TOWN OF EXETER, NEW HAMPSHIRE
TOTAL NITROGEN CONTROL PLAN ANNUAL REPORT FOR 2015

1. BACKGROUND

This 2015 Total Nitrogen Control Plan Annual Report was prepared for the Town of Exeter, New Hampshire in order to comply with the requirements of AOC 13-010, Article IV.E. The AOC stipulates that the following items be addressed:

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

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

2. SUMMARY OF AOC STIPULATED ITEMS

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

Attachment 1 summarizes the total pounds and total tons of nitrogen discharged from the WWTF for the calendar year as well as the annual average total nitrogen value measured at the Squamscott River "GRBCL" sampling location, located just downstream of Newfields WWTF at Chapman's Landing.

2.2. Operational Changes at the WWTF

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

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

- The Wastewater Facilities Plan was finalized in March 2015 and submitted to the Exeter Public Works Department, DES and EPA on April 6, 2015. This report identified the most cost-effective "on-site" solution for the Town. This report addressed regional wastewater treatment opportunities, including serving as a regional host facility for Stratham and/or Newfields. This report also serves as the outline and framework for the future town-wide Nitrogen Control Plan. The March 2015 report cover, table of contents and executive summary are included as **Attachment 2**.

- The preliminary design phase for the WWTF and Main Pump Station began in April 2015. A "dual track" was implemented for a preliminary design of the "on-site" WWTF upgrade and for a continued evaluation of a regional treatment approach in collaboration with the City of Portsmouth and the Town of Stratham. After much deliberation, the Town decided that the "onsite" WWTF upgrade would be their most cost-effective solution. Subsequent workshops and meetings with Town Staff resulted in the decision to proceed with a phased upgrade of the WWTF: an initial upgrade design flow of 2.2 mgd (Bardenpho process, TN < 5mg/L) and 2.65 mgd (Modified Ludzack-Ettinger process, TN<8 mg/L), with a future design flow of 3.0 mgd (Bardenpho process). The preliminary design phase concluded in October 2015 with the submittal of a Preliminary Design Report to the Town, DES and EPA. The October 2015 report cover, table of contents and executive summary are included as **Attachment 3**.

- The NHDES Wastewater Engineering Bureau completed a review of the WWTF and Main Pump Station Preliminary Design. The NHDES review comment letter was issued on December 11, 2015. A response letter to NHDES review comments on the Preliminary Design was submitted on December 30, 2015. The Town is awaiting further correspondence with NHDES.

- A preliminary design phase Value Engineering (VE) workshop for the WWTF and Main Pump Station was completed during the week of December 7, 2015. The Preliminary VE Report was issued on December 23, 2015. Currently the Town is preparing comments and responses to the Preliminary VE Report.

- The final design phase for the WWTF and Main Pump Station will begin in January 2016 after DES coordination and VE deliverables are completed.

- The Town included the WWTF and Main Pump Station Upgrade project on the Capital Improvement Project list and generated several revised project costs throughout the year. The project has been added to the 2016 Town Warrant as Article 7 and will be voted on during the Town Elections on March 8^{th}, 2016.

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

The Town has continued to actively participate in the Watershed Integration for Squamscott-Exeter (WISE) project along with the Towns of Stratham and Newfields as well as NHDES and EPA participants. The WISE project began in September 2013 and was completed in December 2015. This project addressed the Squamscott-Exeter River watershed as a whole as well as by individual Towns. The project included watershed assessment, pollutant load assessment (current and projected future), nitrogen control strategy identification, alternatives analysis, and stakeholder participation.

2.3.1. PTAPP Participation

The Town of Exeter is participating in the Great Bay Pollution Tracking and Accounting Pilot Program (PTAPP), which is led by NHDES and EPA. The purpose of PTAPP is to enable coordination on nitrogen tracking and accounting for the Great Bay region. PTAPP is intended to make progress towards developing shared approaches and tools within the participant Great Bay communities. The two year implementation framework is briefly described in the following four phases of PTAPP. The PTAPP Implementation Framework_v4 is included as **Attachment 4.**

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

Phase 2: Pilot Tracking Program and Conceptual Planning for Accounting Methods. Phase 2 is scheduled to begin in Winter 2016 and conclude in Winter 2017. The Tracking Program is anticipated to include a Local Tracking Efforts path and a Regional Tracking Efforts path. The Accounting Methods will include the development of regional accounting methods to quantify existing loads and load reductions achieved through implementation of tracked NPS management activities.

Phase 3: Evaluate Pilot Tracking Program and Formalize Accounting Process. Phase 3 is scheduled to begin in Fall 2016 and conclude in Fall 2017. The participants will focus on evaluating the local and regional pilot tracking programs. Also, based on feedback from stakeholders' review of the conceptual framework, a formal process for developing accounting methods will be established.

Phase 4 and Beyond: Implementation of Regional Tracking Program for Completing and Implementing Accounting System. Phase 4 is scheduled to begin in Fall 2017 (Note: Accounting implementation could happen sooner if opportunities and resource to fast-track the efforts arise.) It is anticipated that technical and financial resources will be in place to implement the regional tracking program including additional communities. The process for developing accounting methods will also be implemented. This will likely include a series of expert panels, stakeholder meetings, comprehensive literature reviews and other steps that will be needed in what is likely to be a highly iterative, long term process.

2.3.2. Nitrogen Tracking Worksheet

The Town previously generated a "Land Use Development Tracking Worksheet" to be used until the Great Bay Pollution Tracking and Accounting Pilot Program (PTAPP) implements a universal tracking tool. This form is intended for use on new development projects and remains a work in progress. A sample of this form and the instructions used to complete, which has been used to summarize data from developments in 2015, is included as **Attachment 5**.

2.3.3. Existing Septic Systems

The WISE project completed a preliminary analysis to identify parcels with septic systems that are within 200 meters of the major streams. This work was completed in December 2015 and a map is included as **Attachment 6**.

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

The Wastewater Facilities Plan (March 2015) devoted Section 4 to the town-wide nitrogen management plan. The WISE project presented the Draft Nitrogen Control Plan, Schedule and Financing Estimate for Exeter, Stratham and Newfields on February 19, 2015. The WISE project concluded in December 2015 with the submittal of the Preliminary Integrated Plan – Final Technical Report. The February 19, 2015 presentation and the December 2015 Final Technical Report cover, table of contents and executive summary are included as **Attachment 7**. These two documents will serve as the framework for the future Nitrogen Control Plan. The Town anticipates developing a plan of study, preliminary schedule and report table of contents for the Nitrogen Control Plan in 2016.

In 2015 the Town collaborated with the WISE project team, UNH and PREP regarding the scoping, budgeting and implementation of a Great Bay water quality monitoring program. The 2015 sampling data and correlated Water Sampling Sites map depicting all 15 locations in the Great Bay watershed are presented in **Attachment 8**. For 2016 the Town has budgeted another $32,000 for the continuation of the Great Bay water quality monitoring program.

Other Nitrogen Control Plan related activities that the Town anticipates for the upcoming year include:

- Preparing Final Design plans and documents for the WWTF and Main Pump Station Upgrade project.
- Continued participation in the NHDES PTAPP project.
- Complying with the requirements of the NPDES MS4 General Permit reissued as a draft for additional public comment in September 2015 once finalized.
- Continued outreach and education to the residents of Exeter.
- Review possible adoption of updated Stormwater Ordinances based on the Southeast Watershed Alliance draft model stormwater management standards.
- Identifying potential Town permit application form modifications to collect tracking data in a more efficient manner (e.g., Site Plan Review, Building Permit, etc.).
- Identifying potential State permit application form modifications to collect tracking data in a more efficient manner (e.g., NHDES Application for Repair of Replacement of an Individual Sewage Disposal System).
- Continuing tracking efforts by Town departments.
- Continuing outreach to NHDES on Great Bay watershed strategies.
- Consider future initiatives outlining strategies to engage other communities within the Exeter River watershed. *[Note: As presented in the Wastewater Facilities Plan, Exeter is the source of 33% of the delivered load to the Great Bay from the Exeter/Squamscott River watershed; conversely, the other 14 communities represent 66% of the delivered load. Achieving the targeted water quality improvements will require the cooperation and participation of all the communities within the Exeter River watershed.]*

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

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

2.5.1. Baseline Stormwater Total Nitrogen - Existing Loads

The WISE project estimated the baseline (existing) stormwater total nitrogen load for the Town of Exeter. This effort was completed based on input from EPA and NHDES using a combination of methods including SWMM and the 2014 DES report on Great Bay Nitrogen Nonpoint Source Study and revisions from watershed stakeholders. EPA and NHDES participation in the methodology development, refinement, and review has been integral to the process. The project also quantified the non-point source groundwater load from septic systems and non-septic sources (surface infiltration) as well as the point source load (from the wastewater treatment facilities) for the three Towns (Exeter, Stratham and Newfields). The results are included in the WISE Preliminary Integrated Plan – Final Technical Report (December 2015).

2.5.2. BMP Optimization and Costing for Nitrogen Management

As part of the WISE project, a linear BMP optimization model was built to determine the least-cost mixture and load reduction effective suite of best management practices (BMPs) for implementation in the three towns. A host of scenarios ranging from integrated planning on the individual and town levels, and traditional permitting were examined. A draft final Integrated Plan was presented to the WISE project Team and stakeholders on February 19, 2015 and was included in the draft (March 2015) and final (December 2015) reports.

2.5.3. Water Quality Monitoring Plan

As noted above, a draft water quality monitoring plan has been developed for the WISE communities with input from the three towns, WISE, NHDES, and EPA. This Plan will be a key element to support the adaptive management. Initial sampling was conducted in 2015 a total of 15 locations (eight watershed locations and seven estuarine locations). Sampling will continue in the summer of 2016.

2.5.4. MS4 Permit Assistance

- An Evaluation of Exeter's Stormwater Management Program and Action Plan for Stormwater Program Improvements were performed by Tighe & Bond in July 2015. The technical memorandum identified recommended actions for short- and long-term stormwater program improvements, as well as an evaluation of Exeter's compliance with its Small MS4 and General Permit requirements.
- Wright-Pierce was retained to assist the Town with their compliance with the 2003 NH Small MS4 Permit and in preparation for the impending Final 2013 NH Small MS4 Permit. Tasks which were completed as part of this assistance assignment include:
  - MS4 Public Outreach Presentation
  - Perform dry-weather outfall inspections and water quality screening for pilot program

2.6. Description of Activities Conducted which Affect Nitrogen in the Great Bay Estuary

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

2.6.1. Coordination between Departments

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

Status of "Primary Areas of Responsibility Tracking"

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

2.6.2. Planning and Building Departments

Over the past year, the Building Department issued 800 building permits, as summarized in the table below.

Building Permits Issued in 2015

Building Permits Issued	Number
January	44
February	33
March	55
April	75
May	100
June	93
July	62
August	61
September	74
October	84
November	64
December	55
Total	***800***

Of these building permits, a total of 22 parcels had development/re-development which impacted total nitrogen. In summary, these parcels resulted in approximately 68,610 square feet of disconnected new impervious area, 148,466 square feet of connected new impervious area, five rebuilt septic systems, one new septic system, and 11 new sewer connections. Of the 16 parcels with new impervious area, seven included at least one Best Management Practice (BMP) such as a rain garden or tree box filter. The Preliminary Nitrogen Tracking Summary is included as **Attachment 11**.

The Planning Department acquired a grant to adopt fertilizer buffers for all surface waters in the Zoning Ordinance. A Planning Department memo was submitted to the Exeter Planning Board which proposes to prohibit the use of fertilizer within Exeter's Shoreland Overlay Protection District as a means of reducing nitrogen runoff and is included as **Attachment 12**.

To facilitate public education and outreach regarding fertilizer management, the "Healthy Lawns – Clean Water" group was formed. The group met with experts, Julia Peterson (NH Sea Grant and UNH Cooperative Extension) and Margaret Hagen (UNH Cooperative Extension) during the Household Hazardous Waste Day on Saturday October 3, 2015 at the Exeter Public Work Complex, where they presented "Are You Prepared for Water Quality-Friendly Lawn Care?" which is included as **Attachment 13** with additional information on the "Healthy Lawn – Clean Water" group.

Planning Department and Conservation Commission personnel attended a NHDES sponsored "Soak Up the Rain NH" event in the neighboring town of Hampton, NH. The volunteers helped install two rain gardens on a property along the Little River. The Planning Department and Conservation Commission distributed "Soak Up the Rain NH" brochures which is included as **Attachment 14**.

Public Works Department

The Public Works Department has conducted a substantial amount of activities in 2015 which have affected nitrogen in Great Bay, including capital improvements, best management practices, training activities, outreach activities and planning efforts. These are summarized below.

- Rain barrels were available for residents to purchase (13 sold in 2015).
- Continued outreach and education through the following efforts are included in **Attachment 15.**
    - "Think Blue Exeter" program website.
    - "Sump Pump Removal Program" informative pamphlets.
    - "Septic Smart" program informative display in town offices and pamphlets.
    - Exeter Clean Water Campaign pamphlets.
    - "What's Flushable?" NHDES program pamphlets.
- Continued street sweeping and catch basin cleaning programs. All Town roads were swept twice and the downtown area was completed every other week during the warm months. In 2015, new street sweeping equipment was purchased by the Town for improved sweeping capabilities and a total of 590 catch basins were cleaned.
- In 2015, approximately 3,838 linear feet of stormwater pipeline was cleaned and videoed.

- Continued infiltration/inflow investigations, which included building inspections, dye testing and flow evaluations. The sources contributed approximately 0.5 million gallons of water to the WWTF, which in turn was "polluted with nitrogen" at the WWTF. These efforts removed nitrogen from the WWTF effluent discharge. See **Attachment 16.**
- Three public works personnel completed an educational class on "Advanced Activated Sludge Process Control and Optimization" organized by NHWPCA.
- Three public works personnel completed a NASSCO Certification course.
- All Highway Department snow plow drivers received their "Green Pro Snow Certification".
- Prior to first snow fall, all salt spreaders were calibrated.
- All drains to the Squamscott River were stenciled or verified stenciled "Drains to River".
- Each Town resident was permitted to have twelve bags of leaves picked up for free in the Fall of 2015, and they were able to drop leaves off at the Exeter transfer station. The leaves were distributed to a compost pile and residents are allowed to use the compost.
- A downtown sidewalk replacement project on Water Street is in the planning process and is targeting construction in 2016. The downtown area has a high percentage of impervious area. This project will include several retrofitted sidewalk tree filter BMPs. Based on a June 2015 analysis by Geosyntec, installation of the tree filter BMPs could provide a 65% reduction in annual total nitrogen. See **Attachment 17.**
- A NHDES 319 Nonpoint Source Grant was awarded to the Exeter PWD for the Lincoln Street Watershed Planning Project. The grant was in the amount of $50,000 and requires a match, which will be provided by the Town.
- The Linden Street Culvert Replacement Project is on the 2016 Town Warrant which will be voted on during the Town Elections on March 8th, 2016.
- There was continued planning on the Great Dam removal. Contractors were pre-qualified in November, and permits were obtained in December. The project design phase is scheduled to be complete in January 2016, with the project going to Bid in March/April 2016.
- The Squamscott River Outfall Restoration Project was conducted by Unitil Corporation (formerly Northern Utilities) in the Squamscott River at a municipal stormwater outfall, adjacent to Swasey Parkway. The project scope included removal and subsequent processing of sediment containing coal tar, which covered and surrounded the municipal stormwater outfall. The project was conducted from mid-October through early December 2015. A Unitil Fact Sheet is included as **Attachment 18.**

LIST OF ATTACHMENTS

Attachment 1: WWTF Effluent Total Nitrogen Annual Load Table
Attachment 2: Wastewater Facilities Plan, March 2015
Attachment 3: Preliminary Design Report, October 2015
Attachment 4: PTAPP Implementation Framework
Attachment 5: Land Use Development Worksheet
Attachment 6: Town of Exeter Septic System Map (WISE)
Attachment 7: WISE Preliminary Integrated Plan - Final Technical Report, December 2015
Attachment 8: 2015 Great Bay Watershed Sampling Data
Attachment 9: AOC Checklist
Attachment 10: Draft MS4 Checklist
Attachment 11: Preliminary Nitrogen Tracking Summary
Attachment 12: Planning Department Proposed Zoning Amendment Memo
Attachment 13: Healthy Lawns – Clean Water
Attachment 14: Soak Up the Rain NH Brochure
Attachment 15: Exeter PWD Public Outreach
Attachment 16: 2015 Inflow and Infiltration Report
Attachment 17: Draft Memo, Sidewalk Tree Filter BMP Designs, June 2015
Attachment 18: Unitil Fact Sheet – Squamscott River Outfall Restoration Project, October 2015

Attachment 1
2015 Exeter Annual TN Load Table

ATTACHMENT 1 - EXETER, NH - TOTAL ANNUAL NITROGEN LOAD TO SQUAMSCOTT RIVER

															GRBCL
	WWTF EFFLUENT - TOTAL ANNUAL NITROGEN LOAD														Squamscott R.
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Load	Load	TN Conc.
	(lbs/mn)	(lbs/mn)	(lbs/mn)	(lbs/mn)	(lbs/mn)	(lbs/mn)	(lbs/mn)	(lbs/mn)	(lbs/mn)	(lbs/mn)	(lbs/mn)	(lbs/mn)	(lbs/yr)	(tons/yr)	(mg/l)
Days per month	31	28	31	30	31	30	31	31	30	31	30	31			
Past Years															
2003-2008	-	-	-	-	-	-	-	-	-	-	-	-	85,400	42.69	0.77
2009-2011	-	-	-	-	-	-	-	-	-	-	-	-	83,600	41.80	0.71
2012	8,457	7,830	9,303	8,151	11,590	7,633	4,338	2,235	2,312	6,349	6,222	11,745	86,164	43.08	0.83
2013	10,700	9,082	13,913	8,681	9,029	12,500	10,852	7,165	3,971	5,203	8,611	11,270	110,976	55.49	0.82
2014	9,331	7,140	8,122	6,810	6,479	7,140	6,789	7,750	4,560	3,565	11,040	15,717	94,443	47.22	-
2015	10,441	8,630	13,638	12,249	7,454	12,009	10,911	9,024	6,667	6,980	6,644	8,713	113,359	57	0.88

Previous Year (2012)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly Avg Flow (mgd)	1.92	1.69	1.91	1.56	1.84	1.94	1.27	1.30	1.26	1.45	1.38	1.75	-	-
Avg TN Conc. on Sample Day (mg/l)	18.3	20.8	19.9	21.0	24.4	16.3	*11.9*	7.5	8.5	17.1	19.3	27.5	-	-
Avg TN Load on Sample Day (lb/d)	253	266	283	270	374	245	*154*	63	65	202	192	355	-	-
Load - Flow Basis	9,071	8,212	9,833	8,201	11,586	7,917	3,903	2,516	2,674	6,436	6,684	12,484	-	-
Load - Load Basis	7,843	7,448	8,773	8,100	11,594	7,350	4,774	1,953	1,950	6,262	5,760	11,005	-	-
Load - Average	8,457	7,830	9,303	8,151	11,590	7,633	4,338	2,235	2,312	6,349	6,222	11,745	86,164	43.08

Previous Year (2013)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly Avg Flow (mgd)	1.71	1.67	2.56	1.95	1.63	2.17	1.75	1.29	1.53	1.22	1.25	1.45	-	-
Avg TN Conc. on Sample Day (mg/l)	24.2	23.3	21.0	18.5	21.8	23.1	24.2	21.9	10.5	16.9	25.0	31.8	-	-
Avg TN Load on Sample Day (lb/d)	345	324	449	278	286	415	347	226	131	164	313	342	-	-
Load - Flow Basis	10,705	9,092	13,907	9,022	9,192	12,549	10,947	7,323	4,012	5,321	7,832	11,938	-	-
Load - Load Basis	10,695	9,072	13,919	8,340	8,866	12,450	10,757	7,006	3,930	5,084	9,390	10,602	-	-
Load - Average	10,700	9,082	13,913	8,681	9,029	12,500	10,852	7,165	3,971	5,203	8,611	11,270	110,976	55.49

Previous Year (2014)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly Avg Flow (mgd)	1.82	1.66	1.98	2.73	1.72	1.26	1.33	1.28	1.12	1.36	1.42	1.5	-	-
Avg TN Conc. on Sample Day (mg/l)	23.5	24.5	21.0	9.8	15.3	20.5	19.1	25.0	16.3	18.5	30.3	26.4	-	-
Avg TN Load on Sample Day (lb/d)	301	255	262	227	209	238	219	250	152	115	368	507	-	-
Load - Flow Basis	11,064	9,503	10,757	6,698	6,808	6,467	6,572	8,278	4,570	6,509	10,772	10,244	-	-
Load - Load Basis	9,331	7,140	8,122	6,810	6,479	7,140	6,789	7,750	4,560	3,565	11,040	15,717	-	-
Load - Average	10,198	8,321	9,439	6,754	6,643	6,803	6,680	8,014	4,565	5,037	10,906	12,981	96,342	48.17

Current Year (2015)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly Avg Flow (mgd)	1.71	1.36	1.83	2.88	1.56	1.74	1.49	1.23	1.18	1.32	1.31	1.37	-	-
Avg TN Conc. on Sample Day (mg/l)	24.5	27.0	29.0	17.5	18.2	28.0	27.5	27.3	23.2	21.0	20.3	25.2	-	-
Avg TN Load on Sample Day (lb/d)	324	310	437	396	244	394	362	302	216	219	221	274	-	-
Load - Flow Basis	10,838	8,580	13,729	12,618	7,345	12,197	10,600	8,687	6,854	7,171	6,658	8,931	-	-
Load - Load Basis	10,044	8,680	13,547	11,880	7,564	11,820	11,222	9,362	6,480	6,789	6,630	8,494	-	-
Load - Average	10,441	8,630	13,638	12,249	7,454	12,009	10,911	9,024	6,667	6,980	6,644	8,713	113,359	56.68

NOTES:

1. Blue font indicates data from grab samples, TN estimated based on NH3-N plus 2 mg/l for effluent Organic Nitrogen.
2. Green font indicates data from grab samples, TN measured directly.
3. Red font indicates data from effluent composite sampler, TN measured directly.
4. Per the 2009 NHDES document, "Numeric Nutrient Criteria for the Great Bay Estuary," for days with multiple samples, the highest Squamscott River TN value was utilized.
5. Sample location is identified as GRBCL, located just downstream of the Newfields Wastewater Treatment Facility.
6. 2014 Squamscott River Data is not available at this time.

SOURCES:

1. 2003-2011 WWTF TN Loading values are from the 2012 Environmental Data Report (PREP).
2. The 2003-2013 Squamscott River TN Concentration values are derived from the UNH Jackson Estuarine Laboratory Tidal Water Quality Monitoring Program.
3. The 2015 Squamscott River TN Concentration values are derived from the 2015 Great Bay Watershed Quality Monitoring Program.

Wright-Pierce, 29 January 2016

Attachment 2

Wastewater Facilities Plan, March 2015

WASTEWATER FACILITIES PLAN
for the
TOWN OF EXETER, NEW HAMPSHIRE

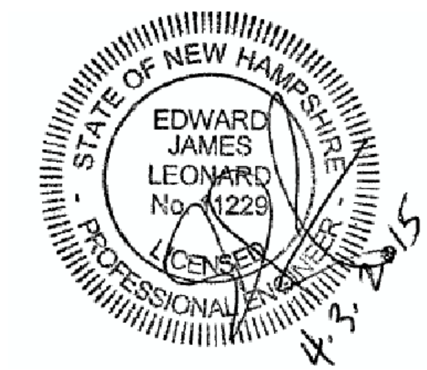
March 2015

WRIGHT-PIERCE
Engineering a Better Environment

TOWN OF EXETER, NEW HAMPSHIRE

WASTEWATER FACILITIES PLAN

MARCH 2015



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TOWN OF EXETER, NEW HAMPSHIRE

WASTEWATER FACILITIES PLAN

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SECTION 1

EXECUTIVE SUMMARY

1.1 INTRODUCTION

The Town of Exeter owns and operates a wastewater collection, treatment and disposal system which serves the Town of Exeter as well as small portions of the Towns of Stratham and Hampton. The collection system includes 9 pumping stations and approximately 51 miles of sewers. There are approximately 3,600 wastewater accounts.

The wastewater treatment facility (WWTF) is an aerated lagoon facility with disinfection that was constructed in 1964 and comprehensively upgraded in 1988. The WWTF discharges effluent into a tidally-influence segment of the Squamscott River (Class B), upstream of the Great Bay. The WWTF outfall has a dilution factor of 25:1. The effluent must meet standards set forth in state and federal water quality legislation, including the Clean Water Act. The WWTF effluent quality requirements are contained in a National Pollutant Discharge Elimination System (NPDES) permit which is issued by the US Environmental Protection Agency (EPA).

EPA issued a new NPDES permit to the Town in December 2012, which included requirements that the existing WWTF is not able to accomplish. EPA then issued an Administrative Order on Consent (AOC) to the Town in June 2013. The AOC provides a framework and schedule for the Town to achieve compliance with the NPDES permit requirements.

1.2 PURPOSE AND ORGANIZATION OF REPORT

The purpose of this report is to provide a technical basis upon which to make wastewater management decisions necessary to comply with the AOC and NPDES permit. This report is divided into the following sections: 1) Executive Summary; 2) Wastewater Flows, Loads and Effluent Standards; 3) Evaluation of Existing Facilities; 4) Town-Wide Nitrogen Management; 5) Evaluation of Alternatives; 6) Recommended Plan ; and 7) Project Costs and Financing. A list of commonly used acronyms and abbreviations is provided in **Table 1-1**.

TABLE 1-1
LIST OF COMMONLY USED ACRONYMS AND ABBREVIATIONS

AO	Administrative Order
AOC	Administrative Order on Consent
BMP	Best Management Practice
BOD	Biochemical Oxygen Demand
BOS	Board of Selectmen
CAPE	Climate Adaption Plan for Exeter
CMOM	Capacity, Management, Operations and Maintenance (for sewer collection system)
COD	Chemical Oxygen Demand
CSO	Combined Sewer Overflow
Current	Covering the dates 2011 to 2013, applied to population, wastewater flow or nitrogen load conditions
DO	Dissolved Oxygen
Future	Referring to population, wastewater flows or nitrogen loads, expected at Planning Horizon (2040)
GIS	Geographic Information System
gpd	Gallons Per Day
gpd/sf	Gallons Per Day Per Square Foot
IDDE	Illicit Discharge Detection and Elimination
I/I	Infiltration and Inflow
lb/day, lb/yr	Pounds Per Day, Pounds Per Year
mgd	Million Gallons Per Day
mg/l	Milligrams Per Liter
MS4	Municipal Separate Storm Sewer System
NHDES	New Hampshire Department of Environmental Services
NPDES	National Pollutant Discharge Elimination System
NPS	Non-Point Source
PH	Planning Horizon
ppm	Parts Per Million
PREP	Piscataqua Region Estuaries Partnership
SRF	State Revolving Fund (administered by New Hampshire Department of Environmental Services)
SSO	Sanitary Sewer Overflow
TBA	Total Buildable Area
TBO	Theoretical Build-Out
TDN	Total Dissolved Nitrogen
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorous
USEPA	U.S. Environmental Protection Agency
USGS	United States Geologic Survey
WISE	Water Integration for Squamscott-Exeter
WWFP	Wastewater Facilities Plan
WSAC	Water & Sewer Advisory Commission

1.3 CONCLUSIONS

Based on the work completed as a part of this project, the following conclusions are provided:

1. The WWTF has provided reliable service since the late 1980s; however, many of the equipment and building systems are reaching the end of their useful life and will require comprehensive upgrades in order to provide continued reliable service for the planning period. In addition, the WWTF will require significant modifications in order to meet the AOC requirements (i.e., less than 8 mg/l effluent total nitrogen) and/or the NPDES permit requirements (i.e., less than 3 mg/l effluent total nitrogen). Refer to **Section 3** for additional information.

2. Estimates of future wastewater flows were prepared based on input from the Public Works Department and Planning Department and are consistent with the Town Master Plan. Future flows are projected to be less than the NPDES permit flow limit (3.0-mgd) at the "Planning Horizon" (i.e., 2040) and at "Build-Out" (i.e., 2040 and beyond) for the Town of Exeter alone. Future flows are projected to be less than the NPDES permit flow limit at the "Planning Horizon" but slightly greater than the NPDES permit flow limit at "Build-Out" if the Stratham and Newfields were connected to the Exeter WWTF. The current NPDES permit capacity limit of 3.0-mgd can be maintained if the Towns commit to removing infiltration/inflow as the 3.0-mgd limit is approached. Refer to **Section 2** for additional information.

3. The AOC requires that the Town upgrade the WWTF to achieve 8-mg/l effluent total nitrogen or better. Based on the Town's evaluative criteria, the recommended approach is to upgrade the existing facility to achieve 5 mg/l effluent total nitrogen. In the future, if required by EPA, this system can be upgraded to achieve 3 mg/l effluent total nitrogen. The Town will utilize either On-Site Alternative No. 2 (Bardenpho) or On-Site Alternative No. 3 (SBR). The Town will evaluate the specific advantages/disadvantages of these alternatives early in the preliminary design phase. The Town will also evaluate phasing alternatives in detail early in the preliminary design phase. Refer to **Section 4** and **Section 5** for additional information.

4. The AOC requires significant efforts by the Town to track and account for increases and decreases in point source and non-point sources loadings of total nitrogen from the Town to the Exeter/Squamscott River and Great Bay. Non-point sources include storm drainage, fertilizer, septic systems, animal wastes and atmospheric deposition. This effort is expected to require collaboration between the Public Works, Planning and Building Departments. Refer to **Section 4** for additional information.

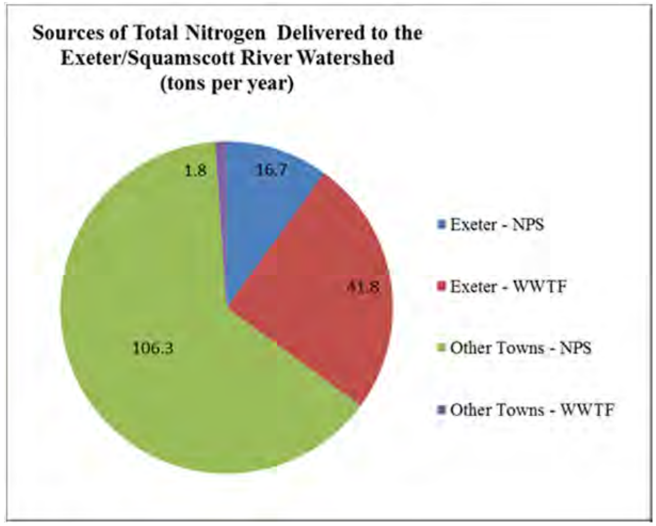
5. Per the AOC, the Town needs to fund and develop a town-wide Nitrogen Control Plan by September 2018. This Nitrogen Control Plan should be an "integrated plan" (i.e., meaning that the NPDES, AOC and MS4 requirements are addressed in concert with each other). This will allow the Town to address the nitrogen management problem holistically and over the longest potential compliance timeframe. The WISE report will address this topic in greater detail.

6. The amount of nitrogen reduction required is very dependent on the regulatory threshold (i.e., the allowable nitrogen load to the river/bay) and there is uncertainty associated with the current threshold criteria established by NHDES. The ultimate determination as to the appropriate threshold will take many years to play out and will have significant cost implications.

7. It is critical for the Town to establish a river monitoring program, in collaboration with other towns and NHDES, in order to establish baseline water quality information and to allow refinement of allowable threshold nitrogen loadings. While there is a relatively long-term record of data in Great Bay, such data does not exist for the Squamscott River or the Exeter WWTF. The upcoming Great Dam removal and WWTF upgrade will introduce major changes in the data record for the river. The Town should establish a robust monitoring program, based on sound science, as well as a calibrated water quality model, in order for the Town, NHDES and EPA to properly assess the environmental benefits resulting from these significant capital expenditures. Refer to **Section 4** for additional information.

8. Based on the NHDES Great Bay Nitrogen Non-Point Source Study (June 2014, Appendix H), the nitrogen from septic systems which are located greater than 200 meters from a 5th order river receives *significant natural attenuation* whereas septic systems which are located closer than 200 meters to a 5th Order River receive little to no natural attenuation. Existing parcels

which are located closer than 200 meters should be considered for potential sewer extensions or for private nitrogen removing septic systems. Moving forward, new development within 200 meters of a 5th order river should not be allowed to use a conventional septic system. Refer to **Section 2** and **Section 4** for additional information.



Total Delivered Load – 167 tons/year

Source: NHDES-GBNNPS, June 2014

9. The AOC and NPDES permit requires the Town to remove significant amounts of nitrogen from the Exeter River/Squamscott River watershed. Under current conditions, Exeter represents approximately 35% of the total nitrogen load to the Exeter River/Squamscott River watershed. The Town should aggressively pursue a watershed funding source for additional point source and non-point source nitrogen controls. The Town should consider partnering with other "point source communities" through the Great Bay Municipal Coalition and/or the Southeast Watershed Alliance to foster a watershed-based regional revenue generation approach. Refer to **Section 4** for additional information.

    To put this in perspective:

    - ***Exeter's contributes 8.4 lbs/capita/year to the Exeter/Squamscott River watershed as compared to the 7.4 lbs/capita/year from the other 15 communities in the watershed.***
    - ***The "upper threshold value" (based on river dissolved oxygen) is equivalent to 6.2 lbs/capita/year across the watershed.***
    - ***Once the WWTF upgrade is completed in 2018, Exeter's contribution will be reduced to 4.4 lbs/capita/year – substantially less than the other watershed communities.***

10. The loadings described above represent current conditions; development within the watershed will increase these loadings. Whereas most of Exeter's development potential is within the sewered area, Exeter's future development should have a lower nitrogen footprint due to the fact that sewage will be treated at a new WWTF. That said, other non-point source nitrogen

reduction strategies will be advisable to prevent making the nitrogen challenge larger and more costly. This is especially true for the other watershed communities that do not have a WWTF and that have the significant potential to dramatically increase future nitrogen loadings to Great Bay under a "business as usual" approach to managing development. The importance of engaging the other watershed communities on the topic of regulating nitrogen from new development cannot be overstated.

11. There are two on-going planning projects which will provide information, analysis and conclusions that are essential to the Town's decision making process with regard to the WWTF and its regional upgrade options. These projects – the WISE project and the Portsmouth Pease Regional WWTF Alternative – are expected to be completed in March/April 2015 and April/May 2015, respectively. Refer to **Sections 4 and 5** for additional information.

12. There is a clear downward trend in peak system flows based on the infiltration/inflow reduction efforts initiated in the late 1990's and continued to present. There is also a downward trend in average system flows. This is a result of the Town's considerable infiltration/inflow removal efforts. This trend should be re-assessed in Spring 2015 to incorporate the results of the on-going and recently completed efforts with private inflow removal from Phillips Exeter Academy and the Jady Hill neighborhood. Refer to **Section 2** for additional information.

13. The Town's WWTF influent sampling program indicates that there is a relatively small data set with relatively large variability. The detailed supplemental sampling program should be continued until there is a sufficient body of data on which to base the design of its upgraded wastewater treatment facilities. In addition, the Town should investigate the impacts of the Exeter Water Treatment Plant discharge as well as potential impacts of industrial user discharges to the variability of the influent concentrations. This topic represents significant uncertainty in terms of the cost of the recommended plan. Refer to **Section 2** for additional information.

1.4 PROJECT COSTS AND FINANCING

The recommended plan, and its estimated cost, is described in detail in **Section 6**. The funding and financing implications are described in detail in **Section 7**. The recommended facilities are estimated to cost approximately $51,870,000 to design/construct and $1,150,000 annually to operate (upon start-up in 2018), both expressed in 2014 dollars. The estimated annual Sewer Fund revenue requirements from the Town of Exeter, including the debt and O&M for the new facility, are $5,889,000. These cost estimates are for the recommended facilities as identified in **Section 6** (i.e., WWTF upgrade for a 3.0-mgd facility design to achieve 5-mg/l, Main Pump Station Upgrade, Main Pump Station forcemain upgrade, watermain to the DPW complex and lagoon decommissioning activities). It is important to note that these costs do not include the following:

- Cost saving opportunities identified in **Section 6**. These opportunities to reduce or defer project costs should be explored as an early task in preliminary design.
- Additional costs associated with the non-point source nitrogen reductions or other AOC related compliance items described in **Section 4**.

These project costs are significant and will have a significant impact on the average sewer user rate. Based on the funding assumptions described in **Section 7**, the total annual Sewer Enterprise Fund would increase to approximately $5,889,000 (*with no State Aid Grant but with 15% SRF principal forgiveness*). This results in a 140% increase in the Sewer Enterprise Fund annual budget. If the State of New Hampshire re-establishes the State Aid Grant program, the total annual Sewer Enterprise Fund would increase to approximately $5,039,000 and would result in a 105% increase in the existing Sewer Enterprise Fund annual budget.

In order to mitigate these impacts to the sewer user rates, the following grant funding sources should be aggressively pursued: NHDES State Aid Grant (SAG) and SAG Plus grants; US Economic Development Administration grants; and Unitil grants. The Town should also review and revise, as appropriate, all of its other sewer-related fees.

It is important to note that DES has issued a moratorium on new SAG and SAG Plus grant applications as of July 1, 2013. To this end, we recommend that the Town:

- Get involved with the New Hampshire Municipal Association's on-going effort to maintain this important grant program.
- Get involved with efforts to create a State Water Trust Fund, which was recommended by the SB60 Joint Legislative Study Commission created to study water infrastructure sustainability funding.
- Begin contacting grant agencies and assembling grant application materials.
- Lobby NHDES for a significant principal forgiveness allocation for this project.

1.5 PROJECT IMPLEMENTATION

The Administrative Order on Consent (AOC Docket No. 13-010) puts forth a specific implementation schedule, as described in greater detail in **Section 4**. The October 2014 preliminary draft of this report has been on the Town's website since November 2014. In addition, the preliminary draft report was presented to a joint meeting of the Water and Sewer Advisory Committee and Board of Selectmen in December 2014 (televised meeting). Accordingly, the following key implementation steps are recommended:

1. Submit this report to NHDES and EPA.
2. Review the WISE report, CAPE report and Pease Regional Evaluation report when they are issued. Determine whether they modify any conclusions identified herein.
3. Engage NHDES, EPA and neighboring communities regarding watershed-wide reductions in non-point source nitrogen loadings, allocation of nitrogen removal responsibilities and watershed-wide revenue sources.
4. Initiate efforts to review the Town's ordinances as well as the Southeast Watershed Alliances' model stormwater ordinance. This review should identify ordinance updates and revisions that will minimize the increase of future nitrogen from current and future development.
5. Engage the Southeast Watershed Alliance and watershed communities on establishing lawn chemical fertilizer and agricultural best management practice measures that can produce low

cost nitrogen reductions as well as establishing development standards that can ensure future development has the lowest practicable nitrogen footprint.

6. Engage NHDES and WISE to further study the anticipated future reductions in atmospheric deposition sources of nitrogen. Near-field (e.g., automobiles) and far-field (e.g., power plants) of nitrogen have/will continue to decline due to EPA air pollution control regulations.
7. Engage Stratham and Newfields regarding the inter-municipal contractual details if the Exeter intends to serve as a regional host facility for wastewater treatment.
8. Engage grant funding agencies including NHDES, EDA and Unitil. Complete grant funding applications for portion(s) of the project which are eligible and supported.
9. Consider phasing and other cost saving and affordability strategies.
10. Review sewer user fees, as well as all other fees, and determine whether revisions are appropriate.
11. Formalize rate increases based on the final project financing scenario.
12. Implement the recommended upgrades in accordance with the approved project schedule.
13. Continue with monitoring, study, planning and implementation of non-point source nitrogen management to comply with the AOC (refer to **Section 4** of this report).

A preliminary implementation schedule for the recommended plan is presented in **Table 1-2**.

TABLE 1-2
IMPLEMENTATION SCHEDULE

Item	**Milestone Dates**
Planning	
Submit Report to NHDES and EPA	March 2015
Review WISE, CAPE and Portsmouth Reports, when available	March to May 2015
Finalize Decision regarding On-Site or Off-Site Treatment	May to July 2015
Develop and Submit Grant Applications	April to October 2015
Design, Bidding & Award	
Design	April 2015 to June 2016
Bidding & Award	June to September 2016
Town Meeting Funding Authorizations	
Design Funding	Completed (March 2014)
Construction Funding	March 2016
Construction	
Initiate Construction (AOC)	June 30, 2016 (1,2)
Substantially Complete Construction (AOC)	June 30, 2018 (1,2)
Meet Interim TN NPDES Permit (AOC)	June 30, 2019 (1)
Other	
TN Annual Reports (on-going)	2015 to 2018
Squamscott River Monitoring (on-going)	2015 to 2018
Review regulations, ordinances and bylaws (e.g., stormwater, fertilizer control, nitrogen management, etc.)	2015 to 2016
Total Nitrogen Control Plan (AOC)	September 30, 2018 (1)
Nitrogen Reduction Projects	To be determined
Nitrogen Engineering Evaluation (AOC)	December 31, 2023 (1)

Notes:

1) AOC specified deadline
2) The Town will likely require an AOC schedule extension; however, additional evaluations will occur during the preliminary design phase in order to determine how the AOC dates could be achieved. The Town continues to consider the Pease Regional WWTF option on a "dual-track" with preliminary design of the on-site WWTF option.

Attachment 3

Preliminary Design Report, October 2015

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

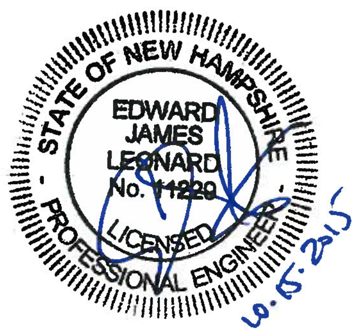
October 2015

WRIGHT-PIERCE
Engineering a Better Environment

TOWN OF EXETER, NH

WWTF & MAIN PUMP STATION UPGRADE
PRELIMINARY DESIGN REPORT

OCTOBER 2015



Prepared By:

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Portsmouth, NH 03801

TOWN OF EXETER, NH – WWTF AND MAIN PUMP STATION UPGRADE PRELIMINARY DESIGN REPORT

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WRIGHT-PIERCE
Engineering a Better Environment™

SECTION 1
INTRODUCTION & EXECUTIVE SUMMARY

1.1 PURPOSE OF THIS REPORT

The purpose of this Preliminary Design Report is: to document the basis of design for the components of the project for use in final design; to develop preliminary layout plans for the proposed improvements; to document alternatives analyses used in the selection of equipment or approaches; to refine the estimated project costs; to allow for value engineering; and to obtain Town and NHDES comments on the proposed project prior to proceeding with final design.

1.2 REPORT ORGANIZATION

This Preliminary Design Report is divided into the following sections:

1. Introduction
2. Design Considerations
3. Project Implementation
4. Preliminary Cost Estimate

Select information regarding equipment systems, technical memoranda and preliminary drawings can be found in the appendices to this report.

1.3 BACKGROUND

The Town of Exeter owns and operates a wastewater collection, treatment and disposal system which serves the Town of Exeter as well as small portions of the Towns of Stratham and Hampton. The collection system includes 9 pumping stations and approximately 51 miles of sewers. There are approximately 3,600 wastewater accounts.

The wastewater treatment facility (WWTF) is an aerated lagoon facility with disinfection that was constructed in 1964 and comprehensively upgraded in 1988. The WWTF discharges effluent into a tidally-influence segment of the Squamscott River (Class B), upstream of the

Great Bay. The WWTF outfall has a dilution factor of 25:1. The effluent must meet standards set forth in state and federal water quality legislation, including the Clean Water Act. The WWTF effluent quality requirements are contained in a National Pollutant Discharge Elimination System (NPDES) permit which is issued by the US Environmental Protection Agency (EPA).

EPA issued a new NPDES permit to the Town in December 2012, which included requirements that the existing WWTF is not able to accomplish. EPA then issued an Administrative Order on Consent (AOC) to the Town in June 2013. The AOC provides a framework and schedule for the Town to achieve compliance with the NPDES permit requirements.

This preliminary design report (PDR) builds upon the analysis, conclusions and recommendations outlined in the *Wastewater Facilities Plan* (Wright-Pierce, March 2015) for the physical upgrades proposed for the WWTF and the Main Pump Station.

The Town has been working diligently on the preliminary design since early April 2015, when the Board of Selectmen authorized the Wright-Pierce design contract. The preliminary design has included numerous workshops with the Town to obtain valuable input on this project. The Town DPW, Town Manager, Water and Sewer Advisory Committee and the Board of Selectmen have taken a keen interest in the preliminary design due to the magnitude of the dollars involved. The Town has never undertaken a project this large.

The Town directed Wright-Pierce to work on a “dual-track” to complete the preliminary design of a regional treatment approach at the Exeter WWTF site. Exeter is considering expanding its current regional role by incorporating increased flows from Stratham and potentially Newfields.

The Town closely followed and seriously considered a regional treatment approach in collaboration with the City of Portsmouth and the Town of Stratham. This was discussed at the meeting hosted in Exeter on February 24, 2015 which was attended by EPA, NHDES and representatives from numerous municipalities. As was discussed and agreed by all parties at the February 2015 meeting, a regional approach at the Pease WWTF location was worth taking some additional time to evaluate. After several months of study, the City of Portsmouth decided it would not move forward in this direction at a City Council meeting on May 18, 2015. The Town of Exeter reached the same conclusion at a Board of Selectmen meeting in July 2015.

To this end, there have been 4 workshops and meetings regarding process selection and phased construction of capacity. The Town is extremely focused on the affordability and sustainability of its wastewater infrastructure. These workshops culminated in a meeting on August 10, 2015 where the Water & Sewer Advisory Committee and Board of Selectmen indicated their desire to proceed in a phased manner as long as their permitted capacity could be retained. The Town directed Wright-Pierce to submit a letter to NHDES regarding whether phased construction would impact its permitted capacity. The request letter was submitted on August 12, 2015. Response letters were received from both EPA (dated August 20, 2015) and NHDES (dated August 21, 2015). These responses were very favorable but indicated that formal approval is subject to the full NPDES permit renewal process at some point in the future.

On August 25, 2015, the Water & Sewer Advisory Committee recommended that the Board of Selectmen vote to proceed with the project in a phased manner. This recommendation was based, in part, on correspondence from EPA (dated August 20, 2015) and NHDES (dated August 21, 2015) on the topic of maintaining the NPDES permit capacity of 3.0-mgd. One of the Selectmen was not present, so the Board of Selectmen did not formally vote and a follow-up meeting was scheduled to discuss. A combined Board of Selectmen/Water & Sewer Advisory Committee meeting was held on September 8, 2015. At that meeting, the Town elected to proceed with the project in phased manner (i.e., phased construction of capacity) and working with EPA and NHDES to maintain the NPDES permit capacity.

This Preliminary Design Report documents the recommended facility upgrades required for a 3.0-mgd design annual average capacity but proposed to construct the upgrades required for a 2.65-mgd design annual average capacity initial construction project (2.65-mgd via MLE process and 2.2-mgd via Bardenpho process). It is important to note that the 2.65-mgd constructed capacity is equal to the Town’s projected flow needs in the planning period, as identified in the Wastewater Facilities Plan (Table 2-12). The Town is committed to designing and constructing a

WWTF which will achieve substantially better nitrogen removal than the minimum required by the AOC.

1.4 STATUS WITH REGARD TO THE REQUIREMENTS OF THE AOC

A summary of the AOC requirements, as well as the Town's current status/progress with regard to the requirements of the AOC (*indicated in italics*) is presented below.

- **June 30, 2016 [A.1]:** Initiate construction of the WWTF upgrade. *Based on the factors described above, the Town is currently behind schedule on this requirement. Refer to Section 3 of the PDR where the schedule is presented as well as potential approaches to reduce the amount of time needed to initiate construction are identified.*

- **June 30, 2018 [A.2]:** Achieve substantial completion of the WWTF upgrade. *See item above.*

- **September 30, 2018 [D.4]:** Submit a "Nitrogen Control Plan" for implementing specific control measures for non-point source and stormwater nitrogen loadings. *The Town-funded Wastewater Facilities Plan (Section 4) and the NERRS-funded (National Estuarine Research Reserve System) WISE Project Report represent significant progress towards the Nitrogen Control Plan. Additional work is planned in order to fulfill this requirement of the AOC.*

- **June 30, 2019 [B.2]:** Meet the interim effluent limit of 8 mg/l effluent TN. *See items above; however, it is expected that the upgraded facility will be discharging less than 8 mg/l effluent TN by this date (i.e. as a typical value vs a seasonal rolling average including the preceding six months).*

- **December 31, 2023 [E.2]:** Submit an engineering evaluation with recommendations to achieve the NPDES effluent TN discharge requirement of 3 mg/l or a justification for leaving the interim limit of 8 mg/l. *Work on this will begin after completion of the WWTF Upgrade and the Nitrogen Control Plan.*

- **Nitrogen Tracking [D.1]:** Begin tracking all activities that the Town should reasonably be aware of that affect the total nitrogen load to Great Bay Estuary. *The Town has been conducting nitrogen tracking since the submittal of the January 2014 annual report required by the AOC and will continue to do so.*

- **Coordination with NHDES and other Great Bay Communities [D.2,D.3]**: Begin coordination with the NHDES, other Great Bay communities, and watershed organizations in NHDES's efforts to develop and utilize a comprehensive subwatershed-based tracking/accounting system for quantifying the total nitrogen loading changes associated with all activities within the Town that affect the total nitrogen load to the Great Bay Estuary [D.2] and to develop a subwatershed community-based total nitrogen allocation." [D.3] *Town staff has been actively involved in the on-going NHDES PTAPP project. Town staff/elected officials/citizens have been actively involved in the recently completed WISE project. The Town will continue to coordinate with NHDES and the other Great Bay communities through PTAPP.*

1.5 DESIGN CAPACITY AND PHASED CONSTRUCTION

The August 2015 letters from EPA and NHDES indicated that the project must comply with the requirements of the NHDES design regulations (Env-Wq 700). Specifically, the NHDES letter provided a few specific citations. These citations, as well as how the Town has addressed them (*indicated in italics*), are summarized below.

- **Env-Wq 708.05(a) –** WWTP design and layout must include locations of forseeable future facilities on construction drawings. *The drawings indicate the location of the current proposed and future proposed facilities for the full 3.0-mgd design flow as well as potential future primary and tertiary treatment.*

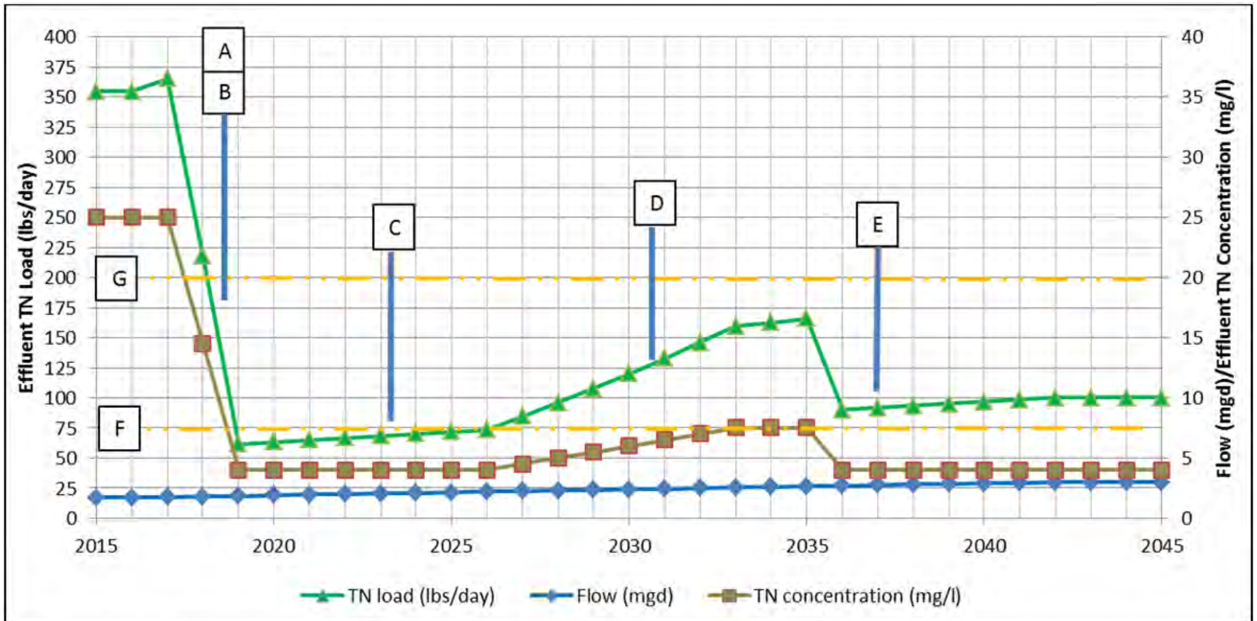
- **Env-Wq 708.05(b) –** WWTP hydraulics, sizing of conduits connecting unit processes, and flow distribution shall provide for future expansion. *The drawings indicate the hydraulic elevations and conduit sizes for the current proposed and future facilities for the full 3.0-mgd design flow.*

- **Exeter must meet the 80 percent design flow capacity or design loading capacity permit requirement for all permit conditions.** *The design flow for the future facility is 3.0-mgd (Bardenpho process). The design flow for the current proposed facility is 2.2-mgd (Bardenpho process, TN<5-mg/l) and 2.65-mgd (Modified Ludzack-Ettinger process, TN<8-mg/l). The proposed trigger flow is a 3-month average of 2.4-mgd; which is 80 percent of the design flow capacity for the 3.0-mgd facility.*

- **Exeter must consider the time to design, bid and construct additional facilities required to meet varying flow and loading conditions while maintaining compliance with the AOC.** *The AOC allows for an effluent total nitrogen concentration of 8-mg/l between April 1 and October 31 (seasonal rolling average). Based on our Biowin modeling, the MLE process will achieve this objective. The timeline to complete the funding, final design, bidding and construction of the additional facilities identified herein is approximately 30 to 36 months. Given the flow allowance between the MLE capacity (2.65-mgd) and the trigger capacity (2.4-mgd), sufficient time is available to complete those tasks.*

A graphical depiction of the conceptual wastewater flow (mgd), effluent TN concentration (mg/l) and effluent TN load (lbs/day) based on the phased construction of the design capacity is shown in **Figure 1-1** below.

FIGURE 1-1
CONCEPTUAL WASTEWATER FLOW, EFFLUENT TN CONCENTRATION AND EFFLUENT TN LOADS OVER TIME



A - Complete Initial WWTF Upgrade (2018)
B - Complete Nitrogen Control Plan (2018)
C - Complete Engineering Evaluation (2023)
D - Hit "Trigger Flow", beginning planning for Phase 2 Upgrade (2030)
E - Complete Phase 2 Upgrade (2036)
F - NPDES Permit Limit (75 lbs/day) based on 3.0-mgd at 3-mg/l effluent TN. Superseded by AOC (8-mg/l, no mass limit).
G - AOC Limit (~200 lbs/day) based on 3.0-mgd at 8-mg/l effluent TN.

If, based on the content of this PDR, EPA and NHDES agree that the design capacity is sufficiently addressed, then the following permitting approach could be considered:

- 2016 and 2017 – Complete design/bidding of WWTF Upgrade, initiate construction
- 2017 – Complete NPDES permit renewal application (on or before June 12, 2017, which is 6 months prior to permit expiration)
- 2018 and 2019 – Complete WWTF Upgrade construction and the Nitrogen Control Plan
- 2019 to 2023 – Implement Nitrogen Control Plan projects & develop Engineering Evaluation
- 2023 to 2024 – Evaluate progress with EPA/NHDES and act on 2017 NPDES renewal.

This potential permitting approach should be discussed among the Town, EPA and NHDES.

1.6 SCHEDULE

The AOC, which was issued in June 2013, calls for construction to be initiated by June 30, 2016 and to be substantially completed by June 30, 2018. A WWTF project of this size would typically take between 24 to 36 months from notice to proceed to substantial completion. This specific site includes numerous unique aspects, several of which were identified during the preliminary design efforts, which will extend the total construction duration longer than the 24 months originally envisioned in the AOC. Based on the nature of the work, we are currently anticipating 3 to 4 construction contracts. A detailed project schedule is included in Section 3 and indicates key design, permitting and construction phase assumptions and milestones. In short, based on the information contained in Section 3:

- Initiating AOC related construction will be approximately 6 months late.
- Completing AOC related construction will be approximately 6 months late.
- Completing construction overall will extend beyond AOC related construction.

The Town has asked that we identify specific approaches which could be taken in order reduce or eliminate the need to request an AOC schedule extension. Some approaches will shorten the design/permitting duration, some approaches will shorten the overall construction duration and some approaches will increase the overall construction duration but reduce the time required for just the AOC-related components. The potential measures are listed in Section 3. These measures will impact the cost of the design and/or construction efforts; however, the magnitude (i.e., amount, positive/negative) has not been developed at this time.

1.7 COST ESTIMATE

The Project Cost Estimate and the Construction Cost Estimates for the project are presented as **Tables 4-1** and **4-2**, respectively. The Project Cost Estimate for the full scope of construction (i.e., Contracts 1/2/3/4) described herein is \$56.7M to \$59.8M (based on Option 2 and Option 3 for lagoon decommissioning and wetlands restoration and creation, respectively). This is greater than the amount originally allocated to the project based on the Wastewater Facilities Study (\$51.87M). This differential is due to a number of modifications to the project approach from that identified in the Wastewater Facilities Plan as well as to an improved understanding of the site subsurface conditions and project needs during the preliminary design process. We have prepared a list of the factors associated with the cost increase in Section 4.1**.**

Given the AOC requirements, the preliminary design phase followed an aggressive schedule for a project of this size. Significant process and site layout work needed to be completed earlier than desired (i.e., before geotechnical work was completed). Ideally more time would have been available in order to fine tune the site layout based on the geotechnical information and the significant earthwork cuts/fills required. We have already initiated some these fine-tuning efforts in anticipation of the Value Engineering process and have identified approximately \$16M in potential cost savings or deferrals. A tabular summary of these items is included as **Figure 1-2** at the end of this section.

When working through potential cost savings items, it is critical to understand the inter-dependency of the various items, as a decision on one item may have a significant impact on a separate item. **Table 1-1** provides a listing of the major project components and identifies whether each is required for AOC compliance (or for a different reason) and how it is inter-related to the overall project.

FIGURE 2-1: PRELIMINARY COST AND TIME SAVING OPPORTUNITIES

	Preliminary Cost (C##) & Time (T##) Saving Opportunities	Savings Project Cost ($M)	Input/Preference					Decision	Savings ($M)	Cumulative ($M)
			WP	VE	DPW	WSAC	BOS			
C1	Eliminate future tertiary system from hydraulic profile.	$0.5								
C2	Eliminate Main Pump Station influent channels, channel grinder and odor control system.	$0.8								
C3	Reduce Headworks peak flow from 12.5-mgd to 6.6-mgd.	$0.7								
C4	Eliminate Septage Receiving and odor control system.	$0.9								
C5	Eliminate Headworks odor control system.	$0.1								
C6	Use diesel generators in lieu of natural gas generators at WWTF and Main Pump Station.	$0.6								
C7	Defer IEQ basin upgrade but construct IEQ pump station.	$0.5								
C8	Seek NHDES waiver on Disinfection Building enclosure for UV System.	$0.2								
C9	Seek NHDES waiver to reduce Sludge Storage Tank volume from 5 days at design maximum month (300kgal) to 5 days at design annual average (200kgal).	$0.4								
C10	Reconfigure the site plan to minimize costs associated with subsurface conditions.	$0.5								
C11	Reconfigure the Solids Handling Building and Sludge Storage Tanks to raise the dewatering operation to a higher elevation. Eliminate the Yard Pump station.	$0.5								
C12	Reconfigure the Headworks Building to incorporate Supplemental Alkalinity. Eliminate Supplemental Chemical Building and construct stand-alone Supplemental Carbon tank.	$0.4								
C13	Eliminate UV System, retain CCT and construct an addition to the Plant Water Building for Sodium Hypochlorite and Sodium Bisulfite storage and feed systems.	$0.4								
C14	Defer sludge removal and disposal from Aerated Lagoon Nos. 1, 2 & 3.	$3.8								
C15	Defer embankment removal and wetlands restoration of Aerated Lagoon Nos. 2 & 3.	$6.3								
T1	Postpone design of Contracts 2/3/4 and focus efforts only on design of Contract 1.	Not Est.								
T2	Prepare Lagoon Closure Plan and obtain Sludge Quality Certificates prior to bidding Contract No. 1; or issue an early site work contract to prepare the Sludge Storage Lagoon site in advance of bidding Contract No. 1.	Not Est.								
T3	Advance the design of Contract No. 1 concurrent with the 60% value engineering review as well as Town/DES/EPA reviews.	Not Est.								
	Preliminary Total Cost Savings	**$16.6**								

TABLE 1-1
INTER-DEPENDENCY OF PROJECT COMPONENTS

Project Component	Required for AOC	Required or Desired for Other Reasons	Inter-Dependency
Main Pump Station		X	Hydraulic profile
Main Pump Station forcemain		X	Hydraulic profile
Watermain extension	X		Fire protection for WWTF
Control Building Renovations	X		Staff, SCADA, Disinfection
Septage Building		X	None
Headworks Building		X	Hydraulic profile
Influent Equalization		X	Hydraulic profile
Primary Treatment (*Future*)		X	Hydraulic profile
Nutrient Removal Activated Sludge	X		Hydraulic profile
Tertiary Treatment (*Future*)			Hydraulic profile
Disinfection	X		Control Building
Solids Handling Building	X		Process
Sludge Storage Tanks	X		Process
Standby Generator	X		Process
Yard Pump Station	X		Process, hydraulic profile
Supplemental Chemical Building	X		Process
Plant Water Building	X		Process
Stormwater Treatment Basin	X		Site development
Maintenance Building		X	Displacing current space
Materials Storage Bins		X	Displacing current space
Decommission Sludge Storage Lagoon	X		Needed for new WWTF
Decommission Lagoon 1, 2, 3		NR	Not require until lagoons are out-of-service
Wetlands Restoration		NR	Preferred end-use when lagoons are out-of-service

1.8 NEXT STEPS

There are numerous critical and high priority tasks that need to be completed before final design can commence. These tasks, as well as the lead responsible parties, are identified below. ***Note: the project schedule presented in Section 3 of this PDR assumes that all of the following activities can be completed in 40 working days (60 calendar days).*** *It will take a concerted effort by all parties to complete these tasks in the allotted time. It is not unusual for these tasks to take longer than this and, if they do, the schedule will need to be extended.*

- Obtain Town, NHDES and EPA technical and permitting comments on the PDR.
- Obtain Town, NHDES and EPA direction on which time-saving items identified in Section 3 and on which cost-saving items identified in Section 4 are desired.
- Complete the Value Engineering process, including Engineer response and Town response.
- Obtain Town and NHDOT comments and approval on the proposed scope and traffic management concept for work in Route 85 (Newfields Road).
- Obtain Town and Unitil comments/agreement on the WWTF gas service request and WWTF access drive location based on the existing Unitil easements over Town land.
- Obtain input/concurrence from Town (legal counsel) on whether land acquisition or easements are required for any of the work items in the project.

Concurrent with the above tasks, initiate work on the following tasks:

- Conduct grant agency outreach
- Discuss preliminary approaches to cost-recovery from regional customers/partners
- Discuss initial strategies for Town Meeting warrant article
- Discuss additional data needs for final design, as identified in Section 3

1.9 ACKNOWLEDGEMENTS

The Preliminary Design Report is the culmination of many months of work. During this time, Town Public Works staff, Town volunteers (from the Water & Sewer Advisory Committee), elected officials (the Board of Selectmen), and NHDES staff generously provided their time and input to help guide the process.

Attachment 4
PTAPP Implementation Framework

Great Bay Pollution Tracking and Accounting Pilot Project

Two Year Implementation Framework:
Sustaining Progress toward Regional Pollution Tracking and Accounting

PURPOSE

This document provides a road map and describes next steps for sustaining progress for the next phase of the Great Bay Pollution Tracking and Accounting Pilot Project (PTAPP). Phase of PTAPP resulted in significant progress toward developing a framework to implement regional coordination; however, participants agree future phases and additional work are needed to achieve regional coordination.

Introduction and Description

Coastal watershed communities face regulatory measures to improve water quality in New Hampshire's Great Bay and its tributaries. The requirements include tracking of pollution control activities including point and non-point sources. Implementing tracking and accounting measures that effectively and accurately quantify water quality improvements is a technically challenging and potentially costly endeavor. Communities in the region agree that on-going, collaborative coordination by permitted and non-permitted entities and state and federal regulators is needed to leverage scarce financial resources and develop an effective and affordable system.

Phase One of PTAPP was initiated in 2015 to bring communities together to develop a regionally coordinated approach that leverages existing resources and develop regional goals for the long term implementation of a coordinated pollutant tracking and accounting system.

Phase One of PTAPP consisted of a series of six meetings designed to provide a forum and a process to identify key components, needs and next steps for implementation of a regional approach. Phase 1 goals include progress toward development of 1) uniform tools to track pollution control activities, and 2) regionalized accounting methods to credit pollutant load reduction resulting from the implementation of control activities. A summary of progress to-date and anticipated next steps follows.

Phase 1 Outcomes

The PTAPP participants succeeded in meeting the two Phase 1 goals by active participation in six facilitated workshops. Eight municipalities participated in the project, including four consulting firms that have worked with the participating communities. Other participants included: state and federal agencies, regional planning commissions, the Piscataqua Region Estuaries Partnership, University of New Hampshire, Southeast Watershed Alliance, and others (Table 1.). Participants recognized and agreed that a regional approach is the most cost effective and efficient way to meet tracking requirements.

Collectively, PTAPP participants developed a group decision-making process, identified key tracking items and needs, and made progress toward determining necessary accounting methods. Phase 1 resulted in a Two-Year Implementation Framework that identifies next steps and outcomes for subsequent phases.

Phase 1 Outcomes: PTAPP Foundational Elements

- Project teams developed and defined roles and responsibilities and a group decision-making process was established
- Consensus definitions of "tracking" and "accounting" created (See Glossary of Common Terms: PTAPP Glossary)
- Tracking Matrix developed to describe activities municipalities will track and defined at the category and subcategory level; based on regulatory requirements and other local needs (Final Tracking Matrix)
- Rationale, benefits, interest and commitment to regional approach confirmed
- Discussion of next steps for developing accounting methods
- Two Year Implementation Framework developed to guide next steps.

Phase 1 meeting notes and other resources can be found on the PTAPP website:
http://www.unh.edu/unhsc/ptapp

Phase 1 Outcomes: Project Teams - Sustaining the Process

An important outcome of Phase 1 included the establishment of two key process teams: a **Regional Stakeholder Team** and a **Project Management Team**. As the Phase One process evolved, all participants recognized there is a clear need for continued participation from both teams in future phases of the effort (Table 1.).

- **Regional Stakeholder Team (RST)**: Includes an interdisciplinary group of regional participants who represent a range of interests. The participants include municipalities, state and federal agencies, regional planning commissions, and other key stakeholders.

  RST Role: The RST participated in PTAPP meetings and provided input during the process to develop key outcomes and products.

- **Project Management Team (PMT)**: Oversees programmatic implementation for the process. This team includes representatives from funding agencies and facilitators including NHDES (Coastal Program and Watershed Assistance Section), Rockingham Planning Commission, Strafford Regional Planning Commission, and the UNH Stormwater Center.

  PMT Role: The PMT developed meeting agendas, refined process outcomes, and provided grant/project management.

During Phase 1, the RST continuously reviewed, discussed, and established roles for current and future phases of the project. Additionally, RST meeting participants identified resource needs to enable participation in future phases. The PMT met frequently during Phase One and continued to refine general and specific project roles for both teams.

Table 1. PTAPP Process Participants and Roles

Project Team	Participant Description	Process Role Phase 1	Process Role Future Phases	Resource Needs for Continued Participation
RST	**Phase 1 Municipalities:** Dover, Durham, Exeter, Lee, Newmarket, Portsmouth, Rochester, Stratham	Participation – provide local input and reality checks	Continued participation; including additional communities as identified	Funding may be needed to enable continued participation of municipal consultants
PMT & RST	UNH Stormwater Center	Project management & technical facilitation	Participation could increase to provide additional technical assistance	Funding would be needed to support staff participation
PMT & RST	NH Department of Environmental Services	Project management, facilitation, funding	Continued participation	Evaluate role and staffing requirements for future phases
RST & PMT	Regional Planning Commissions	Participation – serve as regional planning resource & project management	Continued participation	Funding will needed to support RPC staff participation
RST	US EPA	Participation and technical assistance	Continued participation	Evaluate and define
RST	Piscataqua Region Estuaries Partnership	Participation and resource leveraging	Continued participation	Evaluate interest and define roles
RST	Southeast Watershed Alliance	Participation	Potential for increased participation depending on needs	Evaluate capacity and define roles
TBD	The Nature Conservancy	None	TNC has active oyster restoration program in Great Bay and has conducted extensive research on benefits of implementation –	Evaluate interest and define role

			Technical Panel contributor	
TBD	US Department of Agriculture	None	Assistance on technical panel for determination of agricultural BMPs and load reduction potential	Evaluate interest and define role
	University of New Hampshire Cooperative Extension	None	Assistance on technical panel for determination of fertilizer BMPs and load reduction potential	Evaluate interest and define roles

Phase 1 Outcomes: Benefits and Rationale for Moving Forward

During the six Phase One meetings, participants identified three key benefits to justify moving forward to further develop and implement a regional approach for pollution tracking and accounting.

Benefits

- **Cost Savings**: A regional approach will generate and leverage shared financial and technical resources thereby reducing the burden of cost and effort for municipalities

  Regulatory Compliance: Tracking items at the category and sub-category level were developed and reviewed during Phase One (Final Tracking Matrix). The Tracking Matrix includes activities that will fulfill regulatory requirements. . It also includes activities that non-regulated and MS4-waiver communities should consider to avoid future waiver revocation or invocation of residual regulation authority by EPA.

- **Coordination with other Regional Efforts**: The Great Bay region has a number of related efforts underway. The PTAPP products and process should be used to enhance and leverage projects with related goals

Next Steps: Where do we go from here and how do we get there?

The Phase 1 process resulted in a foundation for further development of a regional tracking and accounting approach; however, additional phases of PTAPP are needed to make continued progress toward developing and sustaining a regional system. Future phases will require additional financial, technical, and collaborative resources.

The **Two-Year Implementation Framework** will guide the PTAPP process through the next steps toward implementing a regional pollution tracking and accounting program. The framework recognizes that over the next two years, interim pilot phases may be needed to build a strong foundation for widespread implementation of regional pollution tracking and accounting (Figure 1.). A description of the two year framework, anticipated phases and key tasks follows.

It is anticipated that the Regional Stakeholder and Project Management Teams will continue to participate in the next phases of the project as needed and described.

Phase 2: Pilot Tracking Program and Conceptual Planning for Accounting Methods

The next phase of PTAPP will include implementation of a pilot tracking program for several communities in the region. This will involve direct technical assistance to help communities implement tracking for items described in the Tracking Matrix and will make progress toward identifying items and methods best suited for tracking at the regional level.

Concurrently during this phase, progress will be made toward developing accounting methods for tracked items.

Implement Pilot Tracking Program

Tracking efforts will be piloted both locally within select communities and regionally. The Tracking Matrix will serve as the foundation for the pilot program. Two tracks are anticipated:

1.) **Local Tracking Efforts**: Phase Two will provide direct technical assistance to help pilot communities to evaluate accuracy, efficacy and additional needs for implementing tracking at the local level for activities described in the Tracking Matrix. PTAPP will offer technical assistance to further define and identify tracking elements and assist with translation to functional units of measure such that long term trends in land use and NPS management can be further understood.

Several communities have made progress toward developing local tracking approaches through updated NPDES permit requirements. PTAPP will leverage resources from these efforts to develop a common tracking sheet to be used by participating communities.

2**.) Regional Tracking Efforts**: A subcommittee will be established to work with RPCs and DES to consolidate major tracking items that can be developed regionally (GIS and OneStop) into a single database or report. This effort would likely have a five year reporting timeframe and would overlap or parallel some of the local tracking elements that would be reporting similar information on an annual timeframe. Deliverables would be a single report for all participating communities on long term changes with respect to land use change and septic developments. A key component of the regional effort would be ensuring that aerial photography is flown/created and that funding is secured to work with DES and RPC and UNH GRANIT partners to complete the analysis and comparative reporting on the first five year report period between 2010-2015.

Milestone: The Tracking Matrix is piloted in select communities to determine feasibility, economics and efficacy of selected metrics. Attention will be paid to long term practicability of selected metrics as well as effective time scales and cooperative reporting methods so as to reduce overall economic burdens and maximize regional efficiencies.

Accounting Methods: Develop Conceptual Process

The development of regional accounting methods to quantify load reductions achieved through implementation of tracked NPS management activities will likely be a complex process as it is of primary concern for both regulatory interests (EPA) and community representatives. For some tracking items in the Tracking Matrix, such as impervious cover increases and stormwater best management practice (BMP) implementation, there are advanced regional methods that either have been or are nearing development. These methods have largely been pioneered by EPA Region 1 and are part of a tracking tool developed to assist local communities implementing tracking and accounting efforts associated with impaired waters like the Charles River and Lake Champlain watershed areas. However, for other tracking elements, such as fertilizer reduction programs and other outreach efforts, load reduction estimates are unknown and will need to be researched and developed.

During Phase 2, a conceptual process will be developed to enable development of regional accounting methods for tracked activities. Key process tasks, participants, roles, and costs will be identified and shared with regional partners for input.

Milestone: A conceptual process is defined, described, and shared with regional stakeholders for input.

Phase 2 Timeframe: Fall 2015 – Winter 2017

Phase 3: Evaluate Pilot Tracking Program and Formalize Accounting Process

This phase of the project will focus on evaluation of the pilot tracking program and will solidify the approach for developing regional accounting methods.

Tracking Program Evaluation

Local and regional pilot efforts will be evaluated to identify critical modifications and resources required to scale up to include additional communities. The evaluation will focus on a review of the utility and level of effort required for each tracked item, identification of additional technical and financial resources, and a review and refinement of stakeholder roles.

It is anticipated that some tracking efforts may be more manageable and have higher accuracy at a regional scale. The opposite could be true for other efforts. This comparison should provide information to guide future direction and tool development and will be an important part of identifying the appropriate scope and scale of all tracking efforts that emerged from PTAPP Phase One efforts.

Milestones:

- Refined matrix of practical regional tracking items with appropriate time scales, methods, and roles
- Description of technical and financial resources needed to implement regional tracking for additional communities
- Sustainable business model identifying local and regional ownership roles and opportunities
- Funding secured to implement the regional tracking program in additional communities
- Identification of process and methods to include non-regulated communities
- Evaluation of database options for tracking tool

Formalize Process for Development of Regional Accounting Methods

Based on feedback from stakeholders' review of the conceptual framework, a formal process for developing accounting methods will be established. Key process tasks, costs, participants, and roles will be described.

Milestone: Process is described and funding is secured to implement.

Phase 3 Timeframe: Fall 2016 – Fall 2017 (Note: Overlap with Phase Two is anticipated)

Phase 4 and Beyond: Implementation of Regional Tracking Program and Process for Completing and Implementing Accounting System

Regional Tracking Program

Once Phases 2and 3 are completed, it is anticipated that technical and financial resources will be in place to implement regional tracking with additional communities. Additionally, local and regional roles and responsibilities will be defined and participants will have a clear sense of benefits for participation.

Accounting Method Development

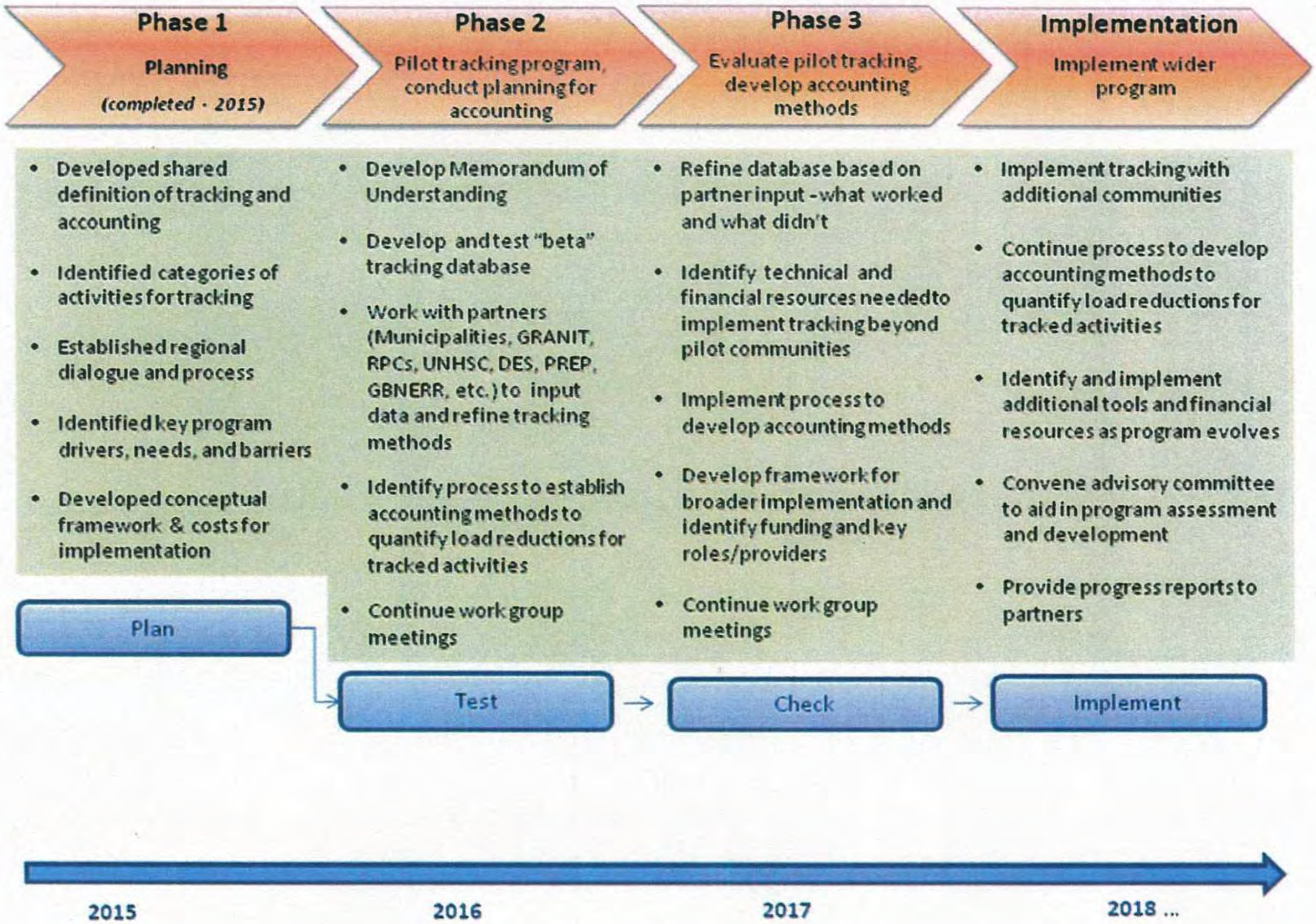
The process for developing accounting methods will be implemented. This is likely to include a series of expert panels, stakeholder meetings, comprehensive literature reviews and other steps that will be needed in what is likely to be a highly iterative, long term process.

Phase 4 Timeframe: Fall 2017 and beyond (Note: Accounting implementation could happen sooner if opportunities and resource to fast-track the effort arise)

It should be noted that as the program moves forward into Phase Four and beyond, continual evaluation and adaptive management of tracking and accounting methods will be needed to ensure economic and programmatic practicality. Additionally, on-going regional stakeholder participation will be critical through all phases of the project to ensure program success.

PTAPP: Implementation Framework

Regional Pollution Tracking and Accounting



Conceptual Budget and Tasks for Phases 2 and 3

Phase 2: Pilot local tracking efforts and explore regional scale tracking efforts

Pilot local tracking efforts in two communities, explore regional scale tracking efforts, and establish process for how to develop accounting methods.

This task will involve input and direct technical assistance from the Project Management Team which includes the NHDES, NHCP, the UNHSC and the RPCs (Strafford and Rockingham). In addition it would likely require the assistance of a computer programmer or database developer. Estimates for costs are provided below and include GIS work, meetings between representatives of the Project Management Team and each of the pilot communities, and technical assistance with Tracking Matrix implementation. For simplicity, two pilot communities (one in Rockingham County and one in Strafford County) have been used for this estimate. Additional pilot communities could be added if interest and funding is identified.

Budget Item	Estimated Budget	Notes
Technical assistance for pilot committee 1	$10,000	Tentatively planned for Newmarket
Technical assistance for pilot committee 1	$10,000	Tentatively planned for Exeter

Task Total for 2 Pilot Communities: $20,000
Additional communities: $10,000 per community.

Specific tasks to include:

- Develop a common tracking form to be used by participating communities.
- Explore possibilities and opportunities of regionalizing reporting
- Develop an annual report template for use by towns to satisfy EPA permit requirements
- Work with RPCs and NHDES to develop regional tracking resources (GIS and OneStop) into a single database or product that can be shared with the larger PTAPP advisory board
- Coordinate meetings with pilot communities, the Regional Stakeholder Team, and Project Management Team

Phase 3: Establish Process for development of regional accounting methods, evaluate tracking process, review databases

Personnel: This task will involve the input and assistance from the Project Management Team which includes the NHDES, NHCP, the UNHSC and the RPCs (Strafford and Rockingham). In addition it would likely require the assistance of an expert panel to spearhead the development and defense of accounting metrics. At minimum there should be 4 subcommittees to start with that parallel the subcommittees that were formed to work on the tracking matrix: Septic, Land Use Changes, Best Management Practices, and Fertilizer Controls. Subcommittees should work with EPA Region I to establish current accounting metrics that have been developed through regional efforts (i.e. BMP DSS

Budget Item	Estimated Budget	Notes
Technical Assistance to develop regional tracking initiatives	$40,000	Work with RPC, SRPC, NHDES and others to develop regional tracking tools.

Total Cost: $40,000

Specific tasks to include:

- Create conceptual and final process for developing methods
- Work with technical expert panels to develop a common accounting metrics for use by participating communities to quantify load reduction estimates for pollutant control activities
- Develop an annual report template that could be submitted to EPA to satisfy permit requirements
- Coordinate meetings with pilot communities, the Regional Stakeholder Team, and Project Management Team

Final Budget Note: The conceptual budgets presented here depict a **bare minimum** expense. With more resources this project could potentially develop processes, tracking tools and templates that are more immediately useful and defensible. It is assumed that additional expenditures for communication personnel, database developers and collaboration facilitators could not only extend the applicability of the results to more communities but could also build trust and commitment amongst project participants which will lead to a greater probability of practicable and sustainable success.

Next Steps

The Project Management Team will work with municipal partners and the RPCs to more fully develop the budgets and tasks for each phase. Funding will be identified to support the next phases. The PTAPP dance will continue.

Attachment 5

Land Use Development Worksheet

Town of Exeter, NH

Land Use Development Tracking Worksheet

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

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

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

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

Type of Agricultural / Pasture use	30

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

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

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

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

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

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

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

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

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

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

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

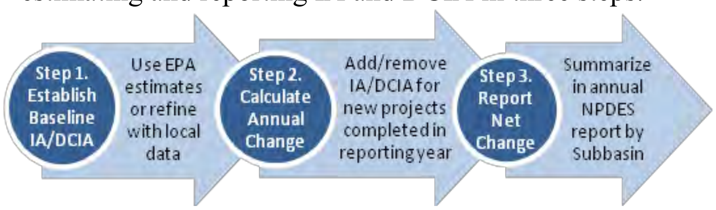
42. Description of BMP such as, structural: wet or dry ponds, wetland system, infiltration system, Bioretention areas or non-structural: vegetative buffers, forested buffers or filter strips.
43. Latitude of BMP.
44. Longitude of BMP.
45. Drainage area (square feet)(see Definition F) directed to the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

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

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

Draft NPDES Permit Focuses on DCIA

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



What does DCIA really mean?

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

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

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

Accepted Methods for Estimating IA & DCIA

Step 1. Establish Baseline IA/DCIA

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

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

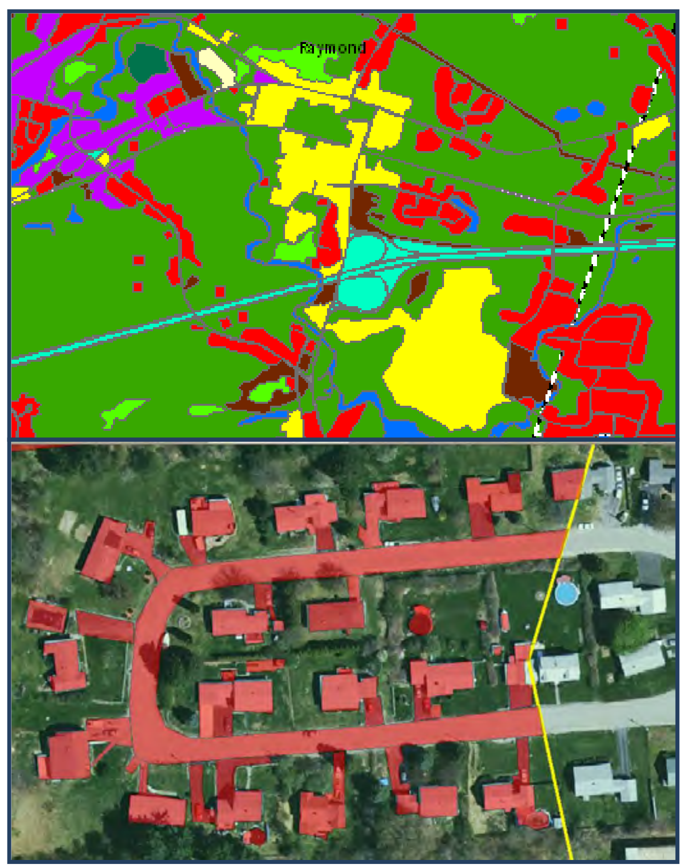


Figure 1. EPA will use statewide land use data (GRANIT), subbasin boundaries, and land use impervious coefficients to estimate baseline IA for each MS4 jurisdiction (upper). Communities may choose to refine these estimates with direct measure of IA where local GIS capacity is available, as shown here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

Why Quantify Your IA & DCIA?

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

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

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

Eq. 1 IA_{Lui} = Total $acres_{Lui}$ * %IA

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

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

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

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

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

Table 2. Sutherland Equations to Determine DCIA (%)

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

Step 2. Calculate Annual Change

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Step 3. Report Net Change in IA & DCIA

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

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

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

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

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

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

Are We Required to Follow This Protocol?

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

Example Subbasin DCIA Calculations

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

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

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

Steps 2 -4. Determine DCIA per BMP

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

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

Step 5. Sum DCIA for entire site

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

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

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

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

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

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

Step 5. Sum DCIA for entire site.

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

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

End of Year Report: Totals for Subbasin #54203:

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

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

Checklist of What to Expect EPA to Provide

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

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

How Does LID Influence IA and DCIA?

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

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

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

What are the Costs of Annual DCIA Tracking?

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

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

Where Can I go for More Information?

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

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

References

Cappiella K. and K. Brown. 2001. Impervious Cover and Land Use in the Chesapeake Bay Watershed.

Center for Watershed Protection. 2003. The Impacts of Impervious Cover on Aquatic Systems. Watershed Protection Research Monograph No. 1. Ellicott City, MD. www.cwp.org/Resource_Library/Center_Docs/IC/Impacts_IC_Aq_Systems.pdf

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

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

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

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

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Attachment 6
Town of Exeter Septic System Map (WISE)

Appendix E:

Septic System Maps for Exeter, Stratham, and Newfields

Appendix E: Septic System Maps for Exeter, Stratham, and Newfields

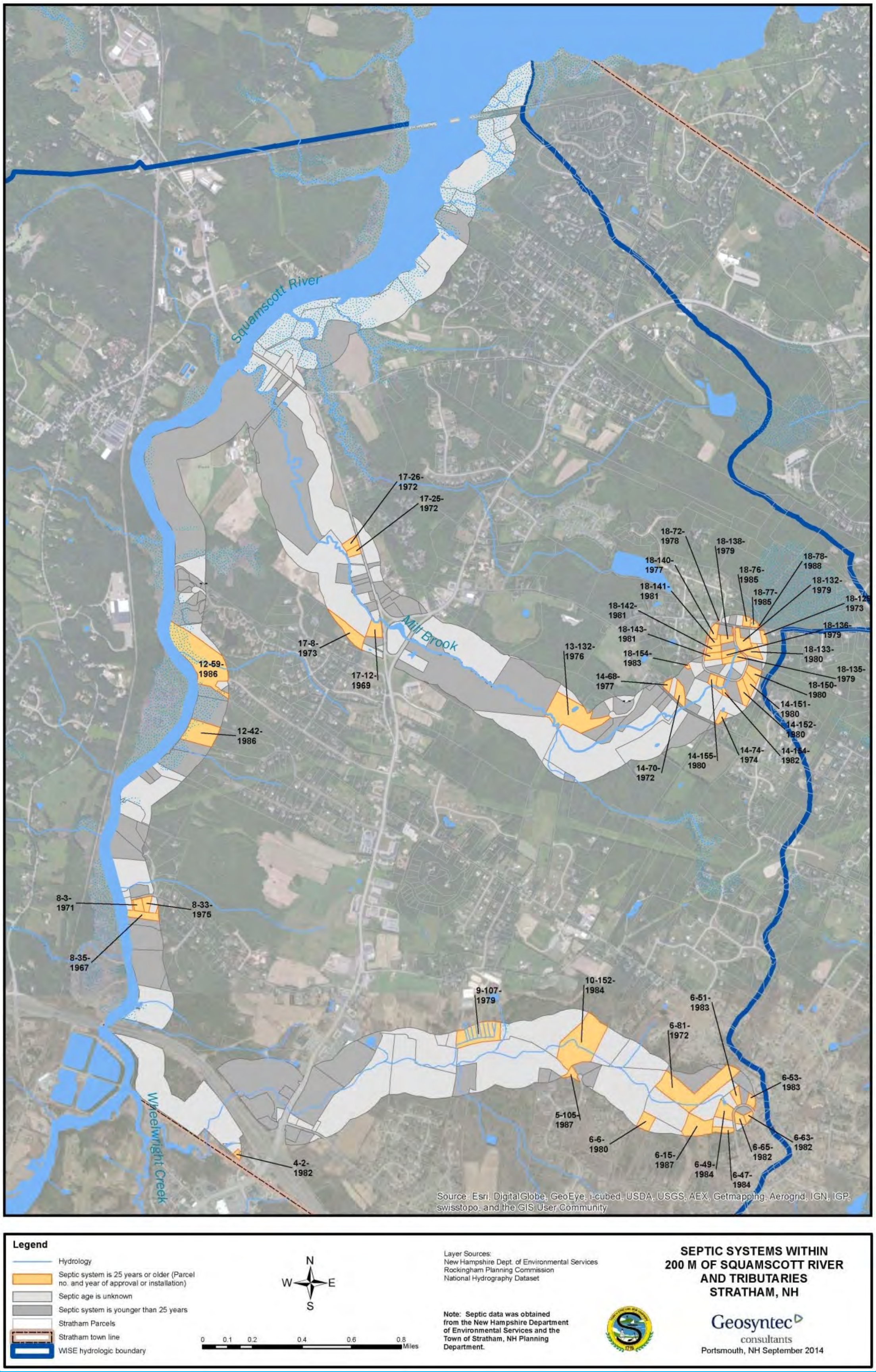
Septic system locations were identified using a method from NHDES (2014). Systesm are identified within and without 200 meters. The draft MS4 permit requires the identification of septic systems within 200 meters and over 25 years of age to be prioritized for upgrade. NHDES delineated regions serviced by municipal sewer systems based on direct information from regional municipalities and information in the USGS Water Demand Model for New Hampshire Towns. The population outside of these service areas, as determined by 2010 US Census block data, was assumed to use septic systems for waste disposal. The detailed process used to determine location of septic system is explained in Appendix G of GBNNPSS.

The Town of Exeter has subsurface septic systems, which serve approximately 1195 properties or 29 percent of the Exeter properties. Of the total number of septic properties within Exeter, approximately 89 percent are located within the Squamscott-Exeter River watershed; of these properties, approximately 33 percent are located within 200 meters (656 feet) of the Squamscott-Exeter River or its larger tributaries (i.e. approximately 350 properties in Exeter have septic systems and are located within 200 meters of the Squamscott-Exeter River or its major tributaries).

The Town of Stratham does not have a municipal sewer system and is entirely dependent on septic systems for wastewater treatment. Of the total number of Stratham properties, which are serviced by septic systems, approximately 66 percent are located within the Squamscott-Exeter River watershed. Of these, approximately 27 percent are located within 200 meters of the Squamscott-Exeter River (or its major tributaries). In the summer of 2014, Geosyntec reviewed all of the available septic system records at the Stratham Planning and Zoning Department; 51 properties were identified, which are located within 200 meters of the Squamscott-Exeter River (or its major tributaries) and are most likely greater than 25 years old.

The Newfields wastewater plant is owned and operated by the Water and Sewer District and serves approximately 170 households (30% of the town population). The District encompasses residences and businesses in the downtown area adjacent to the Squamscott River. In 2014, the District was expanded to add a connection to the Rt 108 corridor, anticipating future growth in that region. The extension also provides the potential for future transfer of septic systems to wastewater treatment. The Town of Newfields has subsurface septic systems, which serve approximately 555 properties or 68 percent of the Newfields properties. Of the total number of septic properties within Newfields, approximately 59 percent are located within the Squamscott-Exeter River watershed; of these properties, approximately 31 percent are located within 200 meters of the Squamscott-Exeter River or its larger tributaries (i.e. approximately 100 properties in Newfields have septic systems and are located within 200 meters of the Squamscott-Exeter River or its major tributaries.

Legend
Septic within 200 meter buffer
Watershed Boundary
Hydrology
Parcel Boundaries
Layer/Data Sources:
New Hampshire Dept.
of Environmental Services;
Rockingham Planning Commission;
National Hydrography Dataset;
Town of Exeter
NOTE:
Future work may include
data on septic system ages
N
0 375 750 1,500
Meters
DRAFT
AREAS WITH SEPTIC SYSTEMS WITHIN
200 METERS OF MAJOR TRIBUTARIES OF THE
SQUAMSCOTT-EXETER RIVER WATERSHED
IN EXETER, NH
January 2015
Geosyntec consultants
Portsmouth, NH



Squamscott River
Mill Brook
Wheelwright Creek
17-26-
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17-25-
1972
17-8-
1973
17-12-
1969
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1986
12-42-
1986
13-132-
1976
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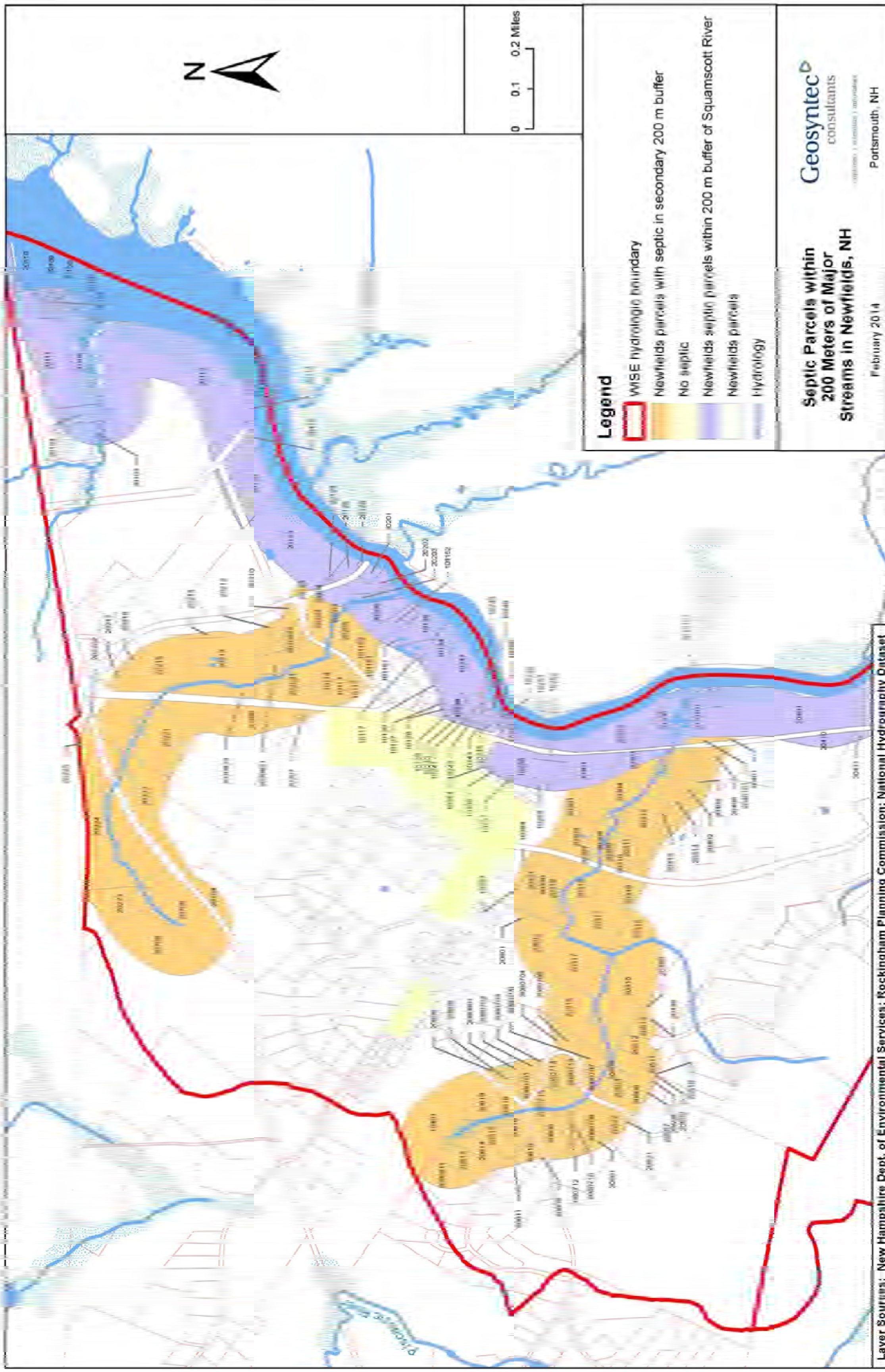
1987
6-6-
1980
6-63-
1982
6-65-
1982
6-15-
1987
6-49-
1984
6-47-
1984
4-2-
1982
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
Legend
Hydrology
Septic system is 25 years or older (Parcel no. and year of approval or installation)
Septic age is unknown
Septic system is younger than 25 years
Stratham Parcels
Stratham town line
WISE hydrologic boundary
N
W
E
S
0 0.1 0.2 0.4 0.6 0.8 Miles
Layer Sources:
New Hampshire Dept. of Environmental Services
Rockingham Planning Commission
National Hydrography Dataset
Note: Septic data was obtained from the New Hampshire Department of Environmental Services and the Town of Stratham, NH Planning Department.
SEPTIC SYSTEMS WITHIN
200 M OF SQUAMSCOTT RIVER
AND TRIBUTARIES
STRATHAM, NH
Geosyntec
consultants
Portsmouth, NH September 2014


N
0 0.1 0.2 Miles
Legend
WISE hydrologic boundary
Newfields parcels with septic in secondary 200 m buffer
No septic
Newfields septic parcels within 200 m buffer of Squamscott River
Newfields parcels
Hydrology
Septic Parcels within 200 Meters of Major Streams in Newfields, NH
February 2014
Geosyntec consultants
Portsmouth, NH
Layer Sources: New Hampshire Dept. of Environmental Services; Rockingham Planning Commission; National Hydrography Dataset

Attachment 7
WISE Preliminary Integrated Plan
Final Technical Report, December 2015

DRAFT NITROGEN CONTROL PLAN, SCHEDULE AND FINANCING ESTIMATE FOR EXETER, STRATHAM, AND NEWFIELDS

February 19, 2015

Water Integration for Squamscott-Exeter (WISE)

Geosyntec consultants

University of New Hampshire

Rockingham Planning Commission

National Estuarine Research Reserve System Science Collaborative

cbi Consensus Building Institute

DRAFT PRELIMINARY MODEL RESULTS, NOT FOR DISTRIBUTION

WISE PROJECT TEAM

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Renee Bourdeau, Project Manager
Chad Yaindl, Senior Staff Engineer

Alison Watts, Watershed Science Lead

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Clay Mitchell, Town Planner, Newfields
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Kalle Matso, Program Manager

Ted Diers, Matt Wood, Phil Trowbridge, Barbara MacMillan, Sally Soule, Eric Williams

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- Steve Jones
- Michelle Daley
- Pete Richardson
- Sylvia VonAulock
- Kristen Murphy
- Phyllis Duffy
- Dean Peschel
- Eric Strecker
- Marcus Quigley
- Bill Arcieri
- David Cedarholm

WHY INTEGRATED PLANNING?

- **Integrated Planning allows for crediting across the MS4 and WWTF permits which can have important economic benefits**
- **Integrated Planning allows a flexibility in implementation to plan for most cost effective measures first while still meeting regulatory standards that protect public health and water quality**
- **Encourages the use of green infrastructure which manages stormwater as a resource, and supports other economic benefits and quality of life.**

NACWA A Clear Commitment to America's Waters | ACWA | NEIWPCC

In cooperation with the Water Environment Federation (WEF)

Region 1 Integrated Planning Workshop

September 9, 2013
10:00 am – 3:00 pm
NHDES Portsmouth Regional Office
222 International Drive, Suite 175
Portsmouth, NH

10:00 – 10:20 **Welcoming Remarks, Introductions and Ground Rules**

Ronald Poltak, Executive Director, NEIWPCC
Alexandra Dunn, Executive Director & General Counsel, ACWA
Chris Hornback, Senior Director of Regulatory Affairs, NACWA

Region 1 has challenged the Great Bay communities to develop the first in the nation IP for MS4 and WW (EPA, 2013)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUN - 5 2012

MEMORANDUM

SUBJECT: Integrated Municipal Stormwater and Wastewater Planning Approach Framework

FROM: Nancy Stoner
Acting Assistant Administrator
Office of Water

Cynthia Giles
Assistant Administrator
Office of Enforcement and Compliance Assurance

TO: EPA Regional Administrators
Regional Permit and Enforcement Division Directors

In recent years, EPA has increasingly embraced integrated planning approaches to municipal wastewater and stormwater management. EPA further committed to work with states and communities to implement and utilize these approaches in its October 27, 2011

Integrated Municipal Stormwater and Wastewater Planning Approach Framework (EPA, 2012)

Lower Exeter River & Squamscott River Watershed Base Map

Newfields

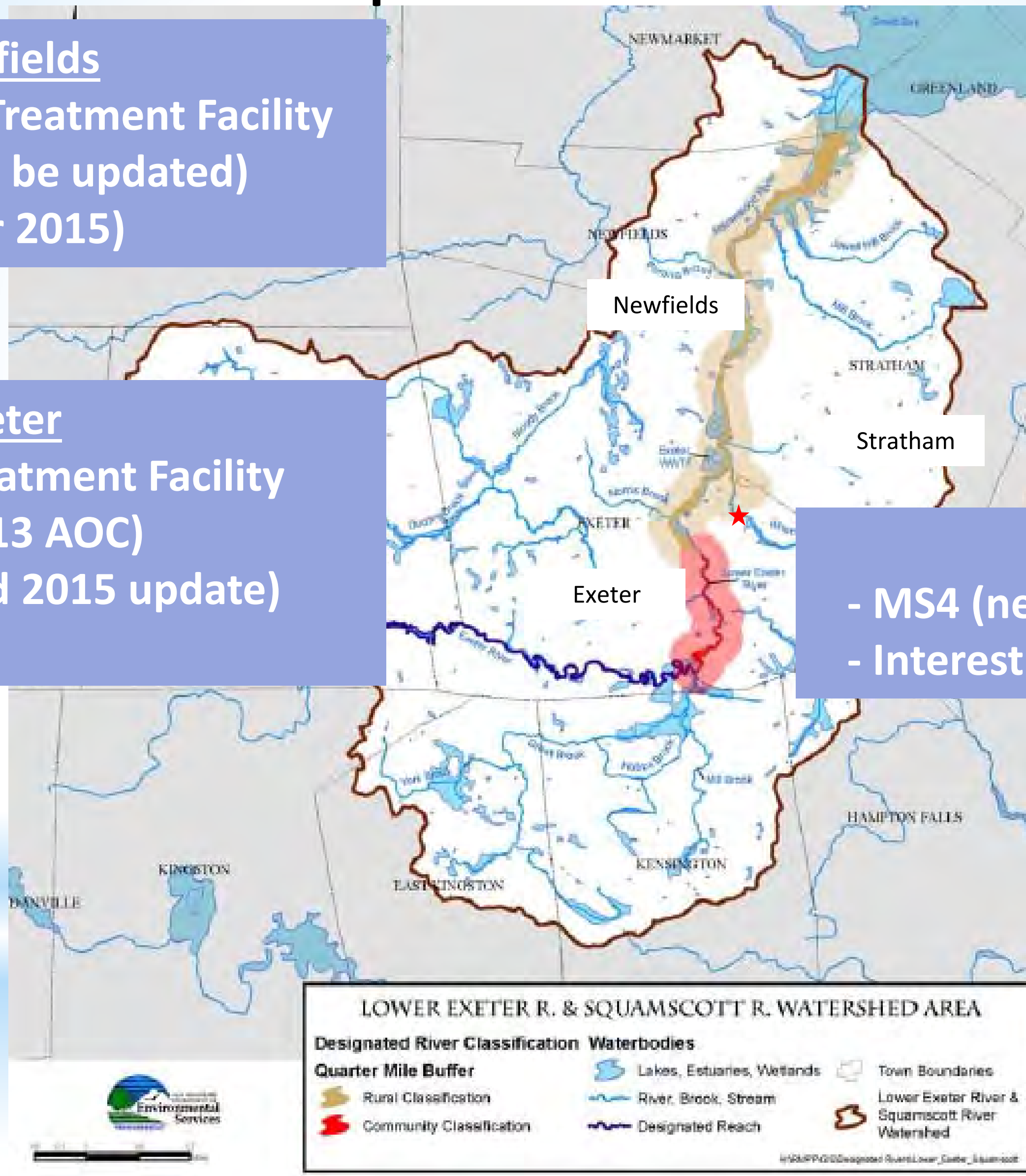
- Waste Water Treatment Facility (to be updated)
- MS4 (waived for 2015)

Exeter

- Waste Water Treatment Facility (June 2013 AOC)
- MS4 (current and 2015 update) pending

Stratham

- MS4 (new, 2015 pending)
- Interest in waste water



(NHDES; Burack, T. S. W., Michael J; Stewart, Harry T; Couture, Steven M. (2011). "The Lower Exeter and Squamscott Rivers A Report to the General Court." 21.)

WATER QUALITY LOAD TARGETS

- A Water Quality Load target is needed to determine the required level of non-point source (NPS) management because **no TMDL exists.**

- Applicable load targets were taken from the Exeter WWTF NPDES Permit:

"The average nitrogen loading threshold for the ***Exeter/Squamscott River watershed*** *that protects all designated uses is a* ***total nitrogen load of 87.8 tons per year****…"*

- Additionally, the Exeter NPDES Permit and Draft WW Facilities Plan (June 2012, Nov 2014) provides the following loading thresholds:

    - *Threshold to prevent low DO:* ***140 tons/yr***
    - *Threshold to protect eelgrass:* ***88 tons/yr***

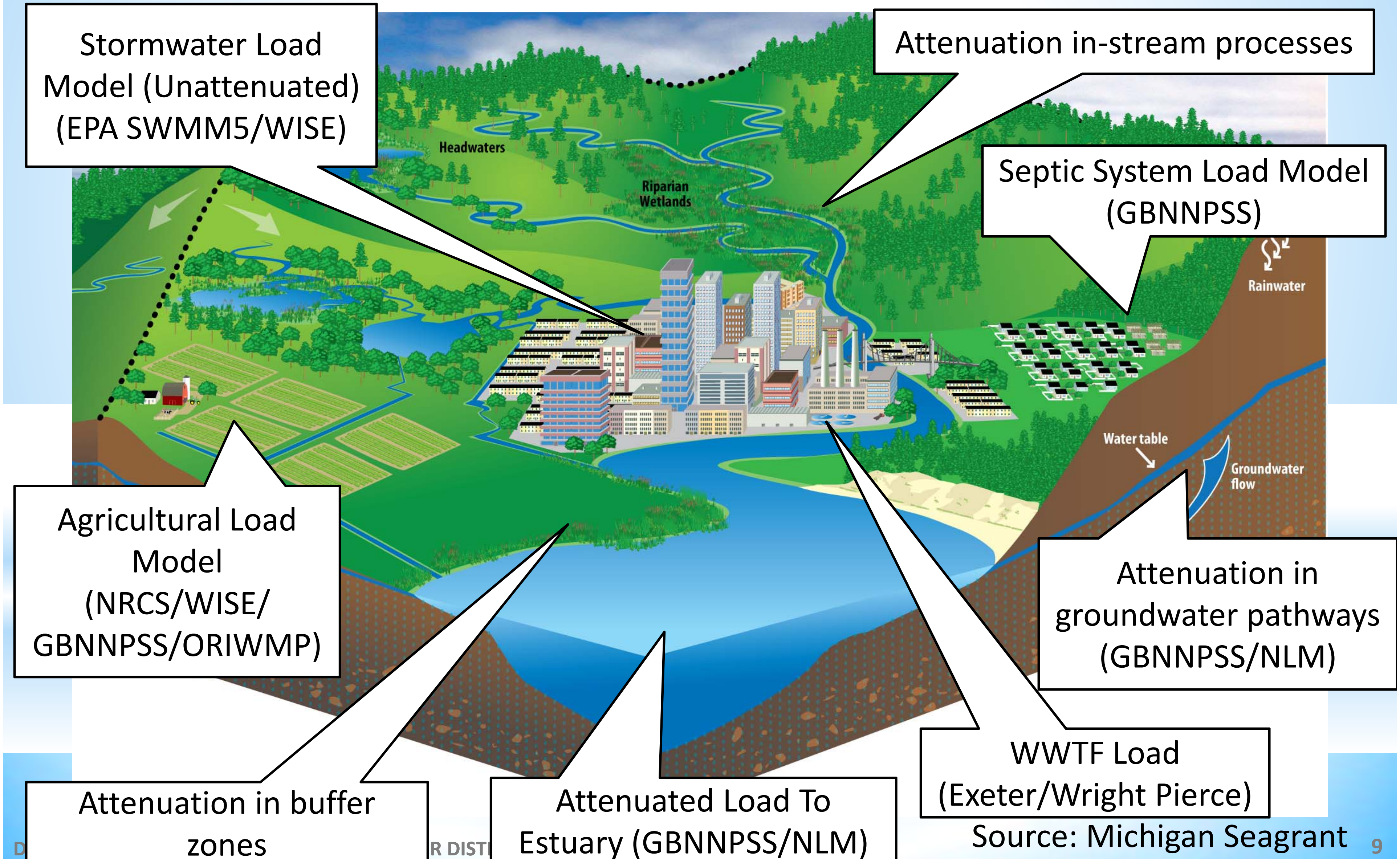
THE WISE PROJECT PLAN

1. Develop a feasible implementation schedule and cost efficiencies achieved by optimization of nutrient control strategies through Integrated Watershed Management (IWM).
2. Develop a watershed model in combination with a cost optimization process which seeks to find the lowest cost of solutions through flexible application of a range of strategies.
3. Use of Adaptive Management through monitoring and tracking

COLLABORATION

EPA, NH DES, Communities of Exeter, Newfields, Stratham, Geosyntec, UNH, NERRS, Rockingham Planning Commission, Consensus Building Institute

POLLUTANT LOAD ANALYSIS COMPONENTS



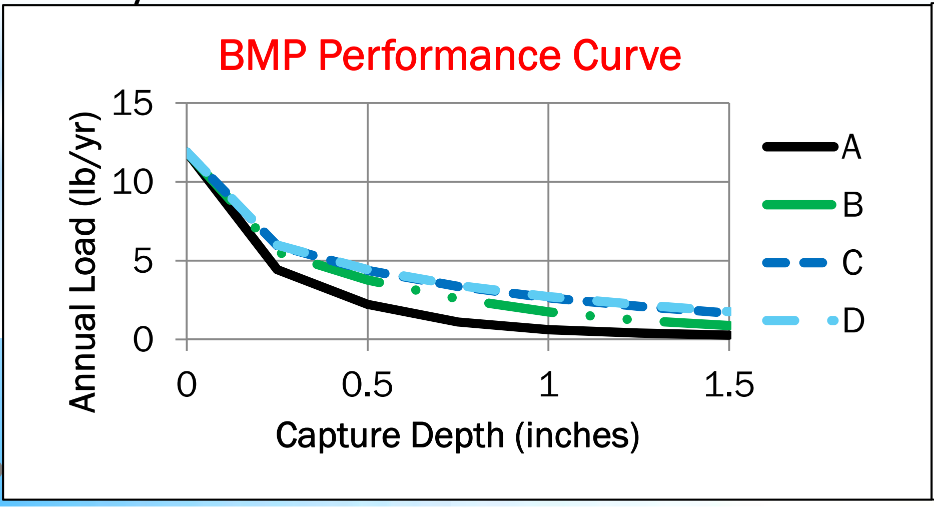
Source: Michigan Seagrant

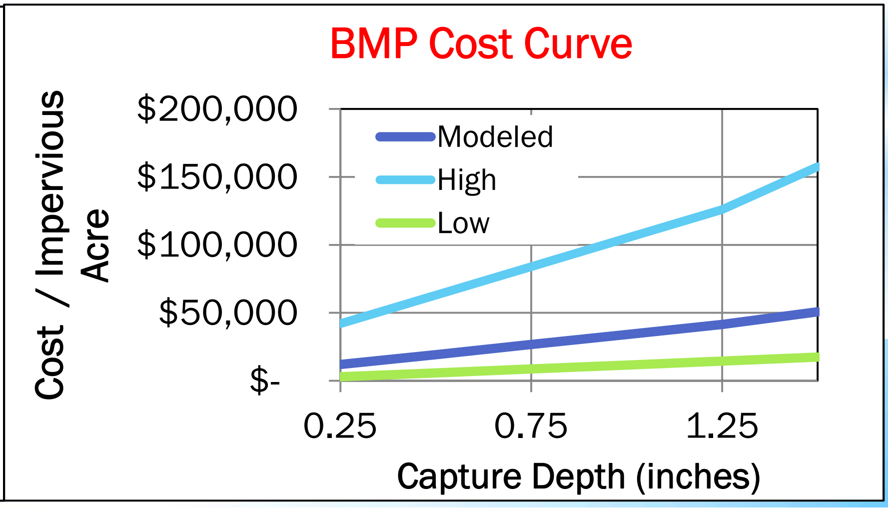
BMP Optimization Process

GOAL: Cost optimization seeks to find the lowest cost of solutions through flexible application of a range of strategies based on performance and cost.

APPROACH: Optimization examines combinations of:

1. **Source:** wastewater, non-point source (ie., septic systems, agriculture), and stormwater controls (ie., urban and industrial)
2. **BMP Type:** stormwater controls (ie., green infrastructure, ponds, dry wells), NPS controls (ie., street sweeping, advanced septic systems, agricultural BMPs)
3. **Size of water quality volumes** with respect to first flush
4. **Land use:** ie., residential, industrial, commercial, institutional, agricultural, sub type for pervious, impervious, and rooftop
5. **Soil types:** ie., clay, sandy loam
6. **Constraints:** ie., dry wells limited to “clean” rooftop, subsurface and hi aesthetic value systems used in urban core

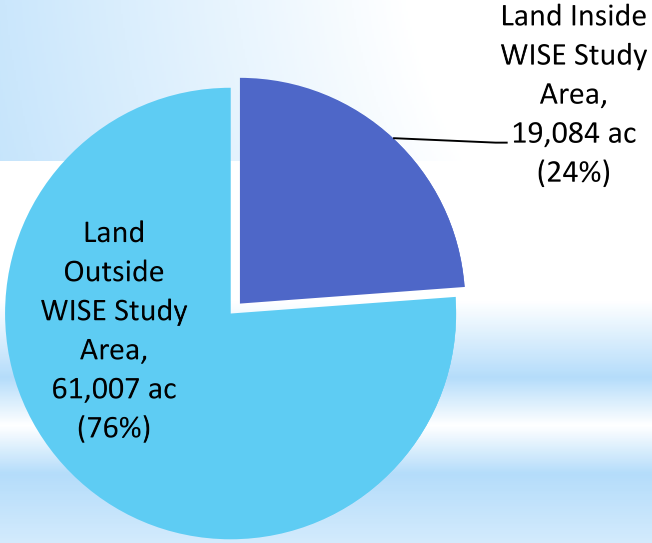




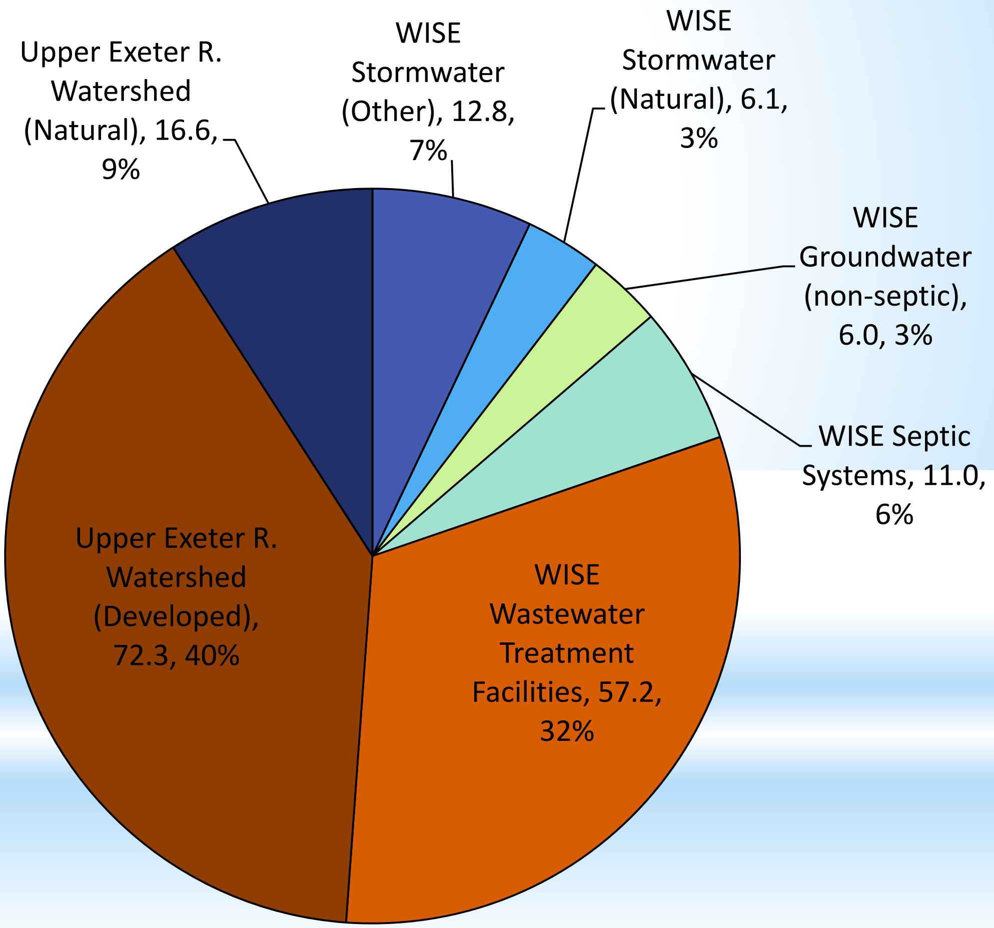
KEY FINDINGS

WATERSHED LOAD ANALYSIS

- Total Annual Attenuated Load Entire Exeter-Squamscott Watershed =182 TONS/YR
- 24% of the watershed is producing 51% of the load



Land Area in Exeter Watershed



NPS CONTROLS

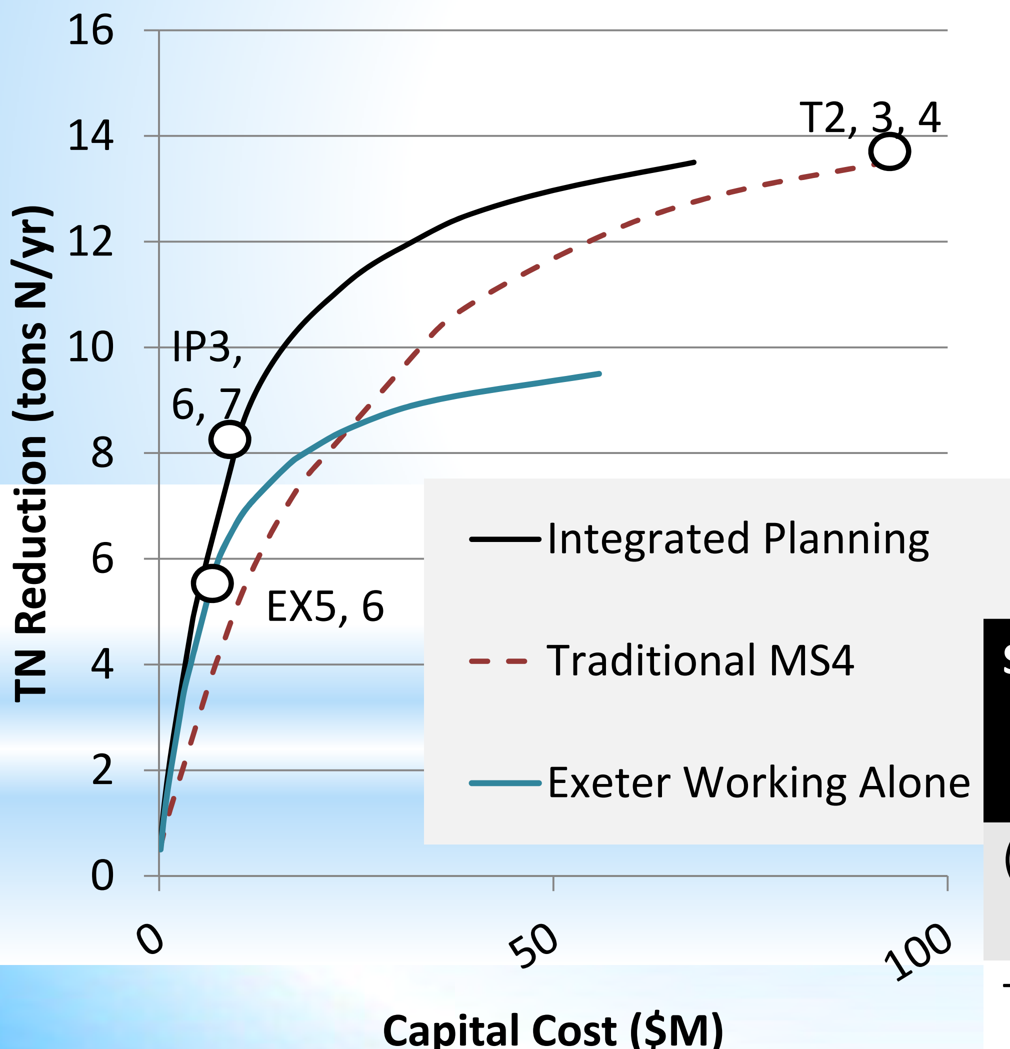
- IP for NPS management is more economical than traditional permitting because it satisfies elements of both the MS4 and wastewater permits.

- IP approach with maximum extent practicable (MEP) for NPS management may be feasible with a 6.5X increase for Exeter's current SW budget whereas traditional permitting would be nearly a 33X increase and is not financially feasible.

- Stratham cost of MS4 implementation is reduced by nearly 80% using IP. Extending WW to Stratham and Newfields is part of an effective Nitrogen control strategy.

- An extended implementation schedule combined with monitoring and adaptive management will help address uncertainty both in management actions and environmental response.

MAXIMUM EXTENT PRACTICABLE "MEP"



- For scenarios with an **unattainable load target**, an NPS goal of "MEP" was chosen.
- Defined as the 'knee' of a Pareto Curve of the relationship between cost and total load reduction.
- **Beyond the inflection point, NPS load reduction becomes increasingly more expensive.**

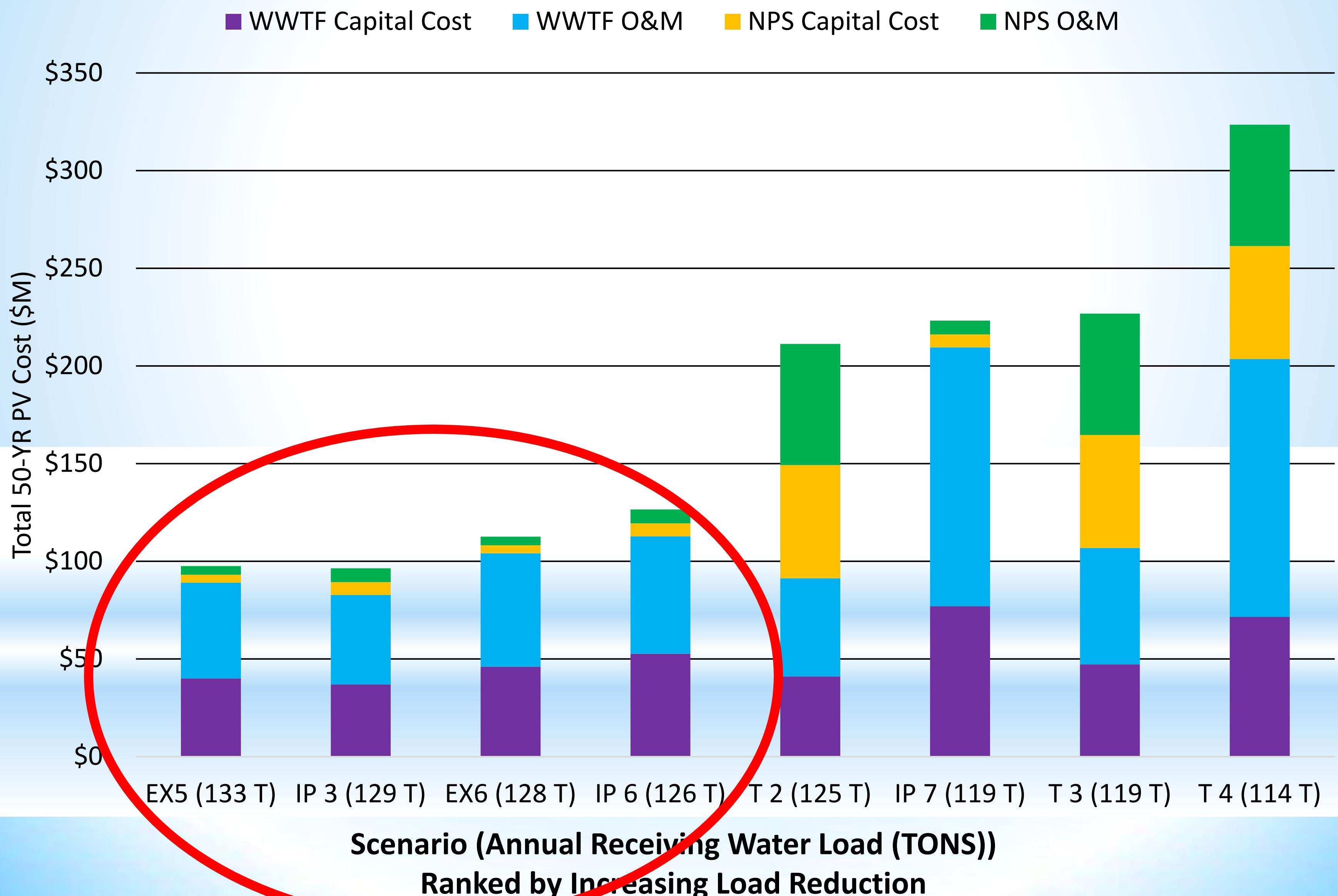
Scenario	Area Treated (acres)	Load Reduction	Cost ($M)
(IP) "MEP"	2,000	8 Tons 17,000 lbs	$13.6
Traditional	5,250	13.5 Tons 27,000 lbs	$120M

DRAFT PRELIMINARY MODEL RESULTS, NOT FOR DISTRIBUTION

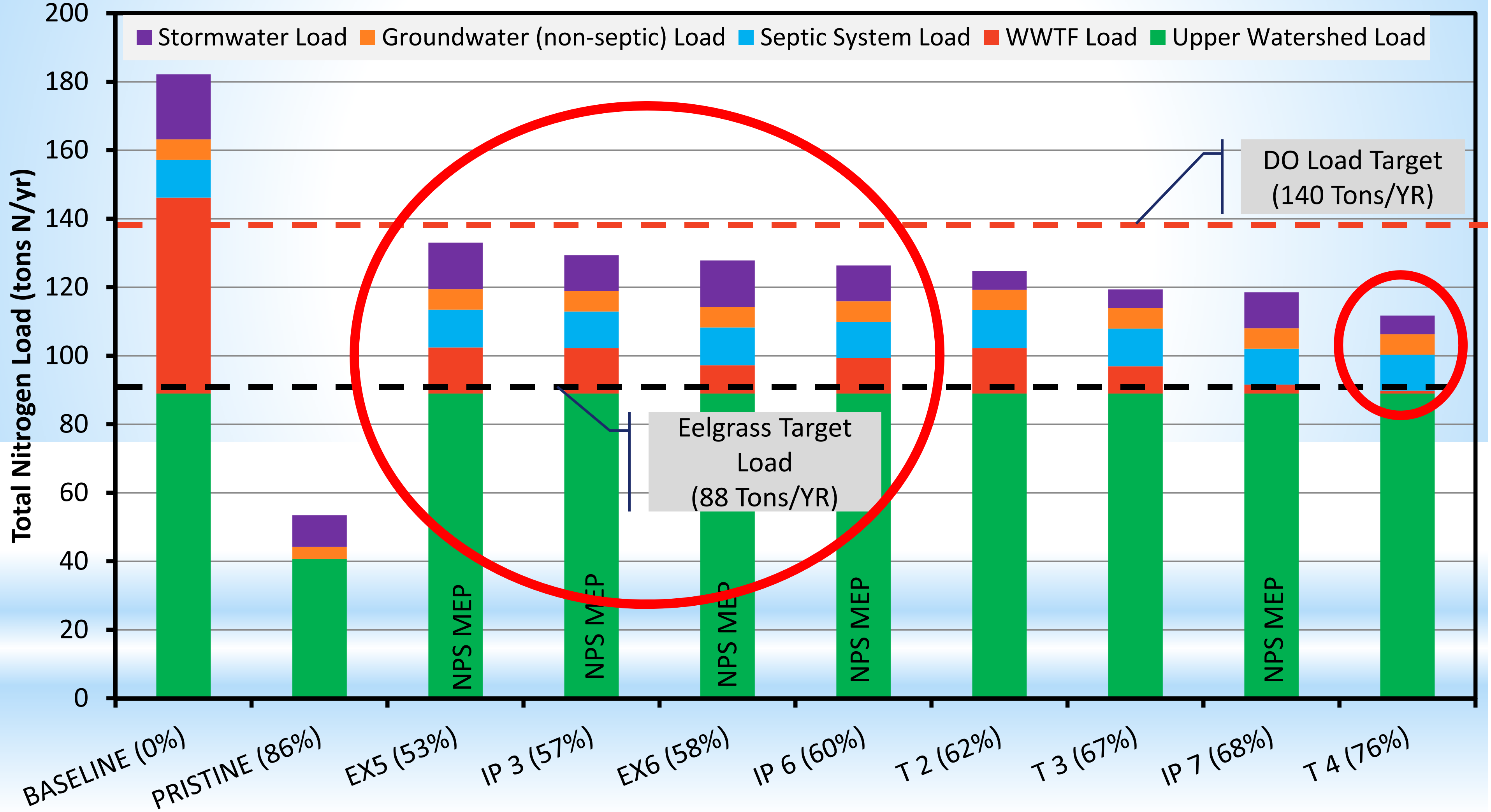
MANAGEMENT SCENARIOS

SCENARIO	WWTF DISCHARGE TARGET (MG/L)	NPS CONTROL TARGET[1]	OTHER CONDITIONS
IP3	5	88 tons/year (Eelgrass)	
IP4	3	140 tons/year (DO)	Stratham Wastewater District
IP5	<1 (Regional Outfall)	140 tons/year (DO)	
IP6	3	88 tons/year (Eelgrass)	Stratham Wastewater District
IP7	<1 (Regional Outfall)	88 tons/year (Eelgrass)	
EX3	3	140 tons/year (DO)	
EX4	<1 Regional Outfall	140 tons/year (DO)	
EX5	5	88 tons/year (Eelgrass)	
EX6	3	88 tons/year (Eelgrass)	
T2	5	MS4 1" capture depth on all developed land	
T3	3	MS4 1" capture depth on all developed land	
T4	<1 (Regional Outfall)	MS4 1" capture depth on all developed land	

MANAGEMENT SCENARIO COST COMPARISON: 50-YR PV Capital and O&M Cost



LOAD REDUCTION VS. ANNUAL LOAD



Note: Management Scenario (% Load reduction relative to subwatershed)

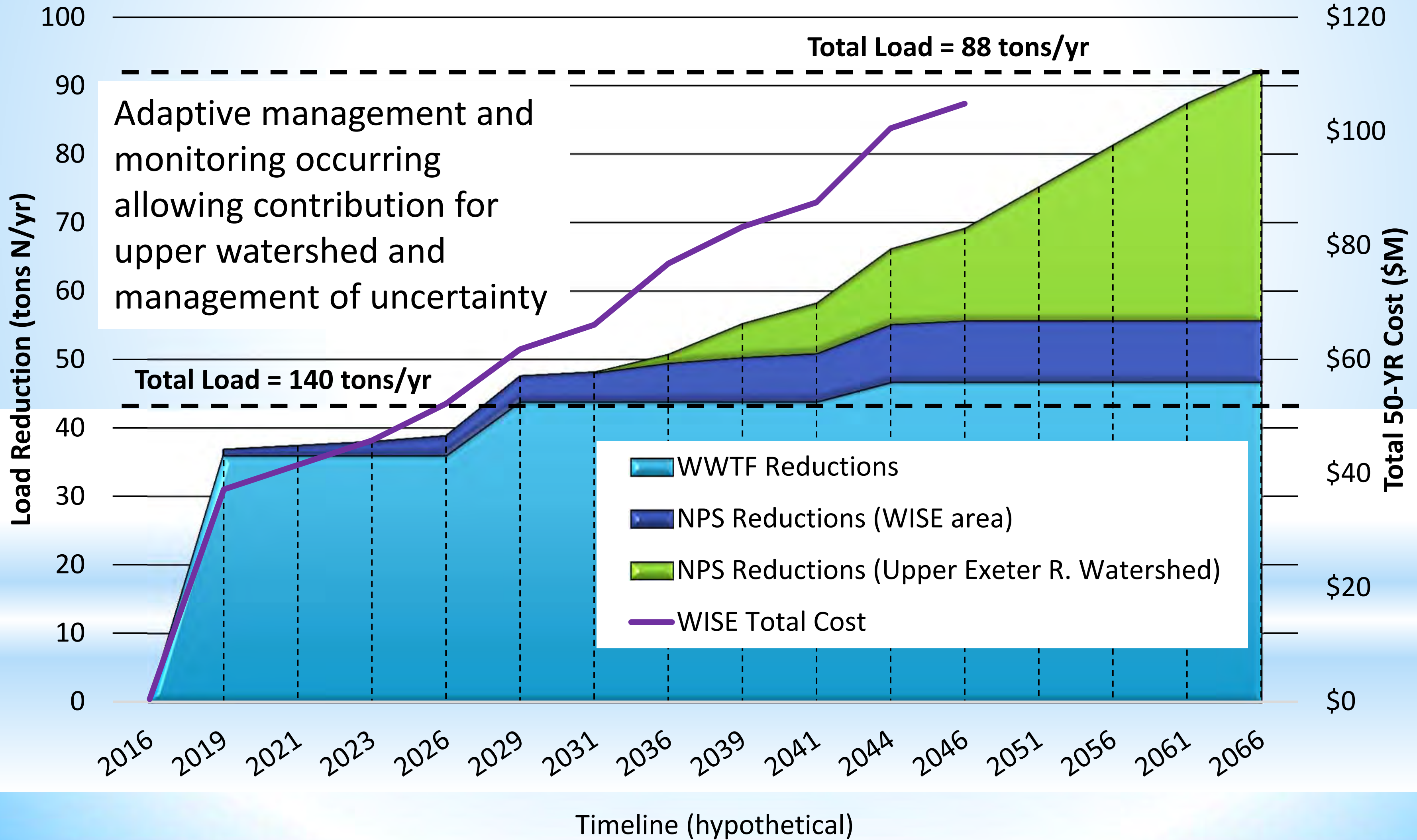
Attenuated annual load reduction

WATERSHED LOAD ANALYSIS

- Achieving a total **load target of 88 tons N/yr** will **require contribution from towns in the upper Exeter River** Watershed whom contribute 89 tons

- To achiever the load target of 88 tons N/yr:
  - Upper Watershed reduction of **36.5** tons N/yr combined with efforts from Exeter, Newfields, and Stratham
  - Equivalent to **41%** of the Upper Watershed's NPS load
  - By contrast, a MEP reduction 8.5 tons N/yr in Exeter/Stratham/Newfields is **55%** of those towns' NPS load

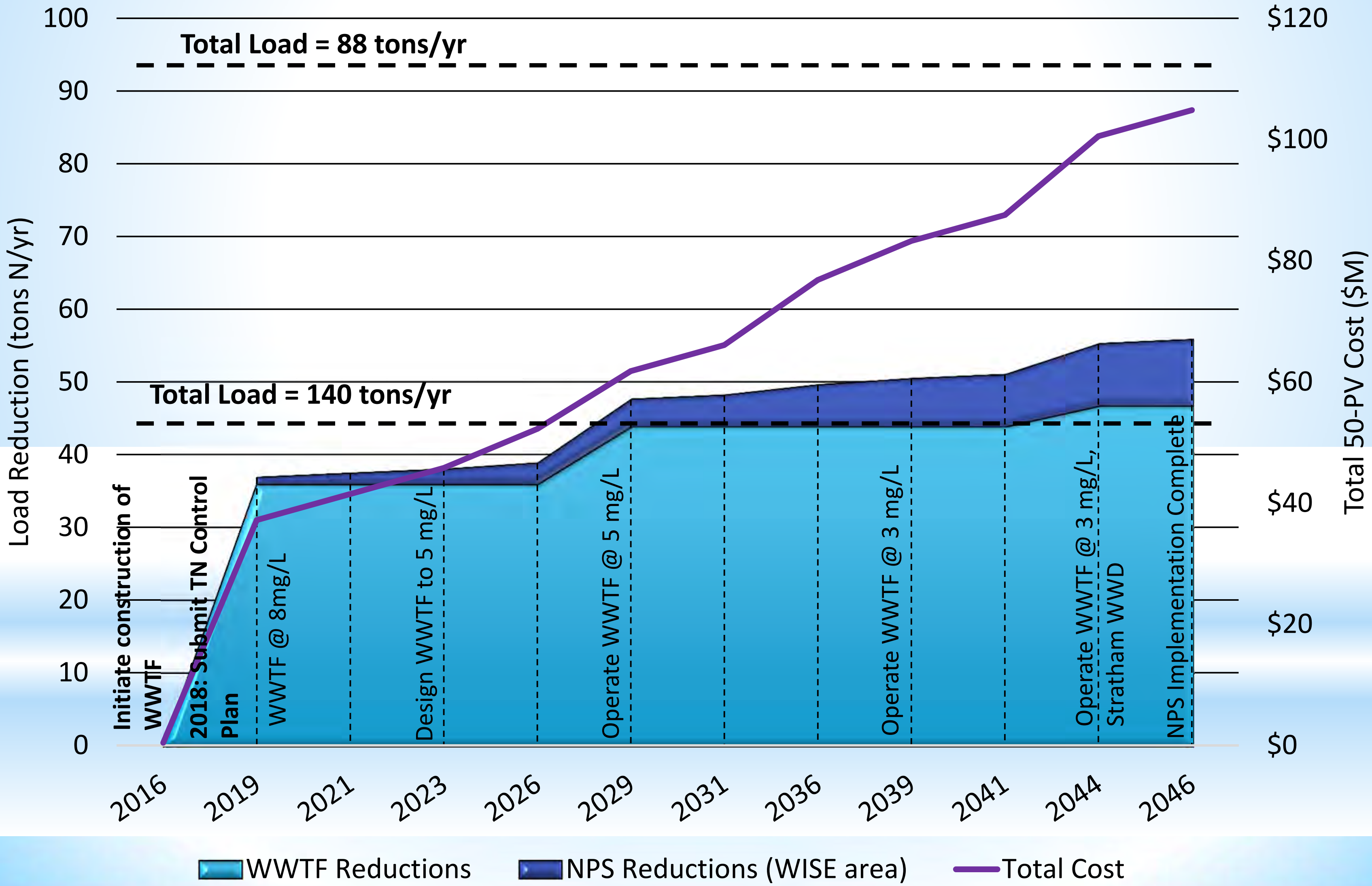
POTENTIAL UPPER WATERSHED CONTRIBUTIONS TO MEET WATER QUALITY GOALS



POTENTIAL IMPLEMENTATION PLAN

YEAR	WWTF GOALS	NPS/SW LOAD REDUCTION (TONS)	CUMMULATIVE LOAD REDUCTION (TONS)	COST ($M)
2016	Design for 8 mg/L	Begin MEP implementation	0	$0.5
2019	Operate at 8 mg/L	0.85	36.9	$37.3
2023	Design for 5 mg/L	1.98	38.0	$45.9
2029	Operate at 5 mg/L	3.68	47.6	$61.9
2039	Design for 3 mg/L	6.52	50.4	$83.3
2044	Operate at 3 mg/L	7.93	55.2	$100.6
2046	Operate at 3mg/L, Stratham WW District	8.50 Complete	55.8	$105.0

IP3/IP6 - IMPLEMENTATION PLAN & SCHEDULE



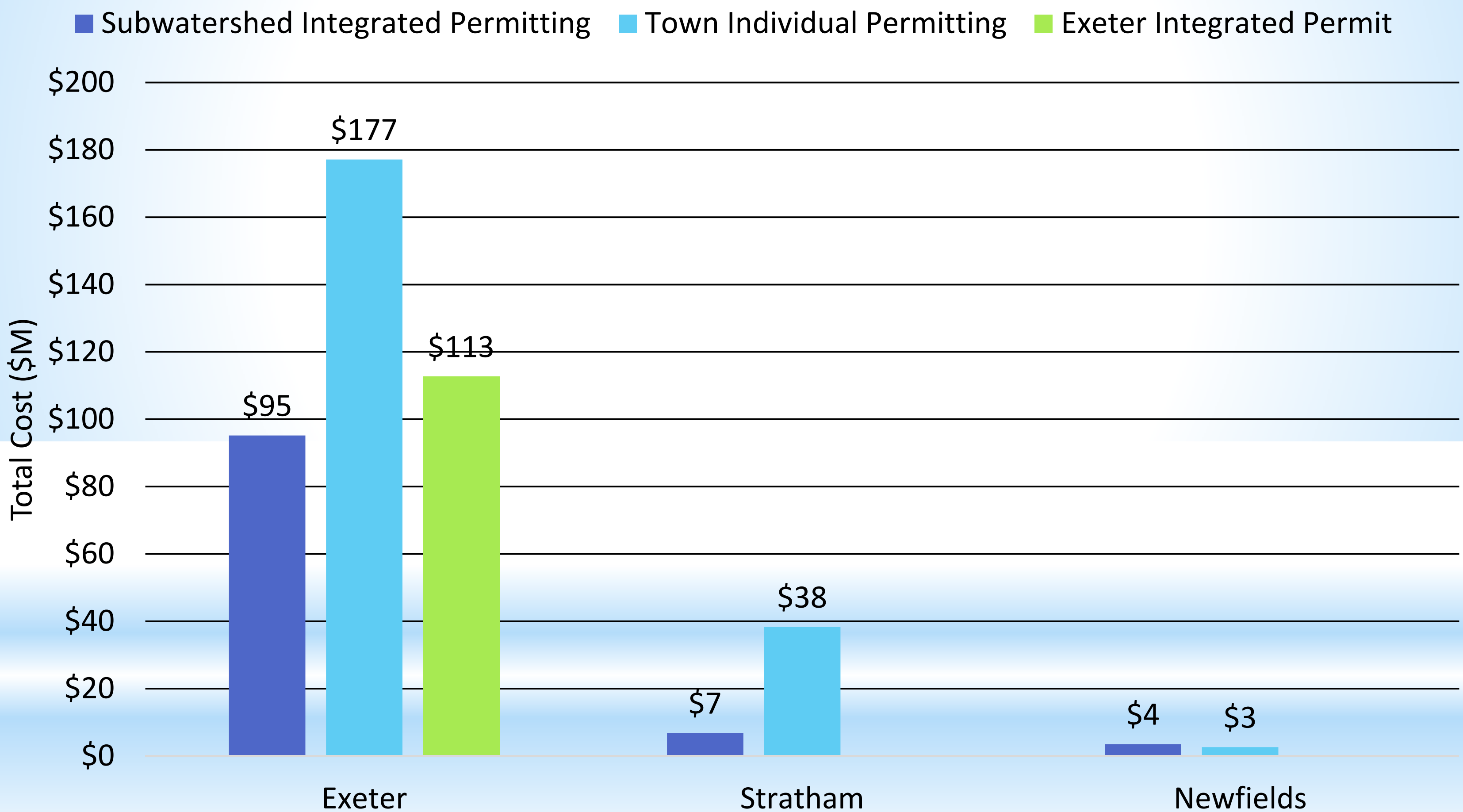
IP3/IP6 LOAD & COST BY TOWN

	WWTF		NPS Controls		TOTAL	
Integrated Permitting: IP3/IP6	Load Reduction (Tons N/yr)	Cost ($M)	Load Reduction (Tons N/yr)	Cost ($M)	Load Reduction (Tons N/yr)	Cost ($M)
Exeter	47.90	$85.95	5.39	$8.55	53.29	**$94.50**
Newfields	1.35	$2.17	0.83	$1.33	2.18	**$3.51**
Stratham[1]	-2.51	$3.26	2.83	$3.74	0.32	**$7.00**
INTEGRATED PERMITTING TOTALS (IP3/IP6):					**55.79**	**$105.01**

1. Includes Stratham interconnection to Exeter WWTF.

Based on a 50-YR Present Worth calculation with capital and O&M

COST COMPARISONS BY TOWN



*In Integrated Permitting scenario for Newfields, cost also includes NPS controls in the Town; whereas, for Newfields the Individual Permit scenario is WWTF upgrades only bc of waived MS4.

DISCUSSION OF THE DETAILS

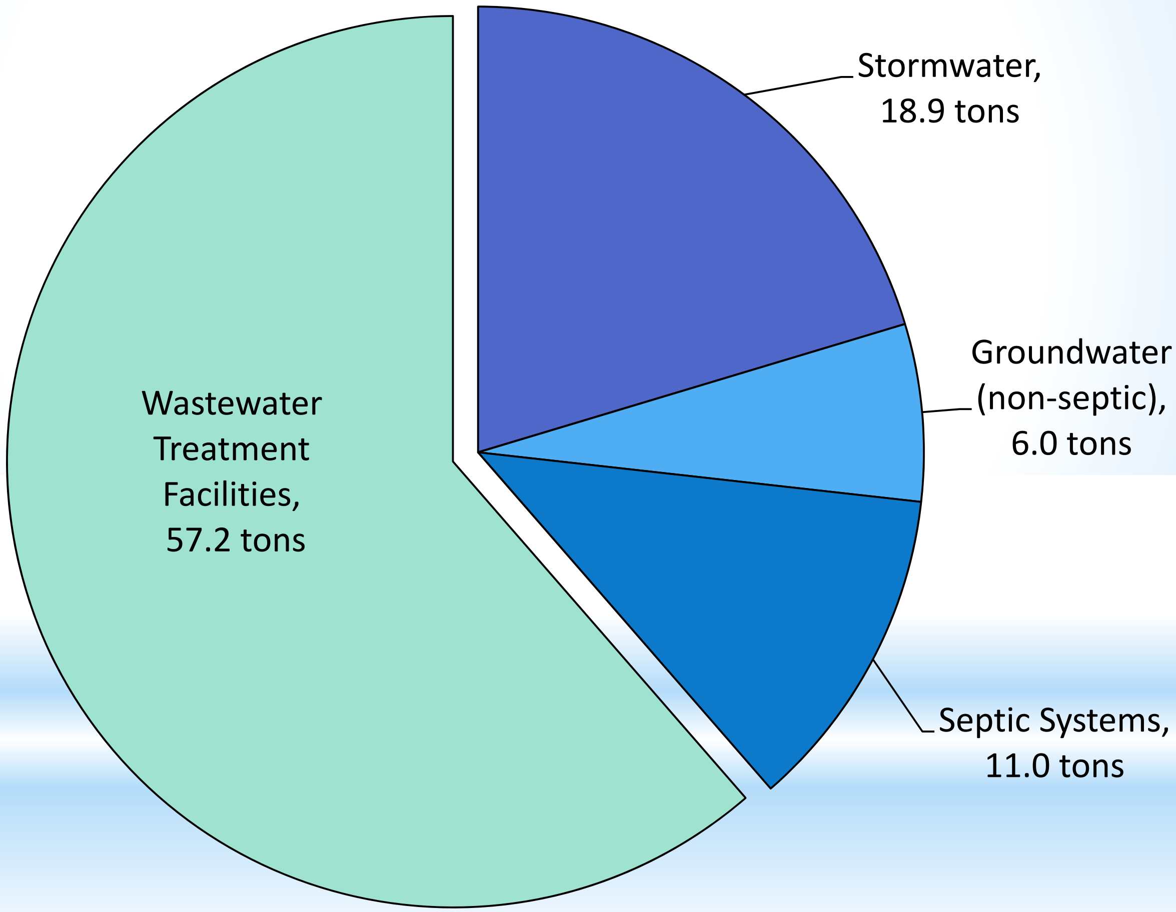
- Total Pollutant Loads
- Discussion and Comparison of Management Scenarios
- Recommended Management Scenario and Suite of BMPs
- Implementation Timeline

PRESENTATION OUTLINE

- **Total Pollutant Loads**
- Discussion and Comparison of Management Scenarios
- Recommended Management Scenario and Suite of BMPs
- Implementation Timeline

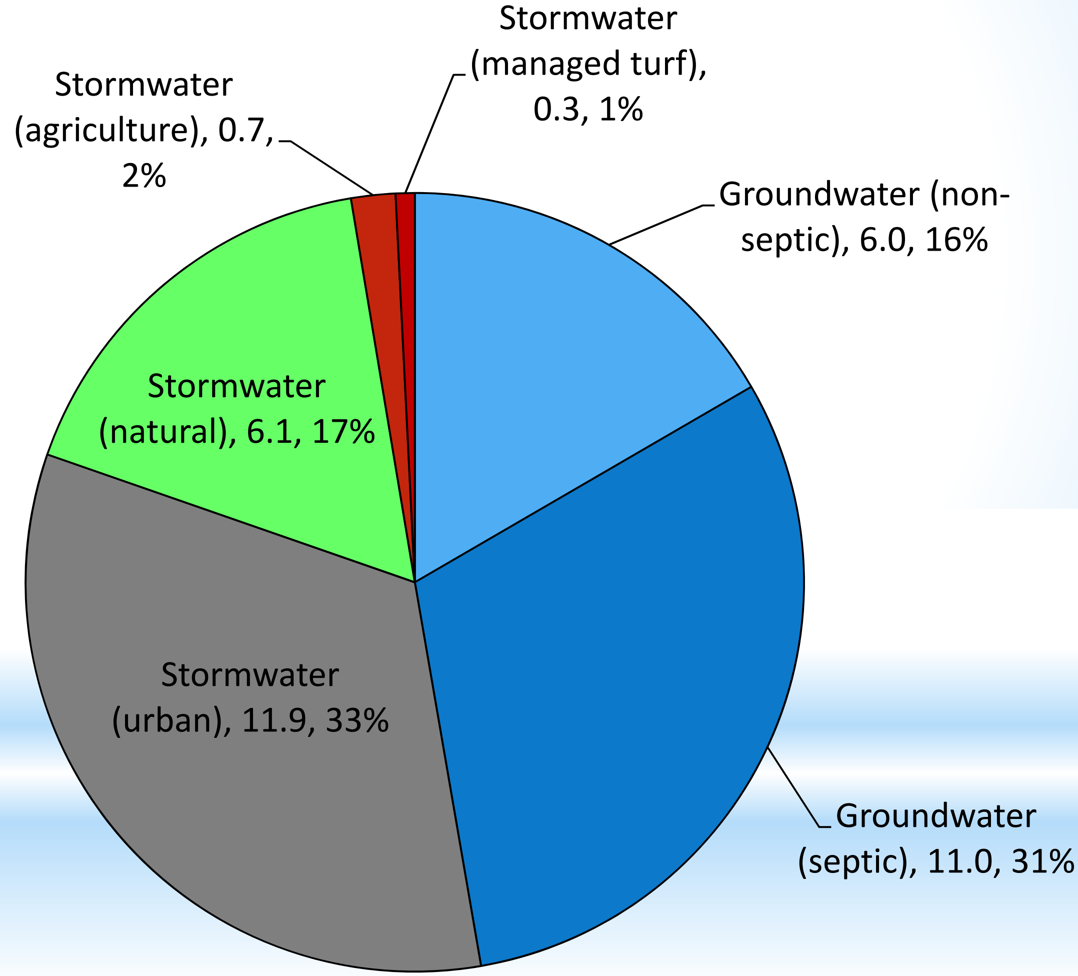
SUBWATERSHED TOTAL ANNUAL ATTENUATED TN LOADS (TONS/YR)

Total Annual WISE Subwatershed Load =93.1 TONS/YR

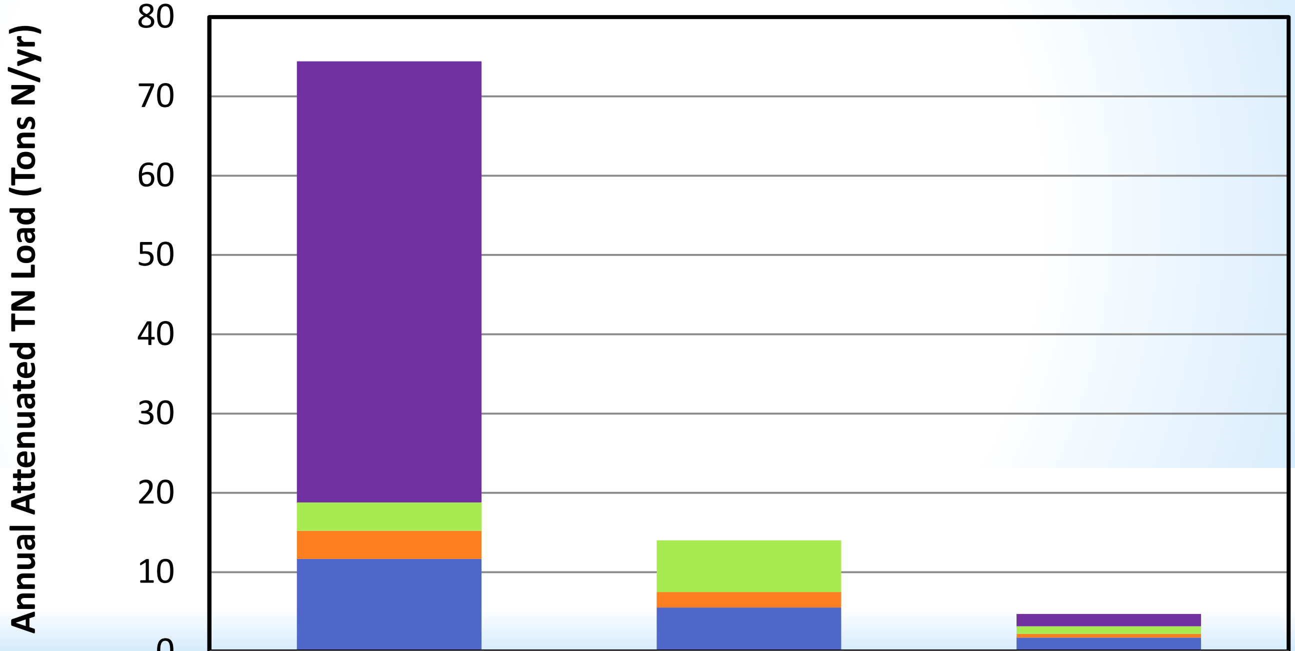


ANNUAL ATTENUATED TN LOADS FOR NPS (TONS/YR)

Total NPS Annual Attenuated Load for 3 WISE Communities =36 TONS/YR



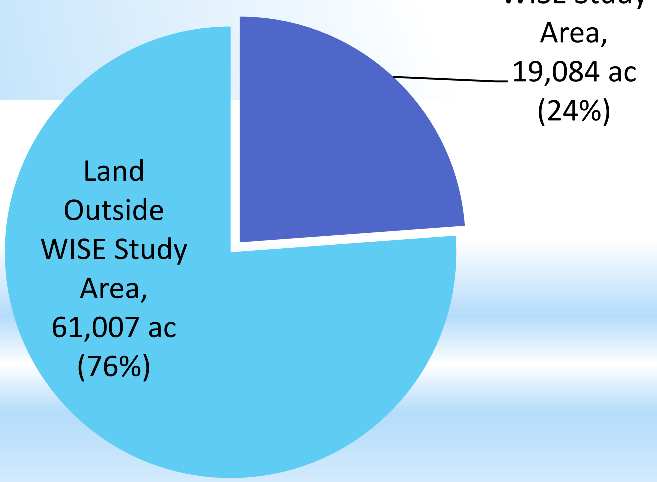
TOTAL ANNUAL ATTENUATED TN LOADS: ALL SOURCES (TONS/YR)



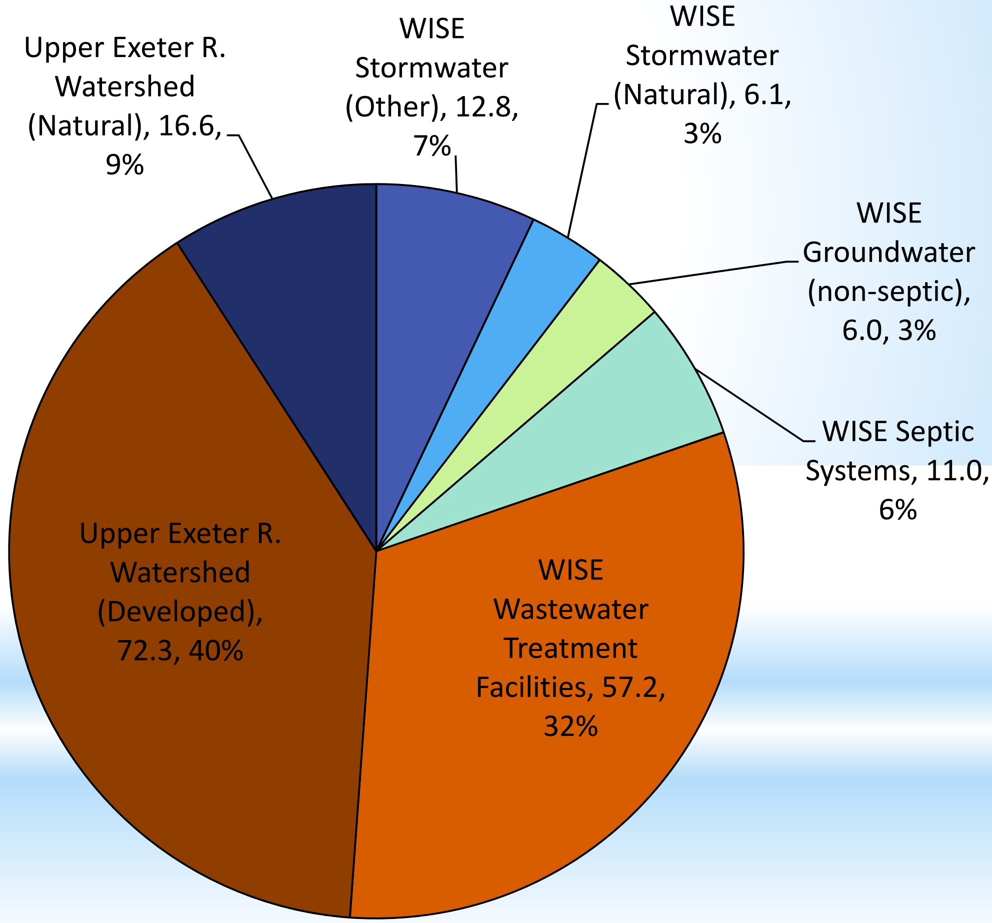
	Exeter	Stratham	Newfields
Wastewater Treatment Facility	55.7	0	1.6
Groundwater (Septic)	3.6	6.5	0.9
Groundwater (non-septic)	3.5	2.0	0.5
Stormwater	11.7	5.5	1.7
TOTAL ANNUAL TN LOAD:	74.5 (80%)	14 (15%)	4.7 (5%)

EXETER RIVER: ANNUAL ATTENUATED TN LOADS (ALL) (TONS/YR)

Total Annual Attenuated Load Entire Exeter-Squamscott Watershed =182 TONS/YR



Land Area in Exeter Watershed



PRESENTATION OUTLINE

- Total Pollutant Loads
- **Discussion and Comparison of Management Scenarios**
- Recommended Management Scenario and Suite of BMPs
- Implementation Timeline

MANAGEMENT SCENARIO CATEGORIES

CATEGORY	DESCRIPTION

Subwatershed Integrated Permitting (IP)	• Three Towns work together
	• Four Permits
	    • Exeter: WWTF and MS4
	    • Stratham: MS4
	    • Newfields: WWTF
	• Loads and costs compiled by Subwatershed

Subwatershed Individual Permitting (TR)	• Three Towns work separately • Towns manage permits separately • Can't take credit for efforts between permits • Loads and costs compiled by Subwatershed
Town Integrated Permitting	• Town of Exeter only • Two Permits: WWTF and MS4 • Loads and costs compiled for Town
Town Individual Permitting	• Three Towns work separately • Towns manage permits separately • Loads and costs compiled by Town

MANAGEMENT SCENARIO CATEGORIES: Assumptions

- MS4 Post Construction Stormwater Management (Minimum Measure 5) needs are met with IP Permitting using green infrastructure and NPS strategies
- WWTF at 3 mg/L or regional outfall does not eliminate the need for NPS controls both for the AOC and MS4 requirements over long-term
- MEP is based on the best unit cost efficiency determined through a cost optimization process which seeks to find the lowest cost of solutions through flexible application of a range of strategies.
- Cost optimization is achieved by evaluating combinations of wastewater, non-point source, and stormwater controls, flexible water quality volumes, land use and soil types.

MANAGEMENT SCENARIOS: Comparison Basis

WASTEWATER TREATMENT FACILITY

- Wastewater **loads reductions and costs** were provided by Wright Pierce (as part of the Exeter WWTF Plan, November 2014)
  - Cost includes capital cost and operation and maintenance
  - 50-Year Present Value Cost

NON-POINT SOURCE CONTROLS

- NPS controls were designed using local design standards
- Water quality reductions for NPS controls were calculated using build up and washoff coefficients
- NPS controls were selected based on:
  - Land use; soil type; pervious or impervious
  - Total load reduction
- Total load reduction for NPS controls selected calculated based on a linear optimization model
- Costs associated of NPS controls were taken from regional and professional judgment
  - 30-Year implementation schedule
  - 50-Year Present Value costs include capital cost and O&M

PRESENTATION OUTLINE

- Total Pollutant Loads
- Discussion and Comparison of Management Scenarios
- **Recommended Management Scenario and Suite of BMPs**
- Implementation Timeline

COST COMPARISON BY $M/TON

Scenario	WWTF Discharge (mg/L)	Wastewater Management District	Wastewater Load (tons N/yr)	NPS Load (tons N/yr)	Load from Upper Exeter R. Watershed (tons N/yr)	Total Load (Tons N/yr)	Cost (Total PV: Capital + O&M, 50 yrs) ($M)	$M/Ton Reduced
IP 3	5	NO	13	27	89	**129**	$96.30	**$1.80**
EX5	5	NO	13	31	89	**133**	$97.60	**$2.00**
EX6	3	NO	8	31	89	**128**	$112.70	**$2.10**
IP 6	3	YES	10	27	89	**126**	$126.40	**$2.30**
IP 7	<1	YES	3	27	89	**119**	$223.10	**$3.60**
T 3	3	NO	8	22	89	**119**	$226.80	**$3.60**
T 2	5	NO	13	22	89	**125**	$211.30	**$3.70**
T 4	<1	NO	3	22	89	**114**	$323.50	**$4.70**

Ranked by $M/Ton Reduced

Assumptions:

- Integrated Permitting allows for crediting across MS4 and WWTF permits
- MS4 Post Construction Stormwater Control needs (MM5) are met with IP using GI
- WWTF only approach will be required to implement MS4 requirements over long-term in addition
- Flexibility in scheduling is critical component of IP to plan for most cost effective measures first

COST COMPARISON BY LOAD

Scenario	Description	Annual Total Load to River (TONS)	Total Cost ($M)	WWTF Capital Cost ($M)	WWTF O&M Cost ($M)	NPS Capital Cost ($M)	NPS O&M Cost ($M)
EX5	WWTF at 5mg/L, NPS at MEP	133	$97.6	$40.0	$49.0	$4.1	$4.4
IP 3	WWTF at 5mg/L, NPS at MEP	129	$96.3	$36.9	$45.8	$6.6	$7.1
EX6	WWTF at 3mg/L, NPS at MEP	128	$112.7	$46.0	$58.1	$4.1	$4.4
IP 6	WWTF at 3mg/L, NPS at MEP	126	$126.4	$52.6	$60.2	$6.6	$7.1
T 2	WWTF at 5mg/L, NPS for MS4 requirements	125	$211.3	$41.0	$50.3	$57.9	$62.1
IP 7	Regional WWTF Outfall, NPS at MEP	119	$223.1	$77.0	$132.5	$6.6	$7.1
T 3	WWTF at 3mg/L, NPS for MS4 requirements	119	$226.8	$47.2	$59.6	$57.9	$62.1
T 4	Regional WWTF Outfall, NPS for MS4 requirements	114	$323.5	$71.5	$132.0	$57.9	$62.1

Ranked by Decreasing Annual Load

Recommended Scenarios

DRAFT PRELIMINARY MODEL RESULTS, NOT FOR DISTRIBUTION

IP3/IP6 LOAD & COST BY TOWN

Integrated Permitting: IP3/IP6	WWTF Load Reduction (Tons N/yr)	WWTF Cost ($M)	NPS Controls Load Reduction (Tons N/yr)	NPS Controls Cost ($M)	TOTAL Load Reduction (Tons N/yr)	TOTAL Cost ($M)
Exeter	47.90	$85.95	5.39	$8.55	53.29	**$94.50**
Newfields	1.35	$2.17	0.83	$1.33	2.18	**$3.51**
Stratham[1]	-2.51	$3.26	2.83	$3.74	0.32	**$7.00**
				INTEGRATED PERMITTING TOTALS (IP3/IP6):	**55.79**	**$105.01**

1. Includes Stratham interconnection to Exeter WWTF.

TOWN INDIVIDUAL PERMITTING

SCENARIO	WWTF DISCHARGE TARGET (MG/L)	NPS CONTROL TARGET	LOAD REDUCTION (TONS)	TOTAL COST (50-YR PV, $M)
Exeter	3	MS4 1” capture depth on all developed land	53.2	$177
Stratham	na	MS4 1” capture depth on all developed land	4.3	$38
Newfields	3	na	1.4	$4
		Total Traditional Permitting Implementation Cost		**$219**

PRESENTATION OUTLINE

- Total Pollutant Loads
- Discussion and Comparison of Management Scenarios
- Recommended Management Scenario and Suite of BMPs
- **Implementation Timeline**

RECOMMENDED MANAGEMENT SCENARIO: SUBWATERSHED INTEGRATED PERMIT

Scenario	WWTF Discharge (mg/L)	Wastewater Management District	Wastewater Load (tons N/yr)	NPS Load (tons N/yr)	Load from Upper Exeter R. Watershed (tons N/yr)	Total Load (Tons N/yr)	Cost (Total PV: Capital + O&M, 50 yrs) ($M)	$M/Ton Reduced
IP 3	5	NO	13	27	89	**129**	$96.3	**$1.8**
IP 6	3	YES	10	27	89	**126**	$126.4	**$2.3**
IP 7	<1	YES	3	27	89	**119**	$223.1	**$3.6**
T 2	5						1.3	**$3.7**
T 3	3						6.8	**$3.6**
T 4	<1						3.5	**$4.7**
EX5	5						7.6	**$2.0**
EX6	3	NO	8	31	89	**128**	$112.7	**$2.1**

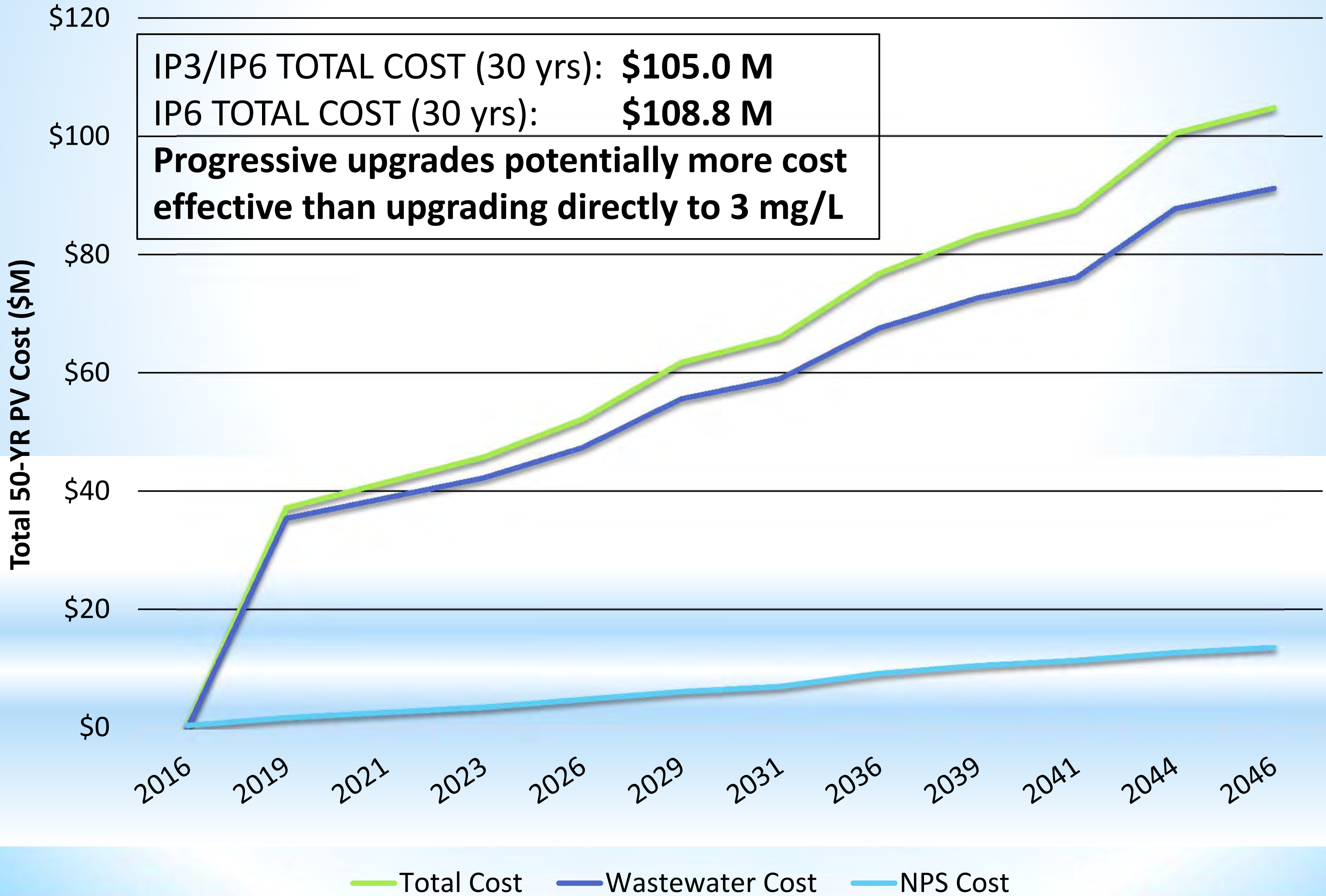
Staggered Approach:

- Start with scenario IP3
- Adaptive Management and Monitoring
- End up at scenario IP6, if necessary
- Flexible implementation plan & schedule

SUBWATERSHED INTEGRATED PERMITTING:
Implementation Plan & Schedule

YEAR	WWTF GOALS	NPS/SW LOAD REDUCTION (TONS)	CUMMULATIVE LOAD REDUCTION (TONS)	COST ($M)
2016	Design for 8 mg/L	Begin MEP implementation	0	$0.5
2019	Operate at 8 mg/L	0.85	36.9	$37.3
2023	Design for 5 mg/L	1.98	38.0	$45.9
2029	Operate at 5 mg/L	3.68	47.6	$61.9
2039	Design for 3 mg/L	6.52	50.4	$83.3
2044	Operate at 3 mg/L	7.93	55.2	$100.6
2046	Operate at 3mg/L, Stratham WW District	8.50 Complete	55.8	$105.0

RECOMMENDED IP3/6 TIMELINE



IP3/IP6 NPS CONTROLS FOR MEP

Total Present Value of NPS Management (including O&M): $13.6 M
Total Load Reduction from NPS Management: 17,000 lb N/yr
Total Acres Treated: 2,000 acres

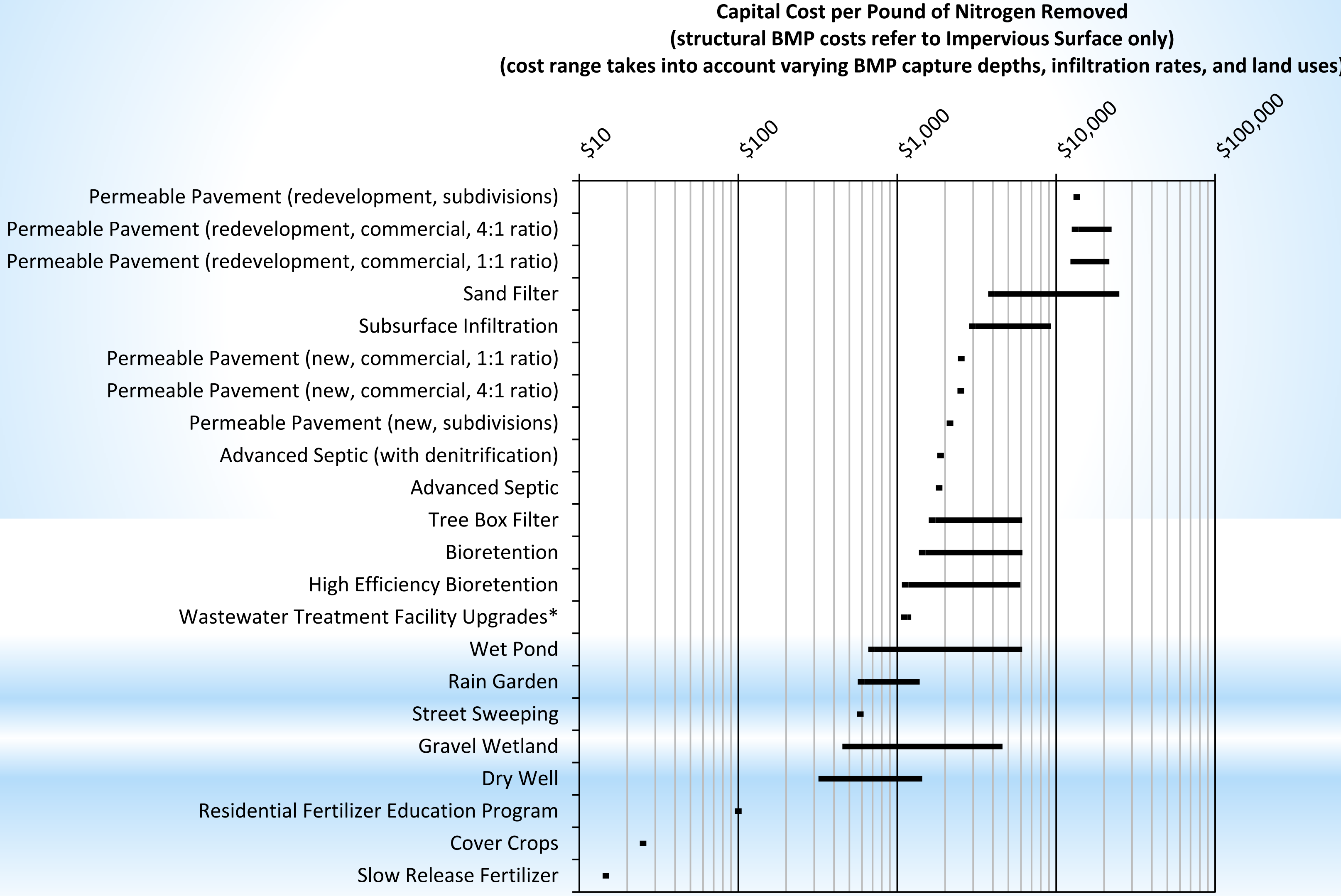
So what does this mean?

We are not computers?

This is the best cost alternative, of course there can be flexibility as to how and where controls are implemented so long as load reduction is met.

BM					S BLE	%
Cov	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	100%
Slov	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	100%
Gra	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	72%
High	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	20%
Sub	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	8%
Dry	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	100%
Gra	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	100%
Dry	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	100%
Gra	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	83%
High	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	17%
Dry	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	100%
Gra	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	99%
Rair	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	81%
Rair	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19%
Dry	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	100%
Law	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
Bioretention	0.25	Road	Impervious	112	658	17%
Gravel Wetland	0.25	Road	Impervious	546	658	83%
Street Sweeping Program	-	Road	Impervious	658	658	100%

UNIT COSTS FOR SW/NPS CONTROLS



*includes capital cost and O&M (50 yr lifespan)

DRAFT PRELIMINARY MODEL RESULTS, NOT FOR DISTRIBUTION

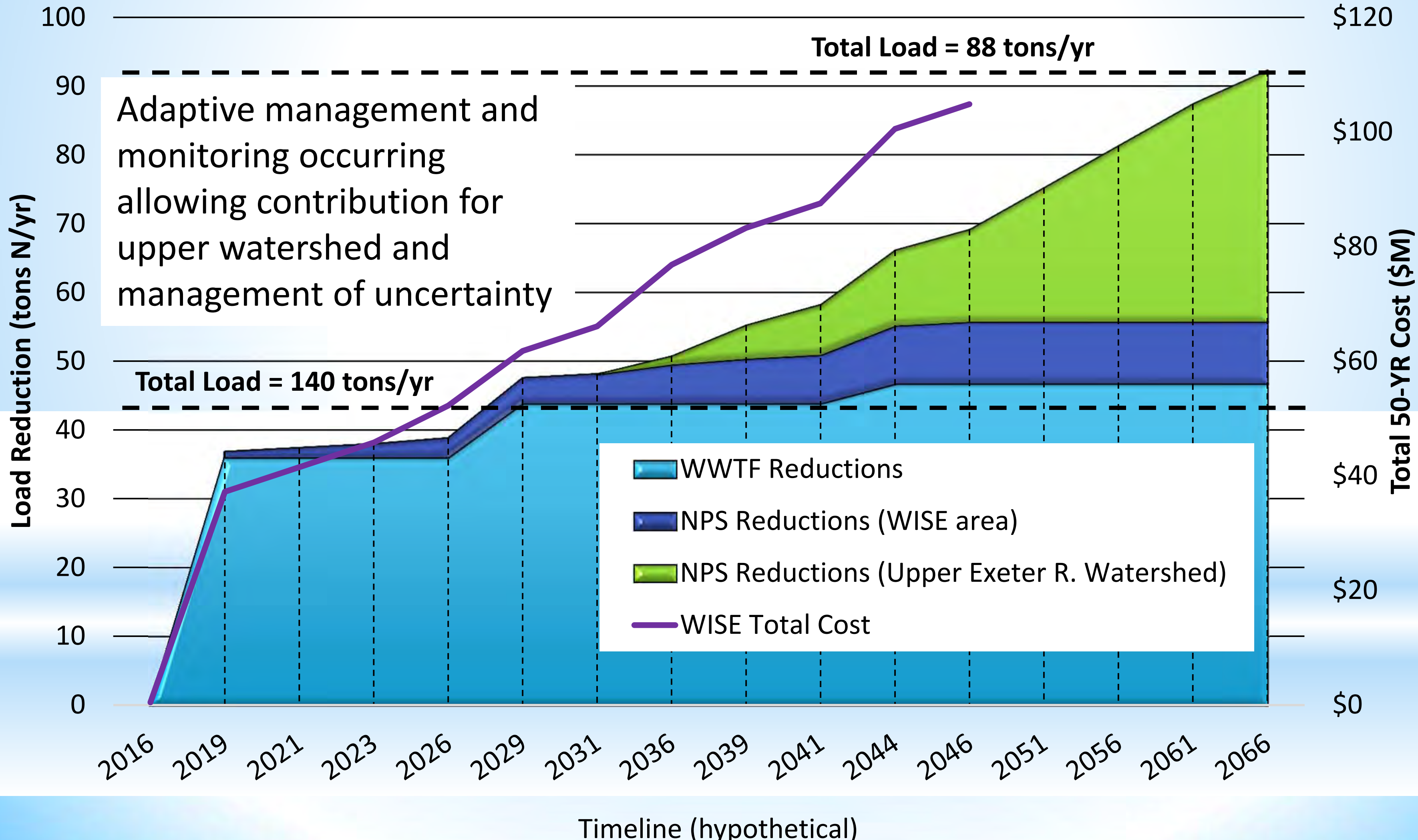
POTENTIAL NEXT STEPS:

- The IP alternative for either the subwatershed or town level could be the basis for a redraft of the Administrative Order on Consent
- The IP can be expanded to complete the 2018 Nitrogen Control Plan requirements for the AOC and simultaneously address MM5 (Post Construction Stormwater Management) for the pending MS4
- Finalize a detailed implementation schedule and financial capability analyses to complete the IP
- Implement monitoring and tracking programs

From the Project Team,
Thank You!!

Questions/
Comments?

POTENTIAL UPPER WATERSHED CONTRIBUTIONS TO MEET WATER QUALITY GOALS



WATER INTEGRATION FOR SQUAMSCOTT EXETER (WISE)

Preliminary Integrated Plan

Final Technical Report

December 2015

Prepared By:

Geosyntec consultants

National Estuarine Research Reserve System

University of New Hampshire

cbi Consensus Building Institute

Rockingham Planning Commission

Prepared For:

Towns of Exeter, Stratham, and Newfields, New Hampshire

WATER INTEGRATION FOR SQUAMSCOTT EXETER (WISE) PRELIMINARY INTEGRATED PLAN

Prepared for

Towns of Exeter, Stratham, and Newfields, New Hampshire

The Science Collaborative of the National Estuarine Research Reserve (NERR)

FINAL December 30, 2015

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FIGURES

ACRONYMS

AOC	Administrative Order on Consent
CSO	Combined Sewer Overflows
CIP	Capital Improvement Plans
CWA	Clean Water Act
EPA	United States Environmental Protection Agency
I/I	Inflow and Infiltration
IP	Integrated Planning
GBNNPSS	Great Bay Nutrient Nonpoint Source Study
GI	Green Infrastructure
HRU	Hydrologic Response Unit
LID	Low Impact Development
MEP	Maximum Extent Practicable
NHDES	New Hampshire Department of Environmental Services
NLM	Nitrogen Load Model
NPDES	National Pollution Discharge Elimination System
NPS	Nonpoint source pollution
NRCS	Natural Resources Conservation Service
MS4	Municipal Separate Storm Sewer System
O&M	Operations and Maintenance
ORIWMP	Oyster River Integrated Watershed Management Plan
PREP	Piscataqua Region Estuaries Partnership
PTAPP	Pollution Tracking and Accounting Pilot Program
PV	Present Value (50 year)
RDA	Residual Designation Authority
SSO	Sanitary Sewer Overflow
SWMM	EPA Stormwater Management Model
TMDL	Total Maximum Daily Load
UNH	University of New Hampshire
WISE	Water Integration for the Squamscott-Exeter
WLA	Waste Load Allocation

WQRP	Water Quality Response Plan
WWTF	Wastewater Treatment Facility

ACKNOWLEDGEMENTS

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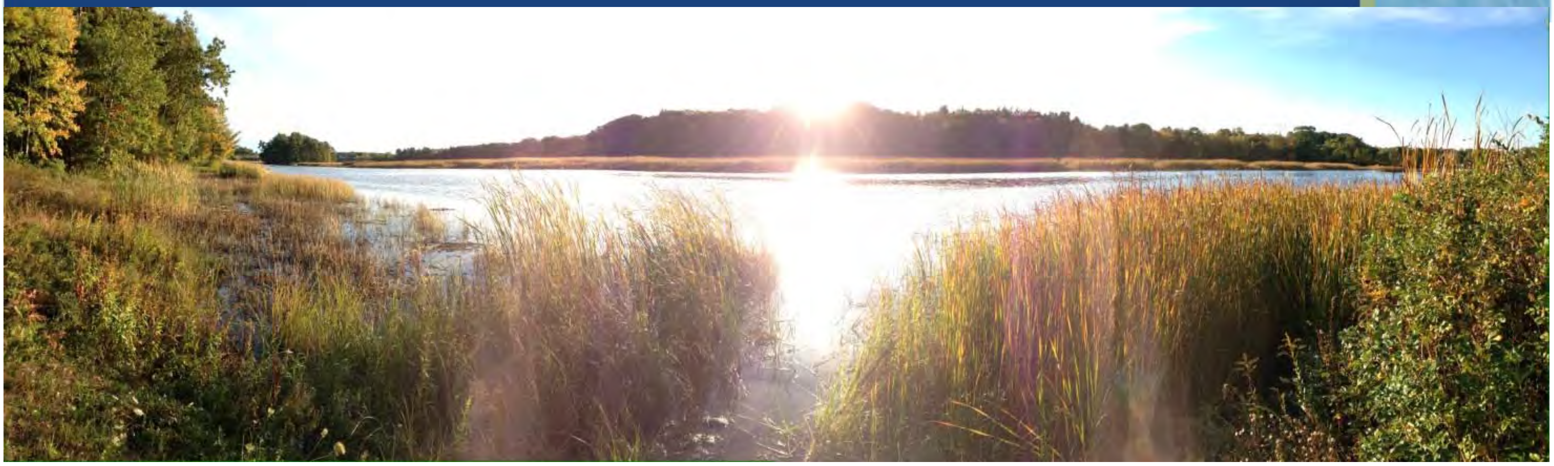
WATER INTEGRATION FOR THE SQUAMSCOTT-EXETER (WISE)

EXECUTIVE SUMMARY



What is WISE? In March 2015 the Water Integration for Squamscott-Exeter (WISE) project completed an Integrated Planning framework (Plan) for three coastal communities including Exeter, Stratham, and Newfields to provide recommendations for affordably managing permits for wastewater and stormwater. Critical next steps to fulfill the Nitrogen Control Plan requirements for Exeter and overlapping municipal separate storm sewer system (MS4) requirements for both Stratham and Exeter include:

- Financial capability assessment;
- Implementation schedule; and
- Detailed implementation plan.

This was accomplished by making use of a new flexibility in EPA permitting called Integrated Municipal Stormwater and Wastewater Planning. The project bridged legal and technical gaps through a collaborative process working with regulators and municipal staff to develop a product that stakeholders and regulators trust and support. The project quantified the economic and performance advantages of municipal collaboration and integration of water resource planning. Success of this new approach depends upon leadership by municipalities, trust in the process an outcome, technical capacity and innovation, and regulatory flexibility. The process has included officials from the Towns of Stratham, Newfields, and Exeter working with a team from Geosyntec Consultants, the University of New Hampshire, Rockingham Planning Commission, Consensus Building Institute, and the Great Bay National Estuarine Research Reserve with funding provided by the National Estuarine Research Reserves (NERRs) Science Collaborative.

What is Integrated Planning? Integrated Planning is a new EPA approach that allows flexibility in permitting of wastewater and stormwater controls to plan for the most cost effective measures first while still meeting regulatory standards that protect public health and water quality. Green infrastructure is a key integrated planning strategy for nutrient and stormwater management and enables management of stormwater as a resource and supports other economic benefits and quality of life. Integrated planning is being shown to have great cost-efficiencies through the comprehensive management of wastewater, stormwater and nonpoint sources throughout the nation.

Why this Project? New Hampshire coastal communities have experienced rising populations resulting in an increase in development and stormwater and wastewater discharge to the Great Bay. As communities respond to new federal permit requirements for treating and discharging stormwater and wastewater, meeting regulatory requirements requires innovative ways to find effective and affordable means to meet water quality goals. The neighboring towns of Stratham, Newfields, and Exeter, New Hampshire share a history of collaboration. They share a regional school district, management of hazardous waste, and town recreation programs. More recently, representatives from the Towns of Stratham and Exeter have been working together to discuss sharing water and wastewater infrastructure and services. Integrated Planning for nutrient management could be a logical next step.

Major Findings

- Since 1960 Exeter, Newfields, and Stratham have experienced substantial population growth of 98%, 128%, and 602% and a 20 year increase in impervious cover of 108%, 177%, and 138%, respectively.
- The Squamscott River has an average Total Nitrogen concentration (0.77 mg/L), the DES numeric and has lost 100% of its eelgrass cover since 1948.
- A draft pending MS4 (stormwater) permit combined with a new 2012 wastewater permit substantially increases municipal requirements for Nitrogen management.
- An Integrated Planning approach that satisfies elements of both the MS4 and wastewater permits reduces existing loads by 60% (56 tons N) and was estimated to provide around 50% cost avoidance from a traditional permitting approach for the three communities.
- Annual nonpoint costs to Stratham are estimated to be $65,000 for town controlled properties and $60,000 for private sector for a total of almost $2 million over 30 yrs for the municipality.
- Estimated cost for wastewater for Stratham to join Exeter is $6,035,000.
- Annual nonpoint costs to Exeter are estimated to be $163,000 for town controlled properties and $122,000 for private sector for a total of almost $4.9 million over 30 yrs for the municipality.
- Annual nonpoint costs to Newfields are estimated to be $23,000 for town controlled properties and $21,000 for private sector for a total of almost $690,000 over 30 yrs for the municipality.
- Within the WISE watershed estimated costs are approximately 10% for stormwater and 90% for wastewater both for construction and operation.

- Communities of Exeter, Stratham and Newfields contribute ~50% of the Nitrogen Load from 24% of the watershed area.
- Nearly 50% of the nitrogen load in the watershed comes from upstream communities, and water quality goals for the Squamscott-Exeter cannot be attained without broader participation throughout the watershed.
- To increase reduction from 53 to 74% for nitrogen load from the WWTF and management of nonpoint sources results in an increase of $159 million (62% increase) when comparing traditional to an Integrated Planning approach.
- Lessons Learned/How to Use This Plan

This Plan is intended to serve as a guide for the towns of Exeter, Stratham and Newfields to support nitrogen load reduction, permit compliance, and ultimately ecosystem recovery in the Great Bay estuary which could fulfill permit requirements for a Nitrogen Control Plan. Municipal officials in each community could use the plan to guide local and watershed decisions around water quality and permit compliance. Detailed analyses of alternatives, calculated load reduction and associated costs, coupled with monitoring and tracking to document progress provide assurance that selected actions will support overall permit compliance and restoration goals. Critical next steps are needed for EPA to accept this Plan to fulfill the Nitrogen Control Plan requirements for Exeter and overlapping MS4 requirements for both Stratham and Exeter. This steps include:

- Conducting a financial capability assessment;
- Development of an implementation schedule; and
- Development of a detailed implementation plan.

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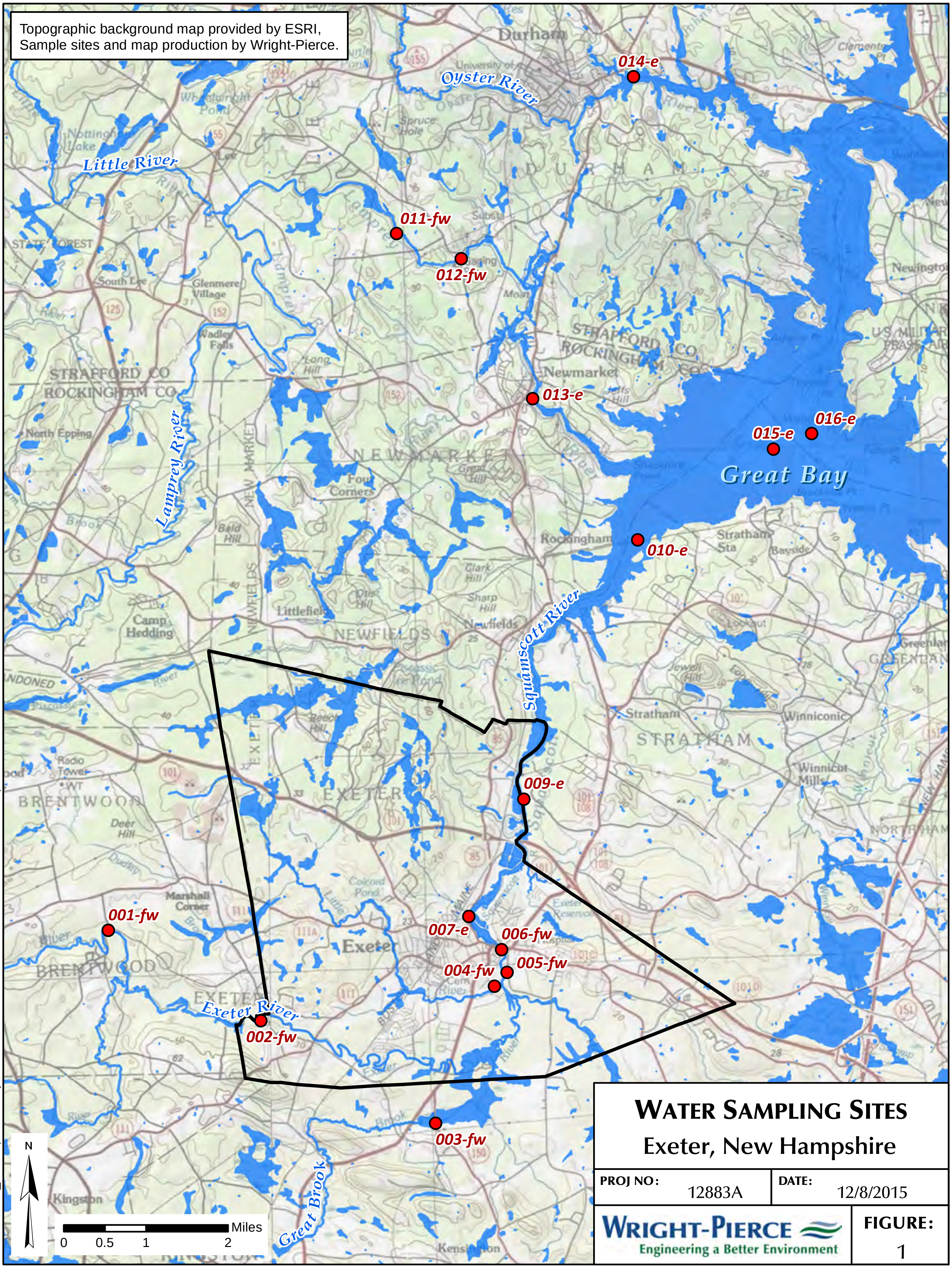
Attachment 8

2015 Great Bay Watershed Sampling Data

2015 Great Bay Sampling Data			Total Nitrogen	Total Phosphorus	Total Dissolved Nitrogen	Nitrate	Ammonia	Total Suspendable Solids	Phosphate
Sample Name	Sample Waterbody	Sample Location	TN (mg N/L)	TP (µg P/L)	TDN (mg N/L)	NO3 (mg NO3-N/L)	NH4 (µg NH4-N/L)	TSS (mg/L)	PO4 (µg PO4-P/L)
001-fw	Exeter River	Haigh Rd. (Brentwood)	0.635	34.741	0.395	0.158	18.926	6.959	9.024
002-fw	Exeter River	Pickpocket Dam	0.555	17.617	0.372	0.103	22.273	5.522	9.442
003-fw	Great Brook	Shaw Hill Rd.	0.709	148.936	0.466	0.019	32.783	19.646	46.569
004-fw	Little River	Chadwick Ln. /Gilman St.	0.637	54.582	0.472	0.086	30.045	5.227	13.347
005-fw	Exeter River	Gilman St./Gilman Ln.	0.610	41.515	0.429	0.098	31.403	10.606	11.272
006-fw	Exeter River	High St. (Rte. 108)	0.648	35.237	0.396	0.066	13.781	8.594	16.152
011-fw	Lamprey River	Wiswall Dam (above dam)	-	-	0.432	0.209	24.945	10.377	14.343
012-fw	Lamprey River	Packers Falls (above bridge)	-	-	0.412	0.211	23.632	5.910	21.442
007-e	Squamscott River	0.75 km below String Bridge	0.846	109.949	0.506	0.156	47.813	30.761	16.450
009-e	Squamscott River	River Rd.	1.328	208.862	0.649	0.218	112.290	80.232	31.781
010-e	Squamscott River Estuary	RR Bridge (Stratham)	0.466	76.490	0.314	0.052	53.982	34.541	32.127
013-e	Lamprey River Estuary	Below Falls (Newmarket)	0.621	29.358	0.415	0.143	32.130	5.096	15.985
014-e	Oyster River Estuary	Jackson Landing (Durham)	0.518	56.763	0.397	0.101	59.599	16.948	39.499
015-e	Great Bay	Mid Great Bay	0.296	28.718	0.210	0.031	22.084	20.123	19.839
016-e	Great Bay	NERACOOS Bouy	0.307	31.320	0.259	0.044	17.008	33.067	16.248



Water Sampling Sites

Exeter, New Hampshire

PROJ NO: 12883A

DATE: 12/8/2015

WRIGHT-PIERCE
Engineering a Better Environment

FIGURE: 1

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Attachment 9

AOC Checklist

Checklist for NPDES Permit No. NH0100871
Administrative Order on Consent Docket No. 13-010

No.	REPORTING TASKS	REPORTING DEADLINE* (Based on effective date of June 24, 2013)	OVERLAPS WITH DRAFT MS4 REQUIREMENTS	ASSISTANCE FROM WISE PROJECT
1.	**Submit progress reports to EPA and NHDES summarizing the compliance with the WWTFs and Interim Effluent Limitations (Section C.1).** Included in the quarterly reports: 1.1 Describe activities undertaken during the quarterly period directed at achieving compliance with the Order. 1.2 Identify all plans, reports and other deliverables required by the Order that have been completed and submitted during the reporting period. 1.3 Describe the expected activities to be taken during the next reporting period in order to achieve compliance with the Order.	**On or before 1/15, 4/15, 7/15, 10/15 of each year** (until 7/15/2018)	YES ☐ NO ☒	YES ☐ NO ☒
2.	**Submit annual Total Nitrogen Control Plan Report to EPA and NHDES (Section E.1)** These reports shall address: 2.1 Total nitrogen (lbs) discharged from WWTF during previous year, 2.2 Operational changes implemented during previous year, 2.3 Status of total nitrogen non-point source and storm water point source accounting system development, 2.4 The status of the non-point and point source Nitrogen Control Plan development, 2.5 Description and accounting of activities conducted by Exeter as part of its Nitrogen Control Plan, and 2.6 Description of Exeter activities affecting the total nitrogen load to Great Bay during previous year.	**Beginning 1/31/2014 and annually thereafter**	YES ☒ NO ☐ **Notes:** Tracking point and non-point sources of nitrogen are part of the draft MS4 requirements.	YES ☒ NO ☐ **Notes:** Products, including tracking tools, developed as part of the WISE project should assist the Town in completing Tasks 2.3 through 2.6.
3.	**Initiate construction of the WWTF (Section A.1)** Necessary to achieve interim effluent limits set forth in Attachment	**6/30/2016**	YES ☐ NO ☒	YES ☐ NO ☒

	1.a in accordance with NHDES approval			
4.	**Achieve substantial completion of construction of the WWTF (Section A.2)** In accordance with NHDES approval	**6/30/2018**	YES ☐ NO ☒	YES ☐ NO ☒
5.	**Submit a Total Nitrogen Non-point Source and Point Source Stormwater Control Plan to EPA and NHDES (Section D.4)** Plan shall include: 5.1 5 year schedule for implementing specific control measures as allowed by state law to address identified non-point source and stormwater Nitrogen loadings in the Town of Exeter that contribute total nitrogen to the Great Bay estuary, including the Squamscott River. 5.2 If any category of de-minimis non-point source loadings identified in the tracking and accounting program are not included in the Nitrogen Control Plan, the Town shall include an explanation in the Plan of any such exclusions. The Nitrogen Control Plan shall be implemented in accordance with the schedules contained therein.	**9/30/2018**	YES ☒ NO ☐ **Notes:** Draft MS4 permit requires an implementation schedule for specific control measures at end of permit cycle	YES ☒ NO ☐ **Notes:** Products, including a menu of best management control practices and tracking tools, developed as part of the WISE project should assist the Town in completion of Task 5.
6.	**Submit an Engineering Evaluation (Section E.2)** That includes recommendations for the implementation of any additional measures necessary to achieve compliance with the NPDES Permit, or a justification for leaving the interim discharge limit set forth in Attachment 1.a in place (or lower the interim limit to a level below 8.0 mg/L but still above 3.0 mg/L) beyond that date. Must analyze: 6.1 Total Nitrogen concentrations in the Squamscott River and downstream are trending towards targets, 6.2 Documented significant improvements in dissolved oxygen, chlorophyll a, and macro algae levels, 6.3 Non-point source and stormwater point source reductions achieved are trending towards targets and mechanisms in place to ensure continued progress.	**12/31/2023**	YES ☐ NO ☒	YES ☒ NO ☐ **Notes:** Products, including monitoring framework, menus of best management control practices and tracking tools, developed as part of the WISE project should assist the Town in completion of Task 6.

* For each specific action outlined in the Order, Exeter must submit a written notice of compliance or noncompliance within 14 days of each deadline. Noncompliance reporting must include a description, a description of actions to be taken, a description of factors that explain or mitigate the noncompliance, and an appropriate date for which Exeter will perform the required action. After a notification of noncompliance has been filed, compliance with the past-due requirement shall be reported by submitting any required documents or providing EPA and NHDES with a written report Indicating that the required action has been achieved.

No.	COMPLIANCE TASKS	COMPLIANCE DEADLINE (Based on effective date of June 24, 2013)	OVERLAPS WITH DRAFT MS4 REQUIREMENTS	ASSISTANCE FROM WISE PROJECT
A.	**Track all activities that affect total Nitrogen load to the Great Bay Estuary. (Section D.1)** This includes (not limited to): A.1 New/modified septic systems, A.2 Decentralized WWTFs, A.3 Changes to the amount of effective impervious cover, A.4 Changes to the amount of disconnected impervious cover, A.5 Conversion of existing landscape to lawns/turf and any new or modified BMPs.	**Effective Immediately**	YES ☒ NO ☐ **Notes:** Tracking requirements will also include dog waste, turf management and agriculture.	YES ☒ NO ☐ **Notes:** Tracking tools that affect nitrogen load could be developed as part of the WISE project.
B.	**Comprehensive subwatershed-based tracking/accounting system (Section D.2)** Coordinate with the NHDES, other Great Bay communities and watershed organizations in NHDES's efforts to develop and utilize a comprehensive subwatershed-based tracking/accounting system for quantifying nitrogen loading changes from Exeter to the Great Bay Estuary.	**Effective Immediately**	YES ☐ NO ☒ **Notes:** Draft MS4 permit does not require a subwatershed-based tracking and accounting system.	YES ☒ NO ☐ **Notes:** The tracking tools and accounting system developed for the WISE project, could be adopted by the subwatershed communities.
C.	**Coordinate with the NHDES to develop a subwatershed community based nitrogen allocation (Section D.3)**	**Effective Immediately**	YES ☐ NO ☒	YES ☐ NO ☒
D.	**The interim limits in Attachment 1.a shall be in effect unless and until EPA determines that the Town has not complied with the milestones set forth in the Order (Section B.3).** If and when EPA determines that the interim limits shall no longer remain in effect, the Town shall fund, design , construct and operate additional treatment facilities to meet the NPDES Permit limit of 3.0 mg/l	**Effective Immediately and no later than 5 years from EPA's determination**	YES ☐ NO ☒	YES ☐ NO ☒
E.	**Operate the WWTF so as to maximize removal efficiencies and effluent quality (Section B.4)** using all necessary treatment equipment available at the facility for optimization at the flow and load received but not requiring methanol or other carbon addition.	**At all times**	YES ☐ NO ☒	YES ☐ NO ☒

F.	**Comply with the interim total nitrogen effluent limitations and monitoring requirements contained in Attachment 1 of the Order (Section B.1 and B.2)**.	**Until 6/30/2019** **or** **12 months after substantial completion of the WWTF** (whichever is sooner)	YES ☐ NO ☒	YES ☐ NO ☒

Attachment 10

Draft MS4 Checklist

Checklist for 2013 Draft NH Small MS4 General Permit Requirements

TASK	DEADLINE (in relation to permit effective date)	OVERLAPS WITH AOC REQUIREMENTS	ASSISTANCE FROM WISE PROJECT
1. Submit Notice of Intent (NOI) *(Part 1.7.2)*			
1.1 NOI is signed by appropriate official *(Appendix B, Subparagraph 11)* 1.2 NOI contains certification *(Part 1.7.2.c)* 1.3 NOI certifies eligibility regarding endangered species *(Part 1.9.1)* 1.4 NOI certifies eligibility regarding historic properties *(Part 1.9.2)*	**Within ninety (90) Days**	☐YES ☒NO	☐YES ☒NO
2. Develop, implement and enforce a written Stormwater Management Program (SWMP) *(Part 1.10)*			
2.1 Identify responsible people for program implementation	**Within one (1) year**	☐YES ☒NO	☐YES ☒NO
2.2 List all receiving water body segments, their classification under the applicable water quality standards, any impairment(s) and associated pollutant(s) of concern, applicable TMDLs and WLAs, and number of outfalls from the MS4 that discharge to each water body		☐YES ☒NO	☒YES (Based on scope) ☐NO **Notes:** WISE Project Team would need to access the size of the scope to complete this for each Town. However, portions of this task could be completed.
2.3 Document all public drinking water sources (surface water and groundwater) that may be impacted by MS4		☐YES ☒NO	☒YES (Based on scope) ☐NO **Notes:** WISE Project Team would need to access the size of the scope to complete this for each Town. However, portions of this task could be completed.
2.4 List all interconnected MS4s and other separate storm sewer systems receiving a discharge from the permitted MS4, the receiving water		☐YES ☒NO	☒YES (Based on scope) ☐NO

	body segment(s) ultimately receiving the discharge, their classification under the applicable state water quality standards, any impairment(s) and associated pollutant(s) of concern, applicable TMDLs and WLAs, and the number of interconnections			**Notes:** WISE Project Team would need to access the size of the scope to complete this for each Town. However, portions of this task could be completed.
2.5	Documentation to support permittee's compliance with Endangered Species requirements *(Part 1.9.1)*		☐YES ☒NO	☐YES ☒NO
2.6	Documentation to support permittee's compliance with historic properties requirements *(Part 1.9.2)*	**Within one (1) year**	☐YES ☒NO	☐YES ☒NO
2.7	Map of separate storm sewer system *(Part 2.3.4.6)*		☐YES ☒NO	☒YES (Based on scope) ☐NO **Notes:** WISE Project Team would need to access the size of the scope to complete this for each Town. However, portions of this task could be completed.
2.8	Listing of all discharges that were found to cause or contribute to an exceedance of applicable water quality standards and a description of the response(s) *(Part 2.1.1.c)*		☐YES ☒NO	☒YES (Based on scope) ☐NO **Notes:** WISE Project Team would need to access the size of the scope to complete this for the Towns. However, portions of this task could be completed using information already generated in the watershed by other projects.
2.9	Description of practices to achieve compliance with Discharges Subject to an Approved TMDL *(Part 2.2.1)*		☐YES ☒NO	☐YES ☒NO
2.10	Water Quality Response Plans (WQRP) including the person(s) or department responsible for the measure; the BMPs for the control measure or permit requirement; and the measurable goal(s) for each BMP. Each measurable goal shall include milestones and timeframes for its implementation and have a quantity or quality associated with its endpoint. Each goal must have a measure of assessment associated with it. *(Part 2.2.2)*		☐YES ☒NO	☒YES (Partial) ☐NO **Notes:** WISE Project Team will provide the foundation and tools for development of the WQRP, including tracking and implementation tools.

(Must also comply with the Great Bay Nitrogen Requirements (Part 2.2.3): Additional and modified BMPs included in the WQRP shall include, at a minimum, the BMPs identified in Appendix H).			
2.11 Description of any other practices to achieve compliance with water quality based requirements of the Water Quality Based Effluent Limitations *(Part 2.1)*		☐YES ☒NO	☒YES (Partial) ☐NO **Notes:** WISE Project Team will provide a list of practices to achieve compliance with water quality requirements.
2.12 Description of practices to achieve compliance with Requirements to Reduce Pollutants to the Maximum Extent Practicable (MEP) *(Part 2.3)* Identify the person(s) or department responsible for the measure; the BMPs for the control measure or permit requirement; and the measurable goal(s) for each BMP. Each measurable goal shall include milestones and timeframes for its implementation and have a quantity or quality associated with its endpoint. Each goal must have a measure of assessment associated with it.		☐YES ☒NO	☒YES (Partial) ☐NO **Notes:** WISE Project Team will provide the foundation and tools for the Towns to determine the necessary practices need to reduce pollutants.
2.13 Description of measures to avoid or minimize impacts to public and known private drinking water sources (surface water and groundwater). The permittee is also encouraged to include provisions to notify public water supplies in the event of an emergency.		☐YES ☒NO	☐YES ☒NO
2.14 Annual Program Evaluation *(Part 4.1)*		☐YES ☒NO	☐YES ☒NO
3. Illicit Discharge Detection and Elimination (IDDE) Program (Part 2.3.4)			
3.1 Outfall Inventory *(Part 2.3.4.7) (include inventory in annual report)*	**Within one (1) year**	☐YES ☒NO	☐YES ☒NO
3.2 System Mapping – Develop a revised and more detailed map than was required by the MS4-2003 *(Part 2.3.4.6)* (*include progress towards completion of map in each annual report)* • Required mapping elements: Municipal separate storm sewer; catchment delineations; waterbodies; municipal sanitary sewer system; municipal combined sewer system; storm sewer material, size and age; sanitary sewer system material, size and age; properties known or suspected to be served by a septic system; areas that have been or could be influenced by septic system discharges; location of	**Within two (2) years**	☐YES ☒NO	☒YES (Partial) ☐NO **Notes:** The Town of Exeter will provide guidance to other Towns on their methods and lessons learned. WISE Team will provide map elements including waterbodies and properties and locations of septic systems. The WISE Team will work

suspected, confirmed and corrected illicit discahrges.			with the Towns of Stratham and Newfields to determine the scope of providing additional mapping elements.
3.3 Complete dry weather screening and sampling (where flowing) of every MS4 outfall and interconnection (except Excluded and Problem Catchments). May rely on screening conducted under the MS4-2003, pursuant to an EPA enforcement action, or by the state or EPA to the extent that it meets the requirements. *(Part 2.3.4.8.d)*	**Within three (3) years**	☒YES ☒NO	☐YES ☒NO
3.4 Outfall Interconnection Screening and Sampling *(Part 2.3.4.8.d)*	**Begin within three (3) months of investigation procedure finalization and no later than 15 months**	☐YES ☒NO	☐YES ☒NO
3.5 Assessment and Priority Ranking of Catchments *(Part 2.3.4.8.c)*. Permittee shall classify each catchment into one of the following categories: • Excluded Catchments: No potential illicit discharge • Problem Catchments: Known or suspected contributions of illicit discharges • High Priority Catchments: Discharging to an area of concern to public health • Low Priority Catchment Priority ranking shall be done based on screening factors and should consider the following: past complaints and reports; poor dry weather receiving water quality; density of generating sites; age of surrounding infrastructure; sewer conversion; historic combined sewer systems; density of aging septic systems; and culverted streams.		☐YES ☒NO	☐YES ☒NO
i. Complete the Catchment Investigation Procedure in a minimum of 80% of the MS4 area served by Problem Catchments	**Within three (3) years**	☐YES ☒NO	☐YES ☒NO
ii. Complete the Catchment Investigation Procedure in 100% of Problem Catchments	**Within five (5) years**	☐YES ☒NO	☐YES ☒NO
iii. Implement the Catchment Investigation Procedure in every catchment of the MS4 where information indicates sewer input including outfall/interconnection screening sewer input based on olfactory/visual evidence or sampling results (ammonia ≥ 0.5 mg/l, surfactants ≥ 0.25 mg/l, and bacteria levels greater than the water quality criteria applicable to the receiving water; or ammonia ≥ 0.5 mg/l, surfactants ≥ 0.25 mg/l, and detectable levels of chlorine)	**Within five (5) years**	☐YES ☒NO	☐YES ☒NO
iv. Complete the Catchment Investigation Procedure in 40% of the area served by all MS4 catchments	**Within five (5) years**	☐YES ☒NO	☐YES ☒NO

v. Complete the Catchment Investigation Procedure in 100% of the area served by all MS4 catchments. May count the area of low priority catchments only if the Catchment Investigation has been started in all other MS4 catchments (considered "started" if Part 2.3.4.8.e.i-ii is complete).	**Within ten (10) years**	☐YES ☒NO	☐YES ☒NO
3.6 Where catchments do not contain junction manholes, the dry weather screening and sampling shall be considered as meeting the manhole inspection requirement. In these catchments dry weather screenings that indicate potential presence of illicit discharges shall be further investigated *(Part 2.3.4.8.e.iii).* Investigations in these catchments may be considered complete where dry weather screening reveals no flow; no evidence of illicit discharges or SSOs is indicated through sampling results or visual or olfactory means; and no wet weather System Vulnerability Factors are identified.		☐YES ☒NO	☐YES ☒NO
3.7 Track progress towards these milestones	**Each annual report**	☐YES ☒NO	☒YES ☐NO **Notes:** WISE Project Team will provide the foundation and tools for the Towns to determine the necessary practices need to reduce pollutants.
4. Public Education and Outreach (Part 2.3.2)			
4.1 Distribute a minimum of two (2) educational messages to: • Residents; • Businesses, institutions (private colleges, private schools, hospitals), and commercial facilities; • Developers (construction); and • Industrial facilities. The distribution of materials to each audience shall be spaced at least one year apart. Educational messages may be printed materials such as brochures or newsletters; electronic materials such as websites; mass media such as newspaper articles or public service announcement (radio or cable); or displays in a public area such as town/city hall. The permittee may use existing materials if they are appropriate for the message the permittee chooses to deliver or the permittee may develop its own educational materials. The permittee may partner with other MS4s, community groups	**Beginning the first year of the permit, distribute a minimum of two (2) education messages over the permit audience; distribute at least eight educational messages during the permit term**	☒YES ☐NO	☒YES ☐NO **Notes:** WISE Project Team will provide the foundation and tools for the Towns to determine the necessary practices need to reduce pollutants.

or watershed associations to implement the education program *(Part 2.3.2.1.b).* *If the small MS4 area has greater than thirty percent of its residents serviced by septic systems, the permittee shall include maintenance of septic systems as part of its education program.*			
5. Indicators of IDDE Program Progress			
5.1 Define or describe indicators for tracking program success. At a minimum, indicators shall include measures that demonstrate efforts to locate illicit discharges, the number of SSOs and illicit discharges identified and removed, the percent and area in acres of the catchment area served by the MS4 evaluated using the catchment investigation procedure, and volume of sewage removed. Evaluate and report the overall effectiveness of the program based on the tracking indicators in the annual report *(Part 2.3.4.10).*	**Each annual report**	☐YES ☒NO	☐YES ☒NO
6. Provide training to employees involved in the IDDE program			
6.1 At a minimum, provide training to employees involved in IDDE program about the program, including how to recognize illicit discharges and SSOs. Report on the frequency and type of employee training in the annual report (Part 2.3.4.11).	**Annually**	☒YES ☒NO	☒YES (Partial) ☐NO **Notes:** WISE Project Team will provide the general knowledge and guidance on the IDDE program which can be used to inform and educate employees.
7. Implement and enforce a Construction Site Stormwater Runoff Control Program *(Part 2.3.5)*			
7.1 Construction site stormwater runoff control program shall be designed to reduce pollutants in any stormwater runoff discharged to the MS4 from construction activities that result in a land disturbance of greater than or equal to one acre. The program shall include disturbances less than one acre if that disturbance is part of a larger common plan of development or sale that would disturb one acre or more. **Permittees authorized under the MS4-2003 shall continue to implement their existing programs and shall modify them as necessary to meet the requirements of this Part.**	**If not already existing, these procedures shall be completed within one (1) year**	☐YES ☒NO	☐YES ☒NO
7.1.1. An ordinance or other regulatory mechanism that requires the		☐YES	☒YES

use of sediment and erosion control practices at construction sites. Development of an ordinance or other regulatory mechanism was a requirement of the MS4-2003 (See Part III.B.4) and was required to be effective by May 1, 2008.		☒NO	☐NO **Notes:** WISE Project Team will provide resources and ordinances adopted by other Towns which could be adapted by the Towns.
7.1.2. Written procedures for site inspections and enforcement of sediment and erosion control measures. The procedures shall clearly define who is responsible for site inspections as well as who has authority to implement enforcement procedures. The program shall provide that the permittee may, to the extent authorized by law, impose sanctions to ensure compliance with the local program. These procedures and regulatory authorities shall be documented in the SWMP.		☐YES ☒NO	☒YES ☐NO **Notes:** WISE Project Team will provide resources for site inspection procedures and enforcement, which may be used by the Town in development of their procedures.
7.1.3. Requirements for construction operators to implement a sediment and erosion control program. The program shall include BMPs appropriate for the conditions at the construction site. The program may include references to BMP design standards in state manuals or design standards specific to the MS4. EPA supports and encourages the use of design standards in local programs. Examples of appropriate sediment and erosion control measures for construction sites include local requirements to: • minimize the amount of disturbed area and protect natural resources; • stabilize sites when projects are complete or operations have temporarily ceased; • protect slopes on the construction site; • protect all storm drain inlets and armor all newly constructed outlets; • use perimeter controls at the site; • stabilize construction site entrances and exits to prevent off-site tracking; and • inspect stormwater controls at consistent intervals.		☐YES ☒NO	☒YES ☐NO **Notes:** WISE Project Team will provide resources for implementation of sediment and erosion controls including appropriate practices, design standards and engineering best practices.
7.1.4. Requirements to control wastes, including but not limited to, discarded building materials, concrete truck wash out, chemicals, litter, and sanitary wastes. These wastes may not be discharged to the MS4.	**If not already existing, this procedure shall be completed within one (1) year**	☐YES ☒NO	☒YES ☐NO **Notes:** WISE Project Team will provide resources for construction site good housekeeping practices.

7.1.5. Written procedures for site plan review. Site plan review shall include a review by the permittee of the site design, the planned operations at the construction site, planned BMPs during the construction phase, and the planned BMPs to be used to manage runoff created after development. The review procedure shall incorporate procedures for the consideration of potential water quality impacts; procedures for pre-construction review; and procedures for receipt and consideration of information submitted by the public. Site plan review procedure shall include evaluation of opportunities for use of low impact design and green infrastructure. When the opportunity exists, the permittee shall encourage project proponents to incorporate these practices into the site design. The permittee shall track the number of site reviews, inspections, and enforcement actions.		☐YES ☒NO	☒YES ☐NO **Notes:** WISE Project Team will provide resources and examples of site plan review procedures which may be adapted by the Towns.
8. Implement and enforce a Stormwater Management in New Development and Redevelopment program (Post Construction Stormwater Management) (Part 2.3.6)			
8.1 Develop a report assessing current street design and parking lot guidelines and other local requirements that affect the creation of impervious cover. This assessment shall be used to provide information to determine if the design standards for streets and parking lots can be modified to support low impact design options. If the assessment indicates that changes can be made, the assessment shall include recommendations and proposed schedules to incorporate policies and standards into relevant documents and procedures to minimize impervious cover attributable to parking areas and street designs. The permittee shall involve any local planning boards and local transportation boards in this assessment to the extent feasible *(Part 2.3.6.6).* ***(Report status of this assessment in each annual report.)***	**Within two (2) years**	☐YES ☒NO	☒YES ☐NO **Notes:** WISE Project Team will provide resources street design and parking lot guidelines with low impact development design which may be adapted by the Towns.
8.2 Develop a report assessing existing local regulations (Part 2.3.6.7)	**Within three (3) years**	☐YES ☒NO	☐YES ☒NO
8.3 Directly Connected Impervious Area (DCIA)			
8.3.1. Estimate the annual increase or decrease in the number of acres of impervious area (Part 2.3.6.8.a)		☒YES ☐NO	☒YES ☐NO **Notes:** WISE Project Team will estimate the current total impervious area, directly connected impervious

			area and effective impervious area for each of the Towns.
8.3.2. Complete an inventory and priority ranking of permittee-owned property and existing infrastructure that could be retrofitted with BMPs designed to reduce the frequency, volume and pollutant loads of stormwater discharges to its MS4 through the mitigation of impervious area (Part 2.3.6.8.b).	**Within two (2) years**	☐YES ☒NO	☒YES (Partial) ☐NO **Notes:** WISE Project Team will work with the Towns to develop an inventory of the existing best management practices and providing materials of retrofit BMPs which may be used on Town owned property.
8.3.3. Estimate for each sub-basin identified , the number of acres of impervious area (IA) and DCIA draining to its MS4 that have been added or removed during the prior year (Part 2.3.6.8.c)	**Second year annual report and in each subsequent annual report.**	☐YES ☒NO	☒YES (Partial) ☐NO **Notes:** WISE Project Team will identify the number of acres of impervious area by Town. The Project Team will evaluate the level of effort to estimate the number of current acres per sub-basin.
8.3.4. Report on those permittee-owned properties and infrastructure inventoried that have been retrofitted with BMPs to mitigate IA and DCIA (Part 2.3.6.8.c)	**Third year annual report and in each subsequent annual report**	☐YES ☒NO	☐YES ☒NO
9. Develop an Operation and Maintenance Program *(Part 2.3.7)* This program shall be included as part of the SWMP (item 2 of this checklist)	**Within one (1) year**		
9.1 Develop an inventory of facilities (Part 2.3.7.1)	**Within six (6) months Review annually and update as necessary**	☐YES ☒NO	☒YES (Partial) ☐NO **Notes:** WISE Project Team will provide inventory the existing best management practices and provide operation and maintenance materials for existing and recommended practices.

10. Develop and implement a written Stormwater Pollution Prevention Plan (SWPPP) for permittee-owned maintenance garages, public works yards, transfer stations and other waste handling facilities where pollutants are exposed to stormwater (Part 2.3.7.2).	**No later than two (2) years**	☐YES ☒NO	☐YES ☒NO
11. Submit Annual Report			
11.1 A self-assessment review of compliance with the permit and conditions	**Annually, due ninety (90) days from the close of each reporting period.**	☐YES ☒NO	☐YES ☒NO
11.2 An assessment of the appropriateness of the selected BMPs		☐YES ☒NO	☐YES ☒NO
11.3 The status of any plans or activities required by the Water Quality Based Effluent Limitations (Part 2.1) and/or Discharges to Impaired Waters (Part 2.2) including: • Identification of all discharges determined to be causing or contributing to an exceedance of water quality standards and description of response including all items required by Part 2.1.1.c; • For discharges subject to TMDLs, identification of specific BMPs used to address the pollutant identified as the cause of impairment and assessment of the BMPs effectiveness at controlling the pollutant (Part 2.2.1); • For discharges to impaired waters and the nitrogen-impaired waters of the Great Bay watershed and their tributaries, a description of each WQRP including the items required by Part 2.2.2.c.; and • For discharges to chloride impaired waters, identification of the specific BMPs used to address the pollutant and assessment of the BMPs effectiveness at controlling the pollutant.		☒YES (Partial) ☐NO	☐YES ☒NO
11.4 An assessment of the progress towards achieving the measurable goals and objectives of each control measure in the Requirements to Reduce Pollutants to the Maximum Extent Practicable (MEP) (Part 2.3) including • Evaluation of the public education program including a description of the targeted messages for each audience; method of distribution and dates of distribution; methods used to evaluate the program; and any changes to the program.		☐YES ☒NO	☐YES ☒NO

	• Description of the activities used to promote public participation including documentation of compliance with state public notice regulations. • Description of the activities related to implementation of the IDDE program including: status of the map; status and results of the illicit discharge potential ranking and assessment; identification of problem catchments; status of all protocols described in Parts 2.3.4. (program responsibilities and systematic procedure); number and identifier of catchments evaluated; number and identifier of outfalls screened; number of illicit discharges located; number of illicit discharges removed; gallons of flow removed; identification of tracking indicators and measures of progress based on those indicators; and employee training. • Evaluation of the construction runoff management including number of project plans reviewed; number of inspections; and number of enforcement actions. • Evaluation of stormwater management for new development and redevelopment including status of ordinance development and review; status of the street design assessment; and information on directly connected impervious area reductions. • Status of the O&M Programs required by Part 2.3.7.1. • Status of SWPPP required by Part 2.3.7.2 including inspection results. • Any additional reporting requirements in Part 3.0.			
11.5	All outfall screening and monitoring data collected by or on behalf of the permittee during the reporting period and cumulative for the permit term, including but not limited to all data collected pursuant to the IDDE Program (Parts 2.3.4) and Part 4.3. Also provide a description of any additional monitoring data received during the reporting period.		☒YES (Partial) ☐NO	☐YES ☒NO
11.6	Description of activities for the next reporting cycle.		☒YES ☐NO	☐YES ☒NO
11.7	Description of any changes in identified BMPs or measurable goals.		☒YES ☐NO	☐YES ☒NO
11.8	Description of activities undertaken by any entity contracted for achieving any measurable goal or implementing any control measure.		☒YES ☐NO	☐YES ☒NO

Attachment 11

Preliminary Nitrogen Tracking Summary

ATTACHMENT 9 - PRELIMINARY NITROGEN TRACKING SUMMARY TABLE
TOTAL NITROGEN CONTROL PLAN ANNUAL REPORT FOR 2015
Wright-Pierce, December 2015

Category	Wastewater									Stormwater		Land Use					
Parcel	Zoning District	Class	Sewered	Septic System Type	Septic System <200m from Surface Water	Septic System Install Year	Rebuilt, New or No Change?	Permitted Bedrooms for Septic System	Design Flow (GPD)	Structural BMPs Installed	Non-Structural BMPs Installed	Land Converted to Turf/Grass from Natural (SF)	Land Converted to Turf/Grass from Impervious (SF)	Existing Impervious Cover Removed (SF)	New Impervious Cover Created (SF)	Amount of New Impervious Cover that is Disconnected (SF)	Land Converted to Agriculture Fields / Pastures (SF)
101-031-0000	R-1	Residential	No	Conventional	No	2015	Rebuilt	3	450	-	-	-	-	-	-	-	-
097-001-0000	R-1	Residential	No	Conventional	No	2015	Rebuilt	2	300	-	-	-	-	-	-	-	-
079-005-0000	R-1	Residential	No	Conventional	No	2015	Rebuilt	3	450	-	-	-	-	-	-	-	-
032-030-0000	C-3	Commercial	No	Conventional	Yes	2015	Rebuilt	-	950	-	-	-	-	-	-	-	-
018-012-0000	RU	Residential	No	Conventional	No	2015	Rebuilt	2	300	-	-	-	-	-	-	-	-
112-007-0000	R-1	Residential	No	Conventional	No	2016	New	4	600	-	-	-	-	-	-	-	-
068-006-0000	R6	Residential	Yes	-	-	-	-	-	-	1	0	321,910	0	0	76,230	0	0
095-079-0019	R-1	Residential	Yes	-	-	-	-	-	-	0	0	8,420	0	0	2,470	1,235	0
095-079-0014	R-1	Residential	Yes	-	-	-	-	-	-	0	0	11,304	0	0	2,635	1,300	0
065-131-0000	H	Hospital	Yes	-	-	-	-	-	-	0	0	0	0	0	1,768	0	0
046-005-0000	CT-1	Commercial	Yes	-	-	-	-	-	-	0	0	0	0	0	875	0	0
055-075-0001	R-4	Residential	Yes	-	-	-	-	-	-	0	0	0	0	0	43,350	0	0
063-236-0000	R-2	Residential	Yes	-	-	-	-	-	-	0	0	0	128	128	0	0	0
094-015-0000	R-2	Residential	Yes	-	-	-	-	-	-	0	0	17,988	0	0	2,050	925	0
073-148-0000	C-1	Residential	Yes	-	-	-	-	-	-	0	0	0	600	600	100	0	0
073-149-0000	C-1	Residential	Yes	-	-	-	-	-	-	0	0	0	0	0	1,168	0	0
073-149-0000	C-1	Residential	Yes	-	-	-	-	-	-	0	0	0	0	0	1,300	0	0
047-001-0001	C-3	Commercial	Yes	-	-	-	-	-	-	12	0	24,925	0	0	56,000	56,000	0
082-013-0000	R-2	Commercial	Yes	-	-	-	-	-	-	2	0	0	0	0	5,370	0	0
062-112-0000	C-2	Commercial	Yes	-	-	-	-	-	-	2	0	0	0	0	14,590	0	0
069-019-0000	R-2	Residential	Yes	-	-	-	-	-	-	1	0	0	0	0	3,050	3,050	0
069-019-0000	R-2	Residential	Yes	-	-	-	-	-	-	1	0	0	0	0	3,050	3,050	0
069-019-0000	R-2	Residential	Yes	-	-	-	-	-	-	1	0	0	0	0	3,050	3,050	0
Totals								**14**	**3,050**	**20**	**0**	**384,547**	**728**	**728**	**217,056**	**68,610**	**0**

Attachment 12

Planning Department Proposed Zoning Amendment Memo

TOWN OF EXETER
PLANNING DEPARTMENT MEMORANDUM

Date:	October 30, 2015
To:	Exeter Planning Board
From:	Kristen Murphy, Natural Resource Planner
Subject:	Proposed Zoning Amendment Relative to Fertilizer Use

Healthy Lawns Clean Water Initiative Progress Report:
As you are aware, we applied for and were awarded a grant to adopt fertilizer buffers for all surface waters. Since that time, our group, now named "*Healthy Lawns – Clean Water*" has been very active. We have met with experts in this field, learned effective strategies for public outreach, developed a logo and website content, initiated our first public connection at Household Hazardous Waste Day, and drafted the attached proposed zoning amendments. For expertise relative to the proposed amendments, this group included two representatives from the Planning Board (Gwen English and Kathy Corson), two representatives from the Exeter Conservation Commission (Ginny Raub and Pete Richardson), a representative from the Board of Selectmen (Don Clement), Jeff Barnam the Great Bay Water Keeper and myself. We also received guidance from Barb McEvoy and Doug Eastman. Glen Greenwood provided assistance on procedures and applicability. Attached is the product of these efforts.

Background for Proposed Zoning Amendment:
In order to meet Federal Clean Water Act requirements, the Town of Exeter is under a mandate to reduce the amount of nitrogen runoff reaching our waterways. It has been shown that fertilizer runoff is a large contributing source to this nitrogen pollution problem. Prohibiting the use of fertilizer near rivers and streams will augment ongoing efforts and assist us in reducing nitrogen pollution.

Our existing zoning regulations for wetlands already address fertilizer. Article 9.1.8.E. prohibits the use of fertilizer within the Wetlands Conservation Overlay District. This means fertilizer cannot be used within our wetland buffers. As you know those buffers are defined as follows: Prime Wetlands - 100', Exemplary Wetlands - 50', Very Poorly Drained Wetlands - 50', Poorly Drained Wetlands - 40', Inland Streams (including intermittent) - 25' and Vernal Pools - 75'.

We do not however, have any prohibition on the use of fertilizer within our Shoreland Overlay Protection District. This essentially means that we have greater protection for inland isolated wetlands than we do for the waterways that provide a source for our drinking water for example. To further add to this protection, it was recommended that we also consider applying this prohibition to our Aquifer Protection District, protecting key aquifers from pollution.

The additions we propose are indicated in RED in the attached document. BLACK text depicts existing language but is provided for reference and context. We look forward to the discussion of these amendments with the full board and at future public hearings.

2.2.30 add definition of Fertilizer (renumber remaining list)

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

9.3.3 *(no change proposed, incl for reference)* District Boundaries: The Exeter Shoreland Protection District is defined to include the following:

A. Exeter River (fresh):

1. The area of land within 300 feet horizontal distance of the seasonal high water level of the Exeter River and its major tributaries. Major tributaries of the Exeter River within the Town of Exeter are defined to be the following: water flowing north from Great Meadows, water flowing westerly from the Cove and from wetlands between Hampton and Hampton Falls Roads, Little River, Dudley Brook and Bloody Brook.

2. In addition, the area of land within 150 feet horizontal distance of the seasonal high water level of all perennial brooks and streams within the Exeter River Watershed and all other perennial brooks and streams.

B. Fresh River (fresh):

1. The area of land within 300 feet horizontal distance of the seasonal high water level of the Fresh River and its major tributaries.

2. In addition, the area of land within 150 feet horizontal distance of the season high water level of all perennial brooks and streams within the Fresh River Watershed.

C. Squamscott River (salt):

1. The area of land within 300 feet horizontal distance of the shoreline of the salt water Squamscott River, and the seasonal high water level of its fresh water major tributaries. Major tributaries of the Squamscott River

within the Town of Exeter are defined to be the following: Norris Brook to its confluence with Watson Brook, Wheelwright Creek, Parkman Brook, and Rocky Hill Brook, and Dearborn Brook and Water Works Pond, due to their importance to the public water supply.

2. In addition, the area of land within 150 feet horizontal distance of the mean high water level of all perennial brooks, streams and creeks within the Squamscott River watershed.

3. The area of land within 150 feet horizontal distance of the upland extent of any tidal marsh adjacent to the Squamscott River

9.3.4 - Use Regulations

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

12. The use of fertilizer as defined in 2.2.30.

9.2. AQUIFER PROTECTION DISTRICT ORDINANCE

9.2.3 - Use Regulations

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

12. The use of fertilizer as defined in 2.2.30

Attachment 13
Health Lawns – Clean Water

Boards, Committees, and Commissions

Exeter's Healthy Lawns - Clean Water Initiative

Do you know that our rivers provide a source for our drinking water?

Chemicals we place on our lawns flow untreated to our rivers through wetlands, streams and storm drains when it rains.

These wetlands, streams and storm drains connect our lawns to our rivers.

So what we place on our lawn matters.

CLICK THE LINKS BELOW FOR MORE INFORMATION.

About Us	**5 Easy Steps "Healthy Lawns - Clean Water"**	**Fertilizer Ducky Video**	**Storm Water Ducky Video**

Also Visit...

Conservation Commissions Page
Think Blue Exeter Page
Town of Exeter Main Page

Supporting Documents

Five Easy Steps for "Healthy Lawns - Clean Water"

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Boards, Committees, and Commissions Menu

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Master Plan

Contact

10 Front Street
Exeter, NH 03833
603-778-0591

To reach all members of the Board of Selectmen
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dclement@exeternh.gov

Dan Chartrand -
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Julie Gilman -
jgilman@exeternh.gov

Anne Surman -
asurman@exeternh.gov

Nancy Belanger -
nbelanger@exeternh.gov

Full Contact Details...

Upcoming Events

Board of Selectmen
Mon, Nov 16th 7:00pm - 9:00pm

Board of Selectmen Work Session
Tue, Nov 17th 6:00pm

Zoning Board of Adjustment
Tue, Nov 17th 7:00pm - 9:00pm

Boards, Committees, and Commissions

Healthy Lawns - Clean Water: About Us

About Us

The Town of Exeter is working toward meeting Federal Clean Water Act requirements by reducing the amount of nitrogen reaching our rivers. Nitrogen is the prime culprit harming the health of our rivers and Great Bay, with chemical fertilizer being a major contributor.

The Town has partnered with a group of dedicated volunteers to spread the word about the wise use of fertilizers with the goal of reducing nitrogen runoff to our waterways. This effort called "Healthy Lawns – Clean Water Initiative" is supported by a grant from the Piscataqua Regions Estuary Partnership (PREP). The Committee is comprised of members from the Planning Board, Water/Sewer Committee, Conservation Commission and the general public.

To participate in the Healthy Lawns – Clean Water Initiative or for more information contact Kristen Murphy with the Exeter Planning Department at (603) 773-6112 or kmurphy@exeternh.gov.

Back to...

Healthy Lawns - Clean Water Page

Conservation Commissions Page

Think Blue Exeter Page

Town of Exeter Main Page

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Boards, Committees, and Commissions Menu

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Master Plan

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Board of Selectmen Work Session
Tue, Nov 17th 6:00pm

Zoning Board of Adjustment
Tue, Nov 17th 7:00pm - 9:00pm

EXETER

Keep your lawn environmentally healthy

COMMENT 0 Recommend 18 0

Posted Sep. 24, 2015 at 3:31 PM
Updated Sep 24, 2015 at 3:32 PM

EXETER — The Town of Exeter is working toward meeting Federal Clean Water Act requirements by reducing the amount of nitrogen reaching our rivers, according to Kristen Murphy with the Exeter Planning Department.

Nitrogen is the prime culprit harming the health of our rivers and Great Bay, with chemical fertilizer being a major contributor, says Murphy. The town is planning a series of educational activities and materials on the wise use of fertilizers with the goal of reducing nitrogen runoff to our waterways.

This effort is spearheaded by a committee called “Healthy Lawns – Clean Water,” and supported by a grant from the Piscataqua Regions Estuary Partnership (PREP). The Committee is comprised of members from the Planning Board, Water/Sewer Committee, Conservation Commission and the general public.

In the coming weeks and months they will offer practical guidelines on lawn care, starting at the Oct. 3 Household Hazardous Waste Day event at the Exeter Department of Public Works site.

To participate in the Healthy Lawns – Clean Water committee or for more information contact Murphy at 773-6112.

» Comment or view comments

Top Video Headlines

of 3

- 

TV GUIDE

Following these 5 steps for a healthy, natural lawn will help keep our rivers clean

1. **Mow better.** Set mower blades at 3" for more vigorous roots.

2. **Let clippings lie.** Clippings are a high quality, free fertilizer.

3. **Fertilize?** Test your soil first. Early Fall (Air temps of 55°F or higher) is the best time to fertilize. Healthy lawns over 10 years old may need only clippings.

4. **Lime?** Periodic lime increases PH allowing plants to absorb more nutrients.

5. **Water wisely.** If needed, water 1" per week.

Are You Prepared for Water Quality-Friendly Lawn Care?

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University of New Hampshire Cooperative Extension

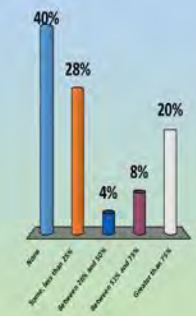
Additional Presentation Contributors

- Karl Guillard, PhD, University of Connecticut
- Brian Eisenhauer PhD, Plymouth State University
- Sadie Puglisi, formerly of UNH Cooperative Extension

Keypad poll

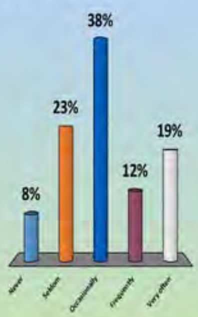
What percentage of your business is related to lawn care products or services?

A. None
B. Some, less than 25%
C. Between 26% and 50%
D. Between 51% and 75%
E. Greater than 75%



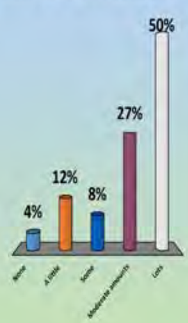
How often do your customers ask your advice regarding lawn care products or practices?

A. Never
B. Seldom
C. Occasionally
D. Frequently
E. Very often



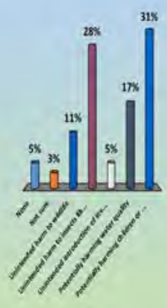
How much demand are you noticing for more environmentally friendly products, advice or services?

A. None
B. A little
C. Some
D. Moderate amounts
E. Lots



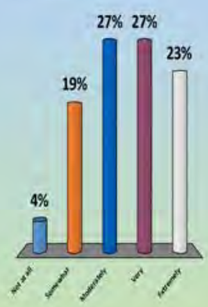
What environmental/health concerns do your customers have related to yard care? *Check up to 3 responses.*

A. None
B. Not sure
C. Unintended harm to wildlife
D. Unintended harm to insects like bees or butterflies
E. Unintended introduction of invasive plants species
F. Potentially harming water quality
G. Potentially harming children or pets



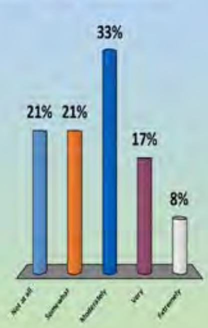
How confident are you in being able to provide water quality-friendly yard care services or recommendations for customers?

A. Not at all
B. Somewhat
C. Moderately
D. Very
E. Extremely



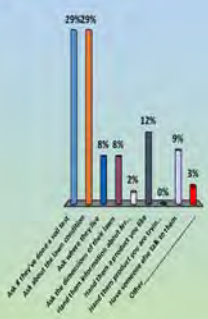
How confident are you that your staff can provide water quality-friendly yard care services or recommendations for customers?

A. Not at all
B. Somewhat
C. Moderately
D. Very
E. Extremely



How do you currently respond to customers' requests for advice on lawn fertilizers? *Choose up to 3 responses.*

A. Ask if they've done a soil test
B. Ask about the lawn condition
C. Ask where they live
D. Ask the dimensions of their lawn
E. Hand them information about fertilizers
F. Hand them a product you like
G. Hand them product you are trying to get rid of
H. Have someone else talk to them
I. Other__________________



Excess nutrients (phosphorus and nitrogen) are considered a water quality problem for both freshwater and marine waters throughout New England.

http://water.usgs.gov/nawqa/sparrow/estuary/n_atlantic/

But ….Plants Need Nutrients!

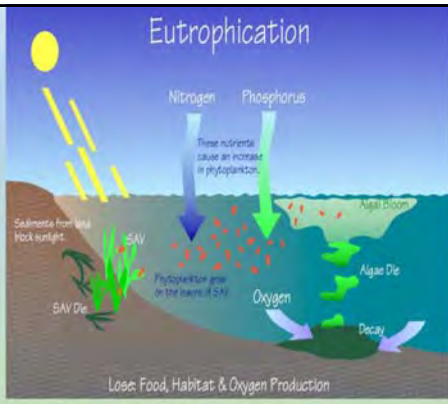


Image from www.fiu.edu/~envstud/labs/nutrientanalysis.html

Where Do Excess Nutrients Come From?

Is This a Problem Here?

"Non-point sources of nitrogen include **lawn fertilizers,** septic systems, animal wastes and atmospheric deposition on to land. "

http://prep.unh.edu/resources/pdf/2013%20SOOE/SOOE_2013_FA2.pdf

Can We Change Lawn Care Behaviors to Reduce Nutrient Runoff from Fertilizer Use Throughout New England?

Illustration: sccwrp.org

Photo: K. Guillard

Challenges for Changing Fertilizer Practices to Improve Water Quality through Extension Education

- Fertilizer recommendations vary according to region, source, nutrient, laws, etc.
- Nitrogen application is based on standard recommendation, not site-specific.
- Uncertainty about drivers of homeowner's (DIY) yard care practices.
- Uncertainty about their willingness and ability to change practices.

Changing Homeowner's Lawn Care Behavior to Reduce Nutrient Losses

USDA/NIFA 2006-51130-03656

National Water Program

Northeast States & Caribbean Islands Regional Water Center

Project Objectives (selected)

1. Have a set of regionally appropriate lawn care recommendations for water-quality sensitive nutrient management for lawns
2. Have a soil-based nitrogen test for turf
3. Know about target audience values, practices and information sources
4. Have outreach products that combine what we know about turf with what we know about people
5. Have a measure of how effective new outreach approaches are

Water Quality Friendly Lawn Care Recommendations

https://extension.unh.edu/resources/files/Resource002468_Rep3617.pdf

Compiled and edited by Karl Guillard, PhD, University of Connecticut, Plant Science

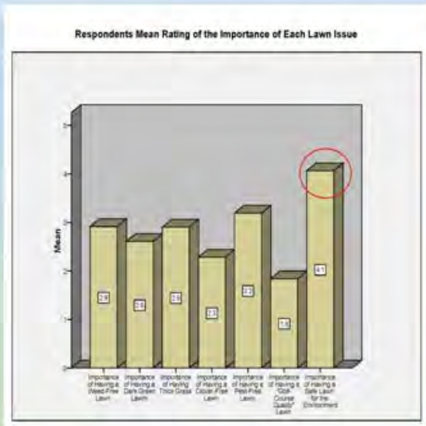
Social Science Results and Recommendations for Outreach

Brian Eisenhauer, PhD
Plymouth State University

From *Report of Social Science findings from Changing Homeowner's Lawn Care Behavior to Reduce Nutrient Losses in New England's Urbanizing Watersheds*

USDA CSREES (now NIFA) project # 2006-51130-03565

What Matters to People in New England Regarding Lawns?



An Example of Putting It All Together

http://seagrant.unh.edu/sites/seagrant.unh.edu/files/media/pdfs/extension/lawncare_information_sheet.pdf

Section 2

Simple Recommendations for Every Lawn

1. Choose the right grass seed
2. Don't overwater
3. Mow smart
4. Test your soil

Limit lawn area to locations that will actually be used for outdoor activities.

Use grass mixes that require less care.

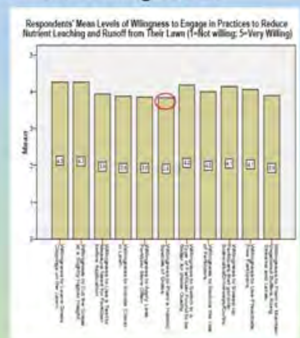
Overseed. Healthy, dense turf helps prevent other problems.

Choose the Right Seed Mixes

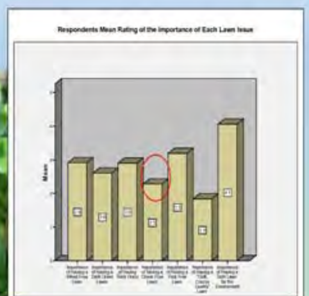
Turf Species	Tolerances	Limitations	Color and Best Conditions
Tall fescues (turf-type)	Heat and drought tolerant Fairly shade tolerant	Slow to establish Fair recovery potential	"New" ones are finer textured and darker green. Best in well drained soils & sun
Fine fescues (creeping red, chewings, hard, sheep)	Very tolerant of low pH and fertility, drought and shade Become semi-dormant in heat and drought but recover quickly	Don't perform well under hot, humid conditions with high fertility	Narrow leaf, medium to dark green Ideal for low maintenance
Kentucky blue grass	High tolerance for cold and wear Moderate tolerance for heat and drought Becomes semi-dormant in heat and drought; can recover	Requires higher amounts of N fertilizer May produce thatch	Fine to medium leaf texture and dark green color Best in well drained, sunny areas
Perennial ryegrass	Germinates rapidly and is quick to establish – good for overseeding Tolerant of wear and heat	Can be competitive Not tolerant of shade and drought Susceptible to ice cover injury	Fine to medium leaf texture and dark green color Best on well drained soils with moderate fertility

Source: http://extension.umass.edu/turf/fact-sheets/selection-grasses

What are DIYers Willing to Do?



Incorporate clover.

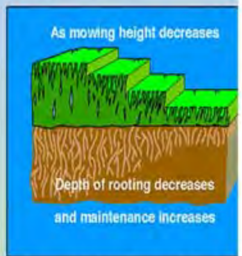


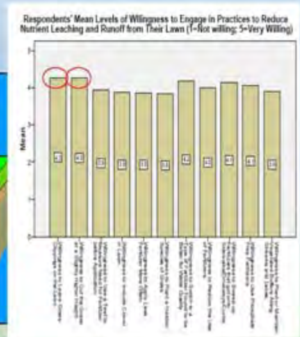
Clover fixes nitrogen naturally in the soil. **Keep clover <10% of seed mix.**
Disregard if there are allergies to bee stings in the household.

Don't Overwater

One inch of water or rain per week is enough. Over-irrigation leads to nutrient runoff and leaching.

Mow Smart

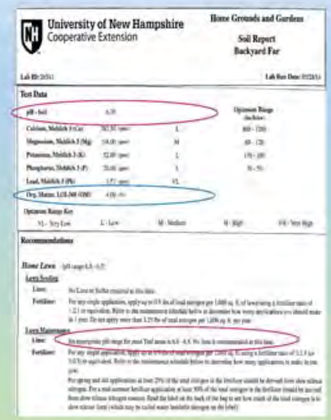




Mow high 3" and leave clippings on the lawn.

Test Soil

Note pH and Organic Matter


University of New Hampshire
Cooperative Extension
Home Grounds and Gardens
Soil Report
Backyard Far
Test Data
Recommendations
Home Lawn

Soil pH (measure of soil acidity)

When pH is maintained at the proper level:

- Availability of nutrients is optimized
- Toxic elements are often at reduced availability
- Beneficial organisms are most active

New England soils naturally acidic: 4.5-5.5

For NEW turf

Incorporate compost or another organic matter source to raise the organic matter content to at least 3%-5%.* *(Be alert that compost can have high phosphorus levels.)*

Is Your Unfertilized Lawn Acceptable To You?

If not -

- Is the **turf type** right for the sun/shade conditions? How about wear and tear conditions?
- Is the lawn status a result of unusual **weather** or even seasonal effects?
- Is there evidence of **serious pest damage**? *(Avoid combination products unless they are truly needed.)*
- Have soil tested for nutrient levels and recommendations.

What Products or Services Can You Promote for Clean Water?

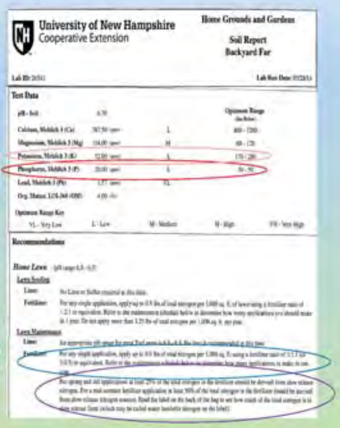
Recommendations for Lawns That Need Fertilizer

1. Determine how much to apply
2. Know when and where to apply
3. Choose the right fertilizer

Test Soil

Note Nutrients

Where's the Nitrogen result?


University of New Hampshire
Cooperative Extension

Home Grounds and Gardens

Soil Report

Backyard Far

Test Data

Recommendations

Is There a Way to Test Nitrogen Levels in Turf?

Determine How Much to Apply

- Measure the dimensions to calculate AREA in square feet.
- Anticipate how many times you will apply this year.
- Read label.
- Make water quality protection a priority.

Do people know the square footage of their lawns?

Does Respondent Know the Square Footage of their Lawn?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	399	52.9	55.4	55.4
	Yes	321	42.6	44.6	100.0
	Total	720	95.5	100.0	
Missing	Not Applicable	8	1.1		
	Missing	26	3.4		
	Total	34	4.5		
Total		754	100.0		

Prefer to Use a Calculator?

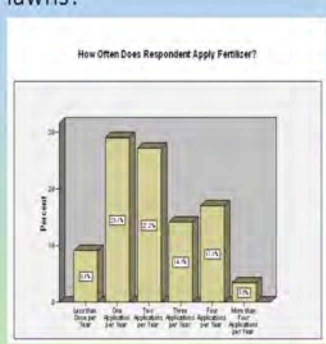
http://www.sustainability.uconn.edu/fertcalc.html

Are people applying fertilizer?

Is Fertilizer Applied to Respondent's Lawn?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	328	43.5	46.7	46.7
	Yes	375	49.7	53.3	100.0
	Total	703	93.2	100.0	
Missing	Don't Know	13	1.7		
	Not Applicable	12	1.6		
	Missing	26	3.4		
	Total	51	6.8		
Total		754	100.0		

How often are people applying fertilizer to lawns?



56% - One to two application per year

31% - Three to four applications per year

Water Friendly Recommendation:
Apply NO MORE than 2 lbs N per year*

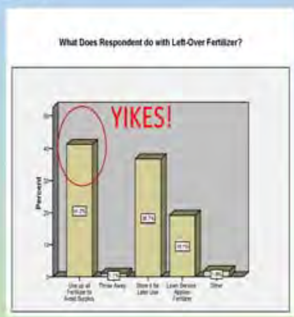
Apply one-half to one-third (or less) of amount recommended on fertilizer bag.

Look for results…
- normal release products - within a couple weeks
- slow release products - over more time

Reapply at reduced rate only if response is unacceptable.

* For lawns greater than 10 years old where clippings are left.

Use Only What You Need, Store or Give Away What You Don't

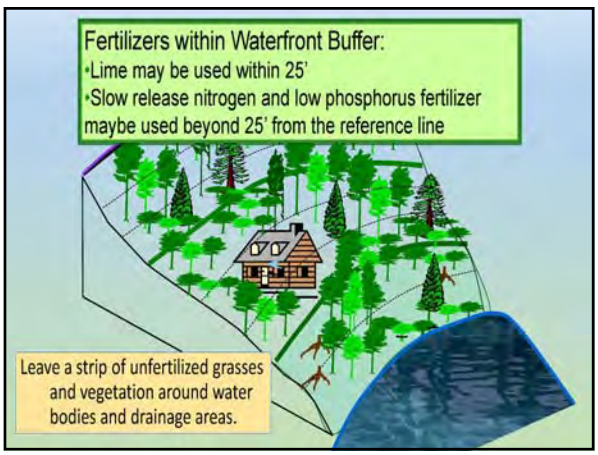


Know When to Apply

If needed, fertilize after spring green-up and no later than mid September.

Avoid fertilizing in the mid-summer.


The New Hampshire Shoreland Water Quality Protection Act (SWQPA)
Investment in the Future


Fertilizers within Waterfront Buffer:
•Lime may be used within 25'
•Slow release nitrogen and low phosphorus fertilizer maybe used beyond 25' from the reference line
Leave a strip of unfertilized grasses and vegetation around water bodies and drainage areas.


Choose the Right Product: Types of Fertilizer
•Slow Release
•Organic
•Synthetic

Slow Release

- Releases in 8-12 weeks
- Defined as containing 1/3 to 1/2 nitrogen in slow release form
  - "Water insoluble Nitrogen (WIN)"
  - "Slowly available"
  - "Slowly available soluble nitrogen"
- Shown as a percent

When To Use Slow Release

BEST when….

- ✓High leaching or runoff potential.
- ✓You don't want to push growth i.e. summer.
- ✓There is time for activation i.e. spring.
- ✓You want less potential to burn

Organic Fertilizer

- Fertilizers from natural sources
- Plant or animal base carriers
- compost, cocoa meal, dried whey, phosphate rock, greensand, natural nitrate of soda, natural sulfate of potash, humates, oyster meal, kelp meal, animal & vegetable protein meals

OMRI Listed

When to Use Organic Fertilizer

BEST when….

- ✓Slow release desired
- ✓Prefer non-petroleum-based
- ✓Want a source of micronutrients
- ✓Feeds microbes
- ✓Adds organic material

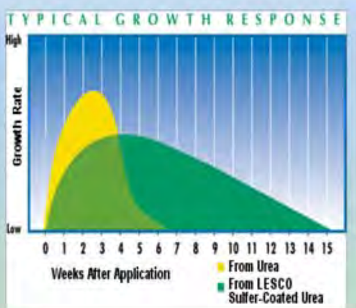
Synthetic Normal Release

- Variety of grades and particle types
- Variety of ratios of nutrients
- Various release rates from very fast to relatively slow
- Custom blends
- Fast acting, fast take up, fast green up

When To Use Synthetics

BEST when…

- ✓Weather is cold
- ✓Late fall
- ✓Don't want some nutrients to build up
- ✓Growing out of a problem
- ✓Need less expense
- ✓Need easy to spread

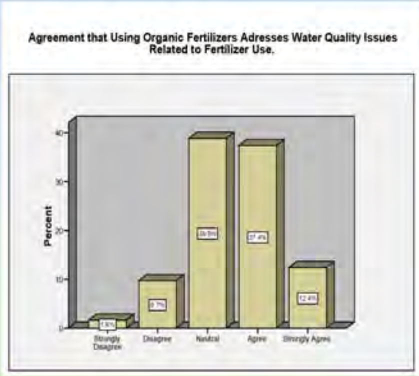


Where trade names are used for identification, no product endorsement is implied nor is discrimination intended against similar materials


University of New Hampshire Cooperative Extension

New Hampshire's Turf Fertilzer Law
What You Should Know

Will Promoting or Using Organic Fertilizers Address the Water Pollution Issue?



Not necessarily, although many believe it will.

RSA 431:Nitrogen for Turf

Sold at Retail

- 3.25 pounds per 1,000 square feet of total nitrogen annually when applied according to label instructions
- 0.9 pounds per 1,000 square feet of total nitrogen per application
- No more than 0.7 pounds per 1,000 square feet of soluble nitrogen per application

RSA 431: Phosphorus for Turf

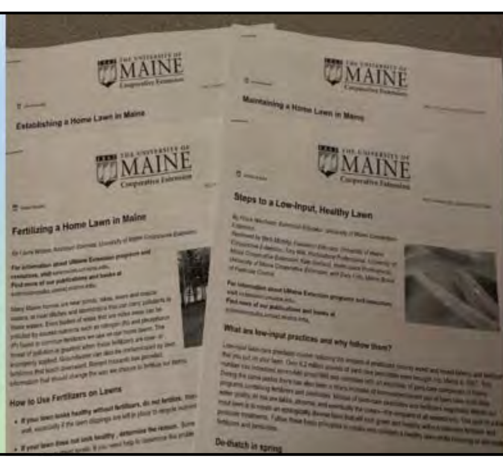
Sold at Retail

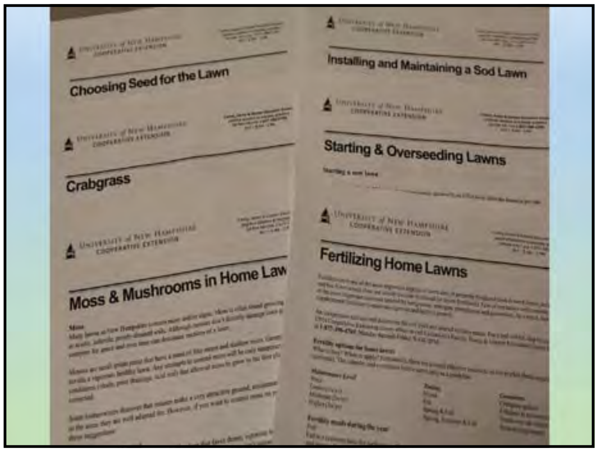
- Apply no more than 0.67% available phosphate unless specifically labeled for establishing new lawns, for repairing a lawn, for seeding, or for use when a soil test indicates a phosphorus deficiency
- No fertilizer that is intended for use on newly established or repaired lawns, or for lawns testing deficient in phosphorus shall exceed an application rate of one pound per 1,000 square feet annually of available phosphate

Why Calibrate Spreaders?

- To deliver granular fertilizers and pesticides to turf at correct rates.
- To make sure the product isn't misapplied, allowing too much or too little of the product to reach the turf

What Products or Services Can You Promote Related to Fertilizing for Clean Water?





University of Massachusetts Cooperative Extension Home Lawn Fact Sheets

- **Cultural Practices**
- Compaction and Cultivation
- Developing a Fertility Program for Lawns
- Drop Spreader Calibration Procedures
- Fall Turf Maintenance
- General Lawn Maintenance & Renovation
- Growing Turf Under Shaded Conditions
- Lawn Mowing
- Management of Compaction: Coring
- Rotary Spreader Calibration Procedures
- Soil pH and Liming
- Understanding a Turf Fertilizer Label
- What is Thatch?
- What's Wrong With My Lawn?

University of Massachusetts Cooperative Extension Home Lawn Fact Sheets

- Planting
- Insects
- Diseases
- Weeds
- Water

Turf Videos – U Maine Cooperative Extension

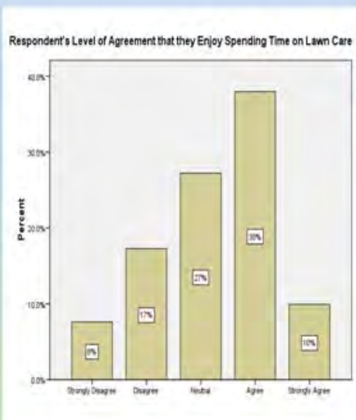
- How to Establish a Home Lawn in Maine
- How to Maintain a Home Lawn in Maine

Turf Videos – UNHCE
Coming Soon

- How to Read a Fertilizer Label
- Fertilizing Home Lawns
- Calibrating a Fertilizer Spreader
- Choosing the Right Seed for Your Lawn
- Stating a New Lawn
- Renovating an Existing Lawn
- Environmentally Friendly Lawn Care
- Controlling Grubs in the Lawn

Section 3

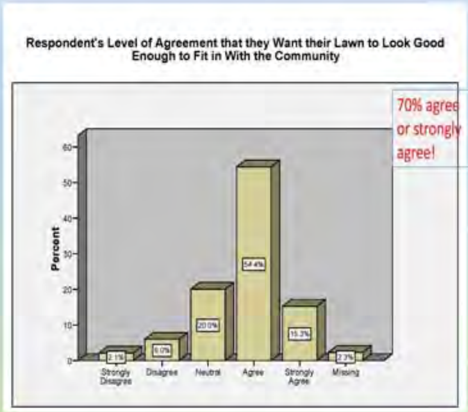
What Else Are People Thinking, Feeling and Doing About Lawn Care?



48% agree or strongly agree!

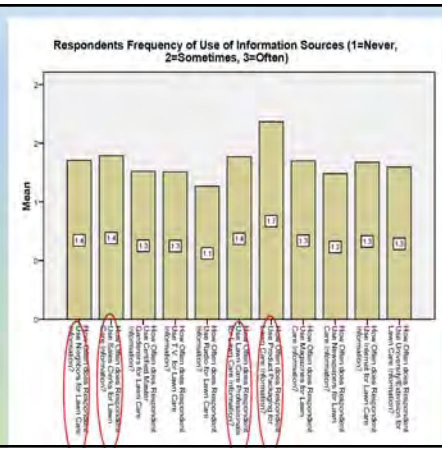
What do They Want?

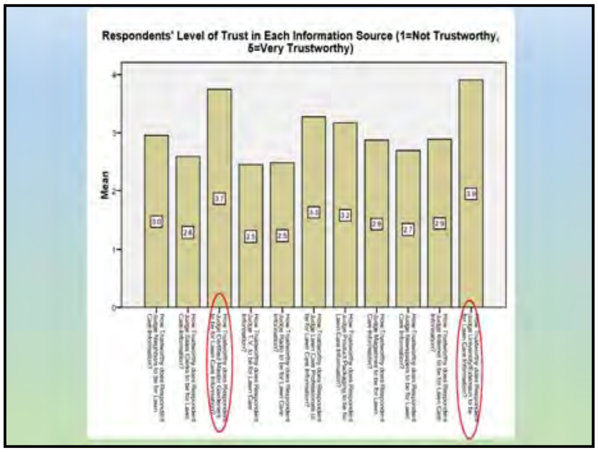
Respondents' Lawn Care Values and Attitudes



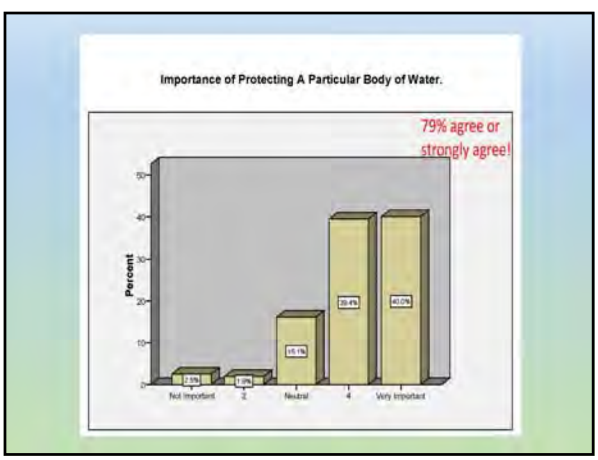
Where Do Respondents Get Information?

Who Do They Trust?





What Else Weighs in on Decisions about Water Quality Friendly Lawn Care?



How Does the Social Science Help Us?

- Recommendations about specific content
- Information about audience values and practices
- Recommendations about how to frame messages
- Recommendations about how to deliver messages

Some Recommendations from the Social Science

- Provide simple, accurate explanations of fertilizer effects on local water bodies. (Opinion Leaders)
- Explain when fertilizer might be appropriate and when not. (Opinion Leaders)
- Link impacts with a specific body of water.
- Promote alternatives (clippings, clover, better varieties of grass).
- Use norms to frame messages.
- Use point of sale and packaging.

Discussion

Thank you!


What is the “perfect lawn”?
You may notice dandelions and other weeds in the turfgrass at Longwood. In an effort to be better stewards of the land and reduce the use of herbicides, Longwood has chosen to tolerate rather than chemically eliminate all lawn weeds.
Cultural methods are used to reduce the use of herbicides on lawns, such as planting improved turfgrass varieties, raising mowing heights to shade weed competitors, and fertilizing in fall to maintain balanced nutrient levels.

Attachment 14

Soak Up the Rain NH Brochure

What is Stormwater?

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

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

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

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

Why is Stormwater a Problem?

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

What is Soak up the rain NH ?

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

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

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

Want to Learn More?

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

Soak up the Rain New Hampshire

YOUR LAND
YOUR WATER
YOUR SOLUTION

A Program of

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Soak up the Rain NEW HAMPSHIRE

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

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

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

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

Stormwater and Your Home: Where does it come from?

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

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

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

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

What can you do to help reduce stormwater pollution?

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

YOUR LAND. YOUR WATER. YOUR SOLUTION.

Attachment 15
Exeter PWD Public Outreach

Boards, Committees, and Commissions

Think Blue Exeter

As rain and snow-melt, also known as stormwater, flows across streets, parking lots, and other surfaces it collects dirt, debris, and chemicals carrying them directly to our rivers and streams. This polluted run-off is called Stormwater Pollution. Our habits play a major role in this type of pollution.

Click the Homeowners category below to learn ways you can help reduce Stormwater Pollution because...CLEAN WATER STARTS WITH YOU!!!

What is Stormwater Pollution?

As stormwater (or rain and snow-melt) flows across buildings, streets, parking lots, and other surfaces it collects dirt, debris, and chemicals and carries them directly to our rivers and streams. Collectively, these surfaces which do not allow water to penetrate are called impervious surfaces. The polluted run-off that flows across them and into our streams is called Stormwater Pollution.

What's the Water Quality Status of Exeter's Streams and Rivers?

As a result of water testing, NH Department of Environmental Services has designated the majority of Exeter's streams and rivers as "impaired" for one or more uses. This means the water contains pollutants which can be harmful to aquatic life, fish consumption, or humans during either direct or indirect contact.

To view how widespread this designation is, click HERE to view Exeter's "impaired rivers". As you look at this map remember, **BLUE** means the water course meets standards, **RED** means it does not. With the majority of Exeter's waterways in red on this map, you may be starting to understand the purpose of the THINK BLUE program.

How Can You Help?

Our habits play a major role in this type of pollution. To find out what simple changes you can make to reduce the amount of pollutants entering our rivers, explore the links below and be sure to check out our "Ducky Ads" at the bottom of the page. You may have seen or heard them on Channel 98 or WXEX.

Boards, Committees, and Commissions Menu

We need more people to THINK BLUE because **CLEAN WATER STARTS WITH <u>YOU</u>**!!!

Click any thumbnail image to view a slideshow

Supporting Documents

- Stormwater Rubber Duck PSA
- Devil Ducky Lawncare PSA
- Rainstorm Radio Ad
- Car Wash Radio Ad

Contact

10 Front Street
Exeter, NH 03833
603-778-0591

To reach all members of the Board of Selectmen
- **Selectmen@exeternh.gov**

Don Clement -
dclement@exeternh.gov

Dan Chartrand -
dchartrand@exeternh.gov

Julie Gilman -
jgilman@exeternh.gov

Anne Surman -
asurman@exeternh.gov

Nancy Belanger -
nbelanger@exeternh.gov

Full Contact Details...

Upcoming Events

Board of Selectmen
Mon, Nov 16th 7:00pm - 9:00pm

Board of Selectmen Work Session
Tue, Nov 17th 6:00pm

Zoning Board of Adjustment
Tue, Nov 17th 7:00pm - 9:00pm

Budget Recommendations Committee
Wed, Nov 18th 6:30pm

Heritage Commission
Wed, Nov 18th 7:00pm - 9:00pm

View the Boards, Committees, and Commissions calendar

EXETER PUBLIC WORKS DEPARTMENT

13 NEWFIELDS ROAD • EXETER, NH • 03833-3792 • (603) 773-6157 •FAX 772-1355
www.exeternh.gov/publicworks

May 15, 2015

Town Resident
Exeter, NH 03833

Re: **Sump Pump Removal Program**
Exeter, New Hampshire

Dear Exeter Resident:

For many years, the Town has been evaluating our sewers, focusing on how to remove Infiltration and Inflow (I/I) from the system. I/I is groundwater and stormwater that enters the sewer system, but does not need treatment like sewage does. It has been determined that half of the water treated at the Wastewater Treatment Facility is I/I and the majority comes from private sources such as basement sump pumps, roof drains, broken pipes, and other drains. Removing I/I reduces sewage treatment costs, saves energy and reduces sewage discharges to the environment. We need everyone's help to remove the I/I.

Enclosed with this letter, you will find a **pamphlet** of information to identify whether your home is contributing I/I to the sewer and what you can do to remove it. Also, enclosed is a **compliance response questionnaire** to fill out and send back to Underwood Engineers by July 1, 2015. A self-addressed stamped envelope has been provided. The information gathered will be compiled to plan future capital projects, identify homeowners who may qualify for amnesty from sewer ordinance enforcement action, and identify homeowners requesting assistance from the Town.

Discharge of I/I into the sewer system is against Town Sewer Ordinance (1507.3 & 1501.8). However, homeowners that return compliance responses acknowledging existing illicit sewer connections will be eligible for amnesty during a 5-year 'grace period'. A non-response will be considered a statement of compliance and precludes any amnesty. The Town's *Policy Statement* regarding this *Private I/I Public Education, Outreach, and Enforcement Program* can be found on the Town's website at: exeternh.gov/publicworks/infiltration-inflow.

The New Hampshire Department of Environmental Services (NHDES) and Environmental Protection Agency (EPA) requires the Town to institute this sump pump removal program. We appreciate your help in this matter.

Very truly yours,

TOWN OF EXETER

Michael Jeffers

Michael Jeffers
Water and Sewer Managing Engineer

HOMEOWNER COMPLIANCE RESPONSE QUESTIONNAIRE
SUMP PUMP REMOVAL PROGRAM
TOWN OF EXETER

The Town of Exeter needs your help with the planning for projects to remove infiltration and inflow and to achieve compliance with our EPA wastewater permit. Infiltration and Inflow is explained in the brochure included with this questionnaire. Your participation in this survey will provide the Town with important information that will be used to develop the most cost effective ways to remove I/I. Please take a few moments to help by providing the information requested below. Your help is needed to identify the areas that send costly infiltration and inflow (clean water) to the Town's Wastewater Treatment Facility. Additional comments and concerns can be included on the back of this form. Thank you for your assistance.

____________________________ ____________________________

(Name) (Street Address)

Lot #:______ Tax Map #:______ (see mailing label)

1. Are you connected to the Town's municipal sewer system? ***Yes or No***
   If no, please skip to the end and return the form. If yes, please fill out the balance of the form.

2. Would you like a Town representative to inspect your home and assist you with completion of this questionnaire or other technical assistance? ***Yes or No***
   If yes, please skip to the end and return the form. A Town representative will contact you to schedule an appointment.

3. Do you have a sump pump (circle one)? ***Yes or No***
   If yes to question 3, where does your sump pump discharge (check all that apply)?
   ☐ Onto the ground outside ☐ basement sink ☐ cellar floor drain ☐basement sewer pipes
   ☐Other (describe): ____________________________________

4. Do you have roof gutters/drains with downspouts (circle one)? ***Yes or No***
   If yes to question 4, where does the down spout discharge (check all that apply)?
   ☐ Onto the ground ☐ Into the ground
   Comments: ____________________________________

5. Do you have any of the following <u>connected to the sewer</u> that may contribute I/I to the sewer (check all that apply)?
   ☐ floor drain ☐ foundation drain ☐ yard drain ☐ roof drains
   ☐ gutters w/ downspouts ☐sump pumps Comments: ________________________

6. Have you experienced? ☐ flooded basement ☐ sewer pipes clogged ☐ sewer backups
   ☐ odors ☐ other __________ Comments: ______________________

7. Comments or concerns can be expressed in the space below and on the back of this form

____

____

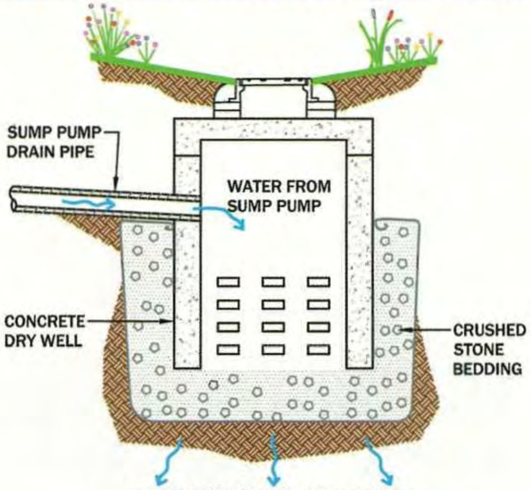
Questions concerning this form can be directed to Matthew Berube at the Exeter Public Works Department (773-6157). Please provide a telephone number if you would like someone to contact you regarding the information on this form: Please contact me at: ______________

Please return the questionnaire to:

Underwood Engineers, Inc., 25 Vaughan Mall, Portsmouth, NH 03801 by <u>July 1, 2015.</u>

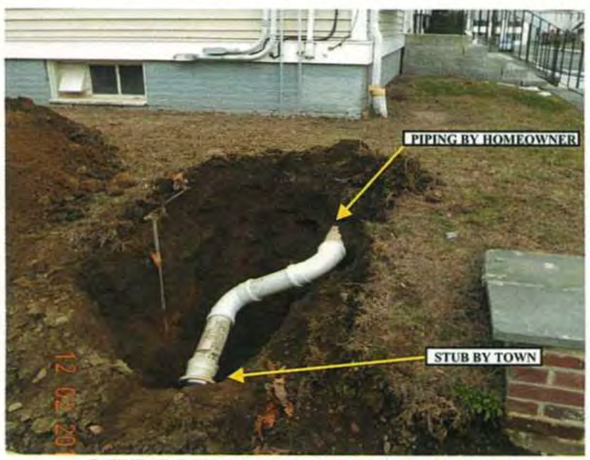
Thank you

SUMP PUMP DISCHARGE OPTIONS



INFILTRATION BASINS

RAIN GARDENS



MUNICIPAL DRAIN SERVICES

TOWN ORDINANCE

Chapter 15 – Sewer Regulations

Article 1507.3C

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

Section 1501.8, Paragraph 6

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

WHAT YOU CAN DO TO HELP

Check to see if your home contributes I/I:

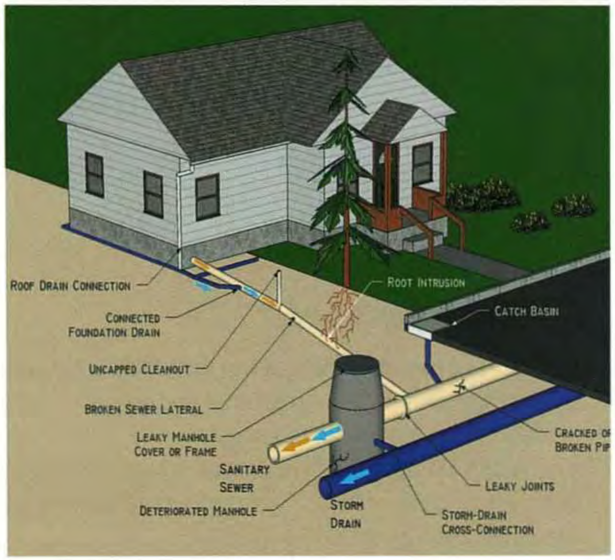
- Look for I/I connections yourself in your basement and on the outside of your house.
- Look for additional information that will be provided by the Town.
- Contact the Town by calling Matt Berube at 773-6157 to set up an appointment and check for I/I connections to the sewer or for more information.

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

TOWN OF EXETER
FOUNDED
1638
NEW HAMPSHIRE

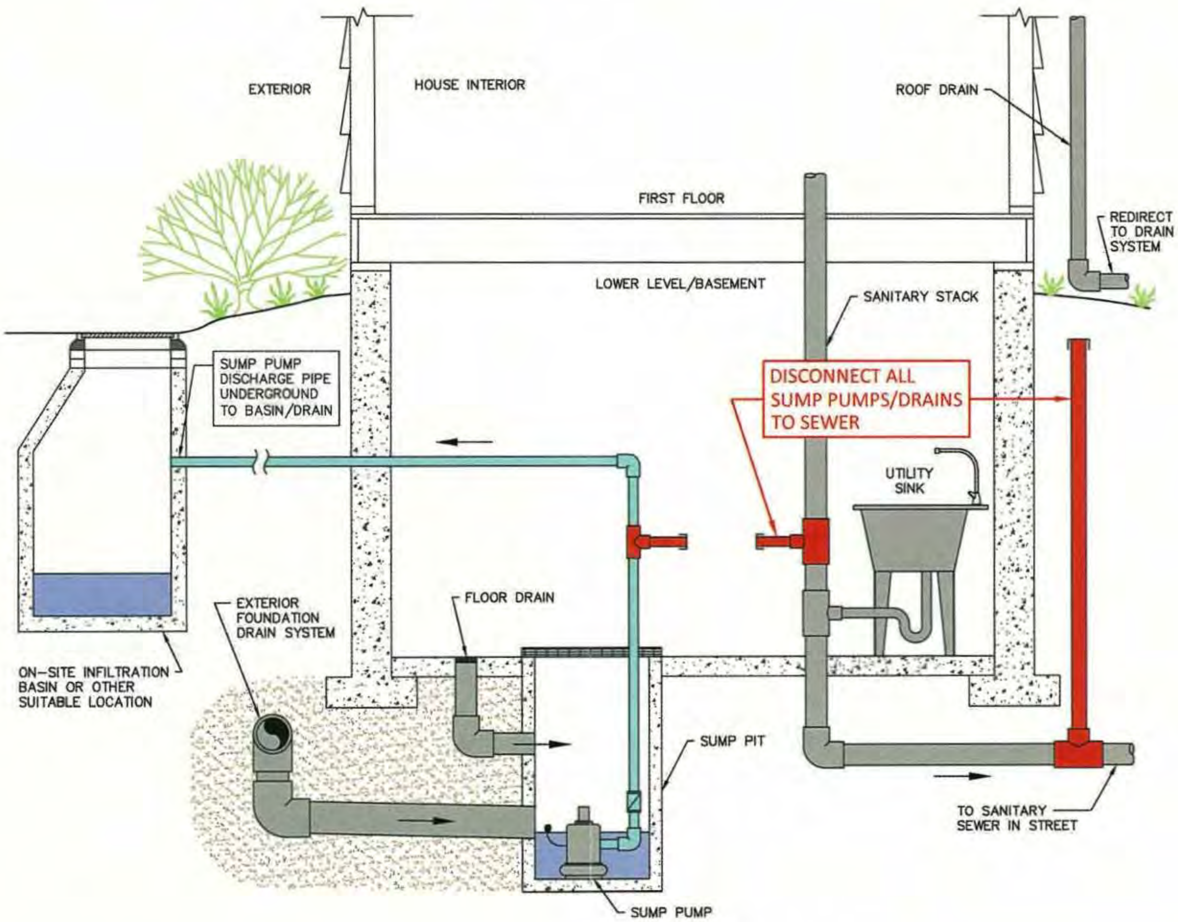
SUMP PUMP REMOVAL PROGRAM*

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



What is Infiltration and Inflow (I/I)?

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



WHY IT'S A BIG DEAL

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

Remove clean water connections to the sewer:

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

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

This can lead to icing and other maintenance issues

Preferred Discharge Locations include:

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

(see reverse side for examples)

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

The Hidden COST

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

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

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

29 Hazen Drive, Concord, NH 03301

des.nh.gov

(603) 271-3571

What's FLUSHABLE?

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

What's FLUSHABLE?

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

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

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

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

The bottom line:

ONLY

Human waste and toilet paper

ARE FLUSHABLE

The DO NOT FLUSH List:

Diapers
Cigarettes
Paper Towels
Cotton Swabs
Tampons

Condoms
Dental Floss
Facial Tissues
Wipes

Attachment 16

2015 Inflow and Infiltration Report

civil & environmental engineering

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

ph 603.436.6192
fx 603.431.4733
25 Vaughan Mall
Portsmouth, NH 03801
underwoodengineers.com

the sewer). When time allowed dye testing was performed to assist in determining the discharge locations of unknown drains. Building inspections were performed in the following areas:

- Portions of the Phillips Exeter Academy (PEA) campus at locations to supplement the August 2014 PEA building inspections.
- Portions of Lincoln Street in advance of planned Capital Improvement Projects (CIP) in the area.
- Portions of Downtown Water Street in advance to planned sidewalk projects in the area.
- The former High School building where the Town has received reports that illicit sewer connections may exist on that property.

A general summary of the key findings from the building inspection investigation is as follows:

Sump Pumps:

- Total = 7 total (5 buildings)
- Sump pump discharge to sewer = 1 (PEA Boathouse)
- Sump pump discharge to unknown location = 2 (1 building)

Roof Drains:

- Total = 74 total (18 buildings)
- Roof drain discharge to sewer = 9 drains (5 bld., ~0.7 acres of impervious area)
- Roof drain discharge to unknown location = 18 (3 buildings)

Other Drains:

- Total = 26 total (11 buildings)
- Discharge to sewer = 2 drains (1 building - PEA Boathouse)

Although a relatively small number of buildings were inspected, significant sources of private I/I were identified:

- The one (1) sump pump that was found to be connected to the sewer was located in the PEA boathouse basement which is susceptible to flooding due to its close proximity to the Squamscott River. In addition, two open window wells/drains located on the north side (river side) of the Boathouse provide a pathway for floodwaters to enter the basement. Past sewer flow records have indicated spikes in flow during extreme high tide events, and although it has not been directly observed, it is possible that the PEA Boathouse sump pump may contribute to these apparent 'tidal' spikes in the sewer.

- Five (5) buildings were identified to have roof drains connected to the sewer and it was estimated that these illicit connections drain approximate 0.7 acres of impervious roof area directly to the sewer. It is estimated that these roof drains can contribute up to 0.5 MGD flow spikes to the sewer in during intense (>1" rainfall/hour) rainfall events.

Recommendations

It is recommended that the identified illicit connections be separated from the sewer because they can significantly contribute to peak flows. A summary of our recommendations is as follows:

1. Develop a plan and schedule with Phillips Exeter Academy to remove illicit connections that were identified during this building inspection program (Table B.4) and during previous building inspections on campus (UE's January 28, 2015 report).

2. Develop a plan and schedule with the owners of Arjay Hardware, Merrill Block, and the former Woolworth's buildings to remove illicit roof drain connections from the sewer (Table B.5).

3. Perform follow-up inspections of the nine (9) properties where external-only inspections were performed as part of this investigation. These properties include the former High School where the Town has received reports of potential illicit connections.

4. Continue illicit connection inspections and smoke testing in other areas of Town where there is evidence or suspicions of illicit sewer connections. Incorporate findings and tracking of private sewer separation into the Town wide *Public Outreach and Private I/I Mitigation Program* (UE Report, January 12, 2016).

We appreciate the opportunity to perform this work for the Town. Please call if you have any questions.

Very truly yours,

UNDERWOOD ENGINEERS, INC.

Keith A. Pratt

Keith A. Pratt, P.E. CAM
President

Cole S. Melendy, P.E.
Project Manager

CSM/ljs
Enc.

Attachment 17

Draft Memo, Sidewalk Tree Filter BMP Designs, June 2015

Geosyntec consultants

75 Congress Street, Suite 301
Portsmouth, New Hampshire 03801
PH 603.601.3903
www.geosyntec.com

DRAFT Memorandum

Date:	30 June 2015
To:	Paul Vlasich, P.E., Town Engineer, Exeter
From:	Daniel Bourdeau, P.E., Renee Bourdeau and Peter Tu; Geosyntec Consultants
Subject:	Sidewalk Tree Filter Stormwater Best Management Practices Designs

The purpose of this memorandum is to present the proposed sidewalk stormwater best management practices (BMP) designs for the Town of Exeter including design calculations and predicted water quality mitigation.

Five (5) potential locations were selected in downtown Exeter to retrofit with sidewalk tree filter BMPs. The proposed tree filter BMPs are shown on the conceptual design plan set entitled "Downtown Street Tree Project, Exeter, New Hampshire," dated April 2015 and prepared by Geosyntec Consultants, Inc (Drwaing Set). Based on Geosyntec's analysis, it is estimated that installation of the BMPs provide a 65% reduction in annual total nitrogen.

TREE FILTER BMP DESIGN CALCULATIONS

The following section includes the tree filter BMP design methodology, analysis and assumptions, and results.

Methodology

- **Conceptual Design**. The conceptual design geometry is depicted in Figure 1 below and is presented in more detail in Details 1 through 5 on Sheet 5 of the Drawing Set. This standard design will be used for all of the proposed tree filter BMP locations. It features an inlet manhole structure with a sump and manhole lid for easy cleaning and maintaining. The manhole drains through a pre-treatment trash and debris guard and through a regtangular perforation in the manhole structure and discharges into the tree filter. The stormwater drains vertically through the bioretention soil media (BSM) and into the underdrain system. The underdrain system consists of a gravel layer and a perforated pipe which is plumbed into the adjacent existing catch basin. A portion of the underdrain system will have a permanent "anaerobic zone" for elevated nitrogen removal efficiency. The tree filter BMP is simply bypassed during large storm events or when the BMP is full and runoff is captured in the existing catch basin as in the existing condition.

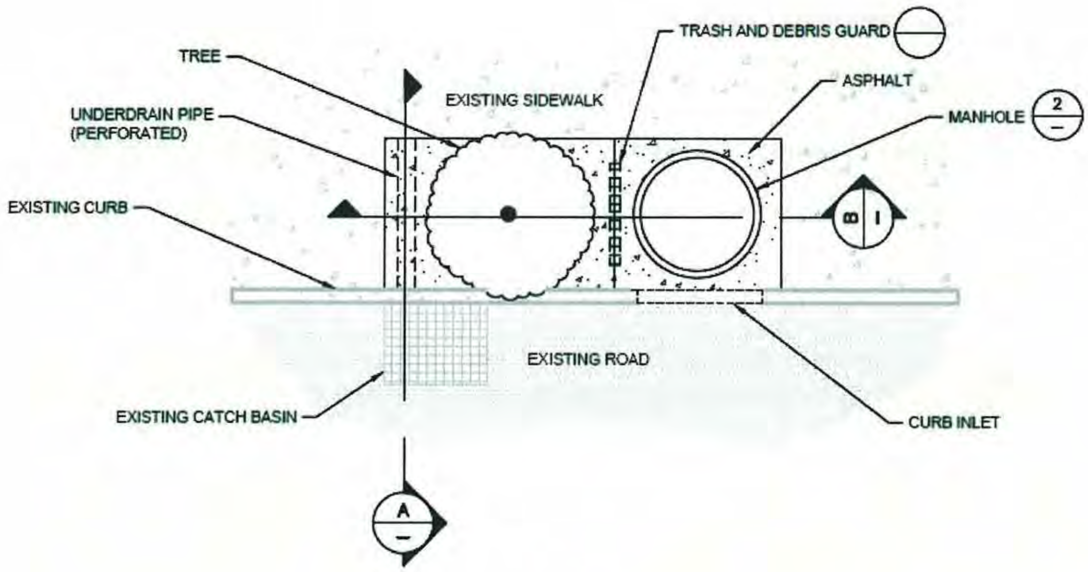


Figure 1: Conceptual Plan View of the Tree Filter BMP.

- **Water Quality Volume.** The Water Quality Volume (WQv) is the amount of stormwater runoff from a rainfall event that is designed to be captured and treated, which is calculated by the following equations (NH DES 2008):

$$WQ_v = P \cdot R_v \cdot A$$

$$R_v = 0.05 + 0.9 \cdot I$$

Where WQ_v is the Water Quality Volume (cf); P is the design precipitation depth, which is usually one inch (1/12 ft); R_v is a unitless runoff coefficient; A is the drainage area of the BMP (ft^2); and I is the percent impervious area within the drainage area .

For this design, the design precipitation depth P was equal to 0.25 inches (0.02 ft). According to the optimization model that was created for the WISE project, this was the optimal value for P (i.e., a tree filter, which was sized to capture a 0.25 inch precipitation depth incurred the highest pollutant reduction per unit capital cost).

- **Filter Sizing.** The proposed BMPs were dynamically sized using the following equation (NYS 2015):

$$A_f = {WQ_v \cdot d_f}\Big/{(k \cdot (h_f + d_f) \cdot t_f)}$$

Where A_f is the surface area of the filter bed (ft^2); WQ_v is the Water Quality Volume (cf); d_f is the filter bed depth (ft); k is the coefficient of permeability of the filter media (ft/day); h_f is the average height of water above the filter bed, which is assumed to be half of the design ponding depth; and t_f is the design filter bed drain time (days).

- **Diameter of Underdrain Outlet Orifice**. The diameter of the underdrain outlet orifice was sized to fully drain the BMP within 24 hours, which was determined with the following equation (Daugherty and Franzini 1965):

$$Q = C \cdot A \cdot (2 \cdot g \cdot h)^{0.5}$$

where Q is the discharge rate (cfs), which is calculated as the mean flow rate to drain the Water Quality Volume in 24 hours; C is the discharge coefficient (usually chosen as 0.6) (Swamee 2010); A is the cross-sectional area of the pipe (ft^2); g is the gravity constant (32.2 ft^2/s); and h is the driving head (ft), which is the sum of the depth of the filter bed (d_f), the depth of the gravel bedding (d_g), and the average depth of ponding (h_f).

Analysis and Assumptions

- **BMP Catchment**. The proposed BMP sites and their associated drainage areas are delineated in Figure 2. It was assumed that all roof areas drain directly to the stormwater sewer, and roof area was therefore not included in the BMP drainage areas. It was also assumed that all roads are crowned at the center line.

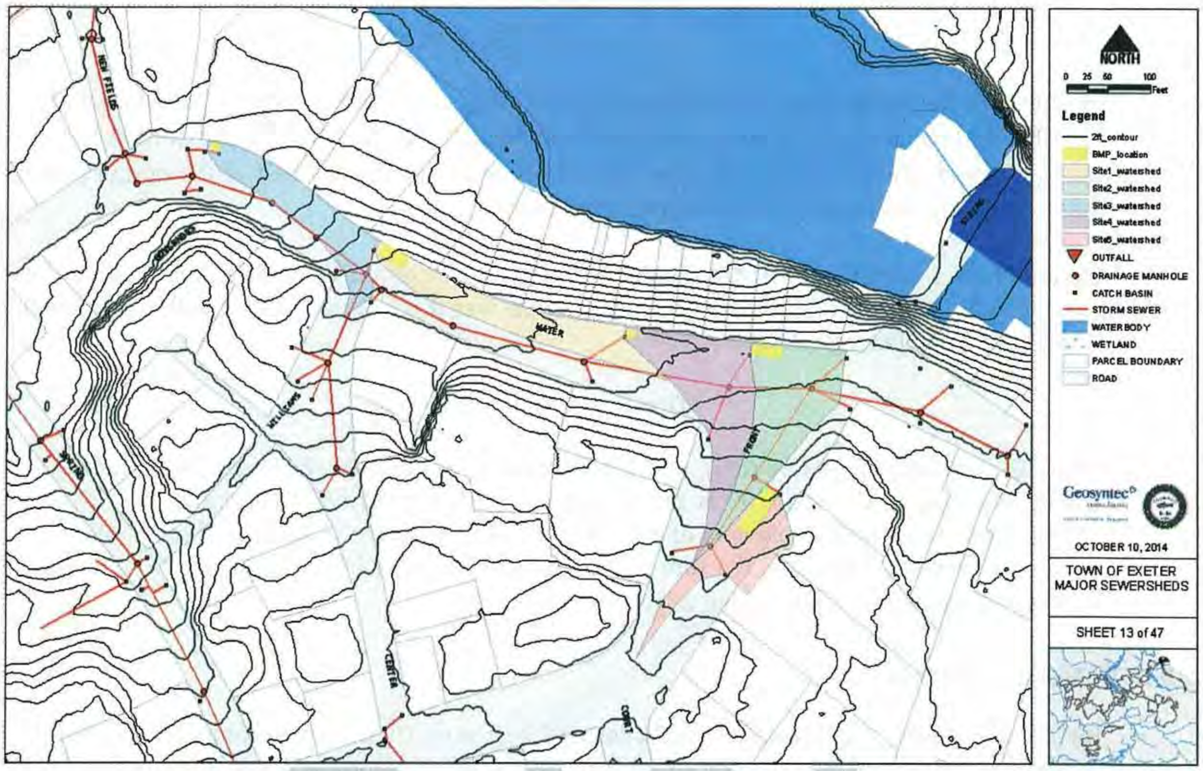


Figure 2: Locations and Associated Catchment of the Proposed Tree Filters

- **Impervious Area**. All road area was assumed to be impervious and the remaining area was assumed to be pervious. All impervious area within the drainage area of BMPs was considered 100% connected impervious area since all overland runoff from the road is assumed to be captured by stormwater sewer prior to installation of BMP.

- **Input Parameters**. The input parameters used to calculate the required BMP area are presented in Table 1. Note that the hydraulic conductivity in Table 1 is assumed to represent the mean hydraulic conductivity of a very fine sandy loam which best represents the soil texture of typical BSM soil (NRCS 2015).

Table 1. Input parameters for sizing proposed Tree Filters

Design Parameters	Site 1	Site 2	Site 3	Site 4	Site 5
A, Total area (ac)	0.27	0.35	0.24	0.35	0.21
I, Imperviousness (%)	100	100	100	100	66
$\mathbf{d_f}$, Depth of filter bed (ft)	2				
$\mathbf{d_g}$, Depth of gravel (ft)	1.6				
Ponding depth (ft)	0.25				
Freeboard[1] (ft)	1.17				
k, Hydraulic conductivity (ft/day)	24				
C, Discharge Coefficient	0.6				
Safety factor	4				
P, Design rainfall (in)	0.25				
$\mathbf{t_f}$, Time to drain (hours)	<24				
Filter width (ft)	4				

[1] The distance from the top of the ponding surface to the ground, not shown in detail in Figure 1.

- **Size of Underdrain Outlet Orifice**. The WISE project model used an underdrain outlet orifice of 1 inch diameter to predict nitrogen removal in BMPs. The same underdrain outlet orifice was applied to the tree filter BMP design and used to verify that the drain time of the BMP is less than 24 hours.

  The size of perforations on the underdrain pipe is not considered in the calculation because the draining rate is ultimately controlled by the size of the underdrain outlet orifice. However, the perforations in the underdrain pipe will be specified to be less than the outlet orifice to reduce potential for clogging the outlet orifice.

Results

- **Water Quality Volume and System Geometry.** The Water Quality Volume and the calculated system size for each proposed BMP are presented in Table 2.

Table 2. Results of sized bioretention facilities

Parameters	Site 1	Site 2	Site 3	Site 4	Site 5
Water Quality Volume (ft^3)	230	299	208	300	120
Required filter area (ft^2)	36.0	46.8	32.7	47.0	18.9
Filter length (ft)[1]	9.0	11.7	8.2	11.8	4.7
Filter width (ft)[2]	4	4	4	4	4
Min underdrain outlet orifice diameter (in)	0.23	0.25	0.21	0.26	0.16
Design underdrain orifice diameter (in)[3]	1	1	1	1	1

[1] Equals to filter area divided by filter width
[2] Identical to that in Table 1.
[3] Set to match the WISE model.

- **Disconnected Impervious Area.** The estimated impervious area that is disconnected by installation of BMPs is provided in Table 3.

Table 3. Disconnected Impervious Area

	Site 1	Site 2	Site 3	Site 4	Site 5	Sum
Disconnected Impervious Area (ac)	0.27	0.35	0.24	0.35	0.14	1.35

WATER QUALITY MITIGATION

The following section includes a summary of water quality mitigation through implementation of the proposed tree filter BMPs.

Methodology

- **Results from the WISE Project.** The expected water quality mitigation is based on the modeling results from the WISE project. Utilizing the well-known SWMM model (EPA 2015), the WISE project simulated the water quality mitigation effect from various combinations of land use and BMP types. The WISE results of annual nitrogen load vs. high-efficiency bioretention capture depth for impervious and pervious commercial land is presented in Figure 3 and Figure 4 respectively.

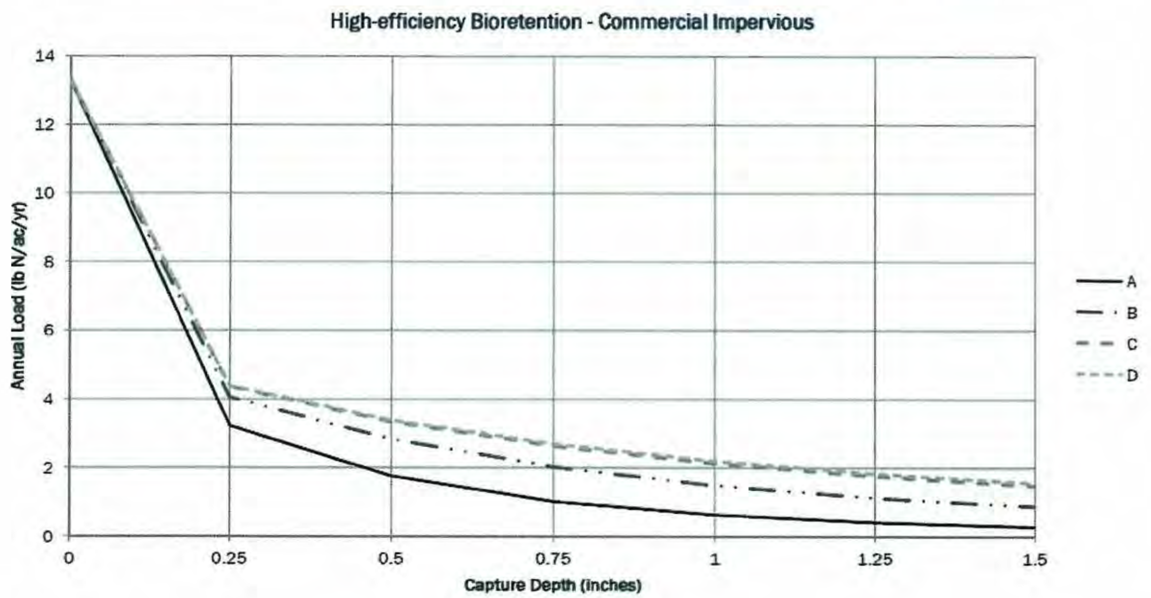


Figure 3. Annual load corresponding to different capture depth for high-efficiency bioretention facilities in commercial impervious land use

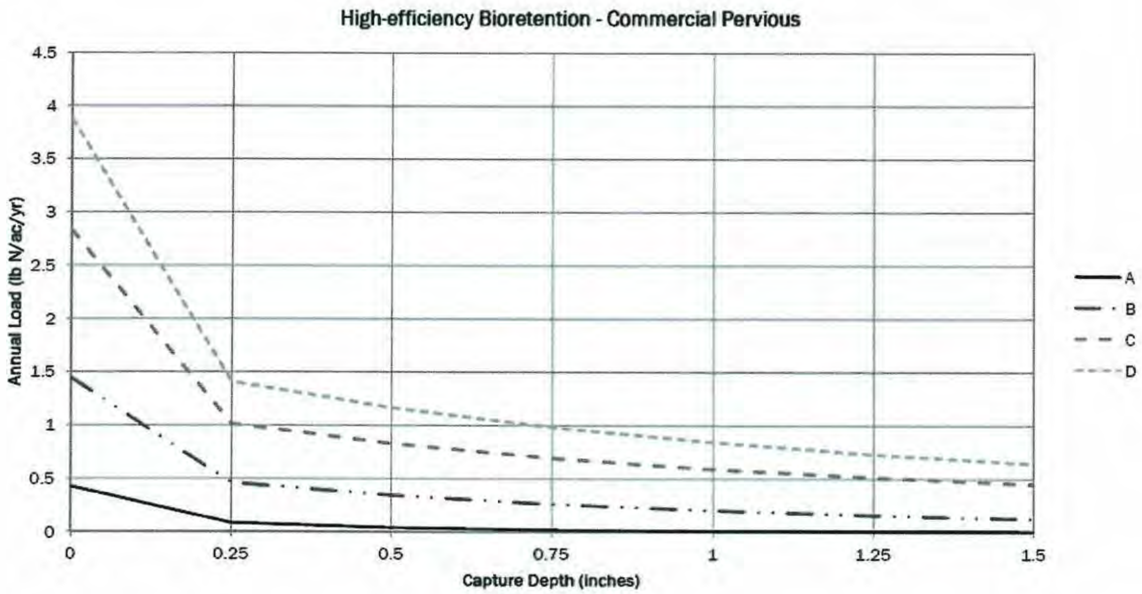


Figure 4. Annual load corresponding to different capture depth for high-efficiency bioretention facilities in commercial pervious land use

Figure 3 and Figure 4 depict the effect of nitrogen reduction for high-efficiency bioretention systems with various capture depths in different types of soil (i.e., hydrologic soil group A-D). Zero capture depth illustrates the scenario without any bioretention installed.

The annual load for any specific capture depth from commercial land use is calculated by the following equation:

$$L_a = (L_{imp} \cdot r_{imp} + L_{per} \cdot r_{per}) \cdot A$$

where L_a is annual load (lb); L_{imp} is annual load from Figure 3 for the specific capture depth (lb); r_{imp} is areal ratio of impervious surface; L_{per} is annual load from Figure 4 for the specific capture depth (lb); r_{per} is areal ratio of pervious surface; and A is the catchment area (ac).

Analysis and Assumptions

- **Capture Depth**. The capture depth of the proposed BMPs was assumed to be 0.25 inch.
- **Hydrologic Soil Group (HSG)**. Soils are classified into HSGs to indicate the minimum rate of infiltration obstained for base soil after prolonged wetting. The soil in downtown Exeter is assumed to be compacted and thus have poor hydrologic properties and assigned a HSG of D.

Results

- **Annual Load**. The annual load before and after BMP installation, and the reduction in nitrogen load, is presented in Table 4 below.

Table 4. Results in water quality mitigation for the proposed BMPs

	Site 1	Site 2	Site 3	Site 4	Site 5	Sum
Catchment impervious area (ac)	0.27	0.35	0.24	0.35	0.14	1.35
Catchment pervious area (ac)	0	0	0	0	0.07	0.07
Annual load without BMP (lb)	3.51	4.55	3.12	4.55	1.85	17.58
Annual load with proposed BMP (lb)	1.22	1.58	1.08	1.58	0.73	6.19
Annual reduction (lb)	**2.29**	**2.97**	**2.04**	**2.97**	**1.12**	**11.39**
Annual nitrogen reduction	**65%**	**65%**	**65%**	**65%**	**61%**	**64.8%**

REFERENCES

Daugherty, R.L., and Franzini, J.B. (1965). *Fluid Mechanics*, 6th ed., McGraw-Hill, New York.

EPA (Environmental Protection Agency). (2015). "Storm Water Management Model." < http://www2.epa.gov/water-research/storm-water-management-model-swmm>. (March 20, 2015)

NH DES (New Hampshire Department of Environmental Services). (2008). *New Hampshire Stormwater Manual*, New Hampshire Department of Environmental Services, New Hampshire.

NRCS (Natural Resources Conservation Service). (2015). "Saturated Hydraulic Conductivity." < http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/office/ssr10/tr/?cid=nrcs144p2_074846>. (April 1, 2015)

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Swamee, P.K. (2010). "Discharge equation of a circular sharp-crested orifice" *J. Hydraulic Research.*, 48(1), 106-107.

* * * * *

DOWNTOWN STREET TREE PROJECT
EXETER, NEW HAMPSHIRE

CONCEPTUAL DRAWINGS

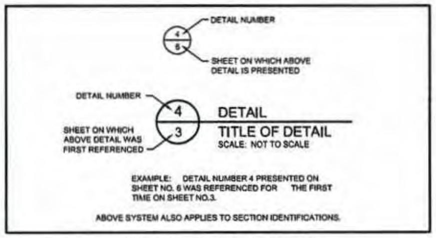
LIST OF DRAWINGS

DRAWING NO.	DRAWING TITLE
1	TITLE SHEET
2	EXISTING CONDITIONS
3	SITE PLAN I
4	SITE PLAN II
5	DETAILS

SOURCE: MICROSOFT BING MAPS 2011

VICINITY MAP

LOCATION MAP



DETAIL IDENTIFICATION LEGEND

PREPARED FOR:

PREPARED BY:

Geosyntec consultants
15 CONGRESS STREET, SUITE 301
PORTSMOUTH, NH 03801

REV	DATE	DESCRIPTION	DRN	APP

Geosyntec consultants

TITLE: TITLE SHEET

PROJECT: DOWNTOWN STREET TREE PROJECT

SITE: EXETER, NEW HAMPSHIRE

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SIGNATURE

DATE

DESIGN BY:	RLB	DATE:	MARCH 2015
DRAWN BY:	TSJ	PROJECT NO.:	BW0271
CHECKED BY:	DB	FILE	
REVIEWED BY:	RLB	DRAWING NO.:	1 OF 5
APPROVED BY:	DB		

LEGEND

- EXISTING CONTOUR
- SURVEY BOUNDARY
- EXISTING WATER LINE
- EXISTING GAS LINE
- EXISTING TELEPHONE LINE
- EXISTING DRAIN LINE
- EXISTING OVERHEAD UTILITY
- EXISTING SEWER LINE
- EXISTING SIDEWALK
- EXISTING TELEPHONE POLE
- EXISTING DRAIN MANHOLE
- EXISTING CATCH BASIN
- EXISTING SEWER MANHOLE
- EXISTING TREE

GENERAL NOTES:

1. LOT BOUNDARY AND CONTOUR INFORMATION OUTSIDE OF THE SURVEY BOUNDARY IS TAKEN FROM GIS DATA. UTILITY DATA OUTSIDE OF THE SURVEY BOUNDARY LINE WAS DIGITIZED FROM A DRAWING ENTITLED "WATER STREET AREA SEWER SEPARATION" BY CAMP DRESSER AND MCKEE INC., DATED JANUARY 1999, ALL INFORMATION INSIDE THE SURVEY BOUNDARY IS FROM A FILE NAMED "07-0191 WS" CREATED BY PROVIDED BY THE TOWN OF EXETER.
2. LOCATION OF EXISTING INFRASTRUCTURE INCLUDING STORMWATER DRAINAGE IS APPROXIMATE AND MAY NOT INCLUDE ALL UNDERGROUND STRUCTURES OF UTILITIES.

0 40' 80'
SCALE IN FEET

REV	DATE	DESCRIPTION	DRN	APP

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TITLE: EXISTING CONDITIONS AND SITE LAYOUT PLAN

PROJECT: DOWNTOWN STREET TREE PROJECT

SITE: EXETER, NEW HAMPSHIRE

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DESIGN BY:	RLB	DATE:	MARCH 2015
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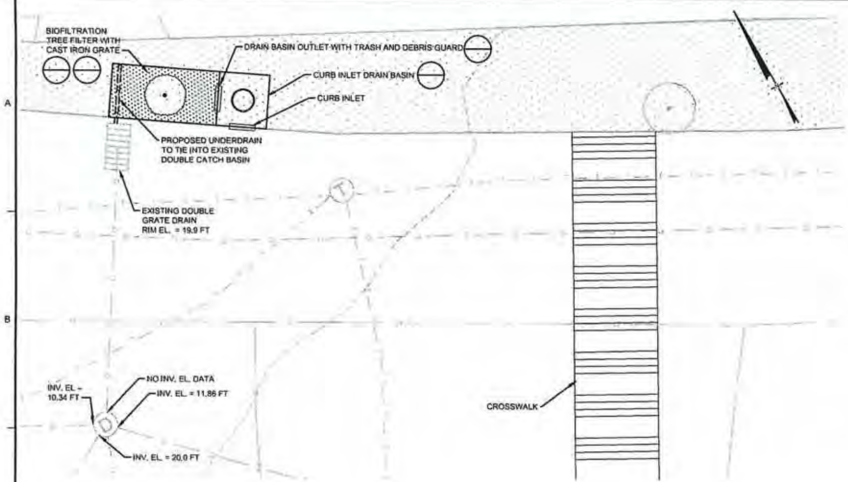
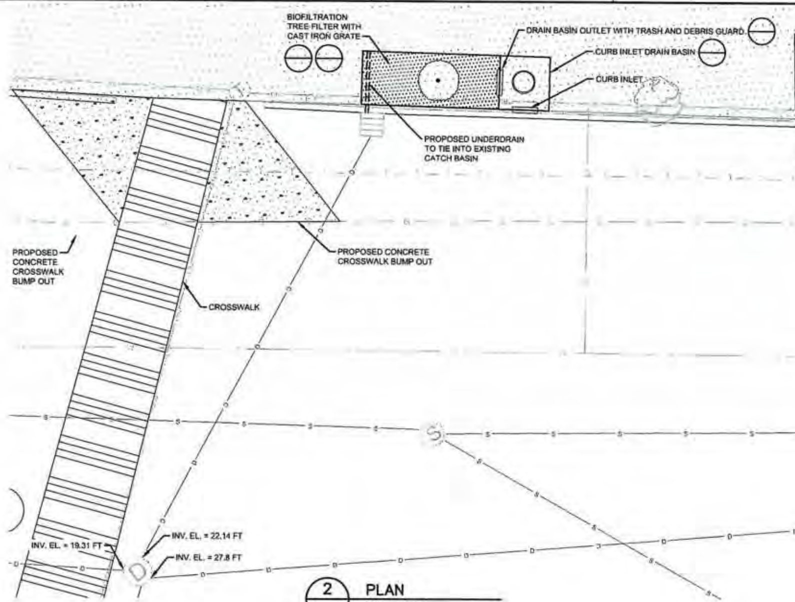
CHECKED BY:	DB	FILE:	
REVIEWED BY:	RLB	DRAWING NO.:	2 OF 5
APPROVED BY:	DB		



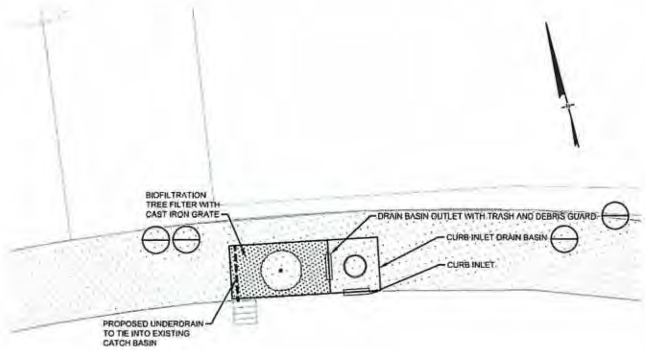
1 PLAN
SITE #1
SCALE: 1" = 5'



2 PLAN
SITE #2
SCALE: 1" = 5'

LEGEND

- EXISTING CONTOUR
- EXISTING WATER LINE
- EXISTING GAS LINE
- EXISTING TELEPHONE LINE
- EXISTING DRAIN LINE
- EXISTING OVERHEAD UTILITY
- EXISTING SEWER LINE
- EXISTING SIDEWALK
- EXISTING TELEPHONE POLE
- EXISTING DRAIN MANHOLE
- EXISTING CATCH BASIN
- EXISTING SEWER MANHOLE
- EXISTING TREE
- PROPOSED CONCRETE



3 PLAN
SITE #3
SCALE: 1" = 5'

NOTES:

1. SEE DRAWING 2 FOR GENERAL NOTES.

0 5' 10'
SCALE IN FEET

REV	DATE	DESCRIPTION	DRN	APP

Geosyntec consultants

TITLE: SITE PLAN I

PROJECT: DOWNTOWN STREET TREE PROJECT

SITE: EXETER, NEW HAMPSHIRE

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SIGNATURE

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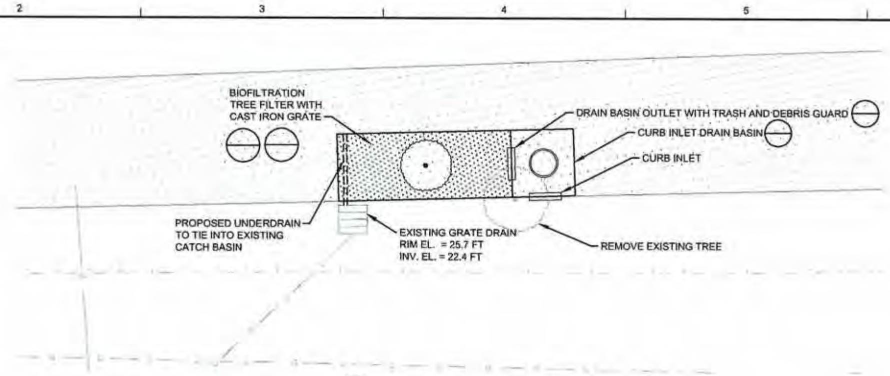
DESIGN BY:	RLB	DATE:	MARCH 2015
DRAWN BY:	TSJ	PROJECT NO.:	BW0271
CHECKED BY:	DB	FILE:	
REVIEWED BY:	RLB	DRAWING NO.:	
APPROVED BY:	DB	3 OF 5	

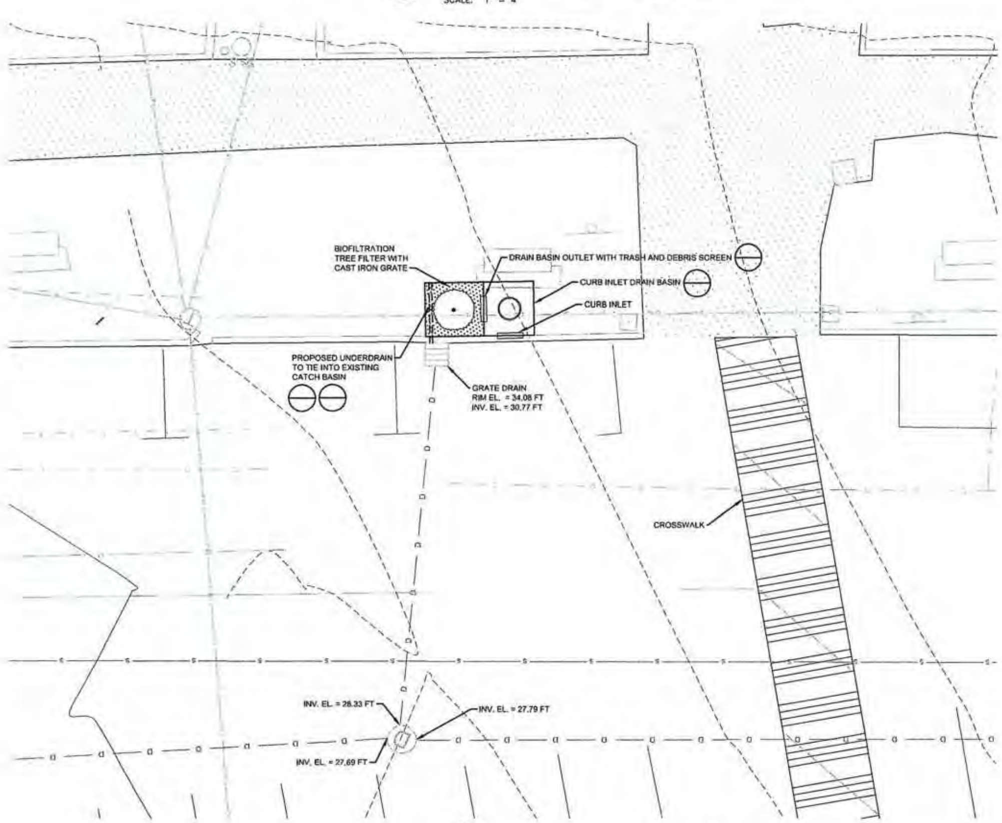


1 PLAN
SITE #4
SCALE: 1" = 4'

0 4' 8'
SCALE IN FEET

LEGEND

- EXISTING CONTOUR
- EXISTING WATER LINE
- EXISTING GAS LINE
- EXISTING TELEPHONE LINE
- EXISTING DRAIN LINE
- EXISTING OVERHEAD UTILITY
- EXISTING SEWER LINE
- EXISTING SIDEWALK
- EXISTING TELEPHONE POLE
- EXISTING DRAIN MANHOLE
- EXISTING CATCH BASIN
- EXISTING TREE



2 PLAN
SITE #5
SCALE: 1" = 5'

0 5' 10'
SCALE IN FEET

NOTES:

1. SEE DRAWING 2 FOR GENERAL NOTES.

REV	DATE	DESCRIPTION	DRN	APP

Geosyntec consultants

TITLE: SITE PLAN II

PROJECT: DOWNTOWN STREET TREE PROJECT

SITE: EXETER, NEW HAMPSHIRE

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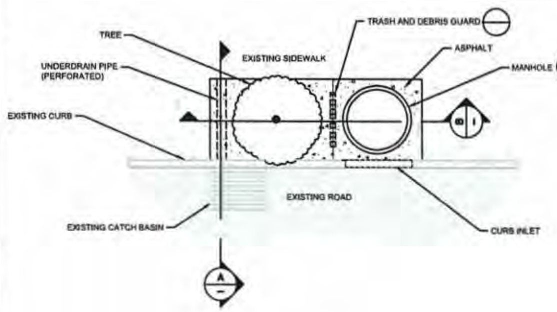
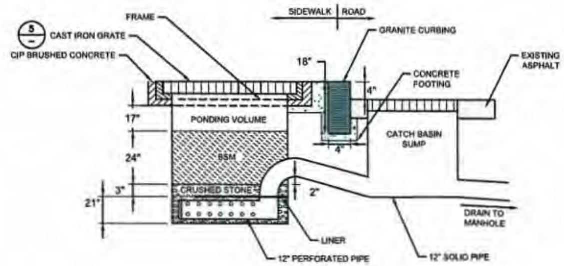
SIGNATURE

DATE

DESIGN BY:	RLB	DATE:	MARCH 2015
DRAWN BY:	TSJ	PROJECT NO.:	BW0271
CHECKED BY:	DB	FILE:	
REVIEWED BY:	RLB	DRAWING NO.	
APPROVED BY:	DB	4 OF 5	

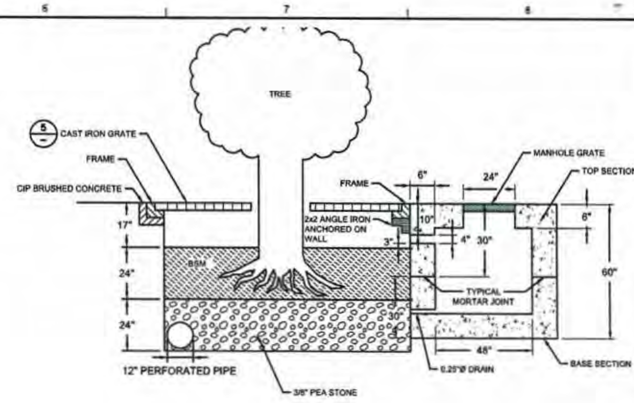


PLAN

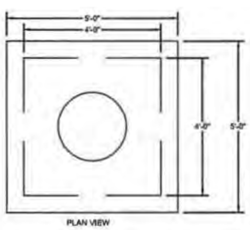


SECTION A

1 DETAIL
TREE PIT
SCALE: NTS



SECTION B



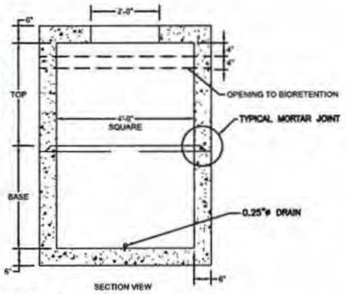
PLAN VIEW

TOP SECTION

HEIGHT	ITEM NO	WEIGHT
1'-0"	MH4S-12T4SQ	3,182#
2'-0"	MH4S-24T4SQ	4,514#
3'-0"	MH4S-36T4SQ	5,846#
4'-0"	MH4S-48T4SQ	7,178#

BASE SECTION

HEIGHT	ITEM NO	WEIGHT
2'-0"	MH4S-24S4SQ	4,514#
3'-0"	MH4S-36S4SQ	5,846#
4'-0"	MH4S-48S4SQ	7,178#
5'-0"	MH4S-60S4SQ	8,510#



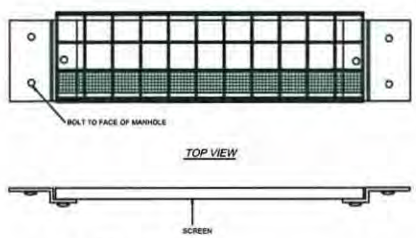
SECTION VIEW

NOTES:

1. CONCRETE: 4,000 PSI MINIMUM AFTER 28 DAYS.
2. H-20 DESIGN LOADING PER AASHTO HS-20-44; ASTM C478 SPEC FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."

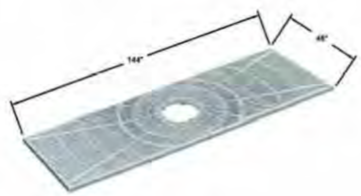
2 DETAIL
MANHOLE
SCALE: NTS

FRONT VIEW



TOP VIEW

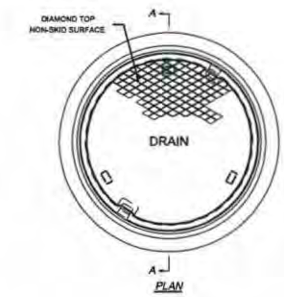
3 DETAIL
TRASH AND DEBRIS GUARD
SCALE: NTS



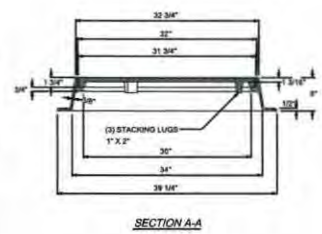
NOTES:

NEENAH FOUNDRY R-8815, FOUR-PIECE GRATE, 18" DIAMETER TREE OPENING, .25" SLOT OPENINGS, 928 POUNDS PER SET.

5 DETAIL
TREE GRATE AND GUARD
SCALE: NTS



PLAN



SECTION A-A

NOTES:

1. ALL DIMENSIONS ARE NOMINAL
2. LABEL TYPE OF MANHOLE WITH 3" HIGH LETTERS IN THE CENTER OF THE COVER

4 DETAIL
MANHOLE COVER AND DRAIN
SCALE: NTS

REV	DATE	DESCRIPTION	DRW	APP

Geosyntec consultants

TITLE: DETAILS

PROJECT: DOWNTOWN STREET TREE PROJECT

SITE: EXETER, NEW HAMPSHIRE

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DESIGN BY:	RLB	DATE:	MARCH 2015
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REVIEWED BY:	RLB	DRAWING NO.:	5 OF 5
APPROVED BY:	DB		

Geosyntec consultants

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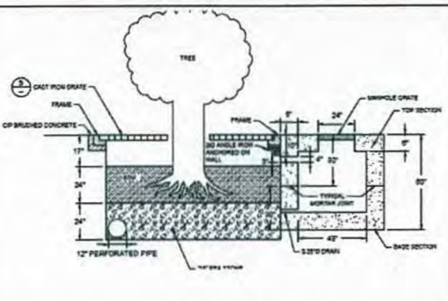
Portsmouth, New Hampshire 03801
PH 603.601.3903
www.geosyntec.com

Table 1. Comparison of Geosyntec Tree Pit Design and Filterra® Configurations.

Design Configuration	Engineer's Rank/ Considerations	Image/Photo	Construction Cost Estimate per Unit	Annual Nitrogen Reduction	Maintenance Considerations	Construction Considerations
Filterra FT6x10 Street Tree with 36" Root Ball and Recessed Top (6'x10')	1 • Allows growth of medium size street tree while achieving water quality benefits with tree root perforations in concrete box; • Relatively simple construction; • Provides structural concrete box to support loading and reduce infiltration to subgrade with solid bottom area (bathtub); • Easy installation, delivered on site and dropped into place; and • First year of maintenance free.		$25,350[1]	43% (65% with alternative plumbing connection[5])	• Remove trash from inlet trash grate (grate optional) • Remove trash, sediment and mulch from tree pit • Replace with a fresh layer (3 inch) of mulch (0.5 CYD) • Prune and maintain tree *(First year of maintenance is included in purchase price)*	• Contractor to prepare excavation and place a 6 inch thick bed of #57 stone • Contractor to offload unit (pick weight TBD) • Contractor to connect plumbing to existing catch basin, backfill and set top • Filterra provides installation of mulch and tree • Does not require specialized construction techniques • Filterra offers a recessed top that allows for integrations of the Filterra unit with cast-in-place concrete or brick sidewalks • Lead time estimated to be 4-6 weeks
Filterra FT6X10 Standard Configuration (6'x10')	2 • Most cost effective configuration; • Relatively simple construction; • Provides structural concrete box to support loading and reduce infiltration to subgrade; • Allows for a small tree with no root perforations in concrete box; • Easy installation, delivered on site and dropped into place; and • First year of maintenance free.		$17,700[2]	43% (65% with alternative plumbing connection[5])	• Remove trash from inlet trash grate (grate optional) • Remove trash, sediment and mulch from tree pit • Replace with a fresh layer (3 inch) of mulch (0.5 CYD) • Prune and maintain tree *(First year of maintenance is included in purchase price)*	
Filterra FT6x10 with Sedimentation Chamber and Recessed Top (20'x7')	3 • Large heavy structure that requires significant excavation; • Provides a pre-treatment catch basin that can be cleaned with a vacuum truck (note the pre-treatment does not meet the requirements of the NH Stormwater Manual to achieve 85% TSS removal); • High capital cost; • Allows for a small tree with no root perforations in concrete box; • Easy installation, delivered on site and dropped into place; and • First year of maintenance free.		$36,500[3]	43% (65% with alternative plumbing connection[5])	• Remove trash from inlet trash grate (grate optional) • Remove trash, sediment and mulch from tree pit • Replace with a fresh layer (3 inch) of mulch (0.5 CYD) • Prune and maintain tree • Vacuum sediments and debris from the pre-treatment catch basin *(First year of maintenance is included in purchase price)*	
Geosyntec Tree Pit (4' x 12')	4 • Lining system could be penetrated by root system and create leaks which could eliminate the anaerobic zone; • Design is complex and will require skilled contractor to install; and • Provides a pre-treatment catch basin that can be cleaned with a vacuum truck (note the pre-treatment does not meet the requirements of the NH Stormwater Manual to achieve 85% TSS removal).		$22,000[4]	65%	• Vacuum sediments and debris from the pre-treatment catch basin • Remove trash from the trash and debris screen • Remove sediment and mulch in the tree pit • Replace with a fresh layer (3 inch) of mulch (0.5 to1.0 CYD) • Prune and maintain tree	• Contractor to prepare excavation and install all components of the system including lining system, cast-in-place concrete frame, liner connections, catch basin and all other components • Contractor required being skilled with lining systems including pipe booting, plumbing, and mixing soil materials. • Lead time a function of individual materials

1. Preliminary construction cost based on $22,350 for Filterra street tree package delivered to the site, plus $3,000 estimated installation cost (offload, excavation, gravel, compaction, backfilling, pipe connection).
2. Preliminary construction cost based on $14,700 for Filterra unit delivered to the site, plus $3000 estimated installation cost (offload, excavation, gravel, compaction, backfilling, and pipe connection).
3. Preliminary construction cost based on $32,500 for Filterra unit delivered to the site, plus $4,000 estimated installation cost (offload, excavation, gravel, compaction, backfilling, and pipe connection).
4. Preliminary construction costs based on engineer's opinion of cost including materials and labor estimates for the proposed features.
5. Alternative plumbing connection includes installation of a series of 90 degree elbows to create an anaerobic zone within the gravel underdrain system of the Filterra unit.

CONTECH ENGINEERED SOLUTIONS

Filterra® Maintenance Steps

1. Inspection of Filterra and surrounding area

2. Removal of tree grate and erosion control stones

3. Removal of debris, trash and mulch

4. Mulch replacement

5. Clean area around Filterra

6. Complete paperwork and record plant height and width

Contech has created a network of Certified Maintenance Providers (CCMP's) to provide maintenance on Filterra systems. To find a CCMP in your area please visit www.conteches.com/maintenance

Attachment 18

Unitil Fact Sheet

Squamscott River Outfall Restoration Project, October 2015

Unitil

Fact Sheet
Squamscott River Outfall Restoration Project

October, 2015

About Unitil

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

Project Description

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

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

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

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

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

For additional Information Please Contact:

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

<u>Site Questions</u>
Mark McCabe
AECOM Project Manager
Telephone: (508-423-9018)