

Barossa Infrastructure Limited

Gomersal Recycled Water Reuse Scheme

Audit Report (2018/19)

September 2019

Commercial in Confidence

Gomersal Recycled Water Reuse Scheme

Audit Report (2018/19)

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1. Introduction & Background

Seed Consulting Services (Seed) were engaged to undertake an independent review (audit) of the management of the Barossa Infrastructure Limited (BIL) Wastewater Reuse Scheme for the 2018/19 year.

BIL injects Community Wastewater Management Scheme (CWMS) water from The Barossa Council's Nuriootpa CWMS scheme in the BIL Gomersal Road pipeline where it blends the CWMS water with BIL water (unfiltered River Murray water – raw water). This is delivered to BIL customers along Gomersal Road as a blended product.

The operation of the wastewater reuse scheme was approved by Department of Health in August 2009 (approval number 2009-7292) and successfully reviewed in 2016.

The approval was subject to 8 conditions of operation, including that:

- The Risk Management Plan and operating procedures are maintained onsite for use by the system operator/maintenance personnel,
- Irrigation is by 'drip' irrigation only, and that properties using the recycled water display appropriate signage, ensure there is no runoff, fence dams and paint exposed pipework lilac,
- Water quality parameters must not exceed certain criteria, including limits set for BOD, suspended solids, coliforms, and chlorine content.

These conditions have been considered in this audit report, however it should be noted that a thorough inspection and assessment for each private user of the wastewater has not been carried out; instead general consultation with randomly selected users has been undertaken.

This report provides a summary of volumes of wastewater supplied under the Wastewater Reuse Scheme and water quality parameters for the operational period of the 2018/19 financial year.

2. Recycled Water Supplied to Users

BIL customers generally are supplied with water transported from the River Murray via the Warren Reservoir by SA Water (raw water). BIL customers in the Gomersal area received a total of approximately 2,195 ML of irrigation water made up of 1,923 ML of raw water and 272 ML of treated effluent water from the Nuriootpa Wastewater Treatment Plant (CWMS) in 2018/19. On average treated water comprised 12.4% of all irrigation water delivered to BIL Gomersal Road customers. This is within the maximum dilution benchmark at 14%. Annual contracted water volume between the Barossa Council and BIL is 265ML, 2.6% more CWMS water was delivered in the reporting period.

Table 1 provides a monthly comparison of the total volume of water supplied versus the volume of treated effluent is provided in.

Month	Total BIL (ML)	Treated Effluent Volume (ML)	Treated Effluent (%)
July 2018	113	33	23
August	159	29	15
September	137	23	14
October	168	20	11
November	230	20	8
December	330	22	6
January 2019	364	21	5
February	234	21	8
March	93	19	17
April	70	22	24
May	18	21	54
June 2019	7	21	75
Total (2195 ML)	1923	272	12.4%

Table 1: Monthly Supply of Water to Gomersal Road BIL Customers

Note that the higher percentages of dilution occur in the months of April, May, June and July. This is not unusual and is a function of low reduced demand of the vineyards during autumn and winter when the vines are dormant, but the supply of effluent to treatment plant and ponds is constant.

3. Water Quality Parameters

The following section provides a summary of the water quality parameters considered in our review and is sourced from data provided by The Barossa Council and BIL. Analysis of water samples was conducted at the Australian Water Quality Centre, AWQC, (NATA certified).

Table 2 provides a summary of the water quality parameters for the Wastewater Reuse Scheme for the 2018/19 financial year.

BIL can inject CWMS water for irrigation water use in the Gomersal area within water quality limits, as detailed in SA Health approval number 2009-7292. The conditions of the approval by SA Health for BOD, Suspended Solids, E coli, and Total Dissolved Solids are summarised below:

- The SA Health BOD Limit is 20 mg/L. The mean BOD was 27.8 mg/L with a range of 8 – 43 mg/L. The Barossa Council reported no plant failures during the operation of the plant for the reporting period. The pipeline system is designed to operate on a 24 hour basis with stable flows. To meet operational procedures the pipeline underwent shutdown/start up events. There were some occasions where this process was not able to be actioned resulting in some deterioration in water quality. As a response the Council actioned a high flow and high chlorination flush to improve mains condition. Free chlorine median of 0.5 mg/L meets expectations.
- SA Health Limits were not exceeded for suspended solids, E coli counts and total dissolved solids.

3.1 Water Quality Results Collected by Barossa Council

The Barossa Council collects water samples for analysis from the Nuriootpa CWMS Treatment Plant final lagoon, just prior to the pipeline to the BIL scheme.

Given there is significant dilution of the treated wastewater once connected into the BIL Gomersal main, the Barossa Council test results are considered the “worse case” scenario for water quality. Average dilution for the reporting period was 12.4%, well within the 14% SA Health limit.

The Barossa Council took samples on a monthly basis, from July 2018 to and including June 2019. A full list of test results (see Appendix) were inspected and a summary of these results for water quality parameters required to be met under the SA Health approval is provided in Table 2. Several parameters and associated limits are also illustrated in Figure 1 and Figure 2.

For the 2017/2018 report SA Health requested 3 year trend data for BOD, E coli, SS, TDS and Phosphorous - P. Refer Figure 3 and Figure 4 for trend graphs.

Water Quality Parameters 2018_2019							
Testing date	BOD (mg/L)	Suspended Solids (mg/L)	E. coli (count per 100mL)	Free Chlorine (mg/L)	TDS (mg/L)	Total N (mg/L)	Total P (mg/L)
July 2018	37	25.6	0	0.5	690	3.59	11.8
August	38	26	0	0.5	740	2.33	10.3
September	43	26	0	0.5	770	1.24	10
October	26	14	0	0.0	790	0.75	10.7
November	20	16	2	0.0	800	<0.06	11.1
December	43	64	11	0.5	700	<0.06	12.4
January 2019	20	38	1	1.0	580	<0.06	13
February	31	21.6	14	1.0	480	0.2	101
March	8	6	22	0.5	460	<0.06	12.1
April	26	20	0	0.0	440	2.67	10.8
May	17	14	0	0.5	470	1.3	10.7
June	16	22	0	0.5	448	3.22	10.1
Mean / Median	27.8 mean	24.3 mean	0 median	0.5 median	614 mean	2.33 mean	18.0 mean
Limits and Trigger Values	20 mg/L SA Health Limit	30 mg/L SA Health Limit	100 SA Health Limit	1.0 mg/L SA Health Limit	1,450 mg/L Risk Plan Trigger	n/a	n/a

Table 2: Summary Water Quality Test Results applicable to SA Health approval Nuriootpa Community Wastewater Management Scheme CWMS, Treatment Plant, Final lagoon.

Approval Inorganic Chemistry – Metals: CWMS Supply Sample

Date	INORGANIC CHEMISTRY METALS				AWQC DATA **BIL SAMPLE	
	Arsenic	Boron	Cadmium	Calcium	Chromium	Lead
*LOR mg / L	0.0003	0.020	0.0001	0.10	0.0001	0.0001
28/06/2019	0.0007	0.264	<0.0001	21.0	0.0011	0.0022

- *LOR: Limits of Reporting

Table 3: Summary Water Quality Test Results applicable to SA Health approval

A recommendation from the 2014/2015 report suggested collecting data on “Heavy Metals”. This action was completed in 2016/17, 2017/2018 and this report, 2018/2019. Samples were taken from the CWMS supply point for analysis by AWQC. These reports were sighted and summarised in Table 3.

Table 4 summarises results from July 2018 and June 2019.

METAL	LOR	24/07/2018 mg / L	28/06/2019 mg / L
Aluminium	0.001	0.087	No sample
Arsenic	0.0003	0.0006	0.0007
Beryllium	0.0003	<0.0003	No sample
Boron	0.020	0.121	0.264
Cadmium	0.0001	<0.0001	<0.0001
Calcium	0.1	25.9	21.0
Chromium	0.0001	0.0005	0.0011
Cobalt	0.0001	0.0002	No sample
Copper	0.0001	0.0171	No sample
Iron	0.0005	0.1220	0.3311
Lead	0.0001	0.0008	0.0022
Lithium	0.0003	0.0060	No sample
Magnesium	0.05	18.1	8.04
Manganese	0.0001	0.0331	0.0485
Mercury	0.00003	<0.00003	No sample
Molybdenum	0.0001	0.0003	No sample
Nickel	0.0001	0.0018	No sample
Potassium	-	No sample	25.5
Selenium	0.0001	0.0002	No sample
Sodium	0.1	144	88.1
Uranium	0.0001	0.0003	No sample
Vanadium	0.0001	0.0008	No sample
Zinc	0.0003	0.0834	0.0867

Table 4: Heavy Metal summary July 2018 and June 2019

Figure 1: CWMS BOD, Suspended Solids, and E coli test results and limits.

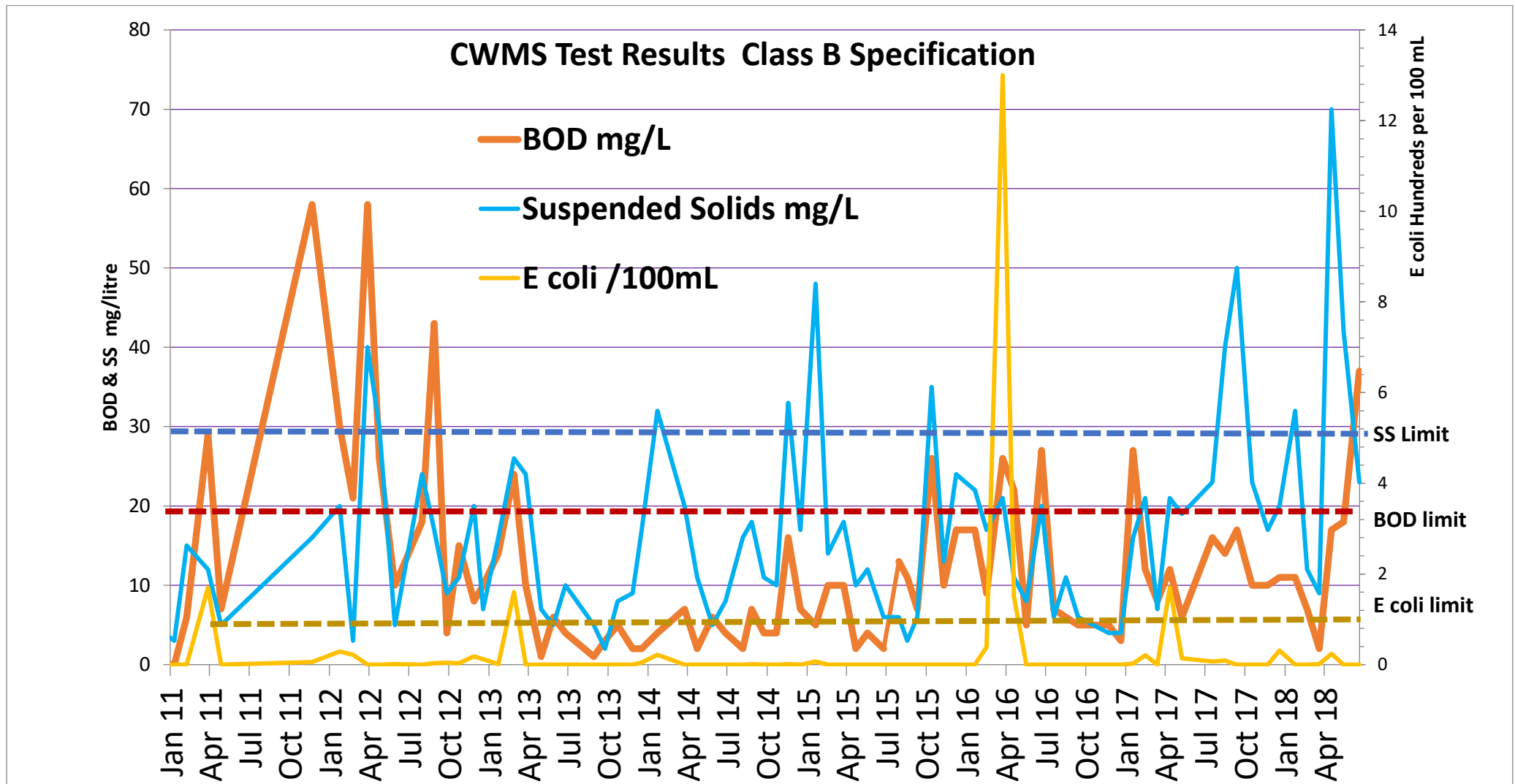


Figure 2: CWMS pH, Total P, Total N, and TDS test results

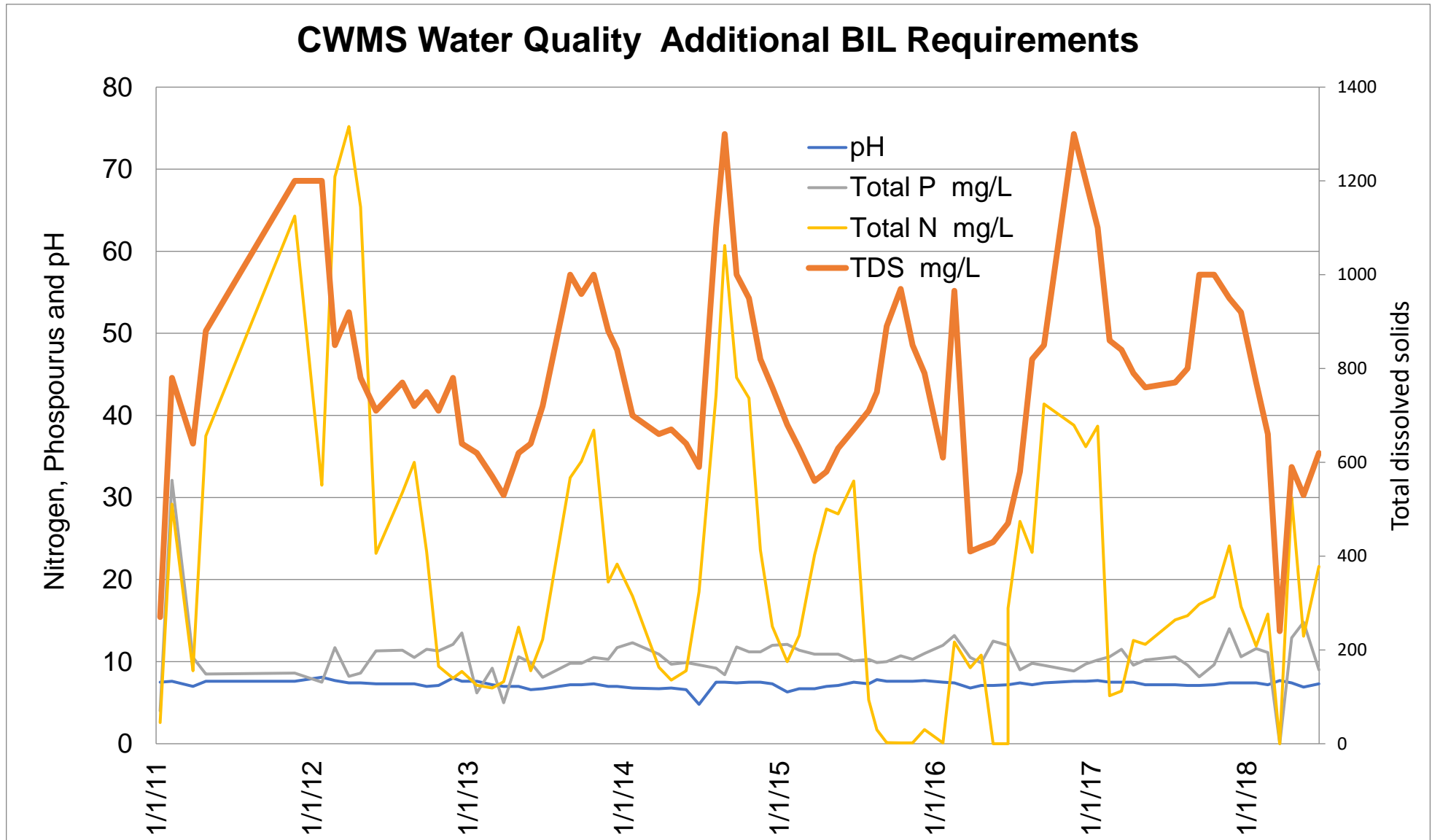


Figure 3: Three Year Trends : BOD, E coli, Suspended Solids

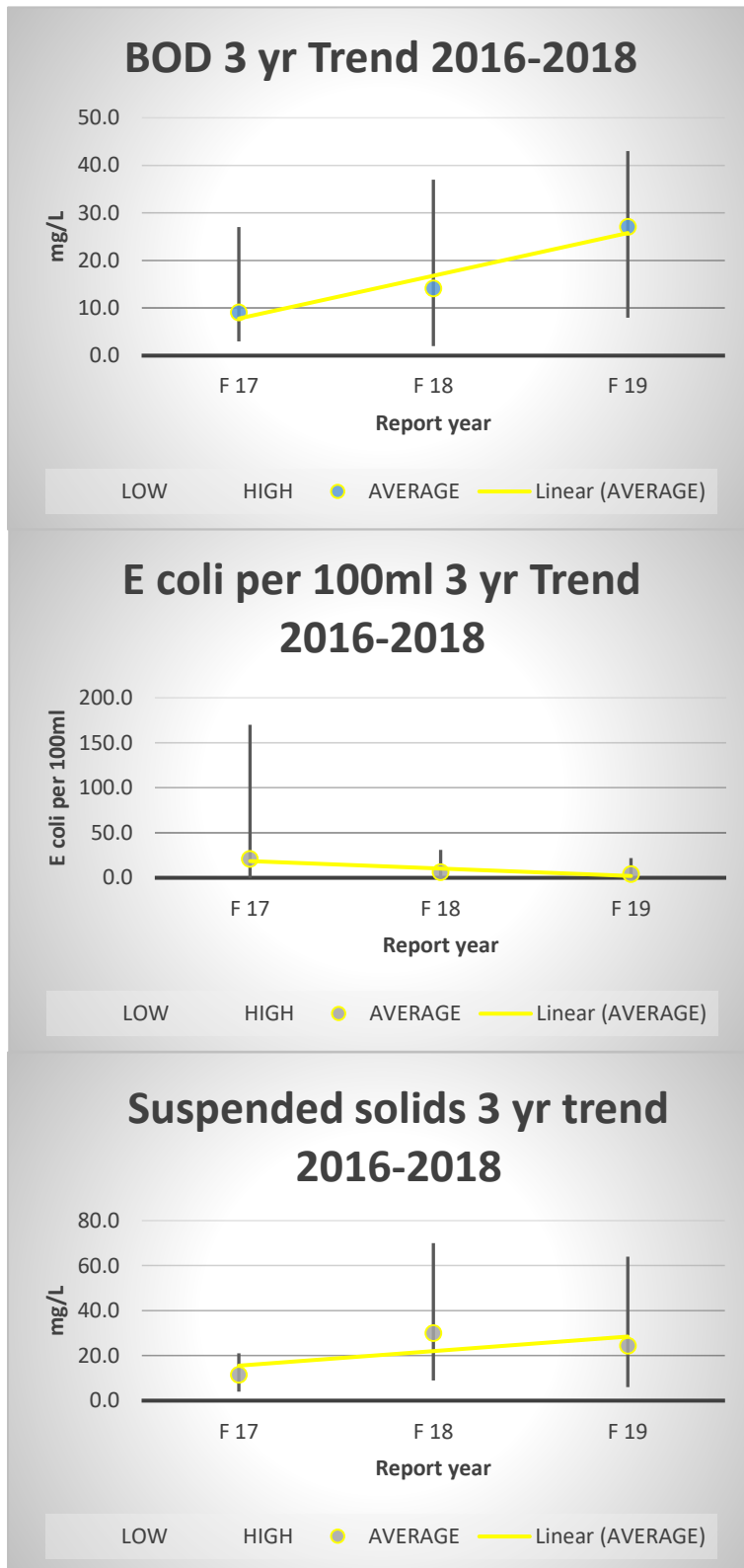
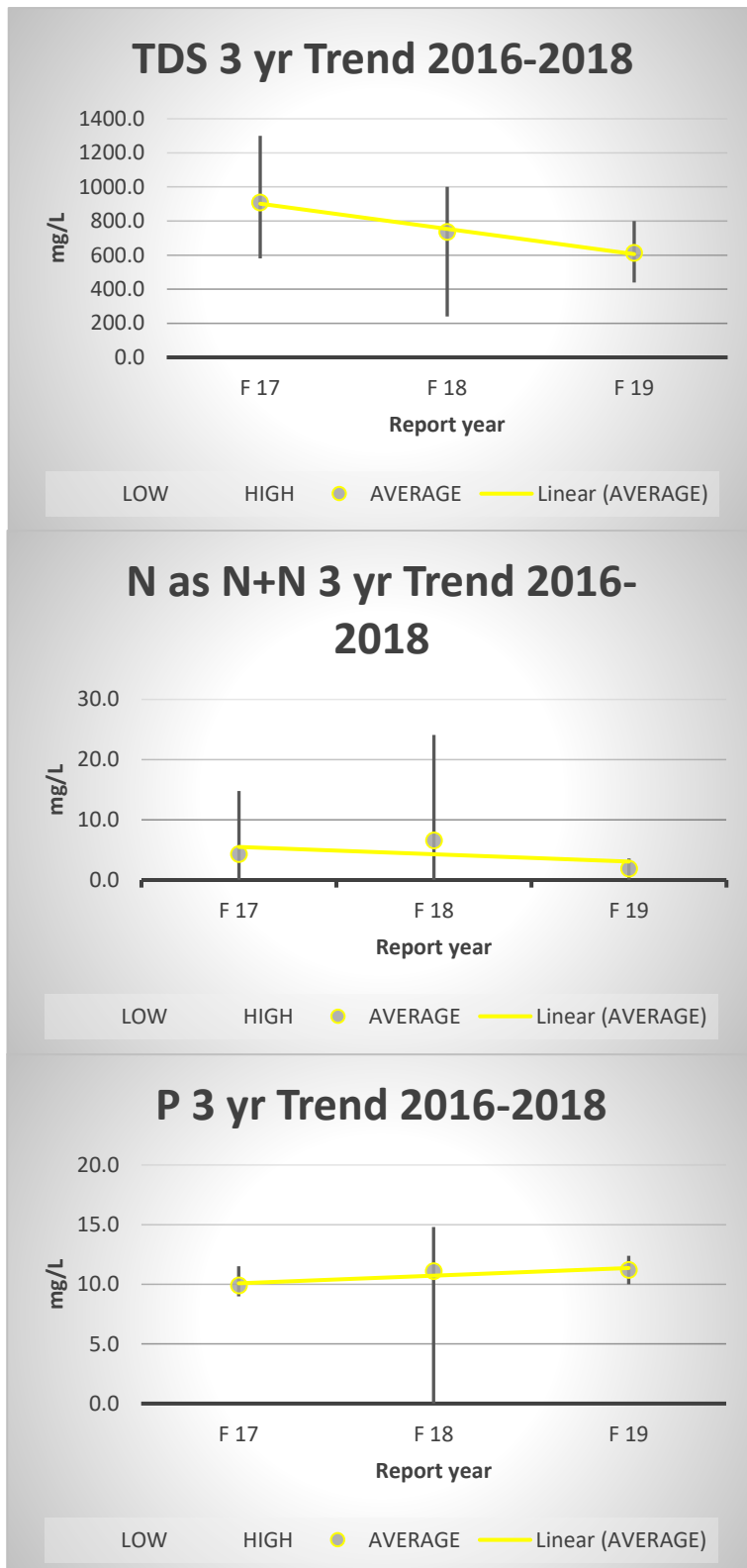


Figure 4: Three Year Trends : TDS, N+N, Phosphorous - P



3.2 Summary of Water Quality Analysis

3.2.1. BOD, Suspended Solids and E. coli

The mean for suspended solids and median E. coli levels did not exceed the SA Health approval limits. BOD limits exceeded for all months except March, April, May.

BOD and suspended solid information is based on fundamental data, means are calculated from this data.

- The SA Health BOD Limit is 20 mg/L. The mean BOD was 27.8 mg/L with a range of 8 to 43 mg/L. The Barossa Council reported no plant failures during the operation of the plant for the reporting period. The pipeline system is designed to operate on a 24 hour basis with stable flows. To meet operational procedures the pipeline underwent shutdown/start up events. There were some occasions where this process was not able to be actioned resulting in some deterioration in water quality. As a response the Council actioned a high flow and high chlorination flush to improve mains condition. Free chlorine median of 0.5 mg/L meets expectations.
- SA Health Limits were not exceeded for Suspended Solids (SS) and E coli counts. SS mean was 24.3 mg/L, SA Health limit is 30mg/L. E.coli median was 0 per 100ml, SA Health limit is 100 per 100mL, TDS mean was 614 mg/L, trigger level is 1,450 mg/L as per risk management plan.

3.2.2. Free Chlorine

SA Health approval criteria were achieved.

Barossa Council operates a chlorine dose trimming system. Chlorine dosing did not exceed SA Health requirements and E Coli results are well within requirements. This result would suggest chlorine dosing and E Coli control is well managed.

3.2.3 Salinity

The salinity trigger point specified in the Risk Plan was not reached.

The Risk Management Plan operated by BIL specifies that salinity testing will be required downstream of the point of injection if salinity in the Council operated final lagoon exceeds 1,450 mg/L. The average TDS was 614 mg/L (results supplied by Barossa Council) well within the trigger point of 1,450 mg/L. There was no need to test further downstream.

3.2.3. Heavy Metals

Future reporting of Heavy Metals may assist some growers with company and/or product reporting.

Table 4 Summarises heavy metal data. This is the third year this data has been reported. No trends are obvious given the limited sample sets.

4. Recommendations

Review 2018/19

The independent review of the management of the Barossa Infrastructure Limited (BIL) Gomersal Road Wastewater Reuse Scheme for the 2018/19 year reports that on average all water quality parameters and requirements are within the required limits, with the exception of BOD in most months.

Recommendations:

Ongoing recommendations from 2017/2018 suggested – “Review of wastewater scheme operations and related landownership to ensure the requirements of the WIMP and RMP are met, including consultation and communication as appropriate.” This recommendation was actioned in both 2018 and 2019.

- This report recommends random site visits continue for 2019/2020.

As a result of this report in order to ensure ongoing compliance with SA Health and BIL’s Wastewater Reuse Scheme requirements and conditions, the following is recommended:

- BOD AWQC reports to be monitored by BIL for any changes in trends.

APPENDIX:

Barossa Council Monthly Water Quality Test Results 2018/19.

Date	Ammonia as N	BOD	Ca	COD	Conductivity	E. coli	Grease & Oil	Mg	N+N as N	Nitrate as N	Nitrite as N	pH	Phos. Total	Sodium	SAR	SS	TKN as N	TDS
	mg/L	mg/L	mg/L	mg/L	uScm	100mL	mg/L	mg/L	mg/L	mg/L	mg/L	Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
24/07/2018	17	37	25.9	106	1260	0	1	18.1	3.59	2.02	1.57	7.3	11.8	144	5.31	`	25.6	690
21/08/2018	23.1	38	25.8	88	1350	0	<1	19.6	2.33	2.06	0.27	7.4	10.3	152	5.49	26	37.5	740
18/09/2018	31.1	43	26.9	85	1390	0	<1	19.9	1.24	0.63	0.61	7.5	10	148	5.27	26	35.9	770
23/10/2018	34.3	26	31.5	105	1440	0	<1	22.4	0.75	0.24	0.51	7.5	10.7	166	5.53	14	42.3	790
20/11/2018	39	20	30.2	93	1450	2	<1	18.5	<0.06	<0.06	<0.06	7.5	11.1	149	5.27	16	45.6	800
18/12/2018	25.4	43	27.7	178	1270	11	<1	16.4	<0.06	<0.06	<0.06	7.3	12.4	131	4.88	64	42.1	700
22/01/2018	17.6	20	24.4	125	1060	1	<1	12.4	<0.06	<0.06	<0.06	7.1	13	110	4.52	38	25.6	580
19/02/2019	15.4	31	22.7	138	877	14	<1	9.63	0.2	0.14	<0.06	12.4	101	4.48	58	21.6	26.5	480
19/03/2019	12.4	8	20.3	77	828	22	2	8.71	<0.06	<0.06	<0.06	7.2	12.1	93.4	4.37	6	16.8	460
16/04/2019	14.9	26	20.5	75	808	0	2	7.39	2.67	1.77	0.9	7.1	10.8	80.9	3.9	20	20.9	440
14/05/2019	22.8	17	21.4	72	848	0	<1	7.99	1.3	0.7	0.6	7.2	10.7	83.8	3.92	14	29.1	470
18/06/2019	18.4	16	20.5	70	808	0	<1	7.99	3.22	1.72	1.5	7.3	10.1	84.6	4.02	22	21.7	448

APPENDIX:

Grower and Barossa Council feedback:

A number of growers were contacted and site visits completed to confirm understanding of operational features and risk management associated with the storage and use of recycled water with the following results:

- No significant issues were reported in terms of major emergencies and hazards to people or the environment.
- All indicated they understood the water contained recycled water and it represented a hazard to people albeit in dilute form. One grower was concerned about the variability of water quality at various times of the years. The report addresses this issue on page 7 in discussion of variability of supply and demand throughout the year, in particular low demand in autumn and winter when flow velocities are low.
- All growers indicated they communicated to employees, contractors and visitors that the site used and stored recycled water.
- All sites had isolation valves in place. One grower had installed Maric flow restriction valves as well as isolation valves.
- All of the growers contacted understand of the requirements to report emergencies that result in spills of recycled water.
- Signage and lilac colour coding was used in all properties inspected. However one grower required more signage around a storage dam to indicate recycled water. This person indicated they would action this requirement.
- All growers were satisfied with the quality of water but indicated maintenance of filtration systems was ongoing and important given the product provided is a combination of treated recycled water and raw water. They acknowledged that water quality did vary depending on time of the season and demand.
- All growers were satisfied with the level of communication and support from BIL. This is important to manage variable supply and demand of the system.
- The Barossa Council indicated that capital was expensed to provide a secondary power back to the system to manage the risk of power shortage.