Publicly Owned Pre-Treatment Plants (POPPs):
A Mutually Beneficial Arrangement for Towns, Firms, and Community Members

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Submitted: Tuesday, April 28, 2015

Environmental Studies Seminar
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I. Introduction

Since the close of the Great Recession, communities across Massachusetts have struggled to create jobs for the unemployed and re-establish the once robust economy. Many households are making less money now than before the recession, with the median household income in 2013 about ten thousand dollars less than it was before the crash in 2008 (Kinney 2015). While the city of Boston has succeeded in becoming a notable hub for biotechnology and technology firms, the more isolated communities of Western Massachusetts have not seen the same level of resilience (Mass. Technology Collaborative 2015). In these communities, policy makers must utilize more creative incentives to attract firms. One such incentive is for the town to offer industrial wastewater treatment. The establishment of publicly owned pretreatment plants (POPPs) to filter toxic pollutants out of industrial effluent before that effluent reaches public sewer systems could be a mutually beneficial arrangement for towns, firms, and community members.

After the Clean Water Act (CWA) was passed in 1997, regulations caused firms to become more aware of what pollutants they were discharging in their wastewater. More recently, amendments to the original act and increased monitoring have placed higher levels of responsibility on businesses. Point source firms that choose to expel effluent into a surface water body have to apply for a National Pollutant Discharge Elimination System (NDPES) permit (33 U.S.C. §402) (facility “1” in graphic 1). NPDES permits can be time consuming and costly because they require firms to monitor their own pollutant levels and filter out toxic pollutants to meet state and local contamination standards. Also, because the Environmental Protection Agency has limited resources to spend on confirming each firm’s pollutant report, the permits threaten local water bodies because they allow firms to discharge with minimal supervision (Collins 2010, pg. 64). If they do not have a NDPES permit, firms can choose to discharge their wastewater into the local sewer system (facilities “2” and “3” in graphic 1). However, this process still requires substantial monitoring and sample analysis (MWRA-Permits). As show in Graphic 1, the wastewater generally goes to a publicly owned treatment works (POTW) center that is designed to treat residential sewage, not the toxic pollutants and metals generally originating from industrial facilities (Fobi 2012). Thus, without perfect information from firms and successful filtration of toxins, towns may be accidentally releasing contaminants back into
waterways. Additionally, residential areas are put at risk when their sewage systems are mixed with industrial wastewater (Entity “4” in Graphic 1).

As shown in Graphic 2, a system utilizing a Publicly Owned Pretreatment Plant (facility “5” in Graphic 2) may present a viable alternative to the current structure. If towns constructed POPPs, the costs and liabilities associated with water pollution would no longer fall on firms (facilities “1,” “2,” and “3” in Graphic 2). Theoretically, this would be a tremendous incentive for firms to relocate to these towns, bringing with them jobs, tax revenue, and economic revitalization. This would assist towns in moving towards their goals of full-employment and better public services. It would also provide the added benefits of more control over water quality and more transparency about water quality for citizens (entity “4” in Graphic 2). Of course, there are costs involved in constructing the facilities. However, state and federal funding programs could significantly reduce the investment costs.
This paper will provide a case study of a town that could benefit from a POPP facility. It will include a general idea of what the capabilities of the POPP would need to be to attract high tech industries as well as an analysis of the costs and benefits for each stakeholder (the town, the firm, and the community member). Finally, the paper will provide recommendations on how towns should begin the process of evaluating whether or not to build a POPP. In addition, this portion will incorporate suggestions on how to approach federal/state funding and financing applications and advise towns which areas need further research.

II. Objectives and Research Methods

The overall goal of this project was to develop a hypothetical case study for building a POPP in a small western Massachusetts community and to provide guidance to towns considering this type of project. In order to accomplish these goals, several objectives were identified. Each objective corresponds to specific research methods, described below.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Research Methods</th>
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### 1) Determine a town that can be used for an experimental case study for the POPPs system.

Even though this idea would ideally be expanded to several communities in Western Massachusetts, it is useful to examine one specific town in order to provide real, tangible details of how this system may be implemented.

- Examine U.S. Government census data to compare statistics such as population, age distribution, average income, education, and poverty levels for various towns in Western Massachusetts.
- Utilize the Massachusetts Department of Environmental Protection in order to observe pre-existing infrastructure in the various towns.
- Conduct research on the industrial history of various towns in Western Massachusetts in order to determine which towns possess the resources and capability of expanding their industrial capabilities.

### 2) Define what the capabilities of the POPP would need to be in order to attract high tech industries to the area

- Compile a list of common regulated industrial pollutants from the Environmental Protection Agency’s water standards and the MWRA’s standards.
- Decipher which pollutants are most relevant to high tech industries, such as electronic manufacturing, using the EPA’s database and firm specific publications.
- Note the current liabilities faced by firms that have to filter their own wastewater in Massachusetts through the Massachusetts Water Resource Authority.
- Estimate the costs to firms of providing the service themselves and the other burdens currently placed on them.

### 3) Summarize the potential benefits to the environment

- Research which regulatory problems POTWs face, and how these adversely affect their surrounding environment.
- Study how a pretreatment program could prevent these regulatory problems by reducing the load of the POTW.
- Investigate local water quality in the chosen town to identify potential areas of improvement.

### 4) State how the POPP would positively influence the area in other ways (jobs, tax revenue, etc)

- Estimate the amount of jobs that could be provided by the installation of an industrial park based on the unemployment data of the town and surrounding areas.
- Study other towns that have recently attracted industry to find other potential benefits.
- Note other benefits including social multipliers.

### 5) Scrutinize the costs of building the POPP and then operating it in the future

- Look over construction proposals for other types of water treatment facilities.
- Compile an inclusive list of cost factors to give communities a general idea of how the funds will be spent.
6) Compile the findings into a general grant and/or loan application to see how the POPP could be proposed to environmental funding agencies or economic development agencies
- Research grant/and or loan application models for proposals requiring similar funding
- Research environmental funding agencies and potential corporate investors
- Draft grant and/or loan application and review with group, Professor Plater, other project stakeholders

7) Determine which areas require further research
- Confirm which pieces of the proposal will be town specific and will therefore vary widely across potential grant/loan applicants
- Discuss which portions of the project were difficult to determine with current information and access to figures

III. Analysis of the Proposal

A. Identifying a Community for the POPP

After analyzing state census data, environmental assessment reports, U.S. Bureau of Labor Statistics data, industrial histories, and geographical layouts of several towns within the Connecticut River Basin in Western Massachusetts, it became apparent that Easthampton possessed the perfect traits to serve as our case study. Located West of Worcester and just North of Springfield, Easthampton lies in between the Manhan and Connecticut rivers.

Graphic 3:
With a population of 16,000, Easthampton has a rich history of industrial development and prides itself on retaining its “mill town soul” (Easthampton). However, unemployment has steadily risen over the past 15 years to 5.4% (City-data). This rate is likely skewed due to the fact that residents are moving out of Easthampton and into other counties at a rate 125% higher than the average Massachusetts resident (City-data). Additionally, Easthampton’s geographical layout in relation to its Publicly Owned Treatment Works facility is ideal for a POPPs set up. The POTW is located just South of the Manhan river and lies at a low point in the area. That way, new industrial facilities would not have to pump water uphill in order to reach the POTW and POPP facilities. For other towns in the area, POTWs were often located on the opposite side of the river from old industrial parks. This is most likely due to the fact that these industrial parks were constructed well before the passing of the Clean Water Act, and had little incentive to treat their water thoroughly before dumping it straight into the river systems. However, Easthampton is unique in that there is plenty of open space surrounding the POTW facility on the same side of the river. Additionally, Easthampton is located very near to highway 91, so transporting construction materials to and from the site would be entirely viable. Section 9.06 of the Zoning Ordinance of Easthampton specifies a business provision for new industrial and mixed-industrial developments. In accordance with this statute, if a new business improves the business environment of the district by donating to the city of Easthampton’s public amenities, they are eligible to receive a ten percent reduction in the minimum lot area requirements (Zoning Ordinance, City of Easthampton, Massachusetts). Thus, a new POPPs facility would have the opportunity to apply for a ten percent reduction in lot area requirements, should it decide to donate to the surrounding city’s public amenities. The Manhan river is labeled by the EPA as impaired due to high levels of escherichia coli and fecal coliform. From an ecological perspective, the city of Easthampton could benefit greatly from the more stringent treatment associated with the POPPs system.

**B. Attracting High Tech Industry**

If a small town such as Easthampton, Massachusetts were to construct a POPP, it would want to ensure that the POPP would attract powerful and healthy industries such as the technology-manufacturing sector. Thankfully, this sector is one of the most motivated to build production plants near a POPP because the pollutants resulting from the metal refinery processes...
are some of the most complex to screen, yet they are highly toxic and heavily regulated by the Environmental Protection Agency (EPA). These firms, which utilize electrical and electronic components, have to follow six regulatory codes on the national level and numerous more on the state and local level. On the national level, the EPA mandates these firms to use the Best Practicable Control Technology Available (BPT) for sixty-five pollutants and classes of pollutants that have been deemed especially concerning (33 U.S.C. §304(b)(1)). Firms in this sector are also required to use Best Available Technology Economically Achievable (BAT) to ensure that as technology becomes more efficient at screening these pollutants that firms will make reasonable upgrades (33 U.S.C. §304(b)(2)). This aspect could represent huge costs for the firms if they have to filter their own effluent.

In order for the POPP to be successful in treating the most common pollutants from the technology production industry it would need to invest in technology that meets the national standards for a variety of chemicals and total toxic organics (TTOs). The pretreatment standards for new sources that wish to discharge into a publicly owned treatment works (POTW) center can be found in Graphic 4. This would apply to the POPP because after effluent leaves the POPP it will travel through the local sewer system to the POTW. The regulated chemicals include cadmium, chromium, lead, and zinc metals. They also include a category referred to as total toxic organics which is comprised of dichlorobenzene, chloroform, trichloroethane, methylene chloride, bis (2-ethylhexyl) phthalate, toluene, and trichloroethylene, amongst others (40 CFR § 469). These are only a few of the many substances regulated by the federal government.
Of course, before a town builds a POPP it should consult with the local regulations to confirm that the POPP being designed also screens to the levels mandated by state and local laws. Some of the standards set by the Massachusetts Water Resource Authority’s Toxic Reduction and Control (TRAC) program are more stringent than the limitations put in place by the federal government (360 CMR §§10.0). Different municipalities will also have to decide on a treatment level that corresponds to the abilities of their existing POTW. It would be unnecessary to filter out chemicals and matter that can be later treated by the other facility that the effluent will travel to.

Firms that have the opportunity to send their wastewater to a POPP will be elated to no longer bear the burden of treating the water and testing it themselves. Firms with permits to discharge into the sewer system must complete monthly discharge monitoring reports and must report their own noncompliance within 24 hours if that noncompliance would lead to the endangerment of human health or the environment (Fobi, pg. 5). Many firms have a hard time with this process and frequently receive notices of noncompliance and fines. In fiscal year 2013, the Massachusetts Water Resource Authority issued 177 notices of violation throughout the commonwealth. The organization also assessed over $200,000 of penalties (MWRA 2013). A chart depicting the different types of notices sent to firms and the overall penalties assessed can
be seen in Graphic 5. Firms despise these penalties and the liabilities associated with them. Firms want to avoid penalties, the public shame that comes from being penalized, and the possible legal burdens that could come if people believe the firm’s violations caused them suffering. By removing the liabilities from the firm, the town creates a more amicable relationship between firms who want to decrease costs and environmental regulators who want to decrease toxins.

Graphic 5:

Created with data from the 2013 Industrial Waste Report of the Massachusetts Water Resource Authority

C. Alleviation of Current Wastewater Issues and Other Potential Environmental Impacts

A publicly-owned pretreatment plant (POPP) would have numerous environmental benefits that would both help the water quality of effluent and the functionality of the publicly-owned treatment works (POTWs). First of all, pretreatment is needed in the case of industrial facilities, as many POTWs are not designed to treat most toxic or non-traditional pollutants that are present in industrial waste (Environmental Protection Agency, 2011). Discharges from industrial and commercial sources can have adverse effects on the water quality of the receiving body. Pretreatment would prevent the introduction of pollutants into a POTW that would interfere with its operation, as well as chemicals that would pass through the plant untreated (EPA, 2011). Even if the POTW has the capability to remove toxic pollutants without causing interference, these pollutants can end up in the sludge end product, which limits the disposal options for the sludge (EPA, 2011).

Industrial wastewater is often contaminated by a variety of harmful substances, such as industrial process by-products, like copper, lead, nickel, and other heavy metals (“National Pollutant Discharge Elimination System (NPDES),” 2014). Because treatment systems are not
designed to remove these substances, industrial wastes can damage sewers and interfere with the operation of treatment plants (“NPDES,” 2014). These substances can also pass through the systems untreated, resulting in pollution of nearby waters and increasing the costs and environmental risks of sludge management (“NPDES,” 2014).

Conventional pollutants can often pose a problem for POTWs if they are not properly pretreated (EPA, 2011). Pretreatment would prevent excess loadings of the conventional pollutants fecal coliform bacteria, and oil and grease, all of which have caused problems in POTWs (EPA, 2011). These pollutants can cause a buildup of suspended solids and an overabundance of dissolved oxygen, both of which have adverse effects on the water body that the POTW discharges into (EPA, 2011). In the Manhan River, the pollutants that have become a particular problem are Escherichia coli and fecal coliform, meaning that the construction of a POPP would benefit the river and the local citizens by preventing the introduction of these pollutants into the water (Waterbody Quality Assessment Report, 2012).

The introduction of a POPP would also have benefits for the perceptions of water quality in Easthampton, or any other town that would choose to build. As Graphic 6 illustrates, residents of the state of Massachusetts have a relatively low perception of their water quality as compared to residents of other New England states (Hu and Wright Morton, 2009). By preventing harmful bacteria and chemicals from entering common waterways, a POPP would improve the quality of local water, consequently improving the local population’s perceptions of that water. The residents would also be more confident in the water quality reports provided by the town because industrial firms would no longer be self-monitoring, a process which leads some to think that the firms would lie in their own self-interests. The federal and state governing agencies lack the resources to double check each report, but the towns will have better incentives to be honest with their citizens and to actually take the appropriate action to bring themselves back into compliance with the set standards (Fobi). Because of this, the quality of life for local residents would increase as they became more willing to use the waterway for recreation or other purposes.
D. Benefits Provided to the Town and Community Members

High levels of unemployment carry tremendous social and economic costs to both the unemployed and society as a whole. Thus, job creation incentives provide a mixture of social and economic benefits. While the unemployment rate in Massachusetts currently hovers around 5%, many of the municipalities surrounding Easthampton have higher rates and many of those working in Easthampton may be interested in more stable, full-time positions (Bureau of Labor Statistics 2015). The construction of the POPP will provide new jobs in three ways. First, the construction and operation of the POPP will require labor. Workers will be needed to construct the facility and later skilled laborers will be needed to operate the facility. The Northeast Guide for Estimating Staffing at Publicly and Privately Owned Wastewater Treatment Plants encompasses different systems and equations for calculating exactly how many workers will be needed and how many hours they will need to dedicate annually based on their job functions (NEIWPCC 2008). As the Environmental Protection Agency grows stronger and new information leads to increased regulation, these jobs could become a pivotal function in our society.

The biggest advance in job creation will be from the firms that relocate to the community. These jobs, hopefully at technology companies or in the technology production sector, can provide job growth with strong wages in order to raise the median household income (Mass. Tech 2014). Many jobs in the manufacturing industry pay higher wages, on average, than the
new jobs being created in the information sector of the Silicon Valley. Manufacturing positions also train employees with highly demanded skills that could help them find new employment in the future if necessary (Kotkin and Shires 2014). In addition, reciprocal job growth may occur because as the local economy grows stronger more jobs will be created in the service sector and local businesses will have a larger customer base to pull from.

The direct benefits of employment empower the individual and the community. Famous economist and philosopher Amartya Sen lists the three main aspects of employment as income security for the individual, increased production of goods and services, and personal empowerment as the employed individuals are engaged in a worthwhile activity (Sen 1975). However, the indirect benefits of employment are just as important for communities. “The social multipliers [of employment] concern the benefits...of decreased crime, drugs, and family disruption, and increased and strengthened security, education, healthcare, and environmental protection” (Forstater 2015). It may not be possible to estimate the true benefits of a POPP project because social multipliers will cause the benefits to ripple into a mutually reinforcing cycle in which the benefits in one area increase the benefits in others. Increased commercial and industrial activity will even assist towns in collecting tax revenue to improve public services, such as education. This positive feedback mechanism will allow the town to continue to realize benefits even when loan repayment terms expire.

E. Costs Associated with Building and Operating a POPP

Costs involved in constructing and operating a wastewater treatment plant can be broadly divided into two categories: 1) investment costs and 2) operating expenses. The investment costs are all costs required for the construction of the wastewater treatment plant while operational costs are those that are incurred to maintain and operate the facility during its lifetime.

The investment costs can be further broken down into subgroups. Construction costs provide the majority of investment costs, usually coming in at close to 85% of the project due to the specialized labor and materials involved. The construction costs consist of all civil and mechanical engineering, instrumentation and electro-technical equipment, connecting pre-existing infrastructure such as pipes and electricity, and unforeseen contingency expenses (Van Haandel and Van der Lubbe 2007). For more detailed cost descriptions, please refer to Graphic 7. Sundt Construction, a firm out of Arizona that specializes in water related projects, provides
construction cost estimates for three different wastewater facilities on their website. The costs of the projects range from $45 million to $148 million. Part of the differential is based upon the size of the plant while other explanations of the different costs fall on quality of the equipment and standards set by the design board for treatment (Sundt). Other construction companies offer similar project descriptions but do not list the prices, making it difficult to compare quality of work or regional factors.

Other investment costs make up smaller portions of the overall balance. One included item in the preparation portion, site acquisition, would depend on whether or not the community owns the land where the POPP would be located. If not, this could add a significant cost to the project because the town would need to purchase the land. Similarly the costs of site preparation could drastically increase if the town needed to tear down pre-existing infrastructure or clean-up residual pollution. Start-up costs include the hiring and training of personnel for the facility and the purchasing of general materials to run the facility. Finally, additional costs cover important items such as project management and the resources dedicated to the planning stages (Graphic 7).

Graphic 7: Division of Investment Costs for a Wastewater Treatment Plant as a Proportion of Total Investment

<table>
<thead>
<tr>
<th>Main Cost Item</th>
<th>Proportion of Investment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Preparation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1 Site acquisition</td>
<td>Not included: location dependent</td>
<td>Acquisition of building plot, brokers, notaries, taxes</td>
</tr>
<tr>
<td>1.2 Infrastructure</td>
<td>Not included: location dependent</td>
<td>Access roads, sewer lines and effluent discharge pipelines, power supply</td>
</tr>
<tr>
<td>1.3 Site preparation</td>
<td>0.5-2%</td>
<td>Demolition, ground work, rerouting pipes &amp; cables, roads</td>
</tr>
<tr>
<td>2. Construction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1 Civil</td>
<td>25-29%</td>
<td>Construction of tanks, buildings, foundations, etc.</td>
</tr>
<tr>
<td>2.2 Mechanical</td>
<td>21-27%</td>
<td>Equipment costs including installation, local piping</td>
</tr>
<tr>
<td>2.3 E&amp;I</td>
<td>10-16%</td>
<td>Local instrumentation and electro-technical equipment</td>
</tr>
<tr>
<td>2.4 Piping</td>
<td>2-5%</td>
<td>Interconnecting piping, utilities, sewers, including insulation and tracing</td>
</tr>
<tr>
<td>2.4 Central PGE&amp;I</td>
<td>2-5%</td>
<td>Central process control including software, motor cabinet (MCC), substation, frequency converters, cable work</td>
</tr>
<tr>
<td>2.5 Contingency</td>
<td>10-30%</td>
<td>Allowance for unforeseen expenses</td>
</tr>
<tr>
<td>3. Startup</td>
<td>13%</td>
<td>Maintenance and lab equipment, computers, etc.</td>
</tr>
<tr>
<td>3.2 Start-up supplies/spares</td>
<td>included in 3</td>
<td>Chemicals, first fills (activated carbon, filter material), fittings, cables, etc.</td>
</tr>
<tr>
<td>3.3 Personnel</td>
<td>included in 3</td>
<td>Hiring and training employees</td>
</tr>
<tr>
<td>4. Additional costs: 10-20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1 Initial studies</td>
<td>included in 4</td>
<td>Feasibility study, system selection, geotechnical survey</td>
</tr>
<tr>
<td>4.2 Design and engineering</td>
<td>included in 4</td>
<td>Basic and detailed design and engineering, requisitions and tender process, procurement</td>
</tr>
<tr>
<td>4.3 Project management</td>
<td>included in 4</td>
<td>Planning and budget control</td>
</tr>
<tr>
<td>4.4 Construction management</td>
<td>included in 4</td>
<td>Site supervision, testing, and commissioning</td>
</tr>
<tr>
<td>4.5 Miscellaneous</td>
<td>included in 4</td>
<td>Permits, taxes, insurance</td>
</tr>
</tbody>
</table>
Operational costs exist while the plant is functioning and will need to be paid each year. These costs include the salaries of those who work at the facility as well as the basic supply costs. In addition, wastewater treatment plants need to consider the costs of aeration, sludge disposal, and discharge costs (Van Haandel and Van der Lubbe 2007). With a POPP, the town would hypothetically eliminate the discharge fees or collect them internally because the water will be going from the POPP to the town sewer system. This could eliminate about 18% of the operating costs. To see a breakdown of the typical operational costs incurred by a wastewater treatment plant, refer to Graphic 8. Once again, the exact amount of each of these costs would depend upon the size of the plant and other regional factors.

Graphic 8:

Breakdown of Operating Costs for a Wastewater Treatment Plant

Adapted from CostWater.com

F. Federal and State Funding Mechanisms

In 1987, with the passage of the amendments to the Clean Water Act (CWA), the United States Congress had set into motion a new process and standard for financing clean water
projects and initiatives. Since its inception, the Clean Water State Revolving Fund (CWSRF), which is administered by the Environmental Protection Agency and other respective state agencies, has provided more than $65 billion and has become the nation’s largest water quality financing source ("Clean Water State Revolving Fund" 2014). The CWSRF, which replaced the Clean Water Act Construction Grants program, provides funding for water quality protection projects for wastewater treatment, nonpoint source pollution control, and watershed and estuary management.

After much research into both alternative grant and loan, and grant/loan combination options, it was concluded that for a project of this scale, with total project costs ranging from $45 to $148 million, that a low-interest loan of this type would be the best option for a town looking to improve water treatment infrastructure while looking to generate economic improvement. Having evolved from a federal grant program, the CWSRF recognizes the need that exists for alternative low-cost financing options for small town and municipalities and therefore operates on a flexible and accommodating repayment schedule which promises to fund the entirety of the implementation process from the initial planning stages through final construction and inspection. The state of Massachusetts, specifically, through such funding programs seeks to provide incentives for small communities to undertake projects with meaningful water quality and public health benefits and which address the needs of the communities and their water supply.

a. Revolving Structure

All 50 states plus Puerto Rico operate and maintain revolving loan funds that provide independent and permanent sources of low-cost financing for a number of water quality infrastructure projects. They operate much like environmental infrastructure lenders and banks capitalized by federal and state contributions, funds that are loaned to the communities and repaid and recycled back into the program to fund future water projects ("How the CWSRF Works" 2014). Building on a federal investment of more than $36.2 billion, the 51 CWSRFs have successfully more than $100 billion in water infrastructure projects, which have helped communities meet environmental standards, protect resources and ensure public health. To date, the CWSRF has assisted a variety of borrowers including, but not limited to: municipalities, farmers, small business owners, and nonprofit organizations ("Clean Water State Revolving Fund" 2014).
b. Clean Water State Revolving Fund (CWSRF) Offerings in Massachusetts

Over the last 25 years, the CWSRF has funded more than 33,320 low-interest loans for water treatment, infrastructure improvement and public health improvement projects. Nationally, interest rates for loans such as these average 1.7 percent, compared to market rates which often average nearly 3.7 percent meaning that projects at the CWSRF rate typically cost 17 percent less than those funded at market rate. CWSRF loans also have the unique ability to finance 100 percent of a project’s cost and provide flexible repayment terms for up to 20 years (“Clean Water State Revolving Fund” 2014).

In Massachusetts, the state CWSRF program is jointly administered by the Division of Municipal Services of the Massachusetts Department of Environmental Protection (MassDEP) and the Massachusetts Water Abatement Trust. Each year, the MassDEP solicits projects statewide municipalities and wastewater districts to be considered for subsidized loans offered at 2 percent interest. Financial assistance is available in the state of Massachusetts for the planning and construction of projects, including, but not limited to: new wastewater treatment facilities and upgrades of existing facilities, Combined Sewage Flow mitigation, infiltration/inflow correction, and nonpoint source pollution abatement projects (“Fund Fact Sheet” 2015). Graphic 9 shows the CWSRF Process steps for securing funding through MassDEP with explanation of the process to follow.

Graphic 9:
During the solicitation period mentioned above, communities seeking funding must complete and submit a Project Evaluation Form (PEF), which MassDEP reviews and uses to rank projects based on a system that assigns points on the basis of various criteria. These criteria include the extent to which the project will eliminate or mitigate a risk to public health, will implement or be consistent with watershed management plans, or is needed to achieve or maintain compliance with applicable discharge permits or other water pollution control requirements, among others. After these forms have been submitted and MassDEP has completed its evaluation, the agency develops and publishes a list of projects it considers to be eligible for funding in the upcoming year. This Intended Use Plan Project List (IUP) lists the projects eligible to apply for loans funding in the coming year. (When taking projects into consideration, the MassDEP makes sure that the total cost of projects that year on the IUP will not exceed the amount of funding available for that year).

Once a project has been listed on the IUP, the borrower (in this case the borrower would be the town of Easthampton) must file a loan application and obtain a Project Approval Certificate from the MassDEP. The loan application must include information regarding the borrower’s repayment ability, funding authorization and project/construction schedule as well as evidence of compliance with any applicable environmental reviews and permits (i.e. NPDES). Once MassDEP has certified that the costs are eligible for funding the CWSRF, the Massachusetts Water Abatement Trust votes to issue the borrower a loan commitment, which commits MassDEP to finance the full eligible cost of the water project. After issuing a Project Regulatory Agreement, the Trust, MassDEP and the borrower enter into a loan agreement, which secures the financing for the project. Following the approval of the Project Approval Certificate, the project must begin within six months ("Fund Fact Sheet" 2015).

IV. Recommendations

A. Further Research

The CWSRF requires a variety of different types of information be submitted and provided to the funding entities both prior to and during the funding process. Specifically for the Massachusetts applications, borrowers are asked to provide information ranging from borrower
information, information regarding repayment ability, construction contracts, project planning and construction costs, etc. While this is information that remains standard in terms of what is asked of each borrower, depending on the scale of the project and where the new infrastructure will be located, project costs, interest rates and contracts may differ.

On a level of environmental concern, the town would need to work with the various firms which will be benefitting from the new water treatment infrastructure to inquire and determine which chemicals and other pollutants each firm is interested in diverting and moving. It is important that in doing so, both the town and the firms comply with all expectations as listed in the necessary and required environmental permits for a project of this nature. Once the project has been deemed to be in compliance, the funding agency will approve the project for financing.

VII. Conclusions

The POPPs system is an innovative tool for encouraging businesses that generate toxic waste to discharge into a centralized, well-designed treatment system, which incorporates a publicly-owned pretreatment plant (POPP). This municipal facility could be extremely advantageous for businesses, towns, and community members. By absorbing the costs for pretreatment and standardizing the pretreatment process in an industrial park, a POPPs system could significantly reduce the price of production for businesses and could provide the sense of stability desired by all production entities. This reduction in overhead costs will encourage businesses to expand into towns in need of economic stimulus, such as Easthampton, where the POPP system can be implemented. Meanwhile, effluent from these companies will be treated with state-of-the-art technology, ensuring the thorough protection of our nation’s treasured waterways. The POPPs system yields job growth for impoverished communities, higher profit margins for businesses, and more stringent protection of at-risk habitats, making this cutting-edge concept an economically feasible, logistically advantageous, and morally admirable solution.

VI. References / Citations / Thank Yous

We would like to extend our sincerest gratitude to Professor Zygmunt Plater, Harry Dodson, and Professor Gabrielle David who provided us with guidance and encouragement throughout our research.
Breakdown of Running Costs of Wastewater Treatment Plant. Adapted

state and selected area, seasonally adjusted.” Washington, D.C.: United States
Department of Labor:

California Environmental Protection Agency State Water Resources Control Board. Application Processes.
(2014, December 24). Retrieved from:
http://www.waterboards.ca.gov/water_issues/programs/grants_loans/srf/docs/forms/application_process.pdf


Massachusetts.html


Retrieved from: http://water.epa.gov/grants_funding/cwsrf/cwsrf_index.cfm

Retrieved from: http://water.epa.gov/grants_funding/cwsrf/basics.cfm

Environmental Protection Agency. Introduction to the National Pretreatment Program. (2011,
June 1). Retrieved from


Fobi, L. “Publicly Owned Pretreatment Plants: A Means of Promoting Industry while
Eliminating the Discharge of Toxic Amounts of Pollutants into the Nation’s Waterways.”
Provided by Professor Zygmunt Plater, January 2015.

Forstater, M. (2015). Working for a better world Cataloging arguments for the right to


Table 10.1 Typical division of investment cost items as proportion of total investment. Adapted from Handbook Biological Wastewater Treatment (Chapter 10), by Adrianus van


Zoning Ordinance: City of Easthampton, Massachusetts. §9.06.