Testimony of:

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On Behalf of the City of Dover and the Great Bay Municipal Coalition

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"EPA Overreach and the Impact on New Hampshire Communities"

United States House of Representatives
Committee on Oversight and Government Reform

June 4, 2012

My name is Dean Peschel of Peschel Consulting and I am speaking on behalf of the City of Dover and the Great Bay Municipal Coalition. I grew up in Kittery, Maine across the river from Portsmouth and spent countless hours with my friends playing, fishing, and swimming in the estuary. We live in a beautiful place and want to keep it that way. I have an undergraduate Degree from the University of New Hampshire where I majored in Geology and a Master's Degree from Oklahoma State University where I studied Soil Science and Engineering Geology. I am currently an environmental consultant to the City of Dover, NH and prior to that was the City of Dover's Environmental Project Manager and Natural Resource Planner for 21 years. My experience in the natural resource field spans more than 36 years.

Congressman Issa and Congressman Guinta, thank you for convening this field hearing of the Oversight and Government Reform Committee here in Exeter, New Hampshire. As you have heard from Peter Rice, Portsmouth City engineer, the USEPA has proposed limit of technology nitrogen permit limits of 3 milligrams per liter (mg/l) for the coalition communities waste water treatment facilities. Nitrogen removal will require all the waste water treatment plants (WWTP) to either modify their existing facility to accommodate nitrogen removal or build completely new facilities.

The NH Department of Environmental Services issued draft nutrient criteria in 2008 which establishes a very low nitrogen water quality standard. The Coalition communities reviewed the nutrient criteria and questioned the underlying assumptions and analysis used. Expert consultants were engaged by the Coalition to review both the science and to analyze the potential economic impacts to meet likely nitrogen permit limits.

Hall & Associates of Washington DC and Hydroqual of Mahwah, New Jersey were the nationally recognized technical experts selected. Applied Economic Research of Laconia New Hampshire was the firm chosen to assess the economic impacts associated with WWTP upgrades.

Our technical experts reviewed the nutrient criteria and told us the document has fatal flaws in the methodology and incorrectly concludes that nitrogen is causing excessive algae growth which is reducing water clarity in the estuary and therefore responsible for eelgrass decline. They further informed us that the nitrogen water quality established is unattainable and will likely require communities to expend even more resources on stormwater reductions indefinitely into the future at a cost 2 to 5 or more times the cost of waste water treatment plant upgrades. Based on stormwater costs incurred in other states, the basinwide costs to meet RPA's mandates could easily exceed one billion dollars. That is a staggering number.

EPA has issued three draft permits which use the draft NHDES criteria as the justification for imposing "limit of technology" nitrogen permit limits of 3mg/l at all waste water treatment facilities. John Hall of Hall Associates will address how this action violated Clean Water Act requirements in more detail with you.

Our economist, Russ Thibeault principal of Applied Economic Research is a well-respected national expert on economic issues. Russ was provided capital costs and anticipated operation and maintenance cost increases to implement nitrogen removal at each of the WWT facilities. Those cost estimates were generated for each community by their waste water engineering consulting firms. Costs to implement

nitrogen removal at three potential permitting limits were analyzed, which were 8, 5, and 3 mg/l of total nitrogen.

The total estimated cost for the five communities is to meet 8 mg/l is $364,000,000. The cost to meet 3 mg/l is $588,000,000. The cost difference between a limit of 8mg/l and 3mg/l is $225,000,000. This represents a small incremental environmental benefit at a great additional cost. The above costs represent the capital cost to build the improvements, the additional annual O & M costs for nitrogen removal and the finance costs for 20 years which is the typical period that major improvements are bonded for.

If we look closer at the economic impacts for the City of Dover we see that the cost to meet an 8mg/l limit is $36.4 million where a 3mg/l limit is $94.9 million, a difference of $58.5 million.

A permit limit of 8mg/l will achieve a 73% nitrogen reduction where a limit of 3mg/l achieves an 83% reduction. Simply on the cost differential alone it is irrational to impose “limits of technology” in this case.

The City of Dover and other coalition communities do not want Great Bay to continue to degrade. The communities also want to insure that the investments to improve the conditions in the estuary are effective and achieve the intended results. It is clear to us that requiring the communities to upgrade WWTP to limits of technology is unwarranted and will not achieve the desired results at an extraordinary cost to rate payers. Times have dramatically changed with respect to funding wastewater. Twenty years ago when the Dover treatment plant was constructed, federal and state grants paid 95% of the capital costs. Today the local rate payer will be paying 100% of all the costs.

In order to move the process forward the Coalition developed an alternative approach to the 3 mg/l permit limit. Nitrogen levels have increased in the estuary. We do not want to them to continue to rise unabated. Nitrogen sources in the watershed are estimated to be 25-30% from point sources which are WWTP’s and 65-70% from non-point sources. Nonpoint sources are primarily run off from stormwater

which includes fertilizers, on agriculture, lawns and recreational facilities, septic systems and urban storm water.

The alternative proposed is called the Great Bay Municipal Coalition Adaptive Management Plan (AMP). It is a plan that:

1. Makes effective use of available resources.
2. Addresses both point and non-point sources.
3. Monitors progress and adapts.

What is adaptive management? It is a process in which one analyzes available data, conducts research, and then implements management practices, monitors the effectiveness of those practices. If a practice shows good results one implements more of those practices, where needed, and if a practice is found ineffective stop using it and try new ones. It is learn by doing.

The benefits of the Coalition AMP are:

1. Provides significant nitrogen reductions quickly.
2. Addresses both point and non-point sources.
3. Funds needed monitoring and restoration efforts.
4. Avoids legal appeals which waste financial resources and delays implementation of nitrogen reductions.

The AMP is based on the recommendation in the Piscataqua Region Estuary Partnership's Comprehensive Conservation Management Plan. The AMP was presented to EPA in the fall of 2011. A copy of the plan will accompany my written testimony.

The AMP includes the following:

- Coalition waste water treatment plants (WWTP's) that discharge to the estuary will be upgraded to meet an 8 mg/l nitrogen limit and be operational in 5 years or less.
- Coalition communities will each invest $30,000 in water quality and habitat monitoring annually.
- Coalition communities will each invest $25,000 annually for habitat restoration.

The Coalition will provide leadership working with the smaller unregulated communities, the state of New Hampshire, and other stakeholders on:

- Stormwater improvements
- A strategy to implement nitrogen reduction from septic systems:
- Fertilizer controls
- Stream and wetland buffers

The Coalition believes that the AMP is an effective and rational approach that will engage the entire watershed community not just the sewer rate payers. It will build upon success that will lead to future success and garner the public support need to fund future improvements that may be needed over the long term.

The plan will implement significant nitrogen reduction at the WWTP quickly for example a 73% reduction at Dover's WWTP. The plan begins non-point nitrogen reduction. It provides enhanced monitoring and supplements current habitat restoration efforts. It provides significant nitrogen reduction at an affordable cost and most importantly provides the process to determine if additional

reduction is necessary. It also saves over 200,000,000 dollars in expenditures that have no proven need or benefit.

Our communities cannot afford to waste financial resources implementing solutions that are based on unsound science. Our technical experts have clearly shown that extreme reductions in nitrogen will not improve water clarity or remove the eelgrass impairments to the estuary. We need an open peer review of the science which includes input from the public to avoid a potentially massive waste of local resources. Our citizens who will be asked to pay for the improvements insist that the nitrogen permit limits imposed are based on sound science.

Dean Peschel

Education

1968 - 1973 University of New Hampshire Durham, NH
BA/Geology

Summer 1973 University of Illinois Champaign, IL
Geologic Field Mapping

1973 – 1975 Oklahoma State University Stillwater, Ok
MS/Soil Science

Professional experience

2011- Present Peschel Consulting LLC Dover, NH
Self Employed Environmental Consultant

1997 – 2010 City of Dover Dover, NH
Environmental Division Manager

- Manage Environmental and Natural Resource programs and activities
- Coordinate and manage city GIS program
- Serve as project manager for Superfund landfill closure, sewer, public water supply, and stormwater capital projects.
- Serve on various regional and state Boards and Commissions

1989 – 1997 City of Dover Dover, NH
GIS Coordinator/Natural Resource Planner

- GIS project management and application development
- System management and database management of GIS
- Prepare maps, perform GIS analysis, and construct reports
- Natural Resource Planning

1978 – 1989 Dean Peschel Consulting YorkHarbor, Me
Self Employed Soil Consultant

- Business development and management of consulting company
- Provided professional soil and land planning consulting services to client
- Presented development proposals before State and local regulatory boards.

1975-1978 State of Maine Augusta, Me
State Soil Scientist

Committee on Oversight and Government Reform
Witness Disclosure Requirement – "Truth in Testimony"
Required by House Rule XI, Clause 2(g)(5)

Name: Dean M Peschel

1. Please list any federal grants or contracts (including subgrants or subcontracts) you have received since October 1, 2009. Include the source and amount of each grant or contract.

I have not received any federal grants or contracts since October 1, 2009

2. Please list any entity you are testifying on behalf of and briefly describe your relationship with these entities.

I am testifying on behalf of the City of Dover NH
I was an employee of the City for over 21 years and retired December 2010.
I am currently an environmental consultant to the City of Dover, NH.

3. Please list any federal grants or contracts (including subgrants or subcontracts) received since October 1, 2009, by the entity(ies) you listed above. Include the source and amount of each grant or contract.

The City of Dover is a governmental agency and has received numerous federal grants.

Dean M Peschel 5/31/2012

I certify that the above information is true and correct.
Signature: Date:

Great Bay Municipal Coalition Adaptive Management Plan

The purpose of this document is to provide an "adaptive management" plan for addressing Great Bay use impairments related to excessive nutrient contributions and habitat loss due to invasive species. Adaptive management is used when there is significant uncertainty regarding the efficacy and scope of various remediation efforts necessary to restore impaired uses. EPA's Watershed Academy document entitled *Watershed Analysis and Management (WAM) Guide for Tribes: Step 5 Adaptive Management* describes the concept as follows:

> "Adaptive management is the process by which new information about the health of the watershed is incorporated into the watershed management plan. Adaptive management is a challenging blend of scientific research, monitoring, and practical management that allows for experimentation and provides the opportunity to "learn by doing." It is a necessary and useful tool because of the uncertainty about how ecosystems function and how management affects ecosystems. Adaptive management requires explicit consideration of hypotheses about ecosystem structure and function, defined management goals and actions, and anticipated ecosystem response (Jensen et al. 1996).
>
> The results of this process are essential to validate the Watershed Assessment, to ensure that ecosystem relationships were considered adequately in Synthesis, and to show that management solutions have been implemented and are effective at achieving watershed objectives."

Thus, the approach seeks to eliminate environmental impairments by (1) identifying priority actions and areas of uncertainty, (2) monitoring, before and after, the effects of implementing the priority measures, and (3) using such information to assess the need for and scope of further remediation efforts to ensure use attainment and protection.

The Memorandum of Agreement (MOA) between the Great Bay Municipal Coalition and the Department of Environmental Services recognized that Great Bay is suffering from a number of significant impairments; however, the precise causes of and solutions to eelgrass-related impairments are uncertain. The MOA established that a review committee should be created to study and better understand that causes of eelgrass loss in the Bay, as related to transparency, epiphytes, and macroalgae. The MOA review was conducted under the auspices of SWA and consisted of experts from UNH, engineering consultants, municipal representatives, DES, and EPA. Based on those collaborative discussions, the following scientific information was brought to light:

- Eelgrass losses in Great Bay do not appear to be a result of either insufficient transparency or excessive epiphyte growth;
- Macroalgae growth has greatly increased in the Bay over the past three decades and is adversely impacting habitat and eelgrass populations;
- Macroalgae die back every winter, and their regrowth occurs primarily during warmer weather months (June to September);
- The excessive macroalgae are most likely caused by increased dissolved inorganic nitrogen (DIN) loads to the Bay; and
- The level of DIN control required to control macroalgae is not known but should be controllable through reduction of inorganic nitrogen loading to early 1990 levels.

Based on these observations, the Coalition is proposing a series of actions designed to achieve the following goals:

1. Reduce municipal DIN levels to pre-1990 conditions;
2. Quantify overall DIN loadings to the system since 1990;
3. Create a monitoring program capable of tracking macroalgae and DIN levels in select areas of the Bay;
4. Complete additional literature research on facts and nutrient levels affecting macroalgae growth; and
5. Reduce non-point source inputs through land use planning changes and implementation of bioremediation projects, such as oyster replenishment.

The attached document identifies the specific components of the adaptive management program and how those components relate to critical restoration efforts identified by the Piscataqua River Estuary Project (PREP) as part of their document entitled *2010 Comprehensive Conservation and Management Plan*. It is expected that the time frame to implement these activates will span a ten year period. The first five years of the Adaptive Management program will focus heavily on setting up the monitoring program and completing the wastewater treatment process changes necessary to significantly reduce DIN levels in the Bay. The next five years will focus on assessing the results of those and other NPS reduction activities. Based on the improvements (or lack thereof) in macroalgae growth and eelgrass health, a reassessment of activities necessary to protect the Bay's ecological resources will occur.

The progress being achieved will be reported in an open and transparent manner through a PREP website. This will allow the public and other interest groups to receive timely information and comment on the efficacy of the program.

The Coalition's Adaptive Management Plan proposes significant investment in reducing nutrients to the Great Bay estuary during the initial 10 year period. The investments include $1,500,000 in water quality and habitat monitoring in the estuary to augment the existing baseline and monitor changes in estuary water quality and habitat following implementation of nitrogen reductions. $1,250,000 will be invested in habitat restoration including oyster bed restoration, and eelgrass re-establishment. The Coalition will also finance an international comprehensive literature search on macroalgae and nutrient levels in the estuarine environment which is estimated at $20,000. In addition the communities will partner with the University of New Hampshire Stormwater Center, a leader in stormwater treatment research, to design and implement innovative best management practices to reduce nutrient concentrations in stormwater. As an example the City of Dover is currently partnering with the UNH Stormwater Center to disconnect impervious surfaces at Berry Brook, a small urban watershed, through installation of best management practices and stream restoration. The City investment of more than $250,000 is leveraged with grant funds to a project of more than $800,000 in improvements.

Permit Condition	PREP CCMP Objective	PREP CCMP Action & Ranking
For wastewater facilities that are significantly contributing nutrients to Great Bay NPDES permit limit of 8 mg/l April- October for 10 years; then assess estuary conditions on need for lower permit limits based on: • water quality improvements • habitat response	**WR 1.3** Reduce nutrient loads to the estuaries and the ocean so that adverse, nutrient-related effects do not occur.	**WR-12** Improve nutrient removal at WWTP's and support system upgrades and expansion **Highest** **WR-14** Support inter-municipal coordination to find and implement effective solutions for reducing nutrients and other pollutant loads throughout the Great Bay watershed **Highest** **WR-23** Encourage watershed based permitting **Moderate**
Invest in water quality and habitat monitoring $30,000 annually per community ($150,000 per year, $1,500,000 over permit period from Coalition communities)	**WR 1.3** Reduce nutrient loads to the estuaries and the ocean so that adverse, nutrient-related effects do not occur.	**WR-10** Support research to develop and better understanding of the nutrient (nitrogen) cycling, geochemistry, and nutrient removal in the Piscataqua watershed **High** **WR-14** Support inter-municipal coordination to find and implement effective solutions for reducing nutrients and other pollutant loads throughout the Great Bay watershed **Highest**

Invest in bio-extraction through oyster restoration and aquaculture projects, eelgrass restoration, and other habitat enhancement projects. $25,000 annually per community ($125,000 per year; $1,250,000 over permit period from Coalition communities). Funds could be directed to SWA and be used as grant match for suitable projects to leverage funds.	**WR 1.3** Reduce nutrient loads to the estuaries and the ocean so that adverse, nutrient-related effects do not occur. **LR 1.1** Increase abundance of adult oysters at the 6 documented beds in Great Bay Estuary to 10 million oysters and restore 20 acres of oyster reef habitat by 2020. **LR 1.3** Increase the areal extent of eelgrass cover to 2900 acres and restore connectivity of eelgrass beds throughout the Great Bay estuary by 2020 **LR 1.11** Monitor and control the extent of invasive nuisance species throughout the Piscataqua region watershed and estuaries. **LR 1.14** Improve implementation capacity for restoration projects	**WR-14** Support inter-municipal coordination to find and implement effective solutions for reducing nutrients and other pollutant loads throughout the Great Bay watershed **Highest** **LR-1** Develop and implement a comprehensive resource action plan for native oyster populations in the Great Bay Estuary and other suitable sites in the Piscataqua region. **Highest** **LR-3** Implement a comprehensive recovery strategy for eelgrass throughout the Great Bay Estuary. **Highest** **LR-16** Support the development and implementation of marine aquatic nuisance species management plans for Piscataqua Region estuaries. **High**

Implement local stormwater and development ordinances and regulations that require LID techniques. Partner with the UNH Stormwater Center to design, implement, and test in the field innovative stormwater management practices that reduce nitrogen as pilot projects within the Coalition communities.	**LU 1.1** Promote sustainable land use practices in both new and redevelopment of existing sites. **LU 1.2** Promote regional strategies for consistent use of ecologically protective planning, regulation, development and enforcement.	**LU-1** Promote inclusion of natural resource chapters in municipal Master Plans, adoption of compact development and conservation subdivision ordinances, and creation of open space plans. **Highest** **LU-2** Employ best management practices and low impact development approaches in new, existing and redevelopment to minimize stormwater runoff impacts and limit changes to pre-development site hydrology. **Highest** **LU-3** Refine and support existing outreach and training programs that promote LID, LEED and sustainable development practices and adopt relevant ordinaces for environmental resource protection. **High**
Adopt and implement stream and wetland buffer protection for new development and re-establishment of buffers where they have been destroyed as a result of past development	**LU 1.1** Promote sustainable land use practices in both new and redevelopment of existing sites. **LU 1.2** Promote regional strategies for consistent use of ecologically protective planning, regulation, development and enforcement. **LU 2.1** Protect floodplains, wetlands, shorelands and associated fluvial erosion hazard zones to maintain their function and value **LU 2.2** Promote improved protection of low order streams	**LU-6** Promote and implement measures to protect floodplains, and riparian shoreland areas from detrimental impacts associated with development. **High** **LU-10** Develop and implement consistent municipal ordinances to protect 1st, 2nd and 3rd order streams and buffers throughout the watershed. **Highest**

Consider implementation of municipal fertilizer control regulations	**WR 1.3** Reduce nutrient loads to the estuaries and the ocean so that adverse, nutrient-related effects do not occur.	**WR-11** Promote low impact and low nutrient commercial and residential landscaping techniques. **High** **WR-14** Support inter-municipal coordination to find and implement effective solutions for reducing nutrients and other pollutant loads throughout the Great Bay watershed **Highest**
Cooperate with NHDES and other stakeholders to determine the best resolution of the septic system nitrogen contribution in the watershed.	**WR 1.3** Reduce nutrient loads to the estuaries and the ocean so that adverse, nutrient-related effects do not occur.	**WR-13** Reduce watershed nutrient loading from on-site septic systems. **WR-14** Support inter-municipal coordination to find and implement effective solutions for reducing nutrients and other pollutant loads throughout the Great Bay watershed **Highest**
Work with NHDES to develop nitrogen trading program	**WR 1.3** Reduce nutrient loads to the estuaries and the ocean so that adverse, nutrient-related effects do not occur.	**WR-23** Encourage watershed based permitting for NPDES discharges
Undertake an international literature review of research relating to macro algae growth and nutrient concentrations in estuarine waters.	**LR 1.11** Monitor and control the extent of invasive nuisance species throughout the Piscataqua region watershed and estuaries. **LR 1.14** Improve implementation capacity for restoration projects	**LR-3** Implement a comprehensive recovery strategy for eelgrass throughout the Great Bay Estuary. **Highest** **LR-16** Support existing program, initiatives, and partnerships to limit the introduction and control the spread of terrestial and aquatic nuisance spesies in the Piscataqua Region watersheds **LR-16** Support the development and implementation of marine aquatic nuisance species management plans for Piscataqua Region estuaries. **High**

The Economics of Seacoast Nutrient Removal

Dover, Durham, Exeter, Newmarket, Portsmouth and Rochester NH

Preliminary Review Draft

June 2011

Applied Economic Research
Laconia, New Hampshire

The Economics of Nutrient Removal in New Hampshire Seacoast Communities

Preliminary Review Draft

July 1, 2011

This analysis was prepared by Applied Economic Research (AER), Laconia, New Hampshire, at the request of a consortium of New Hampshire communities including Dover, Durham, Exeter, Newmarket, Portsmouth and Rochester. The purpose of the analysis is to estimate financial and economic impact of possible nutrient removal standards that may be imposed on these communities as their wastewater discharge permits are renewed.

As of this writing, updated discharge permit conditions remain unknown. In layman's terms, the State of New Hampshire is considering imposing limitations on the concentration of nitrogen and possibly phosphorus allowed in the stream of treated waste emanating from the sewerage treatment plants of the consortium communities. Each of these communities discharges into a tributary of Great Bay. Some studies have shown that the water quality in the Bay has deteriorated. The State is investigating whether the discharge of nitrogen and phosphorus have contributed to the alleged deterioration of the Bay's water quality. Among the factors the state is considering is imposing limits on the concentration of nitrogen (N) and possibly phosphorus (P) allowed in the treated water discharged from these plants.

This report is a preliminary draft. All of the consortium communities are undergoing various levels of engineering studies as their current discharge permits approach their expiration date. As those studies move toward completion, a more refined estimate of capital and operating costs is emerging, but, in general, the costs at this stage are preliminary only, subject to change.

The report was prepared in accordance with the standards set forth in Interim Economic Guidance for Water Quality Standards Workbook issued by the United States Environmental Protection Agency in 1995. This workbook provides a general methodology for evaluating the economics of water quality improvement projects. Limited departures from that methodology were undertaken to update certain variables, considering the passage of time since the EPA report.

Study Procedures

Each community in the consortium was represented by the Director of Public Works, with responsibility for overseeing the treatment plant. The representatives met with AER throughout the one year study

period. AER interviewed each public works director and visited each treatment plant. Each public works director completed a data sheet setting forth the characteristics of their existing treatment plant, the general character of the plant's users (residential vs. nonresidential, for example) and current plant finances. The public works directors analyzed (often based on independent engineering studies) the incremental costs (capital and operating) necessary to meet possible nutrient removal standards. The standards considered were:

- Nitrogen: 8 mg/liter, 5mg/liter, 3 mg/liter
- Phosphorus 1mg/liter, 0.2 mg/liter

All of the communities face limitations on nitrogen. Dover, Newmarket and Rochester may also face limitations on phosphorus concentrations and for these communities, analysis of the cost of phosphorous limitations are also included in the analysis.

After the necessary data was gathered, AER developed a spreadsheet model to reflect the EPA economic guidelines. Preliminary results were then reviewed by each of the consortium members and adjusted accordingly.

Findings and Conclusions

A summary of the study findings for each community and the consortium as a whole are set forth in the following summary. The data inputs and results of the analysis for each community are set forth in the tables in the Addendum to this report.

The principal findings of this analysis are that meeting the possible nutrient removal is an expensive proposition:

- The consortium communities will have to invest between $74 million and $160 million on their treatment plants to meet the possible nitrogen discharge standards;
- The consortium communities will experience annual incremental costs (debt service+incremental operating costs) of $13 million to $25 million per year (measured in constant 2010 dollars) to meet the possible discharge standards;
- This annual cost averages about $300-500 per household served by the combined systems;

- This annual cost represents a 50% to 100% increase in current annual costs per household, measured over the six consortium communities;
- Measured over the 20 year expected life of the plant upgrades, the total economic costs (including principal, interest, operating costs, calculated lost revenues, etc.) are $400-$700 million--$11,000-20,000 per household served;
- The annual operating and capital costs range from 1.7%-2.1% of household income, a significant impact measured by EPA Economic evaluation standards.

The impacts vary from community to community among the consortium members. Generally speaking, economies of scale are at play—impacts tend to be more pronounced among the smaller communities (Exeter and Newmarket, for example), than among the larger communities. Rochester presents a special case because its cost of meeting the standards is especially high, relative to the number of households served. Rochester bears an additional burden in that it has two firms that bear a significant percentage of the current treatment costs. It is unlikely that these firms could survive a substantial increase in treatment fees—either the firms would leave the community or costs would have to be shifted onto other users of the plant, including households.

Synopsis of Preliminary Estimates of Nutrient Removal Costs

Print Date	6/30/2011						
	Dover*	Durham	Exeter	Newmarket*	Portsmouth	Rochester*	Total
Current Average Flow (MGD)	2.70	1.20	1.94	0.85	5.00	3.50	15.19
Households in Community 2010	12,827	2,960	6,114	3,857	10,014	12,378	48,150
Households Served by System 2009	8,856	2,561	5,432	1,240	8,400	10,500	36,989
% Served	69%	87%	89%	32%	84%	85%	77%
Median Household Income 2009	$ 56,500	$ 66,550	$ 63,900	$ 59,300	$ 58,200	$ 52,250	$ 59,450
Annual Sewer Revenues (Costs) 2009	$ 4,294,650	$ 1,486,600	$ 1,699,600	$ 908,200	$ 6,313,700	$ 4,562,000	$ 19,264,750
Annual Current Cost per Household	$ 605	$ 680	$ 854	$ 720	$ 660	$ 714	$ 706
Median Home Value	$ 225,000	$ 305,000	$ 235,000	$ 238,000	$ 315,000	$ 155,000	$ 245,500
Full Value Tax Rate	$ 21.70	$ 27.07	$ 22.05	$ 20.51	$ 15.54	$ 21.41	$ 21.38
Capital Cost: Nitrogen 8	$ 10,500,000	$ 8,000,000	$ 20,000,000	$ 13,000,000	$ 15,000,000	$ 7,450,000	$ 73,950,000
Capital Cost: Nitrogen 5	$ 25,000,000	$ 20,000,000	$ 30,000,000	$ 13,000,000	$ 16,900,000	$ 11,250,000	$ 116,150,000
Capital Cost: Nitrogen 3	$ 30,000,000	$ 20,000,000	$ 36,000,000	$ 18,000,000	$ 34,900,000	$ 21,550,000	$ 160,450,000
Operating Cost: Nitrogen 8	$ 400,000	$ 500,000	$ 1,400,000	$ 300,000	$ 900,000	$ 4,500,000	$ 8,000,000
Operating Cost: Nitrogen 5	$ 600,000	$ 1,000,000	$ 1,400,000	$ 300,000	$ 980,000	$ 4,800,000	$ 9,080,000
Operating Cost: Nitrogen 3	$ 800,000	$ 3,000,000	$ 1,500,000	$ 400,000	$ 1,028,000	$ 5,700,000	$ 12,428,000

Synopsis of Preliminary Estimates of Nutrient Removal Costs

Print Date	6/30/2011						
Calculations							
Annual Incremental Cost (Capital+Operating)							
Nitrogen 8	$ 1,249,800	$ 1,128,400	$ 2,971,000	$ 1,321,200	$ 2,078,300	$ 5,085,200	$ 13,833,900
Nitrogen 5	$ 2,663,800	$ 2,571,000	$ 3,756,500	$ 1,321,200	$ 2,307,500	$ 5,683,700	$ 18,303,700
Nitrogen 3	$ 3,256,500	$ 4,571,000	$ 4,327,800	$ 1,813,900	$ 3,769,400	$ 7,392,800	$ 25,131,400
Annual Incremental Cost per Household Served							
Nitrogen 8	$ 116	$ 145	$ 383	$ 661	$ 104	$ 363	$ 374
Nitrogen 5	$ 246	$ 331	$ 484	$ 661	$ 115	$ 405	$ 495
Nitrogen 3	$ 301	$ 589	$ 558	$ 907	$ 188	$ 528	$ 679
Increment as a % of Current Annual Cost per Household							
Nitrogen 8	19%	21%	45%	92%	16%	51%	53%
Nitrogen 5	41%	49%	57%	92%	17%	57%	70%
Nitrogen 3	50%	87%	65%	126%	28%	74%	96%
Current Annual Cost plus Increment as a % of Median Household Income							
Nitrogen 8	1.3	1.2	1.9	2.3	1.3	2.1	1.7
Nitrogen 5	1.5	1.5	2.1	2.3	1.3	2.1	1.8
Nitrogen 3	1.6	1.9	2.2	2.7	1.5	2.4	2.1
Total Community Cost Over 20 Year Life of Project							
Nitrogen 8	$ 36,415,000	$ 35,430,000	$ 87,003,400	$ 37,884,000	$ 55,165,000	$ 147,546,000	$ 399,443,400
Nitrogen 5	$ 77,615,000	$ 80,724,000	$ 110,006,000	$ 37,884,000	$ 61,248,000	$ 164,911,000	$ 532,388,000
Nitrogen 3	$ 94,884,000	$ 143,520,000	$ 126,736,000	$ 51,942,000	$ 100,052,000	$ 214,500,000	$ 731,634,000
Total Community Cost Over 20 Year Life of Project Per Current Household Served							
Nitrogen 8	$ 4,112	$ 13,834	$ 16,017	$ 30,552	$ 6,567	$ 14,052	$ 10,799
Nitrogen 5	$ 8,764	$ 31,520	$ 20,251	$ 30,552	$ 7,291	$ 15,706	$ 14,393
Nitrogen 3	$ 10,714	$ 56,041	$ 23,331	$ 41,889	$ 11,911	$ 20,429	$ 19,780
* Includes Nitrogen and Phosphorus Removal; See addendum tables							

Addendum

Dover Calculations

Dover Nutrient Removal Analysis: Data Inputs

	Data	Data Source
Print Date	6/30/2011 14:48	
Total Households in Community (2010)	12,827	2010 Census estimate
Households Served By System*	8,856	See Below
Median Household Income 2009	$ 56,500	2000 Census Updated with CPI Inflator
Total Annual Cost of Existing Pollution Control System	$ 4,294,654	Total Budgeted Operating Funds per 6/30/2009 figures
Percent of Existing Costs Paid By Households	82%	Supplemental Data Request
Amount of Annual Costs Paid By Households	$ 3,521,616	Calculated
Annual Current Cost Per Household	$ 605	
Bond Rate	4.8%	Current average municipal bond yield
Bond Term	20	
Median Home Value (2009)	$ 225,000	NHHFA
Equalized Assessed Valuation (2009 in thousands)	$ 2,635,746,700	NH Dept of Rev Admins
Full Value Tax Rate 2009	$ 21.70	NH DRA
Equalization Rate 2009	94.7%	NH DRA
* Calculated Households Served		
Total Daily Flow	2,700,000	
% Residential	82.0	
Residential Flow	2,214,000	
Residential Gallons per Day	250	
Residential Households Served	8,856	

Dover Nutrient Removal Analysis: Calculations Nitrogen and Phosphorus Standards Imposed

PRELIMINARY: SUBJECT TO REVISION

Scenario:	N 8; P 1	N 5; P 0.2	N 3; P 0.2
Cost			
Project Capital Cost - Nitrogen	$ 10,000,000	$ 20,000,000	$ 25,000,000
Project Capital Cost - Phosphorus	$ 500,000	$ 5,000,000	$ 5,000,000
Project Capital Cost - Total	$ 10,500,000	$ 25,000,000	$ 30,000,000
Annualized Capital Cost*	$ 824,800	$ 1,963,800	$ 2,356,500
Incremental Operating Cost - Nitrogen	$ 400,000	$ 600,000	$ 800,000
Incremental Operating Cost - Phosphorus	$ 25,000	$ 100,000	$ 100,000
Total Annual Operating Cost	$ 425,000	$ 700,000	$ 900,000
Total Annual Incremental Cost	$ 1,249,800	$ 2,663,800	$ 3,256,500
Incremental Household Costs			
% Paid By Households	82%	82%	82%
Amount Paid By Households	$ 1,024,800	$ 2,184,300	$ 2,670,300
Households Served	$ 8,856	$ 8,856	$ 8,856
Annual Incremental Cost per Household	$ 115.72	$ 246.65	$ 301.52
Current Cost per Household	$ 605.00	$ 605.00	$ 605.00
Total Cost per Household	$ 720.72	$ 851.65	$ 906.52
Median Household Income	$ 56,500	$ 56,500	$ 56,500
Total Cost as a % of Median Income	1.3%	1.5%	1.6%
Community Costs			
Life of Project Community Cost			
Taxes Foregone over 20 Year Improvement Life			
Total Annual Incremental Cost	$ 1,249,800	$ 2,663,800	$ 3,256,500
Capitalized Value at Muncipal Bond Rate	$ 26,311,579	$ 56,080,000	$ 68,557,895
Full Value Tax Rate/$000	$ 21.70	$ 21.70	$ 21.70
Annual Taxes Foregone	$ 570,961	$ 1,216,936	$ 1,487,706
Taxes Foregone over 20 Year Improvement Life	$ 11,419,225	$ 24,338,720	$ 29,754,126
Total Debt Service Paid	$ 16,496,000	$ 39,276,000	$ 47,130,000
Total Operating Costs Paid (Constant 2010 Dollars)	$ 8,500,000	$ 14,000,000	$ 18,000,000
Total Community Cost Over Life of Facility	**$ 36,415,225**	**$ 77,614,720**	**$ 94,884,126**

Durham Calculations

Durham Nutrient Removal Analysis: Data Inputs

		Data Source
Print Date	6/30/2011 14:49	
Total Households in Community (2010)	2,960	NHHFA+AER
Households Served By System*	2,561	See Below
Median Household Income 2009	$ 66,550	2000 Census Updated with CPI Inflator
Total Annual Cost of Existing Pollution Control System	$ 1,486,600	Total Budgeted Operating Funds per 6/30/2009 figures
Percent of Existing Costs Paid By Households	33%	Supplemental Data Request
Amount of Annual Costs Paid By Households	$ 490,578	Calculated
Annual Current Cost Per Household	$ 680	
Bond Rate	4.8%	Current average municipal bond yield
Bond Term	20	
Median Home Value (2009)	$ 305,000	NHHFA
Equalized Assessed Valuation (2009 in thousands)	$ 891,894	NH Dept of Rev Admins
Full Value Tax Rate 2009	$ 27.07	NH DRA
Equalization Rate 2009	100.0%	NH DRA
* Calculated Households Served		
Total Daily Flow	1,940,000	
% Residential	33%	
Residential Flow	640,200	
Residential Gallons per Day	250	
Residential Households Served	2,561	

Durham Nutrient Removal Analysis: Calculations Nitrogen and Phosphorus Imposed

PRELIMINARY: SUBJECT TO REVISION

Scenario:	N 8	N 5	N 3
Cost			
Project Capital Cost - Nitrogen	$ 8,000,000	$ 20,000,000	$ 20,000,000
Project Capital Cost - Phosphorus			
Project Capital Cost - Total	$ 8,000,000	$ 20,000,000	$ 20,000,000
Annualized Capital Cost*	$ 628,400	$ 1,571,000	$ 1,571,000
Incremental Operating Cost - Nitrogen	$ 500,000	$ 1,000,000	$ 3,000,000
Incremental Operating Cost - Phosphorus			
Total Annual Operating Cost	$ 500,000	$ 1,000,000	$ 3,000,000
Total Annual Incremental Cost	$ 1,128,400	$ 2,571,000	$ 4,571,000
Incremental Household Costs			
% Paid By Households	33%	33%	33%
Amount Paid By Households	$ 372,400	$ 848,400	$ 1,508,400
Households Served	$ 2,561	$ 2,561	$ 2,561
Annual Incremental Cost per Household	$ 145.42	$ 331.30	$ 589.03
Current Cost per Household	$ 680.00	$ 680.00	$ 680.00
Total Cost per Household	$ 825.42	$ 1,011.30	$ 1,269.03
Median Household Income	$ 66,550	$ 66,550	$ 66,550
Total Cost as a % of Median Income	1.2%	1.5%	1.9%
Community Costs			
Life of Project Community Cost			
Taxes Foregone over 20 Year Improvement Life			
Total Annual Incremental Cost	$ 1,128,400	$ 2,571,000	$ 4,571,000
Capitalized Value at Muncipal Bond Rate	$ 23,755,789	$ 54,126,316	$ 96,231,579
Full Value Tax Rate/$000	$ 27.07	$ 27.07	$ 27.07
Annual Taxes Foregone	$ 643,069	$ 1,465,199	$ 2,604,989
Taxes Foregone over 20 Year Improvement Life	$ 12,861,384	$ 29,303,987	$ 52,099,777
Total Debt Service Paid	$ 12,568,000	$ 31,420,000	$ 31,420,000
Total Operating Costs Paid (Constant 2010 Dollars)	$ 10,000,000	$ 20,000,000	$ 60,000,000
Total Community Cost Over Life of Facility	**$ 35,429,384**	**$ 80,723,987**	**$ 143,519,777**
dover 2 0 nitrogen only			

seacoast wastewater preliminary calculations dover 2.0 nitrogen standards imposed

Exeter Calculations

Exeter Nutrient Removal Analysis: Data Inputs

			Data Source
Print Date		6/30/2011 14:50	
Total Households in Community (2010)		6,114	2010 US Census
Households Served By System*		5,432	See Below
Median Household Income 2009	$	63,900	2000 Census Updated with CPI Inflator
Total Annual Cost of Existing Pollution Control System	$	1,699,646	Total Budgeted Operating Funds per 6/30/2009 figures
Percent of Existing Costs Paid By Households		70%	AER revised from town's Supplemental Data Request
Amount of Annual Costs Paid By Households	$	1,189,752	Calculated
Annual Current Cost Per Household	$	854	
Bond Rate		4.8%	Current average municipal bond yield
Bond Term		20	
Median Home Value (2009)	$	235,000	NHHFA
Equalized Assessed Valuation (2009 in thousands)	$	16,462,432	NH Dept of Rev Admins
Full Value Tax Rate 2009	$	22.05	NH DRA
Equalization Rate 2009		100.0%	NH DRA
* Calculated Households Served			
Total Daily Flow		1,940,000	
% Residential		70%	AER Revised from town's preliminary 80%
Residential Flow		1,358,000	
Residential Gallons per Day		250	
Residential Households Served		5,432	

Exeter Nutrient Removal Analysis: Calculations Nitrogen and Phosphorus Imposed

PRELIMINARY: SUBJECT TO REVISION

Scenario:	N 8	N 5	N 3
Cost			
Project Capital Cost - Nitrogen	$ 20,000,000	$ 30,000,000	$ 36,000,000
Project Capital Cost - Phosphorus			
Project Capital Cost - Total	$ 20,000,000	$ 30,000,000	$ 36,000,000
Annualized Capital Cost*	$ 1,571,000	$ 2,356,500	$ 2,827,800
Incremental Operating Cost - Nitrogen	$ 1,400,000	$ 1,400,000	$ 1,500,000
Incremental Operating Cost - Phosphorus			
Total Annual Operating Cost	$ 1,400,000	$ 1,400,000	$ 1,500,000
Total Annual Incremental Cost	$ 2,971,000	$ 3,756,500	$ 4,327,800
Incremental Household Costs			
% Paid By Households	70%	70%	70%
Amount Paid By Households	$ 2,079,700	$ 2,629,600	$ 3,029,500
Households Served	$ 5,432	$ 5,432	$ 5,432
Annual Incremental Cost per Household	$ 382.86	$ 484.09	$ 557.71
Current Cost per Household	$ 854.00	$ 854.00	$ 854.00
Total Cost per Household	$ 1,236.86	$ 1,338.09	$ 1,411.71
Median Household Income	$ 63,900	$ 63,900	$ 63,900
Total Cost as a % of Median Income	1.9%	2.1%	2.2%
Community Costs			
Life of Project Community Cost			
Taxes Foregone over 20 Year Improvement Life			
Total Annual Incremental Cost	$ 2,971,000	$ 3,756,500	$ 4,327,800
Capitalized Value at Muncipal Bond Rate	$ 62,547,368	$ 79,084,211	$ 91,111,579
Full Value Tax Rate/$000	$ 22.05	$ 22.05	$ 22.05
Annual Taxes Foregone	$ 1,379,169	$ 1,743,807	$ 2,009,010
Taxes Foregone over 20 Year Improvement Life	$ 27,583,389	$ 34,876,137	$ 40,180,206
Total Debt Service Paid	$ 31,420,000	$ 47,130,000	$ 56,556,000
Total Operating Costs Paid (Constant 2010 Dollars)	$ 28,000,000	$ 28,000,000	$ 30,000,000
Total Community Cost Over Life of Facility	**$ 87,003,389**	**$ 110,006,137**	**$ 126,736,206**
dover 2.0 nitrogen only			

seacoast wastewater preliminary calculations dover 2.0 nitrogen standards imposed

Newmarket Calculations

Newmarket Nutrient Removal Analysis: Data Inputs

			Data Source
Print Date		6/30/2011 14:51	
Total Households in Community (2010)		3,857	2010 US Census
Households Served By System*		1,240	See Below
Median Household Income 2009	$	59,300	2000 Census Updated with CPI Inflator
Total Annual Cost of Existing Pollution Control System	$	908,219	Total Budgeted Operating Expenses per 6/30/2009 figures
Percent of Existing Costs Paid By Households		62%	Supplemental Data Request
Amount of Annual Costs Paid By Households	$	563,096	Calculated
Annual Current Cost Per Household	$	720	
Bond Rate		4.8%	Current average municipal bond yield
Bond Term		20	
Median Home Value (2009)	$	238,000	NHHFA
Equalized Assessed Valuation (2009 in thousands)	$	758,564	NH Dept of Rev Admins
Full Value Tax Rate 2009	$	20.51	NH DRA
Equalization Rate 2009		100.0%	NH DRA
* Calculated Households Served			
Total Daily Flow		500,000	
% Residential		62%	
Residential Flow		310,000	
Residential Gallons per Day		250	
Residential Households Served		1,240	

Newmarket Nutrient Removal Analysis: Calculations Nitrogen and Phosphorus Imposed

PRELIMINARY: SUBJECT TO REVISION

Scenario:	N 8	N 5	N 3
Cost			
Project Capital Cost - Nitrogen	$ 13,000,000	$ 13,000,000	$ 18,000,000
Project Capital Cost - Phosphorus			
Project Capital Cost - Total	$ 13,000,000	$ 13,000,000	$ 18,000,000
Annualized Capital Cost*	$ 1,021,200	$ 1,021,200	$ 1,413,900
Incremental Operating Cost - Nitrogen	$ 300,000	$ 300,000	$ 400,000
Incremental Operating Cost - Phosphorus			
Total Annual Operating Cost	$ 300,000	$ 300,000	$ 400,000
Total Annual Incremental Cost	$ 1,321,200	$ 1,321,200	$ 1,813,900
Incremental Household Costs			
% Paid By Households	62%	62%	62%
Amount Paid By Households	$ 819,100	$ 819,100	$ 1,124,600
Households Served	$ 1,240	$ 1,240	$ 1,240
Annual Incremental Cost per Household	$ 660.56	$ 660.56	$ 906.94
Current Cost per Household	$ 720.00	$ 720.00	$ 720.00
Total Cost per Household	$ 1,380.56	$ 1,380.56	$ 1,626.94
Median Household Income	$ 59,300	$ 59,300	$ 59,300
Total Cost as a % of Median Income	2.3%	2.3%	2.7%
Community Costs			
Life of Project Community Cost			
Taxes Foregone over 20 Year Improvement Life			
Total Annual Incremental Cost	$ 1,321,200	$ 1,321,200	$ 1,813,900
Capitalized Value at Muncipal Bond Rate	$ 27,814,737	$ 27,814,737	$ 38,187,368
Full Value Tax Rate/$000	$ 20.51	$ 20.51	$ 20.51
Annual Taxes Foregone	$ 570,480	$ 570,480	$ 783,223
Taxes Foregone over 20 Year Improvement Life	$ 11,409,605	$ 11,409,605	$ 15,664,459
Total Debt Service Paid	$ 20,424,000	$ 20,424,000	$ 28,278,000
Total Operating Costs Paid (Constant 2010 Dollars)	$ 6,000,000	$ 6,000,000	$ 8,000,000
Total Community Cost Over Life of Facility	**$ 37,833,605**	**$ 37,833,605**	**$ 51,942,459**

Portsmouth Calculations

Portsmouth Nutrient Removal Analysis: Data Inputs

			Data Source
Print Date		6/30/2011 14:51	
Total Households in Community (2010)		10,014	2010 Census
Households Served By System*		8,400	See Below
Median Household Income 2009	$	58,200	2000 Census Updated with CPI Inflator
Total Annual Cost of Existing Pollution Control System	$	6,313,698	Total Budgeted Operating Funds per 6/30/2009 figures
Percent of Existing Costs Paid By Households		42%	Supplemental Data Request
Amount of Annual Costs Paid By Households	$	2,651,753	Calculated
Annual Current Cost Per Household	$	660	
Bond Rate		4.8%	Current average municipal bond yield
Bond Term		20	
Median Home Value (2009)	$	315,000	NHHFA
Equalized Assessed Valuation (2009 in thousands)	$	4,161,741	NH Dept of Rev Admins
Full Value Tax Rate 2009	$	15.54	NH DRA
Equalization Rate 2009		92.9%	NH DRA
* Calculated Households Served			
Total Daily Flow		5,000,000	
% Residential		42%	
Residential Flow		2,100,000	
Residential Gallons per Day		250	
Residential Households Served		8,400	

Portsmouth Nutrient Removal Analysis: Calculations Nitrogen Standards (Only) Imposed

PRELIMINARY: SUBJECT TO REVISION

Scenario:	N 8	N 5	N 3
Cost			
Project Capital Cost - Nitrogen	$ 15,000,000	$ 16,900,000	$ 34,900,000
Project Capital Cost - Phosphorus			
Project Capital Cost - Total	$ 15,000,000	$ 16,900,000	$ 34,900,000
Annualized Capital Cost*	$ 1,178,300	$ 1,327,500	$ 2,741,400
Incremental Operating Cost - Nitrogen	$ 900,000	$ 980,000	$ 1,028,000
Incremental Operating Cost - Phosphorus			
Total Annual Operating Cost	$ 900,000	$ 980,000	$ 1,028,000
Total Annual Incremental Cost	$ 2,078,300	$ 2,307,500	$ 3,769,400
Incremental Household Costs			
% Paid By Households	42%	42%	42%
Amount Paid By Households	$ 872,900	$ 969,200	$ 1,583,100
Households Served	$ 8,400	$ 8,400	$ 8,400
Annual Incremental Cost per Household	$ 103.92	$ 115.38	$ 188.46
Current Cost per Household	$ 660.00	$ 660.00	$ 660.00
Total Cost per Household	$ 763.92	$ 775.38	$ 848.46
Median Household Income	$ 58,200	$ 58,200	$ 58,200
Total Cost as a % of Median Income	1.3%	1.3%	1.5%
Community Costs			
Life of Project Community Cost			
Taxes Foregone over 20 Year Improvement Life			
Total Annual Incremental Cost	$ 2,078,300	$ 2,307,500	$ 3,769,400
Capitalized Value at Muncipal Bond Rate	$ 43,753,684	$ 48,578,947	$ 79,355,789
Full Value Tax Rate/$000	$ 15.54	$ 15.54	$ 15.54
Annual Taxes Foregone	$ 679,932	$ 754,917	$ 1,233,189
Taxes Foregone over 20 Year Improvement Life	$ 13,598,645	$ 15,098,337	$ 24,663,779
Total Debt Service Paid	$ 23,566,000	$ 26,550,000	$ 54,828,000
Total Operating Costs Paid (Constant 2010 Dollars)	$ 18,000,000	$ 19,600,000	$ 20,560,000
Total Community Cost Over Life of Facility	**$ 55,164,645**	**$ 61,248,337**	**$ 100,051,779**

Rochester Calculations

Rochester Nutrient Removal Analysis: Data Inputs

			Data Source
Print Date		6/30/2011 14:52	
Total Households in Community (2009)		12,378	2010 Census
Households Served By System*		10,500	See Below
Median Household Income 2009	$	52,250	2000 Census Updated with CPI Inflator
Total Annual Cost of Existing Pollution Control System	$	4,562,000	Total Budgeted Operating Funds per 6/30/2009 figures
Percent of Existing Costs Paid By Households		75%	Supplemental Data Request
Amount of Annual Costs Paid By Households	$	3,421,500	Calculated
Annual Current Cost Per Household	$	714	$83 per quarter per Supplemental Data Request
Bond Rate		4.8%	Current average municipal bond yield
Bond Term		20	
Median Home Value (2009)	$	155,000	NHHFA
Equalized Assessed Valuation (2009 in thousands)	$	2,214,009	NH Dept of Rev Admins
Full Value Tax Rate 2009	$	21.41	NH DRA
Equalization Rate 2009		94.8%	NH DRA
* Calculated Households Served			
Total Daily Flow		3,500,000	
% Residential		75%	
Residential Flow		2,625,000	
Residential Gallons per Day		250	
Residential Households Served		10,500	
seacoast wastewater preliminary calculations dover 2.0			
Test of Annual Cost			
Total Annual Costs paid by households	$	3,421,500	
Number of Households		10,500	
Calculated Annual Cost per household	$	325.86	

Rochester Nutrient Removal Analysis: Calculations Nitrogen and Phosphorus Standards Imposed

PRELIMINARY: SUBJECT TO REVISION

Scenario:	N 8	N 5	N 3
Cost			
Project Capital Cost - Nitrogen	$ 5,700,000	$ 9,500,000	$ 12,350,000
	P1	P1	P .2
Project Capital Cost - Phosphorus	$ 1,750,000	$ 1,750,000	$ 9,200,000
Project Capital Cost - Total	$ 7,450,000	$ 11,250,000	$ 21,550,000
Annualized Capital Cost*	$ 585,200	$ 883,700	$ 1,692,800
Incremental Operating Cost - Nitrogen	$ 4,000,000	$ 4,300,000	$ 4,500,000
Incremental Operating Cost - Phosphorus	$ 500,000	$ 500,000	$ 1,200,000
Total Annual Operating Cost	$ 4,500,000	$ 4,800,000	$ 5,700,000
Total Annual Incremental Cost	$ 5,085,200	$ 5,683,700	$ 7,392,800
Incremental Household Costs			
% Paid By Households	75%	75%	75%
Amount Paid By Households	$ 3,813,900	$ 4,262,800	$ 5,544,600
Households Served	$ 10,500	$ 10,500	$ 10,500
Annual Incremental Cost per Household	$ 363.23	$ 405.98	$ 528.06
Current Cost per Household	$ 714.00	$ 714.00	$ 714.00
Total Cost per Household	$ 1,077.23	$ 1,119.98	$ 1,242.06
Median Household Income	$ 52,250	$ 52,250	$ 52,250
Total Cost as a % of Median Income	2.1%	2.1%	2.4%
Community Costs			
Life of Project Community Cost			
Taxes Foregone over 20 Year Improvement Life			
Total Annual Incremental Cost	$ 5,085,200	$ 5,683,700	$ 7,392,800
Capitalized Value at Muncipal Bond Rate	$ 107,056,842	$ 119,656,842	$ 155,637,895
Full Value Tax Rate/$000	$ 21.41	$ 21.41	$ 21.41
Annual Taxes Foregone	$ 2,292,087	$ 2,561,853	$ 3,332,207
Taxes Foregone over 20 Year Improvement Life	$ 45,841,740	$ 51,237,060	$ 66,644,147
Total Debt Service Paid	$ 11,704,000	$ 17,674,000	$ 33,856,000
Total Operating Costs Paid (Constant 2010 Dollars)	$ 90,000,000	$ 96,000,000	$ 114,000,000
Total Community Cost Over Life of Facility	$ 147,545,740	$ 164,911,060	$ 214,500,147
dover 2.0 nitrogen only			

seacoast wastewater preliminary calculations dover 2.0 nitrogen standards imposed

AER Experience and Background

About Applied Economic Research

Applied Economic Research provides comprehensive economic and development consulting services to public and private clients. Since 1976 Applied Economic Research has developed a reputation for objective research and seasoned judgment. We take special pride in our high level of repeat clients and referrals--the best indicators of a job well done. Typical assignments include:

Feasibility Studies including market studies of new residential, commercial and industrial developments; financial pro formas; rehabilitation/reinvestment projects; and highest/best use studies of vacant land.

Development Strategies including target market/product definition analysis, market penetration, buyer preference surveys, problem loan work-outs, and site selection studies.

Valuation/Appraisal of real estate and businesses in financing, acquisition/disposition, tax and litigation settings.

Public Policy Analysis including downtown redevelopment, affordable housing, capital improvement programming, economic development strategies, growth impact studies and neighborhood revitalization.

Impact Studies including school and community facilities impacts, shopping center impact studies, and economic impact analysis of new public investments including highways.

Our Assets

AER brings to each assignment critical resources:

Objectivity. AER's research is thorough, objective and honest. Our studies may not say what the client was hoping to hear - but they report the truth and our unbiased, seasoned advice. As a result, our clients entrust us with their most important and difficult decisions.

> *"When we can't afford to miss, I call Applied Economic Research. I trust AER to give us the information, the insight and the advice we need to make tough real estate decisions. You get what you pay for. The information and guidance they provide have helped us avoid costly pitfalls."*
>
> ***New Hampshire Banker***

Unmatched Information Resources. AER maintains an exclusive database of New England economic and real estate information. Our systems analyst maintains current population, income and housing, production and sales information. Our computer modeling capabilities are comprehensive, flexible and sophisticated.

Seasoned Judgment. Our studies get results. They extend beyond a compilation of data. We interpret the information and recommend strategies that are realistic and effective.

> *"AER has been extraordinarily accurate in predicting market trends. But they do more than give us good numbers. Just discussing project ideas with them can be invaluable--because of their experience and understanding of the market."*
>
> ***Southern New Hampshire Developer***

Credibility. AER enjoys outstanding credibility with lenders, investors and public agencies recommending optimal strategies based on solid research.

> *"Their work throughout the region gives AER great credibility. The AER team is great to work with. They're personal and very professional."*
>
> *State Government Official*

Confidentiality. Our office has a written policy of confidentiality. We do not disclose our research or findings to anyone but our client.

Top Level Contacts. AER has an extensive network of business and professional contacts throughout New England. We go beyond published market data to the community leaders and business decision makers who influence public policy and investment decisions.

Diverse Experience

AER has completed over 3,000 assignments for a balanced mix of public and private clients. Our public clients find our intimate understanding of the developer's world especially useful. Our private clients benefit from our working knowledge of public policy and development issues.

Private assignments include market and development strategies for award-winning ventures such as Windward Harbor, which received Builder magazine's *Project of the Year* award; Wildwood Village, winner of Professional Builder magazine's *Homes for Better Living* award; and the Villages at Granite Hill, winner of 11 New Hampshire Home Builder's Association awards, including *Project of the Year*. Our retail experience ranges from small specialty centers to regional malls. Our office and industrial assignments address both reuse and new construction proposals.

Our public clients range from metropolitan areas to islands off the Maine coast to the region's largest communities and state agencies.

Extensive Exposure

Russ Thibeault, president of AER, is frequently quoted in the state and national media. He is a frequent commentator on National Public Radio's *Marketplace*, heard nationally by over 3 million listeners a week. He has appeared on ABC World News, *The McNeil-Lehrer News Hour,* BBC World Television and Japan Public Television. He has been quoted in *The New York Times*, *The Wall Street Journal*, The *Washington Post* and the *Los Angeles Times*.

Russ is a frequent public speaker addressing economic and development issues before the state's business and government leaders.

Our clients include most of the area's financial institutions, government agencies, developers and municipalities. They provide AER with a high degree of repeat assignments—the best measure of a successful assignment.

RUSSELL W. THIBEAULT
PRESIDENT
APPLIED ECONOMIC RESEARCH, INC.

Russell W. Thibeault is a real estate and economic consultant and appraiser providing services to public and private clients. He founded Applied Economic Research in 1976 and has completed assignments in 30 states.

Expertise

Mr. Thibeault's expertise falls into a variety of economic and real estate topics:

Market Value Appraisals of undeveloped land, industrial, commercial, and investment real estate for government bodies, corporations, financial institutions, estates and private investors.
Economic Development Studies for states, regions and municipalities concerned about job, investment or income displacement.

Market and Financial Feasibility Analysis of shopping centers, office buildings, apartments, condominiums, industrial and land developments.

Highest and Best Use Studies of undeveloped land, industrial, commercial, and investment real estate for government bodies, corporations, financial institutions, estates and private investors.

Economic Loss Calculations for businesses and individuals.

Business Valuations and economic loss estimates of closely held businesses for estate planning, family interest transfers and court testimony.

Real Estate Investment Strategies for corporations, institutions, syndicates and individuals including: acquisition studies, market strategies, after tax cash flow studies, and financing strategies.

Site Location Studies for banks, retail stores, and industrial firms

Downtown Revitalization Studies for corporations, private investors and government bodies, including market penetration estimates, revitalization strategies, and financing strategies.

Economic Impact Studies including retail sales impact of proposed shopping centers and cost-revenue impacts of proposed shopping centers, residential, commercial or industrial developments.

Housing Market Studies for state, regional and local governments, including the evaluation of existing housing markets and identification of housing needs.

Public Finance Studies for local governments including revenue and cost projections, capital improvement programs and tax base analysis.

Between 1972 and 1976, Mr. Thibeault was employed by Hammer, Siler, George Associates, a Washington-based national economic and real estate consulting firm with field offices in Atlanta and Denver. In 1976, he resigned his senior associate position with the Hammer firm to establish Applied Economic Research, an independent consulting practice.

Private real estate investments analyzed by Mr. Thibeault represent a combined investment of nearly $1 billion. His public and private experience has taken him to more than 30 states. Between his Applied Economic Research practice and his Washington position, clients include:

American Institute of Architects
National Association of Home Builders
U.S. Department of Transportation
U.S. Department of Housing & Urban Development
U.S. Army Corps of Engineers
National Commission on Water Quality
National Trust for Historic Preservation
Greater Baltimore Committee
PPG Industries (Pittsburgh)
MONDEV, International (Montreal)
Town of Scarborough, Maine
Haywood Properties (South Carolina)
Pennsylvania Avenue Development Corp. (Washington, DC)
Travelers Insurance
New York State Urban Development Corporation
Public Service Company of New Hampshire
Appalachian Power Company (Virginia)
Chittenden County Regional Planning Commission (Vt.)
Piedmont Environmental Council (Virginia)
City of New Orleans
Lakes Region Planning Commission (New Hampshire)
International Paper Company (New York)
Town of Plymouth, Massachusetts
Town of Franklin, Massachusetts
City of Burlington, Vermont
City of Concord, New Hampshire
City of Laconia, New Hampshire

City of Baltimore, Maryland
State of Delaware
State of Rhode Island
New Hampshire Housing Finance Authority
Fleet National Bank
Dartmouth College
Boston Redevelopment Authority
FDIC

Education/Affiliations

Russell W. Thibeault holds a master's degree in urban and regional planning with an emphasis in economic analysis from the University of North Carolina (Chapel Hill). While attending the University, he was elected president of Planner's Forum, the graduate student organization. He holds a Bachelor of Arts degree from the University of New Hampshire and has taken advanced real estate courses in the Graduate School of Business at American University (Washington, D.C.). He has successfully completed courses leading to the MAI designation offered by the American Institute of Real Estate Appraisers. He has successfully completed residential and income property appraisal course examinations offered by the Society of Real Estate Appraisers. He is presently an asssociate member of the Appraisal Institute. He has completed course work and examinations leading to the Certified Business Appraiser designation offered by the Institute of Business Appraisers.

Mr. Thibeault is a Certified General Appraiser licensed by the New Hampshire Real Estate Appraiser Board, License #NHCG-4. He has served as the only Certified General Real Estate Appraiser on the New Hampshire Real Estate Appraiser Board. He presently serves on the NH appraisal review committee of the Board.

He was the recipient of a National Science Foundation research assistantship for research on consumer housing preferences and placed first in the Southern Regional Science Association research competition. He has authored several papers published in professional journals, including The Review of Regional Studies and Traffic Quarterly. He was a contributor to the President's Report on National Growth and Development issued to the U.S. Congress in 1974 and has authored several research papers distributed by the National Association of Home Builders. He has served as a course instructor in economics at New Hampshire College and has lectured in urban planning at Plymouth State College.

He maintains membership in the Institute of Business Appraisers, the Appraisal Institute (associate member) and the National Association of Business Economists.

Appearances

Mr. Thibeault has appeared as an economist/real estate expert on *Nightline*, *ABC World News*, the *MacNeil-Lehrer News Hour*, *CNN* the *Japanese Broadcasting Network* and *BBC World Television News*. He has been interviewed by the New York Times, the Los Angeles Times, the Wall Street Journal, the Washington Post, Fortune magazine, the Kiplinger Letter, the Irish Times, USA Today and U.S. News and World Report.

Mr. Thibeault has served on the Board of Directors and as President of the New Hampshire Planners Association. He was elected to the Executive Committee of the North Carolina Chapter of the American Institute of Planners.

Mr. Thibeault served on the Board of Directors of the Indian Head National Bank of Laconia, until such time as that institution merged with the Indian Head National Bank of Nashua. He has served on the Board of Directors and Finance Committee of the Lakes Region General Hospital and as a director of First NH Bank, and Citizens Bank (NH). He currently serves on the board of Laconia Savings Bank. He is past-president of the Laconia Industrial Development Corporation and also of Plan NH. Mr. Thibeault has served on the NH Governor's Revenue Advisory Panel.

His economic commentaries have been heard nationally over National Public Radio affiliates on programs including Marketplace, The Savvy Traveler and Living on Earth

He is a frequent public speaker. He has presented before the NH Bar Association's Continuing Legal Education series (CLE), the NH Chapter of the Appraisal Institute, the NH Bankers Association, the NH Association of School Superintendents, the NH Assessors Association, and the National Conference of the National Association of Home Builders.

He has been qualified as an expert witness in the US District Court, the US Bankruptcy Court, the NH Board of Tax and Land Appeals and most of the Superior courts in New Hampshire.

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National Commission on Water Quality

While a senior associate with Washington-based Hammer, Siler George Associates, Russ Thibeault analyzed the economic implications of the Clean Water Act via a case study analysis of the Chatahoochi-Flint-Appilachicola river system in Georgia and Alabama on behalf of the National Commission on Water Quality.

Pennichuck Water Company

The publicly traded Pennichuck Water company retained AER to analyze and value its assets in the face of a proposed takeover or the company by the City of Nashua. AER focused on the valuation of the company's holdings in coordination with a second consultant retained to estimate the overall value of the Corporation.

Milford/Hopkinton Massachusetts

Milford, Massachusetts retained Applied Economic Research to analyze the economic aspects of sharing unused sewage treatment capacity with neighboring Hopkinton, Massachusetts. The analysis included estimating the impact on Milford's sewer rates and estimating the inducednonresidential development likely to occur in both Milford and Hopkinton if Milford shared its unused sewer treatment capacity with adjacent Hopkinton.

Plymouth, Massachusetts: Sewer Extension Implications

Working in conjunction with Stearns & Wheler, Applied Economic Research analyzed the economic dimensions of extending sewer service to undeveloped sections of the Plymouth Industrial Park. The analysis included estimating the induced development likely to occur as a result of the extension and the impact on the local rate structure.

Route 3 Sewer Extension Feasibility: Bow, New Hampshire

In conjunction with Stearns & Wheeler, Applied Economic Research analyzed the feasibility of extending sewer service to Route 3A south in Bow, New Hampshire. Bow is located immediately adjacent to Concord and the proposed extension corridor was immediately adjacent to Interstate 93. Working in conjunction with Stearns & Wheler, AER analyzed alternative strategies to extend sewer service to this area of prime developable land, estimated the amount of induced development likely to occur, estimated the property tax revenues that would emerge from the extension and estimated the resulting sewer rates in reaching a conclusion as to the economic feasibility of the extension.

Mohegan Sun Wastewater Cost Analysis

The Mohegan Sun Casino retained Applied Economic Research to analyze the rate implications of alternative methods of financing a $30 million expansion to the wastewater collection system serving the Casino.

Mohegan Sun Casino

The Mohegan Tribe retained Applied Economic Research to analyze appropriate sewer impact fees for a $30 million extension of sewer service to the $1.2 billion expansion of the Mohegan Sun Casino. Working with the Tribe and local sewer officials, AER analyzed anticipated sewer volumes and loadings in determining a sewer impact fee and analyzing the implications of the tie-in to the overall local sewer system.

Shared Sewer Capacity Analysis: Dover and Rochester, New Hampshire

The city of Dover, New Hampshire retained Applied Economic Research to analyze the induced development and rate implications of permitting adjoining Rochester, New Hampshire to tie into the local sewer system. The local plant was operating at 50 percent of capacity. The adjoining city of Rochester needed to replace its aging sewage treatment plant and proposed that as an alternative to building a new plant, the two communities combine efforts. AER analyzed both the development implications of such a merger and the rate implications.