Town of Milton
BOARD OF SELECTMEN WORKSHOP MEETING
June 13, 2022

ATTENDANCE:
Members: Claudine Burnham (Chair), Humphrey Williams,
Absent: Matthew Morrill
Staff: Chris Jacobs, Town Administrator,
Presenter: Jeff Mercer, PE & Mike Theriault, PE– Wright Pierce Engineers
Public: Kym Libby

Claudine Burnham, Chair, opened the public session at 6:00PM.

1.) Pledge of Allegiance: Claudine Burnham, Chair, led the meeting in the Pledge of Allegiance.

2.) Facilities Plan Presentation

- Mr. Jeff Mercer, PE & Mr. Mike Theriault, PE using the overhead projector presented a powerpoint summary of the Facilities Study of the Towns Wastewater Treatment Facility.
- The powerpoint materials prepared by Wright Pierce Engineers are attached to this set of minutes.

3.) Adjournment: at 6:53 pm.

Given under our hands this 20th day of June, 2022.

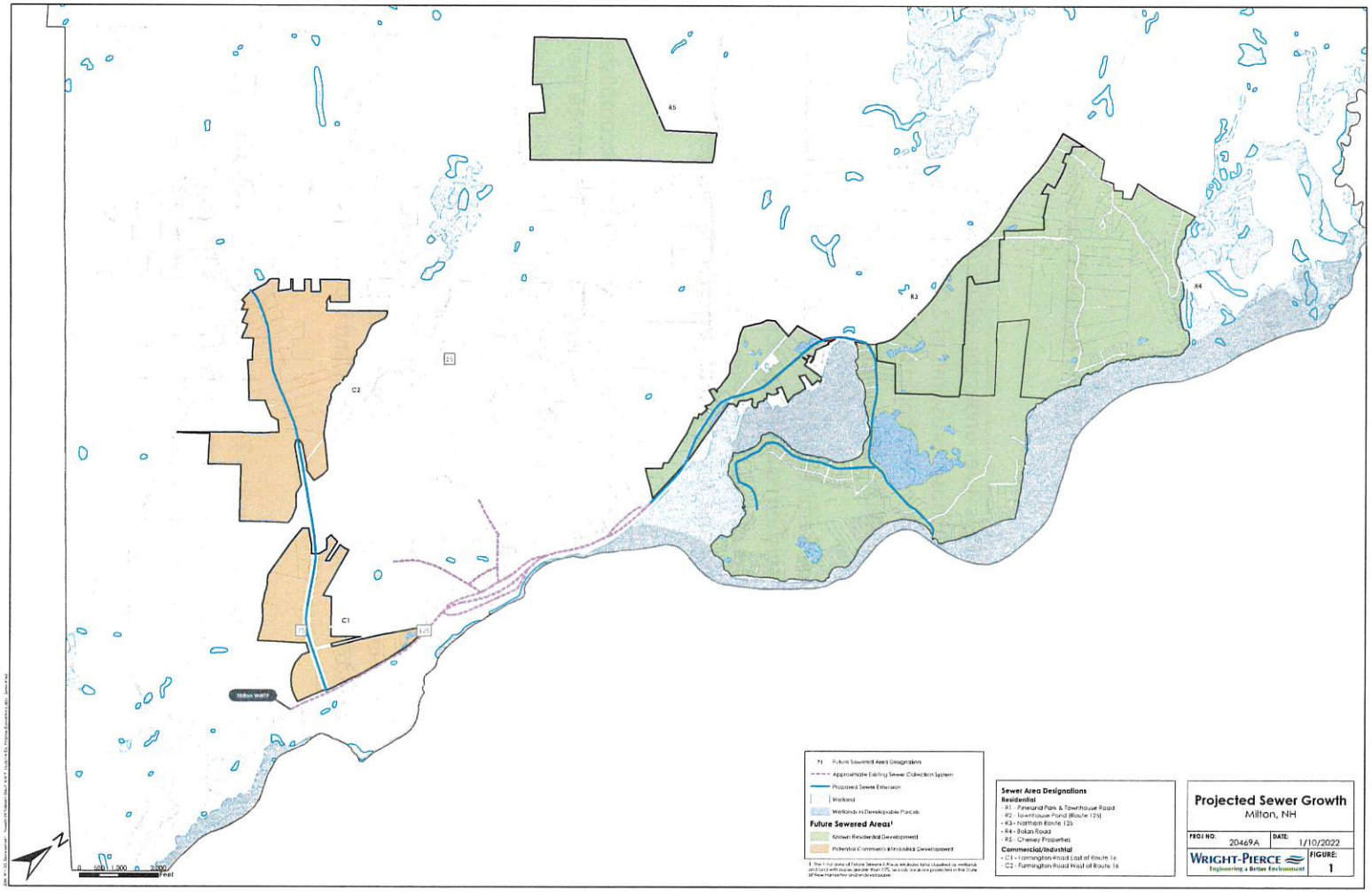
Claudine Burnham – Chairman BOS

absent_____

Matthew Morrill - Board Member

Humphrey Williams - Board `

ATTACHMENT



Projected Sewer Growth

Milton, NH

PROJ NO.	DATE
20469A	1/10/2022

WRIGHT-PIERCE
Engineering a Better Environment

FIGURE: 1

WRIGHT-PIERCE
Engineering a Better Environment

Memorandum

Subject: **Town of Milton Board of Selectmen Meeting, June 13, 20222**

Wastewater Treatment Plant – Secondary Treatment Evaluation Summary

This memorandum will serve as a summary for the June 13th Milton WWTF Secondary Treatment workshop.

The first part of the presentation focuses on the existing and projected flows and loads. A technical memorandum was provided to the Town in March 2022 with an explanation for the presented values and is attached to this Memo.

- Existing Average Daily Flow: 51,000 gallons per day
- Projected Average Daily Flow (2041): 133,000 gallons per day.

Projected flow is based on completion of 2 major sewer extensions: Route 125 and Route 75. Growth within the existing system is expected to be negligible.

The WWTF currently disposes of treated effluent to the Salmon Falls River under the NPDES General Permit issued in 2021. This permit includes a mass-based seasonal effluent total phosphorus limit of 2.0 lbs/day (May 1 – September 30) and a monitoring requirement for total nitrogen. Note that should the Town design their new facility for a higher influent flowrate as proposed above a revised NPDES permit will be required.

The existing facility removes phosphorous from the effluent via chemical precipitation (it is stored in the lagoon sludge). Nitrogen is not currently removed by the lagoons. In northern climates lagoons are not able to easily remove nitrogen from water due to the cold water inhibiting the biological removal process. Other facilities in the Great Bay watershed are required to remove nitrogen down to 8 and 3 mg/l. Milton currently discharges nitrogen over 20 mg/l.

Eliminating the surface water discharge is one option to avoid a nitrogen effluent limit. This could be accomplished via regionalization (discussed below) or via land disposal (rapid infiltration basin, RIB). There is a high chance that a RIB would also have a nitrogen limit (it may be less stringent). Regardless, the need for nitrogen removal in Milton is a high probability on future permits.

Options for nitrogen removal include a new facility using activated sludge or regionalization with Rochester. We explored options that reused the lagoons, but there are currently no technologies that we are confident recommending to reliably remove nitrogen. For a facility this size, sequencing batch reactors are the most economical and flexible treatment option to meet nutrient removal requirements and would allow the Town to expand its sewer access.

The other option is regionalization with Rochester which would include a 2-mile forcemain extension from the existing outfall to Milton Road. This is a much lower capital cost than a new facility but requires an intermunicipal agreement and the Town would pay sewer use fees based on the volume of flow. A summary of the financial considerations is provided in the presentation and will be included in the facility plan.

WRIGHT-PIERCE
Engineering a Better Environment

Memorandum

Project No.:	**20469A**		
Subject:	**Milton, NH Wastewater Treatment Plant – Flows & Loads Analysis**		
Prepared By:	**C. Maranto**	Date:	**1/5/2022**
Reviewed By:	**J. Mercer**	Date:	**1/6/2022**
Revised by:	**J. Mercer**	Date:	**2/23/2022**

Background

As part of the Town's Wastewater Treatment Plant Facility Study, Wright-Pierce performed a Flows and Loads Analysis. The goals of the analysis were to confirm current capacity, characterize the influent flows, and estimate the future flows and loads for the design year, 2041.

The Town of Milton owns and operates a lagoon wastewater Treatment Plant (WWTP) constructed in 1988, located at 227 White Mountain Highway. The WWTP is designed to treat an average daily flow of 0.1 million gallons per day (mgd) and authorized to discharge treated effluent to the Salmon Falls River under General Permit GP NHG580000.

Milton's wastewater is generated from two sources: *sewage flow* from residential, commercial, and industrial sources, and *infiltration and inflow (I/I)*, which is water from extraneous sources such as storm drains, cellar drains and roof leaders generally associated with rainfall or ground water. Flow is conveyed through approximately 23,000 linear feet of 8" and 12" gravity piping, and a 6" forcemain. The facility does not receive septage nor have any major industrial users.

Using influent sampling data provided by the Town from 2015 through 2021, the raw influent wastewater characteristics were evaluated. Sampling is conducted at the facility headworks upstream of the influent screen. There is no known side stream or recycle flows upstream. The collected data was used to determine the annual average, maximum month and maximum day flows and loads. A brief description of each calculated parameter is listed below:

- **Annual Average**: The average of daily values for the period. The average flow and loadings are important benchmarks, but treatment capacity is typically controlled by other design criteria.
- **Maximum Month**: The maximum 30-day running average for the period which is calculated for each parameter independently. Two maximum month parameters were developed for this analysis: the maximum month flow and the maximum month BOD5. The maximum month conditions are an important measure of sustained treatment capacity requirements.
- **Maximum (Peak) Day**: The maximum daily flow is typically the shortest time frame used to assess loadings and is an important measure of peak capacity requirements. This is the maximum single day that occurs for each parameter during the evaluation period.

Existing Flows and Loads

Data from November 2015 through September 2020 was analyzed to confirm the wastewater quantity and characterization. The summary of this analysis is presented in **Table 1** and **Table 2**.

Table 1 Existing Influent Flows & Loads

Parameter	Flow		BOD5		TSS		TN[2]		Phosphorous[2]	
	MGD	P.F.	mg/l	lb/day	mg/l	lb/day	mg/l	lb/day	mg/l	lb/day
Minimum Day	0.016	-	60.0	22.9	110	37.3			3.3	1.6
Annual Average	0.051	1.0	164	59.0	227	81.7			5.1	2.0
Maximum Month	0.090	1.7	310	106.8	400	149.5				
Maximum Day	0.173	3.4	340	130.2	430	176.5			6.7	2.7
March – June[1]	0.056	1.1	137	53.7	185	71.7				
July - October[1]	0.039	0.8	193	52.8	274	74.9				

1. Includes the days through the end of the month listed
2. There were no influent TN samples and a total of 7 TP samples taken (not enough for a maximum month determination)

Table 2 Existing Effluent Flows & Loads

Parameter	Flow[1]		BOD5		TSS		TN[2]		Phosphorous[2]	
	MGD	P.F.	mg/l	lb/day	mg/l	lb/day	mg/l	lb/day	mg/l	lb/day
Minimum Day	0.00	-	6.0	1.2	1.2	0.0	16.5	4.6	1.4	0.5
Annual Average	0.074	1.0	8.0	4.6	8.7	5.1	28.0	8.6	2.4	1.2
Maximum Month	0.158	1.9	27.3	15.3	44.5	29.2	33.7	13.0	4.3	2.4
Maximum Day	0.196	3.7	33.0	18.9	62.0	40.6	35.0	15.1	4.3	2.6

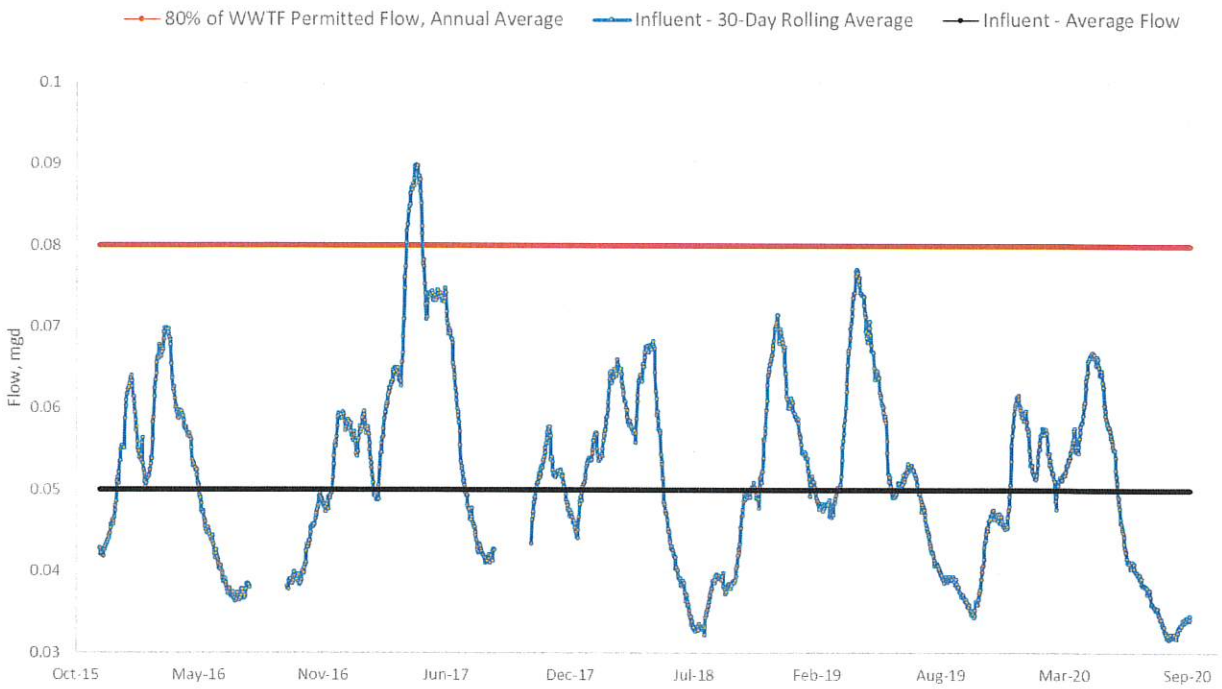
1. Effluent is pumped. There are days that the flow is held in the lagoons and effluent flow is 0 mgd.
2. There were 25 TN samples taken and 73 TP samples taken

Influent and Effluent Flows

As shown in **Table 1**, the facility has a current annual average flowrate of approximately 51,000 gpd. Based on data provided by the Town there are approximately 300 units connected to the collection system equating to a flowrate of 170 gpd per unit (including any infiltration and inflow contributions). This value is consistent with an average 2-person home (75 gpd per person) and average I/I (~15% of flow).

The influent 30-day moving average, average influent flow (0.05 mgd) and 80% of the permitted monthly average flow (0.08 mgd) are compared in **Figure 1**.

Figure 1 30-Day Influent, Permitted Flow & 80% Permitted Flow (mgd)



NHDES regulates new sewer connections using an 80% threshold for flows occurring for 3 consecutive months. This has not occurred at the WWTP. Monthly average influent flows exceeded the 80% threshold in 2017 but not for 3 consecutive months and flows have stayed below it since then. Permitted flows and loads will be an important consideration when discussing the facility's future including proposed sewer extensions.

Infiltration and Inflow

Influent flow peaks appear to occur during the spring and fall which are typically considered wet months where infiltration and inflow (I/I) is high. Since a comprehensive I/I study has not been conducted for the collection system, I/I rates can only be approximated by observing recorded flows and precipitation data. Infiltration rates are generally estimated by observing flows at nighttime when it is assumed wastewater flow is minimal and the observed flow tends to be predominantly groundwater infiltration. Since real time influent flow and rain gauge data is not available, the next best option for determining I/I is to compare spring and summer flows. This level of analysis only provides average I/I and doesn't provide an idea of peak I/I (typically from inflow sources). Reviewing the influent flows for these periods provides a snapshot of I/I impacts on the facility resulting in the following averages:

- March – June: 56,000 gpd ("wet" period)
- July – October: 39,000 gpd ("dry" period)

The Town likely has some additional sewage flow in the summer months related to summer seasonal activities. However, it does not appear to be impactful since the BOD and TSS loads in **Table 1** are the same regardless of the season. In fact, the impacts from I/I can be observed in the differences in TSS and BOD concentrations for these months which shows BOD and TSS as 40-50% higher during the "dry" months.

Assuming sewage flows remain consistent through the year this means the facility has an average I/I rate of around 17,000 gpd during the wet months. Based on standard I/I rates for 23,000 LF of sewer (approximately 13-14,000 gpd per NHDES standards) the Town has a slightly higher than average level of I/I.

Influent Loading

Metcalf and Eddy's "Wastewater Engineering Treatment and Resource Recovery" indicates the following typical concentrations for low to medium strength municipal wastewater.

- BOD5: 110-190 mg/l
- TSS: 120-210 mg/l
- TN: 20-40 mg/l
- TP: 4-7 mg/l

Comparing these typical values to those presented in **Table 1**, Milton has typical wastewater characteristics. TSS is slightly elevated (227 mg/l), but not enough to be overly impactful for facility planning purposes.

The influent wastewater flows and BOD5 loading (influent and effluent) from 2015-2020 are presented in **Figure 2**. The influent wastewater flows and TSS loading (influent and effluent) for the same period are presented in **Figure 3**.

Figure 2 Influent Flow, Influent BOD & Effluent BOD

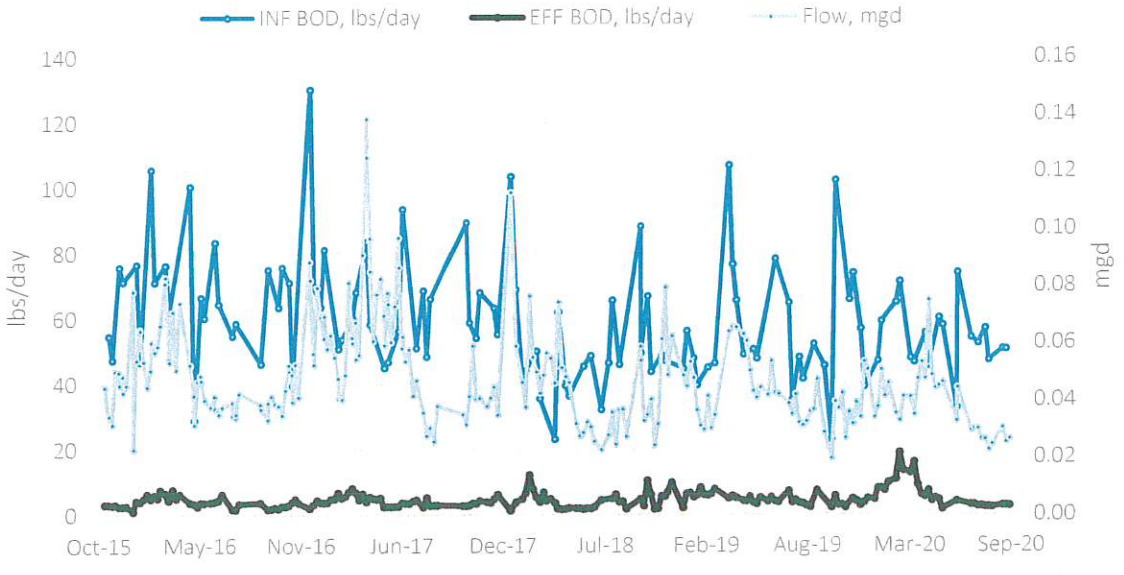
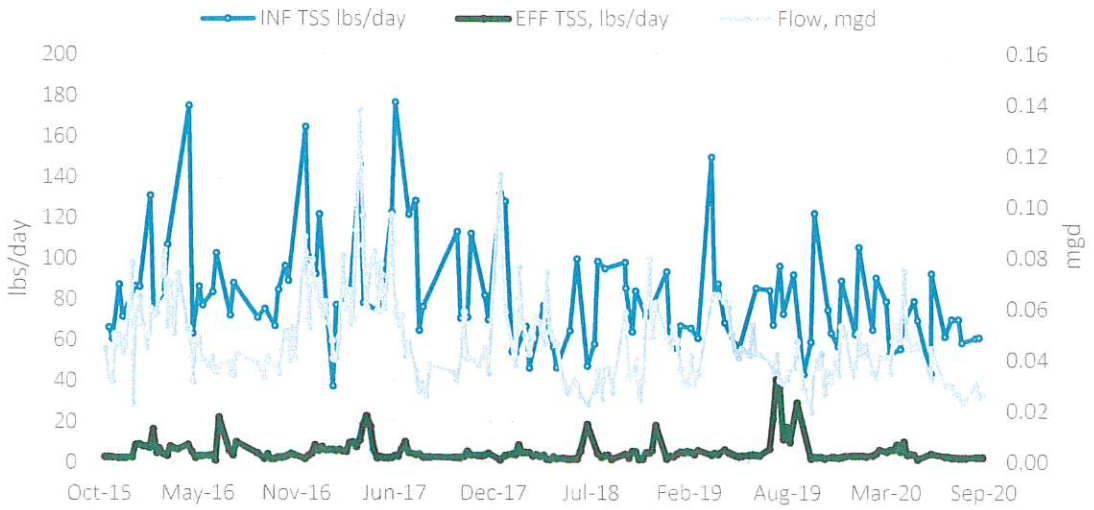


Figure 3 Influent Flow, Influent TSS & Effluent TSS



As illustrated in **Figure 2**, the influent and effluent BOD loads are highly variable, ranging from 23-130 lbs/day in the influent and 1-19 lbs/day in the effluent. **Figure 3** shows the same variability in the influent and effluent TSS loads, ranging from 37-176 lbs/day and 0-41 lbs/day. The average calculated removal rate for BOD and TSS was 92% and 93% respectively, which exceed the requirements of the facility's discharge permit. The allowable maximum daily effluent loadings for BOD and TSS per the facility's discharge permit are 37.5 lbs/day and 41.7 lbs/day, respectively. The effluent limits have not been exceeded, although TSS reached 40.6 lbs/day in the summer of 2019. The WWTF has not historically had issues with algal blooms causing TSS violations though algae does grow in lagoons 2 & 3.

There is no influent nitrogen data available and limited effluent nitrogen data (25 samples). Since the lagoons are fully aerated and the facility does not appear to denitrify it is a reasonable assumption that the influent nitrogen characteristics would be similar to the effluent samples. **Figure 4** below shows the total nitrogen loading for 2020.

Figure 4 Annual Effluent Total Nitrogen Averages

Total effluent phosphorus has been measured one to four times per month for the months of May through September since 2016. The General Permit includes a monthly average phosphorus limit of 2.0 lbs/day (2 grabs samples) for the period of May 1 through September 30. **Figure 5** shows the annual averages per year and **Figure 6** shows the monthly averages per year for the years 2016-2020.

Figure 5 Annual Effluent Total Phosphorous Averages

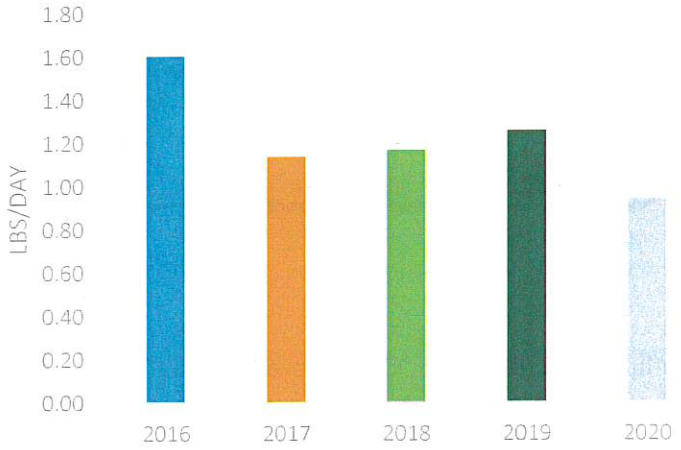
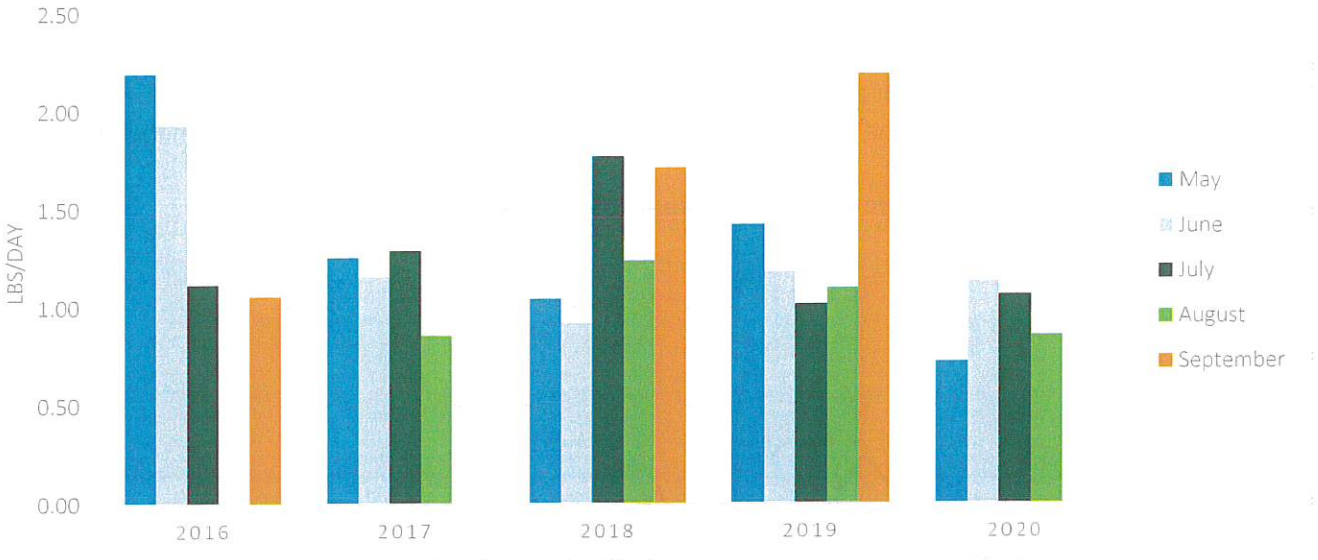


Figure 6 Monthly Effluent Total Phosphorous Averages



1. September 2018 and September 2019 include only one sample each.

Total phosphorous has been measured 70 times and has exceeded the 2.0 lbs/day monthly average limit twice (May 2016 and September 2019). However, on average the facility discharges 1.2 lbs/day. Since the General Permit only includes two samples per month, a single high measurement could result in permit exceedance.

Projected Design Flows and Loads

Projected wastewater flows were developed over a 20-year planning period (2021 – 2041). Flow projections are based on the following:

- Undeveloped parcels eligible for development were identified where residential, commercial, and industrial flows were anticipated in a 20+ year period.
- Undeveloped parcels ineligible for development were identified as conservation lands, groundwater protection areas, wetland conservation areas, groundwater use area, shoreland protection area and currently undeveloped parcels which do not meet the minimum lot size of 1 acre.
- Expansion of the existing sewer collection system to serve areas identified as likely being connected to the system during the planning period.
- Residential flows were based on 150-gallons per day per unit for 3 bedroom homes (1-2 residents) and 175-gallons per day per unit for 4 bedroom homes (2-3 residents). This is based on 75-gpcd for 2.3 people per household (per the 2015-2019 census there was a mean household size of 2.3 people in nearby Farmington, NH).
- Commercial and industrial development based on 600-gallons per day per acre.
- Infiltration estimates are based on 300-gallons per day per inch diameter mile (gpd/idm) for areas to be sewered in the future (NHDES, Env-Wq 700)
- Peaking factors (average flow to instantaneous peak flow) based on industry standards (TR-16).

The projected flows and loads were calibrated using the analysis of existing data included in this memorandum which shows a slight downward trend in the influent flows and loads. This could be the result of limited population growth, reductions in infiltration and inflow, and increased usage of high efficiency plumbing fixtures. As a result, growth within already sewered areas is not expected to impact the projected flows and loads.

The projected wastewater loads are assumed to match the existing wastewater characteristics. Should a large industrial or commercial user develop in the Town it could impact the influent waste strength at the WWTP. For this reason, the projected flows and loads assume only small commercial and residential development.

Areas of future development and expansion were determined using a GIS analysis for developable areas and input from the Town. These areas are shown on **Figure A-1** attached to this memorandum. The following subsections present the anticipated flows and loads at the WWTP.

Projected Flows

The total calculated projected flows are presented in **Table 5** and discussed in more detail below.

Table 3 Future Projected Flows

	gpd	mgd
Current Average Flow	51,000	0.051
Total Sewer Expansion/Development Growth	67,000	0.067
Increased Infiltration and Inflow	15,000	0.015
Total Sewer Flow Increase	82,000	0.082
Design Average Flow (2041)	**133,000**	**0.133**

This proposed design average flow is an increase of 33,000 gpd from the current design annual average through 2041. The instantaneous design peak hour flow rate is 0.72 MGD using TR-16 peaking factor of 5.4. Detailed projected flows are presented in **Table A-1** attached to this memorandum.

The calculated projected flows assume that the municipal sewer system will be extended to include areas along Route 125 (White Mountain Highway) that are currently developed. The analysis also assumes there is a possibility of a sewer extension along Route 75 (Farmington Road) which could spur moderate commercial and residential development. The areas contributing to the projected flows are discussed below.

Elm Street Extension

Elm street is currently partially sewered and developed along the road as shown on the attached **Figure A-1** depicted as R5. There are also existing dirt roads to the large parcel behind the existing developed lots that could eventually be developed into residential lots. Based on discussions with the Town there is a high probability that this short sewer extension is completed which accounts for **6,000 gpd** of additional flow to the WWTP.

Route 125 Sewer Extension

Route 125 consists of a mixture of commercial and residential development sewered up to Milton Pond. The projected flows and loads assume that the existing sewer system will be extended up Route 125 to Saltbox Road (right before the bridge crossing the corner of Town House Pond) depicted as R2. This extension adds approximately 51 single family homes and some commercial establishments (combination of already developed and developable lots). This accounts for approximately **10,500 gpd** of additional flow to the WWTP.

The analysis also assumes that the sewer extension would continue and incorporate the developed and developable areas along the peninsula south of Townhouse Road (R1). This area includes a campground which is assumed to include a sewer connection for its facilities. Due to the density of development (approximately 265 units) this area contributes **31,000 gpd** of additional flow to the projected flows presented.

Route 75 Development and Sewer Extension

Route 75 is currently undeveloped for the most part. This analysis incorporates a potential 10,000 ft long sewer extension from the existing sewer system to the intersection of Nutes / Governors Rd (C1 & C2). The parcels in this

area are assumed to be available for commercial and residential development. Due to the potential cost of the extension and the fact that a majority of the land is undeveloped, this sewer extension has a lower impact on the projected flows and loads; however, it represents a large area of potential growth. The additional flow from this extension is **16,000 gpd** based on a lower probability that the entire section is sewered and developed fully by 2041.

Other Areas

There are several areas in Town that are further away from the potential sewer extensions (R3 & R4). These areas include partially developed land north of Town House Pond. Since these areas have a lower chance of being part of the Town's sewer system they are weighted differently than the other areas discussed above. These areas (approximately 190 potential units) contribute **3,500 gpd** to the projected flows.

Infiltration and inflow is assumed to contribute **15,000 gpd** based on normal deterioration of the existing sewer system and future growth of the sewershed.

Projected Loads

If the extensions and development discussed are performed in the planning period, then the wastewater treatment plant will see a significant increase in influent loads as shown in **Table 6**. These loads were developed using the projected flows and the current wastewater characteristics. As discussed, this analysis assumes that development does not include any major industrial users which could alter the influent wastewater characteristics.

Table 4 Design Year (2041) Influent Flows and Loads

Parameter	Flow		BOD5	TSS	TN	TP
	gpd	mgd	lb/day	lb/day	lb/day	lb/day
Minimum Day	29,000	0.029	43	71	8.7	3.1
Annual Average	133,000	0.133	153	212	22.4	5.3
Maximum Month	301,000	0.301	357	500	43.4	9.0
Maximum Day (98%)	356,000	0.356	373	571	51.4	9.7
Instantaneous Peak	720,000	0.720	-	-	-	-

END OF MINUTES – 2022 06 13