Malcolm Pirnie, Inc.
44 South Broadway
15th Floor
Box 751
White Plains
New York 10602-0751
Tel 914 694 2100
Fax 914 694 9286
www.ARCADIS-us.com

Water

Richard Slingerland
Village Manager
Village of Mamaroneck
123 Mamaroneck Avenue
Mamaroneck, NY 10543

Subject:
Illicit Discharge Detection and Elimination Study
Outfall and River Sampling Results

Date:
November 13, 2012

Contact:
Robert Matarazzo

Phone:
914.641.2790

Email:
robert.matarazzo@
ARCADIS-us.com

Dear Mr. Slingerland:

The Village of Mamaroneck (Village) is a regulated MS4 and, as such, is required to implement an illicit discharge detection and elimination program. The Environmental Protection Agency (EPA) has reported that they identified illicit discharges from the MS4, which appeared to contain sanitary sewage. The EPA also collected samples at three locations on September 30, 2010. The results of these samples showed high levels of fecal and total coliform bacteria and were the basis for Administrative Order CWA-02-2001-3022 (Order) against the Village.

Malcolm Pirnie/ARCADIS was awarded a contract to assist the Village with their illicit discharge detection and elimination program. This contract included an amendment to collect river samples to establish a general understanding of the fecal coliform pollutant load coming from adjacent municipalities and from the Village. It also included collecting samples at outfalls that have historically had some evidence of dry weather flow to conclude if the flow contained fecal coliform bacteria.

This letter report summarizes the results of the outfall and river sampling events and provides recommendations for follow-up investigations. The sampling of the river and two of the outfalls was completed on August 30, 2012 and August 31, 2012. The remaining ten outfalls were inspected and sampled on October 22, 2012 and October 23, 2012. Samples were collected during dry weather, defined as a 48 hour period with less than 0.1 inches of precipitation. Water quality parameters, such as pH, temperature, and dissolved oxygen, were measured for each sample using a handheld probe. The samples were analyzed for fecal coliform bacteria by Envirotest, a laboratory certified by the New York State Department of Health (NYSDOH) and Environmental Laboratory Approval Program (ELAP). The field team measured water depth, flow velocity, and the culvert\river geometry to calculate flow.

The results of the inspections and sampling events and recommendations for follow-up investigations are provided below. The field and laboratory data and the field photos are provided in the following appendices:

- Appendix A – Analytical Laboratory Results
- Appendix B – Water Quality Parameter Results
- Appendix C – Outfall Inspection Forms and Summary
- Appendix D – Field Photos

River Sampling Event

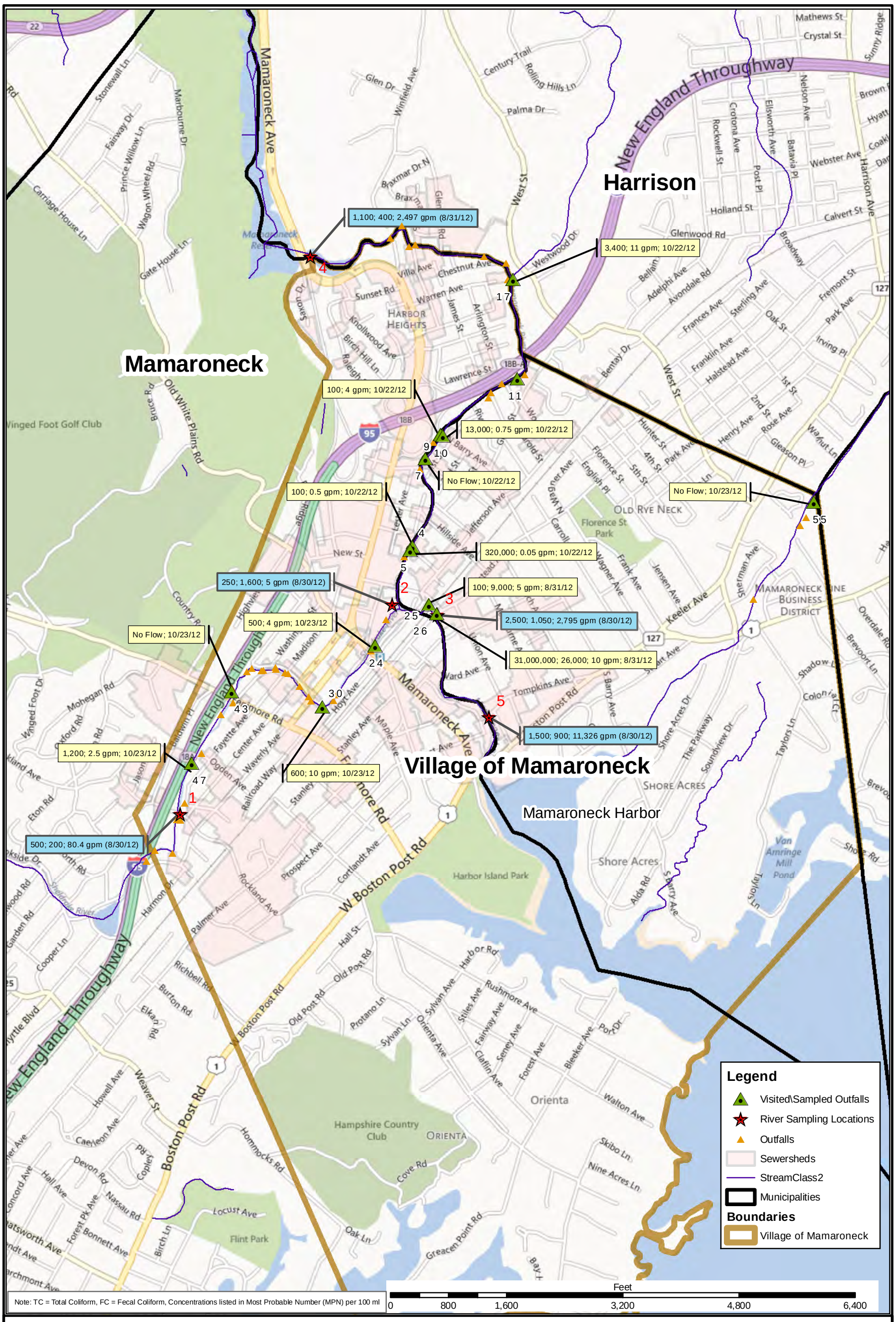
Samples were collected in the Mamaroneck River, Sheldrake River, and the Gedney Pond stream to obtain a general understanding of the fecal coliform pollutant load coming from adjacent municipalities and from the Village. Two samples were collected from each of the following five locations:

- Location 1 - Sheldrake River, near the Village border;
- Location 2 - Gedney Pond stream, downgradient of the Gedney Pond;
- Location 3 - Mamaroneck River, downgradient of the confluence with the Sheldrake River;
- Location 4 - Mamaroneck River, near the Village border; and
- Location 5 - Mamaroneck River at Tompkins Avenue, upgradient of the confluence with the Mamaroneck Harbor.

The analytical results, flow, and calculated pollutant load is provided within Table 1 – River Sampling Results. A map showing a graphical summary of the results is provided as Figure 1.

Table 1 - River Sampling Results

Location	Result (CFU[2]/100ml)	Flow (gpm)	Pollutant Load[1] (Billion CFU/Day)
Location 1	500; 200	80	1.5
Location 2	1600; 250	5	0.3
Location 3	2500; 1050	2,795	270.4
Location 4	1100; 400	2,497	102.1
Location 5	1500; 900	11,325	740.7



Note: TC = Total Coliform, FC = Fecal Coliform, Concentrations listed in Most Probable Number (MPN) per 100 ml

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

Village of Mamaroneck

OUTFALL AND RIVER SAMPLING

FIGURE
1

(1) Pollutant Load = Flow in gallons per minute *60 minutes/hour*24 hours/day*Fecal Coliform CFU/100 ml *3.785 liters in a gallon *10 (100 ml) in a liter)/1,000,000,000 = Billion CFU/Day.

(2) Colony Forming Unit.

The analytical results show that there is fecal coliform bacteria in the flow entering the Village from both the Mamaroneck and Sheldrake Rivers, locations 1 and 4. However, the pollutant load increases significantly at the sampling location downgradient of the confluence of the Sheldrake and Mamaroneck Rivers, and then again at the Tompkins Avenue location. This demonstrates that there is fecal coliform entering the River from within the Village border. There was a very low pollutant load coming from the Gedney Pond stream.

For both the Mamaroneck River and Sheldrake Rivers, the surface water standard requires that the monthly geometric mean from a minimum of five examinations not exceed 200 cfu/100 ml. The river samples were above the numeric limit of 200 cfu\100ml, although only one sampling event was completed.

Outfall Sampling Event

The majority of the Village storm sewer outfalls were surveyed using a global positioning system (GPS) and inspected in 2009 by Woodard and Curran. Of the 53 outfalls inspected within the area of concern, 12 had dry weather flow ranging from a trickle to what the inspector categorized as substantial. The Pirnie/ARCADIS team visited each of these 12 locations to perform a dry weather inspection for evidence of illicit discharges and to collect a sample. The field team did not collect samples at two of the twelve locations, as these locations were surcharged with river water. The Village may want to revisit these two outfalls in the summer during low flow conditions to confirm that there is not dry weather flow discharging from these drainage areas.

The analytical results, flow, and calculated pollutant load is provided within Table 2 – Outfall Sampling Results. A map showing a graphical summary of the results is provided as Figure 1.

Table 2 – Outfall Sampling Results

Outfall ID	Results (CFU[(2)]/100ml)	Flow (gpm)	Pollutant Load [(1)] (Billion CFU/Day)
5	320,000	0.05	0.9
4	100	0.5	0.003
10	13,000	0.75	0.5
9	100	3.8	0.02
17	3,400	11	2.1
24	500	4	0.1
25 (Old ID 51)	100	5	0.03
25 (Old ID 51)	9,000	5	2.5
26 (Old ID 52)	26,000	10	14.2
26 (Old ID 52)	31,000,000	10	16896.2
30	600	10	0.3
43	NA	Stagnant	-
47	1,200	2.5	0.2
55	NA	Stagnant	-

(1) Pollutant Load = Flow in gallons per minute *60 minutes/hour*24 hours/day*Fecal Coliform CFU/100 ml *3.785 liters in a gallon *10 (100 ml) in a liter)/1,000,000,000 = Billion CFU/Day.

(2) Colony Forming Unit.

Outfall IDs 51 and 52 represent the old GIS outfall IDs, which were replaced by the new IDs 25 and 26. These samples were collected prior to receiving the new GIS data from the Village. Two samples were collected from these two outfalls, as they were collected the same day as the river samples and the field team was using the river sampling protocol. Pirnie/ARCADIS will not charge the Village for these two additional samples. The variability in the results from these two samples shows the value of taking multiple samples (replicates). There is often variability with illicit discharge samples as the sources are intermittent, there may not be thorough mixing in the storm drain, and the collected sample may include solids.

Discussion\Recommendations

There is not an “end of pipe” water quality standard, but the regulatory agencies use the surface water standards as guidance for determining if illicit discharge investigations are appropriate. Based on the results of these sampling events, we

recommend that the Village begin an illicit discharge detection and elimination (IDDE) program in drainage areas 5, 10, 17, 25, and 26, with priority on drainage area 26. This would include additional sampling to confirm these results are replicable, sampling to track and isolate the sources of the illicit discharges, and then techniques such as dye testing, smoke testing, and video inspection to locate the sources so they can be eliminated. The other drainage areas have low flow and relatively low fecal coliform concentrations. They may need to be revisited at a later date to confirm the pollutant load is still low.

The field team observed several locations where the sanitary sewer crosses a river or steam. These sanitary sewers should be dye tested to confirm that they are not leaking into the rivers/streams. The field team observed a plastic pipe coming from a business and entering the river in the vicinity of outfall ID 30. A photograph was taken by the field team and it is included in Appendix D. Further investigation is recommended to determine what is being discharged from this pipe.

We would like to meet with you to discuss the results of this project in person and to develop a strategy to prioritize and implement the IDDE program.

Please do not hesitate to contact myself at 914.641.2725 or Bob Matarazzo at 914.641.2790 if you have any questions or would like additional information.

Sincerely,

Malcolm Pirnie/ARCADIS, Inc.

Carolyn A. Lowe

Carolyn A. Lowe, P.E.
Principal In Charge

Copy: K. Hogan, Pirnie/ARCADIS
R. Matarazzo, Pirnie/ARCADIS

Technical Memo
Mamaroneck Outfall and River Sampling

APPENDIX

A

Analytical Laboratory Results

EnviroTest Laboratories Inc.

ANALYTICAL REPORT

Job Number: 420-60412-1

SDG Number: 01547034.0001

Job Description: Mamaroneck

For:
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Attention: Mr. Kevin Hogan

Renee M. Cusack

Renee Cusack
Lab Director
rcusack@envirotestlaboratories.com
10/24/2012

cc: Ms. Katherine Clubine

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EnviroTest Laboratories, Inc. Certifications and Approvals: NELAP Accredited, NYSDOH 10142, NJDEP NY015, CTDOPH PH-0554, EPA NY00049.

METHOD SUMMARY

Client: Arcadis US, Inc.

Job Number: 420-60412-1
Sdg Number: 01547034.0001

Description	Lab Location	Method	Preparation Method
Matrix: Water			
Membrane Filter Technique - Fecal Coliform Procedure	EnvTest	SM18 SM 9222D	

Lab References:

EnvTest = EnviroTest

Method References:

SM18 = "Standard Methods For The Examination Of Water And Wastewater", 18th Edition, 1992.

SAMPLE SUMMARY

Client: Arcadis US, Inc.

Job Number: 420-60412-1
Sdg Number: 01547034.0001

Lab Sample ID	Client Sample ID	Client Matrix	Date/Time Sampled	Date/Time Received
420-60412-1	Outfall 4	Water	10/22/2012 1005	10/22/2012 1500
420-60412-2	Outfall 10	Water	10/22/2012 1120	10/22/2012 1500
420-60412-3	Outfall 9	Water	10/22/2012 1140	10/22/2012 1500
420-60412-4	Outfall 17	Water	10/22/2012 1240	10/22/2012 1500
420-60412-5	Outfall 24	Water	10/22/2012 1320	10/22/2012 1500

Mr. Kevin Hogan
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Job Number: 420-60412-1
Sdg Number: 01547034.0001

Client Sample ID: **Outfall 4**
Lab Sample ID: **420-60412-1**

Date Sampled: 10/22/2012 1005
Date Received: 10/22/2012 1500
Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Method: SM 9222D		Date Analyzed:	10/22/2012 1600	
Coliform, Fecal	100	CFU/100mL	100	100

Mr. Kevin Hogan
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Job Number: 420-60412-1
Sdg Number: 01547034.0001

Client Sample ID: **Outfall 10**
Lab Sample ID: **420-60412-2**

Date Sampled: 10/22/2012 1120
Date Received: 10/22/2012 1500
Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Method: SM 9222D		Date Analyzed:	10/22/2012 1600	
Coliform, Fecal	13000	CFU/100mL	1000	1000

Mr. Kevin Hogan
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Job Number: 420-60412-1
Sdg Number: 01547034.0001

Client Sample ID: **Outfall 9**
Lab Sample ID: **420-60412-3**

Date Sampled: 10/22/2012 1140
Date Received: 10/22/2012 1500
Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Method: SM 9222D		Date Analyzed:	10/22/2012 1600	
Coliform, Fecal	100	CFU/100mL	100	100

Mr. Kevin Hogan
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Job Number: 420-60412-1
Sdg Number: 01547034.0001

Client Sample ID: **Outfall 17**
Lab Sample ID: **420-60412-4**

Date Sampled: 10/22/2012 1240
Date Received: 10/22/2012 1500
Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Method: SM 9222D		Date Analyzed:	10/22/2012 1600	
Coliform, Fecal	3400	CFU/100mL	100	100

Mr. Kevin Hogan
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Job Number: 420-60412-1
Sdg Number: 01547034.0001

Client Sample ID: **Outfall 24**
Lab Sample ID: **420-60412-5**

Date Sampled: 10/22/2012 1320
Date Received: 10/22/2012 1500
Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Method: SM 9222D		Date Analyzed:	10/22/2012 1600	
Coliform, Fecal	500	CFU/100mL	100	100

EnviroTest Laboratories Inc.

CHAIN OF CUSTODY

315 Fullerton Avenue
Newburgh, NY 12550
TEL (845) 562-0890
FAX (845) 562-0841

CUSTOMER NAME	[illegible]
ADDRESS	[illegible]
CITY, STATE, ZIP	[illegible] NY 10502
NAME OF CONTACT	[illegible] PHONE NO. [illegible]
PROJECT LOCATION	[illegible]
PROJECT NUMBER / PO NO.	[illegible]

REPORT TYPE
STANDARD ☒ ISRA ☐
NJ REG ☐
NYASP A ☐ B ☐ CLP ☐
OTHER _____

TURNAROUND
☒ NORMAL _____
☐ QUICK _____
☐ VERBAL _____

REPORT # (Lab Use Only)
60412
SAMPLE TEMP. 2.4 C
SAMPLE REC'D ON ICE ☒ Y ☐ N
ph CHECK ☐ Y ☐ N
CHLORINE (RESIDUAL) ☐ Y ☐ N
REVIEWED BY: _____

NY PUBLIC WATER SUPPLIES
SOURCE ID ___ ___ ___
ELAP TYPE ___ ___ ___
FEDERAL ID ___ ___ ___ ___ ___ ___ ___

Matrix
DW = DRINKING WATER S = SOIL O = OIL
WW = WASTE WATER SL = SLUDGE GW = GROUND WATER

NOTE: SAMPLE TEMPERATURE UPON RECEIPT MUST BE 4° ± 2°C.

ANALYSIS REQUESTED

ETL #	SAMPLING DATE	TIME AM PM	COMP	GRAB	MATRIX	CLIENT I.D.	Total Number of Containers	40ml Glass HCL	Liter Amber HCL	250ml Amber Sulfuric	Liter Amber Organic Washed	250ml Plastic Nitric Acid	250ml Plastic Sodium Hydroxide	Liter Plastic	250ml Plastic Sulfuric Acid	250ml Plastic	125ml Plastic Sterile	250ml Plastic NAOH/ZN ACC	40ml Glass Sulfuric	40ml Glass	DO	
	[illegible]	[illegible]		✓	[illegible]	[illegible]	1										X					[illegible]
	↓	[illegible]		✓	↓	[illegible]	1										X					↓
		[illegible]		✓		[illegible]	1										X					
		[illegible]		✓		[illegible]	1										X					
	↓	[illegible]		✓	↓	[illegible]	1										X					↓

SAMPLES SUBMITTED FOR ANALYSIS WILL BE SUBJECT TO THE ETL TERMS AND CONDITIONS OF SALE UNLESS ALTERNATE TERMS ARE AGREED IN WRITING.

RELINQUISHED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME
SAMPLED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME
RELINQUISHED BY [signature]	COMPANY ETL	DATE 10/22/12	TIME 3:00	RECEIVED BY [signature]	COMPANY ETL	DATE 10/22/12	TIME 1500

COMMENTS _____

NYSDOH 10142 NJDEP NY015 CTDOPH PH-0554 EPA NY00049

LOGIN SAMPLE RECEIPT CHECK LIST

Client: Arcadis US, Inc.

Job Number: 420-60412-1
Sdg Number: 01547034.0001

Login Number: 60412

Question	T/F/NA	Comment
Samples were collected by ETL employee as per SOP-SAM-1	NA	
The cooler's custody seal, if present, is intact.	NA	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is recorded.	True	2.4 C
Cooler Temp. is within method specified range.(0-6 C PW, 0-8 C NPW, or BAC <10 C	True	
If false, was sample received on ice within 6 hours of collection.	NA	
Based on above criteria cooler temperature is acceptable.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	NA	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	

EnviroTest Laboratories Inc.

ANALYTICAL REPORT

Job Number: 420-60443-1

SDG Number: 01547034.001

Job Description: Mamaroneck

For:
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Attention: Mr. Kevin Hogan

Renee M. Cusack

Renee Cusack
Lab Director
rcusack@envirotestlaboratories.com
10/25/2012

cc: Ms. Katherine Clubine

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EnviroTest Laboratories, Inc. Certifications and Approvals: NELAP Accredited, NYSDOH 10142, NJDEP NY015, CTDOPH PH-0554, EPA NY00049.

METHOD SUMMARY

Client: Arcadis US, Inc.

Job Number: 420-60443-1
Sdg Number: 01547034.001

Description	Lab Location	Method	Preparation Method
Matrix: Water			
Membrane Filter Technique - Fecal Coliform Procedure	EnvTest	SM18 SM 9222D	

Lab References:

EnvTest = EnviroTest

Method References:

SM18 = "Standard Methods For The Examination Of Water And Wastewater", 18th Edition, 1992.

SAMPLE SUMMARY

Client: Arcadis US, Inc.

Job Number: 420-60443-1
Sdg Number: 01547034.001

Lab Sample ID	Client Sample ID	Client Matrix	Date/Time Sampled	Date/Time Received
420-60443-1	Outfall 5	Water	10/23/2012 0910	10/23/2012 1500
420-60443-2	Outfall 30	Water	10/23/2012 1000	10/23/2012 1500
420-60443-3	Outfall 47	Water	10/23/2012 1145	10/23/2012 1500

Mr. Kevin Hogan
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Job Number: 420-60443-1
Sdg Number: 01547034.001

Client Sample ID: **Outfall 5**
Lab Sample ID: **420-60443-1**

Date Sampled: 10/23/2012 0910
Date Received: 10/23/2012 1500
Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Method: SM 9222D		Date Analyzed:	10/23/2012 1553	
Coliform, Fecal	320000	CFU/100mL	10000	10000

Mr. Kevin Hogan
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Job Number: 420-60443-1
Sdg Number: 01547034.001

Client Sample ID: **Outfall 30**
Lab Sample ID: **420-60443-2**

Date Sampled: 10/23/2012 1000
Date Received: 10/23/2012 1500
Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Method: SM 9222D		Date Analyzed:	10/23/2012 1553	
Coliform, Fecal	600	CFU/100mL	100	100

Mr. Kevin Hogan
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Job Number: 420-60443-1
Sdg Number: 01547034.001

Client Sample ID: **Outfall 47**
Lab Sample ID: **420-60443-3**

Date Sampled: 10/23/2012 1145
Date Received: 10/23/2012 1500
Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Method: SM 9222D		Date Analyzed:	10/23/2012 1553	
Coliform, Fecal	1200	CFU/100mL	100	100

EnviroTest Laboratories Inc.

CHAIN OF CUSTODY

315 Fullerton Avenue
Newburgh, NY 12550
TEL (845) 562-0890
FAX (845) 562-0841

CUSTOMER NAME: Arcadis
ADDRESS: 44 South Broadway
CITY, STATE, ZIP: White Plains, NY 10602
NAME OF CONTACT: Robert Matarazzo
PHONE NO.: 914-694-2100
PROJECT LOCATION: Mamaroneck, NY
PROJECT NUMBER / PO NO.: 015470

REPORT TYPE
STANDARD ☒ ISRA ☐
NJ REG ☐
NYASP A ☐ B ☐ CLP ☐
OTHER _____

TURNAROUND
☒ NORMAL _____
☐ QUICK _____
☐ VERBAL _____

REPORT # (Lab Use Only): 60443

SAMPLE TEMP. 27 C
SAMPLE REC'D ON ICE ☒ Y ☐ N
ph CHECK ☐ Y ☐ N
CHLORINE (RESIDUAL) ☐ Y ☐ N
REVIEWED BY: _____

NY PUBLIC WATER SUPPLIES
SOURCE ID _____
ELAP TYPE _____
FEDERAL ID _____

Matrix
DW = DRINKING WATER S = SOIL O = OIL
WW = WASTE WATER SL = SLUDGE GW = GROUND WATER

NOTE: SAMPLE TEMPERATURE UPON RECEIPT MUST BE 4° ± 2°C.

ETL #	SAMPLING DATE	TIME AM PM	COMP	GRAB	MATRIX	CLIENT I.D.	Total Number of Containers	40ml Glass HCL	Liter Amber HCL	250ml Amber Sulfuric	Liter Amber Organic Washed	250ml Plastic Nitric Acid	250ml Plastic Sodium Hydroxide	Liter Plastic	250ml Plastic Sulfuric Acid	250ml Plastic	125ml Plastic Sterile	250ml Plastic NAOH/ZN ACC	40ml Glass Sulfuric	40ml Glass	DO	ANALYSIS REQUESTED
	10/23/12	0910		X	WW	Outfall 5	1										X					Fecal Coliform
	↓	1000		X	↓	Outfall 30	1										X					↓
	↓	1145		X	↓	Outfall 47	1										X					↓

SAMPLES SUBMITTED FOR ANALYSIS WILL BE SUBJECT TO THE ETL TERMS AND CONDITIONS OF SALE UNLESS ALTERNATE TERMS ARE AGREED IN WRITING.

RELINQUISHED BY: Jon Barker	COMPANY: Arcadis	DATE: 10/23/12	TIME: 2:00	RECEIVED BY: [signature]	COMPANY: ETL	DATE: 10/23/12	TIME: 2:00
SAMPLED BY: [signature]	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME
RELINQUISHED BY: [signature]	COMPANY: ETL	DATE: 10/23/12	TIME: 3:00	RECEIVED BY: [signature]	COMPANY: ETL	DATE: 10/23/12	TIME: 1500

COMMENTS _____

NYSDOH 10142 NJDEP NY015 CTDOPH PH-0554 EPA NY00049

LOGIN SAMPLE RECEIPT CHECK LIST

Client: Arcadis US, Inc.

Job Number: 420-60443-1
Sdg Number: 01547034.001

Login Number: 60443

Question	T/F/NA	Comment
Samples were collected by ETL employee as per SOP-SAM-1	NA	
The cooler's custody seal, if present, is intact.	NA	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is recorded.	True	2.7 C
Cooler Temp. is within method specified range.(0-6 C PW, 0-8 C NPW, or BAC <10 C	True	
If false, was sample received on ice within 6 hours of collection.	NA	
Based on above criteria cooler temperature is acceptable.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	NA	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	

EnviroTest Laboratories Inc.

ANALYTICAL REPORT

Job Number: 420-58587-1

SDG Number: 01547034.0001

Job Description: Mamaroneck

For:
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Attention: Mr. Kevin Hogan

Renee M. Cusack

Renee Cusack
Lab Director
rcusack@envirotestlaboratories.com
09/04/2012

cc: Ms. Katherine Clubine

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EnviroTest Laboratories, Inc. Certifications and Approvals: NELAP Accredited, NYSDOH 10142, NJDEP NY015, CTDOPH PH-0554, EPA NY00049.

METHOD SUMMARY

Client: Arcadis US, Inc.

Job Number: 420-58587-1
Sdg Number: 01547034.0001

Description	Lab Location	Method	Preparation Method
Matrix: Water			
Membrane Filter Technique - Fecal Coliform Procedure	EnvTest	SM18 SM 9222D	

Lab References:

EnvTest = EnviroTest

Method References:

SM18 = "Standard Methods For The Examination Of Water And Wastewater", 18th Edition, 1992.

SAMPLE SUMMARY

Client: Arcadis US, Inc.

Job Number: 420-58587-1
Sdg Number: 01547034.0001

Lab Sample ID	Client Sample ID	Client Matrix	Date/Time Sampled	Date/Time Received
420-58587-1	LOC5_A	Water	08/30/2012 0925	08/30/2012 1510
420-58587-2	LOC5_B	Water	08/30/2012 0930	08/30/2012 1510
420-58587-3	LOC1_A	Water	08/30/2012 1105	08/30/2012 1510
420-58587-4	LOC1_B	Water	08/30/2012 1110	08/30/2012 1510
420-58587-5	LOC2_A	Water	08/30/2012 1230	08/30/2012 1510
420-58587-6	LOC2_B	Water	08/30/2012 1235	08/30/2012 1510

Mr. Kevin Hogan
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Job Number: 420-58587-1
Sdg Number: 01547034.0001

Client Sample ID: **LOC5_A**
Lab Sample ID: **420-58587-1**

Date Sampled: 08/30/2012 0925
Date Received: 08/30/2012 1510
Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Method: SM 9222D		Date Analyzed:	08/30/2012 1608	
Coliform, Fecal	1500	CFU/100mL	100	100

Mr. Kevin Hogan
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Job Number: 420-58587-1
Sdg Number: 01547034.0001

Client Sample ID: **LOC5_B**
Lab Sample ID: **420-58587-2**

Date Sampled: 08/30/2012 0930
Date Received: 08/30/2012 1510
Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Method: SM 9222D		Date Analyzed:	08/30/2012 1608	
Coliform, Fecal	900	CFU/100mL	10.0	10

Mr. Kevin Hogan
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Job Number: 420-58587-1
Sdg Number: 01547034.0001

Client Sample ID: **LOC1_A**
Lab Sample ID: **420-58587-3**

Date Sampled: 08/30/2012 1105
Date Received: 08/30/2012 1510
Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Method: SM 9222D		Date Analyzed:	08/30/2012 1608	
Coliform, Fecal	500	CFU/100mL	100	100

Mr. Kevin Hogan
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Job Number: 420-58587-1
Sdg Number: 01547034.0001

Client Sample ID: **LOC1_B**
Lab Sample ID: **420-58587-4**

Date Sampled: 08/30/2012 1110
Date Received: 08/30/2012 1510
Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Method: SM 9222D		Date Analyzed:	08/30/2012 1608	
Coliform, Fecal	200	CFU/100mL	10.0	10

Mr. Kevin Hogan
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Job Number: 420-58587-1
Sdg Number: 01547034.0001

Client Sample ID: **LOC2_A**
Lab Sample ID: **420-58587-5**

Date Sampled: 08/30/2012 1230
Date Received: 08/30/2012 1510
Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Method: SM 9222D		Date Analyzed:	08/30/2012 1608	
Coliform , Fecal	1600	CFU/100mL	100	100

Mr. Kevin Hogan
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Job Number: 420-58587-1
Sdg Number: 01547034.0001

Client Sample ID: **LOC2_B**
Lab Sample ID: **420-58587-6**

Date Sampled: 08/30/2012 1235
Date Received: 08/30/2012 1510
Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Method: SM 9222D		Date Analyzed:	08/30/2012 1608	
Coliform, Fecal	250	CFU/100mL	10.0	10

EnviroTest Laboratories Inc.

CHAIN OF CUSTODY

315 Fullerton Avenue
Newburgh, NY 12550
TEL (845) 562-0890
FAX (845) 562-0841

CUSTOMER NAME: Arcadis/Malcolm Pirnie
ADDRESS: 44 S. Broadway
CITY, STATE, ZIP: White Plains, NY 10602
NAME OF CONTACT: Robert Matarazzo
PHONE NO.: 914-694-2100
PROJECT LOCATION: Mamaroneck
PROJECT NUMBER / PO NO.: 015470

REPORT TYPE
STANDARD ☑ ISRA ☐
NJ REG ☐
NYASP A ☐ B ☐ CLP ☐
OTHER ____

TURNAROUND
☑ NORMAL ____
☐ QUICK ____
☐ VERBAL ____

REPORT # (Lab Use Only)
58587
SAMPLE TEMP. 10 C
SAMPLE REC'D ON ICE ☒ Y ☐ N
ph CHECK ☐ Y ☐ N
CHLORINE (RESIDUAL) ☐ Y ☐ N
REVIEWED BY: ____

NY PUBLIC WATER SUPPLIES
SOURCE ID ____
ELAP TYPE ____
FEDERAL ID ____

Matrix
DW = DRINKING WATER S = SOIL O = OIL
WW = WASTE WATER SL = SLUDGE GW = GROUND WATER

NOTE: SAMPLE TEMPERATURE UPON RECEIPT MUST BE 4° ± 2°C.

ANALYSIS REQUESTED

ETL #	SAMPLING DATE	TIME AM PM	COMP	GRAB	MATRIX	CLIENT I.D.	Total Number of Containers	40ml Glass HCL	Liter Amber HCL	250ml Amber Sulfuric	Liter Amber Organic Washed	250ml Plastic Nitric Acid	250ml Plastic Sodium Hydroxide	Liter Plastic	250ml Plastic Sulfuric Acid	250ml Plastic	125ml Plastic Sterile	250ml Plastic NAOH/ZN ACC	40ml Glass Sulfuric	40ml Glass	DO		ANALYSIS REQUESTED
	8/30/12	0925		X	WW	LOC5_A	1										X						Fecal Coliform
		0930		X		LOC5_B	1										X						
		1105		X		LOC1_A	1										X						
		1110		X		LOC1_B	1										X						
		1230		X		LOC2_A	1										X						
		1235		X		LOC2_B	1										X						

SAMPLES SUBMITTED FOR ANALYSIS WILL BE SUBJECT TO THE ETL TERMS AND CONDITIONS OF SALE UNLESS ALTERNATE TERMS ARE AGREED IN WRITING.

RELINQUISHED BY	COMPANY YEC, Inc	DATE 8-30-12	TIME 1400	RECEIVED BY	COMPANY ETL	DATE 8/30/12	TIME 1400
SAMPLED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME
RELINQUISHED BY	COMPANY ETL	DATE 8/30/12	TIME 1510	RECEIVED BY	COMPANY ETL	DATE 8/30/12	TIME 1510

COMMENTS ____

09/04/2012

LOGIN SAMPLE RECEIPT CHECK LIST

Client: Arcadis US, Inc.

Job Number: 420-58587-1
Sdg Number: 01547034.0001

Login Number: **58587**

Question	T/F/NA	Comment
Samples were collected by ETL employee as per SOP-SAM-1	NA	
The cooler's custody seal, if present, is intact.	NA	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is recorded.	True	1.0 C
Cooler Temp. is within method specified range.(0-6 C PW, 0-8 C NPW, or BAC <10 C	True	
If false, was sample received on ice within 6 hours of collection.	NA	
Based on above criteria cooler temperature is acceptable.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	NA	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	

EnviroTest Laboratories Inc.

ANALYTICAL REPORT

Job Number: 420-58624-1

SDG Number: 01547034.0001

Job Description: Mamaroneck

For:
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Attention: Mr. Kevin Hogan

Renee M. Cusack

Renee Cusack
Lab Director
rcusack@envirotestlaboratories.com
09/04/2012

cc: Ms. Katherine Clubine

The test results in this report meet all NELAP requirements unless specified within the case narrative. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory. EnviroTest Laboratories Inc. certifies that the analytical results contained herein apply only to the samples tested as received by our laboratory. All questions regarding this report should be directed to the EnviroTest Customer Service Representative.

EnviroTest Laboratories, Inc. Certifications and Approvals: NELAP Accredited, NYSDOH 10142, NJDEP NY015, CTDOPH PH-0554, EPA NY00049.

METHOD SUMMARY

Client: Arcadis US, Inc.

Job Number: 420-58624-1
Sdg Number: 01547034.0001

Description	Lab Location	Method	Preparation Method
Matrix: Water			
Membrane Filter Technique - Fecal Coliform Procedure	EnvTest	SM18 SM 9222D	

Lab References:

EnvTest = EnviroTest

Method References:

SM18 = "Standard Methods For The Examination Of Water And Wastewater", 18th Edition, 1992.

SAMPLE SUMMARY

Client: Arcadis US, Inc.

Job Number: 420-58624-1
Sdg Number: 01547034.0001

Lab Sample ID	Client Sample ID	Client Matrix	Date/Time Sampled	Date/Time Received
420-58624-1	LOC 3_A	Water	08/31/2012 0925	08/31/2012 1500
420-58624-2	IOC 3_B	Water	08/31/2012 0930	08/31/2012 1500
420-58624-3	LOC 4_A	Water	08/31/2012 1130	08/31/2012 1500
420-58624-4	LOC 4_B	Water	08/31/2012 1135	08/31/2012 1500
420-58624-5	OFS2_A	Water	08/31/2012 1220	08/31/2012 1500
420-58624-6	OFS2_B	Water	08/31/2012 1225	08/31/2012 1500
420-58624-7	OFS1_A	Water	08/31/2012 1240	08/31/2012 1500
420-58624-8	OFS1_B	Water	08/31/2012 1250	08/31/2012 1500

Mr. Kevin Hogan
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Job Number: 420-58624-1
Sdg Number: 01547034.0001

Client Sample ID: **LOC 3_A**
Lab Sample ID: **420-58624-1**

Date Sampled: 08/31/2012 0925
Date Received: 08/31/2012 1500
Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Method: SM 9222D		Date Analyzed:	08/31/2012 1536	
Coliform, Fecal	2500	CFU/100mL	100	100

Mr. Kevin Hogan
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Job Number: 420-58624-1
Sdg Number: 01547034.0001

Client Sample ID: **IOC 3_B**
Lab Sample ID: **420-58624-2**

Date Sampled: 08/31/2012 0930
Date Received: 08/31/2012 1500
Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Method: SM 9222D		Date Analyzed:	08/31/2012 1536	
Coliform, Fecal	1050	CFU/100mL	10.0	10

Mr. Kevin Hogan
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Job Number: 420-58624-1
Sdg Number: 01547034.0001

Client Sample ID: **LOC 4_A**
Lab Sample ID: **420-58624-3**

Date Sampled: 08/31/2012 1130
Date Received: 08/31/2012 1500
Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Method: SM 9222D		Date Analyzed:	08/31/2012 1536	
Coliform, Fecal	1100	CFU/100mL	100	100

Mr. Kevin Hogan
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Job Number: 420-58624-1
Sdg Number: 01547034.0001

Client Sample ID: **LOC 4_B**
Lab Sample ID: **420-58624-4**

Date Sampled: 08/31/2012 1135
Date Received: 08/31/2012 1500
Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Method: SM 9222D		Date Analyzed:	08/31/2012 1558	
Coliform, Fecal	400	CFU/100mL	100	100

Mr. Kevin Hogan
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Job Number: 420-58624-1
Sdg Number: 01547034.0001

Client Sample ID: **OFS2_A**
Lab Sample ID: **420-58624-5**

Date Sampled: 08/31/2012 1220
Date Received: 08/31/2012 1500
Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Method: SM 9222D		Date Analyzed:	08/31/2012 1558	
Coliform, Fecal	26000	CFU/100mL	1000	1000

Mr. Kevin Hogan
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Job Number: 420-58624-1
Sdg Number: 01547034.0001

Client Sample ID: **OFS2_B**
Lab Sample ID: **420-58624-6**

Date Sampled: 08/31/2012 1225
Date Received: 08/31/2012 1500
Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Method: SM 9222D		Date Analyzed:	08/31/2012 1558	
Coliform, Fecal	31000000	CFU/100mL	1000	1000

Mr. Kevin Hogan
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Job Number: 420-58624-1
Sdg Number: 01547034.0001

Client Sample ID: **OFS1_A**
Lab Sample ID: **420-58624-7**

Date Sampled: 08/31/2012 1240
Date Received: 08/31/2012 1500
Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Method: SM 9222D		Date Analyzed:	08/31/2012 1558	
Coliform, Fecal	100	CFU/100mL	100	100

Mr. Kevin Hogan
Arcadis US, Inc.
855 Route 146 Suite 210
Clifton Park, NY 12065

Job Number: 420-58624-1
Sdg Number: 01547034.0001

Client Sample ID: **OFS1_B**
Lab Sample ID: **420-58624-8**

Date Sampled: 08/31/2012 1250
Date Received: 08/31/2012 1500
Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Method: SM 9222D		Date Analyzed:	08/31/2012 1558	
Coliform, Fecal	9000	CFU/100mL	1000	1000

EnviroTest Laboratories Inc.

CHAIN OF CUSTODY

315 Fullerton Avenue
Newburgh, NY 12550
TEL (845) 562-0890
FAX (845) 562-0841

CUSTOMER NAME: Arcadis / Malcolm Pirnie
ADDRESS: 44 S. Broadway
CITY, STATE, ZIP: White Plains, NY 10602
NAME OF CONTACT: Robert Matarazzo
PHONE NO.: 914-694-2100
PROJECT LOCATION: Mamaroneck, NY
PROJECT NUMBER / PO NO.: 015470

REPORT TYPE
STANDARD ☑ ISRA ☐
NJ REG ☐
NYASP A ☐ B ☐ CLP ☐
OTHER ____

TURNAROUND
☑ NORMAL ____
☐ QUICK ____
☐ VERBAL ____

REPORT # (Lab Use Only)
58624
SAMPLE TEMP: 15°C
SAMPLE REC'D ON ICE ☒ Y ☐ N
ph CHECK ☐ Y ☐ N
CHLORINE (RESIDUAL) ☐ Y ☐ N
REVIEWED BY: ____

NY PUBLIC WATER SUPPLIES
SOURCE ID ____
ELAP TYPE ____
FEDERAL ID ____

Matrix
DW = DRINKING WATER S = SOIL O = OIL
WW = WASTE WATER SL = SLUDGE GW = GROUND WATER

NOTE: SAMPLE TEMPERATURE UPON RECEIPT MUST BE 4° ± 2°C.

ETL #	SAMPLING DATE	TIME AM PM	COMP	GRAB	MATRIX	CLIENT I.D.	Total Number of Containers	40ml Glass HCL	Liter Amber HCL	250ml Amber Sulfuric	Liter Amber Organic Washed	250ml Plastic Nitric Acid	250ml Plastic Sodium Hydroxide	Liter Plastic	250ml Plastic Sulfuric Acid	250ml Plastic	125ml Plastic Sterile	250ml Plastic NAOH/ZN ACC	40ml Glass Sulfuric	40ml Glass	DO		ANALYSIS REQUESTED
	8/31/12	0925		X	WW	LOC3_A	1										X						Fecal Coliform
		0930		X		LOC3_B	1										X						
		1130		X		LOC4_A	1										X						
		1135		X		LOC4_B	1										X						
		1220		X		OFS2_A	1										X						
		1225		X		OFS2_B	1										X						
		1240		X		OFS1_A	1										X						
		1250		X		OFS1_B	1										X						

LAB USE ONLY

SAMPLES SUBMITTED FOR ANALYSIS WILL BE SUBJECT TO THE ETL TERMS AND CONDITIONS OF SALE UNLESS ALTERNATE TERMS ARE AGREED IN WRITING.

RELINQUISHED BY	YEC, Inc	DATE 8-31-12	TIME 1500	RECEIVED BY	EIC	DATE 8-31-12	TIME 1500
SAMPLED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME
RELINQUISHED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME

COMMENTS ____

NYSDOH 10142 NJDEP NY015 CTDOPH PH-0554 EPA NY00049

09/04/2012

LOGIN SAMPLE RECEIPT CHECK LIST

Client: Arcadis US, Inc.

Job Number: 420-58624-1
Sdg Number: 01547034.0001

Login Number: 58624

Question	T/F/NA	Comment
Samples were collected by ETL employee as per SOP-SAM-1	NA	
The cooler's custody seal, if present, is intact.	NA	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is recorded.	True	1.5 C
Cooler Temp. is within method specified range.(0-6 C PW, 0-8 C NPW, or BAC <10 C	True	
If false, was sample received on ice within 6 hours of collection.	NA	
Based on above criteria cooler temperature is acceptable.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	NA	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	

Technical Memo
Mamaroneck Outfall and River Sampling

APPENDIX

B

Water Quality Parameters Results

Mamaroneck- River Sampling Data Sheet

Location	Date	Time	pH	Cond	Turb	DO	Temp	Sal	TDS	σ	ORP
				ms/cm	NTU	mg/L	deg C	%	g/L	oT	mV
LOC5_A	8/30/2012	925	6.09	1.09	0.7	6.30	19.36	0.5	0.591	0.0	92
LOC5_B	8/30/2012	930	6.32	1.1	0.8	6.49	19.08	0.5	0.704	0.0	95
LOC1_A	8/30/2012	1105	6.88	0.482	0.4	5.75	19.90	0.2	0.313	0.0	79
LOC1_B	8/30/2012	1110	6.99	0.479	0.3	5.79	19.94	0.2	0.306	0.0	81
LOC2_A	8/30/2012	1230	6.74	1.21	2.1	8.29	23.40	0.6	0.775	0.0	167
LOC2_B	8/30/2012	1235	6.97	1.20	1.0	5.23	23.47	0.6	0.781	0.0	159

Date_____

Task 2 - Mamaroneck Sampling Data Sheet

Location	Date	Time	pH	Cond ms/cm	Turb NTU	DO mg/L	Temp deg C		TDS g/L	σ oT	ORP mV	
Outfall 4	10/22/12	1005	6.14	0.626	0.0	6.96	18.05	0.3	0.401	0.0	275	
Outfall 10	10/22/12	1110	6.88	0.166	7.4	9.04	18.01	0.1	0.075	0.0	222	
Outfall 9	10/22/12	1130	7.97	1.03	0.0	5.66	18.54	0.5	0.656	0.0	199	
Outfall 7	10/22/12	—	—	—	—	—	—	—	—	—	—	Dry
Outfall 17	10/22/12	1235	7.96	0.488	0.0	9.71	15.78	0.2	0.317	0.0	208	
Outfall 24	10/22/12	1325	8.04	0.766	0.0	13.05	16.84	0.4	0.490	0.0	203	
Outfall 30	10/23/12	1015	6.42	0.517	8.6	9.44	15.95	0.2	0.331	0.0	191	
Outfall 43	10/23/12	—	—	—	—	—	—	—	—	—	—	Surcharge
Outfall 47	10/23/12	1130	7.04	0.500	0.0	16.68	16.52	0.2	0.325	0.0	231	
Outfall 55	10/23/12		—	—	—	—	—	—	—	—	—	

Date 10/22/12 - 10/23
Page

Technical Memo
Mamaroneck Outfall and River Sampling

APPENDIX

C

Outfall Inspection Forms and Summary

Village of Mamaroneck Outfall Sampling Event
8-31-2012, 10-22-2012 and 10-23-2012

Outfall ID	Date	Time	Flow Determination	Evidence of Illicit Discharge	Structural Problems	Flow (gpm)	Analytical Results	Pollutant Load [2]
5	10/22/2012	9:35		Gray color, rancid sewer odor, moderate floatables		0.05	320,000	0.872
4	10/22/2012	10:00	bucket			0.50	100	0.003
10	10/22/2012	10:05	bucket	Gray bacteria growth		0.75	13,000	0.531
9	10/22/2012	11:28	bucket	Mild bacteria growth	Seperated joint, soil entering pipe, root growth	3.75	100	0.020
17	10/22/2012	12:30	velocity meter	Sewage odor, mild gray bacteria growth, mild floatables		11.24	3,400	2.083
24	10/22/2012	13:20	bucket			4.00	500	0.109
30	10/23/2012	9:50	visual	Mild brown color, oil sheen, opaque, mild gray bacteria		10.00	600	0.327
43	10/23/2012	11:00	visual	(Stagnant) Slightly turbid		Stagnant	NA	-
47	10/23/2012	11:45	bucket	Mild mildew odor, cloudy	Poor condition	2.50	1,200	0.164
55	10/23/2012	12:15	visual	(Stagnant) mild brown color, cloudy		Stagnant	NA	-
25[1] (Old ID 51)	8/31/2012	12:15	visual	Faint yellow color and sewage odor		5	100	0.027252
25[1] (Old ID 51)	8/31/2012	12:30	visual	Faint yellow color and sewage odor		5	9,000	2.45268
26 [1] (Old ID 52)	8/31/2012	12:15	visual			10	26,000	14.17104
26 [1] (Old ID 52)	8/31/2012	12:30	visual			10	31,000,000	16896.24

Notes:

(1) Outfall IDs 51 and 52 represent the old GIS outfall IDs, which were replaced by the new IDs 25 and 26. These samples were colleted prior to receiving the new GIS from Woodard and Curran. Two samples were collected from these outfalls, as they were collected the same day as the river samples and the field team was using the same protocol.

(2) Pollutant Load = Flow in gallons per minute *60 minutes/hour*24 hours/day*Fecal Coliform CFU/100 ml *3.785 liters in a gallon *10 (100 ml) in a liter)/1000000000 = Billion CFU/Day.

OUTFALL INSPECTION PROGRAM

STRUCTURE

Structure ID	25 (old ID 51)	Diameter (in)	24
Material	Concrete	Submerged in Water	NO
Shape	Cir	Submerged in Sediment	NO
Quantity	1		

INSPECTION EVENT

Inspector	BC	Air Temperature (F)	80°F
Date	8-31-12	Rainfall, Past 24 hrs (in)	0
Time	12:30	Rainfall, Past 48 hrs (in)	0

INSPECTION EVENTCOMMENTS

Location perpendicular to Station Plaza

Photo Numbers

ASSESSMENT

Structural Condition	Good
Operational Condition	Good
Illicit Discharge Potential	Potential

FLOW

Flow Description	Shallow
Flow (gpm)	5 gpm
Determination:	Visual

FIELD PARAMETERS

Sample Temperature (F)	
Sample pH	
Sample Ammonia (mg/mL)	

DISCHARGE CHARACTERISTICS

Color	Faint yellow	Turbidity	clear	Flow Line	—
Color Strength	Faint	Floatables (Suds)	None	Abnormal Vegatation	None
Odor Type	Sewage	Floatables (Sewage)	None	Bacteria Growth	None
Odor Severity	Faint	Floatables (Oil)	None		

POOL QUALITY

Color	Nit	Suds	
Color Strength		Oil Sheen	
Odor		Algae	
Odor Severity			

POOL QUALITY COMMENTS

Display Multiple Image

OUTFALL INSPECTION PROGRAM

STRUCTURE

Structure ID	26 (Old ID 52)	Diameter (in)	30"
Material	Concrete	Submerged in Water	—
Shape	Cir	Submerged in Sediment	—
Quantity	1		

INSPECTION EVENT

Inspector	BC	Air Temperature (F)	80°F
Date	8-31-12	Rainfall, Past 24 hrs (in)	0
Time	12:15	Rainfall, Past 48 hrs (in)	0

INSPECTION EVENTCOMMENTS

Outfall in wall of Halstead Ave overpass

Photo Numbers

ASSESSMENT

Structural Condition	Fair
Operational Condition	Fair
Illicit Discharge Potential	potential

FLOW

Flow Description	Shallow
Flow (gpm)	~ 10gpm
Determination:	Usual

FIELD PARAMETERS

Sample Temperature (F)	
Sample pH	
Sample Ammonia (mg/mL)	

DISCHARGE CHARACTERISTICS

Color	Clear	Turbidity	Clear	Flow Line	None
Color Strength	N/A	Floatables (Suds)	None	Abnormal Vegatation	None
Odor Type	~~[illegible]~~ None	Floatables (Sewage)	None	Bacteria Growth	None
Odor Severity	N/A	Floatables (Oil)	None		

POOL QUALITY

Color	N/A	Suds	
Color Strength		Oil Sheen	
Odor		Algae	
Odor Severity			

POOL QUALITY COMMENTS

☐ Display Multiple Image

OUTFALL INSPECTION PROGRAM

STRUCTURE

Structure ID	Outfall 5	Diameter (in)	18
Material	Concrete	Submerged in Water	No
Shape	Circular	Submerged in Sediment	No
Quantity	Single		

INSPECTION EVENT

Inspector	JB, JC	Air Temperature (F)	56
Date	10/22/12	Rainfall, Past 24 hrs (in)	0
Time	0935	Rainfall, Past 48 hrs (in)	0

INSPECTION EVENTCOMMENTS

Sample collected over a period of of 24 hrs from dripping flow.

Photo Numbers: 1-4

ASSESSMENT

Structural Condition	Good
Operational Condition	Good
Illicit Discharge Potential	Obvious

FLOW

Flow Description	Drip
Flow (gpm)	N/A
Determination:	Visual

FIELD PARAMETERS

see attached

Sample Temperature (F)	-
Sample pH	-
Sample Ammonia (mg/mL)	-

DISCHARGE CHARACTERISTICS

Color	Gray	Turbidity	Cloudy	Flow Line	None
Color Strength	Clearly visible in bottle	Floatables (Suds)	None	Abnormal Vegatation	None
Odor Type	Rancid/Sewage	Floatables (Sewage)	Moderate	Bacteria Growth	None
Odor Severity	Severe	Floatables (Oil)	None		

POOL QUALITY

Color	-	Suds	-
Color Strength	-	Oil Sheen	-
Odor	-	Algae	-
Odor Severity	-		

POOL QUALITY COMMENTS

No pooling observed.

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OUTFALL INSPECTION PROGRAM

STRUCTURE

Structure ID	Outfall 4	Diameter (in)	18
Material	Concrete	Submerged in Water	No
Shape	Circular	Submerged in Sediment	No
Quantity	Single		

INSPECTION EVENT

Inspector	JB, JC	Air Temperature (F)	60
Date	10/22/12	Rainfall, Past 24 hrs (in)	0
Time	1000	Rainfall, Past 48 hrs (in)	0

INSPECTION EVENTCOMMENTS

Protruding pipe has a cracked/ missing bottom.

Photo Numbers: 5-8

ASSESSMENT

Structural Condition	Fair
Operational Condition	Fair
Illicit Discharge Potential	Potential

FLOW

Flow Description	Trickle
Flow (gpm)	0.5
Determination:	Bucket

FIELD PARAMETERS

see attached

Sample Temperature (F)	-
Sample pH	-
Sample Ammonia (mg/mL)	-

DISCHARGE CHARACTERISTICS

Color	Clear	Turbidity	Clear	Flow Line	None
Color Strength	Clear	Floatables (Suds)	None	Abnormal Vegatation	None
Odor Type	None	Floatables (Sewage)	None	Bacteria Growth	None
Odor Severity	None	Floatables (Oil)	None		

POOL QUALITY

Color	Clear	Suds	-
Color Strength	Clear	Oil Sheen	-
Odor	None	Algae	-
Odor Severity	None		

POOL QUALITY COMMENTS

Display Multiple Image

Water height: 1/8 inch

OUTFALL INSPECTION PROGRAM

STRUCTURE

Structure ID	Outfall 10	Diameter (in)	24
Material	Concrete	Submerged in Water	No
Shape	Circular	Submerged in Sediment	No
Quantity	Single		

INSPECTION EVENT

Inspector	JB, JC	Air Temperature (F)	60
Date	10/22/12	Rainfall, Past 24 hrs (in)	0
Time	1005	Rainfall, Past 48 hrs (in)	0

INSPECTION EVENTCOMMENTS

Shifted at joints slightly.
6'' steel pipe protruding next to Outfall

Photo Numbers: 12-13

ASSESSMENT

Structural Condition	Good
Operational Condition	Good
Illicit Discharge Potential	Potential

FLOW

Flow Description	Trickle
Flow (gpm)	0.75
Determination:	Bucket

FIELD PARAMETERS

see attached

Sample Temperature (F)	-
Sample pH	-
Sample Ammonia (mg/mL)	-

DISCHARGE CHARACTERISTICS

Color	Clear	Turbidity	Clear	Flow Line	Slight
Color Strength	Clear	Floatables (Suds)	None	Abnormal Vegatation	None
Odor Type	None	Floatables (Sewage)	None	Bacteria Growth	Gray
Odor Severity	None	Floatables (Oil)	None		

POOL QUALITY

Color	Clear	Suds	-
Color Strength	Clear	Oil Sheen	-
Odor	None	Algae	-
Odor Severity	None		

POOL QUALITY COMMENTS

☐ Display Multiple Image

Water height: 1/4 inch

OUTFALL INSPECTION PROGRAM

STRUCTURE

Structure ID	Outfall 9	Diameter (in)	30
Material	Concrete	Submerged in Water	No
Shape	Circular	Submerged in Sediment	No
Quantity	Single		

INSPECTION EVENT

Inspector	JB, JC	Air Temperature (F)	62
Date	10/22/12	Rainfall, Past 24 hrs (in)	0
Time	1128	Rainfall, Past 48 hrs (in)	0

INSPECTION EVENTCOMMENTS

Break in joint ~4' inside pipe.
Substantial root growth.

Photo Numbers: 15-18

ASSESSMENT

Structural Condition	Good
Operational Condition	Good
Illicit Discharge Potential	Potential

FLOW

Flow Description	Moderate
Flow (gpm)	3.75
Determination:	Bucket

FIELD PARAMETERS

see attached

Sample Temperature (F)	-
Sample pH	-
Sample Ammonia (mg/mL)	-

DISCHARGE CHARACTERISTICS

Color	Clear	Turbidity	Clear	Flow Line	None
Color Strength	Clear	Floatables (Suds)	None	Abnormal Vegatation	Roots
Odor Type	None	Floatables (Sewage)	None	Bacteria Growth	Mild Gray
Odor Severity	None	Floatables (Oil)	None		

POOL QUALITY

Color	Clear	Suds	-
Color Strength	Clear	Oil Sheen	-
Odor	None	Algae	-
Odor Severity	None		

POOL QUALITY COMMENTS

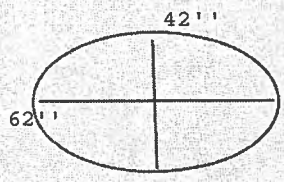
Display Multiple Image

Water height: 3/8 inch

OUTFALL INSPECTION PROGRAM

STRUCTURE

Structure ID	Outfall 17	Diameter (in)	64
Material	Metal	Submerged in Water	yes
Shape	Elliptical	Submerged in Sediment	No
Quantity	Single		



INSPECTION EVENT

Inspector	JB, JC	Air Temperature (F)	62
Date	10/22/12	Rainfall, Past 24 hrs (in)	0
Time	1230	Rainfall, Past 48 hrs (in)	0

INSPECTION EVENTCOMMENTS

Break in joint ~4' inside pipe.
Substantial root growth.

Photo Numbers: 23-24

ASSESSMENT

Structural Condition	Good
Operational Condition	Good
Illicit Discharge Potential	Potential

FLOW

Flow Description	Heavy
Flow (gpm)	see below
Determination:	Velocity meter

FIELD PARAMETERS

see attached

Sample Temperature (F)	-
Sample pH	-
Sample Ammonia (mg/mL)	-

DISCHARGE CHARACTERISTICS

Color	Clear	Turbidity	Clear	Flow Line	Yes
Color Strength	Clear	Floatables (Suds)	Mild	Abnormal Vegatation	-
Odor Type	Sewage	Floatables (Sewage)	None	Bacteria Growth	Mild Gray
Odor Severity	Mild	Floatables (Oil)	None		

POOL QUALITY

Color	-	Suds	-
Color Strength	-	Oil Sheen	-
Odor	-	Algae	-
Odor Severity	-		

POOL QUALITY COMMENTS

No pooling observed.

Display Multiple Image

Water height: 2.75 inches

Average/ Maximum :
0.57/0.6
0.55/0.6
0.57/0.6

OUTFALL INSPECTION PROGRAM

STRUCTURE

Structure ID	Outfall 24	Diameter (in)	48
Material	Concrete	Submerged in Water	No
Shape	Circle	Submerged in Sediment	No
Quantity	Single		

INSPECTION EVENT

Inspector	JB, JC	Air Temperature (F)	65
Date	10/22/12	Rainfall, Past 24 hrs (in)	0
Time	1320	Rainfall, Past 48 hrs (in)	0

INSPECTION EVENTCOMMENTS

Grate collects debris and leaves; blocks flow.

Photo Numbers: 25-28

ASSESSMENT

Structural Condition	Good
Operational Condition	Good
Illicit Discharge Potential	Potential

FLOW

Flow Description	Moderate
Flow (gpm)	4
Determination:	Bucket

FIELD PARAMETERS

see attached

Sample Temperature (F)	-
Sample pH	-
Sample Ammonia (mg/mL)	-

DISCHARGE CHARACTERISTICS

Color	Clear	Turbidity	Clear	Flow Line	Yes
Color Strength	Clear	Floatables (Suds)	None	Abnormal Vegatation	-
Odor Type	None	Floatables (Sewage)	None	Bacteria Growth	-
Odor Severity	None	Floatables (Oil)	None		

POOL QUALITY

Color	Gray	Suds	None
Color Strength	Fair	Oil Sheen	None
Odor	None	Algae	None
Odor Severity	None		

POOL QUALITY COMMENTS

Leaves and debris in pool.

Display Multiple Image

Water height: 3/4 inch

OUTFALL INSPECTION PROGRAM

STRUCTURE

Structure ID	Outfall 30	Diameter (in)	30
Material	Concrete	Submerged in Water	Yes
Shape	Circle	Submerged in Sediment	No
Quantity	Single		

INSPECTION EVENT

Inspector	JB, JC	Air Temperature (F)	60	INSPECTION EVENTCOMMENTS	Leaf test average 8sec/ft.
Date	10/23/12	Rainfall, Past 24 hrs (in)	0		
Time	0950	Rainfall, Past 48 hrs (in)	0	Photo Numbers	30-31

ASSESSMENT

Structural Condition	Good
Operational Condition	Good
Illicit Discharge Potential	Potential

FLOW

Flow Description	Moderate
Flow (gpm)	10
Determination:	Visual

FIELD PARAMETERS

see attached

Sample Temperature (F)	-
Sample pH	-
Sample Ammonia (mg/mL)	-

DISCHARGE CHARACTERISTICS

Color	Brown	Turbidity	Opaque	Flow Line	Yes
Color Strength	Mild	Floatables (Suds)	None	Abnormal Vegatation	-
Odor Type	None	Floatables (Sewage)	None	Bacteria Growth	Mild Gray
Odor Severity	None	Floatables (Oil)	Yes		

POOL QUALITY

Color	-	Suds	-
Color Strength	-	Oil Sheen	-
Odor	-	Algae	-
Odor Severity	-		

POOL QUALITY COMMENTS

No pooling observed.

Display Multiple Image

OUTFALL INSPECTION PROGRAM

STRUCTURE

Structure ID	Outfall 43	Diameter (in)	36
Material	Concrete	Submerged in Water	Yes
Shape	Circle	Submerged in Sediment	Yes
Quantity	Single		

INSPECTION EVENT

Inspector	JB, JC	Air Temperature (F)	60
Date	10/23/12	Rainfall, Past 24 hrs (in)	0
Time	1100	Rainfall, Past 48 hrs (in)	0

INSPECTION EVENTCOMMENTS

No flow. No sample collected.

Photo Numbers: 32-37

ASSESSMENT

Structural Condition	Good
Operational Condition	Good
Illicit Discharge Potential	Potential

FLOW

Flow Description	Stagnant
Flow (gpm)	0
Determination:	Visual

FIELD PARAMETERS

see attached

Sample Temperature (F)	-
Sample pH	-
Sample Ammonia (mg/mL)	-

DISCHARGE CHARACTERISTICS

Color	Clear	Turbidity	Murky	Flow Line	None
Color Strength	None	Floatables (Suds)	None	Abnormal Vegatation	-
Odor Type	None	Floatables (Sewage)	None	Bacteria Growth	-
Odor Severity	None	Floatables (Oil)	None		

POOL QUALITY

Color	Brown	Suds	-
Color Strength	Mild	Oil Sheen	-
Odor	None	Algae	-
Odor Severity	None		

POOL QUALITY COMMENTS

Leaves and debris.

Display Multiple Image

Water depth: 1.1 ft

Technical Memo
Mamaroneck Outfall and River Sampling

APPENDIX

D

Field Photos

Mamaroneck River Near Harbor (MRMH)- Location 5: Parking lot along river bank, at intersection of Tompkins Ave and E Prospect Ave.

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Photo Direction:

Location 5- Culvert, Tompkins Ave above. Looking upstream.

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Photo Direction:

Location 5- Looking downstream.

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Photo Direction:

Sheldrake River at West Border (SRWB)- Location 1: Park just off road on grassy patch before bridge culvert on Rockland Ave. Near Rockland Ave, Fayette Ave intersection.

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Photo Direction:

Location 1- 2 culverts, Left dry, Right with minimal flow.

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Photo Direction:

Location 1- Left culvert has no flow.

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Photo Direction:

Location 1- Right culvert has minimal flow, very shallow depths with sediment buildup.

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Photo Direction:

Location 1- Samples collected in area of best flow.

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Photo Direction:

Location 1- Looking downstream.

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Photo Direction:

Gedney Pond Stream (GPS)- Location 2. Stream is an outfall emptying into the Mamaroneck River upstream of the confluence with the Sheldrake River. Mamaroneck River in photo.

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Photo Direction:

Location 2- Outfall in wall of Jefferson Ave culvert. Parking available at Columbus Park.

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Photo Direction:

Location 2- Flow too shallow for flow measurements. Estimated discharge ~5 gpm.

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Photo Direction:

Location 2- Looking downstream at confluence of Mamaroneck and Sheldrake Rivers.

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Photo Direction:

Location 2- Jefferson Ave, culvert over Mamaroneck river. Storm sewer located just before outfall, could be used as “judgment outfall location” for future sampling.

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Photo Direction:

Location 2- Manhole on Jefferson Ave. Estimated pipe diameter to be 5’, consistent with Location 2 outfall.

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Photo Direction:

Mamaroneck Rivers South of Sheldrake (MRSS)- Location 3: Street parking is off Station Plaza (North of train station). 2 culverts pictured are for train tracks. Halstead Ave is the next downstream culvert.

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Photo Direction:

Location 3- Halstead Ave culvert. Samples collected downstream of this culvert.

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Photo Direction:

Location 3- Outfall 52 located in wall of Halstead Ave culvert. Sample collected.

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Photo Direction:

Mamaroneck River North Border (MRNB)- Location 4: Parking on concrete section of median in Mamaroneck Ave. Looking upstream.

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Photo Direction:

Outfall 5.

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Photo Direction:

Storm manhole upstream of Outfall 5.

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Photo Direction:

Outfall 5 in good structural condition, low flow observed in trough of pipe.

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Photo Direction:

Gray bacteria and rancid sewage odor observed from outfall. Collected sample over a period of 24 hours from the dripping flow.

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Photo Direction:

Outfall 4.

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Photo Direction:

Outfall 4 in fair condition; base of protruding pipe cracked/ missing.

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Photo Direction:

Flow observed trickling in Outfall 4 from upstream source(s).

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Photo Direction:

Concrete structure observed ~3 ft downstream of Outfall 4.

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Photo Direction:

Manhole observed on left bank (when facing upstream) in line with concrete structure.

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Photo Direction:

Manhole observed on left bank (when facing upstream) in line with concrete structure.

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Photo Direction:

Confirmed as a sanitary manhole.

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Photo Direction:

Outfall 10 in good condition. Protruding 6 inch pipe observed; possibly sanitary.

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Photo Direction:

Outfall 10 flow observed as a trickle during sample collection.

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Photo Direction:

Concrete structure downstream of Outfalls 10 and 9; possibly sanitary.

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Photo Direction:

Outfall 9.

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Photo Direction:

Outfall 9 flow observed as moderate during sample collection.

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Photo Direction:

Break in joint observed 4 ft back inside pipe.

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Photo Direction:

Abnormal vegetation and heavy root growth observed in Outfall 9.

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Photo Direction:

Outfall 17.

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Photo Direction:

Outfall 17 in good condition. Mild sewage odor detected, and bacteria observed in base of pipe.

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Photo Direction:

Outfall 24.

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Photo Direction:

Outfall 24 pool created by debris of leaves inside outfall grate.

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Photo Direction:

Flow observed as moderate during time of sampling.

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Photo Direction:

Outfall 24 in good structural condition.

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Photo Direction:

Hose observed in river upstream of Outfall 30. Assumed source is from the adjacent auto business.

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Photo Direction:

Outfall 30 submerged in water. Pipe in good condition.

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Photo Direction:

Outfall 30 inlet moderate flow.

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Photo Direction:

Outfall 43.

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Photo Direction:

Outfall 43 has no flow. No sample collected.

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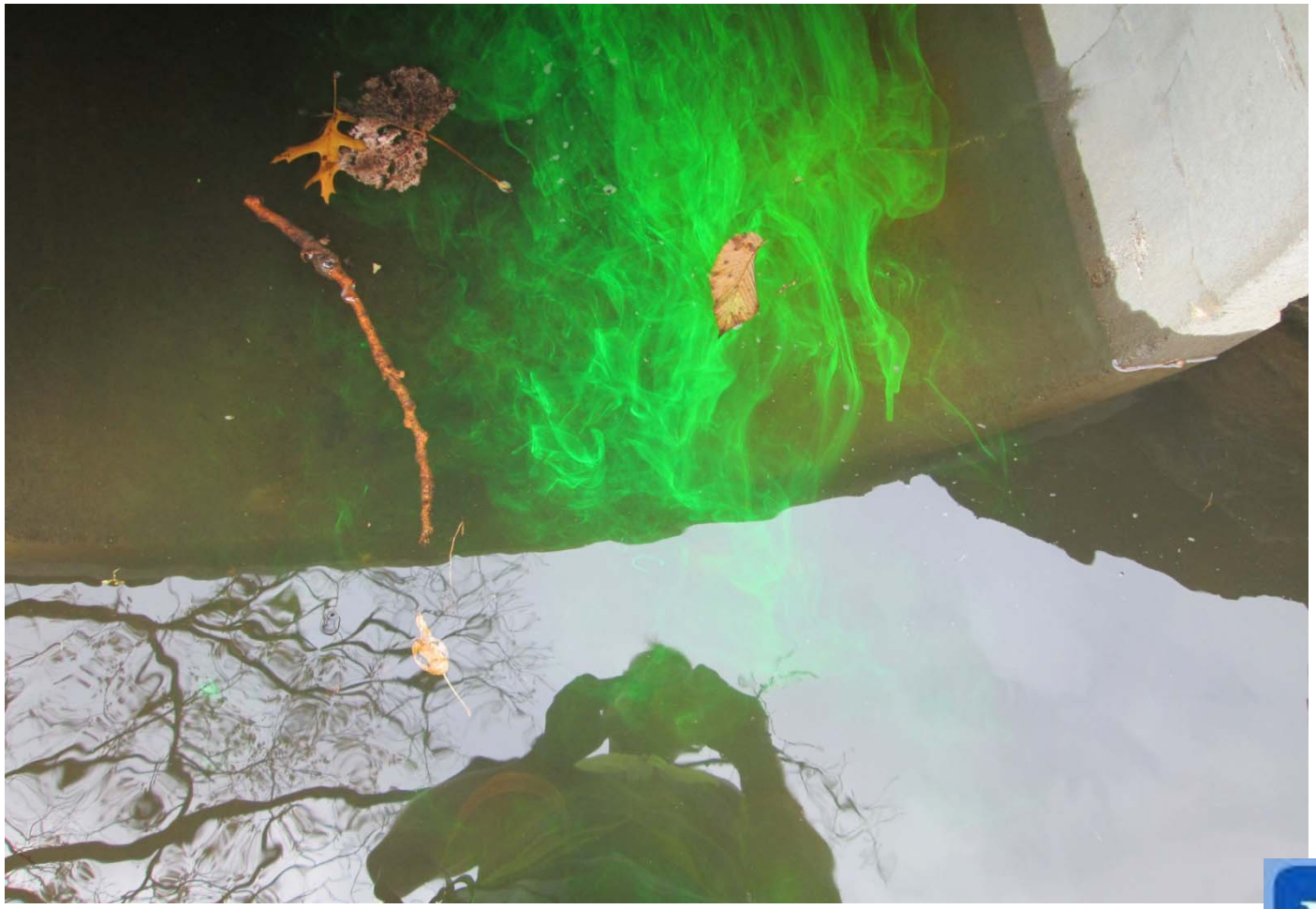
Photo Direction:



Stagnant flow from Outfall 43 confirmed using green dye. Photos show backflow.

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Photo Direction:

Stagnant flow from Outfall 43 confirmed using green dye.

YEC
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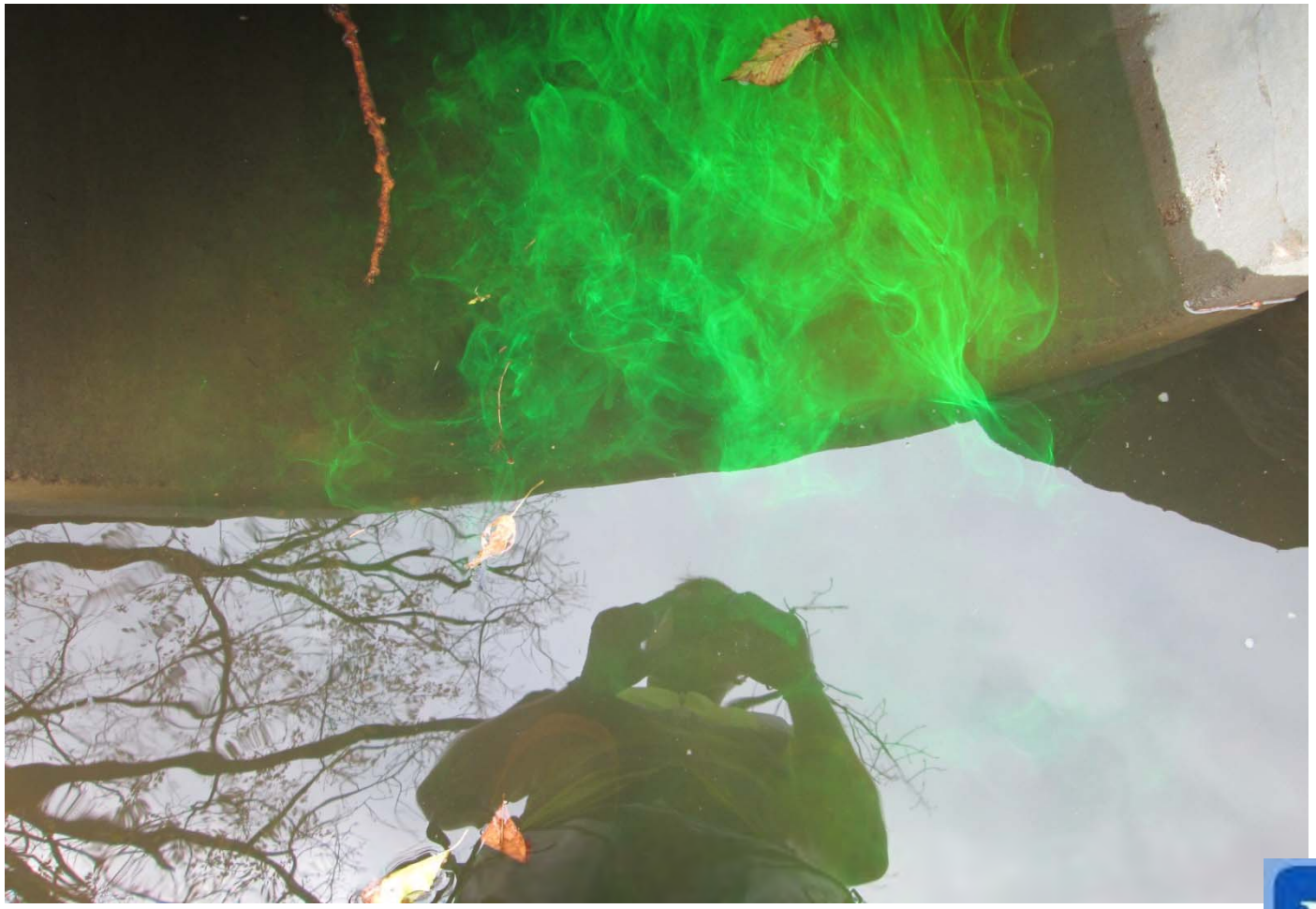
Photo Direction:



Stagnant flow from Outfall 43 confirmed using green dye.

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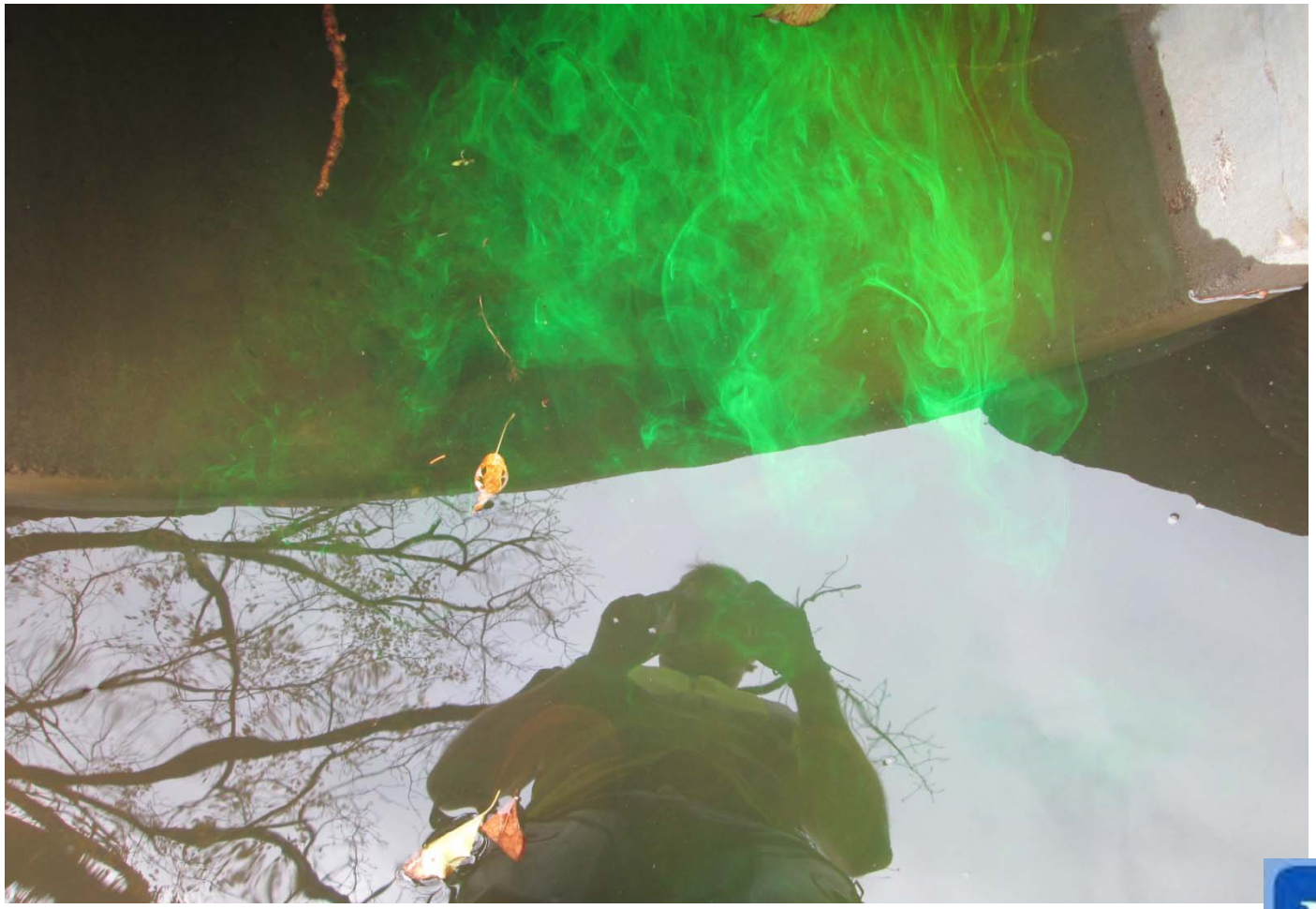
Photo Direction:



Stagnant flow from Outfall 43 confirmed using green dye.

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Photo Direction:

Outfall 47.

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Photo Direction:

Outfall 47 has a trickle flow during time of sample collection.

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Photo Direction:

Outfall 47 in poor condition. Steel pipe is shifted. 18 inches into pipe bottom it discontinues for 5 ft.

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Photo Direction:

Outfall 55.

YEC

Environmental Engineering

Photo Direction:

Outfall 55 is surcharged into the pipe.

YEC

Environmental Engineering

Photo Direction:

No flow observed; heavy in debris and leaves. No sample collected.

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Environmental Engineering

Photo Direction: