Newmarket's Battle Between Capital and Compliance

NEWEA CSO/Wet Weather Conference

October 30, 2018

Sean T. Greig

Environmental Services Director

Renee L. Bourdeau

Sr. Water Resources Engineer, Horsley Witten Group

AGENDA

- Regulatory Background
- WWTF Upgrades
- WWTF Nitrogen Reduction
- WWTF Cost
- Non-point Source (NPS) Nitrogen Control Plan
- NPS Costs
- Conclusions

Newmarket NPDES Permit

- Draft permit October 5, 2011
- Final Permit November 15, 2012
- Permit in effect February 1, 2013
- Permit Changes:
  - New Total Nitrogen Permit Limit 3 mg/L
  - Additional Bacteria Testing
  - Collection System mapping
  - Collection System Operation & Maintenance plan
  - Annual Reporting

Newmarket Discharge Permit

- EPA negotiations

  The Town attorney and staff had many meetings with NHDES and EPA to develop a schedule for Newmarket that would have the least financial impact on the Town's sewer users, while moving toward water quality goals by substantially reducing the amount of total nitrogen being discharged from Newmarket's Wastewater Facility to the Lamprey River.

Administrative Order By Consent

- Years 1-5

  Design, build and operate WWTF upgrade to 8 mg/L

  Prepare non-point source control plan
- Years 6-10

  Interim limit of 8 mg/L

  Implement non-point source control plan
- Year 10

  Extend interim limit of 8 mg/L, or

  Require that Town treat to 3 mg/L
- Years 10-15 – Build additional treatment (if required)

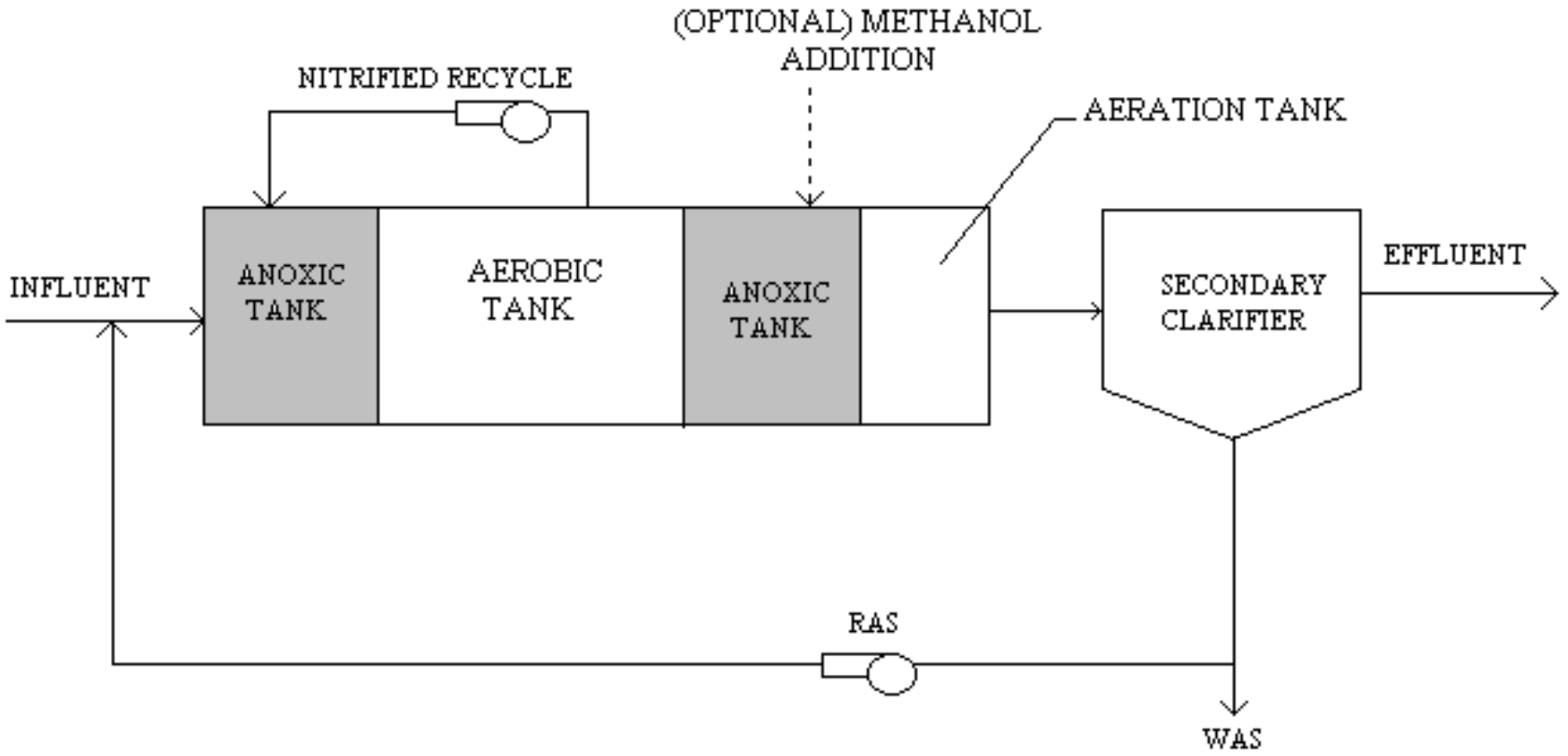
Wastewater Treatment Plant Pre-Upgrade Conditions

- Wastewater Treatment Facility
  - primary treatment portion 44 years old
  - secondary treatment portion 28 years old
- The average day total nitrogen discharge
  - 30 mg/L
  - 125lbs
- The current facility is not capable of removing nitrogen to low levels.

4 Stage Bardenpho Process

- 4 Stage Bardenpho process identified as most cost-effective to meet Newmarket's current and future needs
  - Lowest life-cycle cost
  - Numerous successful installations, including many in cold weather areas
  - Well documented performance for low TN
  - Easily modified

4-Stage Bardenpho Process



WWTF Nitrogen Reductions

- Current Trickling Filter Facility

  Average Total Nitrogen Discharge per day:

  30 mg/L

  125 lbs

- New 4-Stage Bardenpho Facility

  Estimated Average Total Nitrogen Discharge per day:

  5 mg/L

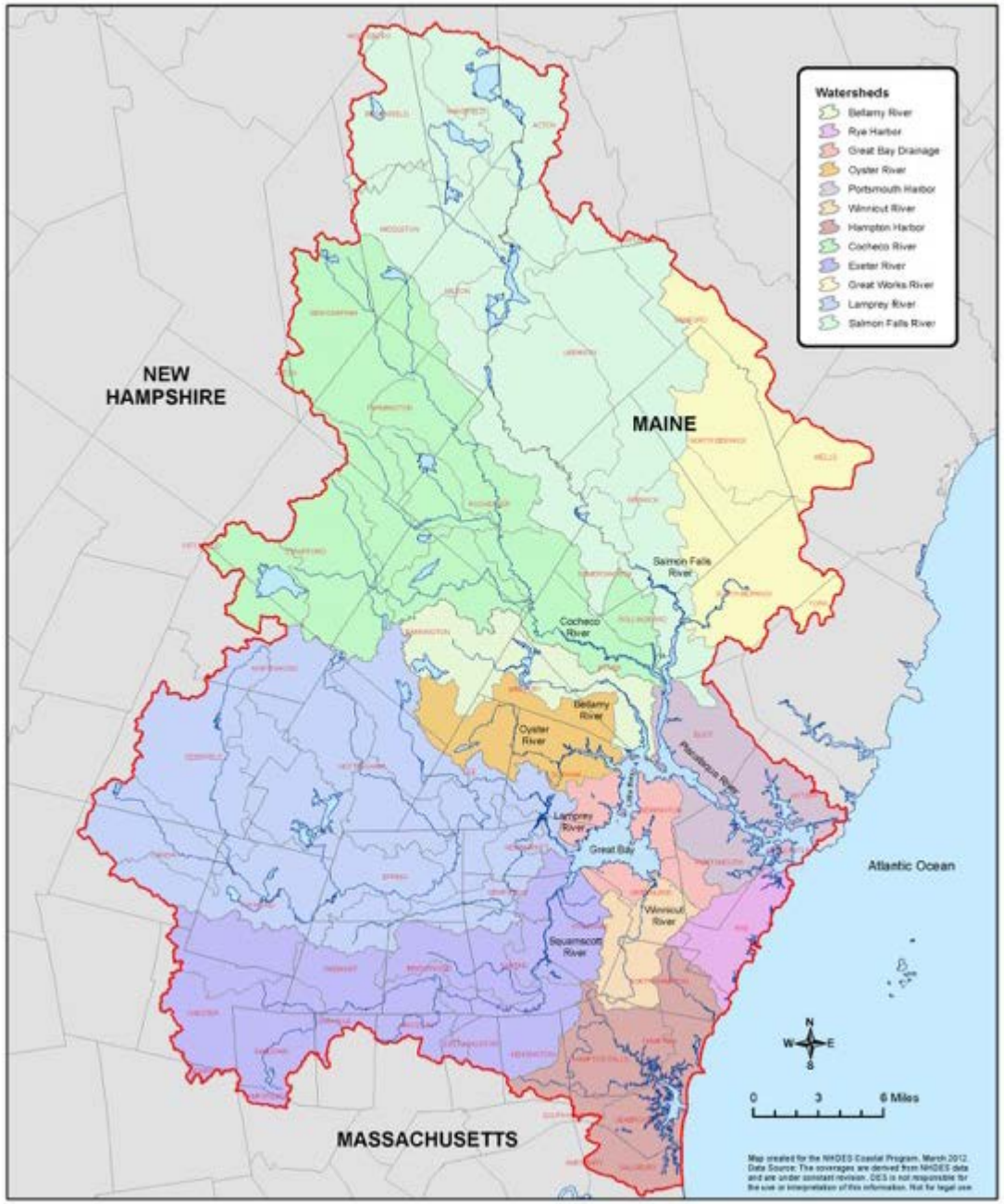
  21 lbs

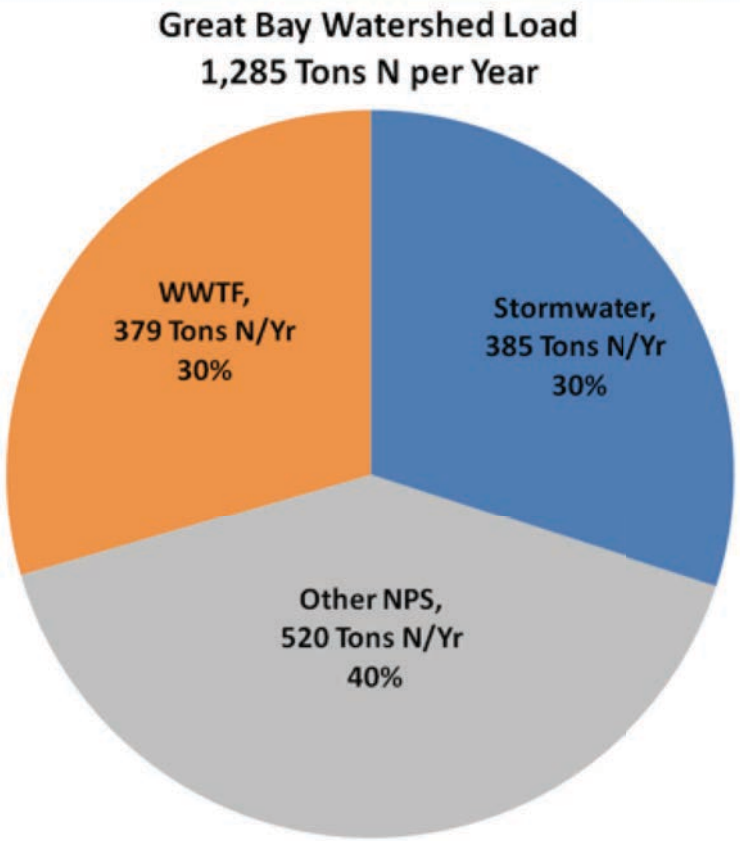
- Total Nitrogen Discharge Reduction of 83%

Costs of WWTF Obligations under AOC

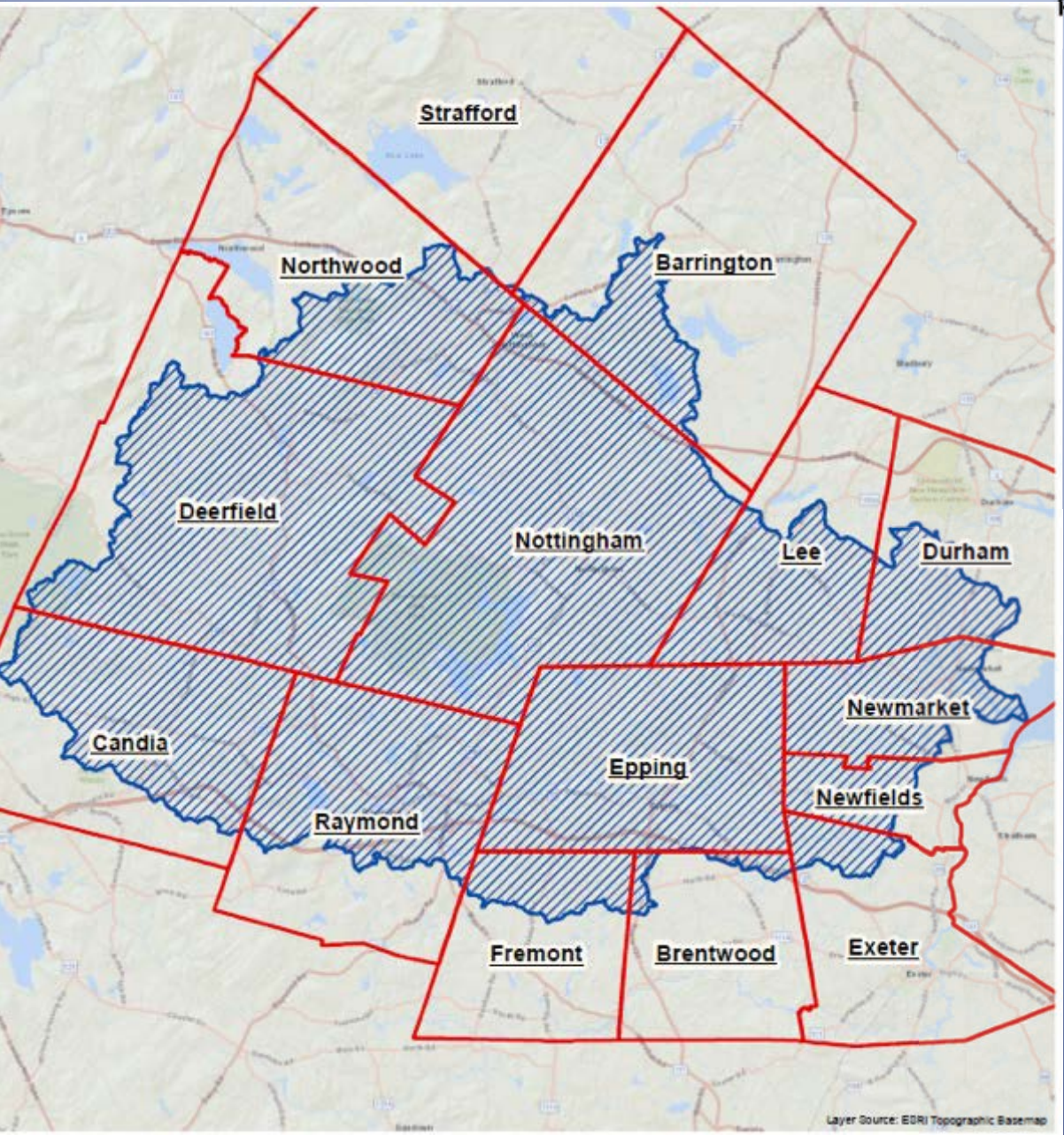
- Treatment plant upgrade for 8mg/L
  Capital cost -- $14.1M (2015 dollars)
  O&M cost -- $345,000/year
- Cost of additional Treatment for 3mg/L
  Capital cost -- $5.0M (2026 dollars)
  O&M cost -- $45,000/year

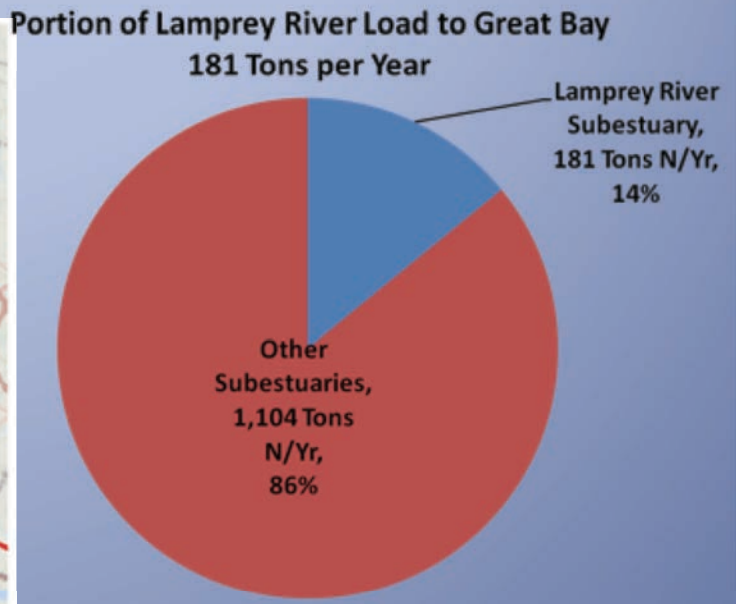
Coastal Watershed

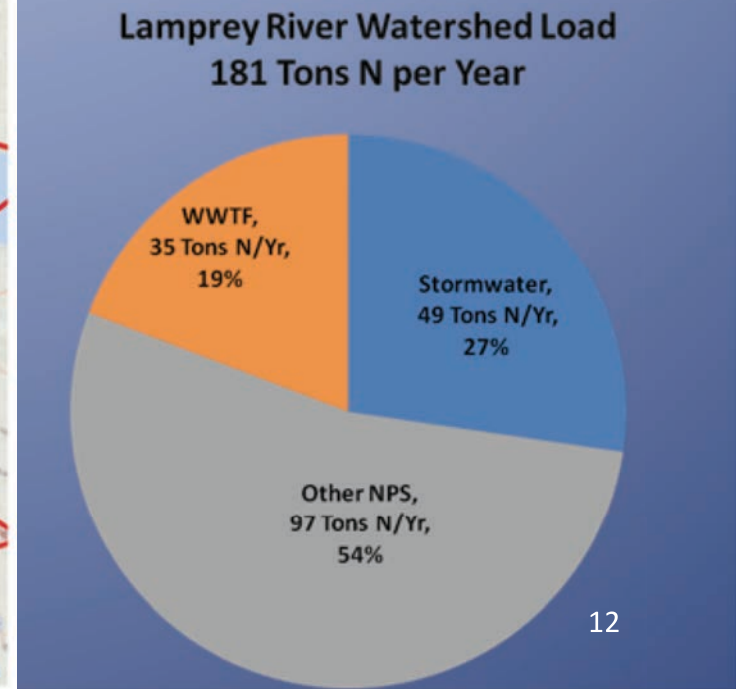




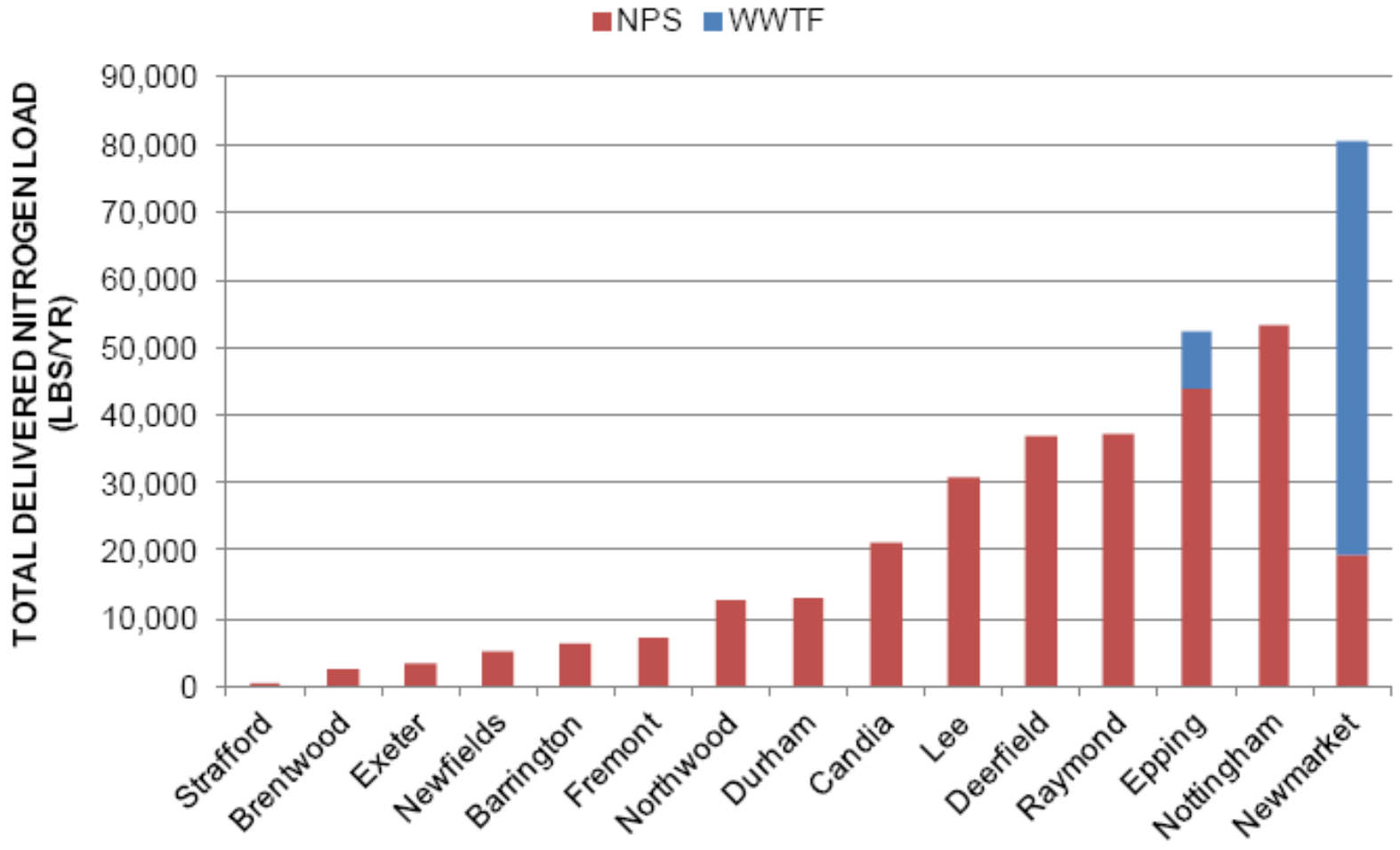
Lamprey River Watershed



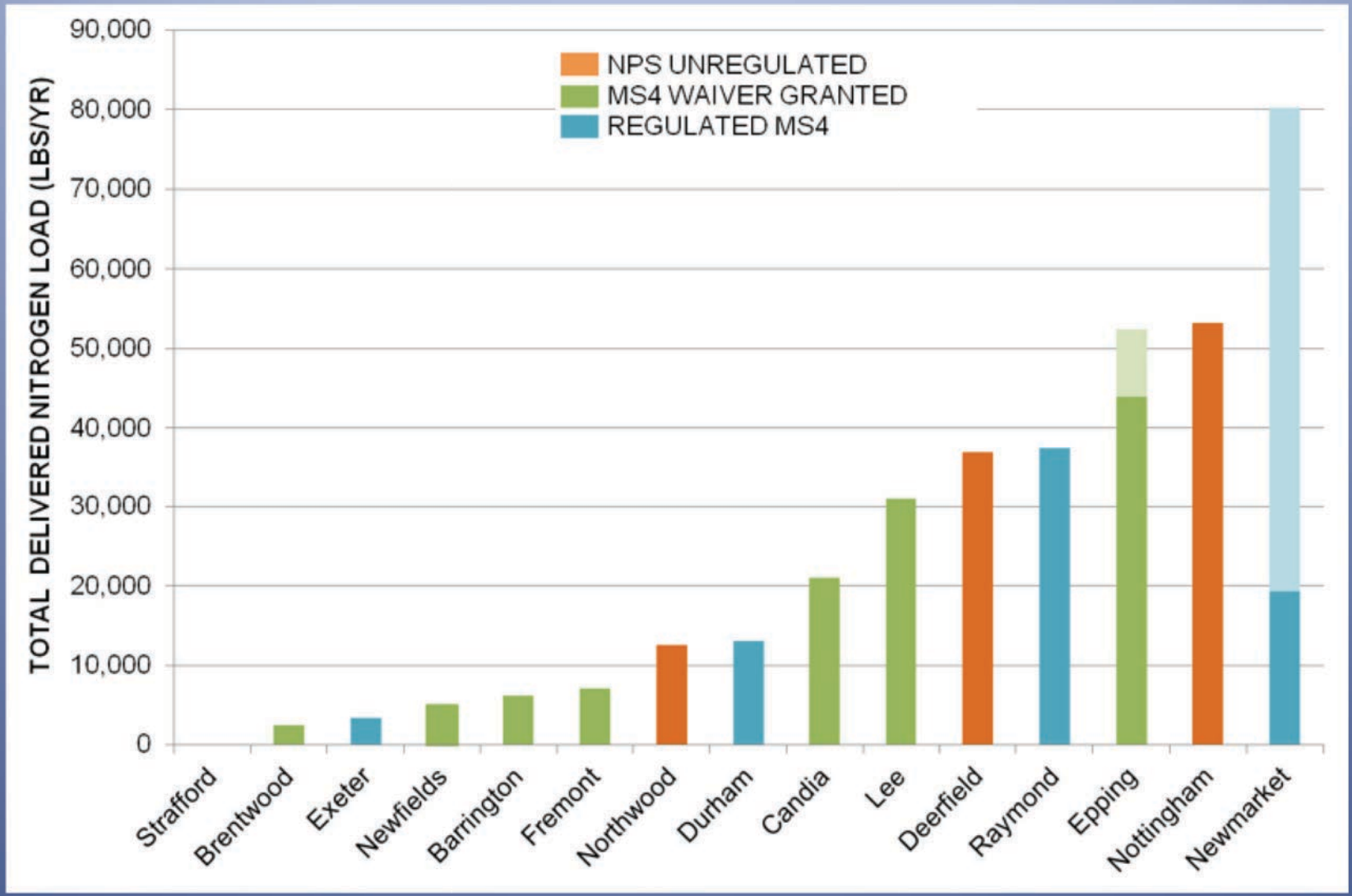




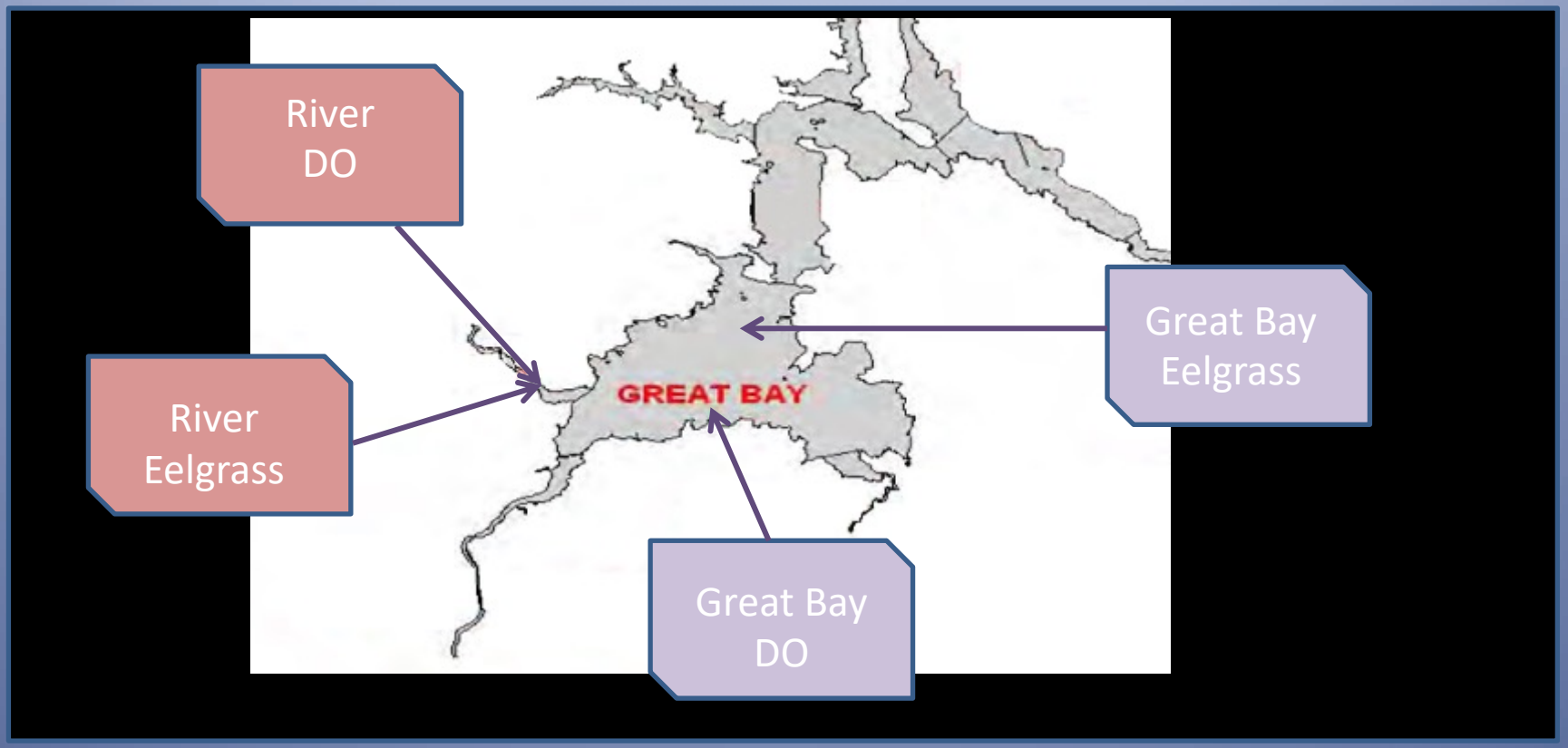
Baseline Lamprey River Watershed Load



Baseline Lamprey River Watershed Load



How Much N Reduction Needed?



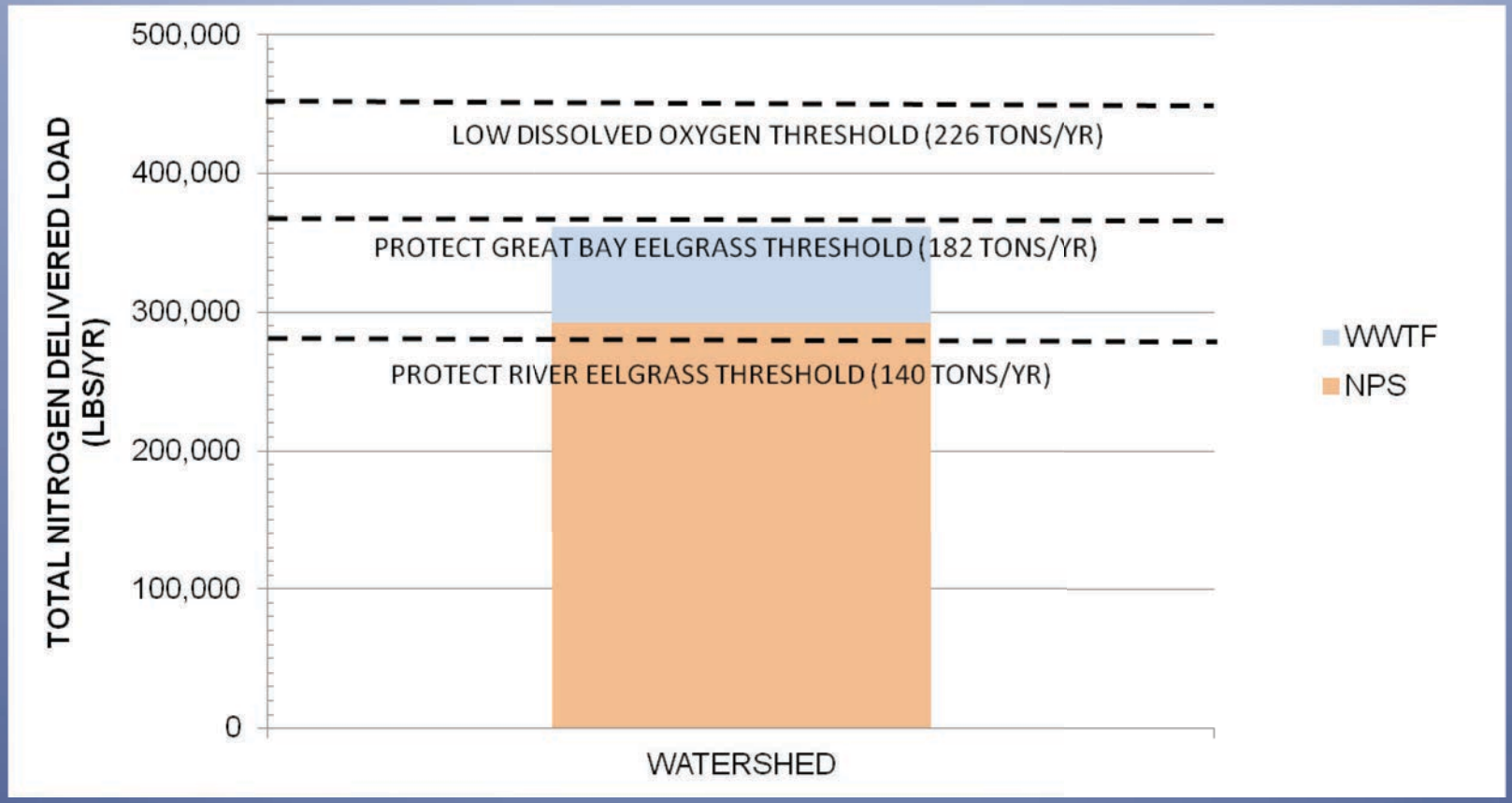
Based on NHDES Work:

Goal 1 = 182 tons/year for Great Bay Eelgrass

Goal 2 = 226 tons/year for River DO

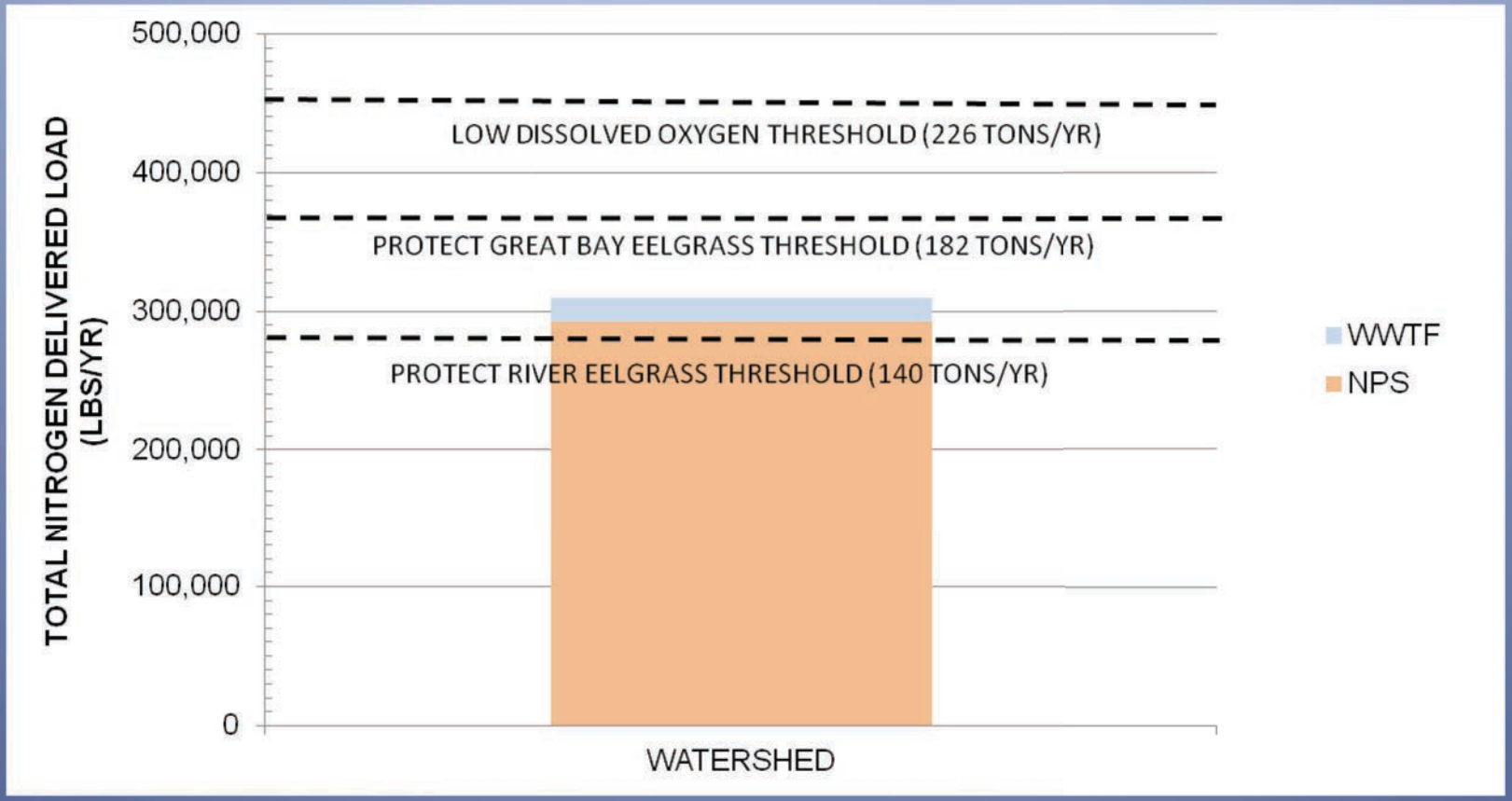
Goal 3 = 140 tons/year for River Eelgrass

How Much N Reduction is Needed?



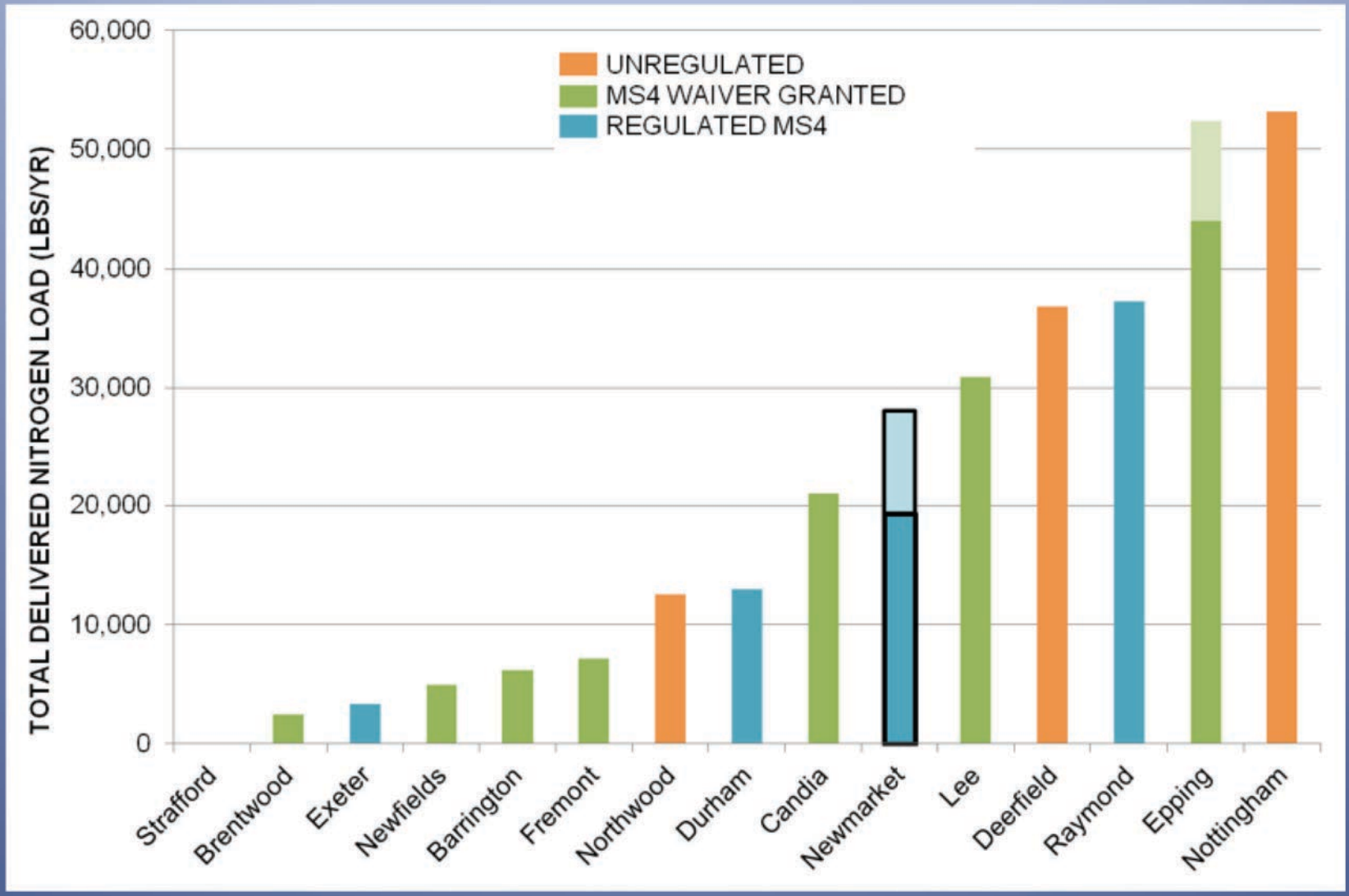
Pre-Newmarket Wastewater Treatment Facility Upgrade

How Much More N Reduction is Needed?



Post-Newmarket Wastewater Treatment Facility Upgrade

Post-Upgrade Watershed Load



NPS Nitrogen Control Strategies

- Atmospheric Deposition
- Agricultural Nutrient Management
- Fertilizer Management
- Street/Pavement Cleaning Program
- Organic Waste & Leaf Litter Collection
- Stormwater Infrastructure O&M Program
- Advanced On-Site Septic Systems
- Targeted Sewer Extensions
- Stormwater Best Management Practices

Alternatives Analysis

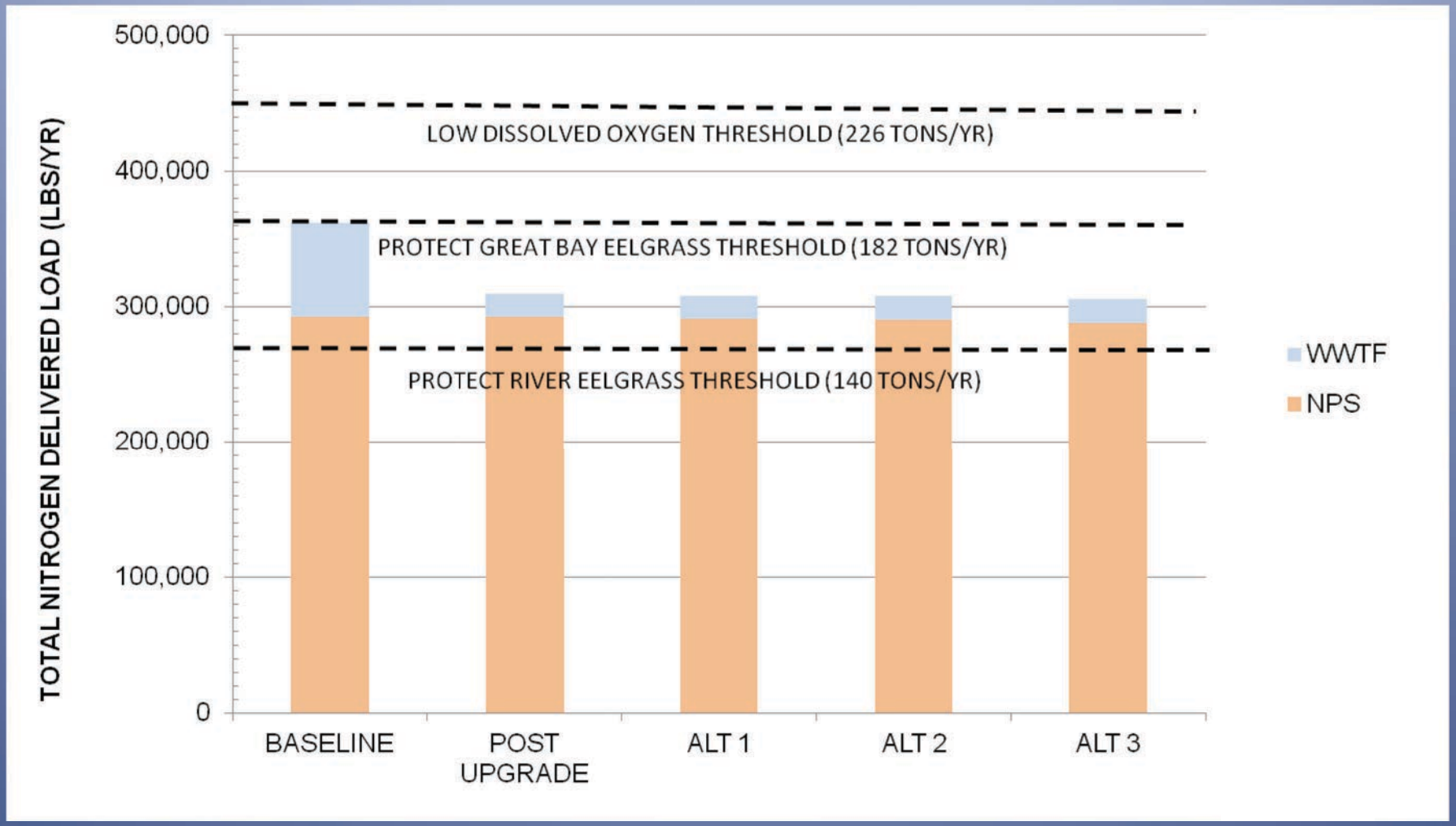
Alternative 1: Status Quo	**Alternative 2: Status Quo Plus**	**Alternative 3: Equivalent to Final Permit**
• Street Sweeping • Catch Basin Cleaning • Leaf Collection • Retrofit of Existing Properties	• Alternative 1 plus an additional annual investment of up to $75,000	• Alternative 1 plus reducing NPS load equal to WWTF final permit limit (3-mg/L) or 4,250 lbs TN/Yr

NPS Alternatives Analysis

Alternative	NPS Delivered Load Removed (lbs N/yr)	Percent Reduction of NPS Delivered Load	Total 20 Year Life Cycle Cost	Est Cost per NPS Delivered Load Removed ($/lbs N/yr)*
1: Status Quo	1,545	6%	$4.8M	$940
2: Status Quo Plus	1,832	7%	$6.3M	$580
3: Equivalent to Final Permit	4,250	17%	$27.1M	$460

**Atmospheric deposition load reduction excluded*

Newmarket's Impact on Watershed Loads



Cost of NPS Obligations under AOC

- Non-point source (NPS) obligations -- $241,000/year
- Water quality monitoring -- $182,000

Conclusions

- Town is expected to reduce nitrogen by 63% annually
- Town will invest $23.6M in stormwater, wastewater and in-stream water quality monitoring
- Watershed-wide participation is critical

Questions?

Contact:

Sean T. Greig

Newmarket Water and Wastewater Superintendent

sgreig@newmarketnh.gov

Renee L. Bourdeau, PE

Sr. Water Resources Engineer, Horsley Witten Group

Rbourdeau@horsleywitten.com

Cost-Effectiveness of NPS Nitrogen Control Strategies

Strategy	Est. 20 Year Cost Per Pound TN Removed
Atmospheric Deposition Reductions from Clean Air Act	$ 0
Residential Fertilizer Program	$ 80
Agricultural Program	$140
Advanced On-Site Septic System	$190 - $ 430
Infrastructure Maintenance Program	$ 360
Targeted Sewer Extension	$ 510 - $1,220
Stormwater Infiltration BMP	$ 520 - $850
Stormwater Enhanced Biofiltration BMP	$ 850 - $ 1,480
Street/ Pavement Cleaning Program & Organic Waste and Leaf Litter Collection Program	$ 2,240

Funding Sources

- Newmarket is ranked #1 on the State Revolving Loan List.
  - 20 year loan @ 2.72% interest
  - $250,000 in Principle forgiveness is being offered; current maximum loan of $13.66 million
- Rural Development
  - To be considered for Rural Development funding, you must have a positive bond vote
  - $5M request discussed; grant likely to be 10 to 30 percent
  - Town is actively working to get as large a package as possible; no guarantees but any grants will offset impact