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

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UE # 1936/2088

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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:

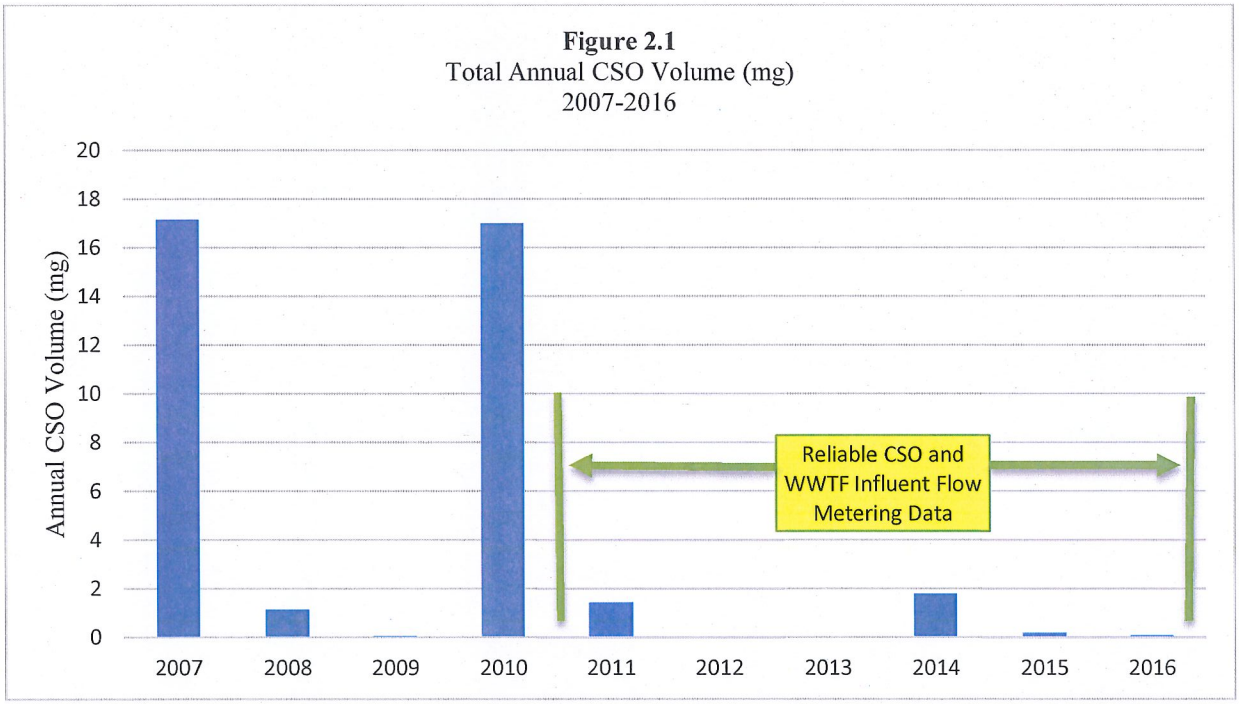
- Pressure transducer on upstream side of CSO overflow weirs (primary CSO measuring device)
- Ultrasonic on the downstream side of the overflow weirs (back-up CSO measuring device)
- Ultrasonic on the downstream side of the overflow weirs (measures receiving water 'backflow' over the weir backwards into 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

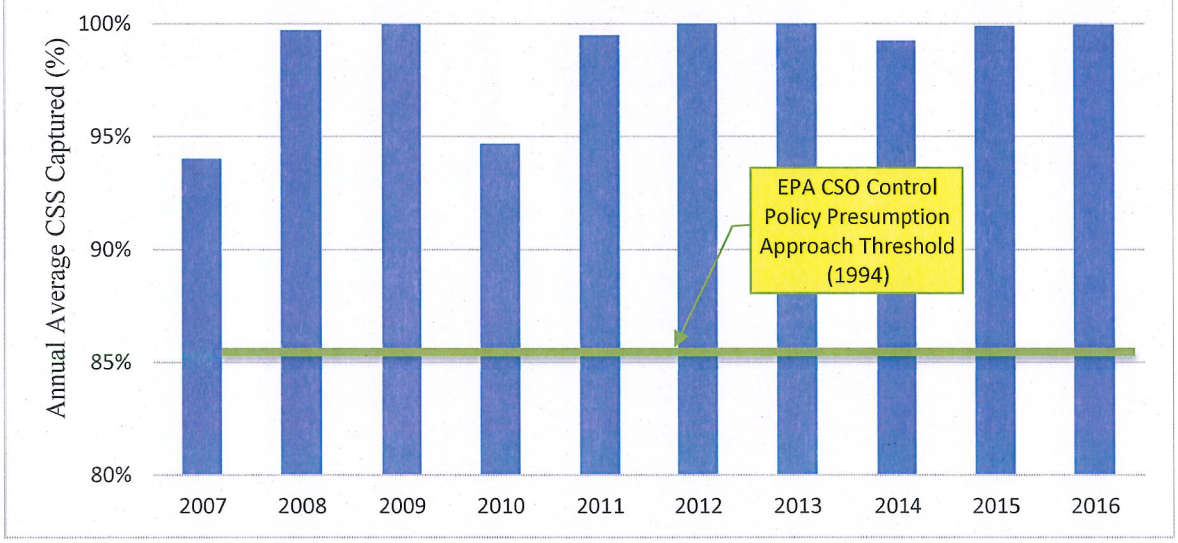


Table 1 summarizes the total and peak hour flows during the 11 CSO events that have occurred 2011- 2016 since reliable flow metering instrumentation was installed. Please note that no CSO occurred during the 9/30/15 precipitation event but this event is included due to the relatively high daily and peak 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
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

Alternative 3 – Sump Pump Force Main System

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***	***2017***	***2018***	***2019***	***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***

CSO LTCP Confirmation | *CSO LTCP Confirmation*

Actual CSO LTCP Costs	***Planned CSO LTCP Budgets***	***8-YEAR PHASE II LTCP***
$3,789,501	***$6,380,000***	***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

HEAVY SMOKE FROM DRAIN CONNECTION TO THE SEWER

NO SMOKE OBSERVED FROM PREVIOUS BULKHEAD REPAIR

LIGHT SMOKE IN CB (1) FROM LEAKING BULKHEADED CONNECTION TO SEWER

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

SCALE: 1"=200'

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

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LIGHT SMOKE IN CATCH BASINS (3) FROM LEADING BULKHEADED CONNECTIONS TO SEWER

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

SCALE: 1"=200'

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

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MANUFACTURED HOMES

N

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

NO DRAIN CONNECTIONS IDENTIFIED CONNECTED TO SEWER

CLEMSON POND

SQUAMSCOT RIVER

SCALE: 1"=200'

DATE 1/13/2017	UNDERWOOD engineers	FORMER MILL BUILDING SMOKE TESTING	FIGURE 3.3
PROJECT 1936/2088	25 Vaughan Mall, Portsmouth, N.H. 03801 Tel. 603-436-6192 Fax. 603-431-4733	CSO LTCP Update Exeter, New Hampshire	

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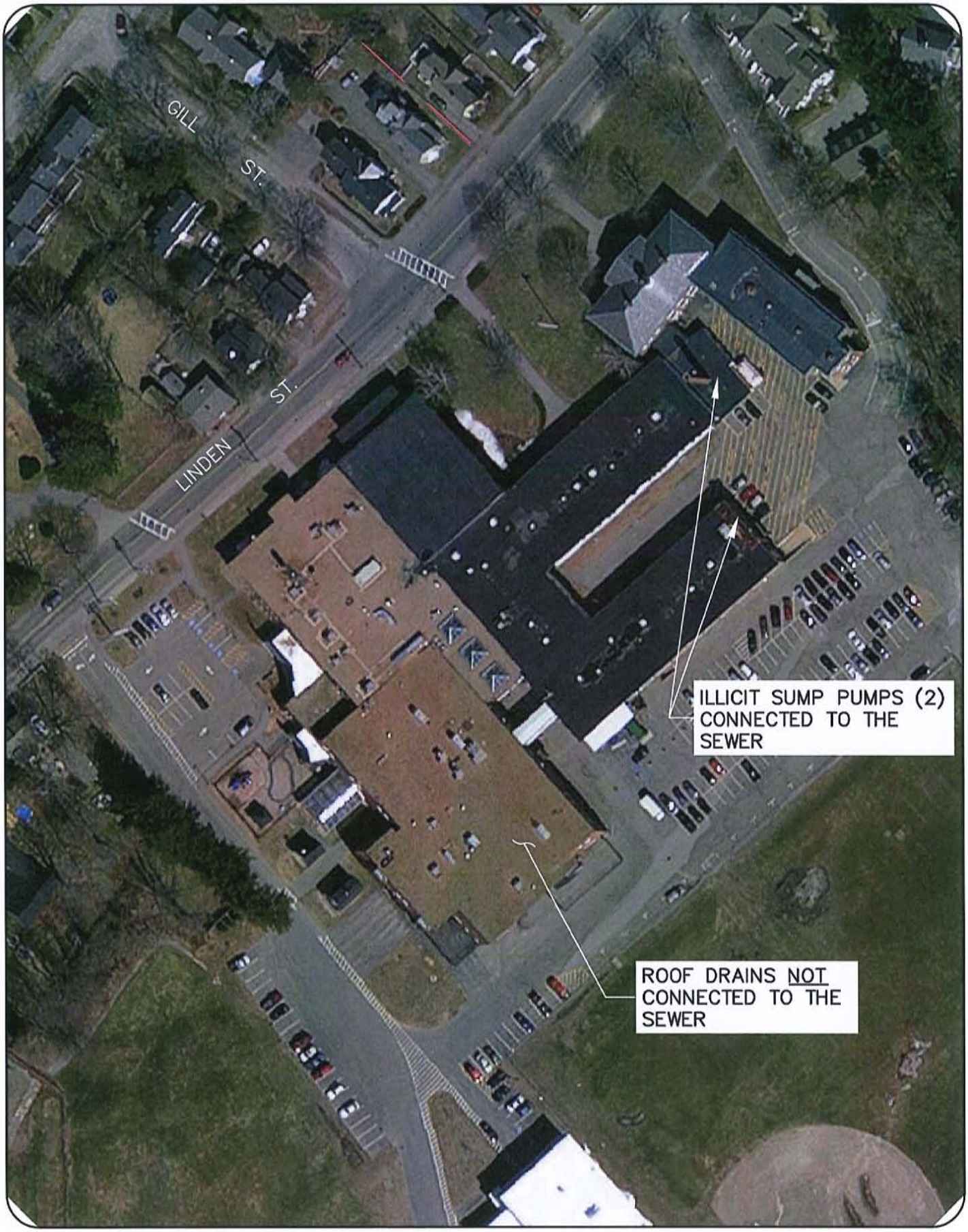

DATE		FIG.
1/13/2017	FORMER HIGH SCHOOL ILLICIT CONNECTION INVESTIGATION CSO LTCP Update Exeter, New Hampshire	3.4
PROJECT 1936/2088		

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

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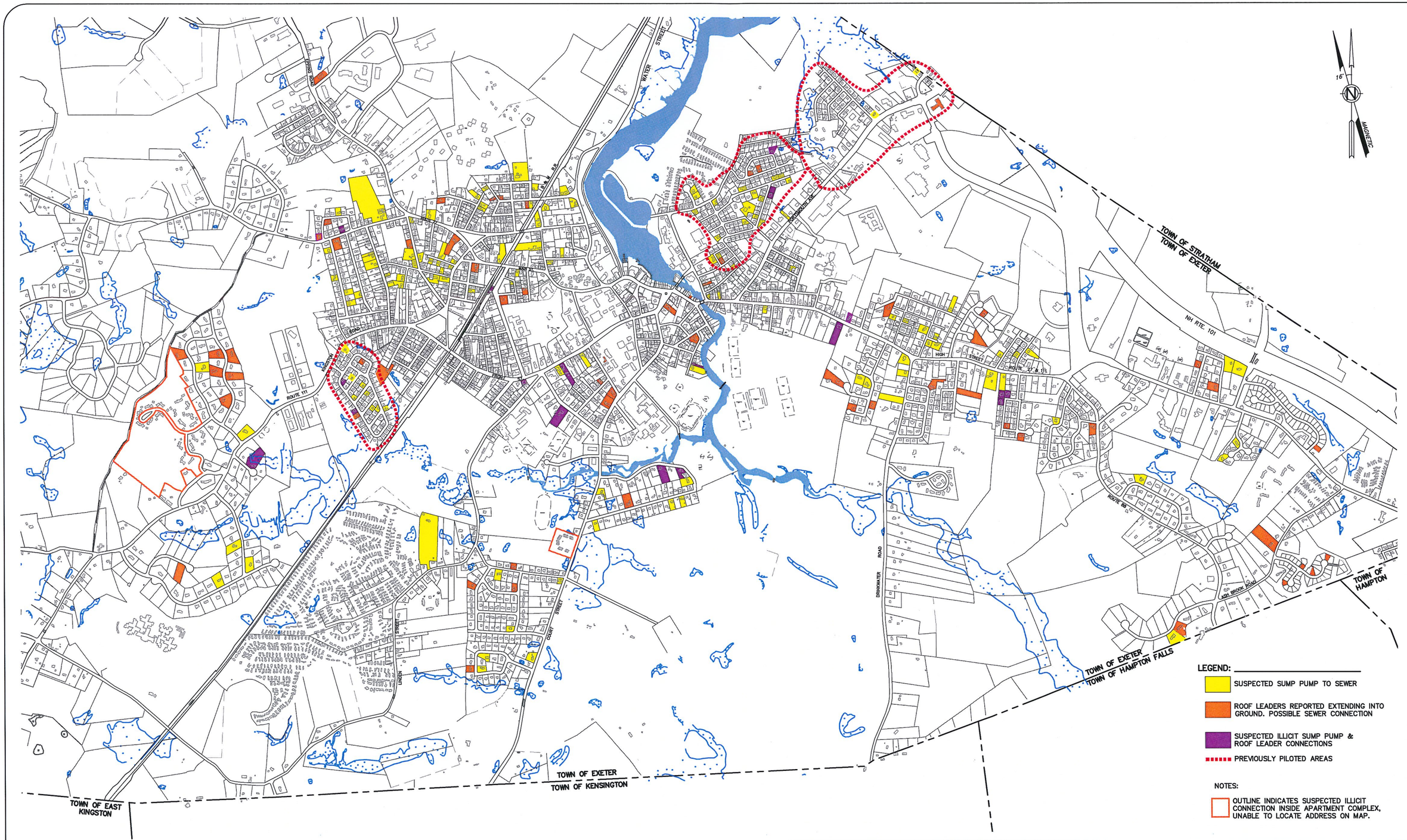

DATE 1/13/17	UNDERWOOD engineers	COMPLIANCE RESPONSE QUESTIONNAIRE SUMMARY	FIG. 3.5
PROJECT 1936/2088	25 Vaughan Mall, Portsmouth, N.H. 03801 Tel. 603-436-6192 Fax. 603-431-4733	CSO LTCP Update Exeter, New Hampshire	

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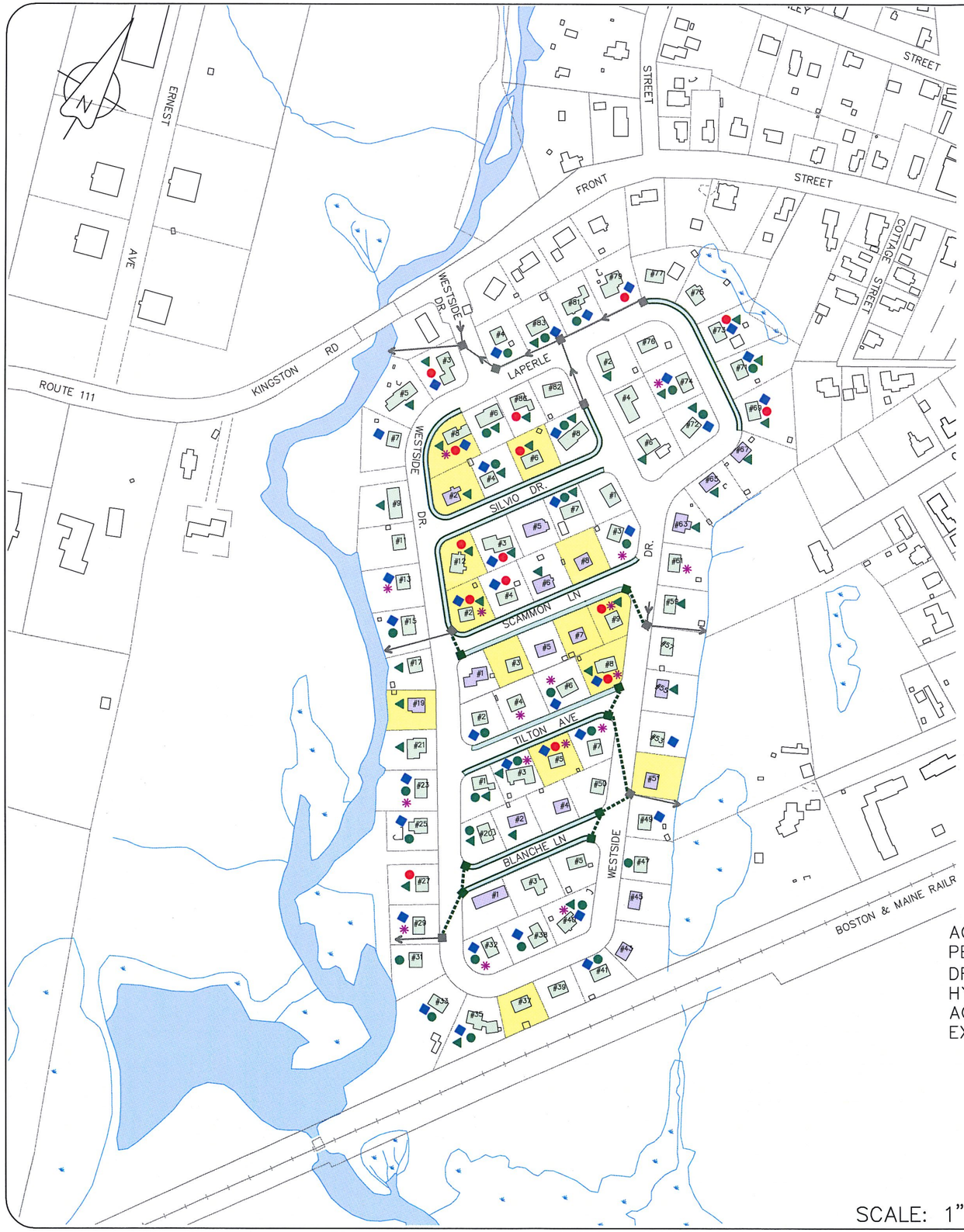

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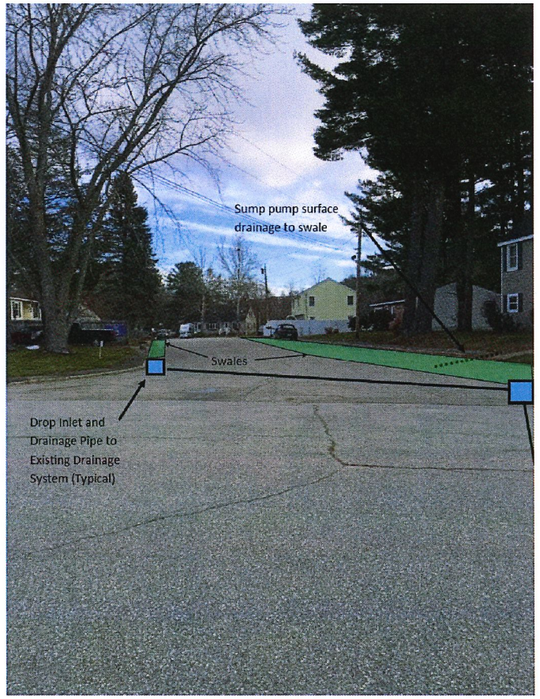
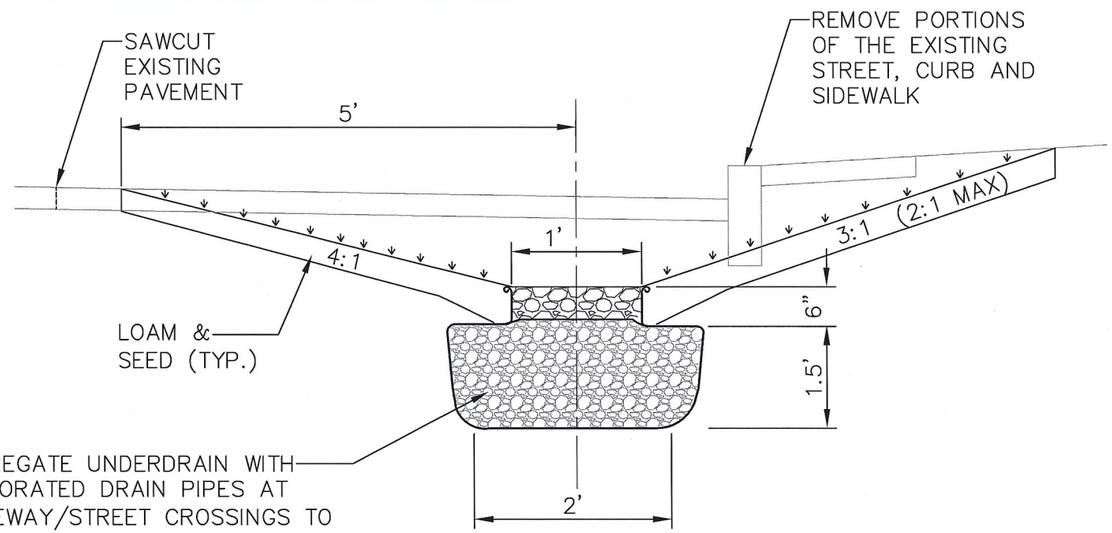


LEGEND:

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

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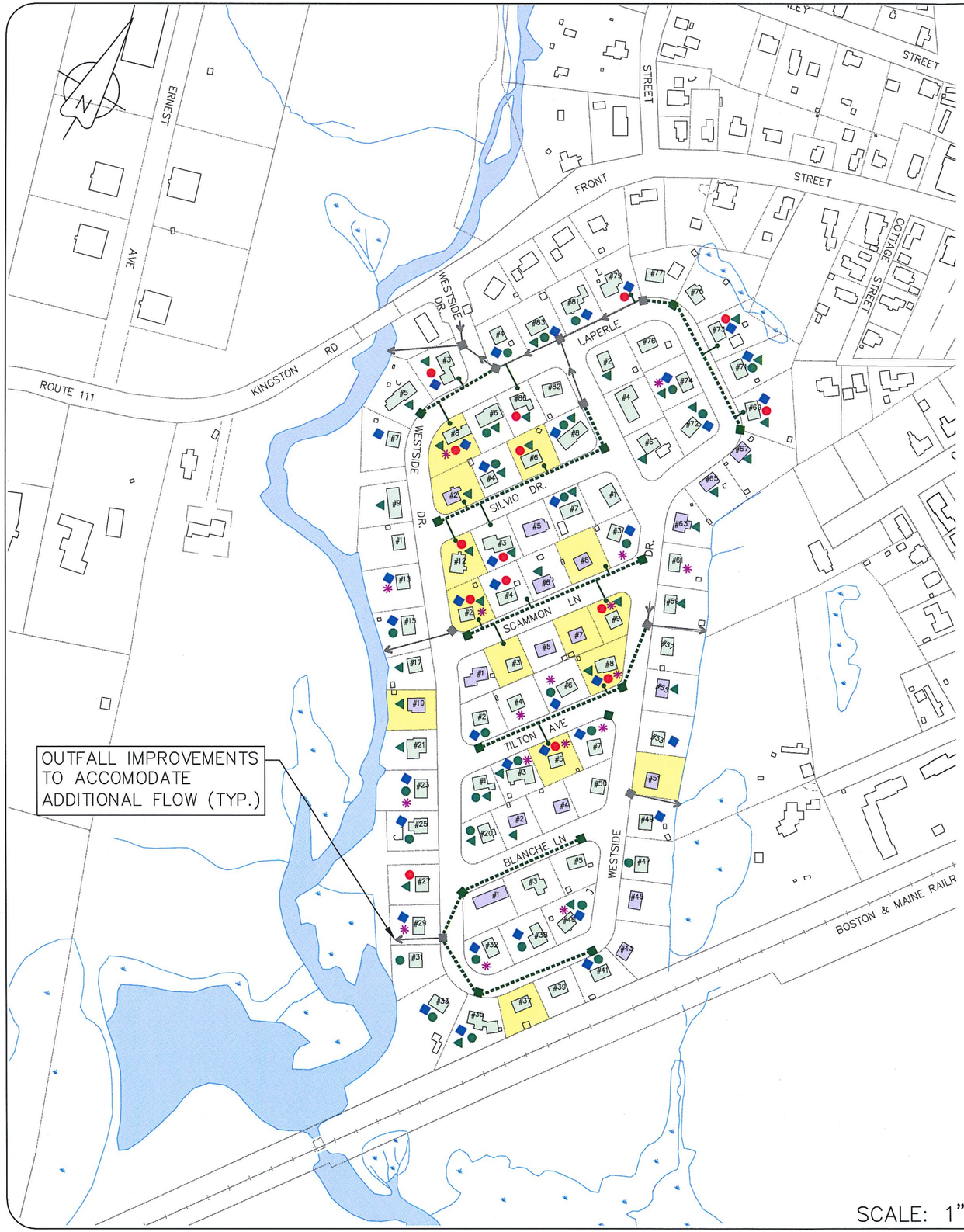
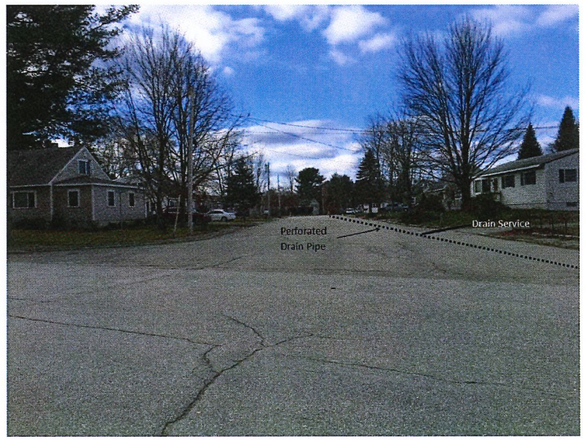
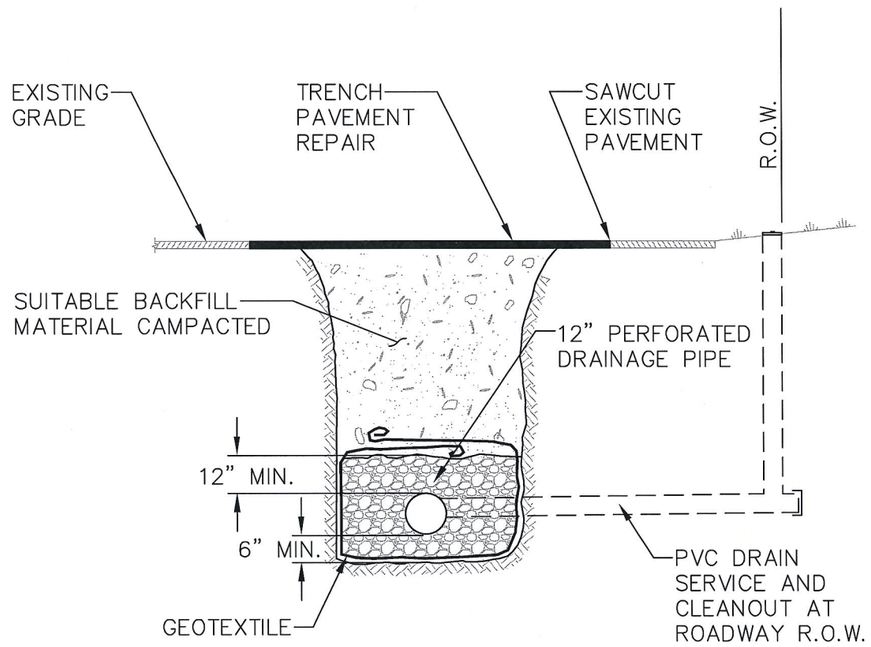




LEGEND:

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

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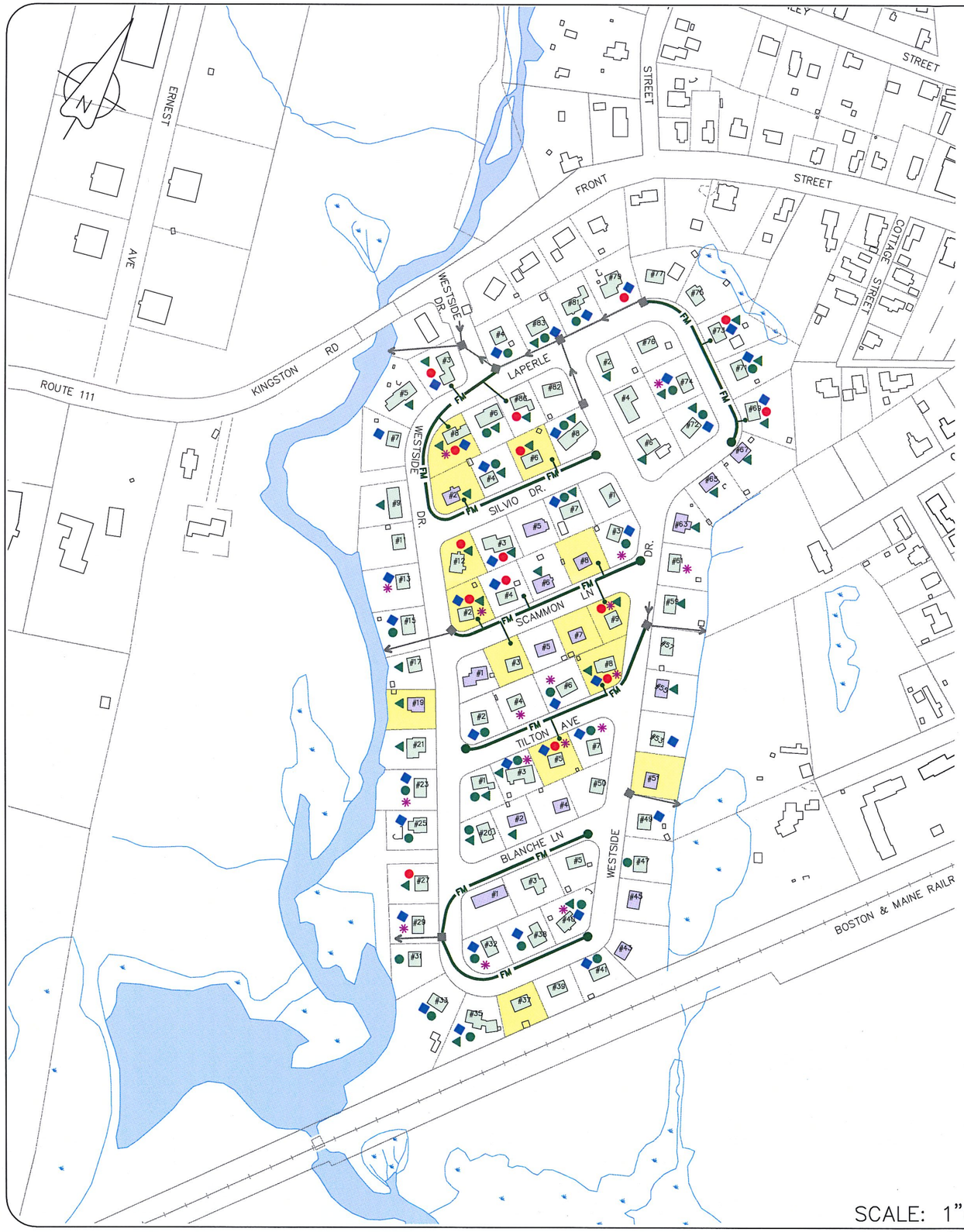


SCALE: 1"=250'

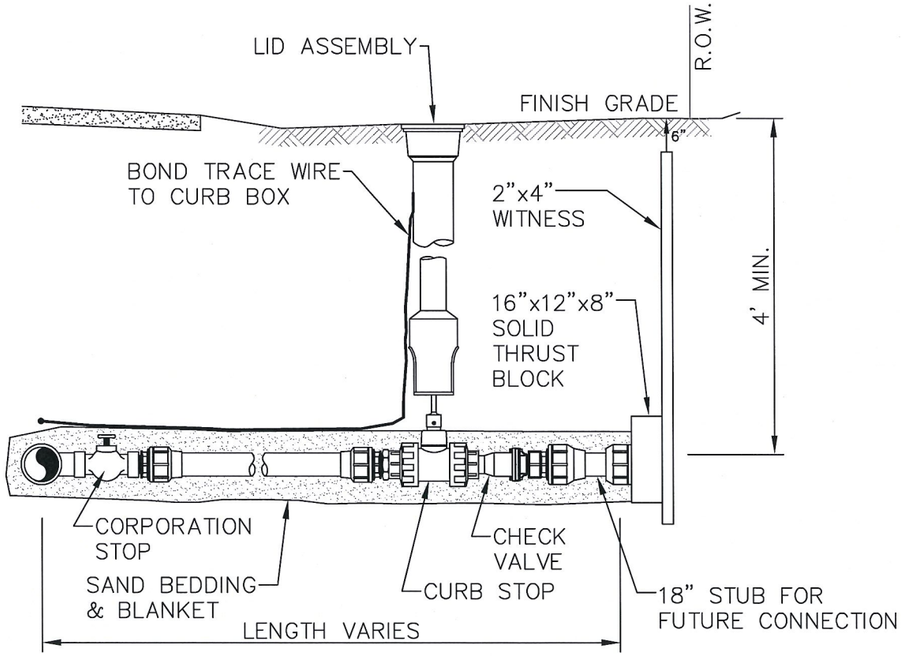
NOTE:

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.)
- FM — PROPOSED SUMP PUMP FORCE MAIN AND DRAIN SERVICE CURB STOP
- PROPOSED CLEANOUT MANHOLE

* 2010 HOUSE INSPECTION



TYPICAL SERVICE CONNECTION

NOT TO SCALE

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

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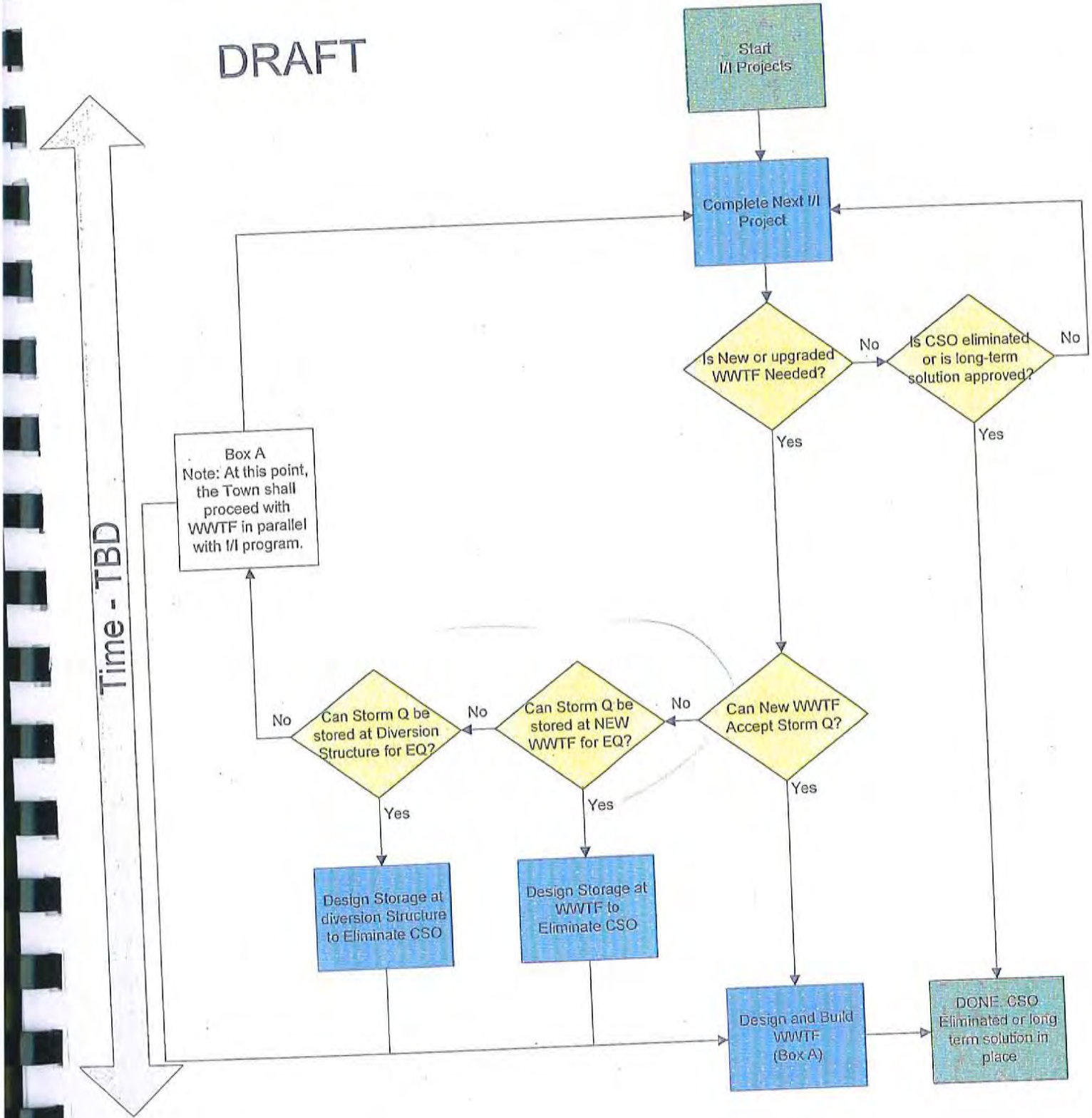
Appendix A

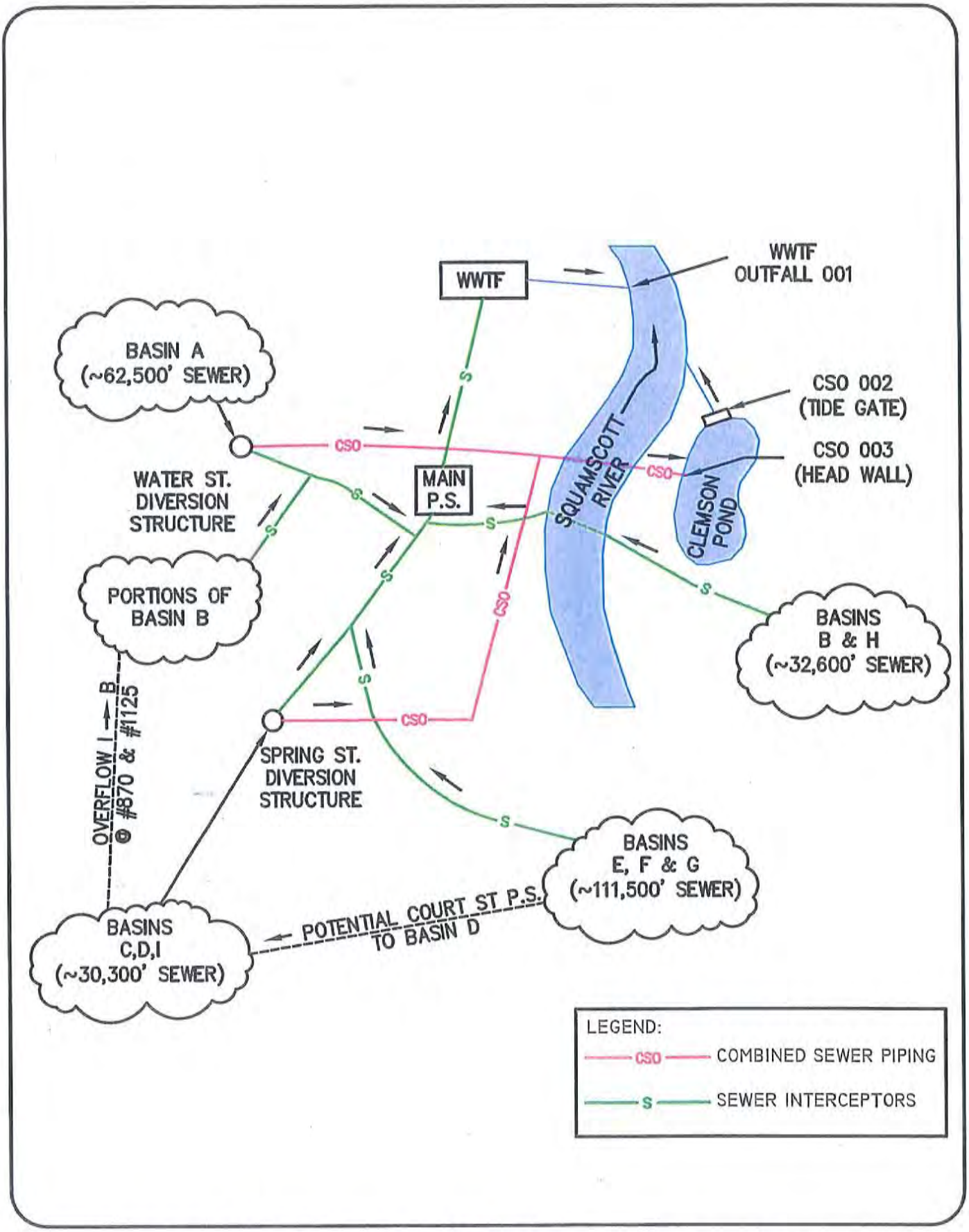
Excerpts from: *Phase III Infiltration and Inflow Evaluation,* Underwood Engineers, January 2013

FIGURE 14-1

Exeter I/I and CSO

Decision Matrix
February 9, 2010





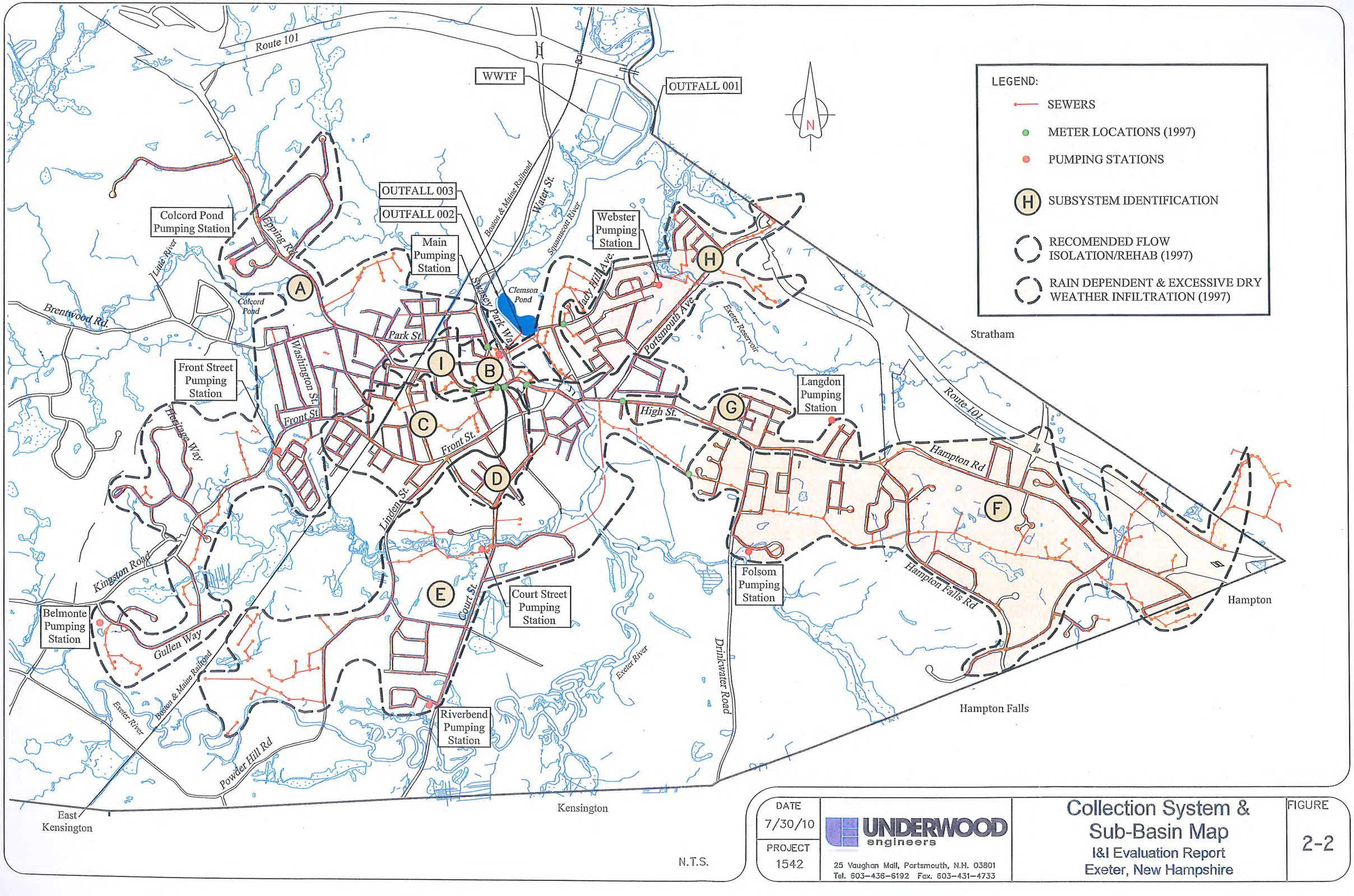
Exeter Sewer System Schematic

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



DATE 7/30/10	UNDERWOOD engineers	Collection System & Sub-Basin Map	FIGURE 2-2
PROJECT 1542	25 Vaughan Mall, Portsmouth, N.H. 03801 Tel. 603-436-6192 Fax. 603-431-4733	I&I Evaluation Report Exeter, New Hampshire	

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]	*Project Year* 2013	2014	2015		2016	2017		2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
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)							***10-YEAR PHASE II LTCP***									
		$3.34M Jady Hill + $1.24M Additional							***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

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

SEWER MAIN DIRECTLY TO MAIN SEWAGE PUMPING STATION

DMH1

CB4

1+00

CB5

CB6

DMH2

SMH2

0+00

PHOTO DIRECTION

DMH3

3+00

4+00

5+00

6+00

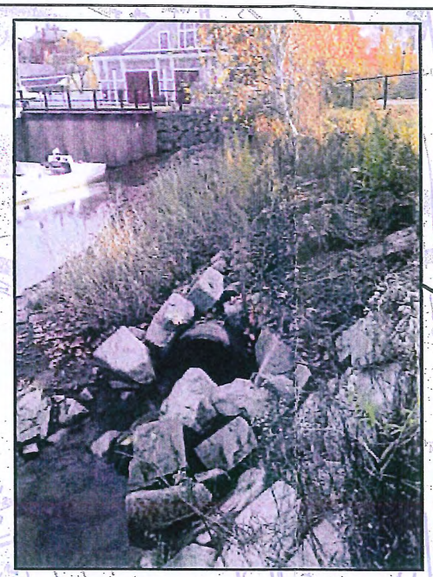
7+00

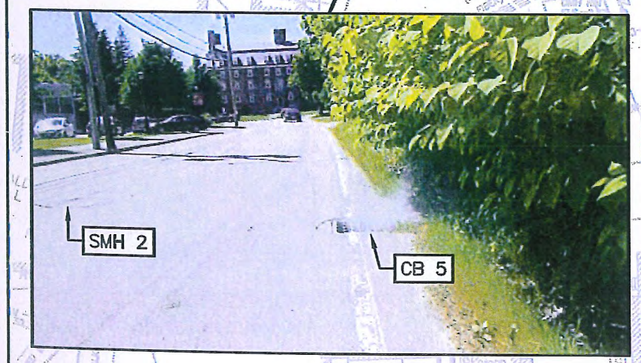
DMH4

8+00

APPROXIMATE LOCATION OF 8" DRAIN CONNECTION TO SEWER

SEE DRAINAGE PROFILE FOR APPROXIMATE ELEVATIONS





N

HARRIS FAMILY CHILDREN'S CENTER

EXETER NEWSLETTER DATA CENTER

WATER STREET PROFESSIONAL BUILDING

SWASEY PARKWAY

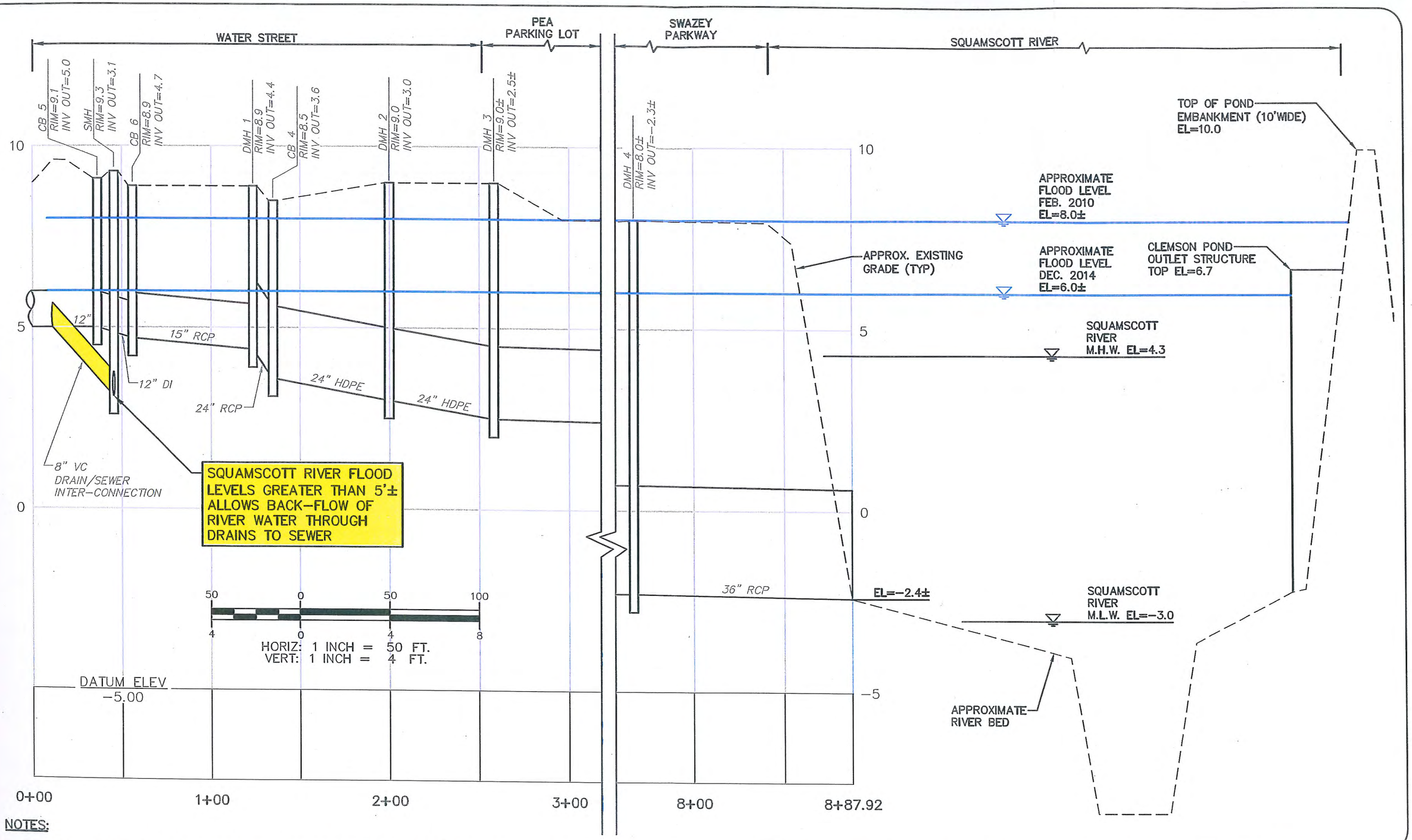
NOTES:

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

50 0 50 100

APPROXIMATE SCALE

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



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

LEGEND:

STRUCTURE TYPE:

- □ SUMP PUMP
- ○ ROOF LEADER
- △ "OTHER" DRAIN

OUTLET TYPE:

- NO OBSERVED ILLICIT SEWER CONNECTIONS
- UNKNOWN OUTLET
- CONNECTS TO SEWER

PORTER HOUSE
BEATON HOUSE
HOOPER HOUSE
SLEEPER HOUSE
TOWN HILL HOUSE
DUTCH HOUSE
GOULD HOUSE
VEAZEY HOUSE
TAN LANE HOUSE
DOCTOR'S HOUSE
EWALD HALL
STACKPOLE HOUSE
YOCUM HOUSE
CLASS OF 1944 HOUSE
MAIN ST. HALL
HARRIS FAMILY CHILDREN'S CENTER
EXETER NEWSLETTER DATA CENTER
BELMONTE BUILDING
TATTESALL HOUSE
BOUTHOUSE
LAMONT HALL
LAMONT HOUSE
JEREMIAH SMITH HALL
WHEELWRIGHT HALL
LAMONT HEALTH & WELLNESS CENTER
PHELPS SCIENCE CENTER
PHELPS ACADEMY CENTER
PHILLIPS HALL
MERRILL HALL
WETHERELL DINING HALL
LANGDELL HALL
FISHER THEATER
FORRESTAL–BOWLD MUSIC CENTER
DOW BARN
WOODBRIDGE HOUSE
DOW HOUSE
BROWNING HOUSE
PHILLIPS CHURCH
ACADEMY BUILDING
ABOTT HALL
SOULE HALL
HOYT HALL
LAMONT ART GALLERY
PEABODY HALL
WATKINS HOUSE
MODEL HOUSE
WILLIAMS HOUSE
ANDERSON HOUSE
KENNEDY HOUSE
BOOKSTORE
FRONT STREET
DENNEN HOUSE
KNIGHT HOUSE
TRAPHAGEN HOUSE
BISSELL HOUSE ADMISSIONS
NATHANIEL GILMAN HOUSE
K.E.P. HOUSE
GEORGE WELLS HOUSE
DUNBAR HALL
CLASS OF 1945 LIBRARY
DAVIS STUDENT CENTER
WELL KERR HOUSE
ELM ST. DINING HALL
CILLEY HOUSE
WEBSTER HALL
McCONNELL HALL
PINE STREET
ELLIOT STREET
ELM STREET
SQUAMSCOT RIVER
MAIN STREET
WATER STREET
SWASEY PARK
SPRING LANE
GOVERNOR'S LANE
LAD LANE
CENTER STREET
COURT STREET

200 0 200 400

KEY MAP

FIGURE 1

DATE		FIG.
01/26/15	EXETER ACADEMY BUILDING INSPECTION SUMMARY CSO LTCP IMPLEMENTATION EXETER, NEW HAMPSHIRE	C1
PROJECT 1815		

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

LEGEND:

STRUCTURE TYPE:

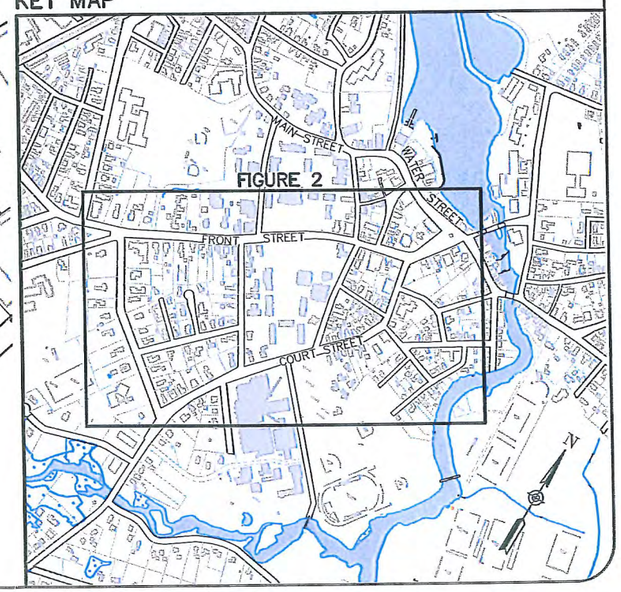
- □ SUMP PUMP
- ○ ROOF LEADER
- △ "OTHER" DRAIN

OUTLET TYPE:

- NO OBSERVED ILLICIT SEWER CONNECTIONS
- UNKNOWN OUTLET
- CONNECTS TO SEWER

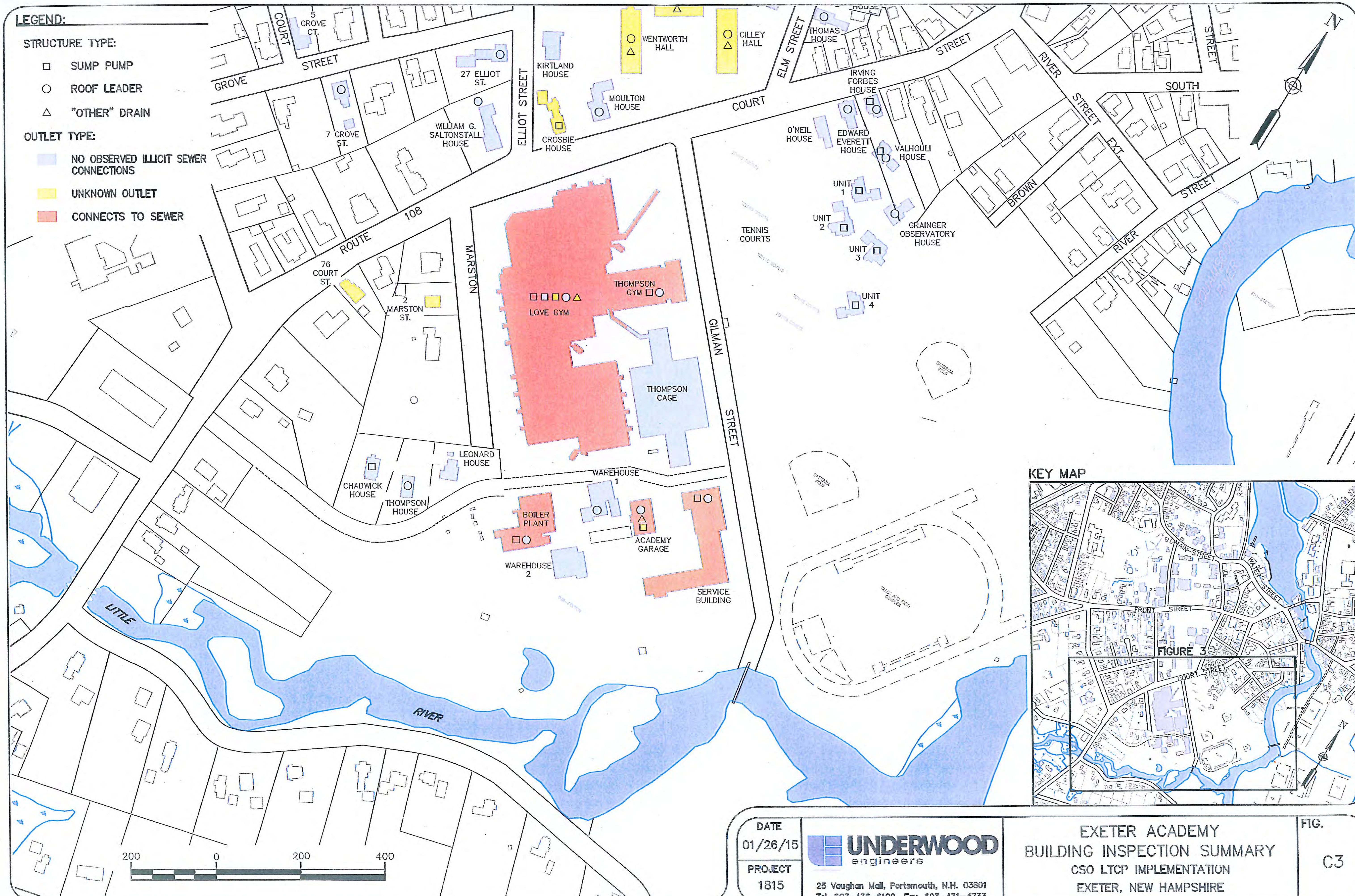
FISHER THEATER
FORRESTAL–BOWLD MUSIC CENTER
DOW BARN
WOODBRIDGE HOUSE
DOW HOUSE
BROWNING HOUSE
PHILLIPS CHURCH
TAN LANE
LAMONT ART GALLERY
ACADEMY BUILDING
HALL
HOYT HALL
PEABODY HALL
WATKINS HOUSE
MODEL HOUSE
HOUSE
ANDERSON HOUSE
LAD LANE
KENNEDY HOUSE
BOOKSTORE
CENTER STREET
STREET
FRONT STREET
DENNEN HOUSE
TRAPHAGEN HOUSE
KNIGHT HOUSE
BISSELL HOUSE ADMISSIONS
NATHANIEL GILMAN HOUSE
K.E.P. HOUSE
GEORGE WELLS HOUSE
DUNBAR HALL
WELL KERR HOUSE
CILLEY HOUSE
BANCROFT HALL
WEBSTER HALL
CLASS OF 1945 LIBRARY
DAVIS STUDENT CENTER
ELM ST. DINING HALL
McCONNELL HALL
CUSHWA HOUSE
AMEN HALL
WENTWORTH HALL
CILLEY HALL
KIRTLAND HOUSE
MOULTON HOUSE
CROSBIE HOUSE
ELLIOT STREET
ELM STREET
MAPLE STREET
BOW STREET
CLIFFORD STREET
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
GILMAN
COURT STREET
HILLARD STREET
GROVE STREET
9 GROVE CT.
4 HILLARD CR.
5 GROVE CT.
COURT STREET
PINE STREET
27 ELLIOT ST.
7 GROVE ST.
WILLIAM G. SALTONSTALL HOUSE
ROUTE 108
76 COURT ST.
2 MARSTON ST.
MARSTON
THOMPSON GYM
LOVE GYM
THOMPSON CAGE
200 0 200 400

KEY MAP



DATE		FIG.
01/26/15	UNDERWOOD engineers 25 Vaughan Mall, Portsmouth, N.H. 03801 Tel. 603-436-6192 Fax. 603-431-4733	C2
PROJECT 1815	EXETER ACADEMY BUILDING INSPECTION SUMMARY CSO LTCP IMPLEMENTATION EXETER, NEW HAMPSHIRE	

P:\Project Number\EXETER\1815 - LTCP Implementation\DWG\Design\1815base.dwg, Fig C2, 1/26/2015 2:37:38 PM, ljb



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

FIGURE B.1

MAIN ST.

WATER ST.

FRONT ST.

TREET

STREET

WATER STREET

SWASEY PARK WAY

SQUAMSCOT RIVER

N

HARRIS FAMILY CHILDREN'S CENTER

261

EXETER NEWSLETTER DATA CENTER

255

BELMONTE BUILDING

225

231

237

BATTESALL HOUSE

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

YEAZEY HOUSE

YOCUM HOUSE

MAIN STREET

GOULD HOUSE

TAN LANE HOUSE

DOCTOR'S HOUSE

LAMONT HOUSE

TAN LANE

JEREMIAH SMITH HALL

WHEELWRIGHT HALL

PHILLIPS HALL

MERRILL HALL

WETHERELL DINING HALL

LANGDELL HALL

HOYT HALL

SOULE HALL

ABBOTT HALL

WATKINS HOUSE

MODEL HOUSE

PEABODY HALL

PHILLIPS ACADEMY CENTER

ACADEMY BUILDING

PHILLIPS BOOKS CENTER

LAMONT ART GALLERY

LANE

FRONT ST.

SPRING STREET

ANDERSON HOUSE

WILLIAMS HOUSE

LADD LANE

CENTER STREET

KENNEDY HOUSE

BOOKSTORE

STREET

150 0 150

LEGEND:

123 STREET ADDRESS #

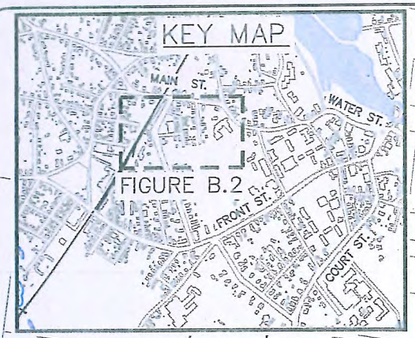
STRUCTURE TYPE:

- □ SUMP PUMP
- ○ ROOF LEADER
- △ "OTHER" DRAIN

OUTLET TYPE:

- NO OBSERVED ILLICIT SEWER CONNECTIONS
- UNKNOWN OUTLET
- CONNECTS TO SEWER

DATE 1/12/16	UNDERWOOD engineers	AUGUST 2015 BUILDING INSPECTIONS TOWN OF EXETER EXETER, NEW HAMPSHIRE	FIG. B.1
PROJECT 1936	25 Vaughan Mall, Portsmouth, N.H. 03801 Tel. 603-436-8192 Fax. 603-431-4733		



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.

LEGEND:

123 STREET ADDRESS #

STRUCTURE TYPE:

□ SUMP PUMP

○ ROOF LEADER

△ "OTHER" DRAIN

OUTLET TYPE:

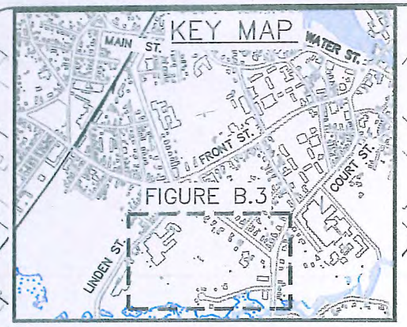
NO OBSERVED ILLICIT SEWER CONNECTIONS

UNKNOWN OUTLET

CONNECTS TO SEWER

100 0 100

DATE 1/12/16	UNDERWOOD engineers	AUGUST 2015 BUILDING INSPECTIONS TOWN OF EXETER EXETER, NEW HAMPSHIRE	FIG. B.2
PROJECT 1936	25 Vaughan Mall, Portsmouth, N.H. 03801 Tel. 603-436-6192 Fax. 603-431-4733		



LINDEN ST.

30

GROVE COURT

GROVE STREET

PINE STREET

ROUTE 108

MARSTON

COURT ST.

NELSON DR.

2

76

SOCCER FIELD

SOCCER FIELD

BASEBALL / FOOTBALL FIELDS

BASEBALL FIELD

N

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		FIG.
1/12/16	AUGUST 2015 BUILDING INSPECTIONS TOWN OF EXETER EXETER, NEW HAMPSHIRE	B.3
PROJECT 1936		

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

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.

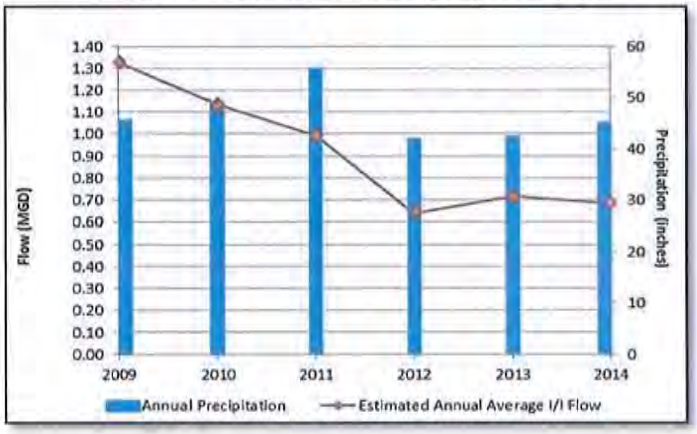
The Town has approximately 51 miles of separated gravity sewer lines, portions of which were originally constructed as combined sewers. The system contains two diversion structures on Water Street and Spring Street, which discharge to CSO Outfall No. 003 at Clemson Pond which has a tide gate discharge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

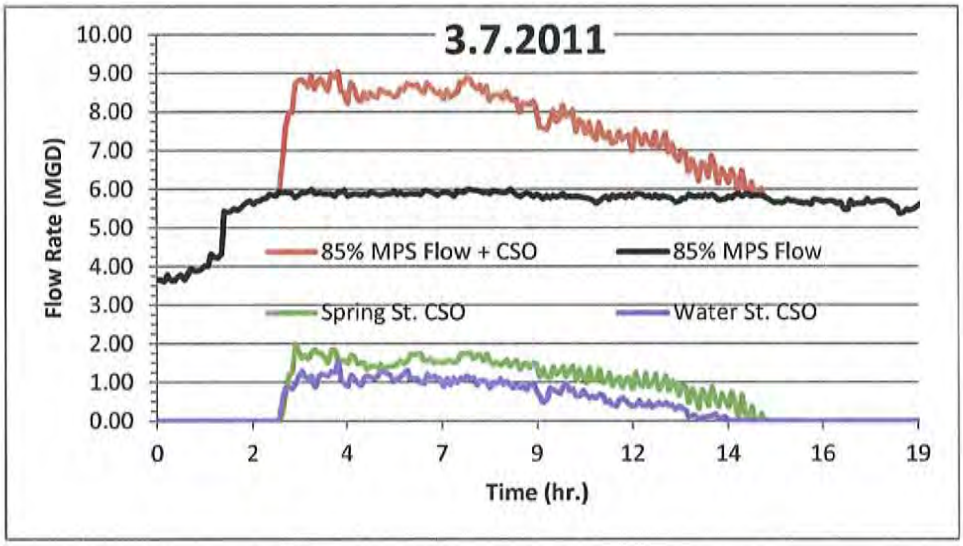
Main Pump Station Upgrade Recommendations

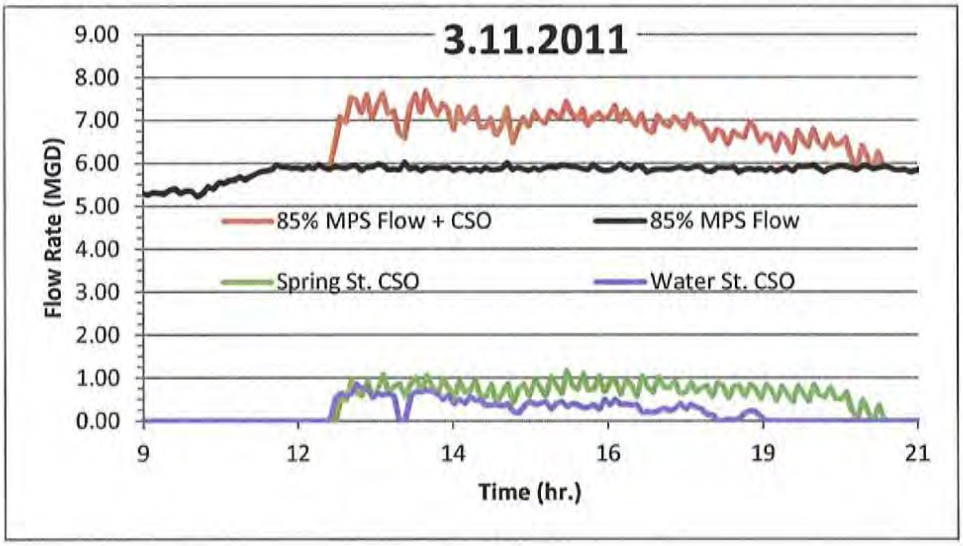
The Town continues to seek out and remove I/I from the collection system; accordingly, the peak flow rate is expected to be reduced over time as it has for the past 5 to 10 years. In order to not oversize the MPS, we recommend upgrading it to convey a minimum month flow rate of 1.09 MGD (760 gpm), a 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





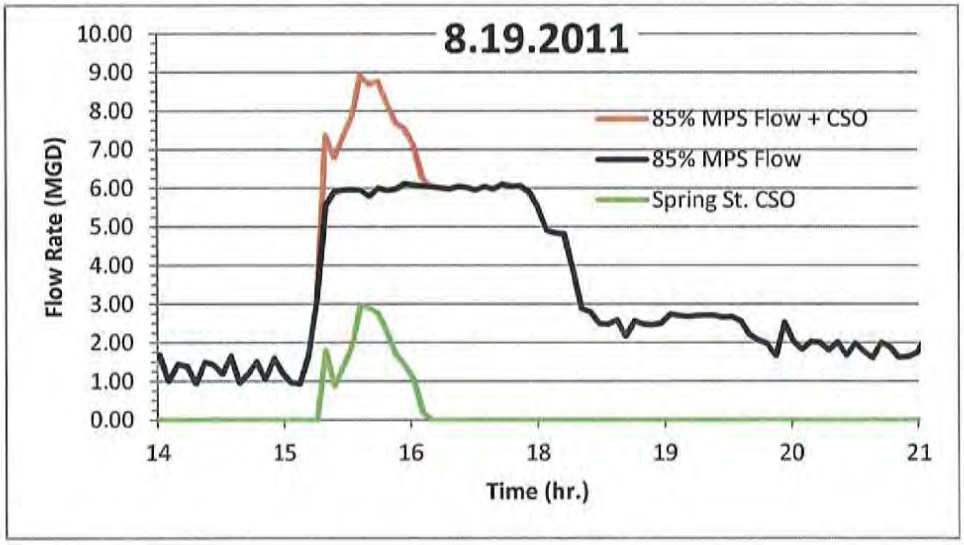
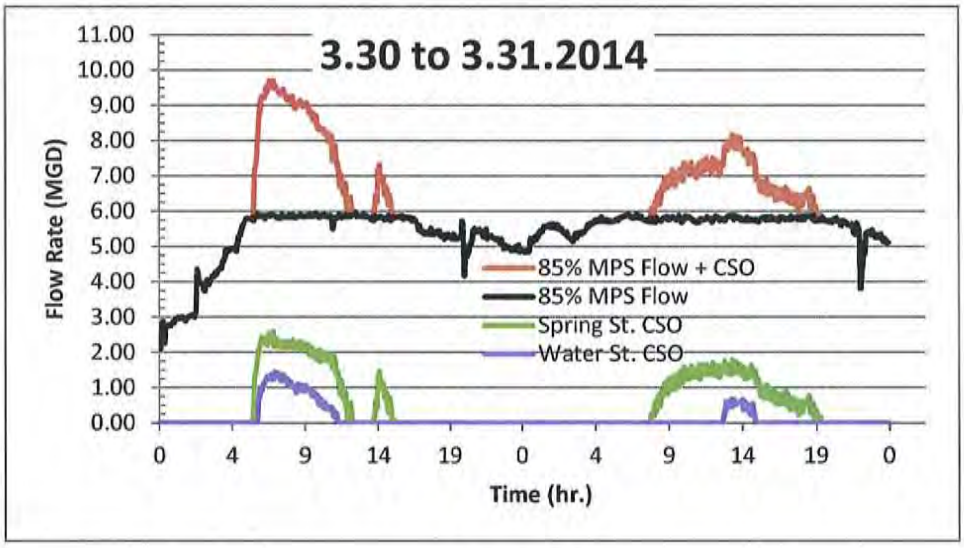
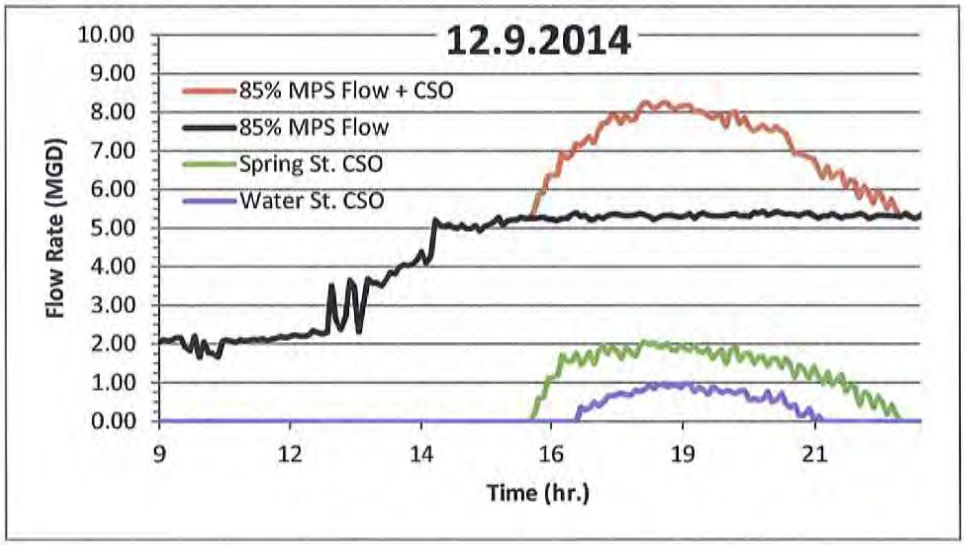
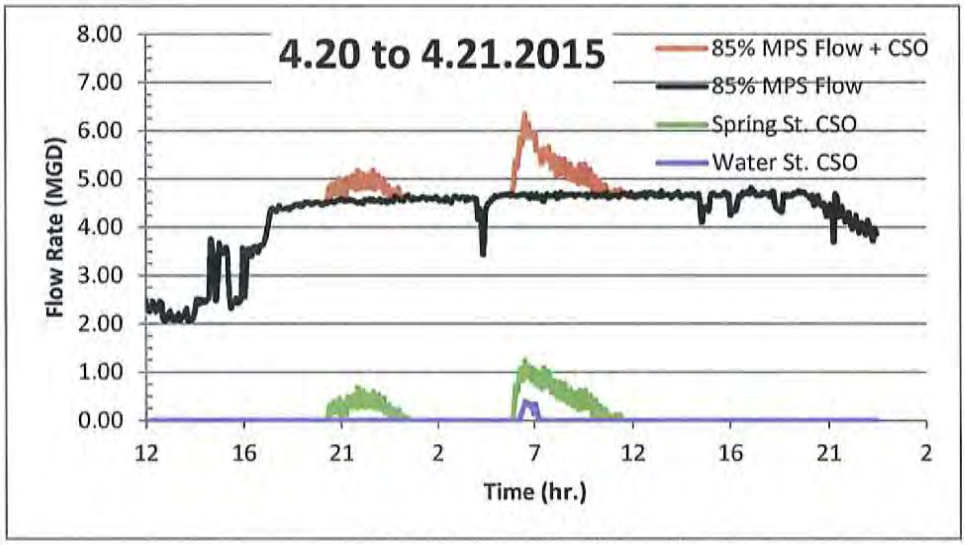


FIGURE 2 - MAIN PUMP STATION AND CSO FLOW RATES FOR VARIOUS STORMS







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)

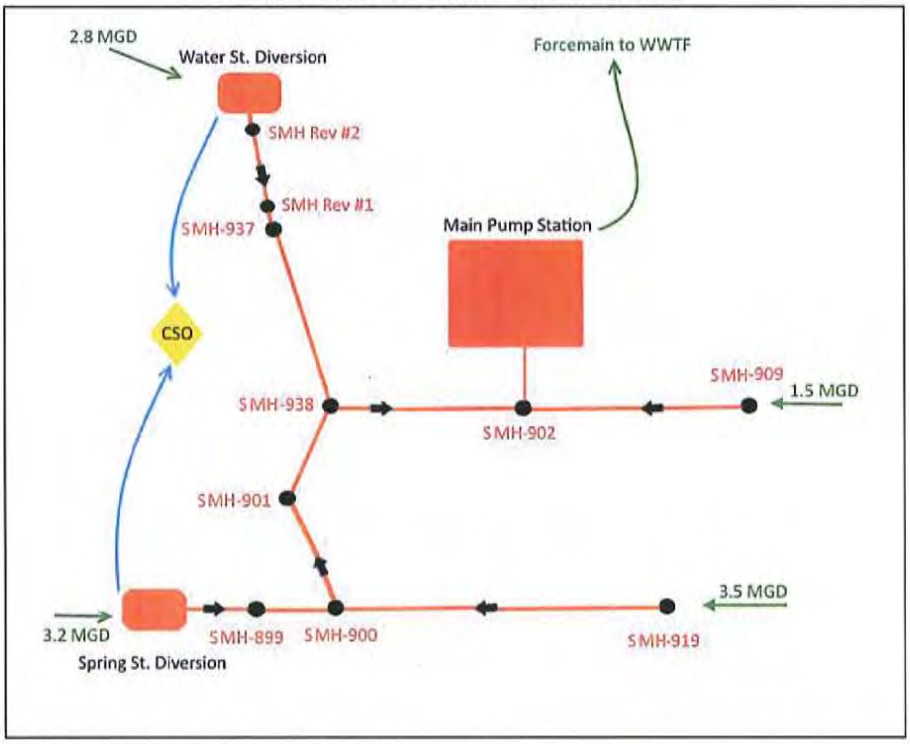
Background

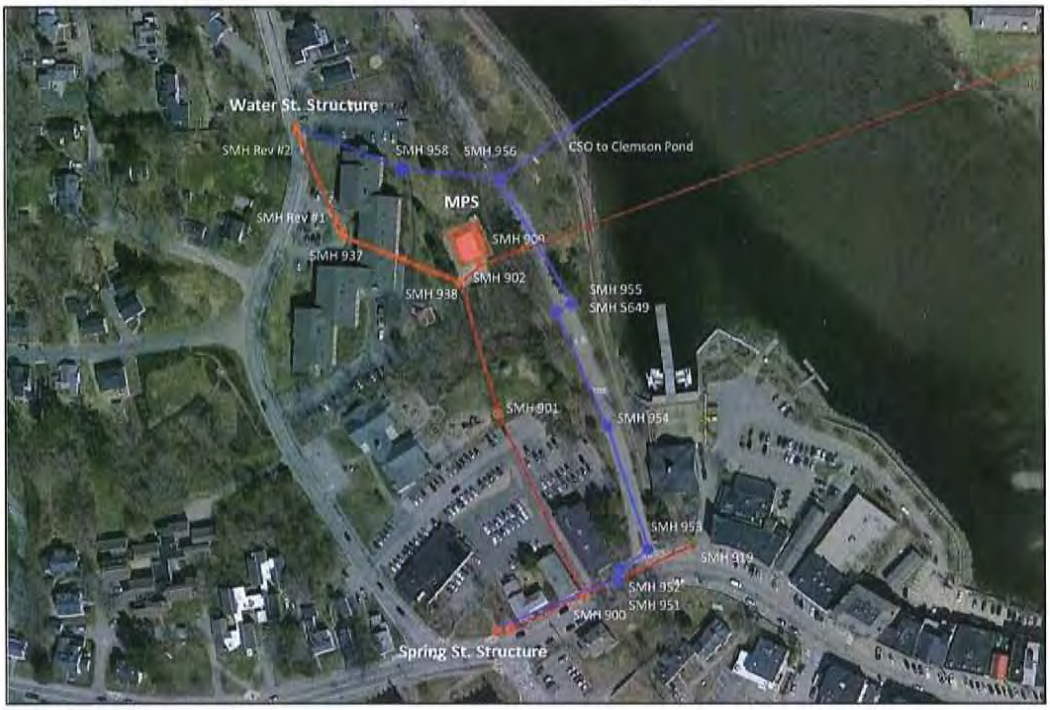
The Town has approximately 51 miles of separated gravity sewer lines, portions of which were originally constructed as combined sewers. The system still contains two diversion structures on Water Street and Spring Street with diversion structures at elevation 5.4-ft and 5.8-ft (NGVD 1929) respectively. 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
dmh2
smh 4
smh 3
cb 4
12
11
10
cb 3
8
9
roof leader
sp 2
17
18
19
7
6
16
cb 5
N
cb 2
sp 1
5
15
14
4
smh 2
stairwell drain 1
stairwell drain 2
3
dmh 1
cb 1
1
2
cb 8
cb 7
smh 1
Roof Drain
cb 6

FLOW
ASSESSMENT SERVICES

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


23
FLOW


SHOP
SHOP
FLOW
ASSESSMENT SERVICES


FLOW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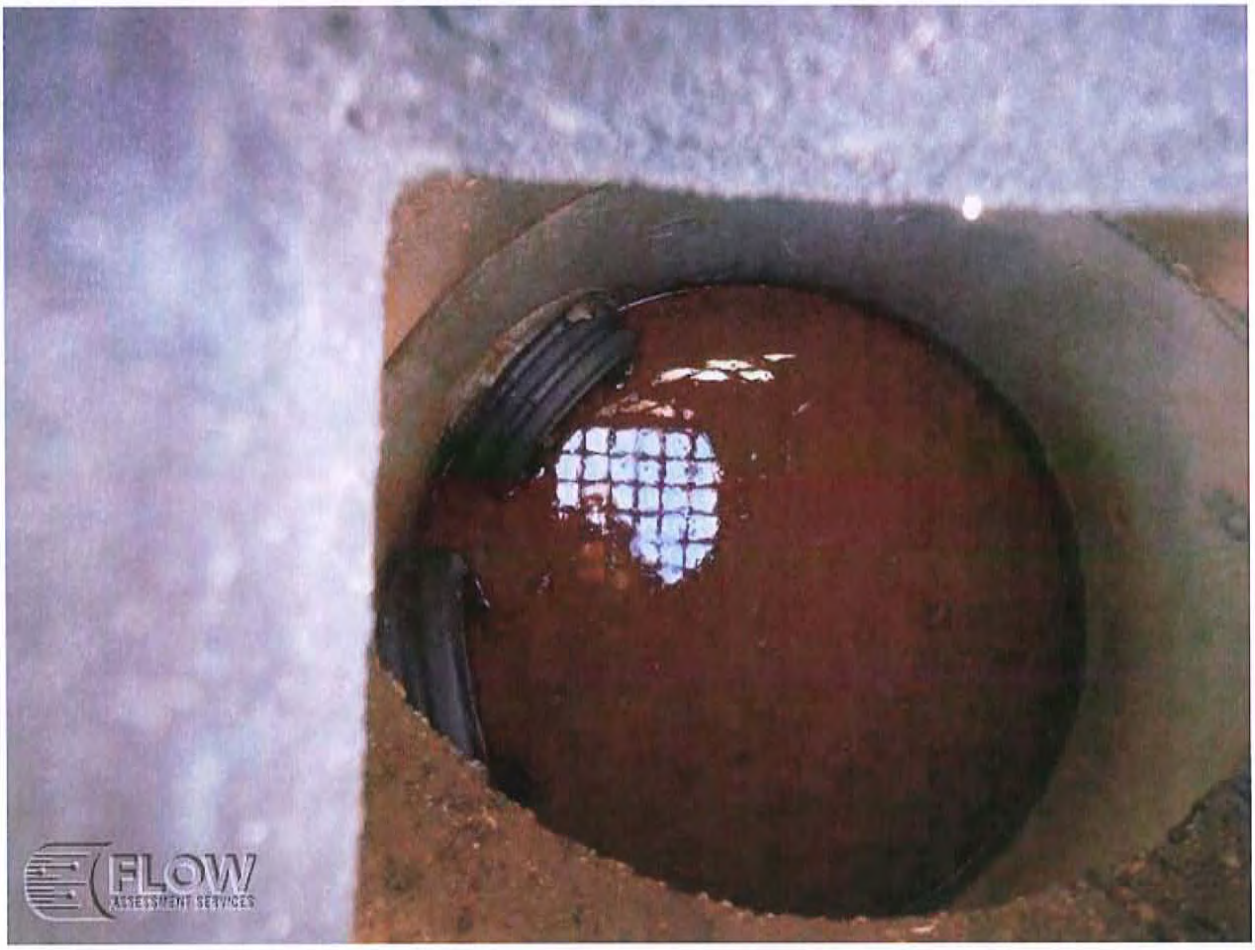
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Appendix F

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	

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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.

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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	

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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	

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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	

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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					

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	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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