Gundagai Sewage Treatment Plant (STP)

Environmental Protection License No. 1721

Effluent Quality Monitoring Report

May 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

The location of sampling points are shown in figure 2.

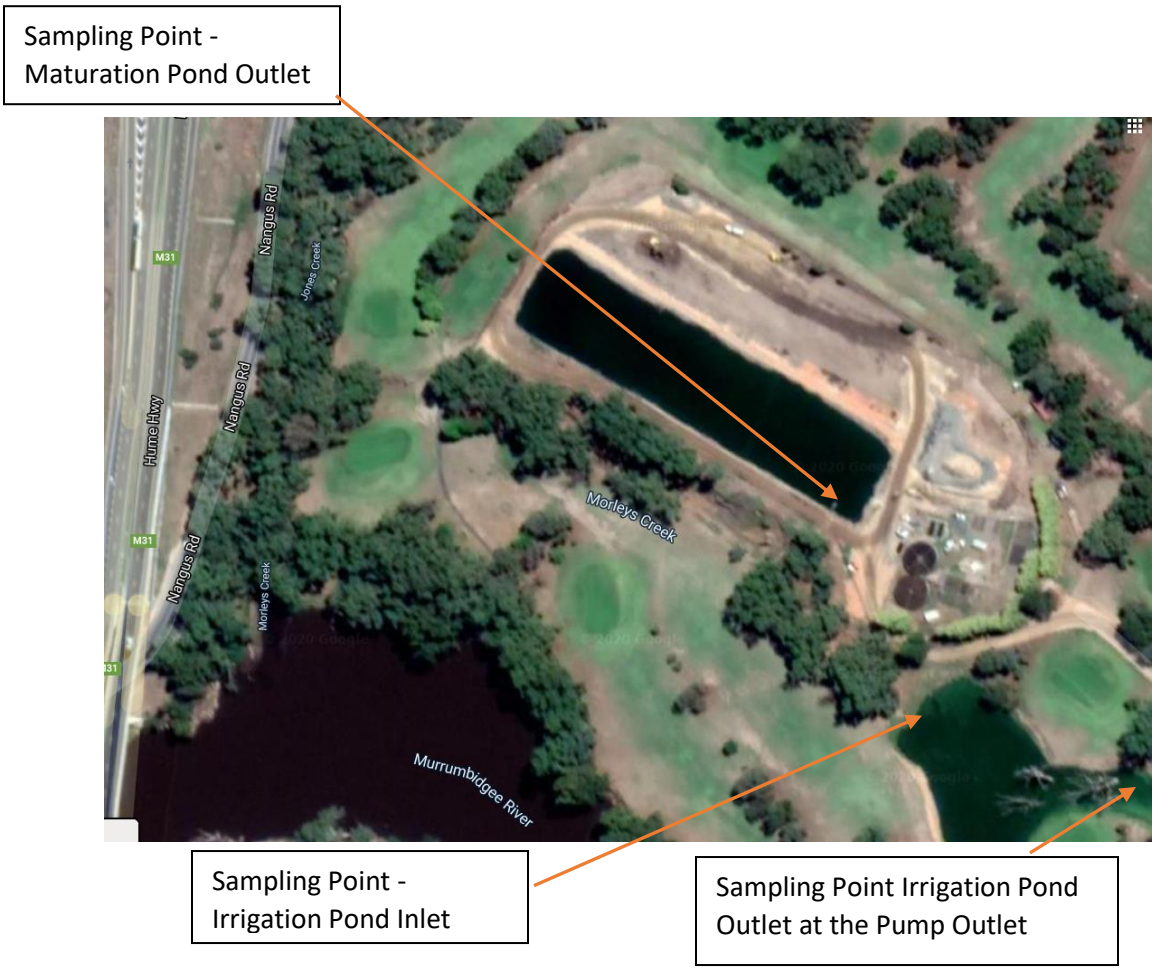

Figure 2- Location of Sampling Points

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

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

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

Date	Faecal coliforms
31/3/20	1410
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
19/1/21	394
3/2/21	1440
16/2/21	556

Date	Faecal coliforms
31/3/20	48500
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
19/1/21	11100
3/2/21	93300
16/2/21	88900

Date	Faecal coliforms
31/3/20	52500
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
19/1/21	32200
3/2/21	200000
16/2/21	200000

Date	Faecal coliforms
2/3/21	55
16/3/21	1210
30/3/21	2420
13/4/21	1220
11/5/21	333
Average	**1769**

Date	Faecal coliforms
2/3/21	22200
16/3/21	267000
30/3/21	88900
13/4/21	45600
11/5/21	42200
Average	**63396**

Date	Faecal coliforms
2/3/21	122000
16/3/21	344000
30/3/21	156000
13/4/21	164000
11/5/21	31100
Average	**133900**

Fortnightly Sampling of Treated Effluent - Bidgee Banks Golf Course (Point 1 Irrigation)

Parameter	Units	7/1/20	24/1/20	5/2/20	18/2/20	3/3/20	16/3/20	31/3/20	14/4/20	22/4/20	22/5/20	2/6/20	19/6/20	30/6/20	14/7/20	29/7/20	11/8/20	25/8/20	8/9/20	23/9/20	6/10/20	20/10/20	3/11/20	17/11/20	1/12/20	15/12/20	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	Average
Biochemical Oxygen Demand	mg/L	9	20	3	4	12	12	17	12	12	11	11	7	12	16	7	9	17	<2	<2	<2	3	6	31	26	12	16	6	17	8	10	27	20	9	16		12
Calcium (dissolved)	mg/L	15.9	18	16.5	17.8	16	17.2	17.6	20.5	17.8	20.1	22.7	25.3	20.7	22.8	22.5	22.3	24.9	25.9	23.6	26.2	22.6	23.2	21.1	24.9	19.7	15.7	12.8	13.6	16.7	18.6	19	18.3	20.4	25.5		20
Faecal coliforms	cfu/100mL	5050	550	140	10	505	2020	1410	800	210	3500	108	3670	111	26700	5110	222	73	<1	<1	<1	70	<1	1440	<1	667	444	394	1440	556	55	1210	2420	1220	3000		1657
Conductivity	µS/cm	523	548	496	524	496	490	466	514	535	553	619	699	793	815	764	758	669	695	734	677	674	588	540	533	524	487	485	482	448	442	480	445	517	570		619
Magnesium (dissolved)	mg/L	5.32	5.63	5.08	5.17	5.10	6.50	5.92	6.45	6.00	7.14	8.59	9.20	7.54	8.83	8.63	8.43	10.50	10.20	9.25	9.23	9.84	7.90	9.06	10.50	9.48	7.13	6.24	6.36	7.68	8.03	8.43	7.71	9.53	10.10		8
Nitrogen, total	mg/L	7	6	4	4	8	11	8	14	15	10	15	27	24	42	36	34	29	27	30	26	26	12	16	11	11	10	9	11	10	8	4	13	15	18		21
Nitrate/Nitrite as N	mg/L	4.4	1.5	<0.1	<0.1	4.3	6.6	3.5	10.0	8.6	<0.1	<0.1	3.4	2.1	6.1	3.6	3.6	7.0	6.2	6.9	8.1	5.5	3.8	12.6	8.0	6.9	5.6	2.9	2.3	3.1	5.2	<0.5	9.5	10	11		5
Oil & Grease	mg/L	2	<1	1	1	2	6	3	3	<1	2	2	6	2	4	3	6	16	1	2	3	4	4	2	5	2	3	2	2	1	9	8	3	<1	5		3
Phosphorus, Total	mg/L	8.06	11.30	5.09	4.68	3.74	3.13	4.33	2.73	2.24	1.98	3.78	4.03	3.98	7.36	7.27	6.22	3.84	4.30	4.40	3.84	6.12	7.22	4.89	3.92	3.96	3.18	2.61	3.25	3.62	3.09	3.18	3.43	2.91	3.14		5
pH	pH units	7.2	7.1	6.7	7.2	7.3	7.6	7.3	7.4	7.8	7.0	7.1	6.4	7.5	7.4	7.6	7.6	7.4	7.4	7.6	7.5	7.9	7.0	6.3	7.8	7.2	8.3	9.3	8.1	7.7	7.8	7.2	7.4	7.4	6.9		8
Sodium Adsorption Ratio	Ratio	4	4	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	3	4	2	3	3	3	4	3	2	2	3	2	3	3		3
Sodium (dissolved)	mg/L	69.4	73.3	68.8	80.4	70.4	60.9	50.9	70.3	62.2	55.4	62.8	73.6	62.6	72.5	68.8	64.2	68.2	62.6	53.7	50.6	60.7	82.0	33.9	68.5	67.8	65.4	62.5	49.9	45.8	50.8	56.3	50.7	67.0	72.5		67
Total Kjeldahl Nitrogen	mg/L	3	5	4	4	4	4	5	4	6	10	15	24	22	36	32	30	22	21	23	18	20	8	3	3	4	4	6	9	7	3	4	3	5	7		16
Total Suspended Solids	mg/L	8	8	15	20	52	56	58	50	49	21	26	28	12	14	10	6	37	7	6	8	20	34	39	35	40	43	40	94	17	19	41	34	21	<2		35

Fortnightly Sampling of Treated Effluent - Bidgee Banks Golf Course (Golf Course Pond Inlet)

d Effluent - Bidgee Banks Golf Course (Golf Course Pond Inlet)

Parameter	Units	7/1/20	24/1/20	5/2/20	18/2/20	3/3/20	16/3/20	31/3/20	14/4/20	22/4/20	22/5/20	2/6/20	19/6/20	30/6/20	14/7/20	29/7/20	11/8/20	25/8/20	8/9/20	23/9/20	6/10/20	20/10/20	3/11/20	17/11/20	1/12/20	15/12/20	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	Average
Biochemical Oxygen Demand	mg/L	31	26	14	28	44	27	46	29	32	19	20	37	21	9	10	10	41	7	14	10	12	23	27	40	33	36	39	34	27	37	46	38	27	84		22
Calcium (dissolved)	mg/L	16	16.7	14.5	15.9	17.2	19.4	19	24.1	26.5	21.4	24.4	24.5	20.8	22.2	22	23	26.5	27	25	26	21.7	21.8	21.4	23.2	17.3	14.5	12.6	13.8	18.5	18.4	19.7	19.0	22.1	23.0		20
Faecal coliforms	cfu/100mL	122000	50200	27000	33300	33300	28300	48500	280000	20000	222000	14000	100000	55600	233000	27800	4040	5050	7070	2520	6670	88900	3030	147000	77800	5560	10000	11100	93300	88900	22200	267000	88900	45600	378000		55074
Conductivity	µS/cm	572	543	480	434	537	497	537	569	627	690	725	693	788	740	747	742	648	749	740	651	660	563	622	563	528	496	486	425	470	505	529	464	570	649		663
Magnesium (dissolved)	mg/L	5.32	4.14	3.85	4.16	4.96	6.82	6.18	7.62	9.42	7.50	8.38	9.31	8.22	8.25	8.81	9.19	12.80	10.20	9.05	8.93	9.52	8.35	9.96	10.10	8.03	6.13	5.55	5.69	9.05	7.79	7.56	7.91	9.91	8.39		7
Nitrogen, total	mg/L	17	15	27	21	23	20	24	26	24	31	31	36	34	31	38	34	25	35	36	30	27	19	23	20	17	16	18	18	20	17	17	18	23	35		30
Nitrate/Nitrite as N	mg/L	4.2	2.0	7.6	7.4	11.0	9.3	6.9	12.0	8.7	5.8	5.6	5.0	4.9	2.3	6.6	6.6	7.9	11.0	9.6	9.2	5.4	7.4	7.9	8.3	8.1	6.4	4.2	5.3	6.6	8.4	5.9	13.2	11	11		7
Oil & Grease	mg/L	4	<1	2	2	2	3	4	3	1	1	1	4	3	3	8	4	7	<1	3	3	3	4	2	7	2	4	2	<1	1	7	6	2	<1	3		4
Phosphorus, Total	mg/L	8.88	30.00	4.87	4.85	6.36	4.03	4.79	3.30	3.48	4.82	6.98	5.16	5.54	6.19	7.31	4.72	3.73	4.79	5.08	4.65	7.86	6.80	5.46	4.67	4.88	4.36	5.24	4.12	4.57	4.67	2.45	4.31	3.74	4.99		7
pH	pH units	8	7.6	6.7	9.4	8.7	7.5	9.1	8.7	8.1	7.3	7.6	6.9	7.8	7.5	7.6	7.6	7.6	7.4	7.7	7.5	7.9	7.2	7.2	8.8	8.7	8.9	9.4	9.1	8.7	8.4	8.1	8.2	7.7	7.4		8
Sodium Adsorption Ratio	Ratio	4	4	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	3	3	2	3	3	3	3	2	2	3	3	2	3	3		3
Sodium (dissolved)	mg/L	70.3	67.7	61.7	67.8	65.8	61.3	54.8	77.2	82.7	59.9	68.8	72.5	67	64.4	63.2	61	75.8	60.7	56	44.5	59.6	67.1	34.4	68.9	66.5	62.9	58.4	41.5	48.1	53.6	56.5	49.0	72.2	66.0		66
Total Kjeldahl Nitrogen	mg/L	13	13	19	14	12	11	17	14	15	25	25	31	29	29	31	27	17	24	26	21	22	12	15	12	9	10	14	13	13	9	11	5	12	24		22
Total Suspended Solids	mg/L	74	47	164	39	63	134	131	111	58	43	26	66	47	9	11	12	10	6	17	13	30	51	72	74	62	70	68	96	78	80	88	52	37	36		57

Bidgee Banks Golf Course (Maturation Pond Outlet)

anks Golf Course (Maturation Pond Outlet)

Parameter	Units	7/1/20	24/1/20	5/2/20	18/2/20	3/3/20	16/3/20	31/3/20	14/4/20	22/4/20	22/5/20	2/6/20	19/6/20	30/6/20	14/7/20	29/7/20	11/8/20	25/8/20	8/9/20	23/9/20	6/10/20	20/10/20	3/11/20	17/11/20	1/12/20	15/12/20	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	Average
Biochemical Oxygen Demand	mg/L	64	35	18	26	44	38	41	22	32	43	23	30	24	13	26	10	7	10	21	13	20	13	33	30	17	21	35	24	20	27	5	24	35	80		21
Calcium (dissolved)	mg/L	16.0	16.4	14.1	14.0	17.1	19.3	18.9	24.6	21.2	22.3	23.5	25.2	22.7	22.5	21.9	24.5	25.3	28.0	25.4	25.7	23.5	21.8	21.3	22.2	15.2	12.9	13.3	13.9	18.5	18.5	19.9	19.9	24.4	25.8		20
Faecal coliforms	cfu/100mL	178000	51100	34000	149000	26300	45400	52500	300000	100000	3330000	12700	100000	44400	66700	62200	1010	13100	7070	2420	16700	116000	3030	178000	44400	7780	15600	32200	200000	200000	122000	344000	156000	164000	811000		127850
Conductivity	µS/cm	615	540	503	441	539	536	525	584	675	761	743	684	800	818	723	722	583	775	758	677	647	537	663	579	522	492	508	469	487	537	548	476	713	698		647
Magnesium (dissolved)	mg/L	5.06	4.12	3.85	4.00	4.98	6.86	6.11	7.92	7.62	7.69	8.03	9.83	9.03	8.62	9.30	10.00	12.70	10.10	8.66	8.51	10.3	8.70	10.6	9.77	6.94	5.22	5.40	5.32	9.41	7.62	7.26	8.45	10.9	8.90		7
Nitrogen, total	mg/L	33	16	27	22	25	26	25	40	20	44	35	37	35	36	39	34	26	41	38	34	30	22	28	25	21	21	28	22	24	28	19	26	34	48		32
Nitrate/Nitrite as N	mg/L	3.8	1.9	6.7	6.8	13	9.9	7.1	24	<0.1	9.3	6.3	5.7	5.8	4.2	9.7	8	10.7	14	11	9.8	4.6	6.9	3.4	6	7.3	5.2	4.4	6.3	7.4	8.6	6.6	10.3	10	9.2		8
Oil & Grease	mg/L	3	<1	5	6	6	6	6	5	<1	1	2	4	2	3	4	4	7	<1	3	3	1	5	<1	7	2	13	<1	1	3	7	6	2	<1	1		5
Phosphorus, Total	mg/L	9.96	5.87	4.78	4.78	6.5	4.54	4.38	4.43	4.11	1.96	7.83	5.45	5.78	7.21	6.19	4.56	2.48	5.3	2.83	5.6	10.0	6.76	5.98	4.32	3.4	4.97	5.81	4.45	4.78	5.03	2.94	2.72	4.16	6.47		6
pH	pH units	8.84	8.1	6.7	9.7	9.1	7.5	9.5	9.1	8.6	7.3	7.7	8.7	8	7.5	7.5	7.5	7.5	7.4	7.7	7.6	8.2	7.8	8.4	9.1	9.4	9.2	9.0	9.0	9.3	8.9	8.8	9.4	8.5	7.0		8
Sodium Adsorption Ratio	Ratio	4	4	4	4	4	3	3	3	3	3	3	3	3	3	3	3	2	3	3	2	3	3	2	3	4	4	3	2	2	3	3	2	3	3		3
Sodium (dissolved)	mg/L	69.8	67.8	62.6	67.7	65.9	59.1	53.3	76.9	65.3	63.2	67.3	72.6	73.3	68.2	59.1	61.2	51.8	62.5	60.4	43.2	68.4	66.3	36.2	70.2	67.3	60.5	58.7	35.3	50.6	55.6	57.2	48.0	82.8	73.5		66
Total Kjeldahl Nitrogen	mg/L	29	14	20	15	12	16	18	16	20	35	29	31	29	32	29	26	15	27	27	24	25	15	25	19	14	16	24	16	17	19	13	16	24	39		25
Total Suspended Solids	mg/L	132	48	161	80	68	119	118	102	71	19	27	60	55	6	16	16	9	12	15	18	39	44	95	96	68	81	83	108	106	122	98	74	84	54		59

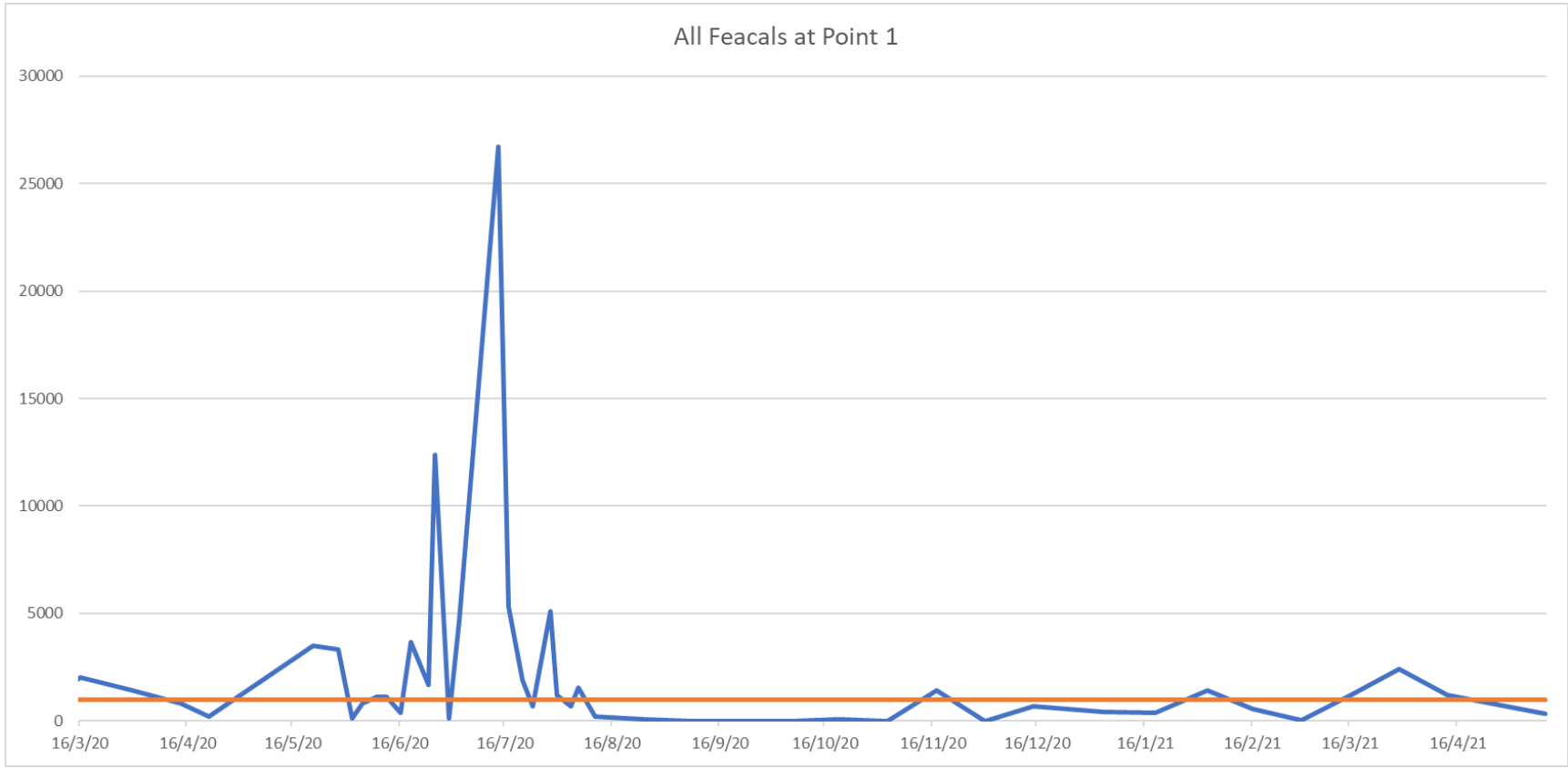

Figure 4 - Fecal Coliform Count (cfu/100 ml) at Irrigation Point