City of Portsmouth, New Hampshire
Wastewater Master Plan

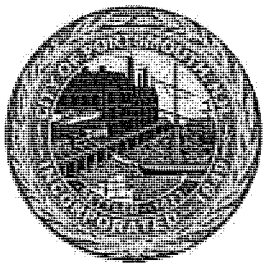
Final Technical Memorandum
Supplemental Work Plan No. 1
Interim Alternatives Evaluation

The City of Portsmouth (the City) entered into a settlement agreement on January 18, 2008 that necessitated the development and implementation of Supplemental Work Plan (SWP) No. 1 as part of the overall Wastewater Master Plan (WMP). This SWP was intended to identify, review, and analyze interim measures that could be implemented during the term of the Peirce Island Wastewater Treatment Facility's (WWTF's) current National Pollutant Discharge Elimination System (NPDES) Permit. Specifically, the categories that were considered included; stormwater pollution mitigation, reduction in wastewater treatment plant sources, review of Best Management Practices (BMP's), and operational improvements at both the Peirce Island and Pease WWTF's. The City's agreement was intended to evaluate potential interim measures to reduce the discharge of total suspended solids (TSS) and total nitrogen (TN) to the Piscataqua River.

This Technical Memorandum summarizes the "Interim Measures" that were identified for further evaluation in the Technical Memorandum titled, Interim Alternatives Evaluation and dated June 20, 2008. The complete Technical Memorandum (June 20, 2008) and its supporting documentation is included in Appendix A. These measures were developed following a two-phase brainstorming and screening process in April and May of 2008. Subsequent negotiations with the City, Regulatory Staff, and representatives of the Conservation Law Foundation ensued, and several of the identified interim measures were selected for final review. In addition to their effectiveness for TSS and TN reduction, the measures were also evaluated for their feasibility of implementation, and capital cost for implementation.

The final "interim measures" that were selected for the more detailed evaluation included:

- Increasing the Illicit Discharge Detection Elimination (IDDE) Program,
- Implement Urban Best Management Practice (BMP) Retrofits,
- Eliminate Nitrogen (Chloramination) Usage at Pease,
- Interim Diversion of Wastewater Flow from the Peirce Island WWTF to the Pease WWTF,
- Headworks Screening Upgrades at Peirce Island,
- Development of a Stormwater Utility,
- In-Pipe Technology Application.



Increasing the IDDE Program:

The City of Portsmouth has been upgrading its aging infrastructure including water, sewer, storm drainage, sidewalks, and roadways on an annual basis. Specifically, the City's Combined Sewer Overflow (CSO) Long Term Control Plan (LTCP) has been focusing on targeted areas for sewer separation to reduce wet weather flows to the Peirce Island WWTF. The City's current IDDE Program includes the relocation of illicit connections that are discovered during the planned construction projects as well as during routine maintenance of the stormwater system. Based on discussions with the City staff, this approach has found between 3 and 6 illicit connections annually. Once located, the connection is relocated to the appropriate sewer and those wastewater flows are directed to the wastewater treatment facility.

The City completed a Stormwater Master Plan (the Plan) dated May 8, 2007 which was prepared by Edwards & Kelcey (E & K) of Portland, Maine. The Plan identified over 3,700 catch basins, 323,000 linear feet of storm drain pipe, and in excess of 450 outfalls. The Plan indicated that the outfall inspections did not warrant an immediate response by the City based on indications of a major sewage spill, oil, or chemical discharge. Of the Outfalls inspected by E & K staff, approximately 1% scored sufficiently high enough using a qualitative assessment to warrant further inspection for illicit connections. However, the Plan noted that none of those outfalls were severe enough to warrant an immediate response by the City. In addition, the Plan identified over 70 outfalls as high priority due to their discharge into the impaired waters of North Mill Pond and the Back Channel. Finally, the Plan indicated that the areas northwest of North Mill Pond should be televised to assess if any illicit connections are present. These are all items that could be completed under an enhanced IDDE Program.

The City's Phase 2 Stormwater Permit identifies the development of an IDDE Program. In accordance with its permit, the City has developed and is implementing an IDDE Program. EPA has recently issued the draft version of the next generation of the Phase 2 General Permit. The changes from the initial Phase 2 General Permit include comprehensive measures for prioritizing areas within the permit holders storm drainage system that are likely to contain the highest number of illicit connections. This is consistent with the original permit cycle conditions with the exception of increased record keeping requirements in the new permit. This will require additional staffing and funding for enhancing the City's current program.

In order to take a more proactive approach, the Plan recommended the City increase the IDDE Program by designating City staff for the program. This program, while not specifically developed, could proceed in numerous directions, however, our understanding of similar efforts in the region indicate that a part-time team of City staff could be utilized to inspect and sample specific outfall(s) during both dry and wet weather periods to screen for the indicators of illicit connections to the storm system. If visual or sample result indicators are found in a drainage basin, City staff will track the indicators within the upstream storm drainage system segments.

This could be accomplished by visual indicators and dry weather storm drain flow conditions, or using storm/surface water sampling and analysis techniques for illicit discharge indicators.

Once a sufficiently small segment of storm drain has been isolated, the City will utilize a combination of dye testing, close circuit television (CCTV) inspection, and other methods to investigate the storm drainage system segment. If there were illicit connections identified, the City sewer division or the responsible party will relocate the connection from the storm drain to the sewer.

Effectiveness: It is difficult to assess the overall effectiveness of implementing this interim measure. Based on the historical number of illicit connections found during recent construction efforts, one might expect the increased effort from a dedicated City staff team could identify fifty percent (50%) more connections. It should be noted that this increase would decrease over time as the number of potential illicit connections is a finite number. During the initial years of a more comprehensive program, we estimate that additional 3-5 illicit connections per year may be identified. Using standard values for TSS and TN for single family residential connections an enhanced IDDE Program would provide a reduction of approximately 600 lbs/yr of TSS and 24 lbs/yr of TN for the additional four (4) illicit connections. These assumptions and associated calculations are included in Appendix B.

Feasibility of Implementation: The City already has an IDDE Program as required by the EPA Phase 2 Stormwater Permit. City budget development should consider funding an enhanced program on an annual basis.

Costs: There are a variety of annual costs that may be required to support a dedicated IDDE team including: labor, sampling/analysis costs, and specialty equipment. The projected results of a more focused IDDE team are also highly speculative since the City has not historically seen a significant number of visual indicator complaints at stormwater outfall locations based on the recently completed Plan. However, based on similar programs in the northeast, we estimate a dedicated staff of two (2) would be required on a part-time basis for six months of the year. This equates to approximately 1,000 person-hours of staff time. Additionally, we estimate that CCTV of storm drains would be required periodically with an annual budget of $15,000 for City staff and equipment. Finally, once each illicit connection is located the City Sewer Staff and equipment would be mobilized and the connection removed and relocated to an adjacent gravity sewer. Cost for such relocation may be recoverable from the property owner if deemed appropriate.

It is estimated that the following annual budget would be required:

City staff 1000 hours	$ 50.000.00
Sampling/Analysis (estimate)	$ 10,000.00
CCTV (estimate)	$ 15,000.00
Illicit Relocation (3/yr at $5k/loc)	$ 15,000.00
Total Estimated Annual Budget	$ 90,000.00

Implement Urban BMP Retrofits:

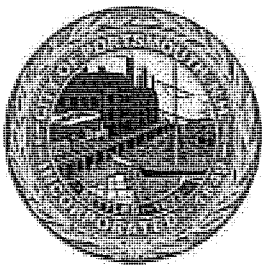
The implementation of urban BMP retrofits was identified as an interim measure based on the success of some of these measures undertaken at the UNH Stormwater Center. The UNH Center has been in existence since 2003 and has been a proving ground for non-point source pollution treatment technologies. The field site is designed to test a range of stormwater treatment systems under the same conditions. The field site contains three (3) types of stormwater treatment systems; conventional, structural BMP's: such as swales, porous pavement, and retention ponds; low impact designs such as tree filters, bio-retention systems, a gravel wetland and manufactured BMP's such as hydrodynamic separators and subsurface infiltration/filtration systems. In addition, EPA has recently developed a new urban retrofit guidance document entitled "Urban Stormwater Retrofit Practices" which is available at the Center for Watershed Protection website at (www.cwp.org). This document is a valuable tool when utilized to evaluate urban infrastructure upgrades.

Based on our discussions with City staff, the majority of the private construction projects within the City are already utilizing a variety of these types of non-point source pollution treatment technologies. The City's Stormwater Master Plan also recommended certain stormwater permitting modifications that would promote the continued and expanded use of these urban BMP stormwater measures. Steps have been taken to update City Ordinances to incorporate these measures.

The intent of this interim measure is to evaluate the utilization of these urban retrofits as part of future infrastructure upgrades. Specifically, the State Street Infrastructure Upgrade, which is presently in the design phase, may be utilized as a pilot program to further assess the benefits of these technologies for the reduction of TSS and TN along with reducing peak flows in both the stormwater and wastewater systems. As part of the design, the City has committed to evaluate utilization of these technologies including technologies such as tree filters, infiltration systems, porous pavement, etc. The 2007 UNH Stormwater Center Annual Report is included as Appendix C and includes descriptive information on the technologies that may be considered by the City.

Effectiveness: It is difficult to accurately quantify the effectiveness of using these urban retrofits as part of the City's infrastructure projects. Many of the technologies have demonstrated the ability to remove TSS at removal rates in excess of 80%. Removal efficiencies for nitrogen are more difficult to quantify, however the UNH Center has reported removal rates ranging from 30 % to over 80 %.

Feasibility of Implementation: Based on the timing for the design and construction of the State Street Project, the City should consider using the project as a pilot program to assess the retrofit(s) effectiveness for future projects in the City.



Costs: The implementation costs for public projects are not readily available and are typically site specific. Vendor information and documentation by the Stormwater Center estimate the costs between $ 15,000 to over $ 50,000 per acre of drainage area. Based on the size of the State Street project, we estimate the City should budget $ 100,000 for utilization of any appropriate urban BMP retrofits.

Eliminate Nitrogen (Chloramination) Usage at Pease:

Sodium hypochlorite is utilized for disinfection at the Pease WWTF. Due to interferences with certain organic compounds within the existing wastewater stream, chloramination (the addition of ammonia with sodium hypochlorite to the WWTF effluent prior to disinfection) has been required to achieve disinfection at various times. The disinfection requirements are regulated by the facility's National Pollutant Discharge Elimination System (NPDES) permit, and therefore, must be met.

Due to changing wastewater characteristics, interfering organic compounds are not currently present, and chloramination was suspended on May 21, 2008.

The Pease WWTF operating data for the summer of 2008 (through August 19) indicated that the facility is fully nitrifying and that denitrification can effectively reduce effluent total nitrogen levels to less than 10 mg/L. Pease WWTF operational data supplied by City staff has been included as Appendix D.

Effectiveness: As currently operated, the WWTF does not utilize chloramination. The available data suggests that without chloramination and with the WWTF operated with a nitrification/denitrification process, total nitrogen is less than 10 mg/l.

Feasibility of Implementation: Chloramination has not been utilized at the Pease WWTF since May 21, 2008. However, should chloramination become necessary in the future to meet NPDES permit requirements, other alternatives may warrant consideration, such as ultraviolet light (UV) disinfection. If UV disinfection is pursued and with allowances for approval by the City Council, design, pilot and optimization testing, bidding and construction, this option could potentially be operational during the last year of the current permit cycle, assuming that the pilot and optimization testing results were favorable.

Costs: As long as the WWTF disinfection limits can be met, there is a cost savings associated with curtailing chloramination, since ammonia does not need to be utilized. Should chloramination again be required, and an alternative such as UV is considered, the estimated cost to pilot test, evaluate and install is approximately $1 million. This cost includes the UV disinfection systems, a structure to house the systems, covers for the effluent equalization tanks, and effluent filters to ensure total suspended solids (TSS) levels are below UV light transmittance interference levels. Covers are required on the effluent equalization tanks to inhibit algae blooms, which currently occur in summer months and would negatively impact the effectiveness of the UV system.

Interim Diversion of Wastewater Flow from Peirce Island WWTF to the Pease WWTF:

The majority of wastewater flow in Portsmouth is conveyed to the Peirce Island WWTF where it receives advanced primary treatment. Flows generated within the Pease Tradeport are conveyed to the Pease secondary treatment facility. The Gosling Road Pump Station and service area are adjacent to Pease. Interim measure screening identified this area for potential divertion to the Pease WWTF for increased TSS and TN removal.

The Gosling Road wastewater pumping station was evaluated to determine if it was capable of pumping wastewater to the Pease WWTF. Based on the evaluation, it was determined that the existing force main could be extended from the current discharge location near Woodbury Avenue along Arthur Brady Drive. From that point, a directional drilling or jacking of the force main extension would be completed across the Spaulding Turnpike to the existing Pease sewer system on Corporate Drive, ultimately discharging to the existing gravity sewer and ultimately to the Pease WWTF.

Effectiveness: Diversion of the existing average daily flow of over 400,000 gallons per day would reduce flows to Peirce Island and provide additional levels of treatment. Based on typical wastewater values for TSS and TN, and the existing levels of treatment for each facility, we estimate the annual reduction in TSS and TN to the Piscataqua River at 70,000 lbs/yr and 35,000 lbs/yr respectively. Excerpts from the pumping station design report, along with calculations used to determine the estimated reduction values are included in Appendix E.

Feasibility of Implementation: Based on information provided in the 2004 Pumping Station Design Report and our discussions with City staff, regulators, and permitting agencies, this interim measure is implementable. However, final design and permitting for implementing this measure should wait until the ongoing WMP is completed and it is determined that the Pease WWTF will be a long term component of the City's wastewater treatment system. With allowances for approval by the City Council, design, bidding and construction, this option could potentially be operational during the last one to two years of the current permit cycle.

Costs: The estimated cost of the force main extension is approximately $ 700,000 including contingencies.

Headworks Screening Upgrades at Peirce Island:

Influent to the Peirce Island WWTF is presently screened at the Mechanic Street Pump Station with a coarse bar screen. Grit removal facilities at the Peirce Island WWTF consist of an aerated grit chamber with mechanical grit removal and conveying equipment.

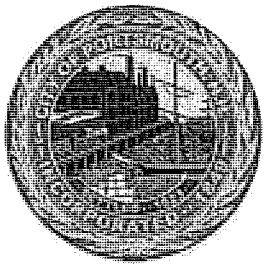
The implementation of new facilities at the Peirce Island WWTF was evaluated and a Basis of Design Report was issued in Draft form in November of 2006. This report recommended the installation of two mechanical bar screens, improvements to the grit removal system, and construction of a new building and appurtenances.

Effectiveness: As a primary facility, grit passing through the grit removal process is captured in the primary clarifiers. Enhanced grit removal facilities would limit the amount of grit in the primary sludge, and would protect sludge handling equipment, but would have little to no effect on effluent total suspended solids or total nitrogen.

Most screenings which are not captured by the mechanical bar screen would also be removed in the primary clarifiers. A small fraction of floatable screenings may pass through the primary clarifiers, but would have a relatively insignificant impact on effluent TSS and Total N concentrations.

Feasibility of Implementation: Given the uncertainty of the WWTF future at Peirce Island, the design and construction of the new headworks facility was put on hold by the City in 2007, pending the outcome of the NPDES permit negotiations. With allowances for approval by the City Council, design, bidding and construction, this option could potentially be operational during the last year of the current permit cycle. However, given that the future of the Peirce Island WWTF has not been determined, implementing this measure would not be recommended at this time, since it would have an insignificant impact on effluent TSS and total nitrogen concentrations.

Costs: The estimated cost of the headworks improvements is $2 to $3 million, depending upon the actual configuration of the facility.



Development of a Stormwater Utility:

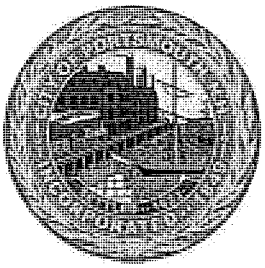
Stormwater Utilities have become a mechanism for municipalities to collect user fees to fund a range of stormwater management activities such as catch basin cleaning, street sweeping, and stormwater infrastructure upgrades. This concept is an emerging approach to improving the funding, and therefore, the operation and maintenance of stormwater systems. Based on the impacts of the EPA Phase 2 regulations, the number of stormwater utilities nationally has risen from 200 in the early 1990's to over 400 in 2000. It is anticipated that that number will triple nationally within the next decade. Implementation of a Stormwater Utilities will enable municipalities to properly fund the operation and maintenance of stormwater systems using the same mechanisms that have historically provided those means for water and sewer systems.

The typical stormwater utility user fee structure is developed based on the amount of runoff generated by the particular parcel from impervious surface areas. However, there are many different types of stormwater utilities, ranging from annual taxes to user fees. Generally, the revenue generated by the utility is dedicated to an enterprise fund similar to those utilized for water/sewer systems.

The City of Manchester is proceeding with the implementation of a stormwater utility and has already been successful with the local and state legislative approval process. House Bill (HB) 1581, the result of the City of Manchester's efforts, was recently signed into law and will allow Manchester to move forward with implementing the State's first stormwater utility in June of 2009. The legislation permits the governing body of municipalities to form stormwater utility districts in order to collect fees for the construction and maintenance of stormwater management systems. Discussions with City of Manchester staff indicated that the initial budget of $ 750,000 will be used based on their historical budgeting and expenditures. Portsmouth's 2007 Stormwater Master Plan also identified a stormwater utility approach as a mechanism to secure adequate funding to operate and maintain the stormwater systems. This would ultimately reduce pollutant runoff into the surface waters including TSS and TN. Excerpts from the E & K Plan and an overview of the recently signed HB 1581 are included in Appendix F.

Effectiveness: The effectiveness for removal/reduction of TSS and TN based on the implementation of a Stormwater Utility is difficult to quantify. However, once the utility is in place and funds are generated for stormwater infrastructure operation, maintenance, and repair, those upgrades could proceed using urban BMP retrofits that would improve the effectiveness of the existing stormwater systems in reducing pollutant discharges to our surface waters.

Feasibility of Implementation: Based on the work completed by the City of Manchester and the State's legislators, implementation of a stormwater utility is a possibility in New Hampshire. These utilities may require between 12 to 18 months to implement, however, that timeframe may be shorter with the work completed within New Hampshire to date.



In addition, the biofilm created by the IPT bacteria may be sloughed off during high flow events. A portion of this biofilm could exit the collection system via one of the three permitted combined sewer overflows. Per IPT's letter dated August 20, 2008, the bacteria utilized by IPT would compete with and displace indigenous bacteria with the CSO receiving waters. The environmental impacts of this are presently unclear. Approval by DES and/or EPA to address this specific issue may be required before the IPT program could be implemented on either a pilot or full scale basis.

Feasibility of Implementation: Per IPT, the system could be implemented in 30 to 45 days. The time for the bacteria to become acclimated and begin to work is dependent upon a number of factors, but is essentially unknown. It is estimated that the IPT program could be implemented within the current NPDES permit cycle.

Costs: IPT provides its product under a monthly service agreement. No firm costs have been provided by IPT for full scale city-wide implementation. However, the cost to implement as presented by IPT, would be a monthly fee based on the number of dosing stations and potential operational savings which may be realized by the City. The cost would increase if additional bacteria are required to re-inoculate the system following a high flow event, to compensate for cold weather, or other events which may require a higher than anticipated feed rate.

The proposal from IPT for a six (6) month pilot phase service within the Pease WWTF collection system was $ 18,000, not including sampling and testing. To establish base line conditions, IPT has recommended a 30-day sampling regime with daily sampling, and after three (3) months of operation, an additional three (3) month sampling regime with samples taken three days (3) per week. As noted above, there are additional costs that would be incurred by the City to sample and evaluate the effectiveness of the service to perform as proposed by the service provider. While other costs presented in this technical memorandum are based on planning level analyses, pricing presented herein for the IPT Service is based on specific costs provided by IPT and a third party certified laboratory.

In-Pipe Technology Service	$ 18,000.00
Sampling Equipment Rental/Maintenance	$ 60,000.00
Laboratory Analysis/Reporting	$ 40,000.00
Data Analysis	$ 10,000.00
Evaluation of IPT Effectiveness	$20,000.00 to $ 40,000.00
Subtotal	$148,000.00 to $168,000

The evaluation of the effectiveness of IPT will require an evaluation of energy use, chemical use, sludge production, and WWTF operational changes. The effort required to complete these tasks, as recommended by IPTG should be completed by the City's consultant. The level of effort for this work is estimated between $ 20,0000 to $ 40,000 depending on the initial results of the pilot test.

Costs: A Stormwater Utility for Portsmouth would ultimately become self sufficient (self funded), however there are implementation costs that based on the best available information to date, would be in the range of $ 50,000.

In-Pipe Technology (IPT) Application:

The IPT system as described in its literature, utilizes a network of microbiological dosing stations throughout the collection system providing a constant feed of organisms which will reduce TSS and TN. IPT gave a presentation on its system in March of 2008. At that time, additional information was requested by the City, specifically on collection systems served solely by primary treatment facilities, such as the Peirce Island wastewater treatment facility (WWTF). No information specific to primary WWTFs was provided, and a request for information was sent to IPT on August 4, 2008 with a requested for response by August 20, 2008 to meet the required deadlines of this TM. No information was provided until August 28, 2008. The information provided in the IPT response was insufficient to determine the actual effectiveness and cost to the City for this technology. On behalf of the City, a pilot test proposal as detailed in the *Cost* section herein, was requested from IPT by Brown and Caldwell in their letter dated September 12, 2008.

Based on the pilot testing request, IPT has offered to provide the service for a period of six (6) months within the Pease WWTF collection system. This approach would allow the City to assess the effectiveness of the service on both the primary and secondary treatment processes at the Pease WWTF. As detailed by IPT in their response, an extensive sampling and analysis program will be required to analyze the effectiveness of the service. Based on the current proposal, the City would incur additional costs beyond that of the IPT effort for the sampling and testing that will be required. Many of the tests required by IPT are not currently performed at the WWTF. In addition, while some tests are performed now, the addition of sampling and testing primary clarifier effluent adds to the effort. Costs which will be incurred by the City include: the rental and maintenance of sampling equipment, the labor required to obtain the samples and transport to the lab for analysis, the cost for lab analysis, and the data reduction and assessment on the effectiveness of the service.

Effectiveness: Based on data provided by IPT on past projects, it appears that this program may have merit for reducing TSS and nitrogen loading to secondary treatment facilities. However, per IPT's letter dated August 20, 2008 received via e-mail August 28th, the IPT system has never been applied to a collection system serviced solely by a primary WWTF. Therefore, the actual effectiveness of the process is unknown for a system such as Portsmouth's. It is our concern that the IPT program will solubilize BOD and TSS. In soluble form, BOD and TSS are not effectively removed with primary or chemically enhanced primary clarification.

6. A stormwater utility would provide the City with a means of addressing stormwater related infrastructure in the same manner as water and sewer infrastructure from both a financial and operations standpoint. This would provide the City with the ability to increase the maintenance of the stormwater system which would reduce TSS and TN loadings to the Piscataqua River. This option appears to be cost-effective and implementable within the NPDES permit cycle. It is recommended that this Interim Measure be pursued.

7. In-Pipe Technology may provide a service which could reduce TSS and TN loadings to the Piscataqua River. In-Pipe Technology has provided a proposal to conduct a pilot phase within the Pease WWTF collection system. The complete cost for the IPT pilot phase service within the Pease collection system, including supplemental costs associated with sampling equipment rental and labor, certified laboratory analysis, and data evaluation for the six (6) month pilot phase is estimated to be $ 148,000 to $168,000 depending on the level of effort required to evaluate the IPT effectiveness. The IPT system will not allow for a reduction in the sizing of the WWTF, and therefore will not affect the ultimate cost of construction of the WWTF. In addition, EPA and DES must approve the use of the IPT system before it can be implemented.

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Summary and Recommendations

Based on the above information, the recommended pursuit of the Interim Measures discussed herein is as follows:

1. The IDDE program is an MS 4 permit requirement. Increasing the IDDE program, based on the information provided herein is not cost effective. The current system should continue and as currently occurs, when illicit connections are located, they are corrected. As noted, the recently released draft Phase 2 General Permit includes provisions for changes to a communities IDDE program. These draft provisions may ultimately require the City to modify its current program.

2. An Urban BMP retrofit pilot program should be considered by the City during the State Street Upgrade project. Comparison of this project against standard metrics should be utilized as an indicator of effectiveness for TSS and TN reduction. If the pilot is shown to be effective, than other projects within the City may warrant the inclusion of BMP retrofits as part of the design.

3. Chloramination at the Pease WWTF has been required in the past to meet NPDES disinfection permit limits due to interferences in the effluent. Currently, chloramination is suspended at the WWTF. Should interferences again require chloramination, alternatives, such as UV disinfection could be considered. Prior to implementation of UV disinfection, a pilot program to evaluate effectiveness and optimization would be required. It is recommended that this pilot program be considered only if chloramination is again required at the WWTF.

4. The diversion of the Gosling Road Pump Station flow from the Peirce Island WWTF to the Pease WWTF would reduce TSS and TN loadings at the Peirce Island WWTF outfall. However, these flows would increase TSS and TN mass loadings at the Pease WWTF outfall, albeit at lower overall mass loadings. This interim measure warrants further evaluation once the Master Plan identifies the potential future use of the Pease WWTF.

5. Headworks upgrades at the Peirce Island WWTF would provide little to no reduction in TSS and TN loading to the Piscataqua River. In addition, the future of the Peirce Island WWTF is uncertain. Therefore, it is not recommended that this Interim Measure be pursued.

Appendix G

In-Pipe Technology

- Miscellaneous Correspondence

IN-PIPE TECHNOLOGY

REAL SCIENCE. REAL RESULTS.

April 10, 2008

Mr. David Allen – Deputy Director Public Works
City of Portsmouth, NH
680 Peverly Hill Rd.
Portsmouth NH 03801-5356

Re: In-Pipe as an Interim Solution to reduce Nitrogen and TSS

Dear Mr. Allen:

Thank you very much for the time you and your staff gave us recently to discuss the application of In-Pipe as an interim measure to reduce the City's total nitrogen and total suspended solids loadings to the Great Bay Estuary.

We have attached our proposal for treatment of your entire collection system. We believe we are an excellent solution to meet your interim requirements. There are several reasons we are an ideal interim solution:

1. We can reduce your nitrogen and TSS load 20-40%.
2. We are a service that will not require the time of your personnel. We install the units and provide monthly service of the units.
3. These dosing units are installed inside lift stations and manholes and do not require any energy to operate. They are unobtrusive, require no land, and will not have any visual impact. There are no chemical trucks or storage units in your neighborhoods. This is extremely easy to implement and can probably be installed in 1-2 weeks with little or no disruptions with traffic.
4. After review with our Chief Technology Officer and Founder, J Rodney Dickerson, we do not believe there will be any drop in performance of your primary plant. We would expect an overall reduction of total loading of nitrogen and TSS to the Piscataqua River to be 20-40%.
5. A significant portion of our fee can be paid from the savings generated from the reduction in solids disposal costs you will gain with our technology.
6. Obviously we can not do anything to correct your hydraulic problems. However, because we do an excellent job controlling fats, oils and greases we should be able to reduce your blockages and flow restrictions in your collection system.
7. With a design flow of 4.8 MGD we should be able to accommodate your 1-2 hr peaks of 22 MGD assuming velocities are not outrageous. We build a biofilm and are continuously adding very high quantities of organisms to maintain dominance in the collection system and always dose sufficiently to handle these short duration peaks. At 70 MGD peak, there may be more organism loss and we may require additional kick starts. A kick start is a very high dose of organisms that are manually grown and applied by our service team. These would be priced at approximately $2500 per event.
8. Our technology would compliment nearly any other changes in treatment or upgrades you may chose to implement. We would reduce the loading requirements for design

IN-PIPE TECHNOLOGY

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and/or increase the safety factor of design. Further, we would improve performance of any secondary treatment upgrade. This interim measure would be proof of results prior to implementing a long term plan.

9. We are a naturally occurring soil bacterium and are therefore environmentally friendly and public acceptance is never an issue.
10. Because we reduce sludge and organic loading without energy input, we reduce landfill quantity and reduce overall carbon footprint.
11. If at any time you feel you are not receiving value from our service, you have the ability to cancel per the terms in our contract.

For these reasons, we are an excellent interim and long term solution to help with the issues in the environmentally sensitive Piscataqua River. We hope we have answered any questions that remained form our meeting. Please feel free to contact either myself or our Eastern Manager, Ms. Amanda Williamson (617-803-1509) with any additional questions or information requests. We also offer a subsequent visit with your team once you have evaluated your options.

Thank you for your interest.

Sincerely,
In-Pipe Technology Company, LLC

Mark Murphy
Director of Sales

Cc: Roger Janson - EPA
Amanda Williamson - IPT

Proposal and Contract

Proposal Number:	2008-1133
Date:	April 10, 2008
Reference:	City of Portsmouth Public Works
Availability:	4 Weeks, ARO
FOB:	Customer Site
Validity:	180 days

To:

- City of Portsmouth Public Works
- 680 Peverly Hill Rd.
- Portsmouth, NH 03801-5356
- Phone: (603) 427-1530
- Fax: (630) 427-1539
- E-mail: dsallen@pw.cityofportsmouth.com
- Attn: Mr. David S. Allen, Deputy Director, Public Works

From:

In-Pipe Technology Company, LLC
100 Bridge Street
Wheaton, IL 60187-4841
Phone: 617-803-1509
Fax: 630-871-0303
E-mail: awilliamson@in-pipe.com
Attn: Amanda Williamson, Eastern Regional Manager

Item	Month	IPT Part #	Description	Sales Price Per Month
1	12	IPT-PINH-1M	**IN-PIPE TECHNOLOGY®** **PROPOSAL** In-Pipe Technology Company, LLC (IPTC) is pleased to provide this proposal for consideration. This is a "sole source" proposal and our technology is protected by US Patents; patent cover copies provided upon request. Based on the information provided by City of Portsmouth Public Works, we propose the following terms for implementation of In-Pipe Technology (IPT) for Pierce Island WWTF **MONTHLY IN-PIPE TREATMENT AND SERVICE** IPTC will dose the system with IPT microbes for the full 12-month term of the contract. Dosing will be based on the reported annual average flow rate of 4.8 MGD. The primary objectives of IPT treatment are organic, TSS and nitrogen removal performance on your primary facility. **PERFORMANCE MEASURES** IPT will receive a minimum of one year of historical operating data for the City of Portsmouth Public Works prior to treatment. This pre-IPT period will establish a baseline to quantify the rate of reduction of loads and wastewater treatment plant characteristics with IPT treatment. In addition, IPT will receive operating reports from the City of Portsmouth Public Works each month for data analysis.	**$19,000.00**

SCOPE OF IPTC SERVICES

- Supply of battery-powered IPT dosing panels to be installed at select locations throughout the City of Portsmouth Public Works collection system. The specific number of dosing panels required and the location and type of each dosing panel will be determined by IPTC during the Engineering phase of the contract. The dosing panels will remain the property of IPTC.
- Installation of the dosing panels. IPTC will contract separately with a third party installer.
- Complete monthly servicing and maintenance of the dosing panels for the duration of the contract. Servicing and maintenance will be performed by a third party serviceperson under the supervision of IPTC.
- Dosing rate adjustments, as required.
- "On call" emergency service on the IPT dosing panels
- IPTC will supply and install additional dosing panels at no additional cost if required to effectively treat the current collection system layout, reported annual average flow rate and number of sewer connections.
- Quarterly progress reports

TERMINATION / REMEDY PERIOD

In the event City of Portsmouth Public Works is unhappy with the performance of the IPT service for ninety (90) consecutive days, City of Portsmouth Public Works shall provide thirty (30) days written notice to IPTC during which time IPTC shall modify the treatment procedures and demonstrate satisfactory performance. If following the thirty (30) day remedy period City of Portsmouth Public Works remains unhappy with the performance, the parties may terminate the agreement. City of Portsmouth Public Works' only financial obligation in the case of termination is to pay all outstanding invoices due to IPTC, including the last full month of service provided prior to the thirty (30) day remedy period.

PAYMENT TERMS

IPTC will invoice City of Portsmouth Public Works on the first day of the month service is provided. If treatment is initiated during the month, the first month's service fee will be

			prorated for the time installed. Invoices are due net thirty (30) days. The contract will be in effect for twelve (12) consecutive months, unless terminated in accordance with "Termination / Remedy Period" above. Any expansion or other modification to the contract will be subject to future negotiation. **PROPRIETARY IPT BULK MICROBE CULTURE** The City of Portsmouth Public Works agrees that it will use prudent attempts to ensure that no analysis will be allowed on the IPT bulk microbe culture reagents without prior written authorization by In-Pipe Technology Company, LLC. **OFFERED BY:** IN-PIPE TECHNOLOGY COMPANY, LLC By: Amanda Williamson Title: Eastern Regional Manager Date: April 10, 2008 **ACCEPTED BY:** City of Portsmouth Public Works By :David S. Allen Title: Deputy Director Date:_____ Purchase Order Number: _____	

IN-PIPE TECHNOLOGY

REAL SCIENCE. REAL RESULTS.

June 12, 2008

Mr. David Allen – Deputy Director of Public Works
City of Portsmouth, NH
680 Peverly Hill Rd.
Portsmouth NH 03801-5356

Re: In-Pipe treatment in Portsmouth

Dear Mr. Allen:

It has been a couple of months since we submitted our interim solution to problems you are having with the primary wastewater treatment facility. We hope we are still being considered for this project. We wanted to touch bases with you to be sure you have all of your questions answered and your concerns addressed.

Upon review of our meeting notes you expressed a couple of concerns. Following are the answers to those concerns:

1. You were worried that In-Pipe treatment may cause the soluble BOD to increase actually making the performance of the primaries worse. This will not be the case. While it is true that we breakdown more complex organics into a more readily bioavailable BOD the overall BOD entering the primary plant will be significantly reduced. The settling characteristics will be improved and the removal efficiency of the primary plant will be improved. The result will be better performance of the primaries. Further, influent TSS will be reduced substantially while improving the removal efficiency of the primary clarifier and reduce the quantity of sludge for removal or ultimate disposal. This has been reviewed and verified by our Chief Technology Officer and Founder, J. Rodney Dickerson, P.E.
2. With a design flow of 4.8 MGD we will be able to accommodate 1-2 hour peak flows of 22 MGD. At peak flows of 70 MGD we may need additional kick starts of the system and have priced these separately. Because we reduce FOG by 60-90% in the collection system, we will significantly reduce SSO's and blockages at peak flow conditions

We believe these were your primary concerns from our meeting. There were several other benefits discussed in our cover letter from our proposal. We have attached a copy of this letter and proposal for your convenience. Do you have any questions or concerns still lingering regarding our technology?

IN-PIPE TECHNOLOGY

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We would certainly appreciate receiving your answers to this letter and a status update regarding our proposal. We continue to believe we are an excellent interim and long-term solution to your treatment difficulties. We look forward to hearing from you soon.

Sincerely,
In-Pipe Technology Company, LLC

Mark Murphy
Director of Sales

Cc: Roger Jansen – EPA
Tom Irwin – Conservation Law Foundation
Amanda Williamson – In-Pipe

IN-PIPE TECHNOLOGY

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155 Fleet Street, Suite 209
Portsmouth, NH 03801

Tel: (603) 570-4889
Fax: (603) 570-4865

August 4, 2008

Amanda Williamson
Regional Manager
In-Pipe Technology
1 Green Street
Marblehead, MA 01945

Subject: City of Portsmouth, NH

Dear Ms. Williamson:

On March 27, 2008 In-Pipe Technology presented information to the City of Portsmouth, New Hampshire regarding its product. Based on the presentation, it is my understanding that the technology utilizes proprietary microbial formations within the collection system to provide pretreatment of the wastewater upstream of the wastewater treatment facility (WWTF). According to the information presented, these formations adhere to the pipe walls, and solubilize the biochemical oxygen demand of fats, oils, grease and other constituents of the raw wastewater, thus allowing the WWTF to more easily bio-degrade these pollutants.

The City of Portsmouth has requested that we evaluate the performance of the In-Pipe Technology System as an interim measure to reduce total suspended solids (TSS) and nitrogen compounds discharged by the Peirce Island WWTF. As we discussed at the March 27 presentation, the Peirce Island WWTF treats wastewater through chemically enhanced primary treatment (CEPT) followed by disinfection. The facility does not provide secondary (biological) treatment.

The City's collection system tributary to the WWTF is a combined sanitary/storm water collection system in certain areas of the City. While the average sanitary flow to the WWTF is approximately 2.5 million gallons per day (MGD), during rainfall events, flows to the WWTF may reach a maximum of 22 mgd. In addition, upwards of 50 to 70 mgd may be discharged through licensed combined sewer overflows (CSOs) at three locations within the City.

To adequately evaluate the potential for In-Pipe Technology to achieve a reduction in TSS and nitrogen compounds discharged from the Peirce Island WWTF, please provide the following information:

1. Has the In-Pipe Technology been utilized in a collection system for a WWTF that only provides primary treatment? If so, please provide contact information for these WWTP(s).
2. If the answer to question No. 1 is "no", what would be the expected performance of In-Pipe Technology at a primary treatment facility? Given

that a primary system does not remove soluble BOD, would you expect the effluent BOD concentration from the Peirce Island WWTF to increase?

3. Has In-Pipe Technology been used on a combined collection system? If so, please provide contact information for the system owner/operator.
4. Does In-Pipe Technology have any concerns utilizing its system in a collection system with flow ratios of 20:1?
5. To what levels does In-Pipe Technology reduce TSS and nitrogen concentrations of wastewater at the following locations:
    a. At the end of the collection system, prior to the WWTF headworks,
    b. Following the primary treatment process, ptior to biological treatment, and
    c. Following the biological treatment process.
6. What nitrogen compounds does In-Pipe Technology target for reduction, and to what form of nitrogen are these compounds reduced to?
7. Can the proprietary microbes supplied via the In-Pipe Technology system interfere or compete with the micro-organisms utilized in the biological nutrient removal process of a secondary treatment system?
8. What would be a budgetary cost of an In-Pipe Technology system for the City of Portsmouth, and how would the costs be structured (i.e. annual agreement, lump sum cost, etc).?
9. What would be the time frame required to implement the system, if the City elected to move forward with In-Pipe Technology?

Please provide the above requested information on or before August 20, 2008.

If you have any questions, please do not hesitate to contact me via phone or via email at mallenwood@brwncald.com.

Very truly yours,
BROWN AND CALDWELL

Mark Allenwood, P.E.
Regional Practice Leader

cc: Peter Rice, City of Portsmouth
David Allen, City of Portsmouth
Suzanne Woodland, City of Portsmouth
Peter Goodwin, Weston & Sampson

8/08

IN-PIPE TECHNOLOGY

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August 28, 2008

Mr. Mark Allenwood, P.E.
Regional Practice Leader
Brown and Caldwell
155 Fleet Street, Suite 209
Portsmouth, NH 03801

Re: Portsmouth, NH - In-Pipe Technology Proposal
Answers to your August 4, 2008 Letter

Dear Mr. Allenwood:

Upon review of your letter of August 4, 2008 and our previous correspondence on this project it became clear that our responses to the original request for information were insufficient to provide you an understanding of how our service offering could economically and efficiently benefit the City of Portsmouth to improve the quality of water entering the Great Bay Estuary. As a result, we have requested our Founder, Chief Technology Officer and Consulting Engineer, J Rodney Dickerson, P.E. to review the project, our previous correspondence, and your request for additional information. Attached is his response to your questions.

Additionally, we are attaching our original proposal dated April 10, 2008 and our follow-up letter of June 12, 2008 to supplement Mr. Dickerson's responses.

In-Pipe Technology Company, LLC (IPT) is a service company that improves the economics and efficiency of wastewater treatment. There is no up-front capital equipment cost or additional labor required. IPT is provided as a service that includes engineering, installation and ongoing maintenance. Our service offers multiple treatment benefits to dramatically reduce overall costs associated with wastewater collection and treatment. The value received exceeds the cost of our service. IPT turns the passive conveyance system into an active, controlled part of the treatment process using beneficial bacteria without energy input. Our technology harnesses the treatment capacity of the existing infrastructure providing many cost saving benefits throughout the treatment system.

We are confident our services will significantly improve the water quality entering the estuary. We will improve the operation of the existing treatment system and will compliment and improve performance of any upgrades to this system. We are effective at removing TSS and total N leaving your primary facility. We would expect reductions of BOD. We will provide substantial treatment in the collection system without energy input reducing overall carbon footprint. Our service uses a completely natural bacterial product and does not add any chemicals to your system. We require no land and have no visual or traffic impact.

We apologize for missing your deadline for response to your questions. This is entirely my fault as I have been traveling and have not had appropriate time allocated to provide you with a response. We hope it has not caused serious inconvenience in your evaluation process.

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Simply stated, we offer economic and efficient improvement to your treatment system performance goals. Once the full value of IPT is considered, it is clear that we are an economic solution to improve multiple treatment objectives.

We hope the attached information will fully answer all of your questions. If not, please contact us. Thank you for your consideration.

Sincerely,
In-Pipe Technology Company, LLC

Mark Murphy
Director of Sales

Cc: Amanda Williamson – IPT
David Allen, City of Portsmouth
Peter Rice, City of Portsmouth
Suzanne Woodland, City of Portsmouth
Peter Goodwin, Weston and Sampson
Tom Irwin, Conservation Law Foundation

DICKERSON CONSULTANTS, LLC

J. RODNEY DICKERSON, PE
Post Office Box 338
Homer, Louisiana 71040

E-mail: jrodneyd @ bellsouth.net
Telephone: (318) 927-2010

August 20, 2008

In-Pipe Technology Company, LLC
100 Bridge Street
Wheaton, IL

Attn: Mark Murphy, Director of Sales

Re: Brown & Caldwell Letter of August 4, 2008

Dear Mark:

I have, at your request, reviewed the above referenced letter as well as prior correspondence. The opening sentence of the letter makes it clear that there is a misunderstanding of what In-Pipe Technology (IPT) is and does. IPT is a service, not a product.

A product is sold in quantity with suggestions to the user on how to use to achieve desired results — *caveat emptor.* IPT service, on the other hand, is about attaining results through the designed application of microbiology and the fee is based upon the value of the results — in other words, performance based.

IPT does not fit into any existing ***engineered category*** known in the wastewater treatment industry. IPT does not sell bacteria, but rather provides a service that includes bacteria as part of the overall process. The service fee is negotiated and based upon attaining the desired performance and resulting economic benefits.

While IPT does not require the client to spend any capital cost, nor provide any engineering services in the use of IPT, that does not mean consulting engineers should not play a role in the application of IPT.

IPT performance affects certain parameters around which metrics are built and used to monetize the economic benefits of IPT. Historically, engineers have not embraced IPT and I have had to perform the bulk of this work as the basis for reporting to the client on the economic benefits of IPT.

It would be much better for all concerned if the client's consultants would work with IPT in gathering data and analysis at the start and on an ongoing basis so that the client would have an independent report on economics benefits. In almost every case the economic benefits from IPT would provide ample money, over and above IPT monthly fee, to pay the consultant from current operating costs, without including avoided costs.

The benefit to the consultant would go far beyond simply analyzing data and reporting to the client on an ongoing basis. As the consultant becomes intimate with the changes that IPT brings to the entire sewer system and treatment plant process, the consultant will be much better prepared to design process changes to further improve the treatment process. Moreover, savings in avoided costs as well as ongoing operating costs can be applied to capital improvements, designed by the consultant, that bring even greater cost savings.

The regulatory interests would be better served as well because the ongoing monitoring of IPT performance would provide a much more in-depth evaluation of the actual treatment performance from a third party perspective. In short, the client would have a better relationship with the regulatory interests from the ongoing analysis being performed by the consultant.

Because IPT performance is monitored in both the collection system and at the treatment plant, the client would have timely, proactive information on an ongoing basis. Such information will, ultimately, lead to significant cost savings by allowing prophylactic action rather than reactive, often emergency, high costs in response to problems.

Now that I have addressed the primary concerns, let's move on to the specific questions raised in the letter:

1. At this point in time IPT has not been used on a plant that only has primary treatment.

2. IPT will provide improved performance in several areas; however, it must be pointed out that BOD testing has proven to be inappropriate as the sole metric, although it is referred to concerning IPT performance. COD is the appropriate choice, along with the ratio of BOD to COD, and other parameters in relation to COD. This will be explained later within this document.

3. Yes, IPT has been used very successfully on combined sewers, as well as sewer systems with very substantial I&I.

4. No concerns. Continuous IPT dosing reestablishes the IPT biofilm quickly. The scouring from high flow rates only enhances the overall performance over time.

5. A. Depending upon a number of variables, and after significant sewer system cleanup has taken place, influent TSS will drop between 30% and 60%. Total nitrogen will also drop between 15% and 30%; however, the ratios of the various forms of nitrogen will shift considerably.

   B. IPT reduces the FO&G and amount of filamentous bacteria in the influent, improving the settling characteristics. When combined with reduced TSS loading the amount of TSS carryover from the primary clarifier is reduced. Nitrogen is also reduced by both the improved removal of TSS (that contains nitrogen) and by the nitrification / denitrification that takes place within the sludge blanket due to the presence of IPT bacteria. This will be explained later within this document.

   C. IPT improves all biological treatment processes. Effluent loading in all parameters will see an improvement of at least 20% and sometimes as much as 75%, depending upon the type of system and its present design specifications. The improvements are not uniform in that reduction in CBOD, for example, may improve by 20% while TSS is improved by 50% and Ammonia is improved by 60%.

6. IPT facultative soil bacteria are very different from the typical bacteria encountered in nitrification and denitrification. In fact, prior to IPT, there are no recorded instances where such bacteria were continually applied to the sewer system in a manner and at concentrations high enough to sustain a modification of the sewer biofilm and subsequent domination of the WWTP microcosm. The classic nitrogen cycle and the typical bacteria that engage in that process have been studied and reported on for decades by the WWTP industry; however, outside agricultural interests, little research information has been generated on the nitrogen cycle supported by facultative soil bacteria and these studies have all concerned soil, not water. This will be explained later within this document.

7. Yes, the IPT bacteria do indeed compete with and displace indigenous bacteria because they are what is known in the microbial world as "R-Strategists" according to the Verhulst Equation of population dynamics while the indigenous bacteria in typical wastewater sewers and WWTP are "K-Strategists". It is the very reason why IPT can modify and sustain the modification of the biofilm and the entire treatment process while all others fail. It is the constant addition of appropriate microbial formula concentration comprised of uniform, naturally occurring, non-pathogenic, facultative, gram positive soil bacteria that out compete other bacteria. Stated differently, we add enough of the fast growing soil bacteria which are the natural attenuators of all waste in the environment that can live under any condition and both attain and sustain domination. IPT bacteria will significantly improve biological nutrient removal in the treatment process because they are constantly added, thereby overcoming problems normally associated with maintaining biomass that can nitrify and denitrify inside the plant through selectors and other processes that coax the growth.

8. There is no budgetary cost for the implementation of IPT, but rather an analysis of existing data and operating costs within a matrix to determine the savings that will be generated by implementing IPT. The fee will be based upon a combination of the anticipated savings along with an analysis of the sewer system to determine the number and location of dosing points. This is necessary because IPT is a service and not priced on any fixed basis. While reference may be made to $ X per MGD of flow under normal load conditions in pricing discussions, this value is purely hypothetical and useful only when discussing IPT to compare to chemistry or other product related methods sold on a quantity basis. IPT is often pressed to provide an estimated fee without significant client information and this often leads to the mistaken impression that IPT is a "product" and not a service. IPT cannot give an accurate proposed fee without significant information and many are disinclined to provide the requisite information until a "rough estimate" is given.

9. It should be noted that while IPT must occur in a budget as a line item of cost, the economic benefits always exceed the fee. The client cannot remove IPT and sustain the economic benefits of IPT. Speed of implementation is solely governed by the client's speed in delivering the necessary technical information to support the lowest possible fee from IPT. Assuming timely delivery of technical information and prompt action on the proposal, most systems can be installed within 30 to 45 days. The time between installation and significant efficacy of treatment will be highly dependent upon the season and precipitation. Colder water temperatures may be offset somewhat by simply increasing the dosage to account for lower metabolic rates (However, IPT bacteria have been adapted to have substantial metabolic activity at temperatures approaching zero degrees Fahrenheit.). Full efficacy will be very dependent upon the size of the sewer system and degree of accumulations within the piping as IPT will ultimately cause nearly all accumulations within the sewer piping to be removed.

The discussions noted above as to be addressed are presented as an addendum to this letter and incorporated herein.

Please let me know if you need additional information or assistance.

Sincerely,

J. Rodney Dickerson, P.E.

Principal Consultant
Dickerson Consultants, LLC.

Technical Director
In-Pipe Technology Company, LLC.

ADDENDUM

Dr. James Young, Chair of the ASTM Standards Committee on BOD and CBOD testing protocols has become familiar with IPT over the past few years. He was contacted because influent data from our long standing client, Lakeland, Florida, started to show CBOD values almost equal to COD values on a significant percentage of samples. Comparative testing for CBOD and BOD clearly indicated those values to be virtually identical a significant of the time.

It was determined that bioaugmentation in general and especially with IPT bacteria impacted testing for both CBOD and BOD, causing the reported values to be significantly higher than would otherwise be the case. As such the current standard procedure states that these tests are inappropriate measures when bioaugmentation is used. This is why we prefer to use COD testing with IPT and look to ratios of both CBOD and BOD to COD when evaluating IPT performance.

The TSS test is not affected and therefore remains a valuable tool in evaluating IPT performance. We have found that an examination of the ratio of TSS to BOD and CBOD, when used in conjunction with COD testing to be very insightful. Because TSS affords a surface for bacteria to attach and grow as these solids are broken down, the rate of conversion of TSS to soluble material is often quite high. In some instances the rate of conversion of TSS into soluble material may appear to be much higher than the conversion of CBOD and BOD into carbon dioxide and nitrogen gas due to the impact on the testing protocols. Nevertheless, tracking COD will prove to be the most valuable tool of all.

Each pound of carbon that is converted within the sewer system by IPT bacteria, without energy input, is a pound removed with lowest carbon footprint. All sewer systems contain biofilm and this biofilm performs a portion of the pretreatment. Unfortunately, in the case of wild biofilm, the bacteria present are not those needed to rapidly and effectively process the wastewater. This biofilm is; however, comprised of very high molecular weight biopolymers that are very difficult for ordinary bacteria within a wastewater treatment process to digest. As such, much of it passes through the treatment process in the form of COD and is not detected by standard CBOD or BOD testing.

Some forms of this biopolymer may contain both nitrogen and phosphorous. The usual Biological Nutrient Removal (BNR) process relies upon long cellular detention times to encourage the growth of bacteria into a state where they will attack this material. This is a delicate operation that often requires the addition of a simple carbon, such as methanol, to sustain the biomass in periods where available food is in short supply.

Generally speaking, most wastewater treatment processes rely upon a recycle stream that may include selectors to try and encourage the growth of certain types of bacteria. While this approach may work in many instances, most of the time, the reality is that they are not consistent under a wide variety of conditions and across all seasons. IPT overcomes these problems by harnessing the sewer to work as an effective and efficient treatment step through the continual addition of IPT bacteria that grow, dominate the sewer biofilm and perform the same tasks as those traditionally used via the selection process.

The greatest differences between the proactive addition of IPT bacteria to the sewer to attain dominance within the sewer biofilm and at the WWTP by facultative bacteria or trying to attain a facultative microcosm at the WWTP through the use of selectors are twofold: 1) the type of facultative bacteria; and, 2) harnessing the sewer as a prefermentation step to maximize the amount of readily biodegradable carbon entering the WWTP.

IPT bacteria are symbiotic, facultative, soil bacteria, selected to work together and to dominate both the sewer and the WWTP. Facultative bacteria grown via selectors at the WWTP are not soil bacteria and must be encouraged to grow in the presence of the competing microbiology coming from the sewer.

Wild, untreated sewer biofilm provides minimal prefermentation and almost entirely anaerobic biomass that is of little benefit to the WWTP and, during major sloughing events, actually hinders operations. IPT dominated sewer biofilm, on the other hand, provides both prefermentation and constant bioaugmentation of the WWTP with robust, facultative, soil bacteria on a constant basis. No additional process equipment is required to maintain a microcosm dominated by facultative bacteria.

The IPT bacteria nitrify and denitrify within the sewer with zero energy input and minimal energy input at the WWTP and there are no concerns about maintaining the microcosm due to changing conditions or seasons. Data from years of operation in places like Lakeland, Florida (since 2001) document this.

155 Fleet Street, Suite 209
Portsmouth, NH 03801

Tel: (603) 570-4869
Fax: (603) 570-4865

September 12, 2008

Mr. Mark Murphy
Director of Sales
In-Pipe Technology
100 Bridge Street
Wheaton, IL 60187

Subject: Portsmouth, NH Proposal

Dear Mr. Murphy:

Thank you for your letter of August 28, 2008 providing additional information regarding the In-Pipe Technology (IPT) service. We appreciate the information provided, and it appears that the service warrants additional review. However, based on the information provided the benefits may be limited to secondary treatment processes.

As we have detailed in our previous discussion both during your visit to Portsmouth in March, and in my letter of August 4, 2008, Portsmouth's Peirce Island WWTF only provides primary treatment and does not have a secondary treatment process. Therefore, we question whether the IPT service may provide positive impacts on the Peirce Island WWTF effluent quality. This concern is borne from the understanding that the bacteria provided with the IPT service, in part, solubilize pollutants in the collection system. Once solubilized, these pollutants would typically be much easier to treat in a secondary process, but would be more difficult to remove in a primary treatment process. This concern has not been diminished based on your letter of August 28, 2008, because the IPT service has never been applied to collection system serviced solely by a primary treatment facility.

Given these concerns, we would not recommend that the City of Portsmouth pursue the IPT service at this time for the Peirce Island facility. However, we would recommend that the City consider implementation of the IPT service at the Pease WWTF, based on the conditions presented later in this letter.

At the Pease WWTF, the effluent quality from the primary clarifiers could be monitored and compared to baseline data collected prior to implementation of the IPT service. This would provided a bench mark to establish the effects of the IPT service on a primary treatment process, but would also protect the receiving waters, since secondary treatment is also provided at the Pease WWTF. Should it be determined that primary treatment is enhanced by the IPT process and that primary effluent quality is not degraded, then utilizing the IPT service for the Peirce Island collection system may be an appropriate interim measure.

At this time, the City is willing to pursue a trial of the IPT system, according to the following conditions:

1. IPT will provide a detailed list of all data it deems necessary to evaluate the cost effectiveness of the IPT service on both the Peirce Island and Pease WWTFs.
2. IPT will provide the City of Portsmouth with a cost effectiveness evaluation based on the data provided by the City.
3. If the cost effectiveness evaluation for both WWTFs provides a benefit to the City in reduced overall operations costs which offset the cost of the IPT system, then a full scale pilot at the Pease WWTF would be recommended to the City Council.
4. IPT will provide a list of all test parameters it requires to determine the impact of the IPT service on operating cost and effluent quality. The City and/or its consultants may also recommend additional testing and sampling parameters.
5. The full scale pilot would be performed within the Pease WWTF collection system for a two to three month period, at no cost to the City of Portsmouth.
6. Primary clarifier effluent quality and primary process operating costs at the Pease WWTF both before and after introduction of the IPT system would be evaluated, substantiating the impact of the program.
7. Depending on the scope of testing requirements the City may be willing to absorb the labor burden and cost of sampling and testing the necessary parameters as part of the pilot study.
8. If, the IPT pilot program for the Pease WWTF primary process proves to reduce operating costs with no adverse affects on primary effluent quality, and reduces TSS and nitrogen compounds entering the secondary process, City staff would recommend the IPT service to the City Council for utilization within the Peirce Island collection system.

If these terms are amenable to IPT, please confirm in writing.

If you have any questions, please contact me.

Very truly yours,

BROWN AND CALDWELL

Mark K. Allenwood, P.E.
N.E. Wastewater Practice Leader

cc: Peter Rice, P.E., City of Portsmouth
David Allen, P.E., City of Portsmouth
Suzanne Woodland, Esquire, City of Portsmouth
Peter Goodwin, P.E., Weston & Sampson

IN-PIPE TECHNOLOGY

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September 29, 2008

Mr. Mark Allenwood, P.E.
Regional Practice Leader
Brown and Caldwell
155 Fleet Street, Suite 209
Portsmouth, NH 03801

Re: Portsmouth, NH - In-Pipe Technology
Responses to your September 12, 2008 Letter

Dear Mr. Allenwood:

In-Pipe is a sustainable technology that improves the economics and efficiency of wastewater treatment with no energy input and no capital cost. Our proposed solution for the Pierce Island WWTF will improve the overall load entering the estuary, and therefore improve the environment. The City of Portsmouth can reduce their carbon footprint using our technology through energy reductions, and we are confident that we can demonstrate this with a pilot program at the Pease WWTF. The value received from our service is always greater than the cost of our service. That being said, environmental benefits must be put into the equation as having value to the City in order to fairly evaluate our service offering.

We would be very pleased to work with you to determine the benefits of our service at your Pease WWTF. We have the following responses to the conditions listed in your letter regarding the trial:

1. Attached is a testing protocol that would clearly demonstrate the benefits of the technology.

2. Cost savings available to the Pease WWTF can be attached to energy reductions, sludge reductions, chemical reductions and FOG maintenance. We also believe a value should be placed on the improvement to the environment as this is the overall goal of the project, based on the interim study for the Pierce Island WWTF. We will be pleased to provide you with a cost effectiveness evaluation based on data provided by Portsmouth. At this point, we have not received any data from the Pease WWTF, costs associated with treatment, plant configuration, collection system maps and other pertinent information we need to provide you with this analysis. We have attached a customer information questionnaire (CIQ) that you can use as a guide to provide us with the necessary information.

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3. Since Portsmouth does not currently use energy at the Pierce Island facility, cost saving potentials would be based on sludge reduction, reduction of chemicals and reduction of FOG maintenance. While these costs may be substantial, they may or may not be sufficient to propose a "no net cost" model or to justify cost effectiveness. The environmental benefits should have value and be put into the equation. The reduction of total carbon load, TSS, N and P should be the major driver for consideration in moving the technology to the Pierce facility. While our technology is being considered an interim solution at Pierce Island until secondary process upgrades are completed or the facility relocated, our service offering can be a long term cost savings solution that will compliment future upgrades, reduce operating costs and possibly reducie capital expenditures associated with this upgrade or relocation.

   We are confident we will prove cost effectiveness at Pease and will provide the analysis when we receive the requested data (see # 2).

4. Attached is a testing protocol that would be used to evaluate the cost effectiveness of the technology. We would strongly encourage the involvement of your firm or other outside consultants as independent verifiers.

5. Since In-Pipe's technology is a biological process that replaces the existing inefficient biofilm with a thinner, more efficient biofilm that effectively converts the collection system into a beneficial pre-treatment step. To fully demonstrate the full efficacy of the benefits our technology, we would require a 6 month pilot study. Our normal cost for a 1.5 MGD treatment plant and collection system would cost approximately $6000 per month or $36,000 for the 6 month study. We would be willing to do the study for 6 months for the Pease WWTF in Portsmouth for 50% of our normal fee for this service or $18,000 for the 6 month study. This does not cover our costs associated with the study but we feel strongly that not only will Portsmouth clearly see the benefits, but other communities in your area would also be interested in the results. We remain confident that the economics and improved environmental performance demonstrated in the pilot will encourage the expansion to the Pierce Island system and any other facilities Portsmouth may build.

6. We agree that primary clarifier effluent and primary process operating costs at the Pease WWTF both before and after introduction of the IPT service will be evaluated through the ongoing exchange of data. Further the overall environmental benefits of the effluent quality as well as the sludge quantity impact should be evaluated.

7. Most of the testing required is typically done on a regular basis at the WWTF and is often required for reporting by the Portsmouth staff. We have not included any of the testing required in our proposal.

8. We believe this pilot will clearly demonstrate the cost effectiveness of the technology at Pease and the primary effluent results can be applied to Pierce Island. We look forward to proving the ability to improve primary effluent quality, reduce total carbon, TSS, N and P compounds both entering and leaving the secondary process.

IN-PIPE TECHNOLOGY

REAL SCIENCE. REAL RESULTS.

We are confident that we will improve the economics and efficiency of wastewater treatment for the City of Portsmouth and view this project an opportunity to validate the efficacy of our service. We look forward to working with the City to help reach their environmental goals and therefore have offered this project at a substantial discount.

We hope the attached information will fully answer all of your questions. If not, please do not hesitate to contact us. Thank you for your consideration.

Sincerely,
In-Pipe Technology Company, LLC

Mark Murphy
Director of Sales

Cc: Amanda Williamson – IPT
David Allen, City of Portsmouth
Peter Rice, City of Portsmouth
Suzanne Woodland, City of Portsmouth
Peter Goodwin, Weston and Sampson
Tom Irwin, Conservation Law Foundation
Roger Jansen – EPA
Stergios Spanos – NH Department of Environmental Services

IN-PIPE TECHNOLOGY

REAL SCIENCE. REAL RESULTS.

Testing Protocol for Portsmouth - September 2008

Testing should be done on the influent to the WWTF, the effluent of the primary treatment facility, and the effluent of the WWTF. Samples for the baseline should be daily composites. 30 days of baseline data is needed. The more baseline data made available to us, the better the statistical relevance of the testing. Once In-pipe is established and most of the pipe cleanout is accomplished (3 months), we will require composite sampling 3 times per week for the last three months of the demonstration. The following data is needed to demonstrate the benefits of In-Pipe. We would expect that a high percentage of this data is already available on the influent and the effluent to the WWTF as a reporting requirement.

- COD
- BOD
- TSS
- Total N
- Ammonia
- Total P
- pH
- TDS
- Total coliforms
- TOC
- Conductivity
- Alkalinity
- ORP
- Primary, secondary, and final sludge quantity

eastern analytical, inc.

professional laboratory services

Quotation 1006541

Mark Allenwood
Brown and Caldwell (NH)
155 Fleet St.
Portsmouth , NH 03801

Quotation Date: 12/3/2008

Project ID: Portsmouth | Wastewater Collection and Autosampler Proposal

EAI Project ID: 2846

Dear Mr. Allenwood:

Thank you in advance for the opportunity to provide this quotation.

Qty.	Description	Discountable Y/N	List Price	Disc Unit Price	Net Ext Price
155	Field Services Labor (per hour)	N	$50.00	$50.00	$7750.00
3720	Mileage at $0.585 per mile	N	$0.59	$0.59	$2176.20
1	Rental - ISCO Autosampler (3 units, 31 days)	N	$4,650.00	$4,650.00	$4650.00
1	Field Services Consumables	N	$250.00	$250.00	$250.00

Gross Quotation Amount $14,826.20-

Total: $14,826.20 *

Quotation is valid for installation of three (3) automatic wastewater samplers. Each of the samplers will be operated via battery and samples will be collected on a time basis and equally composited. EAI personnel will be on site each day to collect the transfer the composite sample, clean the single composite vessel and reconfigure the sampler for the next 24hr period. It is understood that this project will last for 30 consecutive days and thus requires weekend work. Additionally, two of the samplers will be outdoors and will require stand-alone freeze protection.
Consumables figure includes costs for periodic tubing replacement, freeze protection supplies and equipment.
Thank you for the opportunity to provide this quotation. Feel free to contact me if you have questions regarding this quotation or the capabilities of Eastern Analytical.

Sincerely,

ACCREDITED IN ACCORDANCE WITH nelac

Jeff Gagne
Eastern Analytical, Inc.

* This cost is for one (1) 30-day period. The pilot study also requires three (3) months of sampling and testing, or an additional 90 days.

This quotation is valid for 90 days from the date quoted.

Total cost:
4 x $14,826.20 = $59,304
SAY $60,000.

25 Chenell Drive Concord, NH 03301 www.eailabs.com TEL 800-287-0525 (603) 228-0525 Fax (603) 228-4591

eastern analytical, inc.

professional laboratory services

Quotation 1006540

Mark Allenwood
Brown and Caldwell (NH)
155 Fleet St.
Portsmouth , NH 03801

Quotation Date: 12/3/2008

Project ID: Portsmouth | Wastewater
Analytical Proposal

EAI Project ID: 2846

Dear Mr. Allenwood:

Thank you in advance for the opportunity to provide this quotation.

Qty.	Description	Discountable Y/N	List Price	Disc Unit Price	Net Ext Price
90	COD	Y	$25.00	$17.50	$1575.00
90	BOD	Y	$40.00	$28.00	$2520.00
90	Total Suspended Solids	Y	$15.00	$10.50	$945.00
90	Package - Total Nitrogen: NO3/NO2, TKN, TN	Y	$65.00	$45.50	$4095.00
90	Ammonia	Y	$25.00	$17.50	$1575.00
90	Total Phosphorus	Y	$25.00	$17.50	$1575.00
90	pH	Y	$5.00	$3.50	$315.00
90	Total Dissolved Solids	Y	$15.00	$10.50	$945.00
90	TOC	Y	$45.00	$31.50	$2835.00
90	Specific Conductance	Y	$10.00	$7.00	$630.00
90	Alkalinity, Total	Y	$25.00	$17.50	$1575.00
90	Field ORP	Y	$15.00	$10.50	$945.00
12	Weekend BOD Charges (4 weekends x 3 samples)	N	$40.00	$40.00	$480.00

Gross Quotation Amount		$28,380.00-
Discount of 30 %	-	$8370.00
Total:		**$20,010.00** *

30 Consecutive 24hr Composite Samples (30 days) at 3 locations: Raw Wastewater, Primary Clarifier Effluent and Secondary WWTP Effluent. Advance scheduling will be required due to the short hold time for BOD and weekend coverage. Please reference Quotation Number and EAI Project ID when requesting bottles or submitting samples.
Quoted prices are based on standard 10 day turnaround time.
This work includes EAI supplying properly preserved containers, cooler, COC, delivery and sample pick up.
Our Standard Level A and/or Batch Level B reporting is included in this quotation.
Electronic Data Deliverables in EAI formats are included in this quotation and are available upon request.
For your convenience EAI has a courier available for sample kit drop off and sample pick up.
Please call 24 hours in advance to schedule your container drop off or sample pick-up.
Thank you for the opportunity to provide this quotation. Feel free to contact me if you have questions regarding this quotation or the capabilities of Eastern Analytical. Please keep EAI updated on the status of this quotation.

Sincerely,

* This cost is for 30 sample days. An additional three (3) months of testing at 3 tests/wk is also required, for a total of 66 days of sampling and testing.
$20,010 ÷ 30 x 66 = $44,022 SAY $40,000.

Scott B. Kelley
Eastern Analytical, Inc.

ACCREDITED IN ACCORDANCE WITH nelac

This quotation is valid for 90 days from the date quoted.

Appendix H

DES/EPA/CLF Comments and Responses

The following responses have been provided on the comments received from staff of the EPA, DES, and CLF. Copies of the comment letters are also included.

Responses to the September 15, 2008 Final Draft Comment(s)

November 10, 2008 EPA Correspondence (Appendix G):

Comment 1- No response necessary.
Comment 2-CoMag/BioMag- See response to "General Comment" from DES below.
Comment 3-In Pipe Piloting- In-Pipe Technology is being considered by the City for piloting within the Pease Wastewater Collection and Treatment System.
Comment 4- Urban BMP's-This comment is duly noted by the City.
Comment 5-Stormwater Utility- No Response necessary.
Comment 6-Flow Diversion-The historical interfering substances have been identified from a discharge within the existing Pease collection system. Flows associated with diversion of the Gosling Road Pump Station are not expected to have similar interfering substances.
Comment 7- No response necessary.

September 26, 2008 DES Correspondence (Appendix G):

- ***General Comment-*** The City is considering BioMag as an emerging technology within the ongoing Task 5a-Alternatives Evaluation of the WMP. BioMag is only appropriate at this time for the Pease WWTF since its application is with secondary treatment facilities. There are no large scale facilities in operation, and application as an interim measure would require significant capital investment at the Pease WWTF. The CoMag process is designed to reduce phosphorus, utilizing magnetite as a ballasted settling tertiary treatment technology. Based on our experience with the capabilities of the CoMag treatment technology, the process would enhance TSS removal and reduce nitrogen only to the extent of removing the fraction of TSS that contains nitrogen.. Based on the capital costs for implementation and the limitations for use as an interim measure at Pease WWTF or Peirce Island WWTF, along with the status as an emerging technology, we feel that the BioMag treatment technology should remain under consideration within Task 5a-Alternatives Evaluation, but not be considered as an interim measure.
- ***Comment 1- IDDE Program*** The changes in the recently released Draft Phase 2 Stormwater Permit are duly noted and will be utilized by the City with regard to increasing the IDDE Program.

- ***Comment 2- Urban BMP's***-We have included a reference to EPA's new urban retrofit guidance document in the Final Technical Memorandum.
- ***Comment 3- Chloramination***-No response necessary
- ***Comment 4- Flow Diversion*** Anti-degradation will be addressed if the interim diversion of flows to the Pease WWTF is considered for further action by the City.
- ***Comment 5- Headworks***-No response necessary.
- ***Comment 6- Stormwater Utility***- This comment is duly noted.
- ***Comment 7-In-Pipe Technology***-No response necessary.

September 30, 2008 Correspondence from CLF (Appendix G)

- ***In-Pipe Technology-*** This technology is being considered by the City for implementation as an interim measure.
- ***Urban BMP Retrofits and Establishment of a Stormwater Utility-*** This comment is duly noted.
- ***Chloramination at the Pease WWTF-*** This comment is duly noted.
- ***Diversion of Gosling Road Pump Station Flow from Peirce Island WWTF to Pease WWTF-*** This comment is duly noted.

Goodwin, Peter

From: janson.roger@epamail.epa.gov
Sent: Monday, November 10, 2008 10:33 AM
To: phrice@pw.cityofportsmouth.co; Goodwin, Peter
Cc: stergios.spanos@des.nh.gov
Subject: Portsmouth IM Study
Attachments: Porsmouth MP letter.pdf

Gentlemen,

1. My apologies for the delay in sending you this simple response.

2. NHDES comments (with which I concur) attached below. One note: the DES recommends that the CoMag process be further evaluated as an interim measure. I would suggest that you look at BioMag (CoMag moved into the aeration process) which at least through its piloting has shown some TN removal benefits. This should be evaluated particularly in conjunction with additional flows to Pease.

3. Given the relative uncertainty of the Pease/Peirce partitioning either interim or final, I would recommend that "In-pipe" may have a piloting application at Pease versus Peirce given the wet-weather issues. TN reduction should be factored into any Pease options given where the NH DES is relative to its criteria development and the likelihood that the greater Great Bay discharge communities will be staring at TN limits sooner rather tahn later.

4. Incorporation of BMP retrofits and LID for new development contributory to Peirce wouldbe benefial to the extent that it may influence wet weather flow volumes. You should also follow carefully the Agency's efforts with respect to Green Infrastructure which is squarely on point in the reducing wetweather flow impacts.

5. Concur with the DES' comments on storm water utilities.

6. If flows are diverted to Pease - up to 400,000 GPD - is there any likelihood that interfering substances would be reintroduced?

7. Other than the above, I thought the various sessions held by the City and its representatives were well thought out, presented and covered a wide range of topics. They were approached with an open mind and took into account a wide ranging views.

Tanks for the opportunity to participate.

Roger Janson, Chief
Municipal NPDES Permits Branch
617.918.1621

The State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES

Thomas S. Burack, Commissioner

September 26, 2008

Roger Janson
NPDES Municipal Permit Branch Chief
USEPA Region 1
One Congress St, Suite 1100
Mail Code CMP
Boston, MA 02114-2023

Subject: City of Portsmouth, New Hampshire, Wastewater Master Plan
Technical Memorandum 14-Supplemental Work Plan No.1
Interim Alternatives Evaluation

Dear Roger,

We received the subject submittal dated September 16, 2008, and circulated it to personnel at DES in the Wastewater Engineering and the Watershed Management Bureaus for review. In view of the short timeframe and with the understanding that not all relevant staff have had an opportunity to review and comment on the report, we offer the following comments for your consideration and response to the City of Portsmouth.

General Comment

- The IAE appears to include the most promising alternatives discussed at the brainstorming sessions. After the brainstorming sessions, DES staff attended a technical presentation on the CoMag process. This process uses magnetite to significantly enhance floc formation and settling in clarifiers. We suggest that this process be discussed as another potential interim measure.

Comments on Interim Alternatives (as they are enumerated in the submittal)

1. Increasing the IDDE program

   - The draft of the soon to be publicly noticed MS4GP contains significant changes in the IDDE program from the first round permit. The changes include comprehensive procedures for prioritizing areas of the MS4 that are likely to contain the highest numbers of illicit connections. The information in the draft MS4GP should be shared with Portsmouth since, with this more focused approach, a larger number of illicit connections could be identified and removed.

2. Implement urban BMP retrofits

   - The report does not mention EPA's new urban retrofit guidance document (available at the Center for Watershed Protection at www.cwp.org titled "Urban

Stormwater Retrofit Practices"). This guidance provides a screening process that will identify those areas of the City that should be prioritized for retrofitting BMPs since they are likely to lead to the most improvements to water quality. The City should review this guidance document in conjunction with evaluation of this option.

3. Eliminate Nitrogen (chloramination) usage at Pease WWTF

   - No comments

4. Interim diversion of wastewater from Peirce Island WWTF to Pease WWTF

   - Antidegradation must be addressed for the relocation of wastewater to the Pease WWTF if the design flow for the Pease WWTF will increase. Since any interim diversion will increase the likelihood that all of the city's sewage will be redirected to Pease, this issue should be addressed now.

5. Headworks screening upgrades

   - No comments

6. Development of storm water utility

   - We agree that this recommendation has merit. We recommend that the City thoroughly investigate the potential pitfalls in bringing this before the public before proposing it in a public forum. Hiring a public relations firm may be appropriate. Further, the city should consider working with nearby communities in this regard, again being careful to address potential public acceptance problems. It will be key to demonstrate that the fee will ultimately result in cost savings due to less WWTF costs, less CSO treatment costs, reduced flooding costs, etc.

7. In pipe technology application

   - No comments

Sincerely,

Paul Heirtzler, P.E., Administrator
Wastewater Engineering Bureau

SKS/jga23
cc: Stergios K. Spanos, DES-WEB-Permits and Compliance
Paul Currier, DES-WMB
Steven Roberts, DES-WEB-Design Review

CONSERVATION LAW FOUNDATION

September 30, 2008

Via Electronic and U.S. Mail

Suzanne M. Woodland, Esq.
City of Portsmouth, Legal Department
1 Junkins Avenue
Portsmouth, NH 03801

Re: Draft Interim-Measures Technical Memorandum

Dear Suzanne:

I am writing to provide the Conservation Law Foundation's (CLF) comments regarding the draft Technical Memorandum 14, relative to Supplemental Work Plan No. 1 – Interim Measures Evaluation, provided to CLF under cover of correspondence dated September 16, 2008.

In-Pipe Technology

We are pleased that the study recommends further, more detailed consideration of In-Pipe Technology (IPT), and we agree that a pilot study at the Pease wastewater treatment facility (WWTF) will provide a valuable opportunity to assess IPT's capability under primary-treatment conditions and, therefore, as an interim solution to be used at Peirce Island. As discussed below, we believe such a study also will provide information that is highly valuable beyond interim considerations for the Peirce Island WWTF.

We understand that IPT is providing a written response to Brown and Caldwell's letter of September 12, 2008. We further understand that IPT is happy to assist in the development and implementation of a pilot study at Pease WWTF, although it is IPT's recommendation that the study occur over a period of six months. We also understand that although IPT is unable to conduct the pilot study free-of-charge, as requested in Brown & Caldwell's September 12 correspondence, it is willing to do so at a substantially reduced cost amounting to only $18,000.

We believe IPT's response is extremely reasonable. The cost of a mere $18,000 is substantially less than other interim measures under consideration in the Technical

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MAINE: 14 Maine Street, Suite 200, Brunswick, Maine 04011-2026 • Phone 207-729-7733 • Fax 207-729-7373
MASSACHUSETTS: 62 Summer Street, Boston, Massachusetts 02110-1016 • Phone 617-350-0990 • Fax 617-350-4030
RHODE ISLAND: 55 Dorrance Street, Providence, Rhode Island 02903-2221 • Phone 401-351-1102 • Fax 401-351-1130
VERMONT: 15 East State Street, Suite 4, Montpelier, Vermont 05602-3010 • Phone 802-223-5992 • Fax 802-223-0060

Memorandum (i.e., $1 million to eliminate chloramination at Pease WWTF, $700,000 for interim diversion of wastewater from Peirce Island to Pease WWTF, $100,000 for urban BMP retrofits), and the pilot study will provide critically important information for the City as it addresses needs at Peirce Island, Pease WWTF, and the potential need for another facility. In particular, the significant value of this pilot study will be threefold:

1. It will help the City assess the effectiveness of IPT as an interim solution at the Peirce Island WWTF. By assessing the capability of IPT under primary-treatment conditions, the pilot will provide the City a valuable opportunity to evaluate the use of IPT as an interim solution for reducing nitrogen and TSS from the Peirce Island WWTF. Given the magnitude of the Peirce Island WWTF's discharge, and with the potential for IPT to result in significant reductions of total nitrogen and TSS, this interim solution could have significant water-quality benefits for the Piscataqua River and other waters within the Great Bay estuary – many of which soon will be listed as impaired (i.e., violating state water quality standards) as a result of significant eelgrass losses which, in turn, may be attributable to nitrogen and TSS.[1] It also could reduce certain operating costs at Peirce Island, such as costs associated with sludge disposal.

2. It will help the City assess the effectiveness of IPT as a current and long-term option for the Pease WWTF. The Pease WWTF's NPDES permit has expired. As discussed above, the Piscataqua River, into which Pease WWTF discharges its effluent, soon will be added to New Hampshire's Section 303(d) list of impaired waters as a result of substantial eelgrass declines. Because eelgrass declines can be caused by excessive levels of nitrogen and TSS, it is reasonable to expect that the next NPDES permit for the Pease WWTF will include nitrogen limits, and more stringent TSS limits. IPT could play a significant role in reducing nitrogen and TSS discharges from the Pease WWTF, without additional capital expenditures and upgrades. It also could reduce energy consumption at the Pease WWTF, as well as the volume of sludge generated by the plant and the amount of chemicals used there. Accordingly, in addition to improving water quality, it could reduce operating costs *and* advance the City's sustainability goals at this plant.

3. It will help the City assess the effectiveness of IPT as part of its wastewater master planning, and as a means to reduce costs and advance sustainability goals. By assessing the effectiveness of IPT at the Pease WWTF, the City will develop valuable information regarding IPT's effect on pollutant loadings, energy consumption, and other operations costs. This information will be extremely valuable for assessing the potential role of IPT in the City's long-

[1] The N.H. Department of Environmental Services proposed Section 303(d) list of impaired waters includes the Piscataqua River, Little Bay, and several tributaries flowing into the Great Bay estuary as violating state water quality standards as a result of eelgrass declines, and the Squamscott, Lamprey, Oyster, and Salmon Falls Rivers as violating narrative nitrogen standards. The proposed Section 303(d) list also identifies Great Bay as threatened as a result of eelgrass declines.

term plan for either upgrading existing WWTFs, or building a new facility, including the potential for IPT to reduce the size and operation costs of any such upgraded or new facilities.

In light of the significant value of an IPT pilot study at the Pease WWTF, and in light of the minimal cost of such a study, we urge the City's staff and consultant to amend the draft Technical Memorandum to recommend (1) that the City Council support and fund such study, and (2) that the study be conducted as soon as practicable to generate critically important information for (a) consideration as an interim measure at Peirce Island WWTF, (b) ongoing and future operations at Pease WWTF, and (c) the City's wastewater master planning process. We reiterate that the potential cost-savings and other benefits that could accrue to the City – should it adopt IPT in one or more applications – strongly justify the minor expenditure involved in the pilot.[2]

Urban BMP Retrofits and Establishment of a Stormwater Utility

CLF agrees that addressing the problem of stormwater pollution is an important element of protecting the Piscataqua River and other estuarine and coastal waters. We support efforts on the part of the City to engage in urban retrofits to reduce stormwater pollution, and hope such retrofits will extend beyond the State Street Upgrade project to be an ongoing City effort. We also strongly support the establishment of a stormwater utility to generate the funds needed to engage in widespread retrofits, and improved maintenance. It should be noted that these measures can and should be significant components of the City's management plan under the Phase II, Small MS4 General Permit administered by the Environmental Protection Agency. These efforts should be pursued, but should in no way preclude or replace the implementation of an IPT pilot study at Pease WWTF.

Chloramination at Pease WWTF

CLF agrees that should interference conditions arise in the future, alternatives to chloramination should be considered. The potential future study of chloramination alternatives, however, should not preclude immediate implementation of an IPT pilot study at Pease WWTF, which study could generate important information for future operations and planning at this facility.

[2] In its September 12, 2008 letter to IPT, Brown & Caldwell states: "If the cost effectiveness evaluation for *both* WWTFs [i.e., Pease and Peirce Island] provides a benefit to the City in reduced overall operations costs which offset the cost of the IPT system, then a full scale pilot at the Pease WWTF would be recommended to the City Council." (Emphasis added). CLF is troubled by the inclusion of this hurdle – particularly the requirement that cost effectiveness be demonstrated for *both* facilities prior to proceeding with the study at *one* plant. We urge the City staff and consultants to remove this barrier to conducting the pilot study; to include environmental benefit in any cost-benefit analysis pertaining to the use of IPT; and to not require "cost effectiveness" at Peirce Island WWTF as a precondition to an IPT pilot study at the Pease WWTF, where IPT could have independent and ongoing value.

Diversion of Gosling Road Pump Station Flow from Peirce Island WWTF to Pease WWTF

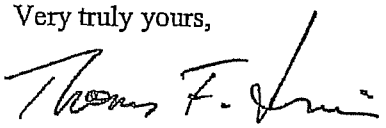
Although the above-stated diversion of wastewater flows at the Gosling Road pump station would reduce TN and TSS loads at Peirce Island WWTF, as the draft Technical Memorandum acknowledges it would *increase* loads at the Pease WWTF. CLF remains greatly concerned with the relocation of pollutant loads to a discharge point further "inland" of Peirce Island, where such loads could have a greater adverse impact on upper portions of the Piscataqua River, and on Little Bay and Great Bay. This concern warrants detailed study before the City proceeds with any plans involving the diversion of flows from Peirce Island WWTF to Pease WWTF.

* * *

Again, CLF is pleased with the draft Technical Memorandum's recommendation that IPT be further studied. However, we urge the City's staff and consultant, in finalizing the Technical Memorandum, to recommend that the City Council support and fund the IPT pilot study at the Pease WWTF (for a period of six months, and at a substantially reduced cost of approximately $18,000), and that such pilot study begin as soon as practicable.

We appreciate the opportunity to comment on the draft Technical Memorandum, and would welcome the opportunity to further discuss these issues with the City's staff and consultant as the Technical Memorandum is finalized. We look forward to working with you as this process continues, and request notice of City Council public meetings and/or hearings at which the recommendations contained in the final Technical Memorandum are presented and/or discussed.

Very truly yours,



Thomas F. Irwin,
Senior Attorney

cc: Roger Janson, EPA New England