



10 April 2018

JPAbusiness Pty Ltd
Suite 7/113, Byng Street
Orange NSW 2800

Attn: James Price

Our ref: L6612c10

Dear James,

Groundwater Monitoring - Proposed Small Stock Abattoir, North Bourke NSW

1. Introduction

A small stock abattoir is proposed for Lot 17 DP753546 Mitchell Highway, Bourke NSW. Conditions of consent include monthly monitoring of groundwater to obtain baseline data on groundwater levels and quality. The monitoring program was described in Envirowest Consulting Pty Ltd report L6612c1.1 and approved by DPI Water, EPA and Bourke Shire Council. Two groundwater monitoring wells were constructed on the site in May 2017 to enable groundwater monitoring (Envirowest Consulting Pty Ltd report L6612c1).

2. Scope

Provide a summary of the results of nine months of groundwater monitoring from two groundwater wells.

3. Monitoring bores

3.1 Sampling procedure

The following was undertaken at each sampling event:

- Measurement of standing water levels
- Purging of well followed by allowing to refill. Samples collected after the well had refilled.
- Groundwater samples collected by Envirowest personnel.
- The water samples drained into new bottles supplied by the laboratory and appropriate for the analytes.
- Samples stored under refrigeration and transported with ice in insulated containers. Appropriate storage duration observed. A chain of custody form tracked the samples to the laboratory.

3.2 Analytes

Groundwater samples were analysed on-site for pH, electrical conductivity, redox potential, dissolved oxygen and temperature. Groundwater samples were analysed in the NATA accredited laboratory of SGS. All samples were analysed for heavy metals (arsenic, cadmium, chromium, copper, lead, nickel and zinc), electrical conductivity, nitrogen, nitrite + nitrate, cations, anions and phosphorus.

4. Assessment criteria

Samples were collected by Envirowest to provide baseline data of groundwater located on the site.

5. Results

The statistical analysis of the results is provided in the following tables. The raw data is provided in Appendix 1.

Table 1. Groundwater SWL and field parameters

	SWL (m)	Temperature (°C)	pH	EC (mS/cm)	DO (ppm)	Redox (mV)
Min	12.421	22.7	4.0	16.7	2.29	54.10
Max	17.542	26.7	7.6	37.9	7.65	299.00
STD	1.655	1.0	0.9	7.6	1.64	76.49
Average	15.175	24.5	6.2	24.6	4.52	168.81
CI	7.01	11.31	2.88	12.91	2.09	77.98
95% CI	22.19	35.79	9.12	37.54	6.60	246.79

Table 2. Groundwater parameter results (mg/L)

	EC (mS/cm)	Chloride	Sulfate	Calcium	Magnesium	Potassium	Sodium
Min	18	5900	1500	720	330	55	2900
Max	49	15000	2600	1700	770	85	5900
STD	11	3546	351	401	190	11	1299
Average	30	9711	1989	1197	528	67	4261
CI	13.86	4486.22	918.80	552.82	244.07	31.13	1968.50
95% CI	43.86	14197.33	2907.69	1749.49	772.41	98.52	6229.61

Table 3. Groundwater nutrient results (mg/L)

	Total Nitrogen	Total Phosphorous	Nitrate as N	Nitrite as N	Total Kjeldahl Nitrogen
Min	0.23	0.03	0.23	0.01	0.05
Max	1.50	0.62	1.50	0.20	0.59
STD	0.31	0.19	0.30	0.08	0.15
Average	0.73	0.14	0.75	0.04	0.24
CI	0.35	0.07	0.38	0.03	0.12
95% CI	1.07	0.21	1.13	0.07	0.36

Table 4. Groundwater metal results (ug/L)

	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc
Min	1	0	1	1	ND	1	6
Max	3	1	4	25	ND	6	86
STD	1	0	1	6	ND	1	19
Average	2	0	3	5	ND	3	26
CI	1.24	0.25	1.32	2.51	ND	1.34	12.09
95% CI	3.33	0.57	4.00	7.64	ND	4.17	38.25

6. Conclusion

The statistical analysis of the background monitoring of the groundwater on the small stock abattoir at Lot 17 DP753546 is suitable for use as a comparison to results obtained during groundwater monitoring during abattoir operation.

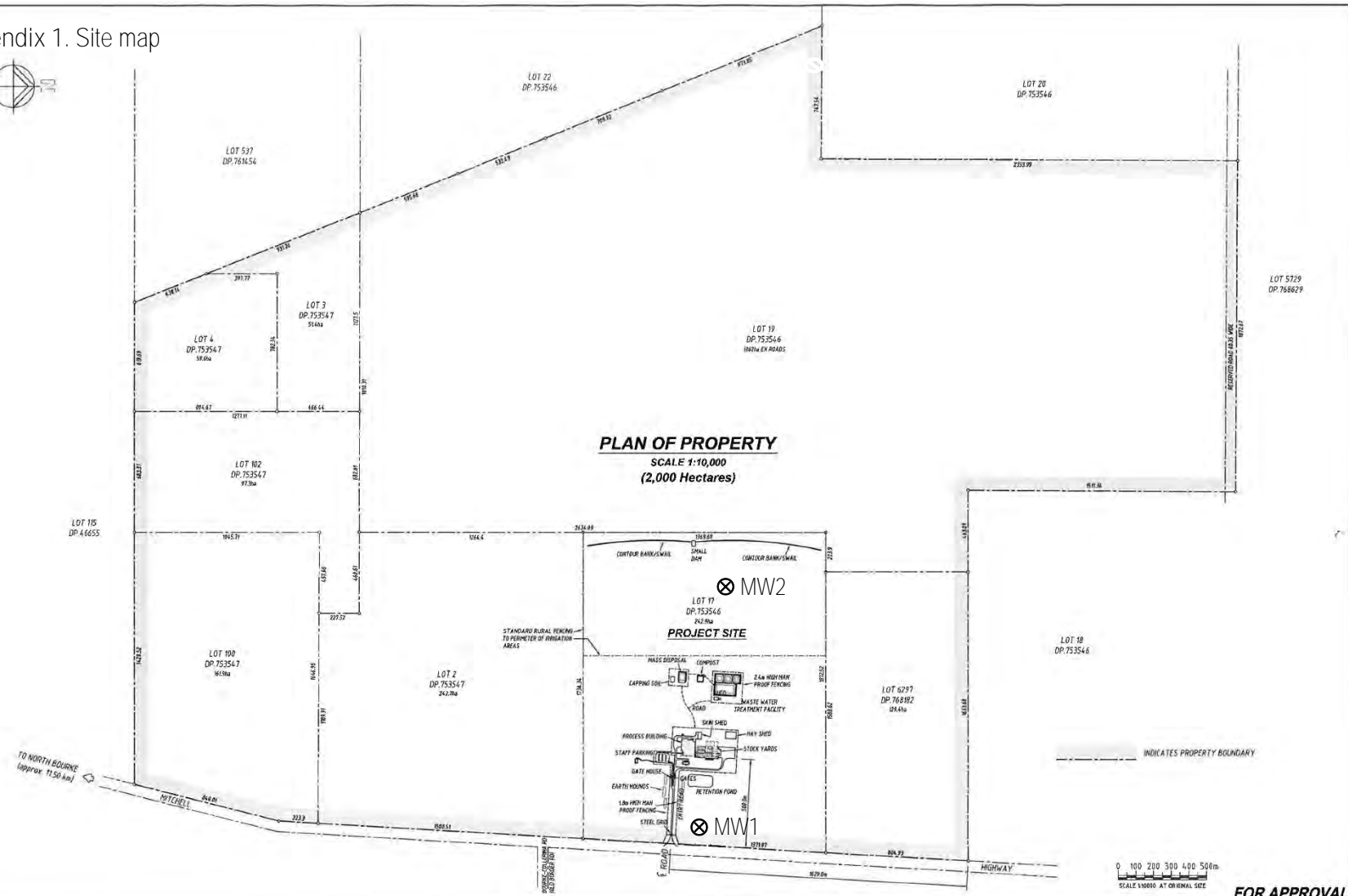
Please call if you require additional information.

Regards,

Leah Desborough
Senior Environmental Scientist

Attachments
Appendix 1. Site plan
Appendix 2. Raw data

Appendix 1. Site map



PLAN OF PROPERTY
SCALE 1:10,000
(2,000 Hectares)

0 100 200 300 400 500m
SCALE 1:10000 AT ORIGINAL SIZE

FOR APPROVAL

REVISED WITH RESPONSE TO SUBMISSIONS	LOH	23.01.17
ISSUED FOR APPROVAL	LOH	29.02.17
Prepared/Drawn/Checked	LOH	

SARAN
ENGINEERS & MANAGERS
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Project **PROPOSED SMALL STOCK ABATTOIR**
MITCHELL HIGHWAY, BOURKE N.S.W.

Title **PLAN OF PROPERTY**

Client CAPRA DEVELOPMENTS PTY LTD			
Drawn	LGH	Designated	Appointed
Scale	AS SHOWN	Date	FEB. 2016
Drawing No.	32061-DA.01	Rev:	B A1

Appendix 2. Raw data

Event	Date	Well_ID	Field Parameters						Groundwater Parameters (mg/L)			Major cations (mg/L)				Nutrients (mg/L)					Metals (ug/L)						
			SWL (m)	Temperature (°C)	pH	EC (mS/cm)	DO (ppm)	Redox (mV)	EC (mS/cm)	Chloride	Sulfate	Calcium	Magnesium	Potassium	Sodium	Total Nitrogen	Total Phosphorous	Nitrate as N	Nitrite as N	Total Kjeldahl Nitrogen	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc
1	7/06/2017	MW1	16.825	23.9	6.6	16.7	2.33	180.20	19	6,000	1,500	780	330	55	2,900	0.23	ND	0.23	0.20	0.59	1	0.9	3	25	ND	4	86
1	7/06/2017	MW2	15.042	22.7	6.2	31.2	5.98	192.00	37	13,000	2,200	1,400	640	71	4,900	ND	0.07	ND	ND	0.47	ND	0.3	ND	11	ND	5	53
2	13/07/2017	MW1	16.845	24.4	6.9	20.4	2.98	131.70	20	5,900	1,600	830	350	56	3,000	0.41	0.12	0.39	0.02	0.30	3	0.2	3	9	ND	2	42
2	13/07/2017	MW2	12.421	23.6	6.3	37.9	6.85	114.70	38	13,000	2,200	1,700	760	76	5,600	0.85	0.62	0.84	0.01	0.33	1	ND	2	2	ND	3	21
3	19/09/2017	MW1	13.600	23.0	4.1	>20	4.34	288.00	19	6,500	1,700	820	340	55	3,100	0.41	ND	ND	0.01	0.32	2	ND	2	9	ND	2	29
3	19/09/2017	MW2	12.500	24.5	4.0	>20	2.29	299.00	46	13,000	2,300	1,600	750	77	5,900	0.85	0.04	ND	ND	0.25	ND	ND	1	2	ND	3	13
4	4/10/2017	MW1	13.600	24.7	6.6	21.6	2.36	179.90	20	6,300	1,700	880	370	61	3,200	0.67	0.03	0.66	0.01	0.28	3	0.2	4	1	ND	1	23
4	4/10/2017	MW2	15.000	24.6	6.2	>25	2.90	217.40	37	13,000	2,300	1,700	760	80	5,600	1.10	0.10	1.10	ND	0.11	ND	ND	2	ND	ND	3	6
5	27/10/2017	MW1	13.800	23.8	6.8	21.6	4.41	274.60	19	6,300	1,700	790	330	59	3,000	0.57	0.04	0.56	0.01	0.05	2	ND	4	3	ND	1	20
5	27/10/2017	MW2	15.000	23.8	6.7	>25	7.65	210.40	49	13,000	2,400	1,600	700	81	5,700	0.47	0.15	0.74	ND	ND	ND	ND	2	3	ND	4	13
6	22/11/2017	MW1	13.500	25.5	6.5	17.1	4.38	152.20	20	7,000	1,800	820	380	63	3,000	0.54	0.09	0.54	ND	0.13	2	ND	2	3	ND	1	23
6	22/11/2017	MW2	14.910	26.7	7.6	31.8	2.82	234.50	37	15,000	2,600	1,600	770	85	5,700	0.82	0.55	0.82	ND	0.13	ND	ND	3	ND	3	25	
7	18/01/2018	MW1	17.542	25.4	6.6	17.2	4.78	79.20	20	6,100	1,500	830	360	58	3,100	0.54	0.04	0.54	ND	ND	3	ND	4	4	ND	ND	27
7	18/01/2018	MW2	15.475	24.1	6.1	31.0	5.95	165.30	41	12,000	2,200	1,600	720	81	5,800	0.91	0.05	0.82	ND	0.09	ND	0.2	1	2	ND	3	25
8	19/02/2018	MW1	16.982	25.9	6.1	17.0	4.78	54.10	20	6,400	1,800	720	330	55	2,900	0.73	0.03	0.73	ND	0.18	2	ND	4	2	ND	6	20
8	19/02/2018	MW2	17.146	24.2	5.9	32.3	6.03	62.40	38	13,000	2,300	1,400	620	70	5,000	0.98	0.14	0.98	ND	0.30	1	0.1	3	2	ND	4	19
9	19/03/2018	MW1	16.141	25.4	6.7	17.1	4.73	72.00	18	6,300	1,700	870	340	55	3,000	0.79	ND	0.79	ND	0.06	3	ND	4	1	ND	1	14
9	19/03/2018	MW2	16.824	24.4	6.4	32.1	5.71	130.90	42	13,000	2,300	1,600	660	75	5,300	1.50	0.04	1.50	ND	0.26	ND	ND	2	ND	ND	2	12
		Min	12.421	22.7	4.0	16.7	2.29	54.10	18	5900	1500	720	330	55	2900	0.23	0.03	0.23	0.01	0.05	1	0	1	1	ND	1	6
		Max	17.542	26.7	7.6	37.9	7.65	299.00	49	15000	2600	1700	770	85	5900	1.50	0.62	1.50	0.20	0.59	3	1	4	25	ND	6	86
		STD	1.655	1.0	0.9	7.6	1.64	76.49	11	3546	351	401	190	11	1299	0.31	0.19	0.30	0.08	0.15	1	0	1	6	ND	1	19
		Average	15.175	24.5	6.2	24.6	4.52	168.81	30	9711	1989	1197	528	67	4261	0.73	0.14	0.75	0.04	0.24	2	0	3	5	ND	3	26
		CI	7.01	11.31	2.88	12.91	2.09	77.98	13.86	4486.22	918.80	552.82	244.07	31.13	1968.50	0.35	0.07	0.38	0.03	0.12	1.24	0.25	1.32	2.51	ND	1.34	12.09
		95% CI	22.19	35.79	9.12	37.54	6.60	246.79	43.86	14197.33	2907.69	1749.49	772.41	98.52	6229.61	1.07	0.21	1.13	0.07	0.36	3.33	0.57	4.00	7.64	ND	4.17	38.25

Event	Date	Well_ID	Field Parameters						Groundwater Parameters (mg/L)			Major cations (mg/L)				Nutrients (mg/L)					Metals (ug/L)						
			SWL (m)	Temperature (oC)	pH	EC (mS/cm)	DO (ppm)	Redox (mV)	EC (mS/cm)	Chloride	Sulfate	Calcium	Magnesium	Potassium	Sodium	Total Nitrogen	Total Phosphorous	Nitrate as N	Nitrite as N	Total Kjeldahl Nitrogen	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc
1	7/06/2017	MW1	16.825	23.9	6.6	16.7	2.33	180.20	19	6,000	1,500	780	330	55	2,900	0.23	ND	0.23	0.20	0.59	1	0.9	3	25	ND	4	86
2	13/07/2017	MW1	16.845	24.4	6.9	20.4	2.98	131.70	20	5,900	1,600	830	350	56	3,000	0.41	0.12	0.39	0.02	0.30	3	0.2	3	9	ND	2	42
3	19/09/2017	MW1	13.600	23.0	4.1	>20	4.34	288.00	19	6,500	1,700	820	340	55	3,100	0.41	ND	ND	0.01	0.32	2	ND	2	9	ND	2	29
4	4/10/2017	MW1	13.600	24.7	6.6	21.6	2.36	179.90	20	6,300	1,700	880	370	61	3,200	0.67	0.03	0.66	0.01	0.28	3	0.2	4	1	ND	1	23
5	27/10/2017	MW1	13.800	23.8	6.8	21.6	4.41	274.60	19	6,300	1,700	790	330	59	3,000	0.57	0.04	0.56	0.01	0.05	2	ND	4	3	ND	1	20
6	22/11/2017	MW1	13.500	25.5	6.5	17.1	4.38	152.20	20	7,000	1,800	820	380	63	3,000	0.54	0.09	0.54	ND	0.13	2	ND	2	3	ND	1	23
7	18/01/2018	MW1	17.542	25.4	6.6	17.2	4.78	79.20	20	6,100	1,500	830	360	58	3,100	0.54	0.04	0.54	ND	ND	3	ND	4	4	ND	ND	27
8	19/02/2018	MW1	16.982	25.9	6.1	17.0	4.78	54.10	20	6,400	1,800	720	330	55	2,900	0.73	0.03	0.73	ND	0.18	2	ND	4	2	ND	6	20
9	19/03/2018	MW1	16.141	25.4	6.7	17.1	4.73	72.00	18	6,300	1,700	870	340	55	3,000	0.79	ND	0.79	ND	0.06	3	ND	4	1	ND	1	14
		Min	13.500	23.0	4.1	16.7	2.33	54.10	18	5900	1500	720	330	55	2900	0.23	0.03	0.23	0.01	0.05	1	0	2	1	ND	1	14
		Max	17.542	25.9	6.9	21.6	4.78	288.00	20	7000	1800	880	380	63	3200	0.79	0.12	0.79	0.20	0.59	3	1	4	25	ND	6	86
		STD	1.747	1.0	0.9	2.2	1.04	84.10	1	322	112	48	19	3	97	0.18	0.04	0.18	0.09	0.18	1	0	1	8	ND	2	22
		Average	15.426	24.7	6.3	18.6	3.90	156.88	19	6311	1667	816	348	57	3022	0.54	0.06	0.56	0.05	0.24	2	0	3	6	ND	2	32
		CI	10.08	16.12	4.13	12.88	2.55	102.49	12.70	4123.18	1088.87	532.82	227.21	37.53	1974.48	0.35	0.05	0.38	0.04	0.17	1.52	0.49	2.18	4.14	ND	1.56	20.62
		95% CI	25.50	40.78	10.45	31.46	6.45	259.37	32.15	10434.29	2755.54	1348.38	574.99	94.97	4996.70	0.90	0.11	0.94	0.09	0.40	3.86	0.92	5.51	10.47	ND	3.81	52.17

Event	Date	Well_ID	Field Parameters						Groundwater Parameters (mg/L)			Major cations (mg/L)				Nutrients (mg/L)					Metals (ug/L)						
			SWL (m)	Temperature (°C)	pH	EC (mS/cm)	DO (ppm)	Redox (mV)	EC (mS/cm)	Chloride	Sulfate	Calcium	Magnesium	Potassium	Sodium	Total Nitrogen	Total Phosphorous	Nitrate as N	Nitrite as N	Total Kjeldahl Nitrogen	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc
1	7/06/2017	MW2	15.042	22.7	6.2	31.2	5.98	192.00	37	13,000	2,200	1,400	640	71	4,900	ND	0.07	ND	ND	0.47	ND	0.3	ND	11	ND	5	53
2	13/07/2017	MW2	12.421	23.6	6.3	37.9	6.85	114.70	38	13,000	2,200	1,700	760	76	5,600	0.85	0.62	0.84	0.01	0.33	1	ND	2	2	ND	3	21
3	19/09/2017	MW2	12.500	24.5	4.0	>20	2.29	299.00	46	13,000	2,300	1,600	750	77	5,900	0.85	0.04	ND	ND	0.25	ND	ND	1	2	ND	3	13
4	4/10/2017	MW2	15.000	24.6	6.2	>25	2.90	217.40	37	13,000	2,300	1,700	760	80	5,600	1.10	0.10	1.10	ND	0.11	ND	ND	2	ND	ND	3	6
5	27/10/2017	MW2	15.000	23.8	6.7	>25	7.65	210.40	49	13,000	2,400	1,600	700	81	5,700	0.47	0.15	0.74	ND	ND	ND	ND	2	3	ND	4	13
6	22/11/2017	MW2	14.910	26.7	7.6	31.8	2.82	234.50	37	15,000	2,600	1,600	770	85	5,700	0.82	0.55	0.82	ND	0.13	ND	ND	3	ND	3	25	
7	18/01/2018	MW2	15.475	24.1	6.1	31.0	5.95	165.30	41	12,000	2,200	1,600	720	81	5,800	0.91	0.05	0.82	ND	0.09	ND	0.2	1	2	ND	3	25
8	19/02/2018	MW2	17.146	24.2	5.9	32.3	6.03	62.40	38	13,000	2,300	1,400	620	70	5,000	0.98	0.14	0.98	ND	0.30	1	0.1	3	2	ND	4	19
9	19/03/2018	MW2	16.824	24.4	6.4	32.1	5.71	130.90	42	13,000	2,300	1,600	660	75	5,300	1.50	0.04	1.50	ND	0.26	ND	ND	2	ND	ND	2	12
		Min	12.421	22.7	4.0	31.0	2.29	62.40	37	12000	2200	1400	620	70	4900	0.47	0.04	0.74	0.01	0.09	1	0	1	2	ND	2	6
		Max	17.146	26.7	7.6	37.9	7.65	299.00	49	15000	2600	1700	770	85	5900	1.50	0.62	1.50	0.01	0.47	1	0	3	11	ND	5	53
		STD	1.621	1.1	0.9	2.6	1.94	70.99	4	782	127	109	57	5	354	0.29	0.23	0.26	-	0.13	0	0	1	3	ND	1	14
		Average	14.924	24.3	6.2	32.7	5.13	180.73	41	13111	2311	1578	709	77	5500	0.94	0.20	0.97	0.01	0.24	1	0	2	4	ND	3	21
		CI	9.75	15.87	4.02	26.18	3.35	118.08	26.50	8565.77	1509.90	1030.80	463.13	50.52	3593.27	0.65	0.13	0.72	0.02	0.17	1.39	0.23	1.38	2.65	ND	2.18	13.57
		95% CI	24.67	40.16	10.18	58.89	8.48	298.81	67.05	21676.88	3821.01	2608.57	1172.02	127.86	9093.27	1.58	0.32	1.69	0.03	0.41	2.39	0.43	3.23	6.22	ND	5.51	34.35

25th November 2019

Darling River Meats
 Mitchell Highway
 Bourke NSW, 2840
 Attention: Mr James Turner / Mr George Tanos
 Re: Water Report

Dear James / George,
 Following is the water report for the Roadside Bore and the Paddock Bore.

DATE OF COLLECTION SAMPLES		25/11/19 ROADSIDE BORE #1	25/11/19 Paddock BORE #2
pH		7.2	7.1
Conductivity	mS/cm	9.3	16.4
Sodium	mg/L	1290	2500
Potassium	mg/L	21	22
Calcium	mg/L	350	140
Magnesium	mg/L	150	340
Nitrate NO ₃ -N	mg/L	0.14	0.46
Nitrite NO ₂ -N	mg/L	<0.1	<0.1
Oxidised Nitrogen NO _x -N	mg/L	0.14	0.47
Ammonia (Total)	mg/L	0.1	<0.1
Total Nitrogen	mg/L	1.1	1.3
Total Kjeldahl Nitrogen	mg/L	1.0	0.8
Phosphate PO ₄ -P	mg/L	<0.1	<0.1
Total Phosphorus	mg/L	<0.1	<0.1
E.Coli	cfu/100mL	<10	<10
Sodium Absorption Ratio		14.5	26.0

- o The standing water level for the roadside bore is 17metres (mbgl)
- o The paddock bore is 14metres (mbgl)
- o The Roadside Bore Temperature is 23.8 degrees °C
- o The Paddock Bore Temperature is 24.2 degrees °C

Please don't hesitate to contact me if you have any questions or queries.

Kind Regards
 Biochem Water Pty Limited

Richard Brown
 Account Manager
 0419840404