Agenda Item VII.6

BRISTOL, VERMONT
ANNUAL WASTEWATER SYSTEM EVALUATION
2022-2023

INDIRECT DISCHARGE PERMIT ID 9-0208-1

APRIL 2023

Prepared By: VTM Engineering, PLC

Date: April 25, 2023

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BRISTOL, VERMONT
ANNUAL WASTEWATER SYSTEM EVALUATION
2022-2023

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APPENDICIES

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1.0 INTRODUCTION

The Town of Bristol, Vermont owns and operates a sewage collection, treatment and disposal system located in the downtown core of Bristol village. The system collects and treats wastewater from approximately thirty-four (34) individual commercial and residential properties within the "core" business district. The wastewater collection and disposal system are governed by Indirect Discharge Permit number 9-0208-1 issued by the State of Vermont.

The System has been operating since September 1, 1993. The system consists of a wastewater collection system, a septic tank, disposal fields and associated appurtenances. An annual inspection of the collection and disposal system by a registered professional engineer is required to be conducted during the month of April as a condition of the Indirect Discharge Permit. The Town of Bristol contracted with VTM Engineering, PLC (VTM) of Hinesburg, Vermont to conduct the annual wastewater inspection and evaluation.

The annual inspection of the Bristol wastewater collection, treatment and disposal system was performed on April 15, 2023 by Steven Palmer, P.E. of VTM. Mr. Palmer performed the inspection in conjunction with Mr. Cyrus Marsano of Vermont Utility Management Services (VTUMS). VTUMS is the licensed wastewater operator for the Bristol Wastewater System.

This Report outlines the items inspected, the observations made, analysis of annual sampling and testing data as well as recommendations for repairs and/or operations.

2.0 WASTEWATER SYSTEM INSPECTION

The Bristol Wastewater system is comprised of three major components: 1) a wastewater collection system comprised of collection manholes, grease traps and piping; 2) a septic tank, splitter box and dosing siphons; 3) eight separate wastewater disposal fields. The original wastewater system design envisioned four of the eight disposal fields being in operation at any given time. The original design envisioned a flow of 5,000 gpd maximum capacity to four operating fields (20,000-gallon total hydraulic capacity). The hydraulic capacity however was later limited by future permit amendments that also applied biological loading criteria including TSS and $BOD^{5.}$

Figures 1, 2 and 3 Appendix A show the general location of the major system components.

2.1 Wastewater Collection System Inspection

The Discharge Permit requires inspecting the collection system including removing manhole covers to observe the condition of sewers and manholes, and noting any signs of inflow or excess infiltration.

A summary of the individual wastewater collection system observations by component are presented in Table 1.

The municipal wastewater collection system consists of twelve concrete collection manholes and approximately 1,500-feet of wastewater collection piping. It should be noted that a number of

the restaurants connected to this system also have privately owned grease traps inside of each facility which are regulated by the Vermont Health Department and were not a part of this inspection. Six of the restaurants also have separate exterior grease traps as noted in Table 1. It is VTM's understanding from VTUMS personnel that the exterior grease traps are maintained by VTUMS and the interior grease traps are maintained independently by each restaurant. VTUMS confirmed that the exterior grease traps are pumped by them on a quarterly schedule. It is unclear from the information available at the time of the inspection whether or not the interior grease traps are being maintained by the restaurant owners as scheduled.

Sewer manhole covers were removed and each component in the collection system was visually inspected by VTM and VTUMS. A summary of observations made during the wastewater collection system inspection are included in Table 1.

TABLE 1
BRISTOL WASTEWATER
COLLECTION SYSTEM OBSERVATIONS

ITEM A	COLLECTION SYSTEM COMPONENT
MH #1	Low flow/good condition/dead end. Shelves should be cleaned.
MH #2	Low flow/good condition.
MH #3	Low flow/good condition. Shelves should be cleaned.
	MH #4 Good condition/low flow. Shelves should be cleaned.
	MH #5 Good condition, low flow/dead end. Shelves should be cleaned.
MH #6	Clean, good condition.
MH #7	Under stone drive. Could not find. Manhole should be found and have a riser added to bring it to surface level.
MH #8	Low flow/gravel on shelves/excellent condition. Drop manhole.
MH #9	Low flow/good condition.
	MH #10 Excellent condition.
	MH #10A Low flow/good condition. Shelves need cleaning.
MH #11	Low flow/good condition.
Mary's Grease Trap - Cannot inspect except during pumping. Quarterly schedule.	
Hendee Grease Trap - Cannot inspect except during pumping. Quarterly schedule.	
Snap's Grease Trap - Cannot inspect except during pumping. Quarterly schedule.	
Bakery Grease Trap - Cannot inspect except during pumping. Quarterly schedule.	
Cubbers Grease Trap- Cannot inspect except during pumping. Quarterly schedule.	
Interior Grease Traps (private) - Not Inspected. Operator reports local hauler is cleaning quarterly for the property owners under separate maintenance agreement.	
Viens Dosing Siphon – Good condition.	

2.2 Wastewater Treatment System Inspection

The Bristol wastewater treatment system consists of a septic tank, piping, splitter box, eight dosing siphons as well as eight separate wastewater disposal fields. Four of the eight wastewater disposal fields are in operation at any given time. Bristol's wastewater Discharge Permit requires an annual inspection of each component within the treatment system to ensure proper operation including but not limited to the septic tank including a notation of the accumulation of solids and scum in the septic tank, verification of disposal field rotation, dosing siphon operation, evaluation of the disposal fields including walking the disposal fields and checking for any signs of surfacing effluent or other signs of failure, and finally notation of any repairs or maintenance that needs to be performed including pumping of the structures if necessary.

2.2.1 Septic Tank Inspection

The septic tank cover was removed and the tank was inspected by both VTM and VTUMS personnel. The septic tank is constructed with four separate compartments for sludge accumulation and storage (refer to Figure 4). Sludge and scum measurements for each compartment were conducted by VTUMS personnel during the inspection. Results were as follows:

Sludge Measurements/Observations Cell #1	Sludge Measurements/Observations Cell #2
Compartment #1 – Sludge 30", Scum 18"	Compartment #1 – Sludge 12", Scum 16"
Compartment #2 – Sludge 12", Scum 24"	Compartment #2 – Sludge 12", Scum 0"

A thick crust (approximately 2' thick) was noted on top of Cell #1, compartment #1. This crust appeared to be primarily grease. Several inches of crust was also noted on the top of Cell #1, compartment #2.

Based on VTM's observations, the septic tank slide gates, safety locks and hasps on hatches appear to be in working condition. The hatches are functional but are seeing some wear and may need to be evaluated for replacement in the future. The septic tank outlet trough was noted to be in poor condition and needs re-bricking. Pumping of both compartments in Cell #1 is recommended based on sludge and grease buildup.

TABLE 2
BRISTOL WASTEWATER SYSTEM
SUMMARY OF TREATMENT SYSTEM OBSERVATIONS

Description	Frame and Cover				Clean Invert	Clean Shelves	Repair Infiltration	Comments/Additional Items
	Replace	Grout	Center	Raise				
S.T. Inlet								Cell 1 Needs Pumping
S.T. Outlet								Eff. Trough Needs Rebuilding
Splitter Box								Good condition
D.S. #1								VTUMS to Check Operation
D.S #2								VTUMS to Check Operation
D.S. #3								VTUMS to Check Operation
D.S. #4								VTUMS to Check Operation
D.S. #5								VTUMS to Check Operation
D.S. #6								VTUMS to Check Operation
D.S. #7								VTUMS to Check Operation
D.S. #8								VTUMS to Check Operation
Disposal Fields 1-8								No issues noted

S.T. = Septic Tank
D.S. = Dosing siphon

2.2.2 Splitter Box Inspection and Disposal Field Rotation

The splitter box cover was opened and inspected by VTM and VTUMS personnel. Observations were as follows:

1. Fields #3, #5, #7 and #8 were observed to be in operation
2. Fields #1, #2, #4 and #6 were observed to be off
3. Good even flow between the fields, very little grease observed in splitter box
4. The splitter box and associated piping inside the box appeared to be in good condition.

VTUMS indicated that they conduct regular verification of even flow to the four fields and conduct skimming of grease in the splitter box if needed. VTM observed VTUMS rotating the disposal fields by opening the valves to dormant disposal fields #1, #2, #4 and #6 and closing the valves to operating fields #3, #5, #7 and #8. Fields #1, #2, #4, #6 will be the operating fields for the next 12 months. Once the valves were opened and the previously dormant fields were brought on-line, even flow was observed to each of the four operating fields. No issues of concern were noted within the splitter box.

2.2.3 Dosing Siphon Inspection

The dosing siphons were visually inspected by VTM and VTUMS personnel. Insufficient flow existed in fields #1, #2, #4 & #6 to determine if th siphons were properly functioning at that time. VTM recommends that VTUMS verify that the siphons are operating properly once they receive sufficient flow.

The siphon counters do not appear to be operational. Green Mountain Engineering (GME) who originally designed the system indicated that the counters have never seemed to function properly. VTM noted that in the 2020/2021 Annual Inspection Report, GME recommended replacing the existing counters with mechanical counters when practical. VTM would support that recommendation as it would assist in verifying whether or not each of the siphon's was operating properly and would provide further verification that relatively even flow was going to each disposal field.

2.3 Wastewater Disposal Field Inspection

VTM and VTUMS personnel walked each of the eight disposal fields. The disposal field area is neat and clean and appears to be mowed on a regular basis. During last seasons inspection, VTM noted that sumac was encroaching on the disposal fields which brings with it the potential for root damage to the disposal fields. In the fall of 2022, VTUMS removed the sumac and graded and re-seeded the impacted areas. The disposal field and surrounding area are now in much better condition and removal of the sumac allows for easier access to the deep monitoring wells. Several box alder trees were noted to be still encroaching on the disposal fields. These trees should be removed as time allows. Regular mowing of the disposal fields and surrounding areas should be continued.

A discharge pipe for a private stormwater or groundwater drain line was noted which daylights along the bottom of the bank adjacent to the northwest side of disposal Field #1. This line was observed to have a steady flow of water that was discharging on the ground adjacent to the northwest corner of Disposal Field #1. A small diversion ditch should be installed west of disposal field #1 to encourage the water to flow in a northwesterly direction away from the disposal fields.

Locks were noted to be absent from each of the four deep monitoring well enclosures. Locks should be added to these wells.

Each disposal field contains 3-4 shallow observation wells to assist in monitoring potential standing water within the disposal fields. Each of the shallow monitoring wells is approximately 1.5 – 2.0 deep. Each shallow monitoring well contained a cover which was removed during the inspection. A flashlight was utilized to visually identify whether each well was dry or if wastewater was visible. No standing water was noted in any of the shallow monitoring wells in all eight disposal fields. VTM's observations are further summarized in Table 3.

TABLE 3
BRISTOL WASTEWATER SYSTEM
SHALLOW OBSERVATION WELL MONITORING

Disposal Field	Observation
#1	Dry
#2	Dry
#3	Dry
#4	Dry
#5	Dry
#6	Dry
#7	Dry
#8	Dry

Three deep monitoring wells also surround the eight wastewater disposal fields (wells #2, #3 and #4). These wells are used to monitor existing groundwater levels within the vicinity of the eight disposal fields. Groundwater elevations can be utilized to verify vertical separation between the bottom of the disposal fields and the existing groundwater table. Groundwater levels in the three wells were obtained and reported by VTUMS personnel during June and September 2022. Table 4 summarizes this information. Based on the information provided, there appears to be adequate separation between the bottom of the disposal fields and the existing water table. It is advised for future reporting that the top of monitoring well elevations as well as bottom of shallow well elevations (bottom of the disposal fields) be established and the information be reported based upon a USGS datum.

TABLE 4
BRISTOL WASTEWATER SYSTEM
DEEP MONITORING WELL MEASUREMENTS[1]

Date	Well #	Depth to Groundwater (ft)
6/3/22	2	18.2
	3	33.1
	4	38.8
6/10/22	2	17.1
	3	32.5
	4	39.7
6/17/22	2	18.1
	3	33.3
	4	40.1
6/24/22	2	18.1
	3	33.2
	4	39.9
9/2/22	2	19.0
	3	34.1
	4	40.5
9/9/22	2	18.7
	3	34
	4	40.5
9/16/22	2	18.8
	3	34.1
	4	40.6
9/23/22	2	18.9
	3	33.1
	4	39.9
9/30/22	2	18.5
	3	33.6
	4	40.3

1. Groundwater level measurements provided by VTUMS.

3.0 WASTEWATER SAMPLING & EFFLUENT TESTING

Effluent sampling was performed by VTUMS during June and September 2021. As outlined in the Discharge Permit, VTUMS obtained representative wastewater samples from the Splitter Box. Wastewater samples were subsequently submitted to Endyne Environmental Laboratories for analysis. A summary of the most recent 2022 data as well historic laboratory data since 2020 is provided in Table 5 for reference.

TABLE 5
BRISTOL WASTEWATER SYSTEM
EFFLUENT TESTING SUMMARY
(Sampling Conducted in Splitter Box)

Sampling Date	June 18, 2020	Sept. 15, 2020	June 21, 2021	Sept. 9, 2021	June 7, 2022	Sept 13, 2022
pH	6.2	6.9	6.28	6.48	6.32	6.6
Chloride	69	74	82	64	60	67
Nitrogen, Ammonia	NR	NR	NR	NR	NR	NR
Nitrogen, Nitrite	0.22	<0.20	<0.20	<0.20	<0.20	<0.20
Nitrogen, Nitrate	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
TKN	63	61	74	<0.64	50	69
Tot. Dissolved Phosphorous	8.6	8.7	9.7	7.0	4.8	7.2
Biochemical Oxygen Demand (5-day)	560	490	640	420	670	430
Total Suspended Solids	70	86	90	66	86	124
Oil and Grease	32.3	37.1	37.1	37.1	31.3	32.2

Notes:
1. *Wastewater quality results are reported in milligrams per liter (ppm) unless otherwise specified.*
2. *Wastewater quality results are for samples from the splitter box (after septic tank).*
3. *NR = Not reported*
4. *laboratory information from 2020 as reported by Green Mountain Engineering.*
5. *Laboratory sampling conducted by Vermont Utility Management Services (VTUMS)*
6. Copies of the laboratory testing data sheets are contained in Appendix B.

Historic laboratory testing data shows that all parameters are well withing the anticipated normal ranges for commercial/residential wastewater. No significant variations in parameters were noted from year to year which would indicate a substantive change in the wastewater makeup or strength over this time period.

Nitrite levels in the groundwater samples have significant variability. No clear trend appears to be visible. It is advised to continue to monitor these levels for substantive changes or trend lines.

4.0 GROUNDWATER SAMPLING & TESTING

The Discharge Permit requires that groundwater sampling and testing be performed on deep monitoring wells #3 and #4 during June and September of each year. Groundwater sampling was performed by VTUMS during June and September 2022. Representative water samples

from Monitoring Wells #3 and #4 were submitted to Endyne Environmental Laboratories for analysis. A summary of the laboratory data from 2020 - 2022 is provided in Table 6. Copies of the individual laboratory testing data sheets for 2022 are contained in Appendix B.

TABLE 6
BRISTOL WASTEWATER SYSTEM
GROUNDWATER WELL TESTING SUMMARY
(Sampling Conducted in Monitoring Wells #3 & #4)

Monitoring Well # & Date Sampled	pH	E. Coli (MPN/100ml)	Chloride	Nitrate as N	Tot. Dissolved Phosphorous
MW – 3 (June 18, 2020)	6.75	<1.0	7.4	1.3	0.008
MW – 3 (Sept. 15, 2020)	6.86	<1.0	8.8	0.16	0.006
MW-3 (June 21, 2021)	6.93	<1.0	11	1.4	0.007
MW-3 (Sept. 9, 2021)	6.68	<1.0	9.0	<0.20	0.008
MW-3 (June 7, 2022)	6.92	<1.0	13	4.4	0.011
MW-3 (Sept. 13, 2022)	6.8	5.2	8.9	.34	0.011
MW – 4 (June 18, 2020)	6.65	1.0	27	3.3	0.016
MW – 4 (Sept. 15, 2020)	6.80	1.0	35	5.1	0.009
MW-4 (June 21, 2021)	7.49	<1.0	15	1.0	<.005
MW-4 (Sept 9, 2021)	6.71	2.0	27	4.5	0.010
MW-4 (June 7, 2022)	7.47	<1.0	29	0.39	0.011
MW-4 (Sept. 13, 2022)	6.6	16	36	10	0.014

Notes:
1. Wastewater quality results are reported in milligrams per liter (ppm) unless otherwise specified.
2. Wastewater quality results are for samples from the splitter box (after septic tank).
3. NR = Not reported
4. Laboratory information from 2020 as reported by Green Mountain Engineering.
5. Laboratory sampling conducted by Vermont Utility Management Services (VTUMS)

5.0 WASTEWATER FLOW DATA

The treatment system average daily flows are estimated using individual water meter readings for each of the 34 customers connected to the system. The individual water meter readings for the 34 users connected to the Bristol Wastewater system were provided by the Town of Bristol. A summary of that data presented in Appendix C.

The average daily flow for the system for the 2022/2023 reporting period as measured from April 14, 2022 to April 11, 2023 was 7,793 gpd. Current and historic average daily flow information is summarized below in Table 7.

TABLE 7
BRISTOL WASTEWATER SYSTEM
HISTORIC AVERAGE DAILY FLOW

Year	Average Daily Flow (GPD)
*2020-2021	6,082
2021-2022	8,362
2022-2023	7,793

Two Year Average Daily Flow = 8,078 gpd

* 2021-2022 low flow data can be attributed to Covid shutdowns.

6.0 UNCOMMITTED RESERVE CAPACITY

The uncommitted reserve capacity of the system is based upon daily maximum BOD^5 and TSS loading. The calculations for loading capacity are outlined in the Permit. A copy of the Uncommitted Reserve Capacity calculations are contained in Appendix D. The total allowable BOD^5 AND TSS loadings per the Discharge Permit are 33.4 lb/day and 25.0 lb/day respectively. The previous three years of data were utilized for calculating the average BOD^5 and TSS loadings. The actual loadings based on the three-year average were 33.1 and 5.4 lb/day respectively which are less than the allowable permit limits. From a practical standpoint however, there is no additional uncommitted reserve capacity remaining in the system.

7.0 SUMMARY AND CONCLUSION

The wastewater system is in its 30th year of operation. The wastewater collection, treatment and disposal portions of the system are in good working condition. Some minor maintenance items are necessary as summarized herein.

As previously noted, there is no additional uncommitted reserve capacity in the system at this time due to elevated BOD^5. The Town of Bristol is aware of this limitation and has indicated that they are in the process of hiring an engineering consultant to assist them with evaluating potential pre-treatment technologies with a goal of reducing BOD^5.

Laboratory testing results show that the wastewater effluent and groundwater sampling parameters are withing the historical range of values which would be expected. Nitrite levels in the groundwater samples should continue to be monitored to note any spikes or an increasing trend line.

Current recommended maintenance and repair issues include:

a. Continue to utilize the routine system maintenance checklists outlined in the O&M Manual
b. Complete the recommended collection and treatment system maintenance items listed in Tables 2 & 3.
c. Cell #1 of the septic tank should be pumped. Grease buildup in the septic tank should be monitored on a quarterly basis.
d. Quarterly monitoring of the grease levels in the septic tank. If excessive grease buildup continues, the septic tank pumping frequency should be increased to more than once per year.
e. Confirmation that the restaurants connected to the wastewater system are maintaining their interior grease traps on a quarterly basis.
f. Re-build the septic tank outlet trough.
g. Remove the remaining box alder trees that continue to encroach on the disposal fields.
h. USGS elevations should be determined for the top of Wells #2, #3 and #4 as well as the shallow monitoring wells within the disposal field. Subsequent water depth data should include USGS elevations.
i. A stormwater or groundwater drainage line was observed to be discharging near field #1. Ditching should be conducted near the base of the bank to encourage the water to flow away from the disposal fields.
j. Continue to monitor the splitter box flows regularly. Clean the v-notches with a brush at least bi-weekly to ensure equal flow to each of the disposal fields.
k. Replace the existing dosing siphon counters with mechanical counters when practical.
l. Verify proper operation of the dosing syphons.
m. Continue regular mowing and trimming of the disposal field area.
n. Install locks on the covers of the four deep monitoring wells.
o. Continue with efforts to evaluate pre-treatment technologies to reduce BOD^5

APPENDIX A

Figures

Figures 1 & 2 - Collection System Component Locations
Figure 3 - Disposal Area Components
Figure 4 - Septic Tank Detail

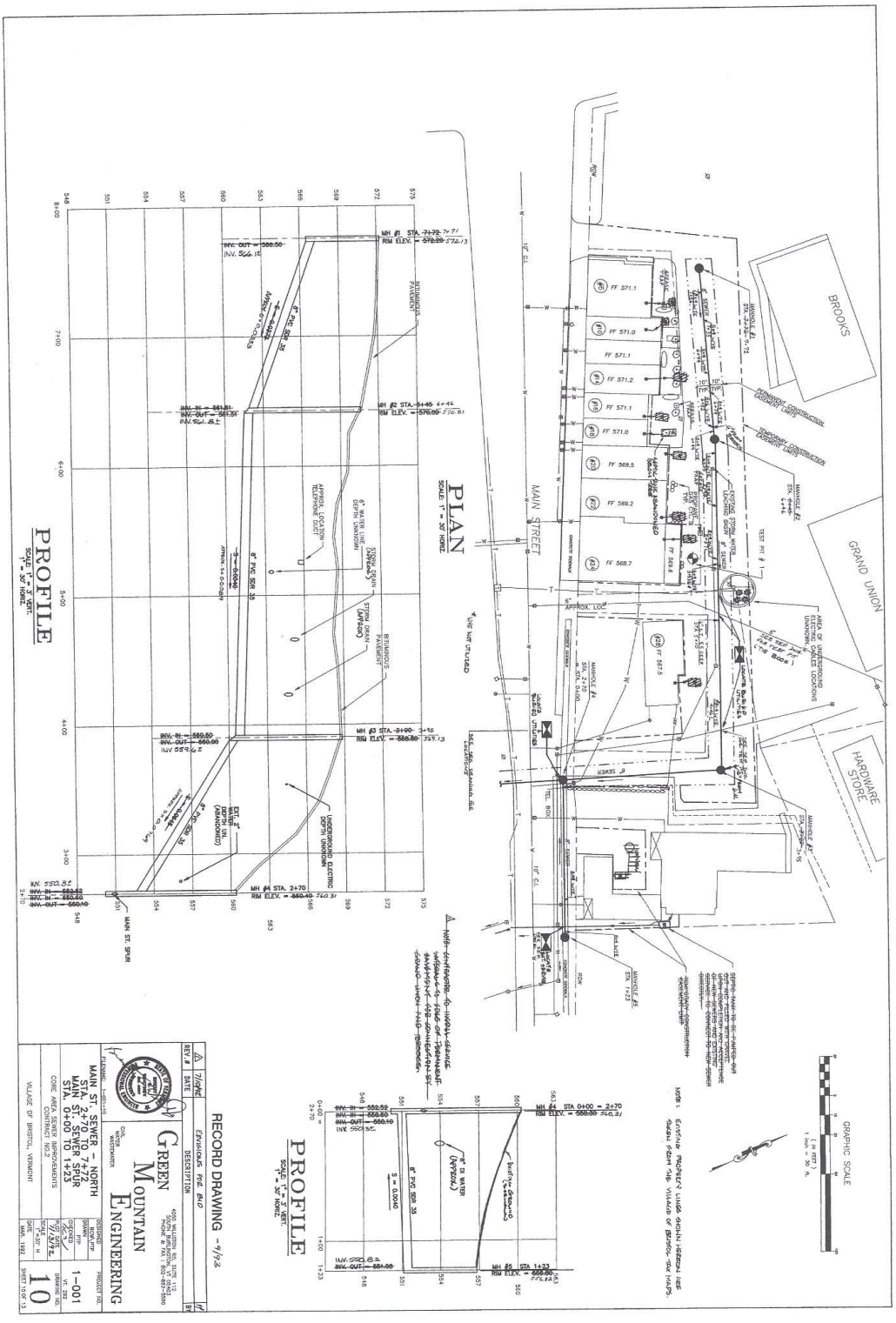

FIGURE 1

VTM ENGINEERING, PLC
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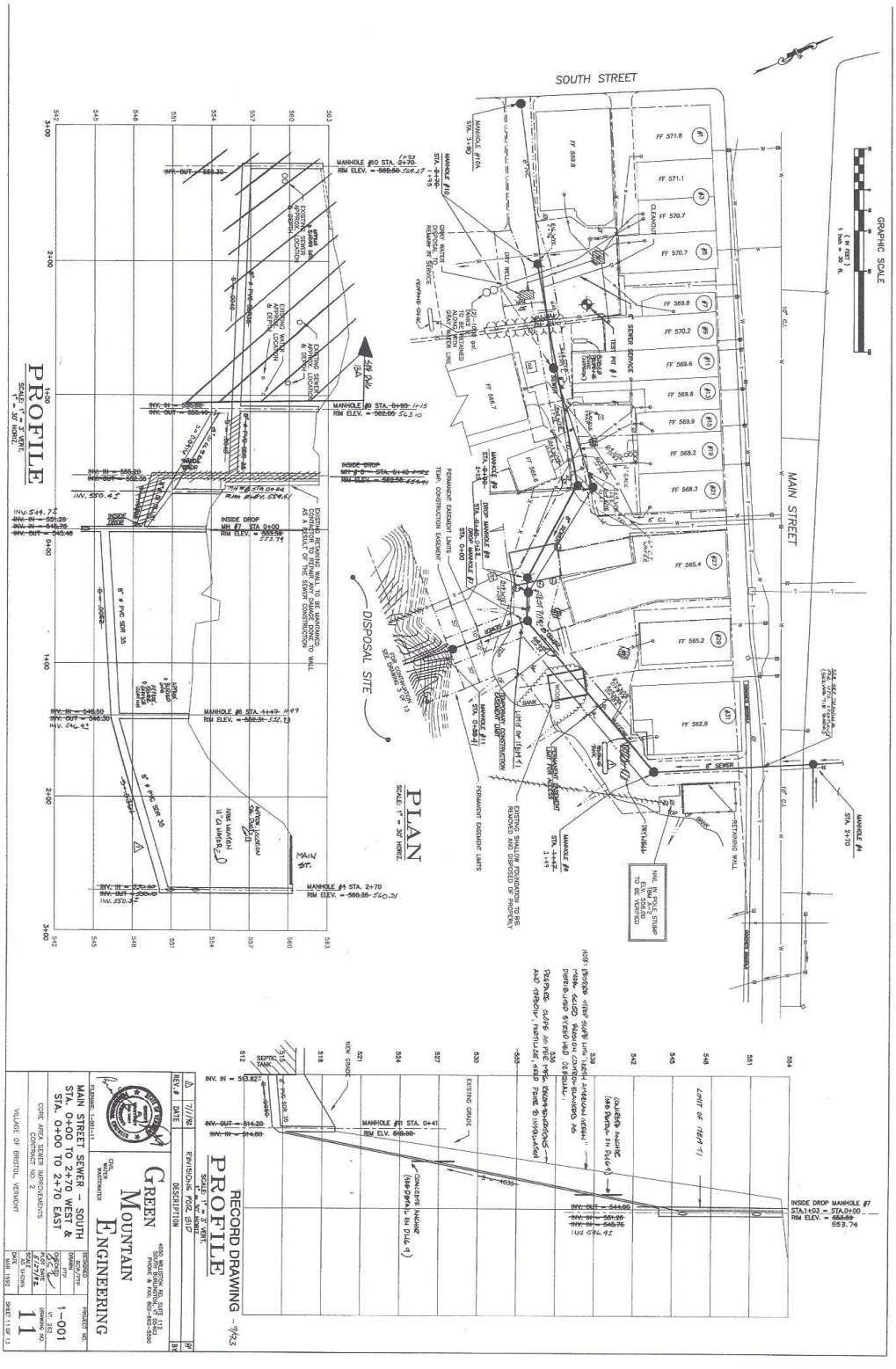

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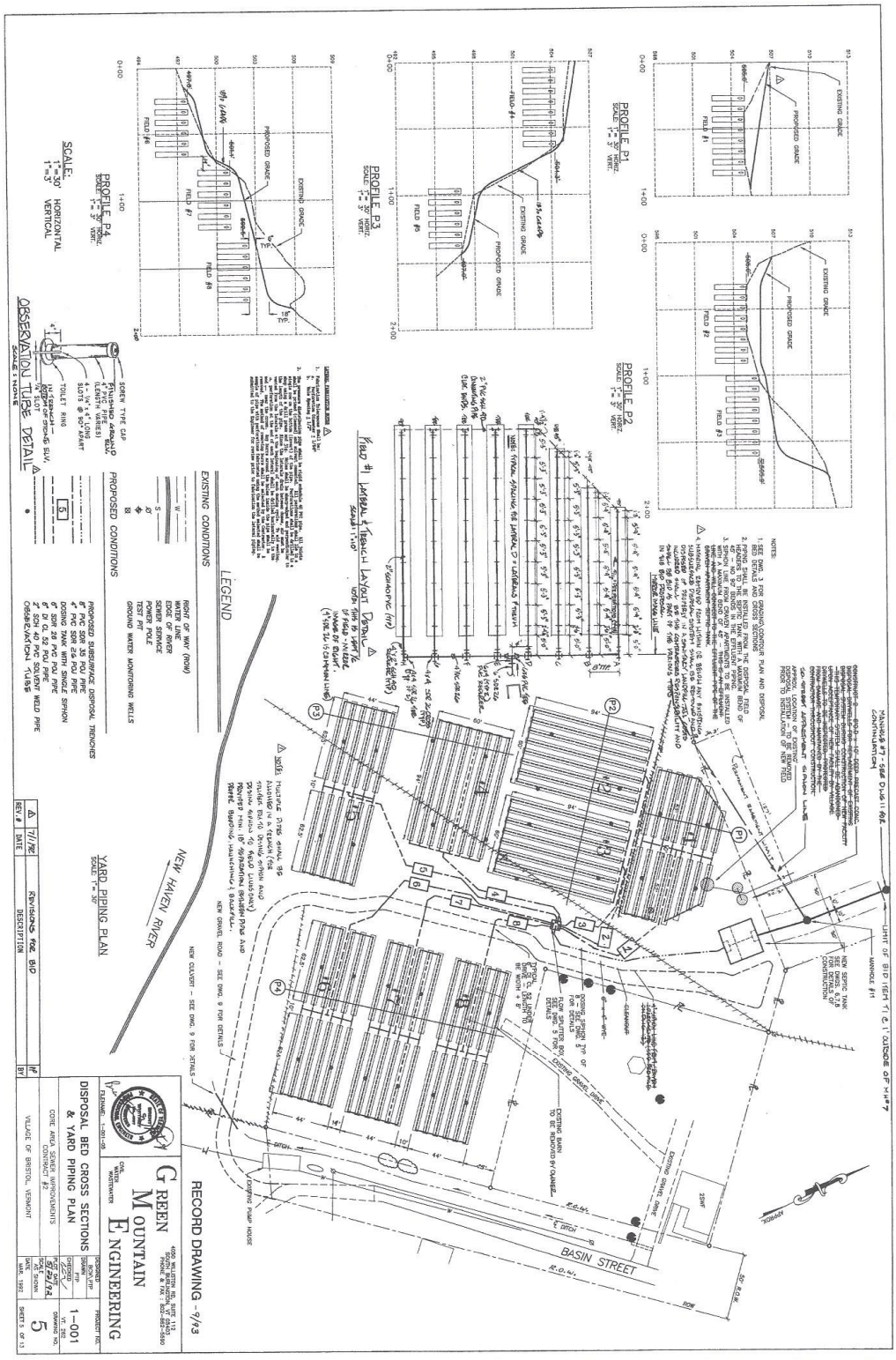

FIGURE 3

VTM ENGINEERING, PLC
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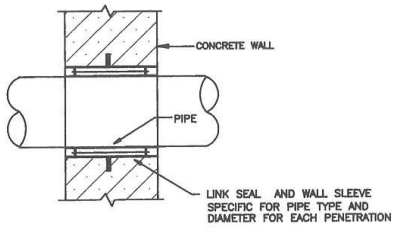
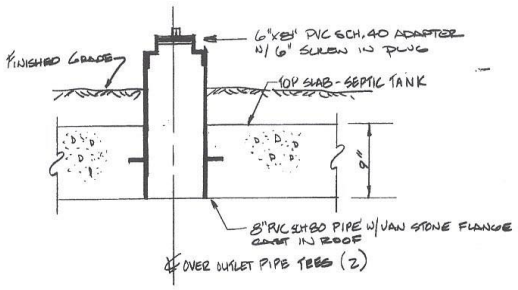


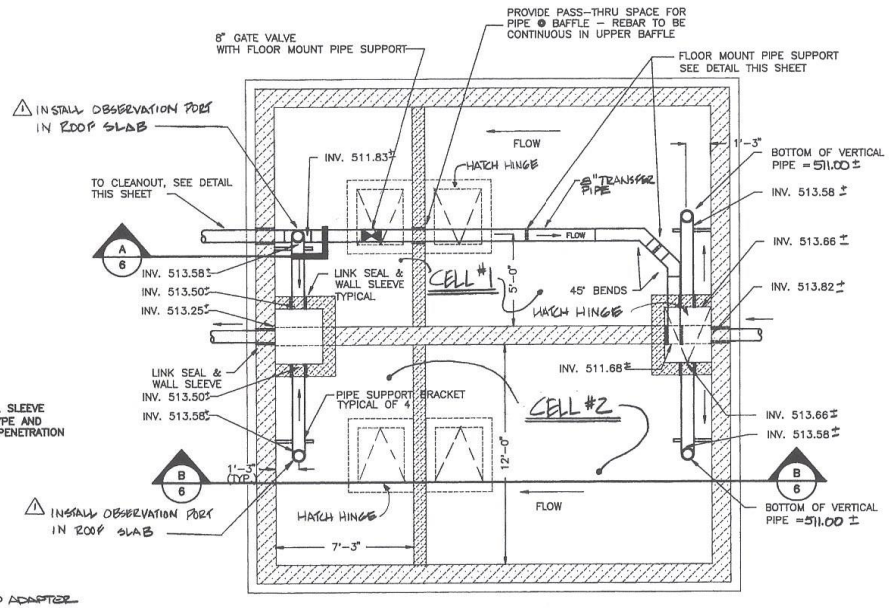
LINK SEAL WALL SLEEVE

SCALE: NONE



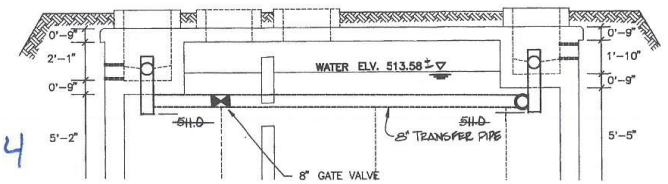
OUTLET PIPE OBSERVATION PORT ⚠

SCALE: NONE



SEPTIC TANK – PLAN VIEW

SCALE: 1/4"=1'-0"



NOTES:

1. ALL PIPES IN SEPTIC TANK TO BE 8"ø SCHEDULE 80 SOLVENT CEMENT PVC.
2. ALL ANCHOR BOLTS AT SEPTIC TANK TO BE STAINLESS STEEL.

FIGURE 4

VTM ENGINEERING, PLC
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APPENDIX B

2022 Wastewater Discharge and Monitoring Well Sampling Results

VTM ENGINEERING, PLC
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ENDYNE Inc.
Environmental Laboratories

Bristol, Town of	
PO Box 249	070294
Bristol, VT 05443	
Atten: Cyrus Marsano	

PROJECT: Bristol Core Area Sewer
WORK ORDER: **2206-14573**
DATE RECEIVED: June 07, 2022
DATE REPORTED: June 23, 2022
SAMPLER: Jill Marsano

Laboratory Report

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. All required method quality control elements including instrument calibration were performed in accordance with method requirements and determined to be acceptable unless otherwise noted.

The column labeled Lab/Tech in the accompanying report denotes the laboratory facility where the testing was performed and the technician who conducted the assay. A "W" designates the Williston, VT lab under NELAC certification ELAP 11263; "R" designates the Lebanon, NH facility under certification NH 2037 and "N" the Plattsburgh, NY lab under certification ELAP 11892. "Sub" indicates the testing was performed by a subcontracted laboratory. The accreditation status of the subcontracted lab is referenced in the corres ponding NELAC and Qual fields. The Williston, VT facility is also ISO/IEC 17025:2017 accredited for Total Coliform and E coli by SM9223B.

The NELAC column also denotes the accredit ation status of each laboratory for each reported parameter. "A" indicates the referenced laboratory is NELAC accredited for the parameter reported. "N" indicates the laboratory is not accredited. "U" indicates that NELAC does not offer accreditation fo r that parameter in that specific matrix. Test results denoted with an "A" meet all National Environmental Laboratory Accreditation Program requirements except where denoted by pertinent data qualifiers. Test results are representative of the samples as t hey were received at the laboratory

Endyne, Inc. warrants, to the best of its knowledge and belief, the accuracy of the analytical test results contained in this report, but makes no other warranty, expressed or implied, especially no warranties of mercha ntability or fitness for a particular purpose.

Reviewed by:

Harry B. Locker, Ph.D.
Laboratory Director

www.endynelabs.com

nelac ELAP 11263 160 James Brown Dr., Williston, VT 05495 Ph 802-879-4333 Fax 802-879-7103

56 Etna Road, Lebanon, NH 03766 Ph 603-678-4891 Fax 603-678-4893 nelac NH2037

Laboratory Report DATE REPORTED: 06/23/2022

CLIENT: Bristol, Town of
PROJECT: Bristol Core Area Sewer

WORK ORDER: **2206-14573**
DATE RECEIVED: 06/07/2022

001 Site: Splitter Box Date Sampled: 6/7/22 Time: 10:20

Parameter	Result	Units	Method	Analysis Date/Time	Lab/Tech	NELAC	Qual.
pH per Client	6.32	SU at 21.9C	Client Data	6/7/22 10:20	W CLI	N	
BOD-5day	670	mg/L	SM 5210B(16)	6/8/22 9:06	W JSS	A	
Chloride	60	mg/L	EPA 300.0	6/9/22 7:26	W ECM	A	
Nitrate as N	< 0.020	mg/L	EPA 300.0	6/8/22 20:25	W ECM	A	
Nitrite as N	< 0.020	mg/L	EPA 300.0	6/8/22 20:25	W ECM	A	
TKN	50	mg/L	EPA 351.2, R.2(1993)	6/14/22	N MAP	A	
Phosphorus, Total Dissolved	4.8	mg/L	SM20 4500 P-F	6/22/22 16:53	R RLS	A	
Solids, Total Suspended	86	mg/L	SM 2540 D-15	6/8/22	W JSS	A	
Oil & Grease Total Recoverable	31.3	mg/L	EPA 1664A	6/9/22	W ECM	A	

002 Site: MW #3 Date Sampled: 6/7/22 Time: 10:00

Parameter	Result	Units	Method	Analysis Date/Time	Lab/Tech	NELAC	Qual.
pH per Client	6.92	SU at 15.1C	Client Data	6/7/22 10:00	W CLI	N	
E. coli	< 1.0	MPN/100ml	SM 9223B(16)	6/7/22 14:59	W TEL	A	
Chloride	13	mg/L	EPA 300.0	6/8/22 21:45	W ECM	A	
Nitrate as N	4.4	mg/L	EPA 300.0	6/9/22 7:46	W ECM	A	
Phosphorus, Total Dissolved	< 0.011	mg/L	SM20 4500 P-F	6/22/22 16:54	R RLS	A	

003 Site: MW #4 Date Sampled: 6/7/22 Time: 10:10

Parameter	Result	Units	Method	Analysis Date/Time	Lab/Tech	NELAC	Qual.
pH per Client	7.47	SU at 14.7C	Client Data	6/7/22 10:10	W CLI	N	
E. coli	< 1.0	MPN/100ml	SM 9223B(16)	6/7/22 14:59	W TEL	A	
Chloride	29	mg/L	EPA 300.0	6/8/22 22:05	W ECM	A	
Nitrate as N	0.39	mg/L	EPA 300.0	6/8/22 22:05	W ECM	A	
Phosphorus, Total Dissolved	< 0.011	mg/L	SM20 4500 P-F	6/22/22 11:08	R RLS	A	

ENDYNE Inc. www.endynelabs.com

ENDYNE Inc.
Environmental Laboratories

Bristol, Town of
PO Box 249 070294
Bristol, VT 05443

Atten: Cyrus Marsano

PROJECT: Bristol Core Area Sewer
WORK ORDER: **2209-25919**
DATE RECEIVED: September 13, 2022
DATE REPORTED: September 27, 2022
SAMPLER: Jill Marsano

Laboratory Report

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. All required method quality control elements including instrument calibration were performed in accordance with method requirements and determined to be acceptable unless otherwise noted.

The column labeled Lab/Tech in the accompanying report denotes the laboratory facility where the testing was performed and the technician who conducted the assay. A "W" designates the Williston, VT lab under NELAC certification ELAP 11263; "R" designates the Lebanon, NH facility under certification NH 2037 and "N" the Plattsburgh, NY lab under certification ELAP 11892. "Sub" indicates the testing was performed by a subcontracted laboratory. The accreditation status of the subcontracted lab is referenced in the corres ponding NELAC and Qual fields. The Williston, VT facility is also ISO/IEC 17025:2017 accredited for Total Coliform and E coli by SM9223B.

The NELAC column also denotes the accredit ation status of each laboratory for each reported parameter. "A" indicates the referenced laboratory is NELAC accredited for the parameter reported. "N" indicates the laboratory is not accredited. "U" indicates that NELAC does not offer accreditation fo r that parameter in that specific matrix. Test results denoted with an "A" meet all National Environmental Laboratory Accreditation Program requirements except where denoted by pertinent data qualifiers. Test results are representative of the samples as t hey were received at the laboratory

Endyne, Inc. warrants, to the best of its knowledge and belief, the accuracy of the analytical test results contained in this report, but makes no other warranty, expressed or implied, especially no warranties of merchantability or fitness for a particular purpose.

Reviewed by:

Harry B. Locker, Ph.D.
Laboratory Director

Laboratory Report DATE REPORTED: 09/27/2022

CLIENT: Bristol, Town of
PROJECT: Bristol Core Area Sewer

WORK ORDER: **2209-25919**
DATE RECEIVED: 09/13/2022

001 Site: Splitter Box — Date Sampled: 9/13/22 Time: 11:15

Parameter	Result	Units	Method	Analysis Date/Time	Lab/Tech	NELAC	Qual.
pH per Client	6.6	SU at 22.8C	Client Data	9/13/22 11:15	W CLI	N	
BOD-5day	430	mg/L	SM 5210B(16)	9/15/22 8:41	W JSS	A	
Chloride	67	mg/L	EPA 300.0	9/13/22 14:57	W ECM	A	
Nitrate as N	< 0.20	mg/L	EPA 300.0	9/13/22 14:57	W ECM	A	
Nitrite as N	< 0.20	mg/L	EPA 300.0	9/13/22 14:57	W ECM	A	
TKN	69	mg/L	EPA 351.2, R.2(1993)	9/23/22	N CAL	A	
Phosphorus, Total Dissolved	7.2	mg/L	SM20 4500 P-F	9/26/22 17:02	R RLS	A	
Solids, Total Suspended	124	mg/L	SM 2540 D-15	9/19/22	W JSS	A	
Oil & Grease Total Recoverable	32.2	mg/L	EPA 1664A	9/14/22	W CLD	A	

002 Site: MW #3 — Date Sampled: 9/13/22 Time: 10:30

Parameter	Result	Units	Method	Analysis Date/Time	Lab/Tech	NELAC	Qual.
pH per Client	6.8	SU at 13.5C	Client Data	9/13/22 10:30	W CLI	N	
E. coli	5.2	MPN/100ml	SM 9223B(16)	9/13/22 16:27	W AKJ	A	CL2A
Chloride	8.9	mg/L	EPA 300.0	9/13/22 15:17	W ECM	A	
Nitrate as N	0.34	mg/L	EPA 300.0	9/13/22 15:17	W ECM	A	
Phosphorus, Total Dissolved	< 0.011	mg/L	SM20 4500 P-F	9/26/22 17:04	R RLS	A	

003 Site: MW #4 — Date Sampled: 9/13/22 Time: 10:50

Parameter	Result	Units	Method	Analysis Date/Time	Lab/Tech	NELAC	Qual.
pH per Client	6.6	SU at 13.7C	Client Data	9/13/22 10:50	W CLI	N	
E. coli	16	MPN/100ml	SM 9223B(16)	9/13/22 16:27	W AKJ	A	
Chloride	36	mg/L	EPA 300.0	9/13/22 15:37	W ECM	A	
Nitrate as N	10	mg/L	EPA 300.0	9/13/22 15:37	W ECM	A	
Phosphorus, Total Dissolved	0.014	mg/L	SM20 4500 P-F	9/26/22 16:28	R RLS	A	

Report Summary of Qualifiers and Notes

CL2A: Sample was identified and submitted as non-chlorinated water. The DPD Chlorine Check indicated that chlorine or other oxidizer was present. The sample did not smell of Chlorine, so analysis was performed. The DPD analysis is a more sensitive screen, but is susceptible to interference. The presence of Chlorine will kill bacteria and bias the results low. Please contact the laboratory with questions.

ENDYNE Inc. www.endynelabs.com

Bristol Core Area Sewer

Endyne Inc. COC — **2209-25919**

Prepared 9/13/22

Bill to:
Pam Comeau
Bristol, Town of
PO Box 249
Bristol VT 05443
Ph (802)453-2410

Report to:
Cyrus Manseau
Bristol, Town of
PO Box 249
Bristol VT 05443
town@bristolvtgovernment.com

Quot # 0702

COREAREASHWI

W-70291

2209-25919

Bristol, Town of
Bristol Core Area Sewer

Splitter Box

Sampled Date/Time: 9/13/22 @ 11:45am Sampler: Jill Manseau

pH Client Data	6.6 SU @ 22.8°C	
Oil & Grease	1 - Liter Amber Glass and 1 - 8oz Amber Glass	<6C HCl
Chloride	1 - 2 oz-Plastics Anion	<6C
Nitrate as N	✓	
Nitrite as N		
HDPE-Eday	1 - 1/2 gal Plastic ✓	<6C
Solids, Total Suspended		
TKN	1 - 125 Plastic ✓	<6C, NY Plus, H2SO4
Phosphorus, Total Dissolved	1 - 4oz Clear Glass ✓	<6C, Filter then preserve

MW #3

Sampled Date/Time 9/13/22 @ 10:30am Sampler: Jill Manseau

pH Client Data	6.8 SU @ 13.5°C	
E. coli	1 - 150ml Sterile Plastic ✓	<10C, Na2S2O3 if Cl2
Chloride	1 - 2 oz Plastics Anion ✓	<6C
Nitrate as N		
Phosphorus, Total Dissolved	1 - 4oz Clear Glass ✓	<6C, Filter then preserve

MW #4

Sampled Date/Time 9/13/22 @ 10:50am Sampler: Jill Manseau

pH Client Data	6.6 SU @ 13.7 °C	
E. coli	1 - 150ml Sterile Plastic ✓	<10C Na2S2O3 if Cl2
Chloride	1 - 2 oz-Plastics Anion	<6C
Nitrate as N	✓	
Phosphorus, Total Dissolved	1 - 4oz Clear Glass ✓	<6C, Filter then preserve

Relinquished by Brittany Manseau 9/13/22 12:55 Date Time — Accepted by Glen Storey 9/13/22 1255 Date Time

Relinquished by _____ Date Time — Received by _____ Date Time

Bills/Parameters correctly listed Client initials _____

Client Authorization to use Subcontract lab Client Initials _____

Sample origin VT ☐ NH ☐ NY ☐ Other ☐

Special reporting instructions (PDF)

Requested Turnaround Time Routine Rush Due Date _____

Deliv: Client
Temp 6.3.3
Comment:

Tmpl Ck
Log by

Lab use Only

Aqueous samples requiring metals testing require acid preservation for a 24 hr period prior to analysis.

ENDYNE Inc.
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315 New York Rd.
Plattsburgh, NY 12901
Ph 518-563-1720
Fax 518-563-0952

APPENDIX C

2022/2023 Wastewater Treatment System Flow Data

VTM ENGINEERING, PLC
2941 Shelburne Falls Road, Hinesburg, Vermont 05461
spalmer@vtmengineering.com (802) 233-7531

2022-2023 Bristol Water Usage Summary (Wastewater District Only)

Revised 4-24-23

Month	Date Reading Started	Date Reading Ended	Total Monthly Water Usage (Gallons)
Apr-22	4/14/2022	5/11/2022	230,000
May-22	5/11/2022	6/14/2022	278,000
Jun-22	6/14/2022	7/12/2022	239,000
Jul-22	7/12/2022	8/12/2022	281,000
Aug-22	8/12/2022	9/14/2022	281,000
Sep-22	9/14/2022	10/12/2022	238,000
Oct-22	10/12/2022	11/11/2022	139,000
Nov-22	11/11/2022	12/16/2022	257,000
Dec-22	12/16/2022	1/23/2023	274,000
Jan-23	1/23/2023	2/13/2023	168,000
Feb-23	2/13/2023	3/13/2023	223,000
Mar-23	3/13/2023	4/11/2023	213,000

Total Annual Flow (Gallons) =	**2,821,000**
Monthly Average Flow (Gallons/Month) =	**235,083**
Total Number of Days in Survey =	**362**
Average Flow Per Day (Gallons/Day)=	**7,793**

VTM ENGINEERING, PLC
2941 Shelburne Falls Road, Hinesburg, Vermont 05461
spalmer@vtmengineering.com (802) 233-7531

APPENDIX D

Uncommitted Reserve Capacity Calculations

VTM ENGINEERING, PLC
2941 Shelburne Falls Road, Hinesburg, Vermont 05461
spalmer@vtmengineering.com (802) 233-7531

Town of Bristol
Wastewater Reserve Capacity Calculations

Revised 4/26/23

Base Information		Avg Annual Flow (gpd)	Avg Annual Flow (MGD)
* 1. Average Daily Flow 2020/2021 =		6,082	0.0060820
2. Average Daily Flow 2021/2022 =		8,362	0.0083620
3. Average Daily Flow 2022/2023 =		7,793	0.0077930
	Long Term Avg. (gpd) =	7,412	0.0074123

	* 6/18/2020	* 9/15/2020	6/21/2021	9/9/2021	6/7/2022	9/13/2022	Long Term Average (mg/l)
3. AVG BOD 5 (mg/l) =	560	490	640	420	670	430	535
4. AVG TSS (mg/l) =	70	86	90	66	86	124	87

Calulations lbs/day Discharged

BOD 5 (lb.day) discharged = ADF x (BOD 5) x 8.34
Calculated BOD 5 (lb/day) discharged = 33.1 lb/day

Result < Permitted Capacity of 33.4 lb/day
80% of 33.4 lb/day = 26.72 lb/day
Result > 26.72 lb/day. Indicates no reserve capacity.

TSS (lb/day) discharged = ADF x TSS x 8.34
Calculated TSS Discharged = 5.4 lb/day

Result < Permitted Capacity of 25 lb/day

* Data as reported by Green Mountain Engineering

VTM ENGINEERING, PLC
2941 Shelburne Falls Road, Hinesburg, Vermont 05461
spalmer@vtmengineering.com (802) 233-7531

APPENDIX E

Photographs

VTM ENGINEERING, PLC
2941 Shelburne Falls Road, Hinesburg, Vermont 05461
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Overview of the wastewater distribution field

Septic tank access hatches

Splitter Box

Septic tank outlet trough

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