

Nambeelup Substrate Facility

Department of Water & Environmental Regulation

Annual Environmental Report 2021



Mushroom Exchange Pty Ltd

L7210/1997/10

20 February 2022

Document control

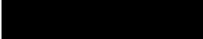
Business Name	Mushroom Exchange Pty Ltd		
Project Title	Nambeelup Substrate Facility		
Document Title	DWER Annual Environmental Report 2021		
Version:	Prepared by.	Status:	Date:
1	J. Toth	Draft	27/01/2022
2	J. Toth	Final	20/02/2022
Authorising manager to sign when released externally			
		20/02/2022	
(Name)	(Signature)	(Date)	

TABLE OF CONTENTS

1	INTRODUCTION	2
2	SITE DESCRIPTION	2
2.1	LOCATION	2
2.2	ACTIVITIES	2
2.3	OPERATING HOURS	2
3	LICENSE COMPLIANCE	4
3.1	EMISSIONS	4
3.2	COMPOST PRODUCTION LIMIT	4
3.3	WASTE ACCEPTANCE CONTROLS	4
3.4	SPECIFIED INFRASTRUCTURE AND EQUIPMENT CONTROLS	4
3.5	OPERATIONAL CONTROLS	5
3.6	GROUNDWATER MONITORING	5
3.7	POND MONITORING AND ACTIONS	5
3.8	SPECIFIED ACTIONS	6
3.9	RECORD KEEPING	6
3.10	ONGOING REPORTING	6
4	ENVIRONMENTAL ASSESSMENT AND RESULTS	6
4.1	GROUNDWATER MONITORING	6
4.2	POND MONITORING	18

APPENDIX 1

1.	Mushroom Exchange Groundwater Bore Assessment Results for MB1	8
----	---	---

APPENDIX 2

2.	Mushroom Exchange Groundwater Bore Assessment Results for MB1	8
----	---	---

INTRODUCTION

This Annual Audit Compliance Report (AACR) is submitted to meet Part V of the Environmental Protection Act 1986 as it applies to the Nambeelup Substrate Facility. The report covers the period from 1 January 2021 to 31 December 2021.

In 1997 MushroomExchange submitted its application to the EPA, seeking approval for a licence for the Nambeelup Substrate Facility. The facility operates under the approved licence L7210/1997/10. The licence was initially issued in April 2000, detailing the conditions of approval.

2 SITE DESCRIPTION

2.1 LOCATION

The substrate production facility is located at Lot 89 on Plan 741, 230 Gull Road, Nambeelup, WA 6208.

An aerial view of the facility (in the solid red boundary line) is shown in Figure 1. The substrate preparation operation moved to this site in 1988.

2.2 ACTIVITIES

The facility prepares up to 700 tonnes per week of mushroom growing substrate which is transported to the MushroomExchange growing facility at 45 Orton Rd, Casuarina. The Casuarina site produces, packs and distributes mushrooms to the Western Australian fresh food market.

The facility consists of various processing and storage areas:

- Raw Materials Storage – used to store straw bales, poultry manure, gypsum and recycled water (leachate).
- Pre-wet Dry straw bales – with recycled water (dunking process).
- Recycled Water Ponds - aeration of recycled water occurs 24hrs per day.
- Bale break straw bales – poultry manure and recycled water added to straw and blended. This is then stacked in a pile. Bore water is added as required.
- Pile is flipped with front end loader (twice).
- Pile is formed into four to five ricks.
- Ricks are turned with a Pannell Turner, and gypsum is added on the first turn, poultry manure added if required.
- Ricks are turned a further four-five times, and bore water is added.
- Compost is loaded into trucks and despatched to Casuarina.
- A complete cycle is currently 21 days - this may change depending on straw quality.

2.3 OPERATING HOURS

This facility's standard operating hours are 5 am to 5 pm Monday to Sunday. On Wednesday, the normal start time is 3:00 am, as this is the one day of the week where the compost is loaded and despatched to the MushroomExchange site at Casuarina.

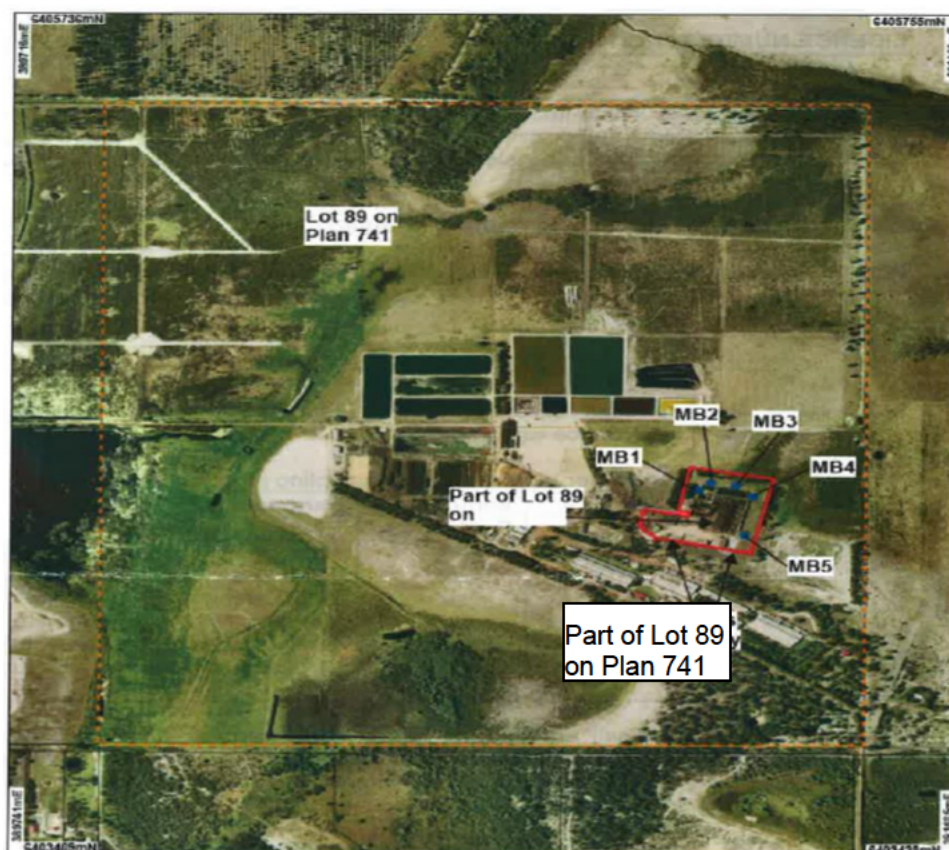


Figure 1 Layout of Lot 89 on Plan 741.



Figure 2 Layout of Mushroom Exchange Substrate Facility on Lot 89 of Plan 741.

3 LICENSE COMPLIANCE

MushroomExchange Nambeelup Site has complied with conditions stipulated within the license during the reporting period. There have been timing delays associated with the completion of and compliance with some components. These are explained in further detail within this section.

3.1 EMISSIONS

The MushroomExchange Nambeelup Site is not aware of any emissions that have been emitted beyond those permitted within the license issued in August 2018. Leachate emissions and Odour emissions have been controlled within expectations and as per the stated compliance conditions.

There have been no emissions under the General Emissions descriptor as per the license.

3.2 COMPOST PRODUCTION LIMIT

During the reporting period approx. 31,700 tonnes of Phase 1 substrate were dispatched from the site. The corresponding raw materials received to site are detailed below.

Raw Material Receipts & Product Dispatched					2021			
	January	February	March	April	May	June		
Straw (tonnes)	782	595	647	633	773	620		
Poultry Manure (m ³)	1412	1118	1047	838	1428	1127		
Gypsum (tonnes)	78	58	61	58	63	49		
Phase 1 Dispatched (tonnes)	3104	2485	2454	2427	3036	2399		
	July	August	September	October	November	December		Totals
Straw (tonnes)	578	738	637	746	645	601		7996
Poultry Manure (m ³)	1025	1143	969	1103	963	1214		13385
Gypsum (tonnes)	62	55	67	84	63	67		765
Phase 1 Dispatched (tonnes)	2427	3037	2476	3024	2451	2284		31604

3.3 WASTE ACCEPTANCE CONTROLS

As per condition 3 of the licence, chicken manure was the only waste product accepted onto the site.

3.4 SPECIFIED INFRASTRUCTURE AND EQUIPMENT CONTROLS

3.4.1 Hardstand Area

The hardstand area encompasses all composting activities and the drainage channel to Pond 1. The repairs have been completed and reported on as per this specified action and Condition 5 of the license. The report from [REDACTED] was submitted on the 1 October 2020 to DWER.

3.4.2 Pond 1

Installed as per Table 2 of the licence.

3.4.3 Pond 2

Installed as per Table 2 of the licence.

3.4.4 Pond 3

Installed as per Table 2 of the licence.

3.4.5 Monitoring Bores

Installed as per Table 2 of the licence.

3.4.6 Pond Aerator

Installed as per Table 2 of the licence. This was communicated to DWER on the 15 October 2018 as per condition 6 of the licence.

3.4.7 Concrete Storage Bunkers

Installed as per Table 2 of the licence.

3.4.8 Screen & Trap

Installed as per Table 2 of the licence. This was communicated to DWER on the 15 October 2018 as per condition 6 of the licence.

3.4.9 Bale Dunking Apparatus

Installed and operational as per Table 2 of the license.

3.4.10 Bale Line Covers

Installed as per Table 2 of the licence. This was communicated to DWER on the 15 February 2019 as per Condition 7 of the licence.

3.5 OPERATIONAL CONTROLS

For the reporting period, MushroomExchange has been fully compliant with the conditions contained within the Operational Controls, namely Conditions 8, 9, 10, 11, 12, 13(a), 13(b), 14, 15 and 16.

3.6 GROUNDWATER MONITORING

As stipulated by the license conditions, the Nambeelup site operates five existing monitoring bores designated as MB1S, MB2, MB3, MB4 and MB5S. The groundwater was tested quarterly during the current reporting period.

The water sample collection is conducted by an independent third-party organisation (GEO & HYDRO Environmental Management Private Limited). Sampling complies with the license conditions and has been carried out in accordance with AS/NZS 5667.1 and AS/NZS 5667.11. All water samples have been analysed by ALS Environmental (NATA accredited).

The groundwater monitoring requirements have been complied with for the 2021 regulatory year. The groundwater sample results are attached as part of the Annual Compliance Report as shown in Appendix 2 and the summary is shown in Table 1 to Table 13 below as per Schedule 3 of the License.

3.7 POND MONITORING AND ACTIONS

MushroomExchange Nambeelup site personnel have regularly monitored the pond water as per Condition 18 of the license. The data set is developing and shows that the ponds are consistent to the measurable characteristics, with minor variations evident between seasonal changes.

This analysis is not being tested as per NATA expectations instead, it is being conducted via infield measurement undertaken by our trained staff using calibrated equipment.

The data collected during 2021 is attached in excel format and displayed in a tabulated form as per Schedule 3 of the licence.

To satisfy Condition 19, no pond has accumulated a level of sludge greater than 30%. Pond 3 has been empty and cleaned during the year. Both Pond 1 and Pond 2 are the current working ponds, and as such bore water is transferred between both bores on a weekly basis. Pond 1 and 2 will be systematically drained, inspected and refilled with bore water in early 2022.

3.8 SPECIFIED ACTIONS

Condition 20 – this condition has been completed and communicated to DWER as per the licence expectations. See communication received on the 15 October 2018.

Condition 21 – Pond Liner Integrity testing – Ponds 2 & 3 have been tested as has been communicated with DWER in the 2017/18 annual report. Pond 1 was tested during May 2019. The report was forwarded to DWER in July 2019. A 2022 inspection schedule has been developed to test the pond liner integrity.

Condition 22- The Seepage Report as completed by Golder Associates has been forwarded to DWER on 7 February 2020.

Condition 23 – The depth to groundwater report was submitted to DWER on 15 November 2018 as per requirement.

3.9 RECORD KEEPING

Condition 24 – Groundwater Monitoring and analysis is being conducted by a NATA accredited body. The infield pond monitoring is being undertaken by trained MushroomExchange Staff.

Condition 25 – Auditable records are being maintained as per expectations.

Condition 26 – During the reporting period MushroomExchange has not received any complaints that have been conclusively attributable to the operations conducted at the site.

3.10 ONGOING REPORTING

Condition 28 – The April, July and October quarterly reports were submitted to DWER.

Condition 29 / 30 – This report is the evidence to satisfy the Annual Reporting requirements.

4 ENVIRONMENTAL ASSESSMENT AND RESULTS

4.1 GROUNDWATER MONITORING

The results obtained from the groundwater bore monitoring assessments carried out by ALS Environmental Laboratory are summarised in Table 1 - 13 below.

The parameters analysed are as follows:

- Ammonium - N (mg/L)
- Total Nitrogen (mg/L)
- Nitrate Nitrogen (mg/L)
- Nitrate Nitrogen (mg/L)

- Total Dissolved Solids (mg/L)
- Total Phosphorous (mg/L)
- pH
- Mercury (mg/L)
- Zinc (mg/L)
- Arsenic (mg/L)
- Standing Water Level (mBGL)

Based on the results presented below, all of the groundwater monitoring bores fall below the recommended maximum levels for parameters considered to be harmful to livestock as per the ANZECC-ARMCANZ – 2000 Guidelines.

For future reference values above, the following would be considered potentially harmful to livestock drinking water:

Nitrate - >400mg/L

Nitrite - >30mg/L

TDS – varies but values lower than or between 2000-4000mg/L tolerable based on the type of livestock.

Arsenic – Trigger Value >0.5mg/L

Mercury – Trigger Value >0.002mg/L

Zinc – Trigger Value >20mg/L

The groundwater monitoring bores are also subject to the background level review as provided by DWER. The derived background levels are:

TDS – 764mg/L

Total Nitrogen – 8.11mg/L

Total Phosphorus – 2.17mg/L

TDS – Apart from Bore 1S, all remaining bores fall below the background levels. During the 2019 Annual Review DWER was notified that our testing agent believed that Monitoring Bore 1S had been contaminated with foreign contaminants due to the bore covering being inadvertently removed for a period of time. This is supported by the monthly testing results, which show that since the covering has been put back in place, the results for all measured parameters are returning to more normal levels for this bore. Given this, testing has subsequently returned to quarterly analysis. We believe we will see a new seasonal variation that will continue to occur in that bore. Bore 5S is understood to be a sampling error. We will continue to monitor this bore.

Total Nitrogen – All bores currently exceed the background level for Total Nitrogen. As above, monitoring Bore 1S exceeded this level the most. We will investigate this bore, monitor its results, and understand what is causing the spike.

Total Phosphorus – All bores currently exceed the background level for Total Nitrogen. As above, monitoring Bore 1S was the worst, but this decreased to more normal levels. We will continue to monitor these results, and if anything significantly changes, we will investigate to understand what is causing the change.

Table 1 Mushroom Exchange Groundwater Bore Assessment Results for MB1

Test for MB1	20/01/2016 MB1	14/04/2016 MB1	6/07/2016 MB1D	5/10/2016	10/01/2017	18/04/2017	19/07/2017	12/10/2017	18/01/2018	11/04/2018	23/07/2018	22/10/2018	23/01/2019	30/04/2019	30/07/2019	23/10/2019	30/01/2020	28/04/2020	29/07/2020	30/10/2020
pH	6.92	7.25	6.22																	
conductivity @ 25°C µS/cm			1185																	
Total dissolved solids	1260	1390	746																	
Total Kjeldahl Nitrogen mg/L			45.4																	
Total Nitrate Nitrogen mg/L	0.01	0.05	4.87																	
Total Nitrite Nitrogen mg/L	0.01	0.01	0.01																	
Total Nitrogen mg/L			50.3																	
Total inorganic Nitrogen	13.4	56	42.8																	
Ammonia Nitrogen	13.4	56	37.9																	
Total Phosphorus mg/L	9.17	11.6	16.1																	
Standing water level meters	4.4	4.4	4.22																	

Table 1A Mushroom Exchange Groundwater Bore Assessment Results for MB1S

Test for MB1S	10/01/2017 MB1S	18/04/2017 MB1S	19/07/2017 MB1S	12/10/2017 MB1S	18/01/2018 MB1S	11/04/2018 MB1S	23/07/2018 MB1S	22/10/2018 MB1S	23/01/2019 MB1S	30/04/2019 MB1S	30/07/2019 MB1S	23/10/2019 MB1S	30/01/2020 MB1S	28/04/2020 MB1S	29/07/2020 MB1S	30/10/2020 MB1S	26/01/2021 MB1S	27/04/2021 MB1S	30/07/2021 MB1S	27/10/2021 MB1S	11/01/2022 MB1S
East:390993; North:6404439																					
pH	6.04	5.94	6.07	6.02	5.6	5.54	6.19	5.95	7.13	5.12	5.94	6.43	6.8	6.52	6.23	5.93	6.06	6.37	6.58	6.35	6.08
conductivity @ 25°C µS/cm	1451	1060	905	1080	1287	890	1387	2112	1928	1102	1615	2880	6410	4000	2190	1340	1528	3780	2110	1070	2780
Total dissolved solids	928.64	678	580	632	824	570	888	1352	1234	705	1033	1843	4100	2560	1402	858	978	2419	1350	685.0	1779
Mercury								<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.00005	<0.00005	<0.00005
Zinc				0.005	0.009	0.02	0.01	0.04	0.16	<0.01	0.05	<0.01	0.33	0.13	0.03	0.02	0.11	0.038	0.025	0.0	0.009
Arsenic				0.004	0.004	0.004	0.004	0.008	0.005	0.007	0.008	0.013	0.035	0.008	0.021	0.006	0.017	0.034	0.006	0.0	0.012
Total Kjeldahl Nitrogen mg/L	36.5	18.3	10.1	14.3	20.5	13	35	53	39	20	56	120	250	190	97	50	110	150	100	39	100
Total Nitrate Nitrogen mg/L	0.1	0.05	3.86	3.97	1.82	<0.01	3.1	<0.01	<0.01	<0.01	<0.01	<0.01	0.06	0.03	0.16	<0.01	<0.01	0.02	<0.05	<0.005	<0.005
Total Nitrite Nitrogen mg/L	0.01	0.01	<0.01	<0.01	0.34	<0.01	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.04	<0.01	<0.01	<0.01	<0.05	<0.005	<0.005
Total Nitrogen mg/L	36.6	18.4	14.0	18.3	22.7	13.0	38	53	39	20	56	120	250	190	97	61	110	150	100	39	100
Total inorganic Nitrogen	25.61	11.46	10.28	12.98	17.36	8.60	32.15	33.00	25.00	9.80	40.00	120.00	250.00	190.00	72.00	39.00	93	130	68.00	24.00	83.00
Ammonia Nitrogen	25.5	11.4	6.42	9.01	15.2	8.6	29	33	25	9.8	40	120	250	190	72	39	93	130	68	24	83
Total Phosphorus mg/L	8.5	6.32	4.80	5.20	4.89	4.80	3.1	4.8	15	7.2	3.9	5.9	23	33	90	18	17	16	11	8	4.7
Top of Casing mAHd	19.765	19.765	19.765	19.765	19.765	19.765	19.765	19.765	19.765	19.765	19.765	19.765	19.765	19.765	19.765	19.765	20.765	21.765	22.765	23.765	24.765
Height of casing above GL	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Standing Water Level mAHd	15.36	15.25	16.21	16.17	15.87	15.48	16.32	16.06	15.60	15.73	16.24	15.65	15.81	15.54	15.84	15.90					
Standing water level mBGL	3.37	3.48	2.52	2.56	2.86	3.25	2.41	2.67	3.13	3.00	2.49	3.08	2.92	3.19	2.89	2.83	3.07	3.55	2.7	2.60	3.04

Table 2 Mushroom Exchange Groundwater Bore Assessment Results for MB2

Test for MB2	10/01/2017 MB 2	18/04/2017 MB 2	19/07/2017 MB 2	12/10/2017 MB 2	18/01/2018 MB 2	11/04/2018 MB 2	23/07/2018 MB 2	22/10/2018 MB 2	23/01/2019 MB 2	30/04/2019 MB 2	30/07/2019 MB 2	23/10/2019 MB 2	30/01/2020 MB 2	28/04/2020 MB 2	29/07/2020 MB 2	30/10/2020 MB 2	26/01/2021 MB 2	27/04/2021 MB 2	30/07/2021 MB 2	27/10/2021 MB 2	11/01/2022 MB 2
East:391017; North:6404455																					
pH	5.93	5.88	6.31	6.2	5.57	5.30	5.74	5.71	7.1	4.8	5.89	6.1	5.19	6.58	6.06	7.42	6.13	5.78	4.36	6.21	5.79
conductivity @ 25°C µS/cm	716	703	1149	779	329	613	453	439	416	373	1875	423	384	377	566	721	385	316	630	348	316
Total dissolved solids	458.24	450	736	499	211	392	290	281	266	239	1200	271	245	241	362	461	246	202	403	223	202
Mercury								<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.00005	<0.00005	0.00005
Zinc				<0.005	0.02	<0.01	<0.01	<0.01	0.06	<0.01	0.04	<0.01	<0.01	<0.01	<0.01	0.10	0.1	<0.005	0.004	0.001	0.001
Arsenic				0.002	<0.001	0.002	0.001	0.001	<0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	<0.001	<0.001	<0.001
Total Kjeldahl Nitrogen mg/L	9.2	7.4	7.3	8.1	4.4	9.1	4.8	6.8	3.8	5.5	25	6	4.3	5.9	6	7	4.1	5.1	7	223	3.5
Total Nitrate Nitrogen mg/L	35.7	7.52	11.6	0.06	0.06	0.37	7.2	<0.01	<0.01	<0.01	21	12	8.6	0.48	22	16	9.9	5.8	17	<0.005	0.008
Total Nitrite Nitrogen mg/L	0.04	0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.02	0.01	0.06	0.12	0.05	0.04	0.04	0.07	<0.05	<0.005	<0.005
Total Nitrogen mg/L	44.9	14.9	18.9	8.2	4.5	9.5	12	6.8	3.8	5.5	25	18	13	6.5	28	23	14	11	24	3.3	3.5
Total inorganic Nitrogen	38.4	13.7	12.0	1.5	1.6	4.6	8.1	2.7	0.6	1.8	22.1	12.8	10.2	3.2	51.0	17.7	12.2	9	18	0.28	0.53
Ammonia Nitrogen	2.68	6.18	0.42	1.42	1.52	4.2	0.9	2.7	0.56	1.8	1.1	0.79	1.5	2.6	0.8	1.7	2.3	3.1	1	0.28	0.52
Total Phosphorus mg/L	1.79	1.98	1.7	8.34	5.4	4.9	2.5	9.2	4.7	3.6	3.6	3.4	2.3	2.8	2.9	2.8	1.9	4.34	2.2	3.2	2.3
Top of Casing mAHd	19.885	19.885	19.885	19.885	19.885	19.885	19.885	19.885	19.885	19.885	19.885	19.885	19.885	19.885	19.885	19.885	20.885	21.885	22.885	23.885	24.885
Height of casing above GL	0.876	0.876	0.876	0.876	0.876	0.876	0.876	0.876	0.876	0.876	0.876	0.876	0.876	0.876	0.876	0.876	0.876	0.876	0.876	0.876	0.876
Standing Water Level mAHd	14.85	14.77	16.18	15.69	15.46	14.94	16.26	15.59	15.08	15.61	16.20	15.15	15.72	15.46	16.12	16.07					
Standing water level mBGL	4.16	4.24	2.83	3.32	3.55	4.07	2.75	3.42	3.93	3.40	2.81	3.86	3.29	3.55	2.89	2.94	3.17	4.34	3.12	3.32	3.84

Table 3 Mushroom Exchange Groundwater Bore Assessment Results for MB3

Test for MB3 East:391066; North:6404446	10/01/2017 MB 3	18/04/2017 MB 3	19/07/2017 MB 3	12/10/2017 MB 3	18/01/2018 MB 3	11/04/2018 MB 3	23/07/2018 MB 3	22/10/2018 MB 3	23/01/2019 MB 3	30/04/2019 MB 3	30/07/2019 MB 3	23/10/2019 MB 3	30/01/2020 MB 3	28/04/2020 MB 3	29/07/2020 MB 3	30/10/2020 MB 3	26/01/2021 MB 3	27/04/2021 MB 3	30/07/2021 MB 3	27/10/2021 MB 3	11/01/2022 MB 3
pH	5.91	5.71	5.98	6.16	5.73	5.39	5.61	5.83	7.02	5.75	5.48	5.84	4.8	6.27	6.1	6.61	5.8	6.05	5.91	6.25	5.94
conductivity @ 25°C µS/cm	821	1048	1482	579	390	895	1043	535	765	1586	600	523	700	696	720	737	15	893	750	471	458
Total dissolved solids	525	671	949	371	250	573	667	343	490	1015	384	335	450	445	460	472	266	572	480	300	293
Mercury								<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.00005	<0.00005	<0.00005
Zinc				<0.005	0.023	<0.01	<0.01	<0.01	0.06	<0.01	0.07	<0.01	<0.01	<0.01	<0.01	<0.005	0.089	<0.005	0.006	0	0.004
Arsenic				0.001	<0.001	0.003	0.002	0.001	0.003	0.003	0.001	0.002	0.002	0.001	0.002	0.002	0.002	0.002	0.001	<0.001	<0.001
Total Kjeldahl Nitrogen mg/L	9	7.1	7.0	7.0	5.7	8.0	12	8.7	11	11	8	10	9.2	9.7	15	10	12	13	13	11	12
Total Nitrate Nitrogen mg/L	11	13.1	2.88	0.02	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.17	9.1	3.9	<0.014	<0.01	14	3.8	<0.005
Total Nitrite Nitrogen mg/L	0.14	0.12	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.08	0.11	0.12	0.09	<0.01	<0.01	<0.05	<0.005	<0.005
Total Nitrogen mg/L	20.1	20.3	9.9	7.0	5.8	8.0	12	8.7	11	11	8	10	9.2	9.7	15	10	12	13	26	14	12
Total inorganic Nitrogen	13.08	15.97	3.6	1.3	2.6	3.3	4.7	3.4	4.9	4.9	2.9	5.1	3.8	4.9	10.3	5.7	6	6.4	14.4	4.9	3.2
Ammonia Nitrogen	1.94	2.75	0.71	1.23	2.55	3.3	4.7	3.4	4.9	4.9	2.9	5.1	3.7	4.6	1.1	1.7	6	6.4	0.4	1.1	3.2
Total Phosphorus mg/L	2.48	2.4	2.86	5.92	5.33	3.5	4.8	6.6	4.1	4.2	8	3.4	3.1	3	4	3.6	4.5	4.7	5.2	4.4	3.7
Top of Casing mAHd	19.493	19.493	19.493	19.493	19.493	19.493	19.493	19.493	19.493	19.493	19.493	19.493	19.493	19.493	19.493	19.493	20.493	21.493	22.493	23.493	24.493
Height of casing above GL	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Standing Water Level mAHd	14.98	14.90	16.18	15.80	15.04	15.03	16.42	15.71	15.15	15.74	16.29	15.28	15.80	15.53	16.23	16.18					
Standing water level mBGL	3.70	3.77	2.49	2.87	3.63	3.64	2.25	2.96	3.52	2.93	2.38	3.39	2.87	3.14	2.44	2.49	2.69	3.85	2.53	2.78	3.41

Table 4 Mushroom Exchange Groundwater Bore Assessment Results for MB4

Test for MB4 East:391097; North:6404421	10/01/2017 MB 4	18/04/2017 MB 4	19/07/2017 MB 4	12/10/2017 MB 4	18/01/2018 MB 4	11/04/2018 MB 4	23/07/2018 MB 4	22/10/2018 MB 4	23/01/2019 MB 4	30/04/2019 MB 4	30/07/2019 MB 4	23/10/2019 MB 4	30/01/2020 MB 4	28/04/2020 MB 4	29/07/2020 MB 4	30/10/2020 MB 4	26/01/2021 MB 4	27/04/2021 MB 4	30/07/2021 MB 4	27/10/2021 MB 4	11/01/2022 MB 4
pH	4.85	4.92	4.79	5.34	4.67	4.38	4.41	5.32	7	4.91	5.03	4.82	5.24	6.01	4.75	5.72	5.07	4.64	3.65	5.65	5.31
conductivity @ 25°C µS/cm	1016	858	1220	1230	804	973	1045	336	842	651	663	1016	908	672	741	830	358	392	840	700	730
Total dissolved solids	650	549	781	787	515	623	669	215	539	417	424	650	580	430	474	531	229	251	546	448.00	467
Mercury								<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.00005	<0.00005	<0.00005
Zinc				0.013	0.008	<0.01	0.01	<0.01	0.07	<0.01	0.10	<0.01	0.36	0.12	<0.01	<0.005	0.17	<0.005	0.012	0.01	0.004
Arsenic				0.001	0.002	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.001	0.001	0.001	0.002	0.002	<0.001	0.00	<0.001
Total Kjeldahl Nitrogen mg/L	9.6	9.1	9.1	14.4	8.1	15	21	14	13	17	29	16.8	36	19	17	11	12	13	13	11	12
Total Nitrate Nitrogen mg/L	0.1	0.05	15.5	43.2	0.15	0.07	6.2	8.2	<0.01	<0.01	17	0.22	<0.01	0.15	17	0.24	<0.01	<0.01	14	3.8	<0.005
Total Nitrite Nitrogen mg/L	0.01	0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	0.02	0.04	<0.01	<0.01	<0.05	<0.005	<0.005
Total Nitrogen mg/L	25.7	9.1	28.3	57.6	8.4	15.1	27	22	13	17	29	17	36	19	34	11	12	13	26	14	12
Total inorganic Nitrogen	1.87	4.97	17.9	44.4	3.87	5.2	11.6	11.3	6.0	7.0	24.0	7.8	9.0	8.2	21.6	4.2	6.00	6.40	14.40	4.90	3.20
Ammonia Nitrogen	1.76	4.91	2.4	1.23	3.7	5.1	5.4	3.1	6	7	7	7.6	9	8	4.8	3.9	6	6.4	0.4	1.1	3.2
Total Phosphorus mg/L	3.58	2.98	2.58	1.63	4.74	4.1	4.1	2.7	2.2	3.9	5	4.8	5.9	5.7	5.2	5.8	4.5	4.7	5.2	4.4	3.7
Top of Casing mAHd	19.511	19.511	19.511	19.511	19.511	19.511	19.511	19.511	19.511	19.511	19.511	19.511	19.511	19.511	19.511	19.511	20.511	21.511	22.511	23.511	24.511
Height of casing above GL	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684
Standing Water Level mAHd	15.16	15.11	16.43	16.01	15.63	15.20	16.54	15.91	15.34	15.82	16.37	15.49	15.85	15.60	16.34	16.28					
Standing water level mBGL	3.67	3.72	2.40	2.82	3.20	3.63	2.29	2.92	3.49	3.01	2.46	3.34	2.96	3.23	2.49	2.55	2.56	3.78	2.66	2.72	3.36

Table 5 Mushroom Exchange Groundwater Bore Assessment Results for MB5

Test for MB5	20/01/2018 MB 5	14/04/2018 MB 5																			
pH	6.29	6.4																			
conductivity @ 25°C µS/cm																					
Total dissolved solids	470	575																			
Total Kjeldahl Nitrogen mg/L																					
Total Nitrate Nitrogen mg/L	0.03	0.05																			
Total Nitrite Nitrogen mg/L	0.01	0.01																			
Total Nitrogen mg/L																					
Total inorganic Nitrogen	27.2	33																			
Ammonia Nitrogen	27.2	33																			
Total Phosphorus mg/L	0.11	0.29																			
Standing water level mBGL	5.03	5.95																			

Table 5A Mushroom Exchange Groundwater Bore Assessment Results for MB5S

Test for MB5S East:391080; North:6404308	10/01/2017 MB5S	18/04/2017 MB5S	19/07/2017 MB5S	12/10/2017 MB5S	18/01/2018 MB5S	11/04/2018 MB5S	23/07/2018 MB5S	22/10/2018 MB5S	23/01/2019 MB5S	30/04/2019 MB5S	30/07/2019 MB5S	23/10/2019 MB5S	30/01/2020 MB5S	28/04/2020 MB5S	29/07/2020 MB5S	30/10/2020 MB5S	26/01/2021 MB5S	27/04/2021 MB5S	30/07/2021 MB5S	27/10/2021 MB5S	11/01/2022 MB5S
pH	5.68	5.66	5.64	5.53	5.24	5.54	5.13	5.52	6.98	6.09	5.48	6.23	4.83	5.93	5.78	5.71	5.38	5.66	5.21	5.45	5.21
conductivity @ 25°C µS/cm	332	299	317	441	291	312	334	309	307	267	243	326	264	206	333	263	197	2193	320	434	268
Total dissolved solids	212	191	203	282	286	200	214	198	196	171	155	209	170	132	213	174	126	1403	205	278.00	172
Mercury								<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.00005	<0.00005	<0.00005
Zinc				0.096	0.038	0.01	0.04	0.04	0.06	<0.01	0.05	0.01	0.21	<0.01	<0.01	0.31	0.089	<0.005	0.052	0.01	0.051
Arsenic				<0.001	<0.001	0.001	<0.001	0.001	0.001	0.002	<0.001	<0.001	0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Kjeldahl Nitrogen mg/L	2.9	2.1	2.1	5.9	2.6	4.1	3.6	3.3	3.3	3.1	9.4	5.6	3.4	3.6	2	6.9	3.1	4.7	11	12	3.9
Total Nitrate Nitrogen mg/L	0.61	0.05	4.1	9.44	0.12	<0.01	3.8	4.8	0.01	0.01	7.6	3.4	<0.01	<0.01	16	6.1	<0.01	<0.01	7.6	8	0.27
Total Nitrite Nitrogen mg/L	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.05	<0.005	<0.005
Total Nitrogen mg/L	2.9	2.2	8.3	15.3	2.7	4.1	7.4	8.1	3.3	3.1	17	8	3.4	1.2	18	13	3.1	4.7	11	12	3.9
Total inorganic Nitrogen	1.09	0.94	5.06	9.72	0.52	0.51	4.50	5.10	0.57	0.55	8.05	3.77	0.47	1.20	18.00	0.40	1.30	8.00	8.25	0.65	
Ammonia Nitrogen	0.47	0.88	0.96	0.28	0.4	0.51	0.7	0.3	0.55	0.53	0.44	0.37	0.47	12	0.25	0.32	0.42	1.3	0.4	0.25	0.38
Total Phosphorus mg/L	6.38	4.5	4.56	5.09	11.4	7.9	4.3	4.6	4.4	3.8	3.7	3.5	3.7	3.6	3.2	5	3.5	4.7	3.9	4.3	4.3
Top of Casing mAHD	20.489	20.489	20.489	20.489	20.489	20.489	20.489	20.489	20.489	20.489	20.489	20.489	20.489	20.489	20.489	20.489	20.489	20.489	20.489	20.489	20.489
Height of casing above GL	0.845	0.845	0.845	0.845	0.845	0.845	0.845	0.845	0.845	0.845	0.845	0.845	0.845	0.845	0.845	0.845	0.845	0.845	0.845	0.845	0.845
Standing Water Level mAHD	15.11	15.31	16.26	16.25	15.77	15.56	16.46	15.58	15.65	15.07	16.30	15.73	15.87	15.67	16.46	16.29					
Standing water level MBGL	4.53	4.33	3.38	3.39	3.87	4.08	3.18	4.06	3.99	4.57	3.34	3.91	3.77	3.97	3.18	3.35	3.36	4.36	3.61	3.41	3.81

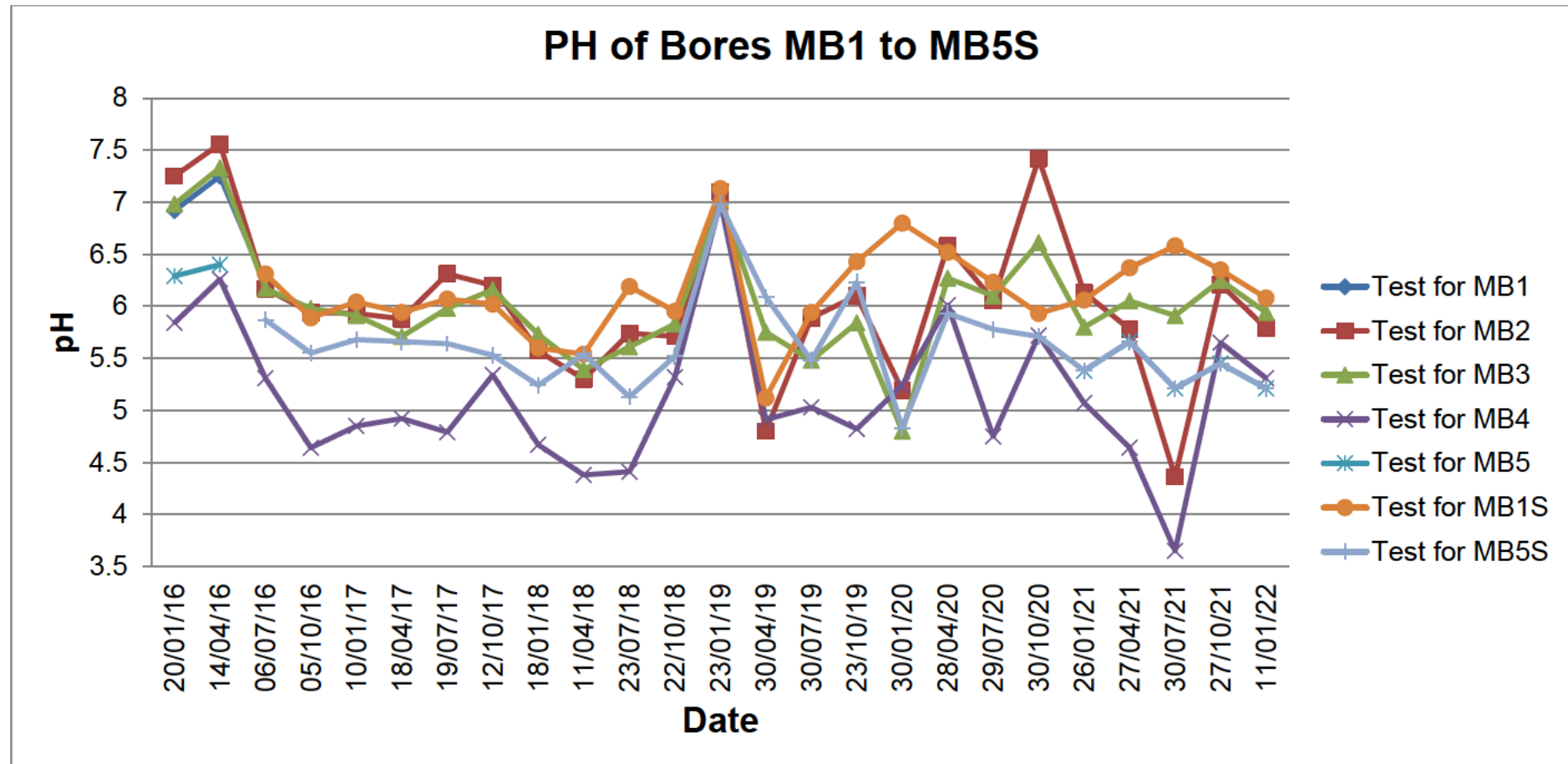
Table 6 pH Groundwater Bore Assessment Results for MB1 to MB5S

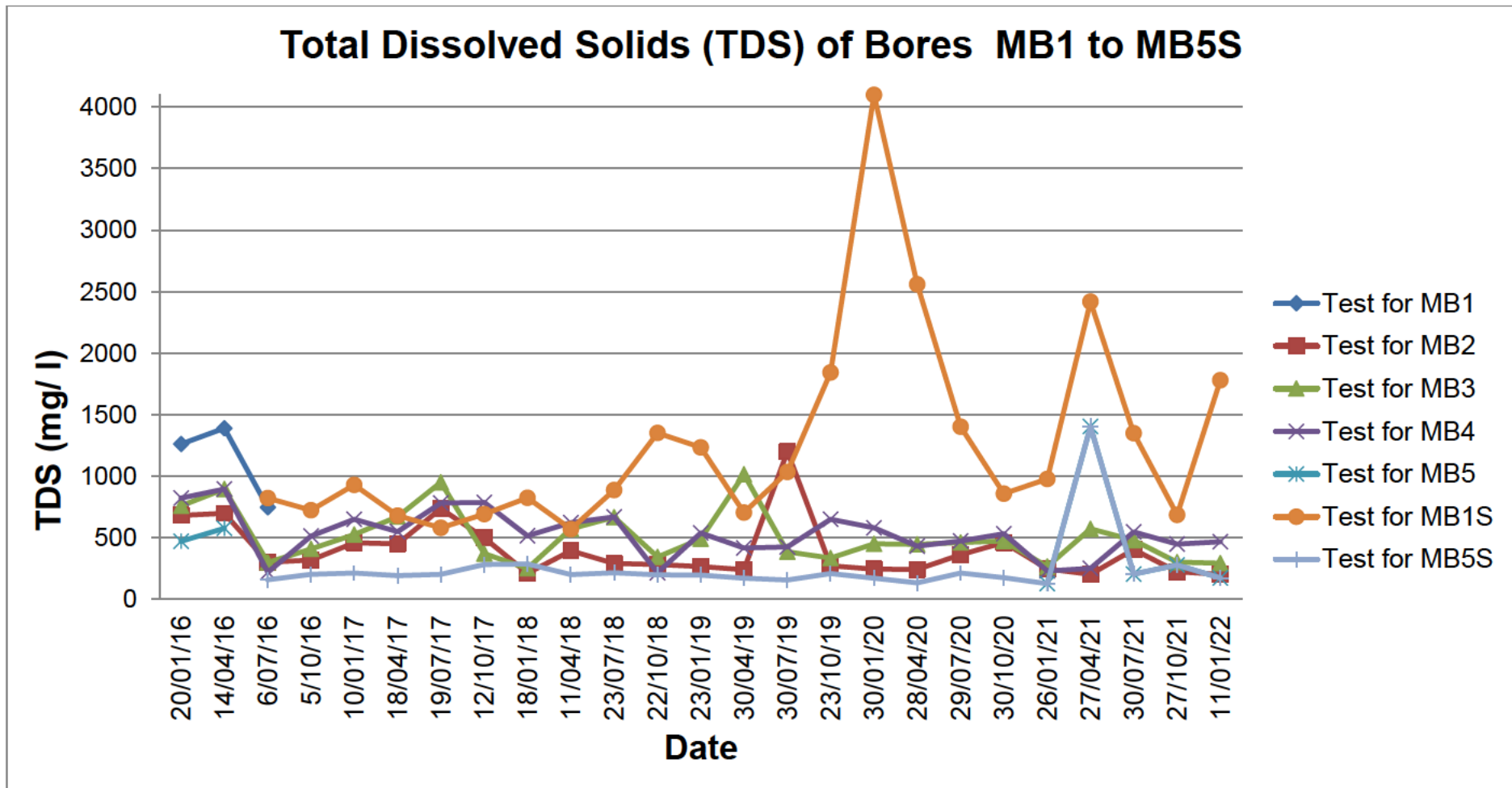
Table 7 Total Dissolved Solids (TDS) Groundwater Bore Assessment Results for MB1 to MB5

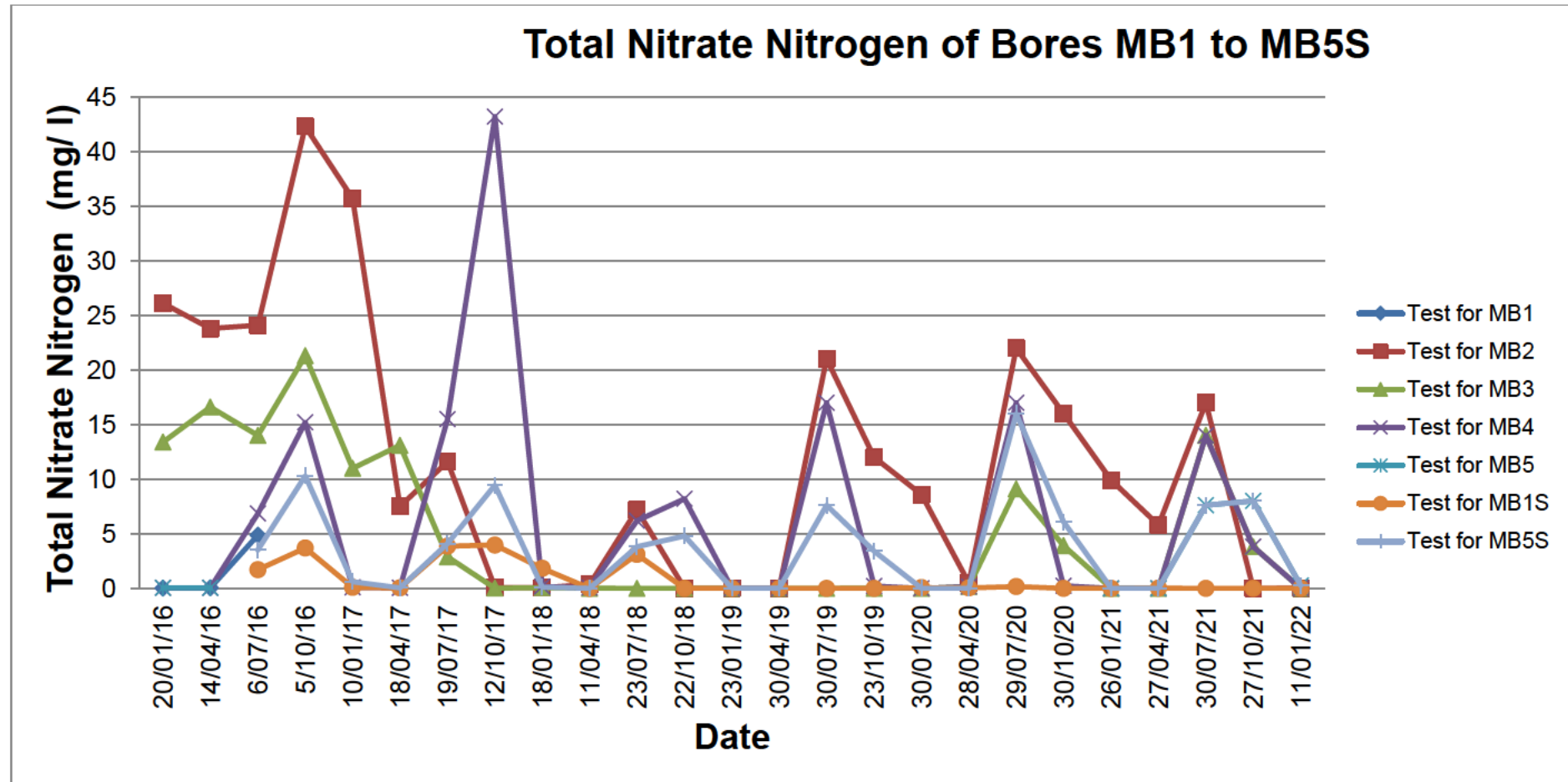
Table 8 Total Nitrate as Nitrogen Groundwater Bore Assessment Results for MB1 to MB5

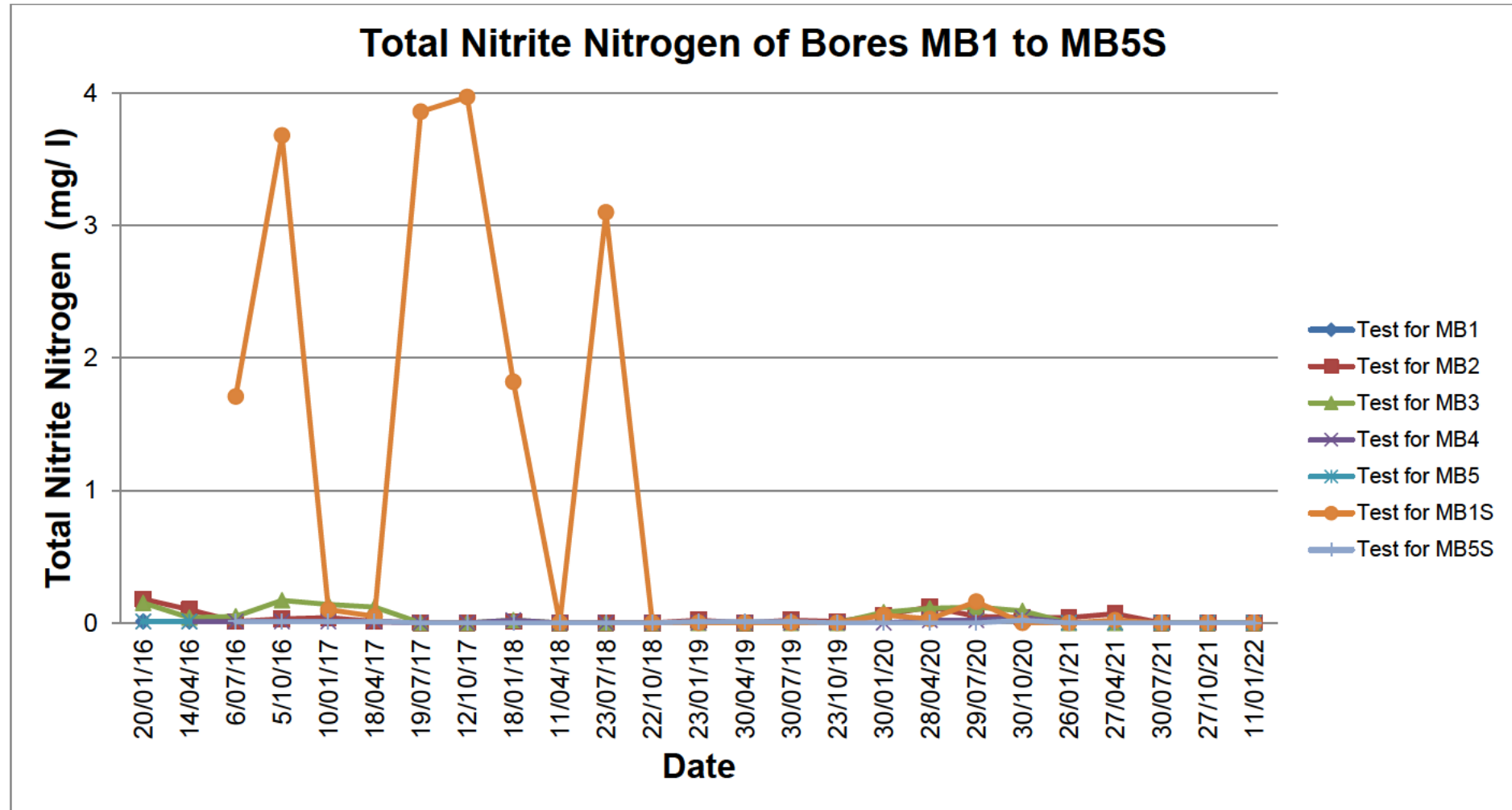
Table 9 Total Nitrite Nitrogen Groundwater Bore Assessment Results for MB1 to MB5

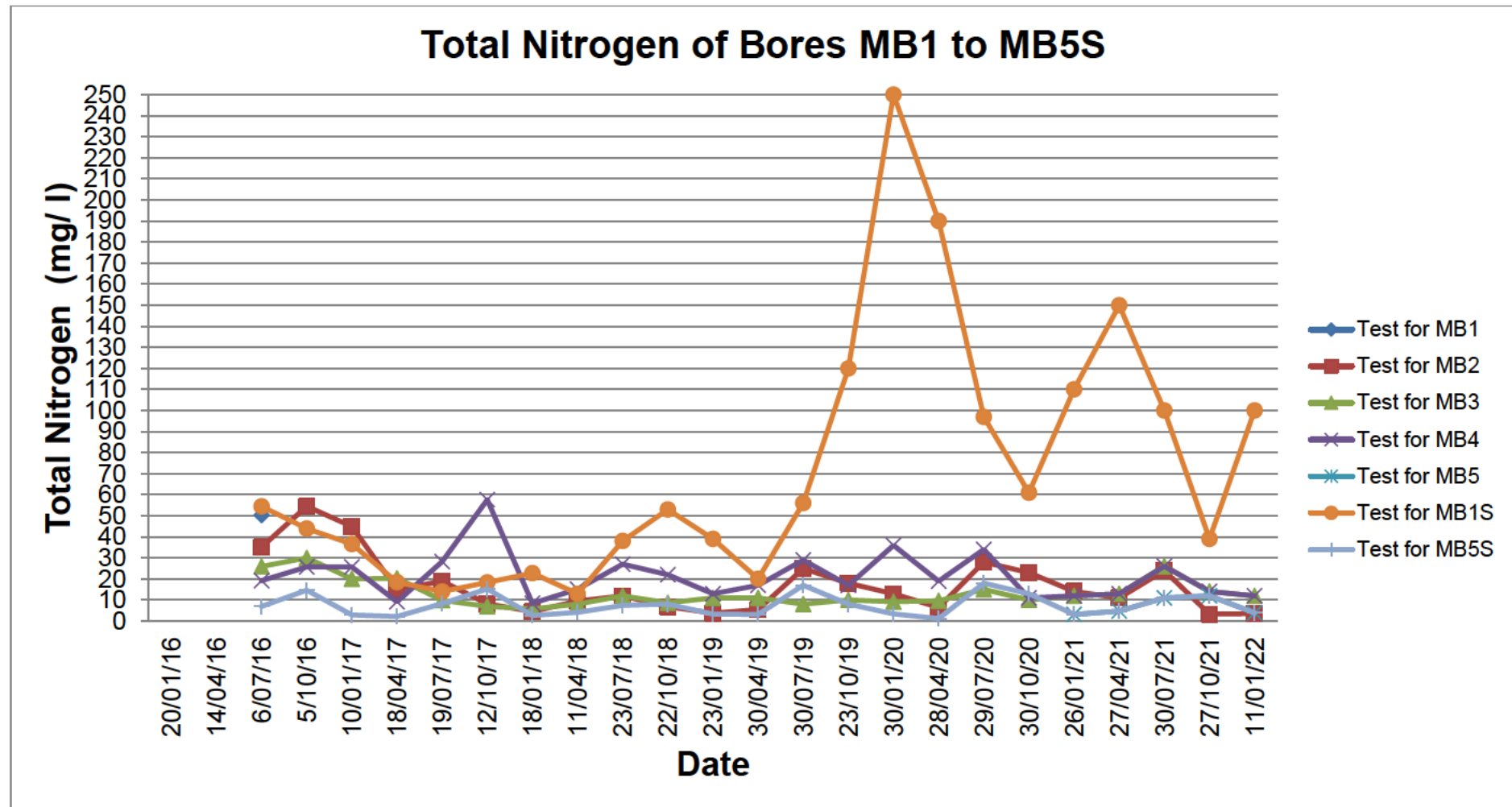
Table 10 Total Inorganic Nitrogen Groundwater Bore Assessment Results for MB1 to MB5

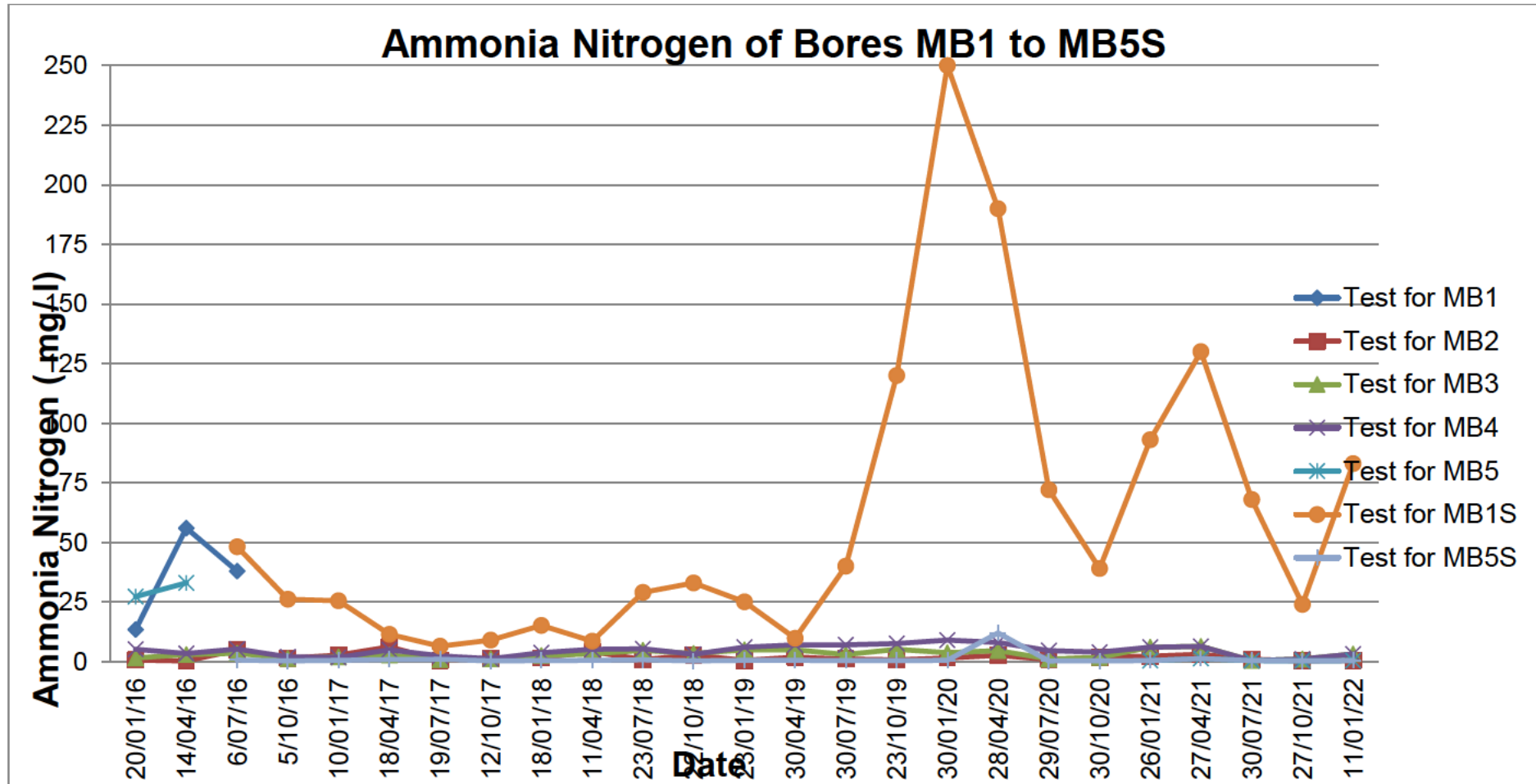
Table 11 Ammonia Nitrogen Groundwater Bore Assessment Results for MB1 to MB5

Table 12 Total Phosphorous Groundwater Bore Assessment Results for MB1 to MB5

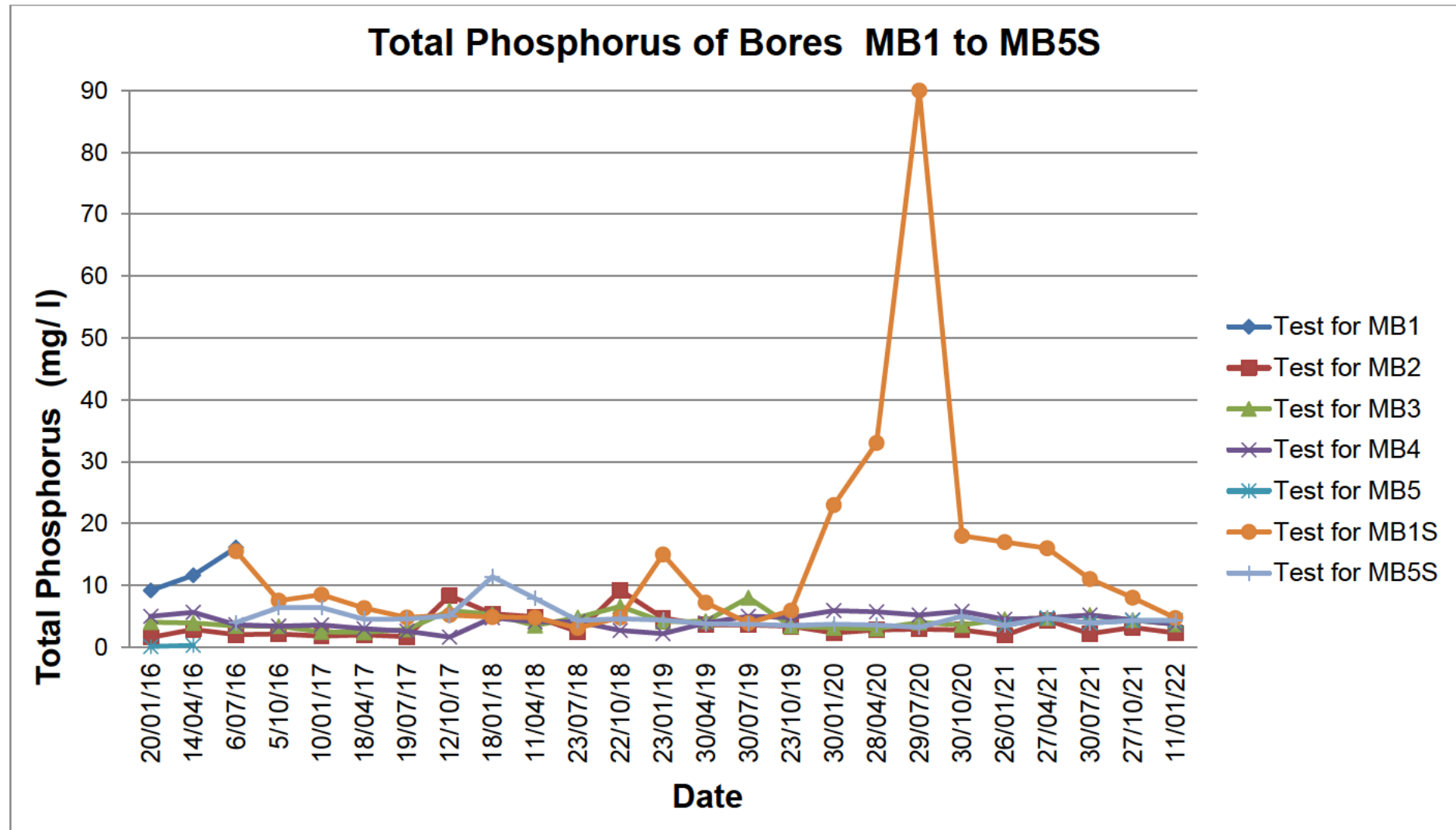
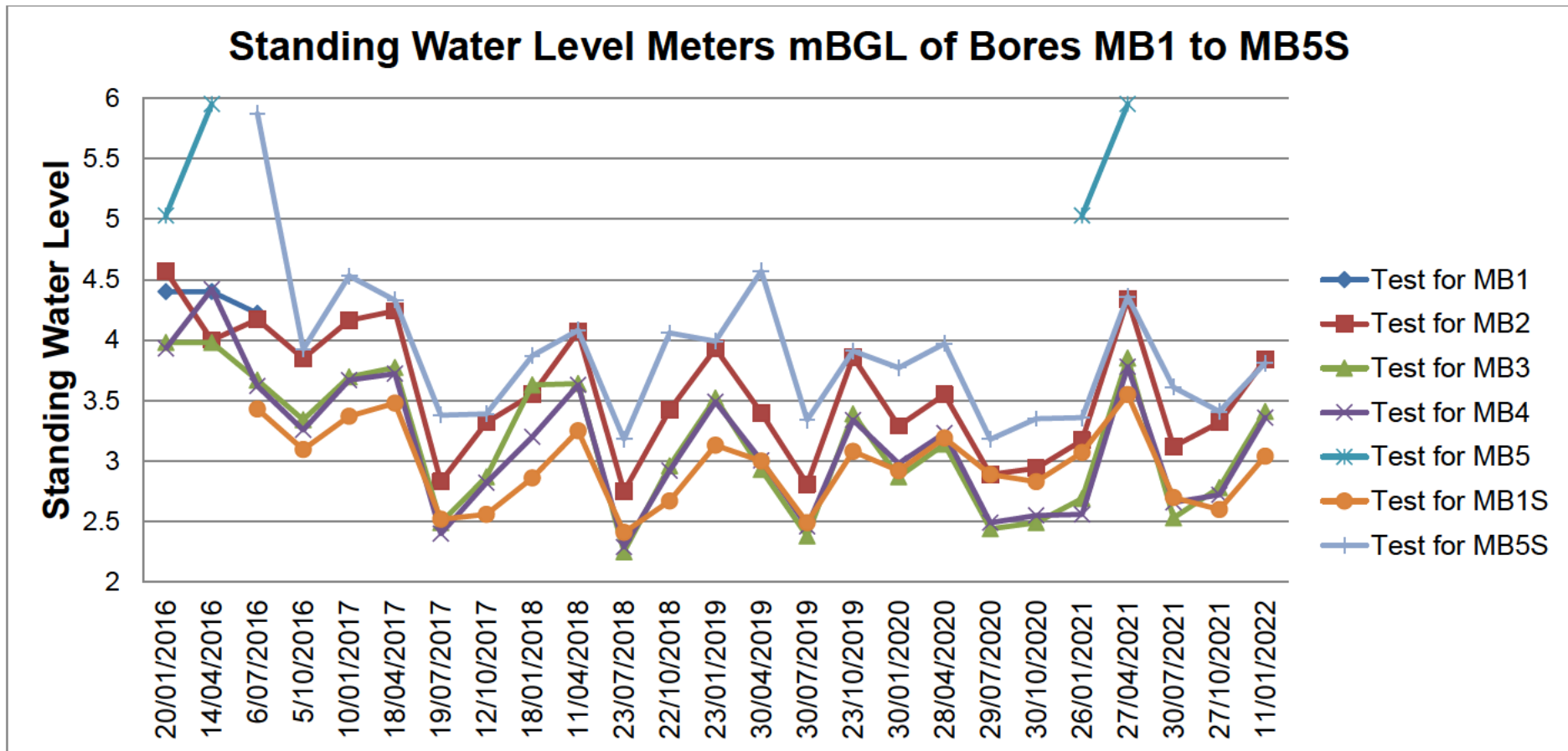


Table 13 Standing Water Level Groundwater Bore Assessment Results for MB1 to MB5

4.2 POND MONITORING

Pond (leachate) monitoring has commenced with onsite testing.

This testing is record only – the results of testing are provided in the separate spreadsheet – 2021 DWER Nambeelup Licence Number L7210-1997-10 Groundwater Monitoring – Annual Report. The represented data shows that the leachate ponds are relatively stable with the main variations appearing to occur around the changes in seasons. This outcome is not unexpected as we only use one dam for the majority of the year, and this is being replenished with bore water regularly on a weekly basis.

Appendix 1. Annual Audit Compliance Report Proforma

Appendix 2. ALS ENVIRONMENTAL RESULTS