

Outfall 14 IDDE Memorandum



To: Chip Sawyer, Director of Planning and Development
Marty Manahan, Director of Public Works
City of St. Albans

From: Watershed Consulting

Date: March 28, 2024

Re: ***City of St. Albans Illicit Discharge Detection and Elimination (IDDE) – 2023/2024 Advanced Investigation***

This memorandum summarizes our progress to date on the City of St. Albans IDDE – 2023/2024 Advanced Investigation project at Outfall 14. This outfall was initially sampled in 2018 and was flagged for advanced investigation due to high E. Coli concentrations. Advanced Investigation continued in Fall of 2023 and included resampling of the outfall and additional sampling throughout the storm line. In December 2023, Smoke tests, dye tests, and camera work were performed to pinpoint the source of contamination. In February 2024, due to observation of raccoons in the storm line, a microbial source tracking sample was collected and analyzed for human fecal contamination.

Overview

Outfall 14 is located along Steven's Brook near 92 Lincoln Ave in St. Albans City, VT. This outfall was evaluated on October 18th, 2023. Sample results revealed a high concentration of E. Coli at >2,419.6 MPN/ 100 mL. This outfall also had slightly elevated levels of anionic surfactants at 0.232 mg/L (threshold >0.20 mg/L) and a slightly elevated chlorine concentration of 0.08 mg/L (threshold >0.06 mg/L). To narrow down the source of contamination, especially concerning the elevated E. Coli concentration, advanced investigation was performed on this outfall at seven stormwater manholes located upstream of outfall 14.

Outfall 14 – Manhole 1: located at intersection of Lincoln Ave and Ferris St – October 25th, 2023

Flow from Manhole 1 was sampled and revealed an anionic surfactant concentration of 0.559 mg/L, well above the threshold of 0.2 mg/L. E. Coli results returned a concentration of >2,419.6 MPN/ 100 mL.

Outfall 14 – Manhole 2: located at intersection of Lincoln Ave and Bishop St – October 25th, 2023

Flow at Manhole 2 revealed slightly elevated anionic surfactants at 0.25 mg/L (threshold >0.2 mg/L). E. Coli results returned a concentration of 2,419.6 MPN/ 100 mL.

Outfall 14 – Manhole 3: located at intersection of Bishop St and High St – October 25th, 2023

Flow at Manhole 3 was sampled and revealed an elevated anionic surfactants concentration of 0.322 mg/L. E. Coli results returned an elevated concentration of 816.4 MPN/ 100 mL. This is below the sampling threshold, but warrants additional attention given the comparatively lower surrounding results.

Outfall 14 – Manhole 4: located at intersection of Bishop St and Smith St – October 25th, 2023

Flow at Manhole 4 was sampled and revealed an elevated anionic surfactants concentration of 0.307 mg/L. E. Coli results returned a concentration of 135.4 MPN/ 100 mL.

Outfall 14 – Manhole 5: located at intersection of Bishop St and Smith St – October 25th, 2023

Flow at Manhole 5 was sampled and revealed an elevated anionic surfactants concentration of 0.349 mg/L. E. Coli results returned a concentration of < 1.0 MPN/ 100 mL.

Outfall 14 – Manhole 6: located at intersection of Lincoln Ave and Bank St – November 3rd, 2023 Flow at Manhole 6 was sampled and revealed an elevated anionic surfactants concentration of 0.361 mg/L. E. Coli results returned a concentration of 167.0 MPN/ 100 mL.

Outfall 14 – Manhole 7: located at intersection of Lincoln Ave and Congress St – November 3rd, 2023

Flow at Manhole 7 was sampled and revealed an anionic surfactants concentration of 1.142 mg/L, well above the threshold of 0.2 mg/L. E. Coli results returned a concentration of 980.4 MPN/ 100 mL.

Given the prevalence of elevated parameters throughout the stormline, particularly E. Coli, it was determined that additional measures were necessary to pinpoint the source(s) of contamination.

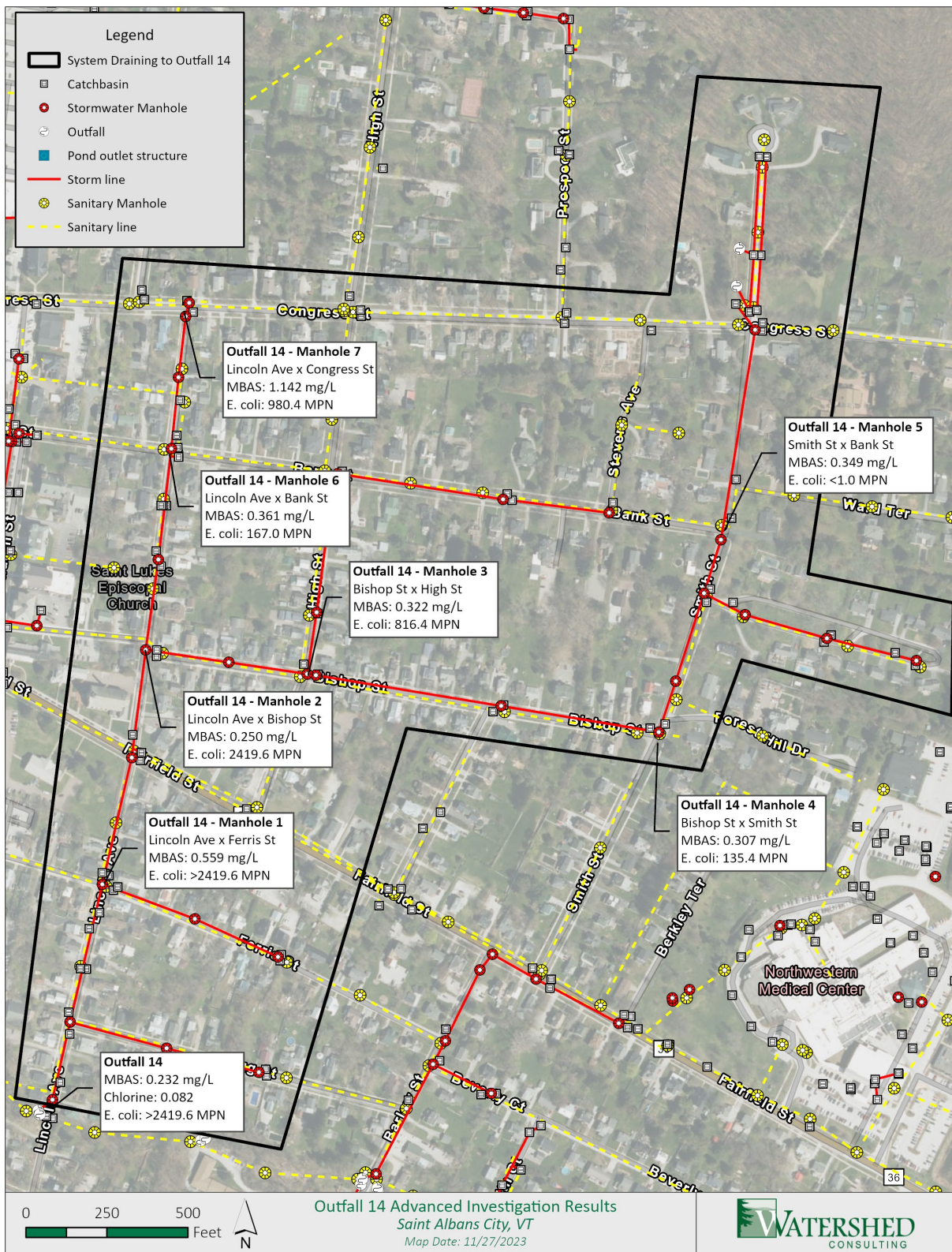


Figure 1: Outfall 14 Location with Stormwater Infrastructure and 2023 Sampling Data

Advanced Investigation – Smoke, Dye, Camera

On December 28th, 2023, Watershed Consulting, along with BP Wastewater Services of VT, performed advanced investigation of outfall 14 in response to elevated E. Coli values found at the outfall and up the stormline. Smoke tests, dye tests, and cameras were used to investigate potential sources of contamination.

A smoke test was conducted at the stormwater manhole occurring at the intersection of Lincoln Ave and Rugg Street. This stormwater manhole (referred to as Manhole 8/MH8) is relatively deep and had substantial flow at the time of investigation. Smoke came out of all catchbasins upstream of the manhole on Lincoln Ave up to Bishop Street. The home at 72 Lincoln Ave had smoke coming from its sewer vent. The occupant of 72 Lincoln Ave allowed us to perform a dye test, and dye was flushed down the toilet. Dye was observed in the sewer line, and no dye was observed in the stormline from 72 Lincoln Ave, indicating that their sewer is not connected to the stormline. However, smoke was observed in the sewer manhole located on Lincoln Ave between Rugg Street and Ferris Street.

Another smoke test was performed in the sewer manhole on Lincoln Ave between Rugg Street and Ferris Street. Smoke was observed in a stormwater catchbasin directly in front of 70 Lincoln Ave. Smoke was also observed at this catchbasin when the stormline was smoked. Upon investigation, a 4" clay tile drain was found in the catchbasin, and a camera was inserted. The occupant at 70 Lincoln flushed their toilet, and, using a camera, it was confirmed that the tile drain is connected to the sewer line. Adjacent to the clay tile drain, there is a larger galvanized culvert that connects to the stormline which was confirmed by camera.

Camera work was attempted within the stormwater manhole at the intersection of Rugg Street and Lincoln Ave (MH8). Unfortunately, due to large rocks and debris, proper footage could not be obtained as the camera was unable to pass over these obstacles.

Additionally, in the stormwater manhole at the intersection of Lincoln Ave and Rugg Street, at least one raccoon was observed, indicating the possibility that the source of contamination may be raccoon fecal contamination.

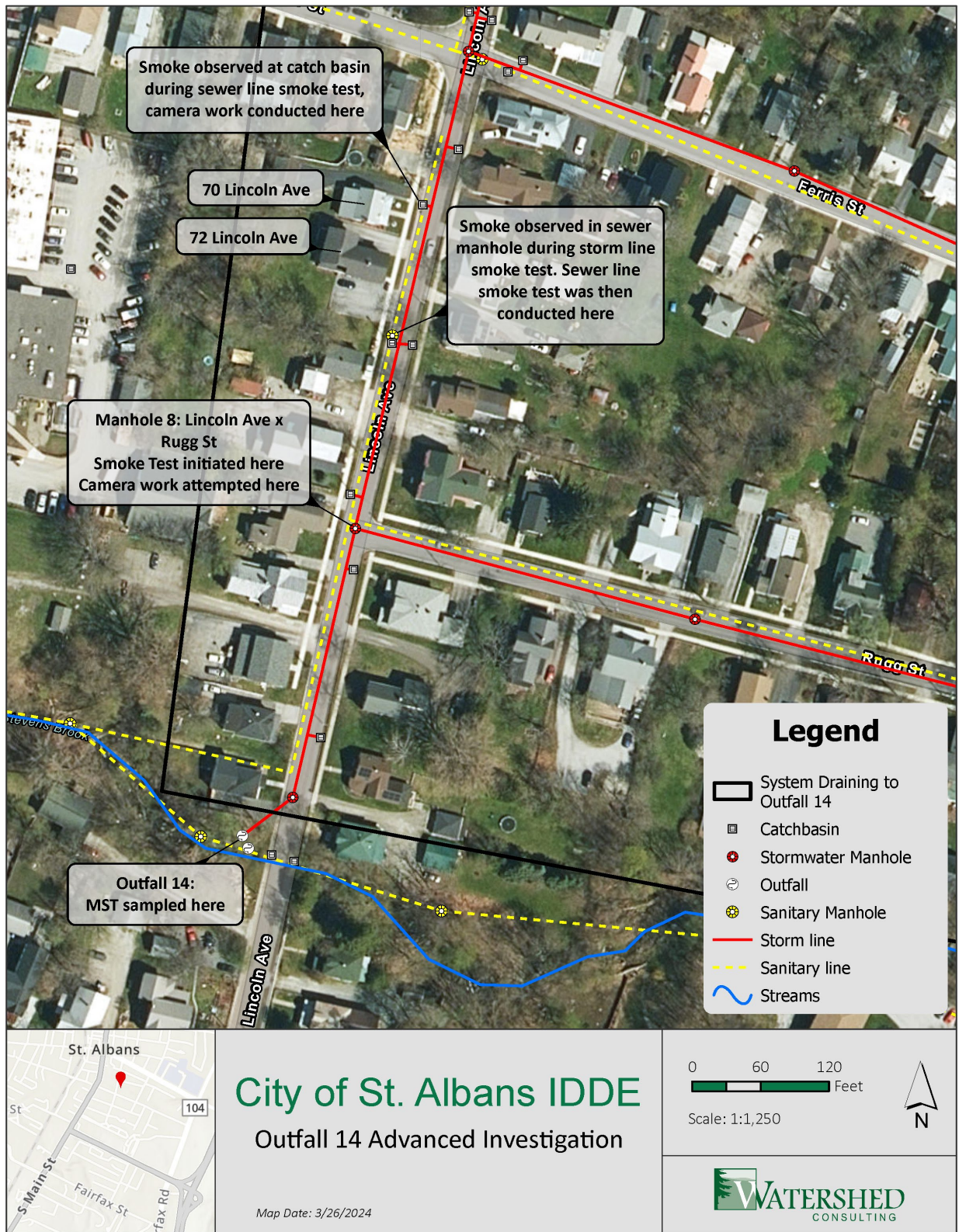


Figure 2: Outfall 14 Advanced Investigation with BP Waste and Microbial Source Tracking

Microbial Source Tracking

The observation of raccoons in the storm line indicated the potential for the raccoons to be the source of E. Coli contamination. To confirm the biological source of the E. Coli contamination, a microbial source tracking (MST) analysis was performed. A sample taken directly from outfall 14 was collected on February 6th, 2024, and shipped to Montclair State University to be analyzed for the presence of human DNA markers. The results detected human markers, which indicate the presence of human fecal contamination, ruling out the possibility of raccoon fecal contamination as the sole source of contamination.

Recommendations

Further investigation is needed to confirm the source of contamination at outfall 14.

Recommended next steps include:

- Additional E. Coli sampling at key points along the storm line, especially upstream of manhole 8 closer to the intersection with Fairfield Street.
- Clean the storm line and vactor catch basins along Lincoln Ave.
- Conduct additional camera work after the storm line has been cleaned.
- Seal the sewer/storm line connection discovered at the catchbasin in front of 70 Lincoln Ave.
- Upon further E. coli sampling, consider additional MST sampling, dye testing and smoke testing at key locations in the storm and sewer system.

Attachments

Attachment 1 – Microbial Source Tracking Analytical Report

Attachment 2 – Endyne Lab Reports: Field Sampling Results

Montclair State University

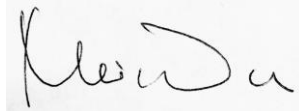
NJCWST

New Jersey Center for Water Science and Technology

Analytical Report

For: Watershed Consulting Associates, LLC

Project: St. Albans - IDDE ADV Microbial Source Tracking



Meiyin Wu, Ph.D.

Director

Report Date: 02/20/2024

Certified Water Analysis Laboratory (NJDEP # 07105)

New Jersey Center for Water Science and Technology

Montclair State University

1 Normal Ave, Montclair, NJ 07043

Phone: (973) 655-3711

Email: waterlab@montclair.edu

Analytical Results

Analyte	Sample ID	Date Collected	Date Analyzed	Result	Qual	Unit
Human marker	OF14	2/6/2024	2/15/2024	123		copies/mL

Notes- Human marker HF183

Reference: USEPA Method 1696

Qualifier K indicates “less than” the value of the results

Minimal Reporting limits (MRL): 10 marker gene copies/mL



Watershed Consulting Assoc.	
PO Box 4413	100879
Burlington, VT 05406	
Atten: Samplers Name	

PROJECT: St. Albans IDDE (STA)
 WORK ORDER: **2310-33330**
 DATE RECEIVED: October 18, 2023
 DATE REPORTED: October 19, 2023
 SAMPLER: Clare Girrard

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 corresponding 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 accreditation 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 for 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 they 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

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Ph 802-879-4333 Fax 802-879-7103

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



Laboratory Report

DATE REPORTED: 10/19/2023

CLIENT: Watershed Consulting Assoc.

WORK ORDER: 2310-33330

PROJECT: St. Albans IDDE (STA)

DATE RECEIVED: 10/18/2023

Parameter	Result	Units	Method	Analysis Date/Time	Lab/Tech	NELAC	Qual.
001 Site: St. Albans 26.1-C Date Sampled: 10/18/23 Time: 13:33							
E. coli	127.4	MPN/100 mL	SM 9223B (-16)	10/18/23 16:48	W ECM	A	
002 Site: St. Albans 26.1-C-ADV Date Sampled: 10/18/23 Time: 14:17							
E. coli	2.0	MPN/100 mL	SM 9223B (-16)	10/18/23 16:48	W ECM	A	
003 Site: St. Albans 39.2-ADV Date Sampled: 10/18/23 Time: 11:56							
E. coli	34.1	MPN/100 mL	SM 9223B (-16)	10/18/23 16:48	W ECM	A	
004 Site: St. Albans 39.2 Date Sampled: 10/18/23 Time: 11:00							
E. coli	12.1	MPN/100 mL	SM 9223B (-16)	10/18/23 16:48	W ECM	A	
005 Site: St. Albans 39.2-ADV Date Sampled: 10/18/23 Time: 11:56							
E. coli	37.3	MPN/100 mL	SM 9223B (-16)	10/18/23 16:48	W ECM	A	
006 Site: St. Albans 40-C Date Sampled: 10/18/23 Time: 9:00							
E. coli	< 1.0	MPN/100 mL	SM 9223B (-16)	10/18/23 16:48	W ECM	A	
007 Site: St. Albans 40-ADV Date Sampled: 10/18/23 Time: 10:12							
E. coli	< 1.0	MPN/100 mL	SM 9223B (-16)	10/18/23 16:48	W ECM	A	
008 Site: St. Albans 14 Date Sampled: 10/18/23 Time: 15:02							
E. coli	> 2419.6	MPN/100 mL	SM 9223B (-16)	10/18/23 16:48	W ECM	A	



Watershed Consulting Assoc.
PO Box 4413 100879
Burlington, VT 05406
Atten: Anna Sherman

PROJECT: St. Albans IDDE
WORK ORDER: 2310-34121
DATE RECEIVED: October 25, 2023
DATE REPORTED: October 26, 2023
SAMPLER: Anna Sherman

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.

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Reviewed by:

Harry B. Locker, Ph.D.
Laboratory Director

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Laboratory Report

DATE REPORTED: 10/26/2023

CLIENT: Watershed Consulting Assoc.

WORK ORDER: **2310-34121**

PROJECT: St. Albans IDDE

DATE RECEIVED: 10/25/2023

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>	<u>Analysis Date/Time</u>	<u>Lab/Tech</u>	<u>NELAC</u>	<u>Qual.</u>
001 Site: St. Albans 14-MH1 Date Sampled: 10/25/23 Time: 11:30							
E. coli	> 2419.6	MPN/100 mL	SM 9223B (-16)	10/25/23 17:00	W ECM	A	
002 Site: St. Albans 14-MH2 Date Sampled: 10/25/23 Time: 14:04							
E. coli	2419.6	MPN/100 mL	SM 9223B (-16)	10/25/23 17:00	W ECM	A	
003 Site: St. Albans 14-MH3 Date Sampled: 10/25/23 Time: 14:29							
E. coli	816.4	MPN/100 mL	SM 9223B (-16)	10/25/23 17:00	W ECM	A	
004 Site: St. Albans 14-MH4 Date Sampled: 10/25/23 Time: 14:30							
E. coli	135.4	MPN/100 mL	SM 9223B (-16)	10/25/23 17:00	W ECM	A	
005 Site: St. Albans 14-MH5 Date Sampled: 10/25/23 Time: 14:45							
E. coli	< 1.0	MPN/100 mL	SM 9223B (-16)	10/25/23 17:00	W ECM	A	



Watershed Consulting Assoc.	
PO Box 4413	100879
Burlington, VT 05406	
Atten: Samplers Name	

PROJECT: St. Albans IDDE
 WORK ORDER: 2311-34975
 DATE RECEIVED: November 03, 2023
 DATE REPORTED: November 06, 2023
 SAMPLER: Anna Sherman

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.

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Reviewed by:

Harry B. Locker, Ph.D.
Laboratory Director

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Laboratory Report

DATE REPORTED: 11/06/2023

CLIENT: Watershed Consulting Assoc.

WORK ORDER: **2311-34975**

PROJECT: St. Albans IDDE

DATE RECEIVED: 11/03/2023

001 Site: 14-MH6 Date Sampled: 11/3/23 Time: 9:53

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>	<u>Analysis Date/Time</u>	<u>Lab/Tech</u>	<u>NELAC</u>	<u>Qual.</u>
E. coli	167.0	MPN/100 mL	SM 9223B (-16)	11/3/23 16:22	W ECM	A	

002 Site: 14-MH7 Date Sampled: 11/3/23 Time: 9:26

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>	<u>Analysis Date/Time</u>	<u>Lab/Tech</u>	<u>NELAC</u>	<u>Qual.</u>
E. coli	980.4	MPN/100 mL	SM 9223B (-16)	11/3/23 16:22	W ECM	A	

Watershed Consulting Assoc.
PO Box 4413 100879
Burlington, VT 05406
Atten: Samplers Name

PROJECT: St. Albans IDDE
WORK ORDER: **2312-40130**
DATE RECEIVED: December 28, 2023
DATE REPORTED: December 29, 2023
SAMPLER: Clare Girard

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.

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Reviewed by:



Harry B. Locker, Ph.D.
Laboratory Director

Laboratory Report

DATE REPORTED: 12/29/2023

CLIENT: Watershed Consulting Assoc.

WORK ORDER: **2312-40130**

PROJECT: St. Albans IDDE

DATE RECEIVED: 12/28/2023

001 Site: OF 14 Date Sampled: 12/28/23 Time: 12:58

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>	<u>Analysis Date/Time</u>	<u>Lab/Tech</u>	<u>NELAC</u>	<u>Qual.</u>
E. coli	> 2419.6	MPN/100ml	SM 9223B(16)	12/28/23 16:06	W CM	A	

002 Site: OF 14 - MH8 Lincoln x Rugg Date Sampled: 12/28/23 Time: 13:11

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>	<u>Analysis Date/Time</u>	<u>Lab/Tech</u>	<u>NELAC</u>	<u>Qual.</u>
E. coli	613.1	MPN/100ml	SM 9223B(16)	12/28/23 16:06	W CM	A	