

## **INTERDEPARTMENTAL COMMUNICATION**

Acton Board of Health - Telephone 978-264-9634 - Fax 978-264-9630

April 23, 2004

**TO:** Don Johnson, Town Manager  
**FROM:** Doug Halley, Health Director  
**SUBJECT:** Sewer Expansion

February 21<sup>st</sup> marked the second anniversary of the opening of Acton's Wastewater Treatment Plant and Collection System. These first two years have seen the system work with remarkable efficiency both in wastewater flows and treatment requirements. That efficiency has been matched by the users of the system who continue to discharge a wastewater daily flow below the anticipated design levels. This fact provides an opportunity for the wastewater collection system to be expanded without needing to upgrade the wastewater treatment plant.

Prior to the construction of the sewer system the Sewer Action Committee received a request from Atlantic Management (owner of Powdermill Plaza) and Acton Ford to be included in the sewer service area. At that time their request could not be considered because the potential flows received at the treatment plant could not be quantified.

In November of 2002 Atlantic Management and Acton Ford again approached the Town about the possibility of the sewers expanding to their facilities. After a series of meetings they agreed to provide a gift to the Town to fund a study to determine the feasibility of expanding the sewer and that gift was accepted by the Board of Selectmen. In August of 2003 the study was completed and it was determined that there was sufficient capacity within the treatment plant to accept the wastewater flows from their facilities and that the cost of construction was in the range of \$500,000. The full report was submitted to the Board of Selectmen at their September 5, 2003 meeting.

At this point Atlantic Management and Acton Ford would like to move forward with the design of a sewer extension to their property. They have made a commitment to fund the design and the full construction costs. However, there are several issues that remain open. First and foremost of these issues is the Board of Selectmen's guidance on whether the proposal should move forward to design and construction.

Other issues that remain to be addressed are as follows:

1. A determination must be made regarding the structure and amount of the capital charges and fees the Town would apply to Acton Ford and Atlantic Management for the use of the Wastewater Treatment Facility, connection and use of the collection system and the manner to account expenditures for capital costs attributed to design and construction of the proposed pump station and force main. Atlantic Management has stated a willingness to build a proposed pump station to a capacity that would allow additional properties along Powdermill Road to connect.
2. A decision must be made on whether to construct the force main from the pump station to the treatment plant within the public way or to place it entirely on private property. This decision impacts which properties would have legal access to the sewer and also impacts the design regarding physical access to the sewer.
3. A decision must be made on whether to notify and poll other commercial properties in the area to determine if they see a future benefit in connecting to the proposed pump station.
4. If the pump station is designed for future capacity and if the design provides for access for properties between the pump station and the treatment plant a decision must be made on what credit Atlantic Management and Acton Ford would receive and in what manner they would be compensated.
5. An examination must be made on whether a gift should be given to the town to design and construct the sewer extension and that the work would proceed through the full public bidding process or if Atlantic Management and Acton Ford should do the design and construction privately and then gift the finished product to the town.

The Health Department has reviewed this proposal fully and would recommend that the Selectmen accept the proposal and direct the applicants to proceed to design, permit approval and construction. This recommendation is based on the following considerations:

1. Woodard & Curran's feasibility study has identified an unused capacity of 60,000 gallons per day at the wastewater treatment plant. This additional capacity has been identified as actual flows received at the treatment plant have been compared to the flows originally anticipated. The future peak flow of 5,000 gpd for Atlantic Management and Acton Ford are well within the identified additional capacity.
2. The initial phase of the Comprehensive Wastewater Resources Management Plan has identified the Powdermill Plaza and surrounding properties as an area of concern. While the second phase of the plan (identifying solutions for areas of concern) has not been completed it appears evident that the only solution for this area would be connection to the existing sewer system.
3. The Powdermill Plaza owned and operated by Atlantic Management currently has a small treatment plant that discharges into the Assabet River. The permit

- requirements for the plant are currently being reviewed by EPA and are likely to be extremely more restrictive than the present requirements. Both EPA and DEP have approached the Town and expressed their support of abandoning the current treatment plant and bringing a sewer extension to this property.
4. Both Atlantic Management and Acton Ford have made commitments to fully fund the design, permitting and construction of the sewer extension. They have also expressed interest in providing additional capacity in their design as compensation for their fair share of the capital costs expended in building the treatment plant.
  5. Due to wastewater flows from properties connected to the sewer being lower than predicted the O&M costs for residential properties remains higher than expected. Extending the sewer to commercial properties will help reduce the sewer rate for the residential properties currently connected to the sewer.

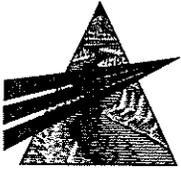
As part of this recommendation the Health Department would advise that the issues identified above be addressed in the following manner:

1. The Town hired Dufresne-Henry to review Woodard & Curran's feasibility study and to analyze potential betterment charges. This study found that the potential capital cost for constructing the sewer extension exceeded the potential betterment charges for Atlantic Management and Acton Ford. Based on this study it is recommended that the capital charges be accepted as the betterment payment.
2. Placing the force main on private property instead of the public way may delay the project as well as increase the cost of construction. Negotiating with the owners of the properties necessary to keep the force main on private property will take time and likely require compensation to the property owner. Based on those concerns the Health Department recommends that the force main be placed in the public way and that the applicants pay for the cost of installing the force main as part of their compensation for the right to use the treatment plant. In addition, it is recommended that the three private properties that are impacted by this decision not be charged an immediate betterment but are charged a demand fee equal to the betterment cost when and if they connect to the sewer.
3. The Health Department recommends that the proposed pump station be designed and constructed to accept the flows from the needs area on Powdermill Road as identified by the Comprehensive Wastewater Resources Management Plan. Notification and polling of the commercial properties impacted should be conducted but their potential connection should be considered separate from the present proposal.
4. Design and construction of a pump station capable of handling the potential wastewater flow of the needs area will be the responsibility of Atlantic Management and Acton Ford as part compensation for the right to use the treatment plant.
5. Advice from Town Counsel indicates that it would be prudent to continue and finish this proposal as a public bid project funded by gifts received from Atlantic Management and Acton Ford. It is highly unlikely and most likely

impossible to structure the actual construction as a gift without going through the appropriate bid process. Based on this it is recommended that the public bidding process be complied with.

Should the Selectmen agree with these recommendations the next step would be for the Town Manager to negotiate with Atlantic Management and Acton Ford a comprehensive agreement for their inclusion into the sewer service area. Once that agreement has been outlined it can be brought back to the Board for final approval. While that work is being done the Town should also meet with state regulators to present the justification to expand the sewer collection system without exceeding the permitted daily flow.

Attached with this memo are the final feasibility study conducted by Woodard & Curran and the follow-up report completed by Dufresne-Henry. Should you have any questions regarding this information please contact me.



September 12, 2003

Doug Halley, Director of Health  
Board of Health  
Town of Acton  
472 Main Street  
Acton, MA 01720

SEP 15 2003

RE: Final Letter Report  
Feasibility Study for Sewer System Expansion  
Acton, Massachusetts

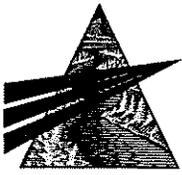
Dear Mr. Halley:

We are pleased that the Acton Selectmen chose to approve the Draft Letter Report on the Feasibility Study for adding the commercial properties located at the intersection of High Street and Massachusetts Avenue (Powdermill Plaza and Acton Ford, but not the Concord Rental Center) to the Acton sewer collection system and are happy to issue the Final Letter Report. This Final Letter Report includes comments on the Draft from the Town of Acton and Powdermill Plaza management. Input was solicited from but not received from Acton Ford, therefore the sections regarding Acton Ford have remained the same from the Draft Report. This report does not detail every required task, nor does it guarantee the commercial properties may join the sewer collection system, but it identifies those issues that Woodard & Curran (W&C) sees as the key concerns and tasks to be considered if the commercial properties are to connect to the sewer collection system. This study entails the preliminary assessment into the technical, regulatory, and construction components required for sewerage these commercial properties.

#### Technical Issues

W&C has reviewed the expected average daily and peak daily flows from the commercial properties. We have reviewed Powdermill Plaza's wastewater treatment facility (WWTF) flow and waste characteristics data from February 2000 to March 2003 and summarized this information in the table below. We have also reviewed Acton Ford's water meter readings for the past three (3) years and assumed their waste quality is typical for a sanitary sewer collection.

The Powdermill Plaza average daily flow based upon the data is 1,750 gallons per day (gpd) while the existing Powdermill Plaza WWTF has a Massachusetts Department of Environmental Protection (MADEP) discharge permit limit of 12,000 gpd. The actual peak daily flow according to the data is approximately 2,800 gpd while the existing Powdermill Plaza WWTF is permitted for 24,000 gpd peak daily flow. The flows at the WWTF are significantly lower than the permitted limits and we have confirmed with the Powdermill Plaza's management that the existing water use is representative of the maximum future usage since no expansion or use change is anticipated. Due to this fact and the historic peak daily flow of 2,800 gpd, we have assumed a future peak daily flow of 4,000 gpd for the purposes of discussion and conceptual design.



Acton Ford's water consumption, and subsequent assumed wastewater generation, has been averaged between 600 and 700 gpd over the past 3 years based upon water meter records. Assuming the facility does not expand, an estimated peak daily flow of 1,000 gpd is reasonable for the purposes of discussion and conceptual design.

The waste characteristics for Powdermill Plaza, based upon the historic monthly data, are within typical ranges. The waste characteristics from Acton Ford are expected to be typical of standard sanitary waste since the Town of Acton does not allow industrial or process waste, such as oil, solvent, or lubricants, into the Acton sewer system. Therefore, existing oil/water separators and floor drain systems at both Acton Ford and Powdermill Plaza are assumed to be properly maintained to separate out these products.

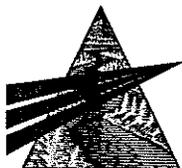
A summary of the influent flows and loadings based upon this analysis at the Powdermill Plaza and at Acton Ford are as follows:

	<b>Powdermill Plaza</b>	<b>Acton Ford</b>
Current Average Daily Flow	1,750 gpd	680 gpd
Historic Peak Daily Flow	2,800 gpd	825 gpd
Estimated Future Peak Daily Flow	4,000 gpd	1,000 gpd
Average Biochemical Oxygen Demand (BOD)	922 mg/l	300 mg/l*
Average Total Suspended Solids (TSS)	244 mg/l	300 mg/l*

\*Based upon typical value due to site specific information not being available.

The Acton WWTF is a 250,000 gpd average daily flow Sequence Batch Reactor (SBR) facility, with a 500,000 gpd peak daily flow permit limitation via Groundwater Discharge Permit GW#0-656-T#W003143. The specific discharge limitations of the permit are as follows:

- Biochemical Oxygen Demand (BOD), 5 Day, 20 C = 20 mg/l
- Total Suspended Solids (TSS)= 20 mg/l
- Oil and Grease = 15 mg/l
- Fecal Coliform = 200 org/100 ml
- Total Nitrate-Nitrogen = 10 mg/l
- Total Nitrogen (TKN + NO<sub>3</sub> + NO<sub>2</sub>) = 10 mg/l
- Total Phosphorus
  - 0.5 mg/l maximum daily limit until facility reaches 125,000 ADF or March 1, 2004, whichever is sooner;
  - thereafter, 0.2 mg/l average monthly limit with a 0.5 mg/l maximum daily limit.



In order to meet these effluent characteristics the Acton WWTF contains the following process capabilities and equipment:

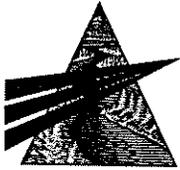
- Influent screening
- Grit removal
- SBRs and associated components
  - Chemical Feed Systems
  - Aeration System
  - Pre and Post -Equalization
- Filtration via cloth media
- Ultraviolet (UV) Disinfection
- Sludge handling and disposal
- Process Instrumentation and Controls via a SCADA system

Effluent from the Acton WWTF is pumped to one of six rapid infiltration basins (RIBs) located adjacent to the facility on Adams Street near High Street (1,000 feet north of Acton Ford). Discharge from the facility is controlled via a flow distribution vault on the RIBs site where the effluent is routed to the "active" basin.

The Acton WWTF has been operating since February 2002. The facility services approximately 15% of the Town of Acton (the Town), which equates to approximately 920 residences. The flow for those 920 residences, based upon Title 5 estimates prepared during the design and permitting of the WWTF and sewer collection system, was 250,000 gpd. It is this 250,000 gpd average daily flow limit that defined the extent of the sewer collection area and the Town was not permitted to add more than the 920 connections due to the potential of allowing more than 250,000 gpd average flow into the facility.

Since the WWTF started-up in February 2002 and the actual flows have been less than the Title 5 estimated flows. In reality, now that approximately 330 services have been connected, it is clear that the Title 5 estimated flows are very conservative. Figure A compares the expected flows based upon the Town's database of users connected as of June 30, 2003 versus the actual average daily flow being received at the facility on a week-by-week basis since February 2002. As illustrated in Figure A, the expected flows, as based upon Title 5 estimates, are conservative and actual flows have been 25 to 40% lower. For example, in the month of June 2003 the estimated Title 5 flow was 162,000 gpd while the actual daily flow from ranged from 74,190 gpd to 115,540 gpd with an average daily flow of 89,200 gpd for the month.

In summary, the limiting factor for the number of connections to the Acton WWTF is the facility capacity of 250,000 gpd which equates to 920 connections based upon conservative Title 5 estimates. However, actual numbers at this time illustrate that approximately 60,000 gpd of capacity exists. This 60,000 gpd or a portion thereof could be utilized by new connections without the potential of allowing more than 250,000 gpd average daily flow into the facility or preventing any of the preexisting 920 approved service connections from flowing into the system.



The combined average daily flow of Powdermill Plaza and Acton Ford, based on current flows, is 2,610 gpd. The estimated combined future peak daily flow is 5,000 gpd. Both of these flows are within the 60,000 gpd available capacity of the facility. Based upon this analysis, sufficient capacity exists at the Acton WWTF to accept average and peak daily flows from Powdermill Plaza and Acton Ford.

Currently the influent loadings and effluent characteristics at the Acton WWTF are within the following ranges:

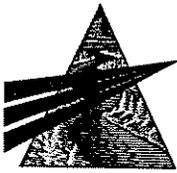
	<b>Typical Influent Range</b>	<b>Average Influent Concentration</b>	<b>Permitted Effluent Concentration</b>	<b>Average Effluent Concentration</b>
BOD (mg/l)	240 – 310	250	30 or below	Below 5
TSS (mg/l)	70 – 260	200	30 or below	Below 5
Ammonia Nitrogen (mg/l)	15 – 50	40	10 or below	Below 5
Phosphorus (mg/l)	5 – 10	7	0.5 or below	Below 0.2

The potential impact of the Powdermill Plaza and Acton Ford loading on the Acton WWTF are not significant. The facility is operating well within its design parameters and is consistently meeting permit limits for effluent quality. The additional BOD and TSS will not adversely affect the WWTFs ability to meet discharge permit limitations in the future. In fact, the increased BOD load is expected to aid the biological phosphorus removal process.

### Conveyance System

Three conveyance system options were conceptually reviewed prior to forming a recommendation for the connection of the two commercial properties. Each of the three options had advantages and challenges, and each had factors that were more beneficial to either commercial property. The alternatives were reviewed for factors making a best fit scenario. The screening criteria for reviewing alternatives include the following:

- Need for land ownership versus easements or land purchase;
- Need to remove and replace existing sewers and to bypass pump wastewater to keep the Powdermill Plaza and Acton Ford open during construction;
- Ease of constructability without impacting business operation (vehicle and pedestrian traffic, etc.) of the plaza or Acton Ford;
- Maximum use of existing infrastructure to reduce possible capital costs;
- Maximum future use by others (ease in other commercial properties in the area connecting)
- Meeting Town and industry standards for pumping and conveyance systems (Figure B is a conceptual sketch of the Town of Acton standard submersible pumping station)



A brief summary of each of the three scenarios for collection and conveyance systems are detailed below.

Scenario 1: Converting the existing Powdermill Plaza WWTF into a Pumping Station

This scenario consist of converting the existing tankage and pumps at the Powdermill Plaza WWTF into a pumping station while adding infrastructure to allow Acton Ford to flow to the existing Powdermill Plaza collection system and a force main to connect the pumping station to the Acton sewer collection system on Adams Street.

One key advantage to converting the existing Powdermill Plaza WWTF into a pumping station is that all of the existing sewers from the plaza already flow to the WWTF therefore no existing sewers would need to be removed and replaced at the plaza. Another key advantage is the existence of 3 phase power and a telephone service connection which may be utilized. However upon review of the existing WWTF equipment and layout it is clear that the existing wetwell outside the facility (in front of the access door) does not have sufficient capacity to store the required volume of incoming waste nor are the existing pumps (Myers WG20 pumps) sufficient to pump the wastewater up to Adams Street. These are both strong disadvantages. Although Powdermill Plaza owns the property and therefore no land acquisition is necessary and easements are assumed to be easily obtained, a majority of the equipment and tankage inside the Powdermill Plaza WWTF is not useable for the purposes of creating a pumping station.

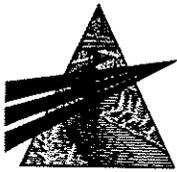
If the Powdermill Plaza WWTF were to be converted into a pumping station, Acton Ford would be required to convey their wastewater flow into the plaza gravity flow system (most likely behind Dunkin' Donuts) or to pump into the proposed force main in High Street. The more appropriate option appears to be for Acton Ford to pump into the plaza gravity flow system because it will allow Acton Ford to utilize lower power pumps and lower discharge pressure pumps. It will also allow Acton Ford the ability to perform this connection to the sewer system after the plaza has completed their conversion as opposed to concurrently.

Due to the inability to reuse the tankage and pumps at the Powdermill Plaza WWTF, this scenario is now recommended and a cost analysis was not performed.

Scenario 2: Create a new pumping station on High Street near the Powdermill Plaza driveway

This scenario consists of building a new submersible type pumping station that meets the Town standards, on the west side of Powdermill Plaza in the grass area adjacent to the plaza driveway on High Street and to have Acton Ford flow across High Street via a gravity collection system. Powdermill Plaza shall maintain their existing influent pumps and wetwell outside their facility (in front of the access door) and pump through a new 2-inch force main into the pumping station. The pumping station would then pump the wastewater up High Street to Adams Street. Figure C illustrates Scenario 2.

The advantages of this scenario include reducing impacts to plaza operation and traffic flow, since it will not need to remove and relay sewer pipes, eliminating the need for the plaza to install a by-pass pump wastewater during construction, allowing Acton Ford to have a gravity



service connection and eliminate the need to pump effluent into the septic field, and the pumping station location is more accessible to future users in the area.

The new pumping station may be located in the grass strip at the plaza driveway just outside the 100 foot (ft.) jurisdiction of the Acton Conservation Commission. It appears that Acton Ford could reach this station via gravity flow by crossing under High Street with an 8-inch service pipe.

A business decision that must be made by Powdermill Plaza is whether to keep the existing influent pumping station at their WWTF and reroute the force main to the new pumping station. The existing Myers WG20 pumps have sufficient capability to pump through 900 feet (ft.) of 2-inch force main and currently have a control and alarm system inside the Powdermill Plaza WWTF which must be maintained or relocated. However, the wetwell does not meet Acton's industry standards for pumping station storage therefore; the Town of Acton may not chose to take over the responsibility and maintenance for these influents pumps. If Powdermill Plaza wanted to flow to the new pumping station by Gravity, approximately 800 ft. of existing sewer collection system at Powdermill Plaza would have to be reinstalled to flow away from the plaza WWTF toward High Street. Most of this construction would be behind the plaza with the exception of the sewer service from the remote building (currently an eye doctors office) which may need to be rerouted across the parking lot to minimize elevation impacts on the rerouted sewers or to have an individual grinder pumping station installed.

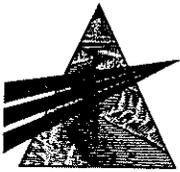
Another key advantage to this pumping station location is that it is more accessible to the remaining Town of Acton properties in this section of Town. The town lines with Concord and Maynard limit the number Acton properties in the area and many properties would be required to flow or pump under the Assabet River on Powdermill Road; however the location on High Street is significantly more accessible than behind Powdermill Plaza at the existing WWTF.

#### Scenario 2 Conceptual Cost Estimate

The Design and Construction component of the project has been subdivided into three segments for the conceptual cost estimate:

1. The Powdermill Plaza property service effort;
2. Acton Ford gravity service and pump & tank decommissioning effort.
3. The pumping station, force main and High Street effort;

Figure C illustrates the Scenario 2 conceptual collection and conveyance system.

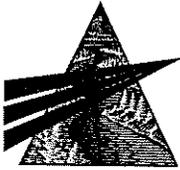


Program level costs for this scenario are as follows:

<u>Direct Costs</u>	Conceptual Unit Cost	Estimated Quantity	Conceptual Extended Cost
<b>Powdermill Plaza Property effort</b>			
Force Main (LF)	\$25	900	\$22,500
Special Manholes (Ea)	\$4,000	1	\$4,000
Trench Paving (SY)	\$8	600	\$5,000
Decommission Existing WWTF & Reuse of Influent Pumps & Wetwell	\$10,000	1	\$10,000
Powdermill Plaza Property		Subtotal:	\$41,500
<b>Acton Ford effort</b>			
Gravity Service Connection (LF)	\$60	100	\$6,000
Manholes (Ea)	\$3,000	1	\$3,000
Decommission Existing Septic System	\$3,000	1	\$3,000
Acton Ford Property		Subtotal:	\$12,000
<b>High Street Effort</b>			
Pumping Station (Ea)	\$160,000	1	\$160,000
Force Main (LF)	\$30	1,400	\$42,000
Trench Paving (SY)	\$8	1,200	\$9,500
Overlay Paving (SY)	\$4	7,500	\$30,000
Remove & Relay Watermain (LF)	\$80	50	\$4,000
Remove & Relay Drain Pipe (LF)	\$30	35	\$1,000
High Street Effort		Subtotal:	\$246,500
<b>Direct Construction Costs</b>		<b>Subtotal:</b>	<b>\$300,000</b>
 <u>Indirect Costs</u>			
Permitting, Design & Construction Engineering (30%)			\$90,000
Administration (Police, Financing, Legal, & Town fees) (5%)			\$15,000
Land Acquisition & Easements (0%)			\$0
Contingency (15%)			\$45,000
<b>Indirect Costs</b>		<b>Subtotal:</b>	<b>\$150,000</b>
<b>Scenario 2 Total Conceptual Project Cost:</b>			<b>\$450,000</b>

Assumptions on Scenario 2 conceptual costs

- The pumping station \$160,000 cost estimate is based upon bid costs for Town of Acton's Pumping Station #6 and #8 and the station have future capacity for other properties in the area but a starting peak daily flow of 5,000 gpd. Conceptual costs should be revised once actual equipment is selected. For example, currently undetermined equipment which will impact cost include permanent auxiliary power generator, odor control pumps and manner of installation (public bid with state wages or private installation)



- Pumping station wet well shall be set at a depth to allow Acton Ford to be serviced by gravity, and potential future Powdermill Plaza gravity service.
- Powdermill Plaza shall maintain private operation of their existing influent pumping station at the existing WWTF and only inactive processes at the WWTF shall be decommissioned. If the Town of Acton chooses to take-over ownership of these pumps, system upgrades may be required and those costs are not included herein.
- Buried pipe installation, such as sewers and force mains, assume no ledge shall be encountered on the selected route.
- On High Street 50 LF of water main relocation and 35 LF of drainage pipe relocation have been included in the estimates to account for the possibility of encountering these existing utilities during construction.

### Scenario 3: Create a New Pumping Station Adjacent to the Existing Powdermill Plaza WWTF

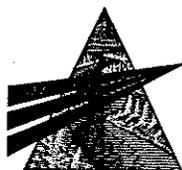
This scenario consist of building a new submersible type pumping station that meets the Town standards, next to the existing Powdermill Plaza WWTF and to have Acton Ford pump across High Street into the plaza gravity collection system. The pumping station would pump into a 3 or 4-inch force main back across the Powdermill Plaza property and up High Street to Adams Street. Figure D illustrates Scenario 3.

The advantages of this scenario include minimizing impacts to plaza operation and traffic flow, no need to remove and relay existing sewer pipes, eliminating the need for the plaza to install a by-pass pump wastewater during construction, since the new pumping station influent pipe can be connected in less than 1 day, and reusing of the existing power and telephone connections. It will also allow the reuse of a portion of the existing WWTF building for storage of an auxiliary power generator and chemical feed systems for odor control, if required.

The disadvantages of this scenario include the fact that the location may limit other properties in the area from reaching the pumping station via gravity and it may require other properties to obtain easement from Powdermill Plaza for access. Another disadvantage is that Acton Ford must pump their existing wastewater to the Powdermill Plaza gravity system and heavily modify their existing system.

Acton Ford has a relatively new septic system consisting of a 2,500 gallon septic tank, a 1,500 pump chamber containing two Myers SRM4 effluent pumps, and a leaching field that receives the discharge from the Myers pumps. Currently Acton Ford wastewater flows by gravity to the septic tank.

A pumping station behind Powdermill Plaza will require Acton Ford to change the existing pumps to grinder type pumps and modify the tanks. Acton Ford would be required to change their existing Myers SRM 4 pumps with Myers grinder pumps, or equal, because these pumps can grind and pump solids whereas the existing Myers SRM4 pumps pump effluent (liquid) only. For suitable long term storage, the 2,500 gallon septic tank and 1,500 gallon pump chamber may be combined by adding two connection pipes of 12 to 18-inch diameter at the invert (bottom) of



both tanks. This would allow both tanks to act a single 4,000 gallon tank and allow solids to flow toward the proposed grinder pumps located in the sump of the pump chamber (see Figure E for a conceptual sketch).

If the existing Myers SRM4 pumps are replaced with new grinder pumps only the 2-inch discharge piping exiting the effluent chamber may be reused. Grinder pumps that macerate any solids prior to pumping have larger power requirements and typically discharge into 1 to 1 ¼-inch piping (since the solids have been macerated) therefore the discharge piping from the pump will have to increase from 1 or 1 ¼ inch diameter pipe to the 2 inch piping currently existing the effluent tank. Grinder pumps also typically have a different configuration, or “footprint”, than effluent pumps therefore a majority of the existing pump equipment mounted on the floor of the pump chamber would most likely have to be replaced.

The 2-inch force main currently exiting the effluent tank may be rerouted to cross High Street and a portion of the Powdermill Plaza parking lot to an existing manhole behind Dunkin’ Donuts. At this point the 2-inch diameter force main can discharge and the Acton Ford wastewater will flow by gravity to the proposed Powdermill Plaza pumping station.

Scenario 3 Conceptual Cost Estimate

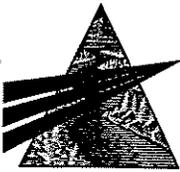
The Design and Construction component of the project has been subdivided into three segments for the conceptual cost estimate:

1. The Powdermill Plaza property service effort;
2. Acton Ford force main and pump and tank modification effort.
3. The pumping station, force main and High Street effort;

Figure D illustrates the Scenario 3 conceptual collection and conveyance system.

Program level costs for this scenario are as follows:

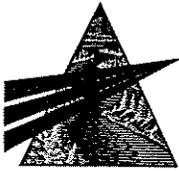
<u>Direct Costs</u>	<u>Conceptual Unit Cost</u>	<u>Estimated Quantity</u>	<u>Conceptual Extended Cost</u>
Powdermill Plaza Property effort			
Gravity Sewer (LF)	\$60	50	\$3,000
Manholes (Ea)	\$3,000	1	\$3,000
Trench Paving (SY)	\$8	60	\$500
Decommission Existing WWTF	\$15,000	1	\$15,000
Powdermill Plaza Property Service		Subtotal:	\$21,500
Acton Ford effort			
New Pumps and Reconfigured Tanks	\$20,000	1	\$20,000
Small diameter force main	\$15	300	\$4,500
Acton Ford Property		Subtotal:	\$24,500



<u>Direct Costs</u>	Conceptual Unit Cost	Estimated Quantity	Conceptual Extended Cost
<u>High Street Effort</u>			
Pumping Station (Ea)	\$160,000	1	\$160,000
Force Main (LF)	\$30	2,200	\$66,000
Trench Paving (SY)	\$8	2,000	\$16,000
Overlay Paving (SY)	\$4	7,000	\$28,000
Remove & Relay Watermain (LF)	\$80	50	\$4,000
Remove & Relay Drain Pipe (LF)	\$30	35	\$1,000
	High Street Effort	Subtotal:	\$275,000
	<b>Direct Construction Costs</b>	<b>Subtotal:</b>	<b>\$321,000</b>
 <u>Indirect Costs</u>			
Permitting, Design & Construction Engineering (30%)			\$96,500
Administration (Police, Financing, Legal, & Town fees) (5%)			\$16,000
Land Acquisition & Easements (0%)			\$0
Contingency (15%)			\$48,500
	Indirect Costs	Subtotal:	\$161,000
	<b>Scenario 3 Total Conceptual Project Cost:</b>		<b>\$482,000</b>

Assumptions on Scenario 3 conceptual costs

- The pumping station \$160,000 cost estimate is based upon bid costs for Town of Acton's Pumping Station #6 and #8 and the station have future capacity for other properties in the area but a starting peak daily flow of 5,000 gpd. Conceptual costs should be revised once actual equipment is selected. For example, currently undetermined equipment which will impact cost include permanent auxiliary power generator, odor control pumps and manner of installation (public bid with state wages or private installation)
- The Acton Ford 2-inch diameter force main will be in the same trench from High Street to behind Dunkin' Donuts as the Powdermill Plaza force main and left capped and dry. Acton Ford then will finish the connection at High Street and at an existing manhole behind Powdermill Plaza at some future date.
- Buried pipe installations, such as sewers and force mains, assume no ledge shall be encountered on the selected route.
- On High Street 50 LF of water main relocation and 35 LF of drainage pipe relocation have been included in the estimates to account for the possibility of encountering these existing utilities.



### Recommended Conceptual Collection and Conveyance System: Scenario 2

Scenario 2 is the recommended alternative as a best fit for all stakeholders in the process. The factors that were advantageous and made Scenario 2 the recommendation are:

- Lower conceptual total project cost;
- Minimize impacts to the Powdermill Plaza and Acton Ford operation and traffic flow;
- Eliminates the need for the Powdermill Plaza or Acton Ford to install a by-pass pump wastewater during construction;
- Acton Ford has a gravity service connection and eliminates the need to pump effluent into the septic field;
- Achieved town of Acton and industry standards;
- The pumping station location is more accessible to future users in the area.

The recommended pumping station is a submersible type similar to the existing Town of Acton Pumping Station #6 on Railroad Street. The pumping station would consist of the below listed components and equipment and Figure B is a typical pumping station layout:

- 8 ft. diameter concrete wetwell for storage of wastewater;
- Two (2) submersible pumps within the wetwell; 40-50 gpm for this application;
- Masonry block building to house electrical system and process controls
- Auxiliary generator (internal to building, external on a slab with enclosure or pigtail connection for portable power) with appropriate transfer switch;
- Ultrasonic level controls and secondary mechanical float bypass system for pump operation;
- Process instrumentation and controls via a SCADA system utilizing the Town's I-Net system and a dedicated line connection to the Town WWTF.

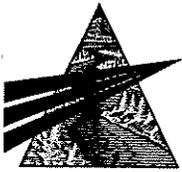
The detailed design of the pumping station must factor existing flows from Powdermill Plaza and Acton Ford with future flows to the station. Given the estimated future peak daily flow of 5,000 gpd and the possible peak daily flows from the remaining properties in the area, design considerations such as a partitioned wetwell and two separate sized pumps may have to be considered during the detailed design to ensure proper operation.

### Regulatory Components

A key factor in the potential connection of these commercial properties to the Acton WWTF is the required regulatory approvals to authorize the connection, the construction, and the decommissioning of the existing WWTF. The regulatory components have been divided into state/federal and Town of Acton discussions.

### State & Federal Permits

A MADEP Bureau of Resource Protection Water Pollution Control Sewer Connection/Extension permit shall be required. The expected permit shall be the MADEP Minor Sewer



Extension/Sewer Connection with Pump Station (MADEP code MADEP WP 14). This permit is applicable for sewer discharges where the extension is under 2,500 ft. and where flows are less than 50,000 gpd, or where there is a connection with a pumping station. This proposed project satisfies all three of these criteria. The permit application consists of a MADEP form to be completed by the Engineer and signed by both of the Owners and Town. In addition, the permit application requires the submittal of 95% complete design drawings for the pumping station and piping system. The permit application fee is currently \$435 and the approval MADEP published schedule is as follows, although in our experience we have found approval typically requires less time:

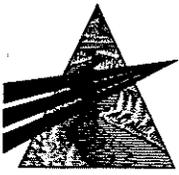
<u>Activity</u>	<u>Max Duration</u>
Administrative Comment Period	30 days
Technical review #1	90 days
Technical review #2 (if necessary )	90 days
Public Comment Period	<u>90 days</u>
Total Duration*	300 days

\* In our experience with pumping stations of this size and complexity we have achieved permit approvals in as little as 90 days. 300 days is not a typical approval duration.

The key challenge to the Sewer Connection/Extension Permit shall be giving a clear explanation of the existing capacity at the Acton WWTF and justifying why the commercial properties should be allowed to connect. The Town will have to document that by allowing the commercial properties to connect, they are not precluding residential users who are currently in the sewer collection area but who have yet to connect, from someday connecting. The Town must also establish the available capacity created by the difference between the estimated flows used in the original Sewer Connection/Extension permits filed for the Middle Fort Pond Brook Sewer Project and the actual flows being received. Figure A provides a graphic justification for the Town's use in these discussions with the MADEP.

Another key issue from a State regulatory perspective is whether the project triggers a Notice of Project Change to the original MEPA Certificate issued on the Middle Fort Pond Brook Sewer Project. A Notice of Project Change is required whenever there is a "significant" material change (positive or negative) on a project prior to the taking of all agency action for the project. The definition of "significant" is the key factor and typically includes the following changes:

1. Expansion in the physical dimension of a project 10% or more
2. Increase in the level of impacts previously reviewed of 25% or more
3. Meeting or exceeding any review threshold that was not previously met or exceeded
4. Changing of expected dates of the project
5. Changing project site
6. New application for a permit or new request for financial assistance or land transfer
7. Any change that prevents or materially delays the realization of the intended environmental benefits.



Based upon these definitions of "significant" the addition of Powdermill Plaza and Acton Ford to the Acton sewer system does not appear to trigger a Notice of Project Change. The additional flow to the system is a peak of 5,000 gpd, or about 2% increase on peak days; and the added 2,200 LF of pipe is likewise and insignificant increase. The MEPA office should be contacted to confirm that item 5, change of project site does not apply to the extension of a collection system in a roadway where it already exists, and that the proposed project does not institute a "project change" as defined under MEPA. If additional commercial properties in the area are added to the project, there is a possibility that a "significant" change may be interpreted, but at this time it is our belief that a MEPA Notice of Project Change is not required to service Acton Ford and Powdermill Plaza.

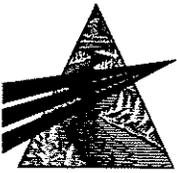
We have confirmed with both the MADEP and the Environmental Protection Agency (EPA) that no state or federal permits are required to decommission an existing WWTF or to surrender an existing discharge permit, however both the MADEP and the EPA request a formal letter from the Owner indicating why and when the facility is being decommissioned and a discussion of where the wastewater is now being treated.

#### Local Permits

A number of permits will have to be obtained from the Town of Acton during design and prior to construction. These permits are expected to be:

Sewer System Connection Approval – Issued by Board of Health - This permit will be prepared in parallel with the MADEP Sewer Connection/Extension permit described above. The Town will issue the approval prior to signing the MADEP Sewer Connection/Extension permit application. Acton's current Application and inspection charge is \$150 for commercial establishments.

Notice of Intent Application / Order of Conditions – Issued by Conservation Commission-A Notice of Intent (NOI) application will have to be filed with the Town because approximately 540 ft. of the proposed force main behind the building shall be within 100 ft. of a resource area (wetland) under the protective jurisdiction of the Acton Conservation Commission. An NOI is filed with both the MADEP and the local Conservation Commission, but it is administered, reviewed and approved at the local level. The NOI is a MADEP standard form that requires site layout design drawings with sufficient information to establish the limit of the resource area and illustrate the intended impacts, if any, on that resource area. The NOI application fee can be expected to range from \$500 to \$1,200 and is based upon the magnitude of the impacts on the resource area. A typical NOI approval duration is 2 to 3 months for a project this size and requires a public hearing. The approval of the NOI is called an Order of Conditions. The Order of Condition stipulates the Town standard requirements for work adjacent to a resource area and will include any project specific tasks discussed during the public hearing.



Permit to Work in the right of Way (“Road Opening Permit”) – Issued by Acton Highway Department - A permit to work in the High Street right-of-way must be applied for and received prior to the initiation of construction. The permit fee is \$50.00 and a bond, of sufficient value to cover cost of repair(s) to the roadway in case of contractor default, is expected to be required. The bond is to ensure the roadway is returned to preconstruction conditions. If a contractor defaults on the work or does not perform to the Towns standards for roadway repair, the Town collects on the bond to cover their costs of repair. The Road Opening Permit is easily acquired through the Town Engineer and the bond is typically the responsibility of the selected contractor..

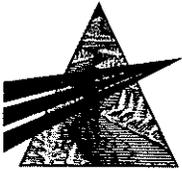
Acton Water District Notification - A formal permit from the Acton Water District is not required for the work; however the Water District has a 12-inch water transmission main from the Assabet Well in High Street. The proposed force main will be separated by a minimum of 10 ft. from the existing water main but it will be buried in the ground parallel to the water main for approximately 500 ft. If the Assabet Well water main had to be taken off line, or the pipes were accidentally broken, the Acton Water District will be challenged to provide sufficient water to service the Town and damage from the water lost during the break could be significant. Due to these concerns we recommend that the Acton Water District be notified of the project.

Town of Acton Easement for Pumping Station and Force Main - It is Town of Acton policy that all wastewater infrastructures under their ownership and control be located on and inside permanent easements which allow the Town access for operation, maintenance and monitoring of their infrastructure. If the Town is to own and operate the Powdermill Plaza pumping station easements must be granted to the Town. Typically the easements have been of sufficient size for pumping stations and buildings and 20 ft. wide over the length of piping, in this case force main, in the ground. The owners of Powdermill Plaza must arrange an easement agreement with the Town of Acton.

### Conclusions & Recommendations

Sufficient capacity exists at the Acton WWTF to handle the Powdermill Plaza and Acton Ford existing average daily flow of 2,610 gpd, future peak daily flow of 5,000 gpd, and the associated waste load characteristics. The additional BOD and TSS waste load will not adversely affect the WWTF's ability to meet discharge permit limitations in the future.

Several feasible scenarios exist to provide a collection and conveyance system from lower High Street area up to Adams Street and the Town of Acton sewer collection system. W&C recommend what is detailed herein as Scenario 2, which involves building a new submersible type pumping station on the west side of Powdermill Plaza, in the grass area adjacent to the plaza driveway on High Street, and to have Powdermill Plaza pump into the station via their existing influent pumps at their WWTF and to have Acton Ford flow across High Street via a gravity collection system into the station. Figure C illustrates Scenario 2.



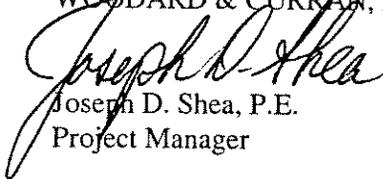
Recommendations:

- The Town of Acton to meet with state regulators to present the justification to expand the Acton sewer collection system without exceeding the permitted average daily flow or limiting any of the preexisting 920 approved connections.
- The Town of Acton, Powdermill Plaza and Acton Ford meet to discuss the conclusions from this report and determine a plan and schedule to move forward. Included in that plan should be cost sharing amongst the commercial properties and fees to be collected by the Town. The limits of private versus public sewer infrastructure and expected easements should also be discussed.
- Town of Acton to formally contact the other commercial properties in the area to determine the probability of their future connection into the pumping station. This data will be used in the pumping station design as well as financial models for capital outlay on behalf of the Acton Ford and Powdermill Plaza.
- All partners discuss schedule and timing of the project in order to determine when any design work should initiate. For one example, one key factor is season sensitive work, such as identifying wetlands, which should be initiated prior to winter.

We appreciate the opportunity to support the Town with this Final Letter Report and are available to assist with the next set of task moving forward. If you have any questions or comments, please do not hesitate to contact our office.

Very truly yours,

WOODARD & CURRAN, INC.

  
Joseph D. Shea, P.E.  
Project Manager

JDS/lis  
Project 212553

Enclosures

cc: Anthony Capobianco, Founder, Atlantic Management  
David Abatsis, Vice President, Acton Ford  
Helen Priola, Senior Vice President, Woodard & Curran  
Frank Cavaleri, Vice President, Woodard & Curran  
James Gagliard, Plant Manager, Woodard & Curran

FIGURE A

Town of Acton, MA  
T5 Estimated Flows vs Actual Flows  
Compared with Number of Weekly Connections to the Sewer System

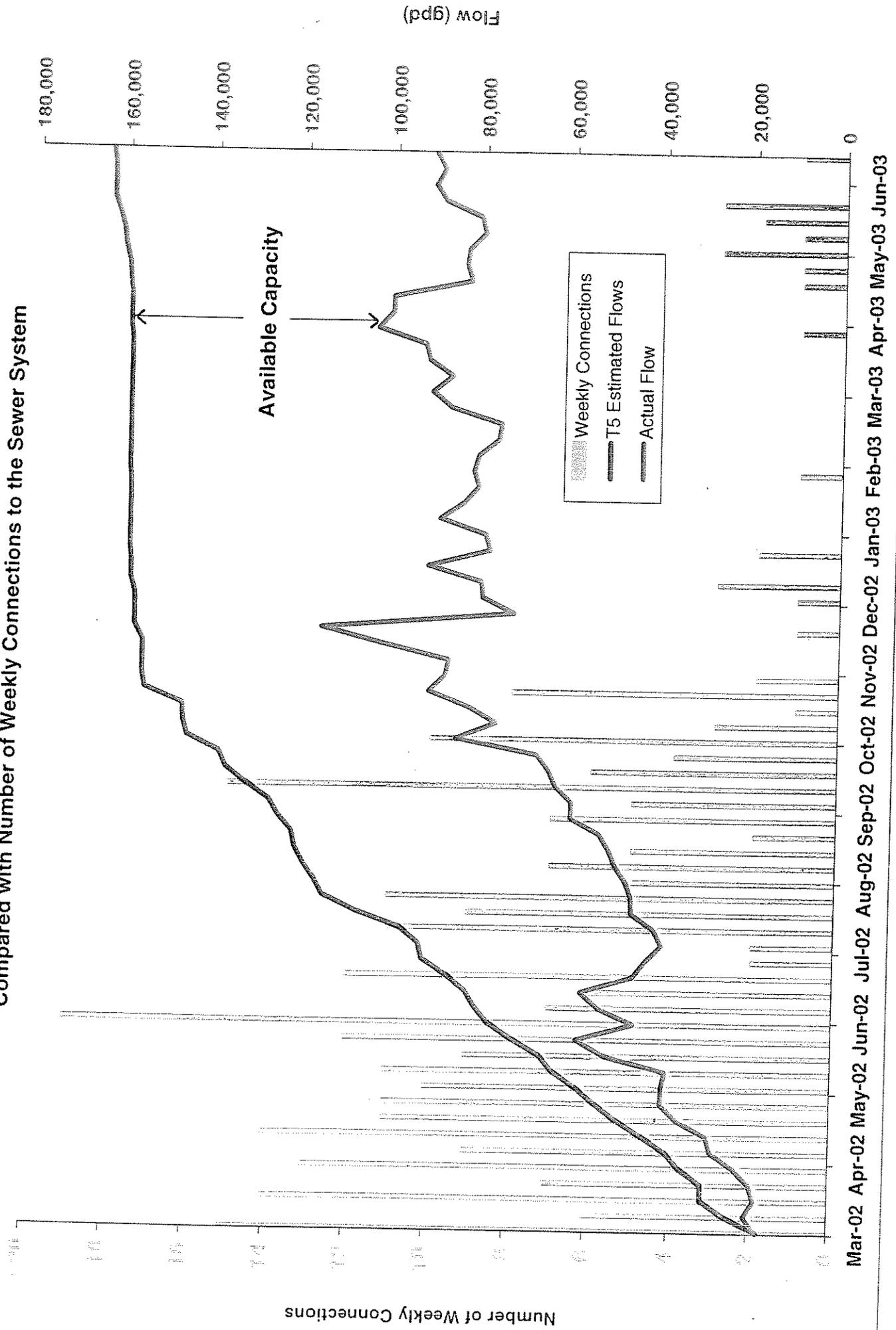
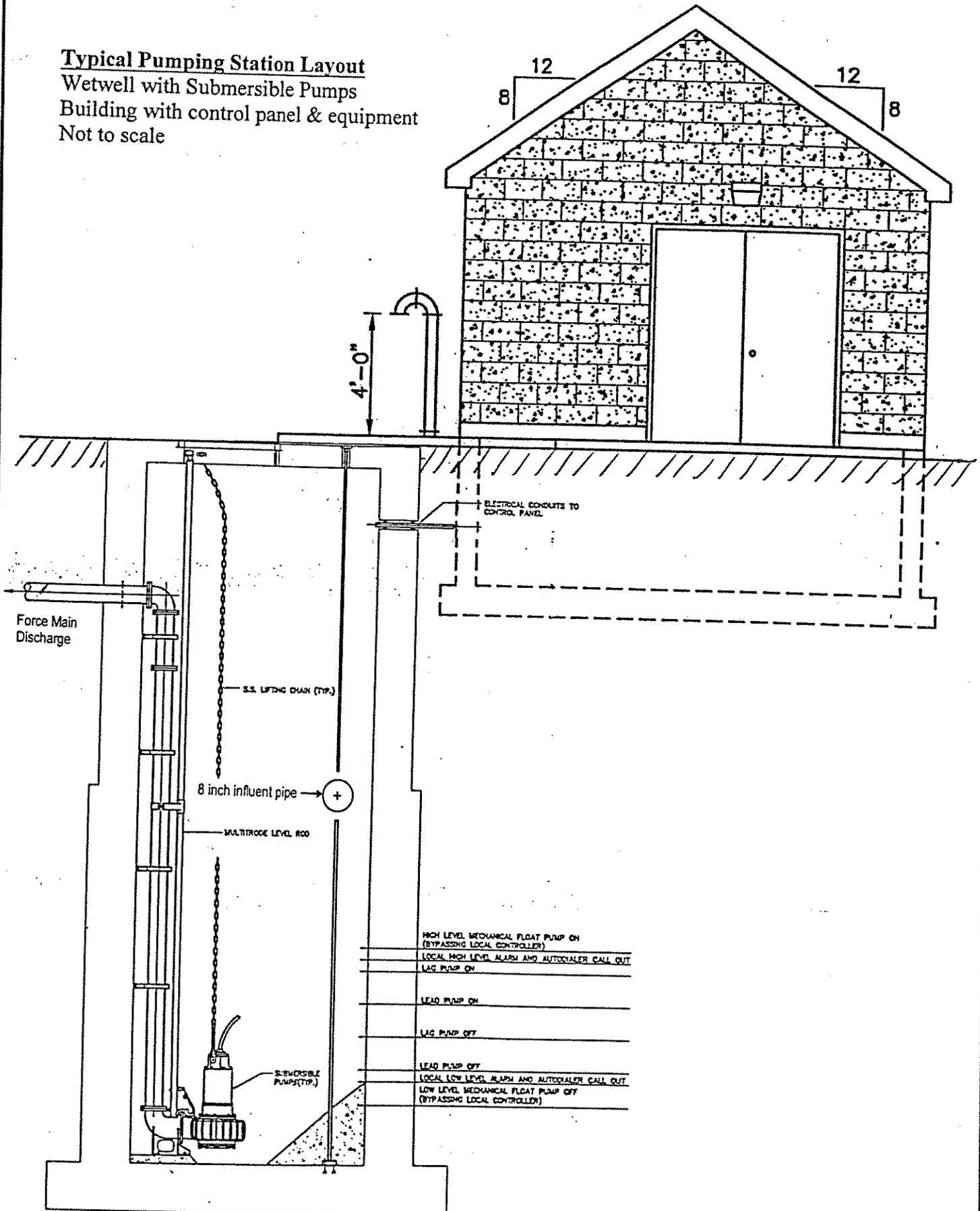
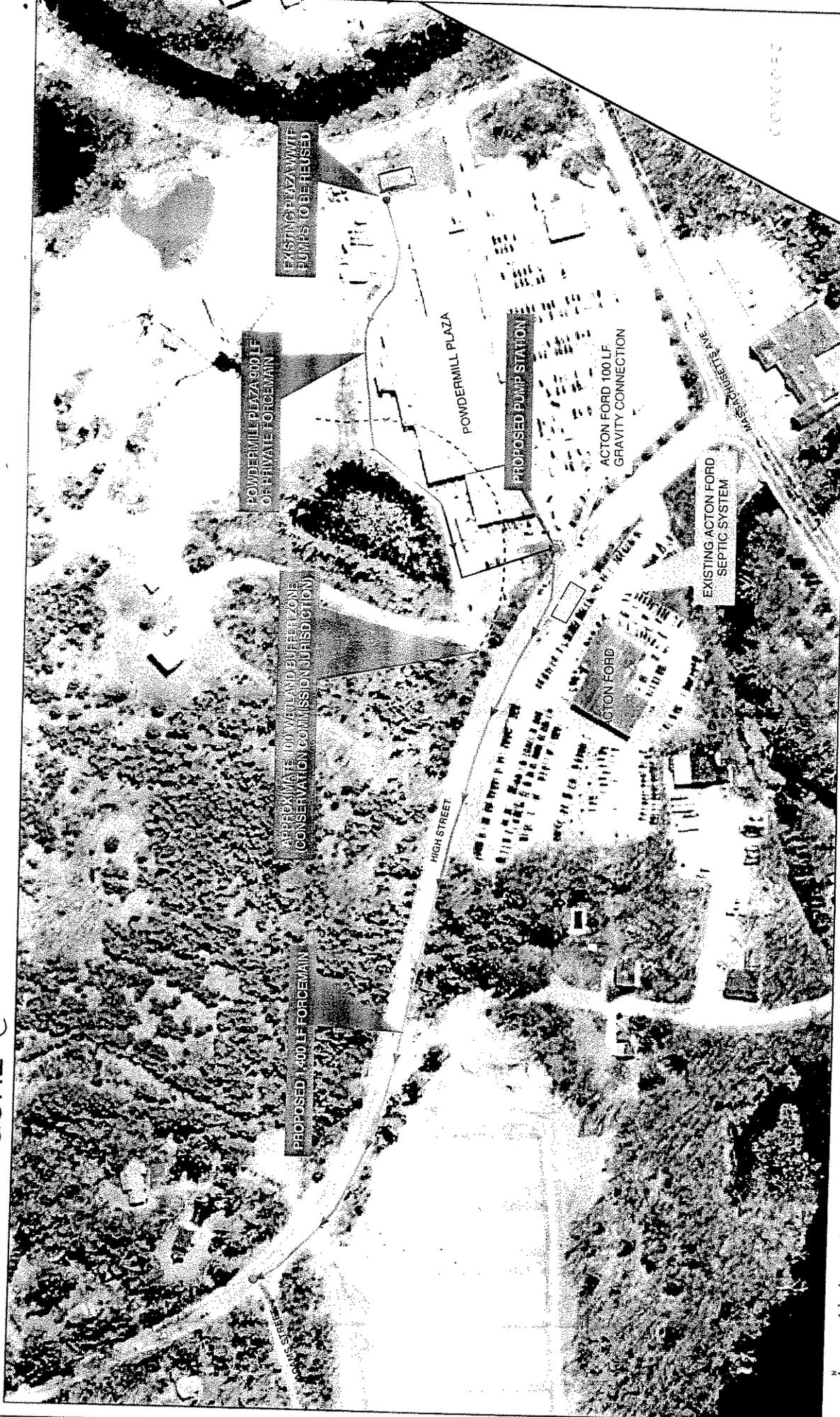


FIGURE B

**Typical Pumping Station Layout**  
 Wetwell with Submersible Pumps  
 Building with control panel & equipment  
 Not to scale



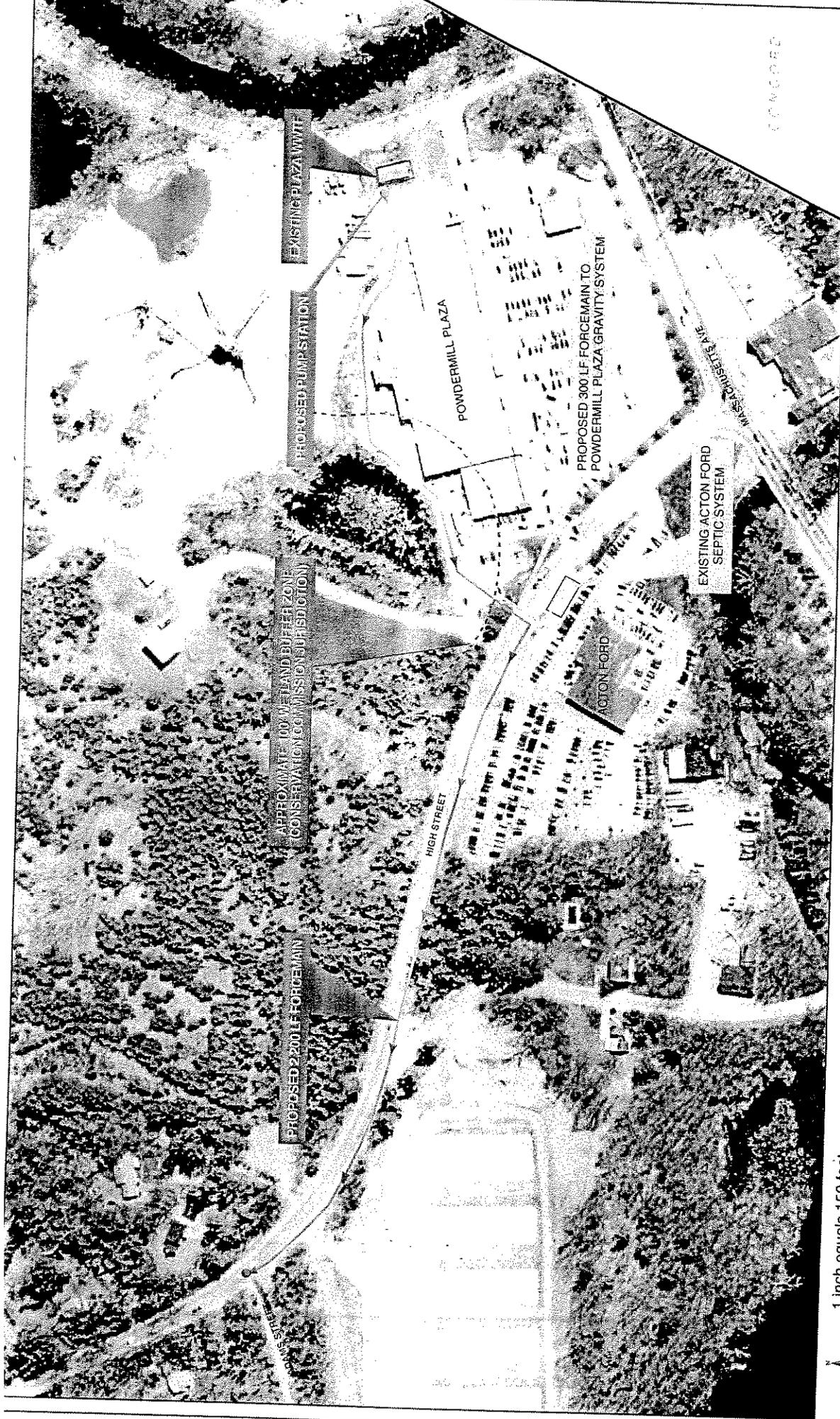


1 inch equals 150 feet



SOURCE OF DATA: MassGIS (Color Ortho Photo Date: April 2001), Woodward & Curran Inc.



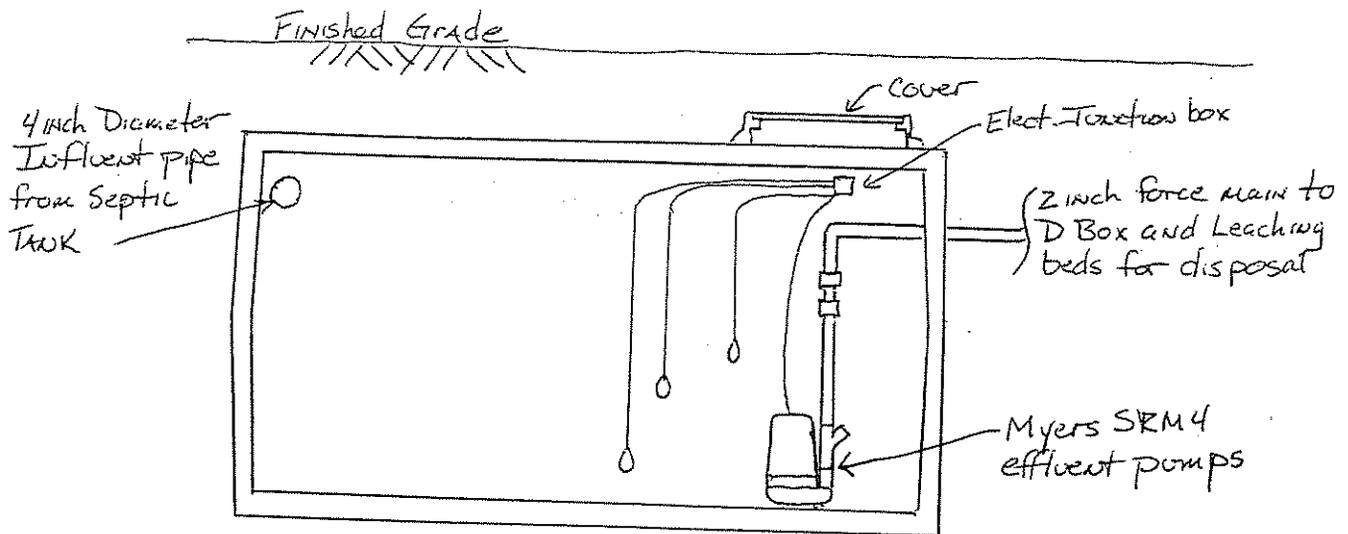


1 inch equals 150 feet



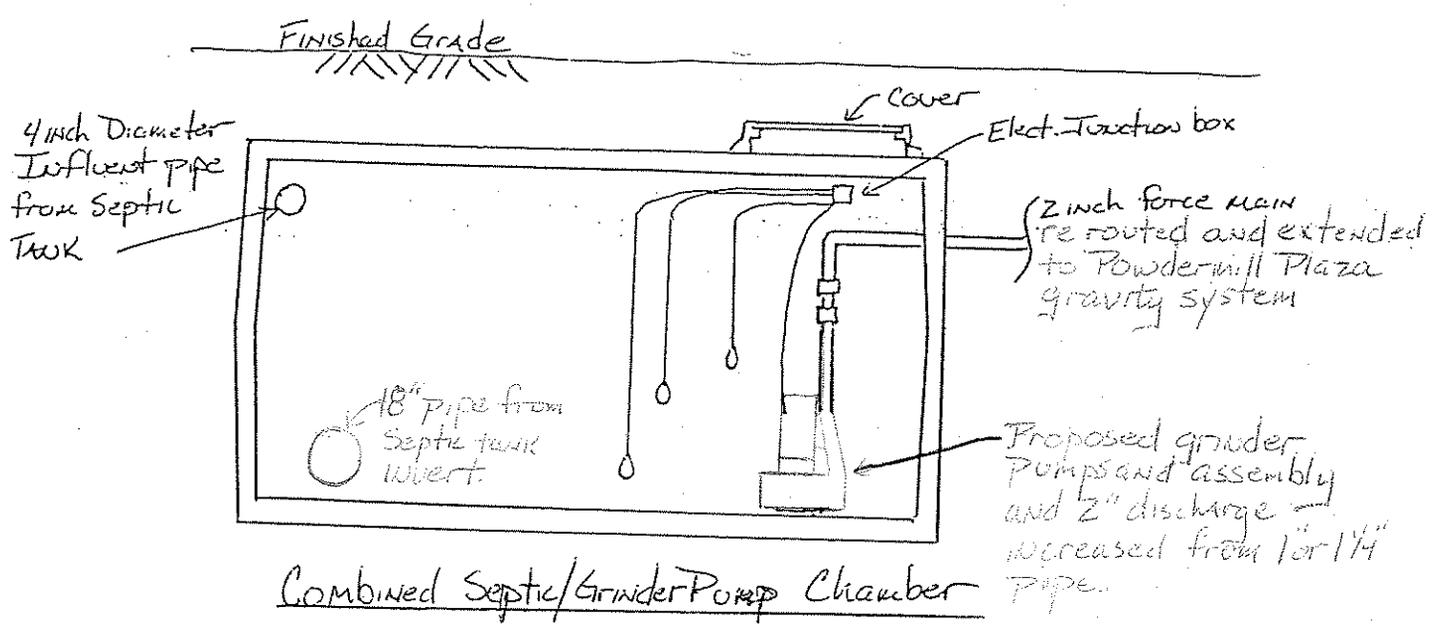
SOURCE OF DATA: MassGIS (Color Ortho Photo Date: April 2001), Woodard & Curran Inc.





Existing 1500 gallon Pump Chamber  
N.T.S.

Taken from Records on file at Board of Health.



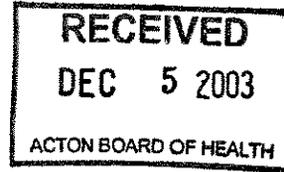
Combined Septic/Grinder Pump Chamber  
N.T.S.

FIGURE E



December 3, 2003

Mr. Douglas Halley  
Acton Board of Health  
472 Main Street  
Acton, MA 01720



**Re: Powdermill Plaza WWTP Sewer Connection**

Dear Mr. Halley:

In accordance with our agreement we have evaluated the costs for continued use of the Powdermill Plaza WWTP vs. connection to the Acton WWTP.

*1. Sewage Strength and Treatment Performance*

The Powdermill Plaza WWTP was constructed in the early 1980's and treats an average of 1,750 gpd to a maximum of 2,800 gpd from the shopping center. The plant discharges effluent to the Assabet River under its NPDES Permit. The Powdermill Plaza WWTP routinely has met the conditions of the discharge permit. There are no outstanding actions by DEP or EPA regarding treatment or operations. Issuance of a new discharge permit is on hold. In September 2003 Woodard and Curran, Inc. evaluated the means and impacts of connecting the sewage from Powdermill Plaza and Acton Ford into the Acton WWTP and found that these businesses would use only 5,000 gpd of the 65,000 gpd available remaining capacity (i.e. unreserved capacity) of the Acton WWTP. We have summarized the existing and future flows which will be treated and the results are shown in Table 1.

**Table 1 – Acton WWTP Existing and Future Average Flows**

<b>A. Existing Flows with schools in session</b>	
• Residential	74,000 gpd
• Commercial	10,000 gpd
• Schools	16,000 gpd
<b>Average Existing Flow</b>	<b>100,000 gpd</b>
<b>B. Future Reserved Flows</b>	
• Reserved for 368 users (almost all residential)	85,000 gpd
<b>Average Existing &amp; Future Reserved Flows</b>	<b>185,000 gpd</b>
<b>C. New Connections &amp; Unreserved Capacity</b>	
• WWTP Design Capacity	250,000 gpd
• Total Unreserved Capacity	65,000 gpd
• Powdermill Plaza & Acton Ford Connections	5,000 gpd
<b>Remaining Unreserved Capacity</b>	<b>60,000 gpd</b>

2. *Treatment Limits for Continued Discharge to Assabet River*

The existing and anticipated NPDES discharge permits for the continued discharge to the Assabet River from the Powdermill Plaza WWTP were discussed with Bryant Firman at DEP. It is anticipated that any future plant discharge will remain small compared with large discharges upstream and the location of the discharge is into the Assabet River in a segment of a rapid flow below the Prescott Dam. DEP accordingly felt that less stringent limits would likely be imposed for a new permit. The existing and anticipated limits are shown below in Table 2:

**Table 2 – Existing and Future Discharge Limits for Powdermill Plaza WWTP**

	Existing NPDES Permit	Anticipated NPDES Permit
Flow	12,000 gpd	5,000 gpd
BOD	30 mg/L	30 mg/L
Suspended Solids	30 mg/L	30 mg/L
Ammonia	No limit	No limit
Total Phosphorus	No limit	0.5 mg/L
Total Chlorine Residual	1.5 mg/L	1.5 mg/L
Copper	No limit	No limit

3. *Process Upgrade*

In order to meet the anticipated limits and to provide for continued reliable operation, and to provide for another 20 year design life, the process, tankage and structure will require upgrading. The existing Powdermill Plaza WWTP uses the activated sludge process to treat sewage to the existing limits and includes the following unit processes:

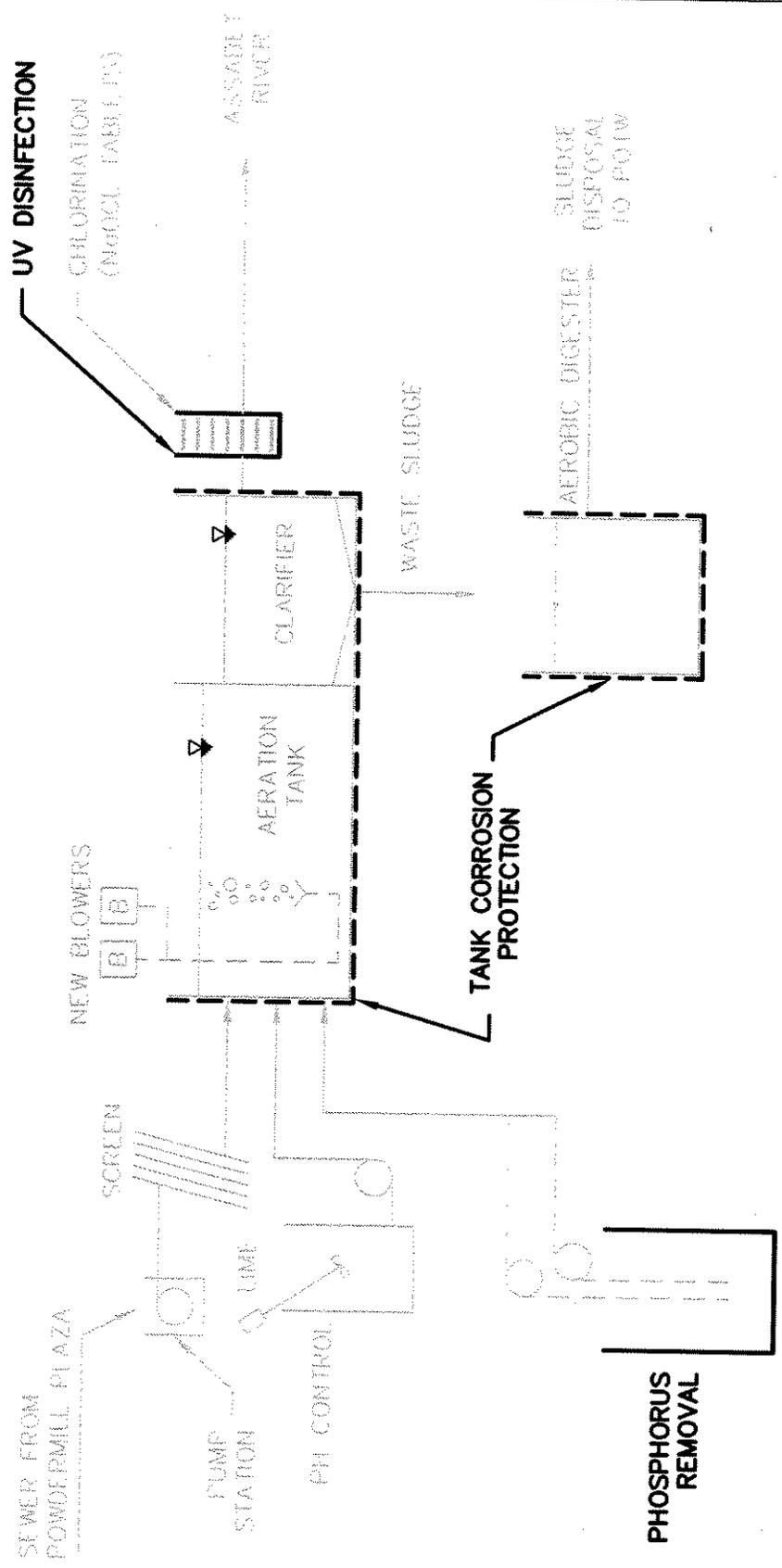
- Sewage pumping with submersible pumps
- Screening
- pH adjustment with lime slurry
- Aeration with fine bubble diffusers
- Secondary clarification
- Effluent disinfection with sodium hypochlorite tablets
- Aerobic sludge digestion

A schematic process diagram is shown on Figure 1.

The existing process is a steel package plant constructed in 1984± and designed for an average flow of 12,000 gpd. From a process standpoint and to comply with the anticipated permit only, phosphorous removal would need to be added. This is a relatively simple process in small plants and would be achieved by metering a metal salt solution of alum or ferrous sulfate into the aeration tank where the reaction to precipitate phosphorus from solution would occur. The precipitated phosphorus would then settle with suspended solids in the clarifier for removal as waste sludge. The chemical process would include two 55 gallon drums of metal salt solution, two metering pumps, piping and controls.

The existing chlorination process uses dissolution of sodium hypochlorite tablets to achieve disinfection of the effluent before discharge. The process is simple and would likely continue meeting the existing and anticipated total chlorine residual limit of 1.5 mg/L. We have seen a long term tightening of these limits for all plants discharging into surface water and for small plants discharging to groundwater. In these cases chlorination has been abandoned as a process choice in favor of ultraviolet light (UV) disinfection





**NOTE: UPGRADES ARE SHOWN BOLD**

**Dufresne-Henry**  
Westford, Massachusetts  
Tel. (978) 692-1913  
www.dufresne-henry.com

POWDERMILL PLAZA WWTP

**FIGURE 1  
PROCESS SCHEMATIC**

ACTON MASSACHUSETTS

Project No.	9130038.01
Proj. Mgr.	W.W.T.
Scale	NOT TO SCALE
Date	NOVEMBER 2003
A	SK1

used as there are no chemicals to handle and no chlorine residual toxicity occurs in the receiving waters. Considering that discharge permits have a history of becoming increasingly stringent and are issued every 5 years, we recommend substituting UV light disinfection for chlorination in the plant upgrade. The package UV system would include 2 – UV lights housed in a stainless steel channel structure and retrofitted into the outlet piping of the existing clarifier.

The treatment process does not have standby power for operation during outages. This is now normally required by DEP regulations and has been added in the process upgrade.

#### 4. *Corrosion Protection for Steel Tank*

The existing steel package plant is approximately 20 years old and was installed so that about 3/4s of the tank is buried leaving the top area above grade. The plant is housed in a concrete block building. Depth to groundwater is not known but based on observed standing water in adjacent drainage ditches and the relative closeness to the Assabet River we believe that the lower half of the tank lies below the groundwater table. Buried steel tanks in groundwater are subject to corrosion and sacrificial magnesium anodes were typically installed at construction to mitigate corrosion of the steel. The tanks are believed to be in sound condition but inspection is needed to confirm the soundness of the tank. If after inspection of both the interior and exterior surfaces little to no corrosion is evident, then one could presume that the steel tank could serve for treatment well into the future. However, the tank has not been dewatered for internal inspection since the mid 1980s when US Filter Corp. was retained to operate the plant and there is no space within the concrete block building to permit excavation of the tank to check for exterior corrosion. A corrosion specialist firm (Corr-Tech Inc. of Hopkinton, MA 508-435-0090) was contacted for advise on how to determine if corrosion has occurred in the tank in order to determine if, with proper corrosion protection, the tank could be used of another 20 years. The investigation would be done from inside a dewatered tank (possibly only the aerobic digester or clarifier) to avoid taking the aeration tank out of service. The measurements would include ultrasonic thickness measurements, visual inspection and cathodic protection testing and would be used to decide if corrosion protection would be appropriate. If the testing showed exterior corrosion then a cathodic protection system could be designed and installed but this would be problematic because of the building limiting access by excavation. If testing showed internal corrosion then coating or relining the tank would be used. It is not thought that corrosion would be so severe as to require outright abandonment of the tank.

#### 5. *Structure Upgrade*

The existing masonry block structure appears to be in fair condition. For the next 20 year design life we recommend that the roof shingles would need replacement.

We recommend constructing an addition to the north side of the building to house the process upgrade for phosphorus precipitation and provide a clean laboratory area by relocating the lime tank. See Figure 2.

#### 6. *Treatment Upgrade Cost Estimates*

Two options have been considered for upgrading the Powdermill Plaza WWTP to permit its continued operation. Woodard & Curran, Inc., in an earlier report evaluated the costs of options to connect the plaza and Acton Ford into the Acton WWTP. The options are for a 20 year design life using continued discharge into the Assabet River (Option 1) and a new plant with new leaching bed for groundwater discharge. The costs are summarized below and presented in Tables 3 and 4.

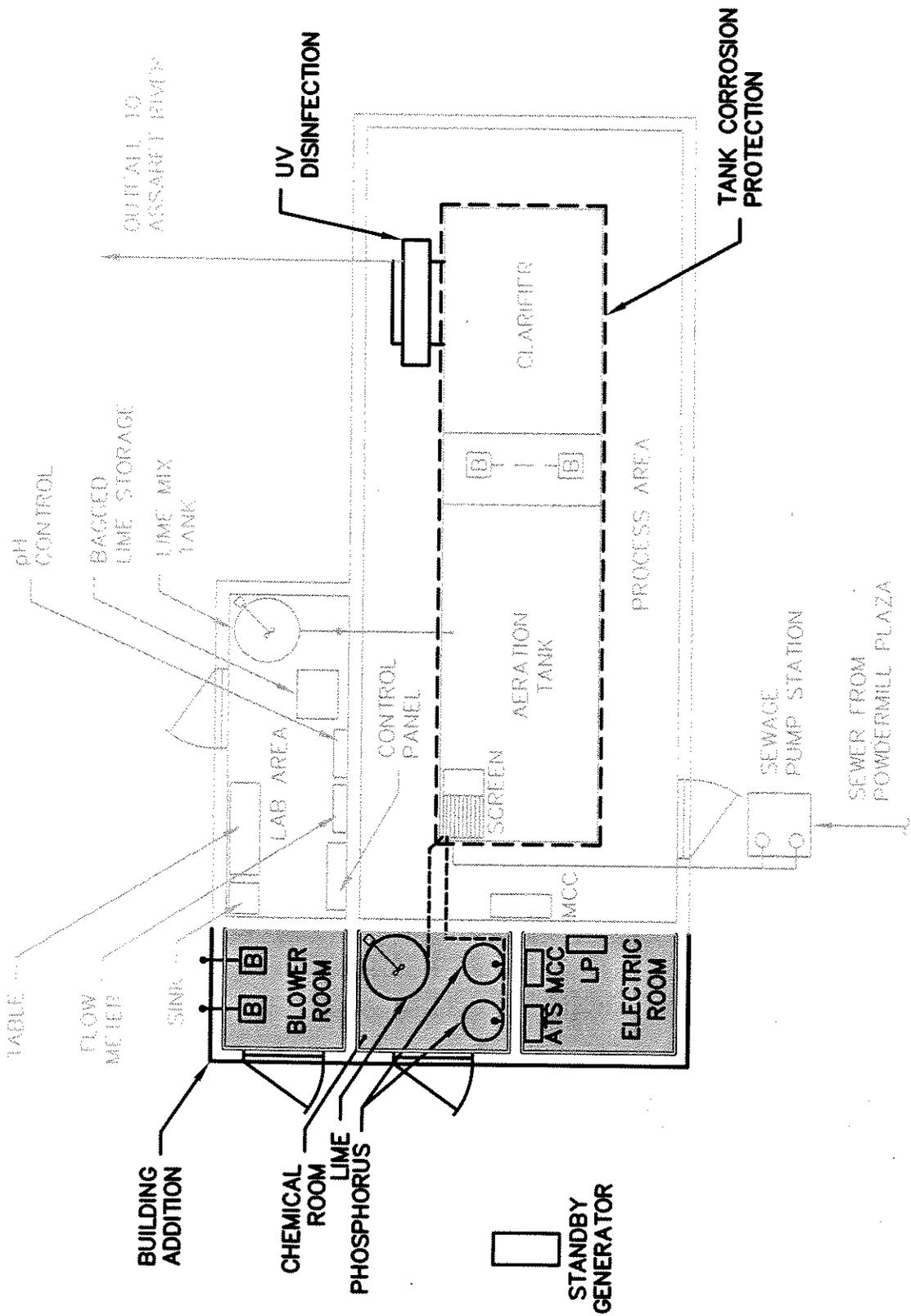
- Option 1 – WWTP upgrade with continued discharge to Assabet River. Estimated cost \$123,000
- Option 2 – New WWTP with groundwater discharge. Estimated cost \$475,000.

**Table 3 – Option 1 – WWTP Upgrade Cost Estimate**

<b>Building</b>	
<ul style="list-style-type: none"> <li>Chemical room addition 8' x 16' = 128 ft<sup>2</sup> @ \$150/ft<sup>2</sup></li> </ul>	\$ 19,200
<ul style="list-style-type: none"> <li>Replace roof shingles on existing building 18' x 40' = 720 ft<sup>2</sup> @ \$10/ft<sup>2</sup></li> </ul>	7,200
<ul style="list-style-type: none"> <li>Upgrade ventilation &amp; lighting in process area Inlet &amp; outlet louvers ≈ 1500 cfm Lighting improvements</li> </ul>	4,000 2,000
<b>Laboratory Area</b>	
<ul style="list-style-type: none"> <li>Relocate lime feed tank &amp; pump to new addition</li> </ul>	2,000
<b>Process Upgrade</b>	
<ul style="list-style-type: none"> <li>Phosphorus chemical feed tank &amp; pumps</li> </ul>	5,000
<ul style="list-style-type: none"> <li>New blowers &amp; relocate</li> </ul>	10,000
<ul style="list-style-type: none"> <li>Corrosion protection for tanks</li> </ul>	15,000
<ul style="list-style-type: none"> <li>Ultraviolet light disinfection</li> </ul>	8,000
<ul style="list-style-type: none"> <li>Standby power &amp; auto-transfer switch</li> </ul>	20,000
Sub-Total	\$ 92,400
Engineering and Contingency	30,600
<b>Option 1 – Upgrade Project Cost Estimate</b>	<b>\$123,000</b>

**Table 4 – Option 2 – New WWTP with Groundwater Discharge**

Process based on 2 stage FAST system for denitrification, phosphorus removal and buried infiltration beds.	
<ul style="list-style-type: none"> <li>Septic Tank 48 hour detention – 10,000 gal.</li> </ul>	\$ 20,000
<ul style="list-style-type: none"> <li>Flow equalization 24 hour detention – 5,000 gal dosing pumps</li> </ul>	20,000
<ul style="list-style-type: none"> <li>First stage FAST system and tank</li> </ul>	50,000
<ul style="list-style-type: none"> <li>Flow equalization 24 hour detention</li> </ul>	20,000
<ul style="list-style-type: none"> <li>Second stage FAST system and tank</li> </ul>	30,000
<ul style="list-style-type: none"> <li>UV disinfection &amp; flow meter</li> </ul>	12,000
<ul style="list-style-type: none"> <li>Leach trenches &amp; dosing pumps (Area = 10,000 ft<sup>2</sup>)</li> </ul>	100,000
<ul style="list-style-type: none"> <li>Precast process building</li> </ul>	25,000
<ul style="list-style-type: none"> <li>Site work &amp; piping</li> </ul>	40,000
<ul style="list-style-type: none"> <li>Site electrical</li> </ul>	40,000
Sub-Total	357,000
Engineering and Contingency	118,000
<b>Option 2 – New WWTP Project Cost Estimate</b>	<b>\$475,000</b>



**NOTE: UPGRADES ARE SHOWN BOLD**



ACTON		MASSACHUSETTS		POWDERMILL PLAZA WWTP	
<b>FIGURE 2 PROCESS UPGRADE FOR SURFACE DISCHARGE</b>					
Project No.		9130038.01			
Proj. Mgr.		W.W.T.			
Scale		NOT TO SCALE			
Date		NOVEMBER 2003			
A		SK1			

7. Betterments & User Charges

The project cost of the entire sewer system (collection, pump stations and WWTP) is \$25.1 million and of this \$8.1 million was the cost of the WWTP. This cost and cost of the sewers and pump stations (\$17.0 million) is to be recovered by betterments assessed to residential and commercial properties. While the final average betterment for residences has not yet been established, the Town has estimated the average betterment to be \$15,000/single family residence. While single family residences contribute or will contribute approximately 64% of the sewage flows residences account for 91.4% of the betterments. Commercial properties using 4% of the flow capacity account for 5.7% of the betterments. The reason for this non-equivalency is that municipal users, mostly schools, contribute 6% of the flow but are not assessed as betterments and these costs are paid as a tax levy. Hence, residences and commercial interests pay 100% of the costs associated with their flows.

Table 5 presents a proposed method of betterment allocation to recover the WWTP cost should Powdermill Plaza and Acton Ford connect to the plant. The allocation assumes that the future unreserved flow capacity of 60,000 gpd remains unused over the next 10 years and that only existing and known future properties would tie in and be assessed betterments. Should other unknown residential or commercial interests seek connections their betterment could be estimated in a similar manner.

**Table 5 – Betterments Allocation for Known Existing & Future Connections**

Allocations based on WWTP project cost to property owners = \$8,100,000.				
	FLOW (GPD)	FLOW (%)	ALLOCATED BETTERMENT (%)	BETTERMENT (SMILLION)
Existing Residential	74,000	30	42.5	\$ 3.46
Existing Commercial	10,000	4	5.7	0.41
Existing Schools	16,000	6	0	0
Future Residential	58,000	34	48.9	3.98
<b>Future Powdermill Plaza</b>	<b>4,000</b>	<b>0.16</b>	<b>2.3</b>	<b>0.20</b>
<b>Future Acton Ford</b>	<b>1,000</b>	<b>0.40</b>	<b>0.6</b>	<b>0.05</b>
Future Schools	0	0	0	0
Future Unreserved	60,000	24	0	0
	250,000	100	100	\$ 8.10

Using this cost model the recommended tie in fees for Powdermill Plaza and Acton Ford would be \$200,000 and \$50,000, respectively.

The annual sewer user charges were estimated from the water meter readings and the operating annual business days. See Table 6 below.

**Table 6 – Annual Sewer User Charges**

	AVERAGE FLOW	DAYS OF OPERATION	USER CHARGE*
Powdermill Plaza	1750 gpd	365 days	\$9,580/yr.
Acton Ford	650 gpd	300 days	\$2,920/yr.

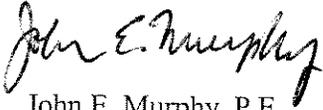
\* Based on unit charge of \$0.015/gallon.

The above presents one method of assessing the tie-in charges for Powdermill Plaza and Acton Ford. Do not hesitate to contact me to discuss the above or other approaches at your convenience.

Thank you for giving us the opportunity to serve the Town in this matter.

Sincerely,

DUFRESNE-HENRY, INC.



John E. Murphy, P.E.  
Associate