WARWICK SEWER AUTHORITY
125 ARTHUR W. DEVINE BLVD.
WARWICK, RHODE ISLAND 02886

TEL (401)-739-4949

July 24, 2012

Mr. Angelo Liberti, P.E.
Chief, Surface Water Protection Section
Office of Water Resources
Rhode Island Department of Environmental Management
235 Promenade St.
Providence, RI 02908-5767

Subject: Approval of Facility Plan Amendment and Finding of No Significant Impact for DEM File #11-H Warwick, Rhode Island Additional Phosphorus and Nitrogen Removal

Dear Mr. Liberti:

Warwick Sewer Authority (WSA) is in receipt of your letter approving the Facility Plan Amendment and issuing a Finding of No Significant Impact. In accordance with the approval letter, we are submitting a response evaluating the options for, and suggested good faith reductions to, the current interim limit for Total Phosphorus (TP). Additionally, we are responding to the requirement that the final Total Nitrogen (TN) limit of 8 mg/L be met immediately.

WSA currently removes TP with a combination of biological and chemical processes. TP is predominantly removed through the biological phosphorus removal process. A small amount of aluminum sulfate (alum) is added to the rotary screen thickener filtrate when sludge is processed because TP is highly concentrated in the filtrate and can be removed very effectively with a small amount of chemical. Removal of additional TP can only accomplished on-site through additional chemical means such as dosing alum ahead of the primary settling tanks or after the biological nutrient removal basins. Both of these alternatives were examined in the Facility Plan in Section VII.

Chemical dosing to the primary settling tanks is not recommended by WSA's engineer or possible at this time. As alluded to in the Facility Plan, this practice has the potential of removing too much phosphorus and starving the biological process of the phosphorus needed for cell growth. Additionally, the piping for this practice is not in place and would need to be installed in a permanent manner due to the distance between the primary settling tanks and the alum pumps.

Although the piping exists for chemical dosing to the secondary clarifiers, there is little convincing data that regular dosing of alum at this point will reliably reduce the effluent TP to a point where WSA would feel comfortable proposing a reduction in the TP limit before the implementation of the WWTF upgrades. As presented in Section VII of the Facility Plan, one day of jar testing was conducted on the secondary effluent. The data are suspicious due to the fact that TP is often less than filtered TP and soluble TP, but they seem to suggest that approximately 0.2 mg/L of TP is removed when dosing with alum at this location.

As also presented in Section VII of the Facility Plan, the average effluent TP since completion of the last upgrade in 2005 is 0.65 mg/L. The standard deviation during this time is 0.48 mg/L. However, the data is skewed to the high side of the average. Assuming that the one day of jar testing is representative, a reduction of approximately 0.2 mg/L will not result in reliable operation well below 1 mg/L which is the level the plant was designed for in the 2004 upgrade. WSA will continue to strive to improve phosphorus removal but request that the interim limit remain in place.

In regards to the TN limit being implemented immediately, WSA and its engineer, AECOM, believe that replacement of the existing submersible mixers is required to meet the permit limit In addition to the DO control system and filtrate holding tank improvements detailed in the Facility Plan, replacement of the mixers is also discussed as a shortcoming of the existing biological nutrient removal process in Section V. The reasoning for the replacement is that the existing mixers in the biological nutrient removal process are largely inoperable and have been maintenance intensive which has created zones that are poorly mixed and allows solids to settle out of solution.

The model results presented in the Facility Plan that serve as the basis for meeting the permit requirement of 8 mg/L assume that this issue is resolved and that the anoxic zones are mixed without the introduction of air. WSA admits that the text in the Facility Plan is not explicit in regards to the criticality of these mixers to the overall process. Nonetheless, WSA requests that implementation of the TN limit be delayed until the original date in the Consent Agreement of September 30, 2014, allowing it time to evaluate the mixing power required for the various zones, evaluate mixer configurations, and design and install a properly designed mixing system.

All of this being said, the WSA staff is committed to nutrient removal. We strive to reduce our nutrient discharges to the lowest levels given these constraints. For example, we achieved an average of 7 mg/l for effluent TN in June. Please be assured that we will continue to make our best efforts but, without the new equipment and other facility upgrades, we cannot guarantee we will get those results consistently.

On a related matter, we would like to meet with you and your staff to discuss the levee and other flood protection measures for the facility. AECOM recently completed the preliminary design and we are now looking at combining the levee project with the phosphorus removal project into a single contract with the levee construction proceeding before any expensive equipment for phosphorus removal is installed. In preparing the initial schedule for the combined projects (see enclosed), substantial completion of the phosphorus project looks to be delayed about 8 months. Sequencing the projects -- doing the levee first followed by the new phosphorus process – results in even longer delays (see enclosed). We have not yet decided how to proceed and would like your input.

Please contact me directly at 738-0354 should you have any questions or comments regarding this letter.

Yours sincerely,

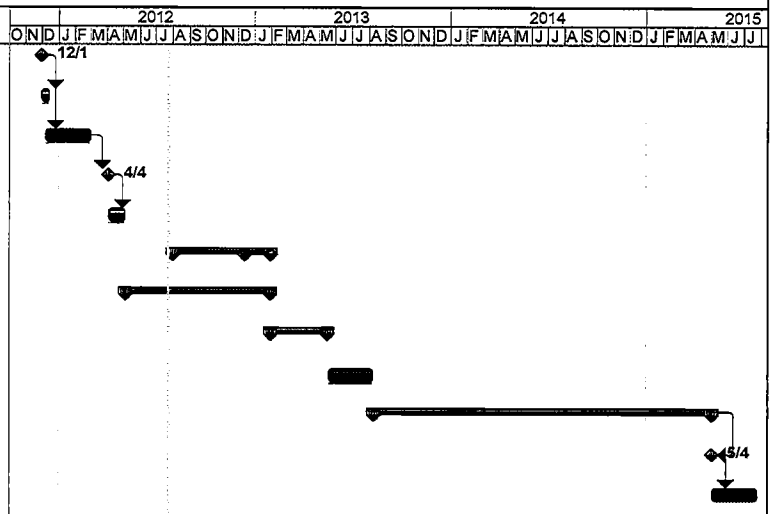
Janine Burke
Executive Director
Warwick Sewer Authority

Encl: Schedule with Combined Phosphorus/Levee Project
Schedule with Separate Phosphorus and Levee Projects

cc: S. Avedisian, City of Warwick
WSA Board of Directors
P. Doyle, WSA
A. Zeman, RIDEM
D. Setzko, AECOM
File

Warwick Sewer Authority
Phosphorus Removal Upgrade / Flood Protection
Implementation Schedule with Combined Construction Projects

ID	Task Name	Duration	Start	Finish	Predecessors
1	Submit Draft Facilities Plan Amendment	1 day	Thu 12/1/11	Thu 12/1/11	
2	Submit Intergovernmental Review Documents	10 days	Fri 12/2/11	Thu 12/15/11	1
3	RIDEM Review	3 mons	Fri 12/9/11	Thu 3/1/12	1
4	Public Hearing	1 day	Wed 4/4/12	Wed 4/4/12	3FS+15 days
5	Respond to Comments / Submit Final Facility Plan	22 days	Thu 4/5/12	Fri 5/4/12	4
6	Levee Design	131 days	Fri 8/3/12	Fri 2/1/13	
32	Phosphorus Removal Design	194 days	Mon 5/7/12	Fri 2/1/13	
64	RIDEM Review / Order of Approval	76 days	Fri 2/1/13	Fri 5/17/13	
73	Bidding Services + Contract Execution	60 days	Mon 5/20/13	Fri 8/9/13	72
74	Construction	451 days	Mon 8/12/13	Mon 5/4/15	
81	Substantial Completion	1 day	Mon 5/4/15	Mon 5/4/15	74FF
82	Punch List and Closeout	60 days	Tue 5/5/15	Mon 7/27/15	81



Project: Implementation Schedule
Date: Tue 7/24/12

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

Warwick Sewer Authority
Phosphorus Removal Upgrade / Flood Protection
Implementation Schedule with Separate Construction Projects

ID	Task Name	Duration	Start	Finish
1	Submit Draft Facilities Plan Amendment	1 day	Thu 12/1/11	Thu 12/1/11
2	Submit Intergovernmental Review Documents	10 days	Fri 12/2/11	Thu 12/15/11
3	RIDEM Review	3 mons	Fri 12/9/11	Thu 3/1/12
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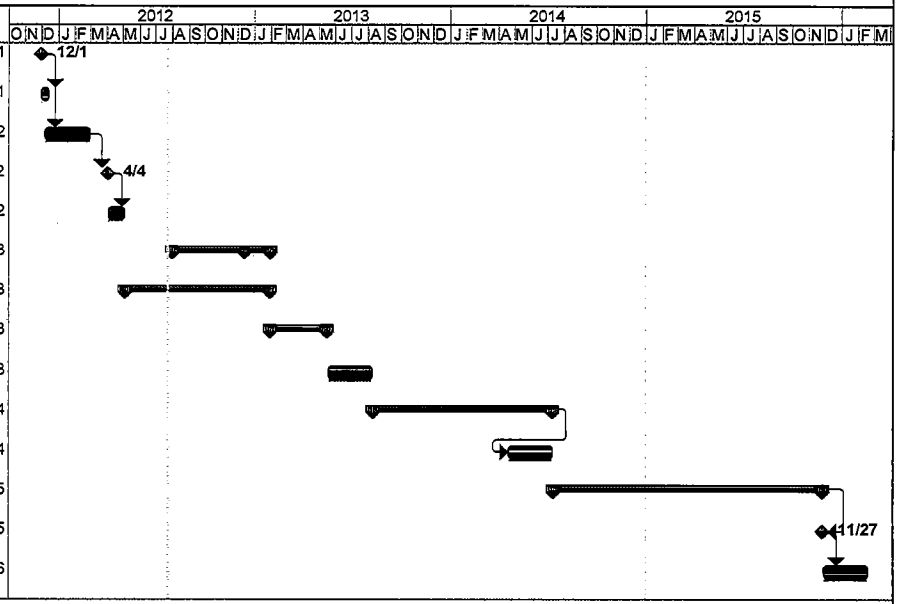
6	Levee Design	131 days	Fri 8/3/12	Fri 2/1/13
32	Phosphorus Removal Design	194 days	Mon 5/7/12	Fri 2/1/13
64	RIDEM Review / Order of Approval	76 days	Fri 2/1/13	Fri 5/17/13
73	Levee Bidding Services	60 days	Mon 5/20/13	Fri 8/9/13
74	Levee Construction	240 days	Mon 8/12/13	Fri 7/11/14
78	Phosphorus Bidding / Contract Execution	60 days	Mon 4/21/14	Fri 7/11/14
79	Phosphorus Construction	360 days	Mon 7/14/14	Fri 11/27/15
84	Substantial Completion	1 day	Fri 11/27/15	Fri 11/27/15
85	Punch List and Closeout	60 days	Mon 11/30/15	Fri 2/19/16



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