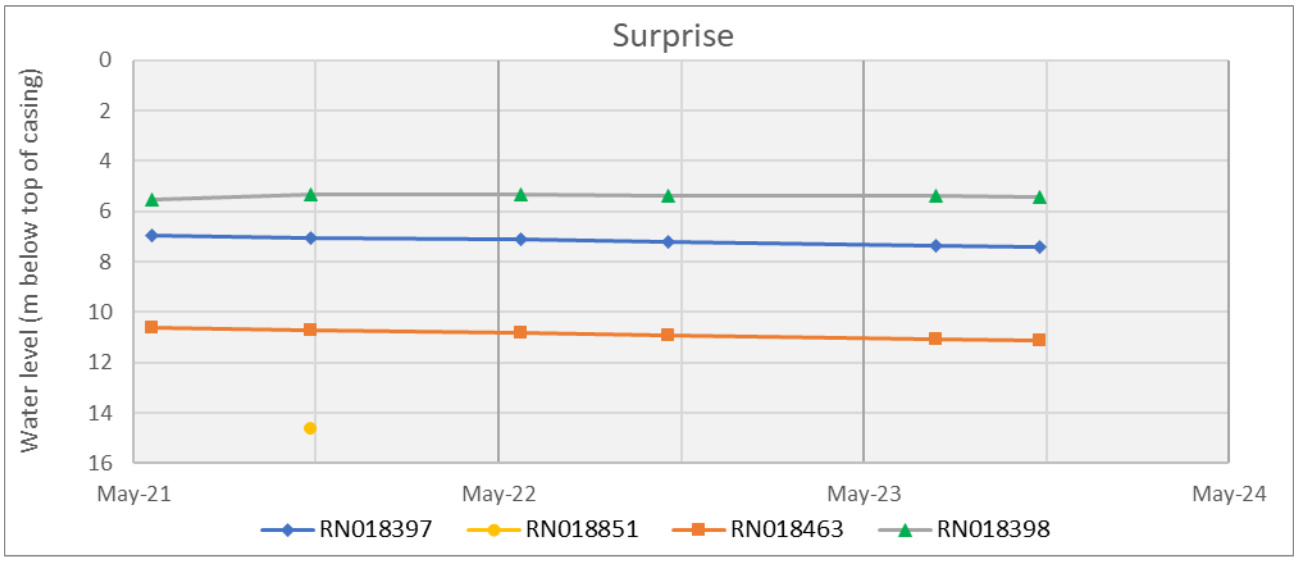
Water level measured as meters below reference point. Negative denotes artesian conditions

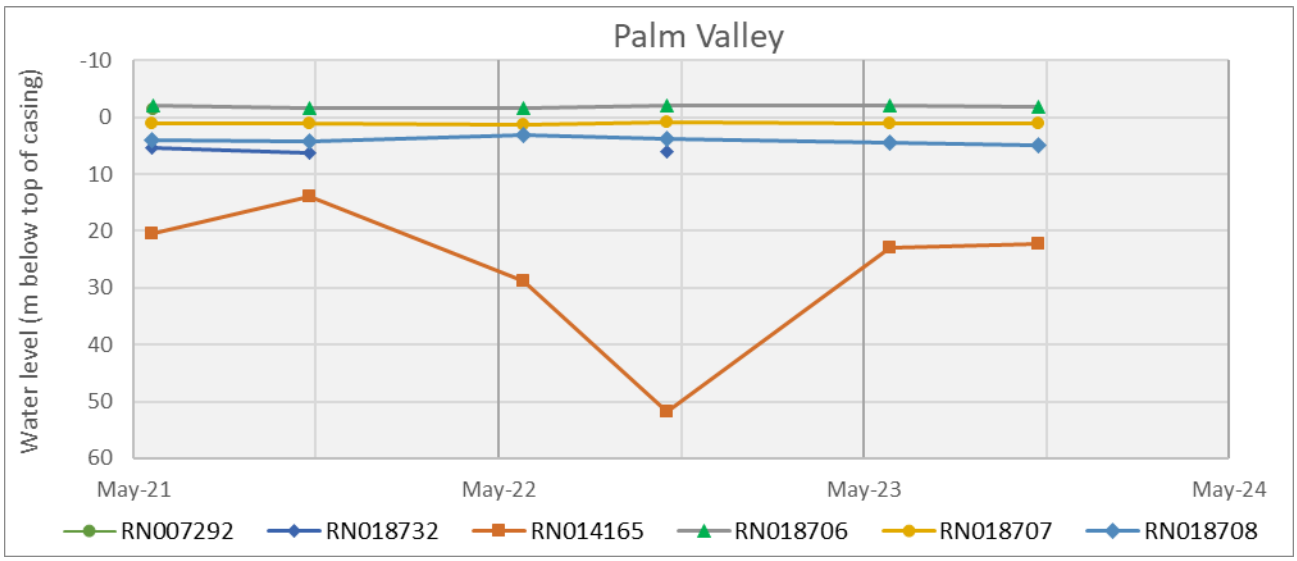
	Dingo 2		Dingo 3	
Dingo	12/05/2021	20159	12/05/2021	17408
	27/10/2021	15165	28/10/2021	9610
	24/05/2022	16343	24/05/2022	9350
	16/10/2022	17364	16/10/2022	9463
	28/05/2023	18200	28/05/2023	9312
	23/10/2023	16423	23/10/2023	9471

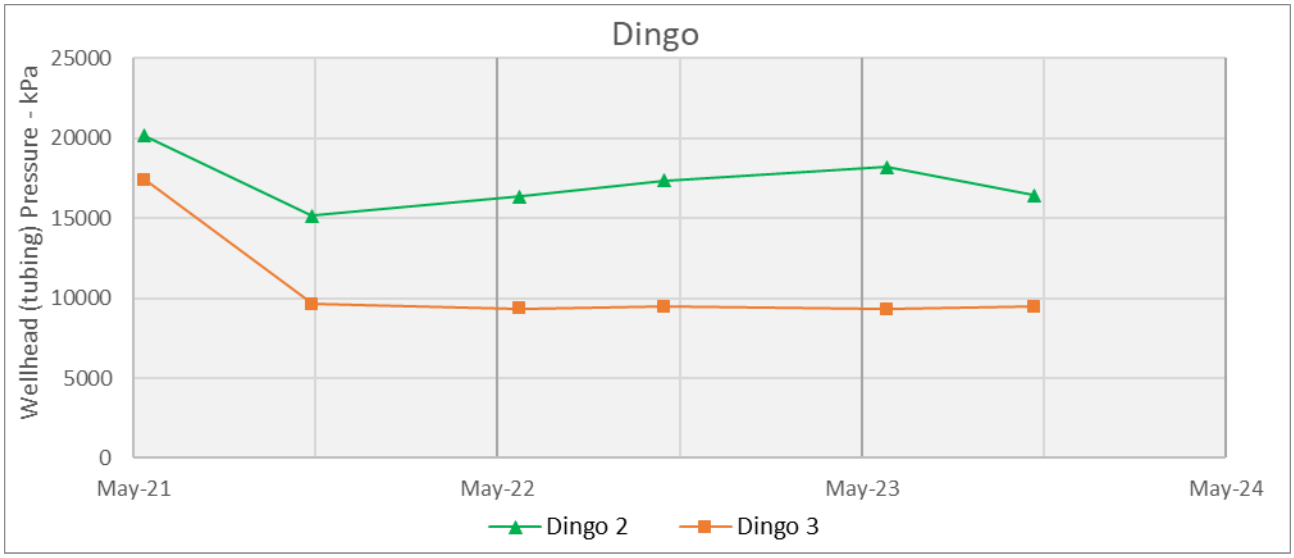
	Surprise 1		Johnstone West 1	
Surprise	8/04/2021	810	8/04/2021	1938
	1/12/2021	1520	1/12/2021	1175
	25/05/2022	468	25/05/2022	1885
	16/10/2022	308	16/10/2022	1991
	15/07/2023	1501	15/07/2023	1931
	23/10/2023	1402	23/10/2023	1973

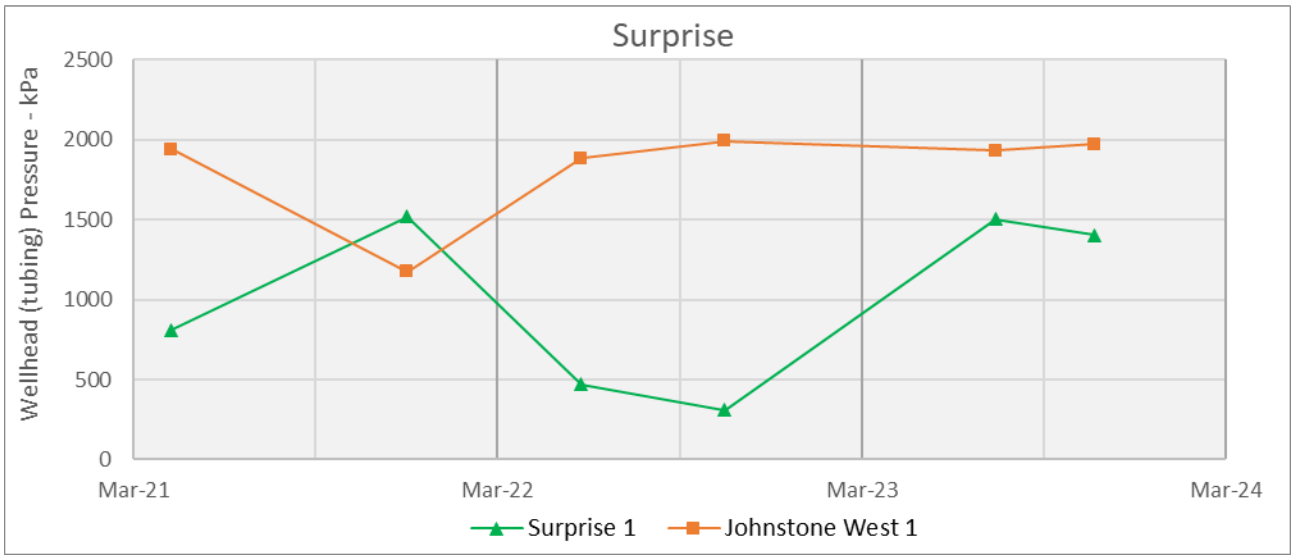
Wellhead pressure measured in kPa


Dingo
Water level (m below top of casing)
0
20
40
60
80
100
120
140
May-21
May-22
May-23
May-24
RN010853
RN002943


Surprise
Water level (m below top of casing)
0
2
4
6
8
10
12
14
16
May-21
May-22
May-23
May-24
RN018397
RN018851
RN018463
RN018398


Palm Valley
Water level (m below top of casing)
-10
0
10
20
30
40
50
60
May-21
May-22
May-23
May-24
RN007292
RN018732
RN014165
RN018706
RN018707
RN018708


Dingo
Wellhead (tubing) Pressure - kPa
25000
20000
15000
10000
5000
0
May-21
May-22
May-23
May-24
Dingo 2
Dingo 3


Surprise
Wellhead (tubing) Pressure - kPa
2500
2000
1500
1000
500
0
Mar-21
Mar-22
Mar-23
Mar-24
Surprise 1
Johnstone West 1

Appendix D – Photographs of Springs

Palm Creek Lower Oasis
May 2023

October 2023


Palm Valley Area Spring No 8
May 2023

October 2023


Palm Valley Area Spring No 9
May 2023

October 2023


Pimelia Spring
May 2023

October 2023