Gundagai Sewage Treatment Plant (STP)

Environmental Protection License No. 1721

Effluent Quality Monitoring Report

November 2021

Contents

Gundagai Sewage Treatment Plant

1.0 Background

Gundagai Sewerage system was constructed during 1930s. The sewerage systems consists of reticulation sewers, sewage pump stations and rising mains and a sewage treatment plant. The existing sewage treatment plant has passed its useful life and a contract has been let to construct a new sewage treatment plant to replace the existing sewage treatment plant and part of the existing sewerage infrastructure.

The existing treatment plant consist inlet works, Imhoff tank and trickling filters, humus tank, maturation pond and sludge digester. Digested sludge is discharged into drying beds and disposed at landfill sites. Treated effluent is used to irrigate parks, sporting fields and golf course.

Figure 1- Layout of Gundagai Sewage Treatment Plant

At present a new Sewage Treatment Plant is under construction with Intermittently Decanted Extended Aeration (IDEA) with sludge dewatering facilities. Upon completion of testing and commissioning of the new treatment plant which is designed to produce higher quality treated effluent for irrigation reuse.

The new plant will have screens, grit removal IDEA process with sludge dewatering facilities. The treated effluent will be disinfected with UV light unit prior to using it for irrigation of parks, garden, sporting fields and golf course. Treated Effluent will be discharged into the nearby waterways while there is not irrigation demand.

2.0 Water Quality Monitoring

2.1 Water Quality Monitoring Locations

Sampling and testing of the Treated effluent is done at fortnightly interval at three locations which include;

- Maturation pond outlet
- Inlet to the irrigation pond
- Outlet to the irrigation pond irrigation delivery

The location of sampling points are shown in figure 2.

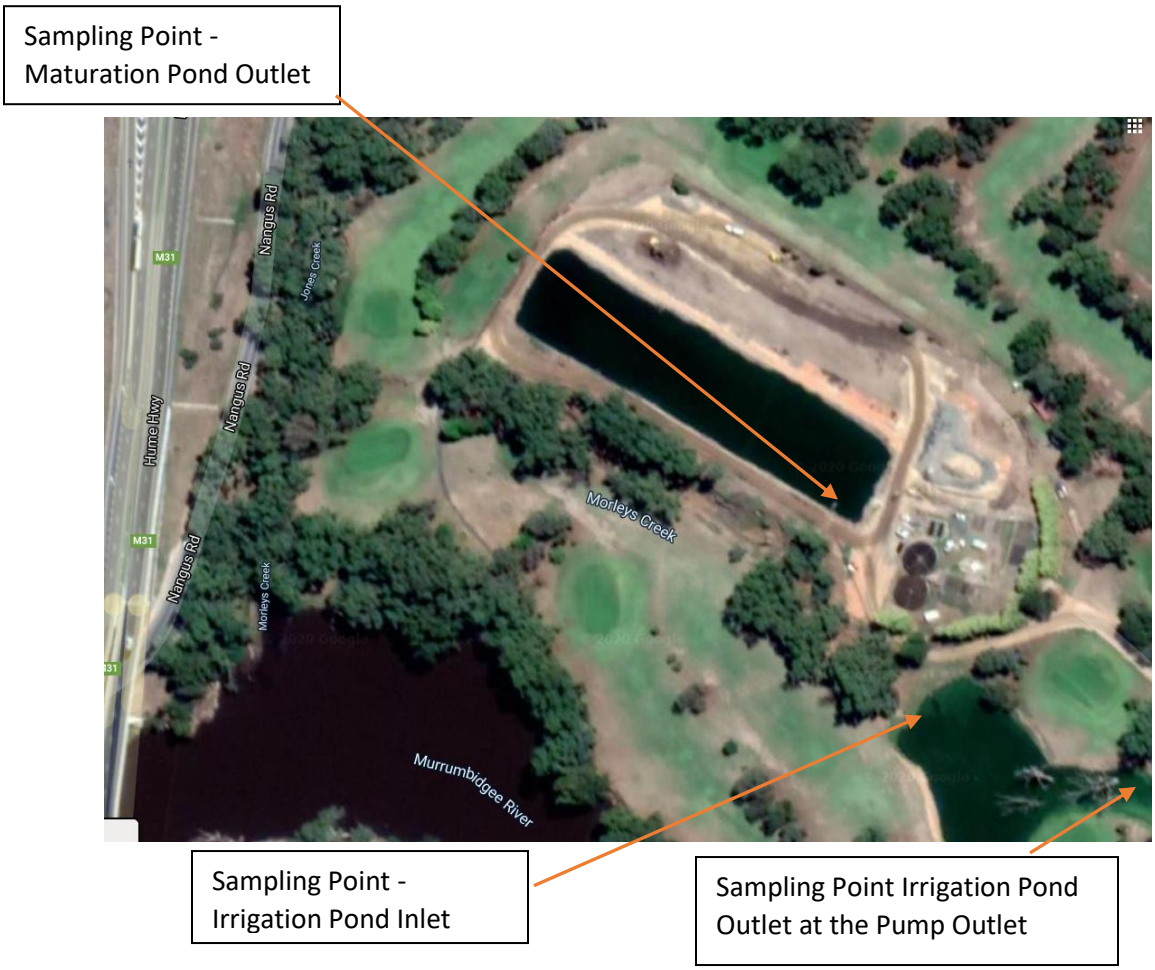

Figure 2- Location of Sampling Points

2.1 Water quality monitoring and reporting

Water samples are collected and dispatched for testing at NATA accredited laboratories and the test results are provided in Section 3 of this report.

Subsequent to a Risk Management Study on the treated effluent reuse facilities, it was proposed to install a disinfection unit based using sodium hypochlorite solution to reduce the coliform count on the irrigation water and to fully comply with License Requirements.

A skid Chlorinator using 12.5% hypochlorite solution was installed, tested and commissioned on 28 August 2020. Subsequent to this the coliform count in the irrigation point has dropped significantly representing an LRV of 3 and above achieved by the disinfection process. Further details can be found in the water quality report in Section 3 of this report.

Figure 3 - Chlorinator

2.0 Water Quality Monitoring Results

Fortnightly Sampling of Treated Effluent - Bidgee Banks Golf Course (Point 1 Irrigation)	
Date	**Faecal coliforms**
Units	cfu/100mL
1/2/18	30
10/4/18	330
15/10/18	45
14/12/18	6160
14/1/19	1
31/1/19	100
13/2/19	50
28/2/19	444
14/3/19	10
28/3/19	90
11/4/19	734
23/4/19	2600
9/5/19	6000
23/5/19	5600
6/6/19	6560
4/7/19	300
18/7/19	50
1/8/19	1
19/8/19	83
29/8/19	20
12/9/19	37
30/9/19	119
10/10/19	64
24/10/19	606
6/11/19	101
20/11/19	28
5/12/19	192
19/12/19	606
7/1/20	5050
24/1/20	550
5/2/20	140
18/2/20	10
3/3/20	505
16/3/20	2020
31/3/20	1410

Bidgee Banks Golf Course (Golf Course Pond Inlet)	
Date	**Faecal coliforms**
Units	cfu/100mL
1/2/18	
10/4/18	
15/10/18	
14/12/18	
14/1/19	2500
31/1/19	96700
13/2/19	3670
28/2/19	34400
14/3/19	22500
28/3/19	60000
11/4/19	36000
23/4/19	73000
9/5/19	169000
23/5/19	96000
6/6/19	193000
4/7/19	10800
18/7/19	37400
1/8/19	150
19/8/19	10000
29/8/19	55
12/9/19	4500
30/9/19	2020
10/10/19	8590
24/10/19	25600
6/11/19	178000
20/11/19	1620
5/12/19	3160
19/12/19	4340
7/1/20	122000
24/1/20	50200
5/2/20	27000
18/2/20	33300
3/3/20	33300
16/3/20	28300
31/3/20	48500

Bidgee Banks Golf Course (Maturation Pond Outlet)	
Date	**Faecal coliforms**
Units	cfu/100mL
1/2/18	
10/4/18	
15/10/18	
14/12/18	
14/1/19	
31/1/19	
13/2/19	6560
28/2/19	40000
14/3/19	15100
28/3/19	83300
11/4/19	41000
23/4/19	68000
9/5/19	187000
23/5/19	103000
6/6/19	212000
4/7/19	13600
18/7/19	12100
1/8/19	340
19/8/19	10000
29/8/19	100
12/9/19	4500
30/9/19	2420
10/10/19	44400
24/10/19	90000
6/11/19	178000
20/11/19	8890
5/12/19	6400
19/12/19	4020
7/1/20	178000
24/1/20	51100
5/2/20	34000
18/2/20	149000
3/3/20	26300
16/3/20	45400
31/3/20	52500

Fortnightly Sampling of Treated Effluent - Bidgee Banks Golf Course (Point 1 Irrigation)	
Date	Faecal coliforms
14/4/20	800
22/4/20	210
13/5/19	3200
19/5/19	3100
22/5/20	3500
29/5/20	3330
2/6/20	108
5/6/20	800
9/6/20	1100
12/6/20	1110
16/6/20	372
19/6/20	3670
24/6/20	1670
26/6/20	12400
30/6/20	111
3/7/20	4670
14/7/20	26700
17/7/20	5330
21/7/20	1890
24/7/20	667
29/7/20	5110
31/7/20	1210
4/8/20	667
6/8/20	1560
11/8/20	222
25/8/20	73
8/9/20	1
23/9/20	1
6/10/20	1
20/10/20	70
3/11/20	<1
17/11/20	1440
1/12/20	<1
15/12/20	667
4/1/21	444

Bidgee Banks Golf Course (Golf Course Pond Inlet)	
Date	Faecal coliforms
14/4/20	280000
22/4/20	20000
13/5/19	3800
19/5/19	24400
22/5/20	222000
29/5/20	233000
2/6/20	14000
5/6/20	167000
9/6/20	22200
12/6/20	14400
16/6/20	10000
19/6/20	100000
24/6/20	178000
26/6/20	389000
30/6/20	55600
3/7/20	144000
30/6/20	233000
17/7/20	75600
21/7/20	12200
24/7/20	1110
30/6/20	27800
31/7/20	11100
4/8/20	4440
6/8/20	16200
11/8/20	4040
25/8/20	5050
8/9/20	7070
23/9/20	2520
6/10/20	6670
20/10/20	88900
3/11/20	3030
17/11/20	147000
1/12/20	77800
15/12/20	5560
4/1/21	10000

Bidgee Banks Golf Course (Maturation Pond Outlet)	
Date	Faecal coliforms
14/4/20	300000
22/4/20	100000
13/5/19	
19/5/19	23200
22/5/20	3330000
29/5/20	189000
2/6/20	12700
5/6/20	411000
9/6/20	33300
12/6/20	322000
16/6/20	5300
19/6/20	100000
24/6/20	300000
26/6/20	511000
30/6/20	44400
3/7/20	189000
30/6/20	66700
17/7/20	82200
21/7/20	32200
24/7/20	27600
30/6/20	62200
31/7/20	47500
4/8/20	1110
6/8/20	10100
11/8/20	1010
25/8/20	13100
8/9/20	7070
23/9/20	2420
6/10/20	1670
20/10/20	116000
3/11/20	3030
17/11/20	178000
1/12/20	44400
15/12/20	7780
4/1/21	15600

Fortnightly Sampling of Treated Effluent - Bidgee Banks Golf Course (Point 1 Irrigation)	
Date	**Faecal coliforms**
19/1/21	394
3/2/21	1440
16/2/21	556
2/3/21	55
16/3/21	1210
30/3/21	2420
13/4/21	1220
11/5/21	333
25/5/21	3330
8/6/21	1220
22/6/21	128
6/7/21	9
20/7/21	100
3/8/21	4
17/8/21	30
31/8/21	22
14/9/21	102
30/9/21	<1
12/10/21	4
26/10/21	<1
9/11/21	130
24/11/21	50
Average	**1621**

Bidgee Banks Golf Course (Golf Course Pond Inlet)	
Date	**Faecal coliforms**
19/1/21	11100
3/2/21	93300
16/2/21	88900
2/3/21	22200
16/3/21	267000
30/3/21	88900
13/4/21	45600
11/5/21	42200
25/5/21	100000
8/6/21	54400
22/6/21	1820
6/7/21	1110
20/7/21	<1
3/8/21	2000
17/8/21	667
31/8/21	6
14/9/21	140
30/9/21	5960
12/10/21	100
26/10/21	1020
9/11/21	23600
24/11/21	909
Average	**56127**

Bidgee Banks Golf Course (Maturation Pond Outlet)	
Date	**Faecal coliforms**
19/1/21	32200
3/2/21	200000
16/2/21	200000
2/3/21	122000
16/3/21	344000
30/3/21	156000
13/4/21	164000
11/5/21	31100
25/5/21	187000
8/6/21	244000
22/6/21	13300
6/7/21	8890
20/7/21	100
3/8/21	4800
17/8/21	778
31/8/21	20
14/9/21	238
30/9/21	8000
12/10/21	116
26/10/21	1820
9/11/21	21700
24/11/21	5560
Average	**117685**

Fortnightly Sampling of Treated Effluent - Bidgee Banks Golf Course (Irrigation)																											
Parameter	**Units**	4/1/21	19/1/21	4/2/21	16/2/21	2/3/21	16/3/21	30/3/21	13/4/21	27/4/21	11/5/21	25/5/21	8/6/21	22/6/21	6/7/21	20/7/21	3/8/21	17/8/21	31/8/21	14/9/21	28/9/21	12/10/21	26/10/21	9/11/21	24/11/21	**Average**
Biochemical Oxygen Demand	mg/L	16	6	17	8	10	27	20	9	16	9	7	8	7	5	6	2	4	4	7	15	17	<2	5	8	**12**
Calcium (dissolved)	mg/L	15.7	12.8	13.6	16.7	18.6	19	18.3	20.4	25.5	20.9	21.3	21.6	20.2	19.3	19.4	26.9	23.0	25.5	21	22.4	25.1	22.0	21.5	20.7	**21**
Faecal coliforms	cfu/100mL	444	394	1440	556	55	1210	2420	1220	3000	333	3330	1220	128	9	100	4	30	22	102	<1	4	<1	130	50	**1483**
Conductivity	µS/cm	487	485	482	448	442	480	445	517	570	596	635	644	649	584	603	651	563	575	587	593	566	632	662	552	**608**
Magnesium (dissolved)	mg/L	7.13	6.24	6.36	7.68	8.03	8.43	7.71	9.53	10.10	7.69	7.29	7.12	7.28	8.50	9.10	12.0	12.2	16.6	19.4	22.3	20.1	24.9	23.9	23.3	**9**
Nitrogen, total	mg/L	10	9	11	10	8	4	13	15	18	21	23	29	23	26	30	24	16	16	14	13	12	17	5	14	**20**
Nitrate/Nitrite as N	mg/L	5.6	2.9	2.3	3.1	5.2	<0.5	9.5	10	11	6.4	3.3	3.0	4.3	5.6	5.5	3.5	0.4	<0.1	0.5	0.4	0.2	13.0	<0.1	12.4	**5**
Oil & Grease	mg/L	3	2	2	1	9	8	3	<1	5	7	4	5	2	1	3	3	3	4	3	4	1	2	2	2	**3**
Phosphorus, Total	mg/L	3.18	2.61	3.25	3.62	3.09	3.18	3.43	2.91	3.14	3.82	1.71	3.77	4.78	3.99	4.43	4.01	4.22	4.30	4.12	4.18	3.28	2.59	2.90	2.06	**5**
pH	pH units	8.3	9.3	8.1	7.7	7.8	7.2	7.4	7.4	6.9	7.4	7.2	7.2	7.4	7.4	7.6	7.4	7.5	7.6	7.9	7.9	7.7	7.8	7.3	7.4	**8**
Sodium Adsorption Ratio	Ratio	3	4	3	2	2	3	2	3	3	3	2	3	3	2	2	2	2	2	2	2	3	2	2	2	**3**
Sodium (dissolved)	mg/L	65.4	62.5	49.9	45.8	50.8	56.3	50.7	67.0	72.5	57.0	51.0	53.4	58.9	45.2	44.2	61.3	43.8	46.2	43.9	47.9	45.5	64.3	68.9	46.0	**64**
Total Kjeldahl Nitrogen	mg/L	4	6	9	7	3	4	3	5	7	15	20	26	19	20	24	20	16	16	13	13	12	4	5	2	**15**
Total Suspended Solids	mg/L	43	40	94	17	19	41	34	21	<2	7	5	9	3	2	5	<2	4	17	14	21	35	29	31	15	**32**

Fortnightly Sampling of Treated Effluent - Bidgee Banks Golf Course (Golf Course Pond Inlet)																											
Parameter	**Units**	4/1/21	19/1/21	4/2/21	16/2/21	2/3/21	16/3/21	30/3/21	13/4/21	27/4/21	11/5/21	25/5/21	8/6/21	22/6/21	6/7/21	20/7/21	3/8/21	17/8/21	31/8/21	14/9/21	28/9/21	12/10/21	26/10/21	9/11/21	24/11/21	**Average**
Biochemical Oxygen Demand	mg/L	36	39	34	27	37	46	38	27	84	10	12	15	6	5	6	5	9	6	10	22	13	8	11	8	**21**
Calcium (dissolved)	mg/L	14.5	12.6	13.8	18.5	18.4	19.7	19.0	22.1	23.0	20.8	21.0	21.9	20.0	19.4	19.1	23.6	23.7	23.5	21.8	22.1	22.2	21.1	17.7	19.4	**21**
Faecal coliforms	cfu/100mL	10000	11100	93300	88900	22200	267000	88900	45600	378000	42200	100000	54400	1820	1110	<1	2000	667	6	140	5960	100	1020	23600	909	**54925**
Conductivity	µS/cm	496	486	425	470	505	529	464	570	649	660	670	668	656	582	570	565	620	649	618	648	644	624	476	531	**645**
Magnesium (dissolved)	mg/L	6.13	5.55	5.69	9.05	7.79	7.56	7.91	9.91	8.39	7.05	6.82	7.08	7.23	8.81	10.70	16.90	20.10	21.10	22.1	24.0	23.5	26.6	19.4	23.4	**9**
Nitrogen, total	mg/L	16	18	18	20	17	17	18	23	35	29	24	34	28	29	28	21	23	23	19	18	18	25	20	14	**28**
Nitrate/Nitrite as N	mg/L	6.4	4.2	5.3	6.6	8.4	5.9	13.2	11	11	6	5.4	4.5	5.5	6.4	7.8	5.0	7.0	7.0	6.6	6.8	6.5	16.0	11.9	10.9	**7**
Oil & Grease	mg/L	4	2	<1	1	7	6	2	<1	3	8	3	8	1	1	3	2	4	4	2	5	2	3	3	2	**4**
Phosphorus, Total	mg/L	4.36	5.24	4.12	4.57	4.67	2.45	4.31	3.74	4.99	4.07	2.82	3.95	4.93	3.96	3.99	4.22	3.84	3.95	4.25	4.22	4.21	3.79	3.49	2.49	**6**
pH	pH units	8.9	9.4	9.1	8.7	8.4	8.1	8.2	7.7	7.4	7.5	7.4	7.6	7.5	7.5	7.6	7.5	7.6	7.6	8.3	8.0	7.0	8.4	7.5	7.9	**8**
Sodium Adsorption Ratio	Ratio	3	3	2	2	3	3	2	3	3	3	2	3	3	2	2	2	2	2	2	2	2	2	1	2	**3**
Sodium (dissolved)	mg/L	62.9	58.4	41.5	48.1	53.6	56.5	49.0	72.2	66.0	55.5	51.5	53.5	58.0	44.3	39.1	43.5	47.1	50.8	46.3	50.9	49.9	53.2	37.0	43.6	**62**
Total Kjeldahl Nitrogen	mg/L	10	14	13	13	9	11	5	12	24	23	29	29	22	23	20	16	16	16	12	11	11	9	8	3	**21**
Total Suspended Solids	mg/L	70	68	96	78	80	88	52	37	36	11	11	16	<2	4	5	5	<2	8	20	23	18	24	33	32	**53**

Bidgee Banks Golf Course (Maturation Pond Outlet)																											
Parameter	**Units**	4/1/21	19/1/21	4/2/21	16/2/21	2/3/21	16/3/21	30/3/21	13/4/21	27/4/21	11/5/21	25/5/21	8/6/21	22/6/21	6/7/21	20/7/21	3/8/21	17/8/21	31/8/21	14/9/21	28/9/21	12/10/21	26/10/21	9/11/21	24/11/21	**Average**
Biochemical Oxygen Demand	mg/L	21	35	24	20	27	5	24	35	80	15	17	20	22	7	8	7	8	10	18	41	11	10	17	10	**21**
Calcium (dissolved)	mg/L	12.9	13.3	13.9	18.5	18.5	19.9	19.9	24.4	25.8	20.2	20.8	22.3	19.8	21.0	19.9	25.4	24.6	22.4	22.3	21.5	21.6	20.9	18.4	20.6	**21**
Faecal coliforms	cfu/100mL	15600	32200	200000	200000	122000	344000	156000	164000	811000	31100	187000	244000	13300	8890	100	4800	778	20	238	8000	116	1820	21700	5560	**121757**
Conductivity	µS/cm	492	508	469	487	537	548	476	713	698	696	780	692	648	606	558	626	691	679	630	664	689	648	491	623	**644**
Magnesium (dissolved)	mg/L	5.22	5.40	5.32	9.41	7.62	7.26	8.45	10.9	8.90	6.31	6.17	6.69	7.19	10.4	11.4	21.7	25.8	22.0	24.7	24.9	23.9	27.4	20.0	29.5	**10**
Nitrogen, total	mg/L	21	28	22	24	28	19	26	34	48	36	44	37	31	34	26	22	22	24	18	18	18	26	21	17	**31**
Nitrate/Nitrite as N	mg/L	5.2	4.4	6.3	7.4	8.6	6.6	10.3	10	9.2	5.2	4.0	4.0	7.7	9.9	7.3	7.1	7.6	9.0	7.1	7.0	7.1	16.0	12.2	13.4	**8**
Oil & Grease	mg/L	13	<1	1	3	7	6	2	<1	1	9	3	6	1	<1	3	2	4	3	<1	23	<1	1	1	4	**4**
Phosphorus, Total	mg/L	4.97	5.81	4.45	4.78	5.03	2.94	2.72	4.16	6.47	5.24	3.95	4.95	6.64	4.10	3.69	5.35	3.22	4.81	4.44	4.51	4.60	3.84	3.64	3.50	**6**
pH	pH units	9.2	9.0	9.0	9.3	8.9	8.8	9.4	8.5	7.0	7.6	7.5	7.5	7.4	7.5	7.5	7.5	7.6	7.7	8.7	8.0	7.6	8.3	7.5	8.3	**8**
Sodium Adsorption Ratio	Ratio	4	3	2	2	3	3	2	3	3	3	3	2	3	2	2	2	2	2	2	2	2	2	1	2	**3**
Sodium (dissolved)	mg/L	60.5	58.7	35.3	50.6	55.6	57.2	48.0	82.8	73.5	53	51.3	51.9	55.2	44.6	39.1	46.2	52.2	54.9	48.9	52.1	49.9	54.1	38.2	49.9	**63**
Total Kjeldahl Nitrogen	mg/L	16	24	16	17	19	13	16	24	39	31	40	33	23	24	19	15	14	15	11	11	11	10	9	4	**23**
Total Suspended Solids	mg/L	81	83	108	106	122	98	74	84	54	18	7	32	36	11	<2	<2	<2	11	35	23	12	330	33	22	**58**

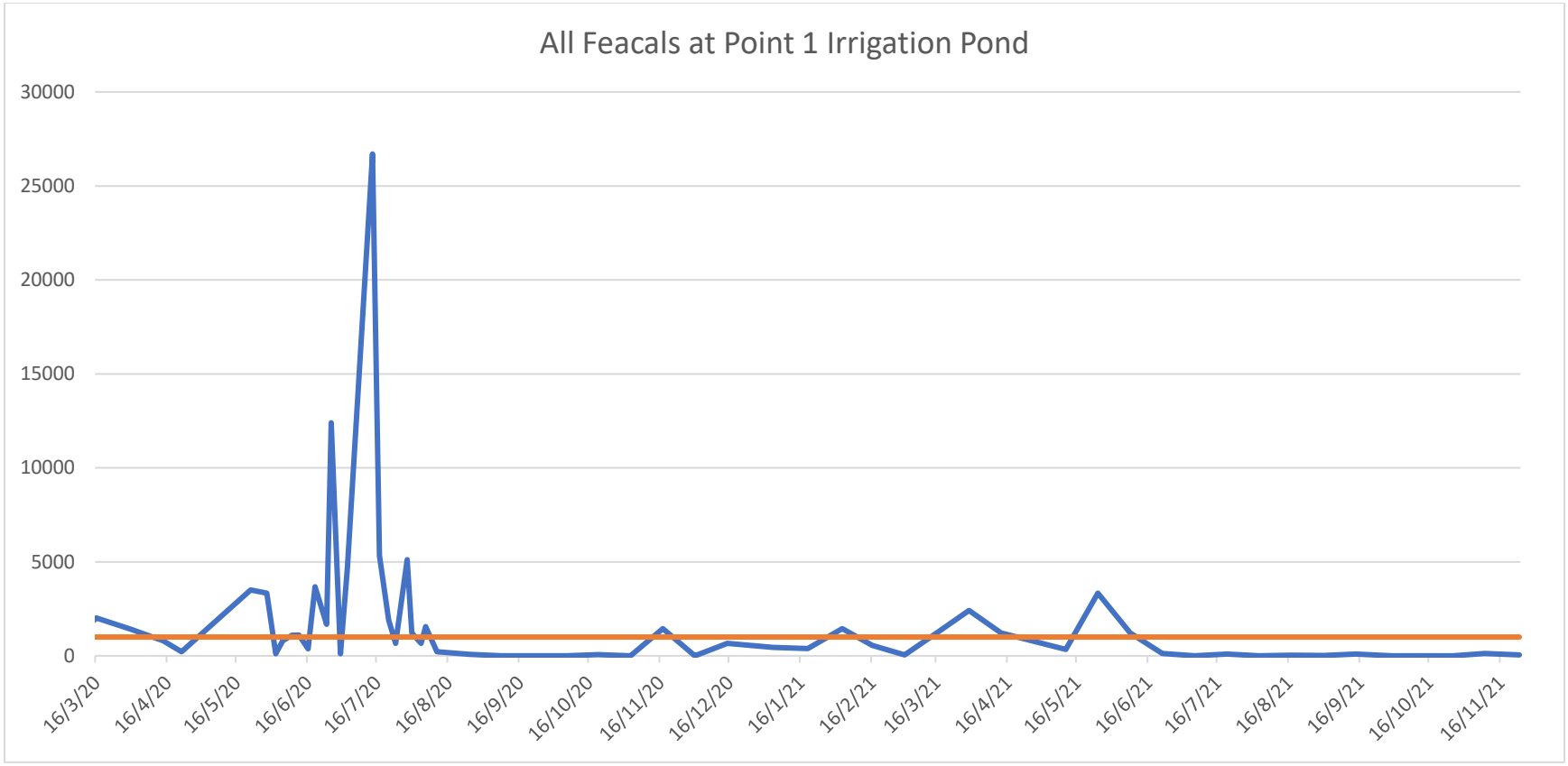

Figure 4 - Fecal Coliform Count (cfu/100 ml) at Irrigation Point