Newmarket’s Battle Between Capital and Compliance

NH Water & Watershed Conference
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Renee L. Bourdeau, PE
Sr. Water Resources Engineer, Horsley Witten Group

Sean T. Greig
Environmental Services Director
AGENDA

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

Great Bay Watershed Load
1,285 Tons N per Year

- WWTF, 379 Tons N/Yr (30%)
- Stormwater, 385 Tons N/Yr (30%)
- Other NPS, 520 Tons N/Yr (40%)

Map created for the NHDES Coastal Program, March 2013.
Source: The coverage is derived from NASSCO data.
For use and interpretation of this information, not for legal use.
Lamprey River Watershed

Portion of Lamprey River Load to Great Bay
181 Tons per Year

Other Subestuaries, 1,104 Tons N/Yr, 86%

Lamprey River Subestuary, 181 Tons N/Yr, 14%

Lamprey River Watershed Load
181 Tons N per Year

WWTF, 35 Tons N/Yr, 19%

Stormwater, 49 Tons N/Yr, 27%

Other NPS, 97 Tons N/Yr, 54%
Baseline Lamprey River Watershed Load
Baseline Lamprey River Watershed Load

[Bar chart showing the total delivered nitrogen load (lbs/yr) for different locations, with categories for NPS UNREGULATED, MS4 WAIVER GRANTED, and REGULATED MS4.]
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
# NPS Alternatives Analysis

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

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

*Atmospheric deposition load reduction excluded*
Newmarket’s Impact on Watershed Loads

- **Low Dissolved Oxygen Threshold (226 Tons/yr)**
- **Protect Great Bay Eelgrass Threshold (182 Tons/yr)**
- **Protect River Eelgrass Threshold (140 Tons/yr)**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>WWTF</th>
<th>NPS</th>
</tr>
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<tbody>
<tr>
<td>Baseline</td>
<td>300,000</td>
<td>500,000</td>
</tr>
<tr>
<td>Post Upgrade</td>
<td>200,000</td>
<td>400,000</td>
</tr>
<tr>
<td>Alt 1</td>
<td>150,000</td>
<td>300,000</td>
</tr>
<tr>
<td>Alt 2</td>
<td>100,000</td>
<td>200,000</td>
</tr>
<tr>
<td>Alt 3</td>
<td>50,000</td>
<td>100,000</td>
</tr>
</tbody>
</table>
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:

Renee L. Bourdeau, PE
Sr. Water Resources Engineer, Horsley Witten Group
Rbourdeau@horsleywitten.com
### Cost-Effectiveness of NPS Nitrogen Control Strategies

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