A Multi-Faceted Approach to Addressing Nitrogen Sources in Exeter, New Hampshire

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WRIGHT-PIERCE
Engineering a Better Environment

Outline

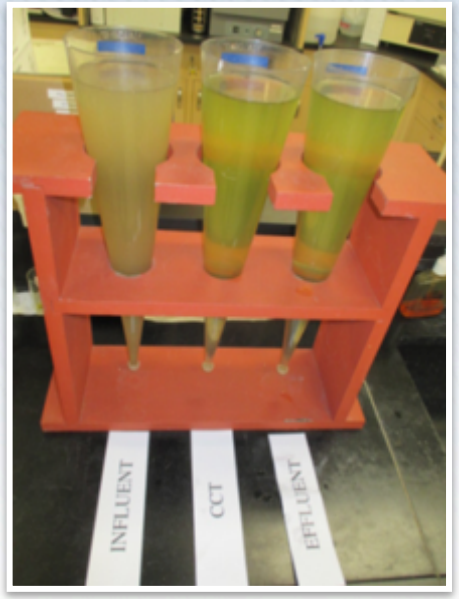
- Background
- Regulatory Drivers
- Subwatershed TN Loads
- Multi-Faceted Approach
- Questions & Discussion

Town of Exeter

- Population - 14,300
- 12,646 acres

Exeter Infrastructure

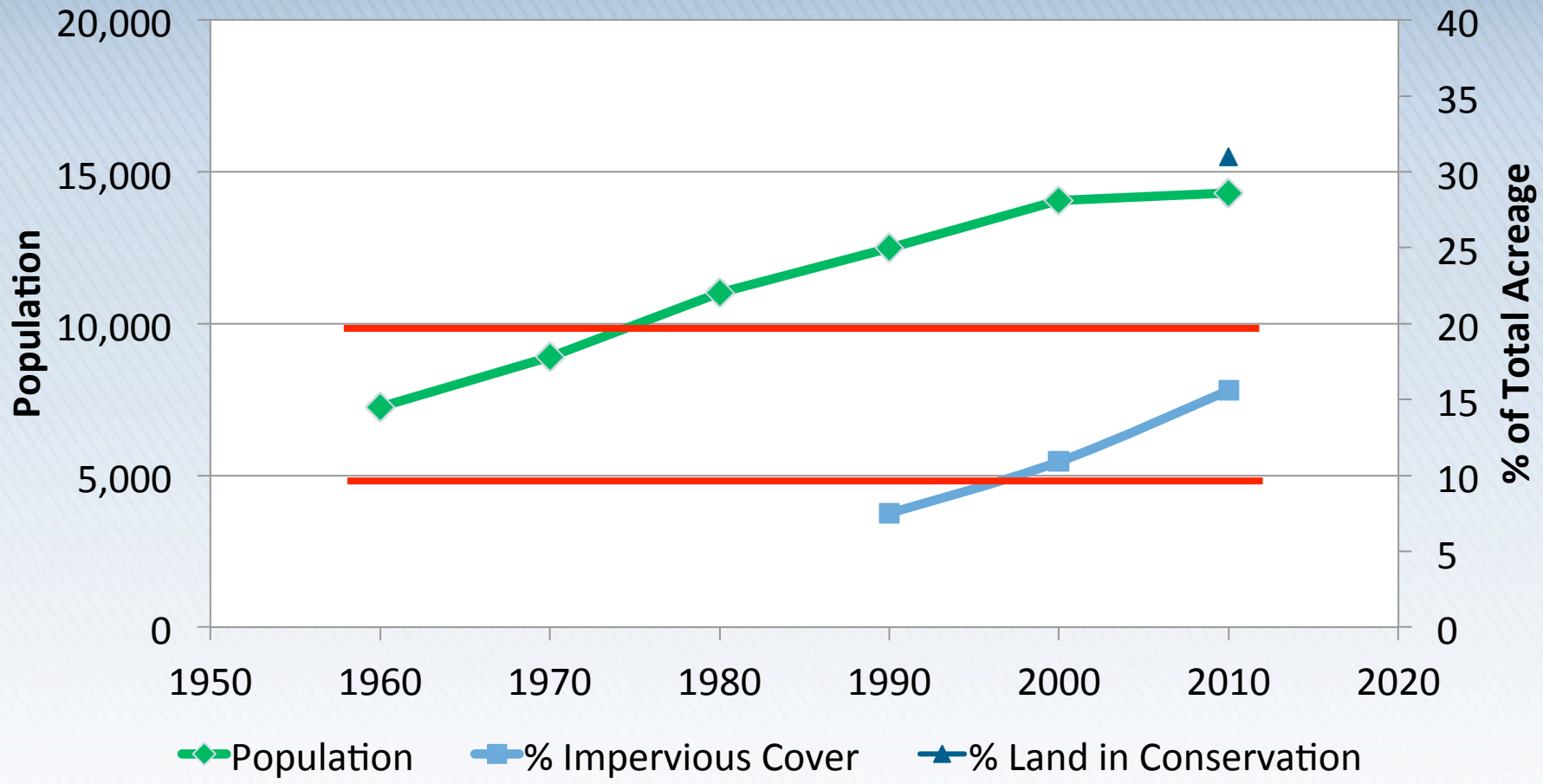
- Wastewater
  - 51 miles of sewers
  - 9 pump stations
  - 2 CSO locations
  - 1 WWTF (aerated lagoons)
  - 1.7-mgd effluent to Squamscott River



Exeter Infrastructure

- Stormwater
  - 66 miles of road
  - 47 miles of storm drains
  - 2,590 structures
  - 65 outfalls

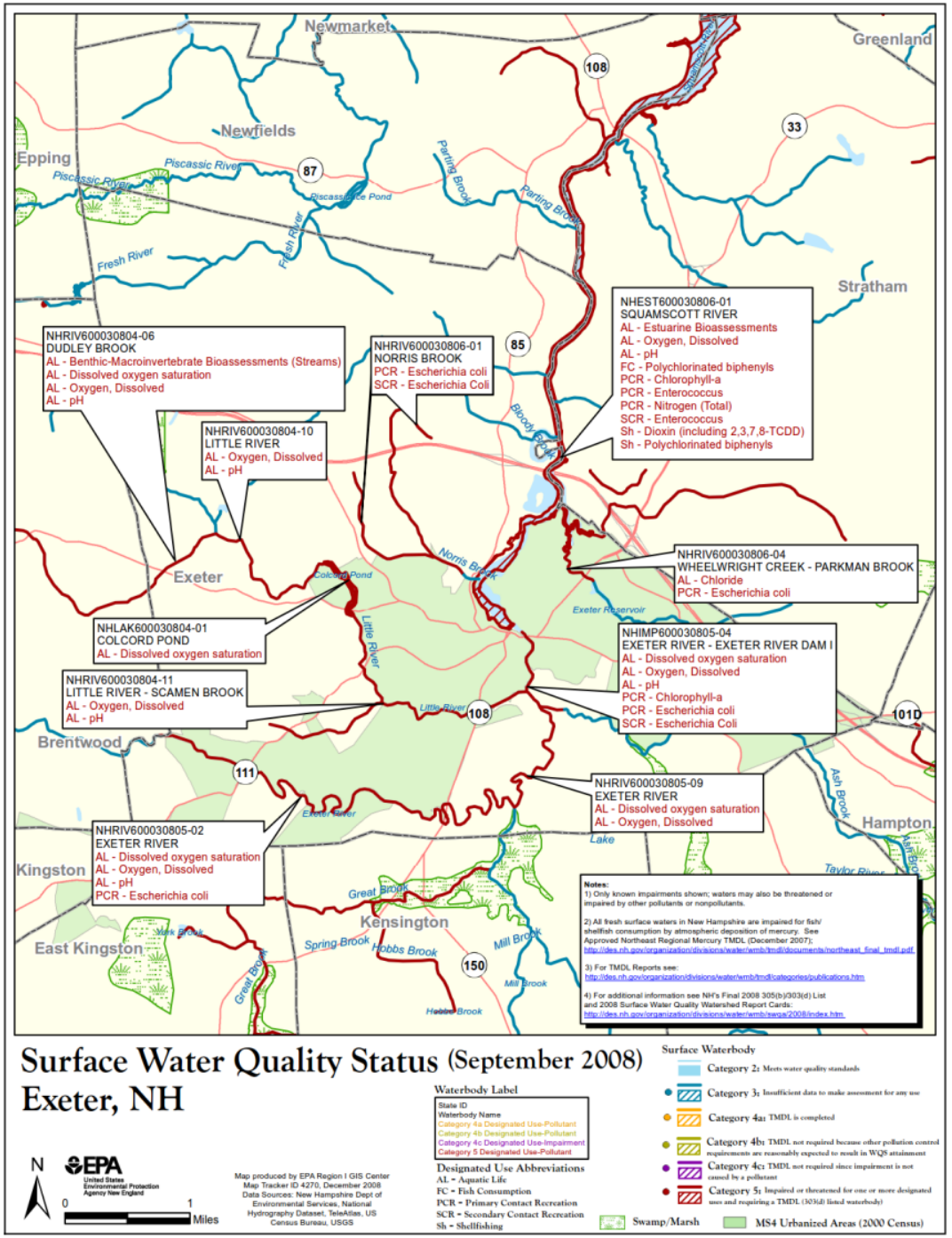
Population and Impervious Cover Trends



Source: WISE Report, Dec 2015; Rockingham Planning Commission

Threatened or Impaired Water Bodies

- Dudley Brook
- Little River
- Colcord Pond
- Exeter River
- Norris Brook
- Wheelwright Ck
- Squamscott River
- Great Bay



Regulatory Drivers – Regional

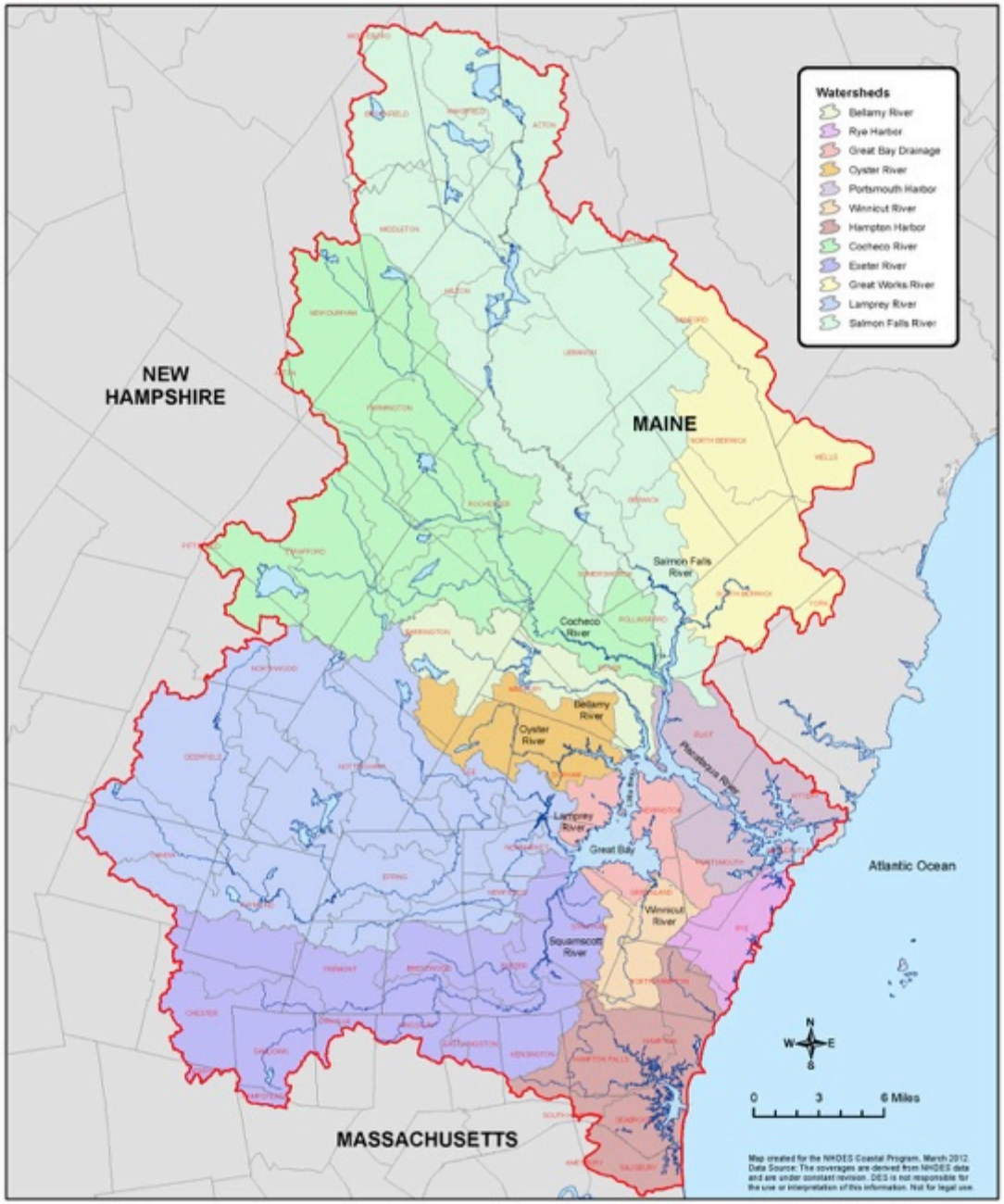
- 2003 NPDES MS4 Permit issued final
- 2009 Numeric Nutrient Criteria issued
- 2009 Great Bay placed on 303(d) list
- 2012/13 WWTF NPDES and AOC issued to Exeter
- 2013/14 Great Bay Nitrogen NPS Study (GBNNPSS)
- 2014 Peer Review of Numeric Nutrient Criteria
- 2013/15 NPDES MS4 Permit re-issued draft

Photo: National Estuarine Research Reserve System website

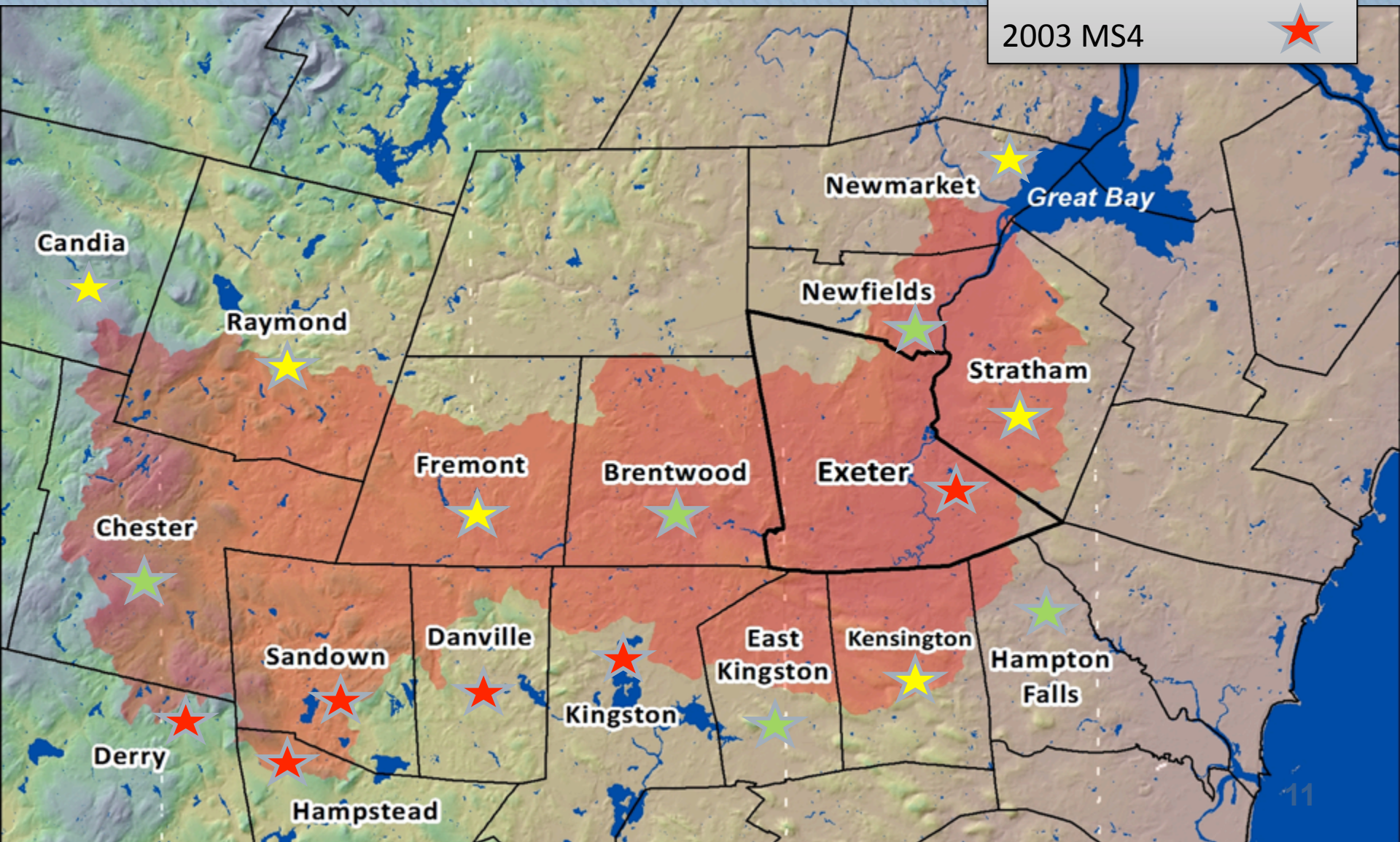
Regulatory Drivers – Exeter

- NPDES MS4 Permit
- NPDES WWTF Permit
  - Total Nitrogen limit of 3 mg/l
  - Seasonal Rolling Average (April 1 thru Oct 31)
- Administrative Order on Consent
  - Interim Total Nitrogen limit of 8 mg/l
  - WWTF Upgrade and NPS measures (2016 to 2018)
  - Nitrogen Control Plan (2018)
  - Engineering Evaluation (2023)
  - Coordinate with NHDSE and watershed comm.

Coastal Watershed



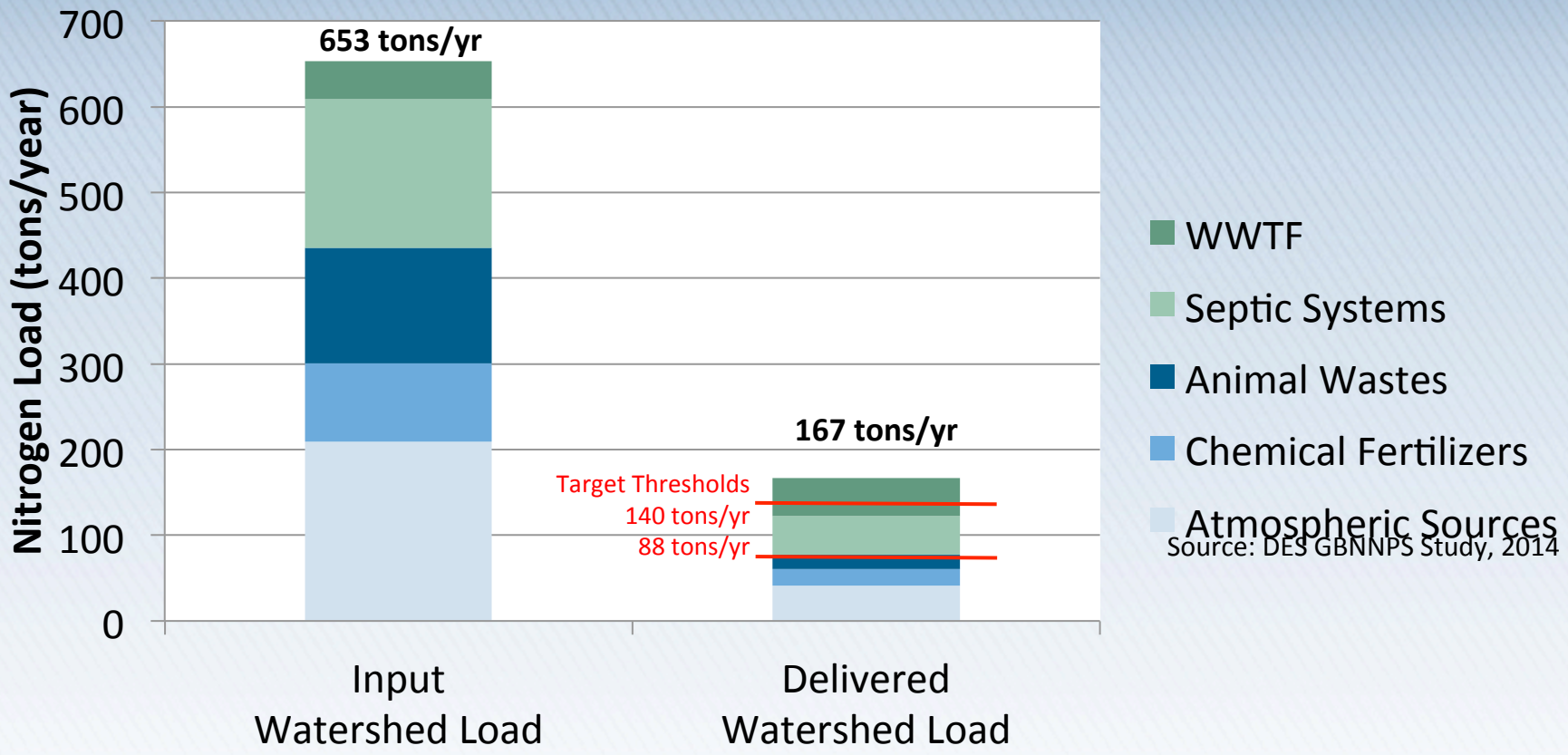
The Subwatershed



Nitrogen Inputs, Delivery and Attenuation Mechanisms

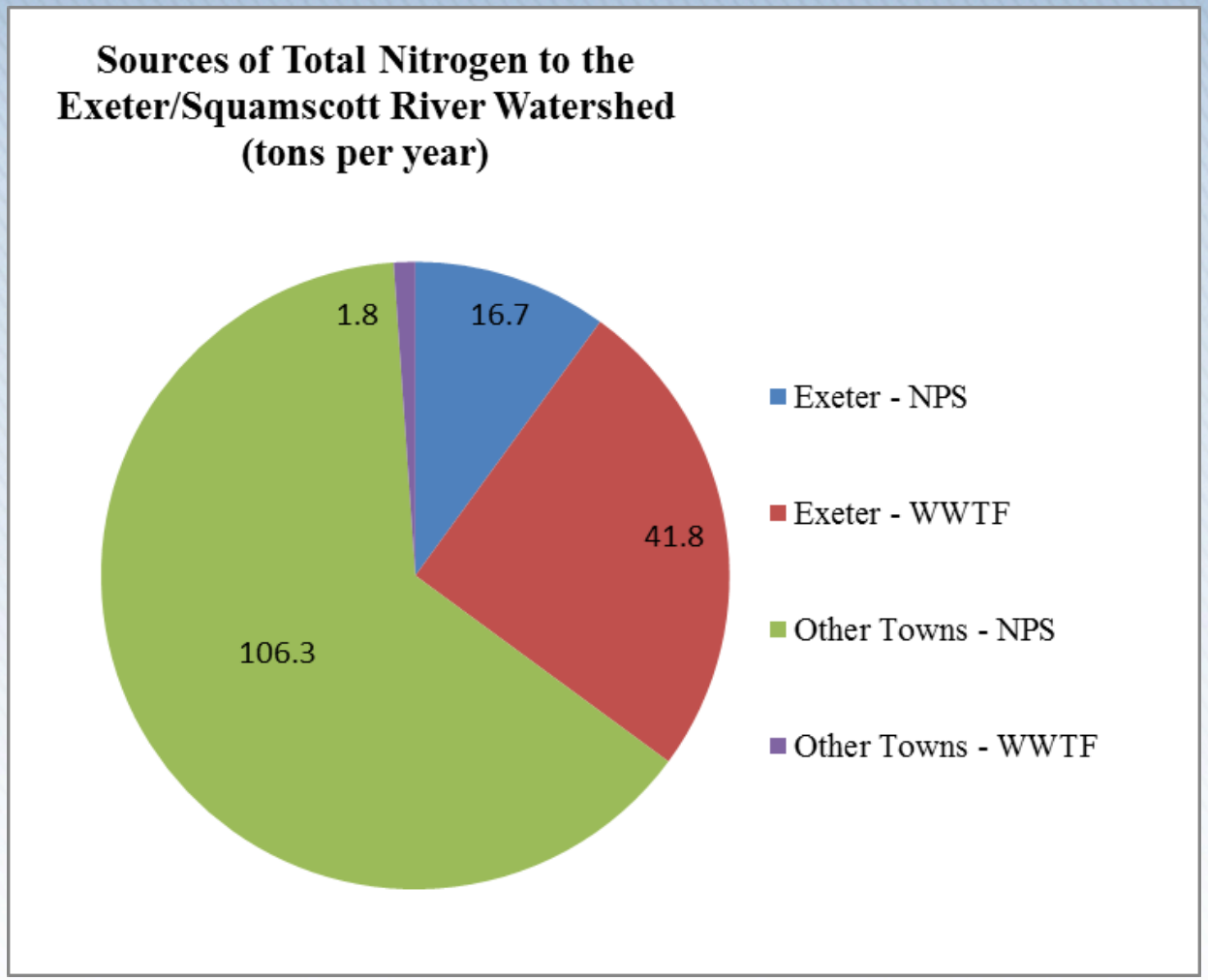
Inputs	Delivery Method	Attenuation Mechanism
• Food (i.e., wastewater) • Fertilizers • Atmospheric N • N-fixing crops	• WWTFs • Groundwater • Precipitation • Stormwater	• Storage in soil & plants • Removal in crops & woods • Microbial action • Aeration in surface water

Exeter/Squamscott Subwatershed Current Nitrogen Loads



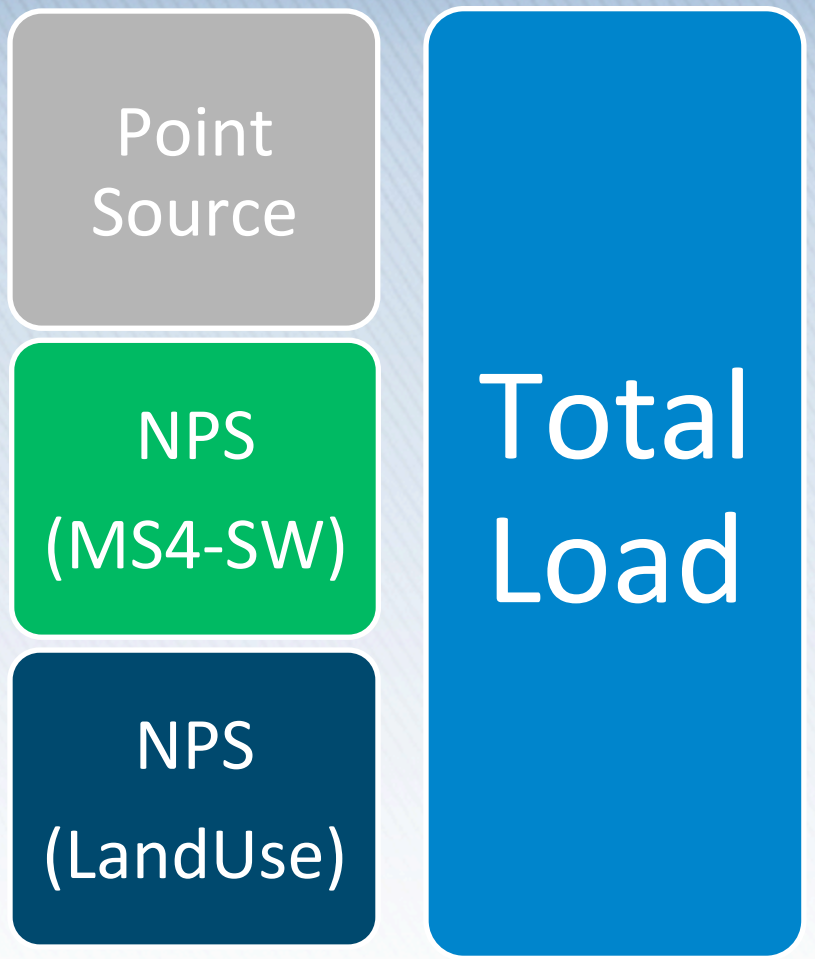
Source: DES GBNNPS Study, 2014

Exeter/Squamscott Subwatershed Nitrogen Load by Town



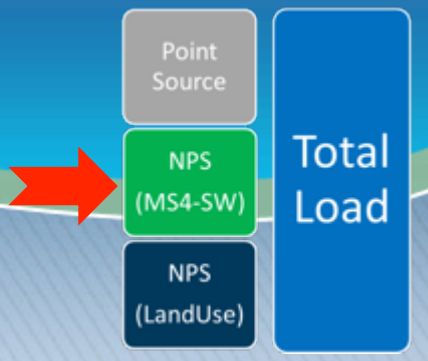
Source: DES GBNNPS Study, 2014

Multi-Faceted Approach to TN Sources



- MS4
- WWTF Upgrade
- Local Projects
- Local Ordinances
- Nitrogen Control Plan

MS4 - Stormwater



1. Public Education and Outreach
2. Public Involvement
3. IDDE Program
4. Construction Site Runoff Control
5. Post-Construction Runoff Control
6. Good Housekeeping & Pollution Prevention

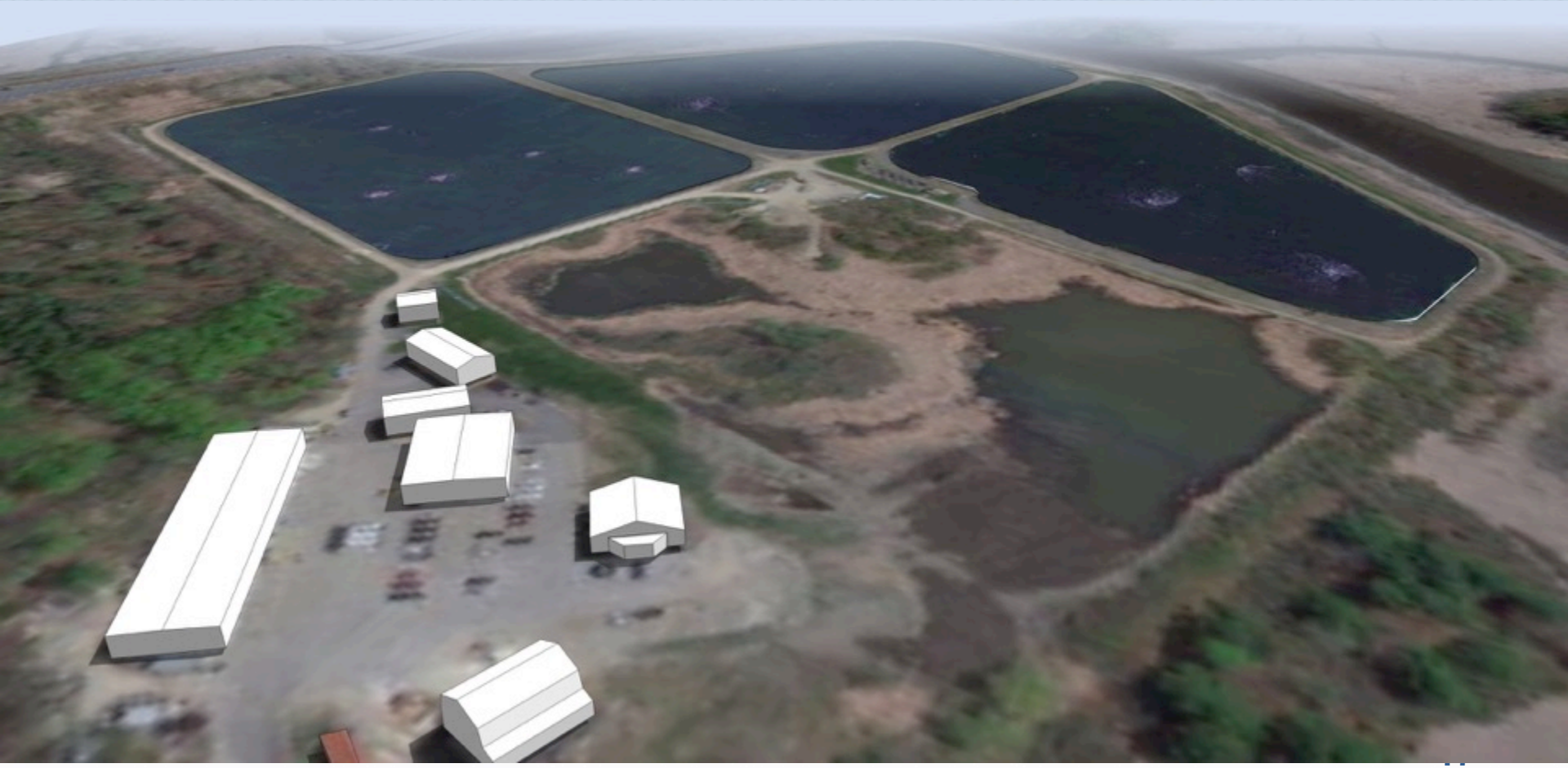
Existing WWTF

Point Source

NPS (MS4-SW)

NPS (LandUse)

Total Load



Recommended WWTF

Point Source

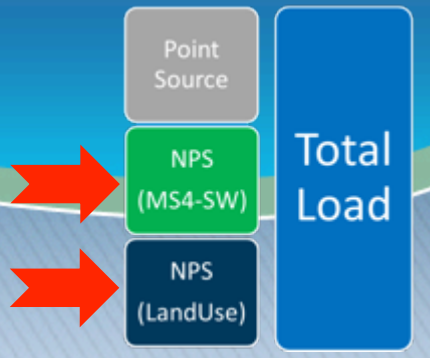
NPS (MS4-SW)

NPS (LandUse)

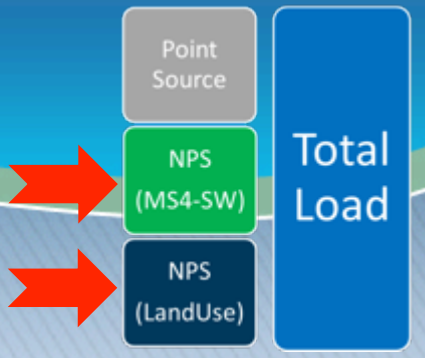
Total Load

Local Projects

- Brick Yard Pond Cleanup
- Great Dam Removal
- LID Pilot Project – Downtown Sidewalks

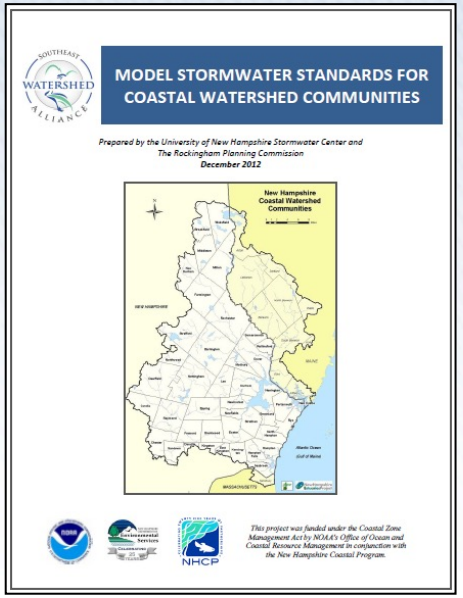


Local Ordinance Updates

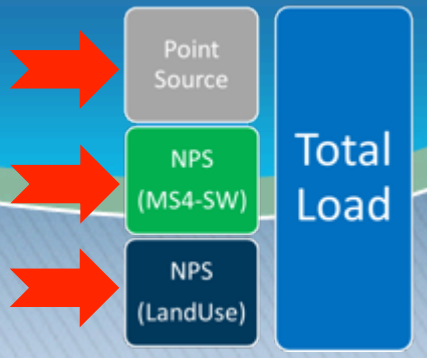


- Fertilizer management
  - PREP grant
  - “Healthy Lawns-Clean Water”

- Stormwater ordinance
  - Address current sources
  - Address future sources via redevelopment threshold
  - Encourage LID practices



Nitrogen Control Plan



- Adaptive and Collaborative
- Build on existing work products
- Track environmental benefits of local projects
- Determine equitable allocation of responsibility

Tracking & Accounting

- Pollutant Tracking and Accounting Pilot Project (PTAPP)
  - Grant funded and led by NHDES
  - Leveraging from other programs
  - Multi-year project (2015 to 2018)
    - Phase 1 – Define Tracking & Accounting
    - Phase 2 – Develop Pilot
    - Phase 3 – Evaluate Pilot
    - Phase 4 – Implement

Town of Exeter, NH

Land Use Development Tracking Worksheet

Map / Lot No.	Zoning District	Project Name	Exeter File No.

Planning Board #	Approval Date	Occupancy Date	Source Reference Material

Within Shoreland Protection	Name of Water Body	Distance from Water (Ft)	Buffer Size (SF)

Land To	Turf / Grass	New Impervious	Imp. Removed	Disconnected Imp.	Agr. / Pasture
(SF)					
Previous					
Soil Type					
Percent Disconnected					
Infiltration Rate					
Description of soil / landscape restoration					
Estimated annual runoff					

Type of Agricultural / Pasture use	

Wetland areas filled (SF)		Wetland areas restored (SF)	

Sewer Connection	Septic System Type	Design Flow (Gal)	Maintenance Required and Frequency

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

BMP No.	BMP Type	BMP Description	GPS Coordinates		Drainage Area (SF)	Design Storm (in)
			Latitude	Longitude		

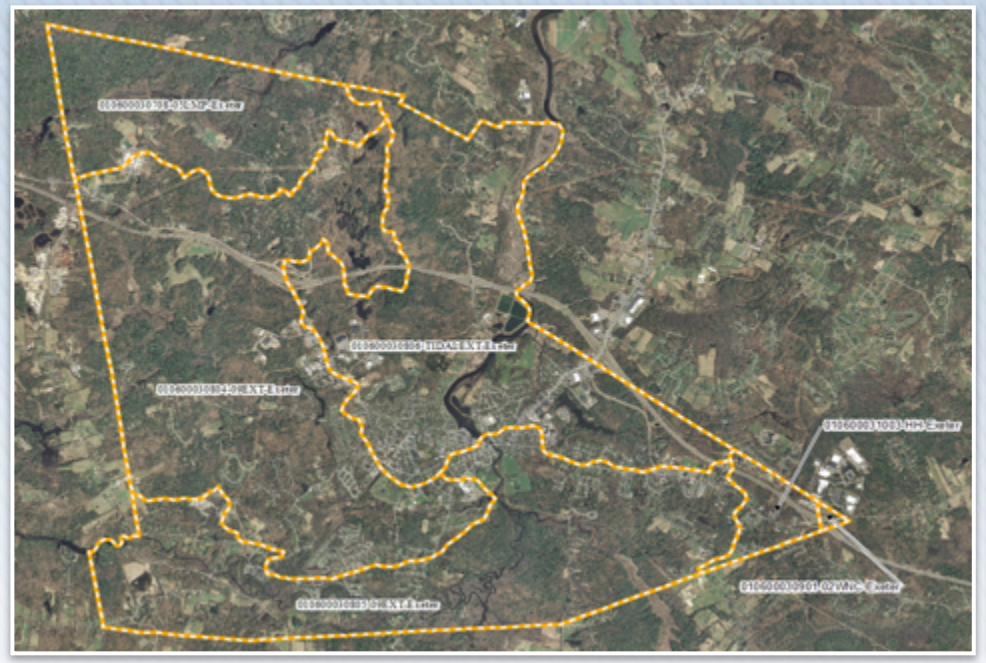
BMP No.	Water Quality Volume (CF)	Percent Runoff Volume Reduction	Disconnection Multiplier	Effective Impervious (SF)	Underdrained

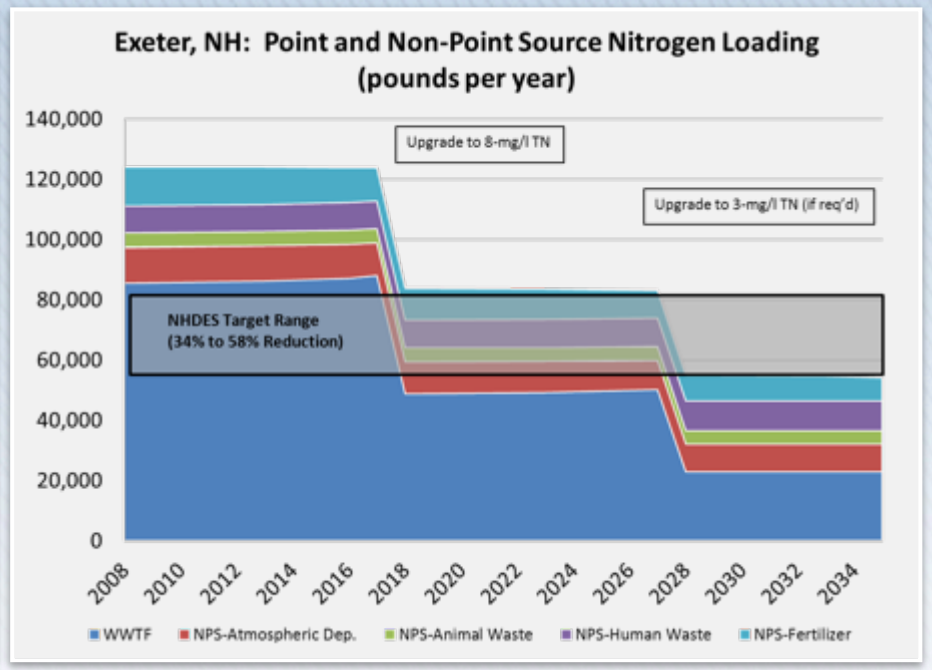
BMP No.	Description of required maintenance and scheduled frequency

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)

Parcel Existing Annual N Load (lbs N/Yr)	Total Parcel N Load Reduction (lbs N/Yr)	Parcel Proposed Annual N Load (lbs N/Yr)

Tracking & Accounting Longer-Term





Affordability and Equitability

- Utilize a phased and adaptive approach
- Continue to seek out grants
- Continue to collaborate
- Evaluate watershed permitting, fees and trading

	LbTN/capita/year
Exeter - Status Quo	8.4
Rest of Watershed – Status Quo	7.4
Exeter – 2018 (NPDES/AOC)	4.4

Closing Comments

1. A phased and adaptive approach is needed to provide for a sustainable program.
2. Watershed-wide NPS management is warranted through ordinance revisions and pollutant-based development standards.
3. Collaboration with other watershed communities is required to effect the necessary reductions.
4. Collaboration with DES and EPA is needed to incentivize inter-municipal collaboration and to adopt long-term implementation strategy.

Questions & Discussion