



PORTSMOUTH IDDE | REPORT



TO: Terry Desmarais & Ray Pezzullo, City of Portsmouth
FROM: Laura Diemer, FB Environmental Associates
SUBJECT: **Portsmouth IDDE Summary Report for Marcy St/Prescott Park**
DATE: May 10, 2017
CC: Forrest Bell, FB Environmental Associates

FB Environmental Associates (FBE) assisted the City of Portsmouth with Illicit Discharge Detection and Elimination (IDDE) monitoring and investigation efforts within the drainage area to OF 12564 near Marcy Street and Prescott Park in Portsmouth, NH. Samples were collected during dry weather (<0.1" rain within 24 hours) at low tide from the outfall (OF 12564), as well as from flowing inflow pipes at major manhole/catchbasin junctions draining to the outfall (DMH 5430, DMH 5340, and DMH 5426; Table 1, Figure 1). Sandbags were used to dam up a flowing pipe that was too shallow to sample adequately with a sample bottle. Sampling followed protocols set forth in the IDDE Guidance Manual developed in 2004 by the Center for Watershed Protection. Samples collected by the City of Portsmouth on 2/23/17 were not included due to improper sample collection (disturbance of sediment in manhole at upstream junction from outfall) and the influence of sediment-laden snowmelt (that likely carried high levels of fecal indicator bacteria). Samples were analyzed by Absolute Resources Associates for ammonia, potassium, surfactants, E. coli, Enterococci, and fluoride. A YSI 30 field meter was used to measure temperature and salinity.



OF 12564 sampled on 5/3/2017. Photo: FBE.

Table 1. Summary of sampling event conditions.

DATE	4634 (Sump)	9202 (Inlet Pipe)	5426 (Sump)	9210 (Inlet Pipe)	9254 (Inlet Pipe)	9062 (Inlet Pipe)	5430 (Sump)	OF12564 (Outfall)	SAMPLER	LOW TIDE	PRIOR 24 HR PRECIP (IN)
2/21/2017							x	x	Portsmouth	13:41	0
3/2/2017	x	x	x	x	x	x	x	x	Portsmouth	7:45	0
4/17/2017			NF	x	x	x		x	Portsmouth/FBE on site	10:20	0
5/3/2017			NF	x	x	x		x	FBE	12:16	0

Low tide based on US Harbors - Seavey Island

Precipitation amounts based on Weather Underground - Pease International Tradeport

NF = no flow

RESULTS

Flows were moderate to low at sampled outfalls and inflow pipes. No odors, colors, turbidity, or floatables were observed on any of the sampling dates, though a small amount of foam was observed on the surface on the sump water at DMH 5430 (Table 2). A seepage was noted in the sidewall of DMH 5430, but low flow conditions did not allow for proper sampling of the inflow; the seepage was below the elevation of the water table and was likely groundwater. Refer to Appendix A and B for field sheets, laboratory results, and chain of custody forms.

It is important to note that IDDE work is particularly challenging in tidally-influenced stormwater systems. The high salt concentrations (i.e., salinity) interfere with fluoride analyses, complicate the interpretation of potassium as an indicator of industrial discharge, and impact fecal indicator bacteria survival. Figure 2 displays the high collinearity of salinity and total potassium in collected samples, indicating that much of the potassium measured was likely sourced naturally from marine waters. However, the chemical ions contributing to salinity always occur in the same relative proportion to each other. Using in-field salinity measurements, we can calculate the expected concentration of potassium and fluoride from seawater; the difference between measured and expected concentrations of potassium and fluoride give us the possible human-sourced component.

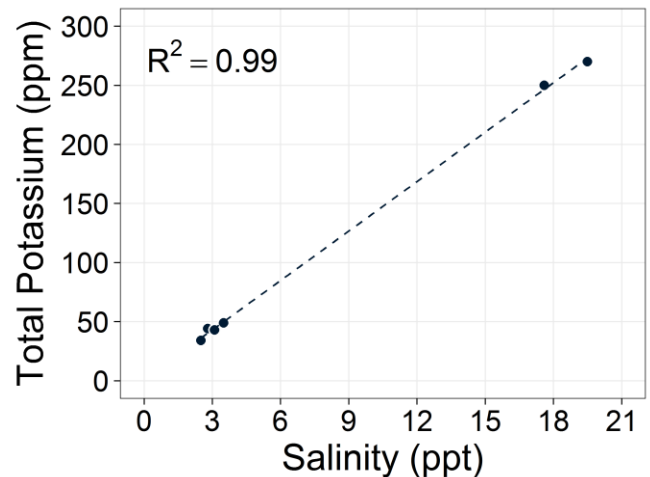
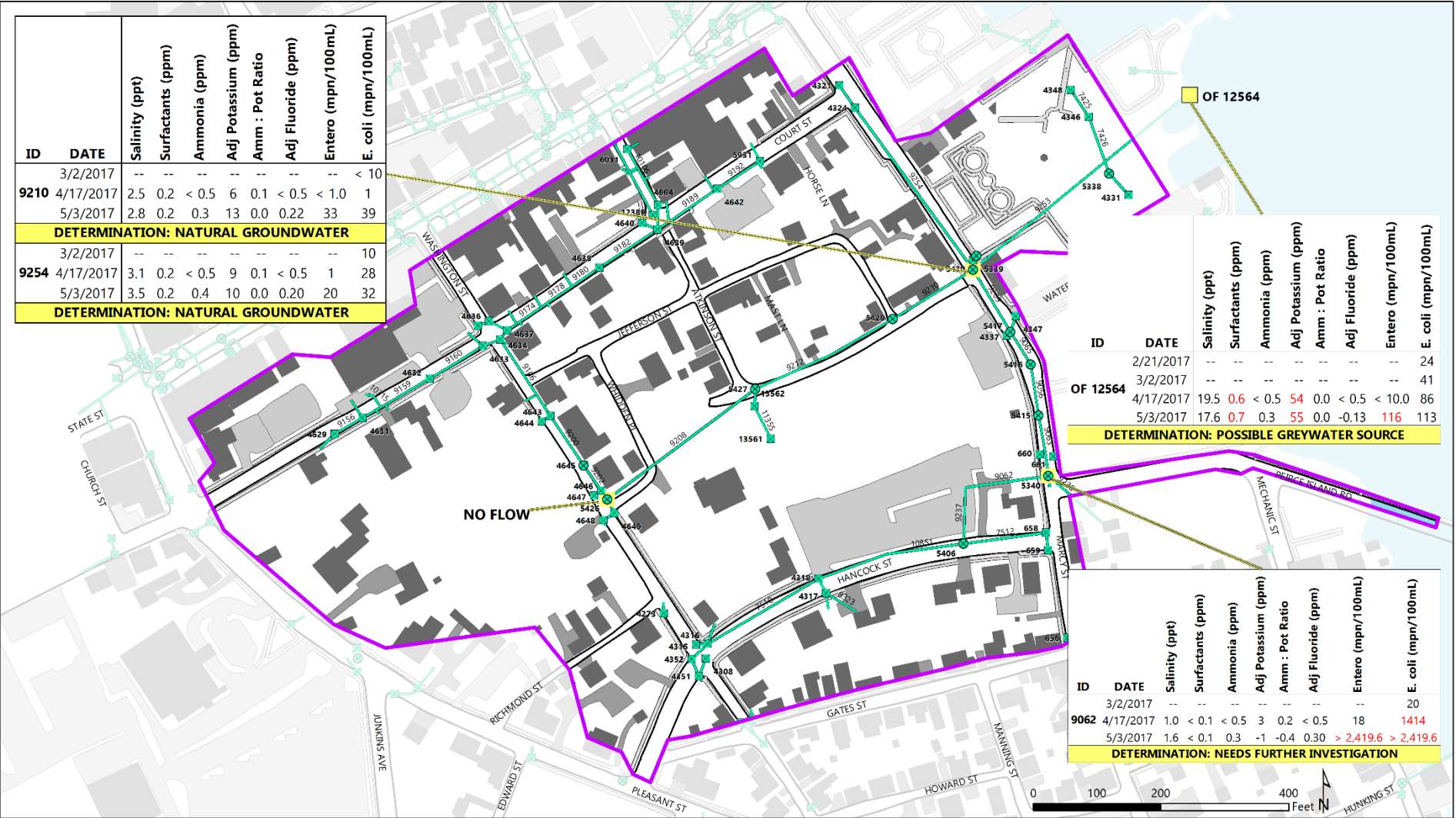


Figure 2. Total potassium is highly related to the salinity of each sample. Potassium is one of several contributing ions to salinity.

Overall, results showed no indication of sewage contamination within the drainage area to OF 12564 (Figure 1; Table 3). CCTV line inspections by City staff on 3/7/17, 3/17/17, 3/20/17, and 3/21/17 also showed no indication of line breaks or points of possible contamination (Figure 2; Appendix C). The outfall itself showed elevated levels of surfactants, potassium, and chlorine, which suggests a possible greywater source; however, the relatively low readings for surfactants, potassium, and chlorine indicate that the possible greywater source was minor and was likely from one or two small, non-commercial buildings or from surface runoff. Elevated fecal indicator bacteria were also measured at inlet pipe 9062 on Marcy Street, which drains Hancock Street. Since the other indicator parameters were low and did not signify sewage or greywater contamination, elevated fecal indicator bacteria alone likely does not constitute a sewage contamination. Bacteria can proliferate on sediment, which was observed during CCTV line inspections; thus, the high bacteria counts were likely from regrowth within the stormwater pipe.

NEXT STEPS

- Sediment within the pipes feeding to inlet pipe 9062 should be cleaned out and the manholes at and upstream of inlet pipe 9062 should be resampled for all indicators. If fecal indicator bacteria (along with the other indicators) come back low and within acceptable limits, then we can determine that the source of flow to inlet pipe 9062 is natural groundwater.
- OF 12564 showed a possible greywater source, which should be followed up with upstream source identification.



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Prepared by L. Diemer, FBE 05-09-17
Projected in NAD 1983 State Plane NH
Data Source: City of Portsmouth

Project Area

- Catchment Area
- Catchbasin
- Drain Manhole
- Drain Separator
- Stormwater Drain Pipe
- Walkways
- Road Edge
- Parking Lots
- Driveways
- Buildings
- Open Water

0 100 200 400 Feet

Portsmouth IDDE
Marcy St - Prescott Park

Figure 1. Map of sampling locations and results.

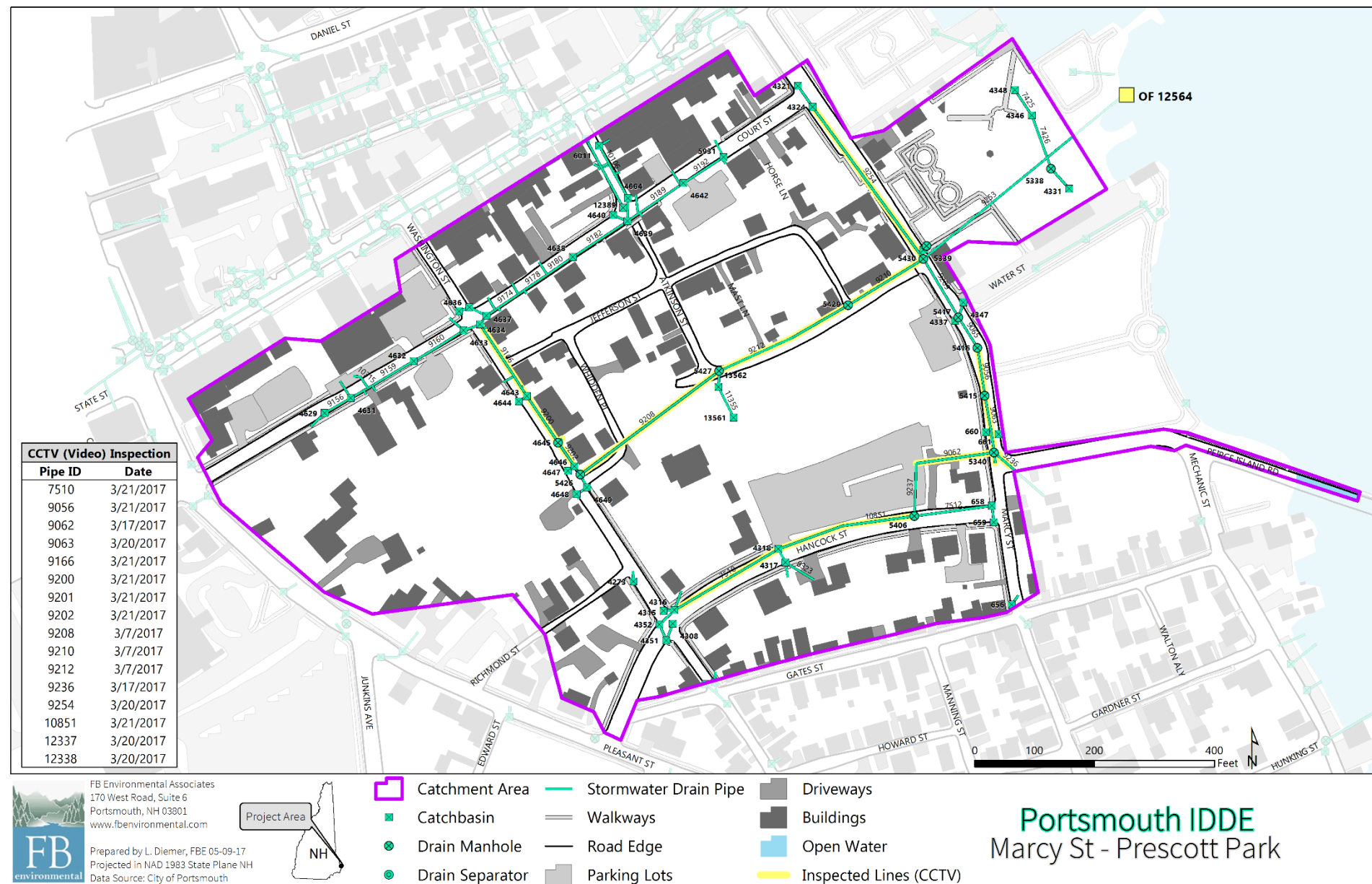


Figure 2. Map of inspected stormwater lines by CCTV (video).

Table 2. Physical condition summary of sampling sites.

SITE ID	TYPE	DATE	FLOW?	FLOW RATE	ODOR	COLOR	TURBIDITY	FLOATABLES	Notes
5430	Sump	2/21/2017	yes	--	None	Clear	None	None	--
OF12564	Outfall		yes	--	None	Clear	None	None	--
4634	Sump	3/2/2017	yes	--	None	Clear	None	None	--
9202	Inlet pipe		yes	--	None	Clear	None	None	--
5426	Sump		yes	--	None	Clear	None	None	--
9210	Inlet pipe		yes	--	None	Clear	None	None	--
9254	Inlet pipe		yes	--	None	Clear	None	None	--
9062	Inlet pipe		yes	--	None	Clear	None	None	--
5430	Sump		yes	--	None	Clear	None	None	--
OF12564	Outfall		yes	--	None	Clear	None	None	--
5426	Sump	4/17/2017	no	--	None	Clear	None	None	Eel in sump.
9210	Inlet pipe		yes	Moderate	None	Clear	None	None	Water exited pipe about 0.5-1 ft above sump.
9254	Inlet pipe		yes	Low	None	Clear	None	None	Sample bottles were placed on structure wall to collect sample.
9062	Inlet pipe		yes	Low	None	Clear	None	None	Sheet flow; sample collected by placing lip of bottle onto floor. Seepage coming from plugged former sewer line.
OF12564	Outfall		yes	Low	None	Clear	None	None	Higher-than-normal low tide influencing effluent.
5426	Sump	5/3/2017	no	--	None	Clear	None	None	--
9210	Inlet pipe		yes	Moderate	None	Clear	None	None	Some foam on surface of sump water.
9254	Inlet pipe		yes	Low	None	Clear	None	None	More flow than 4/17/17 sampling.
9062	Inlet pipe		yes	Low	None	Clear	None	None	Sheet flow; sample collected in dammed pool using sandbag.
OF12564	Outfall		yes	Moderate	None	Clear	None	None	Some trash in flow.

Table 3. Parameter and source results summary for sampling sites. Red text indicates exceedance of recommended threshold or limit. Adjusted negative values for potassium and fluoride indicate that results were within the accuracy of the measuring instrument.

SITE ID	TYPE	DATE	Temp (°C)	Salinity (ppt)	Conductivity (mS/cm)	Surfactants (ppm)	Total Ammonia (ppm)	Total Ammonia - Test Strip (ppm)	Potassium (ppm)	Adjusted Potassium (ppm)	Ammonia : Potassium Ratio	Fluoride (ppm)	Adjusted Fluoride (ppm)	Chlorine (ppm)	Enterococci (mpn/100mL)	E. coli (mpn/100mL)	Result
		Threshold/Limit	--	--	--	< 0.25	< 0.5	< 0.5	NA	< 20	< 1.0	NA	< 0.25	0.00	< 104	< 406	
4634	Sump	3/2/2017	--	--	--	--	--	--	--	--	--	--	--	--	--	305	NA
9202	Inlet pipe	3/2/2017	--	--	--	--	--	--	--	--	--	--	--	--	--	199	NA
5426	Sump	3/2/2017	--	--	--	--	--	--	--	--	--	--	--	--	--	< 10	NA
		4/17/2017	--	1.9	--	--	--	--	--	--	--	--	--	--	--	--	NA
		3/2/2017	--	--	--	--	--	--	--	--	--	--	--	--	--	< 10	NA
9210	Inlet pipe	4/17/2017	9.3	2.5	--	0.2	< 0.5	--	34	6	0.1	< 0.5	--	--	< 1.0	1	Natural Groundwater
		5/3/2017	--	2.8	--	0.2	0.3	0.50	44	13	0.0	0.3	0.22	--	33	39	Natural Groundwater
		3/2/2017	--	--	--	--	--	--	--	--	--	--	--	--	--	10	NA
9254	Inlet pipe	4/17/2017	13.0	3.1	--	0.2	< 0.5	--	43	9	0.1	< 0.5	--	--	1	28	Natural Groundwater
		5/3/2017	--	3.5	--	0.2	0.4	0.25	49	10	0.0	0.3	0.20	--	20	32	Natural Groundwater
		3/2/2017	--	--	--	--	--	--	--	--	--	--	--	--	--	20	NA
9062	Inlet pipe	4/17/2017	10.7	1.0	--	< 0.1	< 0.5	--	14	3	0.2	< 0.5	--	--	18	1,414	Natural Groundwater
		5/3/2017	--	1.6	--	< 0.1	0.3	0.50	17	-1	-0.4	0.3	0.25	--	> 2,419.6	> 2,419.6	Needs further investigation
5430	Sump	2/21/2017	--	--	--	--	--	--	--	--	--	--	--	--	--	36	NA
		3/2/2017	--	--	--	--	--	--	--	--	--	--	--	--	--	63	NA
		2/21/2017	--	--	--	--	--	--	--	--	--	--	--	--	--	24	NA
OF12564	Outfall	3/2/2017	--	--	--	--	--	--	--	--	--	--	--	--	--	41	NA
		4/17/2017	6.6	19.5	31.2	0.6	< 0.5	--	270	54	0.0	< 0.5	--	0.04	< 10.0	86	Possible greywater source
		5/3/2017	8.6	17.6	--	0.7	0.3	< 0.25	250	55	0.0	0.4	-0.13	--	116	113	Possible greywater source

Note: E. coli is used in freshwater systems and should be interpreted with caution; Enterococci is the accepted indicator for brackish sites; Thresholds/limits for bacteria were not applied to sumps due to stagnant conditions that may have promoted bacterial growth.

Ammonia and fluoride concentrations on 5/3/2017 are estimates (MDL = 0.5 ppm).

Thresholds/Limits obtained from CWP's IDDE Guidance Manual (2004) and the 2017 NH Small MS4 General Permit

APPENDIX A: FIELD SHEETS

(field notes on 5/3/17 were collected by FBE on a tablet; results were downloaded to CSV)

APPENDIX B: LABORATORY RESULTS & COC FORMS

APPENDIX C: CCTV STORMWATER LINE INSPECTION REPORTS

(multiple reports may be associated with some pipe segments for a variety of reasons (e.g., revisiting after cleaning out pipes due to blockage, etc.))