TOWN OF EXETER, NEW HAMPSHIRE
TOTAL NITROGEN CONTROL PLAN ANNUAL REPORT FOR 2016

1. BACKGROUND

This 2016 Total Nitrogen Control Plan Annual Report was prepared for the Town of Exeter, New Hampshire in order to comply with the requirements of AOC 13-010, Article IV.E. The AOC stipulates that the following items be addressed:

- The pounds of total nitrogen discharged from the WWTF during the previous calendar year (***refer to Section 2.1 of this annual report***).
- A description of the WWTF operational changes that were implemented during the previous calendar year (***refer to Section 2.2 of this annual report***).
- The status of the development of a total nitrogen NPS and storm water point source accounting system (***refer to Section 2.3 of this annual report***).
- The status of the development of the non-point source and stormwater point source Nitrogen Control Plan (***refer to Section 2.4 of this annual report***).
- A description and accounting of the activities conducted by the Town as part of its Nitrogen Control Plan (***refer to Section 2.5 of this annual report***); and
- A description of all activities within the Town during the previous year that affect nitrogen loading to the Great Bay Estuary. The annual report shall include sufficient information such that the nitrogen loading change to the watershed associated with these activities can be quantified upon development of the non-point source/point source storm water accounting system (***refer to Section 2.6 of this annual report***).

In addition, this report is intended to support the future engineering evaluations due in September 2018 (Nitrogen Control Plan) and December 2023 (Engineering Evaluation), including: documenting total nitrogen, dissolved oxygen, *chlorophyll a* and macroalgae concentration trends in the Squamscott River and downstream waters; documenting non-point source and stormwater point source reduction trends towards allocation targets; and documenting that appropriate mechanisms are in place to ensure continued progress.

2. SUMMARY OF AOC STIPULATED ITEMS

2.1. Total Pounds of Nitrogen Discharged from the WWTF in Previous Calendar Year

Attachment 1 summarizes the total pounds and total tons of nitrogen discharged from the WWTF for the calendar year as well as the annual average total nitrogen value measured at the Squamscott River "GRBCL" sampling location, located just downstream of Newfields WWTF at Chapman's Landing. Note that the Squamscott River Sampling data will not be available from NHDES until March 2017.

On July 6, 2016 the WWTF operators stopped influent flow to Lagoon 3 and blended effluent flow from Lagoons 2 and 3 due to unattainable chlorine demand caused by partial nitrification. On August 30 the WWTF operators returned to normal operation by restarting influent flow to Lagoon 3 and stopping direct discharge flow from Lagoon 2.

2.2. Operational Changes at the WWTF

There are no operational changes which can be made at a lagoon facility, such as Exeter's, which would reduce the amount of nitrogen discharged.

In anticipation of major operational changes at the WWTF, the Town has been engaged in on-going planning and design efforts for the full calendar year. Each is summarized below:

- A Preliminary Design Phase Value Engineering (VE) workshop for the WWTF and Main Pump Station was completed during the week of December 7, 2015, and the Preliminary VE Report was issued on December 23, 2015. The WP Preliminary Design Report was revised accordingly and resubmitted in January 2016 to the Town, DES and EPA.

- The final design phase for the WWTF, Main Pump Station, and Main Pump Station Forcemain began in January 2016.

- The WWTF, Main Pump Station and Forcemain Upgrade projects were approved for $49.98 M at 2016 Town Meeting (Article 7) on March 8, 2016 (**see Attachment 2)**.

- The 60% Drawings and Specifications were submitted to the Town, NHDES and EPA on March 28, 2016. The 60% Workshops were held with the Town and NHDES in May 2016.

- The 90% Drawings and Specifications for Contract No. 1 WWTF Upgrade were submitted to the Town, NHDES and EPA on September 23, 2016. Comments were received in November and December 2016.

- 100% Bidding Documents for Contract No. 1 WWTF Upgrade were submitted on December 20, 2016 and were approved for bidding on December 21, 2016.

- General Contractor prequalification for Contract No. 1 WWTF Upgrade was completed on December 20, 2016. Bidding Documents were advertised and made available to bidders on December 21, 2016. The bid opening is scheduled for February 13, 2017.

- 90% Drawings and Specifications for Contract No. 2 (Forcemain Upgrades) and Contract No. 3 (Main Pump Station Upgrade) were submitted to the Town, NHDES and EPA on December 30, 2016.

2.3. Development of Total Nitrogen NPS & Stormwater Point Source Accounting

2.3.1. PTAPP Participation

The Town of Exeter is actively participating in the Great Bay Pollution Tracking and Accounting Pilot Program (PTAPP), which is led by NHDES and EPA. The purpose of PTAPP is to enable coordination on nitrogen tracking and accounting for the Great Bay region. PTAPP is intended to make progress towards developing shared approaches and tools within the participant Great Bay communities. The multi-year implementation framework is briefly described in the following four phases of PTAPP. The PTAPP Implementation Framework and Draft PTAPP Partner Roles (issued on September 14, 2016) is included as **Attachment 3.** A summary of the phases is provided below.

Phase 1: Outcomes, Benefits and Rationale for Moving Forward. Phase 1 was completed in October 2015. During Phase 1 participants identified three key benefits to justify moving forward to further develop and implement a regional approach for pollution tracking and accounting. The three key benefits were Cost Savings, Regulatory Compliance and Coordination with other Regional Efforts.

Phase 2: Pilot Tracking Program and Conceptual Planning for Accounting Methods. Phase 2 began in January 2016 and is scheduled to conclude with the roll-out of the pilot tracking software in Spring 2017. The Tracking Program is anticipated to include a Local Tracking Efforts path and a Regional Tracking Efforts path. The Accounting Methods will include the development of regional accounting methods to quantify existing loads and load reductions achieved through implementation of tracked NPS management activities. NHDES and UNH agreed to collaborate to develop the pilot program database and on-line user interface. NHDES and UNH developed a scope of work and a contractual arrangement for UNH to complete this work and for UNH to serve as the data host for several years. NHDES and UNH began development of the database and interface in Spring 2016 and intend to complete the development and roll-out by Spring 2017. Three PTAPP meetings were held in 2016 – January 22, April 22 and November 17 and Exeter attended and participated in all meetings. The PTAPP communities also agreed to a Memorandum of Understanding, which will be circulated for signature in late 2016/early 2017.

Phase 3: Evaluate Pilot Tracking Program and Formalize Accounting Process. Phase 3 is scheduled to occur in 2017. The participants will focus on evaluating/utilizing the local and regional pilot tracking programs. Also, based on feedback from stakeholders' review of the conceptual framework, a formal process for developing accounting methods will be established.

Phase 4 and Beyond: Implementation of Regional Tracking Program for Completing and Implementing Accounting System. Phase 4 is scheduled to begin in 2018 and continue into the future. It is anticipated that technical and financial resources will be in place to implement the regional tracking program including additional communities. The process for developing accounting methods will also be implemented. This will likely include a series of expert panels, stakeholder meetings, comprehensive literature reviews and other steps that will be needed in what is likely to be a highly iterative, long term process.

2.3.2. Nitrogen Tracking Worksheet

The Town previously generated a "Land Use Development Tracking Worksheet" to be used until the Great Bay Pollution Tracking and Accounting Pilot Program (PTAPP) implements a universal tracking tool. This form is intended for use on new development projects and remains a work in progress. A sample of this form and the instructions used to complete, which has been used to summarize data from developments in 2016, is included as **Attachment 4**.

2.3.3. NPDES MS4

The Town submitted an NPDES Small MS4 General Permit Annual Report, which summarizes the activities taken to date for compliance with all permit conditions **(See Attachment 5).**

2.4. Status of NPS and Stormwater Point Source Nitrogen Control Plan

The Town and Wright-Pierce began discussing the plan of study during Fall 2016 and continued discussions into December 2016. The anticipated preliminary schedule is to begin work on Phase 1 of the Nitrogen Control Plan in Spring 2017 for completion in accordance with the AOC required date of September 2018. The Nitrogen Control Plan will integrate and build upon the point source and non-point source content that was developed in the Wastewater Facilities Plan (WP, March 2015) and the WISE Report (Geosyntec, et.al., December 2015). The Town has tasked Wright-Pierce with submitting the scope of work and contract amendment in the first quarter of 2017.

In conjunction with Waterstone Engineering, the Town was awarded a grant from NOAA for a coastal resiliency project which will explore green infrastructure and low impact development practices in the Lincoln Street subwatershed. This project will identify specific stormwater BMP projects to improve stormwater quality and reduce stormwater quantity to the Squamscott River. The project began in October 2016 and is scheduled to be completed in 2017. A key component of the project will be the development and implementation of an innovative messaging plan, including materials to engage the interested public. The grant proposal is included as **Attachment 6.**

Other Nitrogen Control Plan related activities that the Town completed this year include:

- Continued design for the WWTF and Main Pump Station Upgrade project.
- Continued participation in the NHDES PTAPP project.
- Continued compliance with the requirements of the NPDES MS4 General Permit.
- Continued outreach and education to the residents of Exeter.
- Amended the Town Zoning Ordinance in March 2016 to include language which prohibits the use of fertilizer in the Wetlands Conservation Overlay District, the Aquifer Protection Zone, and the Shoreland Protection District (**see Attachment 7)**.

- Continuing tracking efforts by Town departments.
- Continuing outreach to NHDES on Great Bay watershed strategies.

- Started and progressed Stormwater Ordinance revisions in 2016. The Town and Wright-Pierce are continuing to work on these revisions in 2017.
- Continuing to consider future initiatives outlining strategies to engage other communities within the Exeter River watershed. *[Note: As presented in the Wastewater Facilities Plan, Exeter is the source of 33% of the delivered load to the Great Bay from the Exeter/Squamscott River watershed; conversely, the other 14 communities represent 66% of the delivered load. Achieving the targeted water quality improvements will require the cooperation and participation of all the communities within the Exeter River watershed.]*

2.5. Description and Accounting of the Activities Conducted by the Town as part of its Nitrogen Control Plan

Some of the Town's activities related to the development of the Nitrogen Control Plan are summarized on the preceding pages. Additional information is presented below.

2.5.1. Baseline Stormwater Total Nitrogen - Existing Loads

No new work on this element since the completion of the Wastewater Facility Study and the WISE Study in 2015. This work will restart in 2017 with the Nitrogen Control Plan.

2.5.2. BMP Optimization and Costing for Nitrogen Management

No new work on this element since the completion of the Wastewater Facility Study and the WISE Study in 2015. This work will restart in 2017 with the Nitrogen Control Plan.

2.5.3. Water Quality Monitoring Plan

As noted above, a draft water quality monitoring plan has been developed for the WISE communities with input from the three towns, WISE, NHDES, and EPA. This Plan will be a key element to support the adaptive management. Initial sampling was conducted in 2015 a total of 15 locations (eight watershed locations and seven estuarine locations). No sampling occurred in 2016, but it is anticipated that nutrient sampling will continue in Spring 2017.

Town Planning Department staff regularly participate in the State's Volunteer River Assessment Program (VRAP). Bi-monthly samples are taken at nine sites throughout Exeter as part of the state-wide effort to promote water quality efforts. The 2016 Exeter River Watershed VRAP data results are included in **Attachment 8**. The Town also purchased new water monitoring equipment to help with VRAP efforts.

2.5.4. MS4 Permit Assistance

- Wright-Pierce was retained to evaluate the existing Stormwater Ordinances and regulations for compliance with the 2013/2015 Draft NH Small MS4 Permit.
- Wright-Pierce was retained to develop a written draft of the Stormwater Management Program (SWMP) and Illicit Discharge Detection and Elimination (IDDE) Plan for compliance with the 2013/2015 Draft NH Small MS4 Permit.
- The MS4 Permit Assistance work was started in 2016. Refer to the Wright-Pierce memorandums outlines **(Attachment 9)**.

2.6. Description of activities conducted which affect nitrogen in the Great Bay Estuary

Numerous activities were conducted in Town which affects nitrogen in the Great Bay Estuary. The activities are described below and are organized by municipal department.

2.6.1. <u>Coordination between Departments</u>

As noted above, the Town is required to develop a total nitrogen tracking and accounting system as a part of the AOC. There are three departments that are responsible for managing, monitoring and/or approving activities which impact the total nitrogen load – either increasing or decreasing – to the Great Bay Estuary. The Planning Department is primarily responsible for new developments (e.g., buildings, private roads, etc.), the Building Department is primarily responsible for monitoring the status of construction of development (e.g., housing, commercial, etc.) and the Public Works Department is primarily responsible for public infrastructure (e.g., WWTF, public roads, sewers, storm drains, etc.). Over the past year, the Town has made progress in identifying areas of responsibility for the three departments and in identifying coordination procedures between departments. The table below summarizes the results of the initial discussions regarding the responsibility for tracking.

Status of "Primary Areas of Responsibility Tracking"

Public Works Department	Planning and Building Departments
WWTF activities and upgrades	New and modified septic systems
Changes in Infiltration/Inflow	New and modified private WWTFs
Changes in impervious cover (public)	New connections to the sewer system
Changes in stormwater BMPs (public)	Changes in stormwater BMPs (private)
Changes in turf management (public)	Changes in turf management (private)
Changes in ordinances (e.g., stormwater)	Changes in ordinances (e.g., zoning)
Maintenance and mapping of infrastructure	Conversion of existing landscape
Facilities Planning	Changes in impervious cover (development)

2.6.2. Planning and Building Departments

The Building Department issued a total of 35 building permits for parcels which had development/re-development that impacted total nitrogen. In summary, these parcels resulted in approximately 220,608 square feet of new impervious area, four rebuilt septic systems, nine new septic systems, and seven new sewer connections. Of the 22 parcels with new impervious area, eight included at least one Best Management Practice (BMP) such as a rain garden or roof runoff infiltration system. The Preliminary Nitrogen Tracking Summary is included as **Attachment 10**.

The Planning Department acquired a grant to adopt fertilizer buffers for all surface waters in the Zoning Ordinance. The Ordinance was adopted in March 2016 as a means of reducing nitrogen runoff. In association with the new ordinance, several public education sessions were held (see **Attachment 11**).

Planning Department and Conservation Commission personnel attended a NHDES sponsored "Soak Up the Rain NH" event. The volunteers helped install two rain gardens on residential properties. The Planning Department and Conservation Commission distributed "Soak Up the Rain NH" brochures which is included as **Attachment 12**.

Rain barrels were available for residents to purchase (8 sold in 2016).

Public Works Department

The Public Works Department has conducted a substantial amount of activities in 2016 which have affected nitrogen in Great Bay, including capital improvements, best management practices, training activities, outreach activities and planning efforts. These are summarized below.

- Continued outreach and education through the following efforts are included in **Attachment 13.**
  - "Think Blue Exeter" program website.
  - "Sump Pump Removal Program" – six sump pumps were removed from the Phillips Exeter Academy campus in 2016 and one sump pump was removed from 15 Locust Avenue.
  - "Septic Smart" program informative display in town offices and pamphlets.
  - "What's Flushable?" NHDES program pamphlets.
- Expanded their "Pet Waste" initiative through purchasing $1,500 pet waste dispensers and bags, which were made available during 2017 pet registration at the Town Clerk's office. There are 19 pet waste stations available throughout the Town for use by the public (see **Attachment 14**).
- Continued street sweeping and catch basin cleaning programs. In 2016, 1,290 miles of streets were swept and a total of 586 catch basins were cleaned.
- In 2016, approximately 15,848 linear feet of sanitary sewer was jetted and 7,127 linear feet had root control applied to it and was later videoed to ensure effectiveness, which was confirmed.

- Continued infiltration/inflow investigations were conducted by the Town and Underwood Engineers during 2016, which included field evaluations, building inspections, dye testing, smoke testing and flow evaluations. These efforts removed nitrogen from the WWTF effluent discharge. This effort was documented in a report entitled “Combined Sewer Overflow (CSO) Long Term Control Plan (LTCP) Update, Town of Exeter, New Hampshire”, dated January 30, 2017 (see **Attachment 15)**.
- Three public works personnel completed an educational “Pretreatment Workshop”.
- One public works personnel attended a Low Impact Development (LID) conference (3 days).
- Three public works personnel completed the NHDES educational class on “Fats, Oil and Grease”.
- Two public works personnel attended and successfully completed the NHDES “Lab Certification class”.
- One public works personnel attended the NHDES “Laboratory Basics class”.
- Two public works personnel attended Water Environment Federation Annual Technical Exhibition and Conference.
- Two public works personnel attended the NHDES “Math Review class”.
- Two public works personnel attended the NHDES “Grade 1-2 Preparation class”.
- Two public works personnel passed the NHDES WWTF Grade 2 Operator License exam.
- All Highway Department snow plow drivers received their “Green Pro Snow Certification”.
- Prior to first snow fall, all salt spreaders were calibrated.
- All drains to the Squamscott River were stenciled or verified stenciled “Drains to River”.
- Each Town resident was permitted to have up to twelve bags of leaves picked up for free in the Spring and Fall of 2016, and they were able to drop leaves off at the Exeter transfer station. The leaves were distributed to a compost pile and residents are allowed to use the compost.
- Each Town resident was permitted to have one Christmas Tree picked up for free in the Winter of 2016.
- A downtown sidewalk replacement project on Water Street was constructed in 2016. The downtown area has a high percentage of impervious area. This project included two retrofitted sidewalk tree filter BMPs.
- A cross-connection between the sewer system and the drainage system was repaired at 26 Walnut Street.
- The Great Dam was removed in 2016 affecting the water quality of the Exeter River. The Exeter River had an impounded reach within the town that is listed on the 2012 303(d) list of impaired waters. River monitoring will continue through 2021 which will include inspections for erosion at five cross sections of the river as well as dissolved oxygen (DO) testing.
- The Court Street Culvert Replacement Project is on the 2017 Town Warrant which will be voted on during the Town Elections on March 14, 2017.
- The Exeter River Coop project was approved in 2016 and is a private sewer upgrade which will replace all sanitary sewers during the 2017 construction season.
- The Squamscott River Outfall Restoration Project was completed by Unitil Corporation (formerly Northern Utilities) in early 2016 **(see Attachment 16)**.

LIST OF ATTACHMENTS

<u>Attachment 1</u>

2016 Exeter Annual TN Load Table

EXETER WWTF - TOTAL ANNUAL NITROGEN LOAD TO SQUAMSCOTT RIVER

	WWTF EFFLUENT - TOTAL ANNUAL NITROGEN LOAD														GRBCL Squamscott R.
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Load	Load	TN Conc.
	(lbs/mn)	(lbs/mn)	(lbs/mn)	(lbs/mn)	(lbs/mn)	(lbs/mn)	(lbs/mn)	(lbs/mn)	(lbs/mn)	(lbs/mn)	(lbs/mn)	(lbs/mn)	(lbs/yr)	(tons/yr)	(mg/l)
Days per month	31	28	31	30	31	30	31	31	30	31	30	31			
Past Years															
2003-2008	-	-	-	-	-	-	-	-	-	-	-	-	85,400	42.7	0.77
2009-2011	-	-	-	-	-	-	-	-	-	-	-	-	83,600	41.8	0.71
2012	8,457	7,830	9,303	8,151	11,590	7,633	4,338	2,235	2,312	6,349	6,222	11,745	86,164	43.1	0.83
2013	10,700	9,082	13,913	8,681	9,029	12,500	10,852	7,165	3,971	5,203	8,611	11,270	110,976	55.5	0.82
2014	10,198	8,321	9,439	6,754	6,643	6,803	6,680	8,014	4,565	5,037	10,906	12,981	96,342	48.2	0.68
2015	10,441	8,630	13,638	12,249	7,454	12,009	10,911	9,024	6,667	6,980	6,644	8,713	113,359	56.7	0.88
2016	10,751	10,554	11,538	8,765	8,714	6,858	9,769	6,856	2,645	6,070	9,799	13,340	105,658	52.8	Note 6

Previous Year (2013)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly Avg Flow (mgd)	1.71	1.67	2.56	1.95	1.63	2.17	1.75	1.29	1.53	1.22	1.25	1.45	-	-
Avg TN Conc. on Sample Day (mg/l)	24.2	23.3	21.0	18.5	21.8	23.1	24.2	21.9	10.5	16.9	25.0	31.8	-	-
Avg TN Load on Sample Day (lb/d)	345	324	449	278	286	415	347	226	131	164	313	342	-	-
Load - Flow Basis	10,705	9,092	13,907	9,022	9,192	12,549	10,947	7,323	4,012	5,321	7,832	11,938	-	-
Load - Load Basis	10,695	9,072	13,919	8,340	8,866	12,450	10,757	7,006	3,930	5,084	9,390	10,602	-	-
Load - Average	10,700	9,082	13,913	8,681	9,029	12,500	10,852	7,165	3,971	5,203	8,611	11,270	110,976	55.5

Previous Year (2014)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly Avg Flow (mgd)	1.82	1.66	1.98	2.73	1.72	1.26	1.33	1.28	1.12	1.36	1.42	1.5	-	-
Avg TN Conc. on Sample Day (mg/l)	23.5	24.5	21.0	9.8	15.3	20.5	19.1	25.0	16.3	18.5	30.3	26.4	-	-
Avg TN Load on Sample Day (lb/d)	301	255	262	227	209	238	219	250	152	115	368	507	-	-
Load - Flow Basis	11,064	9,503	10,757	6,698	6,808	6,467	6,572	8,278	4,570	6,509	10,772	10,244	-	-
Load - Load Basis	9,331	7,140	8,122	6,810	6,479	7,140	6,789	7,750	4,560	3,565	11,040	15,717	-	-
Load - Average	10,198	8,321	9,439	6,754	6,643	6,803	6,680	8,014	4,565	5,037	10,906	12,981	96,342	48.2

Previous Year (2015)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly Avg Flow (mgd)	1.71	1.36	1.83	2.88	1.56	1.74	1.49	1.23	1.18	1.32	1.31	1.37	-	-
Avg TN Conc. on Sample Day (mg/l)	24.5	27.0	29.0	17.5	18.2	28.0	27.5	27.3	23.2	21.0	20.3	25.2	-	-
Avg TN Load on Sample Day (lb/d)	324	310	437	396	244	394	362	302	216	219	221	274	-	-
Load - Flow Basis	10,838	8,580	13,729	12,618	7,345	12,197	10,600	8,687	6,854	7,171	6,658	8,931	-	-
Load - Load Basis	10,044	8,680	13,547	11,880	7,564	11,820	11,222	9,362	6,480	6,789	6,630	8,494	-	-
Load - Average	10,441	8,630	13,638	12,249	7,454	12,009	10,911	9,024	6,667	6,980	6,644	8,713	113,359	56.7

Current Year (2016)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly Avg Flow (mgd)	1.72	1.84	1.99	1.69	1.36	1.21	1.12	1.11	1.08	1.22	1.32	1.45	-	-
Avg TN Conc. on Sample Day (mg/l)	23.8	25.0	21.4	20.8	24.6	22.5	33.3	24.0	9.8	20.0	28.8	36.5	-	-
Avg TN Load on Sample Day (lb/d)	352	370	389	291	283	230	319	220	88	188	336	419	-	-
Load - Flow Basis	10,590	10,748	11,017	8,800	8,655	6,816	9,648	6,892	2,650	6,312	9,517	13,691	-	-
Load - Load Basis	10,912	10,360	12,059	8,730	8,773	6,900	9,889	6,820	2,640	5,828	10,080	12,989	-	-
Load - Average	10,751	10,554	11,538	8,765	8,714	6,858	9,769	6,856	2,645	6,070	9,799	13,340	105,658	52.8

NOTES:

1. Blue font indicates data from grab samples, TN estimated based on NH3-N plus 2 mg/l for effluent Organic Nitrogen. (2013 data only)
2. Green font indicates data from grab samples, TN measured directly. (2013 data only)
3. Red font indicates data from effluent composite sampler, TN measured directly. (2013 data to present)
4. Per the 2009 NHDES document, "Numeric Nutrient Criteria for the Great Bay Estuary," for days with multiple samples, the highest Squamscott River TN value was utilized.
5. Sample location is identified as GRBCL, located just downstream of the Newfields Wastewater Treatment Facility.
6. 2016 Squamscott River Data will not be available until completion of the NHDES QA/QC process in March 2017.

SOURCES:

1. 2003-2011 WWTF TN Loading values are from the 2012 Environmental Data Report (PREP).
2. The 2003-2013 Squamscott River TN Concentration values are derived from the UNH Jackson Estuarine Laboratory Tidal Water Quality Monitoring Program.
3. The 2014 Squamscott River TN Concnetration value was derived from the UNH Tidal Water Quality Monitoring Program and samples were taken at the Chapmans Landing on the Squamscott River.
4. The 2015 Squamscott River TN Concentration values are derived from the 2015 Great Bay Watershed Quality Monitoring Program.

Wright-Pierce, 18 January 2017

<u>Attachment 2</u>
2016 Warrant Article 7 Informational Brochure

Town of Exeter, NH

Wastewater Facility and Main Pumping Station Improvements

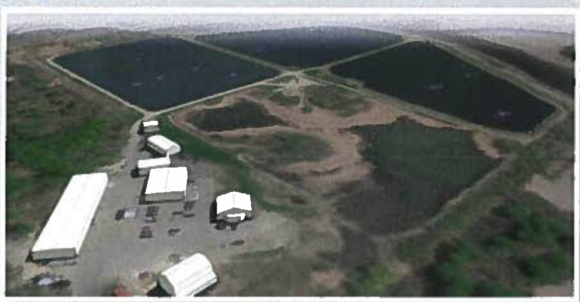
Town Meeting
March 8, 2016

2016 Warrant
ARTICLE 7

Polls Open
7:00 AM - 8:00 PM

Talbot Gymnasium at the Tuck Learning Center

30 Linden Street
Exeter, NH



PRSRT STD
US POSTAGE
PAID
EXETER, NH
PERMIT 25

RETURN ADDRESS

Town of Exeter-DPW
13 Newfields Road
Exeter, NH 03833

2016 Warrant ARTICLE 7 Informational Brochure

Town of Exeter, NH

Wastewater Facility and Main Pumping Station Improvements

Town Meeting
March 8, 2016

The second session of the annual town meeting, to elect town officers by official ballot and to vote on all warrant articles, will be held on Tuesday, March 8, 2016, at the Talbot Gymnasium at the Tuck Learning Center, 30 Linden Street (polls open for voting at 7:00 AM and close at 8:00 PM). Following is information on Article 7, which seeks authorization to raise and appropriate $49,980,000 for the construction of a new wastewater facility and main pumping station improvements. The Board of Selectmen recommended the article 5 - 0 (unanimous).

Why is the WWTF upgrade needed?

The existing aerated lagoon wastewater treatment facility (WWTF) was originally constructed in 1964 and was last upgraded in 1988. The US Environmental Protection Agency (EPA) issued Exeter a new wastewater discharge (NPDES) permit in December 2012; this permit included a new treatment limit of 3 mg/L effluent total nitrogen. The treated wastewater from the aerated lagoons cannot meet this permit nitrogen limit and sometimes cannot meet other permit limits due to algae that grows in the aerated lagoons. The new NPDES permit was issued because the WWTF causes or contributes to water quality deterioration in the Squamscott River and Great Bay, including low dissolved oxygen concentrations in the Squamscott River. While this type of aerated lagoon treatment facility was fairly common in the 1960s, it is no longer appropriate for Exeter. A modern wastewater treatment facility is needed to meet the permit limits.

Why is the Pump Station upgrade needed?

The existing Main Pump Station and forcemain to the WWTF were originally constructed in 1964. The pump station was last upgraded in 1995. The pump station and forcemain need to be upgraded to maintain operational reliability. The pump station capacity also needs to be increased to help reduce combined sewer overflows (CSOs) to the Squamscott River.

What is the Administrative Order on Consent?

The Administrative Order on Consent (AOC) is a legal document that was negotiated between the USEPA and the Town as permit holder. It establishes milestone tasks and a schedule for the Town to come into compliance with the new NPDES permit. The AOC was required because the Town was in non-compliance immediately upon the effective date of the new NPDES permit.

Why do we have to complete the WWTF now?

The AOC requires a WWTF upgrade to achieve an "interim limit" of 8 mg/l effluent total nitrogen. The AOC schedule includes starting construction in 2016 and completing it in 2018. The AOC also requires a number of additional activities related to stormwater ("MS4"), other non-point sources ("NPS") of nitrogen and pollutants as well as a scientific and engineering assessment of whether the interim limit is sufficiently protective of the Squamscott River and Great Bay. This project addresses the first component of the AOC.

How was the project cost determined?

The Town undertook a 15-month wastewater facilities planning effort from December 2013 to March 2015. Part of this planning effort included working closely with other Great Bay communities to evaluate a potential regional wastewater treatment facility located at the Pease Development Authority. Ultimately, it was concluded that the most feasible and cost-effective approach for Exeter was to upgrade its own wastewater treatment. The Town initiated the design process in April 2015. A comprehensive regulatory review was competed in December 2015. In addition, a comprehensive peer review and value engineering effort was completed between December 2015 and January 2016. Recommendations from this regulatory and value engineering review were incorporated into the project.

Has the Town explored low interest loans and grants?

As proposed, the Town will fund the project with a Clean Water State Revolving Fund (SRF) low interest rate loan provided by NHDES. The SRF has a federally subsidized low interest rate (currently at 2.552%). Through the SRF loan program, the Town has received a "principal forgiveness" commitment from NHDES of $2,500,000. Principal forgiveness is similar to a grant. In addition:

- The Town submitted a pre-application for State Aid Grant (20% grant on eligible costs) and State Aid Grant Plus (additional 10% grant on eligible septage costs); however, no commitments are in place. The State Aid Grant program has not been funded by the New Hampshire legislature for over 5 years.
- The Town expects to secure an energy efficiency grant from Unitil.
- The Town has targeted the US Economic Development Administration as a source of potential grant funds; however, no commitments are in place.
- The Town is committed to continuing to explore additional grant opportunities to fund the project.

How will the WWTF project be paid for?

As noted herein, the Town will use low interest rate loans and principal forgiveness to finance the project over 20 years; 100% of the costs will be repaid by the users of the sewer system through sewer user fees.

What will the impact be to sewer user rates?

Using Exeter's typical residential water use of 14,000 gallons/quarter, the current typical residential sewer user rate is $85/quarter. The additional debt, and operations and maintenance costs associated with this project are expected to increase the typical residential sewer user rate by $134/quarter (i.e., to a total of $219/quarter). If State Aid Grant (SAG) program funding is restored by the NH legislature, the typical residential sewer user rate would increase by $103/quarter (i.e., to a total of $188/quarter).

Why is the project paid for by the sewer rate payers only?

The Board of Selectmen have considered numerous factors regarding how the project will be paid for, including the Water and Sewer Advisory Committee's recommendation to evaluate the use of general taxation funds to pay a portion of the debt. The primary factors in the Board's decision are:

- The WWTF and Main Pumping Station are used by the sewer users.
- Several of the largest sewer users are organizations that have tax-exempt properties which do not contribute to general taxation in Exeter.
- There are sewer users located in Stratham and Hampton who do not contribute to general taxation in Exeter.
- The Town is committed to reaching a wastewater agreement with Stratham which includes an appropriate buy-in fee.
- The Town is committed to evaluating the current sewer rate structure.
- The additional requirements of the AOC which are related to stormwater and non-point source nitrogen and pollutants will be paid by a much broader base than just the sewer users.

TOWN OF EXETER
FOUNDED
1638
NEW HAMPSHIRE

Attachment 3
PTAPP Implementation Framework

Great Bay Pollution Tracking and Accounting Pilot Project
Implementation Framework

Phase 1
Planning

(completed - 2015)

- Developed shared definition of tracking and accounting
- Identified activities for tracking (Tracking Matrix)
- Established regional dialogue and process
- Identified key program drivers, needs, and barriers
- Developed conceptual framework and costs for implementation

Plan

2015

Phase 2
Pilot tracking program, conduct planning for accounting

- Create Memorandum of Understanding
- Develop and test "beta" regional tracking database; use Tracking Matrix as foundation
- Work with municipalities, GRANIT, RPCs, UNHSC, DES, PREP, GBNERR, etc. to input data and refine tracking methods
- Identify accounting process to quantify load reductions for tracked activities
- Develop business plan
- Continue work group meetings

Test

2016 - 2017

Phase 3
Evaluate pilot tracking, develop accounting methods

- Refine database based on partner input - what worked and what didn't
- Identify technical and financial resources to implement tracking beyond pilot communities
- Implement process to develop accounting methods
- Develop framework for broader implementation and identify funding and key roles/providers
- Continue business plan development
- Continue work group meetings

Check

2017 - 2018

Implementation
Implement wider program

- Implement tracking with additional communities
- Continue process to develop accounting methods to quantify load reductions for tracked activities
- Identify and implement tools and financial resources as program evolves
- Convene advisory committee to aid in program assessment and development
- Provide progress reports to partners

Implement

2018 ...

Great Bay Pollution Tracking and Accounting Pilot Project

Phase 2 Partner Roles

Overview

The following table describes partner roles and activities for Phase 2 of PTAPP. In summary, four key partner roles are anticipated and described below: Tracking tool end users, technical assistance, tracking database development, and project administration.

Project Participants	Role Description	Key Tasks
Municipalities: Dover Durham Exeter Lee Newfields Newmarket Portsmouth Rochester Stratham Others? Municipal consulting teams (as identified by municipalities)	Tracking Tool End Users	Work with database development team to ensure tracking tools meet end user needs; such as, helping to identify tracking database elements, ensuring required elements are tracked appropriately, helping to define tracking tool requirements (e.g. user registration/authentication, workflow, etc.), assisting in determining how tracking information is collected at the local level. Attend PTAPP Work Group meetings
Great Bay National Estuarine Research Reserve Piscataqua Region Estuaries Partnership Rockingham Planning Commission, Southeast Watershed Alliance Strafford Regional Planning Commission US EPA Others as identified	Technical Assistance	Provide input on technical processes and products, identify opportunities for linkages to similar efforts, help identify and define scale of tracking (regional or local and who would be best entity to collect tracking data), etc.. Attend PTAPP Work Group meetings as available.

UNH GRANIT UNH Research Computing Center, UNH Stormwater Center NH Department of Environmental Services Regional planning commissions	Tracking Database Development	Develop Tracking Database. Provide and/or obtain data inputs (GRANIT, RPCs, local information). Coordinate with end users to input data and test database. Modify products and process (with input from Technical Assistance providers and Tracking Tool End Users).
NH Department of Environmental Services UNH Stormwater Center	Project Administration	Manage project funding and grants, develop project reports, administer Memorandum of Understanding, and coordinate project activities including: database development, work group meetings, partner coordination, and communication.

Attachment 4
Land Use Development Tracking Worksheet

Town of Exeter, NH

Land Use Development Tracking Worksheet

Map / Lot No.	Zoning District	Project Name	Exeter File No.
1	2	3	4

Planning Board No.	Approval Date	Occupancy Date	Source Reference Material
5	6	7	8

Within Shoreland Protection	Name of Water Body	Distance from Water (Ft)	Buffer Size (SF)
9	10	11	12

Land To	Turf / Grass	New Impervious	Imp. Removed	Disconnected Imp.	Agr. / Pasture
(SF)	13	16	19	23	27
Previous	14	17		24	28
Soil Type(s)	15		20	25	
Percent Disconnected		18			29
Infiltration Rate			21		
Description of soil / landscape restoration			22		
Estimated annual runoff				26	

Type of Agricultural / Pasture use	30

Wetland areas filled (SF)	31	Wetland areas restored (SF)	32

Sewer Connection	Septic System Type	Design Flow (Gal)	Maintenance Required and Frequency
33	34	35	36

New / Rebuilt	Name of closest Water Body to Septic System	Distance to closest Water Body (Ft or Mi)
37	38	39

BMP No.	BMP Type	BMP Description	GPS Coordinates		Drainage	Design Storm (in)
			Latitude	Longitude	Area (SF)	
40	41	42	43	44	45	46

BMP No.	Water Quality Volume (CF)	Percent Runoff Volume Reduction	Disconnection Multiplier	Effective Impervious (SF)	Underdrained
47	48	49	50	51	52

BMP No.	Description of required maintenance and scheduled frequency
53	54

BMP No.	Annual N Load to BMP (lbs N/Yr)	N Removal Efficiency (%)	N Load Reduction (lbs N/Yr)	Cumulative N Load Reduction (lbs N/Yr)
55	56	57	58	59

Parcel Existing Annual N Load (lbs N/Yr)	Cumulative N Load Reduction (lbs N/Yr)	Parcel Proposed Annual N Load (lbs N/Yr)
60	61	62

Town of Exeter, NH
Land Use Development Tracking Worksheet
Direction Sheet

Listed below is the information that need to be input for each numbered block.

1. Map and Lot number for the subject parcel.
2. Zoning District for the subject parcel.
3. Project Name.
4. Exeter File Number.
5. Planning Board Number.
6. Planning Board Approval Date.
7. Date the Certificate of Occupancy was issued.
8. Source of the reference material used to obtain the information of fill out the Land Use Development Tracking Worksheet.
9. If the subject parcel is within the Shoreland Protection Zone input Yes, if not then input No.
10. If Box 9 is Yes, input the name of the Shoreland Protection Zone water body that the subject parcel is within.
11. If Box 9 is Yes, input the distance from the subject parcel to the water body.
12. If Box 9 is Yes, input the Buffer Size in square feet.
13. Area (square feet) of land that was converted to turf / grass.
14. Previous cover type of land area that was converted to turf / grass.
15. Soil Type(s) of land converted to turf / grass.
16. Area (square feet) of land that was converted to new impervious.
17. Previous cover type of land that was converted to new impervious.
18. Percent of new impervious area that is disconnected (See Definition A).
19. Area (square feet) of Impervious area that was removed.
20. Soil Type(s) of land where impervious was removed.
21. Soil Infiltration Rate of land where impervious was removed.
22. Description of how the soil or landscape restoration.
23. Area (square feet) of land that was converted to disconnected impervious (See Definition A).
24. Previous cover type of land that was converted to disconnected impervious.
25. Soil Type(s) of land that was converted to disconnected impervious.
26. Estimated runoff volume (acre-feet) from the land that was converted to disconnected impervious.
27. Area (square feet) of land that was converted to agricultural / pasture.
28. Previous cover type of land that was converted to agricultural / pasture.
29. Percent of new agricultural / pasture area that is disconnected (See Definition B).
30. If Box 27 has an area (square feet), description of the type of agricultural / pasture used.
31. Area (square feet) of wetlands that were filled.
32. Area (square feet) of wetlands that were restored.
33. If the subject parcel is connected to the Exeter sewer system input Yes, if not input No.
34. If Box 33 is No, type of septic system (conventional single family home, conventional shared, nitrogen removing, etc.) that the subject parcel is served by.
35. If Box 33 is No, design flow (gallons) of the septic system.
36. If Box 33 is No, septic system maintenance required and the frequency (monthly, quarterly, yearly, etc.)
37. If Box 33 is No, if the septic system was newly installed input New, if the septic system was rebuilt input Rebuilt.
38. If Box 33 is No, name of the closest water body to the septic system.
39. If Box 33 is No, distance (feet or mile) from septic system to the closest water body.
40. Number of the BMP (Best Management Practice, See Definition C) as designated on the Grading Plan.
41. Type of BMP, Structural BMP (See Definition D) or Non-Structural BMP (See Definition E).

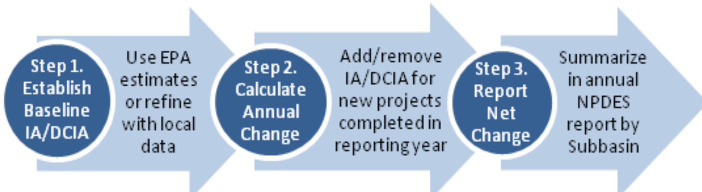
42. Description of BMP such as, structural: wet or dry ponds, wetland system, infiltration system, Bioretention areas or non-structural: vegetative buffers, forested buffers or filter strips.
43. Latitude of BMP.
44. Longitude of BMP.
45. Drainage area (square feet)(see Definition F) directed to the BMP.
46. Design Storm (inches) the BMP is designed to service.
47. Number of the BMP as designated on the Grading Plan.
48. Water Quality Volume (cubic feet) (see Definition G).
49. Percent runoff volume reduction (see Definition H) being directed to the BMP.
50. Disconnection Multiplier (see Definition I) for the BMP.
51. Effective Impervious (square feet) (see Definition J) directed to the BMP.
52. If the BMP is underdrained enter Yes, if not enter No.
53. Number of the BMP as designated on the Grading Plan.
54. Description of the BMP required maintenance and scheduled frequency.
55. Number of the BMP as designated on the Grading Plan.
56. Annual Nitrogen load (lbs Nitrogen per year) being delivered to the BMP.
57. Nitrogen Removal Efficiency (%) of the BMP.
58. Nitrogen load reduction (lbs Nitrogen per year) of the BMP.
59. Cumulative Nitrogen load reduction (lbs Nitrogen per year) for all BMPs (If there is a BMP listed above, add the Nitrogen load reduction (lbs Nitrogen per year) to the current BMP).
60. Parcel existing annual Nitrogen load (lbs Nitrogen per year)(Determined by the existing cover type areas of the subject parcel multiplied by the Nitrogen allocation rate (TBD)).
61. Cumulative Nitrogen load reduction (lbs Nitrogen per year)(Determined by adding the Nitrogen load reduction (lbs Nitrogen per year) for all BMPs listed).
62. Parcel proposed annual Nitrogen load (lbs Nitrogen per year)(Calculated by subtracting the Cumulative Nitrogen load reduction (Box 61) from the Parcel existing annual Nitrogen load (Box 60)).

Estimating Change in Impervious Area (IA) and Directly Connected Impervious Areas (DCIA) for New Hampshire Small MS4 Permit

Small MS4 Permit Technical Support Document, Revised April 2014 (Original Document, April 2011)

Draft NPDES Permit Focuses on DCIA

The 2010 NPDES Small MS4 permits for New Hampshire require regulated communities to estimate the number of acres of **impervious area** (**IA**) and **directly connected impervious area** (**DCIA**) that have been added or removed each year due to development, redevelopment, and or retrofitting activities (Draft Permit Section 2.3.6.8 (c)). Beginning with the second year annual report, IA and DCIA estimates must be provided for each subbasin within your regulated MS4 area. This technical support tool outlines accepted methods for estimating and reporting IA and DCIA in three steps:



What does DCIA really mean?

Impervious surfaces such as roadways, parking lots, rooftops, sidewalks, driveways, and other pavements impede stormwater infiltration and generate surface runoff. Research has shown that total watershed IA is correlated with a number of negative impacts on our water resources such as increased flood peaks and frequency, increased sediment, nutrient, and other pollutant levels, channel erosion, impairments to aquatic biota, and reduced recharge to groundwater (Center for Watershed Protection, 2003). Typically watersheds with 4-6% IA start to show these impacts, though recent work has found lower % IA threshold values for sensitive species (Wenger *et* al., 2008). Watersheds exceeding 12% IA often fail to meet aquatic life criteria and narrative standards (Stanfield and Kilgore, 2006).

For the purposes of the MS4 permit, DCIA is considered the portion of IA with a direct hydraulic connection to the permittee's MS4 or a waterbody via continuous paved surfaces, gutters, drain pipes, or other conventional conveyance and detention structures that do not reduce runoff volume. DCIA does not include:

- IA draining to stormwater practices designed to meet recharge and other volume reduction criteria.
- Isolated IA with an indirect hydraulic connection to the MS4, or that otherwise drain to a pervious area.
- Swimming pools or man-made impoundments, unless drained to an MS4.
- The surface area of natural waterbodies (e.g., wetlands, ponds, lakes, streams, rivers).

Accepted Methods for Estimating IA & DCIA

Step 1. Establish Baseline IA/DCIA

Use the estimates of existing IA and DCIA provided by EPA to establish the baseline acreage from which future additions or reductions of impervious cover can be tracked and measured.

For each regulated municipality in New Hampshire, EPA will provide graphical and tabular estimates of IA/DCIA ordered by land use type and subbasin. **Permittees may simply use these baseline estimates as is, or develop more accurate estimates when justified.** This may include using local data to refine EPA's estimates or the direct measure of IA (**Figure 1**). If the EPA estimates are not used for the baseline, permittees must provide in the annual report a description of the alternative methodology used.

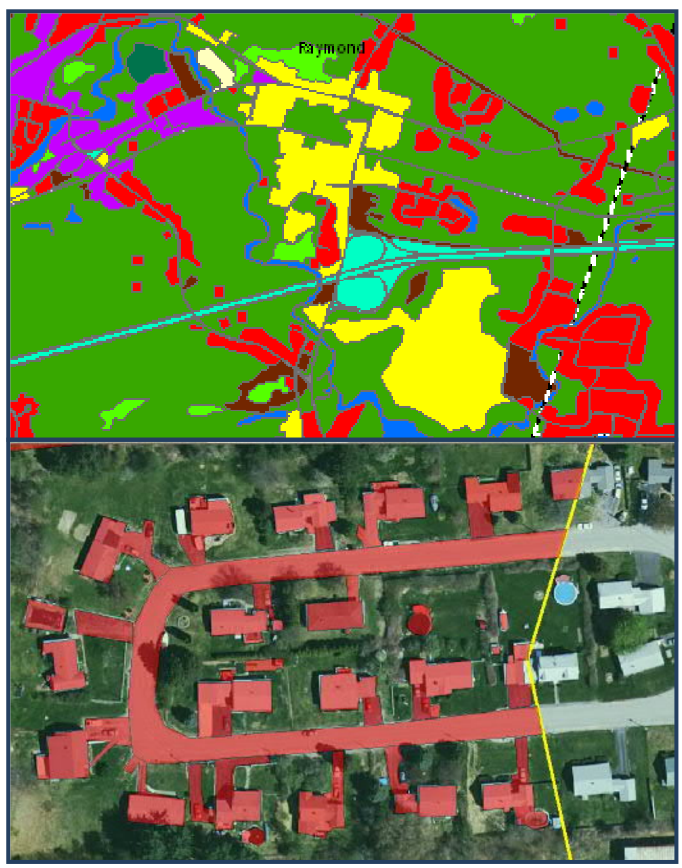


Figure 1. EPA will use statewide land use data (GRANIT), subbasin boundaries, and land use impervious coefficients to estimate baseline IA for each MS4 jurisdiction (upper). Communities may choose to refine these estimates with direct measure of IA where local GIS capacity is available, as shown here from Somersworth, NH (lower).

Why Quantify Your IA & DCIA?

New construction, redevelopment, and restoration activities can change existing IA and DCIA – potentially exacerbating or reducing existing watershed impairments. Understanding watershed imperviousness is important for communities because it:

- Informs management of impaired waterbodies and prioritization of watershed restoration efforts;
- Facilitates investigation of existing chronic flooding and stormwater drainage problems, and avoidance of new problems;
- Indicates potential threats to drinking water reservoirs/aquifers; commercial fisheries, and recreational waters;
- Demonstrates progress toward achieving future **Total Maximum Daily Load (TMDL)** allocations based on impervious cover thresholds;
- Serves as an educational tool for encouraging environmentally sensitive land use planning and **Low Impact Development (LID);**
- Facilitates equitable derivation of possible stormwater utility fees based on parcel-specific impervious cover; and
- Provides guidance for stormwater retrofit efforts.

Based on the established IA, DCIA can be estimated using empirical formulas developed by Sutherland as a function of watershed type (CWP, 2000). **Table 1** provides approved IA coefficients to be used for this approach. These coefficients were derived from previous studies and used by EPA to establish baseline conditions for regulated New Hampshire communities using **Equations 1** and **2**.

Eq. 1 IA_{Lui}= Total $acres_{Lui}$ * %IA
Eq. 2 Total Subbasin IA=$\sum_{i=1}^{n} IA_{Lui}$

Table 1. Estimating DCIA as a function of Land Use[1]

Land Use	% IA
Commercial	76
Industrial	56
High density residential	51
Med. density residential	38
Low density residential	19
Institutional	34[2]
Agricultural	2
Forest	1.9
Open Urban Land	11

[1] IA coefficients taken from Rouge River Study/EPA
[2] Institutional land use coefficient from Cappiella and Brown, 2001

Table 2 summarizes the appropriate Sutherland equations to apply for estimating DCIA from IA for *average*, *highly connected*, *totally connected*, *somewhat connected*, and *mostly disconnected* watersheds. **Permittees may opt to refine DCIA estimates to better reflect actual basin conditions where justified.**

Table 2. Sutherland Equations to Determine DCIA (%)

Watershed Selection Criteria	Assumed Land Use	Equation *(where IA(%) ≥1)*
Average: Mostly storm sewered with curb & gutter, no dry wells or infiltration, residential rooftops not directly connected	Commercial, Industrial, Institutional/ Urban public, Open land, and Med. density residential	$DCIA=0.1(IA)^{1.5}$
Highly connected: Same as above, but residential rooftops are connected	High density residential	$DCIA=0.4(IA)^{1.2}$
Totally connected: 100% storm sewered with all IA connected	--	DCIA=IA
Somewhat connected: 50% not storm sewered, but open section roads, grassy swales, residential rooftops not connected, some infiltration	Low density residential	$DCIA=0.04(IA)^{1.7}$
Mostly disconnected: Small percentage of urban area is storm sewered, or 70% or more infiltrate/disconnected	Agricultural; Forested	$DCIA=0.01(IA)^{2}$

Step 2. Calculate Annual Change

Once baseline IA/DCIA is established for each subbasin, permittees must annually track the change in IA and DCIA acreage from development, redevelopment, and retrofit projects completed that year.

To account for the estimated annual change in DCIA, permittees will need to determine how much IA and DCIA have been added or removed as a result of individual development, redevelopment, or retrofit projects completed during the reporting period.

The acres of DCIA for each project will be based on two factors: **(1) the amount of site IA, and (2) the effectiveness of stormwater best management practices (BMPs)** employed to reduce associated runoff. Practices that reduce runoff volume will lower DCIA. Note that practices that remove stormwater pollutants but do not provide runoff reduction benefits are not considered effective at reducing DCIA.

This information must be obtained from site plans and verified by as-built drawings or site inspection upon project completion. For all completed projects:

(1) Determine the former and new IA for each site.

(2) Determine the number and type of existing and/or new BMP(s) used, and calculate the amount of IA removed, managed, and unmanaged draining to each BMP.

(3) For each BMP designed in accordance with specifications provided in New Hampshire Stormwater Manual Stormwater Handbook (Vol. 2, Ch. 4), select the appropriate "disconnection" multiplier from **Table 3**. For infiltration trenches or basins, determine appropriate runoff volume reduction using **Tables 4** and **5** depending on site-specific soil infiltration rates and runoff depth captured as derived from the EPA 2010 BMP Performance Curves. Use **Equation 3** to generate the "disconnection" multiplier.

Eq. 3 Multiplier = 1 - % Runoff Reduction Volume/100

(4) Calculate DCIA for each BMP using **Equation 4** if adding newly created IA at new construction or redevelopment site, OR by using **Equation 5** if reducing existing IA in a retrofit or redevelopment scenario.

Eq. 4 Added $DCIA_{BMPi}$= IA_{BMPi} * BMP Multiplier

Eq. 5 Reduced $DCIA_{BMPi}$= IA_{BMPi} * (1 – BMP Multiplier)

(5) Calculate DCIA for entire project site draining to BMPs by summing DCIA for individual BMPs using **Equation 6**.

Eq. 6 Site $DCIA_{added} = \sum_{i=1}^{n} DCIA_{BMPi}$ + New Unmanaged IA

Table 3. Determining DCIA based on Interim Default BMP Disconnection Multiplier or EPA's Infiltration Curves

BMP Description	% Runoff Volume Reduction[1]	BMP "Disconnection" Multiplier[2]
Removal of pavement; restore infiltration capacity	100%	0
Redirection of rooftop runoff to infiltration areas, rain gardens or dry wells	85%	0.15
Permeable pavement, bioretention, dry/vegetated water quality swales	75%	0.25
Infiltration trenches	15-100%	0.85-0
Infiltration basins	13-100%	0.87-0
Non-runoff reduction practices (i.e., detention ponds, wetlands, sand filters, hydrodynamic separators, etc)	0%	1.0

[1] Interim default values for % runoff reduction are based on Schueler 2009 and are subject to change as more data becomes available. Values for infiltration trenches and basins are based on soil infiltration rates and depth of runoff treated. See Tables 3 and 4 to determine the site specific values to apply.

[2] BMP multiplier = 1 - %Runoff Volume Reduction/100

Step 3. Report Net Change in IA & DCIA

Starting in year 2, permittees must include a summary of net changes in IA/DCIA by subbasin and document methodology in its annual report.

Permittees will be required to summarize IA and DCIA estimates for all completed construction, redevelopment, and retrofit projects within each subbasin. **EPA will provide a tracking spreadsheet to assist in the calculation and tracking of this information.** For individual BMPs at each site, permitees will need to track the type of practice, the IA captured, and the % runoff reduction and "disconnection" multiplier assigned to that practice. Consider incorporating these DCIA accounting elements into your program's existing BMP tracking database.

Table 4. Infiltration Trench: Percent Runoff Reduction based on EPA's Infiltration Curves

Storage Capacity: Runoff Depth from DCIA (inches)	Soil Infiltration Rate (in/hr)					
	0.17	0.27	0.52	1.02	2.41	8.27
0.1	15%	18%	22%	26%	34%	54%
0.2	28%	32%	38%	45%	55%	76%
0.4	49%	55%	62%	68%	78%	93%
0.6	64%	70%	76%	81%	88%	97%
0.8	75%	79%	84%	88%	93%	99%
1.0	82%	85%	89%	92%	96%	100%
1.5	92%	93%	95%	97%	99%	100%
2.0	95%	96%	97%	98%	100%	100%

Table 5. Infiltration Basin: Percent Runoff Reduction based on EPA's Infiltration Curves

Storage Capacity: Runoff Depth from DCIA (inches)	Soil Infiltration Rate (in/hr)					
	0.17	0.27	0.52	1.02	2.41	8.27
0.1	13%	16%	20%	24%	33%	55%
0.2	25%	30%	36%	42%	54%	77%
0.4	44%	51%	58%	66%	78%	93%
0.6	59%	66%	73%	79%	88%	98%
0.8	71%	76%	81%	87%	93%	99%
1.0	78%	82%	87%	91%	96%	100%
1.5	89%	91%	94%	96%	99%	100%
2.0	94%	95%	97%	98%	100%	100%

Are We Required to Follow This Protocol?

Permittees are encouraged to refine IA and DCIA baseline estimates where local data is more accurate; however the general methodology for calculating annual change in IA and DCIA should be applied. Deviations from the methodology are subject to review by EPA and must be described in the annual report.

Example Subbasin DCIA Calculations

Baseline conditions for subbasin #54203 were estimated to include 100 acres IA and 50 acres DCIA. By the second year of NPDES reporting, two construction projects were completed that resulted in an overall change in the amount of subbasin IA and DCIA as follows:

Project 1: New 5-acre residential townhome complex with 4 acres of new IA, of which, 0.9 acres drain to a bioretention facility, 3 acres drain to an infiltration basin, and 0.1 acres drain untreated to the main road. The infiltration basin is designed based on a soil infiltration rate of 0.52 in/hr and 0.8 inches of runoff captured.

Step 1. Establish new IA to add to baseline = 4.0 ac

Steps 2 -4. Determine DCIA per BMP

Eq. 3 $Multiplier_{inf.\ basin} = 1 - 81/100 = 0.19$

Eq. 4 $DCIA_{bioretention} = 0.9\ ac * 0.25 = 0.23\ ac$
$DCIA_{inf.\ basin} = 3.0\ ac * 0.19 = 0.57\ ac$

Step 5. Sum DCIA for entire site

Eq. 6 Total Project DCIA= 0.23 ac + 0.57 ac + 0.1 $ac_{unmanaged}$
= **0.9 ac DCIA to add to baseline**

Project 2: Redevelopment of an 8-acre retail outlet with 5.5 acres of existing IA. After redevelopment, there are now 6.0 acres total IA. 3.0 acres of IA continues to drain to an existing detention pond, but 1.0 acre of overflow parking was converted to pervious pavement. A new bioretention retrofit now captures 0.7 acres of IA that used to drain to the pond, as well as 0.5 acres of newly added IA. The remaining 0.8 acre of site IA remains untreated.

Step 1. Establish new IA to add to baseline = 6.0 ac - 5.5 ac
= 0.5 ac

Steps 2 -4. Determine DCIA per BMP to be added or subtracted from baseline.

Eq. 4 Added $DCIA_{bioretention\text{-}new\ IA} = 0.5\ ac * 0.25 = 0.13\ ac$

Eq. 5 Reduced $DCIA_{porous\ pavement} = 1\ ac *(1-0.25) = 0.75\ ac$
Reduced $DCIA_{drypond} = 3.0\ ac *(1-1.0) = 0\ ac$
Reduced $DCIA_{bio\text{-}existing\ IA} = 0.7\ ac *(1-0.25) = 0.53\ ac$

Step 5. Sum DCIA for entire site.

Eq. 6 Total Project Added DCIA = 0.13 ac + 0 $ac_{new\ unmanaged\ IA}$
= 0.13 ac DCIA to add to baseline

Eq. 6 Total Reduced DCIA = 0.75 ac + 0 ac+0.53 ac
= **1.28 ac DCIA to subtract from baseline**

End of Year Report: Totals for Subbasin #54203:

IA = 100 $ac_{baseline}$ + 4.0 $ac_{project\ 1}$ + 0.5 $ac_{project\ 2}$
= 104.5 ac *(net gain of **4.5 ac**)*

DCIA = 50 $ac_{baseline}$ +0.9 $ac_{project\ 1}$ + 0.13 $ac_{project\ 2}$ – 1.28 $ac_{project\ 2}$
= 49.75 ac DCIA *(net reduction of 0.**25 ac**)*

Checklist of What to Expect EPA to Provide

EPA will provide all regulated MS4 communities in New Hampshire with the following information:

- Delineation of subbasin boundaries.
- Baseline estimates of IA and DCIA for each subbasin in your regulated area in tabular format.
- DCIA calculation and tracking spreadsheet.

How Does LID Influence IA and DCIA?

Incorporating LID techniques into site design can reduce IA & DCIA, protect natural areas, and minimize alterations to existing hydrology on site. The use of BMPs that maximize runoff reduction benefits (e.g., practices with low BMP Multipliers in **Table 2** and those shown in **Figure 2**) can result in a higher "disconnection" factor than if using traditional detention ponds. Your community can help reduce total IA and DCIA by:

- Adopting LID design requirements for new development projects.
- Requiring documentation of design methods used to minimize site IA and to disconnect IA.
- Requiring site designers to calculate and submit %IA and %DCIA for each site.
- Retrofitting existing, unmanaged impervious areas.

Figure 2. BMPs such as the bioretention, porous pavers, and infiltration trenches seen here are designed to provide water quality treatment and maximize runoff reduction through improved infiltration, evapotranspiration, and plant uptake. These are effective practices for reducing DCIA.

What are the Costs of Annual DCIA Tracking?

The cost will vary depending on the size of the regulated area, amount of existing IA, sophistication of existing GIS, number of new projects requiring tracking, and the level of effort required to obtain information for each site. Refining the EPA-provided baseline estimates of IA and DCIA may require collecting new data, purchasing new software/GIS, and additional staff time. This effort may not be worth the cost if the annual **net change** in IA and DCIA is the true measure of interest. Factors that will add to overall effort may include:

- Refining EPA's baseline estimates, particularly if local IA mapping doesn't already exist.
- Over-complicating the analysis by refining given equations.
- Not easily obtaining required IA and BMP information from proposed site plans. Determine the most efficient method to obtain this information as soon as possible – changing applicant reporting requirements may be a solution.
- Verifying as-built conditions with individual site visits. Consider alternatives (e.g., occupancy certifications).
- Maintaining an updated impervious and stormwater infrastructure layer in GIS, particularly if new projects have to be hand-digitized. Possibly require applicants to submit plans electronically.
- Not integrating effort with other existing programs (i.e., plan review, building inspection, or stormwater utility).

Where Can I go for More Information?

For more information regarding the new permit requirements, go to the New Hampshire Small MS4 webpage at:
www.epa.gov/ne/npdes/stormwater/MS4_2008_NH.html

Here you will find links to relevant permit documents; community-specific mapping and statistics for baseline IA and DCIA estimates; detailed descriptions of methods used to calculate IA and DCIA estimates; and the calculation and tracking spreadsheet template.

References

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Schueler, T. 2009. Guidance for meeting NPDES Permit Requirement in Montgomery County, MD

Stanfield and Kilgour, 2006. Effects of Percent Impervious Cover on Fish and Benthos Assemblages and Instream Habitats in Lake Ontario Tributaries. American Fisheries Society Symposium 48: 577-599.

Sutherland. 2000. Methods for Estimating Effective Impervious Cover. Article 32 in *The Practice of Watershed Protection*, Center for Watershed Protection, Ellicott City, MD.

Tetra Tech Inc., 2010. Stormwater BMP Performance Analysis. www.epa.gov/region1/npdes/stormwater/assets/pdfs/BMP-Performance-Analysis-Report.pdf

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Attachment 5

MS4 Annual Report

Municipality/Organization:	Town of Exeter, NH
EPA NPDES Permit Number:	**NHR041007**
Annual Report Number & Reporting Period:	**Year 13** **April 1, 2015 – March 31, 2016**

NPDES PII Small MS4 General Permit
Annual Report
(Due: May 1, 2016)

Part I. General Information

Contact Person: Jennifer Mates, P.E. Title: Assistant Town Engineer

Telephone #: (603) 418-6431 Email: jmates@exeternh.gov

Mailing Address: 13 Newfields Rd, Exeter, NH 03833

Certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature:

Printed Name: Russell Dean

Title: Town Manager

Date: 4/28/16

Part II. Self-Assessment

The Town of Exeter has completed the required self-assessment and has determined that our municipality is in compliance with all permit conditions, with the possible exception of the following provisions:

Part 1 C. Discharges to Water Quality Impaired Waters

1. The permittee must determine whether stormwater discharges from any part of the MS4 contribute; either directly or indirectly, to a 303(d) listed water body.
2. The storm water management program must include a section describing how the program will control the discharge of the pollutants of concern and ensure that the discharges will not cause an instream exceedance of the water quality standards. This discussion must specifically identify control measures and BMPs that will collectively control the discharge of the pollutant(s) of concern. Pollutant(s) of concern refer to the pollutant identified as causing the impairment.

The Town of Exeter has been studying the Squamscott and Exeter Rivers because of a condition set in a new wastewater treatment facility (WWTF) permit. The permit has imposed stringent discharge limits on nitrogen. The permit requires: development of total nitrogen non-point source (NPS) and point source accounting system; a nitrogen control plan be developed by 2018; a description and accounting of the activities by the town as part of its nitrogen control plan; and description of activities conducted which affect nitrogen in these rivers.

The town has participated in a Water Integration for the Squamscott and Exeter Rivers (WISE) study over the past several years, which addresses some of the issues required by the WWTF permit. Officials from the Towns of Exeter, Stratham and Newfields worked with a team from Geosyntec Consultants, the University of New Hampshire (UNH), Rockingham Planning Commission, Consensus Building Institute and the Great Bay National Estuarine Research Reserve to develop the study. The final report was made available in December 2015. The WISE group studied integrated planning opportunities with neighboring communities to meet regulatory requirements for treating and discharging stormwater and wastewater and to find effective and affordable means to meet water quality goals.

The WISE project:

Estimated baseline stormwater nitrogen loads for the town
Determined the most cost-effective BMP's for load reductions
Established continuing water quality monitoring plans for the river
Analyzed and mapped septic systems within 200 meters of major streams
Estimated substantial budget increases to the town for implementation
Obtained tentative approval for fulfilling the required 2018 Nitrogen Control Plan

The town is also participating in the Great Bay Pollution Tracking and Accounting Pilot Program (PTAPP) coordinated by NHDES. The purpose of PTAPP is to enable coordination on nitrogen tracking and accounting for the Great Bay region. The Town developed a draft accounting worksheet for possible future use for land developers.

The Town retained Tighe & Bond, in July 2015, to perform an Evaluation of Exeter's Stormwater Management Program and provide an Action Plan for Stormwater Program Improvements. The technical memorandum identified recommended actions for short- and long-term stormwater program improvements, as well as an evaluation of Exeter's compliance with the current Small MS4 Permit. The Town has determined that the municipality is in compliance with the current permit conditions and has taken steps to improve the Stormwater Management Program based on anticipated future Small MS4 Permit requirements.

An on-going project that will affect the water quality of the Exeter River is the removal of the Great Dam. The town approved $1.79 million in funds for this removal project in March 2014 after extensive analysis and debate. The final design was finished and all permits were obtained in March 2016. A contractor selection process to remove the dam was started in February 2016. Several contractors were pre-qualified and bids were scheduled to open in April 2016.The Exeter River has an impounded reach within the town that is listed on the 2012 303(d) list of impaired waters. With the removal of the dam, the river will be restored to fully support designated uses of Aquatic Life Use support and Primary Contact Recreation. Additionally, without the impoundment, the river will be free of water quality impediments to fish migration, and will be allowed to return to a state of geomorphic equilibrium. Ultimately, the river within Exeter will have dissolved oxygen concentrations sufficient for maintaining aquatic life and chlorophyll a, and bacteria concentrations that do not pose a risk for primary contact recreation.

The Town retained Horsely Witten Group to evaluate possible adjustments to buffer width regulations in the Epping Road Tax Increment Finance District.

A project that will improve the water quality of the Squamscott River is the Squamscott River Outfall Restoration Project, which began in October of 2015. Unitil, in conjunction with the Town of Exeter and the NHDES, conducted an environmental restoration project in the Squamscott River adjacent to Swasey Parkway. The project removed sediment near a stormwater outfall that had been impacted by the operation of a Manufactured Gas Plant at the corner of Green and Water Streets during the period of 1864 to 1955.

An NHDES 319 Nonpoint Source Grant for Water Integration for the Squamscott – Exeter (WISE) Integrated Plan Ph 1 – Lincoln Street Subwatershed Nutrient Control was approved by the Town for $75,000. A contract with Waterstone Engineering in the same amount was approved to perform the work in the grant. The Town is awaiting final approval by the State.

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PUBLIC EDUCATION & OUTREACH

BMP #1 DISPLAY AT ALEWIFE FESTIVAL

The festival no longer takes place.

ADDITIONS

2015 Spring clean up of Swasey Parkway Norris Brook Buffer. The Exeter Conservation Commission (ECC) in partnership with the Trustees of Swasey Parkway led volunteers in a clean up of the buffer including removal of invasive plants. The following two events were held:

- April 11, 2015, volunteers from Exeter Congregational Church participated. All participants were given an overview of the function of a healthy stream buffer, invasive plants.
- April 18, 2015, Cub Scout Pack 177 members and parents joined ECC and Trustees for Swasey Parkway to conduct a clean up of the Parkway. All participants were given a presentation about stormdrains, how they differ from sanitary sewers, how they collect dirt, leaves, and why they should be cleaned. They also learned about where the water goes and how they outfall at rivers or wetlands.

BMP #2 STENCIL STORM DRAINS

All catch basins in town were stenciled or touched up with the message "Attention – Drains to Local Waterway" as needed.

BMP #3 STORMWATER VIDEO ON LOCAL PUBLIC STATION

No videos were played on the local public station; however, the Town has the following educational videos on the town website: "Stormwater Rubber Duck" PSA; "Devil Duck Lawn Care" PSA; "Rain Storm" Radio Ad; and, "Car Wash" Radio Ad.

The Conservation Commission and River Study Committee meetings provide information regarding the local stormwater program and are televised. The stormwater education program "Think Blue Exeter" is a subcommittee of the River Study Committee, so their activities are presented during these televised meetings. Also, the Board of Selectman's televised meetings included presentations about the progress and results of the WISE project.

BMP #4 DISPLAY AT TOWN BUILDING

Permanent educational signs: Stream buffer at a popular local park. This display is located adjacent to the Squamscott/Exeter Rivers and highlights how rain garden and stream buffers functions can improve water quality.

During the month of September, a "Smart Septic" display was located at the town office, along with handouts. The display addressed proper septic system construction and maintenance

ADDITIONS-

Town Website and Facebook pages –

- "Think Blue Exeter" – general stormwater education, water quality in Exeter's streams & rivers, simple changes to reduce stormwater pollution.
- "Drug Take Back Day" – Exeter Police Department participates in National Drug Take Back Day, which allows residents to drop off household and prescription drugs at the police department to prevent improper disposal.
- "Drug Drop-Off Box" – Exeter Police Department – The Exeter Police Department has taken a step further to help protect our waterways by providing a safe, sustainable and secure method to dispose of unwanted and/or expired household and prescription medications by installing a secure container in the lobby of the Police Department.
- "Household Hazardous Waste Collection Day" – Exeter continues to host the once per year collection of household hazardous waste. The collection is coordinated by the Rockingham Planning Commission and includes Exeter and four other communities.
- Announcements for Spring 2015 and Fall 2015 leaf collection, and January 2016 Christmas tree pickup. Each Town resident was permitted to have ten bags of leaves picked up for free in the spring and fall 2014. The leaves were distributed to a compost pile and residents are allowed to use the compost.

Educational Speakers, Tours, and Information -

- Exeter Conservation Commission's Guest Speaker Night – May 2015. Great Bay - Piscataqua Waterkeeper discussed the challenges facing the Great Bay including the water quality of the estuary and Exeter's connection to the Bay via the Exeter/Squamscott River.
- Exeter DPW Sump Pump Removal program – The Town distributed information regarding the Sump pump Removal Program, including a response questionnaire and educational materials, to residents in May 2015.

Newspaper Articles –

- An article informing the public that river restoration work, including dredging of contaminated sediments to improve the functionality of a stormwater outfall, was being conducted in the Squamscott River.
- Announcements for Spring 2015 and Fall 2015 leaf collection and January 2016 Christmas tree pickup.
- Announcements for Household Hazardous Waste Collection Day and Drug Take-Back Day

PUBLIC PARTICIPATION

BMP #5 PUBLIC NOTICE

Completed 1st year

BMP #6 REVIEW NEED FOR STORMWATER COMMITTEE

No additional review for a stormwater committee; however, the education program "Think Blue Exeter" is a subcommittee of the Exeter River Study Committee. Information on activities of the subcommittee is presented at various meetings, which are televised and open to the public. The majority of committee members are local residents.

The Exeter River Study Committee conducted many outreach presentations dealing with the removal of the Great Dam which would return the lower Exeter River to its natural state improving water quality and native fish populations.

BMP #7 STENCIL STORM DRAINS

All catch basins in town were stenciled with the message "Attention – Drains to Local Waterway" by town employees and the stencils are repainted as needed.

ADDITIONS-

- The CAPE (Climate Adaptation Plan for Exeter) study included a large community involvement component. The study estimated the effects of climate change within the Town. The study included: large public meetings, neighborhood and stakeholder focus groups, meetings with town staff and volunteer boards. This CAPE study was completed in the winter of 2015.
- "Exeter Rain Barrel Program" – Exeter Conservation Commission offered reduced rates on rain barrels during the month of May 2015 (13 sold in 2015)
- Volunteer River Assessment Program , which monitors 10 sites on the Exeter River and Little River, between April and August (3 to 4 times each). The Exeter Conservation Commission and Town staff conduct the annual sampling for dissolved oxygen, conductance, pH, turbidity, and temperature.
- This is a part of the NHDES state-wide river monitoring program.
- Exeter-Squamscott River Local Advisory Committee (ESRLAC) – volunteers representing the twelve communities in the Exeter-Squamscott River watershed celebrated its 19th year of stewardship of the river and its watershed in 2015. Work by ESRLAC included discussions with municipalities and state and federal agencies about water quality in the river and its impact on water quality in Great Bay, the review of development proposals along the river corridor, and assisting with stormwater management projects. Several ESRLAC members participated in Project WISE.
- Annual Fish Ladder Tour – May 2015. Presented by NH Fish and Game Department, targeted at the importance of fish ladders. The annual tour of the fish ladder located next to the Great Dam in downtown Exeter. As always, this event attracted a large crowd interested in learning about the annual fish migration from the salt water of the Squamscott River to the fresh water of the Exeter River.

ILLICIT DISCHARGE DETECTION AND ELIMINATION

BMP #8 SURVEY OUTFALLS

The Town retained Wright-Pierce, in December 2015, to perform dry-weather outfall inspections and water quality screenings at a selected group of MS4 outfalls. As part of this effort, eleven (11) outfall locations were visited, inspected, and photographed. The inspection forms and photos for each of these outfalls are on record with the Town in paper and electronic formats.

BMP #9 MAP/UPDATE OUTFALLS

The Town retained Wright-Pierce, in December 2015, to perform dry-weather outfall inspections and water quality screenings at a selected group of MS4 outfalls. As part of this effort, eleven (11) outfall locations were verified in the field and revisions were made to the Town's GIS mapping system as necessary.

BMP #10 ORDINANCE TO PROHIBIT NON-STORMWATER DISCHARGES

Existing Storm Drainage Ordinance prevents illegal discharges to the drainage system, with fines. The ordinance will be reviewed and updated as needed after the new Small MS4 Permit for New Hampshire is issued final.

BMP #11 CREATE EDUCATION FOR BUSINESSES

"Think Blue Exeter" – General Stormwater Education - No specific education for businesses this year.

BMP #12 HOTLINE

Police Dispatch and Exeter Department of Public Works

BMP #13 SAMPLE SUSPECT OUTFALLS

The Town retained Wright-Pierce, in December 2015, to perform dry-weather outfall inspections and water quality screenings at a selected group of MS4 outfalls. Eleven (11) outfalls, a tributary to the Little River, Exeter River, Squamscott River and Norris Brook were inspected and sampled in December 2015. The inspection consisted of verification of the outfall location, completion of dry weather screening, water quality field testing (when flow was present), reconnaissance of potential nearby pollution sources and a photograph log.

Flow was present during these dry-weather inspections at five (5) of the 11 outfalls. Water quality screening was conducted at those 5 outfalls. Six (6) of the 11 outfalls were flagged for follow-up water quality sampling based on either physical condition, water quality observation and field test results, inability to field locate or further questions regarding outfall identification. Follow-up work has not yet been performed for these systems.

BMP #14 TEST SUSPECT CONNECTIONS

Infiltration/inflow investigations were performed in several locations throughout town, including manhole inspections, dye testing, smoke testing, building inspections and flow evaluations.

Approximately 3800 feet of stormwater lines were cleaned and inspected via CCTV camera on Water Street , Lincoln Street , Center Street and 300 feet of Front St.

BMP #15 CORRECT ILLICIT CONNECTIONS

No corrective actions were taken to remove illicit connections to the stormwater collection pipelines.

ADDITIONS –

- The Town maintains 18 “pet waste station” (bags and disposal container) located around Town. A full list of the locations is provided on the Town’s website.
- The CAPE (Climate Adaptation Plan for Exeter) study included a stormwater collection system mapping component. The study estimated the effects of climate change within the Town. The study included: modeling/technical team focused on creating three models for Exeter’s river and stormwater systems; evaluating water quality, flooding, and stormwater aspects of watershed systems; delineating stormwater catchments in the central urbanized areas of Town. This CAPE study was completed in the winter of 2015.

CONSTRUCTION SITE RUNOFF CONTROL

BMP #16 UPDATE SITE REGULATION

Completed – The Town will review and update the stormwater regulations as needed after the new Small MS4 Permit for New Hampshire is issued final.

BMP #17 SITE PLAN REVIEW FOR ALL CONSTRUCTION PROJECTS GREATER THAN 1 ACRE

The Technical Review Committee (TRC) reviews all development greater than 1 acre, with a focus on construction and post-construction erosion controls and stormwater Best Management Practices (BMPs).

BMP #18 SITE INSPECTIONS

Projects are inspected throughout construction for all development greater than one acre to monitor stormwater management and erosion controls.

BMP #19 DEVELOP AND IMPLEMENT CONSTRUCTION SITE INFORMATION AND REPORTING PROGRAM

Town construction projects are posted on the town website and social media sites with contact information.

An emergency contact list for all privately owned construction projects is updated regularly and distributed to emergency response personnel.

POST CONSTRUCTION RUNOFF CONTROL

BMP #20 IMPLEMENT SITE APPROPRIATE NON-STRUCTURAL, STRUCTURAL, INFILTRATION, AND VEGETATIVE PRACTICES

BMPs are in place as per Planning Board approved plans. Seven (7) of the development/redevelopment projects, reviewed by the Planning Board in 2015, included at least one Best Management Practice (BMP) such as a rain garden or tree box filter.

Addition - Stormwater BMP’s are being incorporated into town projects. Two water quality tree filters are being installed in an upcoming sidewalk project in the downtown area.

BMP #21 DEVELOP AND IMPLEMENT LONG TERM OPERATION AND MAINTENANCE PROGRAM FOR BMPs

Maintenance Agreements and Maintenance Plans are implemented during planning and construction process

ADDITIONS –

- Stormwater inspections were performed at several private developments with deficiencies identified.
- A downtown sidewalk replacement project on Water Street is in the planning and preliminary design phase, targeting construction in 2016. The downtown area has a high percentage of impervious area. This project will incorporate several retrofitted sidewalk tree box filters.

POLLUTION PREVENTION AND MUNICIPAL GOOD HOUSEKEEPING

BMP #22 CREATE POLLUTION PREVENTION & GOOD HOUSEKEEPING PROGRAM FOR MUNICIPAL EMPLOYEES

The following training was completed within the last year:

- Several of the highway department employees hold NH-DES solid waste certification and train annually for best management practices to operate the transfer station.
- All town Highway Department employees involved in snow plowing were trained on equipment calibration, attended UNH T2 Green SnowPro training course, and received NHDES Salt Applicator Certification;
- The Town's Natural Resource Planner is working with the "Soak Up the Rain NH" group to identify an area in Exeter for a project. Representatives from SoakNH, NHDES, and ECC walked the neighborhood of Westside Drive and Marshall Farms talking with residents. Initial planning for implementing a rain garden project in the Westside Drive neighborhood began and is anticipated for construction in 2016.

The Exeter DPW Director is a member of the WISE program and the Exeter Town Planner is a member of the CAPE program.

The Town attends regular meetings of the Seacoast Stormwater Coalition. The town engineer presented findings of last year's BMP review to the group.

BMP #23 SWEEP STREETS

All Town streets were swept twice (once in spring and once in fall). The streets located within the downtown area were swept bi-weekly during the warm months of the year. In 2015, new street sweeping equipment was purchased by the Town for improved sweeping capabilities.

BMP #24 INSPECT CATCH BASINS

A total of 565 catch basins were documented with individual inspection forms to be entered into the Town's GIS database.

BMP #25 CLEAN CATCH BASINS

A total of 565 catch basins were cleaned in this year.

LIST OF ATTACHMENTS

1. WISE Final report, December 2015
2. PTAPP 2- year Implementation Framework
3. Nitrogen Accounting Worksheet
4. Squamscott River Outfall Remediation Project summary
5. Swasey Park – Norris Brook Spring Cleanup
6. Think Blue Exeter website
7. Septic Week announcement
8. Household Hazardous Waste Day announcement
9. Spring and Fall leaf pickup announcement
10. Great Bay Waterkeeper public presentation announcement
11. Sump Pump Removal Program flyer
12. Squamscott River Outfall Remediation newspaper article
13. Rain barrel sale announcement
14. VRAP data summary
15. ESRLAC annual report
16. Fish Ladder Tour announcement

Attachment 6
Lincoln Street Sub-watershed Grant Proposal

Coastal Zone Management Projects of Special Merit Competition - Fiscal Year 2016

Funding Opportunity Number: NOAA-NOS-OCM-2016-2004595

1. **PROJECT TITLE: Incentivizing Resiliency through Implementation Plans in one of coastal New Hampshire's Fastest Growing Communities**
2. **PROJECT OVERVIEW**

Applicant Contact Information
Name: Steve Couture, Coastal Program Manager
Email: steven.couture@des.nh.gov *Telephone:* 603-559-0027
Address: Pease District Office, 222 International Drive, Suite 175, Portsmouth, NH 03801
Principal Project Manager
Name: Nathalie Morison, Coastal Resilience Specialist
Email: nathalie.morison@des.nh.gov *Telephone:* 603-559-0029
Address: Pease District Office, 222 International Drive, Suite 175, Portsmouth, NH 03801

Project Partners*:* Waterstone Engineering; Rockingham Planning Commission; Town of Exeter, New Hampshire (in-kind); Great Bay National Estuarine Research Reserve (in-kind); Coastal Adaptation Workgroup (in-kind); and the Southeast Watershed Alliance (in-kind).

a. ***Name:*** Robert Roseen, Waterstone Engineering
Address: 9 Gretas Way, Stratham, NH,. 03885
Email: rroseen@waterstone-eng.com *1st Congressional District
b. ***Name:*** Julie LaBranche, Rockingham Planning Commission
Address: 156 Water Street, Exeter, NH 03833
Email: jlabranch@rpc-nh.org*1st Congressional District
c. ***Name:*** Paul Vlasich, Town of Exeter
Address: 13 Newfields Road, Exeter, NH 03833
Email: pvlasich@exeternh.gov*1st Congressional District
d. ***Name:*** Steve Miller, Great Bay National Estuarine Research Reserve/Coastal Adaptation Workgroup
Address: 69 Depot Road, Greenland, NH 03840
Email: steve.miller@wildlife.nh.gov *1st Congressional District
e. ***Name:*** Michael Trainque, Southeast Watershed Alliance
Address: P.O. Box 22122, Pease Tradeport, Portsmouth, NH 03802
Email: mtrainque@hoyletanner.com*1st Congressional District

Geographic Areas Affected: This project will be completed for one coastal New Hampshire community – Town of Exeter in the south-central region of Rockingham County.

Total Cost: $71,200
Did you submit an additional proposal for consideration? Yes

3. **PROJECT OF SPECIAL MERIT ENHANCEMENT AREAS:** Coastal Hazards and Cumulative and Secondary Impacts

4. **ASSOCIATED PROGRAM CHANGE**
   a. **Title of approved strategy:**
      i. Coastal Resilience Technical Assistance Program
   b. **Program change description**:
      i. New or revised authorities, including statutes, regulations, enforceable policies, administrative decisions, executive orders, and memoranda of agreement/understanding;
      ii. New or revised local coastal programs and implementing ordinances;

5. **PROJECT DESCRIPTION**

Coastal New Hampshire communities, much like many coastal communities nationwide, have grown rapidly over the past 40 years. In particular, Exeter, NH has grown at a rate 62% since 1970. This increased growth has led to opportunities from economic development to a sustained and vibrant community center, however it has also led to challenges with increased stormwater runoff, flooding, and degradation of aquatic resources. Changes in land use and impervious cover (IC) have stressed aging drainage infrastructure and caused decreased resiliency to extreme storm events. As populations continue to increase and current land uses undergo development and redevelopment, plans need to be put in place to limit future impacts from projected increases in precipitation and extreme storm events. Exeter's growing population provides both challenges and opportunities for the community to adopt growth management strategies that can increase community resiliency. The Great Bay National Estuarine Research Reserve (GBNERR) and the New Hampshire Coastal Adaptation Workgroup have identified the use of green infrastructure (GI) and low impact development (LID) practices with municipal capacity building as an important climate adaptation measure. The ecosystem service benefits of GI crosscut economic, social, and environmental sectors, and have the potential to minimize today's most pressing environmental problems – flooding from climate change, runoff pollution, and habitat degradation. Combined gray and green infrastructure strategies can be considerably more cost-effective for stormwater management than traditional gray infrastructure approaches and have been demonstrated widely on a large municipal scale across the country.

The Project Partners propose to work with community leaders in the Town of Exeter, NH to incentivize resilient development strategies through the development of a subwatershed scale implementation plan and climate adaptation policies combined with innovative communications that illustrate the economic benefits of flood adaptation. The Project Team is comprised of technical experts in the fields of coastal adaptation and climate science, community planning, water resources engineering, environmental economics, and representatives from key stakeholder groups. The Project Team proposes to support the development of *Coastal Resilience Technical Program Assistance* by addressing the identified strategy work plan activity to *improve community education and engage in projects focused on using green stormwater infrastructure as a tool to enhance flood protection and water quality* with the following main project elements:

The RPC regional planner will work with the Town of Exeter to develop community-tailored Climate Adaptation Policies. The process will be guided by a Steering Committee to provide formative direction throughout. The Policies will identify a framework for integrating resiliency policies into zoning ordinances, regulations, building code, capital improvement plans, and design guidelines.

A vulnerability analysis of municipal drainage infrastructure and shorelands will be conducted in combination with an examination of flooding extent and climate adaptation strategies at the subwatershed scale for the purpose of developing site-specific implementation plans and construction ready designs. These implementation plans and adaptation designs can be used as part of future Capital Improvement Plans to assist municipalities with preparing for increases in IC from anticipated growth and impacts from climate change. The CIP will provide specific examples of adaptation strategies including green infrastructure, impervious cover disconnection, expansion and/or protection of buffers, infrastructure upgrades, and shoreland protection and stabilization.

To more fully explore the benefits of climate adaptation, an economic analysis will be conducted to examine the direct fiscal impacts from flooding damage for various planning scenarios. Standard federal practices for damage valuation will be used in combination with innovative visualization of flooding impacts.

Lastly we will engage coastal zone communities with an outreach effort using innovative messaging to communicate the social, economic and environmental impacts from flooding to the public in vulnerable areas. Innovative visualization tools and approaches will be installed in key public places to illustrate climate vulnerability in both physical terms, such as flood elevations with high water marks, and economic terms such as the risk to the local economy and fiscal impacts.

Incentivizing resiliency through the implementation of climate adaptation strategies and updates to municipal policies in coastal communities can reduce impacts to both the built landscape and natural environment from a changing climate. The 2011 report Climate Change in the Piscataqua/Great Bay Region details extensive current and future climate changes that may impact coastal communities (Wake et al. 2011). Recent analyses examining impacts from climate and land use changes in the Lamprey River watershed indicated a 45% increase in the current 100-year flood flow. However, in urban settings the application of low impact development (LID), while not eliminating flooding, reduced runoff by as much as 46% in locations with high percentages of IC (Wake et al 2013).

Project Goals

The strategic project goal is to support the development of a New Hampshire coastal resilience program with a dedicated NHCP Coastal Resilience Specialist to provide technical assistance and outreach to coastal zone communities. The proposed effort will build capacity amongst local municipal leaders and develop community resilience action plans. Communities will be incentivized to implement plans and policies to better address the coastal risks and hazards exacerbated by climate change New Hampshire. This project will incentivize the implementation of climate adaptation strategies by assisting municipalities in updating key policies and engaging the public by illustrating the benefits of adaptation. This project will be conducted with the Town of Exeter, New Hampshire, the Rockingham Planning Commission, the NH Coastal Program, and stakeholders in the larger Great Bay watershed. Project goals can be grouped into three categories: 1) municipal capacity building around planning for climate change and flood events, 2) public outreach and communication to build support for and understanding of adaptation planning including socio-economic consideration, and 3) the advancement of green infrastructure, low-impact development, and other effective means of adaptation implementation.

Municipal capacity building will be achieved by: the engagement of municipal decision makers with water resources engineering, planners, outreach specialists, and climate science through joint fact finding, problem definition, and trust-building; the development of policy recommendations for climate adaptation based on specific sub-watershed plans; and the implementation of guidelines for design standards. Community support for and understanding of planning efforts will be achieved by using customized innovative messaging that are directly accessible to the public, such as visual installations in public places communicating the physical, social, and economic risk associated with climate change. The advancement of effective means of climate adaptation will be achieved by the development of specific, construction-ready adaptation plans that can be easily included in capital improvement programs and infrastructure planning and management.

Measurable Objectives

1. Information gathered from analysis/assessments in Tasks 3-6 presented to the Town of Exeter.

2. Information gathered from Town of Exeter about local challenges associated with implementation of adaptation strategies.
3. Preparation of informational factsheets for Town of Exeter following completion of Tasks 3-6.
4. Presentation of analysis/assessment results and drafting of Exeter's Climate Adaptation Policy (CAP), with CAP finalized and presented.
5. Initial messaging strategy drafted and materials tested with municipal representatives and project steering committee; strategy and materials revised, implementation begun.
6. Needs assessment completed, workshop planning team convened and workshop implemented and summary written.
7. Preliminary evaluation of messaging strategies implemented in Exeter completed; evaluation integrated with feedback from final workshop and summary completed and shared with project team.
8. Draft final report available for steering committee review, final report, and final presentation conducted.
9. Identify infrastructure at increased risk of flooding based on climate scenarios (eg. duration, frequency, and flooding extent);
10. Determine costs impacts and benefits of adaptation strategies for adaptation planning scenarios (eg. green infrastructure, infrastructure upsizing, buffers, etc);
11. Develop site-specific implementation plans for LID/GI for one community in a vulnerable sub-watershed;
12. Develop implementation plans with engineering designs for up to five LID/GI adaptation strategies for one sub-watershed in Exeter;
13. Develop Climate Adaptation Policies tailored for Exeter that guides investment in and management of municipal infrastructure;
14. Deliver a climate adaptation workshop for 42 coastal watershed communities in partnership with the Southeast Watershed Alliance, and the Rockingham Planning Commission;
15. Install various forms of innovative messaging in key public spaces that are engaging and simple in such a way as to create a sense of urgency in Exeter;
16. Advance the implementation of previous client climate adaptation products and projects including 2015 PSM Climate Ready Culverts and Communities, Climate Adaptation Plan for Exeter (CAPE), Lincoln Street Watershed, and COAST.

Outcomes

1. Coastal communities and coastal watershed communities have increased understanding of barriers to integrating adaptation into existing local regulations, and green infrastructure (LID) management and projects.
2. Exeter will have a thorough understanding of the technical analysis results and of the adaptation and water quality strategies available to them; each municipality will have a collaboratively developed Climate Adaptation Policy (CAP) to guide incorporation of appropriate adaptation strategies into their plans, regulations and procedures; other Great Bay communities can use the CAP as an example to adapt to their own needs (Month 12).
3. Project partners have a ground-tested, innovative messaging strategy and example materials to guide communication with municipalities about the project's results and adaptation strategies (Month 14); Exeter has at least two messaging strategy component implemented by the end of the project (Month 18)
4. Representatives of additional NH coastal watershed municipalities are aware of the project's findings and the potential applications for their own communities (Month 15); project team receives additional

feedback from a broader audience to incorporate into the messaging strategy, final report, and future efforts to integrate resiliency policies in other communities (Month 15).

5. Recommended changes in municipal stormwater and building codes will induce innovative and effective engineering approaches to stormwater and flood controls;
6. Community members are educated on the potential physical and economic risks of flooding associated with climate change and support of municipal programmatic change;
7. Community support is built for both funding and implementing future flood control and adaptation projects;
8. Adoption of cost-effective strategies for avoiding future damages and minimizing the long-term annual cost of flood prevention and management; and
9. Project will contribute to long-term protection of riverine and wetland habitats that could be adversely affected by future growth and climate change impacts if no meaningful climate adaptation policy is developed.

Goals and Objectives to Further the Section 309, Strategy 3: Coastal Resilience Technical Assistance Program

The proposed project directly supports the development of a *Coastal Resilience Technical Assistance Program* and the identified work plan activity to *Improve community education and engage in projects focused on using green stormwater infrastructure as a tool to enhance flood protection and water quality as climate change exacerbates both issues, and explore opportunities to implement municipal stormwater utilities as a method for raising local revenue for floodplain management.* The following major milestones will be addressed:

- Conduct education in at least two municipalities related to green infrastructure and climate change.
- Complete a least one project and develop up to five (5) concept designs that result in the design of green infrastructure to accommodate increased precipitation levels related to climate change.
- Following the issuance of the MS4 EPA permits, participate in discussions with NHDES 319 program and at least one municipality related to stormwater utility development.

The Issue Areas addressed by this Strategy include:

a. Coastal Hazards

__**Management Priorities*:***__ 1) Assist all coastal zone communities and state agencies to complete vulnerability assessment processes that account for climate change impacts by identifying steps to prepare for coastal hazards [Task 3, 8], 2) Develop and promote guidance to encourage best management practices for coastal infrastructure and land use [Task 2].

__***Priority Needs:***__ 1) Training/Capacity-Building - Support for NHCP, CAW, and a regional planning commission to expand training and capacity-building to municipalities for coastal resiliency and shoreline management [Task 2, 7, 8].

b. Cumulative and Secondary Impacts

__***Management Priorities:***__ 1) Comprehensive Watershed-based Planning for Great Bay [Task 3-5, 8], 2) Promote Municipal Planning that Reduces Cumulative and Secondary Impacts [Task 2, 8];

__***Priority Needs:***__ 1) Research - Better information about changes in stormwater impacts from climate change/precipitation changes. Studies to understand cost benefit analysis/economics [Task 3-6], 2) Training/Capacity building - Technical support [Task 2,7, 8], 3) Communication and outreach - Communities need additional resources and training in order to choose, install and maintain appropriate Low Impact Development techniques and BMPs that will effectively reduce NPS pollution [Task 2,7, 8], 4) Local Regulations - Determine existing municipal regulations affecting cumulative and secondary impacts, and then help municipalities develop and adopt effective, consistent regulations [Task 2, 7, 8].

Project Activities

The Project Team will conduct the following items with roles and responsibilities and lead for each (See Section 9, Figure 1: Project Schedule of Activities, Outcomes, and Products):

Task 1. Project Steering Committee - Partner Participation [All Partners, NHCP (Lead)]

Task 2. Engagement with Town of Exeter for Program Recommendations [RPC (Lead), NHCP]

Task 3. Watershed and Drainage Infrastructure Vulnerability and Flooding Analysis [Waterstone (Lead)]

Task 4. Green Infrastructure and Climate Adaptation Modeling [Waterstone (Lead), RPC]

Task 5. HAZUS and COAST Flood Damage Avoidance Assessment for Aquatic Habitat and Stormwater and Wastewater Infrastructure [Waterstone (Lead)]

Task 6. Innovative Messaging, Public Outreach and final SWA Workshop [All Partners, RPC and Communications Consultant (Lead)]

Task 7. Implementation Plans Development for Select Adaptation Strategies and Green Infrastructure BMPs [Waterstone (Lead)]

Task 8. Final Report [RCP (Lead), Waterstone, NHCP]and Climate Implementation Plans [Waterstone (Lead), NHCP, RPC]

Innovation

Municipal capacity will be increased through the development of a municipality-specific Climate Adaptation Policy (CAP) for the Town of Exeter which combines the project's technical analysis results with the local context (municipal character, priorities, vulnerabilities, risk etc.). Unlike traditional approaches, the CAP will be informed by: municipal assessments to identify community values and perspectives; socio-economic and demographic impacts assessment data; audience specific innovative messaging to communicate the challenges and risks posed by climate change, and the development of Implementation Plans for specific subwatersheds comprised of construction ready designs for implementation in Capital Improvement Planning. The CAP will serve as an integrated framework for viewing all aspects of governance, planning and regulation through the climate adaptation lens for the purpose of adding resilience in the built landscape and protecting natural systems.

Likelihood of Success and Leveraged Resources

This project has a high likelihood of success because: 1) the project partners have broad technical expertise, extensive local knowledge, and a proven track record of collaboration on climate change and adaptation projects and outreach in southeastern, N.H.; and 2) it builds upon a significant body of existing work contributing to momentum amongst the region and specifically within the municipalities of Exeter and Dover to provide meaningful and impactful change. Specifically this project will make use of valuable existing resources and efforts including:

- *Climate Ready Culverts and Communities (C-Rise): Vulnerability Assessment for Coastal Communities*, FY15 Project of Special Merit
- *The New England Climate Adaptation Project (NECAP)*, Dover, NH by *Lawrence Susskind, Patrick Field, and Danya Rumore*
- *Lincoln Street Complete Street Design for Nutrient Management and Climate Adaptation*, Exeter, New Hampshire (2016-2017)
- *Climate Adaptation Plan for Exeter (CAPE)*, Exeter, New Hampshire by P. Kirshen, S. Aytur, M. Becker, D. Burdick, M. Holt-Shannon, S. Jones, C. Keeley, B. Mallory, L. Mather, S. Miller, C. Riley, R. Roseen, and P. Stacey (2013-2015).
- *Water Integration for Squamscott Exeter (WISE)*, Preliminary Integrated Plan, Draft Technical Report, by Robert Roseen, Watts, A., Bourdeau, R., Stacey, P., Sinnott, C., Walker, T., Thompson, D., Roberts, E., and Miller, S. (2013-2015).

- *Assessing the Risk of 100-year Freshwater Floods in the Lamprey River Watershed of New Hampshire Resulting from Changes in Climate and Land Use"* and a National Sea Grant Law Center project titled "*New Floodplain Maps for a Coastal New Hampshire Watershed and Questions of Legal Authority, Measures and Consequences,* two recently completed efforts by Wake, Miller, Roseen, Rubin et al (2013).
- *Analysis and Communication of Flood Damage Cost Avoidance in the Lamprey River Watershed,* a follow-up study by the same investigators. This project proposes to expand these previously developed flood studies and watershed models by refining the study for Moonlight Brook by adding survey and infrastructure details previously unavailable (2014-Current).

Project Evaluation and Communication Components

Each Task in the project will have an evaluation component to solicit participants' feedback on: 1) effectiveness of the planning process, 2) effectiveness of technical information communication, 3) changes in level of knowledge and understanding, 4) levels of cooperation and trust, and 5) effectiveness of the project outcomes. This feedback will be provided in a timely manner to the Project Team and Advisory Board to help guide the next phase of each Task in the project. The Project evaluation will be a formative process and be incorporated into routine Steering Committee and Public Engagement involvement. The evaluation will be conducted by the Communications Consultant and the Rockingham Planning Commission. Overall Project evaluation will be conducted 3 times, at project inception, midway, and at completion. This will be conducted with the steering committee and municipal project partners regarding project understanding, problem definition, project process, clarity and organization, and satisfaction with project outcomes. At the end of the project, information will be solicited from all project participants on: 1) how successful or useful were the outcomes, 2) effectiveness of resources and support provided, 3) was a shared vision developed, 4) were target outcomes and goals for the project meet, and 5) are there tangible next steps being pursued as a result of the project.

Project Geographic Area

The project geographic area will include the Lincoln Street subwatershed in the Town of Exeter.

6. BENEFITS TO COASTAL MANAGEMENT

Like many other coastal regions, the Great Bay watershed has experienced a tremendous increase in flooding incidence and infrastructure failure, and decrease in community resilience to extreme storm events. Population growth and an associated increase in development have both threatened aquatic habitat, water quality, and the health of the Great Bay. Nationwide, climate-related increases in precipitation are placing increasing stress on municipal drainage and wastewater infrastructure. These sequences of events, and the choices being considered, are common in many regions, although the optimal solutions will depend upon the unique characteristics of each watershed and set of communities. New policies and management frameworks are needed to develop sustainable long-term choices that will effectively manage aquatic ecosystems within the interconnected natural, engineered, social, and economic framework. In 2004, the Great Bay NERRS Coastal Training Program conducted an assessment and concluded that the primary challenges to the Great Bay were land use change, increasing impervious cover, stormwater management, sewage/septic nutrient pollution, and climate change (GB NERRS CTP, 2004). Unfortunately, all of those problems still persist today; in 2009 the Bay was listed as impaired for nitrogen (EPA 2009), In 2009, NHDES concluded that the Squamscott and ten other sub-estuaries in the Great Bay Estuary were impaired by nitrogen, and were placed on the CWA Sec. 303(d) list of impaired and threatened waters (NHDES, 2009). A 2012 report by the Piscataqua Region Estuaries found 17 of 25 indicators show a negative or cautionary trend (PREP 2012). All of these items are related to the issues of urban impervious cover and altered urban hydrology, one of the major factors causing decreased resiliency. The focus of this study is on controlling the flooding impacts from extreme events in one vulnerable Great Bay sub-watersheds. It also provides context and an example for collective action in an integrated watershed management framework. The benefits are quantified in this subwatershed as a cost avoidance benefit.

7. FISCAL AND TECHNICAL NEEDS AND PAST PERFORMANCE

a) Fiscal and Technical Needs: The fiscal and technical needs for the coastal watershed communities are large and complex. Community planning for resiliency is challenged by its perceived long term nature and thus lack of certainty that initial short-term actions are necessary first steps toward adaptation implementation. As such, some crucial resiliency planning activities are out competed by items of lesser importance but greater short term significance. In some instances, capital expenditures requiring approval at town meeting or by city councils are postponed or defeated, and only later approved when a tangible inconvenience or impact is experienced within the community. Only then is the long term significance of the investment apparent.

b) Past Performance under the Section 309 Program: Over the past several years, the Section 309 Program has largely been focused in two areas: 1) wetlands; and 2) coastal hazards. Within these Enhancement Areas, the NHCP has focused its efforts on tidal river restoration and climate adaptation. The mainstay of the success of the Section 309 Program in New Hampshire is the formation of the New Hampshire Climate Adaptation Workgroup (CAW) (letter of support included). CAW has been working with coastal watershed communities to help them prepare for the impacts of a changing climate since 2010. CAW successfully facilitated a project in the Hampton-Seabrook Estuary in partnership with the New England Environmental Finance Center and the Piscataqua Region Estuaries Parternship using the COAST (Coastal Adaptation to Sea Level Rise Tool) model to help communities understand the potential economic impacts to critical infrastructure from storm surge and sea level rise. In 2012 CAW assisted Natural Resources Outreach Coalition to facilitate and promote very successful modified NOAA Roadmap efforts in Newfields and Rye, NH that led to an Adaptation Action Plan and immediate implementation of climate adaptation measures. Most importantly, CAW has been a critical partner assisting in the successful completion of the FY 13 PSM that enabled the development of marsh migration data. These data were made available along with other coastal hazard information to coastal stakeholders via an online GIS-based data viewer and toolbox (NH Coastal Viewer). CAW has also been instrumental in the ongoing FY 15 PSM will conduct vulnerability assessments of municipal resources and assets in the ten inland coastal NH municipalities, including culverts. Through CAW and other partners, the 309 Program continues to be a cornerstone of innovation within Coastal Zone communities. Results of the FY15 assessment are proposed for use in this FY16 project to support the municipalities in applying climate impact data directly into programmatic changes such as facilities (infrastructure upgrades and priorities), permit processes, codes, and regulations.

8. PROJECT WORK PLAN

The project schedule of activities, milestones, and deliverables is presented below in Appendix 2.

Task 1. Project Steering Committee - Partner Participation

This Project Team has identified a Steering Committee representing the following groups: municipal planning and engineering staff from the Town of Exeter, the Coastal Adaptation Workgroup (CAW), Great Bay National Estuarine Research Reserve, the Southeast Watershed Alliance (SWA), local watershed groups and regional stakeholders. This experienced and engaged group of regional stakeholders are invested in this effort and will in turn keep the Project Team informed of related activities to ensure that final results are directly relevant to their own watershed goals and activities. Timeframe: Meet every other month from months 1-17

Task 2. Engagement with Town of Exeter with Program Update Recommendations

a) Initial Outreach to Present Project Information

The Rockingham Planning Commission (RPC) [Lead], Waterstone, and Communications Consultant will organize and implement an initial project meeting with the Town of Exeter staff and municipal officials to discuss the project purpose and outcomes. RPC will to provide a review of climate scenarios and types of adaptation strategies. RPC will work with Exeter to identify local challenges to implementing adaptation strategies, especially vulnerable locations and infrastructure, and vulnerable populations. This will inform the development of a local Climate Adaptation Policy (CAP) (Task 2C), vulnerability assessments and green infrastructure modeling (Tasks 3-6), and innovative messaging for the community (Task 7). RPC will also provide information about the project to Exeter's Planning Board and make information available on the municipal website.

Products: 1) Summary of meetings to be incorporated into the development of innovative messaging, CAP, and final report; 2) Presentation materials. Timeframe: Months 1-3

b) Review of Findings from Vulnerability Assessments

The Rockingham Planning Commission (RPC) will organize and facilitate two to three meetings with Exeter elected officials, staff, and land use boards and commissions, to present the findings of the technical vulnerability assessments and green infrastructure modeling implemented in Tasks 3-6. RPC will present and engage participants in a discussion of the findings of the vulnerability assessments and implications for infrastructure, residents and businesses, and the municipality's long term planning. RCP will prepare informational factsheets for Exeter that presents the technical analysis and findings in layman's terms and highlight opportunities for adaptation.

Products: 1) Summary of meetings to be incorporated into the development of innovative messaging, CAP, and final report; 2) Presentation Materials; 3) Four informational factsheets for Exeter. Timeframe: Months 5-16 in coordination with Tasks 3, 4, 5 and 7

c) Develop Climate Adaptation Policies

Description of Activities: Building off of the earlier outreach in 2A and 2B, RPC will prepare a model/draft Climate Adaptation Policy (CAP) for Exeter with input and review from the project team. RPC [Lead], Waterstone, and the Communication Consultant will first organize and implement a meeting in Exeter with key municipal decision makers, staff, and other community stakeholders to identify principles on which to base the CAP and specific needs and opportunities in the community. RPC will conduct a municipal assessment to identify community values and perspectives to help develop the CAP and inform the communication strategy for each municipality in preparation for the work with the communication specialist (Task 7A). This assessment will include a review of relevant municipal documents and regulations (e.g., master plan and other plans), as well as interviews with stakeholders from the community (including municipal decision makers and local residents) to identify community members' values, perspectives, and priorities. As the technical team conducts the various analysis pieces (Tasks 3-6), RPC will meet again with municipal representatives in Exeter to review findings, discuss adaptation strategies, and draft the CAP. The CAP will combine the project's technical analysis results with the local context (municipal character, priorities, vulnerabilities, etc.). The project team will work with the municipal representatives to identify specific adaptation strategies and appropriate designs. RPC will develop and implement presentations about the CAP for the municipality.

Products: 1) Summary of feedback from meetings to be incorporated into the CAP, messaging plans, and project final report; 2) A model CAP; 3) Presentation materials; 4) Summary of framework for integrating resiliency policies at the municipal level that will be incorporated into the final report (Task 9). Timeframe: Months 12-14

Task 3. Sub-Watershed Assessment and Flooding Analysis

The Project Team will define the boundaries of the study sub-watershed with input from the town staff. For Exeter, the Project Team's preference is to work in the upper Lincoln Street sub-watershed since Waterstone is already performing a 319/complete streets project in the Lincoln Street lower sub-watershed [See Appendix 3, Figure 2-5, and Appendix 6 Project Team Qualifications]. Other possible focus areas include those identified in the municipalities' capital improvement plan (CIP). Waterstone and the Project Team will work closely with the municipalities to define a suitable sub-watershed that has current flooding problems and would serve as a good example for remediation planning and implementation. The NH Coastal Adaptation Workgroup will participate in the review and interpretation of results. This will be conducted in the context of the larger regional dialogue with the municipalities of the Southeast Watershed Alliance. Timeframe: Months 1-4

Task 4. Green Infrastructure and Climate Adaptation Modeling

Waterstone will create a sub-watershed model for the selected study area based on the site specific topographic survey information collected by the Project Team and data collected through Rockingham Planning Commission (RPC). This task involves the following items: GIS data review; a watershed site walk; a topographic survey; and stormwater infrastructure mapping. Depending on model availability, these data will either be used to develop a new Stormwater Management Model (SWMM) model or update an existing SWMM model. For Exeter, there is an existing SWMM model that was developed for a prior project lead by Dr. Roseen (See Appendix 6 Project Team Qualifications, Water Integration for Squamscott-Exeter (WISE)). Where necessary, survey information will be collected to supplement LiDAR-derived elevation data. Site specific information will be collected for critical areas including watershed cross sections, road spot elevations and culvert crossings (elevation, location, geometry and diameter) along the study area. This modeling effort will demarcate the extent, depth and duration of flooding under different extreme weather events and that information will feed into the HAZUS and COAST models for social-economic assessment (Task 5). The Project Team will determine the future climate and climate adaptation strategies. The Project Team will provide information and detail strategies that can be used to mitigate projected increases in flood flow from future climate change and build out scenarios. We will also use a linear optimization modeling framework to minimize the costs and volume reduction benefits of GI implementation developed from a recent GI optimization study to leverage significant resources using an approach developed in conjunction with NHDES and EPA and led by Dr. Roseen (See Appendix 6, WISE). The optimization model considers a suite of typical Best Management Practices (BMPs), both structural and non-structural, which are suitable for the northeast. The BMPs have been vetted using input from communities and environmental agencies. For any given level of performance and volume reduction the model provides the optimal mixture of BMP types and sizing, and land uses to be treated that result in the lowest cost. This allows the benefits to be compared and ranked by relating the cost to the volume reduction to illustrate the concept of diminishing returns (i.e. less cost-effective measures may be required to reach higher levels of load reduction). This will also yield a detailed breakdown of optimal BMP types by land use and provide the municipalities with an outcome of the types and quantities of BMPs that would be required to reach various goals within the focus subwatershed. The analyses include cost performance information for the municipality on the various stormwater BMPs such as cost effectiveness, unit costs ($/ft3 reduced), and total minimum optimized cost. The NH Coastal Adaptation Workgroup will participate in the review and interpretation of results. Timeframe: Months 5-7

Task 5. HAZUS and COAST Flood Damage Avoidance Assessment for Aquatic Habitat and Stormwater and Wastewater Infrastructure

Using the previously developed watershed and floodplain models, Waterstone will conduct a valuation of flood damages will be performed using a FEMA standardized methodology called HAZUS (Hazards-United States) and COAST (COastal Adaptation to Sea level rise Tool). HAZUS is used routinely for rapid impact assessment of natural disasters. The method is applied for a spectrum of storm sizes and analyzed with respect to average annualized losses, or loss avoidance. HAZUS is a GIS-based analysis using readily available census block level data to make estimate loss assessments. COAST is a mapping tool to assist municipal managers in the analysis of the costs and benefits of strategies to avoid damages to assets from coastal flooding. This method uses preloaded census data including general building stock from the US Census Bureau, essential facilities (hospitals, police and fire, and schools), and high potential loss facilities (dams, hazardous waste facilities, etc). The outcome of this task is the potential annualized losses (also called the expected value, a statistical term that is the product of all event losses and probabilities from flooding for physical, social, and economic impacts). Timeframe: Months 8-10

Task 6. Innovative Messaging, Public Outreach and final SWA Workshop

The Project Team will develop and implement an effort to broadly disseminate the results to key audiences within the watershed. The team will collaborate with a group of local and national communication experts to develop and implement audience specific and innovative approaches to communicate both the challenges and risks posed by climate change and cost avoidance benefits of land use management decisions and their contribution to resiliency. The use of visible measures to communicate climate impacts, in particular visualization tools installed in public places showing areas impacted by flooding both with high water marks and economic impacts, will be explored.

a) Develop Innovative Messaging Plan and Materials

Description of Activities: The Project Team and project steering committee will work with the communication specialist to develop innovative messaging for Exeter. Messaging will utilize multi-media tools such as educational signage, print materials, municipal websites and cable access television. RPC and the Communication Consultant will then organize and facilitate 1-2 meetings with municipal stakeholder groups from each municipality and the innovative messaging team to test the messaging strategy and materials. RPC [Lead], Waterstone, and the Communication Consultant will present stakeholder input about the messaging strategy and materials with the project steering committee. RPC and the communication specialist will incorporate feedback from municipal representatives and the project team and modify the strategy and materials as needed. RPC will assist with implementing the messaging strategies during the remainder of the project. Timeframe: Months 1-18 with quarterly meetings/review with municipality

Products: 1) Municipal assessment summary, to inform the communication strategy for each municipality; 2) Communication products/materials for each municipality; 3) Summary of feedback on messaging strategy from municipal representatives and project team. Timeframe: Months 1-18 development of materials and quarterly review meetings with municipality

b) Final Workshop

Description of Activities: The Project Team will design and implement a workshop in coordination with the Southeast Watershed Alliance (SWA) and with input from the NH Coastal Adaptation Workgroup for the broader NH coastal watershed municipalities about project findings, transferable policies, and messaging materials. This task will include conducting a needs assessment of the target workshop participants (through approximately 20 interviews with target audience members) to inform workshop design. Based on the needs assessment, RPC and the Communication Consultant will work with the project team to design and plan the workshop, and then RPC and the Communication Consultant will host and run the workshop. This workshop will provide an opportunity to transfer technical products from the project and test the innovative messaging strategies, Climate Adaptation Policies, and adaptation strategies with a broader audience, and to build on previous climate adaptation planning and education in the region.

Products: 1) Needs assessment results; 2) Workshop materials; 3) Workshop summary. Timeframe: Months 12-15

c) Evaluate Effectiveness

Description of Activities: The Project Team will evaluate the effectiveness of the innovative messaging approach. Innovative messaging feedback will be incorporated into the final project report and also will be useful for adapting the messaging materials and the creating a model framework for integrating resiliency policies for other communities.

Products: 1) Evaluation summary. Timeframe: Months 16-17

Task 7. Development of Implementation Plans for Select Adaptation Strategies and Green Infrastructure BMPs

Waterstone will develop 5 conceptual designs and one permit-ready (100%) designs for stormwater management practices within the study area. This 100% designs will include construction drawings, specifications, operation and maintenance plan sufficient to allow the municipality to permit and construct the stormwater practice. We will identify BMP locations and provide recommendations for stormwater BMPs that maximize infiltration and mitigate flooding impacts. This task assumes that an existing conditions base map is available that includes topography, building corners, property lines, edge of pavement, curb, wetland boundaries, and utilities and includes a single day of survey for each design. The Project Team will complete a 75% drawing set for the municipality's review and 100% construction drawings for a single BMP (permitting excluded). The selected BMP must meet a level and complexity appropriate for the budget. We assume that the municipality will arrange for and provide a backhoe to conduct the soils investigations and Waterstone will provide a staff member to conduct soil investigations. We assume one round of comments and revisions for each 75% design submission. The 75% plans will include proposed site grading (1-foot contour intervals), spot grades, location of any proposed BMP structures, rim and invert elevations. Timeframe: Months 11-16

Task 8. Final Report and Implementation Plan for Area of Study

Description of Activities: Waterstone and RPC will consolidate and synthesize outcomes and products from Tasks 1-8 into a final report. RPC will identify transferable strategies and policies identified in each municipality's CAP that may be appropriate adaptation strategies and policies in other coastal communities in New Hampshire and New England. These transferable best practices and an evaluation of outreach and messaging will be included in the final report. RPC and the Communication Consultant will assist with reporting from Tasks 2, 3, and 7 as needed, and will assist with evaluation of outreach and messaging. Waterstone and RPC will work with the project steering committee to finalize the report. The Project Team leaders from each vulnerability assessment will prepare and deliver a final presentation for Exeter to review the findings of the project, highlight transferable findings and adaptation strategies, and discuss next steps. Products: 1) A final report, 2) Presentation materials. Timeframe: Months 9-18 in coordination with Steering Committee and municipality.

9. PROJECT BUDGET NARRATIVE

The total proposed cost for this project is $71,200. The New Hampshire Department of Environmental Services (NHDES) will issue sub-awards totaling the $23,568.64 to the Rockingham Planning Commission which includes $5,000 to the Communications Consultant, and $47,560.16 to Waterstone Engineering. These sub-awards and subcontracts are included under Object Class Category "f. Contractual" on the NHDES Standard Form 424-A; however, they are not included under NHDES Contractual costs in Table 1 below. Appendices include the proposed budget by task and category for each project partner according to NOAA Form 424-A categories, detailed budget narratives (Appendix 1), and indirect cost agreements (Appendix 4).

Intergovernmental Review: NHDES adhered to the required intergovernmental review processes.

Table 1: SF424A Detailed Budget by Category

Budget Category	Partner	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Task 7	Task 8	Partner Total	Proposal Total
Total	NHDES	9	9	9	9	9	9	9	9	$ 71.20	$ 71,200.00
	WS	1,607	1,330	10,838	12,921	6,260	1,080	11,255	2,270	$ 47,560.16	
	RPC	1,515	7,601	0	0	0	11,976	50	2,427	$ 23,568.64	
0	**Total**	3,131	8,940	10,846	12,930	6,269	13,065	11,314	4,706	$ 71,200.00	

See Appendix 1 for detailed budget table by partner by task, and Appendix 2 for project schedule.

Figure 1: Project Schedule of Activities, Outcomes, and Products

Task #	Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Outcomes	Final Products
	Milestone	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**		
1	Steering Committee Routine Participation	★		★		★		★		★		★		★		★		★		Formative assessment and project direction	Stakeholder Partnerships
2	Engagement with Municipalities																			Development of Project Partner Trust and Climate Awareness	Development of Climate Adaptation Policies for Community
a	Initial Outreach	★		★																Municipalities understand issues, goals, and methods	
b	Review of Findings					★			★			★					★			Partners participate in problem definition and findings analyses	
c	Framework for Integrating Resiliency Policies												★		★					Municipalities build capacity for implementing climate resiliency policies	
3	Watershed and Drainage Infrastructure Vulnerability Analyses	→	→	→	→															Illustration of climate vulnerability to drainage infrastructure and shorelands	Vulnerability analyses and summary report
4	Task 4: GI and Climate Adaptation Modeling					→	→	→												Illustration of land use management strategies on climate resiliency	Adaption results and recommendations, and summary report
5	Task 5: HAZUS and COAST Flood Damage Analysis								→	→	→									Understanding of economic impacts of climate adaptation policies	Economic analyses of flood impacts and cost avoidance of adaptation strategies
6	Task 6: Innovative Messaging, Public Outreach and Final SWA Workshop	★				★				★				★		★			★	Identification of innovative communication strategies, increased awareness	Implementation of communication strategies in Dover and Exeter in key public spaces
7	Task 7: Development of Implementation Plans for Select Mitigation Strategies and Green Infrastructure											→	→	→	→	→	→			Capacity building for implementation of adaptation strategies	Implementation plans for subwatersheds and engineering designs for adaptation strategies
8	Task 8: Final Report and Implementation Plans									★			★						★	Resiliency programs incentivized through Climate Adaption Policies and Implementation Plans	Final Report and Implementation Plans

Attachment 7

Revised Fertilizer Zoning Ordinance 2016

Town of Exeter, N. H.

Zoning Ordinance

As amended through March 2016

2.2.23 **Dwelling:** Any building or portion thereof designed or used exclusively as the residence or sleeping place of one or more persons.

2.2.24 **Dwelling Unit:** One (1) or more rooms, including cooking facilities, and sanitary facilities in a dwelling structure, designed as a unit for living and sleeping purposes.

2.2.25 **Elderly/Senior:** For the purpose of this ordinance, elderly or senior shall be defined as persons fifty-five (55) years of age or older.

2.2.26 **Elderly Congregate Health Care Facilities (ECHCF):** A multi-dwelling residential facility providing various housing options to meet the spectrum of needs and interests from active adults through skilled nursing facilities. ECHCF's primary feature is the provision of "lifetime" supportive services at each stage of a senior's later life. The facility is generally intended for persons fifty-five (55) years of age or older which provides on-site nursing home facilities as licensed by the State of New Hampshire.

2.2.27 **Essential Services:** The erection, construction, alteration or maintenance by public utilities and telecommunication providers or Town or other governmental agencies of underground or overhead gas, electrical, or water transmission or distribution systems, including poles, wires, mains, drains, sewers, pipes, conduits, cables, fire alarm boxes, police call boxes, traffic signals, hydrants, and other similar equipment and accessories in connection therewith reasonably necessary for the furnishing of adequate service by such public utilities or Town or other governmental agencies or for the public health or safety or general welfare, but not including buildings. (See Article 6.6)

2.2.28 **Farm/Farm Uses:** A parcel of land used principally for the raising, keeping or production of agricultural products or animals, including the necessary or usual dwellings, buildings and facilities related to such activity.

2.2.29 **Farm, Roadside Stands:** Structure in connection with a farm operation, for the purpose of display and sale of farm products raised by the owner on the premises.

2.2.30 **Fertilizer:** Any substance containing one or more recognized plant nutrients which is designed for use in promoting plant growth such as nitrogen, phosphorus and potassium. Fertilizer as defined shall not include vegetable compost, lime, limestone, wood ashes, or any nitrogen-free horticultural medium (e.g. vermiculite).

2.2.31 **Floor Area:** For the purposes of determining requirements for off-street parking and off-street loading, it shall mean the gross sum of the area of the several floors of a building or portion thereof, including the basement, if any, as measured from the interior faces of the exterior wall of such buildings.

2.2.32 **Garden Supply Establishment:** An establishment where retail and wholesale garden products and produce are sold to the consumer. The establishment imports most of the items sold, but may include a nursery and/or greenhouses, and may include plants, nursery products and stock, potting soil, hardware, other garden and farm variety tools and outdoor furniture.

2.2.33 **Gasoline and/or Automotive Service Station:** A building or other structure or tract of land used principally for the storage and sale of gasoline or motor fuels, lubricants, automotive parts or supplies, and for the working, servicing, washing and repair of motor vehicles.

2.2.34 **Hazardous Storage:** Facilities intended for the storage of flammable, explosive or toxic chemicals, liquids or gases for the primary purpose of transmission or distribution off-site by pipeline, tank vessel, tank car, tank vehicle, portable tank or container, etc. (See Article 6.14)

2.2.35 **Heliports:** (See Article 6.15)

2.2.36 **Home Occupation:** An occupation conducted on the premises of a dwelling unit which is principally operated by an occupant and which is clearly incidental and secondary to the use of the principal structure as a dwelling unit and does not change the residential character thereof. (See Article 6.10)

2.2.37 **Hotel/Motel:** A building in which living/sleeping accommodations are provided for transient occupancy. A hotel may also be combined with uses related to the needs of short-term visitors such as restaurant, gift store, or conference rooms. These uses may be incorporated within the same building or within the hotel complex.

2.2.38 **Impervious surface:** A modified surface, that cannot effectively absorb or infiltrate water including roofs, decks, patios,

6. That the proposed use will not create a hazard to individual or public health, safety and welfare due to the loss of wetland, the contamination of groundwater, or other reasons;

7. That all required permits shall be obtained from the New Hampshire Department of Environmental Services Water Supply and Pollution Control Division under NH RSA §485-A: 17, the New Hampshire Wetlands Board under NH RSA §483-A, and the United States Army Corps of Engineers under Section 404 of the Clean Water Act.

C. Alternate Procedure for Subdivision and Site Plan Applications

In those cases where the proposed disturbance, activity, or development is associated with a project requiring Planning Board Subdivision or Site Plan approval, the CUP process as outlined in Zoning Ordinance Article 9.1.6.A and the waiver process as outlined in Section 9.9 of Exeter's Site Plan Review and Subdivision Regulations are duplicative. To ensure an efficient and effective review, the Applicant shall follow Section 9.9 of the Site Plan Review and Subdivision Regulations and request a waiver(s) from wetland regulations and may obtain a waiver from Article 9.1.6.A CUP process.

9.1.7 Environmental Impact Assessment: The Planning Board may require the applicant to submit an environmental impact assessment when necessary to evaluate the effects of proposed development on existing wetland natural resources. The cost of this assessment shall be borne by the applicant. The Planning Board may retain its own consultant to review the impact assessment and other materials submitted by the applicant, such expenses to be paid by the applicant.

9.1.8 Prohibited Uses: In reviewing an application for a variance from the provisions of this subsection, the Zoning Board of Adjustment may request that the Conservation Commission and/or the Planning Board review the application and provide written comment as to the potential impacts the proposed use may have on wetlands and wetland buffers. The following uses are not permitted in the Wetlands Conservation Overlay District, notwithstanding that they may be permitted in the underlying zoning district:

A. Salt storage

B. Wastewater Disposal Systems (including a 4,000 square foot reserve area)

C. Automobile junkyards

D. Solid or hazardous waste facilities

E. Use of fertilizer on lawns, except lime or wood ash

F. Bulk storage or handling of chemicals, petroleum products, underground tanks, hazardous materials, or toxic substances as defined under NH RSA 147-A2, VII.

G. Snow storage, unless in accordance with NH Department of Environmental Services Snow Disposal Guidelines (Document WMB-3, 2007)

H. Sand and gravel excavations

I. Processing of excavated material

9.1.9 Lot Size Determination:

A. Areas defined as jurisdictional wetlands in this article may be used to satisfy up to twenty-five percent (25%) of the minimum lot size required by the zoning ordinance, provided that the remaining lot area is sufficient in size and configuration to accommodate adequately all required utilities such as sewage disposal and water supply, and will accommodate permitted structures and lot access.

B. No open bodies of water may be used to satisfy minimum lot sizes.

C. The twenty-five percent (25 %) limitation of this article may be increased up to fifty percent (50%) for minimum sized lots in the RU or R-1 districts that are served by municipal water and sewer, provided all setbacks are adhered to.

tree stumps, sawdust, wood chips and bark, even with a soil matrix, should not be used.

G. The in-place fill should have less than fifteen percent (15%) organic soil by volume.

H. The in-place fill should not contain more than twenty-five percent (25%) by volume of cobbles (six inch diameter).

I. The in-place fill should not have more than fifteen percent (15%) by weight of clay size particles (0.002m and smaller).

J. The fill should be essentially homogeneous. If bedding planes and other discontinuities are present, detailed analysis is necessary.

K. Prohibited Uses: The following uses are prohibited in the Aquifer Protection Zone:

1. Disposal of solid waste.

2. Storage and disposal of hazardous waste.

3. Disposal of liquid or leachable wastes except that from one or two-family residential subsurface disposal systems, or as otherwise permitted as a conditional use.

4. Industrial uses that discharge contact type process waters on-site. Non-contact cooling water is permitted.

5. Outdoor unenclosed storage or use of road salt or other de-icing chemicals, except by duly authorized municipal employees on municipally maintained roads in the performance of their duties.

6. Dumping of snow containing de-icing chemicals brought from outside the district.

7. Animal feedlots

8. Automotive services and repair shops, junk and salvage yards.

9. All on-site handling, disposal, storage, processing or recycling of hazardous or toxic materials.

10. Sand and gravel excavation and other mining within eight (8) vertical feet of the seasonal high water table.

11. Any use or activity that, in the opinion of the Zoning Board of Adjustment or its agent, is detrimental or more so than the above uses.

12. The use of fertilizer as defined in 2.2.30.

    a. Per the intent of this ordinance, this prohibition may be waived by the Planning Board to supplement restoration or the establishment of new landscaping. Applicants shall provide written justification and identify specific location(s) within the property where the request applies. Waivers granted will provide for temporary allowance, not to exceed one year.

9.2.4 Definitions:

A. **Animal Feedlot**: Any animal feedlot shall be considered one on which more than five (5) animals, other than house pets, are raised simultaneously.

B. **Aquifer**: For the purpose of this Ordinance, aquifer means a geologic formation, group of formations, or part of a formation that is capable of yielding quantities of groundwater useable for municipal or private water supplies.

C. **Groundwater**: All the water below the land surface in the zone of saturation or in rock fractures capable of yielding water to a well.

D. **Groundwater Recharge**: The infiltration of precipitation through surface soil materials into groundwater. Recharge may also occur from surface waters, including lakes, streams and wetlands.

1. Exemptions: Prior to the date on which this amendment was posted, the following uses are exempt from the provisions of Article 9.3.4-C.

   a. Septic Systems: septic systems or septic systems leaching field designs applied for with the State Water Supply and Pollution Control Boards as well as principal buildings associated with such uses.

   b. Applications Submitted: applications submitted for consideration by the Planning Board.

D. Surface Alterations: Alteration of the surface configuration of land by the addition of fill or by dredging shall be permitted within 150 feet of the shoreline of the Exeter River, Squamscott River or their major tributaries only to the extent necessitated by a permitted or conditionally permitted use.

E. Vegetative Buffer: Alteration of natural vegetation or managed woodland within 75 feet of the shoreline of the Exeter River, Squamscott River or their major tributaries shall be permitted only to the extent necessitated by a permitted or conditionally permitted use.

F. Prohibited Uses: The following uses shall not be permitted within the Exeter Shoreland Protection District:

1. Disposal of solid waste (as defined by the NH RSA §149-M) other than brush.

2. On site handling, disposal, bulk storage, processing or recycling of hazardous or toxic materials.

3. Disposal of liquid or leachable wastes, except from residential subsurface disposal systems, and approved commercial or industrial systems that are otherwise permitted by this article.

4. Buried storage of petroleum fuel and other refined petroleum products except as regulated by the NH Water Supply and Pollution Control Commission (Ws 411 Control of Non-residential Underground Storage and Handling of Oil and Petroleum

Liquids). Storage tanks for petroleum products, if contained within basements, are permitted.

5. Outdoor unenclosed or uncovered storage of road salt and other de-icing chemicals.

6. Dumping of snow containing road salt or other de-icing chemicals.

7. Commercial animal feedlots.

8. Automotive service and repair shops; junk and salvage yards.

9. Dry cleaning establishments.

10. Laundry and car wash establishments not served by a central municipal sewer systems.

11. Earth excavation as defined by NH RSA §155:E, within 150 feet of the Exeter River, Squamscott River or their major tributaries. It is prohibited to conduct said excavation within four feet of the Seasonal High Water Table.

12. The use of fertilizer as defined in 2.2.30.

    a. Per the intent of this ordinance, this prohibition may be waived by the Planning Board to supplement restoration or the establishment of new landscaping. Applicants shall provide written justification and identify specific location(s) within the property where the request applies. Waivers granted will provide for temporary allowance, not to exceed one year.

G. Conditional Uses:

1. The following uses, if allowed in the underlying zoning district, are permitted only after a Conditional Use Permit is granted by the Planning Board.

    a. Industrial and commercial uses not otherwise prohibited in Article 9.3.4.F Exeter Shoreland

March 2016

2.2 Definitions, add definition 2.2.30 Fertilizer (and renumber accordingly)
9.2.3.K. Prohibited Uses, add subsection 12. addressing use of fertilizer (Aquifer)
9.3.4.F. Prohibited Uses, add subsection 12. addressing use of fertilizer (Shoreland)

<u>Attachment 8</u>
2016 VRAP Data

2016 EXETER RIVER WATERSHED VRAP DATA

Measurements not meeting New Hampshire surface water quality standards
Measurements not meeting NHDES quality assurance/quality control standards

[A] Specific conductance > 835 µS/cm indicate exceedance of chronic chloride standard of 230 mg/L
[B] Chronic water quality standard
[C] Calculated using 1/2 of the 0.25 mg/L detection limit of TKN (0.125 mg/L)

15-EXT, Exeter River, Haigh Road, Exeter - NHDES Trend Station

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)	Chloride (mg/L)	*E. coli* (CTS/100mL)	*E.coli* Geometric Mean
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above background**	**835 µS/cm[A]**	**NA**	**230[B]**	**>406**	**<126**
06/22/2016	12:15	5.99	67.3	6.95	1.44	248.4	21.0	53	110	
07/13/2016	13:00	6.92	80.5	6.98	1.28	273.4	22.9	47	20	
08/17/2016	14:10	6.41	76.4	6.97	0.81	285.4	24.2	67	10	28
10/20/2016	13:30	6.90	64.5	6.68	0.40	286.3	12.3	48		

Date	Time of Sample	Total Phosphorus (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Nitrite (NO2)+ Nitrate(NO3) (mg/L)	Total Nitrogen (mg/L)
Standard	**NA**	**Narrative**	**Narrative**	**Narrative**	**Narrative**
06/22/2016	12:15	0.0220	0.45	0.17	0.62
07/13/2016	13:00	0.0155	0.33	0.15	0.48
08/17/2016	14:10	0.0128	< 0.25	0.10	0.22 [C]

14-EXT, Exeter River, Pickpocket Dam/Cross Road Bridge, Exeter

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above background**	**835 µS/cm[A]**	**NA**
07/05/2016	08:51	6.23	74.0	6.96	1.69		24.0
07/19/2016	08:49	5.54	66.9	7.02	0.90		24.8
08/09/2016	08:57	5.06	59.3	6.76	0.54	261.9	23.4
08/23/2016	09:00	5.56	63.8	6.98	0.71	263.5	22.1

13-EXT, Exeter River, Kingston Road (Route 111) Bridge, Exeter

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above background**	**835 µS/cm[A]**	**NA**
07/05/2016	09:17	4.07	47.7	6.80	1.20		23.2
07/19/2016	09:20	3.97	47.4	6.81	0.95		24.3
08/09/2016	09:14	3.97	47.3	6.75	1.19	146.7	22.0
08/23/2016	09:25	4.56	51.3	6.79	0.97	278.3	21.1

12A-EXT, Exeter River, Linden Street Bridge, Exeter

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above background**	**835 µS/cm[A]**	**NA**
07/05/2016	09:44	5.38	62.8	6.96	2.53		23.2
07/19/2016	09:43	3.15	37.7	6.51	2.47		24.3
08/09/2016	09:34	6.10	70.5	6.93	1.69	303.4	22.2
08/23/2016	09:43	3.88	44.0	6.57	3.51	167.4	21.5

12-EXT, Exeter River, Court Street/Route 108 Bridge, Exeter

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above background	835 µS/cm[A]	NA
07/05/2016	10:20	3.28	38.5	6.56	5.53		23.2
07/19/2016	10:01	2.67	31.9	6.62	3.02		24.5
08/09/2016	09:48	3.15	36.7	6.54	2.04	145.5	22.8
08/23/2016	09:59	3.34	37.7	6.59	4.03	132.7	21.3

05-LTE, Little River, Garrison Road Bridge, Exeter

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above background	835 µS/cm[A]	NA
06/28/2016	09:20	6.39	72.9	6.97	4.68		21.9
07/12/2016	08:58	4.96	54.6	6.99	3.96		20.1
08/02/2016	09:15	4.64	51.7	7.03	2.72		21.6
08/16/2016	08:55	4.31	50.4	6.84	1.92	125	23.3

02-LTE, Little River, Linden Street Bridge, Exeter

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above background	835 µS/cm[A]	NA
06/28/2016	09:54	3.63	41.6	6.60	6.19		22.2
07/12/2016	09:31	6.03	67.5	6.76	3.96		20.9
08/02/2016	09:56	5.22	59.4	6.46	6.87	325.1	21.6
08/16/2016	09:30	2.61	30.3	6.68	3.60	294.3	22.6

00-LTE, Little River, Gilman Street Bridge, Exeter

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above background**	**835 µS/cm[A]**	**NA**
06/28/2016	10:38	5.74	66.6	6.67	4.83		22.7
07/12/2016	10:03	7.27	82.9	6.78	9.84		21.9
07/12/2016	10:12	7.16	82.0	6.73	9.06		21.8
08/02/2016	10:41	6.48	74.2	6.77	4.37	177.4	22.1
08/16/2016	09:55	5.45	63.6	6.70	5.40	312.2	22.3

09-EXT, Exeter River, High Street Bridge, Exeter

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above background**	**835 µS/cm[A]**	**NA**
07/19/2016	10:20	5.48	66.9	7.01	2.43		25.5

Attachment 9
MS4 Assistance Memorandums

MEMORANDUM

TO:	Dave Sharples Jennifer Mates, PE Paul Vlasich, PE	DATE:	December 15, 2016
FROM:	Renee L. Bourdeau, PE HWG Lyndsay R. Butler, PE W-P	PROJECT No.:	13353C
SUBJECT:	DRAFT: Stormwater Regulatory Requirements Under the 2013/2015 NH Draft MS4 Permit and NPDES Administrative Order of Consent, Exeter, New Hampshire		

The purpose of this memorandum is to summarize the stormwater ordinance and regulatory requirements that the Town of Exeter (Town) will be required to implement under the 2013/2015 draft NH Municipal Separate Storm Sewer System (MS4) permit and the National Pollution Discharge Elimination System (NPDES) Wastewater Administrative Order on Consent (AOC). EPA and the State do not anticipate significant changes to the MS4 requirements in the Final version of the New Hampshire permit, expected January 2017, as compared to the most recent Draft permit.

WRIGHT-PIERCE
Engineering a Better Environment

MEMORANDUM

TO:	Paul Vlasich, PE Town Exeter Jennifer Mater, PE Town of Exeter	**DATE:**	10/21/2016
FROM:	Renee Bourdeau, PE W-P Lyndsay Butler, PE W-P	**PROJECT NO.:**	13353C
SUBJECT:	MS4 Stormwater Management Program (SWMP) Content		

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ILLICIT DISCHARGE DETECTION AND ELIMINATION (IDDE) PLAN

for the

TOWN OF EXETER, NH

NOVEMBER 2016

WRIGHT-PIERCE
Engineering a Better Environment

ILLICIT DISCHARGE DETECTION AND ELIMINATION (IDDE) PLAN

FOR THE

TOWN OF EXETER, NH

NOVEMBER 2016

PREPARED BY:

WRIGHT-PIERCE

230 Commerce Way, Suite 302
Portsmouth, NH 03801
Phone: 603.430.3728 | Fax: 603.430.4083

ILLICIT DISCHARGE DETECTION AND ELIMINATION (IDDE) PLAN

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Nitrogen Tracking Summary

PRELIMINARY NITROGEN TRACKING SUMMARY TABLE
TOTAL NITROGEN CONTROL PLAN ANNUAL REPORT FOR 2016
Wright-Pierce, January 18, 2017

Category			Wastewater									Stormwater		Land Use					
Parcel	Address	Subdivision	Zoning District	Class	Sewered	Septic System Type	Septic System <200m from Surface Water	Septic System Install Year	Rebuilt, New or No Change?	Permitted Bedrooms for Septic System	Design Flow (GPD)	Structural BMPs Installed	Non-Structural BMPs Installed	Land Converted to Turf/Grass from Natural (SF)	Land Converted to Turf/Grass from Impervious (SF)	Existing Impervious Cover Removed (SF)	New Impervious Cover Created (SF)	Amount of New Impervious Cover that is Disconnected (SF)	Land Converted to Agriculture Fields / Pastures (SF)
064-051-0000	10 Chestnut Street	No	R-5	Residential	Yes	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0	0	238	0	0
055-061-0000	137 Epping Road	No	C2 / LC	Commercial	Yes	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0	1,500	0	0	0
024-002-0000	64 Newfields Road	No	RU	Residential	No	Conventional	No	2016	New	4	480	0	0	0	0	1,340	8,970	0	0
097-023-0000	7 Riverwoods Drive	Yes	R-1	Residential	Yes	N/A	N/A	N/A	N/A	N/A	N/A	1	0	0	0	2,933	0	0	0
065-131-0000	Alumni Drive	No	H	Healthcare	Yes	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0	246	0	0	0
046-002-0000	18 Continental Drive	No	CT-1	Corporate	Yes	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0	0	8,160	0	0
064-052-0000	27 Chestnut Street	No	R-5	Residential	Yes	N/A	N/A	N/A	N/A	N/A	N/A	2	0	0	0	100,356	0	0	0
065-102-0000	Charron Circle	No	C-2	Commercial	Yes	N/A	N/A	N/A	N/A	N/A	N/A	1	0	0	0	0	20,660	0	0
055-007-0000	120 Epping Road	No	C-2	Commercial	Yes	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0	0	1,288	0	0
064-011-0000	26 Green Street	No	R-2	Residential	Yes	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0	0	624	0	0
086-072-0001	3 Little Pine Lane	No	R-2	Residential	Yes	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0	0	1,684	0	0
063-197-0000	26 Walnut Street	No	R-2	Residential	Yes	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0	0	912	0	0
032-006-0001	1 Stella Way	No	R-1	Residential	No	Conventional	No	2016	New	5	600	0	0	0	0	0	2,180	0	0
073-212-0000	129 Front Street	No	R-2	Residential	Yes	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0	0	100	0	0
068-006-0000	8 Sterling Hill Lane	Yes	R-6	Residential	Yes	N/A	N/A	N/A	N/A	N/A	N/A	2	0	14,809	0	0	37,462	0	0
069-003-0000	2 Hampton Road	Yes	PP	Professional	Yes	N/A	N/A	N/A	N/A	N/A	N/A	1	0	0	0	0	79,470	0	0
015-003-0010	4 Chapman Way	No	RU	Residential	No	Conventional	No	2016	Rebuilt	4	600	0	0	0	0	0	0	0	0
013-004-0000	109 Beech Hill Road	No	RU	Residential	No	Conventional	No	2016	New	4	600	0	0	0	0	0	0	0	0
062-079-0000	2 Hartman Place	No	R-1	Residential	No	Conventional	No	2016	New	4	600	0	0	0	0	0	0	0	0
032-006-0002	3 Stella Way	No	R-1	Residential	No	Conventional	No	2016	New	4	600	0	0	0	0	0	0	0	0
022-003-0000	80 Newfields Road	No	RU	Residential	No	Conventional	No	2016	Rebuilt	4	600	0	0	0	0	0	0	0	0
035-003-0012	7 Walters Way	No	RU	Residential	No	Conventional	No	2016	Rebuilt	5	750	0	0	0	0	0	0	0	0
060-025-0000	99 Brentwood Road	No	R-1	Residential	No	Conventional	Yes	2016	New	4	600	0	0	0	0	0	0	0	0
102-007-0000	19 Powdermill Road	No	R-1	Residential	No	Conventional	Yes	2016	New	4	600	0	0	0	0	0	0	0	0
026-013-0000	84 Watson Road	No	RU	Residential	No	Conventional	No	2016	New	4	600	0	0	0	0	0	0	0	0
083-011-0000	6 Chadwick Lane	No	R-2	Residential	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0	0	400	0	0
083-012-0000	8 Chadwick Lane	No	R-2	Residential	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0	0	400	0	0
087-002-0000	26 Hampton Road	No	R-2	Residential	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0	0	576	0	0
074-107-0000	4 Wentworth Street	No	R-2	Residential	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0	0	600	0	0
029-016-0000	325 Epping Road	No	R-1	Residential	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0	0	720	0	0
Totals											6,630	7	0	14,809	0	106,375	164,444	0	0

Attachment 11

Fertilizer Zoning Ordinance Education Events

HEALTHY LAWNS CLEAN WATER *and* RiverWoods AT EXETER

Invite you to attend a LUNCH & LEARN

Organic Turf Grass for Athletic Fields, Parks and Lawns

With Guest Speaker CHIP OSBORNE

Osborne Organics

August 15th 11:30 – 2:00

The Boulders at Riverwoods - Main Hall

~Lunch provided~

RSVP to: Kristen Murphy

kmurphy@exeternh.gov or (603) 418-6452

Healthy Lawns - Clean Water Initiative is has proposed a Zoning Amendment to the Planning Board that will Help Keep Our Waters Cleaner

Nitrogen is polluting our local rivers and streams and is impacting the health of Great Bay. It has been shown that fertilizer runoff is a large contributing source to this nitrogen pollution problem.

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This ordinance will be discussed at the Planning Board meeting on Jan 14th. To review the proposed ordinance visit: **tinyurl.com/exetercleanwater**

LOOK FOR OUR LAWNCARE WORKSHOP IN THE SPRING

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Follow These 5 Steps For A Healthy, Natural Lawn That Keeps Our Rivers Clean

1. **Mow Better.** Set mower blades at 3" for more vigorous roots.
2. **Let clippings lie.** Clippings are high quality, free fertilizer.
3. **Fertilize?** Older lawns need only clippings. Younger lawns may benefit from lime to increase pH allowing plants to absorb more nutrients.
4. **Got weeds or bugs?** Spot treat with natural methods.
5. **Water wisely.** If needed, water 1" per week.

HEALTHY LAWNS
CLEAN WATER

LOOK FOR OUR LAWNCARE WORKSHOP IN THE SPRING

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HEALTHY LAWNS
CLEAN WATER

Follow These 5 Steps For A Healthy, Natural Lawn That Keeps Our Rivers Clean

1. **Mow Higher.** Set mower blades at 3" for more vigorous roots.
2. **Let clippings lie.** Clippings are high quality, free fertilizer.
3. **Healthy Soil?** Test your soil for pH and organic matter.
4. **Water wisely.** Lawns need 1" of water per week from rain and/or irrigation.
5. **Still not satisfied with your lawn condition?** Visit www.exeterhealthylawnscleanwater.com for resources.

HEALTHY LAWNS CLEAN WATER

Healthy Lawns-Clean Water Forum

Free and Open to the Public

Are fertilizers, pesticides, insecticides, herbicides, and neonicitinoids good for you? Your food? Or clean water? Come! Listen! Ask questions!

Featured speakers:

Jay Feldman, Ex. Dir. of Beyond Pesticides, Washington D.C.

Chip Osborne, a nationally renowned organic turfgrass expert

John Bochert, Eldredge Lumber and Hardware

Wednesday, May 4, 2016, 6 to 8:30 pm

Exeter High School Auditorium

1 Blue Hawk Drive, off Rte. 27, west of Exit 9, Rte. 101

Also present to showcase eco-friendly products:

Arjay's Ace Hardware

Churchill's Gardens

Dodge's Agway

Hosted by: Great Bay-Piscataqua Waterkeeper

Exeter's Healthy Lawns-Clean Water Committee

Looking for an attractive, healthy lawn that is safe for you, your family and Exeter's Rivers?

HEALTHY LAWNS - CLEAN WATER

FREE Lawn Care Clinic

Saturday, May 14, 2016
10 – 11:30 AM

Swasey Parkway, Exeter, NH
or Exeter Town Hall (Rain Location)

Featuring Margaret Hagen of WMUR's Grow it Green with other UNH Cooperative Extension Staff, Volunteers and Partners

Guest visitor: N.H. Dept. of Transportation's stormwater exhibit

Practical Skills Offered

- Take a soil sample and interpret the results of a soil test.
- Determine what soil amendments you need and how to choose the right ones.
- Correctly apply what your lawn needs.
- Cultivate a great lawn that keeps our rivers, lakes, bays and oceans clean.

Registration Is Encouraged, But Not Required

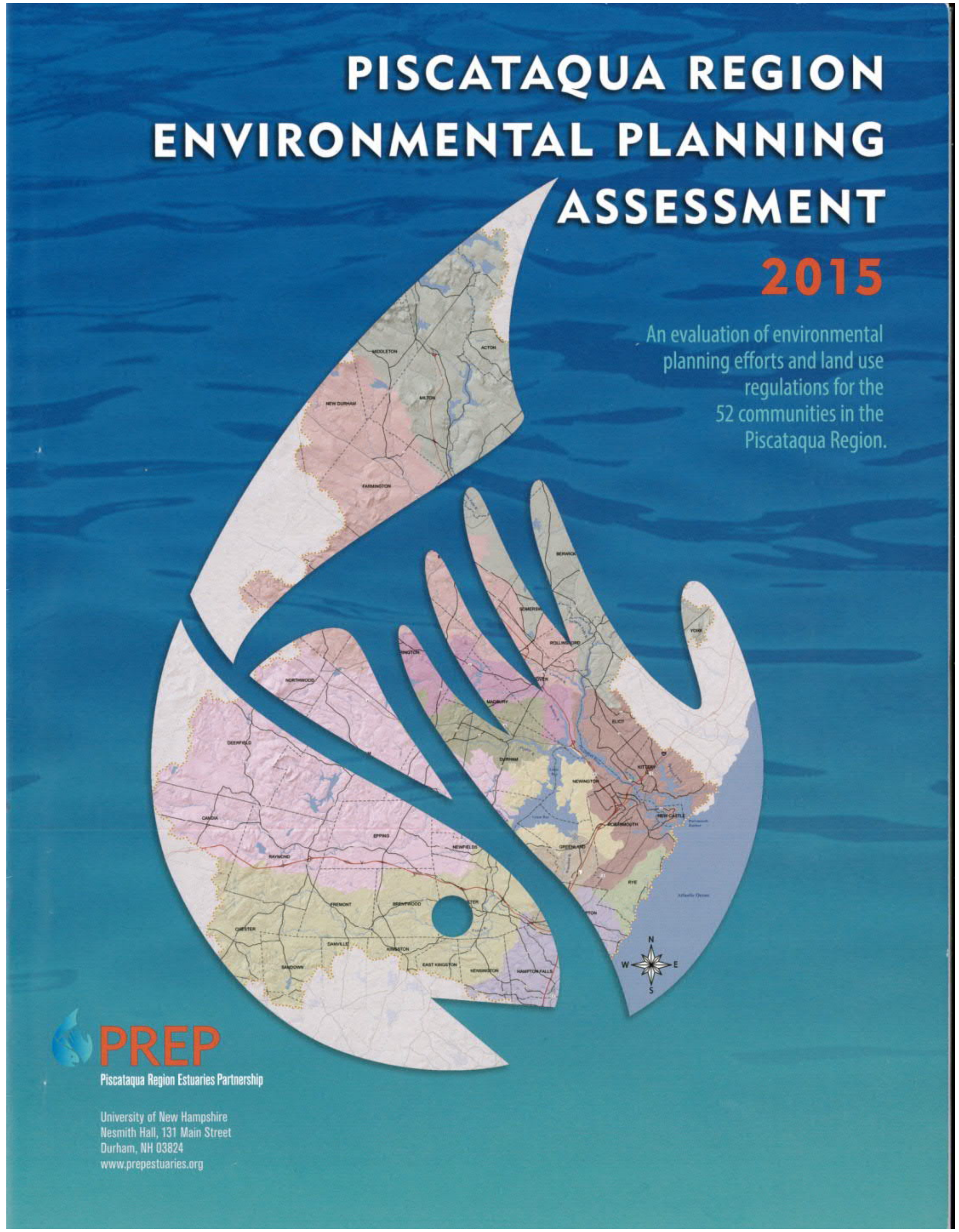
RSVP to kmurphy@exeternh.gov or call 603-418-6452.

Open to residents of Exeter and surrounding towns.

PRIZE DRAWINGS !

Town of Exeter New Hampshire Founded 1638 · Healthy Lawns Clean Water · University of New Hampshire Cooperative Extension · Sea Grant New Hampshire · PREP Piscataqua Region Estuaries Partnership · New Hampshire Department of Environmental Services · New Hampshire DOT Department of Transportation

HEALTHY LAWNS CLEAN WATER



TOWN of EXETER FOUNDED 1638 NEW HAMPSHIRE

HEALTHY LAWNS CLEAN WATER

PREP

1 = Top Priority Action 2 = Second Priority Action
3 = Third Priority Action 4 = Fourth Priority Action

EXETER			
1	2	3	4
Adopt fertilizer application buffers for all surface waters	Increase no vegetation disturbance buffer to 100' on tidal wetlands	Increase wetland setbacks for septic to 100'	Adopt model stormwater management regulations

TOWN of EXETER FOUNDED 1638 NEW HAMPSHIRE

HEALTHY LAWNS CLEAN WATER

TOWN of EXETER FOUNDED 1638 NEW HAMPSHIRE

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HEALTHY LAWNS CLEAN WATER

TOWN of EXETER FOUNDED 1638 NEW HAMPSHIRE

9.1.8.F. Already Prohibits Use Of Fertilizer Within the WCOD

Wetland Buffer Type	Buffer
•Prime……………………….	100’
•Very Poorly Drained…	50’
•Poorly Drained………..	40’
•Exemplary……………….	50’
•Vernal Pool………………	75’
•Inland Stream………….	25’

2.2.30 Add definition of Fertilizer

(renumber remaining list)

Fertilizer means any substance containing one or more recognized plant nutrients which is designed for use in promoting plant growth such as nitrogen, phosphorus and potassium. Fertilizer as defined shall not include vegetable compost, lime, limestone, wood ashes, or any nitrogen-free horticultural medium (eg. vermiculite).

9.3 EXETER SHORELAND PROTECTION DISTRICT

9.3.4.F Prohibited Uses

Add 12. The use of fertilizer as defined in 2.2.30.

9.2 AQUIFER PROTECTION DISTRICT ORDINANCE

9.2.3 - Use Regulations

K. Prohibited Uses:

Add 12. The use of fertilizer as defined in 2.2.30

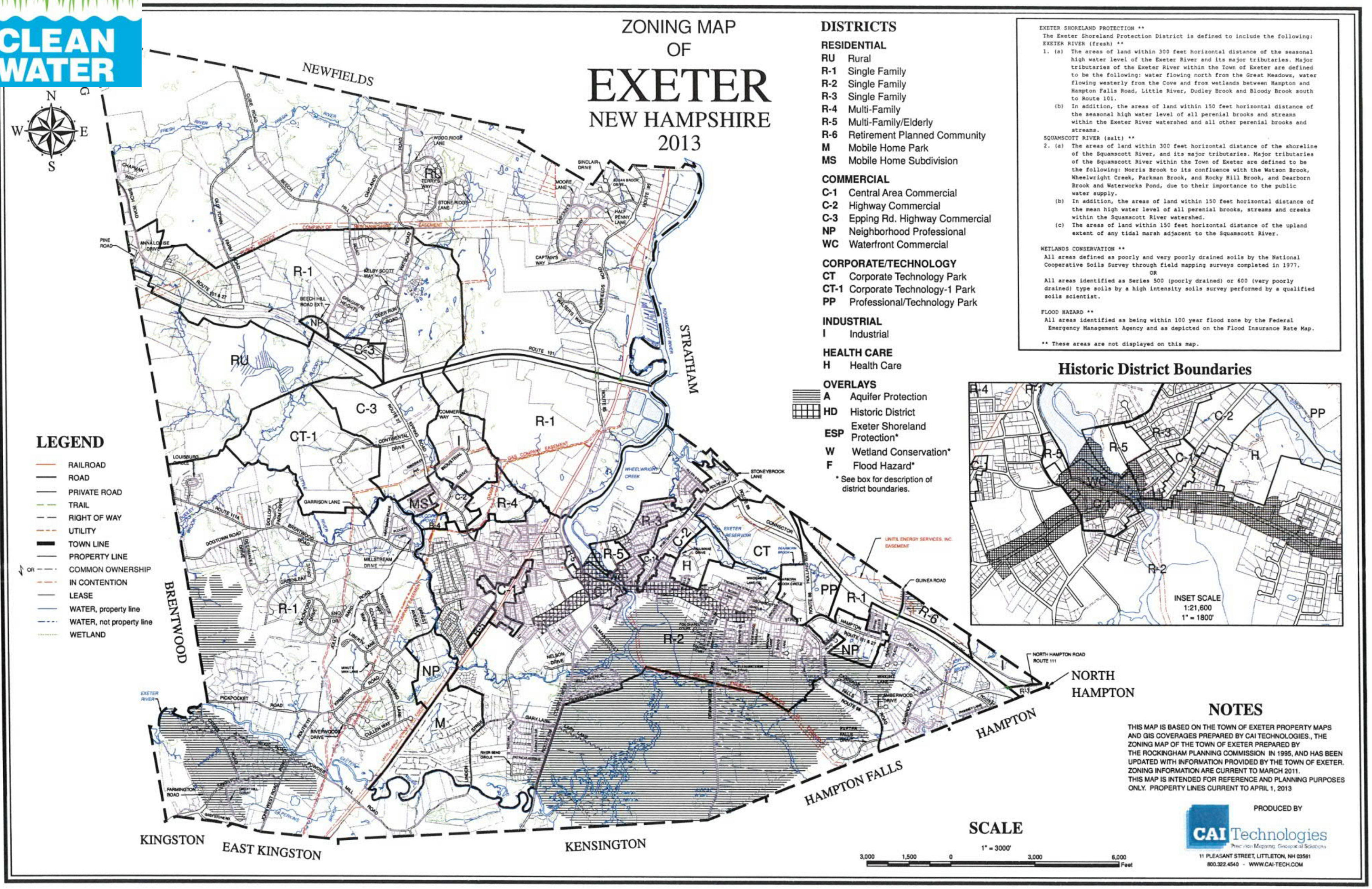
Shoreland District: 300' Buffer

- Exeter River & Major Tributaries
- Fresh River and Major Tributaries
- Squamscott River and Major Tributaries

Shoreland District: 150' Buffer

- Perennial Brooks and Streams in Exeter R. WS
- Perennial Brooks and Streams in Fresh R. WS
- Perennial Brooks and Streams in Sqamscott R.
- Upland Extent of Tidal Marsh adj. Squamscott R.

HEALTHY LAWNS
CLEAN WATER



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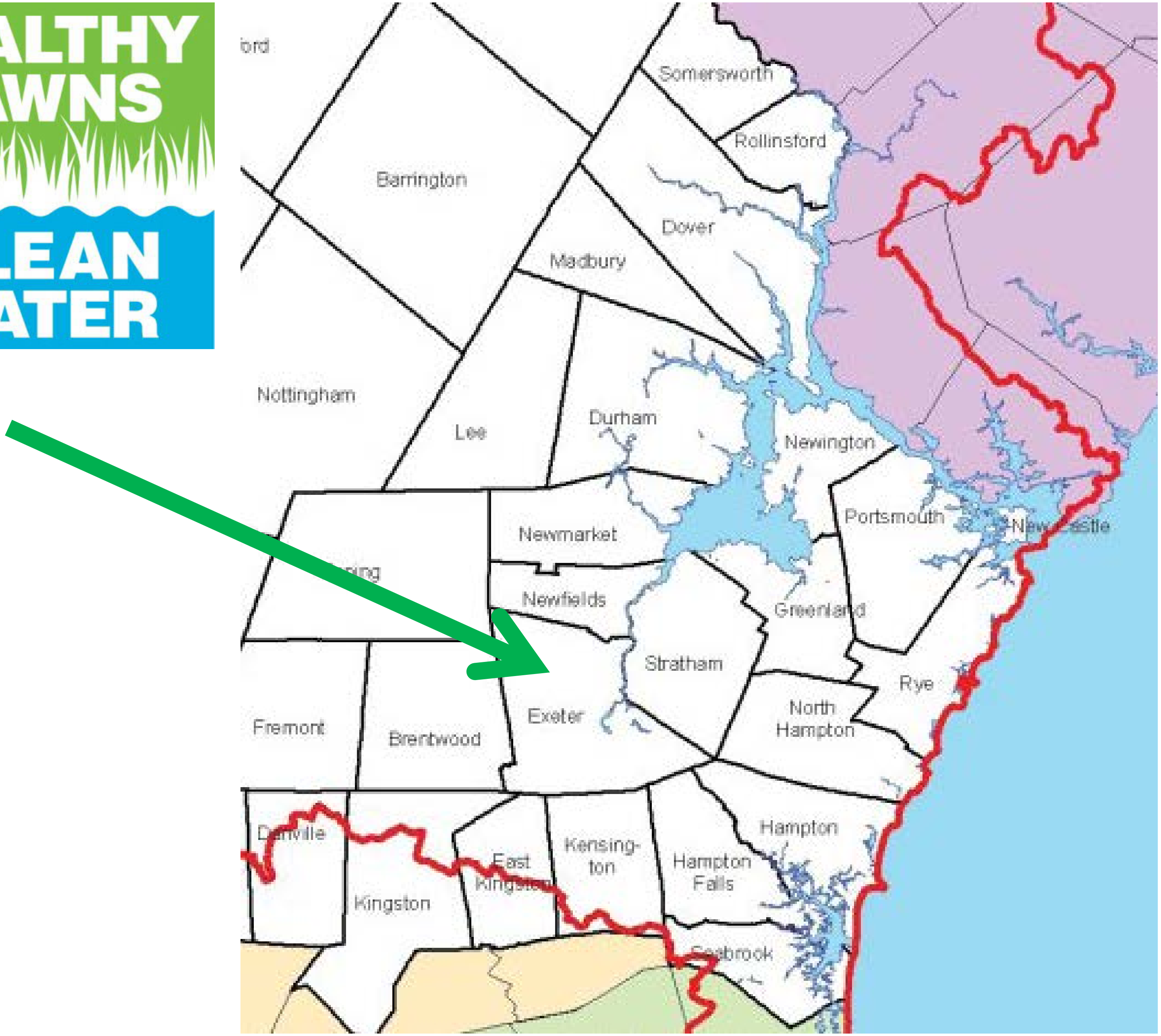

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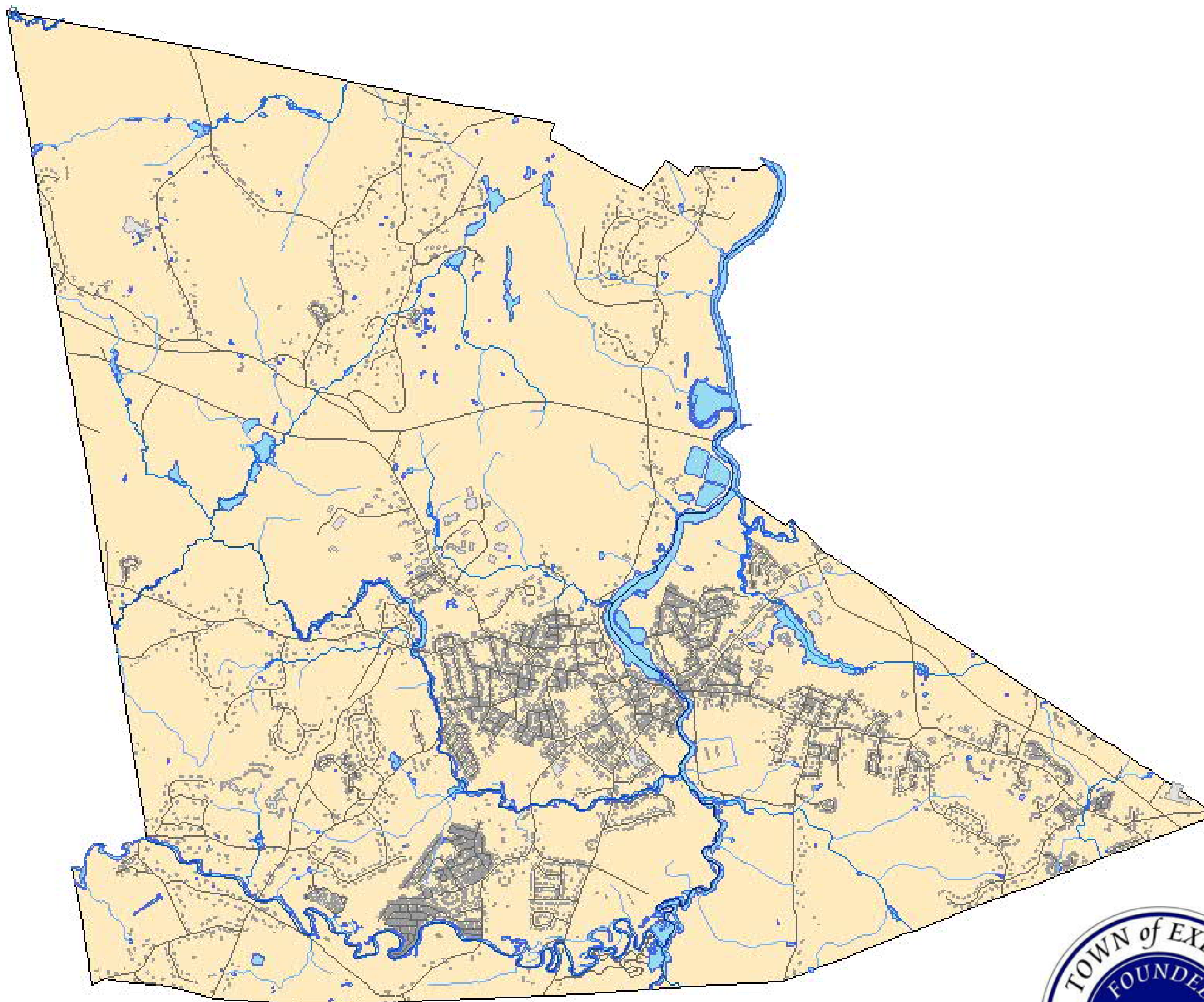

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HEALTHY LAWNS
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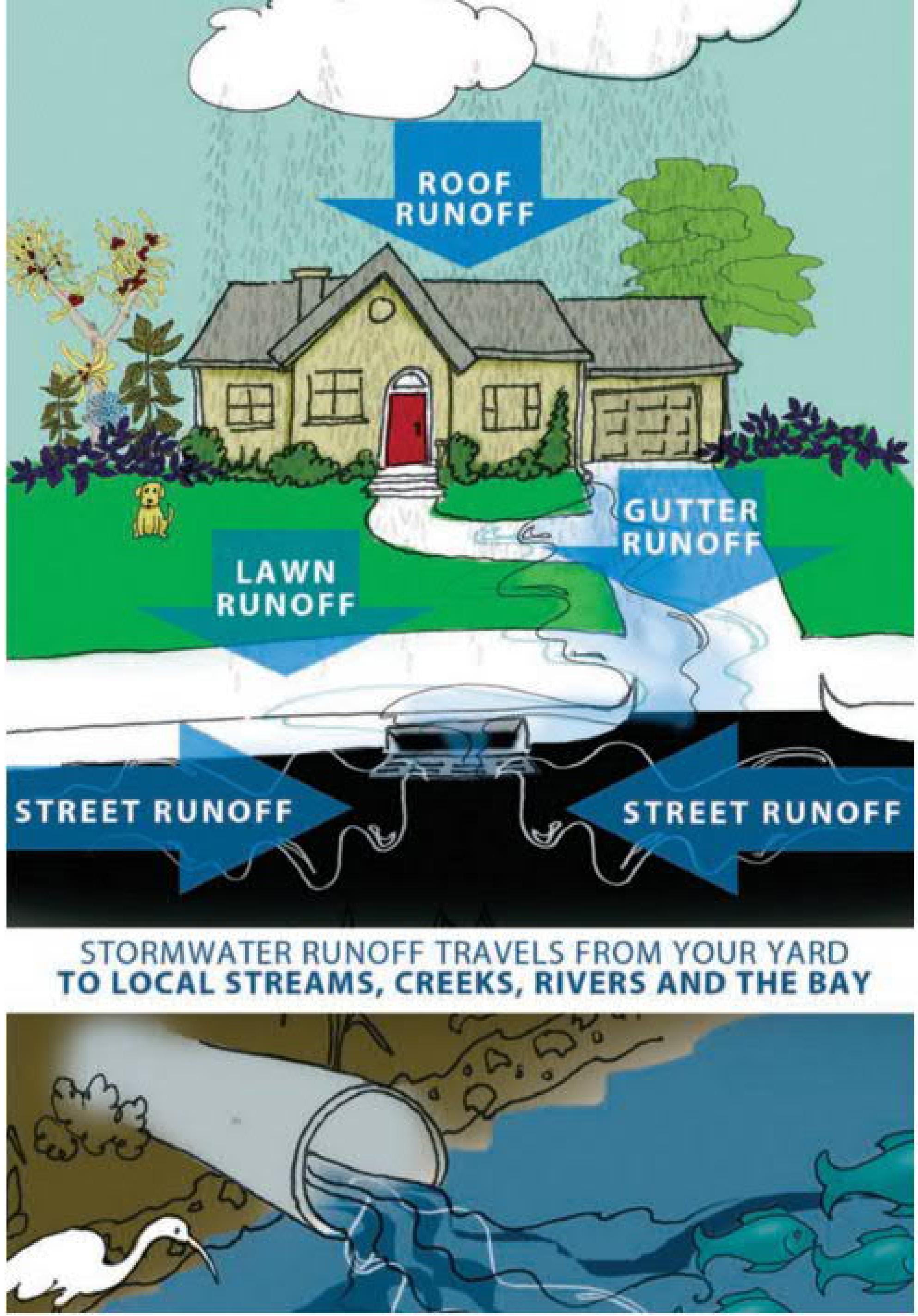

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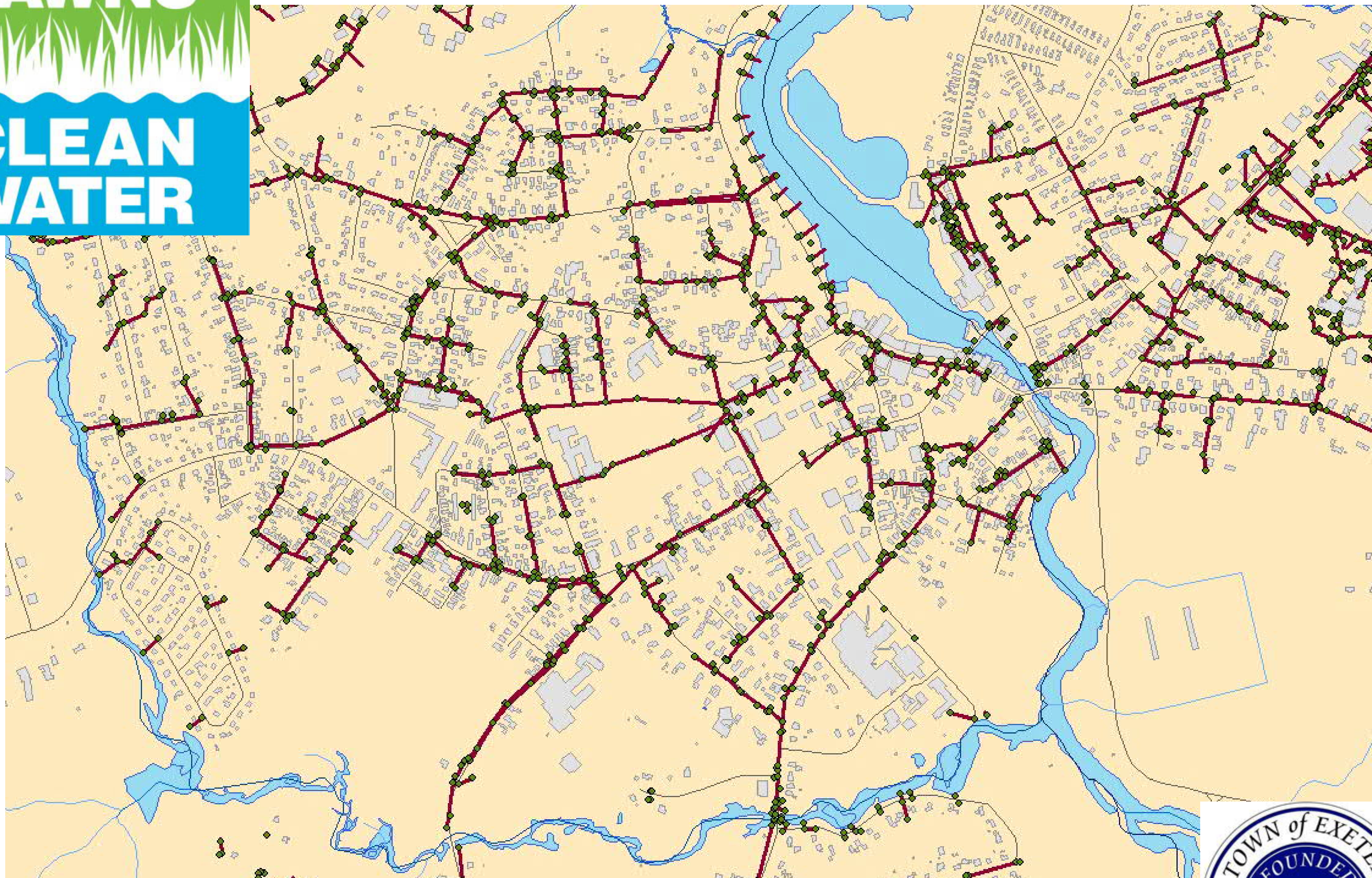

TOWN of EXETER FOUNDED 1638 NEW HAMPSHIRE

HEALTHY LAWNS
CLEAN WATER

TOWN of EXETER
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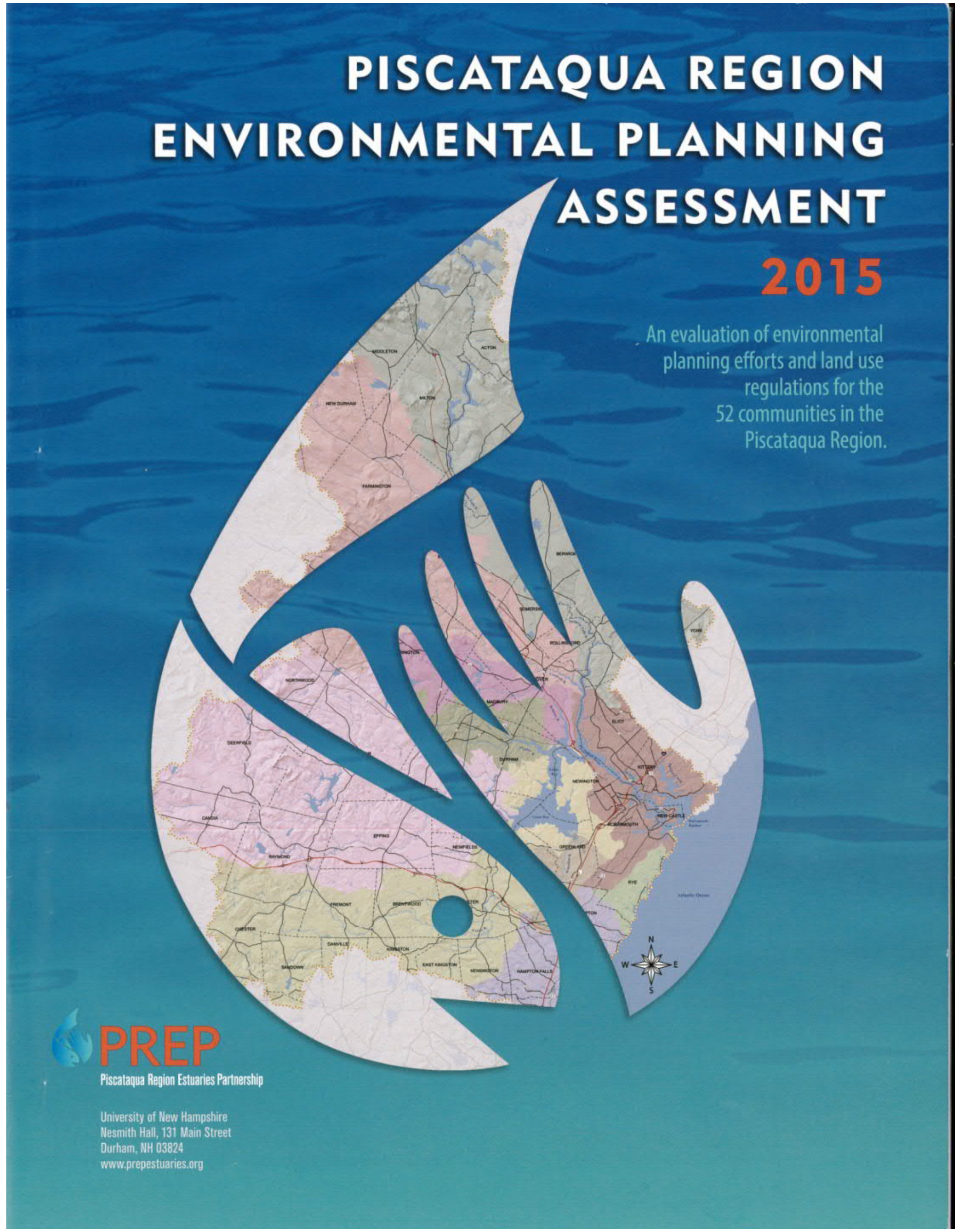

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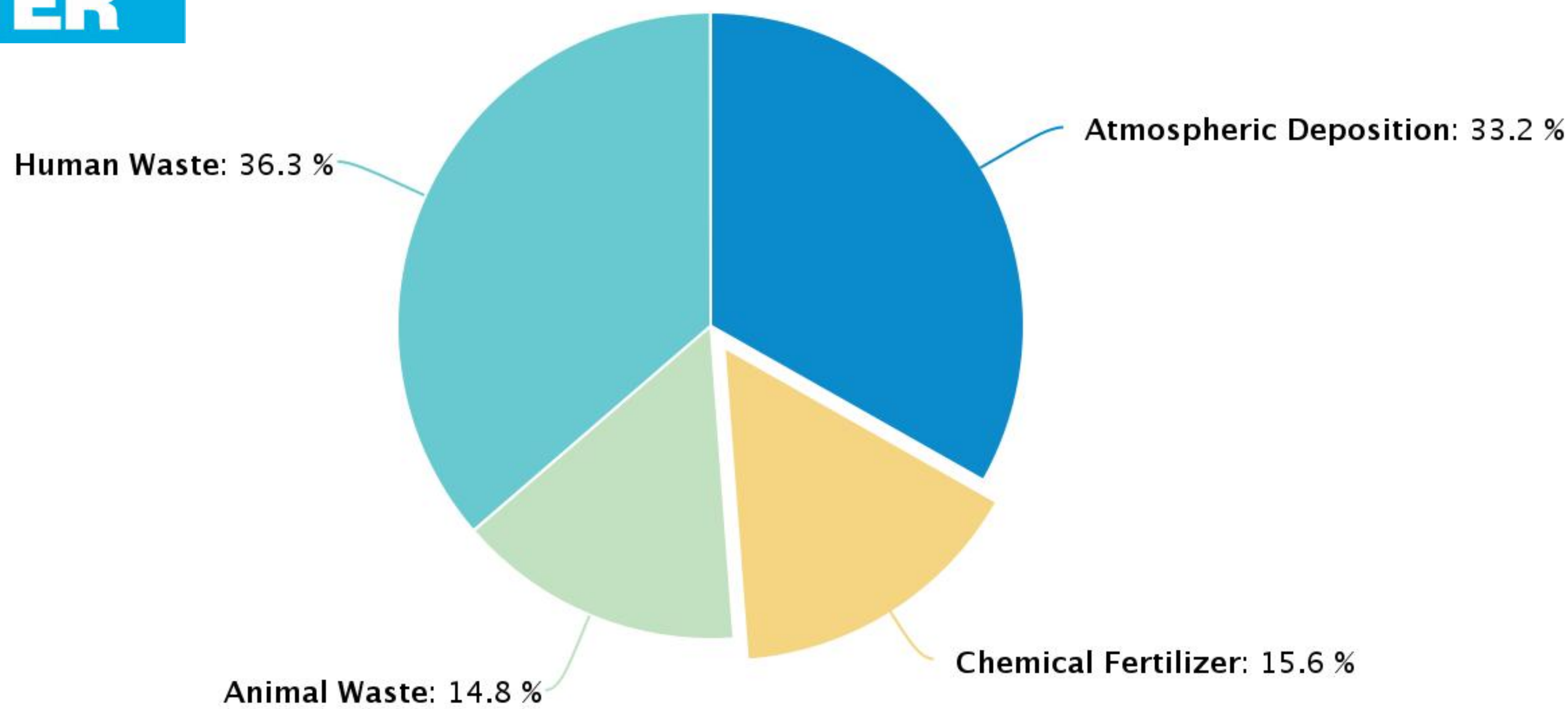
TOWN of EXETER FOUNDED 1638 NEW HAMPSHIRE

Exeter-Squamscott River Watershed



HEALTHY LAWNS CLEAN WATER

TOWN of EXETER FOUNDED 1638 NEW HAMPSHIRE

HEALTHY LAWNS
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TOWN of EXETER
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HEALTHY LAWNS CLEAN WATER

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9.2.3. K. Prohibited Uses:

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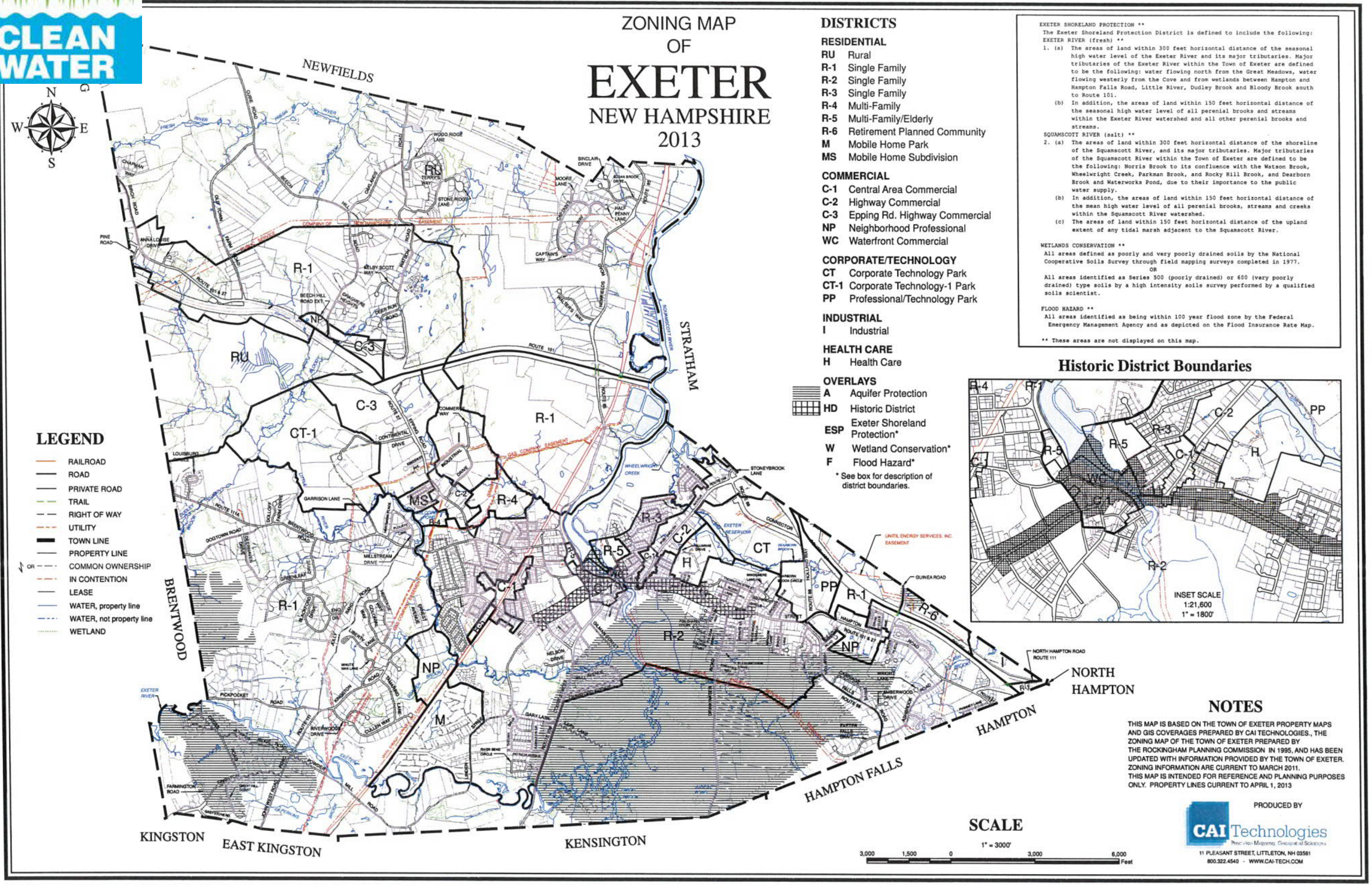
Per the intent of this ordinance, this prohibition may be waived by the Planning Board to supplement restoration or the establishment of new landscaping. Applicants shall provide written justification and identify specific location(s) within the property where the request applies. Waivers granted will provide for temporary allowance, not to exceed one year.

TOWN of EXETER FOUNDED 1638 NEW HAMPSHIRE

HEALTHY LAWNS CLEAN WATER



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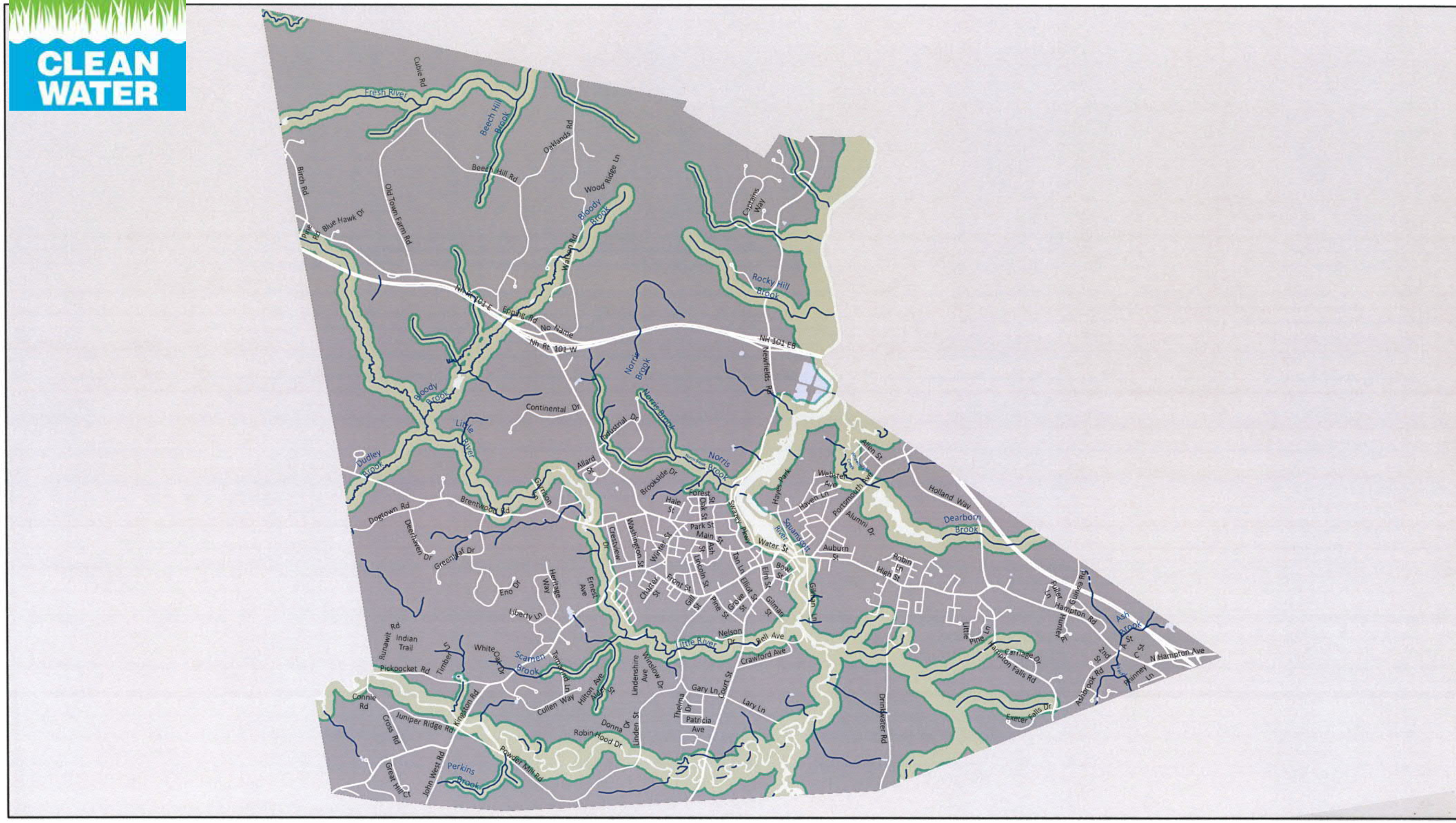


Approximate Extent of Exeter Shoreland Protection District

Refer to Zoning Ordinance Article 9.3 for actual boundary definition

Exeter Shoreland Protection District

Rivers

Waterbodies

NOTE: The information presented above is based on the best available digital data and provides an estimate for the district boundary. The actual Shoreland Protection District boundary requires field location of the seasonal high water mark and determination of stream flow seasonality and therefore site inspection for accurate boundary determination.

HEALTHY LAWNS
CLEAN WATER

TOWN of EXETER
FOUNDED
1638
NEW HAMPSHIRE

Attachment 12

Soak Up the Rain NH Brochure

What is Stormwater?

Stormwater runoff is water from rain or melting snow that doesn't soak into the ground.

In a forest, meadow, or other natural area, stormwater soaks into the ground and naturally filters through the soil.

When forests and meadows are developed, they are replaced with neighborhoods, shopping centers, and other areas that introduce impervious surfaces such as roofs, roads, parking lots, and driveways.

Impervious surfaces prevent rain or melting snow from soaking into the ground. This creates excess stormwater runoff and stormwater pollution.

Why is Stormwater a Problem?

Excess stormwater runoff and the pollutants that it carries can cause many different problems including flooding, erosion, and water pollution. This can make the water unhealthy for fish and other animals to live in and unsafe for us to swim and play in.

What is Soak up the rain NH?

Soak up the Rain (SOAK) New Hampshire is a voluntary program with the goal of protecting and restoring clean water in our local lakes, ponds, streams, rivers, and estuaries.

Working with local organizations, SOAK assists home and property owners to:

- Determine if a property is creating stormwater runoff that may be impacting nearby surface waters.
- Make recommendations and a plan for simple improvements including low-cost, do-it-yourself stormwater practices like the ones described in the *New Hampshire Homeowner's Guide to Stormwater Management*.

Want to Learn More?

Find out more about how you can soak up the rain at:
www.soaknh.org
or email jillian.mccarthy@des.nh.gov

Soak up the Rain
New Hampshire

YOUR LAND
YOUR WATER
YOUR SOLUTION

A Program of
New Hampshire Department of Environmental Services

Soak up the Rain
NEW HAMPSHIRE

Photo source: Think Blue Maine

Pollution in stormwater is the primary cause of water contamination in New Hampshire

All of our homes have the potential to create stormwater runoff. This is because roofs, driveways, and even lawns can prevent rain water from soaking into the ground. The *New Hampshire Homeowner's Guide to Stormwater Management* was created for homeowners to learn the simple things that can be done to reduce the impacts of stormwater from our homes, while improving our properties at the same time.

Simple activities such as picking up pet waste, minimizing fertilizer use, and maintaining septic systems can reduce water pollution. Do-it-yourself stormwater practices like rain barrels, dry wells, infiltration trenches, and rain gardens can be built to further protect clean and healthy water.

Find out more about how you can soak up the rain at www.soaknh.org.

Stormwater and Your Home: Where does it come from?

Extra water that would naturally soak into the ground comes from:

- Roofs
- Driveway and Walkways
- Decks and Patios
- Other hard surfaces

Stormwater carries pollutants that can harm our lakes, streams, estuaries, and other waters. These pollutants can come from:

- Eroding soils
- Fertilizers and lawn chemicals
- Pet waste
- Trash and debris

What can you do to help reduce stormwater pollution?

- Install a rain barrel, rain garden, dry well, or other DIY stormwater practice to reduce the amount of stormwater your property creates.
- Use good housekeeping practices, like applying less fertilizer, sweeping your driveway, and picking up after your pets to reduce stormwater pollutants.
- Get involved with a local SOAK group in your community to help reduce stormwater pollution and keep local lakes and streams healthy and clean.
- Don't have a local group? Visit www.soaknh.org or Contact NHDES to see how you can get involved.

YOUR LAND. YOUR WATER. YOUR SOLUTION.

Attachment 13
Education & Outreach Flyers

THINK BLUE EXETER
TOWN OF EXETER, NH

DO YOUR PART, BE SEPTIC SMART

It's Septic Smart Week: September 19-23, 2016

During Septic Smart Week, the EPA and the Town of Exeter encourage homeowners to get Septic Smart and take action. Proper Care and Maintenance of your septic system can prevent costly repairs and protect the environment.

Malfunctioning septic systems release pollutants into the ground which eventually enter local waterways.

SEPTEMBER 2016

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19 Protect & Inspect	20 Think at the Sink	21 Don't Overload	22 Don't Strain the Drain	23 Shield your Field	24
25	26	27	28	29	30	

Day 1 - September 19: Protect & Inspect

Homeowners can save more than $10,000 in repair and replacement costs if they have their septic system inspected at an average cost of $200-$350 at least every 3 to 5 years by a septic service professional.

Day 2 - September 20: Think at the Sink

Whether you flush down the toilet, grind it in the garbage disposal, or pour it down the sink, shower, or bath...what goes down the drain can have a major impact on how well your septic system works.

Day 3 - September 21: Don't Overload

Only put things in the drain or toilet that belong there. Things that DON'T belong in the drain include: coffee grounds, dental floss, disposable diapers or wipes, feminine hygiene products, cigarette butts and cat liter. These items can clog or damage septic systems.

Day 4 - September 22: Don't Strain the Drain

Efficient use of water and staggering water use can not only improve the operation of your septic system but also reduce the risk of failure as well.

Day 5- September 23: Shield your Field

What is placed on or around your drainfield—a component of your septic system that removes contaminants—matters.

THINK BLUE EXETER

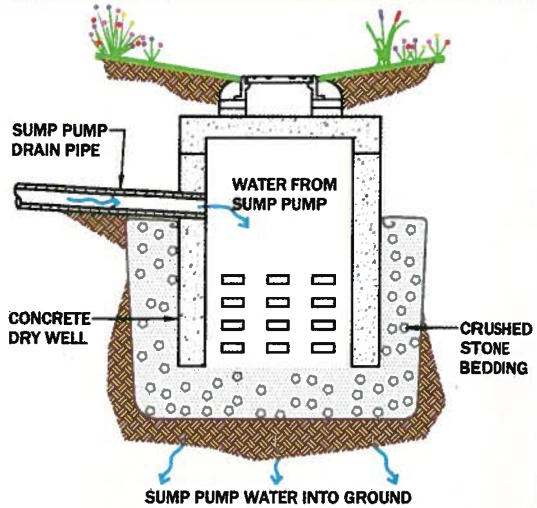
TOWN OF EXETER FOUNDED 1638 NEW HAMPSHIRE

RUNOFF RETURNS CLEAN STORM DRAINS = CLEAN WATER

septicsmart™

U.S. Environmental Protection Agency

SUMP PUMP DISCHARGE OPTIONS



INFILTRATION BASINS

RAIN GARDENS

MUNICIPAL DRAIN SERVICES

TOWN ORDINANCE

Chapter 15 – Sewer Regulations

Article 1507.3C
No person shall discharge or cause to be discharged any stormwater, surface water, groundwater, roof runoff, subsurface drainage, uncontaminated cooling water, or unpolluted industrial process waters to any sanitary sewer

Section 1501.8, Paragraph 6
No person shall make connection of roof downspouts, foundation drains, area drains, or other surface runoff or groundwater to a building sewer

WHAT YOU CAN DO TO HELP

Check to see if your home contributes I/I:

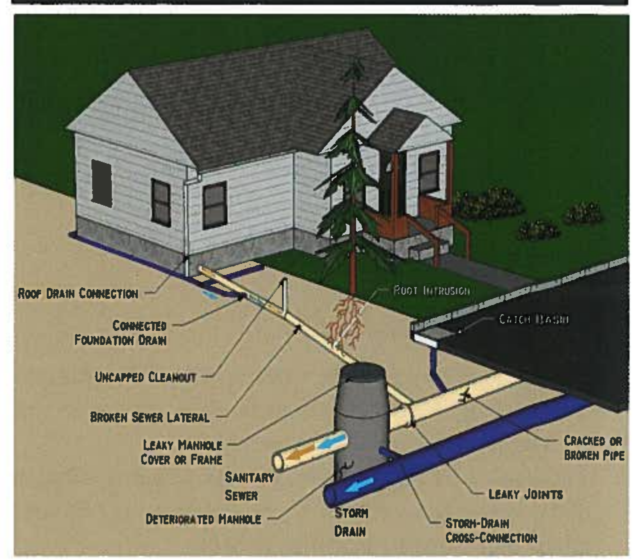
- Look for I/I connections yourself in your basement and on the outside of your house.
- Look for additional information that will be provided by the Town.
- Contact the Town by calling Matt Berube at 773-6157 to set up an appointment and check for I/I connections to the sewer or for more information.

Brochure produced by:
Public Works Department
13 Newfields Rd
603-773-6157

TOWN OF EXETER · FOUNDED 1638 · NEW HAMPSHIRE

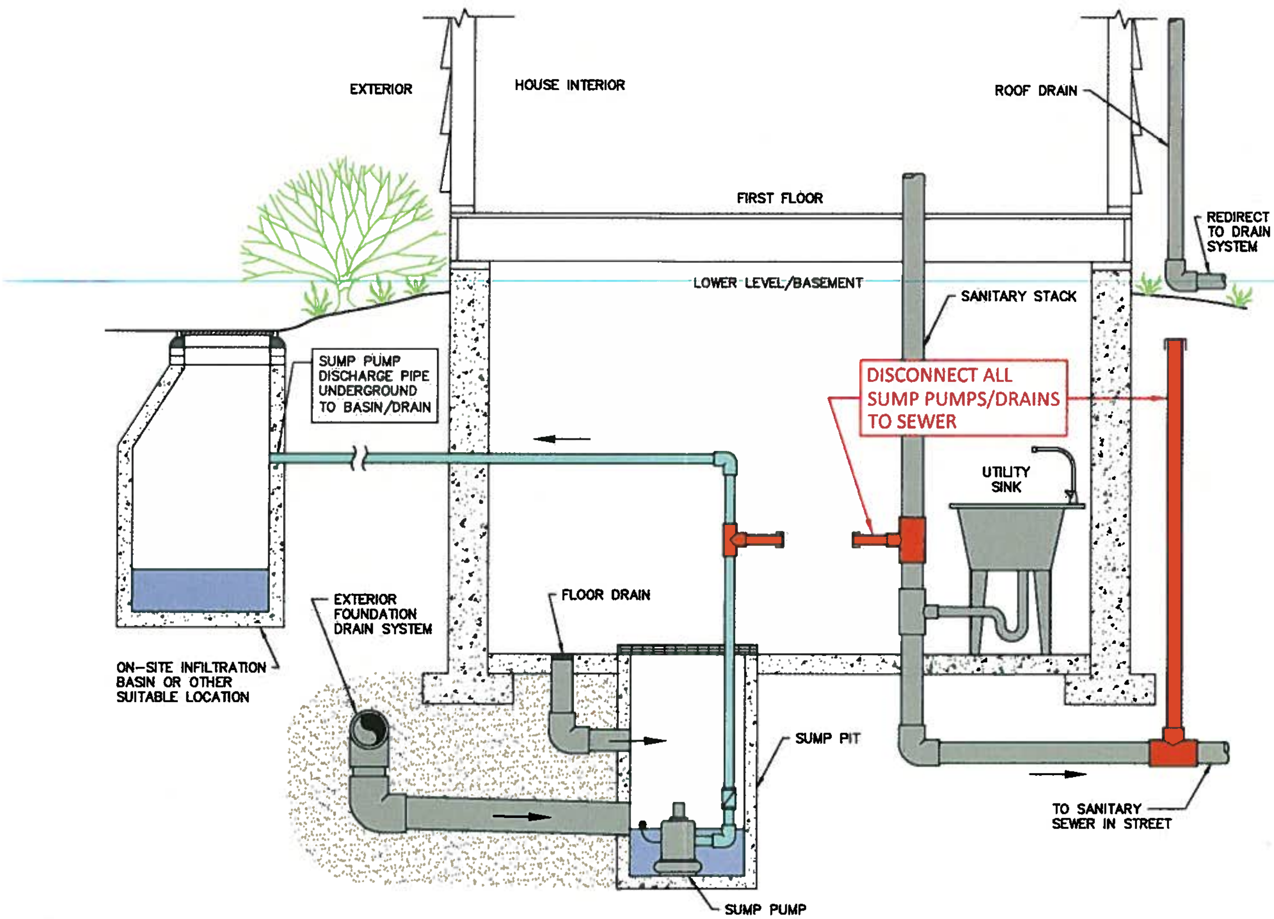
SUMP PUMP REMOVAL PROGRAM*

*Includes roof leaders, floor drains, foundation drains and other illicit connections



What is Infiltration and Inflow (I/I)?

I/I is clean water that gets into the sewer system and is treated at the wastewater treatment facility. Since the water is clean, it doesn't really need to be treated like sewage ("dirty" water) does. However, because it gets into the sewer system it is processed like sewage and treated. Treatment costs money (from ratepayers) and treating clean water is a waste of money and energy. Removing the clean water from the sewer system will reduce the costs of treatment and provides other benefits to the Town. ***This brochure** summarizes some of the important points you should know about I/I in your house and how you can help!*



WHY IT'S A BIG DEAL

- Ratepayers pay to treat wastewater. It is estimated that 50% of the flow at the treatment facility is I/I and much of this I/I from private property.
- Too much I/I can overwhelm the sewer system and cause dirty water to overflow to the Squamscott River (called a combined sewer overflow (CSO).
- Treating I/I at the wastewater treatment facility leaves less space for treating sewage and requires capital improvements to treat these higher flows.
- I/I from private property violates The Town's Sewer Use Ordinance. For more info go to www.town.exeter.nh.us/sewer.

Remove clean water connections to the sewer:

Disconnect any sump pumps or roof leaders from the sewer and discharge to a proper location.

Please Don't Direct Sump Pumps or Roof Leaders to the Street!

This can lead to icing and other maintenance issues

Preferred Discharge Locations include:

- On-site Infiltration Basin
- Rain Gardens
- Municipal Drain Service Lateral (if applicable)
- Surface Drainage Courses

(see reverse side for examples)

Also...spread the word Tell a neighbor or a friend about the Sump Pump Program.

The Hidden COST

A recent survey shows that towns have spent an average of **$40,500** dealing with unflushable items in sewer systems.

The replacement cost of a typical residential leach field is **$6,000-15,000**

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

29 Hazen Drive, Concord, NH 03301

des.nh.gov

(603) 271-3571

What's FLUSHABLE?

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

What's FLUSHABLE?

A toddler will tell you that *everything* is flushable... but what you *think* is flushable could be costing you money!

Product labels can be misleading. Some items that claim to be "flushable" can clog sewer and septic systems and can end up costing you a pretty penny.

"Flushable" does NOT mean it is SAFE for your septic system or sewer.

"Disposable" items ARE NOT flushable and should be placed in the trash.

The bottom line:

ONLY

Human waste and toilet paper

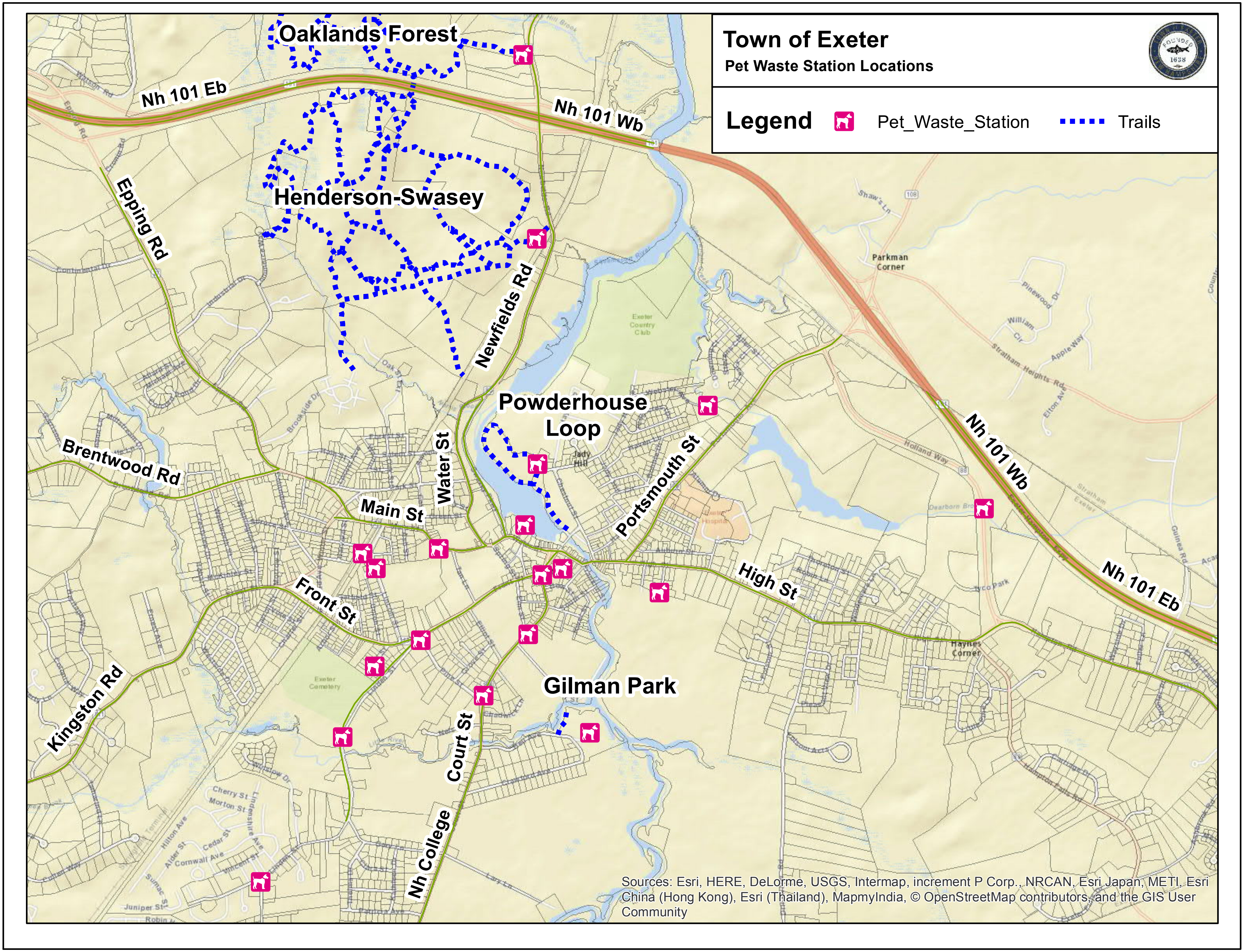
ARE FLUSHABLE

The DO NOT FLUSH List:

Diapers
Cigarettes
Paper Towels
Cotton Swabs
Tampons

Condoms
Dental Floss
Facial Tissues
Wipes

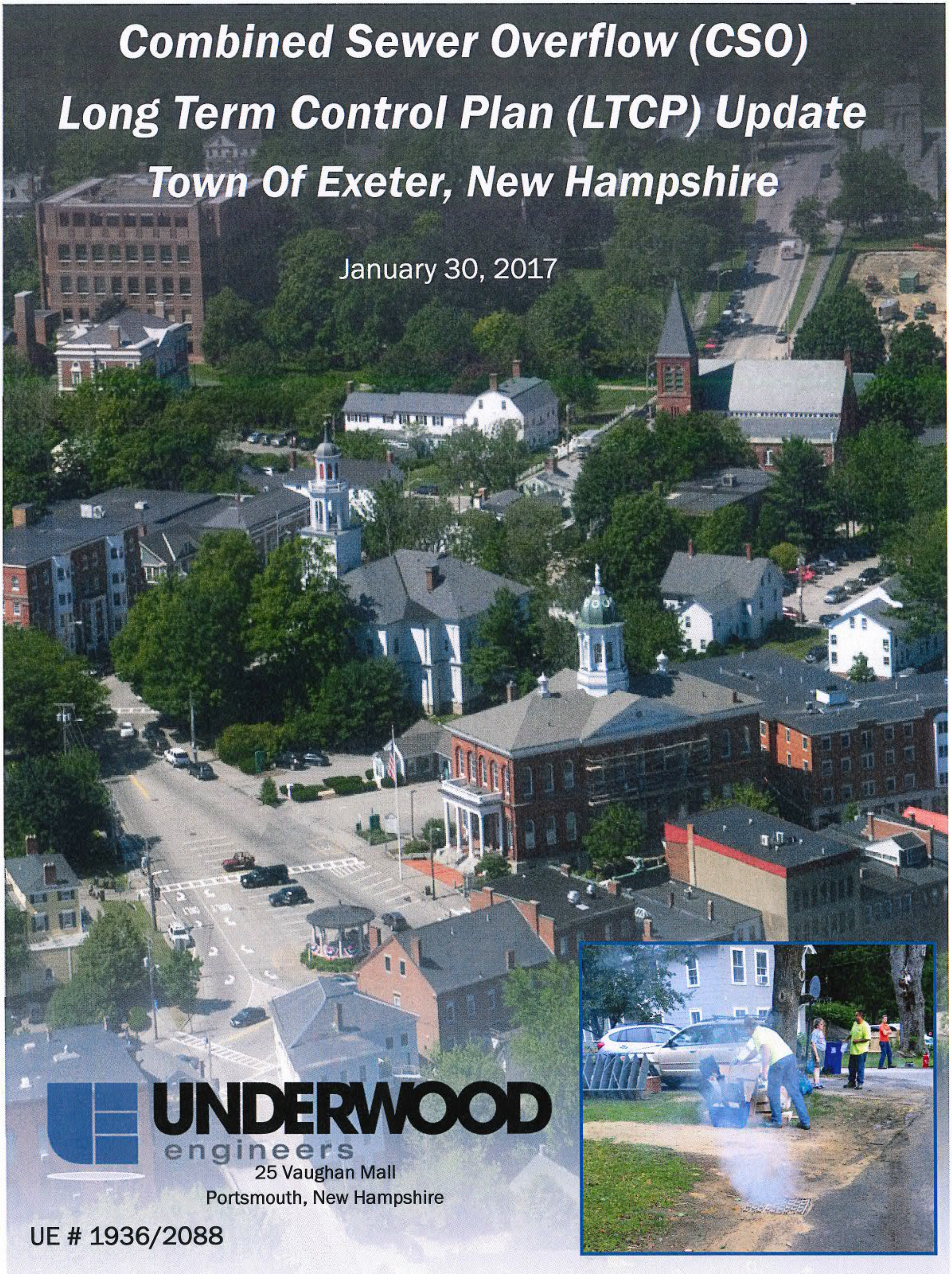
Attachment 14
Pet Waste Station Location Map



Town of Exeter
Pet Waste Station Locations
Legend
Pet_Waste_Station
Trails
Oaklands Forest
Henderson-Swasey
Powderhouse Loop
Gilman Park
Nh 101 Eb
Nh 101 Wb
Epping Rd
Newfields Rd
Brentwood Rd
Water St
Main St
Portsmouth St
High St
Front St
Kingston Rd
Court St
Nh College
Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Combined Sewer Overflow (CSO) Long Term Control Plan (LTCP) Update Town Of Exeter, New Hampshire

January 30, 2017



UNDERWOOD engineers
25 Vaughan Mall
Portsmouth, New Hampshire

UE # 1936/2088

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Appendix B –	Excerpts from *Final Report – 2014 Engineering Services, CSO LTCP Implementation*, Underwood Engineers, January 28, 2015
Appendix C –	Excerpts from *Interim Letter Report (Building Inspections, CSO LTCP Implementation*), Underwood Engineers, January 14, 2016
Appendix D –	Excerpts from *Preliminary Design Report for the Town of Exeter, NH WWTF and Main Pump Station Upgrade,* Wright-Pierce, October 2015
Appendix E –	*Exeter, NH Dyed Water Testing,* Flow Assessment Services, Inc., September 1, 2016
Appendix F –	Engineer's Opinion of Probable Costs, Westside Drive Sump Pump Mitigation Alternatives
Appendix G -	Excerpts from *Public Outreach and Private I/I Mitigation Program (2015) CSO LTCP Implementation,* Underwood Engineers dated January 12, 2016

1. Introduction

1.1 Project Background and Objectives

The Town of Exeter owns and operates a municipal wastewater collection system and wastewater treatment facility (WWTF). The wastewater collection system includes two Combined Sewer Overflow (CSO) diversion structures (Spring St. and Water St. diversion structures) which regulate high sewer flows during storm events. CSO overflow from these diversion structures bypass the Main Pumping Station (and WWTF) and are conveyed by gravity to Clemson Pond which outlets to the Squamscott River, a tidal tributary of Great Bay. The Town has been working for decades to separate stormwater and other I/I from the system to reduce CSO's and submitted UE's *Phase III Infiltration and Inflow Evaluation* to EPA in March 2013 to serve as the Town's CSO Long Term Control Plan (LTCP). Selected excerpts of this report are attached (Appendix A).

Two of the major findings from that study were that much of the identified I/I in Town appeared to be from private sources, and direct drainage connections to the sewer appeared to significantly contribute to CSO discharges because of high peak flows. Since the March 2013 submission of the initial CSO LTCP the Town has performed work focusing on identifying and mitigating private sources of I/I and sources of direct inflow.

An objective of this report is to review the investigations and projects that the Town has completed since the CSO LTCP was issued, assess the effectiveness of these programs toward the Town's ultimate goal to eliminate CSO's, and provide recommendations for potential future LTCP program re-prioritization.

1.2 CSO LTCP Implementation Reports

The following UE reports describe some of the CSO LTCP implementation efforts performed by the Town since submission of the CSO LTCP:

- *Final Report – 2014 Engineering Services, CSO LTCP Implementation*, dated January 28, 2015 (UE 2014 report). Excerpts are provided (Appendix B).
- *Public Outreach and Private I/I Mitigation Program (2015) CSO LTCP Implementation* (Illicit Connection Compliance Program), dated January 12, 2016. Excerpts are provided (Appendix G).
- *Interim Letter Report (Building Inspections, CSO LTCP Implementation*), dated January 14, 2016 (UE 2015 report). Excerpts are provided (Appendix C).

Discussion of some of the major findings of these reports are summarized in Section 3. In addition, UE reviewed the following reports by others as they pertain to CSO LTCP:

- *Preliminary Design Report for the Town of Exeter, NH WWTF and Main Pump Station Upgrade,* Wright-Pierce, October 2015. Excerpts are provided (Appendix D).

1.3 Scope of Work

The following tasks were included in Underwood Engineers' (UE) scope of work that is summarized in this report. Task 1 was aimed to continue Town efforts to identify specific sources of I/I and Tasks 2 and 3 were intended for planning future CSO LTCP implementation projects.

1.3.1 Task 1 - Field Evaluations and Building Inspections

- UE performed private inflow inspections/evaluations and dye testing at the SAU 16 Former High School where illicit roof leaders and sump pumps were suspected to be connected to the sewer in August 2016.

- UE assisted Town personnel perform smoke testing in areas with suspected drain connections to the sewer in September 2016.

1.3.2 Task 2 – Private I/I Mitigation Program Implementation Support

UE provided engineering assistance for implementation of the private I/I mitigation program including:

- Data summary and evaluation assistance regarding the findings of the Town-wide illicit connection mailer/compliance responses.

- An alternative evaluation of different options to mitigate known private illicit sump pumps connected to the sewer in the Westside Drive Pilot Area. The Town planned an 'enforcement only' approach to manage the illicit connections identified in the Westside Drive Pilot Area as part of the original CSO LTCP. However, the Town is reconsidering the 'enforcement only' approach and is evaluating different alternatives that could be used to assist homeowners manage/redirect illicit sewer connections in that area.

1.3.3 Task 3 - LTCP Confirmation Evaluation

The CSO LTCP recommends periodic reassessment of the effectiveness of the LTCP projects/program every several years. UE reviewed the work/projects that the Town has completed since the LTCP was issued, assess the effectiveness of those projects toward the Town's ultimate goal to eliminate CSOs, and provide recommendations for potential future LTCP project reprioritization.

2. Existing Wastewater System (Update)

2.1 General Description

Exeter's wastewater collection system includes 61.4 miles of sewer (53.4 miles Town maintained and 8 miles privately maintained) and 10 publicly owned and operated pumping stations. The wastewater collection system includes two permitted CSO diversion structures that divert CSO flow to Clemson Pond during storm events.

Wastewater from the entire Exeter collection area, including some portions of Stratham and Hampton, is conveyed to the Main Pumping Station (MPS) which is located between Water Street and Swazey Parkway. The Main Pumping Station pumps wastewater to the Exeter Wastewater Treatment Facility (WWTF) located on the Squamscott River north of Town.

The existing lagoon WWTF is designed for an average daily flow of 3.0 MGD and peak flow of 7.5 MGD. The rated design capacity of the Main Pumping Station is not known but believed to be 7.9 MGD or 5 MGD based on CDM's Phase I Infiltration and Inflow Report (1997). Observed historical WWTF influent and Main Pumping Station flows are discussed in Section 2.2 of this report and planned WWTF and Main Pumping Station upgrades are discussed in Section 3.1 of this report.

WWTF influent flow is monitored using a magnetic flow meter that was installed in August 2010 on the MPS force main in a meter pit located near the entrance to the WWTF site on Newfields Road. Prior to the installation of this meter, WWTF influent flows were measured via an area-velocity meter located in the bottom of the WWTF influent channel. However, Town personnel indicated that the influent channel meter did not have a free-flowing condition calling into questions the accuracy of WWTF influent flow data prior to August 2010.

Combined Sewer Overflow (CSO) flows are measured and monitored with the following instrumentation array at both the Spring Street and Water Street diversion structures:

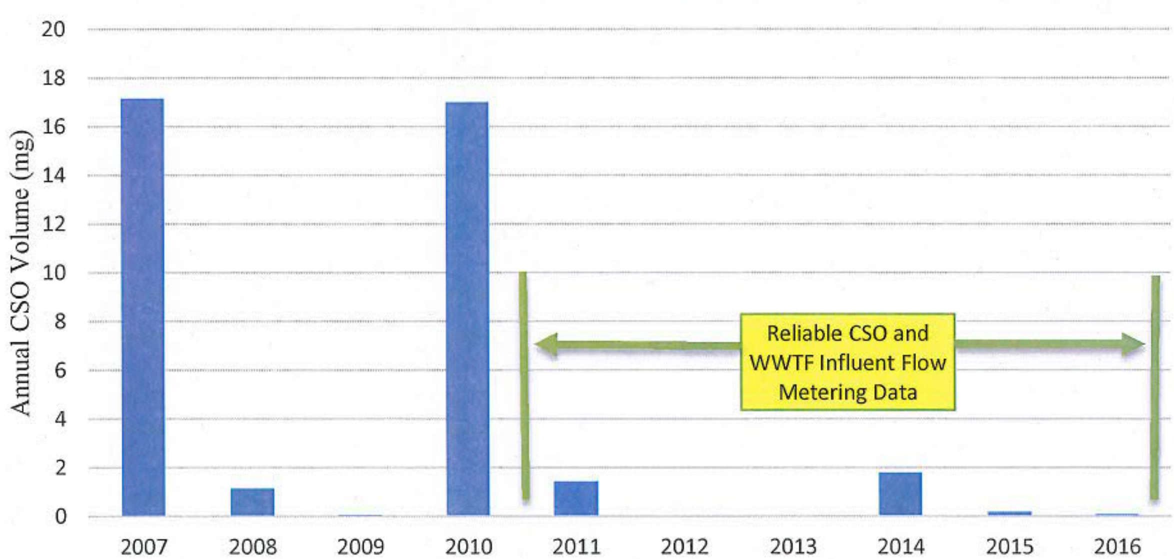
- Pressure transducer on upstream side of CSO overflow weirs (primary CSO measuring device)
- Ultrasonic on the downstream side of the overflow weirs (back-up CSO measuring device)
- Ultrasonic on the downstream side of the overflow weirs (measures receiving water 'backflow' over the weir backwards into the sanitary sewers)
- Rain gauge located on the roof of the Main Pumping Station

The CSO monitoring instrumentation array are operated and maintained by Flow Assessment Services, Inc. (FAS) and the data and alarms are monitored and conveyed to the Town through the FAS website. The CSO monitoring array described above was installed in December 2010 and replaced an ultrasonic/chart recorder system that was not believed to be reliable.

2.2 Historical Wastewater Flows and CSO Events (Update)

Table 3-1 has been updated from the original CSO LTCP submission to include flows from 2012-2016. Note that the historical CSO flows from 2010 to 2011 were corrected from the original CSO LTCP submission due to a CSO instrumentation calibration error identified in 2014 (UE 2014 Report). In addition, historical WTP flows have also been corrected from the original CSO LTCP submission to account for Water Treatment Plant (WTP) metering errors identified by the Town. Generally, the CSO and WWTF flow data from 2011-present is used for this assessment (Figure 2.1) and is considered more reliable than the data before the 2010 flow monitoring improvements.

Figure 2.1
Total Annual CSO Volume (mg)
2007-2016



Updated flow records from 2011 to 2016 [Table 3-1 (Updated)] indicate that the Town has captured 99% to 100% of the estimated average annual Combine Sanitary Sewerage (CSS) during wet weather. This far exceeds the minimum 85% capture required by the presumptive approach of EPA's "CSO Control Policy (1994)" (Figure 2.2). However, does not, in all cases, meet the Town's goal to eliminate CSOs.

Figure 2.2
Annual Average CSS Captured and Treated at the WWTF (%)
2007-2016

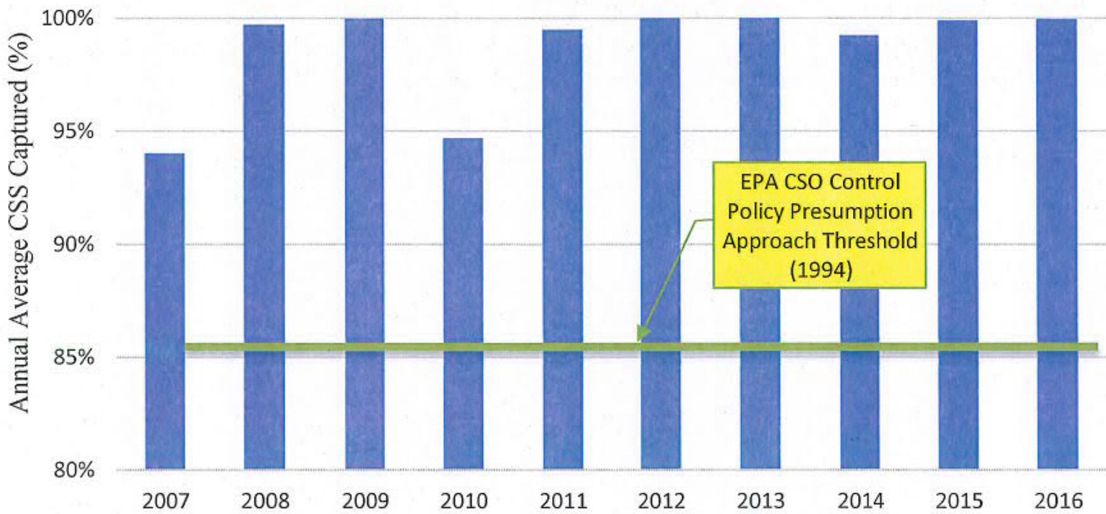


Table 1 summarizes the total and peak hour flows during the 11 CSO events that have occurred 2011- 2016 since reliable flow metering instrumentation was installed. Please note that no CSO occurred during the 9/30/15 precipitation event but this event is included due to the relatively high daily and peak hour precipitation that occurred during that event to help illustrate progress that the Town has made to eliminate I/I from the system since issuance of the CSO LTCP. For example, by contrast the system flow during the 8/19/11 CSO event (7.3 MGD total peak hour flow from 1.65" total & 1.12" peak hour precipitation) prior to CSO LTCP implementation activities was greater than the storm of similar high intensity that occurred on 9/30/15 during which no CSO occurred (5.2 MGD peak hour flow from 3.16" total and 1.05" peak hour precipitation). Flows during 2011 to 2016 CSO events are summarized as follows:

- Daily total CSO volumes ranged from <0.1 mg to 1.0 mg
- Peak hour CSO flow rates ranged from <0.1 MGD to 3.6 MGD
- Peak hour Main Pumping Station flow rates ranged from 4.3 to 5.5 MGD during CSO events
- Total wastewater peak hour flow rates (MPS and CSO) during CSO events ranged from 5.3 to 8.6 MGD. Note that Wright-Pierce identified peak flows up to 9.99 MGD for their basis of design (Appendix D), but we understand the 9.99 MGD peak used by Wright-Pierce was a peak instantaneous flow not peak hour flow.
- Peak wetwell levels during CSO events ranged from 10.9' to 11.9'

Table 3-1 (UPDATED through 12/31/16)
Annual Average Daily Wastewater and CSO Flows
2007-2016

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	6 Year Average (2011-2016)
Annual Average WTP Gallons Water Treated and Pumped to Distribution System, mgd	1.0	1.0	1.1	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.0
Annual Average Wasted WTP to Sewer, mgd	0.3	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.2	0.1	0.1
Subtotal WTP Treated and Wasted to Sewer, mgd	1.3	1.3	1.4	1.4	1.2	1.2	1.1	1.1	1.3	1.2	1.2
Annual Average WWTF Influent, mgd	1.9	2.3	2.1	2.1	1.9	1.6	1.6	1.6	1.6	1.4	1.62
Annual Total CSO Flow, mg	17	1.1	0.05	17	1.4	0.0002	0	1.8	0.2	0.1	0.58
Annual Average CSO Flow, mgd	0.05	0.003	0.0001	0.05	0.004	0.0000005	0	0.005	0.0005	0.0002	0.002
Subtotal Annual Sewer and CSO Flow, mgd	1.9	2.4	2.1	2.2	1.9	1.6	1.6	1.6	1.6	1.4	1.6
Annual Average Extraneous Flow Treated (I/I), mgd	**0.6**	**1.0**	**0.8**	**0.8**	**0.7**	**0.4**	**0.5**	**0.5**	**0.3**	**0.3**	**0.4**
% I/I	**31%**	**44%**	**35%**	**36%**	**37%**	**25%**	**33%**	**29%**	**18%**	**19%**	**27%**
Annual Average Sewage Flow Treated at WWTF (% of Total)	**97.57%**	**99.87%**	**99.99%**	**97.86%**	**99.79%**	**100.00%**[9]	**100.00%**	**99.70%**	**99.97%**	**99.99%**	**99.90%**
Annual Daily Total WWTF Influent during wet weather, mg	269.7	397.4	354.4	303.5	278.5	241.1	222.1	233.9	182.0	170.4	221.3
Annual Average Estimated CSS Capture during wet weather (	**94.02%**	**99.71%**	**99.99%**	**94.70%**	**99.49%**	**100.00%**	**100.00%**	**99.24%**	**99.90%**	**99.96%**	**99.74%**

Notes:
1. All values are in units of million gallons per day
2. WTP Water Treated and Pumped data based on information provided by the Town
3. WTP wasted water to sewer (backwash) assumed based on difference between WTP raw and finish water
4. Average annual daily WWTF influent based on values reported in the WWTF monthly reports (New Influent Meter Feb. 2010)
5. Average annual daily CSO flow based on total CSO volume indicated in CSO summary table provided by the Town (2007-2010)
6. Average annual daily CSO flow based on total CSO volume measured by Flow Assessment Services metering provided by the Town (2011-2016)
7. Annual total CSO flow for 2011-2013 was updated due to Spring St. CSO metering discrepincy discovered in June 2014
8. Annual daily total WWTF influent during wet weather was total daily WWTF influent flow on days that precipitation occurred based on WWTF MOR reports.
9. Rounded due to significant figures.

Table 1
CSO Flow Summary 2011-2016

CSO Event Date	Total Daily Precipitation (inches of rain)	Daily Precipitation (inches of rain)	Total Daily Volume (MG)	Peak Hour Flow (MGD)
3/7/2011	*1.22*	*0.3*		
Main Pumping Station			4.5	5.3
Spring St. CSO			0.623	1.67
Water St. CSO			0.377	1.147
CSO Subtotal			*1.0*	*2.8*
TOTAL			***5.5***	***8.1***
3/11/2011	*0.93*	*0.17*		
Main Pumping Station			4.8	5.2
Spring St. CSO			0.252	0.862
Water St. CSO			0.107	0.538
CSO Subtotal			*0.4*	*1.4*
TOTAL			***5.2***	***6.6***
8/19/2011	*1.65*	*1.12*		
Main Pumping Station			1.8	5.5
Spring St. CSO			0.074	1.772
Water St. CSO			0	0
CSO Subtotal			*0.1*	*1.8*
TOTAL			***1.9***	***7.3***
12/27/2012	*1.59*	*0.31*		
Main Pumping Station			3.7	5.3
Spring St. CSO			0.0002	0.004
Water St. CSO			0	0
CSO Subtotal			*0.0*	*0.004*
TOTAL			***3.7***	***5.3***
3/30/2014	*1.96*	*0.38*		
Main Pumping Station			4.4	5
Spring St. CSO			0.539	2.329
Water St. CSO			0.199	1.304
CSO Subtotal			*0.7*	*3.6*
TOTAL			***5.1***	***8.6***
3/31/2014	*1.05*	*0.14*		
Main Pumping Station			4.2	5.1
Spring St. CSO			0.487	1.528
Water St. CSO			0.042	0.508
CSO Subtotal			*0.5*	*2.0*
TOTAL			***4.7***	***7.1***
12/9/2014	*2.6*	*0.38*		
Main Pumping Station			4.1	5.2
Spring St. CSO			0.397	1.9
Water St. CSO			0.121	0.861
CSO Subtotal			*0.5*	*2.8*
TOTAL			***4.6***	***8.0***

Table 1
CSO Flow Summary 2011-2016

CSO Event Date	Total Daily Precipitation (inches of rain)	Daily Precipitation (inches of rain)	Total Daily Volume (MG)	Peak Hour Flow (MGD)
4/20/2015	*1.65*	*0.2*		
Main Pumping Station			3.4	4.3
Spring St. CSO			0.03	0.42
Water St. CSO			0	0
CSO Subtotal			*0.0*	*0.4*
TOTAL			***3.4***	***4.7***
4/21/2015	*0.42*	*0.25*		
Main Pumping Station			3.8	4.3
Spring St. CSO			0.136	0.926
Water St. CSO			0.011	0.143
CSO Subtotal			*0.1*	*1.1*
TOTAL			***3.9***	***5.4***
9/30/2015	*3.16*	*1.05*		
Main Pumping Station			2	5.2
Spring St. CSO			0	0
Water St. CSO			0	0
CSO Subtotal			*0.0*	*0.0*
TOTAL			***2.0***	***5.2***
1/10/2016	*1.87*	*0.41*		
Main Pumping Station			3.6	5.2
Spring St. CSO			0.056	0.533
Water St. CSO			0	0
CSO Subtotal			*0.1*	*0.5*
TOTAL			***3.7***	***5.7***
10/21/2016	*3.07*	*1.93*		
Main Pumping Station			1.9	5.53
Spring St. CSO			0.018	0.38
Water St. CSO			0	0
CSO Subtotal			*0.0*	*0.4*
TOTAL			***1.9***	***5.9***

Notes:

1 Total daily precipitation based on rain gauge measurements from instrument located on the main pumping stati
2 Peak hour precipitation based on the maxium rainfall measured between whole hours on a given date.
3 Total daily and peak hour main pumping station flow is based on WWTF influent flowmeter records provided l
4 CSO flows based on the CSO flow measured between whole hours on a given date based on metering maintened by Flow Assessment Services and provided by the Town.

3. CSO LTCP

3.1 General

Exeter has a long-term goal to ultimately eliminate CSOs. Because of the potential for extreme coastal flooding events in a changing climate, Exeter intends to keep the diversion structures in place as a safeguard against uncontrolled, unsanitary conditions and private property damage associated with sewer backups during high flow events, and to safely maximize existing in-line storage as required by EPA's nine minimum controls.

The current CSO LTCP recommended complete I/I removal (Alternative 2) to achieve the Town's goal to ultimately eliminate the CSO. The CSO LTCP recommended use of a decision matrix (Figure 14-1) to systematically perform collection system capital projects aimed to reduce I/I and evaluate the impact of the improvements until the desired level of CSO control was achieved or need for WWTF improvements was confirmed. Also, at the time of the original submission of the CSO LTCP the recommended alternative was based on higher flows than may exist now and much of the historical CSO flow information available at that time was not believed to be reliable. Although the CSO and Main Pumping Station flow metering was improved in conjunction with CSO LTCP engineering, the Town did not have the benefit of years of reliable CSO and Main Pumping Station data.

The Town was not willing, able or authorized to commit to over $26M of capital projects, nor was it believed that all $26M would be required to achieve the Town's goal to eliminate the CSO. However, the Town was willing to commit to certain CIP projects which were summarized in Table 14-1 of the original CSO LTCP (Appendix A). Since issuance of the CSO LTCP the work has generally followed the recommendations summarized in Table 14-1, with some adjustments to schedule. The most significant change to the suggested implementation schedule was delay of the Downing Court and Westside Drive Pilot projects. We understand that this interim schedule adjustment was made to redirect funds towards the private I/I and direct inflow investigation and mitigation programs, which successfully identified major sources of I/I as described in the reports referenced in earlier sections of this report.

3.1.1 WWTF Improvements

The anticipated WWTF upgrade was recommended to be used as a catalyst to assess the CSO elimination progress to date, and evaluate the need for and incorporate appropriate CSO mitigation measures into WWTF design as part of the decision matrix for CSO elimination (Figure 14-1, Appendix A, dated January 14, 2013). The Town executed an Administrative Compliance Order (ACO) by consent with the US EPA in the Spring of 2013 which was the first step towards upgrade of the WWTF. The Town's Administrative Order by Consent (ACO) with the EPA defines the scope and schedule for required WWTF improvements.

The Town contracted Wright-Pierce to design WWTF and Main Pumping Station upgrades and the basis of design. We understand that the Town plans to upgrade the WWTF to have a 6.6 peak hour capacity. We also understand that the Town plans to keep the existing WWTF lagoons as part of the upgrade for flow equalization to accommodate the high peak flows from the Main Pumping Station. WWTF improvements are described in more detail in the Town's WWTF Facility Plan.

Planned upgrade of the Main Pumping Station as part of the ACO should have a significant impact to CSO control. We understand that the Town plans to upgrade the Main Pumping Station to have a maximum flow capacity of 10 MGD. The project will include installation of an additional force main parallel to the existing force main to the WWTF. We understand that both force mains will be used to achieve 10 MGD flow and that 2019 is the scheduled completion date for the Main Pumping Station and parallel force main project.

3.1.2 Long Term CSO Control Plan Activities (2013-2015)

Additional CSO LTCP implementation efforts that the Town has performed since submission of the CSO LTCP are generally summarized in UE's reports (listed in Section 1.3 of this report). Some of the key findings of those investigations include:

1. The Jady Hill infrastructure improvement project was completed in 2013. We understand that the post-construction flow monitoring performed by the Town indicated a 70-80% reduction in I/I as a result of the project.

2. The identification and disconnection of a drainage pipe connection to the sewer that allowed Squamscott River waters to back-flow into the sanitary sewers during severe high tides/flood events. We understand that this connection was disconnected from the sewer by the Town in 2014 (UE 2014 Report).

3. Identification and disconnection of a drainage swale that conveyed drainage from an area of approximately 7 acres to the sewer. We understand that the Town disconnected this drainage from the sewer in 2014 (UE 2014 Report).

4. The Town has performed illicit sewer connection building inspections and dye testing throughout the Phillips Exeter Academy (PEA) Campus, on other school campuses, along Lincoln Street in preparation of a planned infrastructure project, and downtown in preparation of a planned sidewalk improvement project. Illicit roof leaders and sump pumps were identified and the Town is working with property owners to re-direct illicit connections (UE 2014 and 2015 Report).

5. The Town began a system-wide public outreach and private I/I mitigation program that included 5-year amnesty from enforcement action for users self-reporting illicit connections to the sewer (Illicit Connection Compliance Program) and the Town is working with property owners to disconnect identified illicit connections from the sewer.

3.1.3 Wastewater Collection System CIP

The Town designed and constructed replacement of over 4,000 feet of sewer mains and sewer laterals (to the ROW) of sewer on Portsmouth Avenue, north of High Street. The Town is also planning for a 2017 warrant article to design and a 2018 warrant article to construct a sewer project on Lincoln Street as part of a larger infrastructure project in that area.

3.2 Recent CSO LTCP Implementation Activities (2016)

The Town performed the following CSO LTCP implementation activities in 2016 that have not been described in the previous reports enumerated in Section 1.3:

- Smoke testing in select areas of Town where drains were suspected to be connected to the sewer and in advance of planned infrastructure projects

- Further investigative work to identify suspected illicit connections on the former High School Campus at 30 Linden St.

- Distribution analysis of illicit connections identified in the Town's Public Outreach and Private Mitigation Program (Illicit Connection Compliance Program)

- Westside Drive Pilot Area sump pump mitigation project alternative evaluation

3.2.1 Smoke Testing in Select Areas

Underwood Engineers observed smoke testing performed by the Town in September 2016 to help the Town document identified drainage connections to the sewer. Smoke testing was performed in the following areas:

- Locust/Walnut St. Area (Figure 3.1) to investigate suspected drain connections to the sewer and the tightness of past bulkhead repairs where drain connections were previously redirected away from the sewer.

- Washington St. Area (Figure 3.2) to evaluate the presence of drain connections to the sewer for planning purposes in advance of planned infrastructure improvement projects in this area.

- Former Mill Buildings (Figure 3.3) to investigate the presence of drain connections to the sewer in this area.

Smoke testing revealed one catch basin connected to the sewer around 26 Walnut St. and several leaking bulkhead connections between catch basins and the sewer on Locust St. and Wentworth St. No drainage connections were identified connected to the sewer in the former mill building area. We understand that the Town has subsequently sealed the 6" sewer/drain connection in the catch basin located around 26 Walnut St.

3.2.2 Former High School Illicit Connection Dye Test Investigations

Underwood Engineers and Flow Assessment Services performed a dye test evaluation of drains on the SAU 16 former high school building located at 30 Linden St. in August 2016. The dye testing report is provided (Appendix E). Dye testing showed that two sump pumps were connected to the sewer, one was located in a chamber below a computer lab floor and one was located in a mechanical room. It was noted that that the sump pump below the computer lab floor also collects surface drainage water from a trench drain located at the bottom of a loading ramp (Figure 3.4). Dye testing also showed that flat roof drains at this building were not connected to the sewer and discharge to the drain system. Dye tests for stairwell drains and one roof leader were not conclusive.

3.2.3 Compliance Response Implementation

As reported in UE's Illicit Connection Compliance Program Report, the Town mailed out 3,400 "Compliance Response" questionnaires in May 2015, which asked sewer users to identify any known private I/I sources located on their property. UE compiled the location of properties reporting a suspected sump pump or roof leader connected to the sewer to help evaluate whether clusters of admitted suspected illicit connections exist in Town (Figure 3.5).

No clear pattern of suspected illicit connection clusters was apparent and suspected illicit connections appeared scattered in different areas of Town. A loose cluster appears in the area around Crestview Drive and Columbus Avenue. However, the Town should generally be aware of the location of suspected illicit connections and try to incorporate provisions to address illicit connections as part of future capital improvement projects and during implementation of the Town-wide sump pump removal program.

Clusters of illicit sump pump connections were also located in previously piloted areas. However, it is unclear why illicit connections remain in the Jady Hill Infrastructure Project in 2013 which we understand included private drain services to provide residents with a viable location for sump pump discharge. The Town should perform investigations to confirm the presence of the reported illicit connections in the Jady Hill Pilot Area or whether the affirmative responses to the 2015 compliance questionnaire was due to confusion by the homeowners completing the questionnaire.

The Westside Drive Pilot Area continues to show a cluster of illicit sump pump connections which was not unexpected because of the challenges of private sump pump discharge in this area due to limited municipal drainage infrastructure and space constraints on individual lots. The original CSO LTCP included enforcement only for removal of the illicit connections in this area. However, the Town is exploring other alternatives including Town participation for more effective illicit connection removal in this area.

3.2.4 Westside Drive Pilot Feasibility Alternatives

The Town requested three (3) conceptual alternatives other than enforcement for private I/I management in the Westside Drive Area.

The challenges of illicit sump pump removal from the sewer in Westside Drive is the small lot size and limited drainage infrastructure, which makes it difficult for homeowners to have a good discharge location for sump pumps on their individual private lots. The three (3) CIP alternatives for sump pump mitigation generally included infrastructure for 'interior' lots to have a sump pump discharge location. It was assumed that perimeter lots with wetland/river frontage can discharge their sump pump toward the wetland/river on their back lot. The following alternatives were evaluated to assist homeowners to have a viable sump pump discharge location:

1. Roadside Swales
2. Perforated Underdrain System
3. Sump Pump Force Main System

Please note that the sizing and routing of the infrastructure associated with each alternative has been assumed based on visual observations during a limited site walk, which was used to develop report–level engineers opinions of probable costs for comparison of the different alternatives. In addition, the alternative concepts were framed as stand-alone alternatives for sump pump mitigation and the Town should consider other factors (non-point source mitigation, other neighborhood improvements, etc.) when selecting the best alternative suited for the Town.

Alternative 1 – Roadside Swales

This alternative concept included the addition of roadside swales on either side of the interior roads of the development as available location for discharge of individual sump pumps (Figure 3.6). The swales include an aggregate underdrain due to the suspected high groundwater in the area as evidenced by the iron staining observed around the pavement cracking in areas of the development. The swales discharge to a drop inlet with drainage pipe to convey water to existing catch basins, which discharge to existing drainage outfalls. The Engineer's Opinion of Probable Cost for this alternative (Appendix F) includes:

- 4,000 LF of roadside swales with aggregate underdrain
- Eight (8) drop inlets
- 700 feet of drainage pipe
- Drain and outlet modifications for the existing drain outfalls

Engineer's Opinion of Probable Cost = $495,000

Alternative 2 – Perforated Underdrain System

This alternative concept included installation of 12" perforated underdrain along interior neighborhood streets with drain services to the R.O.W. to serve as viable discharge locations for sump pumps (Figure 3.7). The underdrain system would convey water to existing catch basins and drainage outfalls. Homeowners would be responsible to re-route sump pump discharges to the drain service at the property line. The Engineer's Opinion of Probable Cost for this alternative (Appendix F) includes:

- 3,000 LF of 12" perforated underdrain drainage pipe
- Sixteen (16) drainage services to ROW
- Thirteen (13) catch basins/drainage structures
- Drain and outlet modifications for the existing drain outfalls

  Engineer's Opinion of Probable Cost = $648,000

<u>Alternative 3 – Sump Pump Force Main System</u>

This alternative concept includes installation of an HDPE force main and sump pump force main lateral 'curb stops' at the ROW to which homeowners could connect their sump pump discharges (Figure 3.8). A 6" HDPE force main has been assumed but sizing would need to be confirmed during final design. The force main lateral kits include a check valve and shut off valve similar to a low pressure sewer (LPS) system and homeowners would be responsible for their own sump pump and piping to connect the sump pump to the individual 'curb stop'. The force main would convey water to existing catch basins and drainage outfalls. The Engineer's Opinion of Probable Cost (Appendix F) for this alternative includes:

- 3,000 LF of 6" HDPE force main
- Seventeen (17) drainage service 'curb stops' at the ROW
- Six (6) force main cleanout manholes
- Drain and outlet modifications for existing drain outfalls
- Homeowners would need to purchase specific sump pumps for the system to operate properly and perform work necessary work on private property to connect the sump pump to the ROW 'curb stop'. The cost of this 'private' work has been included. However, these costs may be born by each individual homeowner.

  Engineer's Opinion of Probable Cost = $871,000

4. RECOMMENDED CSO LTCP UPDATES

Continued I/I identification and removal is recommended for long term CSO control. This approach is consistent with the original Phase III I/I study that currently serves as the Town's CSO LTCP. This approach is also consistent with Option 1 from Wright-Pierce's Pumping Station Capacity Analysis Memo dated September 21, 2015 (Appendix D). Infiltration and Inflow mitigation over the past several years appears to have reduced sewer flow peaks and continued I/I reduction efforts may mitigate the need to replace hydraulically limiting pipes in the vicinity of the Spring St. Diversion Structure reported by Wright-Pierce as a result of their hydraulic modeling. The following is a summary of the recommended I/I mitigation efforts to update the Town's CSO LTCP going forward.

4.1 WWTF and Main Pumping Station Improvements

Planned improvements to the Main Pumping Station and force main to achieve a 10 MGD pumping capacity will reduce CSO discharges and should continue to be included as part of the CSO LTCP. Furthermore, planned improvements to the WWTF should also continue to be included as part of the CSO LTCP because the increased pumping rate as a result of the planned Main Pumping Station improvements will need to be incorporated into the WWTF design. In addition, the magnitude of the benefits and cost of the WWTF and Main Pumping Station projects must be considered as part of the CSO LTCP program.

4.2 Private I/I Mitigation Program Including Pilot Areas

Continuation of the ongoing private I/I mitigation program is recommended to be included as part of the updated CSO LTCP. This program has identified previously unknown sources of private inflow that contribute to flow peaks during CSO events. A summary of next steps is as follows:

- Work with private property owners to separate illicit connections identified in UE's Interim Letter Report (Appendix C). These private inflow sources are located in sewer basins that are routed through the Spring St. Diversion Structure and downstream piping which was identified to be hydraulically limiting in Wright-Peirce's Main Pumping Station Basis of Design Reports (Appendix D) and separation of these illicit connections from the sewer should help mitigate hydraulic issues in this area. A few of the identified illicit connections that are very critical to separate from the sewer to improve CSO control include:
    - The Phillips Exeter Academy (PEA) Boathouse basement pump which appears to have the potential to discharge Squamscott River floodwaters to the Town's sewer.
    - Roof drains connected to the sewer which contribute to flow spikes during CSO events.
- Work with PEA to continue separation of illicit connections identified in UE's Final Report of 2014 Engineering Services (Appendix B). Many of these private inflow sources are located in sewer basins that are routed through the Spring St. Diversion Structure and

downstream piping which was identified to be hydraulically limiting in Wright-Peirce's Main Pumping Station Basis of Design Reports (Appendix D) and separation of these illicit connections from the sewer should help mitigate hydraulic issues in this area.

- Work with PEA and Unitil to for a permanent solution to separate the cross country drain and repair the sewer identified in UE's Final Report of 2014 Engineering Services (Appendix B). It is understood that the existing patch on the sewer may deteriorate over time and allow the ~7 acres of drainage that contributes flow to this area (and infiltration) to re-enter the sewer.
- Work with SAU 16 to re-route the two (2) sump pumps that were identified to discharge to the sewer as part of 2016 field investigations (Figure 3.4). These private inflow sources are located in sewer basins that are routed through the Spring St. Diversion Structure and downstream piping which was identified to be hydraulically limiting in Wright-Peirce's Main Pumping Station Basis of Design Reports (Appendix D) and separation of these illicit connections from the sewer should help mitigate hydraulic issues in this area.
- Continue the system-wide private I/I public education and I/I mitigation program to assist property owners to re-direct illicit connections away from the sanitary sewer (Figure 3.5). This work should include investigation of the illicit connections in the Jady Hill Infrastructure area that were reported by homeowners to remain connected to the sewer.
- Consider alternatives to assist homeowners in the West Side Drive Pilot Area to mitigate illicit sump pumps connected to the sewer. Alternate #1 – Roadside Swales (Figure 3.6) is the preferred alternative because it has the lowest capital cost and includes overall reduction of existing impervious areas (by converting portions of existing paved areas to swales) which should help reduce non-point nitrogen sources in Town and improve the road structure. However, it is recommended that the Town have public workshops to present different alternatives, receive public participation/feedback, and advance the concepts to a 30% design.

4.3 Gravity Sewer Collection System Projects

It is recommended that the CSO control program be modified due to the WWTF and Main Pumping Station projects and the success of I/I reduction. Originally, sewer rehabilitation/replacement projects with private I/I separation was identified as the most cost effective approach for long-term CSO mitigation under the original CSO LTCP. The original CSO LTCP included a budget of $19,000,000 to rehabilitate/replace the 22 project areas identified in this report with an additional $7,000,000 to separate other private services that may be outside the project areas for a total of $26,000,000. It is recommended that the Town continue with this approach because it is consistent with long-term asset management of the collection system and private I/I mitigation efforts appear to have been successful to date. However, the planned +$50,000,000 WWTF and main pumping station improvements over the next several years will likely render sewer rehab/replacement projects unnecessary in the near term for CSO control. It is recommended that the Town defer the majority of the comprehensive $26M program until pilot area work is completed and focus on the private I/I mitigation program in the near term until the Main Pumping Station project is complete and additional reliable CSO flow information becomes available to evaluate the benefits of the planned Main Pumping Station improvements.

4.4 Suggested CSO LTCP Program Implementation Schedule

Suggested updates to the Town's CSO LTCP Program Implementation Schedule are provided [Table 14-1(Updated)]. This approach focuses expenditures on planned WWTF and Main Pumping Station improvements over the next few years. The planned increased capacity of the Main Pumping Station described in Wright-Pierce's Design Report (Appendix D) will help reduce CSO discharges after improvements are completed.

The suggested LTCP updates over the next few years focuses I/I reduction efforts on eliminating private sources of I/I from sewer through public education and outreach. It is recommended that the success of the LTCP be re-evaluated again in several years after Main Pumping Station improvements and continued implementation of private I/I mitigation efforts.

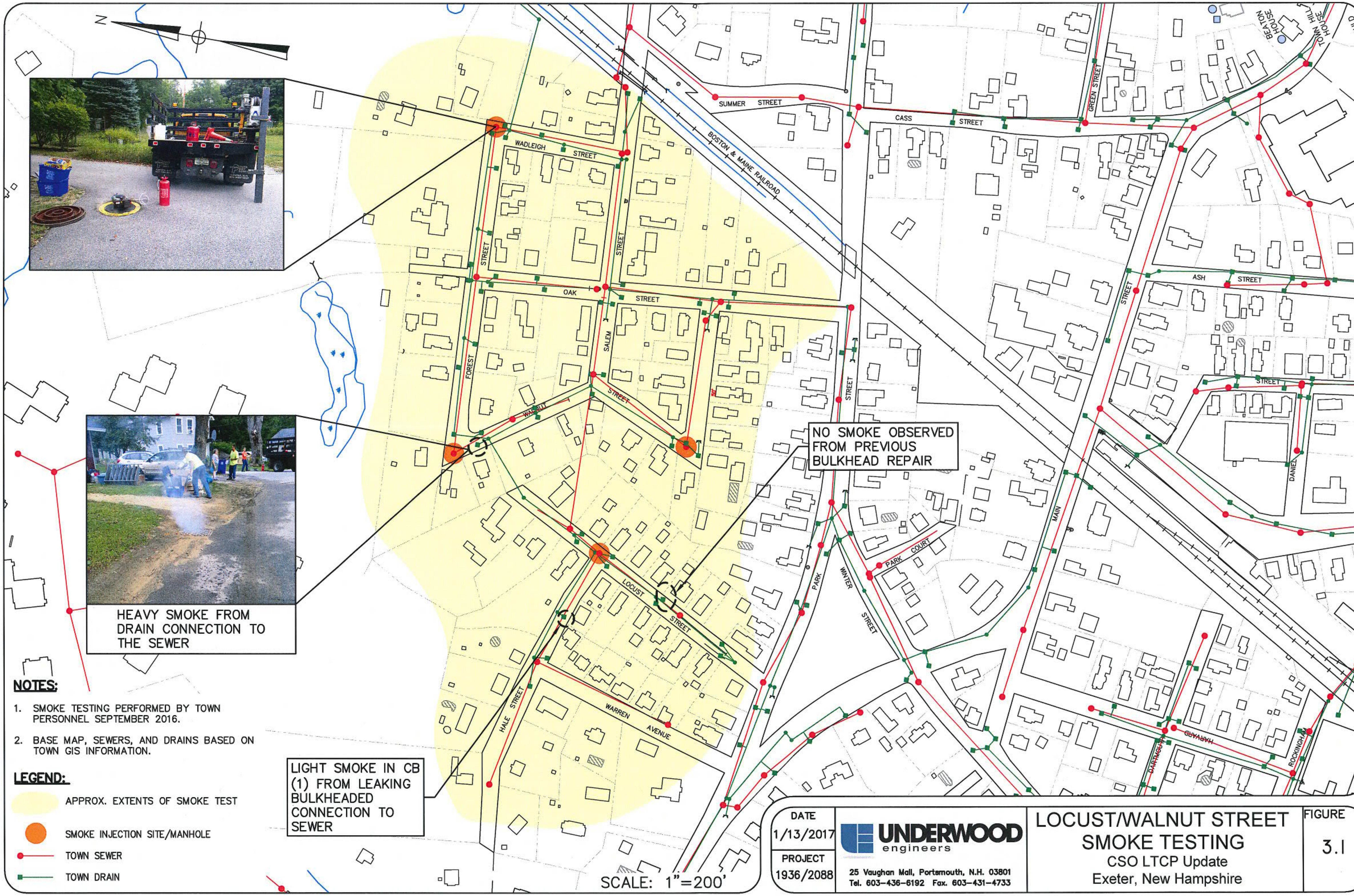
Table 14-1 (UPDATE)
Suggested CSO LTCP Sewer Implementation Schedule and Cash Flow - 3-Year Plan
January 2017

		Project Year																	
		ACTUAL					RECOMMENDED												
Sewer Improvement Project/Program	***Total Cost [3,4,5]***	***2013***	***2014***	***2015***	***2016***	*CSO LTCP Confirmation*	***2017***	***2018***	***2019***	*CSO LTCP Confirmation*	***2020***	***2021***	***2022***	***2023***	***2024***	***2025***	***2026***	***2027***
WWTF Improvements [2]																		
Facility Plan, WWTF, and Main Pumping Station Design	$375,000		$258,400	$773,000	$2,320,000		$540,000											
WWTF Construction	$43,760,000						$43,760,000											
Main Pumping Station and Force Main Construction	$6,240,000							$6,240,000										
Non-point Nitrogen Evaluations and Controls [9]	TBD				$72,000		$90,000	TBD	TBD		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Phase II On-Line (5 mg/L)- If Necessary, TBD [9]	TBD																	
Subtotal Additional I/I Projects AO Driven	***$50,375,000***	***$0***	***$258,400***	***$773,000***	***$2,392,000***		***$44,390,000***	***$6,240,000***	***$0***									
Long Term CSO Control Plan																		
Submit Report and/or update tech memo		*					*				*							
Jady Hill Project [1,6]																		
Construction	$3,436,000	$3,436,000																
Evaluation/Assessment	$20,000		$20,000															
Additional Evaluations/Private Inflow Mitigation [10]			$41,000	$73,400	$29,300		$20,000	$20,000	$40,000		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Manhole Rehabilitation		$30,000	$59,908	$57,893	$42,000		$60,000											
Downing Ct./Westside Drive Private Inflow Pilot Areas																		
Design	$80,000							TBD										
Construction/Implementation [1,8]	$1,000,000								TBD									
Evaluation/Assessment	$40,000																	
Subtotal Additional I/I Projects LTCP Driven		***$3,466,000***	***$120,908***	***$131,293***	***$71,300***		***$80,000***	***$20,000***	***$40,000***									
Wastewater Collection CIP [7]																		
Portsmouth Avenue Sewer	$900,448	$900,448																
Lincoln Street Sewer	$865,000						$75,000	$790,000										
Sewer Line Rehabilitation/Replacement Program	TBD						TBD	TBD	TBD		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Subtotal Existing CIP Sewer Projects		***$900,448***	***$0***	***$0***	***$0***													
ANNUAL TOTAL LTCP AND EXISTING SEWER CIP (WWTF COSTS NOT INCLUDED)		***$4,366,448***	***$379,308***	***$904,293***	***$2,463,300***		***$TBD***	***$TBD***	***$TBD***		***$TBD***	***$TBD***	***$TBD***	***$TBD***	***$TBD***	***$TBD***	***$TBD***	***$TBD***
		Actual CSO LTCP Costs $3,789,501					***Planned CSO LTCP Budgets $6,380,000***				***8-YEAR PHASE II LTCP Costs TBD if needed***							

Notes:

1 Pilot areas should be done initially to further refine private I/I approach.
2 WWTF expenditures and budgets provided by Town.
3 All recommended expenditures and projects indicated above may require Town authorization through voting.
4 Reassessment of affordibility and approach of the program should be performed during critical milestones such as pilot area implementation, WWTF upgrade, and main pumping station improvements.
5 Budgetary project costs are present day and have not been escalated for the time value of money.
6 Jady Hill Project costs includes sewer related expenses only.
7 Wastewater collection system CIP based on actual sewer expeditures and construction phase engineering for the Portsmouth Ave. sewer and estimates for the Lincoln St. Sewer.
8 Assumes sump pump mitigation project in Westside Drive Pilot Area and sewer rehabilitaiton program in Downing Court Pilot Area.
9 Schedule is based on US Environmental Protection Agency (EPS) draft Administrative Compliance Order (ACO).
10 Actual expenditures based on UE engineering contracts for private I/I identification, public education and mitigation program.

Figures



NOTES:

1. SMOKE TESTING PERFORMED BY TOWN PERSONNEL SEPTEMBER 2016.
2. BASE MAP, SEWERS, AND DRAINS BASED ON TOWN GIS INFORMATION.

LEGEND:

- APPROX. EXTENTS OF SMOKE TEST
- SMOKE INJECTION SITE/MANHOLE
- TOWN SEWER
- TOWN DRAIN

DATE	UNDERWOOD engineers	LOCUST/WALNUT STREET SMOKE TESTING	FIGURE
1/13/2017	25 Vaughan Mall, Portsmouth, N.H. 03801	CSO LTCP Update	3.1
PROJECT 1936/2088	Tel. 603-436-6192 Fax. 603-431-4733	Exeter, New Hampshire	

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SCALE: 1"=200'

NOTES:

1. SMOKE TESTING PERFORMED BY TOWN PERSONNEL SEPTEMBER 2016.
2. BASE MAP, SEWERS, AND DRAINS BASED ON TOWN GIS INFORMATION.

LEGEND:

- APPROX. EXTENTS OF SMOKE TEST
- SMOKE INJECTION SITE/MANHOLE
- TOWN SEWER
- TOWN DRAIN

DATE	UNDERWOOD engineers	WASHINGTON STREET SMOKE TESTING	FIGURE
1/13/2017	25 Vaughan Mall, Portsmouth, N.H. 03801	CSO LTCP Update	3.2
PROJECT 1936/2088	Tel. 603-436-6192 Fax. 603-431-4733	Exeter, New Hampshire	

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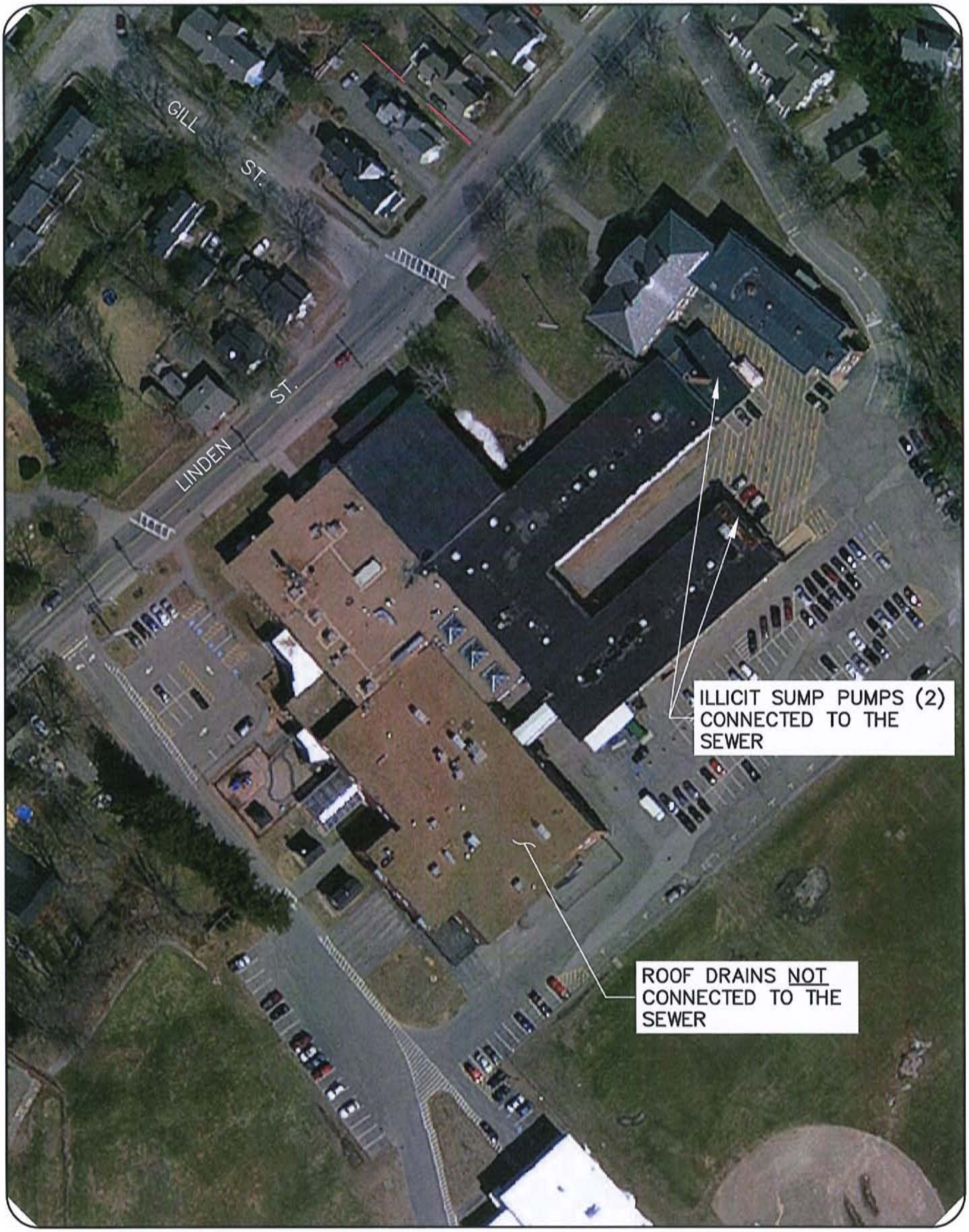
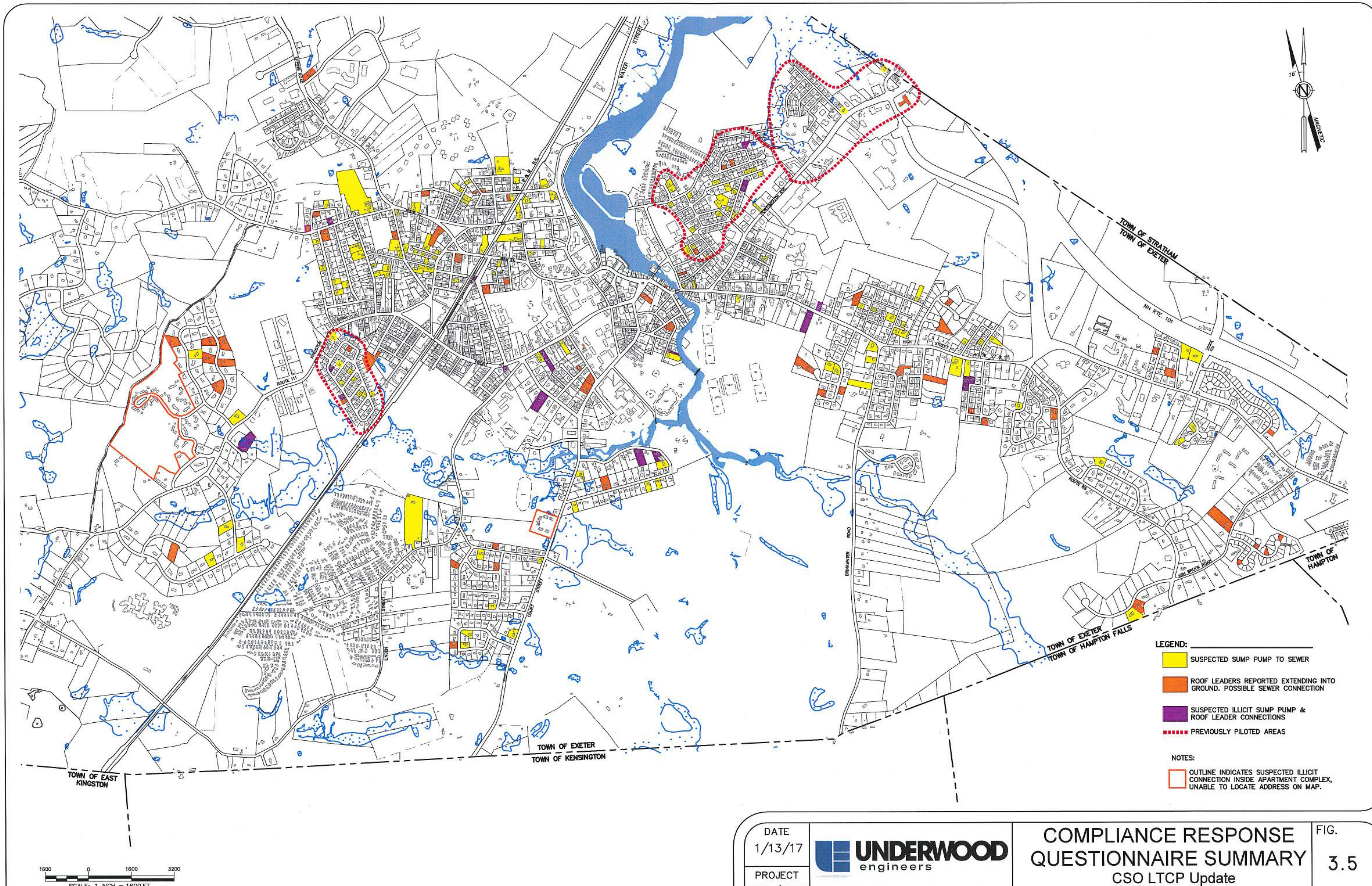


H:\Real Numbers\Exeter\2088 - 2016 CSO LTCP\Drawings\2088 figures 3.4.dwg, NEW FIG, 1/11/2017 2:41:54 PM, rmg

DATE		FORMER HIGH SCHOOL	FIG.
1/13/2017	UNDERWOOD engineers	ILLICIT CONNECTION INVESTIGATION	3.4
PROJECT		CSO LTCP Update	
1936/2088	25 Vaughan Mall, Portsmouth, N.H. 03801 Tel. 603-436-6192 Fax. 603-431-4733	Exeter, New Hampshire	



DATE	UNDERWOOD engineers	COMPLIANCE RESPONSE QUESTIONNAIRE SUMMARY	FIG.
1/13/17	25 Vaughan Mall, Portsmouth, N.H. 03801	CSO LTCP Update	3.5
PROJECT 1936/2088	Tel. 603-436-6192 Fax. 603-431-4733	Exeter, New Hampshire	

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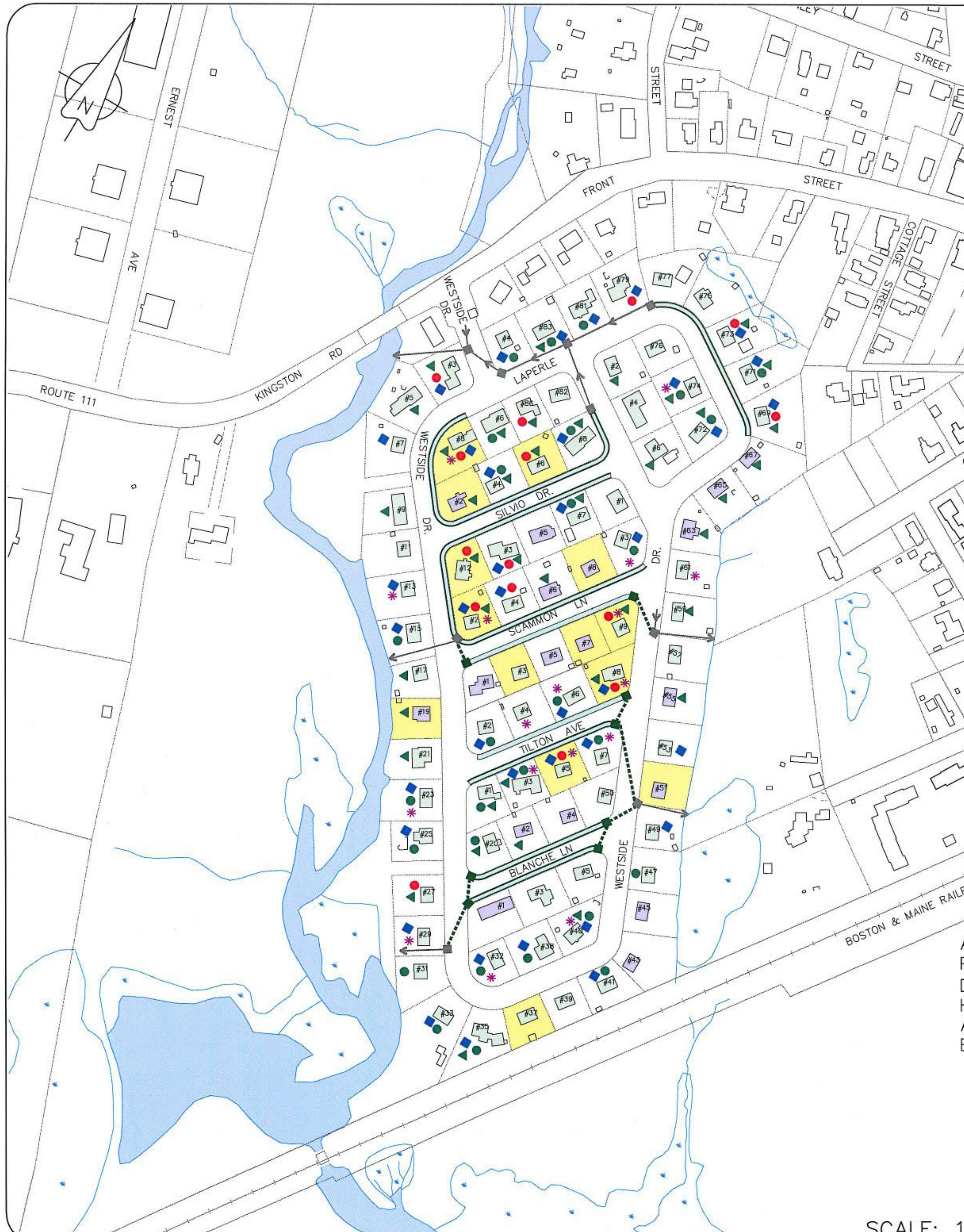

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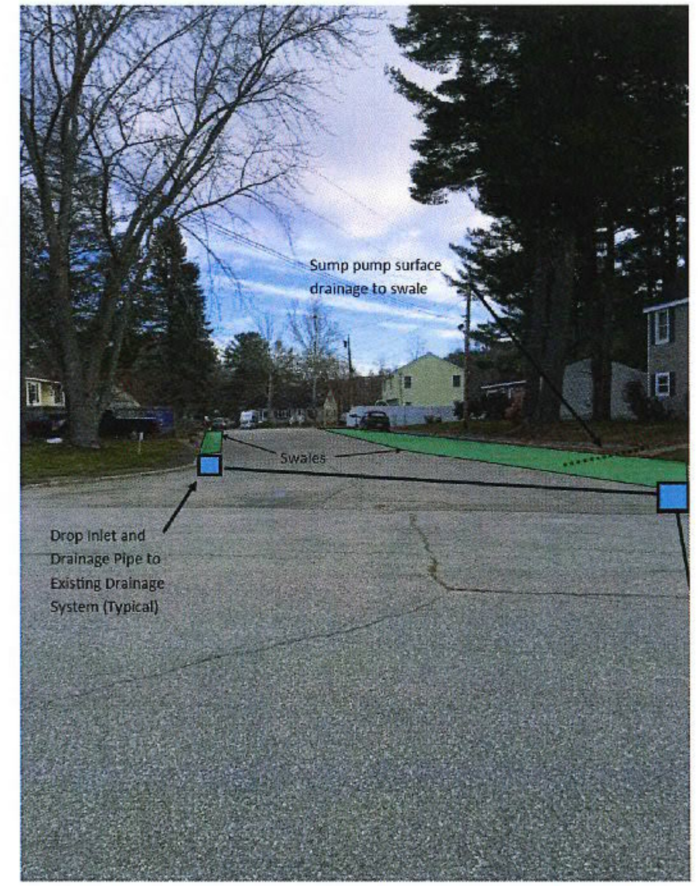
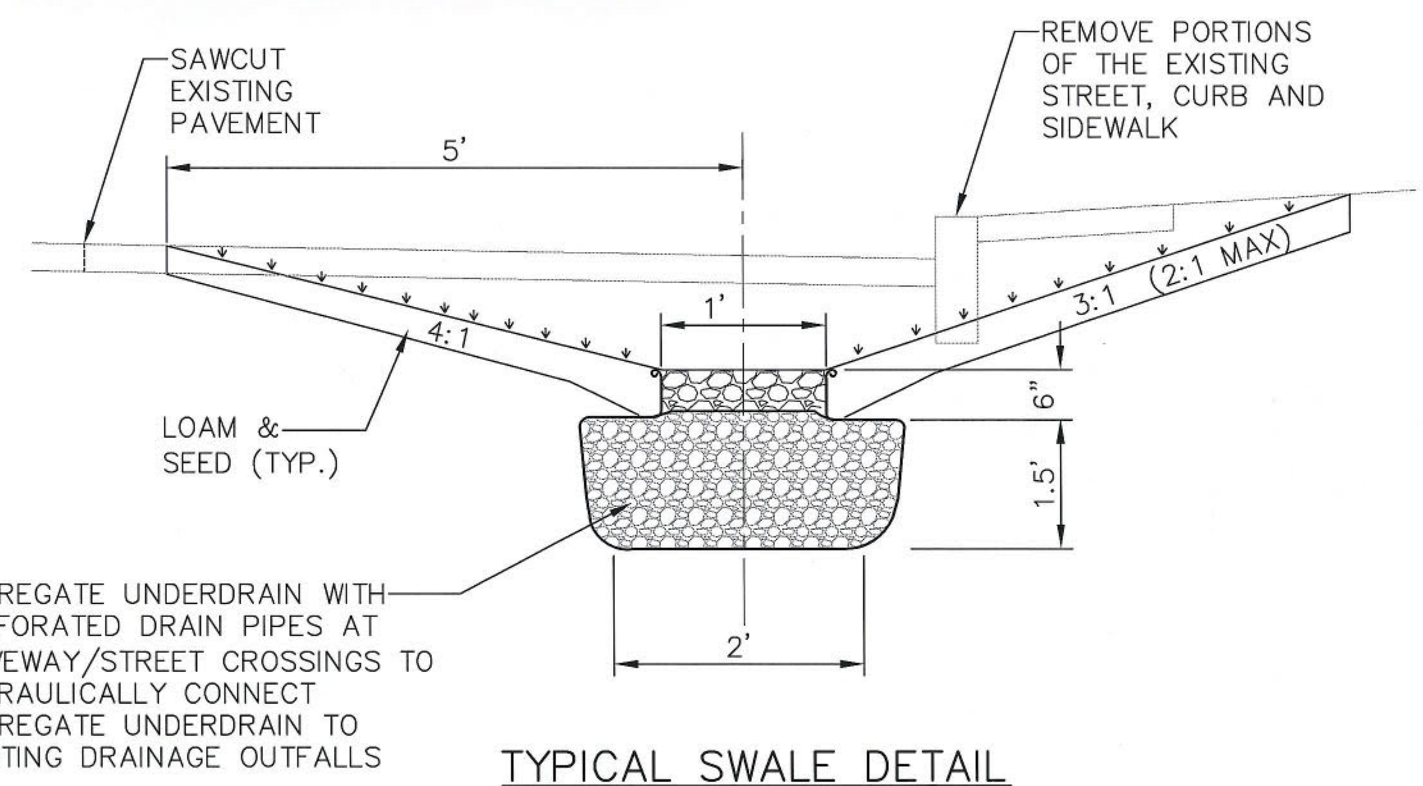


LEGEND:

- HOUSE SURVEY COMPLETE*
- DENIED ACCESS*
- SUMP PUMP DISCHARGE SEWER OR UNKNOWN*
- SUMP PUMP DISCHARGE SURFACE*
- EXTERIOR DRAIN TO SEWER*
- EXTERIOR DRAIN TO SURFACE/STORM DRAIN*
- BASEMENT FLOODING*
- BASEMENT DRAINS*
- REPORTED ILLICIT CORRECTION (2015 COMPLIANCE RESPONSE)
- EXISTING CATCH BASIN AND DRAIN PIPE (APPROX.)
- CONCEPTUAL PROPOSED SWALE
- CONCEPTUAL PROPOSED DROP INLET AND UNDERGROUND DRAINAGE PIPE

* 2010 HOUSE INSPECTION



TYPICAL SWALE DETAIL

NOT TO SCALE

DATE	UNDERWOOD engineers	Alt. #1 - Roadside Swales Westside Drive Pilot Area	FIGURE
1/13/2017	25 Vaughan Mall, Portsmouth, N.H. 03801 Tel. 603-436-6192 Fax. 603-431-4733	CSO LTCP Update Exeter, New Hampshire	3.6
PROJECT 1936/2088			

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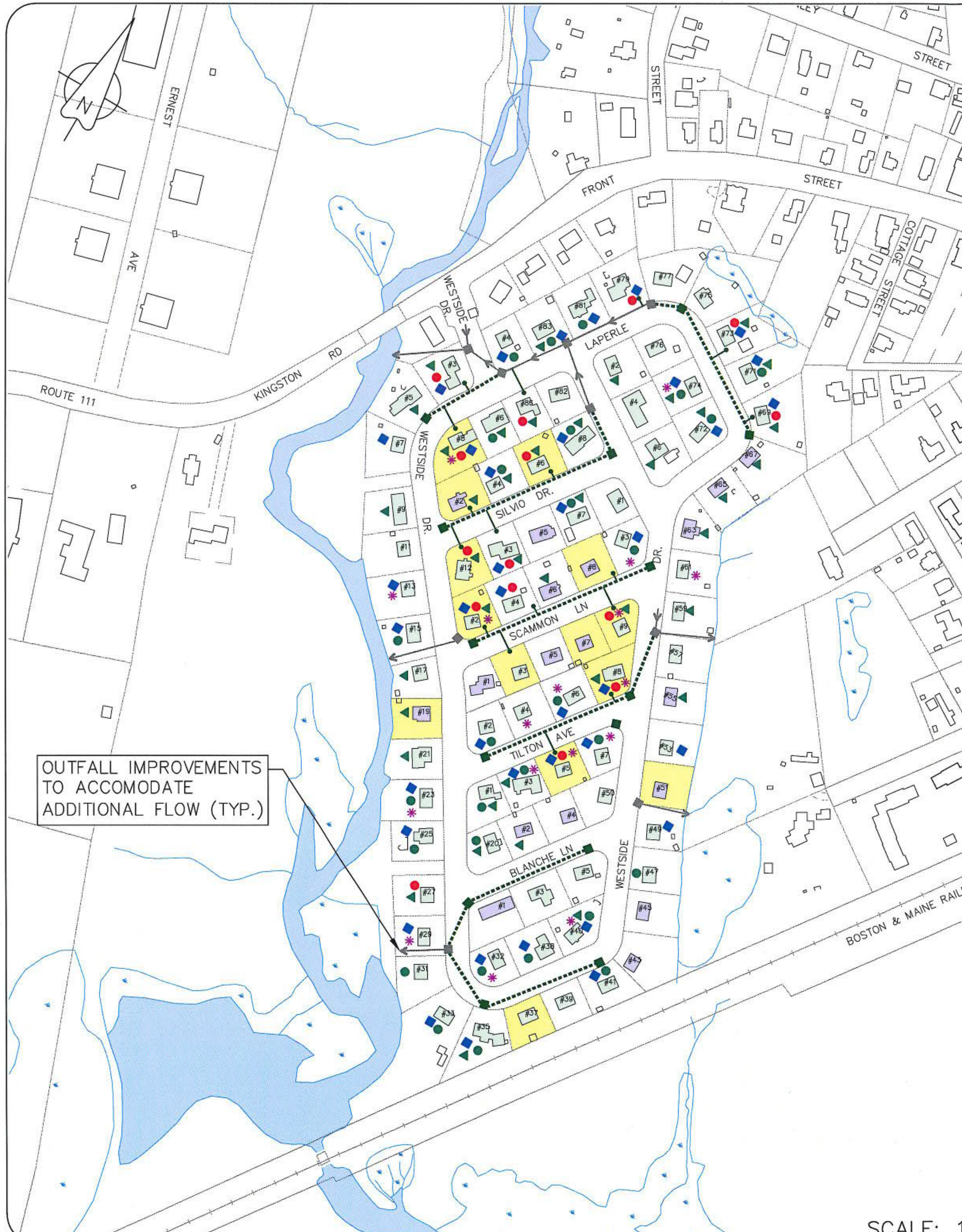
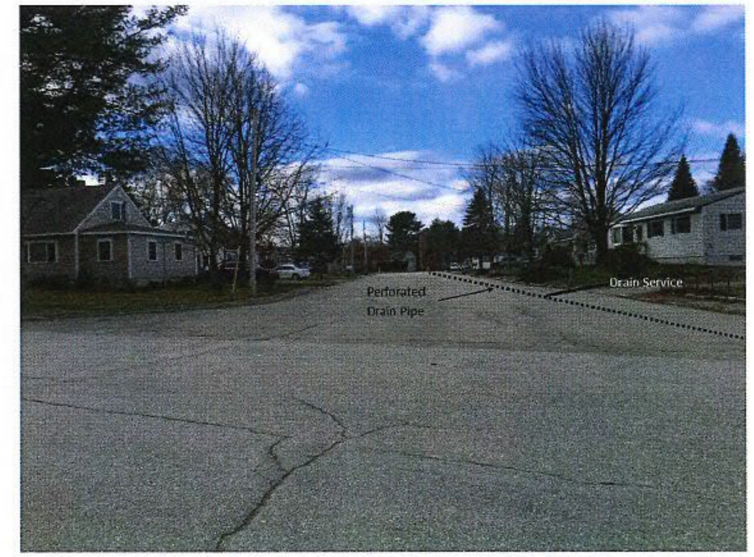
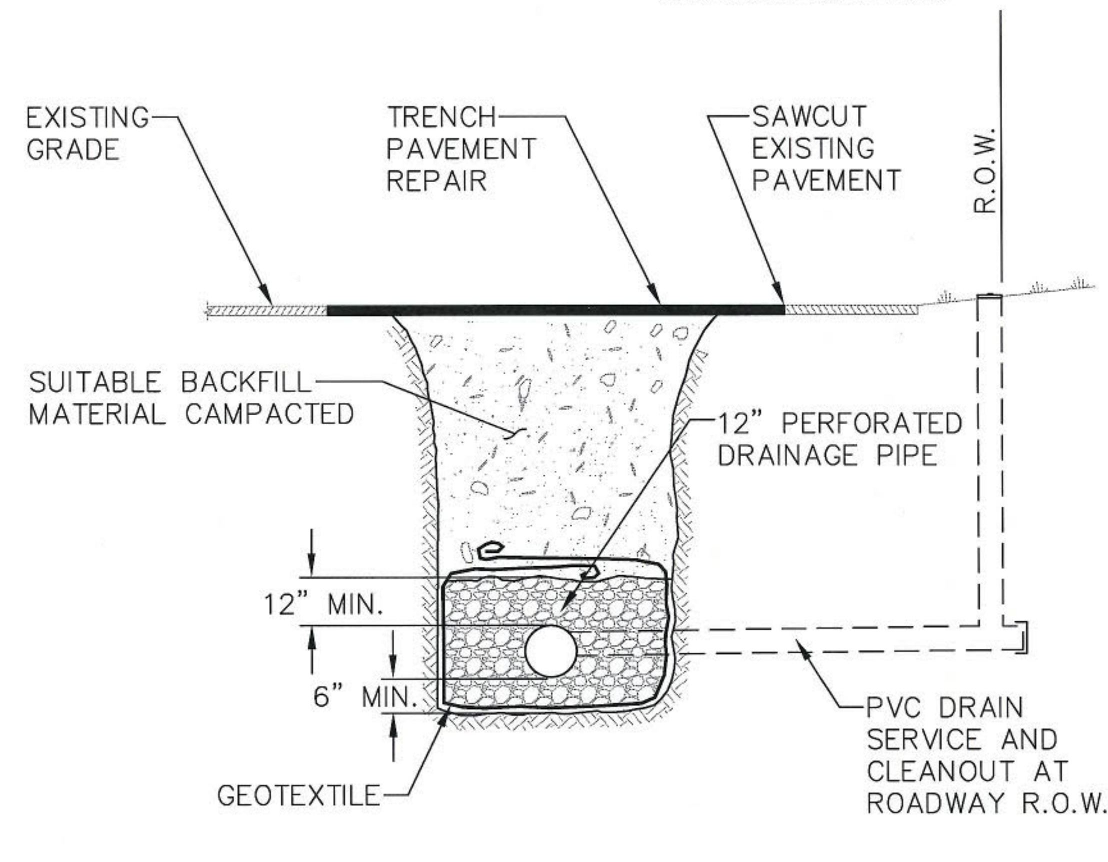




LEGEND:

- HOUSE SURVEY COMPLETE*
- DENIED ACCESS*
- SUMP PUMP DISCHARGE SEWER OR UNKNOWN*
- SUMP PUMP DISCHARGE SURFACE*
- EXTERIOR DRAIN TO SEWER*
- EXTERIOR DRAIN TO SURFACE/STORM DRAIN*
- BASEMENT FLOODING*
- BASEMENT DRAINS*
- REPORTED ILLICIT CORRECTION (2015 COMPLIANCE RESPONSE)
- EXISTING CATCH BASIN AND DRAIN PIPE (APPROX.)
- PROPOSED 12" PERFORATED UNDERDRAIN PIPE AND DRAIN SERVICE

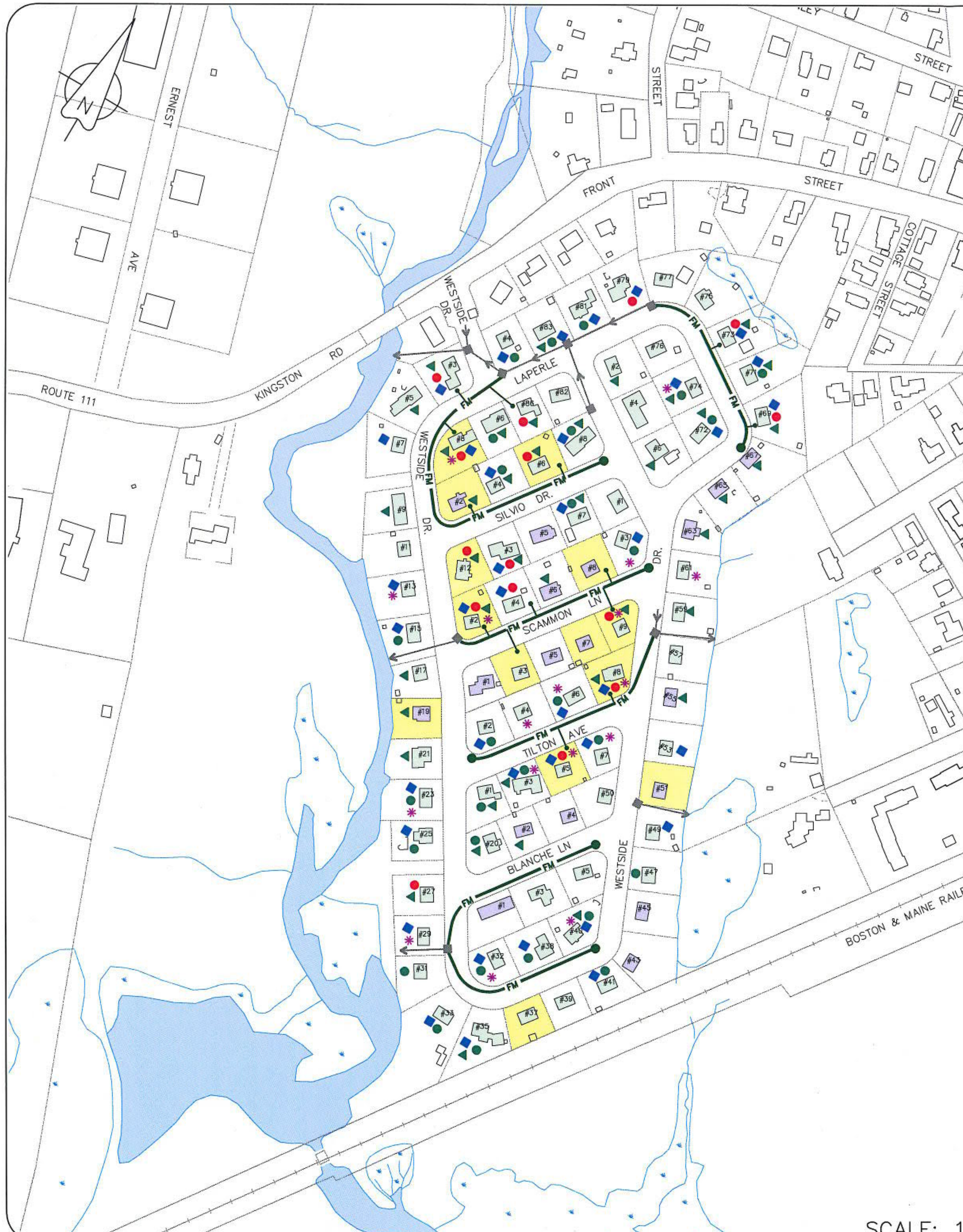
* 2010 HOUSE INSPECTION



TRENCH SECTION – STORM DRAIN

NOT TO SCALE

DATE	UNDERWOOD engineers	Alt. #2 - Perforated Underdrain Westside Drive Pilot Area	FIGURE
1/13/2017	25 Vaughan Mall, Portsmouth, N.H. 03801 Tel. 603-436-6192 Fax. 603-431-4733	CSO LTCP Update Exeter, New Hampshire	3.7
PROJECT 1936/2088			



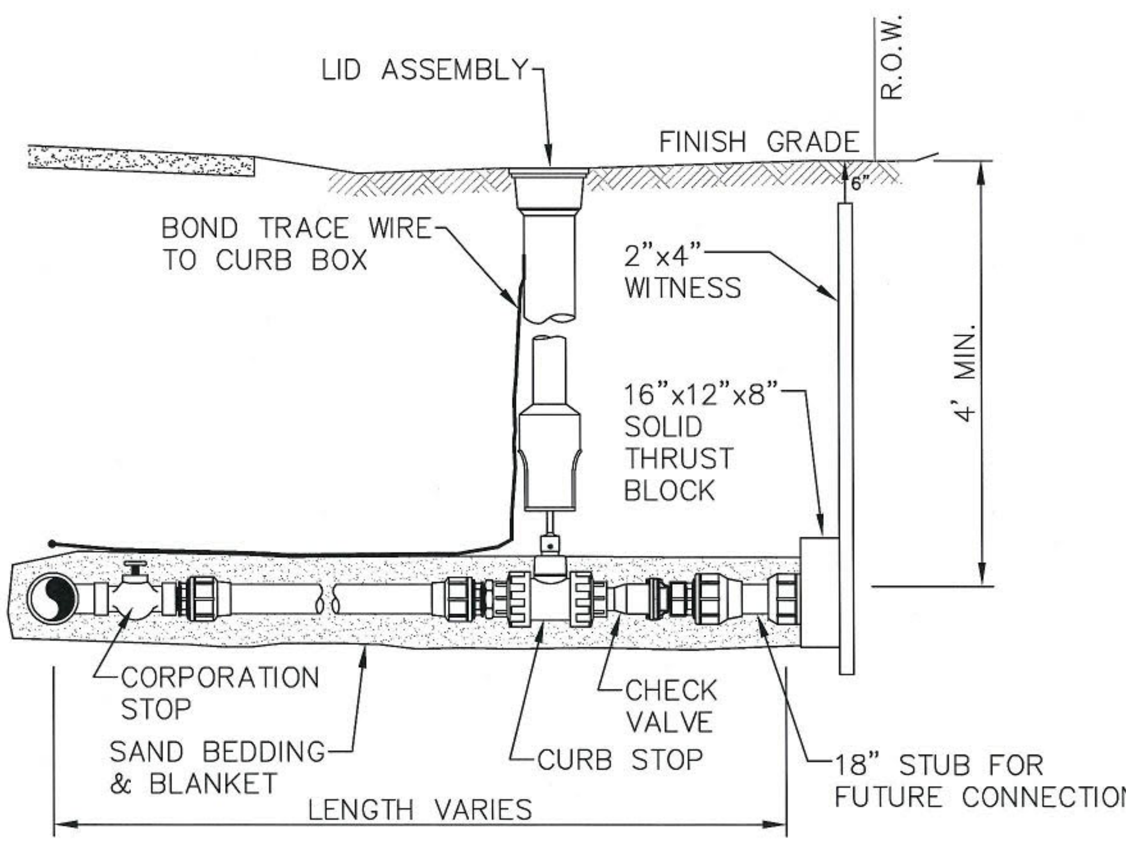
NOTE:

HOMEOWNERS WOULD BE RESPONSIBLE FOR INSTALLATION OF LOW PRESSURE SYSTEM (LPS) SUMP PUMP, SUMP PUMP DISCHARGE PIPING ON PRIVATE PROPERTY, AND CONNECTION OF THE SUMP PUMP DISCHARGE PIPING TO THE SERVICE LATERAL STUB AT THE R.O.W.

LEGEND:

- HOUSE SURVEY COMPLETE*
- DENIED ACCESS*
- SUMP PUMP DISCHARGE SEWER OR UNKNOWN*
- SUMP PUMP DISCHARGE SURFACE*
- EXTERIOR DRAIN TO SEWER*
- EXTERIOR DRAIN TO SURFACE/STORM DRAIN*
- BASEMENT FLOODING*
- BASEMENT DRAINS*
- REPORTED ILLICIT CORRECTION (2015 COMPLIANCE RESPONSE)
- EXISTING CATCH BASIN AND DRAIN PIPE (APPROX.)
- PROPOSED SUMP PUMP FORCE MAIN AND DRAIN SERVICE CURB STOP
- PROPOSED CLEANOUT MANHOLE

* 2010 HOUSE INSPECTION



TYPICAL SERVICE CONNECTION

NOT TO SCALE

DATE	UNDERWOOD engineers	Alt. #3 - Sump Pump F.M. Westside Drive Pilot Area	FIGURE
1/13/2017	25 Vaughan Mall, Portsmouth, N.H. 03801	CSO LTCP Update	3.8
PROJECT	Tel. 603-436-6192 Fax. 603-431-4733	Exeter, New Hampshire	
1936/2088			

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Appendix A

Excerpts from: *Phase III Infiltration and Inflow Evaluation,* Underwood Engineers, January 2013

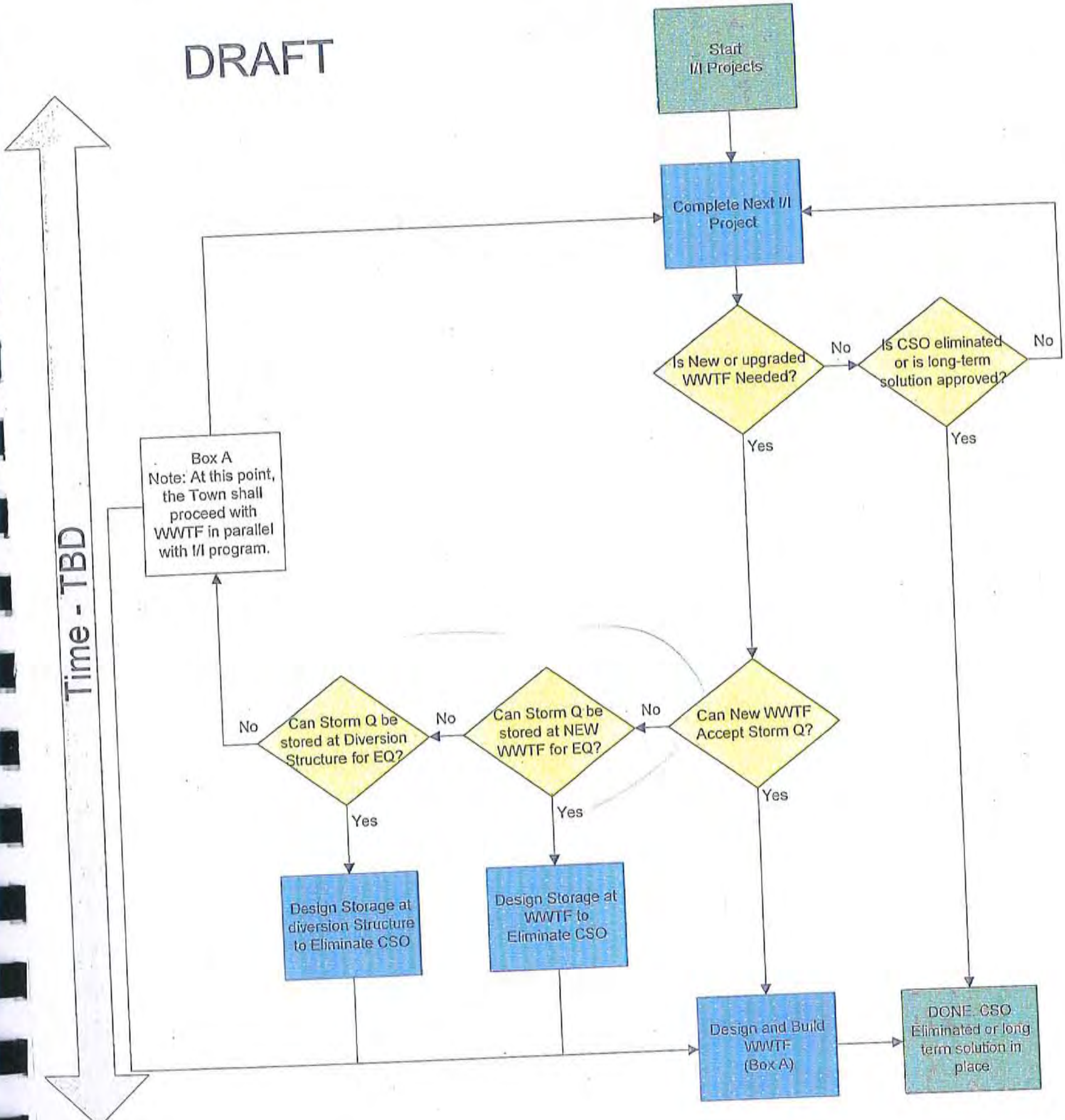
FIGURE 14-1

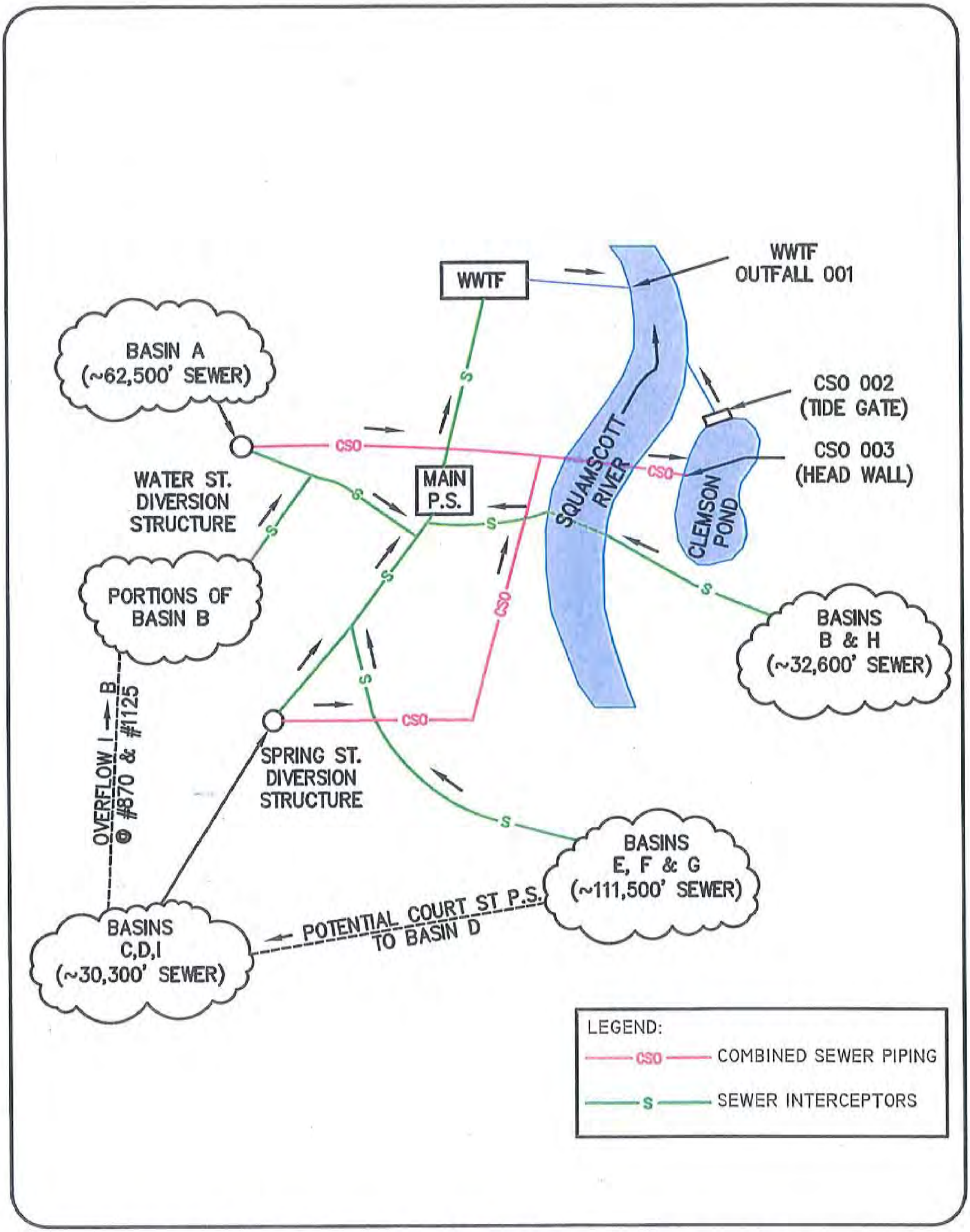
Exeter I/I and CSO

Decision Matrix

February 9, 2010

DRAFT





Exeter Sewer System Schematic

I&I Evaluation Report
Exeter, New Hampshire

UNDERWOOD engineers

25 Vaughan Mall, Portsmouth, N.H. 03801
Tel. 603-436-6192 Fax. 603-431-4733

DATE 7/30/10

FIGURE 7-1

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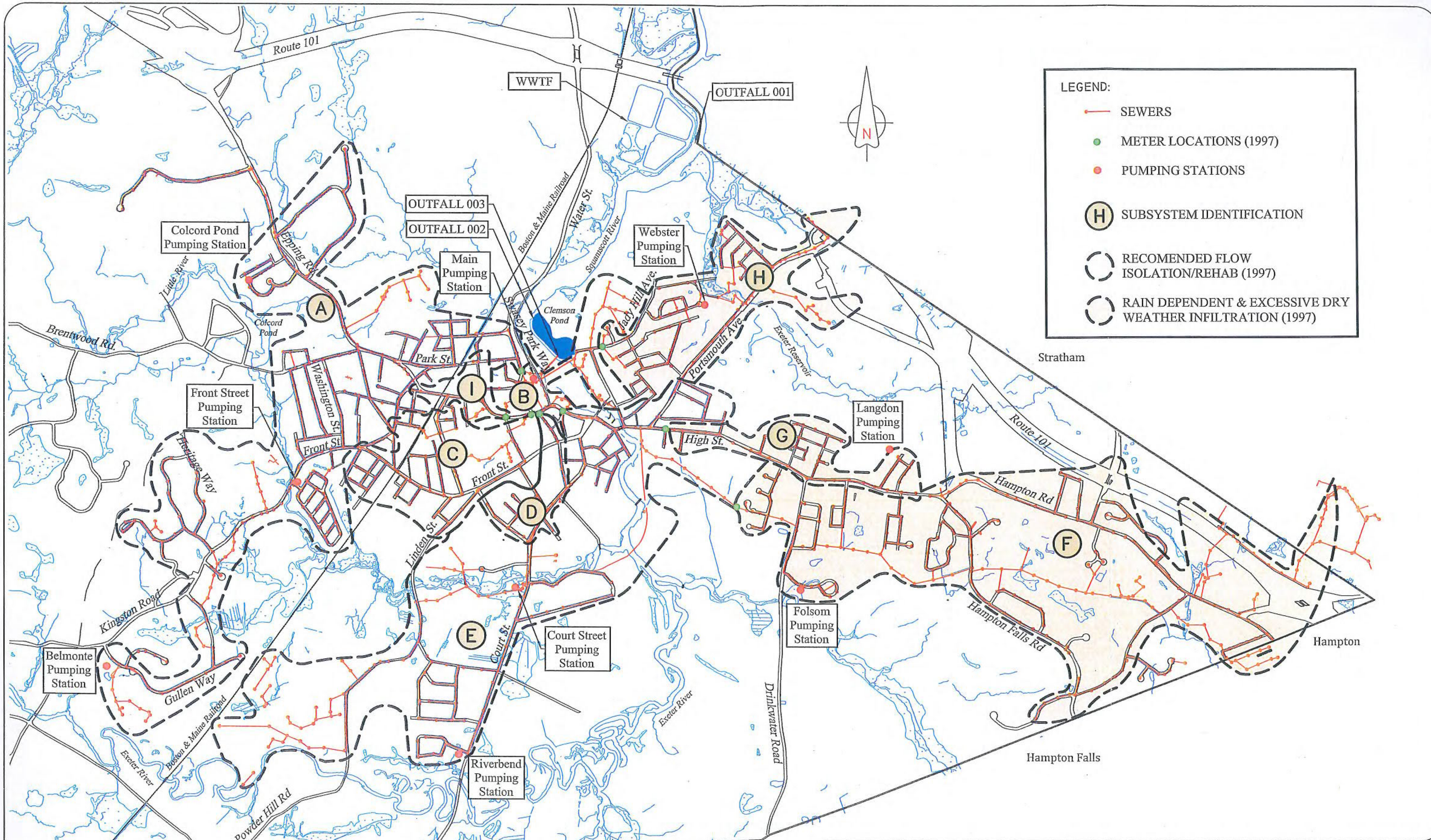

DATE 7/30/10

PROJECT 1542

UNDERWOOD engineers
25 Vaughan Mall, Portsmouth, N.H. 03801
Tel. 603-436-6192 Fax. 603-431-4733

Collection System & Sub-Basin Map
I&I Evaluation Report
Exeter, New Hampshire

FIGURE 2-2

Table 9-7
Sewer Main Projects Ranking and Cost Effective Analysis
OPTION 3 - PUBLIC AND PRIVATE SEWER AND DRAIN WORK

Project Area	Streets	Total Project Cost Budget	$/gal I/I Removed (70% reduction)	Estimated I/I Removed (gpd)	Estimated Peaks Removed (gpd)
1	Hayes Park (Private)				
10	Elm/Spring Street (PEA)	$12,250	$0	46,368	278,208
11	Tan Lane	$33,688	$8	4,032	24,192
19	Ashbrook R.O.W.	$600,250	$25	23,940	143,640
7	Holly Court	$200,594	$33	6,048	36,288
16	Westside Drive	$169,969	$37	4,536	27,216
8	Ridgewood Terrace	$479,281	$38	12,600	75,600
21	Ashbrook Road	$455,394	$56	8,064	48,384
3	Hampton Road	$142,406	$57	2,520	15,120
4	Bonnie Drive	$3,099,250	$67	46,368	1,112,832
6	High Street	$2,268,853	$69	32,760	196,560
12	Pine Street	$1,107,094	$78	14,112	84,672
14	Rockingham Street	$169,969	$84	2,016	12,096
18	Hampton Road	$683,244	$85	8,064	48,384
22	Hampton Falls Road	$680,488	$87	7,862	47,174
15	Front Street	$2,877,372	$93	30,996	185,976
2	Allen Street	$535,938	$106	5,040	30,240
17	Hampton Road	$1,241,997	$108	11,491	68,947
5	Towle Avenue	$773,128	$110	7,006	42,034
13	Main Street	$2,568,978	$127	20,160	120,960
20	Roberts Drive	$400,269	$159	2,520	15,120
9	Pleasant View Drive	$366,428	$182	2,016	12,096
	Subtotal I/I Area Project Cost	$18,866,838		298,519	2,625,739
	Additional Private Service Separation	$7,200,000			
	TOTAL	**$26,066,838**			

Within Pilot Area

Notes: A peaking factor of 6 was based on the April-June 2009 continuous flow monitoring data for the Westside Drive and Allen Street pilot areas. The 6 peaking factor was applied to all projects except Bonnie Drive. A peaking factor of 24 was used for Bonnie Drive based on April-June 2009 continuous flow monitoring information for the Jady Hill pilot area. No CSO events occurred during the April-June 2009 continuous flow monitoring, so peaking factors may be higher.

Additional private sewer separation includes estimated costs of $12,250 for 585 sewer and drain services which represents 22% of all the sewer services in Town not included in the 22 project areas listed above. (($5000+$3000)25% cont and mob)22.5% engineering = $12,250

Project costs generally include lining and point repairs if feasible. Project costs will be greater if the Town replaces sewers in lieu of lining and point repairs.

Table 14-1
Suggested CSO LTCP Sewer Implementation Schedule and Cash Flow - 5-Year Plan

Sewer Improvement Project/Program	Total Budgetary Cost [3,4,5]	2013	2014	2015		2016	2017		2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
		Project Year																
WWTF Improvements [2]																		
Facility Plan	$375,000	$375,000																
Design	TBD		TBD	TBD														
Construction	TBD					TBD	TBD											
Phase I On-Line (8 mg/L) [9]	TBD								*									
Non-point Nitrogen Evaluations and Controls [9]	TBD	TBD	TBD	TBD		TBD	TBD		TBD	TBD	TBD	TBD	TBD	TBD				
Phase II On-Line (3 mg/L)- If Necessary, TBD [9]	TBD																	
Long Term CSO Control Plan																		
Submit Report		*			*Confirmation*			*Confirmation*										
Jady Hill Project [1,6]																		
Construction	$3,436,000	$3,436,000																
Evaluation/Assessment	$20,000		$20,000															
Additional Evaluations/Monitoring/TV/Implementation	$515,000		$265,000			$250,000												
Manhole Rehabilitation			$60,000	$40,000		$11,000	$11,000											
Downing Ct./Westside Drive [1,8]																		
Design	$40,000			$40,000														
Construction/Implementation	$500,000			$500,000														
Evaluation/Assessment	$40,000					$40,000												
Subtotal Additional I/I Projects LTCP Driven		***$3,436,000***	***$345,000***	***$580,000***		***$301,000***	***$11,000***											
Sewer Collection CIP [7]																		
Portsmouth Avenue Sewer	$940,000	$940,000																
Lincoln Street Sewer	$196,000		$196,000															
Sewer Line Replacement	$1,700,000			$850,000			$850,000											
Subtotal Existing CIP Sewer Projects		***$940,000***	***$196,000***	***$850,000***		***$0***	***$850,000***											
ANNUAL TOTAL LTCP AND EXISTING SEWER CIP (WWTF COSTS NOT INCLUDED)		***$4,376,000***	***$541,000***	***$1,430,000***		***$301,000***	***$861,000***		***$TBD***	***$TBD***	***$TBD***	***$TBD***	***$TBD***	***$TBD***	***$TBD***	***$TBD***	***$TBD***	***$TBD***
		5-YEAR LTCP COMMITMENT (I/I) $3.34M Jady Hill + $1.24M Additional							***10-YEAR PHASE II LTCP Costs TBD if needed***									

Notes:
1. Pilot areas should be done initially to further refine private I/I approach.
2. A new WWTF may be needed due to revised permit limits. The schedule for this new facility is not known at this time. The above schedule should be reviewed/adjusted when the schedule and cost of the new WWTF is known.
3. All expenditures and projects indicated above are pending Town authorization through voting.
4. Reassessment of affordibility and approach of the program should be performed at a minimum of every 2-years and during critical milestones such as pilot area implementation, WWTF upgrade, and main pumping station improvements.
5. Budgetary project costs are present day and have not been escalated for the time value of money.
6. Jady Hill Project costs includes sewer related expenses only.
7. Sewer Collection CIP is a draft plan only.
8. Assumes enforcement only in Westside Drive.
9. Schedule is based on US Environmental Protection Agency (EPS) draft Administrative Compliance Order (ACO).

From *Phase III Infiltration and Inflow Evaluation*, Underwood Engineers, Inc., January 14, 2013

Appendix B

Excerpts from: *Final Report - 2014 Engineering Services, CSO LTCP Implementation,* Underwood Engineers, January 2015

CSM Copy

UNDERWOOD engineers

1815

January 28, 2015

Mr. Michael Jeffers
Water & Sewer Managing Engineer
10 Newfields Road
Exeter, NH 03833

Re: ***Final Report – 2014 Engineering Services***
Combined Sewer Overflow (CSO) Long Term Control Plan (LTCP) Implementation
Exeter, New Hampshire

Dear Mr. Jeffers:

The following letter report is the deliverable required by Tasks 1 through 5 of our Scope of Services dated December 23, 2013 and July 28, 2014 and is consistent with the CSO LTCP Table 14-1 *Suggested CSO LTCP Sewer Implementation Schedule and Cash Flow – 5-Year Plan* (Appendix E). The purpose of this letter is to provide a brief letter report summarizing work performed and key findings and recommendations as a result of this work.

Background

The Town of Exeter owns and operates a municipal wastewater collection system and wastewater treatment facility (WWTF). Wastewater from the entire wastewater collection area (including portions of Hampton and Stratham) is conveyed to the Main Pumping Station which is located between Water St. and Swazey Parkway. The Main Pumping Station pumps wastewater to the Wastewater Treatment Facility (WWTF) located north of Town on the Squamscott River, and treated WWTF effluent is discharged to the Squamscott River.

The wastewater collection system includes two CSO diversion structures (Spring St. and Water St. diversion structures) which regulate high wastewater flows. CSO overflow from these diversion structures bypass the Main Pumping Station (and WWTF) and are conveyed by gravity to Clemson Pond. UE provided the Town with the *Phase III Infiltration and Inflow Evaluation, January 14, 2013* which serves as the Town's CSO LTCP. Two of the major findings of this study were that much of the identified I/I appeared to be from private sources, and, direct drainage connections to the sewer (and possible river connections) appeared to significantly contribute to CSO discharges because of high peak flows. The work performed as part of this scope of services was consistent with the recommendations provided in the Town's CSO LTCP aimed to identify private sources of I/I, direct drainage connections and possible river connections to the sewer.

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fx 603.431.4733
25 Vaughan Mall
Portsmouth, NH 03801
underwoodengineers.com

NOTES:

1. STREETS, SEWERS, AND BUILDINGS BASED ON TOWN GIS INFORMATION.
2. APPROXIMATE DRAINAGE AREA BASED ON NH GRANIT WEBSITE DATA, "CONTOURS-2FT-SMOOTH", FOR SQUAMSCOTT RIVER AND LITTLE RIVER-EXETER RIVER, AS WELL AS UE FIELD OBSERVATIONS ON 11/4/14.

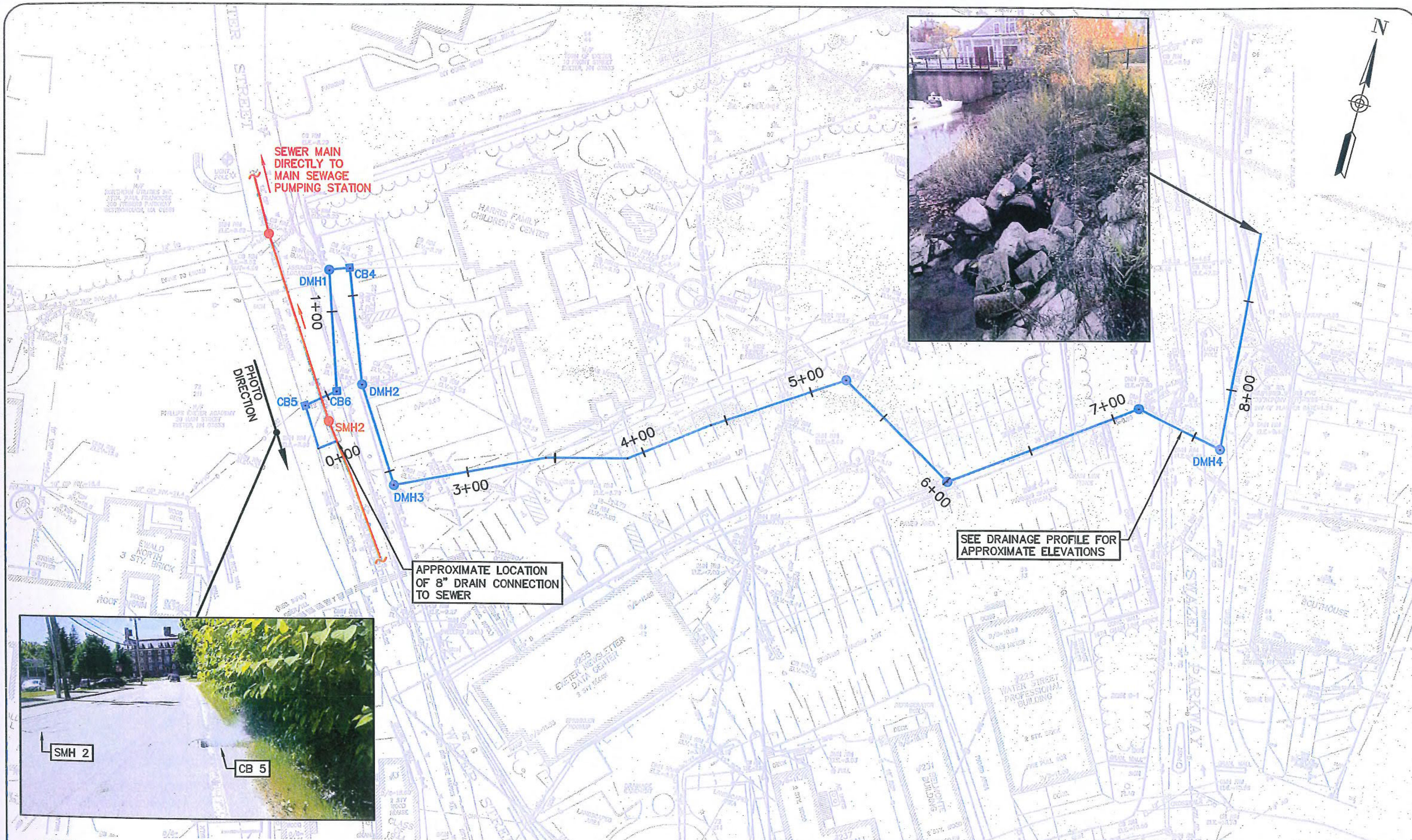
LEGEND:

- APPROXIMATE DRAINAGE AREA CONNECTED TO SEWER
- EXISTING TOWN SEWER MANHOLE
- EXISTING TOWN SEWER MAIN
- APPROXIMATE BUILDING FOOTPRINT

200 0 200 400

DATE	UNDERWOOD engineers	P.E.A./UNITIL	FIG.
01/26/15	25 Vaughan Mall, Portsmouth, N.H. 03801	DRAIN/SEWER CONNECTION SCHEMATIC	B2
PROJECT	Tel. 603-436-6192 Fax. 603-431-4733	CSO LTCP IMPLEMENTATION	
1815		EXETER, NEW HAMPSHIRE	

H:\Real Numbers\Exeter\1815 - LTCP Implementation\DWG\Design\1815base-Drainage Work.dwg, Fig B2-Drainage Area Overview, 1/26/2015 2:09:24 PM, tjb



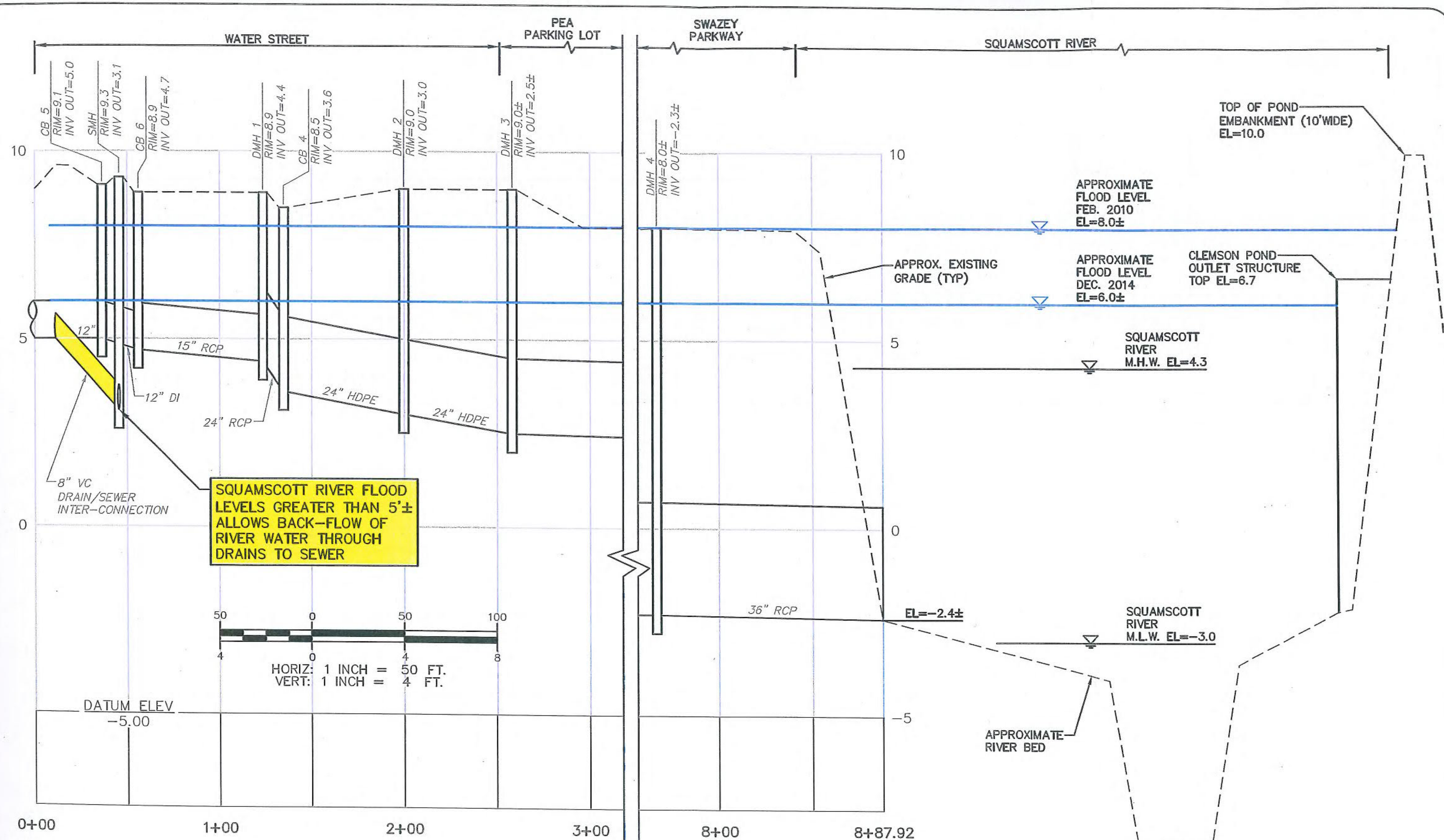
NOTES:

1. BASE PLAN INFORMATION PROVIDED BY P.E.A. PERSONNEL.
2. SEE PROFILE FOR ADDITIONAL INFORMATION.

50 0 50 100

APPROXIMATE SCALE

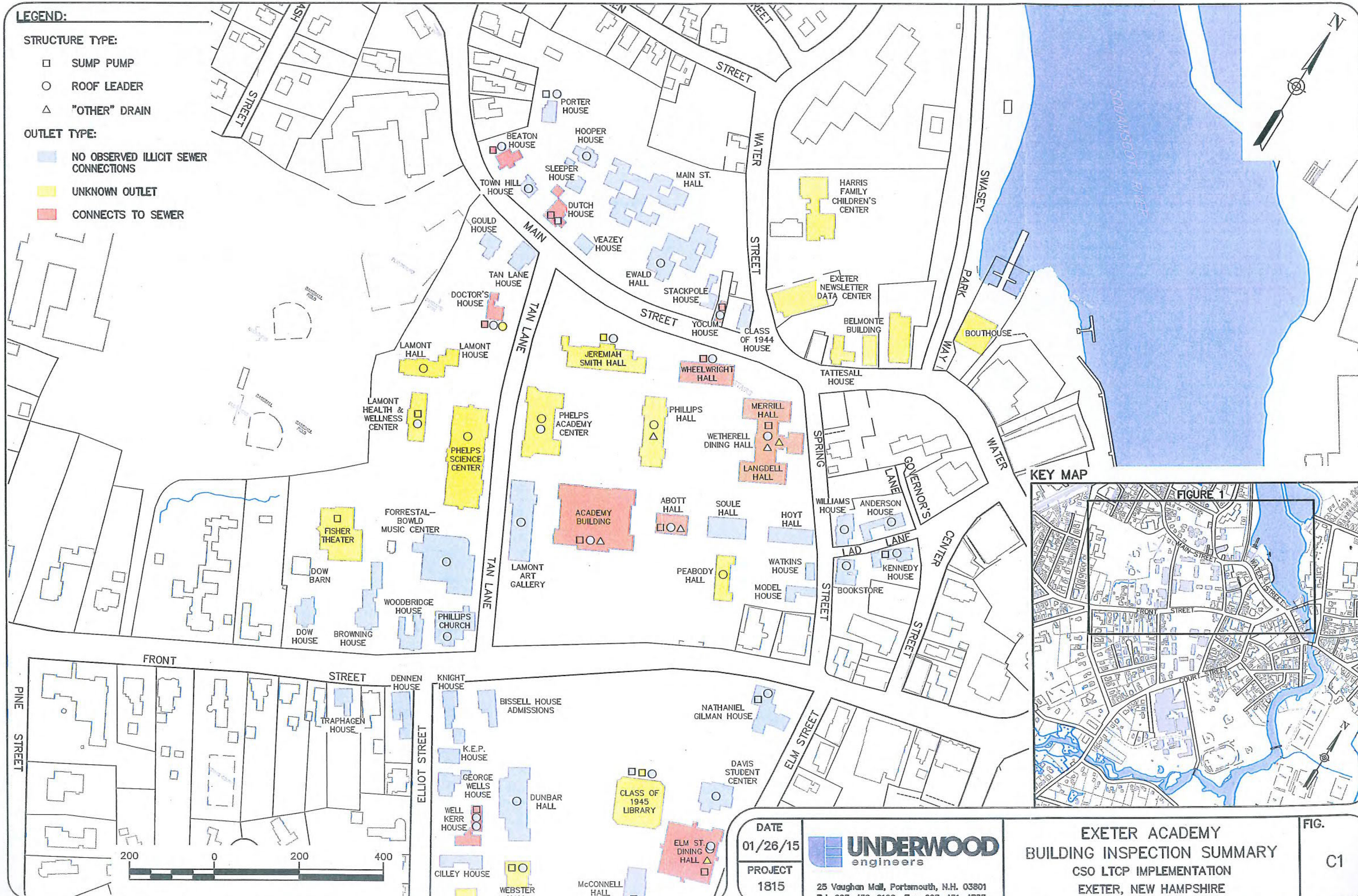
DATE	UNDERWOOD engineers	DRAIN/SEWER INTER-CONNECTION SCHEMATIC	FIG.
01/26/15	25 Vaughan Mall, Portsmouth, N.H. 03801 Tel. 603-436-6192 Fax. 603-431-4733	CSO LTCP IMPLEMENTATION EXETER, NEW HAMPSHIRE	B3
PROJECT 1815			



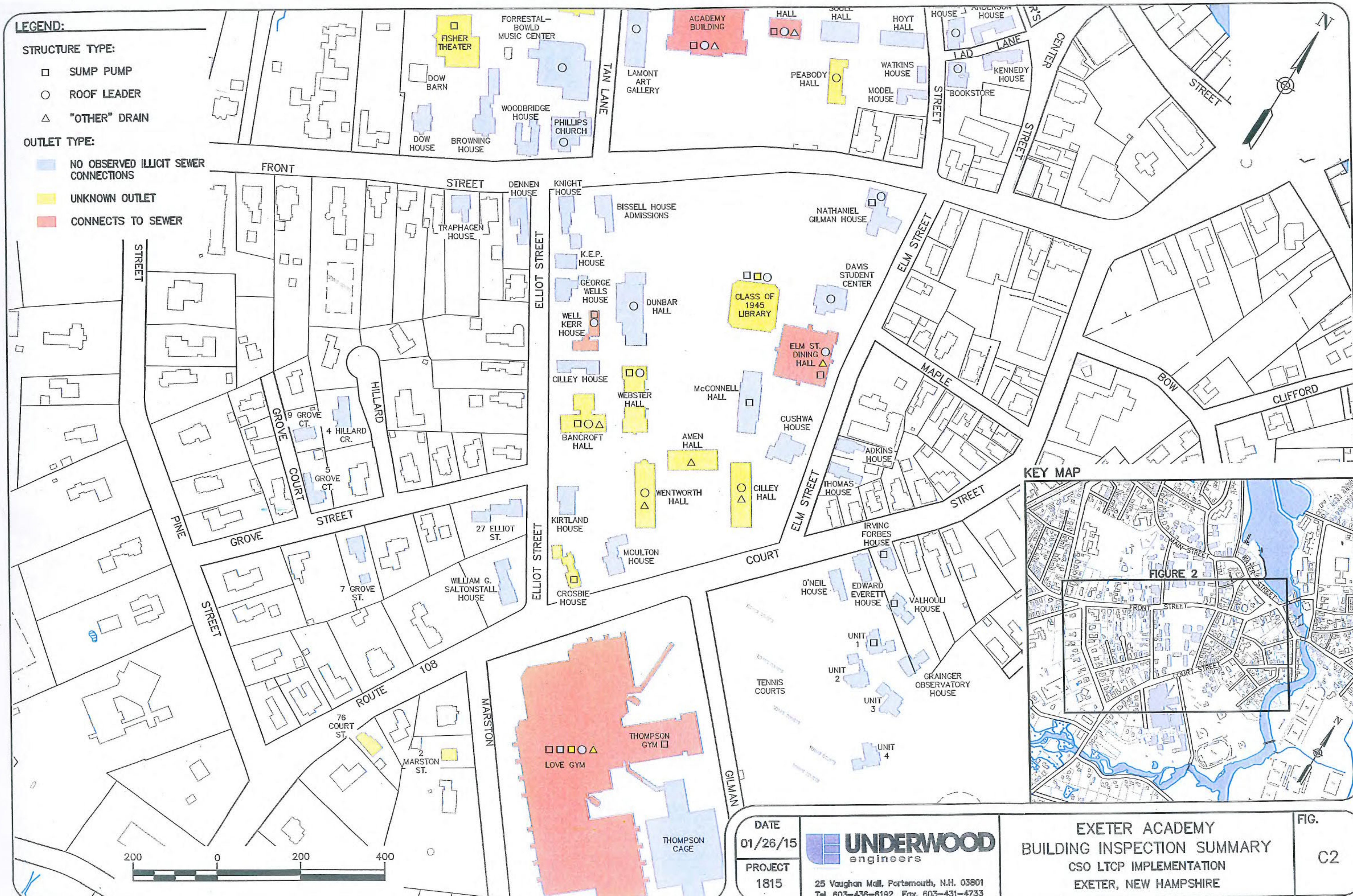
NOTES:

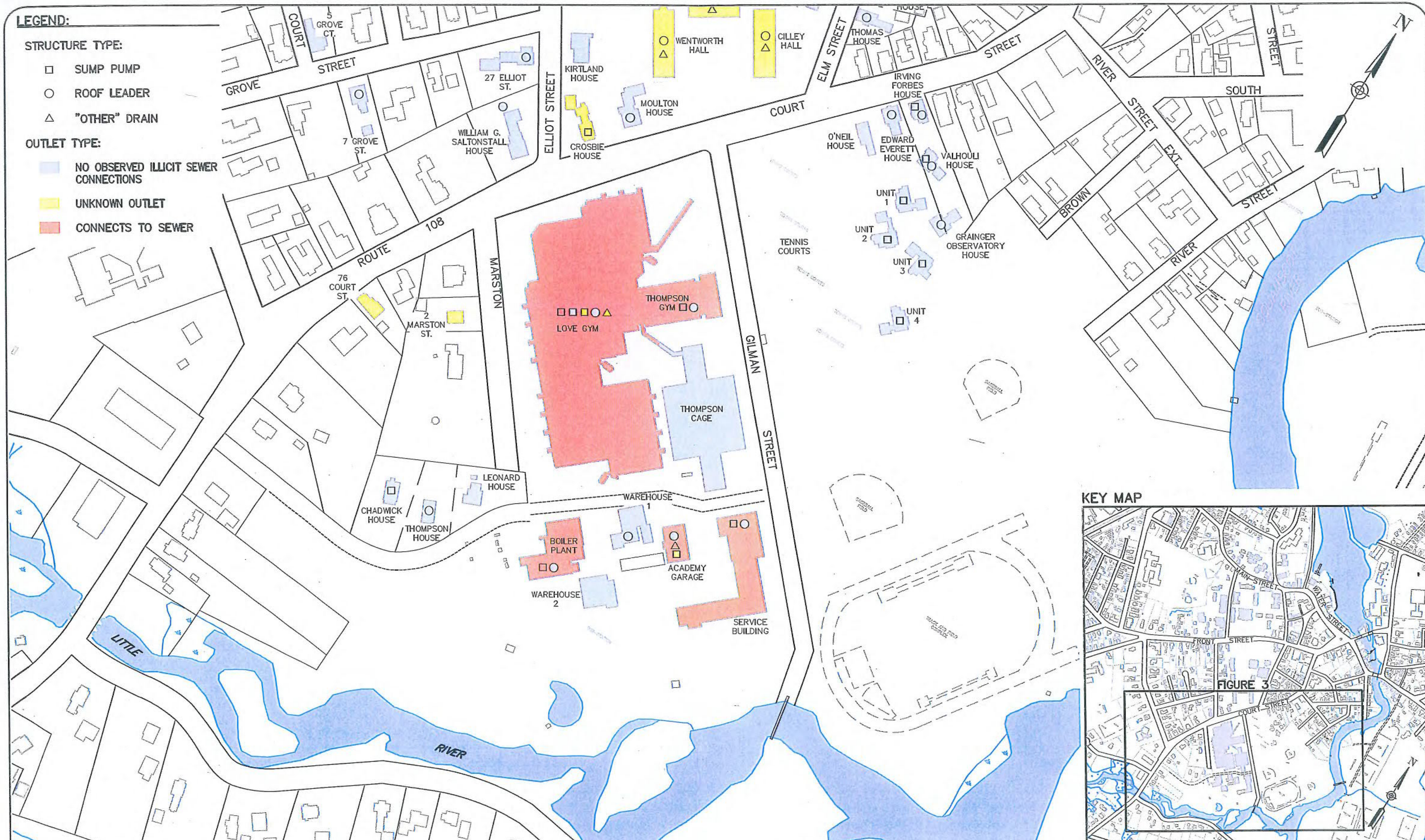
1. ELEVATIONS BASED ON LEVEL SURVEY PERFORMED WITH TOWN PERSONNEL ON 10/9/14, REFERENCING CORNER OF THE MAIN P.S. LOADING DOCK (EL=10.78') AS DATUM.
2. MEAN HIGH AND LOW TIDE WATER LEVELS ARE FROM UEI, "WWTP OUTFALL IMPROVEMENTS", RECORD DRAWINGS 2/2002, AND ARE FROM A LOCATION APPROXIMATELY 1 MILE DOWNSTREAM.
3. PIPE SIZES AND CONFIGURATION ARE APPROXIMATE, AND BASED ON A PLAN PROVIDED BY PHILLIPS EXETER ACADEMY AND UE FIELD OBSERVATIONS.
4. FEBRUARY 2010 AND DECEMBER 2014 FLOOD LEVELS BASED ON UE OBSERVED FLOOD DEBRIS IN SWASEY PARKWAY.

DATE	UNDERWOOD engineers	DRAIN/SEWER INTER-CONNECTION PROFILE	FIG.
01/26/15	25 Vaughan Mall, Portsmouth, N.H. 03801	CSO LTCP IMPLEMENTATION	B4
PROJECT 1815	Tel. 603-436-6192 Fax. 603-431-4733	EXETER, NEW HAMPSHIRE	



H:\Real Numbers\Exeter\1815 - LTCP Implementation\DWG\Design\1815base.dwg, Fig C1, 1/26/2015 2:30:35 PM, tjb


LEGEND:
STRUCTURE TYPE:
SUMP PUMP
ROOF LEADER
"OTHER" DRAIN
OUTLET TYPE:
NO OBSERVED ILLICIT SEWER CONNECTIONS
UNKNOWN OUTLET
CONNECTS TO SEWER
FISHER THEATER
FORRESTAL-BOWLD MUSIC CENTER
DOW BARN
DOW HOUSE
BROWNING HOUSE
WOODBRIDGE HOUSE
PHILLIPS CHURCH
TAN LANE
LAMONT ART GALLERY
ACADEMY BUILDING
HALL
HOYT HALL
PEABODY HALL
WATKINS HOUSE
MODEL HOUSE
HOUSE
ANDERSON HOUSE
LAD LANE
KENNEDY HOUSE
BOOKSTORE
CENTER STREET
STREET
FRONT STREET
DENNEN HOUSE
KNIGHT HOUSE
TRAPHAGEN HOUSE
BISSELL HOUSE ADMISSIONS
NATHANIEL GILMAN HOUSE
K.E.P. HOUSE
GEORGE WELLS HOUSE
DUNBAR HALL
WELL KERR HOUSE
CLASS OF 1945 LIBRARY
DAVIS STUDENT CENTER
ELM STREET
ELM ST. DINING HALL
CILLEY HOUSE
WEBSTER HALL
McCONNELL HALL
BANCROFT HALL
AMEN HALL
CUSHWA HOUSE
WENTWORTH HALL
CILLEY HALL
KIRTLAND HOUSE
MOULTON HOUSE
CROSBIE HOUSE
ELLIOT STREET
MAPLE STREET
BOW
CLIFFORD
ADKINS HOUSE
THOMAS HOUSE
IRVING FORBES HOUSE
O'NEIL HOUSE
EDWARD EVERETT HOUSE
VALHOULI HOUSE
UNIT 1
UNIT 2
UNIT 3
UNIT 4
GRAINGER OBSERVATORY HOUSE
TENNIS COURTS
COURT STREET
HILLARD
9 GROVE CT.
4 HILLARD CR.
5 GROVE CT.
GROVE COURT
GROVE STREET
PINE STREET
7 GROVE ST.
27 ELLIOT ST.
WILLIAM G. SALTONSTALL HOUSE
ROUTE 108
76 COURT ST.
2 MARSTON ST.
MARSTON
LOVE GYM
THOMPSON GYM
THOMPSON CAGE
GILMAN
200
0
200
400
N
KEY MAP
FIGURE 2
MAIN STREET
WATER STREET
FRONT STREET
COURT STREET
DATE
01/26/15
PROJECT
1815
UNDERWOOD engineers
25 Vaughan Mall, Portsmouth, N.H. 03801
Tel. 603-436-6192 Fax. 603-431-4733
EXETER ACADEMY
BUILDING INSPECTION SUMMARY
CSO LTCP IMPLEMENTATION
EXETER, NEW HAMPSHIRE
FIG.
C2



DATE		EXETER ACADEMY	FIG.
01/26/15	UNDERWOOD engineers	BUILDING INSPECTION SUMMARY	C3
PROJECT	25 Vaughan Mall, Portsmouth, N.H. 03801	CSO LTCP IMPLEMENTATION	
1815	Tel. 603-436-6192 Fax. 603-431-4733	EXETER, NEW HAMPSHIRE	

Appendix C

Excerpts from *Interim Letter Report (Building Inspections, CSO LTCP Implementation)*, Underwood Engineers, January 14, 2016

UNDERWOOD
engineers

1936

January 14, 2016

Mr. Michael Jeffers
Water & Sewer Managing Engineer
10 Newfields Road
Exeter, NH 03833

Re: ***Interim Letter Report (Building Inspections)***
Combined Sewer Overflow (CSO) Long Term Control Plan (LTCP) Implementation
Exeter, New Hampshire

Dear Mr. Jeffers:

The following interim letter report summarizes Underwood Engineers, Inc. (UE) work for the referenced project under our Scope of Services dated May 18, 2015 with the Town of Exeter, NH (the Town). Work included illicit building inspections that (UE) performed in 2015 and was performed as part of the Town's CSO LTCP.

Background
The Town of Exeter owns and operates a municipal wastewater collection system and wastewater treatment facility (WWTF). The wastewater collection system includes two CSO diversion structures (Spring St. and Water St. diversion structures) which regulate high sewer flows during storm events. CSO overflow from these diversion structures bypass the Main Pumping Station (and WWTF) and are conveyed by gravity to Clemson Pond which outlets to the Squamscott River, a tidal tributary of the Great Bay Estuary. The Town has been working for decades to separate stormwater and other I/I from the system to eliminate CSO's and submitted UE's *Phase III Infiltration and Inflow Evaluation* to EPA in March, 2013 to serve as the Town's CSO LTCP. Two of the major findings from that study were that much of the identified Infiltration and Inflow (I/I) in Town appeared to be from private sources, and direct drainage connections to the sewer appeared to significantly contribute to CSO discharges because of high peak flows. This work was consistent with the recommendations of the Town's CSO LTCP to identify and mitigate direct connections and other private sources of I/I that contribute to CSO events.

Field Investigations
UE and Flow Assessment Services performed building inspections of 27 buildings (18 internal/external inspections and 9 external only inspections). Inspection reports are provided (Appendix A) and a summary of the findings are tabulated in tables B.1 through B.3 and shown on Figures B.1 through B.3 (Appendix B). The intent of the inspections was to screen buildings for illicit sewer connections (primarily sump pumps, yard drains and roof leaders connected to

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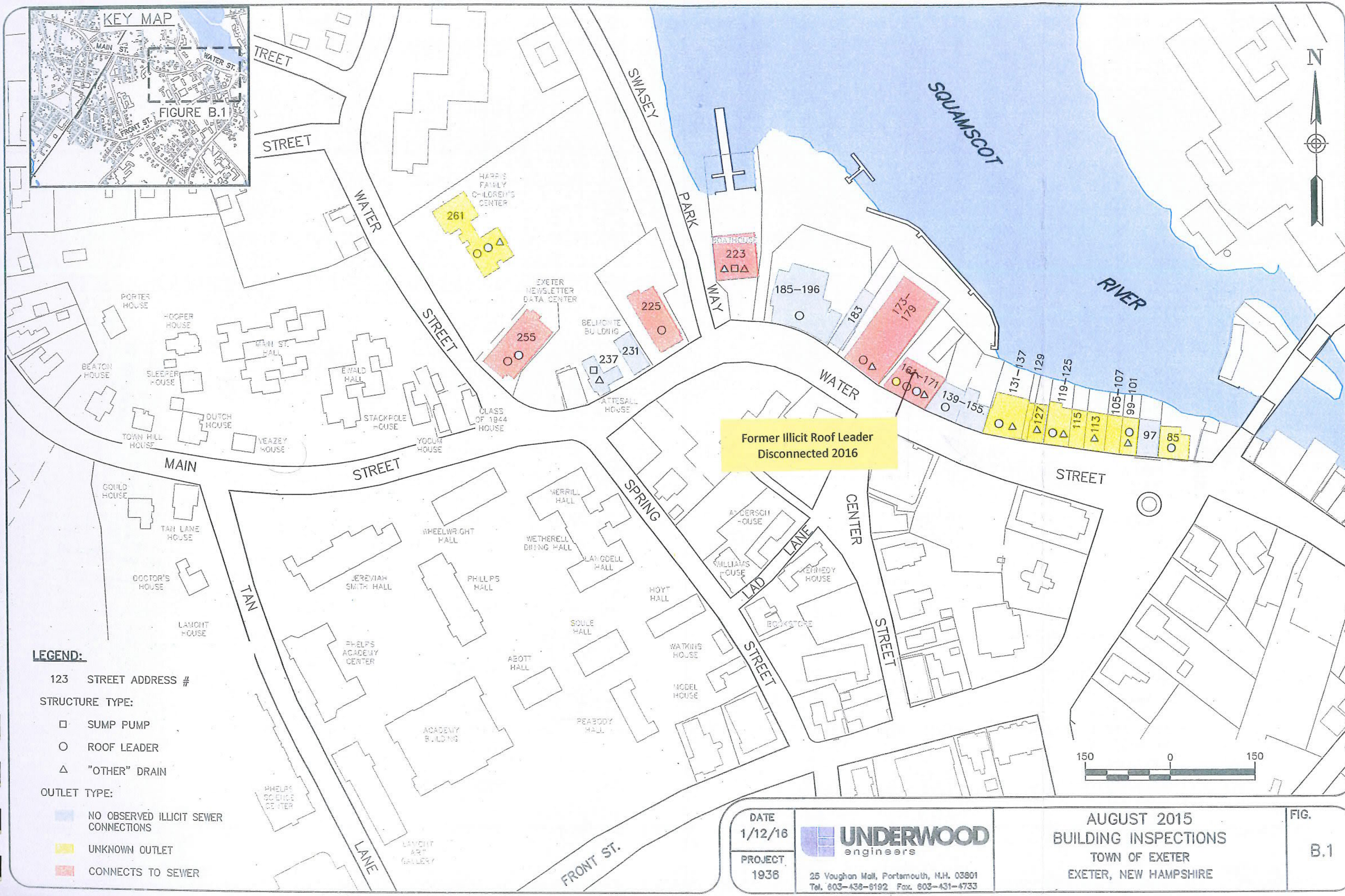
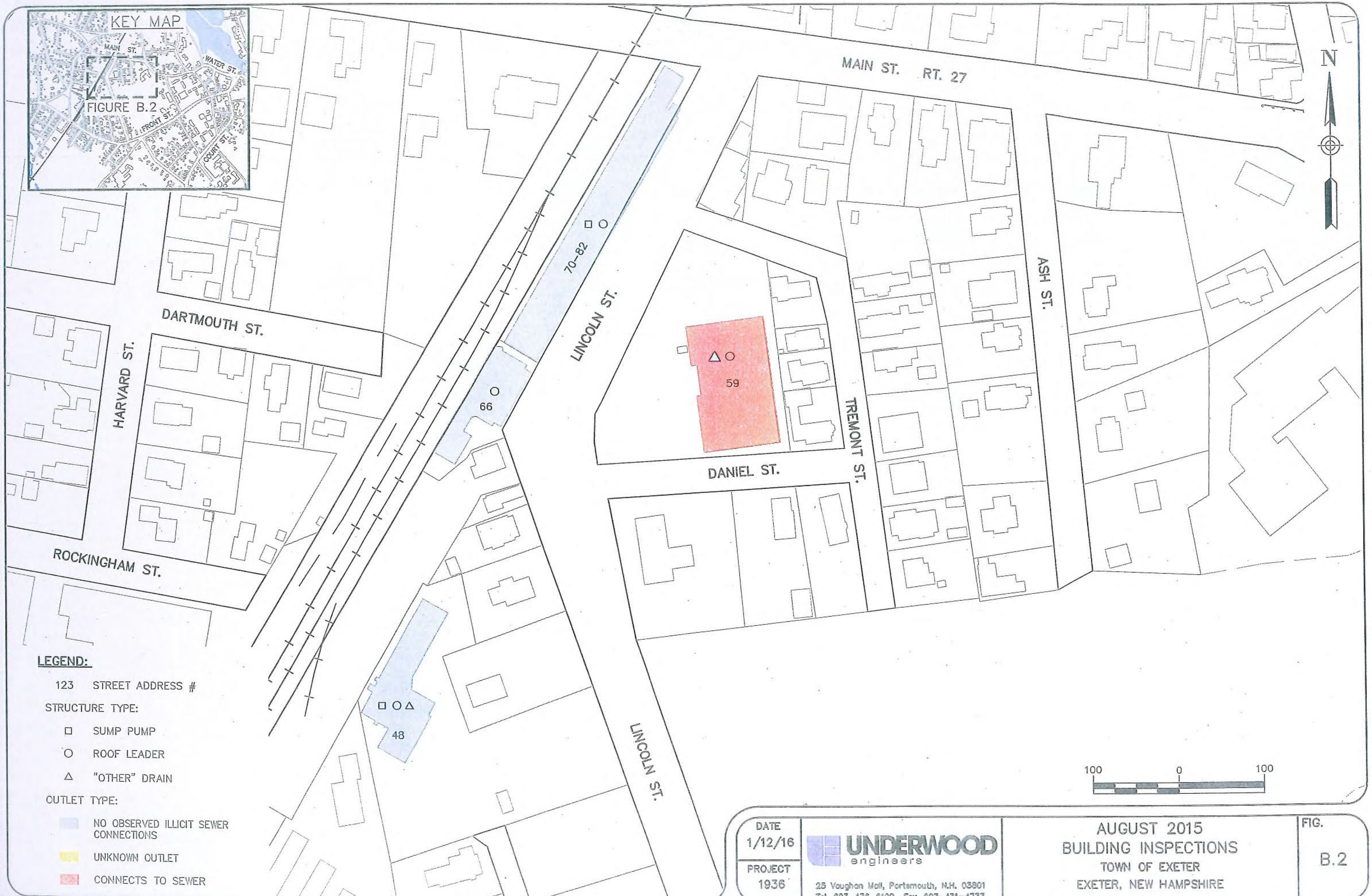
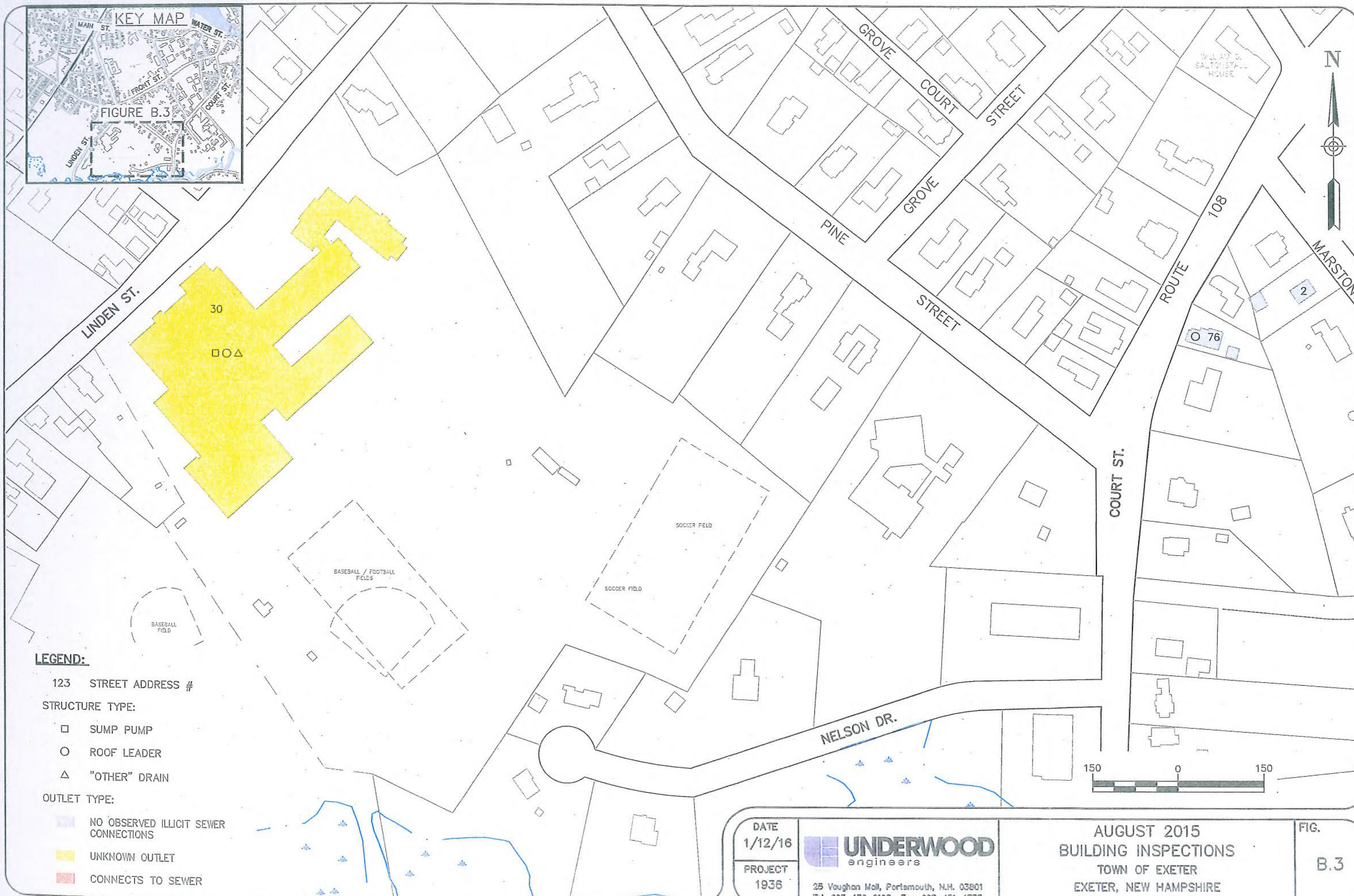
underwoodengineers.com


KEY MAP
MAIN ST.
WATER ST.
FRONT ST.
FIGURE B.1
N
SQUAMSCOT RIVER
WATER STREET
MAIN STREET
SWASEY PARKWAY
SPRING STREET
CENTER STREET
LADD LANE
TAN LANE
FRONT ST.
261
HARRIS FAMILY CHILDREN'S CENTER
EXETER NEWSLETTER DATA CENTER
255
225
BELMONTE BUILDING
237
231
BOATHOUSE
223
185–196
183
173–179
161–171
139–155
131–137
129
127
119–125
115
113
105–107
99–101
97
85
Former Illicit Roof Leader Disconnected 2016
PORTER HOUSE
HOOPER HOUSE
MAIN ST. HALL
BEATON HOUSE
SLEEPER HOUSE
EWALD HALL
DUTCH HOUSE
STACKPOLE HOUSE
CLASS OF 1944 HOUSE
TOWN HILL HOUSE
VEAZEY HOUSE
YOCUM HOUSE
GOULD HOUSE
TAN LANE HOUSE
DOCTOR'S HOUSE
LAMONT HOUSE
MERRILL HALL
WHEELWRIGHT HALL
WETHERELL DINING HALL
LANGDELL HALL
JEREMIAH SMITH HALL
PHILLIPS HALL
HOYT HALL
SOULE HALL
WATKINS HOUSE
ABBOT HALL
PHELPS ACADEMY CENTER
ACADEMY BUILDING
PEABODY HALL
NODEL HOUSE
PHELPS SCIENCE CENTER
LAMONT ART GALLERY
WILLIAMS HOUSE
KENNEDY HOUSE
BOOKSTORE
150 0 150
LEGEND:
123 STREET ADDRESS #
STRUCTURE TYPE:
□ SUMP PUMP
○ ROOF LEADER
△ "OTHER" DRAIN
OUTLET TYPE:
NO OBSERVED ILLICIT SEWER CONNECTIONS
UNKNOWN OUTLET
CONNECTS TO SEWER
DATE 1/12/16
PROJECT 1936
UNDERWOOD engineers
25 Vaughan Mall, Portsmouth, N.H. 03801
Tel. 603-436-6192 Fax. 603-431-4733
AUGUST 2015
BUILDING INSPECTIONS
TOWN OF EXETER
EXETER, NEW HAMPSHIRE
FIG. B.1


KEY MAP
MAIN ST.
WATER ST.
FIGURE B.2
FRONT ST.
COURT ST.
MAIN ST. RT. 27
N
DARTMOUTH ST.
HARVARD ST.
ROCKINGHAM ST.
LINCOLN ST.
70-82
66
59
48
DANIEL ST.
TREMONT ST.
ASH ST.
LINCOLN ST.
100 0 100
LEGEND:
123 STREET ADDRESS #
STRUCTURE TYPE:
□ SUMP PUMP
○ ROOF LEADER
△ "OTHER" DRAIN
OUTLET TYPE:
NO OBSERVED ILLICIT SEWER CONNECTIONS
UNKNOWN OUTLET
CONNECTS TO SEWER
DATE
1/12/16
PROJECT
1936
UNDERWOOD engineers
25 Vaughan Mall, Portsmouth, N.H. 03801
Tel. 603-436-6192 Fax. 603-431-4733
AUGUST 2015
BUILDING INSPECTIONS
TOWN OF EXETER
EXETER, NEW HAMPSHIRE
FIG.
B.2



LEGEND:

123 STREET ADDRESS #

STRUCTURE TYPE:

□ SUMP PUMP

○ ROOF LEADER

△ "OTHER" DRAIN

OUTLET TYPE:

NO OBSERVED ILLICIT SEWER CONNECTIONS

UNKNOWN OUTLET

CONNECTS TO SEWER

DATE	UNDERWOOD engineers	AUGUST 2015	FIG.
1/12/16	25 Vaughan Mall, Portsmouth, N.H. 03801 Tel. 603-436-6192 Fax. 603-431-4733	BUILDING INSPECTIONS TOWN OF EXETER EXETER, NEW HAMPSHIRE	B.3
PROJECT 1936			

Appendix D

Excerpts from *Preliminary Design Report for the Town of Exeter, NH WWTF and Main Pump Station Upgrade,* Wright-Pierce, October 2015

PRELIMINARY DESIGN REPORT
for the
TOWN OF EXETER, NH
WWTF & MAIN PUMP STATION UPGRADE

October 2015

WRIGHT-PIERCE
Engineering a Better Environment

TOWN OF EXETER, NEW HAMPSHIRE
WWTF PRELIMINARY DESIGN
W-P PROJECT NO. 12883B
ENR INDEX 10037 (September 2015)

TABLE 4-1
ESTIMATED CAPITAL COSTS FOR CONTRACTS 1, 2, 3 AND 4
BEFORE VALUE ENGINEERING

Project Component		**CONTRACT 1** WWTF TN 4 mg/l	**CONTRACT 2/3** Main Pump Station FM & WM	**CONTRACT 4** Lagoon Decommissioning	**Notes**
Construction		$34,400,000	$5,050,000	$8,720,000	1
Construction Contingency	5%	$1,720,000	$250,000	$440,000	2
Technical Services		$6,880,000	$1,010,000	$870,000	3
Value Engineering		$60,000	$0	$0	4
Materials Testing	0.25%	$90,000	$10,000	$20,000	5
Asbestos and Lead Paint Abatement		$0	$10,000	$0	6
Activated Sludge Seeding		$10,000	$0	$0	
Direct Equipment Purchase		$0	$0	$0	7
Land Acquisition/Easements		$0	$0	$0	7
Legal/Administrative		$10,000	$10,000	$10,000	8
Interim Financing	0.5%	$220,000	$30,000	$50,000	9
ENGINEER'S ESTIMATE		$43,390,000	$6,370,000	$10,110,000	10,11
EngEst Amounts from Facilities Plan		*$39,830,000*	*$5,070,000*	*$6,970,000*	
Differential from Facilities Plan		*$3,560,000*	*$1,300,000*	*$3,140,000*	
% differential from Facilities Plan		*9%*	*26%*	*45%*	
TOTAL - CONTRACTS 1 TO 4		$59,870,000	<< Note 12		
Total from Facilities Plan		*$51,870,000*			
Differential from Facilities Plan		*$8,000,000*			
% differential from Facilities Plan		*15%*			
TOTAL - CONTRACTS 1/2/3		$49,760,000	<< For Town Meeting 2016		

Notes
1.) Construction cost estimate details provided in Appendices. Costs based on ENR CCI 10037.
2.) Construction contingency is an allowance at 5% of construction cost.
3.) Technical services is an allowance at 20% of construction cost for Contracts 1/2/3 and 10% for Contract 4.
4.) Value engineering is an allowance assuming two sessions.
5.) Materials testing is an allowance based on similar sized projects.
6.) Asbestos and lead paint is not anticipated at the WWTF site, but should be evaluated at the Main Pump Station site.
7.) None anticipated
8.) Legal/administrative costs are for bond counsel and project advertisements.
9.) Financing is an allowance based on assumed interim financing costs at 0.5%.
10.) DES estimate for 5 mg/l effluent TN for Exeter was $44M ("Analysis of Nitrogen Loading Reductions for WWTF and NPS in the Great Bay Estuary Watershed", Dec 2010, ENR 8660).
11.) Contract 4 represents the cost for Option 3 "coastal wetlands creation" (Section 2.5.16), which is more than identified in the Wastewater Facilities Plan. The total cost for Option 2 "upland wetlands restoration" (Section 2.5.16) is $6.9M, which is the same as was identified in the Wastewater Facilities Plan. Under either scenario, approximately $3.8M is related to sludge removal and disposal.
12.) Total cost of $59.8M includes Contract 4/Option 3 ("coastal wetlands creation").
Total cost is $56.7M with Contract 4/Option 2 ("upland wetlands restoration").
Total costs is $53.5 with Contract 4/Option 1 ("keep lagoons for storage").

WRIGHT-PIERCE

Engineering a Better Environment

MEMORANDUM

TO:	File	DATE:	August 26, 2015
FROM:	A. Morrill, J. Mercer	PROJECT NO.:	12883B
SUBJECT:	Exeter, NH– Main Pump Station Design Flow Analysis		

This memo summarizes the analysis of flow data to determine the Main Pump Station (MPS) design flow rates. Compiled data from Exeter WWTF Monthly Operation Reports (MOR), Exeter Flow Assessment data account, and the WP pump test on May 7, 2014 were used to determine the design flow rates for the MPS.

Background

The MPS was originally constructed in 1964 and upgraded in 1995 to include three dry-pit submersible pumps with variable frequency drives and clamp-on Doppler type flow meters. The MPS discharges to a 16-inch diameter, cement-lined cast iron forcemain approximately 4,900 linear feet long. Due to the age of the pumps and poor condition of the forcemain an upgrade at the MPS is warranted. To reduce or eliminate CSO events, the MPS capacity will need to be increased.

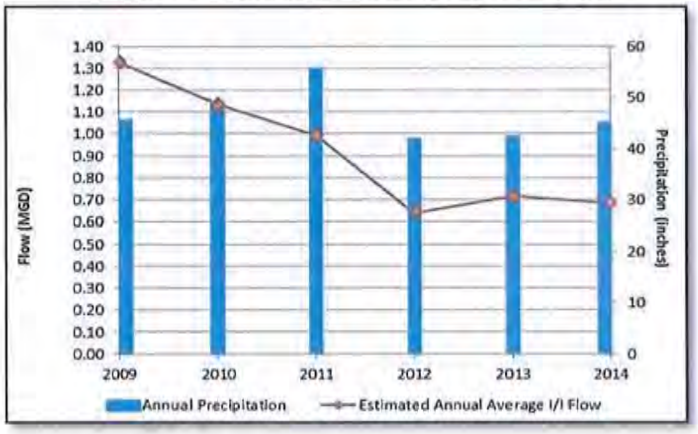
The Town has approximately 51 miles of separated gravity sewer lines, portions of which were originally constructed as combined sewers. The system contains two diversion structures on Water Street and Spring Street, which discharge to CSO Outfall No. 003 at Clemson Pond which has a tide gate discharge to Squamscott River (Outfall No. 002).

Data Analysis

Infiltration and Inflow

The Town continues to make improvements to further reduce I/I flows through regular O&M and sewer replacement projects, yet still experiences CSO events during storms. To limit the frequency of CSO events, the MPS capacity will need to be increased to accommodate normal wastewater flows and peak wet weather flows. **Figure 1** shows that the Town has significantly reduced the estimated annual average I/I flow over the past five years.

Figure 1: Infiltration and Inflow Trends



Exeter WWTF Monthly Operating Reports (MOR)

A review of current CSO and influent WWTF flows was conducted by analyzing data from MORs starting in 2007 through 2014. Influent WWTF flows were recorded by an area-velocity insert flow meter from 2007 through August 2010, and then by a magnetic flow meter on the influent force main from August 2010 to present. CSO flows were recorded by a level indicator over the weir structure in the Water Street and Spring Street diversion structures. The CSO and influent WWTF flows are totalized volumes for each day. To evaluate the combined CSO and influent WWTF peak flow condition, the "Patriot's Day Storm" from April 15, 2007 through April 20, 2007 was analyzed. **Table 1** summarizes the CSO and influent WWTF volumes during the April 2007 storm and CSO event.

Table 1: CSO Event – April 2007

Date	Total CSO (MG)	Influent WWTF (MG)	Combined Flow (MG)
4/15/2007	0.35	3.60	3.95
4/16/2007	1.87	4.30	6.17
4/17/2007	8.34	4.40	**12.74**
4/18/2007	6.51	4.40	10.91
4/19/2007	0.04	4.00	4.04
4/20/2007	0.01	3.60	3.61

The "Patriot's Day Storm" was a 100+ Year Storm and will not be used to determine the MPS design flows. Note: Town has made a number of sewer system improvements since 2007, so even with another comparable storm it is expected that flows would be less.

Main Pump Station Flow Data

Flow Assessment Services has collected and stored MPS and CSO flow rate data for the Town from 2011 to present. The MPS flow rate data is recorded every five minutes from the clamp-on Doppler flow meters on each pumps' discharge piping. The CSO flow rate data is recorded every five minutes from an ultrasonic level indicator, measuring the height of flow over the weirs in the Water Street and Spring Street diversion structures.

The Exeter WWTF Operators indicated that the clamp-on Doppler flow meters are inaccurate. Clamp-on Doppler flow meters are known to be inaccurate for measuring wastewater flows, due to the ductile iron pipe interfering with the Doppler signals. Also, during rain events the wastewater becomes diluted with stormwater from I/I and the Doppler signals have less solid objects to reflect off and obtain accurate readings.

The Exeter WWTF recently started storing flow data from the influent WWTF mag meter installed in 2011. Mag meters are widely used for wastewater flow measurement and do not experience a decrease in accuracy during rain events when wastewater becomes diluted from I/I.

Strap-on Doppler Meter Data vs. WWTF Influent Mag Meter Data

To identify a correlation between the strap-on Doppler meter data and the WWTF influent mag meter data, a pump test was performed on June 4, 2015. The pump test was conducted with all three pumps running at 60 Hz while data from the strap-on Doppler meters and the WWTF influent mag meter was recorded.

Flow data from the pump test and a storm event from April 20, 2015 through April 21, 2015 were compared by dividing the mag meter data by the Doppler meter data and expressed as a percentage. The mag meter versus Doppler meter results were averaged as shown in **Table 2.**

Table 2: MPS Flow Rate Comparison

Date	Mag Meter	Doppler Meter	Mag / Doppler Comparison
	MGD	MGD	%
04/20/2015	4.49	5.41	83.00
04/21/2015	4.62	5.67	81.52
06/04/2015	5.12	6.55	78.17
		Average	**80.90**

The average comparison was 80.90%; however, to be conservative the Doppler data was corrected to 85% of the original values. To evaluate the total CSO and influent WWTF peak flow conditions nine storms were analyzed and are summarized in **Table 3**. For each storm, the following data was analyzed:

- Peak flow from MPS during storm
- Peak flow from Water Street CSO during storm

- Peak flow from Spring Street CSO during storm

The most conservative combination is to combine the peak flows for each location during the CSO event. The highest combined value is 9.99 MGD which occurred on March 30th, 2014.

Table 3: MPS Peak Flow Analysis

Date | Conditions	100% Doppler	85% Doppler	CSO Water	CSO Spring	CSO Total	Total to Capture Storm 85% Doppler
3/7/2011						
Flows at Max PS Flow	7.05	6.00	0.92	1.42	2.34	8.34
Flows at Max Water St Flow	6.97	5.92	1.55	1.56	3.11	9.03
Flows at Max Spring St Flow	6.79	5.78	0.95	1.99	2.94	8.71
Max Values for Each	7.05	6.00	1.55	1.99	3.54	9.54
3/11/2011						
Flows at Max PS Flow	7.08	6.02	0.00	0.57	0.57	6.59
Flows at Max Water St Flow	7.00	5.95	0.85	0.67	1.52	7.47
Flows at Max Spring St Flow	6.99	5.94	0.33	1.16	1.49	7.43
Max Values for Each	7.08	6.02	0.85	1.16	2.02	8.03
8/19/2011						
Flows at Max PS Flow	7.20	6.12	0.00	1.42	1.42	7.54
Flows at Max Water St Flow	0.00	0.00	0.00	0.00	0.00	0.00
Flows at Max Spring St Flow	7.00	5.95	0.00	2.98	2.98	8.93
Max Values for Each	7.20	6.12	0.00	2.98	2.98	9.10
12/27/2012						
Flows at Max PS Flow	7.18	6.10	0.00	0.00	0.00	6.10
Flows at Max Water St Flow	0.00	0.00	0.00	0.00	0.00	0.00
Flows at Max Spring St Flow	7.08	6.02	0.00	0.05	0.05	6.07
Max Values for Each	7.18	6.10	0.00	0.05	0.05	6.15
3/30/2014						
Flows at Max PS Flow	7.03	5.97	0.00	0.00	0.00	5.97
Flows at Max Water St Flow	6.92	5.88	1.44	2.17	3.60	9.49
Flows at Max Spring St Flow	6.93	5.89	1.24	2.58	3.82	9.70
Max Values for Each	7.03	5.97	1.44	2.58	4.01	**9.99**
3/31/2014						
Flows at Max PS Flow	6.97	5.92	0.00	0.00	0.00	5.92
Flows at Max Water St Flow	6.78	5.77	0.67	1.44	2.11	7.88
Flows at Max Spring St Flow	6.95	5.91	0.47	1.78	2.26	8.16
Max Values for Each	6.97	5.92	0.67	1.78	2.45	8.38
12/9/2014						
Flows at Max PS Flow	6.40	5.44	0.57	1.66	2.23	7.67
Flows at Max Water St Flow	6.25	5.31	0.97	1.89	2.86	8.17
Flows at Max Spring St Flow	6.29	5.35	0.83	2.07	2.90	8.24
Max Values for Each	6.40	5.44	0.97	2.07	3.04	8.48
4/20/2015						
Flows at Max PS Flow	5.41	4.60	0.00	0.07	0.07	4.67
Flows at Max Water St Flow	0.00	0.00	0.00	0.00	0.00	0.00
Flows at Max Spring St Flow	5.29	4.50	0.00	0.68	0.68	5.18
Max Values for Each	5.41	4.60	0.00	0.68	0.68	5.28
4/21/2015						
Flows at Max PS Flow	5.67	4.82	0.00	0.00	0.00	4.82
Flows at Max Water St Flow	5.52	4.69	0.40	1.25	1.65	6.34
Flows at Max Spring St Flow	5.52	4.69	0.40	1.25	1.65	6.34
Max Values for Each	5.67	4.82	0.40	1.25	1.65	6.47

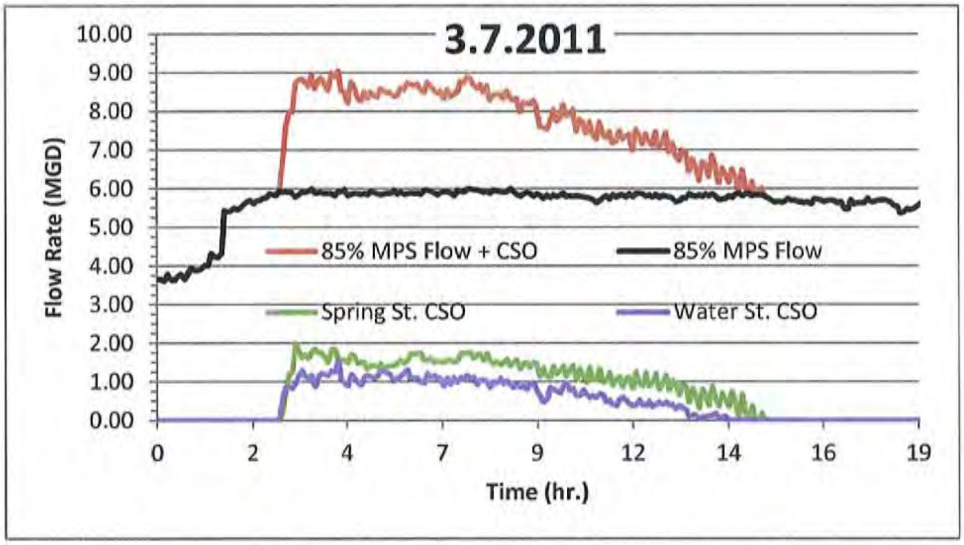
Main Pump Station Upgrade Recommendations

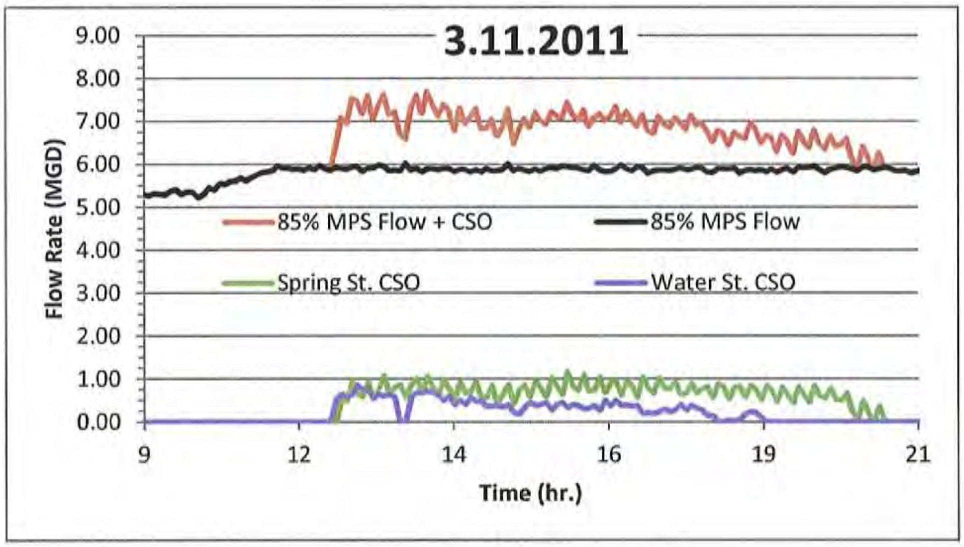
The Town continues to seek out and remove I/I from the collection system; accordingly, the peak flow rate is expected to be reduced over time as it has for the past 5 to 10 years. In order to not oversize the MPS, we recommend upgrading it to convey a minimum month flow rate of 1.09 MGD (760 gpm), a peak flow rate of 9.0 MGD (6,250 gpm) with three pumps running and the stand-by pump will provide additional pumping capacity under peak influent flow conditions (approximately additional 1.0 MGD). At these design flowrates, CSO events should be dramatically reduced or eliminated.

Peak Flow Potential Based on Existing Wetwell Sizing

The Main Pump Station design capacity is 7.9 mgd (5500 gpm), according to Table 3-1 in the Phase I Infiltration/Inflow Study (CDM, October 1997). The existing wetwell has approximately 4,800 gallons of effective volume between the inlet sewer invert and the pump off elevations. At the existing design flow, the existing wetwell allows for a pump cycle time of approximately 2.5 minutes. These pump cycle time are relatively low and strategies should be considered to increase wetwell volume.

FIGURE 2 - MAIN PUMP STATION AND CSO FLOW RATES FOR VARIOUS STORMS





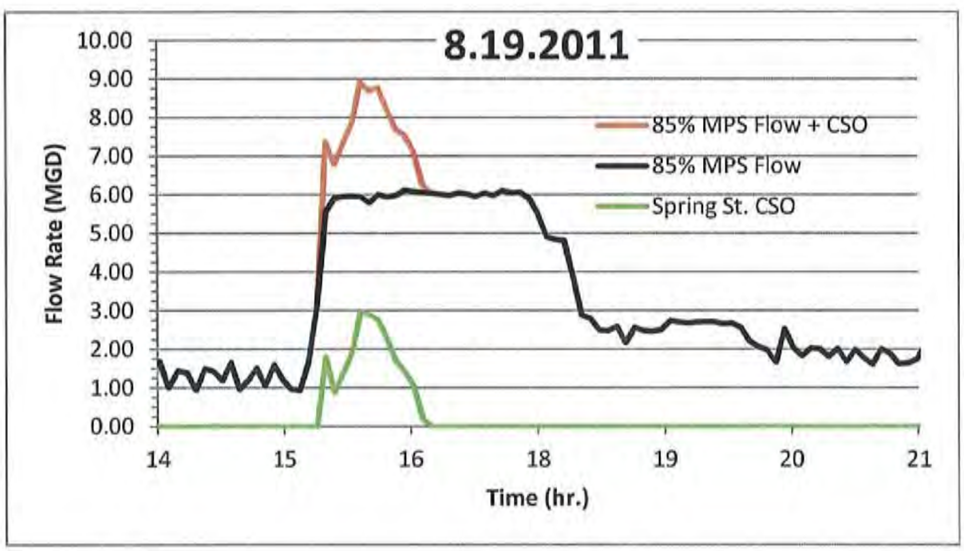
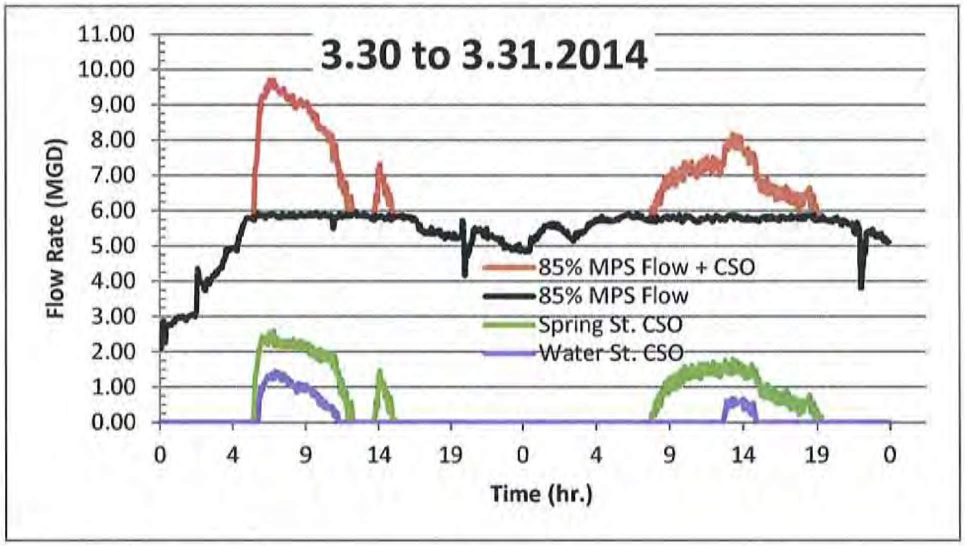
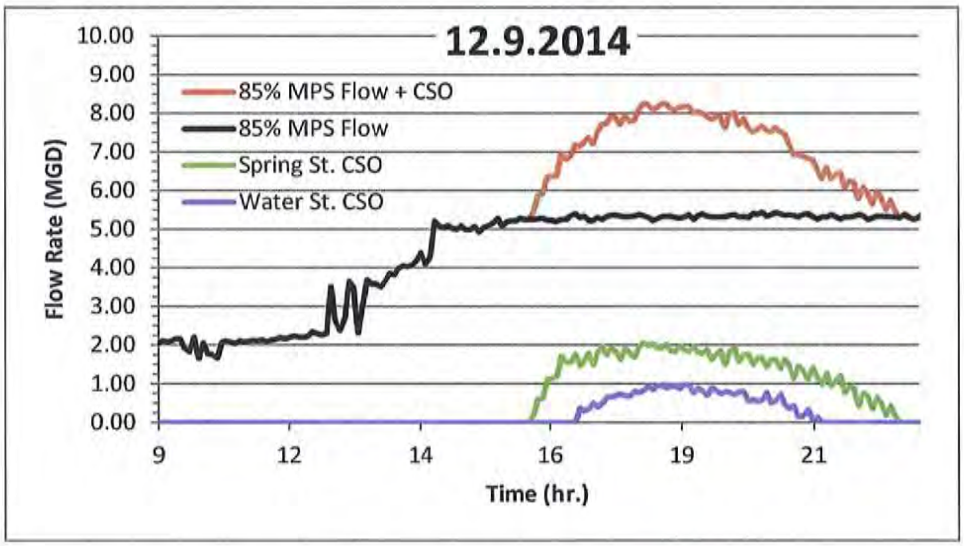
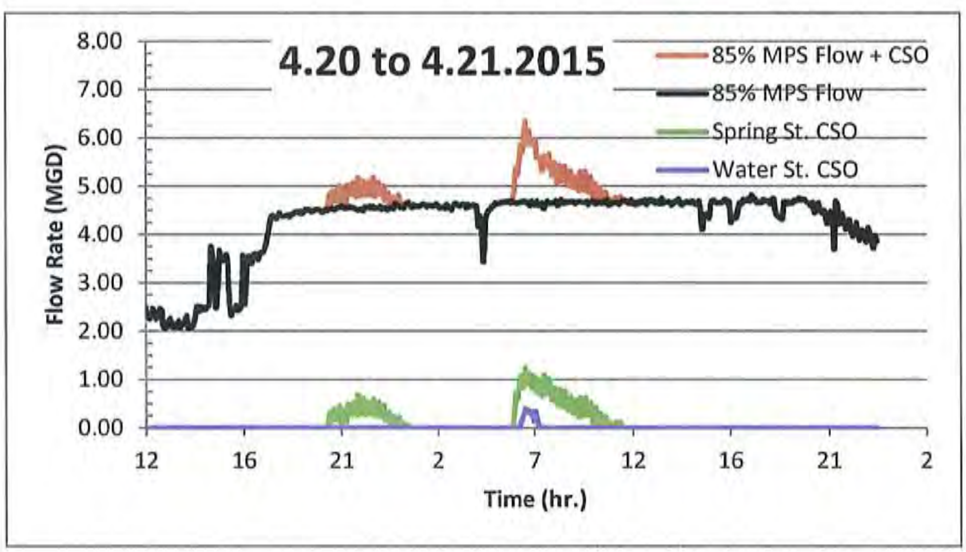


FIGURE 2 - MAIN PUMP STATION AND CSO FLOW RATES FOR VARIOUS STORMS







WRIGHT-PIERCE
Engineering a Better Environment

MEMORANDUM

TO:	File	DATE:	September 21, 2015
FROM:	A. Morrill, J. Mercer	PROJECT NO.:	12883B
SUBJECT:	Exeter, NH– WWTF & Main Pump Station Upgrade Main Pump Station Influent Sewer Capacity Analysis		

This memo summarizes the analysis of flow capacity within the collection system upstream of the Main Pump Station (MPS). Data from the following sources was used in this effort:

- Phase I Infiltration/Inflow Study, (CDM, 1997)
- Phase II Infiltration/Inflow Study, (CDM, 1998)
- Phase III Infiltration/Inflow Evaluation, (Underwood Engineers, 2013)
- Water Street Sewer Interceptor Improvements (Under Wood Engineers, 2013)
- Survey data was collected from Doucet Survey, Inc. (2009 and 2015)

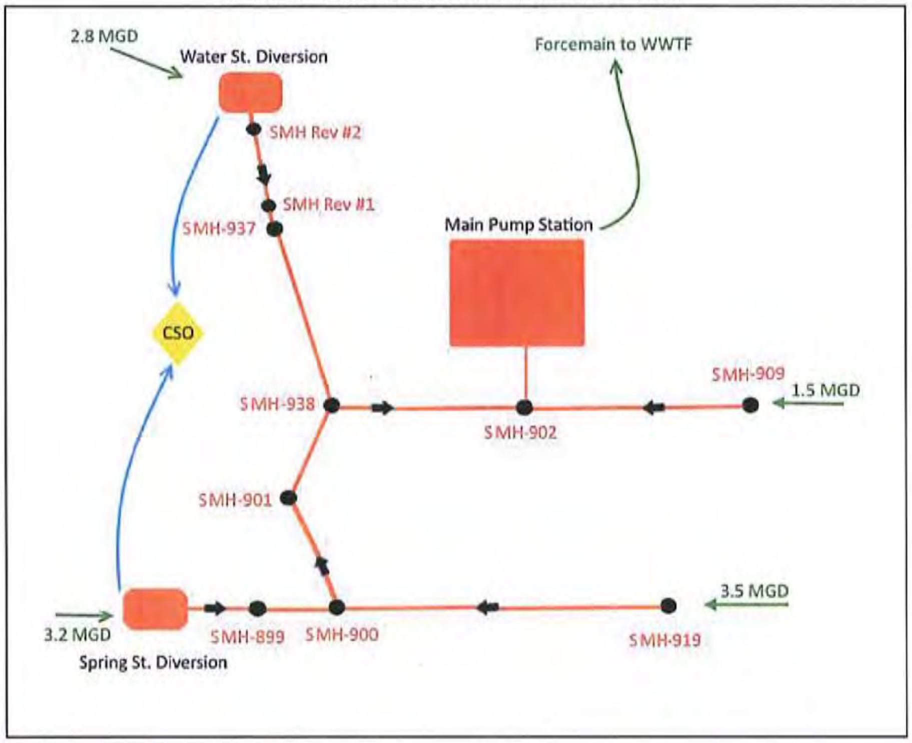
Background

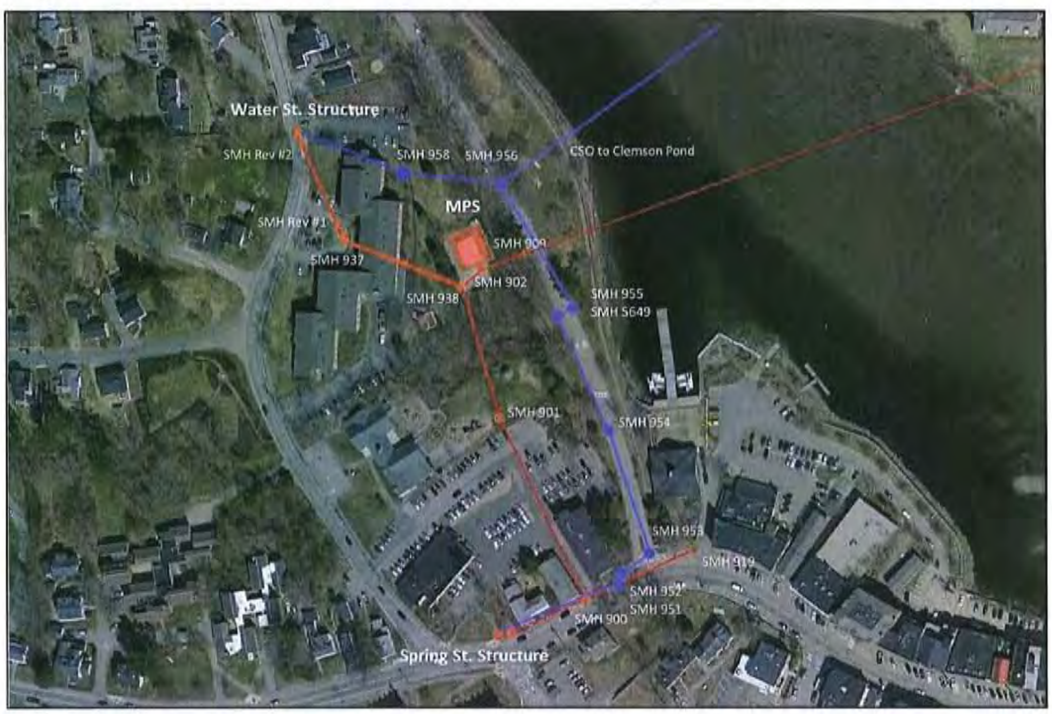
The Town has approximately 51 miles of separated gravity sewer lines, portions of which were originally constructed as combined sewers. The system still contains two diversion structures on Water Street and Spring Street with diversion structures at elevation 5.4-ft and 5.8-ft (NGVD 1929) respectively. The diversion structures discharge to the CSO Outfall No. 003, located at Clemson Pond and controlled by CSO Outfall No. 002, the Clemson Pond tide gate that discharges to the Squamscott River.

The Town continues to make improvements to further reduce I/I flows through regular O&M and sewer replacement projects, yet still experiences CSO events during storm events. To limit the frequency of CSO events, the MPS capacity will be increased to accommodate the normal wastewater flows and the storm flows from I/I. The purpose of this analysis was to determine the capacity of the surrounding influent sewers to determine if the full design flow can be conveyed to the MPS which was originally designed to convey approximately 5,000 gpm with two pumps running.

A SewerCAD (Version 8i) model was developed to assess the dynamic relationship between influent flows, pipe capacity, wet well level, and backwater conditions at the MPS and in the collection system. The model was used to determine the effects of various wet well levels at set influent flows. The influent flows were estimated based on field observations recorded by Underwood Engineers (UEI, 2013) and the three-phase I/I study (CDM, 1997; CDM, 1998; & UEI, 2013). **Figure 1** portrays the area evaluated.

FIGURE 1: SEWERCAD MODEL





Data Input

The Phase 1 I/I study (CDM, 1997), included a sewer system evaluation which was updated in the Phase 3 I/I study (UEI, 2013) based on sewer work completed by the Town between 1997 and 2013 and based on field measurements. The Wright-Pierce memo titled "Main Pump Station Design Flow Analysis" (August, 2015) determined that peak flows from 9.5 to 10.0 MGD at the MPS is likely based on MPS and CSO flow data from 2011 through 2014. This flow range is based on the assumption that the recordings are 15% to 20% high (when compared to the influent mag meter). However, flows in excess of 11.0 MGD upstream of the MPS have been recorded (Patriot's Day Storm) and are the basis for this analysis. To reach a total influent flow rate of 11.0 MGD for model input, the estimated flow rates from the Phase 3 I/I Study (UEI, 2013) were scaled. **Table 1** below summarizes the flows applied to the model. The model assumes the MPS is able to maintain a maximum wet well water level of 0-ft (NGVD 1929) based on increased pumping capacity. The influent channel grinders are assumed to both be operating with headloss based on influent flow and downstream water depth.

Note that SMH-909 and SMH-919 do not flow through either diversion structure. The SewerCAD model determines the hydraulic grade line through each pipe section using a combination of Manning's equation for non-pressurized flow and Hazen-William's equation for pressurized flow. The model then performs a backwater analysis to determine the impacts of surcharging pipes. Given the elevation of the overflow weirs at each CSO diversion structure, the model indicates whether a CSO is likely to occur at the given wet well level and influent flow rates. The SewerCAD Model is calibrated to existing conditions and field results from past reports.

Results

The I/I Study concluded that pipe sections from SMH-900 to SMH-938 and from the Water Street Diversion Structure to SMH-937 were flowing full and therefore undersized for gravity flow. In 2013, the piping between the Water Street Diversion Structure and SMH-937 was replaced with 24-inch piping with sufficient capacity for the design flows. The SewerCAD analysis indicated that the sections from SMH-900 to SMH-938 were flowing full for the flows applied to each section; therefore, confirming the conclusions from the I/I study. The hydraulic grade lines for each Diversion Structure are attached to this memo.

The backwater from SMH-937 to the Water Street Diversion Structure was not enough to raise the HGL above the overflow weir unless the wet well level exceeded an approximate elevation of 3.1-ft. Based on these results, it appears that overflows at the Water Street Diversion Structure are the result of insufficient pumping capacity.

At the Spring Street Diversion Structure, the backwater from the surcharging pipes, independent of backwater from the wet well, results in the HGL exceeding the overflow weir. At the design wet well level of 0-feet and peak influent flow rates (as shown in **Table 1**), the Spring Street Diversion Structure has an influent flow capacity of approximately 1.4 MGD caused by limited capacity from SMH-900 to SMH-938. Flow entering the Spring Street Diversion Structure exceeding 1.4 MGD, under the given conditions, would likely result in a CSO, even if the capacity at the MPS is increased. Raising the wet well level from 0-ft at the MPS causes additional flows to be diverted at the Spring Street Diversion Structure.

TABLE 1: SEWERCAD INPUT FLOW RATES TO MPS

Structure	Phase 3 I/I Study Flow Rate (MGD)[1]	Peak Model Input Flow Rate (MGD)[2]
Water St. Structure	2.6	2.8
SMH-909	1.4	1.5
SMH-919	3.2	3.5
Spring St. Structure	2.9	3.2
Total to MPS (MGD)	**9.1**	**9.2**
CSO (MGD)	**1**	**1.8**
Total	**10.1**	**11.0**

Notes: 1. Based on field measurements by UE during a CSO event on March 30, 2010
2. Assumes that the MPS maintains a wet well level of 0.0-ft

Conclusions

Based on this preliminary analysis, the collection system is able to convey a maximum of 8.7 to 9.2 out of the total 11.0 MGD peak flow to the Main Pump Station under existing conditions. Under the proposed conditions, including a new grinder and influent channel, the collection system is presumed to convey 9.2 to 9.7 MGD and up to 11.0 MGD with collection system improvements. This conclusion is based on the assumed SewerCAD model inputs indicated in **Table 1** which were used to calibrate the model. Furthermore, since the applied flow rates are based on a single storm, it is relatively unknown how the collection system reacts to differences between storms including rainfall intensity, groundwater level, time of day, etc. To develop a better understanding of the flows going to the MPS, we recommend the following next steps to be conducted during the final design phase:

- Install Flow Meters at SMH-901, 909, 919, and 937 to measure flows to the MPS from each sewer section
- Continue to collect CSO flow data at each Diversion Structure
- Update the SewerCAD model and calibrate
- Develop SewerCAD models for each sewer capacity option described below

Following these initial steps, there are three options moving forward:

Option 1: Continue to evaluate the conditions at the Diversion Structures and MPS before and after the MPS upgrade considering the Town continues to search for and eliminate sources of I/I to the collection system.

Option 2: Increase sewer capacity by installing a new pipe from SMH-956 back to the MPS to intercept CSO flow prior to going to Clemson Pond. This could be included as part of the MPS Upgrade or completed later. This would include about 130-ft of new pipe; however, impacts to the MPS hydraulics would need to be evaluated.

Option 3: Increase sewer capacity by upsizing the pipe sections from the Spring Street Diversion Structure to SMH-938. This could be included as part of the MPS Upgrade or completed later. This would include installation of about 680-ft of new pipe via open-trench or pipe-bursting. Impacts to downtown traffic would need to be evaluated.

Appendix E

Exeter, NH Dyed Water Testing, Flow Assessment Services, Inc.,
September 1, 2016

Underwood Engineers
25 Vaughn Mall
Portsmouth, NH 03801
Attn: Cole Melendy

September 1, 2016

Re: Exeter, NH
Dyed Water Testing

On August 17, 2016, a field crew from Flow Assessment Services LLC conducted dyed tests at 30 Linden Street in Exeter, NH.

Dyed water tests are conducted by introducing dyed water into a potential inflow source, such as roof leaders, driveway drains, yard drains, basement drains, and sump pumps. Sanitary manholes downstream of the test area are monitored for the presence of dye, along with surface areas adjacent to the test location. If an external source tested positive to the sanitary sewer, a drainage area and a runoff coefficient was assigned. Lawns and open soils are assigned a runoff coefficient of 0.3 and pavement, concrete or roof surfaces are assigned a 0.9 runoff coefficient.

The dyed water test results are included in this report with the source tested, type of test and results/observations with applicable drainage area if positive to sanitary.

Additionally, we have included photos with description, taken during the testing.

Should you have any questions, please let us know.

Sincerely,

J.T. Lapointe
Data Analyst

Linden St
Gill St
dmh2
smh 4
smh 3
cb 4
12
11
10
9
8
cb 3
sp 2
roof leader
17
18
19
7
6
16
cb 5
cb 2
5
sp 1
smh 2
15
14
4
3
stairwell drain 1
stairwell drain 2
dmh 1
cb 1
1
2
cb 8
cb 7
smh 1
Roof Drain
cb 6
N

EXETER, NH
DYE TEST RESULTS
30 LINDEN STREET
AUGUST 17, 2016

SUSPECT SOURCE	TEST	RESULT	IMAGE #
Driveway Drain	Dye Test	Connects to Sump Pump 1 Effective Drainage Area 26' x 16' x 0.9	8947, 8948
Sump Pump 1	Dye Test	Connects to Sanitary Manhole 1 via Sanitary Manhole 2	8948, 8950
Catch Basin 5	Dye Test	Connects to Catch Basin 1	8949, 8951
Roof Drain 1	Sound Test	Connects to Catch Basin 1	~
Roof Drain 2	Sound Test	Connects to Roof Drain 1	~
Roof Drain 3	Sound Test	Connects to Roof Drain 2	~
Roof Drain 4	Sound Test	Connects to Roof Drain 3	~
Roof Drain 5	Sound Test	Connects to Roof Drain 4	~
Roof Drain 7	Sound Test	Connects to Roof Drain 6	~
Roof Drain 6	Sound Test	Connects to Roof Drain 8	~
Roof Drain 9	Sound Test	Connects to Roof Drain 10	~
Roof Drain 8	Sound Test	Connects to Roof Drain 10	~
Roof Drain 10	Sound Test	Connects to Roof Drain 11	~
Roof Drain 12	Sound Test	Connects to Roof Drain 11	~
Roof Drain 11	Dye Test	Connects to Catch Basin 4	8954
Catch Basin 4	Sound Test	Connects to Drain Manhole 2	~
Catch Basin 2	Sound Test	Connects to Catch Basin 1	~
Catch Basin 3	Sound Test	Connects to Drain Manhole 1	~
Roof Drain 15	Sound Test	Connects to Catch Basin 5	~
Roof Drain 16	Sound Test	Connects to Catch Basin 5	~
Roof Drain 17	Sound Test	Connects to Catch Basin 5	~
Roof Drain 19	Sound Test	Connects to Roof Drain 18	~
Roof Drain 18	Dye Test	Connects to Catch Basin 5	8952
Roof Drain 14	Dye Test	Connects to Catch Basin 8	8953
Sump Pump 2	Dye Test	Connects to Sanitary Manhole 3	8955
Stairwell Drain 1	Dye Test	Dye Not Seen	8956
Stairwell Drain 2	Dye Test	Dye Not Seen	8957
Roof Leader	Dye Test	Dye Not Seen	~

FLOW ASSESSMENT SERVICES

EXETER, NH
30 LINDEN STREET
DYE TESTING
PHOTO LOG

JPG # (OXX.JPG)	STRUCTURE	DESCRIPTION
8947	Driveway Drain	Dyed water added
8948	Sump Pump 1 (sp 1)	Dyed water from driveway drain observed
8949	Catch Basin 5 (cb 5)	Dyed water added to outgoing PVC line
8950	Sanitary Manhole 1 (smh 1)	Dyed water from Sump Pump 1 observed entering from North lateral, (8:00 in photo)
8951	Catch Basin 1 (cb 1)	Dyed water from Catch Basin 5 observed entering Northeast lateral, (11:30 in photo)
8952	Catch Basin 5 (cb 5)	Dyed water from Roof Drain 18 observed entering Northeast lateral, (7:00 in photo)
8953	Catch Basin 8 (cb 8)	Dyed water from Roof Drain 14 observed entering from Southeast lateral, (11:00 in photo)
8954	Catch Basin 4 (cb 4)	Dyed water from Roof Drain 11 observed entering from Southeast lateral, (9:00 in photo)
8955	Sanitary Manhole 3 (smh 3)	Dyed water observed entering Sanitary Manhole 3 from Southeast lateral, (12:00 in photo)
8956	Stairwell Drain 2	Dyed water not seen
8957	Stairwell Drain 1	Dyed water not seen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FLOW
ASSESSMENT SERVICES


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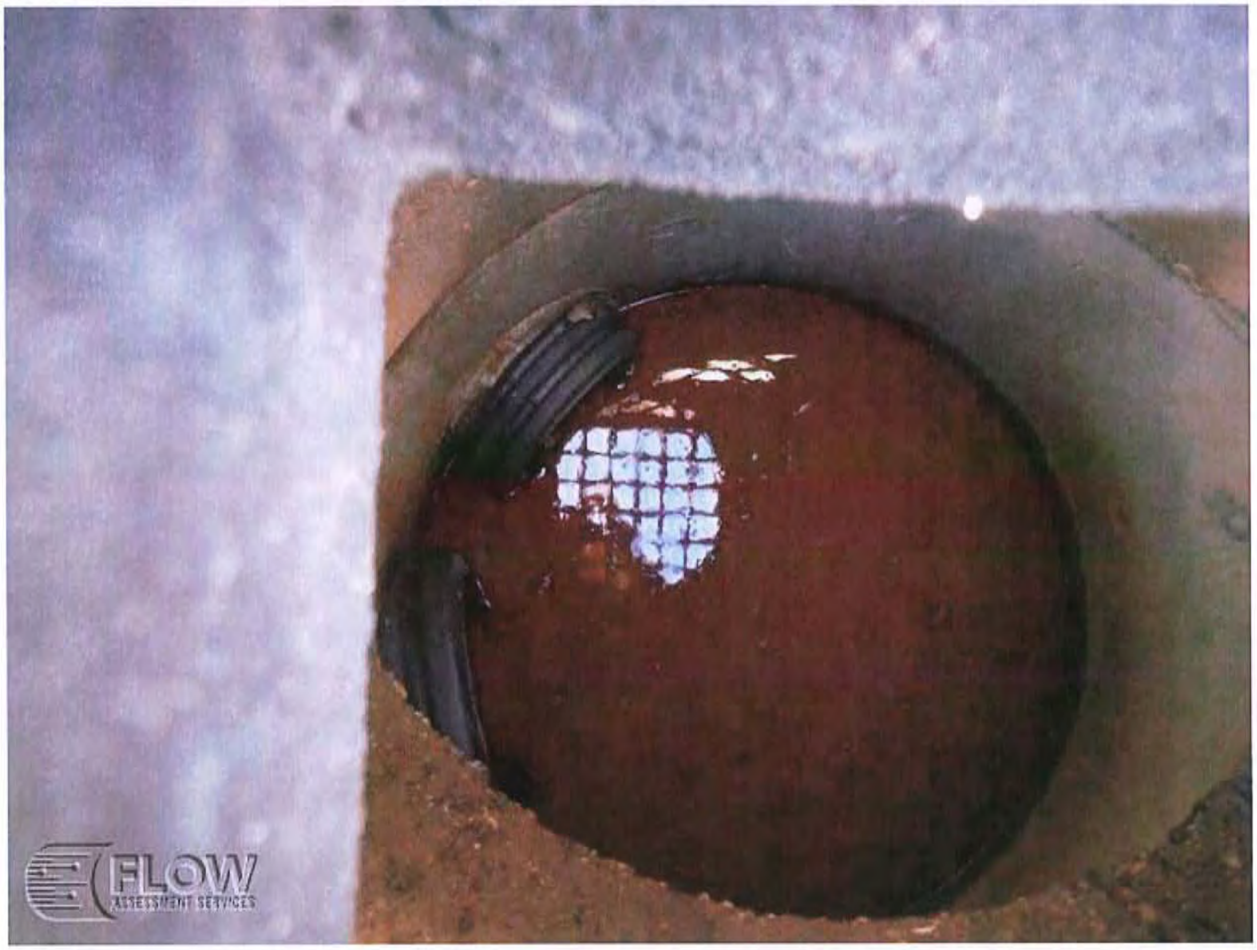


FLOW
ASSESSMENT SERVICES


22
FLOW
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21
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ASSESSMENT SERVICES

Appendix F

Engineer's Opinion of Probable Costs

Westside Drive Sump Pump Mitigation Alternatives

Alternative 1 - Roadside Swale Sump Pump Discharge Conveyance
Engineer's Opinion of Probable Construction Cost
Westside Drive Pilot Area Alternative Analysis
CSO LTCP Exeter, NH

Item	Quantity	Units	Unit Price	Probable Cost
General Conditions (8%)	1	LS	$24,400.00	$24,400.00
Roadside Swales with Aggregate Underdrain	4000	LF	$35.00	$140,000.00
12" CPP Drain	700	LF	$50.00	$35,000.00
Drop Inlets	8	EA	$3,000.00	$24,000.00
Handwork Pavement	700	LF	$30.00	$21,000.00
Existing Drain and Outlet Modifications	5	EA	$15,000.00	$75,000.00
Misc work & cleanup	1	LS	$10,000.00	$10,000.00
SUBTOTAL				**$329,400.00**
Contingency 20%	*(20% of subtotal)*			$65,880.00
SUBTOTAL PROBABLE CONSTRUCTION COST	*(Subtotal plus contingency)*			**$395,280.00**
Desing Engineering and Construction Servies	*(25% of subtotal)*			$98,820.00
TOTAL PROJECT COSTS YEAR 2016				**$495,000**

Alternative 2 - Perforated Underdrain Sump Pump Discharge Conveyance and Drain Services
Engineer's Opinion of Probable Construction Cost
Westside Drive Pilot Area Alternative Analysis
CSO LTCP Exeter, NH

Item	Quantity	Units	Unit Price	Probable Cost
General Conditions (8%)	1	LS	$32,000.00	$32,000.00
12" CPP Drain	3000	LF	$50.00	$150,000.00
Drop Inlets/Catch Basins	13	EA	$3,000.00	$39,000.00
Drain Services and Cleanout to ROW	16	EA	$1,500.00	$24,000.00
Existing Drain and Outlet Modifications	5	EA	$15,000.00	$75,000.00
Handwork Pavement	3400	LF	$30.00	$102,000.00
Misc work & cleanup	1	LS	$10,000.00	$10,000.00
SUBTOTAL				**$432,000.00**
Contingency 20%	*(20% of subtotal)*			$86,400.00
SUBTOTAL PROBABLE CONSTRUCTION COST	*(Subtotal plus contingency)*			**$518,400.00**
Desing Engineering and Construction Servies	*(25% of subtotal)*			$129,600.00
TOTAL PROJECT COSTS YEAR 2016				**$648,000**

Alternative 3 - Sump Pump Force Main and Lateral Connections
Engineer's Opinion of Probable Construction Cost
Westside Drive Pilot Area Alternative Analysis
CSO LTCP Exeter, NH

Item	Quantity	Units	Unit Price	Probable Cost
General Conditions (8%)	1	LS	$33,520.00	$33,520.00
4" HDPE Force Main	3000	LF	$60.00	$180,000.00
Cleanout Manholes	6	EA	$3,000.00	$18,000.00
Lateral Connection Assemblies to ROW	17	EA	$2,000.00	$34,000.00
Existing Drain and Outlet Modifications	5	EA	$15,000.00	$75,000.00
Handwork Pavement	3400	LF	$30.00	$102,000.00
Misc work & cleanup	1	LS	$10,000.00	$10,000.00
Private LPS Sump Pump and Connection to ROW Stub	17	LS	$7,500.00	$127,500.00
SUBTOTAL				**$580,020.00**
Contingency 20%	*(20% of subtotal)*			$116,004.00
SUBTOTAL PROBABLE CONSTRUCTION COST	*(Subtotal plus contingency)*			**$696,024.00**
Desing Engineering and Construction Servies	*(25% of subtotal)*			$174,006.00
TOTAL PUBLIC AND PRIVATE PROJECT COSTS YEAR 2016				**$871,000**

Appendix G

Excerpts from: *Public Outreach and Private I/I Mitigation Program (2015) CSO LTCP Implementation,* Underwood Engineers, dated January 12, 2016

Appendix E

List of Respondents Reporting Sump Pumps

List of Respondants Reporting Suspected Sump Pumps to Sewer

First Name	Last Name	Street Number	Street	Lot #	Tax Map	Phone	#3 Basement Sink	#3 Cellar Floor Drain	#3 Basement Sewer Pipes	#3 Describe
Robert	Root	6	Appledore Avenue			603-778-0600			X	
Laurie	Goupil	37	Bell Ave	38	83	603-772-8678			X	
William	Meehan	3	Blossom Lane	45	85				X	
Alexander H.	Buxton	12	Bonnie Dr			603-793-6346			X	
Katherine	Boudreau	11	Bonnie Dr			603-770-8717			X	
Jeff & Lesley	Dickson	23	Brentwood Road						X	
Catherine & Stephen	Schaefer	18	Brentwood Road	23	62				X	We bought house about 1 1/2 yrs ago and had no idea it was a problem.
Sean	O'Reilly	6	Carriage Drive			603-772-5831			X	
M. Scott	Carhlse III	14	Cass Street	266	63	603-772-2086			X	sump pump for front half of basement (closest to street) into sewer pipe, perimeter drain beneath rear half of basment discharges to STORM drain vis second sump pump and pipe to street approved by DPW in 2003.
Hirsch Realty Trust		5	Cass Street			603-534-2348			X	
Anton	Meulen	1	Colonial Way						X	
PEA		15	Colonial Way						X	
Virgina	Velardo	51	Columbus Ave						X	

List of Respondants Reporting Suspected Sump Pumps to Sewer

First Name	Last Name	Street Number	Street	Lot #	Tax Map	Phone	#3 Basement Sink	#3 Cellar Floor Drain	#3 Basement Sewer Pipes	#3 Describe
Daniel	Hummel	54	Columbus Ave	86	63	603-772-5986	X	X	X	I have made arrangements with a plumber to have the cellar floor drain pump on to the ground outside
Bruce	Wolfe	52	Columbus Ave				X			
Peter	Kennedy	58	Columbus Ave						X	
Susan	Eiserman	2	Conant Lane			603-819-8582			X	
Philip	Capasso	106	Court Street			603-772-1043			X	
Andrew	Stollar	155	Court Street			603-772-2309		X		in the attached but separate apartment
Philip	Capasso	106	Court Street			772-1043			X	
Charles	Bittner	29	Crawford Avenue					X		Sump Pump in front house, but not rear house
Germaine	LeBlanc	35	Crawford Avenue						X	
Paula & Mike	Oliveira	3	Crawford Avenue			603-772-3230			X	
Scott	Burley	1	Crestview Dr				X			
	Zigmont	22	Crestview Dr			978-239-2370			X	

List of Respondants Reporting Suspected Sump Pumps to Sewer

First Name	Last Name	Street Number	Street	Lot #	Tax Map	Phone	#3 Basement Sink	#3 Cellar Floor Drain	#3 Basement Sewer Pipes	#3 Describe
Glenn	Walker		Crestview Drive	45	62			X		And water flows to a pipe that is connected to the catch basin and into a stream leading to little river behind house (to the best of my knowledge)
Douglas	Sharek	18	Cullen Way						X	
Winnifred	McKay	1	Douglass Way			603-772-3933		X		
Don/Ursula	Nolte	9	Drinkwater Road	93	85	603-583-5668			X	
PEA	Wells Kerr	12	Elliot Street						X	
C.	Tucker	16	Epping Road			603-770-6998			X	Dry wall-5 one
Deb	Humiston	50	Epping Road						X	
Robert	Dufour	9	Exeter Falls Drive						X	
D.	Tuck Properties	9	Forest Street					X		
David	Bohn	72	Front St	188	72	603-772-6293			X	
Stanley	Rock	224	Front Street					X		
PEA	Buzell	86	Front Street				X			
PEA	Dow	75	Front Street					X		
Jeffrey	Smith	5	Fuller Lane						X	
Deanna	Clevesy	22	Gary Lane						X	
Donald	Morrisette	2	Gary Lane	22	94				X	
Donna	Griswold	4	Glenerin Lane			603-770-9392			X	
Pamela	King	12	Green Hill Road			265-0445			X	

List of Respondants Reporting Suspected Sump Pumps to Sewer

First Name	Last Name	Street Number	Street	Lot #	Tax Map	Phone	#3 Basement Sink	#3 Cellar Floor Drain	#3 Basement Sewer Pipes	#3 Describe
Heather & Bob	Froumy	14/16	Green Street			603-773-0220		X	X	
Brian	Fieldsend	14	Guinea Road						X	
Leo R.	Bush	19	Hall Place					X		
Margaret	Moody	16	Harvard Street	73	171				X	
Daniel	Heffernan	32	Haven Lane	37	65	603-502-3264			X	
Kathleen	Pohle	34	Haven Lane			603-502-7991			X	
Jean Ellen	Hayes	37	Haven Lane	65	40	603-686-1943		X		not connected to town
Alan	Randle	157	High Street						X	
Kathryn	Schwartz	187	High Street						X	
Martin	Meyers	113	High Street			603-247-3088			X	
Lorraine	Sawyer	20-22	High Street			770-8029			X	Lorraine took list of plumbers from Town as removal would be easy and inexpensive.
Stephen	Paine	5	Hunter Place	T9	2048				X	
Patrick	Ford	11	Hunter Place	5	86				X	
Marie	Janvrin	3	Jady Hill Court						X	
Laura & Dan	Smith	4	Langdon Ave			603-772-8754			X	
Elaine	Hays	2	Lantern Lane	28	70	not provided		X		
Charles	Nelson	1	Lantern Lane			431-8043			X	
Barbara	Young	1D	Leary Court						X	
Timothy	Jones	5	Little Pine Lane	14	85			X	X	
Pearl	Reynolds	13	Locust Ave						X	
Jared	Sheehan	15	Locust Ave	142	63				X	
Gregory	Hankin	81	Main St.						X	

List of Respondants Reporting Suspected Sump Pumps to Sewer

First Name	Last Name	Street Number	Street	Lot #	Tax Map	Phone	#3 Basement Sink	#3 Cellar Floor Drain	#3 Basement Sewer Pipes	#3 Describe
Jack	Dion	70	Main Street	5	63				X	
PEA	Hooper	29	Main Street					X		
PEA	Sleeper	31	Main Street					X		
PEA	Dutch	33	Main Street					X		
PEA	Beaton	37	Main Street						X	
Joyce	Allen	1	Meadow Lane	43	85	603-772-5066	X			
Michael and Erin	McGinley	4	Orchard Circle			603-264-9692			X	
Thomas	Coates	37	Park Street	225	63				X	
James & Julie	Osburn	3	Penn Lane				X			
Randy	Houde	25-29	Pleasant Street			978-289-2121		X		
Clec & Doris	Castonguay	8	Pleasant View Drive						X	seldom operates
	Foy Insurance	64	Portsmouth Ave	115	65				X	No, we have one going outside
	Dagastino	134	Portsmouth Ave	106	52				X	
Michele	Caron	29	Prentiss Way			603-583-0275		X		
		22	Prospect Street						X	
	Ridgecrest Dr. Realty Trust	10	Ridgecrest dr	31	52	603-312-1649			X	
Susan	Ouellet	9	River Bend Circle	104	21				X	
Joe	Fisher	36	River Street						X	

List of Respondants Reporting Suspected Sump Pumps to Sewer

First Name	Last Name	Street Number	Street	Lot #	Tax Map	Phone	#3 Basement Sink	#3 Cellar Floor Drain	#3 Basement Sewer Pipes	#3 Describe
Steve	Halloran	4	Salem Street	215	63				X	
Sheila	Ray	4	Salem Street			770-0430			X	3 Sump Pumps
George	Sweeney	8	Scammon Lane						X	
Robert	Baker Sr.	7	Scammon Lane	4	81	603-944-6584			X	
Sam & Mike	Ostoff	2	Scammon Lane			603-793-2500			X	
Robert	Baker	7	Scammon Lane	4	81	944-6584			X	
Giang	Plankone	6	Silvio Drive	47	74	603-580-2537			X	
Raymond	Morin	4	Spruce Street			not provided	X			
Sean	McDermott	3.5	Spruce Street						X	
Raymond	Morin	4	Spruce Street			772-3236	X			
Paul	Scheider	8	Summer Street			603-770-7302			X	
Summer Street, LP		5	Summer Street						X	
Mat	Pearson	9	Tamarind Lane						X	
Teresa	Moran	14	Tamarind Lane			603-772-2058		X		
PEA	Doctor's House	16	Tan Lane						X	
Margaret	Sutherland	3	Thornton St	T1	1664	978-857-9915		X	X (not sure)	
Paul	Walker	5	Tilton Avenue						X	
Christine	Lowe	18	Tremont Street						X	
Kelly	Mertinooke	1	Wadleigh St	209	63	603-778-8313			X	

List of Respondants Reporting Suspected Sump Pumps to Sewer

First Name	Last Name	Street Number	Street	Lot #	Tax Map	Phone	#3 Basement Sink	#3 Cellar Floor Drain	#3 Basement Sewer Pipes	#3 Describe
Jim	Moser	62	Washington and 47/49 Washington St				X			
Margaret & Richard	Aaronian	68	Washington St	16	61				X	
Derek	Torrey	41	Washington St			312-420-9252			X	
Thomas	Manix	5	Webster Ave	21	52				X	
Jonathan	Flewelling	6	Wentworth St					X		
Christopher	Gurshin	19	Westside Dr	42	81				X	
Anne	Commbs	8	Westside Dr	58	74			X		which goes into the drain leading to under the street
William	Oscroft	8	Wheelwright Ave					X		
William	Compton	1	Wheelwright Ave			603-772-3239			X	
Clem & Christine	Streck	10	Whitley Rd	27	63	603-772-1452			X	
Michael	Shore	6	Whitley Rd						X	
Neil	Hartlock	5	Whitley Rd						X	
Anthony	Shea	6	Winslow Drive			not provided		X		
Ian & Elizabeth	Loch	41	Winter St						X	
Anush & Al	Hansen	33	Winter St						X	
Jim & Kate	Aeschliman	45	Winter Street						X	

List of Respondants Reporting Suspected Sump Pumps to Sewer

First Name	Last Name	Street Number	Street	Lot #	Tax Map	Phone	#3 Basement Sink	#3 Cellar Floor Drain	#3 Basement Sewer Pipes	#3 Describe
Lundy	Smith	70	Washington Street	17	62	603-770-3899			x	2 sumps were connected to sewer when I bought the house. I replaced one-it discharges into my backyard. Other still connected.

Appendix F

List of Respondents Reporting Downspouts into Ground

List of Respondants Reporting Downspouts into Ground

First Name	Last Name	Street Number	Street	Lot #	Tax Map	Phone
127 Water Street Realty Inc.		127				
Hanna	Schaffer	15	Ash Street			
Lawrence	Clothey	18	Ashbrook Road	30	90	
Robert	Bergan	15	Bayberry Lane	47	86	
Laurie	Goupil	37	Bell Ave	38	83	603-772-8678
Richard	Hughes	29	Bell Ave	40	83	
Brian	Kaputa	5	Blossom Lane			
William	Meehan	3	Blossom Lane	45	85	
Katherine	Boudreau	11	Bonnie Dr			603-770-8717
Jeff & Lesley	Dickson	23	Brentwood Road			
James & Amy	Streck	26	Brentwood Road			
Edward	Carmody	26	Carroll Street	7	1526	603-777-0977
	Berrien	7	Coach Rd			
Richard	Crosbie	18	Colonial Way	11	75	
Peter	Kennedy	58	Columbus Ave			
Arlene	Ballantyne	131	Court Street	17		
Casey	Kim	69	Court Street			
Philip	Mallinson	74	Court Street			
Muisel	Campana	12	Crawford Avenue			603-778-2717
George	Adamakoj	4	Dearborn Brook Cir.			603-580-3833
Michael	Cassavaugh	12	Douglass Way			772-9579
	Goudreaulz	8	Douglass Way	7	65	
Don	Nolte	9	Drinkwater Road	93	85	583-5668
PEA	Saltonstall	31	Elliot Street			
PEA	Wells Kerr	12	Elliot Street			
C.	Tucker	16	Epping Road			603-770-6998
John	Livermore	7	Exeter Falls Drive	3	108	
Eugene	Lambert	2	Exeter Farms Rd	87		
Barbara	Tack	9	Folsom Court			
Garvin	Louie	14	Folsom St			
Karen	Clarlee	7	Fox Chapel Ct	76	71	
Jennifer	Young	84	Front St	90	71	603-770-7887 (h) 603-430-4459 (w)

List of Respondants Reporting Downspouts into Ground

First Name	Last Name	Street Number	Street	Lot #	Tax Map	Phone
Anne	Bushwell	12	Front Street			
Barrie & Barbara	Paster	100	Front Street			
Anthony	Chouinard	9	Fuller Lane			
David	Poulin	19	Gary Lane			603-778-9066
	Paterna	6	Greybird Farm Circle			
Thaddeus	Jusczyic	3	Grove Street	72	180	401-286-6415
Debra	Finegan	16	Hale Street			
John	Mulcahy	4	Heritage way			
	Richards	9	Heritage Way	73	74	
Ruthanne C.	Rogers	14	Heritage Way	74-68		
Shelley	Vincent	13	Heritage way	T4	844	
Danette & Steve	Wineberg	10	Heritage Way			
Thomas	Barker	116	High Street			
Martin	Meyers	113	High Street			603-247-3088
Melanie	Drohan	6	Highland Street	65/141	1898	
James	Raymond	5	Hillside Ave			
Luke & Andrea	Benoit	1	Kathleen Drive	41	95	
Nancy	Jolly	3	Liberty Ln	t7 P1	1633	
Ann Marie	Marrinon	15	Liberty Ln			
H&J	Thayer	13	Liberty Ln			
St. Vincent	de Paul	53	Lincoln Street			
Paul	Kilian	27	Little Pine Lane	59	86	did not provide
Nance	Jordan	2	Little River Rd	86	62	
Mark	Hayner/Dodge Place Condominium Assoc.	94	Main St.			
Burchard	Stackhouse	10	Meadow Lane	37	85	
Merlin & Judith	Johns	30	Meadowood Drive	90-18-28		
	RA Languedoe	18	Meadowood Drive	34	90/18134	
Patricia	Szostak	14	Meadowood Drive	39		
James & Kathleen	Taylor	8	Penn Lane			603-772-1922 (h), 603-770-4064 (c)
Stanley	Sempolski	16	Pine Grove Rd			

List of Respondants Reporting Downspouts into Ground

First Name	Last Name	Street Number	Street	Lot #	Tax Map	Phone
John & Hilary	Ireland	27	Pine Steet			
Randy	Houde	25-29	Pleasant Street			978-289-2121
Clec & Doris	Castonguay	8	Pleasant View Drive			
Tod	McFarland	151	Portsmouth Ave			
Drew	Sunstein	6	Prentiss Way			
Anne	Young	1	Pumpkin Circle	24	85	
Robert & Dianne	Dickson	18	Ridgecrest dr	35	52	
Susan & Joseph	St. Martin	8	Ridgewood Terrace			603-642-6652
William	Semrao	20	River Bend Circle			
Shanna	McBurney	34	River Street	72	95	
Tammie & David	Munro	8	Salem Street			
Todd	Kingsbury	4	Sleepy Hollow Road			
Kathleen	Hill	22	South St			
PEA	Model	6	Spring Street			
Marc	Gagnon	5	Squamscott Circle			
Sandra	Cortright	7	Thelma Drive			778-7269
Stephen & Carol	Gallup	7	Twin Pond Circle	T1	214	
	Hutchins	20	Walnut St			603-686-6395
Robert	Moreau	15	Walnut Street			
	Sweetwater Realty LLC	27-31	Water Street			
Cathy	Stickney	8	Wayside Drive			
William & Pauline	Blonda	74	Westside Dr			
Anne	Commbs	8	Westside Dr	58	74	
Christopher	Gurshin	19	Westside Dr	42	81	
David	Walker	21	Westside Dr	41	81	
David	Smart	22	Woodlawn Circle			385-208-3755
	Stockbridge Funeral Home	141	Epping Road			603-772-0400

Appendix G

List of Respondents Reporting Illegal Sewer Connections

List of Respondants Reporting Illicit Connections

First Name	Last Name	Street Number	Street	Phone	Floor Drain to Sewer	Foundation Drain to Sewer	Yard Drain to Sewer	Roof drain to Sewer	Gutters with Downspouts to Sewer	Sump Pumps to Sewer	Comments
Robert	Root	6	Appledore Avenue	603-778-0600						X	
Suzanne	Bowman	14	Bayberry Lane						X		into lawn
Scott &	Carrigan	17	Bell Ave		X						
Laurie	Goupil	37	Bell Ave	603-772-8678						X	
Sally	Coles	11	Bittersweet Ln			X					
William	Meehan	3	Blossom Lane							X	
Katherine	Boudreau	11	Bonnie Dr	603-770-8717						X	
Alexander	Buxton	12	Bonnie Dr	603-793-6346						X	
Dianne	Dedam	5	Bonnie Dr		X						Jady Hill Project Separation
Jeff & Lesley	Dickson	23	Brentwood Road							X	
Anthony	Hall	38	Brentwood Road						X		one onto ground
Lydia &	Hoyt	13	Brentwood Road		X						
Sean	O'Reilly	6	Carriage Drive	603-772-5831						X	
M. Scott	Carhlse III	14	Cass Street	603-772-2086						X	
Hirsch		5	Cass Street	603-534-2348						X	
Anton	Meulen	1	Colonial Way							X	
Daniel	Hummel	54	Columbus Ave	603-772-5986		X				X	
Peter	Kennedy	58	Columbus Ave							X	
John	Maxwell	55	Columbus Ave		X						
Chris/ Nicole	Urner/ Martineau	9	Columbus Ave		X						100 year old house and system
Virgina	Velardo	51	Columbus Ave							X	
Susan	Eiserman	2	Conant Lane	603-819-8582	X					X	
Philip	Capasso	106	Court Street	772-1043						X	
Rev. Dr. David	Lennox	96	Court Street	603-772-1045 after Aug 25						X	

List of Respondants Reporting Illicit Connections

First Name	Last Name	Street Number	Street	Phone	Floor Drain to Sewer	Foundation Drain to Sewer	Yard Drain to Sewer	Roof drain to Sewer	Gutters with Downspouts to Sewer	Sump Pumps to Sewer	Comments
Randy	Tallent	131	Court Street, #4						X		
Muisel	Campana	12	Crawford Avenue	603-778-2717						X	
Germaine	LeBlanc	35	Crawford Avenue							X	
Paula & Mike	Oliveira	3	Crawford Avenue	603-772-3230						X	
Virginia	Bernier	3	Crestview Dr	603-772-3895	X						
Scott	Burley	1	Crestview Dr							X	
	Zigmont	22	Crestview Dr	978-239-2370						X	
	Boynton	6	Cullen Way				X				Put in by town
Douglas	Sharek	18	Cullen Way							X	
George	Adamakoj	4	Dearborn Brook Cir.	603-580-3833					X		
	Goudreaulz	8	Douglass Way						X		
PEA	Saltonstall	31	Elliot Street							X	
PEA	Wells Kerr	12	Elliot Street							X	
Everett	Evans	22	Epping Road		X						capped basement drain/cleanout
Daniel	Gillbert D&G Partners	150	Epping Road		X						
Deb	Humiston	50	Epping Road							X	
Eugene	Niedzielski	10	Epping Road						X		1/3 back roof has gutter draining onto the ground

List of Respondants Reporting Illicit Connections

First Name	Last Name	Street Number	Street	Phone	Floor Drain to Sewer	Foundation Drain to Sewer	Yard Drain to Sewer	Roof drain to Sewer	Gutters with Downspouts to Sewer	Sump Pumps to Sewer	Comments
C.	Tucker	16	Epping Road	603-770-6998						X	One-note that sanitary sewer is still in front of house I think
Autosounds of NH		61	Epping Road	603-778-1402 Tom Hemenway	X						
Robert	Dufour	9	Exeter Falls Drive							X	
Don	Sun	42	Exeter Farms Rd	603-313-0009					X		
Doug	Roselte	18	Folsom St						X		
Karen	Clarlee	7	Fox Chapel Ct						X		
David	Bohn	72	Front St	603-772-6293						X	
Red	Hip LLC	131	Front St				X				
PEA	Buzell	86	Front Street							X	
PEA	Dow	75	Front Street							X	
Stanley	Rock	224	Front Street		X					X	
PEA	Traphagan	74	Front Street							X	
PEA		76	Front Street							X	
Jeffrey	Smith	5	Fuller Lane							X	
Susan	Gorman	19	Garfield St						X		
Deanna	Clevesy	22	Gary Lane							X	not anymore disconnected on 6/19/15
Donald	Morrisette	2	Gary Lane							X	
Donna	Griswold	4	Glenerin Lane	603-770-9392	X					X	
Pamela	King	12	Green Hill Road	265-0445	X	X					
Heather & Bob	Froumy	14/16	Green Street	603-773-0220						X	

List of Respondants Reporting Illicit Connections

First Name	Last Name	Street Number	Street	Phone	Floor Drain to Sewer	Foundation Drain to Sewer	Yard Drain to Sewer	Roof drain to Sewer	Gutters with Downspouts to Sewer	Sump Pumps to Sewer	Comments
Brian	Fieldsend	14	Guinea Road							X	
Leo R.	Bush	19	Hall Place		X					X	
Malcolm	Graves Sr	40	Hampton Rd C10	1-203-749-2331	X						
Langdon Place of Exeter		17	Hampton Road	603-772-5251 x:120 Carl Murphy	X					X	
Arthur & Lucille	French	29	Haven Lane							X	
Daniel	Heffernan	32	Haven Lane	603-502-3264						X	
Kathleen	Pohle	34	Haven Lane	603-502-7991						X	
Greg	Mahanna	24-26	High Street	603-498-1473	X						
Martin	Meyers	113	High Street	603-247-3088						X	
Kathryn	Schwartz	187	High Street							X	one for sump pump only
RCMP Realty Trust		47-49	High Street		X		X				See back side of street
Patrick	Ford	11	Hunter Place							X	sump pump and connection were there prior yo our purchase of home
Stephen	Paine	5	Hunter Place							X	
Charlie	Mabardy	2	Jady Hill Circle						X		
Marie	Janvrin	3	Jady Hill Court							X	
Samuel	Lightner	1	Jady Hill Court			X					
Laura & Dan	Smith	4	Langdon Ave	603-772-8754						X	

List of Respondants Reporting Illicit Connections

First Name	Last Name	Street Number	Street	Phone	Floor Drain to Sewer	Foundation Drain to Sewer	Yard Drain to Sewer	Roof drain to Sewer	Gutters with Downspouts to Sewer	Sump Pumps to Sewer	Comments
Elaine	Hays	2	Lantern Lane	not provided						X	
Barbara	Young	1D	Leary Court							X	
Chris	Umbreit	9	Leary Ct	603-702-2036					X		
Philip	Bogdongff	17	Liberty Ln					X			
Ann Marie	Marrinon	15	Liberty Ln			X			X		
Timothy	Jones	5	Little Pine Lane		X					X	
Paul	Kilian	27	Little Pine Lane	did not provide	X						don't know maybe floor drain
Nick	Papakonstantis	11	Little Pine Lane							X	
Pearl	Reynolds	13	Locust Ave							X	
Jared	Sheehan	15	Locust Ave							X	
Gregory	Hankin	81	Main St.							X	
PEA	Beaton	37	Main Street							X	
Jack	Dion	70	Main Street							X	It wasn't properly installed by others. I have only seen water in it a couple of times.
PEA	Dutch	33	Main Street							X	
PEA	Hooper	29	Main Street							X	
PEA	Sleeper	31	Main Street							X	
PEA	Veazey	25	Main Street							X	
Joyce	Allen	1	Meadow Lane	603-772-5066						X	
	Moore	5	Milson Dr	upnh20@comcast.net	X	X					Unsure if floor drain or fondation drain are connected to sewer.

List of Respondants Reporting Illicit Connections

First Name	Last Name	Street Number	Street	Phone	Floor Drain to Sewer	Foundation Drain to Sewer	Yard Drain to Sewer	Roof drain to Sewer	Gutters with Downspouts to Sewer	Sump Pumps to Sewer	Comments
Michael and Erin	McGinley	4	Orchard Circle	603-264-9692						X	
Thomas	Coates	37	Park Street							X	
Steven	Ruhm	69	Park Street			X					
James & Julie	Osburn	3	Penn Lane							X	foundation drains disconnected from sewer before owning
James & Kathleen	Taylor	8	Penn Lane	603-772-1922 (h), 603-770-4064 (c)		X					
Pam	Herroa	25	Pine Street						X	X	
Clec & Doris	Castonguay	8	Pleasant View Drive							X	
	Dagastino	134	Portsmouth Ave							X	
	Foy Insurance	64	Portsmouth Ave							X	
Tod	McFarland	151	Portsmouth Ave		X						
		22	Prospect Street							X	
	Ridgecrest Dr. Realty Trust	10	Ridgecrest dr	603-312-1649						X	
Philip	Wood	16	Ridgecrest dr				X				
Beverly	Stewart	5	Ridgewood Terrace		X						
Susan	Ouellet	9	River Bend Circle							X	
Joe	Fisher	36	River Street							X	

List of Respondants Reporting Illicit Connections

First Name	Last Name	Street Number	Street	Phone	Floor Drain to Sewer	Foundation Drain to Sewer	Yard Drain to Sewer	Roof drain to Sewer	Gutters with Downspouts to Sewer	Sump Pumps to Sewer	Comments
Shanna	McBurney	34	River Street							X	Sump pump flooded drywell
Steve	Halloran	4	Salem Street							X	
Robert	Baker	7	Scammon Lane	944-6584						X	
Douglas and Robin	Barbin	3	Scammon Lane		X						Basement floor drain pipe
George	Hallett	9	Scammon Lane							X	
Sam & Mike	Ostoff	2	Scammon Lane	603-793-2500						X	
George	Sweeney	8	Scammon Lane							X	
Giang	Plankone	6	Silvio Drive	603-580-2537						X	
Elaine	Willett	2	Silvio Drive	603-772-3666						X	
William	Childs	5	Smith Ave	603-778-8498	X						floor drain not in use
Matthew	Thibodeau	25	Spruce Street	603-817-5724		X					
June	DiCicco	18	Summer Street		X						
John	Dicicco	12	Summer Street		X						
Paul	Scheider	8	Summer Street	603-770-7302						X	
Summer Street, LP		7	Summer Street							X	
Summer Street, LP		5	Summer Street							X	
Mat	Pearson	9	Tamarind Lane							X	
Margaret	Sutherland	3	Thornton St	978-857-9915						X	
Melissa/Marshall	Allen/Stephen	8	Tilton Avenue	603-557-4334 or 615-796-4031					X	X	
Paul	Walker	5	Tilton Avenue							X	

List of Respondants Reporting Illicit Connections

First Name	Last Name	Street Number	Street	Phone	Floor Drain to Sewer	Foundation Drain to Sewer	Yard Drain to Sewer	Roof drain to Sewer	Gutters with Downspouts to Sewer	Sump Pumps to Sewer	Comments
Christine	Lowe	18	Tremont Street							X	
Monroe	Belanger	4	Wadleigh St						X		
Kelly	Mertinooke	1	Wadleigh St	603-778-8313						X	runs approx 2 days a year
Joseph	O'Donnell	2	Walnut Street		X						Floor drain in basement floor
Jim	Moser	62	Washington and 47/49 Washington St							X	
Margaret & Richard	Aaronian	68	Washington St							X	
Lundy	Smith	70	Washington Street	603-770-3899						X	
Roger	Ellaus	64	Water Street		X						In the kitchen-never used
	Exeter Housing Authority	227	Water Street		X						
Brian	Kenyon	12	Water Street						X	X	
42 Water Street Condo Association		42	Water Street	603-778-0222 Susan Rislove Head Hunters Salon						X	
Kurt	Dornheim	6	Wayside Drive							X	
Thomas	Manix	5	Webster Ave							X	
Jonathan	Flewelling	6	Wentworth St							X	

List of Respondants Reporting Illicit Connections

First Name	Last Name	Street Number	Street	Phone	Floor Drain to Sewer	Foundation Drain to Sewer	Yard Drain to Sewer	Roof drain to Sewer	Gutters with Downspouts to Sewer	Sump Pumps to Sewer	Comments
Joan	Pratt	7	Wentworth St	603-778-8881 (I am away July & Aug)	X						
Anne	Commbs	8	Westside Dr		X					X	
Christopher	Gurshin	19	Westside Dr							X	
Richard	Manix	12	Westside Dr							X	
Gary	Mosher	37	Westside Dr	603-502-8855	X						
Karen & Herb	Moyer	51	Westside Dr		X						But it has been plugged since the 1970's when we experienced several sewage backups into our cellar from a backup in the street at tiltion ave westside dr near our home.
William	Compton	1	Wheelwright Ave	603-772-3239						X	
Helen	Hacer	9	Wheelwright Ave						X		
William	Oscroft	8	Wheelwright Ave							X	installed when house was build 1947
Neil	Hartlock	5	Whitley Rd							X	
Michael	Shore	6	Whitley Rd							X	
Clem & Christine	Streck	10	Whitley Rd	603-772-1452						X	
Julia	Lison	5	Winslow Drive	239-331-6383		X					

List of Respondants Reporting Illicit Connections

First Name	Last Name	Street Number	Street	Phone	Floor Drain to Sewer	Foundation Drain to Sewer	Yard Drain to Sewer	Roof drain to Sewer	Gutters with Downspouts to Sewer	Sump Pumps to Sewer	Comments
	Cotes Auto Body	58	Winter St		X						
Anush & Al	Hansen	33	Winter St							X	
Ian & Elizabeth	Loch	41	Winter St							X	
Jim & Kate	Aeschliman	45	Winter Street							X	
William	Thompson	13	Woodlawn Cir		X						

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Attachment 16
Unitil Fact Sheet
Squamscott River Outfall Restoration Project

Fact Sheet
Squamscott River Outfall Restoration Project

October, 2015

About Unitil

Unitil Corporation provides energy for life by safely and reliably delivering natural gas and electricity in New England. We are committed to the communities we serve and to developing people, business practices and technologies that lead to dependable, more efficient energy. Unitil Corporation is a public utility holding company with operations in Maine, New Hampshire and Massachusetts. Together, Unitil's operating utilities serve approximately 101,700 electric customers and 73,700 natural gas customers. For more information, visit www.unitil.com.

Project Description

Unitil, in conjunction with the Town of Exeter and the New Hampshire Department of Environmental Services (NHDES), will be conducting an environmental restoration project in the Squamscott River adjacent to Swasey Parkway. The project will remove sediment near a storm water outfall that had been impacted by the operation of a Manufactured Gas Plant (MGP) at the corner of Green and Water Streets during the period of 1864 to1955. The facility provided fuel for lighting and heating to Exeter prior to the introduction of interstate natural gas pipelines in the 1950s.

Prior to its 2008 purchase by Unitil, Northern Utilities, the previous owner of the property, completed an environmental cleanup of the lot during the period between 2001 and 2002. A Certificate of Completion was issued for the work by NHDES. In recent years, subsequent investigations by Unitil revealed a by-product of the coal gasification process, coal tar, present in the sediments of the Squamscott River adjacent to an outfall from the municipal storm water system.

Coal tar is similar in composition to asphalt or driveway sealer and can have a characteristic odor, which is often described as mothball-like. The restoration project is designed to remove the sediment containing the coal tar and improve the function of the outfall, which is currently covered by sediment.

In order to minimize disruption to the parkway, all of the restoration work will be conducted using equipment on barges in the river. Project access to the river will be limited to an area within the Exeter Department of Public Works facility on Newfields Road approximately one mile upstream. Field activities will be managed for Unitil by AECOM Technical Services, an environmental engineering with local offices in New

Hampshire and Massachusetts. The project will conducted during the period of mid-October to early December 2015, ensuring adherence to the requirements of the NHDES Fish and Game Department and limiting work activities to the day light hours as a means of minimizing inconvenience to nearby residents.

For additional Information Please Contact:

Utility Questions
Unitil Customer Service for NH Gas
Telephone: (866-933-3820)

Site Questions
Mark McCabe
AECOM Project Manager
Telephone: (508-423-9018)