

ENVIRONMENTAL MONITORING

REPORT 2018

BIDGEE BANKS GOLF
COURSE 2017 / 2018

Job No: 5137



DM McMahon Pty Ltd
6 Jones Street, (PO Box 6118)
Wagga Wagga NSW 2650

t (02) 6931 0510
www.dmmcmahon.com.au

**COOTAMUNDRA -GUNDAGAI REGIONAL COUNCIL
ENVIRONMENTAL MONITORING
BIDGEE BANKS GOLF COURSE**

May 2018

Project brief

This report presents the results of the 2017/2018 environmental monitoring of the use of effluent for irrigation at the Bidgee Banks Golf Course Gundagai. The document provides information about the site, soil and water conditions from field observations and laboratory analysis.

Site identification

Address: 255 Sheridan Street Gundagai NSW 2722
Real property description: Park Land - Carberry Park
Centre co-ordinate: E600458 N6119479 MGA GDA z55
Local government area: Cootamundra Gundagai Regional Council
Owner: Cootamundra Gundagai Regional Council
Operator: Cootamundra Gundagai Regional Council
Present use: Parkland & Golf Course
Report reference number: 5137

Certification


Name	Signed	Date	Revision Number
David McMahon BAppSc GradDip WRM		31/05/2018	0

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1. Introduction

Environmental monitoring is carried out at the Bidgee Banks Golf Course for Cootamundra Gundagai Regional Council to monitor the effects of irrigating soils with treated effluent. The golf course is approximately 20 hectares in area and approximately 37.4 Megalitres (ML) of effluent was irrigated in the 2017/18 irrigation season. Irrigation occurs on a demand basis usually from late spring throughout summer and into early autumn. The effluent source is the municipal Wastewater Treatment Plant (WTP). The effluent is treated at the WTP where it is stored in a primary pond for 25 days before being released into a storage lagoon for irrigation.

2. Seasonal Conditions

Total rainfall for the irrigation season (October 2017 to April 2018) was similar to the long-term average, this was influenced by very heavy rainfall in December and well below average rainfall in February, March and April. Temperature conditions varied with all monthly mean maximum temperatures except August above long-term averages, and most monthly mean minimum temperatures below long-term averages. Weather data was sourced from BOM Station 073141, Nangus Road Gundagai. Long term data was sourced from BOM Station 073128 Ridge Street Gundagai. The long-term average was collected between 1976 to 1995.

Table 1: Gundagai weather data April 2017 to March 2018

Month	Average Minimum Temperature 2017/2018	Average Maximum Temperature 2017/2018	Total Rainfall 2017/2018
April 2017	8.0	23.1	54.2
May 2017	4.5	18.1	63.5
June 2017	-0.1	14.7	4.6
July 2017	1.8	13.1	60.8
August 2017	2.5	14.7	68.2
September 2017	4.0	18.6	8.4
October 2017	8.6	24.6	64.9
November 2017	12.5	27.1	67.6
December 2017	16.0	30.0	131.3
January 2018	17.4	33.4	57.8
February 2018	15.2	31.7	12.6
March 2018	12.9	30.0	14.2
April 2018	10.3	27.0	9.5

Table 2: Gundagai long term average weather data

Month	Average Minimum Temperature Long Term	Average Maximum Temperature Long Term	Average Rainfall Long Term
April	8.7	22.8	54.9
May	6.0	18.0	67.7
June	3.2	13.6	60.3
July	2.0	12.8	78.6
August	3.1	14.9	63.2
September	5.1	17.6	68.4
October	7.5	21.7	69.2
November	10.3	25.8	49.5
December	13.1	29.2	52.3
January	15.0	31.6	65.8
February	15.6	31.4	41.1
March	12.9	27.8	43.6

3. Results

3.1 Soil

Soil sampling is conducted annually at the end of the irrigation season to gauge any change in soil physical and nutrient status. Sampling was undertaken on 19 April 2018.

Historically the soil has been sampled at 0-10cm and 50-60cm for a full suite of analytes. However, the soil program was modified in 2007 to satisfy the DEC 2004 (Formerly NSW EPA) environmental guidelines as outlined in the publication *Use of Effluent by Irrigation*.

The current sampling locations have been maintained with the sampling depths extended to four increments (0-10cm, 10-30cm, 30-60cm and 60-100cm). In addition to the parameters that have historically been tested, the topsoil analysis suite now also includes Total Phosphorus (TP) and Total Kjeldahl Nitrogen (TKN). Subsoil analysis has been limited to pH, EC, Nitrate as N and TP, Table 3. The guidelines recommend that subsoil analysis be carried out for less analytes but with more attention to depth increments.

All samples are sent to the Environmental and Analytical Laboratories (EAL) at Charles Sturt University for analysis. Samples from 0-10cm are also sent to Incitec Pivot Laboratories, Werribee, for comprehensive analysis. Both laboratories are NATA accredited.

Table 3: Soil analysis parameters

Depth	Analysis
0-10cm	Total Phosphorus, Total Kjeldahl Nitrogen, Nitrate, Phosphorus (Colwell), Phosphorus Buffer Index, Conductivity, Chloride, pH, Sulphur, Cation Exchange Capacity
10-30cm	Conductivity, Nitrate as N, Total Phosphorus, pH
30-60cm	Conductivity, Nitrate as N, Total Phosphorus, pH
60-100cm	Conductivity, Nitrate as N, Total Phosphorus, pH

Fairways 8 and 5 were chosen as soil sampling sites in order to obtain a cross-section of the soils at the Gundagai Golf Course. Fairway 8 is on the northern side of the course and on slightly higher ground than Fairway 5, which is adjacent to the Murrumbidgee River. A site where no irrigation occurs, on the south-eastern end of Fairway 6, was chosen as a soil testing control for comparison of readily-monitored changes in the irrigated sites. Soils are typically well drained alluvial grey-brown silty loams to clay loams. A GPS (Global Positioning System) is used to log soil sample locations for monitoring and site management.

All the soils sampled are well-drained river loams. The soils demonstrate structure and an abundance of organic material (i.e. roots) down to the sampled depth. The soils appeared to be in good physical condition with the absence of any pans or water logging.

Topsoil and subsoil sampling was undertaken on 19 May 2018 and results can be seen in the following Tables 4 and 5.

Table 4: Topsoil analysis

Parameter	Desirable Range	Fairway 5	Fairway 8	Non-Irrigated
Phosphorus Total (mg/kg)	>30 ³	1120	963	533
Total Kjeldahl Nitrogen (mg/kg)	>200 ¹	4250	6010	-
Nitrate Nitrogen (ppm)	>30 ³	15	28	8
Phosphorus Colwell (ppm)	>30 ³	400	360	110
P Buffer Index (PBI)	> 30 ⁴	130	150	59
Available K (ppm)	> 225 ⁵	-	-	-
Available Sulphur KCl (ppm)	>10 ¹	30	36	12
EC (dS/m)	<0.5 ¹	0.29	0.31	0.14
ECe (dS/m)	<2 ¹	1.8	1.9	0.9
Organic C (% C)	2 ¹	4.6	5.3	4.4
Chloride (ppm)	< 125 ⁴	140	150	40
pH (H ₂ O)	6 - 8 ¹	6.9	6.0	6.2
pH (CaCl ₂)	5.5 - 7 ¹	6.2	5.4	5.5
CEC (meq/100gm)	5 - 15 ¹	16.8	15.5	12.3
Aluminium (meq/100gm)	<1 ²	<0.1	<0.1	<0.1
Calcium (meq/100gm)	n/a	8.8	7.7	8.1
Magnesium (meq/100gm)	n/a	5.4	4.9	2.7
Sodium (meq/100gm)	<4.3 ²	1.00	0.31	0.09
Potassium (meq/100gm)	<i>no data</i>	1.50	2.60	1.40
Ca:Mg Ratio	>2 ¹	1.6	1.6	3.0
K:Mg Ratio	<i>no data</i>	-	-	-
Aluminium %	<5% ¹	<1.0	<1.0	<1.0
Calcium %	65-80% ¹	52.0	50.0	66.0
Magnesium %	10-15% ¹	32.0	31.0	22.0
Sodium %	<5% ¹	6.10	2.0	0.70
Potassium %	1-5% ¹	9.10	17.0	11.0

Table 5: Subsoil analysis

Depth	Parameter	Desirable Range	Fairway 5	Fairway 8	Non-Irrigated
10-30cm	Conductivity ($\mu\text{S/cm}$)	<500	178	102	96
	Nitrate as N (mg/kg)	>30 ³	13	7	12
	Phosphorus Total (mg/kg)	>30 ³	728	578	336
	pH (H ₂ O)	6 - 8 ¹	7.6	7.1	7.0
30-60cm	Conductivity ($\mu\text{S/cm}$)	<500 ¹	125	107	55
	Nitrate as N (mg/kg)	>30 ³	6	10	4
	Phosphorus Total (mg/kg)	>30 ³	451	500	293
	pH (H ₂ O)	6 - 8 ¹	7.6	7.0	7.1
60-100cm	Conductivity ($\mu\text{S/cm}$)	<500 ¹	111	85	53
	Nitrate as N (mg/kg)	>30 ³	2	6	3
	Phosphorus Total (mg/kg)	>30 ³	452	475	289
	pH (H ₂ O)	6 - 8 ¹	7.5	7.1	7.2

1. NSW Agriculture (1998)
2. Charman & Murphy (1991)
3. Gunter (1997)
4. Peverill, Sparrow & Reuter (1999)
5. Incitec Fertilisers et al. Technical Bulletin

The majority of subsoil parameter levels have increased from the previous year with most notable changes occurring in the 10-30cm depth and on fairway 5. However, the control area results have also increased similar to that of the fairways. Topsoil results varied with increases across all three locations for total phosphorus, Colwell phosphorus and Kjeldahl nitrogen as seen in Table 4.

Fairway eight is the most stable for all nutrients, with all parameters returning similar results to the previous year with a slight overall increase. Calcium and nitrate nitrogen levels were seen to be slightly low.

The topsoil phosphorus levels for fairway five have increased again after a sharp increase last year. Exchangeable Sodium Percentage (ESP) has also increased from last year's results. Calcium and nitrogen were again slightly low and magnesium was slightly higher than the desirable range. Fairway five is in between two tees and two greens and is subject to sprinkler overlap. Therefore, more effluent is irrigated per square metre which may induce the slightly elevated soil nutrient levels.

Subsoil results generally have higher conductivity closer to surface level which is similar to the previous year. Subsoil pH has again increased overall, and this will continue to be monitored

in the 2018/2019 season to see if it is a developing trend. These trends were seen across all sites as seen in Table 5.

Historical topsoil phosphorous has been increasing readily over the last few years and gradually since 1999. Exchangeable sodium readings have again increased recently on fairway 5 which agrees with trends from 1999, while fairway 8 and the control have seen increases which are slowing an overall decline since 1999. These trends can be seen in figures 1 and 2.

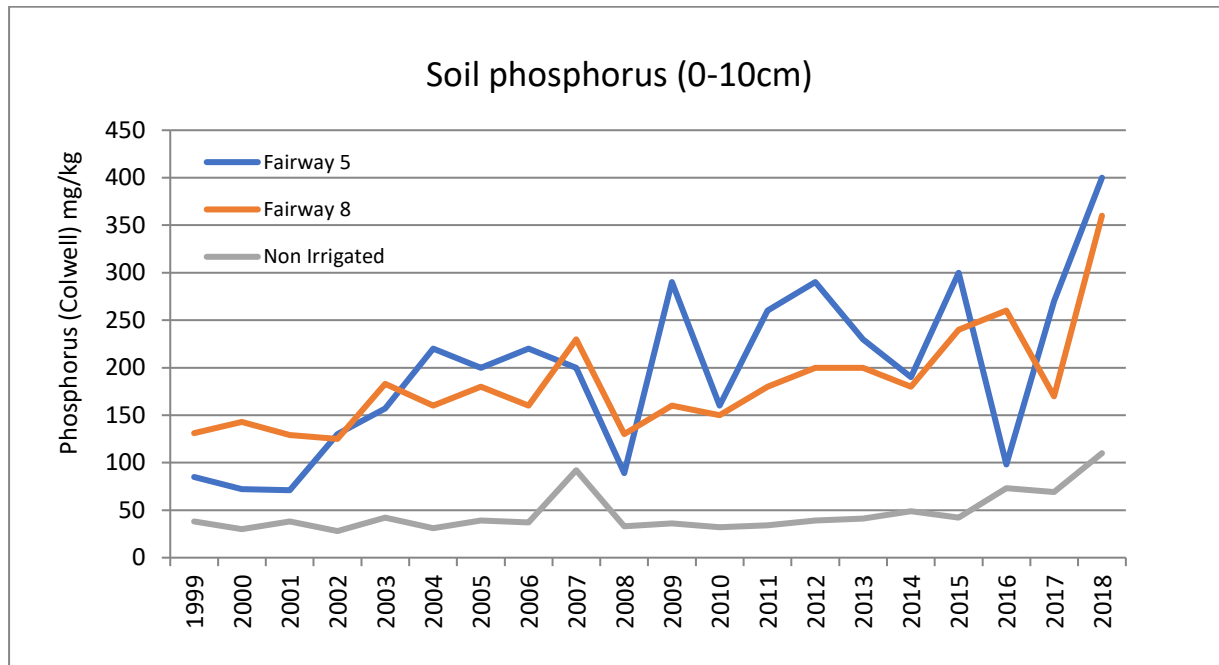


Figure 1: Historical topsoil phosphorus levels

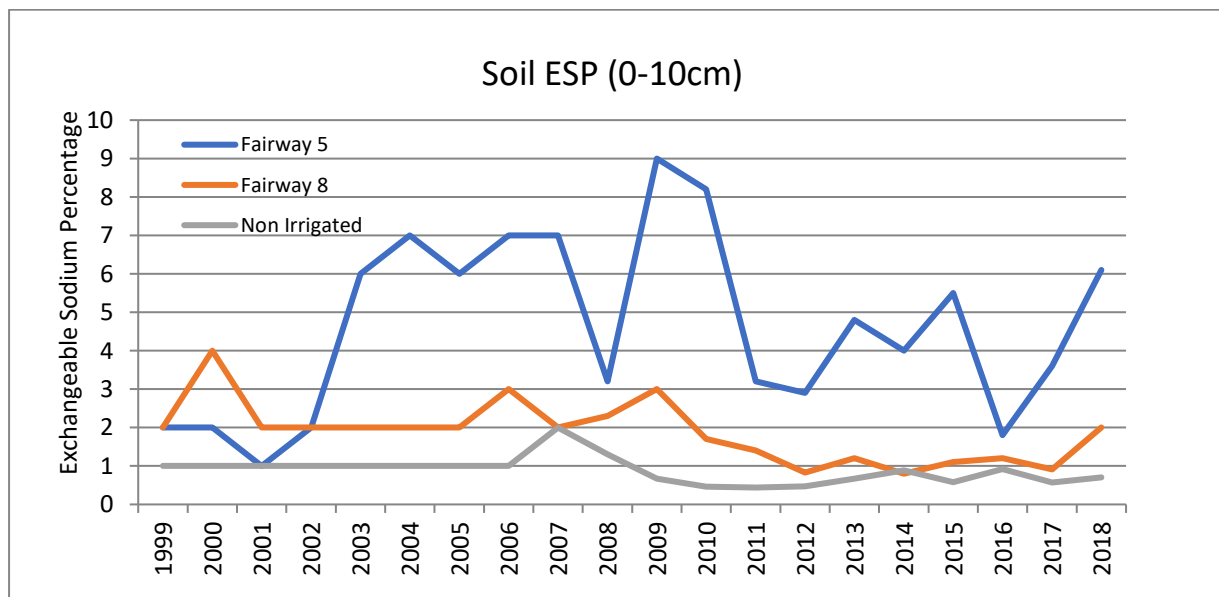


Figure 2: Historical topsoil ESP levels

3.2 Effluent

Four water samples for the 2017/18 irrigation season were collected. Samples were collected on 5 October 2017, 5 December 2017, 1 February 2018 and 10 April 2018. Samples are collected from the irrigation pump head with the pump running.

Water samples are analysed for BOD, Faecal Coliforms, Conductivity, Total Nitrogen, Oil & Grease, Total Phosphorus, pH, Sodium Adsorption Ratio and Total Suspended Solids, as shown in Table 6.

Table 6: Effluent analysis 2017/18

Pollutant	Desirable Level	5/10/17	5/12/17	10/4/18	01/2/18	Mean
BOD mg/L	<40 ²	11	7	5	10	8.3
Conductivity μ S/cm	280 - 800	718	484	440	489	532.8
Faecal Coliforms cfu/100ml	< 1000	81	100	30	330	135.3
Oil & Grease mg/L	<5	0.5	0.5	1	2	1.0
pH	6.5-8.0	7.7	7.7	9.4	9.4	8.6
Phosphorus (total) mg/L	<10	6.25	4.53	1.00	2.46	3.56
Sodium Adsorption Ratio	<6	2	2	3	3	2.5
Nitrogen (total) mg/L	<50	24	6	3	7	10
Total Suspended Solids mg/L	N/A	22	14	44	78	39.5
<u>Comments</u>						
Water Quality	-	Fair	Fair	Fair	Fair	-
Particulate Matter	-	None	None	None	None	-
Weather	-	Fine & Cool	Fine & Warm	Fine & Warm	Fine & Warm	-

ANZECC (2000), 2. DEC NSW (2004), 3. EPA NSW (1995).

Previously, total phosphorus levels have generally been decreasing for the past eight years except for an increase in this year's (2017/18) levels. The average for 2016/2017 was 1.0, 2015/2016 was 3.01, 2014/2015 was 3.45mg/L, 2013/2014 was 3.26mg/L, 2012/2013 was 3.59mg/L, 2011/2012 was 2.31 mg/L, 2010/2011 was 3.14 mg/L, 2009/10 was 5.7 mg/L, 2008/09 was 6.5 mg/L, 2007/08 was 7.3 whilst in 2006/07 the figure was 10.5 mg/L. However, this previous year we have seen an increase to 3.56mg/L.

The Sodium Adsorption Ratio has not changed significantly over the last seven years, which is an indication that the magnesium and calcium cations are in balance with the elevated sodium levels. The Sodium Adsorption Ratio (SAR) has been ranging from 1-5 in that time, the potentially harmful level for irrigated effluent is <6, as outlined in the guidelines, DEC 2004.

Since 1999 pH levels have been steadily on the increase and in 2018 a slightly high level of 9.4 was recorded twice. A local decline over the last few years is helping to slow these trends, but this should be continued to be monitored over the next few years to help stabilise levels between 6.5 – 8 as indicated in Table 6.

With the exception of the April 2018 results, the faecal coliforms level throughout the year were below the ANZECC 2000 guideline (<150 fc/100ml) for primary contact (swimming etc) and Prepared by DM McMahon Pty Ltd

secondary contact (boating, fishing etc) is <1,000fc/100ml. the last time faecal coliforms exceeded both these levels was back in 2015.

Effluent salinity was very stable throughout the year apart from the higher reading in October 2017 which could have been caused by lack/excess of dilution from high variances in rainfall.

The sampled water is classed as low strength effluent for irrigation in relation to the DEC guidelines as seen below in Table 7.

Table 7: Classification of effluent

Constituent	Strength (average concentration mg/L)			
	Effluent 2017/2018	Low	Medium	High
Total Nitrogen	10.00	<50	50-100	>100
Total Phosphorus	3.56	<10	10-20	>20
Total Suspended Solids	39.50	<600	600-1,000	>1,000-2,500

For the purpose of comparison, TDS has been calculated from EC based on the assumption that 1000 EC ($\mu\text{S}/\text{cm}$) = 640ppm TDS. Table 7 shows the effluent strength compared to the guidelines.

3.3 Groundwater

One groundwater sample was collected on the 10 April 2018 from the two piezometers that are located in the vicinity of fairways 17 and 7 respectively.

Piezometer number one, located on fairway 17, had a Standing Water Level (SWL) of -4.53 metres below ground level whilst Piezometer number two had been destroyed and was unable to be sampled.

The groundwater sample was analysed for BOD, Conductivity, Total Nitrogen, Oil & Grease, Total Phosphorus, pH, Sodium Adsorption Ratio and TSS.

Table 8: Groundwater analysis 2017/18

Pollutant	Desirable Level	Piezometer 1	Piezometer 2
BOD mg/L	<40 ²	I/S	-
Conductivity $\mu\text{S}/\text{cm}$	280 - 800 ¹	611	-
Oil & Grease mg/L	<5 ³	7	-
pH	6.5-8.0 ¹	8.4	-
Phosphorus (total) mg/L	<10 ²	27.7	-
Sodium Adsorption Ratio	<6 ³	2	-
Nitrogen (total) mg/L	<50 ²	29	-

Total Suspended Solids mg/L	n/a	I/S	-
<u>Comments</u>			
Water Quality	n/a	Dark Brown Colour	-
Particulate Matter	n/a	Sediment	-
Weather	n/a	Fine & Warm	-

1. ANZECC (2000) *Australian & New Zealand Guidelines for Fresh & Marine Water Quality*.
2. DEC NSW (2004) *Use of Effluent by Irrigation, Environmental Guidelines*
I/S Insufficient sample

The conductivity readings in the piezometer are below the threshold level of 800 µs/cm and is a slight increase after a previously steadily declining trend first noted in 2012/2013. The water in the piezometer generally has a very poor replenishment rate when emptied. The water is usually very dirty and appears to not be connected to the river system at the drilled depth.

4. Nutrient Loading

In the 2017/18 irrigation season approximately 37,400^k kilolitres (37.4^k ML) of effluent was irrigated over an area of approximately 20 hectares. Maximum nutrient loading rates are calculated annually to compare nutrient concentrations in irrigated effluent with the anticipated crop uptake of nutrients. Annual soil analysis is also carried out to correlate the theoretical loading rates with actual nutrient levels in the soil. Table 9 shows the nutrient mass balance incorporating average effluent quality and quantities applied.

Table 9: Nutrient mass balance

Parameter	Effluent Quality (Mean value)	Nutrient Loading*	Nutrient Removal	Nutrient Balance
	mg/L	kg/ha/yr	kg/ha/yr	kg/ha/yr
Nitrogen	10.00	18.7	130	-111.3
Phosphorus	3.56	6.7	16	-9.3

*Based on irrigating 1870 KL/ha/yr

The nutrient mass balance indicates that for perennial pasture the nitrogen and phosphorus supply in the effluent irrigation is below the anticipated crop uptake. Processes such as mineralization, fixation from legumes (clover) and fertilising will boost nitrogen supply to more desirable levels for healthy plants.

4.1 Calculating maximum nutrient loading rates

The following equation is used to determine irrigation area requirements when using treated effluent to water pastures (EPA 1995).

$$A = \frac{C * Q}{L_c}$$

A = the irrigation area (hectares)

C = concentration of constituents (milligrams per litre)

Q = average effluent flow rate (kilolitres per day)

L_c = critical loading rate of constituent (kilograms per hectare per day)

This formula can be rearranged to determine the recommended effluent flow rate in kilolitres per day over the entire 20 hectares.

$$Q = \frac{A * 1000 * L_c}{C}$$

^k - Irrigation loads were calculated on the basis of 200,000L a day over 20 Ha, the irrigation season for this load was identified as the time between the first and last sample taken which was 187 days.

The amount of effluent that can be applied to perennial pasture has been calculated for minimum, average and maximum nutrient levels in the irrigated effluent. The amounts of effluent (Q) that can be applied for the different nutrient levels can be seen in Tables 10 and 11. The values have been calculated in kilolitres per hectare per year.

Table 10: Phosphorus calculations

Phosphorus Concentration Ranges	Min	Average	Max
C - concentration phosphorus in effluent mg/L	1.0	3.6	6.3
L_c - critical loading rate of phosphorus kg/ha/year	16	16	16
A - The irrigation area (hectares)	20	20	20
Q - Average effluent flow rate kL/ha/year	2560	4494	16000
Actual amount of effluent irrigated kL/ha/year	1870	1870	1870
Actual Phosphorus applied in effluent (load) kg/ha	1.9	6.7	11.7

Table 11: Nitrogen calculations

Nitrogen Concentration Ranges	Min	Average	Max
C - concentration of nitrogen in effluent mg/L	3.0	10.0	24.0
L_c - critical loading rate of nitrogen kg/ha/year	130	130	130
A - The irrigation area (hectares)	20	20	20
Q - Average effluent flow rate kL/ha/year	5416	13000	43333
Actual amount of effluent irrigated kL/ha/year	1870	1870	1870
Actual Nitrogen applied in effluent (load) kg/ha	5.6	18.7	44.9

The critical loading rate of constituent (L_c) has been calculated from annual nutrient uptake ranges for perennial pasture as per EPA guidelines (EPA 1995). Table 12 outlines the nutrient uptake ranges in comparison to the actual amount of nutrient applied in the irrigated effluent (at the mean nutrient concentration).

Table 12: Crop nutrient uptake and actual nutrient application 2017/18

Crop	Annual Phosphorus uptake range kg/ha NSW EPA 1995	Phosphorus applied in effluent at mean concentration kg/ha	Annual Nitrogen uptake range kg/ha NSW EPA 1995	Nitrogen applied in effluent at mean concentration kg/ha
Perennial Pasture	8 - 16	6.66	65 - 130	18.70

Table 13 shows the recommended irrigation rate based on sustainable nutrient loading in comparison to actual irrigation in 2017/18. The values in Table 13 are in Megalitres per hectare per year.

Table 13: Recommended effluent application rates (ML/ha)

Effluent application	Actual application 2016/17	Perennial Pasture	
		Phosphorus	Nitrogen
Maximum	1.87	16.00	43.33
Average	1.87	4.49	13.00
Minimum	1.87	2.56	5.42

5. Conclusion & Recommendation

From the mass balance calculations, it can be seen that the amount of nitrogen and phosphorus applied in the effluent is theoretically lower than what the plants can effectively utilise. This shows that at average rates, plants should be able to assimilate the applied nutrients as shown in Table 9.

Piezometer number two had been destroyed and was unable to be sampled as noted in Section 3.3, it is recommended that this piezometer is re-constructed to allow for sampling in upcoming irrigation seasons.

6. References

ANZECC 2000, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality, National Water Quality Management Strategy*, Australia & New Zealand Environment & Conservation Council, Sydney.

Bureau of Meteorology 2018, Climate Data Online, <http://www.bom.gov.au/climate/data/>, Data accessed 1 May 2018.

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NHMRC/ARMCA&NZ 1996, *Australian Drinking Water Guidelines*, publ. National Health & Medical Research Council and the Agriculture & Resource Management Council of Australia and New Zealand

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Singer, MJ & Munns, DN 1996, *Soils an Introduction*, 3rd edition, Prentice Hall, New Jersey, USA

7. Disclaimer

The information contained in this report has been extracted from field and laboratory sources believed to be reliable and accurate. DM McMahon Pty Ltd will not assume any responsibility for the misinterpretation of information supplied in this report. The accuracy and reliability of recommendations identified in this report need to be evaluated with due care according to individual circumstances. It should be noted that the recommendations and findings in this report are based solely upon the said site location and the ground level conditions at the time of testing. The results of the said investigations undertaken are an overall representation of the conditions encountered. The properties of the soil within the location may change due to variations in ground conditions outside of the tested area. The author has no control or liability over site variability that may warrant further investigation that may lead to significant design changes.

Attachments proceeding this document:

Attachments	Details
Certificates of Analysis	16 pages
Chain of Custodies	8 pages



DOCUMENT ATTACHMENTS

REPORT 2018

DM McMahon Pty Ltd
6 Jones Street, (PO Box 6118)
Wagga Wagga NSW 2650

t (02) 6931 0510
www.dmmcmahon.com.au



Attachment A : *Certificates of Analysis*

1710-0023

DM McMahon Pty Ltd
 PO Box 6118, Wagga Wagga, NSW 2650
 Tel: 0269 310 510 Fax: 0269 310 511

CHAIN OF CUSTODY - LABORATORY WORK REQUEST

BIDGEE BANKS GOLF COURSE - GUNDAGAI SHIRE COUNCIL

Safety: Note presence of hydrochloric acid preservative in glass jars for Oil & Grease

EAL Batch ID	EAL Sample ID	CLIENT ID	DATE SAMPLED	TIME SAMPLED	SAMPLED BY	SAMPLE TYPE		TYPE & NUMBER OF CONTAINERS		Sterile
						Grab	Composite	Plastic (1500mL)	Glass (500mL)	
	Point 1 (Irrigation)		4/10	10:00	DM	✓		1	1	1
	Piezo 1							1	1	1
	Piezo 2							1	1	1

Observations:

Analytes:

Point 1 (Irrigation)	Required
Piezo 1 & 2	Quarterly - BOD, Electrical Conductivity, Nitrogen (Total), Oil & Grease, Phosphorus (Total), SAR, *Faecal Coliforms, pH, TSS
	* Piezo 1 & 2 - do not require Faecal Coliforms
Please note that samples must be analysed in accordance with the 2004 EPA Guidelines Approved Methods for the sampling and analysis of Water Pollutants in NSW.	

Chain of Custody:

RELINQUISHED BY:	NAME	SIGNED	DATE & TIME
	DMF McLe	DM	5/10
RECEIVED BY:			

DM McMahon Pty Ltd
PO Box 6118 4A Norton Street
Wagga Wagga NSW 2650
Attention: David McMahon

Tuesday, October 17, 2017



NATA Accredited Laboratory
Number: 9597

Accredited for compliance with
ISO/IEC 17025 - Testing

LABORATORY ANALYSIS REPORT

Report Number: 1710-0023

Page 1 of 2

For all enquiries related to this report please quote document number: 1710-0023

<u>Facility:</u>	<u>Order #</u>	<u>Date Received</u>
<u>Sample Type</u>	<u>Collected By</u>	
Water	D McMahon	05-October-2017

<u>EAL ID</u>	<u>Client ID.</u> Date/Time sample taken	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
17Oct-0087	GSC Point 1 Irrigation 05.10.17 12.0pm	Biochemical Oxygen Demand	11 mg/L	APHA 5210 B/4500-O G	2
		Calcium (dissolved)	26.3 mg/L	APHA 3030 B/3120 B	0.03
		Faecal coliforms	81 cfu/100mL	* AS/NZS 4276.7:2007	
		Conductivity	718 µS/cm	APHA 2510 B	1
		Magnesium (dissolved)	25.9 mg/L	APHA 3030 B/3120 B	0.02
		Nitrogen, total	24 mg/L	APHA 4500-Norg B + 4110 B	2
		Nitrate/Nitrite as N	9.7 mg/L	LTM-W-014	0.5
		Oil & Grease	<1 mg/L	APHA 5520 D	1
		Phosphorus, Total	6.25 mg/L	APHA 3030 E/3120 B	0.05
		pH	7.7 pH units	APHA 4500-H+ B	
		Sodium Adsorption Ratio	2 Ratio	LTM-W-039	
		Sodium (dissolved)	48.6 mg/L	APHA 3030 B/3120 B	0.05
		Total Kjeldahl Nitrogen	14 mg/L	APHA 4500-Norg B	2
		Total Suspended Solids	22 mg/L	APHA 2540 D	2

Note:

* NATA Accreditation does not cover the performance of this service.

DM McMahon Pty Ltd
PO Box 6118 4A Norton Street
Wagga Wagga NSW 2650
Attention: David McMahon

Tuesday, October 17, 2017



NATA Accredited Laboratory
Number: 9597

Accredited for compliance with
ISO/IEC 17025 - Testing

LABORATORY ANALYSIS REPORT

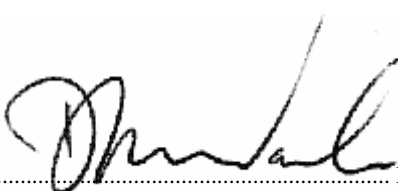
Report Number: 1710-0023

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For all enquiries related to this report please quote document number: 1710-0023

<u>Facility:</u>	<u>Order #</u>	<u>Date Received</u>
<u>Sample Type</u>	<u>Collected By</u>	
Water	D McMahon	05-October-2017

<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
	Date/Time sample taken				

Signed  David Wade, Laboratory Manager.

*All samples analysed as received.
All soil results are reported on a dry basis.
The EAL takes no responsibility for the end use of results within this report.
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DM McMahon Pty Ltd
PO Box 6118 4A Norton Street
Wagga Wagga NSW 2650
Attention: David McMahon

Wednesday, December 13, 2017



NATA Accredited Laboratory
Number: 9597

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LABORATORY ANALYSIS REPORT

Report Number: 1712-0024

Page 1 of 2

For all enquiries related to this report please quote document number: 1712-0024

<u>Facility:</u>	<u>Order #</u>	<u>Date Received</u>
<u>Sample Type</u>	<u>Collected By</u>	
Water	M Donges	06-December-2017

<u>EAL ID</u>	<u>Client ID.</u> Date/Time sample taken	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
17Dec-0077	Point 1 Irrigation 05.12.17	Biochemical Oxygen Demand	7 mg/L	APHA 5210 B/4500-O G	2
		Calcium (dissolved)	14.4 mg/L	APHA 3030 B/3120 B	0.03
		Faecal coliforms	100 cfu/100mL	* AS/NZS 4276.7:2007	
		Conductivity	484 µS/cm	APHA 2510 B	1
		Magnesium (dissolved)	14.9 mg/L	APHA 3030 B/3120 B	0.02
		Nitrogen, total	6 mg/L	APHA 4500-Norg B + 4110 B	2
		Nitrate/Nitrite as N	2.0 mg/L	LTM-W-014	0.1
		Oil & Grease	<1 mg/L	APHA 5520 D	1
		Phosphorus, Total	4.53 mg/L	APHA 3030 E/3120 B	0.01
		pH	7.7 pH units	APHA 4500-H+ B	
		Sodium Adsorption Ratio	2 Ratio	LTM-W-039	
		Sodium (dissolved)	38.8 mg/L	APHA 3030 B/3120 B	0.05
		Total Kjeldahl Nitrogen	4 mg/L	APHA 4500-Norg B	2
		Total Suspended Solids	14 mg/L	APHA 2540 D	2

Note:

* NATA Accreditation does not cover the performance of this service.

DM McMahon Pty Ltd
PO Box 6118 4A Norton Street
Wagga Wagga NSW 2650
Attention: David McMahon

Wednesday, December 13, 2017



NATA Accredited Laboratory
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LABORATORY ANALYSIS REPORT


Report Number: 1712-0024

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For all enquiries related to this report please quote document number: 1712-0024

<u>Facility:</u>	<u>Order #</u>	<u>Date Received</u>
<u>Sample Type</u>	<u>Collected By</u>	
Water	M Donges	06-December-2017

<u>EAL ID</u>	<u>Client ID.</u>	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
	Date/Time sample taken				

Signed  David Wade, Laboratory Manager.

All samples analysed as received.
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1802-0008

DM McMahon Pty Ltd

PO Box 6118, Wagga Wagga, NSW 2650
 Tel: 0269 310 510 Fax: 0269 310 511

CHAIN OF CUSTODY - LABORATORY WORK REQUEST

BIDGEE BANKS GOLF COURSE - GUNDAGAI SHIRE COUNCIL

Safety: Note presence of hydrochloric acid preservative in glass jars for Oil & Grease

EAL Batch ID	EAL Sample ID	CLIENT ID	DATE SAMPLED	TIME SAMPLED	SAMPLED BY	SAMPLE TYPE		TYPE & NUMBER OF CONTAINERS		
						Grab	Composite	Plastic (1500mL)	Glass (500mL)	Sterile
	Point 1 (Irrigation)					✓	Composite	1	1	1
	Piezo 1									
	Piezo 2									

Observations:

Analytes:

Point 1 (Irrigation)	Required
Quarterly - BOD, Electrical Conductivity, Nitrogen (Total), Oil & Grease, Phosphorus (Total), SAR, *Faecal Coliforms, pH, TSS	
* Piezo 1 & 2 - do not require Faecal Coliforms	

Please note that samples must be analysed in accordance with the 2004 EPA Guidelines Approved Methods for the sampling and analysis of Water Pollutants in NSW.

Chain of Custody:

RELINQUISHED BY:	NAME	SIGNED	DATE & TIME
	m. DANHES	<i>[Signature]</i>	01/02/18.
RECEIVED BY:	<i>[Signature]</i>		1/2/18

DM McMahon Pty Ltd
PO Box 6118 4A Norton Street
Wagga Wagga NSW 2650
Attention: David McMahon

Friday, February 9, 2018



NATA Accredited Laboratory
Number: 9597

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LABORATORY ANALYSIS REPORT

Report Number: 1802-0008

Page 1 of 2

For all enquiries related to this report please quote document number: 1802-0008

<u>Facility:</u>	<u>Order #</u>	<u>Date Received</u>
<u>Sample Type</u>	<u>Collected By</u>	
Water	M Donges	01-February-2018

<u>EAL ID</u>	<u>Client ID.</u> Date/Time sample taken	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
18Feb-0027	GSC Point 1 Irrigation 01.02.18	Biochemical Oxygen Demand	5 mg/L	APHA 5210 B/4500-O G	2
		Calcium (acid extractable)	9.88 mg/L	APHA 3030 E/3120 B	0.03
		Faecal coliforms	30 cfu/100mL	* AS/NZS 4276.7:2007	
		Conductivity	440 µS/cm	APHA 2510 B	1
		Magnesium (dissolved)	7.50 mg/L	APHA 3030 B/3120 B	0.02
		Nitrogen, total	3 mg/L	APHA 4500-Norg B + 4110 B	2
		Nitrate/Nitrite as N	0.4 mg/L	LTM-W-014	0.1
		Oil & Grease	1 mg/L	APHA 5520 D	1
		Phosphorus, Total	1.00 mg/L	APHA 3030 E/3120 B	0.01
		pH	9.4 pH units	APHA 4500-H+ B	
		Sodium Adsorption Ratio	3 Ratio	LTM-W-039	
		Sodium (dissolved)	45.8 mg/L	APHA 3030 B/3120 B	0.05
		Total Kjeldahl Nitrogen	3 mg/L	APHA 4500-Norg B	2
		Total Suspended Solids	44 mg/L	APHA 2540 D	2

Note:

* NATA Accreditation does not cover the performance of this service.

DM McMahon Pty Ltd
PO Box 6118 4A Norton Street
Wagga Wagga NSW 2650
Attention: David McMahon

Friday, February 9, 2018



NATA Accredited Laboratory
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LABORATORY ANALYSIS REPORT

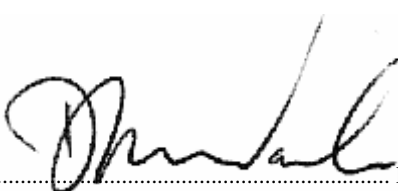
Report Number: 1802-0008

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For all enquiries related to this report please quote document number: 1802-0008

<u>Facility:</u>	<u>Order #</u>	<u>Date Received</u>
<u>Sample Type</u>	<u>Collected By</u>	
Water	M Donges	01-February-2018

<u>EAL ID</u>	<u>Client ID.</u> Date/Time sample taken	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
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Signed  David Wade, Laboratory Manager.

*All samples analysed as received.
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1804-007

DM McMahon Pty Ltd

PO Box 6118, Wagga Wagga, NSW 2650

Tel: 0269 310 510 Fax: 0269 310 511

CHAIN OF CUSTODY - LABORATORY WORK REQUEST

BIDGEE BANKS GOLF COURSE - GUNDAGAI SHIRE COUNCIL

Safety: Note presence of hydrochloric acid preservative in glass jars for Oil & Grease

EAL Batch ID	EAL Sample ID	CLIENT ID	DATE SAMPLED	TIME SAMPLED	SAMPLED BY	SAMPLE TYPE			TYPE & NUMBER OF CONTAINERS		
						Grab	Composite		Plastic (1500ml)	Glass (500ml)	Sterile
	Point 1 (Irrigation)		10/04/2018	10:55	MD	✓			1	1	1
	Piezo 1		10/04/2018	11:10	MD	✓			1	1	1
	Piezo 2		10/04/2018	11:10	MD	✓			1	1	1

Observations:

Analytes:

Point 1 (Irrigation)	Required
Piezo 1 & 2	Quarterly - BOD, Electrical Conductivity, Nitrogen (Total), Oil & Grease, Phosphorus (Total), SAR, Faecal Coliforms, pH, TSS
	* Piezo 1 & 2 - do not require Faecal Coliforms

Please note that samples must be analysed in accordance with the 2004 EPA Guidelines Approved Methods for the sampling and analysis of Water Pollutants in NSW.

Chain of Custody:	NAME	SIGNED	DATE & TIME
RELINQUISHED BY:	Michael Donges		10/04/2018
RECEIVED BY:	<i>D. L. Mac</i>	<i>[Signature]</i>	10/4/18 2:50

DM McMahon Pty Ltd
PO Box 6118 4A Norton Street
Wagga Wagga NSW 2650
Attention: David McMahon

Tuesday, April 24, 2018



NATA Accredited Laboratory
Number: 9597

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LABORATORY ANALYSIS REPORT

Report Number: 1804-0051

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For all enquiries related to this report please quote document number: 1804-0051

<u>Facility:</u>	<u>Order #</u>	<u>Date Received</u>
<u>Sample Type</u>	<u>Collected By</u>	
Water	M Donges	10-April-2018

<u>EAL ID</u>	<u>Client ID.</u> Date/Time sample taken	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
18Apr-0143	GSC Point 1 Irrigation 10.04.18 10.55	Biochemical Oxygen Demand	10 mg/L	APHA 5210 B/4500-O G	2
		Calcium (dissolved)	12 mg/L	APHA 3030 B/3120 B	0.03
		Faecal coliforms	330 cfu/100mL	* AS/NZS 4276.7:2007	
		Conductivity	489 µS/cm	APHA 2510 B	1
		Magnesium (dissolved)	8 mg/L	APHA 3030 B/3120 B	0.02
		Nitrogen, total	7 mg/L	APHA 4500-Norg B + 4110 B	2
		Nitrate/Nitrite as N	0.6 mg/L	LTM-W-014	0.1
		Oil & Grease	2 mg/L	APHA 5520 D	1
		Phosphorus, Total	2.46 mg/L	APHA 3030 E/3120 B	0.01
		pH	9.4 pH units	APHA 4500-H+ B	
		Sodium Adsorption Ratio	3 Ratio	LTM-W-039	
		Sodium (dissolved)	63 mg/L	APHA 3030 B/3120 B	0.05
		Total Kjeldahl Nitrogen	4 mg/L	APHA 4500-Norg B	2
		Total Suspended Solids	78 mg/L	APHA 2540 D	2
18Apr-0144	GSC Piezo 1 10.04.18 11.10	Biochemical Oxygen Demand	I/S mg/L	APHA 5210 B/4500-O G	2
		Calcium (dissolved)	19 mg/L	APHA 3030 B/3120 B	0.03
		Faecal coliforms	<1 cfu/100mL	* AS/NZS 4276.7:2007	
		Conductivity	611 µS/cm	APHA 2510 B	1
		Magnesium (dissolved)	25 mg/L	APHA 3030 B/3120 B	0.02
		Nitrogen, total	29 mg/L	APHA 4500-Norg B + 4110 B	2
		Nitrate/Nitrite as N	0.8 mg/L	LTM-W-014	0.1

DM McMahon Pty Ltd
PO Box 6118 4A Norton Street
Wagga Wagga NSW 2650
Attention: David McMahon

Tuesday, April 24, 2018



NATA Accredited Laboratory
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LABORATORY ANALYSIS REPORT

Report Number: 1804-0051

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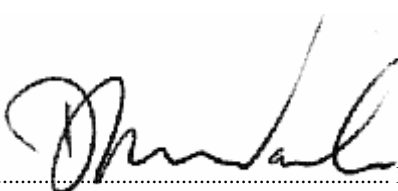
For all enquiries related to this report please quote document number: 1804-0051

<u>Facility:</u>	<u>Order #</u>	
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>
Water	M Donges	10-April-2018

<u>EAL ID</u>	<u>Client ID.</u> Date/Time sample taken	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
18Apr-0144	GSC Piezo 1 10.04.18 11.10	Oil & Grease	7 mg/L	APHA 5520 D	1
		Phosphorus, Total	27.7 mg/L	APHA 3030 E/3120 B	0.05
		pH	8.4 pH units	APHA 4500-H+ B	
		Sodium Adsorption Ratio	2 Ratio	LTM-W-039	
		Sodium (dissolved)	57 mg/L	APHA 3030 B/3120 B	0.05
		Total Kjeldahl Nitrogen	28 mg/L	APHA 4500-Norg B	2
		Total Suspended Solids	I/S mg/L	APHA 2540 D	2

Note: Metals analysed by ALS-Melb

* NATA Accreditation does not cover the performance of this service.

Signed  David Wade, Laboratory Manager.

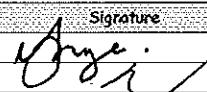
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DM McMahon Pty Ltd
 120 Fitzmaurice Street, Wagga Wagga NSW 2650
 TEL 0269 310 510 MOB 0427 214453.

EAL NUMBER

SITE
 Gundagai Golf Course

CLIENT ID	DATE SAMPLED	TIME SAMPLED	COMMENTS	Required Analysis
Fairway 5 0-10	10/04/2018	12:15		Suite One
Fairway 8 0-10	10/04/2018			Suite One
Control 0-10	10/04/2018	11:50		Suite One
Fairway 5 10-30	10/04/2018	12:20		Suite Two
Fairway 5 30-60	10/04/2018	12:25		Suite Two
Fairway 5 60-100	10/04/2018	12:30		Suite Two
Fairway 8 10-30	10/04/2018	12:35		Suite Two
Fairway 8 30-60	10/04/2018	12:40		Suite Two
Fairway 8 60-100	10/04/2018	12:45		Suite Two
Control 10-30	10/04/2018	11:55		Suite Two
Control 30-60	10/04/2018	12:00		Suite Two
Control 60-100	10/04/2018	12:05		Suite Two

Sampling Chain of Custody Record			
Sample Location		Sampling Officer	
BIDLEE GOLF COURSE		M. DONLIS	
Sample Type		Testing unit	
SOIL			
Coc		Name	
		Mick Donges	
Officer Collecting Sample:		Date & Time	
		10/04/2018	
CSU-EAL Officer Receiving Sample		Signature	
D. L. M. D.			
		Weather Conditions	
		SUNNY	
		Sample Bottles Required	
		1 plastic bag	

Required Analysis			
TEST	Units of Measure	Limit of Reporting	NATA Accredited
Suite One			
TKN - N			
Phosphorus (total)			

Suite Two			
pH			
Electrical Conductivity			
Phosphorus (total)			
Nitrate			

1004-0052

DM McMahon Pty Ltd
PO Box 6118 4A Norton Street
Wagga Wagga NSW 2650
Attention: David McMahon

Thursday, May 10, 2018



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LABORATORY ANALYSIS REPORT

Report Number: 1804-0052

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For all enquiries related to this report please quote document number: 1804-0052

<u>Facility:</u>	<u>Order #</u>				
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>			
Soil	M Donges	10-April-2018			
<u>EAL ID</u>	<u>Client ID.</u> Date/Time sample taken	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
18Apr-0145	Fairway 5 0-10 10.04.18	Phosphorus, Total	1120 mg/kg	LTM-S-015	2
		Total Kjeldahl Nitrogen	4250 mg/kg	LTM-S-011	2
18Apr-0146	Fairway 8 0-10 10.04.18	Phosphorus, Total	963 mg/kg	LTM-S-015	2
		Total Kjeldahl Nitrogen	6010 mg/kg	LTM-S-011	2
18Apr-0147	Control 0-10 10.04.18	Conductivity (1:5 soil/water)	165 µS/cm	LTM-S-003	1
		Nitrate as N	8 mg/kg	LTM-S-007	1
		Phosphorus, Total	533 mg/kg	LTM-S-015	2
		pH (1:5 soil/water)	7.5 pH units	LTM-S-004	
18Apr-0148	Fairway 5 10-30 10.04.18	Conductivity (1:5 soil/water)	178 µS/cm	LTM-S-003	1
		Nitrate as N	13 mg/kg	LTM-S-007	1
		Phosphorus, Total	728 mg/kg	LTM-S-015	2
		pH (1:5 soil/water)	7.6 pH units	LTM-S-004	
18Apr-0149	Fairway 5 30-60 10.04.18	Conductivity (1:5 soil/water)	125 µS/cm	LTM-S-003	1
		Nitrate as N	6 mg/kg	LTM-S-007	1
		Phosphorus, Total	451 mg/kg	LTM-S-015	2
		pH (1:5 soil/water)	7.6 pH units	LTM-S-004	

DM McMahon Pty Ltd
PO Box 6118 4A Norton Street
Wagga Wagga NSW 2650
Attention: David McMahon

Thursday, May 10, 2018



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LABORATORY ANALYSIS REPORT

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For all enquiries related to this report please quote document number: 1804-0052

<u>Facility:</u>	<u>Order #</u>	<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>
Soil			M Donges	10-April-2018

<u>EAL ID</u>	<u>Client ID.</u> Date/Time sample taken	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
18Apr-0150	Fairway 5 60-100 10.04.18	Conductivity (1:5 soil/water)	111 µS/cm	LTM-S-003	1
		Nitrate as N	2 mg/kg	LTM-S-007	1
		Phosphorus, Total	452 mg/kg	LTM-S-015	2
		pH (1:5 soil/water)	7.5 pH units	LTM-S-004	
18Apr-0151	Fairway 8 10-30 10.04.18	Conductivity (1:5 soil/water)	102 µS/cm	LTM-S-003	1
		Nitrate as N	7 mg/kg	LTM-S-007	1
		Phosphorus, Total	578 mg/kg	LTM-S-015	2
		pH (1:5 soil/water)	7.1 pH units	LTM-S-004	
18Apr-0152	Fairway 8 30-60 10.04.18	Conductivity (1:5 soil/water)	107 µS/cm	LTM-S-003	1
		Nitrate as N	10 mg/kg	LTM-S-007	1
		Phosphorus, Total	500 mg/kg	LTM-S-015	2
		pH (1:5 soil/water)	7.0 pH units	LTM-S-004	
18Apr-0153	Fairway 8 60-100 10.04.18	Conductivity (1:5 soil/water)	85 µS/cm	LTM-S-003	1
		Nitrate as N	6 mg/kg	LTM-S-007	1
		Phosphorus, Total	475 mg/kg	LTM-S-015	2
		pH (1:5 soil/water)	7.1 pH units	LTM-S-004	
18Apr-0154	Control 10-30 10.04.18	Conductivity (1:5 soil/water)	96 µS/cm	LTM-S-003	1

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LABORATORY ANALYSIS REPORT

Report Number: 1804-0052

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For all enquiries related to this report please quote document number: 1804-0052

<u>Facility:</u>	<u>Order #</u>	<u>Date Received</u>
<u>Sample Type</u>	<u>Collected By</u>	
Soil	M Donges	10-April-2018

<u>EAL ID</u>	<u>Client ID.</u> Date/Time sample taken	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
18Apr-0154	Control 10-30 10.04.18	Nitrate as N	12 mg/kg	LTM-S-007	1
		Phosphorus, Total	336 mg/kg	LTM-S-015	2
		pH (1:5 soil/water)	7.0 pH units	LTM-S-004	
18Apr-0155	Control 30-60 10.04.18	Conductivity (1:5 soil/water)	55 µS/cm	LTM-S-003	1
		Nitrate as N	4 mg/kg	LTM-S-007	1
		Phosphorus, Total	293 mg/kg	LTM-S-015	2
		pH (1:5 soil/water)	7.1 pH units	LTM-S-004	
18Apr-0156	Control 60-100 10.04.18	Conductivity (1:5 soil/water)	53 µS/cm	LTM-S-003	1
		Nitrate as N	3 mg/kg	LTM-S-007	1
		Phosphorus, Total	289 mg/kg	LTM-S-015	2
		pH (1:5 soil/water)	7.2 pH units	LTM-S-004	

Note:

* NATA Accreditation does not cover the performance of this service.

DM McMahon Pty Ltd
PO Box 6118 4A Norton Street
Wagga Wagga NSW 2650
Attention: David McMahon

Thursday, May 10, 2018



NATA Accredited Laboratory
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LABORATORY ANALYSIS REPORT

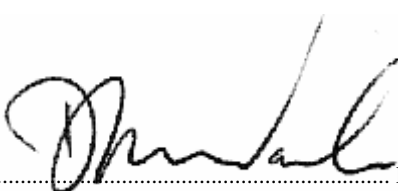
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For all enquiries related to this report please quote document number: 1804-0052

<u>Facility:</u>	<u>Order #</u>	
<u>Sample Type</u>	<u>Collected By</u>	<u>Date Received</u>
Soil	M Donges	10-April-2018

<u>EAL ID</u>	<u>Client ID.</u> Date/Time sample taken	<u>Test</u>	<u>Result (units)</u>	<u>Method Reference</u>	<u>Limit of Reporting</u>
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Signed  David Wade, Laboratory Manager.

*All samples analysed as received.
All soil results are reported on a dry basis.
The EAL takes no responsibility for the end use of results within this report.
This report shall not be reproduced except in full.
This report replaces any previously issued report*



Nutrient Advantage®

Nutrient Advantage Advice®

Nutrient Report

D M MCMAHON PTY LTD ATF
 PO BOX 6118
 WAGGA WAGGA
 NSW 2650

Report Print Date: 20/04/2018
Agent/Dealer:
Advisor/Contact: D M MCMAHON PTY LTD
Phone: 02 6931 0510
Purchase Order No: BIDGEE BANKS

Grower Name : D M MCMAHON PTY LTD
Sample No: 022019478
Paddock Name: BIDGEE BANKS GOLF COURSE
Sample Name: FAIRWAY 5
Sample Depth (cm): 0 To 10

Nearest Town: WAGGA NORTH
Test Code: E13
Sample Type: Soil
Sampling Date: 19/04/2018

Analyte / Assay	Units	Value
Soil Colour		Grey
Soil Texture		Clay
pH (1:5 Water)		6.9
pH (1:5 CaCl2)		6.2
Elect. Conductivity (EC)	dS/m	0.29
Electrical Conductivity (Sat. Ext.)	dS/m	1.8
Chloride	mg/kg	140
Organic Carbon	%	4.6
Nitrate Nitrogen	mg/kg	15
Ammonium Nitrogen	mg/kg	12
Phosphorus (Colwell)	mg/kg	400
Phosphorus Buffer Index		130
Phosphorus Environmental Risk Index		3.08
Sulphur (KCl40)	mg/kg	30
Cation Exch. Cap. (CEC)	cmol(+)/kg	16.8
Calcium	cmol(+)/kg	8.8
Magnesium	cmol(+)/kg	5.4
Sodium	cmol(+)/kg	1.00
Potassium	cmol(+)/kg	1.50
Aluminium	cmol(+)/kg	<0.1
Aluminium % of Cations	%	<1.0
Grass Tetany Risk Index		0.11



Analyses conducted by **Nutrient Advantage Laboratory Services**

NATA Accreditation No: 11958

Certificate of Analysis is available upon request.

8 South Road, Werribee VIC 3030

Tel: 1800 803 453

Email: lab.feedback@incitecpivot.com.au





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Nutrient Report

Grower Name :	D M MCMAHON PTY LTD	Nearest Town:	WAGGA NORTH
Sample No:	022019478	Test Code:	E13
Paddock Name:	BIDGEE BANKS GOLF COURSE	Sample Type:	Soil
Sample Name:	FAIRWAY 5	Sampling Date:	19/04/2018
Sample Depth (cm):	0 To 10		

Analyte / Assay	Units	Value
Calcium % of Cations	%	52.0
Magnesium % of Cations	%	32.0
Sodium % of Cations (ESP)	%	6.10
Potassium % of Cations	%	9.10
Calcium/Magnesium Ratio		1.6
Zinc	mg/kg	9.90
Copper	mg/kg	2.00
Iron	mg/kg	290.0
Manganese	mg/kg	16.0
Boron	mg/kg	1.3

The results reported pertain only to the sample submitted.
Analyses performed on soil dried at 40 degrees Celsius and ground to <2mm (excluding moisture assay)
* One or more components of this test are below their detection limit. The value used is indicative only.

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Nutrient Report

D M MCMAHON PTY LTD ATF
 PO BOX 6118
 WAGGA WAGGA
 NSW 2650

Report Print Date: 20/04/2018
Agent/Dealer:
Advisor/Contact: D M MCMAHON PTY LTD
Phone: 02 6931 0510
Purchase Order No: BIDGEE BANKS

Grower Name : D M MCMAHON PTY LTD
Sample No: 022019479
Paddock Name: BIDGEE BANKS GOLF COURSE
Sample Name: FAIRWAY 8
Sample Depth (cm): 0 To 10

Nearest Town: WAGGA NORTH
Test Code: E13
Sample Type: Soil
Sampling Date: 19/04/2018

Analyte / Assay	Units	Value
Soil Colour		Grey
Soil Texture		Clay
pH (1:5 Water)		6.0
pH (1:5 CaCl2)		5.4
Elect. Conductivity (EC)	dS/m	0.31
Electrical Conductivity (Sat. Ext.)	dS/m	1.9
Chloride	mg/kg	150
Organic Carbon	%	5.3
Nitrate Nitrogen	mg/kg	28
Ammonium Nitrogen	mg/kg	17
Phosphorus (Colwell)	mg/kg	360
Phosphorus Buffer Index		150
Phosphorus Environmental Risk Index		2.40
Sulphur (KCl40)	mg/kg	36
Cation Exch. Cap. (CEC)	cmol(+)/kg	15.5
Calcium	cmol(+)/kg	7.7
Magnesium	cmol(+)/kg	4.9
Sodium	cmol(+)/kg	0.31
Potassium	cmol(+)/kg	2.60
Aluminium	cmol(+)/kg	<0.1
Aluminium % of Cations	%	<1.0
Grass Tetany Risk Index		0.21



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Nutrient Report

Grower Name :	D M MCMAHON PTY LTD	Nearest Town:	WAGGA NORTH
Sample No:	022019479	Test Code:	E13
Paddock Name:	BIDGEE BANKS GOLF COURSE	Sample Type:	Soil
Sample Name:	FAIRWAY 8	Sampling Date:	19/04/2018
Sample Depth (cm):	0 To 10		

Analyte / Assay	Units	Value
Calcium % of Cations	%	50.0
Magnesium % of Cations	%	31.0
Sodium % of Cations (ESP)	%	2.00
Potassium % of Cations	%	17.00
Calcium/Magnesium Ratio		1.6
Zinc	mg/kg	13.00
Copper	mg/kg	2.30
Iron	mg/kg	440.0
Manganese	mg/kg	22.0
Boron	mg/kg	1.0

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Nutrient Report

D M MCMAHON PTY LTD ATF
 PO BOX 6118
 WAGGA WAGGA
 NSW 2650

Report Print Date: 20/04/2018
Agent/Dealer:
Advisor/Contact: D M MCMAHON PTY LTD
Phone: 02 6931 0510
Purchase Order No: BIDGEE BANKS

Grower Name : D M MCMAHON PTY LTD
Sample No: 022019498
Paddock Name: BIDGEE BANKS GOLF COURSE
Sample Name: CONTROL
Sample Depth (cm): 0 To 10

Nearest Town: WAGGA NORTH
Test Code: E13
Sample Type: Soil
Sampling Date: 19/04/2018

Analyte / Assay	Units	Value
Soil Colour		Grey
Soil Texture		Clay
pH (1:5 Water)		6.2
pH (1:5 CaCl2)		5.5
Elect. Conductivity (EC)	dS/m	0.14
Electrical Conductivity (Sat. Ext.)	dS/m	0.9
Chloride	mg/kg	40
Organic Carbon	%	4.4
Nitrate Nitrogen	mg/kg	8
Ammonium Nitrogen	mg/kg	8
Phosphorus (Colwell)	mg/kg	110
Phosphorus Buffer Index		59
Phosphorus Environmental Risk Index		1.86
Sulphur (KCl40)	mg/kg	12
Cation Exch. Cap. (CEC)	cmol(+)/kg	12.3
Calcium	cmol(+)/kg	8.1
Magnesium	cmol(+)/kg	2.7
Sodium	cmol(+)/kg	0.09
Potassium	cmol(+)/kg	1.40
Aluminium	cmol(+)/kg	<0.1
Aluminium % of Cations	%	<1.0
Grass Tetany Risk Index		0.13



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Nutrient Report

Grower Name :	D M MCMAHON PTY LTD	Nearest Town:	WAGGA NORTH
Sample No:	022019498	Test Code:	E13
Paddock Name:	BIDGEE BANKS GOLF COURSE	Sample Type:	Soil
Sample Name:	CONTROL	Sampling Date:	19/04/2018
Sample Depth (cm):	0 To 10		

Analyte / Assay	Units	Value
Calcium % of Cations	%	66.0
Magnesium % of Cations	%	22.0
Sodium % of Cations (ESP)	%	0.70
Potassium % of Cations	%	11.00
Calcium/Magnesium Ratio		3.0
Zinc	mg/kg	6.90
Copper	mg/kg	1.00
Iron	mg/kg	160.0
Manganese	mg/kg	34.0
Boron	mg/kg	0.7

The results reported pertain only to the sample submitted.

Analyses performed on soil dried at 40 degrees Celsius and ground to <2mm (excluding moisture assay)

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Attachment B : *Chain of Custodies*

1710-0023

DM McMahon Pty Ltd
 PO Box 6118, Wagga Wagga, NSW 2650
 Tel: 0269 310 510 Fax: 0269 310 511
CHAIN OF CUSTODY - LABORATORY WORK REQUEST

BIDGEE BANKS GOLF COURSE - GUNDAGAI SHIRE COUNCIL

Safety: Note presence of hydrochloric acid preservative in glass jars for Oil & Grease

EAL Batch ID	EAL Sample ID	CLIENT ID	DATE SAMPLED	TIME SAMPLED	SAMPLED BY	SAMPLE TYPE		TYPE & NUMBER OF CONTAINERS		
						Grab	Composite	Plastic (1500mL)	Glass (500mL)	Sterile
	Point 1 (Irrigation)		4/10	10:00	DM	✓		1	1	1
	Piezo 1							1	1	1
	Piezo 2							1	1	1

Observations:

Analytes:

Point 1 (Irrigation)	Required
Piezo 1 & 2	Quarterly - BOD, Electrical Conductivity, Nitrogen (Total), Oil & Grease, Phosphorus (Total), SAR, *Faecal Coliforms, pH, TSS
	* Piezo 1 & 2 - do not require Faecal Coliforms
Please note that samples must be analysed in accordance with the 2004 EPA Guidelines Approved Methods for the sampling and analysis of Water Pollutants in NSW.	

Chain of Custody:

RELINQUISHED BY:	NAME	SIGNED	DATE & TIME
	DMF McLe	DM	5/10
RECEIVED BY:			

1804-007

DM McMahon Pty Ltd

PO Box 6118, Wagga Wagga, NSW 2650

Tel: 0269 310 510 Fax: 0269 310 511

CHAIN OF CUSTODY - LABORATORY WORK REQUEST

BIDGEE BANKS GOLF COURSE - GUNDAGAI SHIRE COUNCIL

Safety: Note presence of hydrochloric acid preservative in glass jars for Oil & Grease


EAL Batch ID	EAL Sample ID	CLIENT ID	DATE SAMPLED	TIME SAMPLED	SAMPLED BY	SAMPLE TYPE			TYPE & NUMBER OF CONTAINERS		
						Grab	Composite		Plastic (1500ml)	Glass (500ml)	Sterile
	Point 1 (Irrigation)		10/04/2018	10:55	MD	✓			1	1	1
	Piezo 1		10/04/2018	11:10	MD	✓			1	1	1
	Piezo 2		10/04/2018	11:10	MD	✓			1	1	1

Observations:

Analytes:

Point 1 (Irrigation)	Required
Piezo 1 & 2	Quarterly - BOD, Electrical Conductivity, Nitrogen (Total), Oil & Grease, Phosphorus (Total), SAR, Faecal Coliforms, pH, TSS
	* Piezo 1 & 2 - do not require Faecal Coliforms

Please note that samples must be analysed in accordance with the 2004 EPA Guidelines Approved Methods for the sampling and analysis of Water Pollutants in NSW.

Chain of Custody:	NAME	SIGNED	DATE & TIME
RELINQUISHED BY:	Michael Donges		10/04/2018
RECEIVED BY:	D. L. Mac		10/4/18 2:50

DM McMahon Pty Ltd
 120 Fitzmaurice Street, Wagga Wagga NSW 2650
 TEL 0269 310 510 MOB 0427 214453.

EAL NUMBER

SITE
 Gundagai Golf Course

CLIENT ID	DATE SAMPLED	TIME SAMPLED	COMMENTS	Required Analysis
Fairway 5 0-10	10/04/2018	12:15		Suite One
Fairway 8 0-10	10/04/2018			Suite One
Control 0-10	10/04/2018	11:50		Suite One
Fairway 5 10-30	10/04/2018	12:20		Suite Two
Fairway 5 30-60	10/04/2018	12:25		Suite Two
Fairway 5 60-100	10/04/2018	12:30		Suite Two
Fairway 8 10-30	10/04/2018	12:35		Suite Two
Fairway 8 30-60	10/04/2018	12:40		Suite Two
Fairway 8 60-100	10/04/2018	12:45		Suite Two
Control 10-30	10/04/2018	11:55		Suite Two
Control 30-60	10/04/2018	12:00		Suite Two
Control 60-100	10/04/2018	12:05		Suite Two

Sampling Chain of Custody Record			
Sample Location	Sampling Officer	Sample Bottles Required	
BIDLEE GOLF COURSE	M. DONNELL	1 plastic bag	
Sample Type	Testing unit	Weather Conditions	
SOIL		SUNNY	
Coc	Name	Date & Time	Signature
Officer Collecting Sample:	Mick Donges	10/04/2018	
CSU-EAL Officer Receiving Sample:	D. L. M. D.	"	

Required Analysis			
TEST	Units of Measure	Limit of Reporting	NATA Accredited
Suite One			
TKN - N			
Phosphorus (total)			

Suite Two			
pH			
Electrical Conductivity			
Phosphorus (total)			
Nitrate			

1004-0052

DM McMahon Pty Ltd

Customer Details

PLEASE KEEP THIS TOP SECTION FOR YOUR RECORDS

Site ID:	GSC - BIDGE BANKS	Sampling Date:	10/04/2018	Customer Name:	DM McMahon Pty Ltd
1st barcode number in this delivery	0 2 2 0 1 9 4 7 8	Last barcode number in this delivery	0 2 2 0 1 9 4 9 8		

PLEASE REMEMBER TO FAX THIS FORM TO PIVOTEST ON (03) 9974 0699 PRIOR TO SENDING YOUR SAMPLES

Wholesale - Area Information Form

SECTION 1: PLEASE COMPLETE THE FOLLOWING INFORMATION ON ALL AREA INFORMATION FORMS

To avoid delays in receiving your test report and recommendations, thorough and accurate completion of AIF is needed.

1. Please enter the barcode number of the first sample here. **1st Sample No.** 0 2 2 0 1 9 4 7 8

2. Enter the total number of samples being sent to Pivotest in this delivery: **3**

SECTION 2: CUSTOMER DETAILS

Please provide your Pivot customer number: **6 6 3 5 7** Your reference or order number: **5 1 3 7**

Name: DM McMahon Pty Ltd

Telephone No: **0 2** - **6 9 3 1 0 5 1 0** Fax Number: **0 2** - **6 9 3 1 0 5 1 1**

Address: **PO Box 6118** Town: **WAGGA WAGGA** P/Code **2 6 5 0**

E-mail Address: david@dmmcmahon.com.au

SECTION 3: REQUIRED ANALYSIS

TOPSOIL STANDARD (SC) **E13**

(Colwell P Standard)

OPTIONS

Olsen P Trace Elements

Bray P Boron

BSES P Chloride

P Sorption Index (PSI)

DEEPSOIL BASIC

OPTIONS

EC, pH (water), pH (CaCl2)

Exchangeable Cations

Boron

Chloride

TISSUE STANDARD (TH)

OPTIONS

Cobalt + Molybdenum

Nitrate

SECTION 4: PIVOT USE ONLY BOX

Cost Centre Number:

Marketing/quote number: **9 9 9 9 9 9**

Authorisation Number:

