



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***



Economics of Seacoast NH Nutrient Removal

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

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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;

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- 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.

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| 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 |

Economics of Seacoast NH Nutrient Removal

| 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 Inflatior |
| 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

| | N 8; P 1 | N 5; P 0.2 | N 3; P 0.2 |
|--|----------------------|----------------------|----------------------|
| Scenario: | | | |
| 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 Municipal 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 | \$ 8,000,000 | \$ 20,000,000 | \$ 20,000,000 |
| Project Capital Cost - Total | \$ 628,400 | \$ 1,571,000 | \$ 1,571,000 |
| Annualized Capital Cost* | \$ 500,000 | \$ 1,000,000 | \$ 3,000,000 |
| Incremental Operating Cost - Nitrogen | | | |
| Incremental Operating Cost - Phosphorus | \$ 500,000 | \$ 1,000,000 | \$ 3,000,000 |
| Total Annual Operating Cost | \$ 1,128,400 | \$ 2,571,000 | \$ 4,571,000 |
| Total Annual Incremental Cost | | | |
| 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 Municipal 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 |
| <i>dover 2.0 nitrogen only</i> | | | |
| <i>seacoast wastewater preliminary calculations dover 2.0 nitrogen standards imposed</i> | | | |

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 Inflation |
| 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 Residential Flow | 70% | AER Revised from town's preliminary 80% |
| Residential Gallons per Day | 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 Municipal 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 |
| <i>dover 2.0 nitrogen only</i> | | | |
| <i>seacoast wastewater preliminary calculations dover 2.0 nitrogen standards imposed</i> | | | |

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 Inflation |
| 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 Municipal 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 Inflation |
| 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 Municipal 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 Infiator |
| 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 | |
| <i>seacoast wastewater preliminary calculations dover 2.0</i> | | |
| 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 |
| 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 Municipal 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 |
| <i>dover 2.0 nitrogen only</i> | | | |
| <i>seacoast wastewater preliminary calculations dover 2.0 nitrogen standards imposec</i> | | | |

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 associate 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.

3/2010



Applied Economic Research
Municipal Infrastructure Analysis Experience

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-Appalachicola 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 of 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 induced nonresidential 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 & Wheeler, 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 & Wheeler, 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.