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FEASIBILITY ANALYSIS FOR USEPA'S DRAFT GREAT BAY TOTAL NITROGEN GENERAL PERMIT IN DOVER, DURHAM, EPPING, EXETER, MILTON, NEWFIELDS, NEWINGTON, NEWMARKET, PORTSMOUTH, ROCHESTER, ROLLINSFORD, SOMERSWORTH NH AND BERWICK, KITTERY, NORTH BERWICK AND SOUTH BERWICK ME

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EXECUTIVE SUMMARY

The purpose of this study is to determine the feasibility and cost for regulated communities in the Great Bay watershed to implement the optional non-point source and stormwater point source nitrogen reduction pathway (Appendix II) outlined in EPA's draft Great Bay Total Nitrogen General Permit (NPDES Permit No NHG58A000 published in Federal Register Jan 7, 2020). The Total Nitrogen General Permit (TNGP) covers nitrogen discharges from 12 New Hampshire communities in the Great Bay watershed that operate wastewater treatment facilities (WWTF) regulated under the Clean Water Act, including Dover, Durham, Epping, Exeter, Milton, Newfields, Newington, Newmarket, Portsmouth (Pease Tradeport and Peirce Island), Rochester, Rollinsford, and Somersworth. There are four Maine communities within the watershed with wastewater treatment facilities that are *not* covered under this permit (Berwick, Kittery, North Berwick and South Berwick) because they are regulated separately by the Maine Department of Environmental Protection (MEDEP) however, the same or similar reasonable potential analysis is expected by MEDEP for these facilities. This analysis looks at a potential scenario for all 16 communities to achieve required reductions outlined in Appendix II of the draft TNGP.

Feasibility was evaluated on the basis of each community's ability to reduce non-point source and stormwater-derived nitrogen by 45% over four 5-year permit periods as outlined in the Optional Pathway (Appendix II) of the draft TNGP. Feasibility was based on both an assessment of methods to implement nitrogen controls and a corresponding cost analysis. By looking at land use categories and modeled nutrient loads in each category, this analysis has determined how to optimize nitrogen

reductions – get the most bang for the buck - through a variety of stormwater Best Management Practices (BMPs).

This feasibility analysis examines nitrogen reductions attainable through a range of approaches to reducing the volume and pollutant load of stormwater runoff before it flows into receiving waters. The study considers structural BMPs – built infrastructure such as gravel wetlands, dry wells and rain gardens to treat runoff from paved roads, rooftops, parking areas and other hardened surfaces – as well as non-structural BMPs that are typically planning- or maintenance-based strategies such as street sweeping, leaf litter control, catch basin cleaning, septic system retrofits, and fertilizer reduction programs.

Appendix B of the full report contains Nitrogen Control Plans for each of the regulated municipalities. It is important to underscore that these plans are not a prescription for how to implement the optional pathway of the TNGP. They represent one scenario of many possible pathways - each community will need to determine what combination of management approaches is most suitable and achievable.

This feasibility analysis assumes that non-point source and stormwater management conducted to comply with this TNGP would be consistent with EPA's 2017 NH Small Municipal Separate Storm Sewer Discharge (MS4) permit requirements (specifically Appendix H) for communities discharging to nitrogen-impaired waters. All municipalities regulated under this draft TNGP are also MS4 communities or have an MS4 waiver (communities with waivers include Epping, Newfields, and Newington). Requirements common to both the TNGP and MS4 programs that are included in this feasibility study are source identification reporting, stormwater best management practice (BMP) optimization for pollutant removal, retrofit inventory, priority ranking, cost assessment, and evaluation of stormwater program financing mechanisms.

The analytical methods used to determine pollutant loads and assess BMP performance are consistent with those published by EPA, USGS and others, and are generally accepted for water quality permitting purposes.

SUMMARY OF FINDINGS

This study demonstrates that an overall 45% reduction in Nitrogen load from stormwater and non-point sources in the Great Bay estuary is feasible and can be accomplished over a 20-year implementation period at costs well within national norms. If stormwater utilities were formed as a mechanism to fund a 20-year program, annual stormwater fees would range from $26 - $198, with an average annual cost of $91 per year per household.

It is important to note that stormwater utility program costs derived in this analysis are conservatively assumed to be borne entirely by the municipality. In fact, in many communities up to 50% of stormwater-related nitrogen reductions could occur through private sector redevelopment if low impact development (LID) stormwater regulations are in place, thus shifting a significant portion of the cost burden to private development.

Additional findings include:

- Costs of BMPs vary by community depending largely on density and development patterns, with an average unit cost of $561 per pound of N removed, and a range of $429 - $755 per pound N between communities. In comparison, nitrogen removal in wastewater commonly costs between $300-$1,500 per pound of nitrogen removed, depending on the WWTF limit.
- Total costs to implement the TNGP over 20 years vary from community to community, ranging from $2.2 million for Newfields, $3.1 for Rollinsford and $5.2 for Somersworth, to $13.4 million for Berwick, $17.5 for Dover, and $22.3 for Rochester.
- If implemented widely, non-structural BMPs such as street sweeping, catch basin cleaning, and leaf litter collection are the most cost-effective management approaches at an average unit cost of $282 per pound N per year.
- Low-cost structural BMPs such as rain gardens, dry wells and gravel wetlands, with an average annual unit cost of $557/ lb N, can be small-sized and used widely and efficiently in areas with the highest nutrient loads.
- Septic system retrofits offer significant opportunities to reduce nitrogen loads - at an average cost of $630 per pound N, they could reduce nearly 40% of the entire NPS load.
- Towns can plan systematically for structural BMPs in highly impacted areas over the 20-year timeframe proposed in the TNGP; smaller municipalities like Newfields, Rollinsford and North Berwick would need to treat 5, 10 and 20 acres per year respectively, while cities of Rochester, Portsmouth and Dover would need structural BMPs to treat 67, 77, and 107 acres per year.
- Local examples of BMP retrofits in 2019 had a unit cost of $5,833 per treated acre when combined with roadway capital improvements.
- While four communities may struggle to achieve 45% reductions with above-average costs, other communities can go well beyond 45%, potentially achieving load reductions of 71% at $561 per pound N.
- The load reduction shortfall in certain communities could be addressed if the TNGP were to
  1) allow inter-municipal trading;
  2) keep the existing draft allocations and reevaluate over time through adaptive management;
  3) establish a watershed-based load reduction of 45% but vary individual load reduction targets based on an equitable and equivalent unit cost of $560/lb N rather than a uniform 45% load reduction for each regulated community;
  4) distribute load reduction requirements to watershed communities not regulated under this TNGP through other regulatory means such as Residual Designation Authority.
- Using stormwater utilities as the mechanism to fund a 20-yr program, stormwater fees would average $91 per year per residential household with a range of $26 (Portsmouth) to $198 (Milton). The majority of fees were between $52 and $135 per year, within the national range. An alternative approach based on equivalent unit cost for each community would be $88 per year per residential household (a cost consistent with *2011 Portsmouth NH Stormwater Utility Feasibility Study*).

The full report with appendices is available at
https://www.clf.org/wp-content/uploads/2020/05/Full-Study.pdf

Please contact Melissa Paly, Great Bay-Piscataqua Waterkeeper, Conservation Law Foundation, at mpaly@clf.org for additional information.

OVERVIEW OF DRAFT GREAT BAY TOTAL NITROGEN GENERAL PERMIT

On January 7, 2020, EPA filed notice in the Federal Register of the *Draft Great Bay Total Nitrogen General Permit for Wastewater Treatment Facilities In New Hampshire NPDES General Permit: NHG58A000*[1]. The General Permit would supersede individual NPDES permits for 13 wastewater treatment facilities (WWTF) in New Hampshire. An optional Appendix II details non-point source (NPS) and stormwater point source nitrogen reduction that would provide flexibility to municipalities to achieve nitrogen reductions where they can be most cost-effectively achieved.

The "Fact Sheet" issued with **NPDES GENERAL PERMIT: NHG58A000** includes the following information that underlies the draft TNGP:

• Great Bay and many of the rivers that feed it are approaching or have reached their assimilative capacity for nitrogen and are suffering from the adverse impacts of human-derived nutrient over-enrichment, including cultural eutrophication. The impacts of excessive nutrients are evident throughout the Great Bay estuary, including the Piscataqua River (at 17);

• Given that there are 50 individual impairments throughout the estuary, it is apparent that the entire estuary is suffering from significant and pervasive nutrient-related impacts which are not isolated to the most susceptible areas…. there is ample evidence that nitrogen has a reasonable potential to contribute to those impairments (at 19);

• From 2012-2016 the total nitrogen load to the Great Bay Estuary was 189.3 kg/ha/yr with 82.7 kg/ha/yr coming from wastewater treatment facilities and 106.6 kg/ha/yr coming from non-point sources and stormwater (at 26);

• The draft permit details three studies as the scientific basis for establishing a loading threshold of 100 kg/ha/yr nitrogen. To achieve this threshold, the TNGP requires WWTFs to reduce nitrogen discharge 35.4 kg/ha/yr, allowing for a remaining 64.6 kg/ha/yr for NPS and stormwater point source loads.

• To achieve the threshold of 100 kg/ha/year, NPS loads will need to be reduced by 45%. EPA proposes an "optional pathway" for communities to reduce stormwater and non-point source nitrogen loads over four 5-year permit periods.

• The TNGP is based on an adaptive management framework wherein EPA will assess ecosystem response and could change future permit requirements if state Water Quality Standards are not met.

Text from **Appendix II: Optional Non-Point Source and Stormwater Point Source Nitrogen Reduction Pathway** is excerpted below:

[1] EPA (2020). Draft Great Bay Total Nitrogen General Permit For Wastewater Treatment Facilities In New Hampshire. NPDES General Permit: NHG58A000. Boston, MA, Office of Ecosystem Protection, Unites States Environmental Protection Agency.

This permit sets forth an optional pathway to achieve such gross reductions at the scale needed to meet water quality standards and attain designated uses. To provide communities with guidance on the level of reductions needed, EPA and NHDES have identified a pathway to achieve this goal through a long-term, adaptive management approach. Communities who choose to adopt this optional approach would achieve the reductions through fulfillment of the following:

1. *Upon the effective date of this permit, each Permittee may, at their election, coordinate with NHDES, other Great Bay communities and stakeholders to develop and utilize the Pollution Tracking and Accounting Program (PTAP) or its successor, a comprehensive subwatershed-based tracking/accounting system, for quantifying the nitrogen loading changes to the Great Bay estuary associated with activities within each municipality. These activities include, but are not limited to:*
   a. *New/modified septic systems,*
   b. *Decentralized wastewater treatment facilities,*
   c. *Changes to the amount of effective impervious cover,*
   d. *Changes to the amount of disconnected impervious cover,*
   e. *Conversion of existing landscape to lawns/turf, and*
   f. *Any new or modified structural or non-structural best management practices.*

2. *Within 1st Year develop and begin to implement a Short-Term Nitrogen Control Plan including:*
   a. *A schedule of three years for implementing specific short-term (i.e., beginning within one year of submittal) control measures (e.g., fertilizer reduction) to address identified NPS and stormwater point source nitrogen loadings in each municipality that contribute nitrogen;*
   b. *The identification of specific control measures and suitable locations within the Great Bay watershed for each of these control measures based on nitrogen reduction credits approved by PTAP or its successor at the time of plan submittal, cost, and site characteristics to achieve optimal reduction of nitrogen;*
   c. *The estimated cost of each control measure identified in the schedule shall include a description of appropriate financing and regulatory mechanisms to implement the necessary reductions;*
   d. *An operations and maintenance plan for control measures, as necessary; and*
   e. *An explanation of any category of NPS loadings that are not included in the plan.*

3. *Within 3 Years develop and begin to implement a 5-yr Long-Term Nitrogen Control Plan – 1 to achieve an 11% reduction which may include:*
   a. *A municipality-specific baseline of NPS and stormwater point source nitrogen delivered to the Great Bay estuary using data directly from the 2014 Great Bay Non-Point Source Study1 (GBNPSS) or optionally providing a defensible update, normalized to average rainfall;*
   b. *The identification of specific control measures and suitable locations within the Great Bay watershed for each of these control measures based on nitrogen reduction credits approved by PTAP or its successor at the time of plan submittal, cost, and site characteristics to achieve optimal reduction of nitrogen;*
   c. *The estimated cost of each control measure identified in the schedule shall include a description of appropriate financing and regulatory mechanisms to implement the necessary reductions;*
   d. *An operations and maintenance plan for control measures, as necessary; and*

   e. *An explanation of any category of NPS loadings that are not included in the plan.*
   f. *If the municipality's WWTF nitrogen loading is below the annual average allocation, the difference between actual annual average loading and the permitted annual average allocation can be applied toward the NPS and stormwater point source loading reduction target.*

4. *Within 8 Years develop and begin to implement a 5-yr Long-Term Nitrogen Control Plan – 2 to achieve an 22% reduction which may include items (b) through (f) above.*
5. *Within 13 Years develop and begin to implement a 5-yr Long-Term Nitrogen Control Plan – 3 to achieve an 34% reduction which may include items (b) through (f) above.*
6. *Within 18 Years develop and begin to implement a 5-yr Long-Term Nitrogen Control Plan – 4 to achieve an 45% reduction which may include items (b) through (f) above.*

The optional cumulative reduction targets identified above may be adjusted to account for NPS and stormwater point source changes that occur outside of the scope of the Permittees' efforts (e.g., changes in atmospheric deposition of nitrogen to the watershed). In the event the activities described above are not carried out and water quality standards are not achieved, EPA may reopen the General Permit within the timeframe of the permit (5 years) or reissue the General Permit beyond the timeframe of the permit (5 years) and incorporate any more stringent nitrogen effluent limits for the WWTFs necessary to ensure compliance with water quality standards. Conversely, if water quality standards are achieved before the activities described above are fully carried out, further nitrogen reductions from NPS and stormwater point sources or from more stringent nitrogen effluent limits for the WWTFs may not be necessary (assuming that nitrogen loads do not increase from that level because of significant changes in land use, weather, atmospheric deposition or other reasons that can affect water quality).

The Permittees shall all participate in the annual ambient monitoring program detailed below. Each Permittee shall be responsible for a percentage of the overall ambient monitoring cost equivalent to the percentage of the design flow of their WWTF(s) divided by the total design flow of all WWTFs covered by the permit.

The full permit with appendices is available at https://www.epa.gov/npdes-permits/draft-great-bay-total-nitrogen-general-permit