

CAPACITY ANALYSIS REPORT

**TAYLOR COASTAL WWTF
15389 SANDHILL ROAD
PERRY, FLORIDA 32348**

FACILITY ID No.: FLA325864

Report Prepared: May 7, 2020

**Cadenhead Environmental Engineering Services, Inc.
1982 SR 44, #201
New Smyrna Beach, Florida 32168
(904) 307-6824**

PERMITTEE'S CERTIFICATION STATEMENT: CAR, TAYLOR COASTAL WWTF

I have reviewed and am fully aware of the information contained in this report. I have reviewed and am fully aware of and intend to comply with the recommendations and schedules included in the report. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.



Lynn Aibejeris, Chairman
Taylor Coastal Water and Sewer District
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5/12/2020

Date

PROFESSIONAL ENGINEER'S CERTIFICATION STATEMENT

This is to certify that the information contained in this report is true and correct to the best of my knowledge. The report was prepared in accordance with sound engineering principles and I have discussed any recommendations and findings with the permittee or the permittee's delegated representative. Further, the facility, when properly operated and maintained, will comply with all applicable statutes and rules of the Department and the facility will be capable of meeting permit limitations during the period for which the operation permit is requested.

Ivy Mark Cadenhead, P.E.

5/18/2020

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Chapter 1: Existing Conditions

The Taylor Coastal WWTF is dedicated solely to serving the community. Based on historical information, the facility began operation in late 2005.

The design capacity for the facility is 0.080 million gallons per day (mgd) based on annual average daily flow (AADF).

The most recent 51 months of flow data, from January 2016 until March 2020, as obtained from Department databases, Discharge Monitoring Reports and other sources is included in the attached table. Please note Table 1: MADF, AADF and TMADF which is attached. Graphically the information is presented in Figure 1 below. There appears to be some seasonality to the flows and the operator has reported instances of Infiltration and/or Intrusion. In general, the flows are seasonal with “spikes” in the summer and lower flows in the winter.

Figure 1: MADF, TMADF and AADF vs. AADF Limit

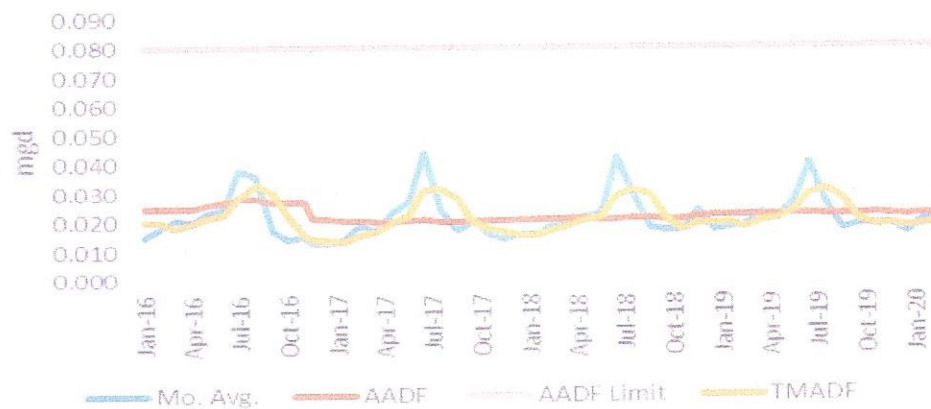


Table 2 provides a comparison of the 12-month rolling average for AADF. *The flow is seasonal and trending just slightly upward overall.* The maximum AADF was 0.0280 mgd in July and August 2016.

Table 2: Annual Average Daily Flow, Month to Month

MONTH	2016	2017	2018	2019	2020
January	0.0250	0.0211	0.0209	0.0221	0.0220
February	0.0250	0.0208	0.0211	0.0223	0.0222
March	0.0250	0.0206	0.0211	0.0223	0.0224
April	0.0250	0.0203	0.0214	0.0224	
May	0.0260	0.0203	0.0213	0.0223	
June	0.0270	0.0205	0.0210	0.0227	
July	0.0280	0.0210	0.0208	0.0225	
August	0.0280	0.0200	0.0213	0.0223	
September	0.0270	0.0200	0.0213	0.0222	
October	0.0270	0.0205	0.0211	0.0223	
November	0.0270	0.0206	0.0212	0.0225	
December	0.0213	0.0207	0.0220	0.0221	
Annual AADF	0.0259	0.0205	0.0212	0.0223	0.0222
Max AADF	0.0280	0.0211	0.0220	0.0227	0.0224

The TMADF may be compared month to month in Table 3. TMADF is a better indicator of the manner flows for the facility increase and/or decrease in accordance with occupancy or seasonality. The maximum TMADF was 0.0330 mgd in August 2016.

Table 3: TMADF Comparison, month to month

MONTH	2016	2017	2018	2019	2020
January	0.0200	0.0137	0.0153	0.0193	0.0180
February	0.0200	0.0133	0.0153	0.0197	0.0183
March	0.0180	0.0153	0.0170	0.0180	0.0193
April	0.0197	0.0167	0.0187	0.0200	
May	0.0213	0.0197	0.0207	0.0210	
June	0.0227	0.0223	0.0220	0.0237	
July	0.0287	0.0313	0.0290	0.0293	
August	0.0330	0.0317	0.0313	0.0310	
September	0.0303	0.0283	0.0297	0.0277	
October	0.0223	0.0203	0.0213	0.0207	
November	0.0153	0.0177	0.0173	0.0183	
December	0.0140	0.0167	0.0193	0.0190	
Annual Avg. Monthly	0.0221	0.0206	0.0214	0.0223	0.0186
Max Month	0.0330	0.0317	0.0313	0.0310	0.0193

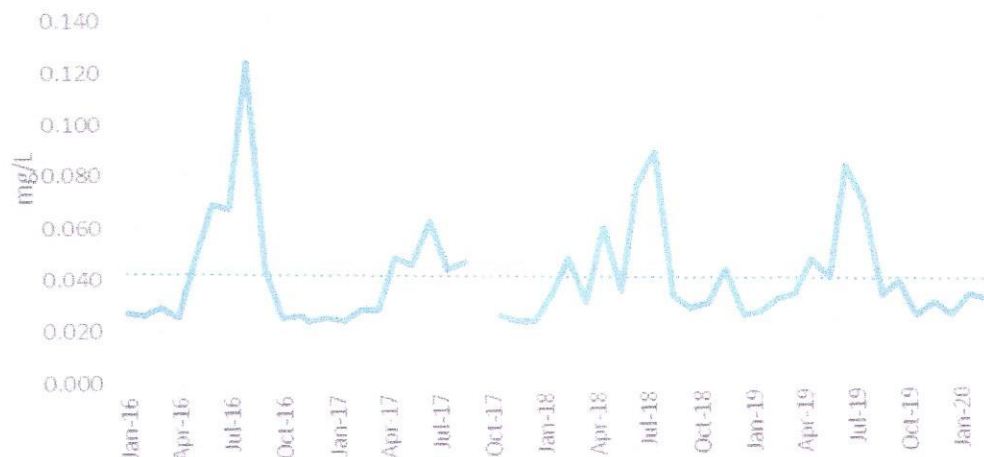
To compare the MADF over the timeframe, please see Table 4: MADF (mgd). The maximum Monthly Average Daily Flow was recorded in July 2017 at 0.0440 mgd. July has historically been the highest flow month for the facility.

Table 4: Monthly Flow Comparison, Month to Month

MONTH	2016	2017	2018	2019	2020
January	0.0150	0.0130	0.0160	0.0170	0.0160
February	0.0180	0.0140	0.0160	0.0180	0.0200
March	0.0210	0.0190	0.0190	0.0190	0.0220
April	0.0200	0.0170	0.0210	0.0230	
May	0.0230	0.0230	0.0220	0.0210	
June	0.0250	0.0270	0.0230	0.0270	
July	0.0380	0.0440	0.0420	0.0400	
August	0.0360	0.0240	0.0290	0.0260	
September	0.0170	0.0170	0.0180	0.0170	
October	0.0140	0.0200	0.0170	0.0190	
November	0.0150	0.0160	0.0170	0.0190	
December	0.0130	0.0140	0.0240	0.0190	
Annual Avg. Monthly	0.0213	0.0207	0.0220	0.0221	0.0193
Max Month	0.0380	0.0440	0.0420	0.0400	0.0220

For the data from January 2016 until March 2020, maximum daily flow reached 0.124 mgd in August 2016. The data point was not out of line with other maximum daily flows recorded during the timeframe studied and are believed to be accurate. The Maximum Daily Flow (mgd) results are presented in the attached Table 5 and below in Figure 2.

Figure 2: Maximum Daily Flow



Currently, the plant does not have a flow capacity issue. There are reports of I/I in the collection system and Florida Rural Water Association is working the facility.

Influent samples are collected monthly (or per permit bi-monthly) for CBOD₅ and TSS. The Permittee appears to have opted to collect the samples monthly regardless.

CBOD₅ influent concentrations range between 6.0 and 357 mg/L so the range is very large. The median value of 119.1 mg/L was “weaker” than what is normally expected as design for wastewater treatment facilities (200 mg/L) for facilities serving residential communities. The average CBOD₅ result was 103 mg/L which also “weak”. The sample is a grab sample which means occurrences within the community greatly influence the results. The facility has an average CBOD₅ removal of 96.8% which is good. The minimum CBOD₅ removal was -25.0% in September 2017. The value was not used in calculating the median or average percent removals. Please see Table 6 attached for CBOD₅ influent concentrations and percent removals. CBOD₅ removal has been very good at the facility overall. When the influent is “weak” the facility has a calculated lower removal generally.

TSS influent concentrations range between 32.0 and 284 mg/L which is also a large range. The median value for TSS is 64.0 mg/L which is very, “weak” when compared to the assumed design value of 200 mg/l. The average value of the influent was 77.3 mg/L which is “weak”. ***The TSS and CBOD₅ weak results for the influent are a possible indication of the I/I issues experienced by the plant.*** TSS removal is poor compared to the reported design of 85%. The average percent removal is 80.2% which below the design. Please see Table 7 for highlighted instances when the facility did not meet the design removal criteria of 85%. The minimum was 14.71% measured in November 2017 when the influent was 34.0 mg/L and the effluent result was 29.0 mg/L. Please see Table 7 attached for influent concentrations and percent removals for TSS.

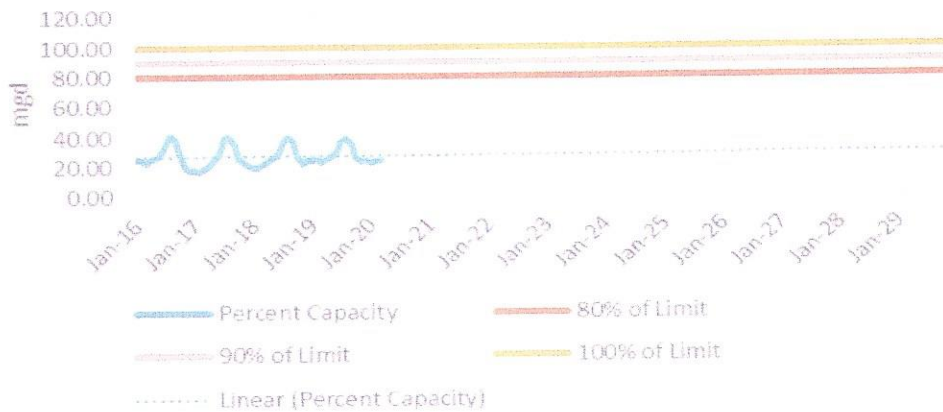
There are no loading issues for the facility. The flow is considerably below the design and the influent parameters are very “weak”.

Chapter 2: Future Conditions

Overall, the percent capacity is well below permitted capacity; however, the TMADF gives indication that the flows are seasonal with the highest flows in July of each year. The overall trend is for very slight increase, but the data is consistent. Past flows are pertinent when forecasting future flows.

Figure 3 provides the trending based on historical data. The trend line was extended until December 2029 and the TMADF shows a very slight increase in percent capacity. Seasonality is apparent from Figure 3.

Figure 3: Flow Trending Based on TMADF and
0.080 mgd AADF Limit



Trending indicates that the facility should be compliant for the upcoming permit cycle. Flows are slightly increasing per the trending plot.

Chapter 3: Summary and Conclusions

Based on the current trending analysis, and, noting that capacity has not been an issue at this facility in the past, the plant should not have capacity problems during the upcoming permit cycle for the upcoming ten (10) years.

There is no CBOD₅ loading issues at the plant. Flows are currently low; both parameters are very, weak compared to the design concentrations. Removal for CBOD₅ is good overall but both parameters are weak and are probably indicative of the operator's reported Infiltration and/or Intrusion (I/I). TSS loading is erratic in concentration of the TSS influent and sometimes the removal is very, low.

The Permittee should continue to work with Florida Rural Water Association to address I/I in the collection system. The weak influent and the I/I do not create chronic non-compliance with the effluent limits, but for consideration of the future of the facility, the inflow should be addressed systematically.

Please also see the Operation and Maintenance Report for more information.

Table 1: Flow through the plant (mgd): Taylor Coastal WWTF

*The MADFs were recalculated to 3 decimal points for the purpose of this report.

DATE	Mo. Avg.	AADF	AADF Limit	TMADF	Percent Capacity	
Jan-16	0.015	0.025	0.080	0.020	25.00	(AA by op.)
Feb-16	0.018	0.025	0.080	0.020	25.00	(AA by op.)
Mar-16	0.021	0.025	0.080	0.018	22.50	(AA by op.)
Apr-16	0.020	0.025	0.080	0.020	24.58	(AA by op.)
May-16	0.023	0.026	0.080	0.021	26.67	(AA by op.)
Jun-16	0.025	0.027	0.080	0.023	28.33	(AA by op.)
Jul-16	0.038	0.028	0.080	0.029	35.83	(AA by op.)
Aug-16	0.036	0.028	0.080	0.033	41.25	(AA by op.)
Sep-16	0.017	0.027	0.080	0.030	37.92	(AA by op.)
Oct-16	0.014	0.027	0.080	0.022	27.92	(AA by op.)
Nov-16	0.015	0.027	0.080	0.015	19.17	(AA by op.)
Dec-16	0.013	0.021	0.080	0.014	17.50	(AA by eng.)
Jan-17	0.013	0.021	0.080	0.014	17.08	(AA by eng.)
Feb-17	0.014	0.021	0.080	0.013	16.67	(AA by eng.)
Mar-17	0.019	0.021	0.080	0.015	19.17	(AA by eng.)
Apr-17	0.017	0.020	0.080	0.017	20.83	(AA by eng.)
May-17	0.023	0.020	0.080	0.020	24.58	(AA by eng.)
Jun-17	0.027	0.021	0.080	0.022	27.92	(AA by eng.)
Jul-17	0.044	0.021	0.080	0.031	39.17	(AA by eng.)
Aug-17	0.024	0.020	0.080	0.032	39.58	(AA by eng.)
Sep-17	0.017	0.020	0.080	0.028	35.42	(AA by eng.)
Oct-17	0.020	0.021	0.080	0.020	25.42	(AA by eng.)
Nov-17	0.016	0.021	0.080	0.018	22.08	(AA by eng.)
Dec-17	0.014	0.021	0.080	0.017	20.83	(AA by eng.)
Jan-18	0.016	0.021	0.080	0.015	19.17	(AA by eng.)
Feb-18	0.016	0.021	0.080	0.015	19.17	(AA by eng.)
Mar-18	0.019	0.021	0.080	0.017	21.25	(AA by eng.)
Apr-18	0.021	0.021	0.080	0.019	23.33	(AA by eng.)
May-18	0.022	0.021	0.080	0.021	25.83	(AA by eng.)
Jun-18	0.023	0.021	0.080	0.022	27.50	(AA by eng.)
Jul-18	0.042	0.021	0.080	0.029	36.25	(AA by eng.)
Aug-18	0.029	0.021	0.080	0.031	39.17	(AA by eng.)
Sep-18	0.018	0.021	0.080	0.030	37.08	(AA by eng.)
Oct-18	0.017	0.021	0.080	0.021	26.67	(AA by eng.)
Nov-18	0.017	0.021	0.080	0.017	21.67	(AA by eng.)
Dec-18	0.024	0.022	0.080	0.019	24.17	(AA by eng.)
Jan-19	0.017	0.022	0.080	0.019	24.17	(AA by eng.)
Feb-19	0.018	0.022	0.080	0.020	24.58	(AA by eng.)
Mar-19	0.019	0.022	0.080	0.018	22.50	(AA by eng.)
Apr-19	0.023	0.022	0.080	0.020	25.00	(AA by eng.)
May-19	0.021	0.022	0.080	0.021	26.25	(AA by eng.)
Jun-19	0.027	0.023	0.080	0.024	29.58	(AA by eng.)
Jul-19	0.040	0.023	0.080	0.029	36.67	(AA by eng.)
Aug-19	0.026	0.022	0.080	0.031	38.75	(AA by eng.)
Sep-19	0.017	0.022	0.080	0.028	34.58	(AA by eng.)
Oct-19	0.019	0.022	0.080	0.021	25.83	(AA by eng.)
Nov-19	0.019	0.023	0.080	0.018	22.92	(AA by eng.)
Dec-19	0.019	0.022	0.080	0.019	23.75	(AA by eng.)
Jan-20	0.016	0.022	0.080	0.018	22.50	(AA by eng.)
Feb-20	0.020	0.022	0.080	0.018	22.92	(AA by eng.)
Mar-20	0.022	0.022	0.080	0.019	24.17	(AA by eng.)

Table 5: Maximum Daily Flow (mgd).

DATE	Max. Day Flow	
Jan-16	0.027	
Feb-16	0.026	
Mar-16	0.029	
Apr-16	0.025	
May-16	0.047	
Jun-16	0.069	(Op. reported intrusion.)
Jul-16	0.067	
Aug-16	0.124	
Sep-16	0.043	
Oct-16	0.024	Hurricane Matthew
Nov-16	0.025	
Dec-16	0.023	
Jan-17	0.024	
Feb-17	0.023	
Mar-17	0.027	
Apr-17	0.027	
May-17	0.047	
Jun-17	0.044	
Jul-17	0.061	
Aug-17	0.042	
Sep-17	0.045	Hurricane Irma
Oct-17		(No Part B.)
Nov-17	0.024	
Dec-17	0.022	
Jan-18	0.022	
Feb-18	0.033	
Mar-18	0.046	
Apr-18	0.029	
May-18	0.058	
Jun-18	0.033	
Jul-18	0.074	
Aug-18	0.087	(Op. reported intrusion.)
Sep-18	0.031	
Oct-18	0.026	Hurricane Michael
Nov-18	0.028	
Dec-18	0.041	
Jan-19	0.023	
Feb-19	0.024	
Mar-19	0.029	
Apr-19	0.031	
May-19	0.044	
Jun-19	0.037	
Jul-19	0.080	
Aug-19	0.067	
Sep-19	0.030	
Oct-19	0.035	
Nov-19	0.022	
Dec-19	0.027	
Jan-20	0.022	
Feb-20	0.030	
Mar-20	0.028	

Table 6: CBOD5 Influent Concentration and Percent Removal

DATE	Influent	Effluent	% Removal
Jan-16	77.50	2.00	97.42
Feb-16	340.00	2.00	99.41
Mar-16	90.90	2.00	97.80
Apr-16	99.30	8.50	91.44
May-16	86.90	2.00	97.70
Jun-16	124.00	6.70	94.60
Jul-16	183.00	8.60	95.30
Aug-16	86.70	12.30	85.81
Sep-16	120.00	4.00	96.67
Oct-16	175.00	5.00	97.14
Nov-16	88.50	2.00	97.74
Dec-16	177.00	2.50	98.59
Jan-17	137.00	2.00	98.54
Feb-17	172.00	2.00	98.84
Mar-17	89.40	2.34	97.38
Apr-17	107.00	2.00	98.13
May-17	61.50	2.00	96.75
Jun-17	78.80	2.00	97.46
Jul-17	103.00	2.00	98.06
Aug-17	103.00	5.20	94.95
Sep-17	6.00	7.50	
Oct-17	93.00	2.00	97.85
Nov-17	82.20	2.00	97.57
Dec-17	155.00	2.00	98.71
Jan-18	156.00	2.00	98.72
Feb-18	103.00	2.00	98.06
Mar-18	163.00	2.00	98.77
Apr-18	139.00	2.00	98.56
May-18	193.00	3.30	98.29
Jun-18	59.00	2.00	96.61
Jul-18	59.20	2.00	96.62
Aug-18	25.20	2.00	92.06
Sep-18	63.00	2.00	96.83
Oct-18	73.40	2.00	97.28
Nov-18	18.00	2.00	88.89
Dec-18	66.40	2.50	96.23
Jan-19	142.00	2.00	98.59
Feb-19	231.00	2.00	99.13
Mar-19	93.00	2.00	97.85
Apr-19	176.00	2.00	98.86
May-19	357.00	7.27	97.96
Jun-19	79.70	2.00	97.49
Jul-19	84.00	5.30	93.69
Aug-19	126.00	2.00	98.41
Sep-19	61.50	2.00	96.75
Oct-19	43.60	2.00	95.41
Nov-19	78.50	5.56	92.92
Dec-19	111.00	2.00	98.20
Jan-20	142.00	2.00	98.59
Feb-20	136.00	2.00	98.53
Mar-20	256.00	9.20	96.41

-25%

Table 7: TSS Influent Concentration and Percent Removal

DATE	Influent	Effluent	% Removal
Jan-16	36.00	19.30	46.39
Feb-16	46.00	12.70	72.39
Mar-16	134.00	14.30	89.33
Apr-16	64.00	12.30	80.78
May-16	172.00	5.60	96.74
Jun-16	74.00	24.00	67.57
Jul-16	154.00	13.30	91.36
Aug-16	120.00	10.30	91.42
Sep-16	54.00	13.00	75.93
Oct-16	72.00	45.00	37.50
Nov-16	34.00	29.00	14.71
Dec-16	72.00	17.50	75.69
Jan-17	66.00	2.30	96.52
Feb-17	44.00	26.00	40.91
Mar-17	64.00	42.40	33.75
Apr-17	70.00	4.40	93.71
May-17	32.00	3.00	90.63
Jun-17	86.00	5.00	94.19
Jul-17	48.00	1.00	97.92
Aug-17	84.00	8.30	90.12
Sep-17	166.00	5.00	96.99
Oct-17	42.00	5.80	86.19
Nov-17	84.00	4.00	95.24
Dec-17	54.00	1.20	97.78
Jan-18	82.00	9.00	89.02
Feb-18	120.00	4.60	96.17
Mar-18	212.00	3.80	98.21
Apr-18	86.00	10.00	88.37
May-18	32.00	4.10	87.19
Jun-18	40.00	4.40	89.00
Jul-18	56.00	6.62	88.18
Aug-18	42.00	2.70	93.57
Sep-18	38.00	6.80	82.11
Oct-18	48.00	6.10	87.29
Nov-18	74.00	5.20	92.97
Dec-18	44.00	28.20	35.91
Jan-19	48.00	5.00	89.58
Feb-19	40.00	6.50	83.75
Mar-19	60.00	8.00	86.67
Apr-19	74.00	20.00	72.97
May-19	284.00	16.90	94.05
Jun-19	54.00	9.20	82.96
Jul-19	32.00	15.70	50.94
Aug-19	98.00	9.40	90.41
Sep-19	38.00	7.20	81.05
Oct-19	104.00	6.40	93.85
Nov-19	64.00	10.90	82.97
Dec-19	82.00	10.70	86.95
Jan-20	114.00	19.00	83.33
Feb-20	56.00	19.50	65.18
Mar-20	46.00	16.70	63.70

(9.0 in WAFR.)