



**APPENDIX K
APRIL 29, 2010 NBMA PROPOSED
COSTS FOR TREATMENT**

April 29, 2010

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Joshua T. Fox, E.I.T.
Water and Energy Staff Professional
Herbert, Rowland & Grubic, Inc.
369 East Park Drive
Harrisburg, PA 17111

Subject: Howe Township, Perry County, Act 537 Plan
Proposed Costs for NBMA Treatment of Howe Township Service Scenarios
Reply to February 19, 2010 Letter

Dear Mr. Fox:

On behalf of the Newport Borough Municipal Authority (NBMA), we welcome the interest of the Howe Township Supervisors and/or its Municipal Authority (Howe) in the potential for a cost effective intermunicipal solution to the wastewater challenges and opportunities facing the greater Newport community. We note that the Tri-County Regional Planning Commission prepared a Perry County Sewerage Plan in 1994 to promote orderly and efficient community growth by preventing duplication of facilities and encouraging intermunicipal management of wastewater services.

The NBMA Wastewater Treatment Plant (NBMA Plant) is permitted for a flow of 0.400 MGD. The most recent Chapter 94 Report for 2009 projects a maximum three month daily average flow in 2014 of 0.339 MGD. Permitted organic capacity is 680 lbs/day and the projected annual organic loading for 2014 was 298 lbs/day. Counting customers both in Newport Borough and Oliver Township, 1,337 EDU's are connected. From 2003 to 2009, there was no change in the EDU count.

Although Perry County as a whole is growing rapidly, the easier highway access and relative lack of floodplain has concentrated developers' interest within the greater Newport area in Howe Township rather than the Borough or Oliver Township. This statement is based on the continual decline in the Borough's population from 1940 to present the continued stagnant number of connections to the NBMA system since 2000 and the evident lack of interest by developers in Newport Borough and the portion of Oliver Township connected to the public sewers. Without the meaningful participation of Howe Township interests, the NBMA would not consider it prudent to increase the proposed wastewater treatment plant size currently serving Newport Borough and Oliver Township.

NBMA would be willing to accommodate service to Howe, to the extent that such service is funded by Howe or by its developers. The stagnant growth service areas of NBMA and OTMA are not able to fund speculative expansion in its wastewater treatment system for possible growth in Howe Township.

Within a reasonable expected design life of 20-40 years, Howe Township users were previously predicted to increase required capacity to 600,000 gallons per day (0.600 MGD). Each of the four scenarios fall within this range. Depending on the currently anticipated requirements of Howe Township, the capital improvements to accommodate Howe Township users differ.

Common Howe Responsibility for All Scenarios

Common to each of the scenarios is the need for at least one pump station to convey Howe Township flow to Newport. NBMA will presume that one (1) connection to the NBMA Plant will accommodate Howe Township flow. The demarcation point between NBMA and Howe Township responsibility is proposed to be the northernmost point of the property to be retained by NBMA on a portion of the former Nordic Gear site, as shown on the attached map.

Accordingly, Howe would be responsible for permitting and construction of the crossings of Norfolk Southern Railway Company property and the Juniata River. NBMA will afford access to its property for boring pits or other incidental construction related to Howe's construction of these crossings.

NBMA will require that Howe use odor control, anticipating that the force main crossings of the river and railroad will be sized for ultimate buildout and consequently the wastewater would have a long residence time in the force main. The capital and operating costs for such odor control will be Howe's responsibility and are not presently estimated. NBMA will also require that Howe implement ordinances to include an Industrial Pretreatment Program to reduce pollutant loadings and concentrations of commercial or industrial wastewaters to acceptable limits.

From the demarcation point to the physical connection within NBMA property to the treatment plant, the end of the force main and a meter will be owned and operated by NBMA. Costs for this terminal connection will be the responsibility of Howe.

For an anticipated 150' of 6" ductile iron force main @ \$100/lf plus \$7,500 for a meter and metering manhole, the capital cost is projected to be \$22,500.

If this connection is included in an expanded NBMA Plant, erosion and sediment pollution control and other permitting will be undertaken by NBMA and included in the project cost of the NBMA Plant. If the connection is made before or after the NBMA Plant is upgraded, the associated earth disturbance permitting and design drawings and specifications for this connection will also be Howe's responsibility subject to NBMA approval.

Scenario-Specific Howe Responsibility for Each Scenario

Beyond the connection or tapping point (within the meaning of Act 57 of 2003), the anticipated capital costs differ for each scenario.

For *Scenario 1*, the 12,000 gpd request falls within the 41,000 gpd reserve capacity of the NBMA Plant. Accordingly, in the event this connection is made before the scheduled upgrade of the NBMA Plant, it would be expected that Howe would purchase this capacity from both NBMA and Oliver Township Municipal Authority (OTMA) at a pro rata share to be determined, but in both cases at the current capacity component of the tapping fee at \$1,697 per 203.4 gpd EDU (59 EDU's), for a cost of \$100,123.

Then, when the treatment plant is upgraded, Howe would be responsible for 3% (0.012 MGD / 0.400 MGD) of the cost of the new treatment plant downstream of the connection point. At the \$7.5 million anticipated project cost of the 0.4 MGD plant, Howe's share would then be \$225,000.

For **Scenario 2**, the 32,000 gpd request falls within the 41,000 gpd reserve capacity of the NBMA Plant. Accordingly, in the event this connection is made before the scheduled upgrade of the NBMA Plant, it would be expected that Howe would purchase this capacity from both NBMA and OTMA at a pro rata share to be determined, but in both cases at the current capacity component of the tapping fee at \$1,697 per 203.4 gpd EDU (158 EDU's), for a cost of \$268,126.

Then, when the treatment plant is upgraded, Howe would be responsible for 8% (0.032 MGD / 0.400 MGD) of the cost of the new treatment plant downstream of the connection point. At the \$7.5 million anticipated project cost of the 0.4 MGD plant, Howe's share would be \$600,000.

Common to both Scenario 1 and Scenario 2 is the use of existing EDU's currently temporarily reserved by Newport Borough Water Authority (NBWA) River Filtration Plant which is currently under construction. However, NBWA has applied for a separate NPDES Industrial Wastewater Permit and it is anticipated that by the time that Howe's system would complete planning, design, and permitting, NBWA's EDU's will have returned to NBMA and OTMA and available for redistribution according to the above procedure.

For **Scenario 3**, the flow of 66,000 gpd will require expansion of the treatment plant. Since the Newport Borough Act 537 Plan is currently being prepared, it will be necessary for Howe to commit very soon to the purchase of this level of capacity. With due regard for peaking and operational flexibility NBMA would propose to increase the capacity of the proposed treatment plant from 0.400 MGD to 0.500 MGD to make 0.100 MGD, or 100,000 gpd, of reserved capacity available for Howe's use. Howe would be responsible for 20% (0.100 MGD / 0.500 MGD) of the cost of the new treatment plant downstream of the connection point. Taking a project cost of \$8.0 million for a potential 2 basin 0.5 MGD SBR, Howe's share would be \$1.6 million.

For **Scenario 4**, the flow of 173,000 gpd will require expansion of the treatment plant. Since the Newport Borough Act 537 Plan is currently being prepared, it will be necessary for Howe to commit very soon to the purchase of this level of capacity. With due regard for peaking and operational flexibility NBMA would propose to increase the capacity of the proposed treatment plant from 0.400 MGD to 0.600 MGD to make 0.200 MGD, or 200,000 gpd, of reserved capacity available for Howe's use. Howe would be responsible for 33.3% (0.200 MGD / 0.600 MGD) of the cost of the new treatment plant downstream of the connection point. Taking a project cost of \$8.5 million for a potential 3 basin 0.6 MGD SBR, Howe's share would be \$2.83 million.

Chesapeake Bay Tributary Strategy/Nutrient Credit Effects

The NBMA Plant will ultimately have a cap loading for Total Nitrogen and Total Phosphorus. Discharges of Total Nitrogen and Total Phosphorus will increase, and continue to increase, as additional housing units are added to the collection system and annual average flows increase. Such increases will be attributed generally to flows originating from Howe if and when such development is connected to the NBMA Plant.

The NBMA Plant will ultimately have a cap loading for Total Nitrogen. The current market price per credit for Total Nitrogen credits, as provided through Red Barn Trading Company, is as follows:

- \$5.15 from 2010 through 2015
- \$6.71 from 2016 through 2020
- \$7.98 from 2021 through 2025
- \$9.01 from 2026 through 2030

The current market price for Total Phosphorus credits, as provided through Red Barn Trading Company, is \$4.00 per credit. Based on discussions with PA DEP, as well as Red Barn Trading Company, it is reasonable to estimate that the future prices will be as follows:

- \$4.50 per credit from 2015 through 2020
- \$5.00 per credit from 2021 through 2025
- \$5.50 per credit from 2026 through 2030

Due to lack of information provided in the letter request concerning nutrient loadings, and the relative proportion of existing (potentially transferable cap) vs. potential new (no new cap), we are presently unable to estimate the value of any required credit purchases to Howe.

The cost for the credits required for any such new development in Howe will be the responsibility of Howe. If no credit purchases are required to meet NBMA Plant's NPDES Permit, there will be no cost to Howe for that year.

If credit purchases are required, Howe will be first responsible for bearing the cost of any credits up to and including its influent loading of total nitrogen measured by sampling from the meter pit. In the event some existing units in Howe are to be connected, it will be expected that the cap loading for the existing units be submitted for DEP to increase the overall cap loading at NBMA's Plant. This will obviously reduce any credit charges that would be made to Howe because no charges are to be made unless and until the entire NBMA Plant is required to buy credits.

In order to meet compliance with the Chesapeake Bay Tributary Strategy requirements (TN of 3 mg/L and TP of 0.4 mg/L), with the possibility of connecting Howe Township users in future, Newport Borough must ultimately achieve enhanced biological nutrient removal. Enhanced biological nutrient removal means reducing the Total Nitrogen concentration to 3 mg/L or less and the Total Phosphorus concentration to 0.4 mg/L or less.

The additional treatment tankage required to increase the capacity to this level would then be constructed and available for use once it is permitted through PA DEP and paid for by Howe Township. However, the established cap loadings will not likely be increased for connection of new development, requiring enhanced biological treatment to continually maintain compliance. The Borough's NPDES permit currently contains a monitor and report provision for Total Phosphorus. When the Chesapeake Bay Tributary Strategy and/or more strict EPA limits are imposed, chemical precipitation of the Phosphorus using aluminum sulfate would likely be required. Nitrogen removal is more critical than phosphorus removal in biological process selection, since phosphorus may be removed by chemical precipitation while nitrogen is not. Accordingly it is assumed that nitrogen will be removed biologically while phosphorus will be precipitated.

The area available within the existing site and flood elevations are also key factors in determining the most feasible biological treatment process. Newport Borough has land available immediately adjacent to its treatment plant due to its purchase of the former Nordic Gear property.

As previously stated, the Borough's facility is predicted to maintain its capacity at 400,000 gallons per day (0.400 MGD). However, Howe Township development within the next 20 years may require treatment at Newport to increase possibly as high as 600,000 gallons per day (0.600 MGD). The additional treatment tankage required to increase the capacity to this level would then be constructed and available for use once it is permitted through PA DEP and paid for by Howe Township. To reduce costs, it is important that as much of the existing treatment tankage be utilized as possible, as this will reduce the overall construction costs and reduce the extent of additional tankage required for the expansion when permitted by PA DEP. The existing tankage can be devoted to digestion and high-flow chlorine contact due to its size.

Financial costs including capital costs, energy and maintenance costs also play a critical role in the selection of the most feasible biological treatment processes. A project of this magnitude will ultimately require significant funds to be borrowed, leading to substantial debt service and unavoidable rate increases. For this reason, the most feasible processes will be those that utilize the existing treatment tankage, require the least amount of additional land and construction, and provide the best treatment for the lowest annual expenses.

The treatment upgrade option anticipated to be chosen in the Newport Borough Act 537 Plan is the upgrade/repair of the treatment plant by replacing the existing conventional activated sludge system with two Sequencing Batch Reactors (SBRs) that have the mechanical and electrical equipment mounted on top of the reactor basins above the 500-year flood plain elevation. The chlorine disinfection system is proposed to be replaced with an Ultraviolet (UV) system. The current lime stabilization and land application approach to biosolids reuse would be retained. The existing treatment tanks would be modified for digestion and high-flow disinfection. At 0.4 MGD, construction cost is estimated at \$7,500,000.

The SBR process is anticipated to generate effluent concentrations as follows; Total Nitrogen 3 mg/L and Total Phosphorus 1 mg/L.

EBNR processes will generally result in an 8% to 10% increase in biosolids production for the same organic loading. The increase in biosolids production is dependent upon the mixed liquor suspended solids maintained within the treatment basins as well as the sludge retention time of the process selected.

Operation and Maintenance (O&M) Costs for Each Scenario

Existing O&M annual budget for NBMA plant operations considering both NBMA and Newport Borough plant expenditures is approximately \$200,000 which is shared by NBMA and OTMA on a semi-annual payment flow-proportional basis. NBMA would extend similar consideration to Howe or it may be adjusted to quarterly payment to coincide with billing cycles.

For *Scenario 1*, it is anticipated O&M costs would increase by 3.4% due to flow variable and metering. Howe would then be responsible for an anticipated 3.4% flow percentage of 103.4% of the existing O&M budget, or \$7,031 annually.

After construction of the new plant, it is anticipated O&M costs would increase by 15% due to higher pumping costs into the elevated flood-protected new plant, the chemical needs of phosphorus precipitation, and handling increased volumes of sludge. In this example, Howe would be responsible for 3.4% flow percentage of 103.4% of 115% of the current O&M budget, or \$8,086 annually.

For *Scenario 2*, it is anticipated O&M costs would increase by 4% because only half of the O&M budget is considered flow variable. Howe would then be responsible for an anticipated 8% flow percentage of 104% of the existing O&M budget, or \$16,640 annually.

After construction of the new plant, it is anticipated O&M costs would increase by 15% due to higher pumping costs into the elevated flood-protected new plant, the chemical needs of phosphorus precipitation, and handling increased volumes of sludge. In this example, Howe would be responsible for 8% flow percentage of 104% of 115% of the current O&M budget, or \$19,136 annually.

For *Scenario 3*, it is anticipated that O&M costs would increase by 25% due to the increased plant size as well as the BNR associated cost increases as detailed above. However, Howe would only be charged its current flow percentage. Adding 0.066 MGD to the 0.339 MGD current flow utilization, gives 0.405 MGD as the O&M flow basis. In this example, Howe's percentage of operating expenses is $(0.066 \text{ MGD} / 0.405 \text{ MGD})$ or 16.3%. Thus Howe would be responsible for 16.3% of 125% of the current O&M budget, or \$40,750 annually.

For *Scenario 4*, it is anticipated that O&M costs would increase by 30% due to the increased plant size as well as the BNR associated cost increases as detailed above. However, Howe would only be charged its current flow percentage. Adding 0.173 MGD to the 0.339 MGD current flow utilization, gives 0.512 MGD as the O&M flow basis. In this example, Howe's percentage of operating expenses is $(0.173 \text{ MGD} / 0.512 \text{ MGD})$ or 33.8%. Thus Howe would be responsible for 33.8% of 130% of the current O&M budget, or \$87,880 annually.

Comments on Funding

It is anticipated that funding for the proposed NBMA Plant upgrade project will be provided either by bank loans, and either PENNVEST grants, RUS grants or loans. If grant money is available, the monthly and quarterly User Rates will be reduced accordingly.

Newport Borough and its Authority do not have sufficient capital reserves to finance the project costs. Funding will be required from grants from PennVest and RUS and/or very low interest loans from these financial institutions. These public funding sources do not fund capacity increases for speculative development hence the capacity increases for Scenarios 3 and 4 will need to be funded through other sources Howe must investigate.

Summary of Costs

The following tables summarize the costs associated with the NBMA Plant treating Howe's wastewater under each of the scenarios, assuming normal domestic strength wastewater.

The summary of presently anticipated capital costs associated with NBMA treatment under each scenario is shown in the table below:

CAPITAL COSTS BY SCENARIO									
Scenario No.	Flow	STP Capacity	Common	Pre-Upgrade	Total Capital Pre-Upgrade	Post-Upgrade	Total Capital	EDU's	Total Capital Cost/EDU
1	12,000		\$22,500	\$100,123	\$122,623	\$ 225,000	\$ 347,623	59	\$5,892
2	32,000		22,500	\$268,126	290,626	600,000	890,626	157	5,673
3	66,000	100,000	22,500	N/A	N/A	1,600,000	1,600,000	324	4,938
4	173,000	200,000	22,500	N/A	N/A	2,833,000	2,833,000	851	3,329
NBMA: 203.4 gpd/EDU									

The summary of presently anticipated O&M costs associated with NBMA treatment under each scenario is:

O&M COSTS BY SCENARIO									
Scenario No.	Howe Flow	NBMA & OTMA Flow	Howe %	Pre-Upgrade	Monthly O&M Pre-Upgrade Cost/EDU	Post-Upgrade Increase	O&M Post Upgrade	EDU	O&M Post-Upgrade Cost/EDU
1	12,000	339,000	3.4%	\$ 7,031	\$9.93	15%	\$ 8,086	59	\$11.42
2	32,000	339,000	8.6%	16,640	8.83	15%	19,136	157	10.16
3	66,000	339,000	16.3%	N/A	N/A	20%	39,111	324	10.06
4	173,000	339,000	33.8%	N/A	N/A	25%	84,473	851	8.27
\$200,000 O&M annual baseline									

Obviously, the costs presented here do not include Howe's collection and transmission capital costs, debt service cost and O&M costs upstream of the proposed demarcation point.

Furthermore, the O&M costs do not include the purchase of treatment credits associated with new development. Treatment credit costs for a Howe go-it-alone scenario would clearly exceed those for treatment at the NBMA Plant, as there would be no possibility of credit use within an existing cap load because Howe does not have an existing cap load.

On behalf of Newport Borough Municipal Authority, we welcome further discussion of the possibility of providing community and public wastewater service to Howe Township and to the greater Newport community.

The NBMA is currently in the process of preparing an update to the Newport Borough Act 537 Plan and presently has an H2O PA funding application submitted for the existing plant upgrade. It would be most helpful if Howe would submit any written request of capacity that may result in an increase to the existing plant capacity of 0.400 MGD as soon as possible. This request would be most useful in advance of the deadline for revisions to NBMA's H2O PA funding application which must be submitted prior to June 1, 2010.

Joshua T. Fox, E.I.T.
Herbert, Rowland & Grubic, Inc.
April 29, 2010
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If you have any further questions or comments, please contact me.

Very truly yours,

Kevin D. Jacobs, P.E.
Project Manager

Cc: Newport Borough Council
Oliver Township Board of Supervisors
Howe Township Board of Supervisors
Oliver Township Municipal Authority
Howe Township Municipal Authority