

Summary of the Brentwood, NH 2016 Surface Water Sampling Program

Prepared for

Brentwood Planning Board
Brentwood, NH

Prepared by

Truslow Resource Consulting LLC
Portsmouth, NH

Exeter River at Crawley Falls Road



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Introduction

The following report provides a summary of the results of water quality sampling for the three rounds of sampling at the 10 sampling locations established for the 2016 Brentwood Surface Water Quality Monitoring Program. This program was developed in collaboration with the Planning Board in order to establish baseline water quality data for the town.

Figure 1 shows the major streams and rivers in Brentwood and the sampling points chosen for baseline sampling in 2016. The stream order is indicated by thickness and color as shown in the legend. The Exeter River is the principal river that flows through Brentwood. It flows west to east across the southern half of the town and is a fourth order stream throughout its course. Four sampling points have been established on the Exeter – BR-7, BR-8, 15-EXT and 14-EXT. The latter two sample locations are also sampled by an Exeter River Volunteer River Assessment Program (VRAP) sampling team. Dudley Brook is another major stream that flows through Brentwood. The stream rises in north central Brentwood and flows northwest to southeast. It becomes a fourth order stream where it joins with a tributary just east of Prescott Road. Four sampling points have been established on Dudley Brook or its tributaries – BR1, BR-2, BR-3 and BR-4. Dudley Brook joins with the Exeter River in Exeter.

The Little River is a third order stream and is a tributary to the Exeter River. It flows north from Kingston and its confluence with the Exeter River is in south central Brentwood. One sampling point – BR-6 has been established on this stream. Another stream called the Little River rises within wetlands in northeastern Brentwood and flows to the Piscassic River. This is a first order stream within Brentwood and sampling point BR-8 has been established on this stream.

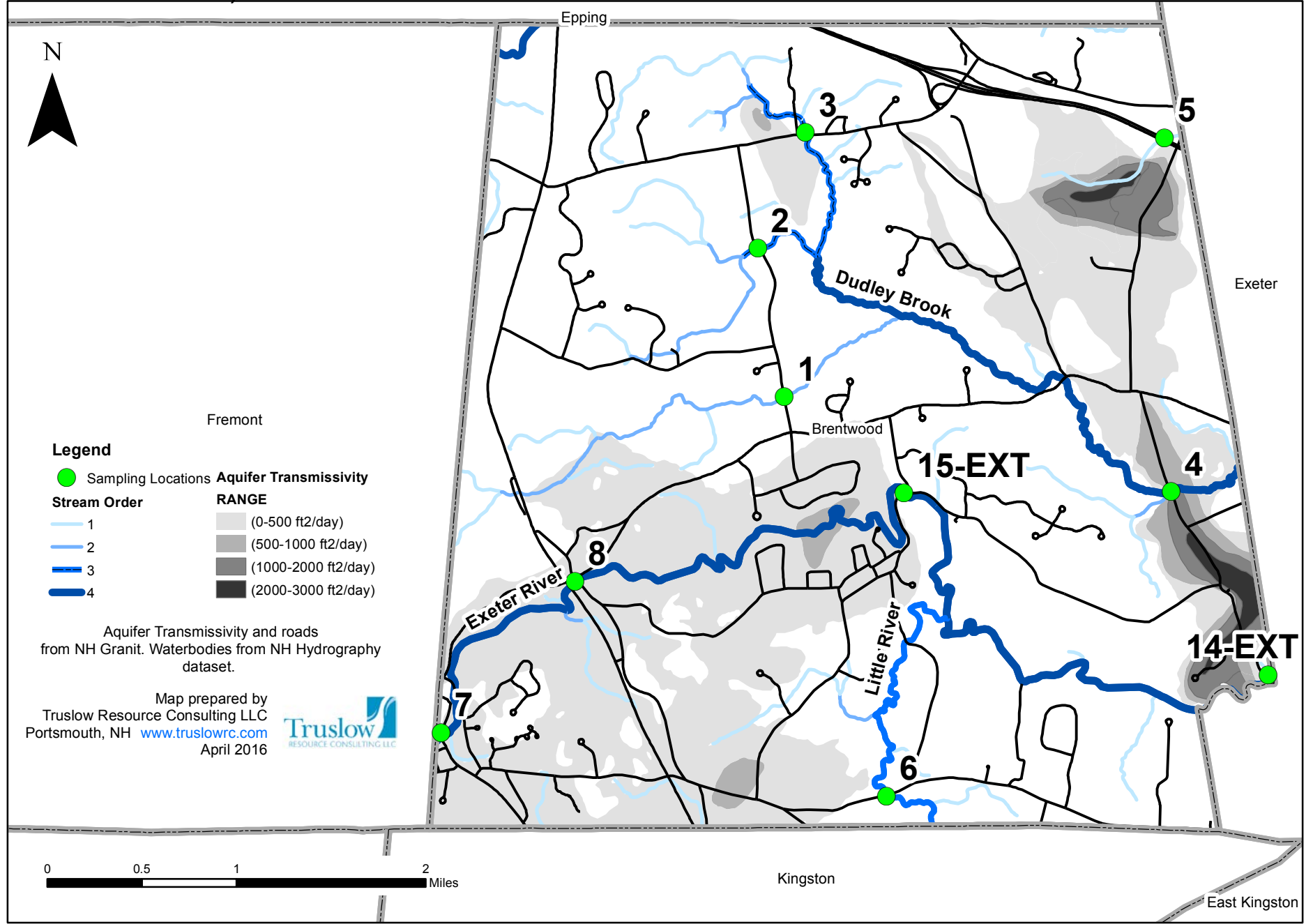
Work Performed

The three rounds of sampling took place on May 11, 2016, July 28, 2016 and November 2, 2016. Fieldwork encompassed measuring field parameters at each site including water temperature, dissolved oxygen, pH, and specific conductance. Samples were also collected for laboratory water quality analyses for chloride, nitrate-nitrogen, total phosphorus, and *E.coli*/total coliform bacteria. Truslow Resource Consulting LLC staff performed all fieldwork. Absolute Resource Associates of Portsmouth, NH completed laboratory analyses.

Brentwood planning administrator Kathy St. Hilaire was contacted prior to the sampling program to ensure that no landowner permissions were needed for the chosen sampling locations prior to sampling in May 2016. All sampling locations were flagged in the field. A photographic log of sampling locations is included in Appendix A.

Most water samples were collected just below the water surface in a segment of the stream that demonstrated visible flow at the time of sampling. Samples were collected in a pre-cleaned glass collection jar (opening of jar facing upstream) and were then decanted into the sample bottles. At several locations where the deepest flowing portion of the stream or river was not safely accessible from the shoreline, water samples were collected from a

Figure 1. Sampling Location Map,
Brentwood, NH 2016



bridge above the river with a bucket and rope. This included sampling locations BR-1, BR-2, 14-EXT and 15-EXT.

Water temperature, pH, and specific conductance (SC) were measured with a YSI 556 multi-parameter probe or PC-Tester 35 instrument. A YSI 556 multi-parameter probe was used to measure dissolved oxygen (DO) in the field. At each sampling location it was also noted whether the water was flowing. At BR-4, Dudley Brook at Pickpocket Road, the November 2016 sample was taken downstream of the culvert, not upstream because of significant woody debris blockage at this point. Wood debris had accumulated downstream too, but the sample was taken just upstream of the blockage where the water was flowing. A sample was not taken at BR-8 during the November 2, 2016 sampling round, as the access path was overgrown. All field measurements and observations were noted on field sheets.

Sample bottles were kept on ice in a cooler and delivered to Absolute Resources Laboratory in Portsmouth, NH for analysis. Chain of custody was maintained during sampling and sample delivery. The laboratory analytical reports are included as Appendix B.

Precipitation and Streamflow – 2016

Precipitation during the 2016 sampling period was lower than normal and streamflow was also lower than normal. All streams or rivers sampled for the May sampling period were flowing, however two of the sampling points were dry during the July sampling event. Due to the low precipitation and streamflow the September sampling event was postponed until November to assure that all points could be sampled.

The United States Geological Survey Gauge on the Exeter River at Haigh Road and Rowell Road in Brentwood provides measurements of river water level and stream discharge every 15 minutes. A graph of river level at the gauge location is shown in Figure 2. This figure shows all three sampling events. On October 28th, the river level was at approximately five feet but had declined to 4.2 feet on the date of sampling. A precipitation gauge also came on line at this location in late July 2016 and is shown on the river level graph.

Water Quality Data Summary - 2016

Water quality data for all three sampling events in 2016 is contained in Table 1 and summarized below. The New Hampshire Department of Environmental Services considers the Exeter-Squamscott River system a Class B water. This water quality criteria is predominately used for the discussion below unless other criteria are applicable for other water quality parameters measured for the Brentwood sampling program. These criteria are also listed in Table 1. Figure 3 shows the concentrations of dissolved oxygen, nitrate-N, total phosphorus and *E. coli* bacteria on the sampling point map for the three sampling events.

Figure 2 - Exeter River at Haigh Road,
Brentwood, NH USGS Measured Gage Height
and Precipitation

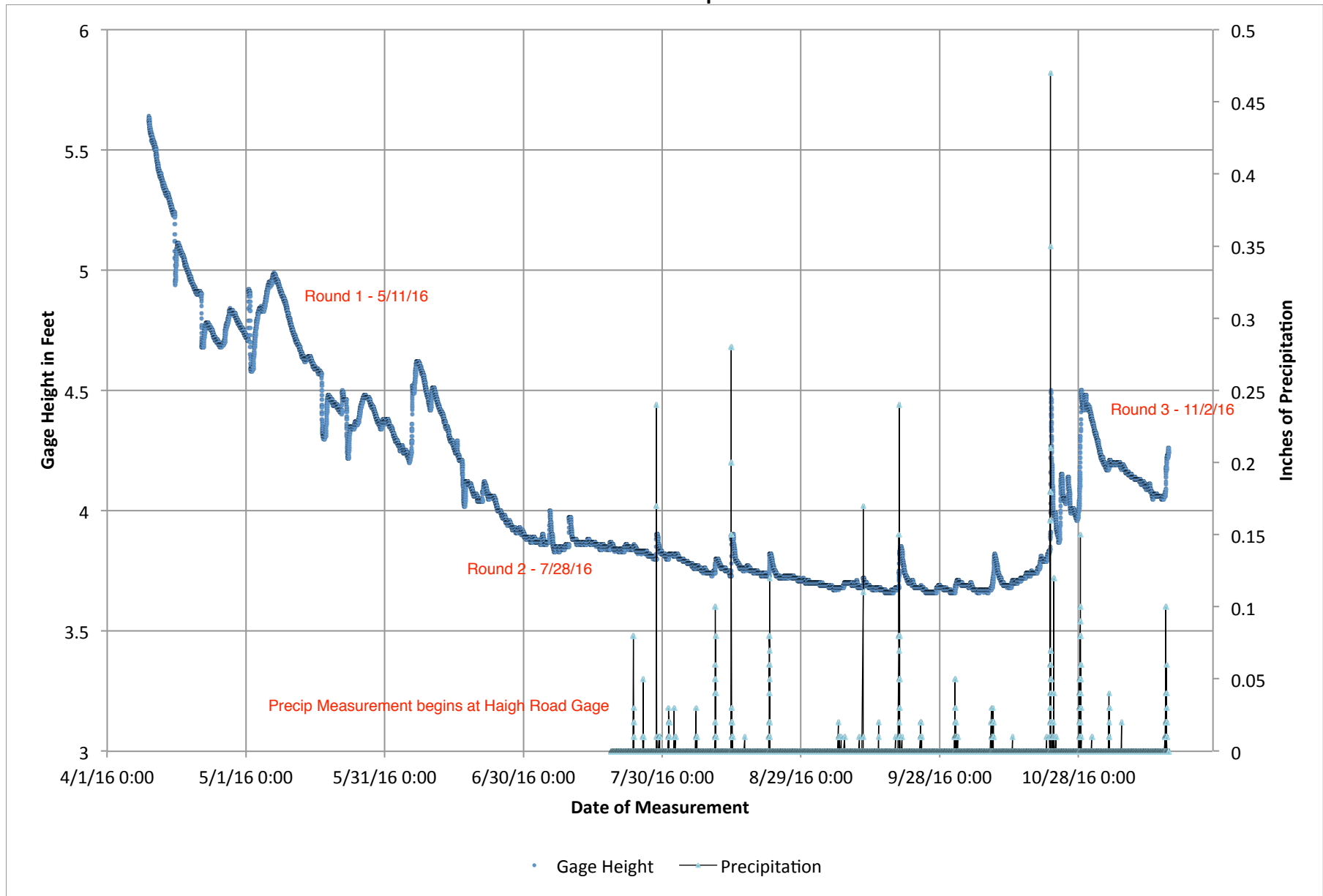


Table 1 - Water Quality Data at Surface Water Sampling Locations, May 11, 2016, July 28, 2016, and Nov. 2, 2016, Brentwood, NH

Location	DATE	Location Description	Field Measured Parameters					Laboratory Analytical Results					Field Observations
			Water Temp. °C	pH	Specific Conductance (uS/cm)	Dissolved Oxygen (% sat)**	Dissolved Oxygen (mg/L)**	Chloride (mg/L)	Nitrate (mg/L)	Total Phosphorus (mg/L)	E. coli Bacteria (MPN)	Total Coliform Bacteria	
BR-1	5/11/16	Little River at South Road	15.6	7.0	251	81.5	8.1	56	0.1	0.03	365.4	>2419.6	water did not appear to be flowing; stagnant
	7/28/16		24.5	7.4	336	31.6	2.6	80	<0.1	0.07	613.1	>2419.6	slightly tannic; stagnant, no apparent flow; organic film on water surface, minor floating aquatic plants
	11/2/16		9.0	6.9	369	84.3	9.7	60	<0.1	0.01	19.9	1413.6	barely flowing, <1' deep, sample taken from bridge
BR-2	5/11/16	Exeter River at Crawley Falls Road	14.6	6.9	212	93.5	9.5	48	<0.1	0.02	30.9	1986.02	water flowing
	7/28/16		25.5	7.5	278	43.9	3.6	66	<0.1	0.03	48.0	>2419.6	swiftly flowing; 2' deep at deepest point
	11/2/16		9.0	6.7	307	90.7	10.4	52	0.1	0.02	259.5	1203.3	Rapid flow; about 3' at deepest point
BR-3	5/11/16	Exeter River at Route 107	15.6	6.9	216	72.8	7.2	49	<0.1	0.01	21.6	2419.6	water flowing
	7/28/16		27.2	7.4	286	46.1	3.7	68	<0.1	0.02	12.1	>2419.6	slight flow; moderate aquatic plants at river's edge
	11/2/16		9.1	6.8	333	78.1	7.0	51	<0.1	0.01	325.5	1046.2	flowing slowly, depth >5'; sample taken from bridge
BR-4	5/11/16	Dudley Brook at Pickpocket Road	18.3	7.0	208	78.0	7.3	39	<0.1	0.04	68.3	>2419.6	water flowing
	7/28/16		19.5	7.2	258	9.1	0.9	39	<0.1	0.07	112.6	>2419.6	slightly tannic; light orange tint; stagnant; minor floating algae
	11/2/16		8.0	6.7	326	81.5	9.4	53	<0.1	0.01	90.6	1011.2	flowing. 1/2' deep, lots of woody debris just before culvert (possible beaver dam?); sample taken on downstream side of road, before debris dam blockage @ end of culvert.
BR-5	5/11/16	Dudley Brook trib. #1 at Prescott Road	16.8	7.0	186	92.5	9.0	67	<0.1	0.03	7.5	1732.9	water flowing
	7/28/16		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Not sampled; totally dry
	11/2/16		7.2	6.6	402	67.3	6.0	34	<0.1	0.03	272.3	>2419.6	flowing slightly; about 1' deep; Temp, pH, SC measured w/PC Tester 35, DO measured w YSI 556
BR-6	5/11/16	Dudley Brook trib. #2 at Prescott Road	18.4	7.2	238	112.2	10.5	52	<0.1	0.03	2	1986.3	water flowing
	7/28/16		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	No sample taken; 100% totally dry, standing mud
	11/2/16		7.1	6.5	508	43.3	5.2	70	<0.1	0.01	95.9	>2419.6	water flowing, 3" deep at culvert
BR-7	5/11/16	Dudley Brook at North Road	15.2	6.7	331	51.5	5.2	75	<0.1	0.04	117.8	1553.1	water flowing
	7/28/16		22.3	7.4	543	17.6	1.5	120	<0.1	0.10	111.9	>2419.6	area is mowed right down to the brook; nearly stagnant w/emergent plants in brook; cloudy water
	11/2/16		8.3	7.5	492	60.1	7.0	89	0.1	0.01	13.2	>2419.6	water flowing, about 1' deep
BR-8	5/11/16	Little River (Exeter) at Route 101	14.1	6.9	133	78.3	8.1	8.8	<0.1	0.03	8.4	980.4	water flowing
	7/28/16		16.5	6.8	301	72.0	7.1	6.5	<0.1	0.06	148.3	>2419.6	stagnant; minor organics in standing water
	11/2/16		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	not sampled, overgrown
14-EXT	5/11/16	Exeter River at Pickpocket Dam	14.0	6.9	216	77.2	7.9	48	<0.1	0.02	33.6	1413.6	water flowing
	7/28/16		26.0	7.3	252	50.8	4.1	57	<0.1	0.03	24.6	>2419.6	fish pass flowing water passing over dam; a few small fish observed; no water over dam but leaking out of lower flashboards; impoundment > 3' below top of dam
	11/2/16		9.4	6.9	323	115.1	13.1	59 M	0.1	<0.01	25.9	524.7	rapidly flowing; 2 '+'; sample taken from bridge
15-EXT	5/11/16	Exeter River at Haigh Road	14.8	7.0	213	91.9	9.2	48	<0.1	0.01	32.7	1203.3	water flowing
	7/28/16		24.5	7.4	273	46.7	3.9	65	<0.1	<0.01	56.3	>2419.6	water flowing, lots of minnows
	11/2/16		8.5	6.8	338	98.2	11.3	54	0.1	<0.01	72.3	304.4	flowing moderately; 4.2' at gauge, sample taken from bridge
Water Quality Guidance Value	Refer to text for additional information on Guidance Levels cited here	NA	RSA 485 - 6.5 to 8 unless naturally occurring	835 us/cm - Freshwater Chronic criteria	Class B - 75%	Class B - 5 mg/L	230 mg/L - Freshwater Chronic Criteria	10 mg/L - Water and Fish Ingestion	NHDES - 0.011 to 0.25 average WQ	> 406 MPN in any one sample > 126 MPN for geometric mean in 60 days	NA		

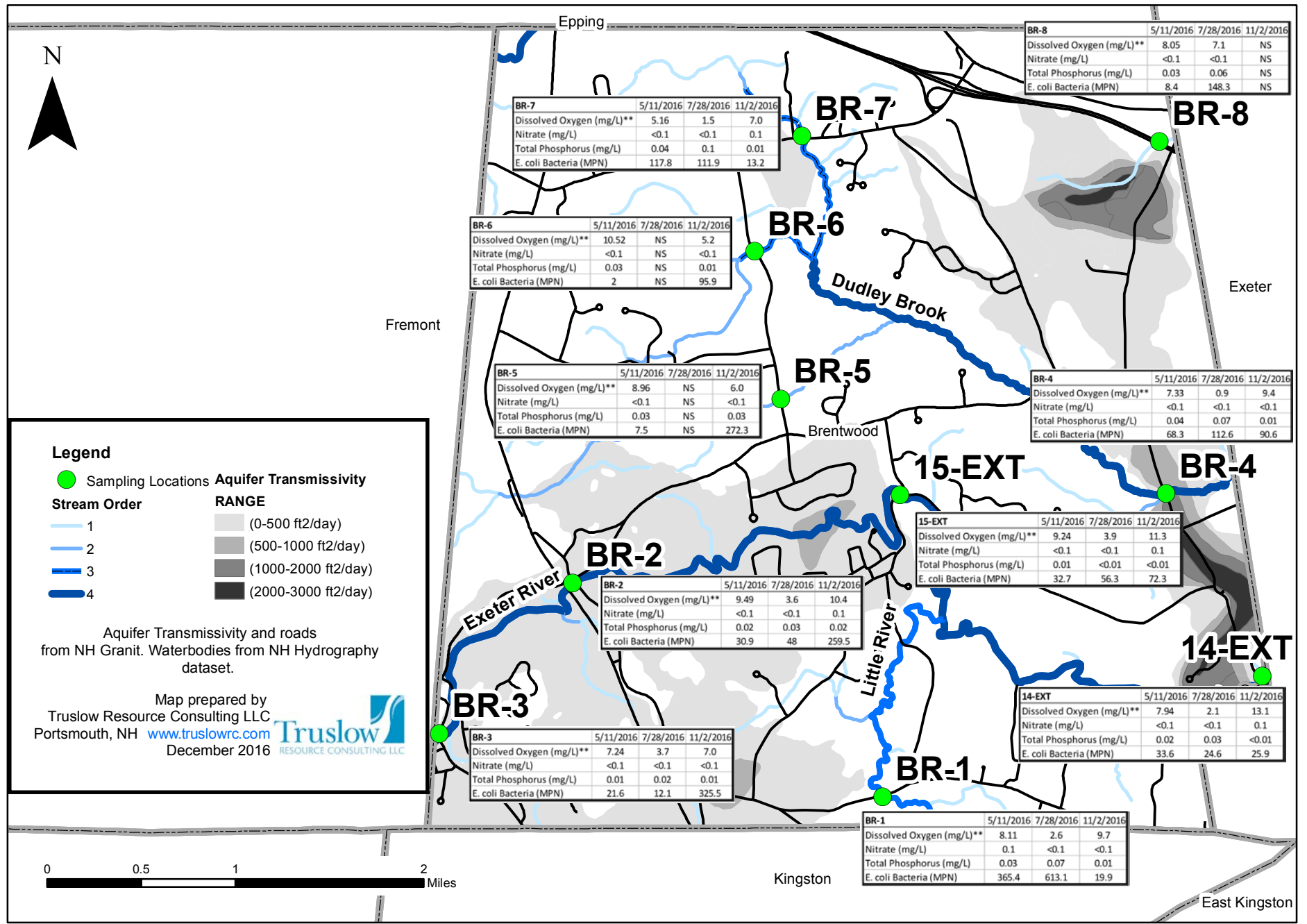
* Highlighted orange cells indicate sample locations where measured values are close to or exceed water quality standards or guidance values as explained in the text.

**May 11, 2016 DO (% sat) parameters calculated by converting DO(mg/L)

**July 28, 2016 DO (mg.L) calculated by converting DO % saturatic

M = The recovery for the matrix spike was 29%. The acceptance criteria is 90-110%. All other associated QC samples were acceptable.

Figure 3 - Concentrations of Dissolved Oxygen, Nitrate-N, Total Phosphorus, And Bacteria At Surface Water Sampling Points Brentwood, NH



pH

pH is a measurement of the hydrogen ion concentration in a water sample. pH affects many chemical and biological processes in the water and levels are important to the survival and reproduction of fish and other aquatic life. All locations monitored for the three monitoring periods had pH values between 6.5 and 7.5. These values are considered normal and meet the Class B NH Surface Water Quality Standard.

Specific Conductance and Chloride

Specific conductance can be used to indicate the presence of dissolved ionic solutes such as chloride, nitrate, sulfate, phosphate, sodium, magnesium, calcium, iron, and manganese. High specific conductance values can indicate impacts from excess road salt, septic systems, wastewater treatment plants, or urban/agricultural runoff.

Appendix B contains a bar graph of chloride concentrations at sampling points for each sampling event. All locations monitored specific conductance values well below 835 uS/cm and 2755 uS/cm, the freshwater chronic criterion and freshwater acute criterion for Class B NH Surface water quality, respectively. Additionally, all locations monitored had water samples with chloride concentrations well below 230 mg/L and 860 mg/L, freshwater chronic standard and acute standard, respectively. As a note, the monitoring location with the highest specific conductance (543 uS/cm) and chloride concentration (120 mg/L) was BR-7 located where Dudley Brook passes underneath North Road near the Rockingham County Complex. The BR-5 and BR-6 locations are also elevated compared to other locations within the town and could indicate impacts from road salt application.

Dissolved Oxygen

Appendix B contains a bar graph of DO % saturation at sampling points for each sampling event. The presence of adequate dissolved oxygen in surface waters is important for most aquatic organisms inhabiting the stream and associated riparian wetlands. For Class B NH Surface Water the dissolved oxygen water quality standard is 5 mg/L or 75% saturation. Using % saturation measurements, water at all monitoring locations contained less than 75% DO during the summer 2016 sampling event. At BR-5, BR-6 and BR-7 DO fell below 75% in either spring or fall measurement periods as well. The summer and fall weather was very warm and dry with many locations experiencing stagnant or no flow conditions into the fall. Stagnant conditions increase the likelihood of low DO especially in shallow surface water settings with little groundwater discharge. The November sampling occurred after a major rainfall event so that dissolved oxygen had rebounded to acceptable levels, but Dudley Brook samples BR-5, BR-6 and BR-7 were only slightly above the 5-mg/L standard for Class B waters.

Nitrate and Total Phosphorus

Eutrophication is the process by which a body of water acquires a high concentration of nutrients, especially phosphorus and nitrates. High concentrations of these nutrients (nitrogen and phosphorus) can promote excessive growth of algae. Nitrate is the nutrient that typically impacts estuarine and saltwater environmental quality. Excess phosphorus can promote unwanted algae growth in freshwater environments. Excess micro and macro algae growth can decrease water clarity and as the algae die, oxygen-consuming bacteria break down the organic matter, causing low dissolved oxygen concentrations in the surface water. Many sources of excess nitrates and phosphorus come from human activities such as fertilizers, animal waste, human waste, and commercial/industrial pollution. Phosphorus can also be associated with excess sediment in surface waters as phosphorus clings to sediment and soil particles.

All monitoring locations contained nitrate concentrations below 0.1-mg/L detection limit. A nitrate concentration of less than 1.0 mg/L is considered excellent water quality (Lehigh University Environmental Initiative, 2011).

Appendix B contains a bar graph of total phosphorus concentrations at sampling points for each sampling event. Less than 0.010 mg/L of total phosphorus is considered ideal for surface waters and 0.011-.025 mg/L is considered average (NHDES, 2011).

Only 15-EXT, Exeter River at Haigh Road, and BR-3, Exeter River at Route 107 contained total phosphorus at levels below this recommended concentration. Dudley Brook at North Road (BR-7) had the highest phosphorus during summer 2017 at 0.1 mg/L. The above average concentrations of phosphorus present in the Exeter River tributaries may be due to non point sources including agriculture, landscaping, human/animal waste and sedimentation.

Bacteria

The presence of *E. coli* bacteria is an indicator of fecal pollution and can also indicate the presence of pathogenic organisms. Possible sources of fecal contamination include wastewater treatment plants, failing septic systems, domestic and wild animal waste, and storm water runoff. *E. coli* levels at designated swimming beaches should not exceed 88 counts per 100 mL (MPN) in any one sample. For a Class B NH surface water and for recreational waters that are not designated beaches the standard is 406 MPN for any one sample or no more than 126 for the average of three samples collected over a 60 day period.

All monitoring locations had *E. coli* bacteria present. The BR-1 sample contained 613.1 MPN in July, which exceeds the Class B criteria. *E. coli* was also elevated at BR-2, BR-3 and BR-5 in November 2016 but did not exceed the standard for a single analysis.

Summary and Conclusions

The overall water quality of the tested stream and river locations in Brentwood is good. Dissolved oxygen (DO) was low to very low at all locations in the summer. At BR-5, -6 and -7 all on Dudley Brook or its tributaries, DO was also below the Class B standard in spring and/or fall. Chloride levels are generally low at most locations but is higher than other Brentwood locations at BR-1 and BR-7. Nitrate-N concentrations are well below the standard at all locations but total phosphorus is elevated at many sampling locations on Dudley Brook, the Exeter River and Little River. In addition some bacterial levels were elevated in the July and November sampling rounds at BR-1, BR-2, BR-3 and BR-5. Based on the analyses completed for 2016, water quality impacts are greatest at BR-7 – Dudley Brook at North Road and BR-1 – Little River at South Road. Sampling will be continued at all locations for three additional sampling events in 2017 as approved by the Planning Board in November 2016.

References

Lehigh University Environmental Initiative, 2011. LEO EnviroSci Inquiry – Nitrates. <www.ei.lehigh.edu/envirosci/watershed/wq/wqbackground/nitratesbg.html>. Accessed 5/27/2016.

NHDES, 2011. Interpreting New Hampshire Volunteer River Assessment Program Water Quality Monitoring Parameters. <http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/vrap_parameters.pdf>. Accessed 5/27/16.

Appendix A – Photo Log of Sampling Locations

Water Quality Monitoring Sites



Site 1: On Dudley Brook tributary just upstream of Prescott Rd. culvert just south of Mink Run; access from Prescott Rd.



Site 2: On Dudley Brook tributary just upstream of culvert on Prescott Road just south of Rockingham County agricultural fields; access from Prescott Road.

Brentwood Surface Water Quality Monitoring Program
Brentwood, NH
Photographs taken 6/8/16 by Samantha Wright, Truslow Resource Consulting LLC



Site 3: On Dudley Brook upstream of North Road culvert just east of the Rockingham County Complex; access from North Road.

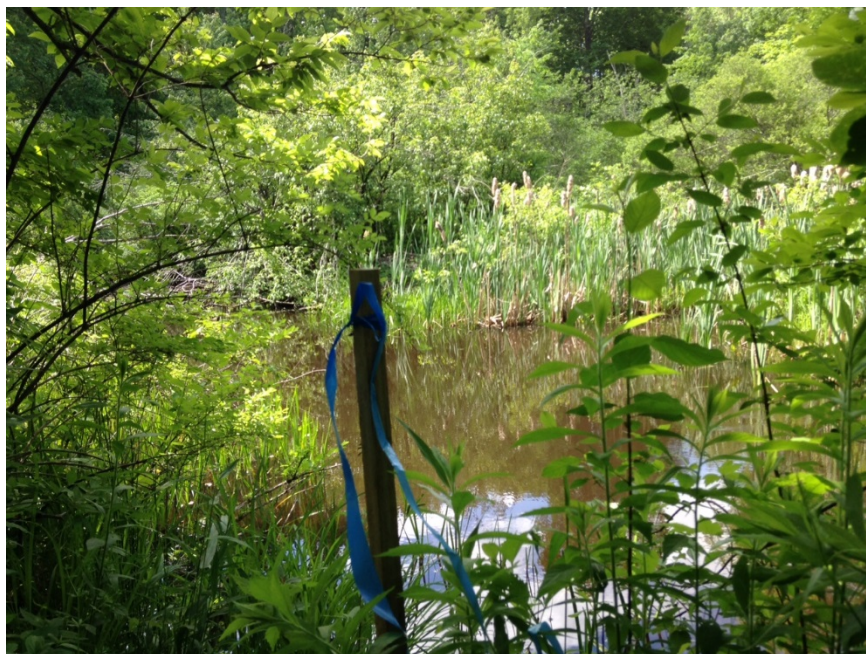


Site 4: On Dudley Brook on the upstream side of the Pickpocket Road culvert; sample taken from directly upstream of culvert; access from Pickpocket Rd.

Brentwood Surface Water Quality Monitoring Program
Brentwood, NH
Photographs taken 6/8/16 by Samantha Wright, Truslow Resource Consulting LLC



Site 5: On Little River (northeastern Little Brook) just upstream of the Route 101 Bridge; access from Pine Road on southern side of Route 101 overpass; walk along highway embankment



Site 6: On Little River upstream of South Road culvert; access from South Road.

Brentwood Surface Water Quality Monitoring Program
Brentwood, NH
Photographs taken 6/8/16 by Samantha Wright, Truslow Resource Consulting LLC



Site 7: On Exeter River on downstream side Route 107 Bridge (shown here); access from Route 107.



Site 8: On Exeter River between Route 125 Bridge and Crawley Falls Rd. Bridge (shown here); access from Crawley Falls Rd.

Brentwood Surface Water Quality Monitoring Program
Brentwood, NH
Photographs taken 6/8/16 by Samantha Wright, Truslow Resource Consulting LLC



Site 14-EXT: On Exeter River just above the first Pickpocket Dam; sample was taken from cement structure closest to the dam flow; access from Cross Rd.



Site 15-EXT: On Exeter River just downstream of Haigh Road Bridge; access from Brie's Way Park on Rowell Rd. (photo taken 3/16/16)

Appendix B -Analytical Laboratory Reports

Laboratory Report



Absolute Resource associates

124 Heritage Avenue Portsmouth NH 03801

Samantha Wright
Truslow Resource Consulting
454 Court Street
Suite 301
Portsmouth, NH 03801

PO Number: None
Job ID: 36496
Date Received: 5/11/16

Project: Brentwood SW Quality

Attached please find results for the analysis of the samples received on the date referenced above.

The following report has been re-issued to provide additional bacteria results, as requested by the customer.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink that reads "Sue Sylvester (for)". The signature is written in a cursive, flowing style.

Sue Sylvester
Principal, General Manager

Date of Approval: 5/23/2016
Total number of pages: 5

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH903

Massachusetts M-NH902

Project ID: Brentwood SW Quality

Job ID: 36496

Sample#: 36496-001

Sample ID: BR-5

Matrix: Water

Sampled: 5/11/16 10:05

Parameter	Result	Reporting	Instr Dil'n		Analyst	Prep	Analysis			Reference
		Limit	Units	Factor		Date	Batch	Date	Time	
Chloride	8.8	0.5	mg/L	1	AJC		1601083	5/11/16	18:52	E300.0A
Nitrate-N	< 0.1	0.1	mg/L	1	AJC		1601083	5/11/16	18:52	E300.0A
Total Phosphorus as P	0.03	0.01	mg/L	1	APA		1601099	5/16/16		E365.3
Total Coliform Bacteria	980.4	1.0	MPN	1	AM		1601168	5/11/16	15:45	SM9223B
E. coli Bacteria	8.4	1.0	MPN	1	AM		1601168	5/11/16	15:45	SM9223B

Sample#: 36496-002

Sample ID: BR-3

Matrix: Water

Sampled: 5/11/16 10:26

Parameter	Result	Reporting	Instr Dil'n		Analyst	Prep	Analysis			Reference
		Limit	Units	Factor		Date	Batch	Date	Time	
Chloride	75	0.5	mg/L	1	AJC		1601083	5/11/16	19:24	E300.0A
Nitrate-N	< 0.1	0.1	mg/L	1	AJC		1601083	5/11/16	19:24	E300.0A
Total Phosphorus as P	0.04	0.01	mg/L	1	APA		1601099	5/16/16		E365.3
Total Coliform Bacteria	1553.1	1.0	MPN	1	AM		1601168	5/11/16	15:45	SM9223B
E. coli Bacteria	117.8	1.0	MPN	1	AM		1601168	5/11/16	15:45	SM9223B

Sample#: 36496-003

Sample ID: BR-8

Matrix: Water

Sampled: 5/11/16 10:54

Parameter	Result	Reporting	Instr Dil'n		Analyst	Prep	Analysis			Reference
		Limit	Units	Factor		Date	Batch	Date	Time	
Chloride	48	0.5	mg/L	1	AJC		1601083	5/11/16	19:41	E300.0A
Nitrate-N	< 0.1	0.1	mg/L	1	AJC		1601083	5/11/16	19:41	E300.0A
Total Phosphorus as P	0.02	0.01	mg/L	1	APA		1601099	5/16/16		E365.3
Total Coliform Bacteria	1986.3	1.0	MPN	1	AM		1601168	5/11/16	15:45	SM9223B
E. coli Bacteria	30.9	1.0	MPN	1	AM		1601168	5/11/16	15:45	SM9223B

Sample#: 36496-004

Sample ID: BR-7

Matrix: Water

Sampled: 5/11/16 11:14

Parameter	Result	Reporting	Instr Dil'n		Analyst	Prep	Analysis			Reference
		Limit	Units	Factor		Date	Batch	Date	Time	
Chloride	49	0.5	mg/L	1	AJC		1601083	5/11/16	20:31	E300.0A
Nitrate-N	< 0.1	0.1	mg/L	1	AJC		1601083	5/11/16	20:31	E300.0A
Total Phosphorus as P	0.01	0.01	mg/L	1	APA		1601099	5/16/16		E365.3
Total Coliform Bacteria	2419.6	1.0	MPN	1	AM		1601168	5/11/16	15:45	SM9223B
E. coli Bacteria	21.6	1.0	MPN	1	AM		1601168	5/11/16	15:45	SM9223B

Project ID: Brentwood SW Quality

Job ID: 36496

Sample#: 36496-005

Sample ID: BR-6

Matrix: Water

Sampled: 5/11/16 11:36

Parameter	Result	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		Reference
		Limit	Units	Factor	Batch			Date	Time	
Chloride	56	0.5	mg/L	1	AJC	1601083	5/11/16	20:47	E300.0A	
Nitrate-N	0.1	0.1	mg/L	1	AJC	1601083	5/11/16	20:47	E300.0A	
Total Phosphorus as P	0.03	0.01	mg/L	1	APA	1601099	5/16/16		E365.3	
Total Coliform Bacteria	>2419.6	1.0	MPN	1	AM	1601168	5/11/16	15:45	SM9223B	
E. coli Bacteria	365.4	1.0	MPN	1	AM	1601168	5/11/16	15:45	SM9223B	

Sample#: 36496-006

Sample ID: 15-EXT

Matrix: Water

Sampled: 5/11/16 11:52

Parameter	Result	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		Reference
		Limit	Units	Factor	Batch			Date	Time	
Chloride	48	0.5	mg/L	1	AJC	1601083	5/11/16	21:04	E300.0A	
Nitrate-N	< 0.1	0.1	mg/L	1	AJC	1601083	5/11/16	21:04	E300.0A	
Total Phosphorus as P	0.01	0.01	mg/L	1	APA	1601099	5/16/16		E365.3	
Total Coliform Bacteria	1203.3	1.0	MPN	1	AM	1601168	5/11/16	15:45	SM9223B	
E. coli Bacteria	32.7	1.0	MPN	1	AM	1601168	5/11/16	15:45	SM9223B	

Sample#: 36496-007

Sample ID: BR-1

Matrix: Water

Sampled: 5/11/16 12:07

Parameter	Result	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		Reference
		Limit	Units	Factor	Batch			Date	Time	
Chloride	67	0.5	mg/L	1	AJC	1601083	5/11/16	21:20	E300.0A	
Nitrate-N	< 0.1	0.1	mg/L	1	AJC	1601083	5/11/16	21:20	E300.0A	
Total Phosphorus as P	0.03	0.01	mg/L	1	APA	1601099	5/16/16		E365.3	
Total Coliform Bacteria	1732.9	1.0	MPN	1	AM	1601168	5/11/16	15:45	SM9223B	
E. coli Bacteria	7.5	1.0	MPN	1	AM	1601168	5/11/16	15:45	SM9223B	

Sample#: 36496-008

Sample ID: BR-2

Matrix: Water

Sampled: 5/11/16 12:20

Parameter	Result	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		Reference
		Limit	Units	Factor	Batch			Date	Time	
Chloride	52	0.5	mg/L	1	AJC	1601083	5/11/16	21:37	E300.0A	
Nitrate-N	< 0.1	0.1	mg/L	1	AJC	1601083	5/11/16	21:37	E300.0A	
Total Phosphorus as P	0.03	0.01	mg/L	1	APA	1601099	5/16/16		E365.3	
Total Coliform Bacteria	1986.3	1.0	MPN	1	AM	1601168	5/11/16	15:45	SM9223B	
E. coli Bacteria	2.0	1.0	MPN	1	AM	1601168	5/11/16	15:45	SM9223B	

Project ID: Brentwood SW Quality

Job ID: 36496

Sample#: 36496-009

Sample ID: BR-4

Matrix: Water

Sampled: 5/11/16 12:37

Parameter	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis			Reference
	Result	Limit	Units	Factor			Batch	Date	Time	
Chloride	39	0.5	mg/L	1	AJC	1601083	5/11/16	21:53	E300.0A	
Nitrate-N	< 0.1	0.1	mg/L	1	AJC	1601083	5/11/16	21:53	E300.0A	
Total Phosphorus as P	0.04	0.01	mg/L	1	APA	1601100	5/16/16		E365.3	
Total Coliform Bacteria	>2419.6	1.0	MPN	1	AM	1601168	5/11/16	15:45	SM9223B	
E. coli Bacteria	68.3	1.0	MPN	1	AM	1601168	5/11/16	15:45	SM9223B	

Sample#: 36496-010

Sample ID: 14-EXT

Matrix: Water

Sampled: 5/11/16 12:50

Parameter	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis			Reference
	Result	Limit	Units	Factor			Batch	Date	Time	
Chloride	48	0.5	mg/L	1	AJC	1601083	5/11/16	22:10	E300.0A	
Nitrate-N	< 0.1	0.1	mg/L	1	AJC	1601083	5/11/16	22:10	E300.0A	
Total Phosphorus as P	0.02	0.01	mg/L	1	APA	1601100	5/16/16		E365.3	
Total Coliform Bacteria	1413.6	1.0	MPN	1	AM	1601168	5/11/16	15:45	SM9223B	
E. coli Bacteria	33.6	1.0	MPN	1	AM	1601168	5/11/16	15:45	SM9223B	

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Danna Truslow
Truslow Resource Consulting
454 Court Street
Suite 304
Portsmouth, NH 03801

PO Number: None
Job ID: 37269
Date Received: 7/28/16

Project: Brentwood-SW

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

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We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

A handwritten signature in black ink that reads "Sue Sylvester (for)". The signature is written in a cursive, flowing style.

Sue Sylvester
Principal, General Manager

Date of Approval: 8/9/2016
Total number of pages: 4

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH903

Massachusetts M-NH902

Project ID: Brentwood-SW

Job ID: 37269

Sample#: 37269-001

Sample ID: SW-8

Matrix: Water

Sampled: 7/28/16 8:05

Parameter	Result	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		Reference
		Limit	Units	Factor	Batch			Date	Time	
Chloride	6.5	0.5	mg/L	1	JZL	1601840	7/28/16	14:33	E300.0A	
Nitrate-N	< 0.1	0.1	mg/L	1	JZL	1601840	7/28/16	14:33	E300.0A	
Total Phosphorus as P	0.06	0.01	mg/L	1	APA	1601931	8/8/16		E365.3	
Total Coliform Bacteria	>2419.6	1.0	MPN	1	JZL	1601887	7/28/16	14:35	SM9223B	
E. coli Bacteria	148.3	1.0	MPN	1	JZL	1601887	7/28/16	14:35	SM9223B	

Sample#: 37269-002

Sample ID: SW-1

Matrix: Water

Sampled: 7/28/16 9:45

Parameter	Result	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		Reference
		Limit	Units	Factor	Batch			Date	Time	
Chloride	80	0.5	mg/L	1	JZL	1601840	7/28/16	14:49	E300.0A	
Nitrate-N	< 0.1	0.1	mg/L	1	JZL	1601840	7/28/16	14:49	E300.0A	
Total Phosphorus as P	0.07	0.01	mg/L	1	APA	1601931	8/8/16		E365.3	
Total Coliform Bacteria	>2419.6	1.0	MPN	1	JZL	1601887	7/28/16	14:35	SM9223B	
E. coli Bacteria	613.1	1.0	MPN	1	JZL	1601887	7/28/16	14:35	SM9223B	

Sample#: 37269-003

Sample ID: SW-7

Matrix: Water

Sampled: 7/28/16 10:25

Parameter	Result	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		Reference
		Limit	Units	Factor	Batch			Date	Time	
Chloride	120	2.5	mg/L	5	JZL	1601863	7/29/16	14:33	E300.0A	
Nitrate-N	< 0.1	0.1	mg/L	1	JZL	1601840	7/28/16	15:06	E300.0A	
Total Phosphorus as P	0.10	0.01	mg/L	1	APA	1601931	8/8/16		E365.3	
Total Coliform Bacteria	>2419.6	1.0	MPN	1	JZL	1601887	7/28/16	14:35	SM9223B	
E. coli Bacteria	111.9	1.0	MPN	1	JZL	1601887	7/28/16	14:35	SM9223B	

Sample#: 37269-004

Sample ID: 14-EXT

Matrix: Water

Sampled: 7/28/16 8:25

Parameter	Result	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		Reference
		Limit	Units	Factor	Batch			Date	Time	
Chloride	57	0.5	mg/L	1	JZL	1601840	7/28/16	15:22	E300.0A	
Nitrate-N	< 0.1	0.1	mg/L	1	JZL	1601840	7/28/16	15:22	E300.0A	
Total Phosphorus as P	0.03	0.01	mg/L	1	APA	1601931	8/8/16		E365.3	
Total Coliform Bacteria	>2419.6	1.0	MPN	1	JZL	1601887	7/28/16	14:35	SM9223B	
E. coli Bacteria	24.6	1.0	MPN	1	JZL	1601887	7/28/16	14:35	SM9223B	

Project ID: Brentwood-SW

Job ID: 37269

Sample#: 37269-005

Sample ID: SW-3

Matrix: Water

Sampled: 7/28/16 9:19

Parameter	Result	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		Reference
		Limit	Units	Factor	Batch			Date	Time	
Chloride	68	0.5	mg/L	1	JZL	1601840	7/28/16	15:39	E300.0A	
Nitrate-N	< 0.1	0.1	mg/L	1	JZL	1601840	7/28/16	15:39	E300.0A	
Total Phosphorus as P	0.02	0.01	mg/L	1	APA	1601931	8/8/16		E365.3	
Total Coliform Bacteria	>2419.6	1.0	MPN	1	JZL	1601887	7/28/16	14:35	SM9223B	
E. coli Bacteria	12.1	1.0	MPN	1	JZL	1601887	7/28/16	14:35	SM9223B	

Sample#: 37269-006

Sample ID: SW-2

Matrix: Water

Sampled: 7/28/16 9:30

Parameter	Result	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		Reference
		Limit	Units	Factor	Batch			Date	Time	
Chloride	66	0.5	mg/L	1	JZL	1601840	7/28/16	15:55	E300.0A	
Nitrate-N	< 0.1	0.1	mg/L	1	JZL	1601840	7/28/16	15:55	E300.0A	
Total Phosphorus as P	0.03	0.01	mg/L	1	APA	1601931	8/8/16		E365.3	
Total Coliform Bacteria	>2419.6	1.0	MPN	1	JZL	1601887	7/28/16	14:35	SM9223B	
E. coli Bacteria	48.0	1.0	MPN	1	JZL	1601887	7/28/16	14:35	SM9223B	

Sample#: 37269-007

Sample ID: 15-EXT

Matrix: Water

Sampled: 7/28/16 10:07

Parameter	Result	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		Reference
		Limit	Units	Factor	Batch			Date	Time	
Chloride	65	0.5	mg/L	1	JZL	1601840	7/28/16	16:12	E300.0A	
Nitrate-N	< 0.1	0.1	mg/L	1	JZL	1601840	7/28/16	16:12	E300.0A	
Total Phosphorus as P	< 0.01	0.01	mg/L	1	APA	1601931	8/8/16		E365.3	
Total Coliform Bacteria	>2419.6	1.0	MPN	1	JZL	1601887	7/28/16	14:35	SM9223B	
E. coli Bacteria	56.3	1.0	MPN	1	JZL	1601887	7/28/16	14:35	SM9223B	

Sample#: 37269-008

Sample ID: SW-4

Matrix: Water

Sampled: 7/28/16 8:20

Parameter	Result	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		Reference
		Limit	Units	Factor	Batch			Date	Time	
Chloride	39	0.5	mg/L	1	JZL	1601840	7/28/16	16:28	E300.0A	
Nitrate-N	< 0.1	0.1	mg/L	1	JZL	1601840	7/28/16	16:28	E300.0A	
Total Phosphorus as P	0.07	0.01	mg/L	1	APA	1601931	8/8/16		E365.3	
Total Coliform Bacteria	>2419.6	1.0	MPN	1	JZL	1601887	7/28/16	14:35	SM9223B	
E. coli Bacteria	112.6	1.0	MPN	1	JZL	1601887	7/28/16	14:35	SM9223B	

Laboratory Report



Absolute Resource *associates*

124 Heritage Avenue Portsmouth NH 03801

Danna Truslow
Truslow Resource Consulting
454 Court Street
Suite 304
Portsmouth, NH 03801

PO Number: None
Job ID: 38409
Date Received: 11/2/16

Project: Brentwood SW

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

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Sincerely,
Absolute Resource Associates

A handwritten signature in black ink that reads "Sue Sylvester (for)". The signature is written in a cursive, flowing style.

Sue Sylvester
Principal, General Manager

Date of Approval: 11/11/2016
Total number of pages: 5

Absolute Resource Associates Certifications

New Hampshire 1732
Maine NH903

Massachusetts M-NH902

Project ID: Brentwood SW

Job ID: 38409

Sample#: 38409-001

Sample ID: 15-EXT

Matrix: Water

Sampled: 11/2/16 12:30

Parameter	Result	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		Reference
		Limit	Units	Factor	Date			Time		
Chloride	54	0.5	mg/L	1	JZL	1603025	11/2/16	17:45	E300.0A	
Nitrate-N	0.1	0.1	mg/L	1	JZL	1603025	11/2/16	17:45	E300.0A	
Total Phosphorus as P	< 0.01	0.01	mg/L	1	APA	1603052	11/7/16		E365.3	
Total Coliform Bacteria	304.4	1.0	MPN	1	JZL	1603040	11/2/16	16:40	SM9223B	
E. coli Bacteria	72.3	1.0	MPN	1	JZL	1603040	11/2/16	16:40	SM9223B	

Sample#: 38409-002

Sample ID: BR-4

Matrix: Water

Sampled: 11/2/16 12:10

Parameter	Result	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		Reference
		Limit	Units	Factor	Date			Time		
Chloride	53	0.5	mg/L	1	JZL	1603025	11/2/16	18:02	E300.0A	
Nitrate-N	< 0.1	0.1	mg/L	1	JZL	1603025	11/2/16	18:02	E300.0A	
Total Phosphorus as P	0.01	0.01	mg/L	1	APA	1603052	11/7/16		E365.3	
Total Coliform Bacteria	1011.2	1.0	MPN	1	JZL	1603040	11/2/16	16:40	SM9223B	
E. coli Bacteria	90.6	1.0	MPN	1	JZL	1603040	11/2/16	16:40	SM9223B	

Sample#: 38409-003

Sample ID: 14-EXT

Matrix: Water

Sampled: 11/2/16 11:55

Parameter	Result	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		Reference
		Limit	Units	Factor	Date			Time		
Chloride	59 M	0.5	mg/L	1	JZL	1603025	11/2/16	18:19	E300.0A	
M = The recovery for the matrix spike was 29%. The acceptance criteria is 90-110%. All other associated QC samples were acceptable.										
Nitrate-N	0.1	0.1	mg/L	1	JZL	1603025	11/2/16	18:19	E300.0A	
Total Phosphorus as P	< 0.01	0.01	mg/L	1	APA	1603052	11/7/16		E365.3	
Total Coliform Bacteria	524.7	1.0	MPN	1	JZL	1603040	11/2/16	16:40	SM9223B	
E. coli Bacteria	25.9	1.0	MPN	1	JZL	1603040	11/2/16	16:40	SM9223B	

Sample#: 38409-004

Sample ID: BR-1

Matrix: Water

Sampled: 11/2/16 11:30

Parameter	Result	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		Reference
		Limit	Units	Factor	Date			Time		
Chloride	60	0.5	mg/L	1	JZL	1603025	11/2/16	19:08	E300.0A	
Nitrate-N	< 0.1	0.1	mg/L	1	JZL	1603025	11/2/16	19:08	E300.0A	
Total Phosphorus as P	0.01	0.01	mg/L	1	APA	1603052	11/7/16		E365.3	
Total Coliform Bacteria	1413.6	1.0	MPN	1	JZL	1603040	11/2/16	16:40	SM9223B	
E. coli Bacteria	19.9	1.0	MPN	1	JZL	1603040	11/2/16	16:40	SM9223B	

Project ID: Brentwood SW

Job ID: 38409

Sample#: 38409-005

Sample ID: BR-3

Matrix: Water

Sampled: 11/2/16 11:05

Parameter	Result	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		Reference
		Limit	Units	Factor	Batch			Date	Time	
Chloride	51	0.5	mg/L	1	JZL	1603025	11/2/16	19:58	E300.0A	
Nitrate-N	< 0.1	0.1	mg/L	1	JZL	1603025	11/2/16	19:58	E300.0A	
Total Phosphorus as P	0.01	0.01	mg/L	1	APA	1603052	11/7/16		E365.3	
Total Coliform Bacteria	1046.2	1.0	MPN	1	JZL	1603040	11/2/16	16:40	SM9223B	
E. coli Bacteria	325.5	1.0	MPN	1	JZL	1603040	11/2/16	16:40	SM9223B	

Sample#: 38409-006

Sample ID: BR-2

Matrix: Water

Sampled: 11/2/16 10:45

Parameter	Result	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		Reference
		Limit	Units	Factor	Batch			Date	Time	
Chloride	52	0.5	mg/L	1	JZL	1603025	11/2/16	20:14	E300.0A	
Nitrate-N	0.1	0.1	mg/L	1	JZL	1603025	11/2/16	20:14	E300.0A	
Total Phosphorus as P	0.02	0.01	mg/L	1	APA	1603052	11/7/16		E365.3	
Total Coliform Bacteria	1203.3	1.0	MPN	1	JZL	1603040	11/2/16	16:40	SM9223B	
E. coli Bacteria	259.5	1.0	MPN	1	JZL	1603040	11/2/16	16:40	SM9223B	

Sample#: 38409-007

Sample ID: BR-5

Matrix: Water

Sampled: 11/2/16 10:25

Parameter	Result	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		Reference
		Limit	Units	Factor	Batch			Date	Time	
Chloride	34	0.5	mg/L	1	JZL	1603025	11/2/16	20:30	E300.0A	
Nitrate-N	< 0.1	0.1	mg/L	1	JZL	1603025	11/2/16	20:30	E300.0A	
Total Phosphorus as P	0.03	0.01	mg/L	1	APA	1603052	11/7/16		E365.3	
Total Coliform Bacteria	>2419.6	1.0	MPN	1	JZL	1603040	11/2/16	16:40	SM9223B	
E. coli Bacteria	272.3	1.0	MPN	1	JZL	1603040	11/2/16	16:40	SM9223B	

Sample#: 38409-008

Sample ID: BR-6

Matrix: Water

Sampled: 11/2/16 10:00

Parameter	Result	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis		Reference
		Limit	Units	Factor	Batch			Date	Time	
Chloride	70	0.5	mg/L	1	JZL	1603025	11/2/16	20:47	E300.0A	
Nitrate-N	< 0.1	0.1	mg/L	1	JZL	1603025	11/2/16	20:47	E300.0A	
Total Phosphorus as P	0.01	0.01	mg/L	1	APA	1603052	11/7/16		E365.3	
Total Coliform Bacteria	>2419.6	1.0	MPN	1	JZL	1603040	11/2/16	16:40	SM9223B	
E. coli Bacteria	95.9	1.0	MPN	1	JZL	1603040	11/2/16	16:40	SM9223B	

Project ID: Brentwood SW

Job ID: 38409

Sample#: 38409-009

Sample ID: BR-7

Matrix: Water

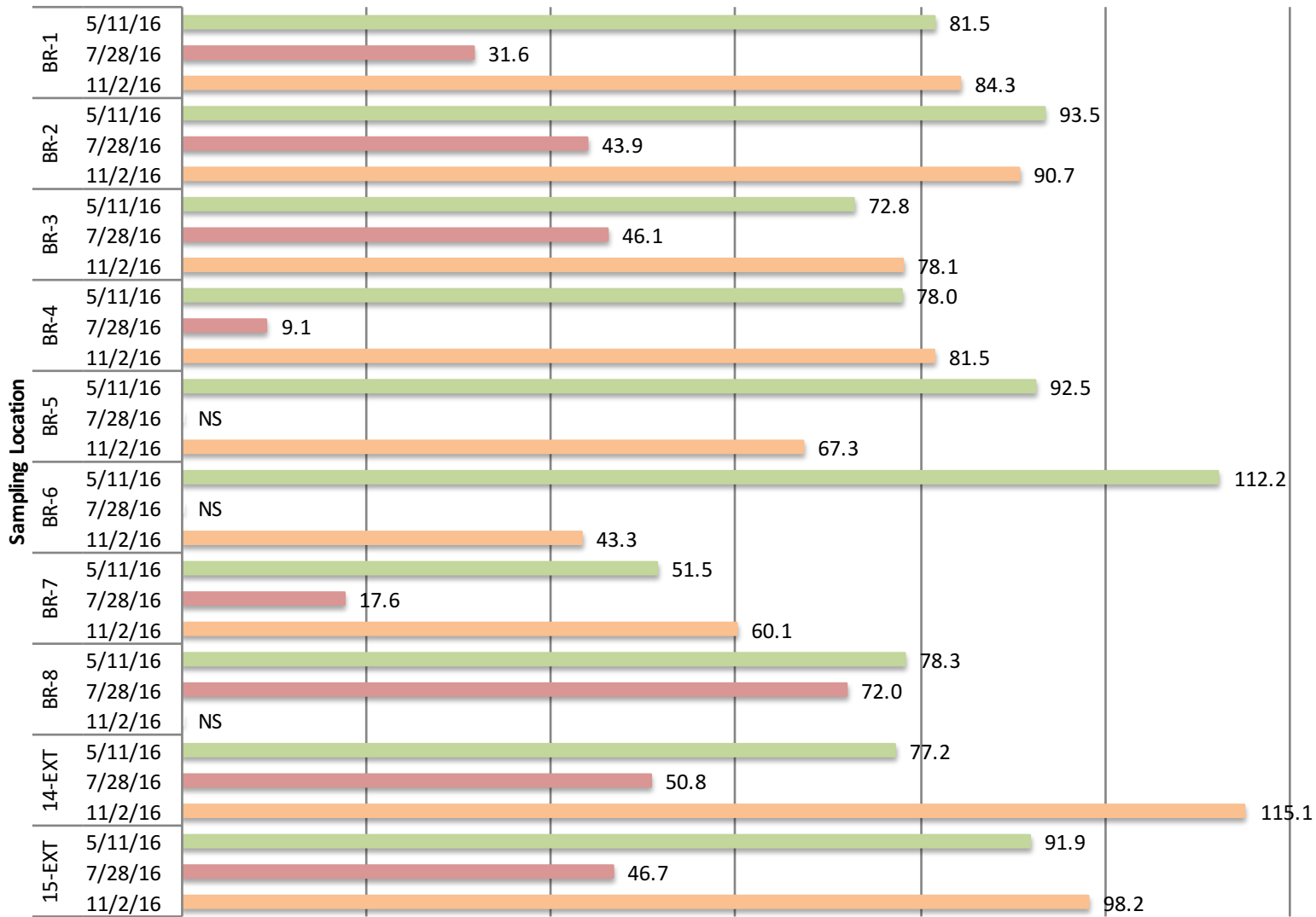
Sampled: 11/2/16 9:45

Parameter	Reporting		Instr Dil'n		Analyst	Prep Date	Analysis			Reference
	Result	Limit	Units	Factor			Batch	Date	Time	
Chloride	89	0.5	mg/L	1	JZL	1603025	11/2/16	21:03	E300.0A	
Nitrate-N	0.1	0.1	mg/L	1	JZL	1603025	11/2/16	21:03	E300.0A	
Total Phosphorus as P	0.01	0.01	mg/L	1	APA	1603052	11/7/16		E365.3	
Total Coliform Bacteria	>2419.6	1.0	MPN	1	JZL	1603040	11/2/16	16:40	SM9223B	
E. coli Bacteria	13.2	1.0	MPN	1	JZL	1603040	11/2/16	16:40	SM9223B	

Appendix C – Water Quality Bar Graphs

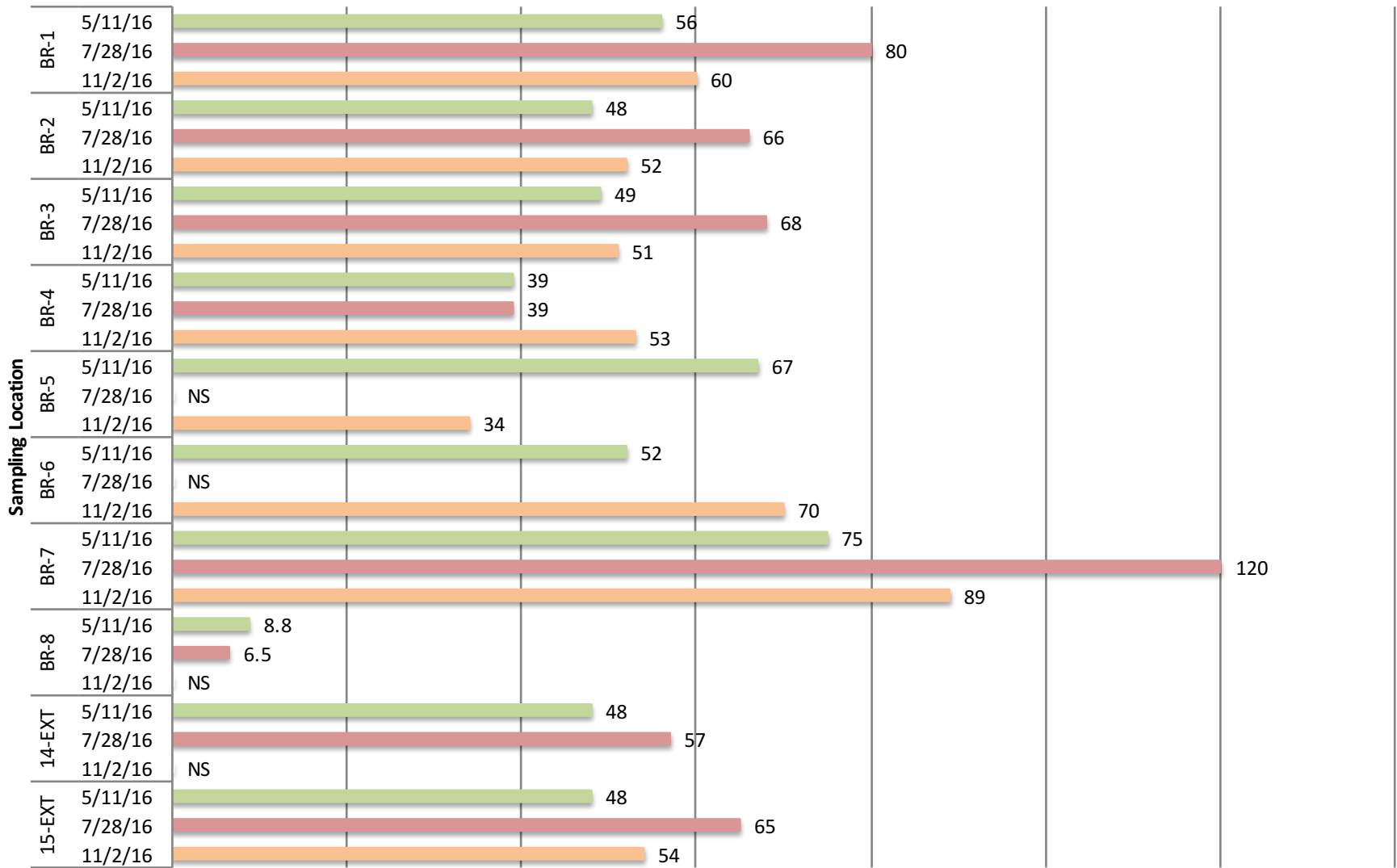
Water Quality at Surface Water Sampling Points Brentwood, NH 2016

Dissolved Oxygen at Sampling Points (% sat)



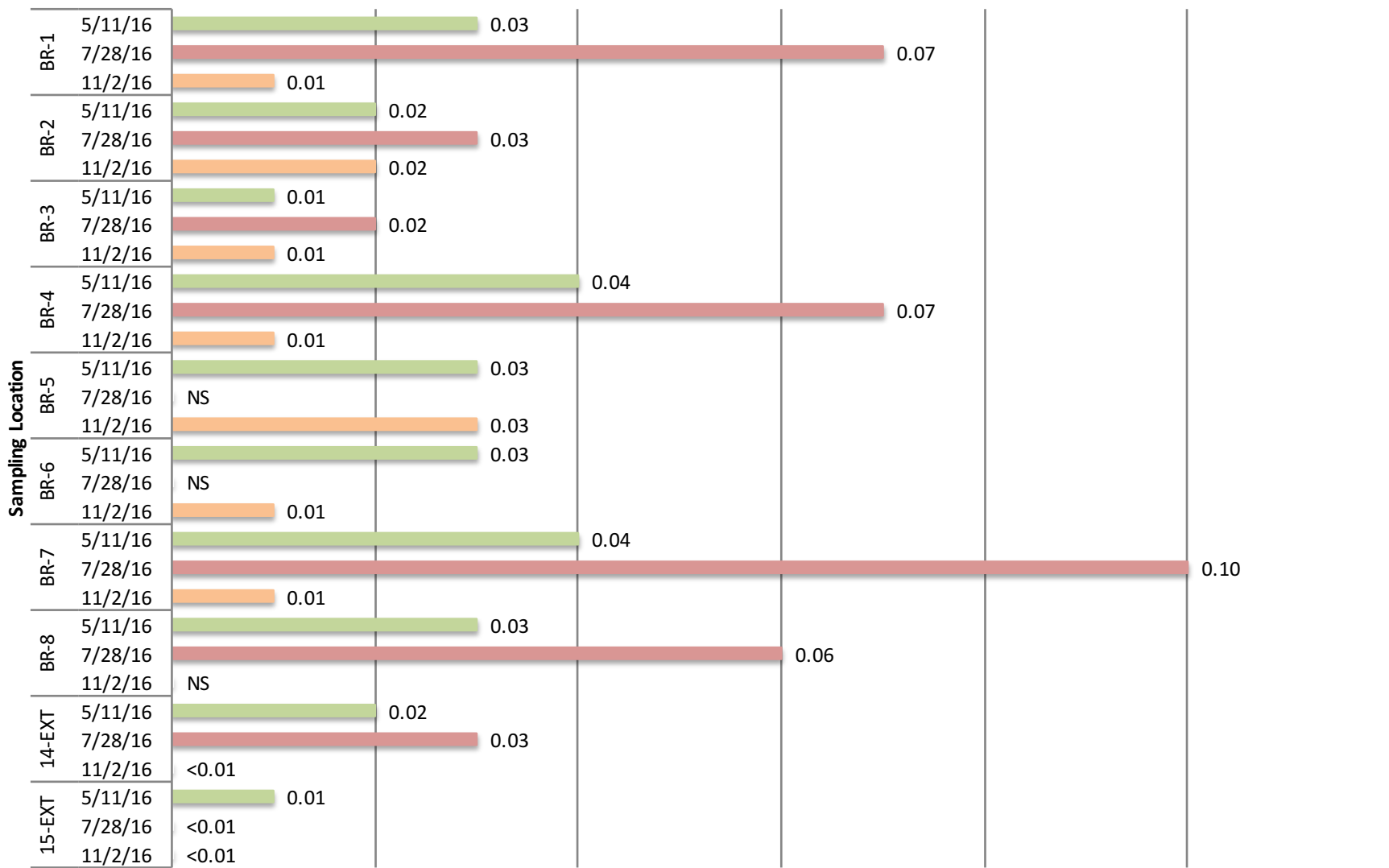
**Water Quality at Surface Water Sampling Points
Brentwood, NH 2016**

Chloride at Sampling Points (mg/L)



Water Quality at Surface Water Sampling Points Brentwood, NH 2016

Total Phosphorus at Sampling Points (mg/L)



**Water Quality at Surface Water Sampling Points
Brentwood, NH 2016**

E. Coli Bacteria at Sampling Points (MPN)

