East Hants Servicing Capacity Study

Technical Memorandum #2: Milford Wastewater Treatment Plant Assessment Report

Final

Prepared for:
Municipality of East Hants

RVA 226421

June 16, 2023

R.V. Anderson Associates Limited
230 Brownlow Avenue, Suite 240
Dartmouth NS B3B 0G5 Canada
T 902 468 1806 F 855 833 4022
rvanderson.com

RVA 226421

June 16, 2023

Municipality of East Hants
Municipal Office
Lloyd E. Matheson Centre
15 Commerce Court
Elmsdale, NS B2S 3K5

Attention: Derek Normanton, P.Eng.

Dear Mr. Normanton:

Re: Milford Wastewater Treatment Plant Assessment
Technical Memorandum #2 – Final

Please find enclosed Milford Wastewater Treatment Plant Assessment Technical Memorandum #2 – Final.

This Technical Memorandum is with regard to the capacity assessment for the Milford Wastewater Treatment Plant.

Please contact the undersigned if you have any questions.

Yours very truly,

R.V. Anderson Associates Limited

Jason Angel, M.Sc., P.Eng., PMP
Senior Project Manager

Encls.

TECHNICAL MEMORANDUM

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1.0 INTRODUCTION

1.1 Background

The Milford Wastewater Treatment Plant (MWWTP) is class II facility and was constructed in 2011 and services the Milford Growth Management Area (GMA) (Refer to the Milford (GMA) as shown in Appendix 1-1) and is located at 1128 Milford Rd., Milford Nova Scotia.

The MWWTP is a sequencing batch reactor (SBR) facility and is equipped with grit removal, influent grinding, equalization, UV disinfection and aerobic sludge digestion. A process flow diagram is provided in **Figure 1.1**. A detailed description of each unit process is provided in the following subsections.

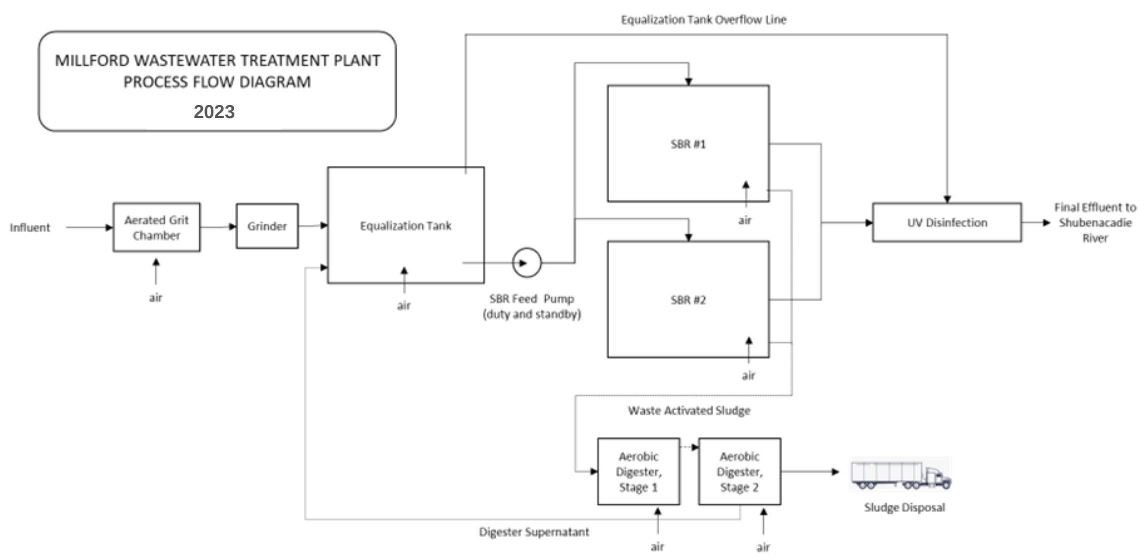


Figure 1.1 – MWWTP Process Flow Diagram

The plant was originally designed for the wastewater flows outlined in **Table 1.1** (ABL Environmental Consultants Ltd., 2012)

Table 1.1 – MWWTP Design Flows

Parameter	Value
Average Daily Flow	998 m^3/d
Peak Daily Flow	2,500 m^3/d
Peak Hourly Flow	232 m^3/hr (5,568 m^3/d)

Notes:
Adapted from the MWWTP Operations manual – Milford Wastewater Treatment Plant (2012) prepared by ABL Environmental Consultants Ltd. (ABL Environmental Consultants Ltd., 2012)

1.2 Objective

R.V. Anderson Associates Limited (RVA) was retained by the Municipality of East Hants to perform an assessment of the MWWTP to determine the plant's ability to treat the community's wastewater for the next 25 years.

The objectives of this assessment are to:

- Calculate the plant's current capacity;
- Calculate the anticipated wastewater flows to the MWWTP based on estimated population growth out to 2050;
- Provide estimated asset costs and Timelines for Replacement for major assets; and
- Provide recommendations of any upgrades required to meet the 2050 wastewater treatment requirements.

This report provides population and wastewater flow estimates to 2050 to assist the Municipality of East Hants in determining the ability of the MWWTP to meet future demands.

2.0 HISTORICAL EFFLUENT ANALYSIS

2.1 Historical Effluent Quality Analysis

The MWWTP operates under Nova Scotia Environment (NSE) Approval to Operate number 2010-071521-R01. The MWWTP's treated effluent limits are provided in **Table 2.1**. Treated effluent is discharged to the Shubenacadie River.

Table 2.1 – MWWTP Treated Effluent Limits

Parameter	Limit	Sampling Frequency	Sampling Location
BOD5	20 mg/L	5 / month	Treated Effluent Discharge
Suspended Solids	20 mg/L	5 / month	Treated Effluent Discharge
Fecal Coliform	200 counts / 100 mL	5 / month	Treated Effluent Discharge
pH	6.5 – 9.0	Continuously or daily grab	Treated Effluent Discharge
Plant Volumes	-	Continuously	Entering and Leaving Plant

Parameter	Limit	Sampling Frequency	Sampling Location
Fish Toxicity	-	As requested by NSE	Treated Effluent Discharge

Notes:

The facility shall be considered to be in compliance as long as:

1 - 80% of the samples meet the limits, and

2 - No single results is greater than two (2) times the limit

RVA reviewed historical effluent laboratory date from January 2019 to December 2021 and found that the MWWTP was in compliance with the facility's Approval to Operate for 100% of the period (see Table 2.2). Furthermore, no single sample was found to exceed the concentration limits. In addition to the parameters required by the approval, the Municipality also collects effluent ammonia (reported as nitrogen) data. The low (0.09 mg/L) concentration indicates that nitrification is occurring at the plant.

Table 2.2 – 2019 – 2021 MWWTP Treated Effluent Results

Parameter	Limit	Average	Compliance
BOD_5	20 mg/L	3 mg/L	100%
Suspended Solids	20 mg/L	5 mg/L	100%
Ammonia (as Nitrogen)	N/A	0.09 mg/L	N/A
Fecal Coliform	200 counts / 100 mL	9 CFU/100 mL	100%
pH	6.5 – 9.0	7.13	100%

The Municipality does not currently collect influent wastewater samples. It is recommended that the plant begin measuring influent concentrations of 5-day Biological Oxygen Demand (BOD5), suspended solids, ammonia and pH on at least a quarterly basis. This data can provide further insight in the performance of the plant as well assist in troubleshooting. Total phosphorus (TP) could also be included so that historical data would be available for design purpose should TP limits be imposed in the future.

2.2 Historical Effluent Flow Analysis

RVA reviewed historical daily totalizer values from January 2019 to December 2021, as recorded at the influent flow meter located after the grit tank. A graphical representation of the flow is illustrated in Figure 2.1.

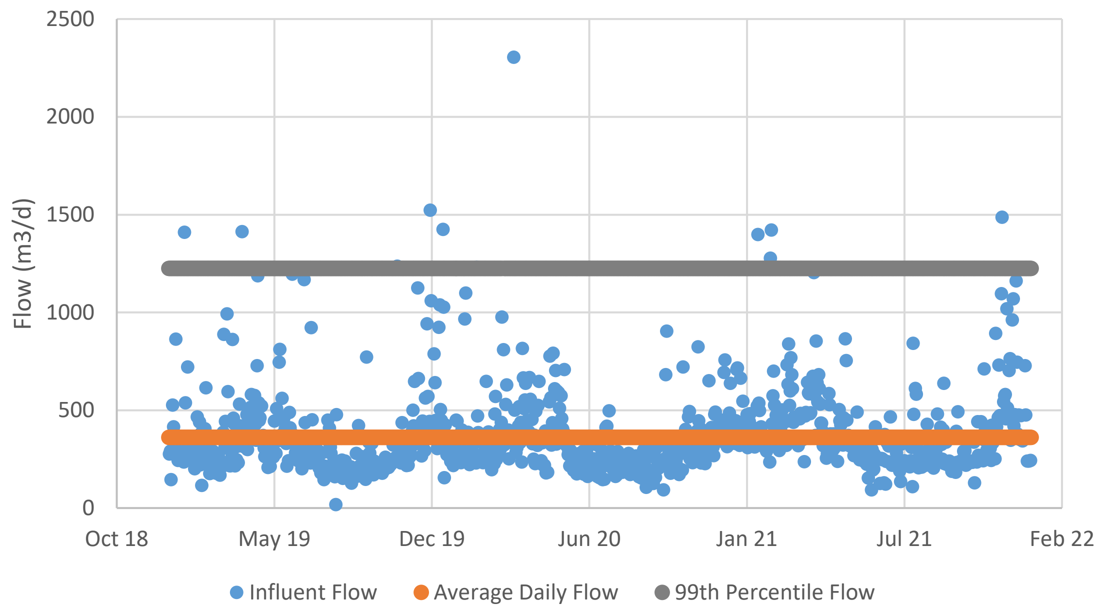


Figure 2.1 – STL WWTP Historic Influent Flow Trend (2020-2022)

The following observations were made based on the flow data analysis:

- The current average flow at the plant is 361 m^3/d.
- The absolute peak daily flow observed over the data period is 2,304 m^3/d, which occurred on March 14, 2020. This corresponds to a peak daily flow factor of 6.4 which is more than double that wastewater system of this size would typically experience. It was noted that for the 5 days preceding this value the effluent totalizer values were not recorded. It is possible that this value could be an anomaly and could represent the total volume of wastewater received over the course of all six days. Distributing its value over six days gives 389 m^3/d.
  - If this value is not considered, the absolute peak daily flow observed over the data period is 1,522 m^3/d, which occurred on November 29, 2019.
- The 99th percentile of the flow data is 1,224 m^3/d, 3.41 times the average flow observed.

As the plant's flow meter only provides a daily, totalized volume and does not provide insights into peak hourly or peak instantaneous flows, these values were calculated based on Water Environment Federation (WEF) Design of Municipal Wastewater Treatment Plants Figure 2.5 shown as Figure 2.2 below (Water Environment Federation, 2010). Based on a ADF of 361 m³/day and applying the graphical method illustrated in Figure 2.2, the peak instantaneous flow factor is estimated at 5.5 and the peak daily flow factor at 3.0, which is comparable to that calculated based on the 99th percentile of flow data. Peak hourly flow (PHF) is defined as the average of the PDF and PIF (see **Figure 2.2**).

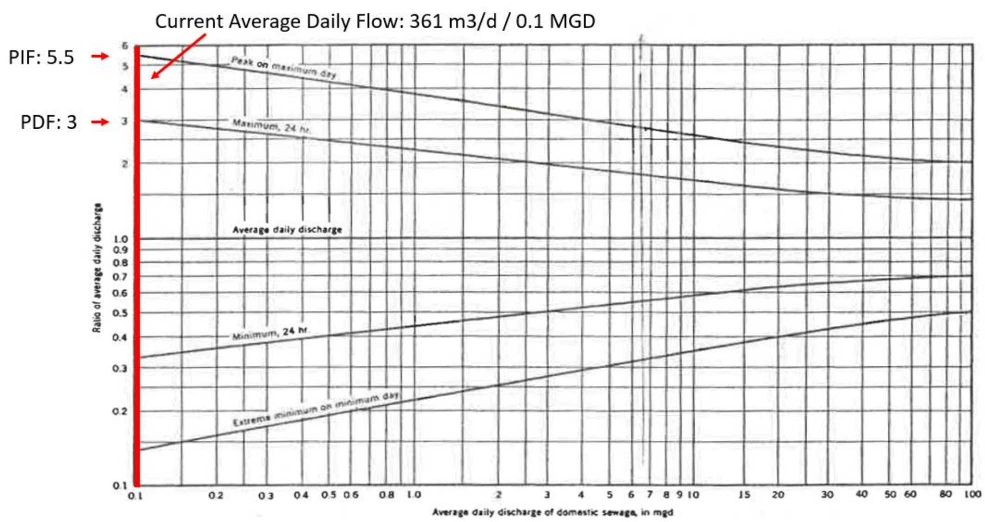


Figure 2.5 Ratio of extreme flows to average daily flow in New England (mgd × 3 785 = m³/d) (ASCE, 1982).

Figure 2.2 – WEF Peaking Factor Guidelines

The measured and calculated flowrates are presented in **Table 2.3**.

Table 2.3 – 2019 – 2021 MWWTP Historical Flowrate Summary

Flow	Peaking Factor	Flowrate (m^3/d)	Source
Average Daily Flow	-	361	2019 - 2021 Data
99th Percentile Flow	3.4	1,225	2019 - 2021 Data
Peak Daily Flow	4.2	1,522[1]	2019 - 2021 Data
Calculated Peak Daily Flow	3.0	1,082	Calculated from WEF Guidelines
Calculated Peak Instantaneous Flow	5.5	1,983	Calculated from WEF Guidelines
Calculated Peak Hourly Flow	4.3	1,532	Calculated from WEF Guidelines

Notes:

[1]One larger value of 2,304 m^3/d was omitted as it appears to be an anomaly.

2.3 Future Wastewater Flow Projections

2.3.1 Population Growth

The Municipality completed population projections, extending to 2050, for low, mid and high growth scenarios in the GMA which were provided to RVA. As per email correspondence with the Municipality on October 18, 2022, RVA utilized the "mid-growth" projections for this analysis; the population projection for 2022 through 2050 is presented in **Figure 2.3**. These projections assume the following:

- The Milford GMA has an estimated current population (as of December 31, 2021) of 948.
- Development rates were based on those typical over the past 5 – 10 years.
- An average of 2.5 people per dwelling as per the combined Corridor/Indian Brook aggregate dissemination area (ADA) from the 2021 census.

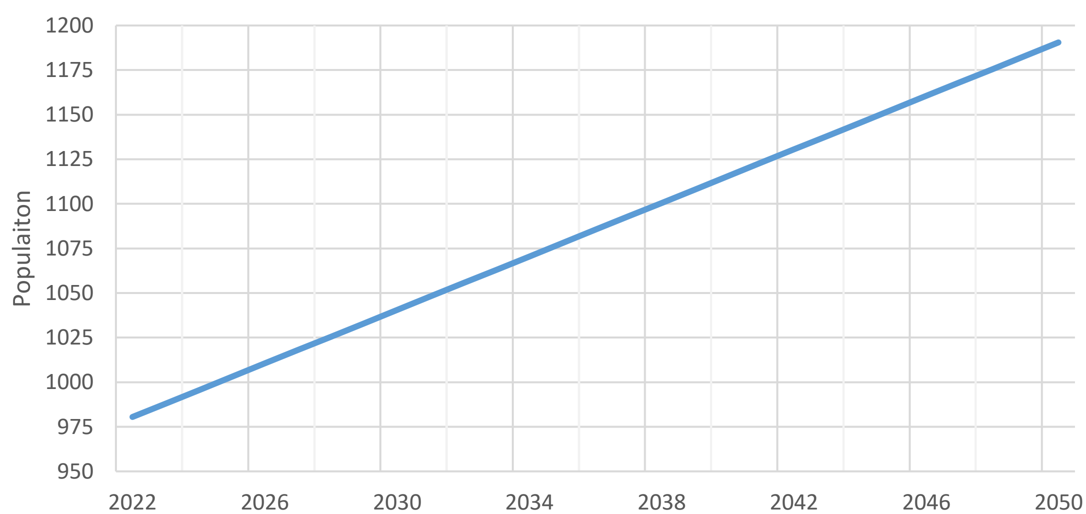


Figure 2.3 – Milford GMA Population Projection, 2022 – 2050

2.3.2 Projected Wastewater Flows

Properties connected to the sewer system within the Milford GMA are nearly completely zoned residential (R1, R2, R2-T, R3) with the exception of limited areas zoned village core (VC). The ACWWA residential guideline value of 380 L person per day, when combined with the current population, closely predicts the current average daily sewage flows observed (see **Error! Reference source not found.**) and will be used to predict the increase in flow associated with population growth.

Table 2.4 – MWWTP Flow Projection Check

Parameter	Unit	Value	Source
Estimated Current Population	Residents	948	Municipality of East Hants
Design Residential Wastewater Flow	L/Cap*d	380	ACWWA Guidelines
Estimated Average Daily Wastewater Flow	m^3/d	360	Calculated from ACWWA Guidelines
Average Daily Flow	m^3/d	361	2019 – 2021 Historical Data

The future peak daily flow has been estimated using the 2019 – 2021 historical peaking factor of 4.2 presented in **Table 2.3**. Though peaking factors typically decrease as flowrates increases (refer to **Figure 2.4**), RVA has conservatively maintained the peaking factor for this analysis. Using this approach, the average daily flow and peak daily flow in 2050 have been estimated to increase to 452 m^3/d and 1,900 m^3/d respectively. This is equivalent to a 25% increase in flowrate.

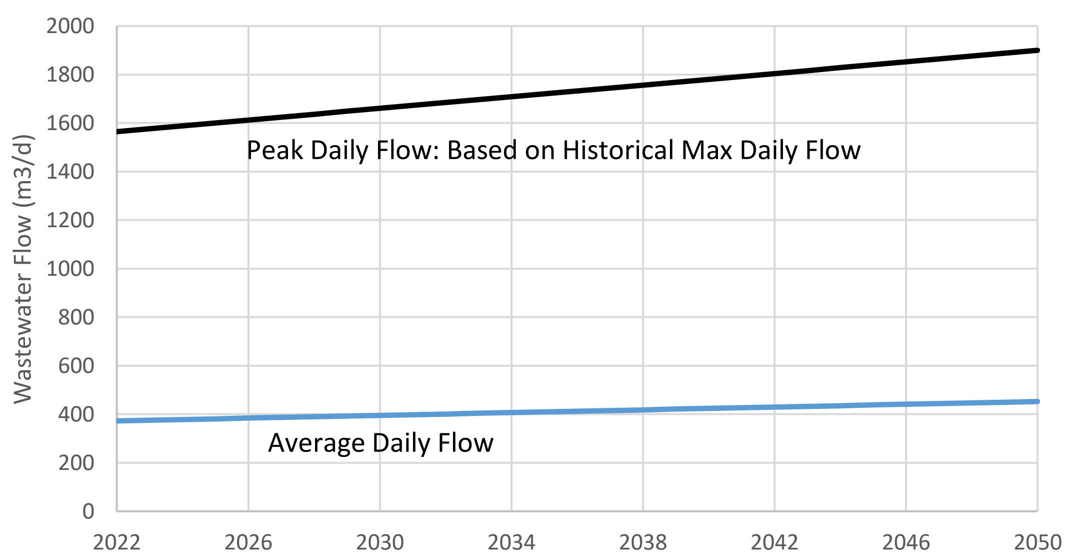


Figure 2.4 – Wastewater Flow Projections, 2022 – 2050

3.0 UNIT PROCESS CAPACITY ASSESSMENT

Each unit process was assessed to confirm the plants capacity:

3.1 Preliminary Treatment

3.1.1 Aerated Grit Chamber

The aerated grit chamber is located near the main gate at the south end of the property. Influent from Manhole (MH) 3 enters the grit chamber and is subjected to an aeration induced roll removing grit which settles to the bottom of the chamber. Air for the coarse bubble diffusors located in the grit tanks is provided by a 75 mm line from the blowers located in the main plant building. Accumulated grit is removed from time to time using an excavator bucket or pumper truck. De-gritted wastewater passes through a grinder to exit the grit chamber (see flow path in **Figure 3.1**).

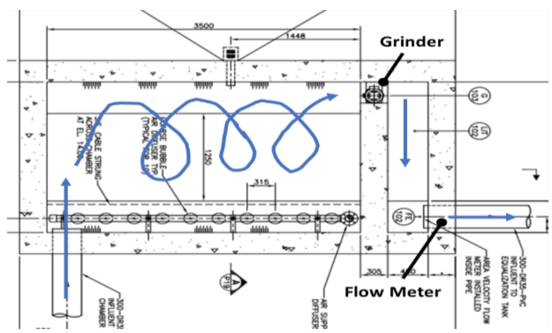


Figure 3.1 – MWWTP Grit Chamber

The grit chamber's parameters are presented in **Table 3.1**. Based on the Atlantic Canada Water and Wastewater Association (ACWWA) guidelines the grit chamber has a peak flow capacity of 5,743 m^3/d (ACWWA, 2022)

Table 3.1 – Aerated Grit Chamber Parameters

Parameter	Value
Dimensions	3.5 L X 2.15 W X 2.65 SWD m
Volume	19.9 m^3
Detention Requirements	5 min at Peak Flowrate (1)
Capacity	5,743 m^3/d
Aeration Requirements	0.5 m^3/min*m of length (1)
	1.75 m^3/min (2)

Notes:
[1] ACWWA Guidelines, Table 6.1: Typical Design Information for Aerated Grit Chambers
[2] Air is provided by the Digester Blower

3.1.2 Influent Grinder

De-gritted wastewater passes though a JWC Muffin Monster channel grinder to reduce any large solids. The grinder is relatively new and was installed in 2021. The wastewater is then transported via a 300 mm gravity sewer to the main plant. The influent grinder's parameters are presented in **Table 3.2**.

Table 3.2 – Influent Grinder Parameters

Parameter	Value
Make/Model	JWC Muffin Monster 30005-0040
Installed	2021
Power	2.2 kW (3 hp)
Capacity	16,464 m^3/d @ 495 mm head loss / 610 mm downstream head (1)
Number of Units	1

Notes:
1 Capacity provided by manufacturer's product literature.

The grinder has a large capacity, based on manufacturers documents, and can pass a flow much larger than the rest of the plant's components at 16,464 m^3/d. Under these conditions, the water level in the grit tank would nearly overtop the grinder and the sewers entering and exiting the grit tank would be surcharged. Therefore, for determining the plant capacity, the capacity of the combined preliminary treatment system shall be limited to 5,743 m^3/d by the grit tank.

3.2 Equalization Tank

De-gritted and ground wastewater enters the aerated equalization tank which is located underneath the main building. The tank's major physical parameters are provided in **Table 3.3** The tank is equipped with a coarse bubble aeration system with air supplied by a dedicated blower. Water level in the equalization tank is used to control the process:

- The "Low Water Level" (L.W.L) protects the aeration diffusors.
- When the "Batch Level" is reached, filling of the SBR is permitted.
- If the "High Water Level" (H.W.L) is reached the SBR reaction time is decreased.
- If the "High High Water Level" (H.H.W.L) is reached the reaction time is further decreased and the fill level in the SBRs is increased.

- If the "Extreme High-Water Level" (E.H.W.L) is reached, aeration is turned off to permit the tank to act as a primary clarifier. Sewage will then by-pass the SBRs once the level reaches the by-pass weir and will be transferred directly to the UV channel.
    - Calculation of the design peak hourly overflow rate, as provided by the SBR manufacturer gives a value of less than 40% of the ACWWA guidelines for primary clarifiers indicating that acceptable settling would occur.
    - The equalization tank is not equipped with a sludge removal system and should only be used on an emergency basis in this fashion.

Table 3.3 – Equalization Tank Parameters

Parameter	Value
Dimensions	9.50 L X 20.35 W X 4.70 H m
Surface Area	193.3 m^2
Design Peak Hourly Flow	232 m^3/hr (1)
Peak Hourly Overflow Rate	28.8 m^3/ m^2*d (2)
Design Peak Hourly Overflow Rate	80 – 120 m^3/ m^2*d (3)
Water Depth	Min: 0.6 m Max: 4.3 m
Level Set Points	L.W.L: 0.6 m Batch level: 1.33 m H.W.L: 2.06 m H.H.W.L: 2.79 m E.H.W.L: 4.00 m Overflow Weir: 4.15 m
Volume	802.3 m^3 (to overflow weir)
Equalization Volume	686.3 m^3 (L.W.L to overflow weir)
Equalization Tank Blower Specs	Aerzen Delta GM 15L Blower 11.8 m^3/min @ 44.8 KPa

Notes:
[1] Design Values taken operational procedures manual – Milford Wastewater Treatment Plant (2012) prepared by ABL Environmental Consultants Ltd.
[2] Peak surface overflow rate would occur if the filling pumps were offline or all SBRs are already filled.
[3] ACWWA Guidelines, Table 7.1: Typical Design Information for Primary Sedimentation Tanks.

3.3 SBR Feed Pumps

The SBR feed pumps are located in the Equalization tank sump on the northwest side of the building. The pumps operate in a duty and standby arrangement. The two pumps do not operate at the same time. Information regarding the SBR feed pumps is provided in Table 3.4. During times of high flows, when the H.H.W.L is reached in the equalization tank, the pumping rate increases due to the decrease in required pumping head.

Table 3.4 – SBR Feed Pump Parameters

Parameter	Value
Make/Model	6" - Flygt NX-3127
Impeller Code	426
Power	5.6 kW (7.5 hp)
Flow	Normal Flow: 2.34 m^3/min Peak Flowrate: 3.12 m^3/min
Number of Units	1 Duty, 1 Standby

3.4 Sequencing Batch Reactors

The MWWTP is equipped with two SBRs. The units are sequentially filled with wastewater, which is then aerated, known as reacting, along with activated sludge for a period of time, the biomass permitted to settle and then the supernatant is decanted to the UV system. Periodically, a volume of waste activated sludge (WAS) is removed from the reactor to maintain the correct MLSS concentration. WAS is diverted to the plant's aerobic digesters. The SBRs operate in a sequential nature; only one unit can be filling, aerating or decanting at one time. During decanting, a control valve is used to modulate the flow leaving the SBR as to not exceed the capacity of the downstream UV system. The SBR can respond to increasing flows by reducing the reaction time and increasing the SBR fill flowrate and volume (see section 3.2). The SBR's parameters are presented in Table 3.5.

Table 3.5 – SBR Parameters

Parameter	Value
Tank Size	10 L X 12.1 W X 4.45 H
Level Set Points	Decanter Invert: 2.23 m Low Water Level: 2.58 m Normal Level: 3.61 m Maximum Level: 3.90 m
Design ADF	998 m^3/d (1)

Parameter	Value
Design Max Daily Flow	2,500 m^3/d (1)
Design Peak Hourly Flow	232 m^3/hr (1)
Batch Volume	Normal Flows: 124.6 m^3 Peak Flows: 159.7 m^3
Fill Time	Normal Flows: 53.3 min Peak Flows: 51.2 min
React Time	Normal: 180 Accelerated: 120 min Emergency: 90 min
Settle Time	60 min
Decant Flowrate	1.92 m^3/min (32 L/s)
Decant Time	Normal Flows: 64.9 min Peak Flows: 83.2 min
Wasting Rate	6.05 m^3 every three cycles, max of 30 min
Calculated Reactor Capacity	Normal Flows 975 m^3/d (2) Peak Flows: 1,563 m^3/d (3)
Calculated System Capacity	Peak Flows: 2,250 m^3/d (4)
SBR and Standby Blower Specs	Aerzen Delta GM 15L Blower 11.0 m3/min @ 48.3 KPa

Notes:
[1] Design Values taken operational procedures manual – Milford Wastewater Treatment Plant (2012) prepared by ABL Environmental Consultants Ltd.
[2] Calculated SBR normal flow capacity assumes a wasting time of 30 min. Wasting is set to 0.05 m of tank depth and likely takes less time. Using a wasting time of 10 minutes gives the design value of 998 m3/d.
[3] On a peak day, the equalization tank is designed to act as primary clarifier. These calculations show that with a design peak day flow of 2,500 m3/d, 1,563 m3/d would be treated while 937 m3/d would be stored in equalization or by-pass the SBR and go directly to the UV system.
[4] System Capacity includes the equalization capacity as well as the SBR's peak daily capacity.

Based on the assumed influent parameters provided in the operations manual, RVA completed calculations to determine the required airflow for aeration. Nitrification was considered as a part of these calculations (see

Table 3.6). These numbers show the installed blowers have the capacity to provide the SBR's peak daily oxygen requirements (SBR's peak daily calculated in Table 3.5) . Furthermore, during peak daily flows it is likely that influent would be more dilute further reducing these oxygen demands.

Table 3.6 – SBR Aeration System Parameters

Parameter	Value
Design Influent BOD	160 mg/L[(1)]
Design Influent Ammonia	20 mg/L[(1)]
Max SBR Treatment Capacity	1,563 m^3/d
Required Airflow	7.9 m^3/min
SBR and Standby Blower Specs	Aerzen Delta GM 15L Blower 11.0 m3/min @ 48.3 KPa

Notes:
[1] Design Values taken operational procedures manual – Milford Wastewater Treatment Plant (2012) prepared by ABL Environmental Consultants Ltd.

3.5 Ultraviolet Disinfection System

The system's UV system was sized to handle both the SBR's peak decanting rate but also the flow of wastewater by-passing the SBR directly form the equalization rate during peak flow events. The UV system's parameters are presented in Table 3.7.

Table 3.7 – UV System Parameters

Parameter	Value
Make/Model	Trojan Technologies/ DUV3600K-1-PTP
Max Design Flow	3.75 m^3/min (5,400 m^3/d)
Max SBR Decant Flow	1.92 m^3/min (2,765 m^3/d)
Additional Capacity for by-pass flows	1.83 m^3/min (2,635 m^3/d)
Number of Units	2
Modules per Unit	6
Bulbs per Module	4

3.6 Aerobic Digesters

A two-stage aerobic digester is utilized at the MWWTP. WAS from the SBR's is discharged into Digester #1 which then overflows into Digester #2. Digester #1 is aerated continuously, while digester #2 halts aeration to allow sludge to settle before decanting supernatant. Decanted supernatant is transferred back to the equalization tank for treatment. Parameters for the Aerobic digester are provided in Error! Reference source not found..

Table 3.8 – Aerobic Digester Parameters

Parameter	Value
Digester #1 Dimensions	10 m L X 3.95 m W X 4.05 m SWD H
Digester #1 Volume	160 m^3
Digester #2 Dimensions	10 m L X 3.95 m W X 4.05 m SWD H
Digester #2 Volume	160 m^3
Total Volume	320 m^3
Average WAS volume	18.15 m^3/d (1)
Average WAS volume, after decanting	6.35 m^3/d (2)
SRT	50 d
Required SRT	45 d (3)
Air Requirements	0.5 L/s*m^3 (3)
	9.6 m^3/min
Grit Tank Air Requirements	1.75 m^3/min (4)
Total Air Requirements	11.3 m^3/min
Digester Blower Specs	Aerzen Delta GM 15L Blower 11.8 m3/min @ 44.8 KPa (5)

Notes:
1 WAS production by SBRs based on 1.5 wastings per day at 6.05 m^3/wasting per SBR at its design flow of 998 m^3/d
2 SBR operations manual estimates that 60 – 75% of WAS volume is decanted from the digester.
3 ACWWA Guidelines.
4 Digester blowers provide air to aerated grit tank.
5 SBR operations manual lists digester blower capacity at 6.7 m^3/min @ 44.8 KPa. Blower information and curves provided by the Municipality indicate the model installed is capable of achieving 11.8 m^3/min @ 44.8 KPa.

Calculations presented above indicate that the aerobic digester has capacity to handle the WAS produced by the SBRs when the plant is operating at its design average daily wastewater flow of 998 m3/d.

3.7 Capacity Summary

The peak and average daily flows estimated to occur in 2050 are presented alongside the capacities of the MWWTP's various unit processes in

Table 3.9. This analysis shows that the plant will have capacity to manage the estimated future average and peak daily flows.

Table 3.9 – SBR Aeration System Parameters

Unit Process	Average Daily Flow (m^3/d)		Peak Daily Flow (m^3/d)	
	2050	Capacity	2050	Capacity
Preliminary Treatment	452	1,044[(1)]	1,900	5,743
SBR Pump		3,370		4,493
SBRs		975		2,250
Disinfection		1,256[(2)]		5,400
Sludge Digestion		998		N/A

Notes:
[1] Average daily flow capacity calculated by dividing by the WEF peak instantaneous flow factor (Table 2-3)
[2] Average daily flow capacity calculated by dividing by the WEF peak hourly flow factor (Table 2-3)

4.0 TIMELINES FOR ASSET REPLACEMENT

As a part of WSP's 2015 Sewer Capacity Study, the lifespan of the plant's major assets was estimated (WSP Canada Inc., 2015). RVA has updated these number where necessary and the are presented in Table 4.1. Though the capacity of the plant was shown to meet the projected 2050 wastewater flows, almost all of the plant's assets, with the exception of the tanks may require replacement or rehabilitation before this time.

Table 4.1 – Major Asset Replacement Timeline

Asset	Installed/ Constructed	Normal Service Life	Expected Replacement
Grinder	2021	25	2046
SBR Pumps	2021	25	2046
Blowers	2011	20	2031
UV system	2011	25	2036
SCADA System	2011	20	2031
Building Electrical and Mechanical System	2011	20	2031
Tanks	2011	50	2061[(1)]

Notes: Adapted from (WSP Canada Inc., 2015)
[1] Tanks would likely be rehabilitated instead of replaced.

High level cost estimates, adjusted for inflation, were prepared for items requiring replacement before 2050 which are presented in Table 4.2. This table does not include reoccurring maintenance costs such as diffusor membrane replacement, etc. RVA reached out to equipment suppliers for budgetary quotations and applied factors for installation and construction contingency on top of provided equipment costs.

Table 4.2 – Major Asset Replacement Cost Estimate

Asset	Expected Replacement	Installation	Construction Contingency	Replacement Cost (1)
Grinder	2046	20%	15%	$110,000
SBR Pumps	2046	20%	15%	$175,000
Blowers	2031	30%	15%	$180,000
UV system	2036	30%	15%	$165,000
SCADA System (2)	2031	Included in Equipment Cost	15%	$230,000
Building Electrical (MCC) (3)	2031		25%	$450,000
Building Mechanical System (4)	2031	50%	50%	$100,000

Notes:
[1] Costs are provided in Canadian dollars and adjusted for 2% inflation to the year of expected replacement. Equipment and installation costs are included in these estimates.
[2] Costs for SCADA system replacement include a new panel, HMI station, programming, installation, startup and testing.
[3] Costs for Building Electrical Systems include replacement of the motor control cabinet (MCC – 1).
[4] Costs for Building Mechanical Systems include replacement of HVAC equipment (fans, HRV, heaters) and plumbing equipment (water heater, pressure tank, water softener .

5.0 CONCLUSIONS

RVA completed an assessment of the MWWTP to determine the plant's ability to treat the community's wastewater for the next 25 years:

- Historical effluent quality data was reviewed:
  - The plant was in 100% compliance with it's Approval to Operate over the period assessed (2019 – 2021) indicating the process is working as designed.
  - Nitrification was found to be occurring.
  - No influent data was available for analysis. It is recommended the Municipality begin influent sampling so this data will be available in the future. Influent data provide by the SBR operating manual was used in capacity assessment calculations.
- Historical influent flow data was reviewed:
  - The current average daily and peak daily flows were determined to be 361 m^3/d and 1,893 m^3/d respectively.
- Population growth projections, provided by the Municipality, were used to estimate the 2050 wastewater flows.

    - 2050 average daily and peak daily flows were estimated to increase to 454 m^3/d and 2398 m^3/d respectively.
- Each unit process was assessed to determine its capacity and ability to treat future flows:
    - The plant, as a whole, has the capacity to treat the estimated future average and peak, daily flows.
- Timelines for replacement or rehabilitation of the major assets were estimated:
    - It is expected that all assets, with the exception of the tanks, will require replacement before 2050, with most having a remaining lifespan of approximately 13 years.
    - Cost estimates were presented for each asset to assist with budgeting for future replacements.

6.0 REFERENCES

ABL Environmental Consultants Ltd. (2012). *OPERATIONAL PROCEDURES MANUAL - MILFORD WASTEWATER TREATMENT PLANT.*

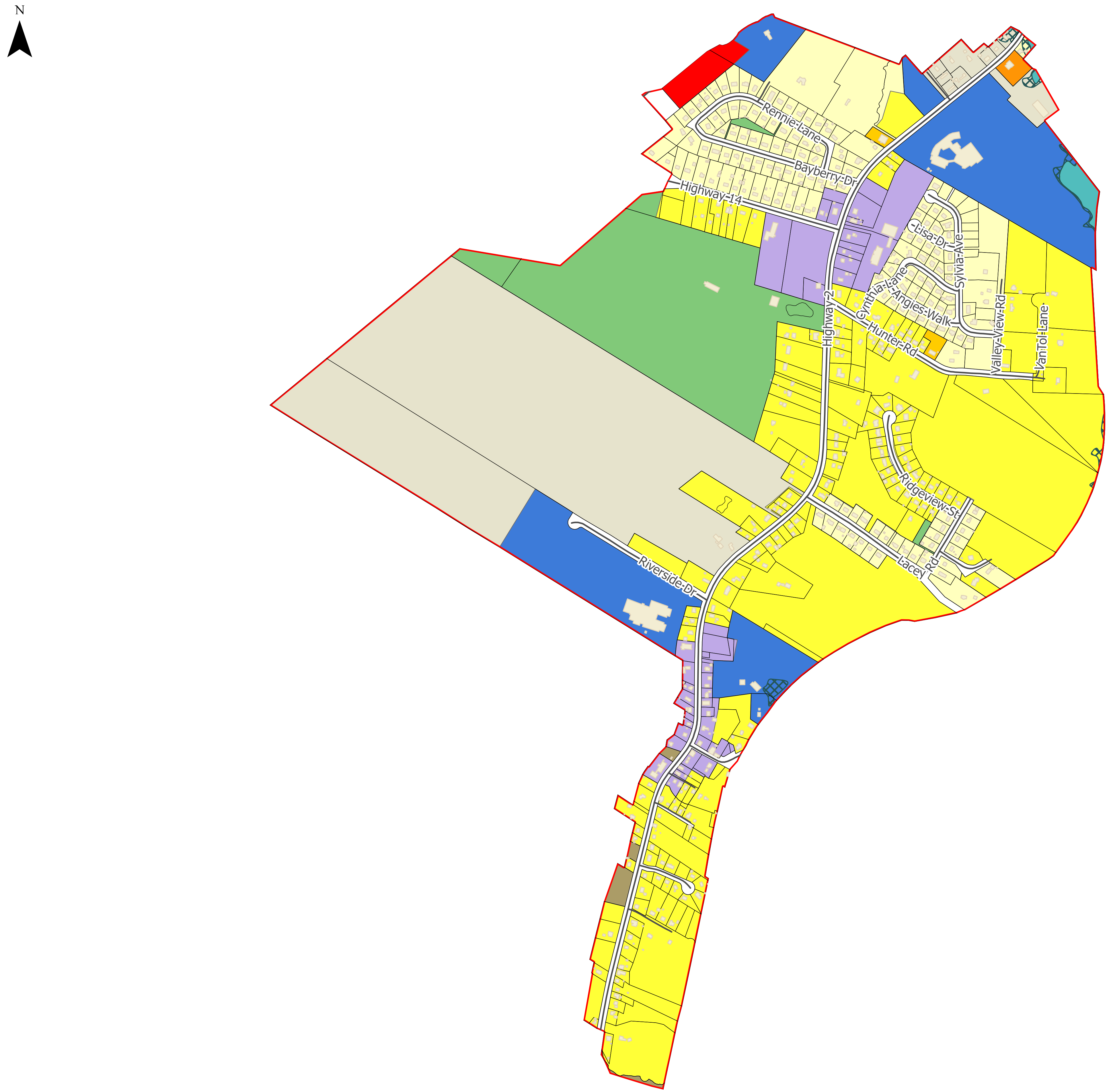
ACWWA. (2022). *Wastewater Systems Guidelines.*

Water Environment Federation. (2010). *Design of Municipal Wastewater Treatment Plants.*

WSP Canada Inc. (2015). *Municipality of East Hants - Sewer Capacity Study.*

APPENDIX 1

Milford Growth Management Area



MILFORD

Growth Management Area

Zone

- MF - Moderate Risk Floodplain Overlay
- AR
- HC
- HF
- IU
- OS
- R1
- R2
- R2-T
- R3
- RU
- VC

0 250 500 1,000
Metres

Disclaimer: this map was produced by the Planning & Development Department of the Municipality of East Hants and shall be used as a graphical representation of property boundaries. It is not intended to be used as a survey plan or for legal descriptions.

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